



**Building 11 Renovation  
Project #I50-35613**

**PROJECT MAUNAL**

**BID NUMBER: #17/18 MB5**

**MARIN COMMUNITY COLLEGE DISTRICT**

**September 20, 2017**

**Mandatory Conference/Site Walk: Monday, October 2, 2017 at  
11:00am**

**Location: 1800 Ignacio Blvd., Fiscal Services, Bldg. 8, Indian Valley  
Campus, Novato, CA 94949**

**Proposal Due Date and Time: Thursday, October 12, 2017 Received  
by 2:00pm**

**Location: 1800 Ignacio Blvd., Fiscal Services, Bldg. 8, Indian Valley  
Campus, Novato, CA 94949**

DOCUMENT 00 01 10

**TABLE OF CONTENTS**

Document 00 01 01	Project Title Page
Document 00 01 10	Table of Contents
Document 00 01 15	List of Drawings and Tables

**DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS**

Document 00 10 00	Notice to Bidders
Document 00 11 00	Instructions to Bidders
Document 00 31 07	Bid Question Form
Document 00 31 19	Existing Conditions
Document 00 41 13	Bid Form and Proposal
Document 00 43 13	Bid Bond
Document 00 43 36	Designated Subcontractors List
Document 00 45 01	Site Visit Certification
Document 00 45 19	Non-Collusion Declaration
Document 00 45 26	Workers' Compensation Certification
Document 00 45 46.03	Drug-Free Workplace Certification
Document 00 45 46.04	Tobacco-Free Environment Certification
Document 00 45 46.05	Hazardous Materials Certification
Document 00 45 46.06	Lead-Based Materials Certification
Document 00 45 46.07	Imported Materials Certification
Document 00 45 46.08	Sex Offender Registration Act Certification
Document 00 45 46.10	Roofing Project Certification
Document 00 45 46.11	Iran Contracting Act Certification
Document 00 45 90	Post Bid Interview
Document 00 51 00	Notice of Award
Document 00 53 00	Agreement
Document 00 55 00	Notice to Proceed
Document 00 57 00	Escrow Agreement in Lieu of Retention
Document 00 61 13.13	Performance Bond
Document 00 65 19.26	Agreement and Release of Any and All Claims
Document 00 65 36	Guarantee Form
Document 00 72 13	General Conditions
Document 00 73 13	Special Conditions
Document 00 73 56	Hazardous Materials Procedures and Requirements
Document 00 91 00	Prevailing Wage and Related Labor Requirements Certification

**DIVISION 01 – GENERAL REQUIREMENTS**

Document 01 11 00	Summary of Work
Document 01 22 00	Alternates and Unit Pricing
Document 01 25 13	Product Options and Substitutions
Document 01 26 00	Contract Modification Procedures
Document 01 31 19	Project Meetings
Document 01 33 00	Submittals
Document 01 35 13.23	Site Standards
Document 01 41 00	Regulatory Requirements
Document 01 42 13	Abbreviations and Acronyms

Document 01 42 16	Definitions
Document 01 42 19	References
Document 01 43 00	Materials and Equipment
Document 01 45 00	Quality Control
Document 01 50 00	Temporary Facilities and Controls
Document 01 50 13	Construction Waste Management and Disposal
Document 01 52 13	Field Offices
Document 01 64 00	Owner-Furnished Equipment
Document 01 66 00	Product Delivery, Storage and Handling
Document 01 71 23	Field Engineering
Document 01 73 29	Cutting and Patching
Document 01 76 00	Alteration Project Procedures
Document 01 77 00	Contract Closeout and Final Cleaning
Document 01 78 23	Operation and Maintenance Data
Document 01 78 36	Warranties
Document 01 78 39	Record Documents

END OF DOCUMENT TABLE OF CONTENTS FOR PROJECT MANUAL

**SPECIFICATION TABLE OF CONTENTS**

Section 02 40 00	Demolition (civil)
Section 02 41 16	Selective Demolition
Section 03 30 00	Cast-in Place Concrete
Section 03 54 00	Gypsum Cement Underlayment
Section 05 12 00	Structural Steel Framing
Section 05 40 00	Cold-Formed Metal Framing
Section 05 50 00	Metal Fabrications
Section 06 10 00	Rough Carpentry
Section 06 40 05	Exterior Finish Carpentry
Section 06 40 23	Architectural Woodwork
Section 07 21 00	Building Insulation
Section 07 25 00	Weather Barriers
Section 07 27 26	Fluid Applied Membrane Air Barriers
Section 07 31 13	Asphalt Shingles
Section 07 62 00	Sheet Metal Flashing and Trim
Section 07 92 00	Joint Sealants
Section 08 11 13	Hollow Metal Doors and Frames
Section 08 14 16	Flush Wood Doors
Section 08 31 13	Access Doors and Frames
Section 08 41 13	Interior Entrances and Glazing Systems
Section 08 51 14	Aluminum Windows
Section 08 71 00	Door Hardware
Section 08 80 00	Glazing
Section 09 22 16	Non-Structural Metal Framing
Section 09 29 00	Gypsum Board

Section 09 30 00	Tiling
Section 09 51 23	Acoustical Ceilings
Section 09 65 13	Resilient Base and Accessories
Section 09 68 16	Sheet Carpeting
Section 09 72 00	Wall Coverings
Section 09 83 00	Acoustic Finishes
Section 09 91 00	Painting and Coating
Section 10 22 33	Accordion Folding Partitions
Section 10 26 00	Wall and Door Partitions
Section 10 28 00	Toilet Accessories
Section 11 31 00	Appliances
Section 12 24 13	Roller Window Shades
Section 21 13 13	Fire Protection Systems
Section 22 05 00	Common Work Results for Plumbing
Section 22 05 19	Meters and Gages for Plumbing
Section 22 05 23	General Duty Valves and Specialties for Plumbing
Section 22 05 29	Hangers and Supports and Anchors for Plumbing Piping
Section 22 05 48	Vibration and Seismic Controls for Plumbing Piping and Equipment
Section 22 05 53	Identification for Plumbing Piping and Equipment
Section 22 05 90	Pressure Testing for Plumbing Systems
Section 22 05 93	Testing, Adjusting and Balancing for Plumbing
Section 22 07 00	Insulation for Plumbing
Section 22 21 13	Pipe and Pipe Fittings for Plumbing
Section 22 25 00	Plumbing Water Treatment
Section 22 30 00	Plumbing Equipment
Section 22 40 00	Plumbing Fixtures
Section 23 05 00	Common Work Results for HVAC
Section 23 05 14	Variable Frequency Drives for HVAC Equipment
Section 23 05 19	Meters and Gages for HVAC
Section 23 05 23	General Duty Valves and Specialties for HVAC
Section 23 05 29	Hangers, Supports and Anchors for HVAC
Section 23 05 48	Vibration and Seismic Controls for HVAC Piping and Equipment
Section 23 05 53	Identification of HVAC Piping and Equipment
Section 23 05 90	Pressure Testing for HVAC Systems
Section 23 05 93	Testing, Adjusting, and Balancing for HVAC
Section 23 07 00	Insulation for HVAC
Section 23 09 00	Instrumentation and Controls for HVAC
Section 23 31 00	HVAC Ducts and Casing-Low Pressure
Section 23 33 00	Air Duct Accessories
Section 23 34 00	HVAC Fans
Section 23 81 00	Decentralized Unitary HVAC Equipment
Section 26 05 00	Common Work Results for Electrical
Section 26 05 19	Low Voltage Electrical Power Conductors and Cables
Section 26 05 26	Grounding and Bonding for Electrical Systems
Section 26 05 29	Hangers and Supports for Electrical Systems
Section 26 05 33	Raceways and Boxes for Electrical Systems

Section 26 05 53	Identification for Electrical Systems
Section 26 05 73	Overcurrent Protective Device Coordination Study
Section 26 05 80	Electrical Testing
Section 26 08 00	Commissioning of Electrical Systems
Section 26 09 13	Electrical Power Monitoring and Control
Section 26 09 43	Network Lighting Controls
Section 26 24 16	Panelboards
Section 26 27 26	Wiring Devices
Section 26 29 00	Motor Controllers
Section 26 50 00	Lighting
Section 27 00 00	Communication Horizontal Cabling
Section 27 40 00	Audiovisual Systems
Section 27 51 26	Assistive Listening System
Section 28 10 00	Access Control
Section 28 20 00	Video Surveillance System
Section 31 10 00	Site Clearing
Section 31 23 33	Trenching and Backfilling
Section 32 11 23	Aggregate Base
Section 32 12 16	Asphaltic Concrete Paving
Section 32 17 23	Pavement Marking

**APPENDIX TO THE SPECIFICATIONS**

	Owner Performance Requirements
	Report No. 2 Acoustics and Noise Control
	Acoustic Partition Details
	Report No. 3 VFR Units Exterior Noise Control
A	Fabric Wrapped Panel Information
B	Low Pressure HVAC Systems Acoustic Requirements and Performance Criteria
C	Plumbing System Noise and Vibration Control
D	Sound Masking Design Guidelines and Performance Criteria
E	Operable Partition Acoustic Requirements and Design Guidelines
	Acoustics Product Data Sheets
	Lighting Cut Sheets
	Plumbing Cut Sheets
	Restroom Accessories Cut Sheets
	Door Hardware Cut Sheets

END OF SECTION TABLE OF CONTENTS FOR PROJECT MANUAL

## DOCUMENT 00 01 15

**LIST OF DRAWINGS AND TABLES**

## DRAWINGS

<u>Sheet number</u>	<u>Description</u>
G0.0	Title Sheet
G0.1	Project Information, General Notes
G0.2	Symbols, Legend, Plumbing Calcs
G1.0	Egress Analysis Plan – First Floor
G1.1	Egress Analysis Plan – Second Floor
G2.0	Accessible Path of Travel Plan
G3.0	Accessibility Details
G3.1	Accessibility Details
G3.2	Accessibility Details
G4.0	Cal-Green Checklist
G4.1	Cal-Green Checklist
G5.0	Title 24 Compliance Forms – Envelope
G5.1	Title 24 Compliance Forms – Envelope
C1.0	Site Utility Plan
C2.0	Site Accessibility Improvements
A1.0	Campus Accessibility Plan
A1.1	Proposed Site Plan
A1.2	Demolition Floor Plans
A1.3	Demolition Roof Plan
A2.1	First Floor Plan
A2.2	Second Floor Plan
A2.3	Roof Plan
A2.4	Finish and Signage Plans
A3.1	Building Elevations – South
A3.2	Building Elevations – East
A3.3	Building Elevations – North
A3.4	Building Elevations – West
A3.11	Building Sections
A3.12	Building Sections
A5.1	Interior Elevations
A5.2	Interior Elevations
A6.1	Reflected Ceiling Plan – First Floor
A6.2	Reflected Ceiling Plan – Second Floor Ceiling Level
A6.3	Reflected Ceiling Plan – Second Floor Beam Level
A7.1	Door, Window, and Storefront Schedule
A8.1	Exterior Details
A8.2	Exterior Details – Mech. Enclosure
A8.3	Trellis Details
A9.0	Interior Details
A9.1	Interior Details
A9.2	Interior Details
A9.3	Interior Details – Ceiling

A9.4	Interior Details – Ceiling
A9.5	Interior Details – Ceiling
A9.6	Interior Details – Ceiling
A9.7	Interior Details
A9.8	Interior Details
A9.9	Interior Details – Acoustic
A9.10	Interior Details – Millwork
A9.11	Details – Interior Doors and Storefront
A9.20	Elevator Plans and Sections
A9.21	Elevator Details
S1.1	General Notes, Symbols and Abbreviations
S2.1	Framing Plans
S3.1	Framing Elevations
S3.2	Framing Elevations
S4.1	Details
M001	Symbols, Legends and Abbreviations – Mechanical
M002	Equipment Schedule Mechanical
M003	Equipment Schedule Mechanical
M004	Title 24 Documentation – Mechanical
M005	Title 24 Documentation – Mechanical
M006	Title 24 Documentation – Mechanical
M007	CalGreen Documentation – Mechanical
M101	Demo First Floor Plan – Mechanical
M102	Demo Second Floor Plan – Mechanical
M103	Demo Roof Plan – Mechanical
M201	First Floor Plan – Mechanical
M202	Second Floor Plan – Mechanical
M203	Roof Plan – Mechanical
M501	Details – Mechanical
M502	Details – Mechanical
M601	Flow Diagrams Mechanical
M701	Control Diagrams Mechanical
E001	Symbols, Legends and Abbreviations – Electrical
E002	Luminaire Schedule – Electrical
E003	M&E Coordination Schedule – Electrical
E010	Site Plan – Electrical
E201	First Floor Plan Lighting
E202	Second Floor Plan Lighting
E203	Second Floor Top of Beam Plan Lighting
E301	First Floor Plan – Power
E302	Second Floor Plan – Power
E601	Details – Electrical
E602	Details – Electrical
E603	Details – Electrical
E701	Single – Line Diagram Electrical
E801	Panel Schedules – Electrical
E802	Panel Schedules – Electrical
E901	Title 24 Compliance Forms – Electrical
E902	Title 24 Compliance Forms – Electrical
E903	Title 24 Compliance Forms – Electrical

E904	Title 24 Compliance Forms – Electrical
E905	Title 24 Compliance Forms – Electrical
P001	Symbols, Legends and Abbreviations Plumbing
P002	Equipment Schedule Plumbing
P003	Title 24 Documentation Plumbing
P100	Demo Underground Plan – Plumbing
P101	Demo First Floor Plan – Plumbing
P102	Demo Second Floor Plan – Plumbing
P200	Underground Plans Plumbing
P201	First Floor Plans Plumbing
P202	Second Floor Plans Plumbing
P501	Details – Plumbing
T0.00	Tel-Com Plan Cover Page
T3.01	Tel-Com First Floor Plan
T3.02	Tel-Com Second Floor Plan
T4.00	Tel-Com A/V Functional Diagrams & Details
T5.00	Tel-Com Plan Details
FP-1	Site Plan
FP-2	1 <sup>st</sup> Floor Reflected Ceiling Plan
FP-3	1 <sup>st</sup> Floor Piping Plan
FP-4	2 <sup>nd</sup> Floor Reflected Ceiling Plan
FP-5	2 <sup>nd</sup> Floor Piping Plan
FP-6	Building Section and Bracing Details
FA-001	Cover Sheet
FA-002	General Information
FA-100	Site Plan
FA-101	Device Placement Plan – 1 <sup>st</sup> Floor
FA-102	Device Placement Plan – 2 <sup>nd</sup> Floor
FA-201	Riser Details
FA-501	Panel Detail
FA-502	FAC Panel Detail
FA-601	Calculations and Schedules
FA-701	Wiring Typical
FA-702	Wiring Typical
FA-703	Wiring Typical
FA-704	Wiring Typical

TABLES

None

END OF DOCUMENT



DOCUMENT 00 10 00

**NOTICE TO BIDDERS**

1. Notice is hereby given that the governing board ("Board") of the Marin Community College District ("District") will receive sealed bids for the following project, Bid No. 17/18 MB5 ("Project" or "Contract"):

**Project: I50-35613 - BUILDING 11 RENOVATION**

2. The Project consists of:

Interior renovation of an existing 1970's two-story building with an approx. 6400 sf. ft. renovation area comprising mainly of the entire second floor and partial scope of the 1<sup>st</sup> floor. The newly renovated area will house the campus Human Resource Department administrative offices. The existing building structure is composed of deep pile concrete columns, glue laminated beams, floor joists and roof rafters. An existing elevator and interior stairwell will remain. The renovation scope of work includes the following:

1<sup>st</sup> Floor:

- New mechanical, lighting, fire alarm and fire protection design
- New ceiling finishes
- New accessible drinking fountain
- Reconfigure existing restrooms
- Replacement of all exterior windows

2<sup>nd</sup> Floor:

- New office layout
- New mechanical electrical, lighting, plumbing, fire alarm, fire protection, security, audio and visual systems
- Two single-stall unisex restroom
- Small kitchenette/workroom
- Replacement of all exterior windows
- Addition of new window openings
- Interior storefront for offices and meeting rooms
- Add batt wall insulation and interior wall finish at existing exterior walls
- Addition of skylight
- Replace existing roof membrane and insulation above existing roof deck

General:

- New exterior trellis slats
- New sidewalk repair and replacement
- New VFR system, pad and utility hook up to serve Bldg. 11 and space to add additional VFR for future connection to Admin. cluster bldgs.
- New sitework for fire protection system

3. To bid on this Project, the Bidder is required to possess one or more of the following State of California Contractor Licenses:

**A or B**

The Bidder's license(s) must remain active and in good standing throughout the term of the Contract.

4. To bid on this Project, the Bidder is required to be registered as a public works contractor with the Department of Industrial Relations. The Bidder's registration must remain active throughout the term of the Contract.
5. Contract Documents are available on September 20, 2017, for review at the District Fiscal Services Office. In addition, Contract Documents are available for bidders' review at the following builders' exchanges:
  - A. Marin Builders Exchange
  - B. North Coast Builders Exchange
  - C. District Fiscal Services Website: <http://fiscal.marin.edu/bids>
6. Contract Documents are also available for purchase for One Hundred dollars (\$100) at the District Fiscal Services Office. This fee is refundable if the Contract Documents are returned in clean condition back to the District Facilities Office no later than ten (10) calendar days after the date of the bid opening.
7. Sealed Bids will be received until **2:00p.m., Thursday October 12, 2017**, at the Marin Community College District Indian Valley Campus, District Fiscal Services Office, Bldg. 8, 1800 Ignacio Blvd., Novato, California, 94949, at or after which time the bids will be opened and publicly read aloud. Any bid that is submitted after this time shall be non-responsive and returned to the bidder. Any claim by a bidder of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code.
8. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.
9. A bid bond by an admitted surety insurer on the form provided by the District, cash, or a cashier's check or a certified check, drawn to the order of the Marin Community College District, in the amount of ten percent (10%) of the total bid price, shall accompany the Bid Form and Proposal, as a guarantee that the Bidder will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.
10. A mandatory pre-bid conference and site visit will be held on **Monday October 2, 2017, at 11:00 a.m.** at Marin Community College District Indian Valley Campus, District Fiscal Services Office, Bldg. 8, 1800 Ignacio Blvd., Novato, California, 94949. All participants are required to sign in. The site visit is expected to take approximately 1 hour. Failure to attend or tardiness will render bid ineligible.

11. The successful Bidder shall be required to furnish a 100% Performance Bond and a 100% Payment Bond if it is awarded the contract for the Work.
12. The successful Bidder may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.
13. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <<http://www.dir.ca.gov>>.
14. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and subject to the requirements of Title 8 of the California Code of Regulations. The Contractor and all Subcontractors under the Contractor shall furnish electronic certified payroll records directly to the Labor Commissioner weekly or within ten (10) days of any request by the District or the Labor Commissioner. The successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, of the Labor Code.
15. The District's Board has found and determined that the following item(s) shall be used on this Project based on the purpose(s) indicated. (Public Contract Code section 3400(c)): A particular material, product, thing, or service is designated by specific brand or trade name for the following purpose(s):
  - (1) In order to match other products in use on a particular public improvement either completed or in the course of completion:
    - Secureall electronic lock door hardware
    - Schlage for hard keyed locks
    - Primex Clocks
    - Delta Controls for Energy Management System (EMS)
    - Simplex Fire Alarm Systems
    - Honeywell Notifier Alarm Control Panel
    - Rain Bird sprinklers, timers and control systems for irrigation

16. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on:
  - A. The base bid amount only.
  
17. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District awards the Contract, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

END OF DOCUMENT

DOCUMENT 00 11 00

**INSTRUCTIONS TO BIDDERS**

Contractors shall follow the instructions in this document, and shall submit all documents, forms, and information required for consideration of a Bid.

Marin Community College District ("District") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to District, Bidder's bid may be rejected at the sole discretion of District.

1. Bids are requested for a general construction contract, or work described in general, for the following project ("Project" or "Contract"):

**I50-35613 - Building 11 Renovation**

2. District will receive sealed Bids from Bidders as stipulated in the Notice to Bidders.
3. Bidders must submit Bids on the Bid Form and Proposal and all other required District forms. Bids not submitted on the District's required forms shall be deemed non-responsive and shall not be considered. Additional sheets required to fully respond to requested information are permissible.
4. Bidders must supply all information required by each Bid Document. Bids must be full and complete. District reserves the right in its sole discretion to reject any Bid as non-responsive as a result of any error or omission in the Bid. Bidders must complete and submit all of the following documents with the Bid Form and Proposal:
  - a. Bid form and proposal
  - b. Bid Bond on the District's form or other security.
  - c. Designated Subcontractors List.
  - d. Site-Visit Certification
  - e. Non-collusion Declaration.
  - f. Iran Contracting Act Certification, if contract value is \$1,000,000 or more.

All information or responses of a Bidder in its Bid Proposal and other documents accompanying the Bid Proposal shall be complete, accurate and true. Incomplete, inaccurate or untrue responses or information provided therein by a Bidder shall be grounds for the District to reject such Bidder's Bid Proposal for non-responsiveness.

5. Bidders must submit with their Bids cash, a cashier's check or a certified check payable to District, or a bid bond by an admitted surety insurer of not less than ten percent (10%) of amount of base Bid, plus all additive alternates. If Bidder chooses to provide a Bid Bond as security, Bidder must use the required form of corporate surety provided by District. The Surety on Bidder's Bid Bond must be an insurer admitted in the State of California and authorized to issue surety bonds in the State of California. Bids submitted without necessary bid security will be deemed non-responsive and will not be considered.

7. If Bidder to whom Contract is awarded fails or neglects to enter into Contract and submit required bonds, insurance certificates, and all other required documents, within **SEVEN (7)** calendar days after the date of the Notice of Award, District may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by District as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of District, and may thereupon award the Contract for the Work to the responsible Bidder submitting the next lowest Bid Proposal or may reject all bids and call for new bids, in its sole and exclusive discretion. It is agreed that calculation of damages District may suffer as a result of Bidder's failure to enter into the Contract would be extremely difficult and impractical to determine and that the amount of the Bidder's required bid security shall be the agreed and conclusively presumed amount of damages.
8. Bidders must submit with the Bid the Designated Subcontractors List for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total Bid. All of the listed subcontractors are required to be registered as a public works contractor with the Department of Industrial Relations. The subcontractor's registration must remain active throughout the term of the Contract. Failure to submit this list when required by law shall result in Bid being deemed non-responsive and the Bid will not be considered.
  - a. An inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.
  - b. An inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:
    - (1) The subcontractor is registered prior to the bid opening.
    - (2) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.
    - (3) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
9. If a mandatory pre-bid conference and site visit ("Site Visit") is requested as referenced in the Notice to Bidders, then Bidders must submit the Site-Visit Certification with their Bid. District will transmit to all prospective Bidders of record such Addenda as District in its discretion considers necessary in response to questions arising at the Site Visit. Oral statements shall not be relied upon and will not be binding or legally effective. Addenda issued by the District as a result of the Site Visit, if any, shall constitute the sole and exclusive record and statement of the results of the Site Visit.

10. Bidders shall submit the Noncollusion Declaration with their Bids. Bids submitted without the Noncollusion Declaration shall be deemed non-responsive and will not be considered.
11. Bids shall be clearly written without erasure or deletions. District reserves the right to reject any Bid containing erasures or deletions.
12. Bidders shall not modify the Bid Form and Proposal or qualify their Bids. Bidders shall not submit to the District a scanned, re-typed, word-processed, or otherwise recreated version of the Bid Form and Proposal or other District-provided document.
13. The Bidder and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, are available upon request at the District's principal office. Prevailing wage rates are also available on the internet at <http://www.dir.ca.gov>.
14. Submission of Bid signifies careful examination of Contract Documents and complete understanding of the nature, extent, and location of Work to be performed. Bidders must complete the tasks listed below as a condition to bidding, and submission of a Bid shall constitute the Bidder's express representation to District that Bidder has fully completed the following:
  - a. Bidder has visited the Site, if required, and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions and federal, state and local laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto;
  - b. Bidder has conducted or obtained and has understood all examinations, investigations, explorations, tests, reports, and studies that pertain to the subsurface conditions, as-built conditions, underground facilities, and all other physical conditions at or contiguous to the Site or otherwise that may affect the cost, progress, performance, or furnishing of Work, as Bidder considers necessary for the performance or furnishing of Work at the Contract Sum, within the Contract Time, and in accordance with the other terms and conditions of Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigations,

explorations, tests, reports, studies, or similar information or data are or will be required by Bidder for such purposes;

- c. Bidder has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents;
- d. Bidder has given the District prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and the actual conditions, and the written resolution thereof by the District is acceptable to Bidder;
- e. Bidder has made a complete disclosure in writing to the District of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any representative of the District or other officer or employee of the District presently has or will have in this Contract or in the performance thereof or in any portion of the profits thereof;
- f. Bidder must, prior to bidding, perform the work, investigations, research, and analysis required by this document and that Bidder represented in its Bid Form and Proposal and the Agreement that it performed prior to bidding. Contractor under this Contract is charged with all information and knowledge that a reasonable bidder would ascertain from having performed this required work, investigation, research, and analysis. Bid prices must include entire cost of all work "incidental" to completion of the Work.
- g. Conditions Shown on the Contract Documents: Information as to underground conditions, as-built conditions, or other conditions or obstructions, indicated in the Contract Documents, e.g., on Drawings or in Specifications, has been obtained with reasonable care, and has been recorded in good faith. However, District only warrants, and Contractor may only rely, on the accuracy of limited types of information.
  - (1) As to above-ground conditions or as-built conditions shown or indicated in the Contract Documents, there is no warranty, express or implied, or any representation express or implied, that such information is correctly shown or indicated. This information is verifiable by independent investigation and Contractor is required to make such verification as a condition to bidding. In submitting its Bid, Contractor shall rely on the results of its own independent investigation. In submitting its Bid, Contractor shall not rely on District-supplied information regarding above-ground conditions or as-built conditions.
  - (2) As to any subsurface condition shown or indicated in the Contract Documents, Contractor may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual reported soil types, actual reported water conditions, or actual obstructions shown or indicated. District is not responsible for the completeness of such information for bidding or construction; nor is



District responsible in any way for any conclusions or opinions of Contractor drawn from such information; nor is the District responsible for subsurface conditions that are not specifically shown (for example, District is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).

- h. Conditions Shown in Reports and Drawings Supplied for Informational Purposes: Reference is made to the document entitled Geotechnical Data, and the document entitled Existing Conditions, for identification of:
- (1) Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Architect in preparing the Contract Documents; and
  - (2) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that has been utilized by Architect in preparing the Contract Documents.
  - (3) These reports and drawings are **not** Contract Documents and, except for any "technical" data regarding subsurface conditions specifically identified in Geotechnical Data and Existing Conditions, and underground facilities data, Contractor may not in any manner rely on the information in these reports and drawings. Subject to the foregoing, Contractor must make its own independent investigation of all conditions affecting the Work and must not rely on information provided by District.
15. Bidders may examine any available "as-built" drawings of previous work by giving District reasonable advance notice. District will not be responsible for accuracy of "as-built" drawings. The document entitled Existing Conditions applies to all supplied "as-built" drawings.
16. All questions about the meaning or intent of the Contract Documents are to be directed in writing to the District. Interpretations or clarifications considered necessary by the District in response to such questions will be issued in writing by Addenda emailed, faxed, mailed, or delivered to all parties recorded by the District as having received the Contract Documents. Questions received less than **THREE (3)** calendar days prior to the date for opening Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
17. Addenda may also be issued to modify other parts of the Contract Documents as deemed advisable by the District.
18. Each Bidder must acknowledge each Addendum in its Bid Form and Proposal by number or its Bid shall be considered non-responsive. Each Addendum shall be part of the Contract Documents. A complete listing of Addenda may be secured from the District.

19. Bids shall be based on products and systems specified in Contract Documents or listed by name in Addenda. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Bidder may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified. The District is not responsible and/or liable in any way for a Contractor's damages and/or claims related, in any way, to that Contractor's basing its bid on any requested substitution that the District has not approved. Contractors and materials suppliers who submit requests for substitutions prior to the award of the Contract must do so in writing and in compliance with Public Contract Code section 3400. All requests must comply with the following:
  - a. District must receive any request for substitution a minimum of **TEN (10)** calendar days prior to bid opening.
  - b. Within 35 days after the date of the Notice of Award, the Successful Bidder shall submit data substantiating a request for substitution containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the Specifications. Insufficient information shall be grounds for rejection of substitution.
  - c. Approved substitutions, if any, shall be listed in Addenda. District reserves the right not to act upon submittals of substitutions until after bid opening.
  - d. Substitutions may be requested after Contract has been awarded only if indicated in and in accordance with requirements specified in the Special Conditions and the Specifications.
20. All Bids must be sealed, and marked with name and address of the Bidder and the Project Number, Bid number, Bid package, and time of bid opening. Bids will be received as indicated in the Notice to Bidders.
  - a. Mark envelopes with the name of the Project.
  - b. Bids must be submitted to the **District Buyer Office, College of Marin Indian Valley Campus, 1800 Ignacio Blvd., Building 8 in AS Room 130, Novato, California, 94949** by date and time shown in the Notice to Bidders.
  - c. Bids must contain all documents as required herein.
21. Bids will be opened at or after the time indicated for receipt of bids.
22. This Contract may include alternates. Alternates are defined as alternate products, materials, equipment, systems, methods, or major elements of the construction that may, at the District's option and under terms established in the Contract and pursuant to section 20103.8 of the Public Contract Code, be selected for the Work.

23. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the criteria as indicated in the Notice to Bidders. In the event two or more responsible bidders submit identical bids, the District shall select the Bidder to whom to award the Contract by lot.
24. Time for Completion: District may issue a Notice to Proceed within **THREE (3)** months from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.
- a. In the event that the District desires to postpone issuing the Notice to Proceed beyond this 3-month period, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed.
  - b. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed beyond a 3-month period. If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to the Contractor, the Contractor may terminate the Contract. Contractor's termination due to a postponement beyond this 3-month period shall be by written notice to District within **TEN (10)** calendar days after receipt by Contractor of District's notice of postponement.
  - c. It is further understood by the Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the District had in writing authorized Contractor to perform prior to issuing a Notice to Proceed.
  - d. Should the Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.
25. The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7<sup>th</sup>)** calendar day following the date of the Notice of Award. Failure to properly and timely submit these documents entitles District to reject the bid as non-responsive.
- a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.
  - b. Escrow of Bid Documentation: This must include all required documentation. See the document Escrow of Bid Documentation for more information.
  - c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

- d. Payment Bond (100%) (Contractor's Labor and Material Bond): On the form provided in the Contract Documents and fully executed as indicated on the form.
  - e. Insurance Certificates and Endorsements as required.
  - f. Workers' Compensation Certification.
  - g. Prevailing Wage and Related Labor Requirements Certification.
  - h. Drug-Free Workplace Certification.
  - i. Tobacco-Free Environment Certification.
  - j. Hazardous Materials Certification.
  - k. Lead-Based Paint Certification.
  - l. Imported Materials Certification.
  - m. Sex Offender Registration Act Certification
  - n. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.
  - o. Iran Contracting Act Certification. **[IF APPLICABLE]**
26. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the District, before 5:00 p.m. of the **FOURTH (4<sup>TH</sup>)** calendar day following bid opening.
- a. Only a Bidder who has actually submitted a bid, and who could be awarded the Contract if the bid protest is upheld, is eligible to submit a bid protest. Subcontractors are not eligible to submit bid protests. A Bidder may not rely on the bid protest submitted by another Bidder.
  - b. A bid protest must contain a complete statement of any and all bases for the protest and all supporting documentation. Materials submitted after the bid protest deadline will not be considered.
  - c. The protest must refer to the specific portions of all documents that form the basis for the protest.
    - (1) Without limitation to other bases for protest, an inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

- (2) Without limitation to other bases for protest, an inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:
    - (i) The subcontractor is registered prior to the bid opening.
    - (ii) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.
    - (iii) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
  - d. The protest must include the name, address and telephone number of the person representing the protesting party.
  - e. The party filing the protest must concurrently transmit a copy of the protest and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
  - f. The procedure and time limits set forth in this paragraph are mandatory and are each bidder's sole and exclusive remedy in the event of bid protest. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.
27. The bid proposals and other documents responding to the bid become the exclusive property of the District upon submittal to the District. At such time as the District issues the Notice of Intent to award the Contract pursuant to the Instructions for Bidders, all bid proposals and other documents submitted in response to the bid become a matter of public record and shall thereupon be considered public records, except for information contained in such bid proposals deemed to be Trade Secrets (as defined in California Civil Code §3426.1) and information provided in response to the District's Pre-Qualification Questionnaire, if applicable. A bidder that indiscriminately marks all or most of its bid proposal as exempt from disclosure as a public record, whether by the notations of "Trade Secret," "Confidential," "Proprietary," or otherwise, may result in render the bid proposal non-responsive and rejected. The District shall not be liable or responsible for the disclosure of such records, including those exempt from disclosure if disclosure is deemed required by law, by an order of a Court of competent jurisdiction, or which occurs through inadvertence, mistake or negligence on the part of the District or its officers, employees or agents. At such time as bid proposals are deemed a matter of public record, pursuant to the above, any bidder or other party shall be afforded access for inspection and/or copying of such bid proposals, by request made to the District in conformity with the California Access to Public Records Act, California Government Code §§6250 - 6270. If the District is required to defend or otherwise respond to any action or proceeding wherein request is made for the disclosure of the contents of

any portion of a bid proposal deemed exempt from disclosure hereunder, the bidder submitting the materials sought by such action or proceeding agrees to defend, indemnify and hold harmless the District in any action or proceeding from and against any liability, including without limitation attorneys' fees arising therefrom. The party submitting materials sought by any other party shall be solely responsible for the cost and defense in any action or proceeding seeking to compel disclosure of such materials; the District's sole involvement in any such action shall be that of a stakeholder, retaining the requested materials until otherwise ordered or directed by a court of competent jurisdiction.

28. District reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, non-responsive, unbalanced, or conditional bids, to re-bid, and to reject the bid of any bidder if District believes that it would not be in the best interest of the District to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by District. District also reserves the right to waive inconsequential deviations not involving price, time, or changes in the Work. For purposes of this paragraph, an "unbalanced bid" is one having nominal prices for some work items and/or enhanced prices for other work items.
29. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of numerals or figures.
30. Prior to the award of Contract, District reserves the right to consider the responsibility of the Bidder. District may conduct investigations as District deems necessary to assist in the evaluation of any bid and to establish the responsibility, including, without limitation, qualifications and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to District's satisfaction within the prescribed time.

END OF DOCUMENT



**Last Date and Time questions can be received is**  
**Date: 10/5/2017 Time: 3:00 P.M.**

To: Marin Community College District 1800 Ignacio Blvd Novato, CA 94949	
Attention: <b>Daniel Park</b>	Email : <a href="mailto:dpark@gilbaneco.com">dpark@gilbaneco.com</a> Cc: <a href="mailto:mramirez@marin.edu">mramirez@marin.edu</a>

**Bid Package #17/18 – MB5**  
**Building 11 Renovation - #150-35613**

**Bid Question**

From : Company _____ Attention: _____	Date: _____	Re: _____
Reference Drawing No. _____ Reference Detail(s) : _____	Reference Spec. Section _____ Reference Paragraph(s) : _____	
Question:		

**Answer:**

Answered By: _____	Date: _____
Firm: _____	

Question Included in Addendum No. _____ to Bid Package No. _____	By: _____ Date: _____
------------------------------------------------------------------	-----------------------

DOCUMENT 00 31 19

**EXISTING CONDITIONS**

**1. Summary**

This document describes existing conditions at or near the Project, and use of information available regarding existing conditions. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

**2. Reports and Information on Existing Conditions**

- a. Documents providing a general description of the Site and conditions of the Work may have been collected by Marin Community College District ("District"), its consultants, contractors, and tenants. These documents may include previous contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, and information regarding underground facilities.
- b. Information regarding existing conditions may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports, documents, and other information are **not** part of the Contract Documents.
- c. Information regarding existing conditions may also be included in the Project Manual, but shall **not** be considered part of the Contract Documents.
- d. Prior to commencing this Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey.
- e. Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.
- f. The reports and other data or information regarding existing conditions and underground facilities at or contiguous to the Project are the following:
  - (1) Original Construction Drawings.

**3. Use of Information**

- a. Information regarding existing conditions was obtained only for use of District and its consultants, contractors, and tenants for planning and design and is **not** part of the Contract Documents.



- b. District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any information regarding existing conditions. Bidder represents and agrees that in submitting a bid it is not relying on any information regarding existing conditions supplied by District.
- c. Under no circumstances shall District be deemed to warrant or represent existing above-ground conditions, as-built conditions, or other actual conditions, verifiable by independent investigation. These conditions are verifiable by Contractor by the performance of its own independent investigation that Contractor must perform as a condition to bidding and Contractor should not and shall not rely on this information or any other information supplied by District regarding existing conditions.
- d. Any information shown or indicated in the reports and other data supplied herein with respect to existing underground facilities at or contiguous to the Project may be based upon information and data furnished to District by the District's employees and/or consultants or builders of such underground facilities or others. District does not assume responsibility for the completeness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information.
- e. District shall be responsible only for the general accuracy of information regarding underground facilities, and only for those underground facilities that are owned by District, and only where Bidder has conducted the independent investigation required of it pursuant to the Instructions to Bidders, and discrepancies are not apparent.

#### **4. Investigations/Site Examinations**

- a. Before submitting a Bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.
- b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 41 13

**BID FORM AND PROPOSAL**

To: Governing Board of Marin Community College District ("District" or "Owner")

From: \_\_\_\_\_  
(Proper Name of Bidder)

The undersigned declares that the Contract Documents including, without limitation, the Notice to Bidders and the Instructions to Bidders have been read and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of Bid No. 17/18MB5.

PROJECT: **150-35613 - BUILDING 11 RENOVATION**

("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:

<p style="text-align: right; margin: 0;">_____ dollars      \$ _____</p>
<b>BASE BID</b>

1. **Allowance.** The Bidder's Base Bid and each alternate shall include a ten percent (10%) allowance for unforeseen items.

The above allowance shall only be allocated for unforeseen items relating to the Work. Contractor shall not bill for or be due any portion of this allowance unless the District has identified specific work, Contractor has submitted a price for that work or the District has proposed a price for that work, the District has accepted the cost for that work, and the District has prepared a change order incorporating that work. Contractor hereby authorizes the District to execute a unilateral deductive change order at or near the end of the Project for all or any portion of the allowance not allocated.

2. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) is described in the Contract Documents, and that each Bidder who is awarded a contract shall be in fact a prime contractor, not a subcontractor, to the District, and agrees that its Proposal, if accepted by the District, will be the basis for the Bidder to enter into a contract with the District in accordance with the intent of the Contract Documents.
3. The undersigned has notified the District in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract

Documents, and has contacted the Construction Manager before bid date to verify the issuance of any clarifying Addenda.

4. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.
5. The liquidated damages clause of the General Conditions and Agreement is hereby acknowledged.
6. It is understood that the District reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.
7. The following documents are attached hereto:
  - Bid Bond on the District's form or other security
  - Designated Subcontractors List
  - Site-Visit Certification
  - Noncollusion Declaration
  - Iran Contracting Act Certification **[IF CONTRACT VALUE IS \$1,000,000 OR MORE]**

8. Receipt and acceptance of the following addenda is hereby acknowledged:

No.____, Dated _____	No.____, Dated _____
No.____, Dated _____	No.____, Dated _____
No.____, Dated _____	No.____, Dated _____

9. Bidder acknowledges that the license required for performance of the Work is a **A** or **B** license.
10. The undersigned hereby certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.
11. Bidder specifically acknowledges and understands that if it is awarded the Contract, Bidder will execute and deliver to the District within seven (7) calendar days after notification of award of the Contract the following documents: (a) the Agreement; (b) Certificates of Insurance evidencing all insurance coverages required under the Contract Documents; (c) the Performance Bond; (d) the Labor and Material Payment Bond; (e) the Certificate of Workers' Compensation Insurance; (f) the Letter of Assent; and (g) the certifications listed in Section 28 of the Instructions to Bidders. Failure of the Bidder awarded the Contract to strictly comply with the preceding may

result in the District's rescission of the award of the Contract and forfeiture of the Bidder's Bid Security. In such event, the District may, in its sole and exclusive discretion elect to award the Contract to the responsible Bidder submitting the next lowest Bid Proposal, or to reject all Bid Proposals. In addition, Bidder acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with all requirements of the Department of Industrial Relations [and with all requirements of the Project Stabilization Agreement].

12. The Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work that may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.
13. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.
14. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Cal. Gov. Code, §12650 et seq.), the District will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.
15. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents and registered as a public works contractor with the Department of Industrial Relations. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

Furthermore, Bidder hereby certifies to the District that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_

Name of Bidder \_\_\_\_\_

Type of Organization \_\_\_\_\_

Signed by \_\_\_\_\_

Title of Signer \_\_\_\_\_

Address of Bidder \_\_\_\_\_

Taxpayer's Identification No. of Bidder \_\_\_\_\_

Telephone Number \_\_\_\_\_

Fax Number \_\_\_\_\_

E-mail \_\_\_\_\_ Web page \_\_\_\_\_

Contractor's License No(s): No.: \_\_\_\_\_ Class: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

No.: \_\_\_\_\_ Class: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

No.: \_\_\_\_\_ Class: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

Public Works Contractor Registration No.: \_\_\_\_\_

If Bidder is a corporation, affix corporate seal.

Name of Corporation: \_\_\_\_\_

President: \_\_\_\_\_

Secretary: \_\_\_\_\_

Treasurer: \_\_\_\_\_

Manager: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 43 13

**BID BOND**

**(Note: If Bidder is providing a bid bond as its bid security, Bidder must use this form, NOT a surety company form.)**

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned, as \_\_\_\_\_ as Principal ("Principal"),  
and \_\_\_\_\_ as Surety ("Surety"),  
a corporation organized and existing under and by virtue of the laws of the State of  
California and authorized to do business as a surety in the State of California, are held and  
firmly bound unto the Marin Community College District ("District") of County, State of  
California as Obligee, in the sum of

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

lawful money of the United States of America, for the payment of which sum well and truly  
to be made, we, and each of us, bind ourselves, our heirs, executors, administrators,  
successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a  
bid to the District for all Work specifically described in the accompanying bid;

NOW, THEREFORE, if the Principal is awarded the Contract and, within the time and manner  
required under the Contract Documents, after the prescribed forms are presented to  
Principal for signature, enters into a written contract, in the prescribed form in accordance  
with the bid, and files two bonds, one guaranteeing faithful performance and the other  
guaranteeing payment for labor and materials as required by law, and meets all other  
conditions to the contract between the Principal and the Obligee becoming effective, or if  
the Principal shall fully reimburse and save harmless the Obligee from any damage  
sustained by the Obligee through failure of the Principal to enter into the written contract  
and to file the required performance and labor and material bonds, and to meet all other  
conditions to the Contract between the Principal and the Obligee becoming effective, then  
this obligation shall be null and void; otherwise, it shall be and remain in full force and  
effect. The full payment of the sum stated above shall be due immediately if Principal fails  
to execute the Contract within seven (7) days of the date of the District's Notice of Award to  
Principal.

Surety, for value received, hereby stipulates and agrees that no change, extension of time,  
alteration or addition to the terms of the Contract or the call for bids, or to the work to be  
performed thereunder, or the specifications accompanying the same, shall in any way affect  
its obligation under this bond, and it does hereby waive notice of any such change,  
extension of time, alteration or addition to the terms of the Contract or the call for bids, or  
to the work, or to the specifications.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorneys' fee to be fixed by the Court.

If the District awards the bid, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above named, on the \_\_\_\_\_ day of \_\_\_\_\_, 2017.

(Affix Corporate Seal)

\_\_\_\_\_  
Principal

\_\_\_\_\_  
By

(Affix Corporate Seal)

\_\_\_\_\_  
Surety

\_\_\_\_\_  
By

\_\_\_\_\_  
Name of California Agent of Surety

\_\_\_\_\_  
Address of California Agent of Surety

\_\_\_\_\_  
Telephone Number of California Agent of Surety

**Bidder must attach Power of Attorney and Certificate of Authority for Surety and a Notarial Acknowledgment for all Surety's signatures. The California Department of Insurance must authorize the Surety to be an admitted Surety Insurer.**

**END OF DOCUMENT**



DOCUMENT 00 43 36

**DESIGNATED SUBCONTRACTORS LIST**  
(TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID)

PROJECT: **I50-35613 - BUILDING 11 RENOVATION**

Bidder acknowledges and agrees that under Public Contract Code section 4100, et seq., it must clearly set forth below the name, location and California contractor license number of each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the Work or who will specially fabricate and install a portion of the Work according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent (0.5%) of Bidder’s total Bid and the kind of Work that each will perform. Vendors or suppliers of materials only do not need to be listed.

Bidder acknowledges and agrees that under Public Contract Code section 4100, et seq., if Bidder fails to list as to any portion of Work, or if Bidder lists more than one subcontractor to perform the same portion of Work, Bidder must perform that portion itself or be subjected to penalty under applicable law. In case more than one subcontractor is named for the same kind of Work, state the portion of the kind of Work that each subcontractor will perform.

If alternate bids are called for and Bidder intends to use subcontractors different from or in addition to those subcontractors listed for work under the base Bid, Bidder must list subcontractors that will perform Work in an amount in excess of one half of one percent (0.5%) of Bidder’s total Bid, including alternates.

If further space is required for the list of proposed subcontractors, attach additional sheets showing the required information, as indicated below.

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractor Name:** \_\_\_\_\_

CA Cont. Lic. #: \_\_\_\_\_ Location: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

Date: \_\_\_\_\_

Proper Name of Bidder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 01

**SITE VISIT CERTIFICATION**

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID  
IF SITE VISIT WAS MANDATORY

PROJECT: **I50-35613 - BUILDING 11 RENOVATION**

Check option that applies:

\_\_\_\_\_ I certify that I visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the Work under contract.

\_\_\_\_\_ I certify that \_\_\_\_\_ (Bidder's representative) visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. The Bidder's representative fully understood the facilities, difficulties, and restrictions attending the execution of the Work under contract.

Bidder fully indemnifies the Marin Community College School District, its Architect, its Engineer, its Construction Manager, and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit and/or the Bidder's representative's visit to the Site.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: \_\_\_\_\_

Proper Name of Bidder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 19

**NON-COLLUSION DECLARATION  
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID  
Public Contract Code Section 7106**

The undersigned declares:

I am the \_\_\_\_\_ of \_\_\_\_\_, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_ [date], at \_\_\_\_\_ [city], \_\_\_\_\_ [state].

Date: \_\_\_\_\_

Proper Name of Bidder: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 26

**WORKERS' COMPENSATION CERTIFICATION**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

Labor Code section 3700, in relevant part, provides:

Every employer except the State shall secure the payment of compensation in one or more of the following ways:

- a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state; and/or
- b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work of this Contract.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

(In accordance with Article Labor Code sections 1860 and 1861, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)

END OF DOCUMENT

DOCUMENT 00 45 46.03

**DRUG-FREE WORKPLACE CERTIFICATION**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

This Drug-Free Workplace Certification form is required from the successful Bidder pursuant to Government Code section 8350 et seq., the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract or grant for the procurement of any property or service from any state agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract or grant awarded by a state agency may be subject to suspension of payments or termination of the contract or grant, and the contractor or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred.

The District is not a "state agency" as defined in the applicable section(s) of the Government Code, but the District is a local agency and public school district under California law and requires all contractors on District projects to comply with the provisions and requirements of Government Code section 8350 et seq., the Drug-Free Workplace Act of 1990.

Contractor shall certify that it will provide a drug-free workplace by doing all of the following:

- a. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the person's or organization's workplace and specifying actions which will be taken against employees for violations of the prohibition.
- b. Establishing a drug-free awareness program to inform employees about all of the following:
  - (1) The dangers of drug abuse in the workplace.
  - (2) The person's or organization's policy of maintaining a drug-free workplace.
  - (3) The availability of drug counseling, rehabilitation, and employee-assistance programs.
  - (4) The penalties that may be imposed upon employees for drug abuse violations.
- c. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required above, and that, as a condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

I, the undersigned, agree to fulfill the terms and requirements of Government Code section 8355 listed above and will publish a statement notifying employees concerning (a) the

prohibition of controlled substance at the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the Contract be given a copy of the statement required by section 8355(a), and requiring that the employee agree to abide by the terms of that statement.

I also understand that if the District determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of section 8355, that the Contract awarded herein is subject to termination, suspension of payments, or both. I further understand that, should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of the aforementioned Act.

I acknowledge that I am aware of the provisions of Government Code section 8350 et seq. and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 46.04

**TOBACCO-FREE ENVIRONMENT CERTIFICATION**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

This Tobacco-Free Environment Certification form is required from the successful Bidder.

Pursuant to, without limitation, 20 U.S.C section 6083, Labor Code section 6400 et seq., Health & Safety Code section 104350 et seq. and District Board Policies, all District sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school owned vehicles and vehicles owned by others while on District property.

I acknowledge that I am aware of the District's policy regarding tobacco-free environments at District sites, including the Project site and hereby certify that I will adhere to the requirements of that policy and not permit any of my firm's employees, agents, subcontractors, or my firm's subcontractors' employees or agents to use tobacco and/or smoke on the Project site.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT



DOCUMENT 00 45 46.05

**HAZARDOUS MATERIALS CERTIFICATION**

PROJECT/CONTRACT NO.: **I50-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

1. Contractor hereby certifies that no Asbestos, or Asbestos-Containing Materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations ("New Hazardous Material"), shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Contractor's work on the Project for District.
2. Contractor further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.
3. Asbestos and/or asbestos-containing material shall be defined as all items containing fibrous forms of various hydrated minerals, but not limited to chrysotile, crocidolite, amosite, fibrous tremolite, fibrous anthophyllite, and fibrous actinolite. Any or all material containing greater than one-tenth of one percent (0.1%) asbestos by weight shall be defined as asbestos-containing material.
4. Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the District's determination. The costs of any such tests shall be paid by Contractor if the material is found to be New Hazardous Material.
5. All Work or materials found to be New Hazardous Material or Work or material installed with equipment containing "New Hazardous Material" will be immediately rejected and this Work will be removed at Contractor's expense at no additional cost to the District.
6. Contractor has read and understood the document Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 46.06

**LEAD-BASED MATERIALS CERTIFICATION**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

- (1) Contractor's work may disturb lead-containing building materials.
- (2) Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.
- (3) Contractor shall comply with the Renovation, Repair and Painting Rule, if lead-based paint is disturbed in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

**1. Lead as a Health Hazard**

Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure, much lower than previously believed, lead can impair the development of a child's central nervous system, causing learning disabilities, and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburse when paint chips, chalks, peels, wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child's hands and toys and then into a child's mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.

Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.

Because the Contractor and its employees will be providing services for the District, and because the Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.

**2. Overview of California Law**

Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools. (Ed. Code, § 32241.)

Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers. (Ed. Code, § 32243, subd. (b).) Moreover, lead-based paint, lead plumbing, and solders, or other potential sources of lead contamination, shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility. (Ed. Code, § 32244.)

Both the Federal Occupational Safety and Health Administration ("Fed/OSHA") and the California Division of Occupational Safety and Health ("Cal/OSHA") have implemented safety orders applicable to all construction work where a contractor's employee may be occupationally exposed to lead.

The OSHA Regulations apply to all construction work where a contractor's employee may be occupationally exposed to lead. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to that regulation. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. It includes, but is not limited to, the following:

- a. Demolition or salvage of structures where lead or materials containing lead are present;
- b. Removal or encapsulation of materials containing lead;
- c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- d. Installation of products containing lead;
- e. Lead contamination/emergency cleanup;
- f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and
- g. Maintenance operations associated with the construction activities described in the subsection.

Because it is assumed by the District that all painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that the Contractor, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (including title 8, California Code of Regulations, section 1532.1).

**Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.**

**3. Renovation, Repair and Painting Rule, Section 402(c)(3) of the Toxic Substances Control Act**

The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

The RRP requirements apply to all contractors who disturb lead-based paint in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a home constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

**4. Contractor's Liability**

If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, the Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of the Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the District.

The Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Contractor.

THE CONTRACTOR HEREBY ACKNOWLEDGES, UNDER PENALTY OF PERJURY, THAT IT:

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON THE OWNER'S PROPERTY;
2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL, OF LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 46.07

**IMPORTED MATERIALS CERTIFICATION**

PROJECT/CONTRACT NO.: **I50-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

This form shall be executed by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site. All Fill shall satisfy all requirements of any environmental review of the Project performed pursuant to the statutes and guidelines of the California Environmental Quality Act, section 21000 et seq. of the Public Resources Code ("CEQA"), and all requirements of section 17210 et seq. of the Education Code, including requirements for a Phase I environmental assessment acceptable to the State of California Department of Education and Department of Toxic Substances Control.

To the furthest extent permitted by California law, the indemnification provisions in the Contract Documents apply to, without limitation, any claim(s) connected with providing, delivering, and/or supplying Fill.

Certification of:     Delivery Firm/Transporter     Supplier     Manufacturer  
                           Wholesaler                                    Broker                                    Retailer  
                           Distributor                                    Other \_\_\_\_\_

Type of Entity     Corporation                                    General Partnership  
                           Limited Partnership                            Limited Liability Company  
                           Sole Proprietorship                            Other \_\_\_\_\_

Name of firm ("Firm"): \_\_\_\_\_

Mailing address: \_\_\_\_\_

Addresses of branch office used for this Project: \_\_\_\_\_

If subsidiary, name and address of parent company: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

By my signature below, I hereby certify that I am aware of section 25260 of the Health and Safety Code and the sections referenced therein regarding the definition of hazardous material. I further certify on behalf of the Firm that all soils, aggregates, or related materials provided, delivered, and/or supplied or that will be provided, delivered, and/or supplied by this Firm to the Project Site are free of any and all hazardous material as defined in section 25260 of the Health and Safety Code. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: \_\_\_\_\_

Proper Name of Firm: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 46.08

**SEX OFFENDER REGISTRATION ACT CERTIFICATION**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between the Marin Community College District ("District") and \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

- Penal Code section 290.01 requires every person required to register pursuant to sections 290 to 290.009, inclusive, of the Sex Offender Registration Act who is carrying on a vocation at the community college for more than fourteen (14) days, or for an aggregate period exceeding thirty (30) days in a calendar year, shall, in addition to the registration required by the Sex Offender Registration Act, register with the campus police department within five working days of commencing employment at that community college on a form as may be required by the Department of Justice. The terms "employed or carries on a vocation" include employment whether or not financially compensated, volunteered, or performed for government or educational benefit.
- If the community college has no campus police department, the registrant shall instead register with the police of the city in which the campus is located or the sheriff of the county in which the campus is located if the campus is located in an unincorporated area or in a city that has no police department, on a form as may be required by the Department of Justice.
- The registrant shall also notify the campus police department within five (5) working days of ceasing to be employed, or ceasing to carry on a vocation, at the community college.

Contractor hereby acknowledges, under penalty of perjury, that it is aware of the provisions of section 290.01 of the Penal Code, and it will provide notice of the above provisions to all of its employees, subcontractors, and employees of subcontractors regardless of whether they are designated as employees or acting as independent contractors of the Contractor at least five (5) working days before commencing the performance of the Work of this Contract.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT





By my signature below, I hereby certify that, to the best of my knowledge, the contents of this disclosure are true, or are believed to be true. I further certify on behalf of the Firm that I am aware of section 3000 et seq. of the California Public Contract Code, and the sections referenced therein regarding the penalties for providing false information or failing to disclose a financial relationship in this disclosure. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: \_\_\_\_\_

Proper Name of Firm: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 45 46.11

**IRAN CONTRACTING ACT CERTIFICATION**  
**(Public Contract Code sections 2202-2208)**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between Marin Community College District ("District") and \_\_\_\_\_  
 \_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

Prior to bidding on or submitting a proposal for a contract for goods or services of \$1,000,000 or more to the District, the Bidder must either: a) certify it is **not** on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b) and is not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS; or b) demonstrate it has been exempted from the certification requirement for that solicitation or contract pursuant to Public Contract Code section 2203(c) or (d).

To comply with this requirement, please insert your vendor or financial institution name and Federal ID Number (if available) and complete **one** of the options below. Please note: California law establishes penalties for providing false certifications, including civil penalties equal to the greater of \$250,000 or twice the amount of the contract for which the false certification was made; contract termination; and three-year ineligibility to bid on contracts. (Public Contract Code section 2205.)

**OPTION #1 - CERTIFICATION**

I, the official named below, certify I am duly authorized to execute this certification on behalf of the vendor/financial institution identified below, and the vendor/financial institution identified below is **not** on the current list of persons engaged in investment activities in Iran created by DGS and is not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person/vendor, for 45 days or more, if that other person/vendor will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

<i>Vendor Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		
<i>Date Executed</i>	<i>Executed in</i>	

**OPTION #2 - EXEMPTION**

Pursuant to Public Contract Code sections 2203(c) and (d), a public entity may permit a vendor/financial institution engaged in investment activities in Iran, on a case-by-case basis, to be eligible for, or to bid on, submit a proposal for, or to enter into or to renew, a contract for goods and services.

If you have obtained an exemption from the certification requirement under the Iran Contracting Act, please fill out the information below, and attach documentation demonstrating the exemption approval.

<i>Vendor Name/Financial Institution (Printed)</i>	<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>	
<i>Printed Name and Title of Person Signing</i>	<i>Date Executed</i>

END OF DOCUMENT

DOCUMENT 00 45 90

**POST BID INTERVIEW**

**PART 1 – GENERAL**

**1.01 SUMMARY**

If requested by the District, this Section requires the apparent low bidder to attend and participate in a Post Bid Interview with the Construction Manager, prior to award of any contract by the District. The Post Bid Interview will be scheduled by the CONSTRUCTION Manager within three (3) calendar days after the date of bid.

**1.02 REQUIRED ATTENDANCE**

- A. Duly authorized representatives of the apparent low bidder are required to attend the Post Bid Interview, in person, and shall bring those members of their team limited to three (3) people who will occupy key positions on the Project such as Project Superintendents, Project Managers, Project Executives so that the District interviews individuals who will work on the Project. The apparent low bidder shall not bring marketing personnel.
- B. One authorized representative of the apparent low bidder must have signatory authority on behalf of the apparent low bidder.
- C. Failure to attend the Post Bid Interview will be considered just cause for the District to reject the Bid.

**1.03 POST BID INTERVIEW PROCEDURE**

- A. The Construction Manager will review the Bid with the attendees.
- B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:
  - (1) Insurance
  - (2) Bonding
  - (3) Addenda
  - (4) Pre-Bid Clarifications
  - (5) Scope of Work
  - (6) Bid Packages Descriptions
  - (7) Bid Alternates
  - (8) The Contract Plans

- (9) The Contract Specifications
- (10) The Project Schedule and Schedule Requirements
- (11) Critical Dates Requirement for Other Bid Packages
- (12) Prevailing Wage Requirements
- (13) Liquidated Damages
- (14) Required Documentation for Contract Administration
- (15) Contract Coordination Requirements

#### **1.04 POST BID INTERVIEW DOCUMENTATION**

The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the Apparent Low Bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

**POST BID INTERVIEW**

**CONSTRUCTION MANAGER**

[Name]

[Address 1]

[Address 2]

[Phone]

[Fax]

BIDDER: \_\_\_\_\_

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ PHONE # \_\_\_\_\_

I. INTRODUCTIONS:

A. Present	_____	_____
	CONTRACTOR	CONTRACTOR
	_____	_____
	[CM]	[CM]

II. PROPOSED CONTRACT: \_\_\_\_\_

III. PURPOSE OF INTERVIEW IS TO ASSURE:

- |    |                                                                                                                |     |    |
|----|----------------------------------------------------------------------------------------------------------------|-----|----|
| A. | Do you acknowledge submission of a complete and accurate bid?                                                  | Yes | No |
| B. | Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines?    | Yes | No |
| C. | Do you acknowledge the requirements for the escrow of bid documents?                                           | Yes | No |
| D. | Do you acknowledge and understand the Project is subject to a Project Stabilization Agreement? (if applicable) | Yes | No |

IV. CONTRACTUAL REQUIREMENTS:

- |    |                                                                                                                        |     |    |
|----|------------------------------------------------------------------------------------------------------------------------|-----|----|
| A. | Do you understand you are a prime contractor?                                                                          | Yes | No |
| B. | Can you meet specified insurance requirements?                                                                         | Yes | No |
| 1. | Does any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements?       | Yes | No |
| 2. | Are you requesting that the District accept an Umbrella or Excess Liability Insurance Policy to meet the policy limit? | Yes | No |

- 3. Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy? Yes No
  
- C. Will you provide the Performance, and a Labor and Material Bond for 100% of the Contract Price as stipulated? Yes No
  - 1. Cost for bond: \_\_\_\_\_ %
  - 2. Is the cost of your bond in your base bid? Yes No
  - 3. Is your surety licensed is issue bonds in California? Yes No
  
- D. Do you understand and agree the Bid requires liquidated damages? Yes No
  
- V. SCOPE OF WORK:
  - A. Acknowledged Receipt of Addenda #1-\_\_\_ Yes No
  - B. Are the costs for addenda items included in your bid? (if applicable) Yes No
  - C. Do you have a complete understanding of your Scope of Work under the proposed Agreement? Yes No
  - D. You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification? Yes No

If yes, please identify them.

  - 1. \_\_\_\_\_  
\_\_\_\_\_
  - 2. \_\_\_\_\_  
\_\_\_\_\_
  - 3. \_\_\_\_\_  
\_\_\_\_\_
  - 4. \_\_\_\_\_  
\_\_\_\_\_
  - 5. \_\_\_\_\_  
\_\_\_\_\_

Is (are) the cost(s) for above items? Yes No



- C. Review bid alternative (if applicable) #1-\_\_\_\_
- D. Are the plans and specifications clear and understandable to your satisfaction? Yes No

VI. SCHEDULE:

- A. Do you acknowledge and agree to the stipulated completion dates and milestones in the contract? Yes No
  - 1. Will you provide a detailed construction schedule to \_\_\_\_\_ within the required ten (10) days, per the contract? Yes No
  - 2. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. Yes No
  - 3. It is understood that if rain does occur, then all dewatering and And protection of work is required, per the contract. Yes No

If not, what must change and why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work.
  - 1. \_\_\_\_\_
  - 2. \_\_\_\_\_
  - 3. \_\_\_\_\_
  - 4. \_\_\_\_\_
  - 5. \_\_\_\_\_

VII. CONTRACTOR COMMENTS/SUGGESTIONS:

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

5. \_\_\_\_\_

VIII. CONTRACTOR

**You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.**

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

\_\_\_\_\_  
Signature \_\_\_\_\_ Title: \_\_\_\_\_

Date: \_\_\_\_\_

IX. CONSTRUCTION MANAGER

Signature \_\_\_\_\_ Title: \_\_\_\_\_

Date: \_\_\_\_\_

Title of Document: POST BID INTERVIEW  
Number of Pages: \_\_\_\_\_  
Date of Document: \_\_\_\_\_

**END OF DOCUMENT**

DOCUMENT 00 51 00

**NOTICE OF AWARD**

Dated: \_\_\_\_\_ 20\_\_

To: \_\_\_\_\_  
(Contractor)

To: \_\_\_\_\_  
(Address)

From: Governing Board ("Board") of Marin Community College District ("District" or "Owner")

PROJECT: **I50-35613 - BUILDING 11 RENOVATION**

("Project" or "Contract").

Contractor has been awarded the referenced Contract on \_\_\_\_\_, 20\_\_, by action of the District's Board

The Contract Price is \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), and includes alternates \_\_\_\_\_.

Three (3) copies of each of the Contract Documents (except Drawings) accompany this Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise made available. Additional copies are available at cost of reproduction.

You must comply with the following conditions precedent within **SEVEN (7)** calendar days of the date of this Notice of Award.

The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award.

- a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.
- b. Escrow of Bid Documentation: This must include all required documentation. See the document Escrow of Bid Documentation for more information.
- c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
- d. Payment Bond (Contractor's Labor & Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
- e. Insurance Certificates and Endorsements as required.
- f. Workers' Compensation Certification.

- g. Prevailing Wage and Related Labor Requirements Certification.
- h. Drug-Free Workplace Certification.
- i. Tobacco-Free Environment Certification.
- j. Hazardous Materials Certification.
- k. Lead-Based Paint Certification.
- l. Imported Materials Certification.
- m. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.

Failure to comply with these conditions within the time specified will entitle District to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited, as well as any other rights the District may have against the Contractor.

After you comply with those conditions, District will return to you one fully signed counterpart of the Agreement.

MARIN COMMUNITY COLLEGE SCHOOL DISTRICT

BY: \_\_\_\_\_

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 53 00

**AGREEMENT**

THIS AGREEMENT IS MADE AND ENTERED INTO THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_, by and between the Marin Community College District ("District") and \_\_\_\_\_ ("Contractor") ("Agreement").

**WITNESSETH:** That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other, as follows:

- 1. The Work:** Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, and material necessary to perform and complete in a good and workmanlike manner, the work of the following project:

PROJECT: **150-35613 - BUILDING 11 RENOVATION**

("Project" or "Contract" or "Work")

It is understood and agreed that the Work shall be performed and completed as required in the Contract Documents including, without limitation, the Drawings and Specifications and submission of all documents required to secure funding or by the Division of the State Architect for close-out of the Project, under the direction and supervision of, and subject to the approval of, the District or its authorized representative.

- 2. The Contract Documents:** The complete Contract consists of all Contract Documents as defined in the General Conditions and incorporated herein by this reference. Any and all obligations of the District and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.
- 3. Interpretation of Contract Documents:** Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the District for interpretation. If a conflict exists in the Contract Documents, modifications, beginning with the most recent, shall control over this Agreement (if any), which shall control over the Special Conditions, which shall control over any Supplemental Conditions, which shall control over the General Conditions, which shall control over the remaining Division 0 documents, which shall control over Division 1 Documents which shall control over Division 2 through Division 18 documents, which shall control over figured dimensions, which shall control over large-scale drawings, which shall control over small-scale drawings. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.
- 4. Time for Completion:** It is hereby understood and agreed that the work under this contract shall be completed within One Hundred Fifty Two (152) consecutive

calendar days ("Contract Time") from the date specified in the District's Notice to Proceed.

**5. Completion-Extension of Time:** Should the Contractor fail to complete this Contract, and the Work provided herein, within the time fixed for completion, due allowance being made for the contingencies provided for herein, the Contractor shall become liable to the District for all loss and damage that the District may suffer on account thereof. The Contractor shall coordinate its work with the Work of all other contractors. The District shall not be liable for delays resulting from Contractor's failure to coordinate its Work with other contractors in a manner that will allow timely completion of Contractor's Work. Contractor shall be liable for delays to other contractors caused by Contractor's failure to coordinate its Work with the work of other contractors.

**6. Liquidated Damages:** Time is of the essence for all work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the District the sum of **One Thousand** dollars (**\$1,000.00/DAY**) per day as liquidated damages for each and every day's delay beyond the time herein prescribed in finishing the Work.

It is hereby understood and agreed that this amount is not a penalty.

In the event that any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due the Contractor under this Agreement. The District's right to assess liquidated damages is as indicated herein and in the General Conditions.

The time during which the Contract is delayed for cause as hereinafter specified may extend the time of completion for a reasonable time as the District may grant. This provision does not exclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

**7. Loss Or Damage:** The District and its authorized representatives shall not in any way or manner be answerable or suffer loss, damage, expense, or liability for any loss or damage that may happen to the Work, or any part thereof, or in or about the same during its construction and before acceptance, and the Contractor shall assume all liabilities of every kind or nature arising from the Work, either by accident, negligence, theft, vandalism, or any cause whatever; and shall hold the District and its authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatever.

**8. Insurance and Bonds:** Before commencing the Work, Contractor shall provide all required certificates of insurance, and payment and performance bonds as evidence thereof.

**9. Prosecution of Work:** If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the District, may, pursuant

to the General Conditions and without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

- 10. Authority of Architect, Project Inspector, and DSA:** Contractor hereby acknowledges that the Architect(s), the Project Inspector(s), and the Division of the State Architect have authority to approve and/or stop Work if the Contractor's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws. The Contractor shall be liable for any delay caused by its non-compliant Work.
- 11. Assignment of Contract:** Neither the Contract, nor any part thereof, nor any moneys due or to become due thereunder, may be assigned by the Contractor without the written approval of the District, nor without the written consent of the Surety on the Contractor's Performance Bond (the "Surety"), unless the Surety has waived in writing its right to notice of assignment.
- 12. Classification of Contractor's License:** Contractor hereby acknowledges that it currently holds valid Type \_\_\_\_\_ Contractor's license(s) issued by the State of California, Contractor's State Licensing Board, in accordance with division 3, chapter 9, of the Business and Professions Code and in the classification called for in the Contract Documents.
- 13. Registration as Public Works Contractor:** The Contractor and all Subcontractors currently are registered as public works contractors with the Department of Industrial Relations, State of California, in accordance with Labor Code section 1771.4.
- 14. Payment of Prevailing Wages:** The Contractor and all Subcontractors shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code.
- 15.** This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code, including, without limitation, the requirement that the Contractor and all of its Subcontractors shall timely submit complete and accurate electronic certified payroll records as required by the Contract Documents, or the District may not issue payment.
- 16. Contract Price:** In consideration of the foregoing covenants, promises, and agreements on the part of the Contractor, and the strict and literal fulfillment of each and every covenant, promise, and agreement, and as compensation agreed upon for the Work and construction, erection, and completion as aforesaid, the District

covenants, promises, and agrees that it will well and truly pay and cause to be paid to the Contractor in full, and as the full Contract Price and compensation for construction, erection, and completion of the Work hereinabove agreed to be performed by the Contractor, the following price:

**Dollars**

(\$ \_\_\_\_\_),

in lawful money of the United States, which sum is to be paid according to the schedule provided by the Contractor and accepted by the District and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

- 17. Severability:** If any term, covenant, condition, or provision in any of the Contract Documents is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions in the Contract Documents shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.
- 18. Authority to Execute:** The individual(s) executing this Agreement on behalf of the Contractor is/are duly and fully authorized to execute this Agreement on behalf of Contractor and to bind the Contractor to each and every term, condition and covenant of the Contract Documents.

IN WITNESS WHEREOF, accepted and agreed on the date indicated above:

**CONTRACTOR**

**DISTRICT**

\_\_\_\_\_

MARIN COMMUNITY COLLEGE DISTRICT

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

NOTE: If the party executing this Contract is a corporation, a certified copy of the by-laws, or of the resolution of the Board of Directors, authorizing the officers of said corporation to execute the Contract and the bonds required thereby must be attached hereto.

END OF DOCUMENT



DOCUMENT 00 55 00

**NOTICE TO PROCEED**

Dated: \_\_\_\_\_, 20\_\_

TO: \_\_\_\_\_  
("Contractor")

ADDRESS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT: **I50-35613 - BUILDING 11 RENOVATION**

PROJECT/CONTRACT NO.: 17/18MB5 between the Marin Community College District and Contractor ("Contract").

You are notified that the Contract Time under the above Contract will commence to run on \_\_\_\_\_, 20\_\_. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor, the date of completion is **April 6, 2018**.

You must submit the following documents by 5:00 p.m. of the **(TENTH (10<sup>th</sup>))** calendar day following the date of this Notice to Proceed:

- a. Contractor's preliminary schedule of construction.
- b. Contractor's preliminary schedule of values for all of the Work.
- c. Contractor's preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals
- d. Contractor's Safety Plan specifically adapted for the Project.
- e. A complete subcontractors list, including the name, address, telephone number, facsimile number, California State Contractors License number, classification, and monetary value of all Subcontracts.

Thank you. We look forward to a very successful Project.

MARIN COMMUNITY COLLEGE DISTRICT

BY: \_\_\_\_\_

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

END OF DOCUMENT

SAMPLE

DOCUMENT 00 57 00

**ESCROW AGREEMENT IN LIEU OF RETENTION**  
**Public Contract Code Section 22300**

**(Note: Contractor must use this form.)**

This Escrow Agreement ("Escrow Agreement") is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between the Marin Community College District ("District"), whose address is \_\_\_\_\_, California, and \_\_\_\_\_ ("Contractor"), whose address is \_\_\_\_\_, and \_\_\_\_\_ ("Escrow Agent"), a state or federally chartered bank in the state of California, whose address is \_\_\_\_\_.

For the consideration hereinafter set forth, District, Contractor, and Escrow Agent agree as follows:

1. Pursuant to section 22300 of Public Contract Code of the State of California, which is hereby incorporated by reference, Contractor has the following two (2) options:
  - Deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract No. \_\_\_\_\_ entered into between District and Contractor for the **I50-35613 - BUILDING 11 RENOVATION** Project, in the amount of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) dated, \_\_\_\_\_, 20\_\_\_\_, (the "Contract"); **or**
  - On written request of Contractor, District shall make payments of the retention earnings for the above referenced Contract directly to Escrow Agent.

When Contractor deposits the securities as a substitute for Contract earnings (first option), Escrow Agent shall notify District within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution and at all times from substitution until the termination of the Escrow Agreement shall be at least equal to the cash amount then required to be withheld as retention under terms of Contract between District and Contractor.

Securities shall be held in name of Marin Community College Community College District, and shall designate Contractor as beneficial owner.

2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.
3. When District makes payment of retention earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow

created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when District pays Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of District. The District will charge Contractor \$\_\_\_\_\_ for each of District's deposits to the escrow account. These expenses and payment terms shall be determined by District, Contractor, and Escrow Agent.
5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to withdrawal of amount sought to be withdrawn by Contractor.
7. District shall have the right to draw upon the securities and/or withdraw amounts from the Escrow Account in the event of default by Contractor. Upon seven (7) days' written notice to Escrow Agent from District of the default, if applicable, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District.
8. Upon receipt of written notification from District certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.
9. Escrow Agent shall rely on written notifications from District and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Escrow Agreement and District and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.
10. Names of persons who are authorized to give written notice or to receive written notice on behalf of District and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of District:

\_\_\_\_\_  
Title  
\_\_\_\_\_  
Name  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Address

On behalf of Contractor:

\_\_\_\_\_  
Title  
\_\_\_\_\_  
Name  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Address

On behalf of Escrow Agent:

\_\_\_\_\_  
Title  
\_\_\_\_\_  
Name  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Address

At the time of Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

On behalf of District:

\_\_\_\_\_  
Title  
\_\_\_\_\_  
Name  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Address

On behalf of Contractor:

\_\_\_\_\_  
Title  
\_\_\_\_\_  
Name  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Address

END OF DOCUMENT

DOCUMENT 00 61 13.13

**PERFORMANCE BOND**  
**(100% of Contract Price)**

**(Note: Bidders must use this form, NOT a surety company form.)**

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Marin Community College District, ("District") and \_\_\_\_\_ ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

**150-35613 - BUILDING 11 RENOVATION** (Project Name)

("Project" or "Contract") which Contract dated \_\_\_\_\_, 20\_\_\_\_, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, the Principal and \_\_\_\_\_ ("Surety") are held and firmly bound unto the Board of the District in the penal sum of \_\_\_\_\_

Dollars (\$\_\_\_\_\_), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Perform all the work required to complete the Project; and
- Pay to the District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

The condition of the obligation is such that, if the above bounden Principal, his or its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration thereof made as therein provided, on his or its part to be kept and performed at the time and in the intent and meaning, including all contractual guarantees and warranties of materials and workmanship, and shall indemnify and save harmless the District, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the District may reject any contractor or subcontractor proposed by Surety to fulfill its obligations in the event of default by the Principal. Surety

shall not utilize Principal in completing the Work nor shall Surety accept a Bid from Principal for completion of the Work if the District declares the Principal to be in default and notifies Surety of the District's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period equal to the warranty and/or guarantee period of the Contract, during which time Surety's obligation shall continue if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the District's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

In the event that suit or other proceeding is brought upon this Bond by the Obligee, the Surety shall pay to the Obligee all costs, expenses and fees incurred by the Obligee in connection therewith, including without limitation, attorneys' fees.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

(Affix Corporate Seal)

\_\_\_\_\_  
Principal

\_\_\_\_\_  
By

\_\_\_\_\_  
Surety

\_\_\_\_\_  
By

\_\_\_\_\_  
Name of California Agent of Surety

\_\_\_\_\_  
Address of California Agent of Surety

\_\_\_\_\_  
Telephone No. of California Agent of Surety

**Bidder must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.**

END OF DOCUMENT



DOCUMENT 00 65 19.26

**AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS**

THIS AGREEMENT AND RELEASE OF CLAIMS ("Agreement and Release") IS MADE AND ENTERED INTO THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_ by and between the MARIN COMMUNITY COLLEGE DISTRICT ("District") and \_\_\_\_\_ ("Contractor"), whose place of business is \_\_\_\_\_.

RECITALS:

- A. California Public Contract Code section 7100 provides that a public entity is not prohibited from placing in a public works contract and enforcing a contract provision which provides that payment of undisputed contract amounts is contingent upon the contractor furnishing the public entity with a release of all claims against the public entity arising by virtue of the public works contract related to those amounts; provided that disputed contract claims in stated amounts may be specifically excluded by the contractor from the operation of the release.
- B. District and Contractor entered into PROJECT/CONTRACT NO.: \_\_\_\_\_ ("Contract" or "Project") in the County of Marin, California.
- C. The Work under the Contract has been completed and the parties desire to enter into this Agreement and Release as provided in California Public Contract Code section 7100 concerning payment of undisputed contract amounts under the Contract.

NOW, THEREFORE, it is mutually agreed between District and Contractor as follows:

AGREEMENT

- 1. Contractor will only be assessed liquidated damages as detailed below:
 

Original Contract Sum	\$ _____
Modified Contract Sum	\$ _____
Payment to Date	\$ _____
Liquidated Damages	\$ _____
Payment Due Contractor	\$ _____
- 2. Subject to the provisions hereof, District shall forthwith pay to Contractor the undisputed sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) under the Contract, less any amounts represented by any notice to withhold funds on file with District as of the date of such payment.
- 3. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against District arising from the performance of work

under the Contract, except for the claims described in Paragraph 4 and continuing obligations described in Paragraph 6. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against District, all its respective agents, employees, inspectors, assignees and transferees except for the Disputed Claim is set forth in Paragraph 4 and continuing obligations described in Paragraph 6 hereof.

4. The following claims submitted under Document 00 72 13 (General Conditions), Article 25, are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

<u>Claim No. Submitted</u>	<u>Description of Claim</u>	<u>Amount of Claim</u>	<u>Date Claim</u>
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____

[If further space is required, attach additional sheets showing the required information.]

5. Consistent with California Public Contract Code section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 2 hereof, Contractor hereby releases and forever discharges District, all its agents, employees, inspectors, assignees, and transferees from any and all liability, claims, demands, actions, or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.
6. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, shall remain in full force and effect as specified in the Contract Documents.
7. To the furthest extent permitted by California law, Contractor shall defend, indemnify, and hold harmless the District, its agents, representatives, officers, consultants, employees, trustees, and volunteers (the "indemnified parties") from any and all losses, liabilities, claims, suits, and actions of any kind, nature, and description, including, but not limited to, attorneys' fees and costs, directly or indirectly arising out of, connected with, or resulting from the performance of the Contract unless caused wholly by the sole negligence or willful misconduct of the indemnified parties.
8. Contractor hereby waives the provisions of California Civil Code section 1542 which provides as follows:

A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER

FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM OR HER MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR.

- 9. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable. If any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal, or other law, ruling, or regulations, then such provision, or part thereof, shall remain in force and effect to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.
- 10. All rights of District shall survive completion of the Work or termination of Contract, and execution of this Release.

\* \* \* CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING \* \* \*

MARIN COMMUNITY COLLEGE DISTRICT

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 65 36

**GUARANTEE FORM**

\_\_\_\_\_ ("Contractor") hereby agrees that the \_\_\_\_\_  
\_\_\_\_\_ ("Work" of Contractor) which Contractor has installed for the Marin  
Community College District ("District") for the following project:

PROJECT: **I50-35613 - BUILDING 11 RENOVATION**

("Project" or "Contract") has been performed in accordance with the requirements of the  
Contract Documents and that the Work as installed will fulfill the requirements of the  
Contract Documents.

The undersigned agrees to repair or replace any or all of such Work that may prove to be  
defective in workmanship or material together with any other adjacent Work that may be  
displaced in connection with such replacement within a period of ONE (1) year from the date  
of completion as defined in Public Contract Code section 7107, subdivision (c), ordinary  
wear and tear and unusual abuse or neglect excepted. The date of completion is  
\_\_\_\_\_, 20\_\_.

In the event of the undersigned's failure to comply with the above-mentioned conditions  
within a reasonable period of time, as determined by the District, but not later than seven  
(7) days after being notified in writing by the District, the undersigned authorizes the  
District to proceed to have said defects repaired and made good at the expense of the  
undersigned. The undersigned shall pay the costs and charges therefor upon demand.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

Representatives to be contacted for service subject to terms of Contract:

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE NO.: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 00 72 13

**TABLE OF CONTENTS**

**GENERAL CONDITIONS** .....1

**1. CONTRACT TERMS AND DEFINITIONS**.....1

**1.1. Definitions**.....1

**1.2. Laws Concerning The Contract**.....6

**1.3. No Oral Agreements**.....6

**1.4. No Assignment**.....6

**1.5. Notice And Service Thereof**.....6

**1.6. No Waiver**.....7

**1.7. Substitutions For Specified Items**.....7

**1.8. Materials and Work**.....7

**2. [RESERVED]** .....8

**3. ARCHITECT**.....9

**4. CONSTRUCTION MANAGER**.....9

**5. INSPECTOR, INSPECTIONS, AND TESTS**.....10

**5.1. Project Inspector**.....10

**5.2. Tests and Inspections**.....10

**5.3. Costs for After Hours and/or Off Site Inspections**.....11

**6. CONTRACTOR**.....11

**6.1. Status of Contractor**.....11

**6.2. Project inspection Card(s)**.....11

**6.3. Contractor’s Supervision**.....12

**6.4. Duty to Provide Fit Workers.....12**

**6.5. Field Office.....13**

**6.6. Purchase of Materials and Equipment .....13**

**6.7. Documents On Work.....13**

**6.8. Preservation of Records .....14**

**6.9. Integration of Work .....14**

**6.10. Notifications.....14**

**6.11 Obtaining of Permits and Licenses .....14**

**6.12. Royalties and Patents .....15**

**6.13. Work to Comply With Applicable Laws and Regulations .....15**

**6.14. Safety/Protection of Persons and Property .....16**

**6.15. Working Evenings and Weekends .....18**

**6.16. Cleaning Up .....18**

**7. SUBCONTRACTORS.....19**

**8. OTHER CONTRACTS/CONTRACTORS .....21**

**9. DRAWINGS AND SPECIFICATIONS .....21**

**10. CONTRACTOR’S SUBMITTALS AND SCHEDULES .....23**

**10.1. Schedule of Work and Schedule of Values .....23**

**10.2. Monthly Progress Schedule(s) .....25**

**10.3. Material Safety Data Sheets (MSDS) .....25**

**11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS.....26**

**11.1. Site Investigation .....26**

**11.2. Soils Investigation Report.....26**

**11.3. Access to Work.....26**

**11.4. Layout and Field Engineering.....27**

**11.5. Utilities.....27**

**11.6. Sanitary Facilities.....27**

**11.7. Surveys.....27**

**11.8. Regional Notification Center.....27**

**11.9. Existing Utility Lines.....28**

**11.10. Notification.....28**

**11.11. Hazardous Materials.....28**

**11.12. No Signs.....29**

**12. TRENCHES.....29**

**12.1. Trenches Greater Than Five Feet.....29**

**12.2. Excavation Safety.....29**

**12.3. No Tort Liability of District.....29**

**12.4. No Excavation Without Permits.....29**

**12.5. Discovery of Hazardous Waste and/or Unusual Conditions  
.....29**

**13. INSURANCE AND BONDS.....30**

**13.1 Insurance.....30**

**13.2 Contract Security - Bonds.....34**

**14. WARRANTY/GUARANTEE/INDEMNITY.....34**

**14.1. Warranty/Guarantee.....34**

**14.2. Indemnity.....35**

**15. TIME** .....36

**15.1. Notice to Proceed** .....36

**15.2. Computation of Time / Adverse Weather** .....37

**15.3. Hours of Work**.....38

**15.4. Progress and Completion**.....38

**15.5. Schedule**.....38

**15.6. Expeditious Completion** .....38

**16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES** .....38

**16.1. Liquidated Damages** .....38

**16.2. Excusable Delay**.....39

**16.3. No Additional Compensation for Delays Within Contractor’s Control** .....39

**16.4. Float or Slack in the Schedule**.....40

**17. CHANGES IN THE WORK** .....40

**17.1. No Changes Without Authorization** .....40

**17.2. Architect Authority** .....41

**17.3. Change Orders**.....41

**17.4. Construction Change Directives**.....41

**17.5. Force Account Directives**.....42

**17.6. Price Request** .....43

**17.7. Proposed Change Order**.....43

**17.8. Format for Proposed Change Order**.....45

**17.9. Change Order Certification** .....47



**17.10. Determination of Change Order Cost.....47**

**17.11. Deductive Change Orders .....48**

**17.12. Addition or Deletion of Alternate Bid Item(s).....48**

**17.13. Discounts, Rebates, and Refunds.....48**

**17.14. Accounting Records.....48**

**17.15. Notice Required .....49**

**17.16. Applicability to Subcontractors .....49**

**17.17. Alteration to Change Order Language.....49**

**17.18. Failure of Contractor to Execute Change Order.....49**

**18. REQUEST FOR INFORMATION .....49**

**19. PAYMENTS.....50**

**19.1. Contract Price .....50**

**19.2. Applications for Progress Payments .....50**

**19.3. Progress Payments.....53**

**19.4. Decisions to Withhold Payment.....54**

**19.5. Subcontractor Payments.....57**

**20. COMPLETION OF THE WORK .....57**

**20.1. Completion.....57**

**20.2. Close-Out Procedures .....58**

**20.3. Final Inspection .....59**

**20.4. Costs of Multiple Inspections.....60**

**20.5. Partial Occupancy or Use Prior to Completion.....60**

**21. FINAL PAYMENT AND RETENTION.....61**

**21.1. Final Payment.....61**

**21.2. Prerequisites for Final Payment.....61**

**21.3. Retention .....62**

**21.4. Substitution of Securities .....62**

**22. UNCOVERING OF WORK.....62**

**23. NONCONFORMING WORK AND CORRECTION OF WORK.....62**

**23.1. Nonconforming Work .....62**

**23.2. Correction of Work.....63**

**23.3 District's Right to Perform Work .....63**

**24. TERMINATION AND SUSPENSION .....64**

**24.1. District's Right to Terminate Contractor for Cause.....64**

**24.2. Termination of Contractor for Convenience .....67**

**24.3. Suspension of Work .....67**

**25. CLAIMS AND DISPUTES.....68**

**25.1. Performance During Dispute or Claim Process.....68**

**25.2. Definition of Dispute.....68**

**25.3. Dispute Presentation.....68**

**25.4. Dispute Resolution.....69**

**25.5. Definition of Claim .....70**

**25.6. Claim Presentations .....70**

**25.7. Claim Resolution .....71**

**25.8. Dispute and Claim Resolution Non-Applicability .....73**

**26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS** .....73

**26.1. [RESERVED]** .....73

**26.2. Wage Rates, Travel, and Subsistence** .....73

**26.3. Hours of Work** .....75

**26.4. Payroll Records** .....75

**26.5. [RESERVED]** .....77

**26.6. Apprentices** .....77

**26.7. Non-Discrimination** .....78

**26.8. Labor First Aid** .....78

**27. [RESERVED]** .....78

**28. MISCELLANEOUS** .....79

**28.1. Assignment of Antitrust Actions** .....79

**28.2. Excise Taxes** .....80

**28.3. Taxes** .....80

**28.4. Shipments** .....80

**28.5. Compliance with Government Reporting Requirements** .....80

DOCUMENT 00 72 13

**GENERAL CONDITIONS**

**1. CONTRACT TERMS AND DEFINITIONS**

**1.1. Definitions**

**Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:**

**1.1.1. Adverse Weather:** Shall be only weather that satisfies all of the following conditions: (1) unusually severe precipitation, sleet, snow, hail, heat, or cold conditions in excess of the norm for the location and time of year it occurred, (2) unanticipated, and (3) at the Project.

**1.1.2. Approval, Approved, and/or Accepted:** Refer to written authorization, unless stated otherwise.

**1.1.3. Architect:** The individual, partnership, corporation, joint venture, or any combination thereof, named as Architect, who will have the rights and authority assigned to the Architect in the Contract Documents. The term Architect means the Design Professional in General Responsible Charge as defined in DSA PR 13-02 on this Project or the Architect's authorized representative.

**1.1.4. As-Built Drawings:** Unless otherwise defined in the Special Conditions, reproducible blue line prints of drawings to be prepared on a monthly basis pursuant to the Contract Documents, that reflect changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed since the preceding monthly submittal.

**1.1.5. Bidder:** A contractor who intends to provide a proposal to the District to perform the Work of this Contract.

**1.1.6. Change Order:** A written order to the Contractor authorizing an addition to, deletion from, or revision in the Work, and/or authorizing an adjustment in the Contract Price or Contract Time.

**1.1.7. Claim:** A Dispute that remains unresolved at the conclusion of the all the applicable Dispute Resolution requirements provided herein.

**1.1.8. Construction Change Directive:** A written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work.

**1.1.9. Construction Manager:** The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Construction Manager is used on the Project that is the subject

of this Contract, then all references to Construction Manager herein shall be read to refer to District.

**1.1.10. Construction Schedule:** The progress schedule of construction of the Project as provided by Contractor and approved by District.

**1.1.11. Contract, Contract Documents:** The Contract consists exclusively of the documents evidencing the agreement of the District and Contractor, identified as the Contract Documents. The Contract Documents consist of the following documents:

- 1.1.11.1.** Notice to Bidders
- 1.1.11.2.** Instructions to Bidders
- 1.1.11.3.** Bid Form and Proposal
- 1.1.11.4.** Bid Bond
- 1.1.11.5.** Designated Subcontractors List
- 1.1.11.6.** Site-Visit Certification (if a site visit was required)
- 1.1.11.7.** Noncollusion Declaration
- 1.1.11.8.** Notice of Award
- 1.1.11.9.** Notice to Proceed
- 1.1.11.10.** Agreement
- 1.1.11.11.** Escrow of Bid Documentation
- 1.1.11.12.** Escrow Agreement for Security Deposits in Lieu of Retention
- 1.1.11.13.** Performance Bond
- 1.1.11.14.** Payment Bond (Contractor's Labor & Material Bond)
- 1.1.11.15.** General Conditions
- 1.1.11.16.** Special Conditions (if applicable)
- 1.1.11.17.** Labor Compliance Program Information and Forms (if applicable)
- 1.1.11.18.** Hazardous Materials Procedures and Requirements
- 1.1.11.19.** Workers' Compensation Certification
- 1.1.11.20.** Prevailing Wage Certification
- 1.1.11.21.** Disabled Veterans Business Enterprise Participation Certification (if applicable)
- 1.1.11.22.** Drug-Free Workplace Certification
- 1.1.11.23.** Tobacco-Free Environment Certification
- 1.1.11.24.** Hazardous Materials Certification
- 1.1.11.25.** Lead-Based Paint Certification
- 1.1.11.26.** Imported Materials Certification
- 1.1.11.27.** Criminal Background Investigation/Fingerprinting Certification
- 1.1.11.28.** Buy American Certification (if applicable)
- 1.1.11.29.** Roofing Project Certification (if applicable)
- 1.1.11.30.** Iran Contracting Act Certification (if applicable)
- 1.1.11.31.** Letter of Assent (if applicable)
- 1.1.11.32.** All Plans, Technical Specifications, and Drawings
- 1.1.11.33.** Any and all addenda to any of the above documents
- 1.1.11.34.** Any and all change orders or written modifications to the above documents if approved in writing by the District

**1.1.12. Contract Price:** The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

**1.1.13. Contract Time:** The time period stated in the Agreement for the completion of the Work.

**1.1.14. Contractor:** The person or persons identified in the Agreement as contracting to perform the Work to be done under this Contract, or the legal representative of such a person or persons.

**1.1.15. Daily Job Report(s):** Daily Project reports prepared by the Contractor's employee(s) who are present on Site, which shall include the information required herein.

**1.1.16. Day(s):** Unless otherwise designated, day(s) means calendar day(s).

**1.1.17. Department of Industrial Relations** (or "DIR"): is responsible, among other things, for labor compliance monitoring and enforcement of California prevailing wage laws and regulations for public works contracts.

**1.1.18. Dispute:** A separate demand by Contractor for a time extension; payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or an amount of payment disputed by the District.

**1.1.19. District:** The public agency or the school district for which the Work is performed. The governing board of the District or its designees will act for the District in all matters pertaining to the Contract. The District may, at any time,

**1.1.19.1.** Direct the Contractor to communicate with or provide notice to the Construction Manager or the Architect on matters for which the Contract Documents indicate the Contractor will communicate with or provide notice to the District; and/or

**1.1.19.2.** Direct the Construction Manager or the Architect to communicate with or direct the Contractor on matters for which the Contract Documents indicate the District will communicate with or direct the Contractor.

**1.1.20. Drawings** (or "Plans"): The graphic and pictorial portions of the Contract Documents showing the design, location, scope and dimensions of the work, generally including plans, elevations, sections, details, schedules, sequence of operation, and diagrams.

**1.1.21. DSA:** Division of the State Architect.

**1.1.22. Force Account Directive:** A process that may be used when the District and the Contractor cannot agree on a price for a specific portion of work or before the Contractor prepares a prices for a specific portion of work and whereby the Contractor performs the work as indicated herein on a time and materials basis.

- 1.1.23. Labor Commissioner's Office** (or "Labor Commissioner") also known as the Division of Labor Standards Enforcement ("DLSE"): Division of the DIR responsible for adjudicating wage claims, investigating discrimination and public works complaints, and enforcing Labor Code statutes and Industrial Welfare Commission orders.
- 1.1.24. Municipal Separate Storm Sewer System** (or "MS4"): A system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.
- 1.1.25. Premises:** The real property owned by the District on which the Site is located.
- 1.1.26. Product(s):** New material, machinery, components, equipment, fixtures and systems forming the Work, including existing materials or components required and approved by the District for reuse.
- 1.1.27. Product Data:** Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.
- 1.1.28. Project:** The planned undertaking as provided for in the Contract Documents.
- 1.1.29. Project Inspector** (or "Inspector"): The individual(s) retained by the District in accordance with title 24 of the California Code of Regulations to monitor and inspect the Project.
- 1.1.30. Project Stabilization Agreement** (or "PSA"): a prehire collective bargaining agreement in accordance with Public Contract Code section 2500 et seq. that establishes terms and conditions of employment for a specific construction project or projects and/or is an agreement described in Section 158(f) of Title 29 of the United States Code.
- 1.1.31. Program Manager:** The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Program Manager is designated for Project that is the subject of this Contract, then all references to Project Manager herein shall be read to refer to District.
- 1.1.32. Provide:** Shall include "provide complete in place," that is, "furnish and install," and "provide complete and functioning as intended in place" unless specifically stated otherwise.
- 1.1.33. Qualified SWPPP Practitioners** ("QSP"): certified personnel that attended a State Water Resources Control Board sponsored or approved training class and passed the qualifying exam.
- 1.1.34. Record Drawings:** Unless otherwise defined in the Special Conditions, Reproducible drawings (or Plans) prepared pursuant to the requirements of the

Contract Documents, that reflect all changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed upon completion of the Project.

**1.1.35. Request for Information (or "RFI"):** A written request prepared by the Contractor requesting that the Architect provide additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems that have arisen under field conditions.

**1.1.36. Request for Substitution for Specified Item:** A request by Contractor to substitute an equal or superior material, product, thing, or service for a specific material, product, thing, or service that has been designated in the Contract Documents by a specific brand or trade name.

**1.1.37. Safety Orders:** Written and/or verbal orders for construction issued by the California Division of Industrial Safety ("CalOSHA") or by the United States Occupational Safety and Health Administration ("OSHA").

**1.1.38. Safety Plan:** Contractor's safety plan specifically adapted for the Project. Contractor's Safety Plan shall comply with all provisions regarding Project safety, including all applicable provisions in these General Conditions.

**1.1.39. Samples:** Physical examples that illustrate materials, products, equipment, finishes, colors, or workmanship and that, when approved in accordance with the Contract Documents, establish standards by which portions of the Work will be judged.

**1.1.40. Shop Drawings:** All drawings, prints, diagrams, illustrations, brochures, schedules, and other data that are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, that illustrate how specific portions of the Work shall be fabricated or installed.

**1.1.41. Site:** The Project site as shown on the Drawings.

**1.1.42. Specifications:** That portion of the Contract Documents, Division 1 through Division 17, and all technical sections, and addenda to all of these, if any, consisting of written descriptions and requirements of a technical nature of materials, equipment, construction methods and systems, standards, and workmanship.

**1.1.43. State:** The State of California.

**1.1.44. Storm Water Pollution Prevention Plan (or "SWPPP"):** A document which identifies sources and activities at a particular facility that may contribute pollutants to storm water and contains specific control measures and time frames to prevent or treat such pollutants.



**1.1.45. Subcontractor:** A contractor and/or supplier who is under contract with the Contractor or with any other subcontractor, regardless of tier, to perform a portion of the Work of the Project.

**1.1.46. Submittal Schedule:** The schedule of submittals as provided by Contractor and approved by District.

**1.1.47. Surety:** The person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond, and must be a California admitted surety insurer as defined in the Code of Civil Procedure section 995.120.

**1.1.48. Work:** All labor, materials, equipment, components, appliances, supervision, coordination, and services required by, or reasonably inferred from, the Contract Documents, that are necessary for the construction and completion of the Project.

## **1.2. Laws Concerning The Contract**

Contract is subject to all provisions of the Constitution and laws of California and the United States governing, controlling, or affecting District, or the property, funds, operations, or powers of District, and such provisions are by this reference made a part hereof. Any provision required by law to be included in this Contract shall be deemed to be inserted.

## **1.3. No Oral Agreements**

No oral agreement or conversation with any officer, agent, or employee of District, either before or after execution of Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract.

## **1.4. No Assignment**

Contractor shall not assign this Contract or any part thereof including, without limitation, any services or money to become due hereunder without the prior written consent of the District. Assignment without District's prior written consent shall be null and void. Any assignment of money due or to be come due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to the Civil Code, Code of Civil Procedure, Government Code, Labor Code, and/or Public Contract Code, and shall also be subject to deductions for liquidated damages or withholding of payments as determined by District in accordance with this Contract. Contractor shall not assign or transfer in any manner to a Subcontractor or supplier the right to prosecute or maintain an action against the District.

## **1.5. Notice And Service Thereof**

**1.5.1.** Any notice from one party to the other or otherwise under Contract shall be in writing and shall be dated and signed by the party giving notice or by a duly

authorized representative of that party. Any notice shall not be effective for any purpose whatsoever unless served in one of the following manners:

**1.5.1.1.** If notice is given by personal delivery thereof, it shall be considered delivered on the day of delivery.

**1.5.1.2.** If notice is given by overnight delivery service, it shall be considered delivered on (1) day after date deposited, as indicated by the delivery service.

**1.5.1.3.** If notice is given by depositing same in United States mail, enclosed in a sealed envelope, it shall be considered delivered three (3) days after date deposited, as indicated by the postmarked date.

**1.5.1.4.** If notice is given by registered or certified mail with postage prepaid, return receipt requested, it shall be considered delivered on the day the notice is signed for.

## **1.6. No Waiver**

The failure of District in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by the District, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the District under the Contract, nor shall any action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

## **1.7. Substitutions For Specified Items**

Unless the Special Conditions contain different provisions, Contractor shall not substitute different items for any items identified in the Contract Documents without prior written approval of the District.

## **1.8. Materials and Work**

**1.8.1.** Except as otherwise specifically stated in this Contract, Contractor shall provide and pay for all materials, labor, tools, equipment, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to execute and complete this Contract within the Contract Time.

**1.8.2.** Unless otherwise specified, all materials shall be new and the best of their respective kinds and grades as noted or specified, and workmanship shall be of good quality.

**1.8.3.** Materials shall be furnished in ample quantities and at such times as to insure uninterrupted progress of Work and shall be stored properly and protected as required.

**1.8.4.** For all materials and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems, functioning as intended. Incidental items not indicated on Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized here in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer's most recent published recommendations and specifications.

**1.8.5.** Contractor shall, after award of Contract by District and after relevant submittals have been approved, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the Work. Contractor shall, upon demand from District, present documentary evidence showing that orders have been placed.

**1.8.6.** District reserves the right but has no obligation, for any neglect in complying with the above instructions, to place orders for such materials and/or equipment as it may deem advisable in order that the Work may be completed at the date specified in the Agreement, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by Contractor or withheld from payment(s) to Contractor.

**1.8.7.** Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the Site to District, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to lien any portion of the Premises or any improvement or appurtenance thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivision, title to which is commonly retained by utility company or political subdivision. In the event of installation of any such metering device or equipment, Contractor shall advise District as to owner thereof.

**1.8.7.1.** If a lien or a claim based on a stop payment notice of any nature should at any time be filed against the Work or any District property, by any entity that has supplied material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by District and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or a claim based on a stop payment notice to be released or discharged immediately therefrom.

**1.8.7.2.** If the Contractor fails to furnish to the District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the District may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by District from any sum payable to Contractor under the Contract.

**1.8.8.** Nothing contained in this Article, however, shall defeat or impair the rights of persons furnishing materials or labor under any bond given by Contractor for their protection or any rights under any law permitting such protection or any rights under any law permitting such persons to look to funds due Contractor in hands of District (e.g., stop payment notices), and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

**1.8.9.** Title to new materials and/or equipment for the Work of this Contract and attendant liability for its protection and safety shall remain with Contractor until incorporated in the Work of this Contract and accepted by District. No part of any materials and/or equipment shall be removed from its place of storage except for immediate installation in the Work of this Contract. Should the District, in its discretion, allow the Contractor to store materials and/or equipment for the Work off-site, Contractor will store said materials and/or equipment at a bonded warehouse and with appropriate insurance coverage at no cost to District. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to District or its authorized representative and shall, at the District's request, forward it to the District.

## **2. [RESERVED]**

## **3. ARCHITECT**

**3.1.** The Architect shall represent the District during the Project and will observe the progress and quality of the Work on behalf of the District. Architect shall have the authority to act on behalf of District to the extent expressly provided in the Contract Documents and to the extent determined by District. Architect shall have authority to reject materials, workmanship, and/or the Work whenever rejection may be necessary, in Architect's reasonable opinion, to insure the proper execution of the Contract.

**3.2.** Architect shall, with the District and on behalf of the District, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the Specifications, Drawings, and shall, with the District, interpret all other Contract Documents.

**3.3.** Architect shall have all authority and responsibility established by law, including title 24 of the California Code of Regulations.

**3.4.** Contractor shall provide District and the Construction Manager with a copy of all written communication between Contractor and Architect at the same time as that communication is made to Architect, including, without limitation, all RFIs, correspondence, submittals, claims, and proposed change orders.

## **4. CONSTRUCTION MANAGER**

**4.1.** If a construction manager is used on this Project ("Construction Manager" or "CM"), the Construction Manager will provide administration of the Contract on the

District's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or District shall be forwarded through the Construction Manager. The Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures or for safety precautions in connection with the Work, which shall all remain the Contractor's responsibility.

**4.2.** The Construction Manager, however, will have authority to reject materials and/or workmanship not conforming to the Contract Documents, as determined by the District, the Architect, and/or the Project Inspector. The Construction Manager shall also have the authority to require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Any decision made by the Construction Manager, in good faith, shall not give rise to any duty or responsibility of the Construction Manager to the Contractor, any Subcontractor, their agents, employees, or other persons performing any of the Work. The Construction Manager shall have free access to any or all parts of Work at any time.

**4.3.** If the District does not use a Construction Manager on this Project, all references to Construction Manager or CM shall be read as District.

## **5. INSPECTOR, INSPECTIONS, AND TESTS**

### **5.1. Project Inspector**

**5.1.1.** One or more Project Inspector(s), including special Project Inspector(s), as required, will be assigned to the Work by District, in accordance with requirements of title 24, part 1, of the California Code of Regulations, to enforce the building code and monitor compliance with Plans and Specifications for the Project previously approved by the DSA. Duties of Project Inspector(s) are specifically defined in section 4-342 of said part 1 of title 24.

**5.1.2.** No Work shall be carried on except with the knowledge and under the inspection of the Project Inspector(s). The Project Inspector(s) shall have free access to any or all parts of Work at any time. Contractor shall furnish Project Inspector(s) reasonable opportunities for obtaining such information as may be necessary to keep Project Inspector(s) fully informed respecting progress and manner of work and character of materials, including, but not limited to, submission of form DSA 156 (or the most current version) to the Project Inspector at least 48 hours in advance of the commencement and completion of construction of each and every aspect of the Work. Forms are available on the DSA's website at: <http://www.dgs.ca.gov/dsa/Forms.aspx>. Inspection of Work shall not relieve Contractor from an obligation to fulfill this Contract. Project Inspector(s) and the DSA are authorized to stop work whenever the Contractor and/or its Subcontractor(s) are not complying with the Contract Documents. Any work stoppage by the Project Inspector(s) and/or DSA shall be without liability to the District. Contractor shall instruct its Subcontractors and employees accordingly.

**5.1.3.** If Contractor and/or any Subcontractor requests that the Project Inspector(s) perform any inspection off-site, this shall only be done if it is allowable

pursuant to applicable regulations and DSA, if the Project Inspector(s) agree to do so, and at the expense of the Contractor.

## **5.2. Tests and Inspections**

**5.2.1.** Tests and Inspections shall comply with title 24, part 1, California Code of Regulations, group 1, article 5, section 4-335, and with the provisions of the Specifications.

**5.2.2.** The District will select an independent testing laboratory to conduct the tests. Selection of the materials required to be tested shall be by the laboratory or the District's representative and not by the Contractor. The Contractor shall notify the District's representative a sufficient time in advance of its readiness for required observation or inspection.

**5.2.3.** The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents, which must by terms of the Contract Documents be tested, in order that the District may arrange for the testing of same at the source of supply. This notice shall be, at a minimum, seventy-two (72) hours prior to the manufacture of the material that needs to be tested.

**5.2.4.** Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated into and/or onto the Project.

**5.2.5.** The District will select and pay testing laboratory costs for all tests and inspections. Costs of tests of any materials found to be not in compliance with the Contract Documents shall be paid for by the District and reimbursed by the Contractor or deducted from the Contract Price.

## **5.3. Costs for After Hours and/or Off Site Inspections**

If the Contractor performs Work outside the Inspector's regular working hours or requests the Inspector to perform inspections off Site, costs of any inspections required outside regular working hours or off Site shall be borne by the Contractor and may be invoiced to the Contractor by the District or the District may deduct those expenses from the next Progress Payment.

## **6. CONTRACTOR**

Contractor shall construct the Work for the Contract price including any adjustment(s) to the Contract Price pursuant to provisions herein regarding changes to the Contract Price. Except as otherwise noted, Contractor shall provide and pay for all labor, materials, equipment, permits, fees, licenses, facilities, transportation, taxes, and services necessary for the proper execution and completion of the Work, except as indicated herein.

### **6.1. Status of Contractor**

**6.1.1.** Contractor is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it and its Subcontractors perform the services required of it by the Contract Documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the District, or any of the District's employees or agents, and Contractor or any of Contractor's Subcontractors, agents or employees. Contractor assumes exclusively the responsibility for the acts of its employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its Subcontractors, agents, and its employees shall not be entitled to any rights or privileges of District employees. District shall be permitted to monitor the Contractor's activities to determine compliance with the terms of this Contract.

**6.1.2.** As required by law, Contractor and all Subcontractors shall be properly licensed and regulated by the Contractor's State License Board 9821 Business Park Drive, Sacramento, California 95827, <http://www.cslb.ca.gov>.

**6.1.3.** As required by law, Contractor and all Subcontractors shall be properly registered as public works contractors by the Department of Industrial Relations at <https://efiling.dir.ca.gov/PWCR/> or current URL.

## **6.2. Project Inspection Card(s)**

Contractor shall verify that forms DSA 152 (or current version) are issued for the Project prior to the commencement of construction.

## **6.3. Contractor's Supervision**

**6.3.1.** During progress of the Work, Contractor shall keep on the Premises, and at all other locations where any Work related to the Contract is being performed, a competent project manager and construction superintendent who are employees of the Contractor, to whom the District does not object and at least one of whom shall be fluent in English, written and verbal.

**6.3.2.** The project manager and construction superintendent shall both speak fluently the predominant language of the Contractor's employees.

**6.3.3.** Before commencing the Work herein, Contractor shall give written notice to District of the name of its project manager and construction superintendent. Neither the Contractor's project manager nor construction superintendent shall be changed except with prior written notice to District, unless the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, District, any of the District's employees, agents, the Construction Manager, or the Architect, in which case, Contractor shall notify District in writing. The Contractor's project manager and construction superintendent shall each represent Contractor, and all directions given to Contractor's project manager and/or construction superintendent shall be as binding as if given to Contractor.

**6.3.4.** Contractor shall give efficient supervision to Work, using its best skill and attention. Contractor shall carefully study and compare all Contract Documents,

Drawings, Specifications, and other instructions and shall at once report to District, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to District's Project Inspector(s). The Contractor shall have responsibility for discovery of errors, inconsistencies, or omissions.

**6.4. Duty to Provide Fit Workers**

**6.4.1.** Contractor and Subcontractor(s) shall at all times enforce strict discipline and good order among their employees and shall not employ or work any unfit person or anyone not skilled in work assigned to that person. It shall be the responsibility of Contractor to ensure compliance with this requirement. District may require Contractor to permanently remove unfit persons from Project Site.

**6.4.2.** Any person in the employ of Contractor or Subcontractor(s) whom District may deem incompetent or unfit shall be excluded from working on the Project and shall not again be employed on the Project except with the prior written consent of District.

**6.4.3.** The Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

**6.4.4.** If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the District. The District shall determine if Contractor's intended change is permissible while performing this Contract.

**6.5. Field Office**

**6.5.1.** Contractor shall provide a temporary office on the Work Site for the District's use exclusively, during the term of the Contract.

**6.6. Purchase of Materials and Equipment**

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from District to assure that there will be no delays.



## **6.7. Documents On Work**

**6.7.1.** Contractor shall at all times keep on the Work Site, or at another location as the District may authorize in writing, one legible copy of all Contract Documents, including Addenda and Change Orders, and Titles 19 and 24 of the California Code of Regulations, the specified edition(s) of the Uniform Building Code, all approved Drawings, Plans, Schedules, and Specifications, and all codes and documents referred to in the Specifications, and made part thereof. These documents shall be kept in good order and available to District, Construction Manager, Architect, Architect's representatives, the Project Inspector(s), and all authorities having jurisdiction. Contractor shall be acquainted with and comply with the provisions of these titles as they relate to this Project. (See particularly the duties of Contractor, Title 24, Part 1, California Code of Regulations, section 4-343.) Contractor shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17. Contractor shall coordinate with Architect and Construction Manager and shall submit its verified report(s) according to the requirements of Title 24.

### **6.7.2. Daily Job Reports.**

**6.7.2.1.** Contractor shall maintain, at a minimum, at least one (1) set of Daily Job Reports on the Project. These must be prepared by the Contractor's employee(s) who are present on Site, and must include, at a minimum, the following information:

- 6.7.2.1.1.** A brief description of all Work performed on that day.
- 6.7.2.1.2.** A summary of all other pertinent events and/or occurrences on that day.
- 6.7.2.1.3.** The weather conditions on that day.
- 6.7.2.1.4.** A list of all Subcontractor(s) working on that day,
- 6.7.2.1.5.** A list of each Contractor employee working on that day and the total hours worked for each employee.
- 6.7.2.1.6.** A complete list of all equipment on Site that day, whether in use or not.
- 6.7.2.1.7.** All complete list of all materials, supplies, and equipment delivered on that day.
- 6.7.2.1.8.** A complete list of all inspections and tests performed on that day.

**6.7.2.2.** Each day Contractor shall provide a copy of the previous day's Daily Job Report to the District or the Construction Manager.

## **6.8. Preservation of Records**

The District shall have the right to examine and audit all Daily Job Reports or other Project records of Contractor's project manager(s), project superintendent(s), and/or project foreperson(s), all certified payroll records and/or related documents including, without limitation, payroll, payment, timekeeping and tracking documents; all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of the Contractor, any Subcontractor, and/or supplier,

including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to the District. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the District. The Contractor shall make available at its office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until three (3) years after final payment under this Contract. Notwithstanding the provisions above, Contractor shall provide any records requested by any governmental agency, if available, after the time set forth above.

## **6.9. Integration of Work**

**6.9.1.** Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive or be received by work of other contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as District and/or Architect may direct.

**6.9.2.** Contractor shall make its own layout of lines and elevations and shall be responsible for the accuracy of both Contractor's and Subcontractors' work resulting therefrom.

**6.9.3.** Contractor and all Subcontractors shall take all field dimensions required in performance of the Work, and shall verify all dimensions and conditions on the Site. All dimensions affecting proper fabrication and installation of all Work must be verified prior to fabrication by taking field measurements of the true conditions. If there are any discrepancies between dimensions in drawings and existing conditions which will affect the Work, Contractor shall bring such discrepancies to the attention of the District and Architect for adjustment before proceeding with the Work. In doing so, it is recognized that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is made in good faith to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from Contractor, the District and/or Architect shall inform Contractor what action, if any, Contractor shall take with regard to such discrepancies

**6.9.4.** All cost caused by defective or ill-timed Work shall be borne by Contractor, inclusive of repair work.

**6.9.5.** Contractor shall not endanger any work performed by it or anyone else by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor except with consent of District.

## **6.10. Notifications**

**6.10.1.** Contractor shall notify the Architect and Project Inspector, in writing, of the commencement of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project

Inspector. Forms are available on the DSA's website at:  
<http://www.dgs.ca.gov/dsa/Forms.aspx>.

**6.10.2.** Contractor shall notify the Architect and Project Inspector, in writing, of the completion of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project Inspector.

### **6.11. Obtaining of Permits, Licenses and Registration**

Contractor shall secure and pay for all permits, licenses, registrations and certificates necessary for prosecution of Work, including but not limited to those listed in the Special Conditions, if any, before the date of the commencement of the Work or before the permits, licenses, registrations and certificates are legally required to continue the Work without interruption. The Contractor shall obtain and pay, only when legally required, for all licenses, registrations, permits, inspections, and inspection certificates required to be obtained from or issued by any authority having jurisdiction over any part of the Work included in the Contract. All final permits, licenses, and certificates shall be delivered to District before demand is made for final payment.

### **6.12. Royalties and Patents**

**6.12.1.** Contractor shall obtain and pay, only when legally required, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date that the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold the District, the Architect, and the Construction Manager harmless and indemnify them from loss on account thereof except when a particular design, process, or make or model of product is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent or copyright, the Contractor shall indemnify and defend the District, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the District of its information.

**6.12.2.** The review by the District or Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be only its adequacy for the Work and shall not approve use by the Contractor in violation of any patent or other rights of any person or entity.

### **6.13. Work to Comply With Applicable Laws and Regulations**

**6.13.1.** Contractor shall give all notices and comply with the following specific laws, ordinances, rules, and regulations and all other applicable laws, ordinances, rules, and regulations bearing on conduct of Work as indicated and specified, including but not limited to the appropriate statutes and administrative code sections. If Contractor observes that Drawings and Specifications are at variance therewith, or should Contractor become aware of the development of conditions not covered by Contract Documents that will result in finished Work being at variance

therewith, Contractor shall promptly notify District in writing and any changes deemed necessary by District shall be made as provided in Contract for changes in Work.

- 6.13.1.1.** National Electrical Safety Code, U. S. Department of Commerce
- 6.13.1.2.** National Board of Fire Underwriters' Regulations
- 6.13.1.3.** Uniform Building Code, latest addition, and the California Code of Regulations, title 24, and other amendments
- 6.13.1.4.** Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America
- 6.13.1.5.** Industrial Accident Commission's Safety Orders, State of California
- 6.13.1.6.** Regulations of the State Fire Marshall (title 19, California Code of Regulations) and Pertinent Local Fire Safety Codes
- 6.13.1.7.** Americans with Disabilities Act
- 6.13.1.8.** Education Code of the State of California
- 6.13.1.9.** Government Code of the State of California
- 6.13.1.10.** Labor Code of the State of California, division 2, part 7, Public Works and Public Agencies
- 6.13.1.11.** Public Contract Code of the State of California
- 6.13.1.12.** California Art Preservation Act
- 6.13.1.13.** U. S. Copyright Act
- 6.13.1.14.** U. S. Visual Artists Rights Act

**6.13.2.** Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act (Public Resources Code section 21000 et seq.)

**6.13.3.** If Contractor performs any Work that it knew, or through exercise of reasonable care should have known, to be contrary to any applicable laws, ordinance, rules, or regulations, Contractor shall bear all costs arising therefrom.

**6.13.4.** Where Specifications or Drawings state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, Contractor shall be responsible for satisfying requirements of such bodies or agencies.

#### **6.14. Safety/Protection of Persons and Property**

**6.14.1.** The Contractor will be solely and completely responsible for conditions of the Work Site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours.

**6.14.2.** The wearing of hard hats will be mandatory at all times for all personnel on Site. Contractor shall supply sufficient hard hats to properly equip all employees and visitors.

**6.14.3.** Any construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work Site.

**6.14.4.** Implementation and maintenance of safety programs shall be the sole responsibility of the Contractor.

**6.14.5.** The Contractor shall furnish to the District a copy of the Contractor's safety plan within the time frame indicated in the Contract Documents and specifically adapted for the Project.

**6.14.6.** Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and completion and final acceptance by District. All Work shall be solely at Contractor's risk with the exception of damage to the Work caused by "acts of God" as defined in Public Contract Code section 7105.

**6.14.7.** Contractor shall take, and require Subcontractors to take, all necessary precautions for safety of workers on the Project and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction.

**6.14.8.** Hazards Control – Contractor shall store volatile wastes in covered metal containers and remove them from the Site daily. Contractor shall prevent accumulation of wastes that create hazardous conditions. Contractor shall provide adequate ventilation during use of volatile or noxious substances.

**6.14.9.** Contractor shall designate a responsible member of its organization on the Project, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Name and position of person so designated shall be reported to District by Contractor.

**6.14.10.** Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, Contractor shall correct such violation promptly.

**6.14.11.** Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

**6.14.12.** In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization, shall act, at its discretion, to prevent such threatened loss or injury. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

**6.14.13.** All salvage materials will become the property of the Contractor and shall be removed from the Site unless otherwise called for in the Contract Documents. However, the District reserves the right to designate certain items of value that shall be turned over to the District unless otherwise directed by District.

**6.14.14.** All connections to public utilities and/or existing on-site services shall be made and maintained in such a manner as to not interfere with the continuing use of same by the District during the entire progress of the Work.

**6.14.15.** Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions, such as extreme heat, cold, rain, snow, dry winds, flooding, or dampness.

**6.14.16.** The Contractor shall protect and preserve the Work from all damage or accident, providing any temporary roofs, window and door coverings, boxings, or other construction as required by the Architect. The Contractor shall be responsible for existing structures, walks, roads, trees, landscaping, and/or improvements in working areas; and shall provide adequate protection therefor. If temporary removal is necessary of any of the above items, or damage occurs due to the Work, the Contractor shall replace same at his expense with same kind, quality, and size of Work or item damaged. This shall include any adjoining property of the District and others.

**6.14.17.** Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property, and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

**6.14.18.** Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of Architect, and shall not interfere with the Work or unreasonably encumber Premises or overload any structure with materials. Contractor shall enforce all instructions of District and Architect regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site.

**6.14.19.** Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, or any person associated with the Work shall conduct themselves in a manner appropriate for a school site. No verbal or physical contact with neighbors, students, and faculty, profanity, or inappropriate attire or behavior will be permitted. District may require Contractor to permanently remove non-complying persons from Project Site.

**6.14.20.** Contractor shall take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed, Contractor shall have a civil engineer, registered as a professional engineer in California, replace them at no cost to District.

**6.14.21.** In the event that the Contractor enters into any agreement with owners of any adjacent property to enter upon the adjacent property for the purpose of performing the Work, Contractor shall fully indemnify, defend, and hold harmless each person, entity, firm, or agency that owns or has any interest in adjacent property. The form and content of the agreement of indemnification shall be approved by the District prior to the commencement of any Work on or about the adjacent property. The Contractor shall also indemnify the District as provided in the indemnification provision herein. These provisions shall be in addition to any other requirements of the owners of the adjacent property.

#### **6.15. Working Evenings and Weekends**

Contractor may be required to work evenings and/or weekends at no additional cost to the District. Contractor shall give the District seventy-two (72) hours notice prior to performing any evening and/or weekend work. Contractor shall perform all evening and/or weekend work only upon District's approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations. Contractor shall reimburse the District for any Inspector charges necessitated by the Contractor's evening and/or weekend work.

#### **6.16. Cleaning Up**

**6.16.1.** The Contractor shall provide all services, labor, materials, and equipment necessary for protecting the Work, all school occupants, furnishings, equipment, and building structure from damage until its completion and final acceptance by District. Dust barriers shall be provided to isolate dust and dirt from construction operations. At completion of the Work and portions thereof, Contractor shall clean to the original state any areas beyond the Work area that become dust laden as a result of the Work. The Contractor must erect the necessary warning signs and barricades to ensure the safety of all school occupants. The Contractor at all times must maintain good housekeeping practices to reduce the risk of fire damage and must make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

**6.16.2.** Contractor at all times shall keep Premises free from debris such as waste, rubbish, and excess materials and equipment caused by the Work. Contractor shall not leave debris under, in, or about the Premises, but shall promptly remove same from the Premises on a daily basis. If Contractor fails to clean up, District may do so and the cost thereof shall be charged to Contractor. If Contract is for work on an existing facility, Contractor shall also perform specific clean-up on or about the Premises upon request by the District as it deems necessary for the continuing education process. Contractor shall comply with all related provisions of the Specifications.

**6.16.3.** If the Construction Manager, Architect, or District observes the accumulation of trash and debris, the District will give the Contractor a 24-hour written notice to mitigate the condition.

**6.16.4.** Should the Contractor fail to perform the required clean-up, or should the clean-up be deemed unsatisfactory by the District, the District will then perform the clean-up. All cost associated with the clean-up work (including all travel, payroll burden, and costs for supervision) will be deducted from the Contract Price, or District may withhold those amounts from payment(s) to Contractor.

## **7. SUBCONTRACTORS**

**7.1.** Contractor shall provide the District with information for all Subcontracts as indicated in the Contractor's Submittals and Schedules Section herein.

**7.2.** No contractual relationship exists between the District and any Subcontractor, supplier, or sub-subcontractor by reason of this Contract.

**7.3.** Contractor agrees to bind every Subcontractor by terms of this Contract as far as those terms are applicable to Subcontractor's work including, without limitation, all labor, wage & hour, apprentice and related provisions and requirements. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to District for acts and omissions of any Subcontractor and of persons either directly or indirectly employed by any Subcontractor, as it is for acts and omissions of persons directly employed by Contractor. The divisions or sections of the Specifications are not intended to control the Contractor in dividing the Work among Subcontractors or limit the work performed by any trade.

**7.4.** District's consent to, or approval of, or failure to object to, any Subcontractor under this Contract shall not in any way relieve Contractor of any obligations under this Contract and no such consent shall be deemed to waive any provisions of this Contract.

**7.5.** Contractor is directed to familiarize itself with sections 4100 through 4114 of the Public Contract Code of the State of California, as regards subletting and subcontracting, and to comply with all applicable requirements therein. In addition, Contractor is directed to familiarize itself with sections 1720 through 1861 of the Labor Code of the State of California, as regards the payment of prevailing wages and related issues, and to comply with all applicable requirements therein all including, without limitation, section 1775 and the Contractor's and Subcontractors' obligations and liability for violations of prevailing wage law and other applicable laws.

**7.6.** No Contractor whose Bid is accepted shall, without consent of the awarding authority and in full compliance with section 4100, et seq. of the Public Contract Code, and section 1771.1 of the Labor Code, including, without limitation, sections 4107, 4107.5, and 4109 of the Public Contract Code, either:

**7.6.1.** Substitute any person as a Subcontractor in place of the Subcontractor designated in the original Bid; or

**7.6.2.** Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the original Subcontractor listed in the Bid; or



**7.6.3.** Sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor's total bid as to which his original bid did not designate a Subcontractor.

**7.7.** The Contractor shall be responsible for the coordination of the trades, Subcontractors, sub-subcontractors, and material or equipment suppliers working on the Project.

**7.7.1.** [Reserved].

**7.7.2.** Contractor is responsible for ensuring that all Subcontractors are properly registered as public works contractors by the Department of Industrial Relations.

**7.8.** Contractor is solely responsible for settling any differences between the Contractor and its Subcontractor(s) or between Subcontractors.

**7.9.** Contractor must include in all of its subcontracts the assignment provisions as indicated in the Termination section of these General Conditions.

**8. OTHER CONTRACTS/CONTRACTORS**

**8.1.** District reserves the right to let other contracts, and/or to perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly coordinate and connect Contractor's Work with the work of other contractors.

**8.2.** In addition to Contractor's obligation to protect its own Work, Contractor shall protect the work of any other contractor that Contractor encounters while working on the Project.

**8.3.** If any part of Contractor's Work depends for proper execution or results upon work of District or any other contractor, the Contractor shall inspect and promptly report to the District in writing before proceeding with its Work any defects in District's or any other contractor's work that render Contractor's Work unsuitable for proper execution and results. Contractor shall be held accountable for damages to District for District's or any other contractor's work that Contractor failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute Contractor's acceptance of all District's or any other contractor's work as fit and proper for reception of Contractor's Work, except as to defects that may develop in District's or any other contractor's work after execution of Contractor's Work.

**8.4.** To ensure proper execution of its subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the District in writing any discrepancy between that executed work and the Contract Documents.

**8.5.** Contractor shall ascertain to its own satisfaction the scope of the Project and nature of District's or any other contracts that have been or may be awarded by District in prosecution of the Project to the end that Contractor may perform this Contract in light of the other contracts, if any.

**8.6.** Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy of the Site, the Premises, or of the Project. Contractor shall not cause any unnecessary hindrance or delay to the use and/or school operation(s) of the Premises and/or to District or any other contractor working on the Project. If simultaneous execution of any contract or school operation is likely to cause interference with performance of Contractor's Contract, Contractor shall coordinate with those contractor(s), person(s), and/or entity(s) and shall notify the District of the resolution.

## **9. DRAWINGS AND SPECIFICATIONS**

**9.1.** A complete list of all Drawings that form a part of the Contract is to be found as an index on the Drawings themselves, and/or may be provided to the Contractor and/or in the Table of Contents.

**9.2.** Materials or Work described in words that so applied have a well known technical or trade meaning shall be deemed to refer to recognized standards, unless noted otherwise.

**9.3. Trade Name or Trade Term.** It is not the intention of this Contract to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of "trade name" or "trade term" shall be considered a sufficient notice to Contractor that it will be required to complete the work so named, complete, finished, and operable, with all its appurtenances, according to the best practices of the trade.

**9.4.** The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

**9.5.** Contract Documents are complementary, and what is called for by one shall be binding as if called for by all. As such, Drawings and Specifications are intended to be fully cooperative and to agree. However, if Contractor observes that Drawings and Specifications are in conflict, Contractor shall promptly notify District and Architect in writing, and any necessary changes shall be made as provided in the Contract Documents.

**9.6.** In the case of discrepancy or ambiguity in the Contract Documents, the order of precedence in the Agreement shall prevail. However, in the case of discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide District with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, District will furnish clarifications with reasonable promptness.

**9.7.** Drawings and Specifications are intended to comply with all laws, ordinances, rules, and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, the laws, ordinances, rules, and regulations shall be

considered as a part of the Contract within the limits specified. Contractor shall bear all expense of correcting work done contrary to said laws, ordinances, rules, and regulations.

#### **9.8. Ownership of Drawings**

All copies of Plans, Drawings, Designs, Specifications, and copies of other incidental architectural and engineering work, or copies of other Contract Documents furnished by District, are the property of District. They are not to be used by Contractor in other work and, with the exception of signed sets of Contract Documents, are to be returned to District on request at completion of Work, or may be used by District as it may require without any additional costs to District. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. District hereby grants the Contractor, Subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings prepared for the Project in the execution of their Work under the Contract Documents.

### **10. CONTRACTOR'S SUBMITTALS AND SCHEDULES**

Contractor's submittals shall comply with the provisions and requirements of the Specifications including, without limitation Submittals.

#### **10.1. Schedule of Work, Schedule of Submittals, and Schedule of Values**

**10.1.1.** Within **TEN (10)** calendar days after the date of the Notice to Award (unless otherwise specified in the Specifications), the Contractor shall prepare and submit to the District for review, in a form supported by sufficient data to substantiate its accuracy as the District may require:

**10.1.1.1. Preliminary Schedule.** A preliminary schedule of construction indicating the starting and completion dates of the various stages of the Work, including any information and following any form as may be specified in the Specifications. Once approved by District, this shall become the Construction Schedule. This schedule shall include and identify all tasks that are on the Project's critical path with a specific determination of the start and completion of each critical path task as well as all Contract milestones and each milestone's completion date(s) as may be required by the District.

**10.1.1.2. Preliminary Schedule of Values.** A preliminary schedule of values for all of the Work, which must include quantities and prices of items aggregating the Contract Price and must subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Unless the Special Conditions contain different limits, this preliminary schedule of values shall include, at a minimum, the following information and the following structure:

**10.1.1.2.1.** Divided into at least the following categories:

**10.1.1.2.1.1.** Overhead and profit;

- 10.1.1.2.1.2.** Supervision;
- 10.1.1.2.1.3.** General conditions;
- 10.1.1.2.1.4.** Layout;
- 10.1.1.2.1.5.** Mobilization;
- 10.1.1.2.1.6.** Submittals;
- 10.1.1.2.1.7.** Bonds and insurance;
- 10.1.1.2.1.8.** Close-out/Certification documentation;
- 10.1.1.2.1.9.** Demolition;
- 10.1.1.2.1.10.** Installation;
- 10.1.1.2.1.11.** Rough-in;
- 10.1.1.2.1.12.** Finishes;
- 10.1.1.2.1.13.** Testing;
- 10.1.1.2.1.14.** Punchlist and acceptance.

**10.1.1.2.2.** Divided by each of the following areas:

- 10.1.1.2.2.1.** Site work;
- 10.1.1.2.2.2.** By each building;
- 10.1.1.2.2.3.** By each floor.

**10.1.1.2.3.** The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

- 10.1.1.2.3.1.** Mobilization and layout combined to equal not more than 1%;
- 10.1.1.2.3.2.** Submittals, samples and shop drawings combined to equal not more than 3%;
- 10.1.1.2.3.3.** Bonds and insurance combined to equal not more than 2%.

**10.1.1.2.4.** Closeout documentation shall have a value in the preliminary schedule of not less than 5%.

**10.1.1.2.5.** Notwithstanding any provision of the Contract Documents to the contrary, payment of the Contractor's overhead, supervision, general conditions costs, and profit, as reflected in the Cost Breakdown, shall be paid based on percentage complete, with the disbursement of Progress Payments and the Final Payment.

**10.1.1.2.6.** Contractor shall certify that the preliminary schedule of values as submitted to the District is accurate and reflects the costs as developed in preparing Contractor's bid. The preliminary schedule of values shall be subject to the District's review and approval of the form and content thereof. In the event that the District objects to any portion of the preliminary schedule of values, the District shall notify the Contractor, in writing, of the District's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the District's written objection(s), Contractor shall submit a revised preliminary schedule of values to the District for review and approval. The foregoing procedure for the preparation, review and approval of

the preliminary schedule of values shall continue until the District has approved the entirety of the preliminary schedule of values.

**10.1.1.2.7.** Once the preliminary schedule of values is approved by the District, this shall become the Schedule of Values. The Schedule of Values shall not be thereafter modified or amended by the Contractor without the prior consent and approval of the District, which may be granted or withheld in the sole discretion of the District.

**10.1.1.3.** Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by District, this shall become the Submittal Schedule. All submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those submittals shall be forwarded to the District so as not to delay the Construction Schedule. Upon request by the District, Contractor shall provide an electronic copy of all submittals to the District.

**10.1.1.4.** Safety Plan. Contractor's Safety Plan specifically adapted for the Project. Contractor's Safety Plan shall comply with the following requirements:

**10.1.1.4.1.** All applicable requirements of California Division of Industrial Safety ("CalOSHA") and/or of the United States Occupational Safety and Health Administration ("OSHA").

**10.1.1.4.2.** All provisions regarding Project safety, including all applicable provisions in these General Conditions.

**10.1.1.4.3.** Contractor's Safety Plan shall be in English and in the language(s) of the Contractor's and its Subcontractors' employees.

**10.1.1.5.** Complete Subcontractor List. The name, address, telephone number, facsimile number, California State Contractors License number, classification, and monetary value of all Subcontracts for parties furnishing labor, material, or equipment for completion of the Project.

**10.1.2.** Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

**10.1.3.** The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

**10.1.4.** The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

**10.1.5.** All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

**10.2. Monthly Progress Schedule(s)**

**10.2.1.** Contractor shall provide Monthly Progress Schedule(s) to the District. A Monthly Progress Schedule shall update the approved Construction Schedule or the last Monthly Progress Schedule, showing all work completed and to be completed. The monthly Progress Schedule shall be sent within the timeframe requested by the District and shall be in a format acceptable to the District and contain a written narrative of the progress of work that month and any changes, delays, or events that may affect the work. The process for District approval of the Monthly Progress Schedule shall be the same as the process for approval of the Construction Schedule.

**10.2.2.** Contractor shall submit Monthly Progress Schedule(s) with all payment applications.

**10.3. Material Safety Data Sheets (MSDS)**

Contractor is required to ensure Material Safety Data Sheets are available in a readily accessible place at the Work Site for any material requiring a Material Safety Data Sheet per the Federal "Hazard Communication" standard, or employees right to know law. The Contractor is also required to ensure proper labeling on substance brought onto the job site and that any person working with the material or within the general area of the material is informed of the hazards of the substance and follows proper handling and protection procedures. Two additional copies of the Material Safety Data Sheets shall also be submitted directly to the District.

**11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS**

**11.1. Site Investigation**

Before bidding on this Work, Contractor shall make a careful investigation of the Site and thoroughly familiarize itself with the requirements of the Contract. By the act of submitting a bid for the Work included in this Contract, Contractor shall be deemed to have made a complete study and investigation, and to be familiar with and accepted the existing conditions of the Site.

Prior to commencing the Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey. This electronic record shall serve as a basis for determining any damages caused by the Contractor during the Project. The Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

**11.2. Soils Investigation Report**

**11.2.1.** When a soils investigation report obtained from test holes at Site is available, that report shall be available to the Contractor but shall not be a part of this Contract. Any information obtained from that report or any information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, does not form a part of this Contract, and Contractor may not rely thereon. By submitting its bid, Contractor acknowledges that it has made visual examination of Site and has made whatever tests Contractor deems appropriate to determine underground condition of soil.

**11.2.2.** Contractor agrees that no claim against District will be made by Contractor for damages and hereby waives any rights to damages if, during progress of Work, Contractor encounters subsurface or latent conditions at Site materially differing from those shown on Drawings or indicated in Specifications, or for unknown conditions of an unusual nature that differ materially from those ordinarily encountered in the work of the character provided for in Plans and Specifications, except as indicated in the provisions of these General Conditions regarding trenches, trenching, and/or existing utility lines.

### **11.3. Access to Work**

District and its representatives shall at all times have access to Work wherever it is in preparation or progress, including storage and fabrication. Contractor shall provide safe and proper facilities for such access so that District's representatives may perform their functions.

### **11.4. Layout and Field Engineering**

**11.4.1.** All field engineering required for layout of this Work and establishing grades for earthwork operations shall be furnished by Contractor at its expense. This Work shall be done by a qualified, California-registered civil engineer approved in writing by District and Architect. Any required Record and/or As-Built Drawings of Site development shall be prepared by the approved civil engineer.

**11.4.2.** The Contractor shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the Site and for having satisfied itself as to the conditions under which the Work is to be performed. Contractor shall follow best practices, including but not limited to pot holing to avoid utilities. District shall not be liable for any claim for allowances because of Contractor's error, failure to follow best practices, or negligence in acquainting itself with the conditions at the Site.

**11.4.3.** Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the prior written approval of District. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of District and with District's approval.

### **11.5. Utilities**

Utilities shall be provided as indicated in the Specifications.

**11.6. Sanitary Facilities**

Sanitary facilities shall be provided as indicated in the Specifications.

**11.7. Surveys**

Contractor shall provide surveys done by a California-licensed civil engineer surveyor to determine locations of construction, grading, and site work as required to perform the Work.

**11.8. Regional Notification Center**

The Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement that is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and/or carried out by the Contractor unless an inquiry identification number has been assigned to the Contractor or any Subcontractor and the Contractor has given the District the identification number. Any damages arising from Contractor's failure to make appropriate notification shall be at the sole risk and expense of the Contractor. Any delays caused by failure to make appropriate notification shall be at the sole risk of the Contractor and shall not be considered for an extension of the Contract time.

**11.9. Existing Utility Lines**

**11.9.1.** Pursuant to Government Code section 4215, District assumes the responsibility for removal, relocation, and protection of main or trunk utility lines and facilities located on the construction Site at the time of commencement of construction under this Contract with respect to any such utility facilities that are not identified in the Plans and Specifications. Contractor shall not be assessed for liquidated damages for delay in completion of the Project caused by failure of District or the owner of a utility to provide for removal or relocation of such utility facilities.

**11.9.2.** Locations of existing utilities provided by District shall not be considered exact, but approximate within reasonable margin and shall not relieve Contractor of responsibilities to exercise reasonable care costs of repair due to Contractor's failure to do so. District shall compensate Contractor for the costs of locating, repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during such work.

**11.9.3.** No provision herein shall be construed to preclude assessment against Contractor for any other delays in completion of the Work. Nothing in this Article shall be deemed to require District to indicate the presence of existing service laterals, appurtenances, or other utility lines, within the exception of main or trunk



utility lines. Whenever the presence of these utilities on the Site of the construction Project can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the Site of the construction.

**11.9.4.** If Contractor, while performing Work under this Contract, discovers utility facilities not identified by District in Contract Plans and Specifications, Contractor shall immediately notify the District and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the District shall be borne by the Contractor.

**11.10. Notification**

Contractor understands, acknowledges and agrees that the purpose for prompt notification to the District pursuant to these provisions is to allow the District to investigate the condition(s) so that the District shall have the opportunity to decide how the District desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the District in writing, pursuant to these provisions, shall constitute Contractor's waiver of any claim for damages or delay incurred as a result of the condition(s).

**11.11. Hazardous Materials**

Contractor shall comply with all provisions and requirements of the Contract Documents related to hazardous materials including, without limitation, Hazardous Materials Procedures and Requirements.

**11.12. No Signs**

Neither the Contractor nor any other person or entity shall display any signs not required by law or the Contract Documents at the Site, fences trailers, offices, or elsewhere on the Site without specific prior written approval of the District.

**12. TRENCHES**

**12.1. Trenches Greater Than Five Feet**

Pursuant to Labor Code section 6705, if the Contract Price exceeds \$25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, promptly submit to the District and/or a registered civil or structural engineer employed by the District or Architect, a detailed plan, stamped by a licensed engineer retained by the Contractor, showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

**12.2. Excavation Safety**

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said

plan has been accepted by the District or by the person to whom authority to accept has been delegated by the District.

**12.3. No Tort Liability of District**

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the District or any of its employees.

**12.4. No Excavation Without Permits**

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CAL OSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

**12.5. Discovery of Hazardous Waste and/or Unusual Conditions**

**12.5.1.** Pursuant to Public Contract Code section 7104, if the Work involves digging trenches or other excavations that extend deeper than four feet below the Surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:

**12.5.1.1.** Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

**12.5.1.2.** Subsurface or latent physical conditions at the Site differing from those indicated.

**12.5.1.3.** Unknown physical conditions at the Site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

**12.5.2.** The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work, shall issue a Change Order under the procedures described herein.

**12.5.3.** In the event that a dispute arises between District and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law that pertain to the resolution of disputes and protests.

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**13. INSURANCE AND BONDS****13.1. Insurance**

Unless different provisions and/or limits are indicated in the Special Conditions, all insurance required of Contractor and/or its Subcontractor(s) shall be in the amounts and include the provisions set forth herein.

**13.1.1. Commercial General Liability and Automobile Liability Insurance**

**13.1.1.1.** Contractor shall procure and maintain, during the life of this Contract, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from operations under this Contract. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 0001 11188. Contractor shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability, and Any Auto including owned, non-owned, and hired, are included within the above policies and at the required limits, or Contractor shall procure and maintain these coverages separately.

**13.1.1.2.** Contractor's deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed \$25,000 unless approved in writing by District.

**13.1.1.3.** All such policies shall be written on an occurrence form.

**13.1.2. Excess Liability Insurance**

**13.1.2.1.** Contractor may procure and maintain, during the life of this Contract, an Excess Liability Insurance Policy to meet the policy limit requirements of the required policies if Contractor's underlying policy limits are less than required.

**13.1.2.2.** There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Excess Liability Insurance Policy. Any Umbrella or Excess Liability Insurance Policy shall be written on a following form and shall protect Contractor, District, State, Construction Manager(s), Project Manager(s), and Architect(s) in amounts and including the provisions as set forth in the Supplementary Conditions (if any) and/or Special Conditions, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

**13.1.3. Subcontractor(s):** Contractor shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part the insurance required herein by procuring and maintaining an Excess Liability

Insurance Policy) with forms of coverage and limits equal to the amounts required of the Contractor.

**13.1.4. Workers' Compensation and Employers' Liability Insurance**

**13.1.4.1.** In accordance with provisions of section 3700 of the California Labor Code, the Contractor and every Subcontractor shall be required to secure the payment of compensation to its employees.

**13.1.4.2.** Contractor shall procure and maintain, during the life of this Contract, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in work under this Contract, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Contractor shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Contractor's insurance. If any class of employee or employee engaged in Work under this Contract, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Contractor shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence work.

**13.1.5. Builder's Risk Insurance: Builder's Risk "All Risk" Insurance**

Contractor shall procure and maintain, during the life of this Contract, Builder's Risk (Course of Construction), or similar first party property coverage acceptable to the District, issued on a replacement cost value basis. The cost shall be consistent with the total replacement cost of all insurable Work of the Project included within the Contract Documents. Coverage is to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall include debris removal, demolition, increased costs due to enforcement of all applicable ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.

**13.1.6. Pollution Liability Insurance**

**13.1.6.1.** Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Contract, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution

conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 2415, or Contractor shall procure and maintain these coverages separately.

**13.1.6.2.** Contractor shall warrant that any retroactive date applicable to coverage under the policy predates the effective date of the Contract and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

**13.1.6.3.** If Contractor is responsible for removing any pollutants from a site, then Contractor shall ensure that Any Auto, including owned, non-owned, and hired, are included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

**13.1.7. Proof of Carriage of Insurance and Other Requirements: Endorsements and Certificates**

**13.1.7.1.** Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract, until Contractor and its Subcontractor(s) have procured all required insurance and Contractor has delivered in duplicate to the District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District has approved these documents.

**13.1.7.2.** Endorsements, certificates, and insurance policies shall include the following:

**13.1.7.2.1.** A clause stating:

“This policy shall not be amended, canceled or modified and the coverage amounts shall not be reduced until notice has been mailed to District, Architect, and Construction Manager stating date of amendment, modification, cancellation or reduction. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.”

**13.1.7.2.2.** Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

**13.1.7.3.** All endorsements, certificates and insurance policies shall state that District, its trustees, employees and agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named

additional insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

**13.1.7.4.** Insurance written on a "claims made" basis is to be renewed by the Contractor and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Agreement. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Agreement, and will cover the Contractor and all Subcontractors for all claims made.

**13.1.7.5.** Contractor's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District, its trustees, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

**13.1.7.6.** All endorsements shall waive any right to subrogation against any of the named additional insureds.

**13.1.7.7.** Unless otherwise stated in the Special Conditions, all of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than **A: VII.**

**13.1.7.8.** The insurance requirements set forth herein shall in no way limit the Contractor's liability arising out of or relating to the performance of the Work or related activities.

**13.1.7.9.** Failure of Contractor and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Agreement.

**13.1.8. Insurance Policy Limits**

Unless different limits are indicated in the Special Conditions, the limits of insurance shall not be less than the following amounts:

<b>Commercial General Liability</b>	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	<b>\$2,000,000 per occurrence; \$4,000,000 aggregate</b>
<b>Automobile Liability – Any Auto</b>	Combined Single Limit	\$1,000,000
<b>Workers Compensation</b>		Statutory limits pursuant to State law
<b>Employers’ Liability</b>		\$1,000,000
<b>Builder’s Risk (Course of Construction)</b>		Issued for the value and scope of Work indicated herein.
<b>Pollution Liability</b>		\$1,000,000 per claim; \$2,000,000 aggregate

**13.2. Contract Security - Bonds**

**13.2.1.** Contractor shall furnish two surety bonds issued by a California admitted surety insurer as follows:

**13.2.1.1. Performance Bond:** A bond in an amount at least equal to one hundred percent (100%) of Contract Price as security for faithful performance of this Contract.

**13.2.1.2. Payment Bond:** A bond in an amount at least equal to one hundred percent (100%) of the Contract Price as security for payment of persons performing labor and/or furnishing materials in connection with this Contract.

**13.2.2.** Cost of bonds shall be included in the Bid and Contract Price.

**13.2.3.** All bonds related to this Project shall be in the forms set forth in these Contract Documents and shall comply with all requirements of the Contract Documents, including, without limitation, the bond forms.

**14. WARRANTY/GUARANTEE/INDEMNITY**

**14.1. Warranty/Guarantee**

**14.1.1.** The Contractor shall obtain and preserve for the benefit of the District, manufacturer’s warranties on materials, fixtures, and equipment incorporated into the Work.

**14.1.2.** In addition to guarantees required elsewhere, Contractor shall, and hereby does guarantee and warrant all Work furnished on the job against all defects for a period of **ONE (1)** year after the later of the following dates:

**14.1.2.1.** The date of completion as defined in Public Contract Code section 7107, subdivision (c), or

**14.1.2.2.** The commissioning date for the Project, if any.

At the District's sole option, Contractor shall repair or replace any and all of that Work, together with any other Work that may be displaced in so doing, that may prove defective in workmanship and/or materials within a **ONE (1)** year period from date of completion as defined above without expense whatsoever to District. In the event of failure of Contractor and/or Surety to commence and pursue with diligence said replacements or repairs within ten (10) days after being notified in writing, Contractor and Surety hereby acknowledge and agree that District is authorized to proceed to have defects repaired and made good at expense of Contractor and/or Surety who hereby agree to pay costs and charges therefore immediately on demand.

**14.1.3.** If, in the opinion of District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to District or to prevent interruption of operations of District, District will attempt to give the notice required above. If Contractor or Surety cannot be contacted or neither complies with District's request for correction within a reasonable time as determined by District, District may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the District believes are necessary. The costs of correction or attention shall be charged against Contractor and Surety of the guarantees provided in this Article or elsewhere in this Contract.

**14.1.4.** The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to District all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by District.

**14.1.5.** Nothing herein shall limit any other rights or remedies available to District.

## **14.2. Indemnity**

**14.2.1.** To the furthest extent permitted by California law, the Contractor shall indemnify, defend with legal counsel reasonably acceptable to the District, keep and hold harmless the District, the Architect, and the Construction Manager, their consultants and separate contractors, and their respective board members, officers, representatives, contractors, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, damages, losses, and expenses, including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or to



any extent that would render these provisions void or unenforceable. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist as to any party or person described herein. This indemnification, defense, and hold harmless obligation includes any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations.

**14.2.2.** The Contractor shall give prompt notice to the District in the event of any injury (including death), loss, or damage included herein. Without limitation of the provisions herein, if the Contractor's agreement to indemnify, defend, and hold harmless the Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the parties that these circumstances shall not otherwise affect the validity or enforceability of the Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, the Contractor shall be and remain fully liable on its agreements and obligations herein to the full extent permitted by law.

**14.2.3.** In any and all claims against any of the Indemnitees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

**14.2.4.** The District may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such suit, claims or actions for damages or until the District, Architect and Construction Manager have received written agreement from the Contractor that they will unconditionally defend the District, Architect and Construction Manager, their officers, agents and employees, and pay any damages due by reason of settlement or judgment.

**14.2.5.** The defense and indemnification obligations hereunder shall survive the completion of Work, including the warranty/guarantee period, and/or the termination of the Agreement.

## **15. TIME**

### **15.1. Notice to Proceed**

**15.1.1.** District may issue a Notice to Proceed within three (3) months from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

**15.1.2.** In the event that the District desires to postpone issuing the Notice to Proceed beyond this 3-month period, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed.

**15.1.3.** If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to Contractor, Contractor may terminate the Contract. Contractor's termination due to a postponement shall be by written notice to District within ten (10) days after receipt by Contractor of District's notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

## **15.2. Computation of Time / Adverse Weather**

**15.2.1.** The Contractor will only be allowed a time extension for Adverse Weather conditions if requested by Contractor and only if all of the following conditions are met:

**15.2.1.1.** The weather conditions constitute Adverse Weather, as defined herein and further specified in the Special Conditions;

**15.2.1.2.** Contractor can verify that the Adverse Weather caused delays in excess of five hours of the indicated labor required to complete the scheduled tasks of Work on the day affected by the Adverse Weather;

**15.2.1.3.** The Contractor's crew is dismissed as a result of the Adverse Weather;

**15.2.1.4.** Said delay adversely affects the critical path in the Construction Schedule; and

**15.2.1.5.** The number of days of delay for the month exceeds those indicated in the Special Conditions.

**15.2.2.** If the aforementioned conditions are met, a day-for-day extension will only be allowed for those days in excess of those indicated in the Special Conditions.

**15.2.3.** The Contractor shall work seven (7) days per week, if necessary, irrespective of inclement weather, to maintain access and the Construction Schedule, and to protect the Work under construction from the effects of Adverse Weather, all at no further cost to the District.

**15.2.4.** The Contract Time has been determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located.

**15.3. Hours of Work**

**15.3.1. Sufficient Forces**

Contractor and Subcontractors shall continuously furnish sufficient forces to ensure the prosecution of the Work in accordance with the Construction Schedule.

**15.3.2. Performance During Working Hours**

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the District and approval of any required governmental agencies.

**15.4. Progress and Completion**

**15.4.1. Time of the Essence**

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

**15.4.2. No Commencement Without Insurance or Bonds**

The Contractor shall not commence operations on the Project or elsewhere prior to the effective date of insurance and bonds. The date of commencement of the Work shall not be changed by the effective date of such insurance or bonds. If Contractor commences Work without insurance and bonds, all Work is performed at Contractor's peril and shall not be compensable until and unless Contractor secures bonds and insurance pursuant to the terms of the Contract Documents and subject to District claim for damages.

**15.5. Schedule**

Contractor shall provide to District, Construction Manager, and Architect a schedule in conformance with the Contract Documents and as required in the Notice to Proceed and the Contractor's Submittals and Schedules section of these General Conditions.

**15.6. Expeditious Completion**

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time.

**16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES**

### **16.1. Liquidated Damages**

Contractor and District hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the amount set forth in the Agreement for each calendar day of delay in completion. Contractor and its Surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

### **16.2. Excusable Delay**

**16.2.1.** Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault of Contractor or its Subcontractors, including acts of God as defined in Public Contract Code section 7105, acts of enemy, epidemics, and quarantine restrictions. Contractor shall, within five (5) calendar days of beginning of any delay, notify District in writing of causes of delay including documentation and facts explaining the delay. District shall review the facts and extent of any delay and shall grant extension(s) of time for completing Work when, in its judgment, the findings of fact justify an extension. Extension(s) of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted if Contractor has timely submitted the Construction Schedule as required herein.

**16.2.2.** Contractor shall notify the District pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the District may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

**16.2.3.** In the event the Contractor requests an extension of Contract Time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work. When requesting time, requests must be submitted with full justification and documentation. If the Contractor fails to submit justification, it waives its right to a time extension at a later date. Such justification must be based on the official Construction Schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the Scope of Work. Any claim for delay must include the following information as support, without limitation:

**16.2.3.1.** The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform the activities within the stated duration.

**16.2.3.2.** Specific logical ties to the Contract Schedule for the proposed changes and/or delay showing the activity/activities in the Construction Schedule that are affected by the change and/or delay. (A portion of any delay of seven (7) days or more must be provided.)

**16.2.3.3.** A recovery schedule must be submitted within twenty (20) calendar days of written notification to the District of causes of delay.

**16.3. No Additional Compensation for Delays Within Contractor's Control**

**16.3.1.** Contractor is aware that governmental agencies, including, without limitation, the Division of the State Architect, the Department of General Services, gas companies, electrical utility companies, water districts, and other agencies may have to approve Contractor-prepared drawings or approve a proposed installation. Accordingly, Contractor shall include in its bid, time for possible review of its drawings and for reasonable delays and damages that may be caused by such agencies. Thus, Contractor is not entitled to make a claim for damages or delays arising from the review of Contractor's drawings.

**16.3.2.** Contractor shall only be entitled to compensation for delay when all of the following conditions are met:

**16.3.2.1.** The District is responsible for the delay;

**16.3.2.2.** The delay is unreasonable under the circumstances involved;

**16.3.2.3.** The delay was not within the contemplation of the District and Contractor; and

**16.3.2.4.** Contractor complies with the claims procedure of the Contract Documents.

**16.4. Float or Slack in the Schedule**

Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule. Float or slack is not for the exclusive use of or benefit of either the District or the Contractor, but its use shall be determined solely by the District.

**17. CHANGES IN THE WORK**

**17.1. No Changes Without Authorization**

**17.1.1.** There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order or a written Construction Change Directive authorized by the District as herein provided. District shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the District's governing board has authorized the same and the cost thereof has been approved in writing by Change Order or Construction Change Directive. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted in writing in the Change Order or Construction Change Directive. Contractor shall be responsible for any costs incurred by the District for professional services and DSA

fees and/or delay to the Project Schedule, if any, for DSA to review any request for changes to the DSA approved plans and specifications for the convenience of the Contractor and/or to accommodate the Contractor's means and methods. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

**17.1.2.** Contractor shall perform immediately all work that has been authorized by a fully executed Change Order or Construction Change Directive. Contractor shall be fully responsible for any and all delays and/or expenses caused by Contractor's failure to expeditiously perform this Work.

**17.1.3.** Should any Change Order result in an increase in the Contract Price, the cost of that Change Order shall be agreed to, in writing, in advance by Contractor and District and be subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that Contractor proceeds with any change in Work without a Change Order executed by the District or Construction Change Directive, Contractor waives any claim of additional compensation or time for that additional work.

**17.1.4.** Contractor understands, acknowledges, and agrees that the reason for District authorization is so that District may have an opportunity to analyze the Work and decide whether the District shall proceed with the Change Order or alter the Project so that a change in Work becomes unnecessary.

## **17.2. Architect Authority**

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Price, or an extension of the Contract Time, or a change that is inconsistent with the intent of the Contract Documents. These changes shall be effected by written Change Order, Construction Change Directive, or by Architect's response(s) to RFI(s) ) by Architect's Supplemental Instructions ("ASI").

## **17.3. Change Orders**

**17.3.1.** A Change Order is a written instrument prepared and issued by the District and/or the Architect and signed by the District (as authorized by the District's Board of Trustees), the Contractor, the Architect, and approved by the Project Inspector (if necessary) and DSA (if necessary), stating their agreement regarding all of the following:

**17.3.1.1.** A description of a change in the Work;

**17.3.1.2.** The amount of the adjustment in the Contract Price, if any; and

**17.3.1.3.** The extent of the adjustment in the Contract Time, if any.

## **17.4. Construction Change Directives**

**17.4.1.** A Construction Change Directive is a written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work. The District may as provided by law, by Construction Change Directive and without invalidating the Contract, order changes in the Work consisting of additions, deletions, or other revisions. The adjustment to the Contract Price or Time, if any, is subject to the provisions of this section regarding Changes in the Work. If all or a portion of the Project is being funded by funds requiring approval by the State Allocation Board (SAB), these revisions may be subject to compensation once approval of same is received and funded by the SAB, and funds are released by the Office of Public School Construction (OPSC). Any dispute as to the adjustment in the Contract Price, if any, of the Construction Change Directive or timing of payment shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

**17.4.2.** The District may issue a Construction Change Directive in the absence of agreement on the terms of a Change Order.

### **17.5. Force Account Directives**

**17.5.1.** When work, for which a definite price has not been agreed upon in advance, is to be paid for on a force account basis, all direct costs necessarily incurred and paid by the Contractor for labor, material, and equipment used in the performance of that Work, shall be subject to the approval of the District and compensation will be determined as set forth herein.

**17.5.2.** The District will issue a Force Account Directive to proceed with the Work on a force account basis, and a not-to-exceed budget will be established by the District.

**17.5.3.** All requirements regarding direct cost for labor, labor burden, material, equipment, and markups on direct costs for overhead and profit described in this section shall apply to Force Account Directives. However, the District will only pay for actual costs verified in the field by the District or its authorized representative(s) on a daily basis.

**17.5.4.** The Contractor shall be responsible for all cost related to the administration of Force Account Directive. The markup for overhead and profit for Contractor modifications shall be full compensation to the Contractor to administer Force Account Directive.

**17.5.5.** The Contractor shall notify the District or its authorized representative(s) at least twenty-four (24) hours prior to proceeding with any of the force account work. Furthermore, the Contractor shall notify the District when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the District. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely notify the District regarding the commencement of force account work, or exceeding the force account budget.

**17.5.6.** The Contractor shall diligently proceed with the work, and on a daily basis, submit a daily force account report on a form supplied by the District no later than 5:00 p.m. each day. The report shall contain a detailed itemization of the daily labor, material, and equipment used on the force account work only. The names of the individuals performing the force account work shall be included on the daily force account reports. The type and model of equipment shall be identified and listed. The District will review the information contained in the reports, and sign the reports no later than the next work day, and return a copy of the report to the Contractor for their records. The District will not sign, nor will the Contractor receive compensation for work the District cannot verify. The Contractor will provide a weekly force account summary indicating the status of each Force Account Directive in terms of percent complete of the not-to-exceed budget and the estimated percent complete of the work

**17.5.7.** In the event the Contractor and the District reach a written agreement on a set cost for the work while the work is proceeding based on a Force Account Directive, the Contractor's signed daily force account reports shall be discontinued and all previously signed reports shall be invalid.

## **17.6. Price Request**

### **17.6.1. Definition of Price Request**

A Price Request ("PR") is a written request prepared by the Architect requesting the Contractor to submit to the District and the Architect an estimate of the effect of a proposed change in the Work on the Contract Price and the Contract Time.

### **17.6.2. Scope of Price Request**

A Price Request shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required herein. The Contractor shall not be entitled to any additional compensation for preparing a response to a Price Request, whether ultimately accepted or not.

## **17.7. Proposed Change Order**

### **17.7.1. Definition of Proposed Change Order**

A Proposed Change Order ("PCO") is a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

### **17.7.2. Changes in Contract Price**

A PCO shall include breakdowns pursuant to the revisions herein to validate any change in Contract Price. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional compensation for Change Order Work.

### **17.7.3. Changes in Time**



A PCO shall also include any changes in time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Construction Schedule as defined in the Contract Documents. If Contractor fails to request a time extension in a PCO, then the Contractor is thereafter precluded from requesting time and/or claiming a delay. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional time for Change Order Work.

**17.7.4. Unknown and/or Unforeseen Conditions**

If Contractor submits a PCO requesting an increase in Contract Price and/or Contract Time that is based at least partially on Contractor's assertion that Contractor has encountered unknown and/or unforeseen condition(s) on the Project, then Contractor shall base the PCO on provable information that, beyond a reasonable doubt and to the District's satisfaction, demonstrates that the unknown and/or unforeseen condition(s) were actually unknown and/or unforeseen and that the condition(s) were reasonably unknown and/or unforeseen. If not, the District shall deny the PCO and the Contractor shall complete the Project without any increase in Contract Price and/or Contract Time based on that PCO.

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**17.8. Format for Proposed Change Order**

**17.8.1.** The following format shall be used as applicable by the District and the Contractor (e.g. Change Orders, PCO’s) to communicate proposed additions and deductions to the Contract, supported by attached documentation. Any spaces left blank will be deemed no change to cost or time.

	<b><u>WORK PERFORMED OTHER THAN BY CONTRACTOR</u></b>	<b><u>ADD</u></b>	<b><u>DEDUCT</u></b>
(a)	<b>Material</b> (attach itemized quantity and unit cost plus sales tax)		
(b)	<b>Add Labor</b> (attach itemized hours and rates, fully encumbered)		
(c)	<b>Add Equipment</b> (attach suppliers’ invoice)		
(d)	<b>Subtotal</b>		
(e)	<b>Add overhead and profit for any and all tiers of Subcontractor</b> , the total not to exceed ten percent (10%) of Item (d)		
(f)	<b>Subtotal</b>		
(g)	<b>Add overhead and profit for Contractor</b> , not to exceed five percent (5%) of Item (f)		
(h)	<b>Subtotal</b>		
(i)	<b>Add Bond and Insurance</b> , not to exceed one and a half percent (1.5%) of Item (h)		
(j)	<b>TOTAL</b>		
(k)	<b>Time</b> (zero unless indicated)		<u>      </u> <b>Calendar Days</b>

	<b><u>WORK PERFORMED BY CONTRACTOR</u></b>	<b><u>ADD</u></b>	<b><u>DEDUCT</u></b>
(a)	<b>Material</b> (attach itemized quantity and unit cost plus sales tax)		
(b)	<b>Add Labor</b> (attach itemized hours and rates, fully encumbered)		
(c)	<b>Add Equipment</b> (attach suppliers’ invoice)		
(d)	<b>Subtotal</b>		
(e)	<b>Add overhead and profit for Contractor</b> , not to exceed fifteen percent (15%) of Item (d)		
(f)	<b>Subtotal</b>		
(g)	<b>Add Bond and Insurance</b> , not to exceed one and a half percent (1.5%) of Item (f)		
(h)	<b>TOTAL</b>		
(i)	<b>Time</b> (zero unless indicated)		<u>      </u> <b>Calendar Days</b>

	<b><u>WORK PERFORMED OTHER THAN BY CONTRACTOR</u></b>	<b><u>ADD</u></b>	<b><u>DEDUCT</u></b>
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(a)	<b>Material</b> (attach itemized quantity and unit cost plus sales tax)		
(b)	<b>Add Labor</b> (attach itemized hours and rates, fully encumbered)		
(c)	<b>Add Equipment</b> (attach suppliers' invoice)		
(d)	<b>Subtotal</b>		
(e)	<b>Add overhead and profit for any and all tiers of Subcontractor</b> , the total not to exceed ten percent (10%) of Item (d)		
(f)	<b>Subtotal</b>		
(g)	<b>Add overhead and profit for Contractor</b> , not to exceed five percent (5%) of Item (f)		
(h)	<b>Subtotal</b>		
(i)	<b>Add Bond and Insurance</b> , not to exceed one and a half percent (1.5%) of Item (h)		
(j)	<b>TOTAL</b>		
(k)	<b>Time</b> (zero unless indicated)		<u>      </u> Calendar Days

	<b><u>WORK PERFORMED BY CONTRACTOR</u></b>	<b><u>ADD</u></b>	<b><u>DEDUCT</u></b>
(a)	<b>Material</b> (attach itemized quantity and unit cost plus sales tax)		
(b)	<b>Add Labor</b> (attach itemized hours and rates, fully encumbered)		
(c)	<b>Add Equipment</b> (attach suppliers' invoice)		
(d)	<b>Subtotal</b>		
(e)	<b>Add overhead and profit for Contractor</b> , not to exceed fifteen percent (15%) of Item (d)		
(f)	<b>Subtotal</b>		
(g)	<b>Add Bond and Insurance</b> , not to exceed one and a half percent (1.5%) of Item (f)		
(h)	<b>TOTAL</b>		
(i)	<b>Time</b> (zero unless indicated)		<u>      </u> Calendar Days

**17.8.2. Labor.** Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Work. Such labor costs shall be limited to field labor for which there is a prevailing wage rate classification. Wage rates for labor shall not exceed the prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work. Labor costs shall exclude costs incurred by the Contractor in preparing estimate(s) of the costs of the change in the Work, in the maintenance of records relating to the costs of the change in the Work, coordination and assembly of materials and information relating to the change in the Work or performance thereof, or the supervision and other overhead and general conditions costs associated with the change in the Work or performance thereof, including but not limited to the cost for the job superintendent.

**17.8.3. Materials.** Contractor shall be compensated for the costs of materials necessarily and actually used or consumed in connection with the performance of the change in the Work. Costs of materials may include reasonable costs of transportation from a source closest to the Site of the Work and delivery to the Site. If discounts by material suppliers are available for materials necessarily used in the performance of the change in the Work, they shall be credited to the District. If materials necessarily used in the performance of the change in the Work are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials. If, in the reasonable opinion of the District, the costs asserted by the Contractor for materials in connection with any change in the Work are excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials from its supplier or vendor of the same, the costs of such materials and the District's obligation to pay for the same shall be limited to the then lowest wholesale price at which similar materials are available in the quantities required to perform the change in the Work. The District may elect to furnish materials for the change in the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials or any mark-up thereon.

**17.8.4. Equipment.** As a precondition for the District's duty to pay for Equipment rental or loading and transportation, Contractor shall provide satisfactory evidence of the actual costs of Equipment from the supplier, vendor or rental agency of same. Contractor shall be compensated for the actual cost of the necessary and direct use of Equipment in the performance of the change in the Work. Use of such Equipment in the performance of the change in the Work shall be compensated in increments of fifteen (15) minutes. Rental time for Equipment moved by its own power shall include time required to move such Equipment to the site of the Work from the nearest available rental source of the same. If Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Equipment is used for performance of any portion of the Work other than the change in the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the Project Inspector and the District, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. Contractor shall not be entitled to an allowance or any other compensation for Equipment or tools used in the performance of change in the Work where such

Equipment or tools have a replacement value of **\$500.00** or less. Equipment costs claimed by the Contractor in connection with the performance of any Work shall not exceed rental rates established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the Project Inspector and the District, the allowable rate for the use of Equipment in connection with the Work shall constitute full compensation to the Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary attachments, repairs or maintenance of any kind, depreciation, storage, insurance, labor (exclusive of labor costs of the Equipment operator), and any and all other costs incurred by the Contractor incidental to the use of such Equipment.

### **17.9. Change Order Certification**

**17.9.1.** All Change Orders and PCOs must include the following certification by the Contractor:

**17.9.1.1.** The undersigned Contractor approves the foregoing as to the changes, if any, and the Contract Price specified for each item and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

**17.9.1.2.** It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Any costs, expenses, damages, or time extensions not included are deemed waived.

### **17.10. Determination of Change Order Cost**

**17.10.1.** The amount of the increase or decrease in the Contract Price from a Change Order, if any, shall be determined in one or more of the following ways as applicable to a specific situation and at the District's discretion:

**17.10.1.1.** District acceptance of a PCO;

**17.10.1.2.** By unit prices contained in Contractor's original bid;

**17.10.1.3.** By agreement between District and Contractor.

**17.11. Deductive Change Orders**

All deductive Change Order(s) must be prepared pursuant to the provisions herein. Where a portion of the Work is deleted from the Contract, the reasonable value of the deducted work less the value of work performed shall be considered the appropriate deduction. The value submitted on the Schedule of Values shall be used to calculate the credit amount unless the bid documentation is being held in escrow as part of the Contract Documents. If Contractor offers a proposed amount for a deductive Change Order(s), Contractor shall include a minimum of five percent (5%) total profit and overhead to be deducted with the amount of the work of the Change Order(s). If Subcontractor work is involved, Subcontractors shall also include a minimum of five percent (5%) profit and overhead to be deducted with the amount of its deducted work. Any deviation from this provision shall not be allowed.

**17.12. Addition or Deletion of Alternate Bid Item(s)**

If the Bid Form and Proposal includes proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the District may elect to add or delete any such Alternate Bid Item(s) if not included in the Contract at the time of award. If the District elects to add or delete Alternate Bid Item(s) after Contract award, the cost or credit for such Alternate Bid Item(s) shall be as set forth in the Bid Form and Proposal unless the parties agree to a different price and the Contract Time shall be adjusted by the number of days allocated in the Contract Documents. If days are not allocated in the Contract Documents, the Contract Time shall be equitably adjusted.

**17.13. Discounts, Rebates, and Refunds**

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omission in the Work as provided herein.

**17.14. Accounting Records**

With respect to portions of the Work performed by Change Orders and Construction Change Directives, the Contractor shall keep and maintain cost-accounting records satisfactory to the District, which shall be available to the District on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents. Such records shall include without limitation hourly records for Labor and Equipment and itemized records of materials and Equipment used that day in connection with the performance of any Work. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the District, the Architect or the Project Inspector upon request. In the event that the Contractor fails or refuses, for any reason, to maintain or make available for inspection, review and/or reproduction such records, the District's reasonable good faith determination of the extent of adjustment to the Contract Price shall be final, conclusive, dispositive and binding upon Contractor.

**17.15. Notice Required**

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension in the Contract Time for completion, it shall notify the District pursuant to the provisions herein, including the Article on Claims and Disputes. No claim shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any change in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a Change Order.

**17.16. Applicability to Subcontractors**

Any requirements under this Article shall be equally applicable to Change Orders or Construction Change Directives issued to Subcontractors by the Contractor to the extent as required by the Contract Documents.

**17.17. Alteration to Change Order Language**

Contractor shall not alter Change Orders or reserve time in Change Orders. Contractor shall execute finalized Change Orders and proceed under the provisions herein with proper notice.

**17.18. Failure of Contractor to Execute Change Order**

Contractor shall be in default of the Contract if Contractor fails to execute a Change Order when the Contractor agrees with the addition and/or deletion of the Work in that Change Order.

**18. REQUEST FOR INFORMATION**

**18.1.** Any Request for Information shall reference all applicable Contract Document(s), including Specification section(s), detail(s), page number(s), drawing number(s), and sheet number(s), etc. The Contractor shall make suggestions and interpretations of the issue raised by each Request for Information. A Request for Information cannot modify the Contract Price, Contract Time, or the Contract Documents. Upon request by the District, Contractor shall provide an electronic copy of the Request for Information in addition to the hard copy.

**18.2.** The Contractor shall be responsible for any costs incurred for professional services that District may deduct from any amounts owing to the Contractor, if a Request for Information requests an interpretation or decision of a matter where the information sought is equally available to the party making the request. District, at its sole discretion, shall deduct from and/or invoice Contractor for all the professional services arising herein.

## **19. PAYMENTS**

### **19.1. Contract Price**

The Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents.

### **19.2. Applications for Progress Payments**

#### **19.2.1. Procedure for Applications for Progress Payments**

##### **19.2.1.1. Application for Progress Payment**

**19.2.1.1.1.** Not before the fifth (5<sup>th</sup>) day of each calendar month during the progress of the Work, Contractor shall submit to the District and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or each portion thereof unless waived by the District in writing:

**19.2.1.1.1.1.** The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

**19.2.1.1.1.2.** The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

**19.2.1.1.1.3.** The balance that will be due to each of such entities after said payment is made;

**19.2.1.1.1.4.** A certification that the As-Built Drawings and annotated Specifications are current;

**19.2.1.1.1.5.** Itemized breakdown of work done for the purpose of requesting partial payment;

**19.2.1.1.1.6.** An updated and acceptable construction schedule in conformance with the provisions herein;

**19.2.1.1.1.7.** The additions to and subtractions from the Contract Price and Contract Time;

**19.2.1.1.1.8.** A total of the retentions held;

**19.2.1.1.1.9.** Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;



**19.2.1.1.1.10.** The percentage of completion of the Contractor's Work by line item;

**19.2.1.1.1.11.** Schedule of Values updated from the preceding Application for Payment;

**19.2.1.1.1.12.** A duly completed and executed conditional waiver and release upon progress payment compliant with Civil Code section 8132 from the Contractor and each subcontractor of any tier and supplier to be paid from the current progress payment;

**19.2.1.1.1.13.** A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134 from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payment(s); and

**19.2.1.1.1.14.** A certification by the Contractor of the following:

The Contractor warrants title to all Work performed as of the date of this payment application has been completed in accordance with the Contract Documents for the Project. The Contractor further warrants that all amounts have been paid for work which previous Certificates for Payment were issued and payments received and all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the District has been informed.

**19.2.1.1.1.15.** The Contractor shall be subject to the False Claims Act set forth in Government Code section 12650 et seq. for information provided with any Application for Progress Payment.

**19.2.1.1.1.16.** All remaining certified payroll records ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment. As indicated herein, the District shall not make any payment to Contractor until:

**19.2.1.1.1.16.1** Contractor and/or its Subcontractor(s) provide electronic CPRs weekly for all weeks any journeyman, apprentice, worker or other employee was employed in connection with the Work directly to the DIR, or within ten (10) days of any request by the District or the DIR, and

**19.2.1.1.1.16.2** Any delay in Contractor and/or its Subcontractor(s) providing CPRs in a timely manner may directly delay the Contractor's payment.

**19.2.2. Prerequisites for Progress Payments**

**19.2.2.1. First Payment Request:** The following items, if applicable, must be completed before the District will accept and/or process the Contractor's first payment request:

- 19.2.2.1.1.** Installation of the Project sign;
- 19.2.2.1.2.** Installation of field office;
- 19.2.2.1.3.** Installation of temporary facilities and fencing;
- 19.2.2.1.4.** Schedule of Values;
- 19.2.2.1.5.** Contractor's Construction Schedule;
- 19.2.2.1.6.** Schedule of unit prices, if applicable;
- 19.2.2.1.7.** Submittal Schedule;
- 19.2.2.1.8.** Receipt by Architect of all submittals due as of the date of the payment application;
- 19.2.2.1.9.** Copies of necessary permits;
- 19.2.2.1.10.** Copies of authorizations and licenses from governing authorities;
- 19.2.2.1.11.** Initial progress report;
- 19.2.2.1.12.** Surveyor qualifications;
- 19.2.2.1.13.** Written acceptance of District's survey of rough grading, if applicable;
- 19.2.2.1.14.** List of all Subcontractors, with names, license numbers, telephone numbers, and Scope of Work;
- 19.2.2.1.15.** All bonds and insurance endorsements; and
- 19.2.2.1.16.** Resumes of Contractor's project manager, and if applicable, job site secretary, record documents recorder, and job site superintendent.

**19.2.2.2. Second Payment Request** The District will not process the second payment request until and unless all submittals and Shop Drawings have been accepted for review by the Architect.

**19.2.2.3. No Waiver of Criteria** Any payments made to Contractor where criteria set forth herein have not been met shall not constitute a waiver of said

criteria by District. Instead, such payment shall be construed as a good faith effort by District to resolve differences so Contractor may pay its Subcontractors and suppliers. Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

### **19.3. Progress Payments**

#### **19.3.1. District's Approval of Application for Payment**

**19.3.1.1.** Upon receipt of a Application for Payment, The District shall act in accordance with both of the following:

**19.3.1.1.1.** Each Application for Payment shall be reviewed by the District as soon as practicable after receipt for the purpose of determining that the Application for Payment is a proper Application for Payment.

**19.3.1.1.2.** Any Application for Payment determined not to be a proper Application for Payment suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. An Application for Payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the Application for Payment is not proper. The number of days available to the District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District exceeds this seven-day return requirement.

**19.3.1.1.3.** An Application for Payment shall be considered properly executed if funds are available for payment of the Application for Payment, and payment is not delayed due to an audit inquiry by the financial officer of the District.

**19.3.1.2.** The District's review of the Contractor's Application for Payment will be based on the District's and the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the District's and the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to:

**19.3.1.2.1.** Observation of the Work for general conformance with the Contract Documents,

**19.3.1.2.2.** Results of subsequent tests and inspections,

**19.3.1.2.3.** Minor deviations from the Contract Documents correctable prior to completion, and

**19.3.1.2.4.** Specific qualifications expressed by the Architect.

**19.3.1.3.** District's approval of the certified Application for Payment shall be based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

**19.3.2.** Payments to Contractor

**19.3.2.1.** Within thirty (30) days after approval of the Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as verified by Architect and Inspector and certified by Contractor) up to the last day of the previous month, less the aggregate of previous payments and amount to be withheld. The value of the Work completed shall be Contractor's best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the District's right to enforce each and every provision of this Contract, and the District shall have the right subsequently to correct any error made in any estimate for payment.

**19.3.2.2.** The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or proper direction given by the District concerning the Work, or any portion thereof, remains incomplete.

**19.3.2.3.** If the District fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment from the Contractor, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.

**19.3.3.** No Waiver

No payment by District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District may correct or require correction of any error subsequent to any payment.

**19.4.** Decisions to Withhold Payment

**19.4.1.** Reasons to Withhold Payment

The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required herein cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to:

**19.4.1.1.** Defective Work not remedied within **FORTY-EIGHT (48)** hours of written notice to Contractor.

**19.4.1.2.** Stop Payment Notices or other liens served upon the District as a result of the Contract. Contractor agrees that the District may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the District's reasonable cost of any litigation pursuant to the stop payment notice.

**19.4.1.3.** Liquidated damages assessed against the Contractor.

**19.4.1.4.** The cost of completion of the Contract if there exists reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price or by the completion date.

**19.4.1.5.** Damage to the District or other contractor(s).

**19.4.1.6.** Unsatisfactory prosecution of the Work by the Contractor.

**19.4.1.7.** Failure to store and properly secure materials.

**19.4.1.8.** Failure of the Contractor to submit, on a timely basis, proper, sufficient, and acceptable documentation required by the Contract Documents, including, without limitation, a Construction Schedule, Schedule of Submittals, Schedule of Values, Monthly Progress Schedules, Shop Drawings, Product Data and samples, Proposed product lists, executed Change Orders, and/or verified reports.

**19.4.1.9.** Failure of the Contractor to maintain As-Built Drawings.

**19.4.1.10.** Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

**19.4.1.11.** Unauthorized deviations from the Contract Documents.

**19.4.1.12.** Failure of the Contractor to prosecute the Work in a timely manner in compliance with the Construction Schedule, established progress schedules, and/or completion dates.

**19.4.1.13.** Failure to provide acceptable electronic certified payroll records, as required by the Labor Code, by these Contract Documents, or by written request; for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or by each Subcontractor in connection with the Work for the period of the Application for Payment or if payroll records are delinquent or inadequate.

**19.4.1.14.** Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements, and/or failure to comply with labor compliance monitoring and enforcement by the DIR.

**19.4.1.15.** Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements,

and/or failure to comply with State labor compliance monitoring and enforcement, if applicable.

**19.4.1.16.** Failure to comply with any applicable federal statutes and regulations regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon Act and related requirements, Contract Work Hours and Safety Standards Act requirements, if applicable.

**19.4.1.17.** Failure to properly maintain or clean up the Site.

**19.4.1.18.** Failure to timely indemnify, defend, or hold harmless the District.

**19.4.1.19.** Any payments due to the District, including but not limited to payments for failed tests, utilities changes, or permits.

**19.4.1.20.** Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

**19.4.1.21.** Failure to pay any royalty, license or similar fees.

**19.4.1.22.** Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

**19.4.1.23.** Failure to perform any implementation and/or monitoring required by any SWPPP for the Project and/or the imposition of any penalties or fines therefore whether imposed on the District or Contractor.

**19.4.2.** Reallocation of Withheld Amounts

**19.4.2.1.** District may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then that amount shall be considered a payment made under Contract by District to Contractor and District shall not be liable to Contractor for any payment made in good faith. These payments may be made without prior judicial determination of claim or obligation. District will render Contractor an accounting of funds disbursed on behalf of Contractor.

**19.4.2.2.** If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, District may, after **FORTY-EIGHT (48)** hours written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The District shall adjust the total Contract Price by reducing the amount thereof by the cost of making good such deficiencies. If District deems it inexpedient to correct Work that is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least one hundred fifty percent (150%) of the estimated reasonable value of the nonconforming Work) shall be made therefor.

**19.4.3. Payment After Cure**

When Contractor removes the grounds for declining approval, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

**19.5. Subcontractor Payments****19.5.1. Payments to Subcontractors**

No later than seven (7) days after receipt, or pursuant to Business and Professions Code section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-subcontractors in a similar manner.

**19.5.2. No Obligation of District for Subcontractor Payment**

The District shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

**19.5.3. Joint Checks**

District shall have the right in its sole discretion, if necessary for the protection of the District, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any contract between the District and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the District to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the District.

**20. COMPLETION OF THE WORK****20.1. Completion**

**20.1.1.** District will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District.

**20.1.2.** The Work may only be accepted as complete by action of the governing board of the District.

**20.1.3.** District, at its sole option, may accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed

to the satisfaction of District, except for minor corrective items, as distinguished from incomplete items. If Contractor fails to complete all minor corrective items within fifteen (15) days after the date of the District's acceptance of completion, District shall withhold from the final payment one hundred fifty percent (150%) of an estimate of the amount sufficient to complete the corrective items, as determined by District, until the item(s) are completed.

**20.1.4.** At the end of the 15-day period, if there are any items remaining to be corrected, District may elect to proceed as provided herein related to adjustments to Contract Price, and/or District's right to perform the Work of the Contractor.

## **20.2. Close-Out/Certification Procedures**

### **20.2.1. Punch List**

The Contractor shall notify the Architect when Contractor considers the Work complete. Upon notification, Architect will prepare a list of minor items to be completed or corrected ("Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the Punch List. Failure to include an item on Punch List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

### **20.2.2. Close-Out/Certification Requirements**

#### **20.2.2.1. Utility Connections**

Buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

#### **20.2.2.2. Record Drawings**

**20.2.2.2.1.** Contractor shall provide exact Record Drawings of the Work upon completion of the Project as indicated in the Specifications.

**20.2.2.2.2.** Contractor is liable and responsible for any and all inaccuracies in the Record Drawings, even if inaccuracies become evident at a future date.

**20.2.2.2.3.** Upon completion of the Work and as a condition precedent to approval of final payment, Contractor shall obtain the Inspector's approval of the corrected prints and employ a competent draftsman to transfer the Record Drawings information to the most current version of Autocad that is, at that time, currently utilized for plan check submission by either the District, the Architect, OPSC, and/or DSA, and print a complete set of transparent sepias. When completed, Contractor shall deliver corrected sepias and diskette/CD/other data storage device acceptable to District with Autocad file to the District.

**20.2.2.3. Maintenance Manuals:** Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.



**20.2.2.4. Source Programming:** Contractor shall provide all source programming for all items in the Project.

**20.2.2.5. Verified Reports:** Contractor shall completely and accurately fill out and file forms DSA 6-C or DSA 152 (or current form), as appropriate. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

### **20.3. Final Inspection**

**20.3.1.** Contractor shall comply with Punch List procedures as provided herein, and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List. Upon receipt of Contractor's written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and District a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

**20.3.2.** Upon Contractor's completion of all items on the Punch List and any other uncompleted portions of the Work, the Contractor shall notify the District and Architect, who shall again inspect such Work. If the Architect finds the Work complete and acceptable under the Contract Documents, the Architect will notify Contractor, who shall then jointly submit to the Architect and the District its final Application for Payment.

#### **20.3.3. Final Inspection Requirements**

**20.3.3.1.** Before calling for final inspection, Contractor shall determine that the following have been performed:

**20.3.3.1.1.** The Work has been completed.

**20.3.3.1.2.** All life safety items are completed and in working order.

**20.3.3.1.3.** Mechanical and electrical Work are complete and tested, fixtures are in place, connected, and ready for tryout.

**20.3.3.1.4.** Electrical circuits scheduled in panels and disconnect switches labeled.

**20.3.3.1.5.** Painting and special finishes complete.

**20.3.3.1.6.** Doors complete with hardware, cleaned of protective film, relieved of sticking or binding, and in working order.

**20.3.3.1.7.** Tops and bottoms of doors sealed.

- 20.3.3.1.8.** Floors waxed and polished as specified.
- 20.3.3.1.9.** Broken glass replaced and glass cleaned.
- 20.3.3.1.10.** Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.
- 20.3.3.1.11.** Work cleaned, free of stains, scratches, and other foreign matter, of damaged and broken material replaced.
- 20.3.3.1.12.** Finished and decorative work shall have marks, dirt, and superfluous labels removed.
- 20.3.3.1.13.** Final cleanup, as provided herein.

#### **20.4. Costs of Multiple Inspections**

More than two (2) requests of the District to make a final inspection shall be considered an additional service of District, Architect, Construction Manager, and/or Project Inspector, and all subsequent costs will be invoiced to Contractor and if funds are available, withheld from remaining payments.

#### **20.5. Partial Occupancy or Use Prior to Completion**

##### **20.5.1. District's Rights to Occupancy**

The District may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the District's Final Acceptance of any part of the Work. Neither the District's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by District shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein. In the event that the District occupies or uses any completed or partially completed portion of the Work, the Contractor shall remain responsible for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents unless the Contractor requests in writing, and the District agrees, to otherwise divide those responsibilities. Any dispute as to responsibilities shall be resolved pursuant to the Claims and Disputes provisions herein, with the added provision that during the dispute process, the District shall have the right to occupy or use any portion of the Work that it needs or desires to use.

##### **20.5.2. Inspection Prior to Occupancy or Use**

Immediately prior to partial occupancy or use, the District, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**20.5.3. No Waiver**

Unless otherwise agreed upon, partial or entire occupancy or use of a portion or portions of the Work shall not constitute beneficial occupancy or acceptance of the Work not complying with the requirements of the Contract Documents.

**21. FINAL PAYMENT AND RETENTION**

**21.1. Final Payment**

Upon receipt and approval of a valid and final Application for Payment, the Architect will issue a final Certificate of Payment. The District shall thereupon jointly inspect the Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon acceptance of the Work of the Contractor as fully complete by the Governing Board of the District (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the District, pay the amount due Subcontractors.

**21.2. Prerequisites for Final Payment** The following conditions must be fulfilled prior to Final Payment:

**21.2.1.** A full release of all Stop Payment Notices served in connection with the Work shall be submitted by Contractor.

**21.2.2.** A duly completed and executed conditional waiver and release upon final payment compliant with Civil Code section 8136, from the Contractor and each subcontractor of any tier and supplier to be paid from the final payment.

**21.2.3.** A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134, from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payments.

**21.2.4.** A duly completed and executed Document 00 65 19.26, "AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS" from the Contractor.

**21.2.5.** The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.

**21.2.6.** Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

**21.2.7.** Contractor must have completed all requirements set forth under "Close-Out/Certification Procedures," including, without limitation, submission of an approved set of complete Record Drawings.

**21.2.8.** Architect shall have issued its written approval that final payment can be made.

**21.2.9.** The Contractor shall have delivered to the District all manuals and materials required by the Contract Documents.

**21.2.10.** The Contractor shall have completed final clean-up as provided herein.

### **21.3. Retention**

**21.3.1.** The retention, less any amounts disputed by the District or that the District has the right to withhold pursuant to provisions herein, shall be paid:

**21.3.1.1.** After approval of the District by the Architect's Certificate of Payment,

**21.3.1.2.** After the satisfaction of the conditions set forth herein, and

**21.3.1.3.** After forty-five (45) days after the recording of the Notice of Completion by District.

**21.3.2.** No interest shall be paid on any retention, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the District and the Contractor pursuant to Public Contract Code section 22300.

**21.4. Substitution of Securities** The District will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

## **22. UNCOVERING OF WORK**

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the District, the Project Inspector, or the Architect, be uncovered for the Project Inspector's or the Architect's observation and be replaced at the Contractor's expense without change in the Contract Price or Contract Time.

## **23. NONCONFORMING WORK AND CORRECTION OF WORK**

### **23.1. Nonconforming Work**

**23.1.1.** Contractor shall promptly remove from Premises all Work identified by District as failing to conform to the Contract Documents whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the

Contract Documents without additional expense to the District and shall bear the expense of making good all work of other contractors destroyed or damaged by any removal or replacement pursuant hereto and/or any delays to the District or other Contractors caused thereby.

**23.1.2.** If Contractor does not remove Work that District has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, District may remove it and may store any material at Contractor's expense. If Contractor does not pay expense(s) of that removal within ten (10) days' time thereafter, District may, upon ten (10) days' written notice, sell any material at auction or at private sale and shall deduct all costs and expenses incurred by the District and/or District may withhold those amounts from payment(s) to Contractor.

### **23.2. Correction of Work**

#### **23.2.1. Correction of Rejected Work**

Pursuant to the notice provisions herein, the Contractor shall immediately correct the Work rejected by the District, the Architect, or the Project Inspector as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including delay costs, additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby.

#### **23.2.2. One-Year Warranty Corrections**

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established hereunder, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the District to do so. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation hereunder shall survive acceptance of the Work under the Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

### **23.3. District's Right to Perform Work**

**23.3.1.** If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the District, after **FORTY-EIGHT (48)** hours written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

**23.3.2.** If it is found at any time, before or after completion of the Work, that Contractor has varied from the Drawings and/or Specifications, including, but not

limited to, variation in material, quality, form, or finish, or in the amount or value of the materials and labor used, District may require at its option:

**23.3.2.1.** That all such improper Work be removed, remade or replaced, and all work disturbed by these changes be made good by Contractor at no additional cost to the District;

**23.3.2.2.** That the District deduct from any amount due Contractor the sum of money equivalent to the difference in value between the work performed and that called for by the Drawings and Specifications; or

**23.3.2.3.** That the District exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the District hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the District shall either issue a deductive Change Order, a Construction Change Directive, or invoice the Contractor for the cost of that work. Contractor shall pay any invoices within thirty (30) days of receipt of same or District may withhold those amounts from payment(s) to Contractor.

## **24. TERMINATION AND SUSPENSION**

### **24.1. District's Right to Terminate Contractor for Cause**

**24.1.1. Grounds for Termination** The District, in its sole discretion, may terminate the Contract and/or terminate the Contractor's right to perform the work of the Contract based upon the following:

**24.1.1.1.** Contractor refuses or fails to execute the Work or any separable part thereof with sufficient diligence as will ensure its completion within the time specified or any extension thereof, or

**24.1.1.2.** Contractor fails to complete said Work within the time specified or any extension thereof, or

**24.1.1.3.** Contractor persistently fails or refused to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

**24.1.1.4.** Contractor files a petition for relief as a debtor, or a petition is filed against the Contractor without its consent, and the petition not dismissed within sixty (60) days; or

**24.1.1.5.** Contractor makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency; or

**24.1.1.6.** Contractor persistently or repeatedly refuses fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified; or

**24.1.1.7.** Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

**24.1.1.8.** Contractor persistently disregards laws, or ordinances, or instructions of District; or

**24.1.1.9.** Contractor fails to supply labor, including that of Subcontractors, that can work in harmony with all other elements of labor employed or to be employed on the Work; or

**24.1.1.10.** Contractor or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Contract, including but not limited to a lapse in licensing or registration.

**24.1.2.** Notification of Termination

**24.1.2.1.** Upon the occurrence at District's sole determination of any of the above conditions, District may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of District's termination of this Contract and/or the Contractor's right to perform the work of the Contract. This notice will contain the reasons for termination. Unless, within three (3) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to District for the correction of the condition(s) and/or violation(s) be made, this Contract shall cease and terminate. Upon Determination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

**24.1.2.2.** Upon Termination, District may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Contract only if Surety:

**24.1.2.2.1.** Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Contract; and

**24.1.2.2.2.** Commences performance of this Contract within (three (3) days from date of serving of its notice to District.

**24.1.2.3.** Surety shall not utilize Contractor in completing the Project if the District notifies Surety of the District's objection to Contractor's further participation in the completion of the Project. Surety expressly agrees that any contractor which Surety proposes to fulfill Surety's obligations is subject to District's approval. District's approval shall not be unreasonably withheld, conditioned or delayed.

**24.1.2.4.** If Surety fails to notify District or begin performance as indicated herein, District may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Contractor and/or its Surety. Contractor and/or its Surety shall be liable to District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Contract. If the District takes over the Work as herein provided, District may, without liability for so doing, take possession of and utilize in completing the

Work such materials, appliances, plan, and other property belonging to Contractor as may be on the Site of the Work, in bonded storage, or previously paid for.

**24.1.3. Effect of Termination**

**24.1.3.1.** Contractor shall, only if ordered to do so by the District, immediately remove from the Site all or any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The District retains the right, but not the obligation, to keep and use any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The Contractor and its Surety shall be liable upon the performance bond for all damages caused the District by reason of the Contractor's failure to complete the Contract.

**24.1.3.2.** In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District shall not be liable nor account to the Contractor in any way for the time within which, or the manner in which, the Work is performed by the District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

**24.1.3.3.** In the event that the Contract is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor or any impact or impairment of Contractor's bonding capacity.

**24.1.3.4.** If the expense to the District to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to District within twenty-one (21) days of District's request.

**24.1.3.5.** The District shall have the right (but shall have no obligation) to assume and/or assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the Contractor under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The District or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the District so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District the rights and benefits of it Subcontractor under Subcontracts or other obligations or commitments. All payments due the Contractor hereunder shall be subject to a right of offset by the District for expenses and damages suffered by the District as a result of any default, acts, or omissions of the Contractor. Contractor must include this assignment provision in all of its contracts with its Subcontractors.



**24.1.3.6.** The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

**24.1.4.** Emergency Termination of Public Contracts Act of 1949

**24.1.4.1.** This Contract is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

**24.1.4.1.1.** Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the public agency and the contractor may, by written agreement, terminate said contract.

**24.1.4.1.2.** Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

**24.1.4.2.** Compensation to the Contractor shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price shall control. The District, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

**24.2. Termination of Contractor for Convenience**

**24.2.1.** District in its sole discretion may terminate the Contract upon three (3) days written notice to the Contractor. Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause. In case of a termination for convenience, the Contractor shall have no claims against the District except:

**24.2.1.1.** The actual cost for labor, materials, and services performed that is unpaid and can be documented through timesheets, invoices, receipts, or otherwise, and

**24.2.1.2.** Five percent (5%) of the total cost of work performed as of the date of termination, or five percent (5%) of the value of the Work yet to be performed,

whichever is less. This five percent (5%) amount shall be full compensation for all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs and any anticipated loss profits resulting from termination of the Contractor for convenience.

### **24.3. Suspension of Work**

**24.3.1.** District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to the Contractor.

**24.3.1.1.** An adjustment may be made for changes in the cost of performance of the Work caused by any such suspension, delay or interruption. No adjustment shall be made to the extent:

**24.3.1.1.1.** That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

**24.3.1.1.2.** That an equitable adjustment is made or denied under another provision of the Contract; or

**24.3.1.1.3.** That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

**24.3.1.2.** Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order herein. This amount shall be full compensation for all Contractor's and its Subcontractor(s)' changes in the cost of performance of the Contract caused by any such suspension, delay or interruption.

## **25. CLAIMS AND DISPUTES**

### **25.1. Performance During Dispute or Claim Process**

Contractor shall continue to perform its Work under the Contract and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the District.

### **25.2. Definition of Dispute**

**25.2.1.** The term "Dispute" means a separate demand by the Contractor for:

**25.2.1.1.** A time extension;

**25.2.1.2.** Payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or

**25.2.1.3.** An amount of payment disputed by the District.

**25.3. Dispute Presentation**

**25.3.1.** If Contractor intends to apply for an increase in the Contract Price or Contract Time for any reason including, without limitation, the acts of District or its agents, Contractor shall, within ten (10) days after the event giving rise to the Dispute, give notice of the Dispute in writing and submit to the District a written statement of the damage sustained or time requested. On or before twenty (20) days after Contractor's written Notice of Dispute, Contractor shall file with the District an itemized statement of the details and amounts of its Dispute for any increase in the Contract Price of Contract Time. Otherwise, Contractor shall have waived and relinquished its dispute against the District and Contractor's claims for compensation or an extension of time shall be forfeited and invalidated. Contractor shall not be entitled to consideration for payment or time on account.

**25.3.2.** The Notice of Dispute shall identify:

**25.3.2.1.** The issues, events, conditions, circumstances and/or causes giving rise to the dispute;

**25.3.2.2.** The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments; and

**25.3.2.3.** The line-item costs for labor, material, and/or equipment, if applicable.

**25.3.3.** The Notice of Dispute shall include the following certification by the Contractor:

**25.3.3.1.** The undersigned Contractor certifies under penalty of perjury that the attached dispute is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the District is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

**25.3.3.2.** Furthermore, Contractor understands that the value of the attached dispute expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from the Work performed on the Project, additional time required on the Project and/or resulting from delay to the Project. Any costs, expenses, damages, or time extensions not included are deemed waived.

**25.3.4.** If a Dispute, or any portion thereof, remains unresolved upon satisfaction of all applicable Dispute Resolution requirements, the Contractor shall comply with all claim resolution requirements as provided in Public Contract Code section 20104.

**25.3.5.** Contractor shall bind its Subcontractors to the provisions of this section and will hold the District harmless against disputes by Subcontractors.

**25.4. Dispute Resolution**

**25.4.1.** Contractor shall file with the District the Notice of Dispute, including the documents necessary to substantiate it, on or before the day of submitting the application for final payment.

**25.4.2.** District shall respond in writing within forty-five (45) days of receipt of the Dispute or may request in writing within thirty (30) days of receipt of the Dispute any additional documentation supporting the Dispute or relating to defenses or claims District may have against the Contractor.

**25.4.2.1.** If additional information is required, it shall be requested and provided by mutual agreement of the parties.

**25.4.2.2.** District's written response to the documented Dispute shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

**25.4.3.** If Contractor disputes the District's written response, Contractor may file a claim pursuant to the Claim Resolution requirements provided herein.

**25.5. Definition of Claim**

**25.5.1.** The term "Claim" means a dispute that remains unresolved at the conclusion of the Dispute Resolution requirements as provided herein.

**25.6. Claim Presentations**

**25.6.1.** Contractor must timely submit the Notice of Claim and all documents necessary to substantiate any Claim. Otherwise, Contractor shall have waived and relinquished its Claim against the District and Contractor's Claims for compensation or an extension of time shall be forfeited and invalidated, and Contractor shall not be entitled to consideration for payment or time on account of the instant matter. No Claim shall be presented prior to Project completion. Any statute that might otherwise govern the presentation of an unresolved Dispute, including but not limited to Government Code section 900 et seq. and Public Contract Code section 20104 et seq. shall be tolled for all purposes during the course of construction on the Project.

**25.6.1.1.** All Claims shall include the following certification by the Contractor:

**25.6.1.1.1.** The undersigned Contractor certifies under penalty of perjury that the attached claim is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the District is liable; and that I am duly authorized to certify the claim on behalf of the Contractor.

**25.6.1.1.2.** Furthermore, Contractor understands that the value of the attached claim expressly includes any and all of the Contractor's costs and

expenses, direct and indirect, resulting from the Work performed on the Project, additional time required on the Project and/or resulting from delay to the Project. Any costs, expenses, damages, or time extensions not included are deemed waived.

**25.6.2.** The attention of the Contractor is drawn to Government Code section 12650, et seq. regarding penalties for false claims.

**25.6.3.** If a Claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Dispute and Claim Resolution requirements, the Contractor shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Contractor's right to bring a civil action against the District. For purposes of those provisions, the running of the time within which a Dispute or Claim must be presented to the District shall be tolled from the time the Contractor submits its written Dispute or Claim until the time the Dispute or Claim is denied, including any time utilized by any applicable meet and confer process.

**25.6.4.** The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the District harmless against claims by Subcontractors.

## **25.7. Claim Resolution**

**25.7.1.** In the event of a disagreement between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for Work performed or not performed, the parties shall, after the conclusion of the Dispute Resolution requirements, attempt to resolve the Claim by those procedures set forth herein.

### **25.7.2. Claims of \$375,000 or Less**

**25.7.2.1.** For all Claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between Contractor and District, the procedure set forth in Public Contract Code section 20104 et seq. shall apply:

**25.7.2.1.1.** Contractor shall file with the District any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

**25.7.2.1.2.** For claims of less than fifty thousand dollars (\$50,000), the District shall respond in writing within forty-five (45) days of receipt of the Claim or may request in writing within thirty (30) days of receipt of the Claim any additional documentation supporting the claim or relating to defenses or claims the District may have against the Contractor.

**25.7.2.1.2.1.** If additional information is required, it shall be requested and provided by mutual agreement of the parties.

**25.7.2.1.2.2.** District's written response to the documented Claim shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

**25.7.2.1.3.** For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the District shall respond in writing to all written Claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

**25.7.2.1.3.1.** If additional information is required, it shall be requested and provided upon mutual agreement of the District and the Contractor.

**25.7.2.1.3.2.** The District's written response to the claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor to produce the additional information or requested documentation, whichever is greater.

**25.7.2.2.** If Contractor disputes the District's written response, or the District fails to respond within the time prescribed, Contractor may so notify the District, in writing, either within fifteen (15) days of receipt of the District's response or within fifteen (15) days of the District's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the District shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

**25.7.2.3.** Following the meet and confer conference, if the claim or any portion of it remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions the running of the time within which a claim must be filed shall be tolled from the time the Contractor submits its written Claim until the time the Claim is denied, including any period of time utilized by the meet and confer process.

**25.7.2.4.** For any civil action filed to resolve claims filed pursuant to this section, within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties

fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

**25.7.2.5.** [Reserved].

**25.7.2.6.** The District shall not fail to pay money as to any portion of a Claim which is undisputed except as otherwise provided in the Contract Documents. In any suit filed pursuant to this section, the District shall pay interest at the legal rate on any arbitration award or judgment. Interest shall begin to accrue on the date the suit is filed in a court of law.

**25.7.3.** Claims Over \$375,000

**25.7.3.1.** For all Claims of over three hundred seventy-five thousand dollars (\$375,000) which arise between a Contractor and the District, the following procedure shall apply:

**25.7.3.1.1.** The parties agree to first endeavor to settle the dispute in an amicable manner by mediation before having recourse to a judicial forum. The Claim shall be identified in writing to the District within thirty (30) days from the date of Contractor's application for final payment of all Contract balances not in dispute and shall be mediated within one hundred and twenty (120) days from the submission of the Claim to the District. Mediator fees and administrative costs of the mediation shall be shared equally by the parties.

**25.7.3.1.2.** District may assert any counter-claims it has for damages against Contractor, including, but not limited to, defective Work, delay damages, and liquidated damages.

**25.7.4.** Contractor shall bind its Subcontractors to the provisions of this section and will hold the District harmless against disputes by Subcontractors.

**25.8.** **Dispute and Claim Resolution Non-Applicability**

**25.8.1.** The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

**25.8.1.1.** Personal injury, wrongful death or property damage claims;

**25.8.1.2.** Latent defect or breach of warranty or guarantee to repair;

**25.8.1.3.** Stop payment notices;

**25.8.1.4.** District's rights set forth in the Article on Suspension and Termination;

**25.8.1.5.** Disputes arising out of State labor compliance, if applicable; or

**25.8.1.6.** District rights and obligations as a public entity set forth in applicable statutes; provided, however, that penalties imposed against a public entity by

statutes, including, but not limited to, Public Contract Code sections 20104.50 and 7107, shall be subject to the Dispute and Claim Resolution requirements provided in this Article.

**25.8.1.7.** District's rights to seek provisional equitable remedies, including temporary retraining orders or preliminary injunctive relief.

**25.9.** Contractor's costs incurred in seeking relief under this Article are not recoverable from the District.

## **26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS**

### **26.1. Labor Compliance and Enforcement**

Since this Project is subject to labor compliance and enforcement by the Department of Industrial Relations ("DIR"), Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code and Title 8 of the California Code of Regulations, including, without limitation, the requirement that the Contractor and all Subcontractors shall timely furnish complete and accurate electronic certified payroll records directly to the DIR. The District may not issue payment if this requirement is not met.

### **26.2. Wage Rates, Travel, and Subsistence**

**26.2.1.** Pursuant to the provisions of article 2 (commencing at section 1770), chapter 1, part 7, division 2, of the Labor Code of California, the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Contract are on file at the District's principal office and copies will be made available to any interested party on request. Contractor shall obtain and post a copy of these wage rates at the job site.

**26.2.2.** Holiday and overtime work, when permitted by law, shall be paid for at the general prevailing rate of per diem wages for holiday and overtime work on file with the Director of the Department of Industrial Relations, unless otherwise specified. The holidays upon which those rates shall be paid need not be specified by the District, but shall be all holidays recognized in the applicable collective bargaining agreement. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code.

**26.2.3.** Contractor shall pay and shall cause to be paid each worker engaged in Work on the Project the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any Subcontractor and such workers.

**26.2.4.** If during the period this bid is required to remain open, the Director of the Department of Industrial Relations determines that there has been a change in any



prevailing rate of per diem wages in the locality in which the Work under the Contract is to be performed, such change shall not alter the wage rates in the Notice to Bidders or the Contract subsequently awarded.

**26.2.5.** Pursuant to Labor Code section 1775, Contractor shall, as a penalty to District, forfeit the statutory amount (believed by the District to be currently up to two hundred dollars (\$200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates, determined by the District and/or the Director, for the work or craft in which that worker is employed for any public work done under Contract by Contractor or by any Subcontractor under it. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

**26.2.6.** Any worker employed to perform Work on the Project, which Work is not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by him, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification.

**26.2.7.** Pursuant to Labor Code section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, subsistence pay, and apprenticeship or other training programs authorized by Labor Code section 3093, and similar purposes.

**26.2.8.** Contractor shall post at appropriate conspicuous points on the Site of Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned. In addition, Contractor shall post a sign-in log for all workers and visitors to the Site, a list of all subcontractors of any tier on the Site, and the required Equal Employment Opportunity poster(s).

### **26.3. Hours of Work**

**26.3.1.** As provided in article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code, eight (8) hours of labor shall constitute a legal days work. The time of service of any worker employed at any time by Contractor or by any Subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract shall be limited and restricted by Contractor to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, Work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

**26.3.2.** Contractor shall keep and shall cause each Subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by Contractor in connection with the Work or any part of the Work contemplated by this Contract. The record shall be

kept open at all reasonable hours to the inspection of District and to the Division of Labor Standards Enforcement of the DIR.

**26.3.3.** Pursuant to Labor Code section 1813, Contractor shall as a penalty to the District forfeit the statutory amount (believed by the District to be currently twenty-five dollars (\$25)) for each worker employed in the execution of this Contract by Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code.

**26.3.4.** Any Work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to the District.

#### **26.4. Payroll Records**

**26.4.1.** Contractor shall upload, and shall cause each Subcontractor performing any portion of the Work under this Contract to upload, an accurate and complete certified payroll record ("CPR") using the Public Works Payroll Reporting Form, including certification (DIR [Form A-1-131](#) or current version), and Statement of Employer Payments (DIR Form PW 26) through the eCPR application using PDF to the DIR at <https://apps.dir.ca.gov/ecpr/DAS/AltLogin> or current application and URL, showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work.

**26.4.1.1.** The CPRs enumerated hereunder shall be filed directly with the DIR on a weekly basis or to the requesting party, whether the District or DIR, within ten (10) days after receipt of each written request. The CPRs from the Contractor and each Subcontractor for each week shall be provided on or before Wednesday of the week following the week covered by the CPRs. District may not make any payment to Contractor until:

**26.4.1.1.1.** Contractor and/or its Subcontractor(s) provide CPRs acceptable to the DIR; and

**26.4.1.1.2.** Any delay in Contractor and/or its Subcontractor(s) providing CPRs to the DIR in a timely manner may directly delay Contractor's payment.

**26.4.2.** All CPRs shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

**26.4.2.1.** A certified copy of an employee's CPR shall be made available for inspection or furnished to the employee or his/her authorized representative on request.

**26.4.2.2.** CPRs shall be made available for inspection or furnished upon request to a representative of District, Division of Labor Standards Enforcement, Division of Apprenticeship Standards, and/or the DIR.

**26.4.2.3.** CPRs shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through the District, Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested CPRs have not been provided pursuant to the provisions herein, the requesting party shall, prior to being provided the records reimburse the costs of preparation by Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of Contractor.

**26.4.3.** Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by District, Division of Apprenticeship Standards, or Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of Contractor awarded Contract or performing Contract shall not be marked or obliterated.

**26.4.4.** Contractor shall inform District of the location of the records enumerated hereunder, including the street address, city, and county, and shall, within five (5) working days, provide a notice of change of location and address.

**26.4.5.** In the event of noncompliance with the requirements of this section, Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Contractor must comply with this section. Should noncompliance still be evident after the ten (10) day period, Contractor shall, as a penalty to District, forfeit up to one hundred dollars (\$100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of Division of Apprenticeship Standards or Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

## **26.5. [RESERVED]**

## **26.6. Apprentices**

**26.6.1.** Contractor acknowledges and agrees that, if this Contract involves a dollar amount greater than or a number of working days greater than that specified in Labor Code section 1777.5, then this Contract is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of Contractor to ensure compliance with this Article and with Labor Code section 1777.5 for all apprenticeship occupations.

**26.6.2.** Apprentices of any crafts or trades may be employed and, when required by Labor Code section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

**26.6.3.** Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which she/he is registered.

**26.6.4.** Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprentice agreements under chapter 4 (commencing at section 3070), division 3, of the Labor Code, are eligible to be employed. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.

**26.6.5.** Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractors employing workers in any apprenticeable craft or trade in performing any Work under this Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

**26.6.6.** Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractor may be required to make contributions to the apprenticeship program.

**26.6.7.** If Contractor or Subcontractor willfully fails to comply with Labor Code section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

**26.6.7.1.** Be denied the right to bid on any subsequent project for one (1) year from the date of such determination;

**26.6.7.2.** Forfeit as a penalty to District the full amount as stated in Labor Code section 1777.7. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council and under the authority of the Chief of the Division of Apprenticeship Standards.

**26.6.8.** Contractor and all Subcontractors shall comply with Labor Code section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

**26.6.9.** Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work. Special attention is directed to sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and title 8, California Code of Regulations, section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, California 94102.

## **26.7. Non-Discrimination**

**26.7.1.** Contractor herein agrees not to discriminate in its recruiting, hiring, promotion, demotion, or termination practices on the basis of race, religious creed, national origin, ancestry, sex, age, or physical handicap in the performance of this

Contract and to comply with the provisions of the California Fair Employment and Housing Act as set forth in part 2.8 of division 3 of the California Government Code, commencing at section 12900; the Federal Civil Rights Act of 1964, as set forth in Public Law 88-352, and all amendments thereto; Executive Order 11246, and all administrative rules and regulations found to be applicable to Contractor and Subcontractor.

**26.7.2.** Special requirements for Federally Assisted Construction Contracts: During the performance of this Contract, Contractor agrees to incorporate in all subcontracts the provisions set forth in Chapter 60-1.4(b) of Title 41 published in Volume 33 No. 104 of the Federal Register dated May 28, 1968.

**26.8. Labor First Aid**

Contractor shall maintain emergency first aid treatment for Contractor's workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 et seq.) and the California Occupational Safety and Health Act of 1973 (8 Cal. Code of Regs., §1 et seq.).

**27. [RESERVED]**

**28. MISCELLANEOUS**

**28.1. Assignment of Antitrust Actions**

**28.1.1.** Section 7103.5(b) of the Public Contract Code states:

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

**28.1.2.** Section 4552 of the Government Code states:

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

**28.1.3.** Section 4553 of the Government Code states:

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

**28.1.4.** Section 4554 of the Government Code states:

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action.

**28.1.5.** Under this Article, "public purchasing body" is District and "bidder" is Contractor.

**28.2. Excise Taxes**

If, under Federal Excise Tax Law, any transaction hereunder constitutes a sale on which a Federal Excise Tax is imposed and the sale is exempt from such Federal Excise Tax because it is a sale to a State or Local Government for its exclusive use, District, upon request, will execute documents necessary to show (1) that District is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of District. No Federal Excise Tax for such materials shall be included in any Contract Price.

**28.3. Taxes**

Contract Price is to include any and all applicable sales taxes or other taxes that may be due in accordance with section 7051 of the Revenue and Taxation Code; Regulation 1521 of the State Board of Equalization or any other tax code that may be applicable.

**28.4. Shipments**

All shipments must be F.O.B. destination to Site or sites, as indicated in the Contract Documents. There must be no charge for containers, packing, unpacking, drayage, or insurance. The total Contract Price shall be all inclusive (including sales tax) and no additional costs of any type will be considered.

**28.5. Compliance with Government Reporting Requirements**

If this Contract is subject to federal or other governmental reporting requirements because of federal or other governmental financing in whole or in part for the Project of which it is part, or for any other reason, Contactor shall comply with those reporting requirements at the request of the District at no additional cost.

END OF DOCUMENT

## DOCUMENT 00 73 13

**SPECIAL CONDITIONS****1. Mitigation Measures**

Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act. (Public Resources Code section 21000 et seq.)

**2. Modernization Projects**

**2.1. Access.** Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District and onsite District personnel before Work is to start. Unless agreed to otherwise in writing, only a school custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the District, other arrangements are made in advance.

**2.2. Maintaining Services.** The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the District. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

**2.3. Maintaining Utilities.** The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

**2.4. Confidentiality.** Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

**2.5. Work During Instructional Time.** By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to the school up to, and including, rescheduling specific work activities, at no additional cost to District.

**2.6. No Work During Student Testing.** Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State-required tests.

**3. Substitution for Specified Items**

**3.1.** Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

**3.1.1.** If the material, process, or article offered by Contractor is not, in the opinion of the District, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

**3.1.2.** This provision shall not be applicable with respect to any material, product, thing or service for which District made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

**3.2.** A request for a substitution shall be submitted as follows:

**3.2.1.** Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

**3.2.2.** Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.

**3.3.** Within 35 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

**3.3.1.** All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

**3.3.2.** Available maintenance, repair or replacement services;

**3.3.3.** Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

**3.3.4.** Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

**3.3.5.** The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.



**3.4.** No substitutions shall be made until approved, in writing, by the District. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

**3.4.1.** The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

**3.4.2.** The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

**3.4.3.** The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

**3.4.4.** The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

**3.4.5.** The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

**3.5.** In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

**3.6.** In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

**3.7.** Contractor shall be responsible for any costs the District incurs for professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods. District may deduct those costs from any amounts owing to the Contractor for the review of the request for substitution, even if the request for substitution is not approved. District, at its sole discretion, shall deduct from the payments due to and/or invoice Contractor for all the professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods arising herein.

**4. Weather Days**

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays:

January	<b><u>11</u></b>	July	<b><u>0</u></b>
February	<b><u>10</u></b>	August	<b><u>0</u></b>
March	<b><u>10</u></b>	September	<b><u>1</u></b>
April	<b><u>6</u></b>	October	<b><u>4</u></b>
May	<b><u>3</u></b>	November	<b><u>7</u></b>
June	<b><u>1</u></b>	December	<b><u>10</u></b>

**5. Insurance Policy Limits**

All of Contractor’s insurance shall be with insurance companies with an A.M. Best rating of no less than  A: VII  The limits of insurance shall not be less than:

<b>Commercial General Liability</b>	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	\$1,000,000 Per occurrence;  \$2,000,000 aggregate
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**6. Permits, Certificates, Licenses, Fees, Approval**

**6.1. Payment of Fees for Permits, Certificates, Licenses, and Registrations.**

As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, registrations, and certificates necessary for the prosecution of the Work with the exception of the following:

- 6.1.1. WATER CONNECTION FEES**
- 6.1.2. SEWER CONNECTION FEES**
- 6.1.3. STORM DRAIN CONNECTION FEES**

With respect to the above listed items, Contractor shall be responsible for securing such items; however, District will be responsible for payment of these charges or fees. Contractor shall notify the District of the amount due with respect to such items and to whom the amount is payable. Contractor shall provide the District with an invoice and receipt with respect to such charges or fees.

**6.2. General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities**

**6.2.1.** Contractor acknowledges that all California community college districts are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements), without limitation:

**6.2.1.1.** Municipal Separate Storm Sewer System (MS4) is a system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

**6.2.1.2.** Storm Water Pollution Prevention Plan (SWPPP) contains specific best management practices (BMPs) and establishes numeric effluent limitations at:

**6.2.1.2.1.** Sites where the District engages in maintenance (e.g., fueling, cleaning, repairing) for transportation activities.

**6.2.1.2.2.** Construction sites where:

**6.2.1.2.2.1.** One (1) or more acres of soil will be disturbed, or

**6.2.1.2.2.2.** The project is part of a larger common plan of development that disturbs more than one (1) acre of soil.

**6.2.2.** Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

**6.2.3.** At no additional cost to the District, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

**6.2.3.1.** At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

**6.2.3.2.** Monitoring any Numeric Action Levels (NALs), if applicable.

## **7. As-Builts and Record Drawings**

**7.1.** When called for by Division 1, Contractor shall submit As-Built Drawings pursuant to the Contract Documents consisting of one set of As-Built drawings in 30" x 42" color reprographic, plus one set of As Built Drawings in .pdf format provided on disc or thumb drive

**7.2.** Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD") files, plus one

set of Record Drawings in 30" x 42" color reprographic, plus one set of Record Drawings in .pdf format provided on disc or thumb drive

**8. Construction Manager**

The District will use a Construction Manager on the Project that is the subject of this Contract. Gilbane Building Company is the Construction Manager for this Project.

**9. Program Manager**

Gilbane Building Company is the Program Manager designated for the Project that is the subject of this Contract.

**10. Preliminary Schedule of Values**

The preliminary schedule of values shall include, at a minimum, the following information and the following structure:

Replace provision in the General Conditions with the following provisions:

**10.1.1.2.3.** The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

- 10.1.1.2.3.1.** Mobilization and layout combined to equal not more than [1]%;
- 10.1.1.2.3.2.** Submittals, samples and shop drawings combined to equal not more than [3]%;
- 10.1.1.2.3.3.** Bonds and insurance combined to equal not more than [2]%.

**11. Construction Work Hours**

Construction activities on campus shall be restricted to between the hours of 7:00 am and 7:00 pm on weekdays and Saturdays. Work on Sundays and holidays will be upon request and acceptance of the Marin Community College District

END OF DOCUMENT

DOCUMENT 00 73 56

**HAZARDOUS MATERIALS  
PROCEDURES & REQUIREMENTS**

**1. Summary**

This document includes information applicable to hazardous materials and hazard waste abatement.

**2. Notice of Hazardous Waste or Materials Conditions**

- a. Contractor shall give notice in writing to the District, the Construction Manager, and the Architect promptly, before any of the following conditions are disturbed, and in no event later than twenty-four (24) hours after first observance, of any:
  - (1) Material that Contractor believes may be material that is hazardous waste or hazardous material, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;
  - (2) Other material that may present a substantial danger to persons or property exposed thereto in connection with Work at the site.
- b. Contractor's written notice shall indicate whether the hazardous waste or material was shown or indicated in the Contract Documents to be within the scope of Work, and whether the materials were brought to the site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this section the term "hazardous materials" shall include, without limitation, asbestos, lead, Polychlorinated biphenyl (PCB), petroleum and related hydrocarbons, and radioactive material.
- c. In response to Contractor's written notice, the District shall investigate the identified conditions.
- d. If the District determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the District shall so notify Contractor in writing, stating reasons. If the District and Contractor cannot agree on whether conditions justify an adjustment in Contract Price or Contract Time, or on the extent of any adjustment, Contractor shall proceed with the Work as directed by the District.
- e. If after receipt of notice from the District, Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under special conditions, then District may order such portion of Work that is in connection with such hazardous condition or such affected area to be deleted from the Work, or performed by others, or District may invoke its rights to terminate the Contract in whole or in part. District will determine entitlement to or the amount or extent of an adjustment, if any, in

Contract Price or Contract Time as a result of deleting such portion of Work, or performing the Work by others.

- f. If Contractor stops Work in connection with any hazardous condition and in any area affected thereby, Contractor shall immediately redeploy its workers, equipment, and materials, as necessary, to other portions of the Work to minimize delay and disruption.

### 3. **Additional Warranties and Representations**

- a. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have the required levels of familiarity with the Site and the Work, training, and ability to comply fully with all applicable law and contract requirements for safe and expeditious performance of the Work, including whatever training is or may be required regarding the activities to be performed (including, but not limited to, all training required to address adequately the actual or potential dangers of Contract performance).
- b. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and quasi-governmental requirements applicable to the Work.
- c. Contractor represents and warrants that it has studied carefully all requirements of the Specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in the Contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by the Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by the Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed Project in full compliance with the Contract Documents.

### 4. **Monitoring and Testing**

- a. District reserves the right, in its sole discretion, to conduct air monitoring, earth monitoring, Work monitoring, and any other tests (in addition to testing required under the agreement or applicable law), to monitor Contract requirements of safe and statutorily compliant work methods and (where applicable) safe re-entry level air standards under state and federal law upon completion of the job, and compliance of the work with periodic and final inspection by public and quasi-public entities having jurisdiction.
- b. Contractor acknowledges that District has the right to perform, or cause to be performed, various activities and tests including, but not limited to, pre-abatement, during abatement, and post-abatement air monitoring, that

District shall have no obligation to perform said activities and tests, and that a portion of said activities and tests may take place prior to the completion of the Work by Contractor. In the event District elects to perform these activities and tests, Contractor shall afford District ample access to the Site and all areas of the Work as may be necessary for the performance of these activities and tests. Contractor will include the potential impact of these activities or tests by District in the Contract Price and the Scheduled Completion Date.

- c. Notwithstanding District's rights granted by this paragraph, Contractor may retain its own industrial hygiene consultant at Contractor's own expense and may collect samples and may perform tests including, but not limited to, pre-abatement, during abatement, and post-abatement personal air monitoring, and District reserves the right to request documentation of all such activities and tests performed by Contractor relating to the Work and Contractor shall immediately provide that documentation upon request.

**5. Compliance with Laws**

- a. Contractor shall perform safe, expeditious, and orderly work in accordance with the best practices and the highest standards in the hazardous waste abatement, removal, and disposal industry, the applicable law, and the Contract Documents, including, but not limited to, all responsibilities relating to the preparation and return of waste shipment records, all requirements of the law, delivering of all requisite notices, and obtaining all necessary governmental and quasi-governmental approvals.
- b. Contractor represents that it is familiar with and shall comply with all laws applicable to the Work or completed Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work relating to:
  - (1) The protection of the public health, welfare and environment;
  - (2) Storage, handling, or use of asbestos, PCB, lead, petroleum based products or other hazardous materials;
  - (3) The generation, processing, treatment, storage, transport, disposal, destruction, or other management of asbestos, PCB, lead, petroleum, or hazardous waste materials or other waste materials of any kind; and
  - (4) The protection of environmentally sensitive areas such as wetlands and coastal areas.

**6. Disposal**

- a. Contractor has the sole responsibility for determining current waste storage, handling, transportation, and disposal regulations for the job Site and for each waste disposal facility. Contractor must comply fully at its sole cost and

expense with these regulations and any applicable law. District may, but is not obligated to, require submittals with this information for it to review consistent with the Contract Documents.

- b. Contractor shall develop and implement a system acceptable to District to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that District may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.
- c. Contractor shall provide District with the name and address of each waste disposal facility prior to any disposal, and District shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which District has objected. Contractor shall document actual disposal or destruction of waste at a designated facility by completing a disposal certificate or certificate of destruction forwarding the original to the District.

**7. Permits**

- a. Before performing any of the Work, and at such other times as may be required by applicable law, Contractor shall deliver all requisite notices and obtain the approval of all governmental and quasi-governmental authorities having jurisdiction over the Work. Contractor shall submit evidence satisfactory to District that it and any disposal facility
  - (1) have obtained all required permits, approvals, and the like in a timely manner both prior to commencement of the Work and thereafter as and when required by applicable law, and
  - (2) are in compliance with all such permits, approvals and the regulations.

For example, before commencing any work in connection with the Work involving asbestos-containing materials, or PCBs, or other hazardous materials subject to regulation, Contractor agrees to provide the required notice of intent to renovate or demolish to the appropriate state or federal agency having jurisdiction, by certified mail, return receipt requested, or by some other method of transmittal for which a return receipt is obtained, and to send a copy of that notice to District. Contractor shall not conduct any Work involving asbestos-containing materials or PCBs unless Contractor has first confirmed that the appropriate agency having jurisdiction is in receipt of the required notification. All permits, licenses, and bonds that are required by governmental or quasi-governmental authorities, and all fees, deposits, tap fees, offsite easements, and asbestos and PCB disposal facilities expenses necessary for the prosecution of the Work, shall be procured and paid for by Contractor. Contractor shall give all notices and comply with the all applicable laws bearing on the conduct of the Work as drawn and specified. If Contractor observes or reasonably should have observed that Plans and Specifications and other Contract Documents are at variance therewith, it shall be responsible for promptly notifying District in writing of such fact. If



Contractor performs any Work contrary to applicable laws, it shall bear all costs arising therefrom.

- b. In the case of any permits or notices held in District's name or of necessity to be made in District's name, District shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for District review and execution upon approval, all necessary applications, notices, and other materials.

**8. Indemnification**

To the extent permitted by law, the indemnities and limitations of liability expressed throughout the Contract Documents apply with equal force and effect to any claims or liabilities imposed or existing by virtue of the removal, abatement, and disposal of hazardous waste. This includes, but is not limited to, liabilities connected to the selection and use of a waste disposal facility, a waste transporter, personal injury, property damage, loss of use of property, damage to the environment or natural resources, or "disposal" and "release" of materials associated with the Work (as defined in 42 U.S.C. § 9601 et seq.).

**9. Termination**

District shall have an absolute right to terminate for default immediately without notice and without an opportunity to cure should Contractor knowingly or recklessly commit a material breach of the terms of the Contract Documents, or any applicable law, on any matter involving the exposure of persons or property to hazardous waste. However, if the breach of contract exposing persons or property to hazardous waste is due solely to an ordinary, unintentional, and non-reckless failure to exercise reasonable care, then the procedures for termination for cause shall apply without modification.

END OF DOCUMENT

DOCUMENT 00 91 00

**PREVAILING WAGE AND  
RELATED LABOR REQUIREMENTS CERTIFICATION**

PROJECT/CONTRACT NO.: **150-35613 - BUILDING 11 RENOVATION** between Marin  
Community College District ("District") and \_\_\_\_\_  
\_\_\_\_\_ ("Contractor" or "Bidder") ("Contract" or "Project").

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project including, without limitation, labor compliance monitoring and enforcement by the Department of Industrial Relations.

Date: \_\_\_\_\_

Proper Name of Contractor: \_\_\_\_\_

Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

END OF DOCUMENT

DOCUMENT 01 11 00

**SUMMARY OF WORK****PART 1 - GENERAL****1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access Conditions and Requirements;
- B. Special Conditions.

**1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of this Contract may consist of the following:

Interior renovation of an existing 1970's two-story building with an approx. 6400 sf. ft. renovation area comprising mainly of the entire second floor and partial scope of the 1<sup>st</sup> floor. The newly renovated area will house the campus Human Resource Department administrative offices. The existing building structure is composed of deep pile concrete columns, glue laminated beams, floor joists and roof rafters. An existing elevator and interior stairwell will remain. The renovation scope of work includes the following:

**1<sup>st</sup> Floor:**

- New mechanical, lighting, fire alarm and fire protection design
- New ceiling finishes
- New accessible drinking fountain
- Reconfigure existing restrooms
- Replacement of all exterior windows

**2<sup>nd</sup> Floor:**

- New office layout
- New mechanical electrical, lighting, plumbing, fire alarm, fire protection, security, audio and visual systems
- Two single-stall unisex restroom
- Small kitchenette/workroom
- Replacement of all exterior windows
- Addition of new window openings
- Interior storefront for offices and meeting rooms
- Add batt wall insulation and interior wall finish at existing exterior walls
- Addition of skylight
- Replace existing roof membrane and insulation above existing roof deck

General:

- New exterior trellis slats
- New sidewalk repair and replacement
- New VFR system, pad and utility hook up to serve Bldg. 11 and space to add additional VFR for future connection to Admin. cluster bldgs.
- New sitework for fire protection system

**1.03 CONTRACTS**

- A. Perform the Work under a single, fixed-price Contract.

**1.04 WORK BY OTHERS**

- A. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:

**NONE**

**1.05 CODES, REGULATIONS, AND STANDARDS**

- A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.
- B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

**1.06 PROJECT RECORD DOCUMENTS:**

- A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:
- (1) Contract Drawings.
  - (2) Specifications.
  - (3) Addenda.
  - (4) Change Orders and other modifications to the Contract.
  - (5) Reviewed shop drawings, product data, and samples.
  - (6) Field test records.
  - (7) Inspection certificates.

- (8) Manufacturer's certificates.
- B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.
- C. Contractor shall record information concurrent with construction progress.
- D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:
  - (1) Manufacturer's name and product model and number.
  - (2) Product substitutions or alternates utilized.
  - (3) Changes made by Addenda and Change Orders and written directives.

**1.07 EXAMINATION OF EXISTING CONDITIONS**

- A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site or of the streets or roads approaching the Site.
- B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.
- C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

**1.08 CONTRACTOR'S USE OF PREMISES**

- A. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.
- B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.
- C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.

- D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.
- E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.
- F. The Contractor shall install the construction security fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

**1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES**

- A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.
- B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

**1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS**

- A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.
- B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

**1.11 STRUCTURAL INTEGRITY**

- A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.
- B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

**PART 2 – PRODUCTS** Not Used.

**PART 3 – EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 22 00

**ALTERNATES AND UNIT PRICING**

**PART 1 – ALTERNATES**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Bid Form and Proposal;
- D. Instruction to Bidders.

**1.02 DESCRIPTION**

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

**1.03 GENERAL**

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an items is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

**1.04 BASE BID**

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

**1.05 ALTERNATES**

**NONE**

**PART 2 - UNIT PRICING**

**2.01 GENERAL**

Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether



specifically stated or not, shall be omitted and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

**2.02 UNIT PRICES**

Furnish unit prices for each of the named items on a square foot, lineal foot, or per each basis, as applies. Unit prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and supplier(s).

**NONE**

END OF DOCUMENT

DOCUMENT 01 25 13

**PRODUCT OPTIONS AND SUBSTITUTIONS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. Instructions to Bidders;
- B. General Conditions, including, without limitation, Substitutions For Specified Items;
- C. Special Conditions.

**1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT:**

- A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.
- B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.
- C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions.
- D. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.
- E. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.

- F. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price.

**PART 2 – PRODUCTS** Not Used.

**PART 3 – EXECUTION** Not Used.

END OF DOCUMENT

**SECTION 01 26 00**

**CONTRACT MODIFICATION PROCEDURES**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This section specifies administrative and procedural requirements for handling and processing contract modifications.

**1.2 RELATED SECTIONS**

- A. Section 01 29 75: Applications and Certifications for Payment.
- B. Section 01 60 00: Product Requirements for administrative procedures for handling request for substitution after award of contract.

**1.3 CHANGE ORDER PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal requests issued by the Architect through the Program Manager are not to be considered as an instruction either to stop work in progress or to execute the proposed change.
  - 2. Should the Owner contemplate making a change in the Work or a change in the Contract Time of Completion, the Architect will issue a "Proposal Request" through the Program Manager to the Contractor.
  - 3. Within 10 working days of receipt of a Proposal Request, initiated by the Owner, submit a quotation of cost necessary to execute the change to the Program Manager for Owner's review.
    - a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rates and hours, and amounts of trade discounts.
    - c. Include labor rates with man-hours appropriate to the change.
    - d. Include a line item for applicable overhead and profit and/or fees.
    - e. Include a statement indicating the effect the proposed change in Work will have on the Contract Time.

**1.4 CONSTRUCTION CHANGE DIRECTIVE**

- A. Construction Change Directive: The Construction Change Directive is an architect issued document to change the DSA approved documents.
- B. Field Work Directive: The Field Work Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. The Field Work Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

**1.5 MINOR CHANGES IN WORK**

- A. The Architect will issue an Architect's Supplemental Instructions (ASI) authorizing minor changes in Work, not involving adjustment to the Contract Sum or Contract Time.

**1.6 CHANGE ORDER PROCEDURES**

- A. Upon the Owner's approval of a Proposal Request, the Program Manager will issue a Change Order for signatures by the Owner and the Contractor. All Change Orders shall be submitted to DSA per Group I, Chapter 4, Part I, Title 24, CBD by the Architect unless otherwise noted. Change Orders will be submitted to the Board of Trustees for approval on a monthly basis.
- B. Basis for Labor Wage Rates: The rates quoted in the Change Order Markup Format will be based upon the Labor Rate Worksheet submitted by the General Contractor within two weeks of Award of Contract. All Subcontractors must submit Labor Rate Worksheets when they first provide a quote for extra work. This Worksheet will provide the basis for any future change orders for which they perform work.
- C. General Contractor Mark-ups on Changes to the Work: In the event of Changes to the Work, pursuant to Article 8 of the General Conditions, the General Contractor's mark-up for all overhead, General Conditions costs and profit, shall be as follows:

Mark-ups on General Contractor's Direct Work Only: 15%  
Mark-up on Subcontractors (all tiers) Direct Work Only: 5%

The 5% mark-up on Subcontractors is based upon their costs, not the total of their costs and their mark-up. Mark-ups upon subcontractor mark-ups are not allowed. The foregoing limitation on mark-ups shall apply regardless of the number of subcontractors, of any tier, performing any portion of such Change to the work. The contractor may add the actual bond premium fee of no greater than one percent (1%) of the actual direct costs for performance of the change.

- D. Subcontractor Mark-ups on Changes to the Work: In the event of Changes to the Work, pursuant to Article 8 of the General Conditions, the Subcontractor's mark-up for all overhead, General Conditions costs and profit, shall be as follows:

Mark-ups on Subcontractor's Direct Work Only: 15%  
Mark-up on Lower Tier Subcontractor's Direct Work Only: 5%

The 5% mark-up on Lower Tier Subcontractors is based upon their costs, not the total of their costs and

their mark-up. Mark-ups upon subcontractor mark-ups are not allowed. The foregoing limitation on mark-ups shall apply regardless of the number of subcontractors, of any tier, performing any portion of such Change to the work.

Labor Rate Worksheet

Labor Rate Worksheet (Journeyman)

		Hourly Rate Vacation	\$ _____
A. Trade/Classification Group:		Taxable Gross Total	\$ _____
Hourly Rate (Base):	\$ _____		
<b>B. Fringe Benefits:</b>			
1. Health/Welfare	\$ _____		
2. Pension	\$ _____		
3. Apprenticeship	\$ _____		
4. Other Detail	\$ _____		
Sub-Total Fringe Benefits		\$ _____	
C. Total Rate of Base + Fringes =			\$ _____
<b>D. Labor Burdens:</b>			
	% Amount	Base	\$ Amount
1. F.I.C.A.	0.00%	X \$ _____	= \$ _____
2. S.U.I.	0.00%	X \$ _____	= \$ _____
3. F.U.I.	0.00%	X \$ _____	= \$ _____
4. Workmen's Comp	0.00%	X \$ _____	= \$ _____
5. Liability	0.00%	X \$ _____	= \$ _____
E. Total Hourly Rate with Fringe Benefits and Burden:			\$ _____
			Total \$ _____

## Change Order Markup Format

Description of change: \_\_\_\_\_

### Subcontractor's Costs

A.	Subcontractor Materials (include itemized quantity and unit costs plus sales tax)	\$ _____
B.	Subcontractor Labor (include itemized hours, trades/classification, and rates)	\$ _____
C.	Subcontractor Equipment Rentals (include invoices or standardized rate charges for contractor-owned equipment)	\$ _____
D.	Sub-Total Subcontractor	\$ _____
E.	Subcontractor markup on Subcontractor costs (15% of Line D)	\$ _____
F.	Subcontractor Total (Line D + Line E)	\$ _____

### General Contractor's Costs

G.	GC Materials (include itemized quantity and unit costs plus salestax)	\$ _____
H.	GC Labor (Include itemized hours, trades and rates)	\$ _____
I.	GC Equipment Rentals (Include invoices or standardized rate charges for contractor-owned equipment)	\$ _____
J.	Sub-Total General Contractor	\$ _____
K.	General Contractor's markup on GC work (15% of Line J)	\$ _____
L.	General Contractor Total (Line J + Line K)	\$ _____

### General Contractor Markup on Subcontractors and Bond Fees

M.	Costs of all Subcontractors (attach separate sheets for multiple Subcontractors performing any portion of this change and add up all line D's)	\$ _____
N.	General Contractor's Mark-up rate on Subcontractors' work (5% of Line M)	\$ _____
O.	Sub-Total (All Line F's + Line L + Line N)	\$ _____
P.	All Direct Costs (all Line D's + Line J)	\$ _____
Q.	Mark-Up for Bond Fees (1% of Line P)	\$ _____
	<b>TOTAL CHANGE PROPOSAL</b> (Line O + Line Q)	<b>\$ _____</b>

**PART 2- PRODUCTS (NOT USED)**

**PART 3- EXECUTION (NOT USED)**

**END OF SECTION**



DOCUMENT 01 31 19

**PROJECT MEETINGS**

**PART I – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Summary of Work; and
- D. Submittals.

**1.02 SECTION INCLUDES:**

- A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.
  - (1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").
  - (2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.
  - (3) Submit schedules and reports as specified in the General Conditions.
- B. Upon Notice of Award, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

**1.03 CONSTRUCTION SCHEDULE:**

- A. Within ten (10) days of the Notice of Award and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.
- B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule: Milestone schedule is based on a contract length of One Hundred Fifty-two (152) days. Construction start, and final project completion dates may be adjusted based on when the Notice to Proceed is issued.

**ACTIVITY DESCRIPTION**

**REQUIRED COMPLETION**

**CONSTRUCTION STARTS  
FINAL PROJECT COMPLETION**

**November 6, 2017  
April 6, 2018**

**1.04 QUALIFICATIONS**

- A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of **Primavera Project Planner**. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.
  - (1) The written statement shall identify the individual who will perform CPM scheduling.
  - (2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.
  - (3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three-fourths ( $\frac{3}{4}$ ) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.
- B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

**1.05 GENERAL**

- A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.
- B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.
  - (1) District is not required to accept an early completion schedule, i.e., one that shows earlier completion date than the Contract Time.
  - (2) Contractor shall not be entitled to extra compensation in event agreement is reached on an early completion schedule and Contractor

completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

- (3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.
- C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.
- (1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.
  - (2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.
- D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.
- E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.
- F. Software: Use **District Project Planner for Windows, latest version**. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.
- G. Transmit each item under the form approved by District.
- (1) Identify Project with District Contract number and name of Contractor.
  - (2) Provide space for Contractor's approval stamp and District's review stamps.

- (3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

**1.06 INITIAL CPM SCHEDULE**

- A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.
- B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.
- C. Initial CPM Schedule shall be time-scaled.
- D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.
- E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.
  - (1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).
  - (2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.
- F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

**1.07 ORIGINAL CPM SCHEDULE**

- A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.
- B. Progress Schedule shall include or comply with following requirements:

- (1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.
- (2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.
  - (a) Activity durations shall be total number of actual work days required to perform that activity.
- (3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.
- (4) District -furnished materials and equipment, if any, identified as separate activities.
- (5) Activities for maintaining Project Record Documents.
- (6) Dependencies (or relationships) between activities.
- (7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.
  - (a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.
  - (b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.
- (8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.
  - (a) Include time for fabrication and delivery of manufactured products for the Work.
  - (b) Show dependencies between procurement and construction.
- (9) Activity description; what Work is to be accomplished and where.
- (10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.

- (11) Resources required (labor and major equipment) to perform each activity.
- (12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.
- (13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.
- (14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.
- (15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.
- (16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.
  - (a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.
  - (b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.
  - (c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.
  - (d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.
- (17) Activity durations shall be in Work days.
- (18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.

- C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.
- (1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.
  - (2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:
    - (a) Clarifications of Contract Requirements.
    - (b) Directions to include activities and information missing from submittal.
    - (c) Requests to Contractor to clarify its schedule.
  - (3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

#### **1.08 ADJUSTMENTS TO CPM SCHEDULE**

- A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.
- (1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:
    - (a) Accept schedule and cost and resource loaded activities as submitted, or
    - (b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.
  - (2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.
  - (3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.

- (4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.
- B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.
  - (1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.
  - (2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.
  - (3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.
- C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.
- D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

**1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS**

- A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.
  - (1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.
  - (2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- B. A meeting will be held on approximately the twenty-fifth (25<sup>th</sup>) of each month to review the schedule update submittal and progress payment application.



- (1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.
  - (2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.
  - (3) Contractor shall plan on the meeting taking no less than four (4) hours.
- C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.
- D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.
- (1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.
  - (2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.
- E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

### **1.10 SCHEDULE REVISIONS**

- A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.
- B. To reflect revisions to the schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.

- C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.
- D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.
- E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

**1.11 RECOVERY SCHEDULE**

- A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.
- B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.
- C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.
- D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

**1.12 TIME IMPACTS EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS**

- A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on

the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.

- B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.
- C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.
- D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

### **1.13 TIME EXTENSIONS**

- A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.
- B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.
- C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.
- D. No time will be granted under this Contract for cumulative effect of changes.
- E. District will not be obligated to consider any time extension request unless the Contractor complies with requirements of Contract Documents.
- F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

- G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

**1.14 SCHEDULE REPORTS**

- A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.

- B. Required Reports:

- (1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.
- (2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to-date, previous payments, and amount earned for current update period.
- (3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.
- (4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.
- (5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

- C. Other Reports

In addition to above reports, District may request, from month-to-month, any two of the following reports. Submit four (4) copies of all reports.

- (1) Activities by early start.
- (2) Activities by late start.
- (3) Activities grouped by Subcontractors or selected trades.
- (4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

- D. Furnish District with report files on compact disks containing all schedule files for each report generated.

### **1.15 PROJECT STATUS REPORTING**

- A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.
  
- B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:
  - (1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
  - (2) Progress made on critical activities indicated on CPM Schedule.
  - (3) Explanations for any lack of work on critical path activities planned to be performed during last month.
  - (4) Explanations for any schedule changes, including changes to logic or to activity durations.
  - (5) List of critical activities scheduled to be performed next month.
  - (6) Status of major material and equipment procurement.
  - (7) Any delays encountered during reporting period.
  - (8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
    - (a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.
    - (b) Contractor shall explain all variances and mitigation measures.
  - (9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.
  - (10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

### **1.16 WEEKLY SCHEDULE REPORT**

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

### **1.17 DAILY CONSTRUCTION REPORTS**

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and manhours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

- A. Project name and Project number.
- B. Contractor's name and address.
- C. Weather, temperature, and any unusual site conditions.
- D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.
- E. Worker quantities for its own Work force and for Subcontractors of any tier.
- F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

### **1.18 PERIODIC VERIFIED REPORTS**

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

**PART 2 - PRODUCTS** Not Used.

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 33 00

**SUBMITTALS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.

**1.02 SECTION INCLUDES:**

- A. Definitions:
  - (1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.
  - (2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
  - (3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.
- B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

- (1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.
- (2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.
- (3) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.
- (4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.
- (5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.
- (6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.
- (7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Also certify that Contractor-furnished equipment can be installed in allocated space.
- (8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.
- (9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.



- C. Submittal Schedule:
- (1) Contractor shall prepare its proposed submittal schedule that is coordinated with the its proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.
  - (2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revised and resubmit", etc.
  - (3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule..

**1.03 SHOP DRAWINGS:**

- A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.
- B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.
- C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.
- D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.
- E. District shall not review Shop Drawings for quantities of materials or number of items supplied.
- F. District's and/or Architect's review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. Shop Drawing reviewed by District and/or Architect is not to be construed as approving departures from Contract Documents.

- G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.
- H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.
- I. Submitted drawings and details must bear stamp of approval of Contractor:
  - (1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.
  - (2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.
- J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.
- K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.
- L. Shop Drawings must clearly delineate the following information:
  - (1) Project name and address.
  - (2) Architect's name and project number.
  - (3) Shop Drawing title, number, date, and scale.
  - (4) Names of Contractor, Subcontractor(s) and fabricator.
  - (5) Working and erection dimensions.
  - (6) Arrangements and sectional views.

- (7) Necessary details, including complete information for making connections with other Work.
  - (8) Kinds of materials and finishes.
  - (9) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.
- M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.
- (1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.
  - (2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

**1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS:**

- A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contractor must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.
- B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.
- C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.
- D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.

**1.05 SAMPLES:**

- A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.
- B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.
  - (1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.
  - (2) Samples must show full range of texture, color, and pattern.
- C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.
- D. Samples to be shipped prepaid or hand-delivered to the District.
- E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.
- F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.
- G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.
- H. After a material has been approved, no change in brand or make will be permitted.
- I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.
- J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.
- K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:

- (1) Size: As Specified.
- (2) Furnish catalog numbers and similar data, as requested.

**1.06 REVIEW AND RESUBMISSION REQUIREMENTS:**

- A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.
- B. One (1) copy of product or materials data will be returned to Contractor with the review status.
- C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.
- D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review.
- E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.
- F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.
- G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.
- H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.

- I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

**PART 2 – PRODUCTS** Not Used.

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 35 13.23

**SITE STANDARDS**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;
- B. Special Conditions;
- C. Drug-Free Workplace Certification;
- D. Tobacco-Free Environment Certification;
- E. Criminal Background Investigation/Fingerprinting Certification;
- F. Temporary Facilities and Controls.

**1.02 REQUIREMENTS OF THE DISTRICT:**

- A. Drug-Free Schools and Safety Requirements:
  - (1) All school sites and other District Facilities have been declared "Drug-Free Zones." No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.
  - (2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school owned vehicles and vehicles owned by others while on District property. Contractor shall be post: "Non-Smoking Area" in a highly visible location on Site. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.
  - (3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.
- B. Language: Unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students or public will not be allowed.

- C. Disturbing the Peace (Noise and Lighting):
- (1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.
  - (2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for handheld communication radios (e.g., Nextel phones or radios).
  - (3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.
- D. Traffic:
- (1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.
  - (2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.
  - (3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.
  - (4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in areas that could otherwise be damaged.
- E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

**PART 2 - PRODUCTS** Not Used.

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT



DOCUMENT 01 41 00

**REGULATORY REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Obtaining of Permits and Licenses and Work to Comply with All Applicable Regulations;
- B. Special Conditions;
- C. Quality Control.

**1.02 DESCRIPTION:**

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

**1.03 REQUIREMENTS OF REGULATORY AGENCIES:**

- A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction of the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").
- B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:
  - (1) Test and testing laboratory per Section 4-335 (District shall pay for the testing laboratory.)
  - (2) Special inspections per Section 4-333(c).
  - (3) Verified reports per Section 4-365 & 4-343(c).

- (4) Duties of the Architect & Engineers shall be per Section 4-333(a) and 4-341.
- (5) Duties of the Contractor shall be per Section 4-343.
- (6) Addenda and Change Orders per Section 4-338.

Contractor shall keep and make available a copy of Part 1 and 2 of the most current version of Title 24 at the Site during construction.

- C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.
  - (1) Building Standards Administrative Code, Part 1, Title 24, CCR
  - (2) California Building Code (CBC), Part 2, Title 24, CCR; (Uniform Building code volumes 1-3 and California Amendments).
  - (3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).
  - (4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).
  - (5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).
  - (6) California Fire Code (CFC), Part 9, Title 24, CCR; (Fire Plumbing Code and California Amendments).
  - (7) California Referenced Standards Code, Part 12, Title 24, CCR.
  - (8) State Fire Marshal Regulations, Public Safety, Title 19, CCR.
  - (9) Partial List of Applicable NFPA Standards:
    - (a) NFPA 13 - Automatic Sprinkler System.
    - (b) NFPA 14 - Standpipes Systems.
    - (c) NFPA 17A - Wet Chemical System
    - (d) NFPA 24 - Private Fire Mains.
    - (e) (California Amended) NFPA 72 - National Fire Alarm Codes.
    - (f) NFPA 253 - Critical Radiant Flux of Floor Covering System.
    - (g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.

(10) California Division of the State Architect interpretation of Regulations.

**PART 2 – PRODUCTS** Not Used.

**PART 3 – EXECUTION** Not Used.

END OF DOCUMENT

## DOCUMENT 01 42 13

**ABBREVIATIONS AND ACRONYMS****PART 1 – GENERAL****1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

**1.02 DOCUMENT INCLUDES:**

- A. Abbreviations used throughout the Contract Documents.
- B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	Aluminum Association
2.	AAMA	Architectural Aluminum Manufacturers Association
3.	AASHTO	American Association of State Highway and Transportation Officials
4.	ABPA	Acoustical and Board Products Association
5.	ACI	American Concrete Institute
6.	AGA	American Gas Association
7.	AGC	Associated General Contractors
8.	AHC	Architectural Hardware Consultant
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AIEE	American Institute of Electrical Engineers
12.	AISC	American Institute of Steel Construction
13.	AISI	American Iron and Steel Institute
14.	AMCA	Air Moving and Conditioning Association
15.	ANSI	American National Standards Institute
16.	APA	American Plywood Association
17.	ARI	Air Conditioning and Refrigeration Institute
18.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
19.	ASME	American Society of Mechanical Engineers
20.	ASSE	American Society of Structural Engineers
21.	ASTM	American Society of Testing and Materials
22.	AWPB	American Wood Preservers Bureau
23.	AWPI	American Wood preservers Institute
24.	AWS	American Welding Society
25.	AWSC	American Welding Society Code

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26.	AWI	Architectural Woodwork Institute
27.	AWWA	American Water Works Association
28.	BIA	Brick Institute of America
29.	CCR	California Code of Regulations
30.	CLFMI	Chain Link Fence Manufacturers Institute
31.	CMG	California Masonry Guild
32.	CRA	California Redwood Association
33.	CRSI	Concrete Reinforcing Steel Institute
34.	CS	Commercial Standards
35.	CSI	Construction Specifications Institute
36.	CTI	Cooling Tower Institute
37.	FGMA	Flat Glass Manufacturer's Association
38.	FIA	Factory Insurance Association
39.	FM	Factory Mutual
40.	FS	Federal Specification
41.	FTI	Facing Title Institute
42.	GA	Gypsum Association
43.	ICC	International Code Council
44.	IEEE	Institute of Electrical and Electronic Engineers
45.	IES	Illumination Engineering Society
46.	LIA	Lead Industries Association
47.	MIA	Marble Institute of America
48.	MLMA	Metal Lath Manufacturers Association
49.	MS	Military Specifications
50.	NAAMM	National Association of Architectural Metal Manufacturers
51.	NBHA	National Builders Hardware Association
52.	NBFU	National Board of Fire Underwriters
53.	NBS	National Bureau of Standards
54.	NCMA	National Concrete Masonry Association
55.	NEC	National Electrical Code
56.	NEMA	National Electrical Manufacturers Association
57.	NFPA	National Fire Protection Association/National Forest Products Association
58.	NMWIA	National Mineral Wool Insulation Association
59.	NTMA	National Terrazzo and Mosaic Association
60.	NWMA	National Woodwork Manufacturer's Association
61.	ORS	Office of Regulatory Services (California)
62.	OSHA	Occupational Safety and Health Act
63.	PCI	Precast Concrete Institute
64.	PCA	Portland Cement Association
65.	PDCA	Painting and Decorating Contractors of America
66.	PDI	Plumbing Drainage Institute
67.	PEI	Porcelain Enamel Institute
68.	PG&E	Pacific Gas & Electric Company
69.	PS	Product Standards
70.	SDI	Steel Door Institute; Steel Deck Institute
71.	SJI	Steel Joist Institute
72.	SSPC	Steel Structures Painting Council
73.	TCA	Tile Council of America

74.	TPI	Truss Plate Institute
75.	UBC	Uniform Building Code
76.	UL	Underwriters Laboratories Code
77.	UMC	Uniform Mechanical Code
78.	USDA	United States Department of Agriculture
79.	VI	Vermiculite Institute
80.	WCLA	West Coast Lumberman's Association
81.	WCLB	West Coast Lumber Bureau
82.	WEUSER	Western Electric Utilities Service Engineering Requirements
83.	WIC	Woodwork Institute of California
84.	WPOA	Western Plumbing Officials Association

**PART 2 - PRODUCTS** Not Used.

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 42 16

**DEFINITIONS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISION**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

**1.02 QUALITY ASSURANCE:**

- A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.
- B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.
- C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.
- D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.
- E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and./or the Architect before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.
- G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF DOCUMENT

DOCUMENT 01 42 19

**REFERENCES****PART 1 - GENERAL****1.01 SCHEDULE OF REFERENCES:**

**The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.**

AA	Aluminum Association 1525 Wilson Blvd., Suite 600 Arlington, VA 22209 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, DC 20005 www.aabchq.com	202/737-0202
AAMA	American Architectural Manufacturers Association 1827 Walden Office Sq., Suite 550 Schaumburg, IL 60173-4268 www.aamanet.org	847/303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 N Capitol St. NW - Suite 249 Washington, DC 20001 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 1500 Rhode Island Ave., NW Washington DC, 20005 www.paint.org	202/462-6272
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.aci-int.org	248/848-3700
ACPA	American Concrete Pipe Association 8445 Freeport Parkway, Suite 350 Irving, TX 75063-2595	972/506-7216



	<a href="http://www.concrete-pipe.org">www.concrete-pipe.org</a>	
ADC	Air Diffusion Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 <a href="http://www.flexibleduct.org">www.flexibleduct.org</a>	847/706-6750
AF&PA	American Forest and Paper Association 1111 Nineteenth Street, NW, Suite 800 Washington, DC 20036 <a href="http://www.afandpa.org">www.afandpa.org</a>	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW Washington, DC 20001 <a href="http://www.aga.org">www.aga.org</a>	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 400 Arlington, VA 22201 <a href="http://www.agc.org">www.agc.org</a>	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 <a href="http://domensino.com/AHA/default.htm">domensino.com/AHA/default.htm</a>	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 <a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a>	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 <a href="http://www.aia.org">www.aia.org</a>	202/626-7300
AISC	American Institute of Steel Construction One East Wacker Drive Suite 700 Chicago, IL 60601-1802 <a href="http://www.aisc.org">www.aisc.org</a>	312.670.2400
AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 2101 L Street, NW, Suite 400 Washington, DC 20037 <a href="http://www.aiadc.org">www.aiadc.org</a>	202/828-7100
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 <a href="http://www.steel.org">www.steel.org</a>	202/452.7100
AITC	American Institute of Timber Construction	303/792.9559

	7012 S. Revere Parkway Suite 140 Centennial, CO 80112 <a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>	
ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 <a href="http://www.assoc-labs.com">www.assoc-labs.com</a>	214/565-0593
ALSC	American Lumber Standards Committee, Inc. P.O. Box 210 Germantown, MD 20875 <a href="http://www.alsc.org">www.alsc.org</a>	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 <a href="http://www.amca.org">www.amca.org</a>	847/394-0150
ANLA	American Nursery & Landscape Association 1200 G Street NW, Suite 800 Washington, DC 20005 <a href="http://www.anla.org">www.anla.org</a>	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 <a href="http://www.ansi.org">www.ansi.org</a>	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 <a href="http://www.apawood.org">www.apawood.org</a>	253/565-6600
APA	Architectural Precast Association 6710 Winkler Road, Suite 8 Fort Myers, Florida 33919 <a href="http://www.archprecast.org">www.archprecast.org</a>	239/454-6989
ARI	Air Conditioning and Refrigeration Institute 4100 N. Fairfax Drive, Suite 200 Arlington, VA 22203 <a href="http://www.lightindustries.com/ARI">www.lightindustries.com/ARI</a>	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association Public Information Department 750 National Press Building 529 14th Street, NW Washington, DC 20045 <a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a>	202/591-2450
ASA	The Acoustical Society of America ASA Office Manager	516/576-2360

	Suite 1NO1 2 Huntington Quadrangle Melville, NY 11747-4502 <a href="http://asa.aip.org">http://asa.aip.org</a>	
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 <a href="http://www.asce.org">www.asce.org</a>	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329-2305 <a href="http://www.ashrae.org">www.ashrae.org</a>	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 <a href="http://www.asla.org">www.asla.org</a>	202/898-2444
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990 <a href="http://www.asme.org">www.asme.org</a>	800/434-2763
ASPE	American Society of Plumbing Engineers 2980 S River Rd. Des Plaines, IL 60018 <a href="http://aspe.org">http://aspe.org</a>	847/296-0002
ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 <a href="http://asq.org">http://asq.org</a>	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A Westlake, Ohio 44145 <a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a>	440/835-3040
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 <a href="http://www.astm.org">www.astm.org</a>	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 <a href="http://www.awci.org">www.awci.org</a>	703/538-1600

AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcat.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 Doral Boulevard, Suite 130 Doral, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 1850 Centennial Park Drive, Suite 301 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 14501 George Carter Way, Suite 103 Chantilly VA 20151-2923 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 1064 Delaware Avenue SE Atlanta, GA 30316 www.cispi.org	404/622-0073
CLFMI	Chain Link Fence Manufacturers Institute	410/290-6267

	10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 <a href="http://www.associationsites.com/main-pub.cfm?usr=clfma">www.associationsites.com/main-pub.cfm?usr=clfma</a>	
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 <a href="http://www.compositepanel.org">www.compositepanel.org</a>	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 <a href="http://www.cpsc.gov">www.cpsc.gov</a>	301/504-7923 800/638-2772
CRA	California Redwood Association 405 Enfrente Drive, Suite 200 Novato, CA 94949 <a href="http://www.calredwood.org">www.calredwood.org</a>	415/382-0662
CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, Georgia 30722-2048 <a href="http://www.carpet-rug.org">www.carpet-rug.org</a>	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 <a href="http://www.crsi.org">www.crsi.org</a>	847/517-1200
CSI	The Construction Specifications Institute 110 South Union Street, Suite 100 Alexandria VA 22314 <a href="http://www.csinet.org">www.csinet.org</a>	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 <a href="http://www.ctioa.org">www.ctioa.org</a>	310/574-7800
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 14150 Newbrook Dr. Chantilly, VA 20151 <a href="http://www.dhi.org">www.dhi.org</a>	703/222-2010
DIPRA	Ductile Iron Pipe Research Association 2000 2nd Avenue, South Suite 429 Birmingham, AL 35233 <a href="http://www.dipra.org">www.dipra.org</a>	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230	202/482-2000

	<a href="http://www.commerce.gov">www.commerce.gov</a>	
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 <a href="http://www.dot.gov">www.dot.gov</a>	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 <a href="http://www.ejma.org">www.ejma.org</a>	914/332-0040
EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 <a href="http://www.epa.gov">www.epa.gov</a>	202/272-0167
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322 <a href="http://www.fcica.com">www.fcica.com</a>	248/661-5015 877/TO-FCICA
FM Global	Factory Mutual Insurance Company Mary Breighner Global Practice Leader Education, Public Entities, Health Care FM Global 9 Woodcrest Court Cincinnati, OH 45246 <a href="http://www.fmglobal.com">www.fmglobal.com</a>	513/742-9516
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 <a href="http://www.gsa.gov">www.gsa.gov</a>	202/619-8925
GA	The Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782 <a href="http://www.gypsum.org">www.gypsum.org</a>	301/277-8686
GANA	Glass Association of North America 800 SW Jackson St., Suite 1500 Topeka, KS 66612-1200 <a href="http://www.glasswebsite.com">www.glasswebsite.com</a>	785/271-0208
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 <a href="http://hmamembers.org">http://hmamembers.org</a>	412/244-0440

HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org	703/435-2900
IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MIA	Marble Institute of America 28901 Clemens Rd, Ste 100 Cleveland, OH 44145 www.marble-institute.com	440/250-9222
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889

MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 <a href="http://mss-hq.org">http://mss-hq.org</a>	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 <a href="http://www.naamm.org">www.naamm.org</a>	630/942-6591
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314 <a href="http://www.naima.org">www.naima.org</a>	703/684-0084
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd. Lanham, MD USA 20706-4407 <a href="http://www.asphaltpavement.org">www.asphaltpavement.org</a>	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 <a href="http://www.ncspa.org">www.ncspa.org</a>	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 <a href="http://www.ncma.org">www.ncma.org</a>	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 <a href="http://www.nebb.org">www.nebb.org</a>	301/977-3698
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814 <a href="http://www.necanet.org">www.necanet.org</a>	301/657-3110
	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 <a href="http://www.nema.org">www.nema.org</a>	703/841-3200



NEII	National Elevator Industry, Inc. 1677 County Route 64 P.O. Box 838 Salem, New York 12865-0838 www.neii.org	518/854-3100
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 12100 Sunset Hills Road, Suite 330 Reston, VA 20190 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321-OSHA (6742)
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 500 New Jersey Ave., N.W. 7 <sup>th</sup> Floor Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCI	Precast/Prestressed Concrete Institute	312/786-0300

	200 W. Adams St. #2100 Chicago, IL 60606 <a href="http://www.pci.org">www.pci.org</a>	
PDCA	Painting and Decorating Contractors of America 2316 Millpark Drive, Ste 220 Maryland Heights, MO 63043 <a href="http://www.pdca.com">www.pdca.com</a>	800/332-PDCA (7322) 314/514-7322
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 <a href="http://pdionline.org">http://pdionline.org</a>	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 <a href="http://www.porcelainenamel.com">www.porcelainenamel.com</a>	770/676-9366
PG&E	Pacific Gas & Electric Company <a href="http://www.pge.com">www.pge.com</a>	800/743-5000
PLANET	Professional Landcare Network 950 Herndon Parkway, Suite 450 Herndon, Virginia 20170 <a href="http://www.landcarenetwork.org">www.landcarenetwork.org</a>	703/736-9666 800/395-2522 703/736-9668
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 <a href="http://www.rfci.com">www.rfci.com</a>	706/882-3833
RIS	Redwood Inspection Service 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 <a href="http://www.redwoodinspection.com">www.redwoodinspection.com</a>	925/935-1499
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 <a href="http://www.sdi.org">www.sdi.org</a>	847/458-4647
SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 <a href="http://www.steeldoor.org">www.steeldoor.org</a>	440/899-0010
SJI	Steel Joist Institute 234 W. Cheves Street Florence, SC 29501 <a href="http://steeljoist.org">http://steeljoist.org</a>	843/407-4091
SMA	Stucco Manufacturers Association	949/387.7611

	500 East Yale Loop Irvine, CA 92614 www.stuccomfgassoc.com	
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1667 K St., NW, Suite 1000 Washington, DC 20006 www.plasticsindustry.org	202/974-5200
SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 40 24th St 6th Fl Pittsburgh, PA 15222 www.sspc.org	412/281-2331 877/281-7772
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 218 North Lee Street, Suite 312 Alexandria, VA 22314 www.tpinst.org	703/683-1010
TPI	Turfgrass Producers International 2 East Main Street East Dundee, IL 60118 www.turfgrassod.org	800/405-8873 847/649-5555
TCIA	Tree Care Industry Association (formerly the National Arborist Association) 136 Harvey Road, Suite 101 Londonderry, NH 03053 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 150 Whitman Avenue Edison, NJ. 08817 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association	972/243-3902

	2711 LBJ Freeway, Suite 1000 Dallas, TX 75234 <a href="http://www.uni-bell.org">www.uni-bell.org</a>	
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 <a href="http://www.usda.gov">www.usda.gov</a>	202/720-2791
WA	Wallcoverings Association 401 North Michigan Avenue Suite 2200 Chicago, IL 60611 <a href="http://www.wallcoverings.org">www.wallcoverings.org</a>	312/321-5166
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281 or 6980 S.W. Varns Tigard, OR 97223 <a href="http://www.wclib.org">www.wclib.org</a>	503/639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 <a href="http://www.wcmanet.org">www.wcmanet.org</a>	212/297-2122
WDMA	Window & Door Manufacturers Association 401 N. Michigan Avenue, Suite 2200 Chicago, IL 60611 or 2025 M Street, NW, Ste. 800 Washington, D.C. 20036-3309 <a href="http://www.wdma.com">www.wdma.com</a>	312/321-6802 202/367-1157
WI	Woodwork Institute P.O. Box 980247 West Sacramento, CA 95798 <a href="http://www.wicnet.org">www.wicnet.org</a>	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 <a href="http://www.wirereinforcementinstitute.org">www.wirereinforcementinstitute.org</a>	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 <a href="http://www.wwcca.org">www.wwcca.org</a>	714/221-5520
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500 Portland, OR 97204-2122	503/224-3930

	<a href="http://www2.wwpa.org">www2.wwpa.org</a>	
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**PART 2 - PRODUCTS** Not Used.

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 43 00

**MATERIALS AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Purchase of Materials and Equipment;
- B. Special Conditions;
- C. Imported Materials Certification.

**1.02 MATERIAL AND EQUIPMENT**

- A. Only items approved by the District and/or Architect shall be used.
- B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

**1.03 MATERIAL AND EQUIPMENT COLORS**

- A. The District and/or Architect will provide a schedule of colors.
- B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.
- C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.
- B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.

- C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.
- D. Materials are not be acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.
- E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, and underground services. Contractor shall protect material and equipment furnished under Contract.
- F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.
- G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.
- B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

### **2.02 FACILITIES AND EQUIPMENT**

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

### **2.03 MATERIAL REFERENCE STANDARDS**

Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of

vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

### **PART 3 - EXECUTION**

#### **3.01 WORKMANSHIP**

- A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).
- B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

#### **3.02 COORDINATION**

- A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.
- B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

#### **3.03 COMPLETENESS**

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

#### **3.04 APPROVED INSTALLER OR APPLICATOR**

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established



relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

### **3.05 MANUFACTURER'S RECOMMENDATIONS**

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

DOCUMENT 01 45 00

**QUALITY CONTROL**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;
- B. Special Conditions.

**1.02 RELATED CODES:**

- A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.
- B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

**1.03 OBSERVATION AND SUPERVISION:**

- A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.
- B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:
  - (1) The Project Inspector shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections.. The Contractor shall provide facilities and access as required and shall provide assistance for sampling or measuring materials.
  - (2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.
  - (3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

**1.04 TESTING AGENCIES:**

- A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.
- B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."
- C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

**1.05 TESTS AND INSPECTIONS:**

- A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.
- B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.
- C. The District will pay for first inspections and tests required by the "CCR", and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:
  - (1) Tests and observations for earthwork and paving.
  - (2) Tests for concrete mix designs, including tests of trial batches.
  - (3) Tests and inspections for structural steel work.
  - (4) Field tests for framing lumber moisture content.

- (5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.
- (6) Test and observation of welding and expansion anchors.
- D. The District may at its discretion, pay and back charge the Contractor for:
  - (1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.
  - (2) Uncovering of work in accordance with Contract Documents.
  - (3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.
  - (4) Testing done off Site.
- E. Testing and inspection reports and certifications:
  - (1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.
    - a. The District;
    - b. The Construction Manager, if any;
    - c. The Architect;
    - d. The Consulting Engineer, if any;
    - e. Other engineers on the Project, as appropriate;
    - f. The Project Inspector; and
    - g. The Contractor.
  - (2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

## **PART 2 - PRODUCTS**

### **2.01 TYPE OF TEST AND INSPECTIONS:**

- A. Slump Test  
ASTM C 143

B. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

(1) Compressive Strength:

- a. Minimum number of tests required: One (1) set of three (3) cylinders for each 100 cubic yards (Sec. 2604(h) 01) of concrete or major fraction thereof, placed in one (1) day. See Title 24, Section 2605(g).
- b. Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.
- c. Concrete shall test the minimum ultimate compressive strength in 28 days, as specified on the structural drawings.
- d. In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with UBC Standard No. 26-13 and tested as required for cylinders.
- e. In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.

C. Reinforcing, Steel

D. Compaction

- (1) Subsoil
- (2) Sub-base Materials

E. Post Installed Anchors

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 50 00

**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Site Standards.

**1.02 TEMPORARY UTILITIES:**

- A. Electric Power and Lighting
  - (1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.
  - (2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.
  - (3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.
  - (4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.

B. Heat and Ventilation

- (1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.
- (2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
- (3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water

- (1) Contractor will pay for water during the course of the Work. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s) or on the Site to point of intended use.
- (2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.
- (3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities

- (1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.
- (2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service

- (1) Contractor shall arrange with local telephone service company for telephone service for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.
- (2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

- (1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.
- (2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

- (1) Contractor shall provide trash removal on a timely basis. The contractor is responsible for providing trash bins, trash bags and/or trash containers to facilitate the removal of trash from the Site
- (2) Contractor is not allowed to utilize the District trash bins or containers during the course of the work.

H. Temporary Facilities:

- (1) **None**

**1.03 CONSTRUCTION AIDS:**

A. Plant and Equipment:

- (1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workmen. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.
- (2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.



**1.04 BARRIERS AND ENCLOSURES:**

- A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.
- B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.
- C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.
- D. Tree and Plant Protection:
  - (1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.
  - (2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations.
  - (3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.
  - (4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.
  - (5) Excavation Around Trees:
    - (a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.

- (b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.
- (c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.
- (d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.
- (e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.
- (f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

**1.05 SECURITY:**

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

**1.06 TEMPORARY CONTROLS:**

A. Noise Control

- (1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.
- (2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other

equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration

- (1) Equipment and impact tools shall have intake and exhaust mufflers.
- (2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt

- (1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
- (2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.
- (3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
- (4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water

Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution

- (1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.
- (2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting

- (1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

**1.07 JOB SIGN(S):**

A. General:

- (1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Architect; locate sign as approved by the District.
- (2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

- (1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.
- (2) Sign Surface: Minimum 3/4-inch exterior grade plywood.
- (3) Rough Hardware: Galvanized.
- (4) Paint: Exterior quality, of type and colors selected by the District and/or the Architect.

C. Fabrication:

- (1) Contractor shall fabricate to provide smooth, even surface for painting.
- (2) Size: 4'-0" x 8'-0", unless otherwise indicated.
- (3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.
- (4) Text and Graphics: As indicated.

**1.08 PUBLICITY RELEASES:**

- A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s).

**PART 2 – PRODUCTS** Not used.

**PART 3 – EXECUTION** Not used.

END OF DOCUMENT

DOCUMENT 01 50 13

**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Document 01 50 00.

**1.02 SECTION INCLUDES:**

- A. Administrative and procedural requirements for the following:
  - (1) Salvaging non-hazardous construction waste.
  - (2) Recycling non-hazardous construction waste.
  - (3) Disposing of non-hazardous construction waste.

**1.03 DEFINITIONS:**

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

**1.04 PERFORMANCE REQUIREMENTS:**

- A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of fifty percent (50%) by weight (or by volume, but not a combination) of total waste generated by the Work.

**1.05 SUBMITTALS:**

- A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:
  - (1) Material category.
  - (2) Generation point of waste.
  - (3) Total quantity of waste in tons or cubic yards.
  - (4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.
  - (5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.
  - (6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.
  - (7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. CHPS Submittal: CHPS letter template for Credit ME2.0 and ME2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For Waste Management Coordinator.
- J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- K. Submittal procedures and quantities are specified in Document 01300.

#### **1.06 QUALITY ASSURANCE:**

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:
  - (1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
  - (2) Review requirements for documenting quantities of each type of waste and its disposition.
  - (3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - (4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - (5) Review waste management requirements for each trade.



**1.07 WASTE MANAGEMENT PLAN:**

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - (1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  - (2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - (3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - (4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - (5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - (6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

**PART 2 - PRODUCTS** Not Used.

**PART 3 - EXECUTION**

**3.01 PLAN IMPLEMENTATION:**

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - (1) Comply with Document 01500 for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
  - (1) Distribute waste management plan to everyone concerned within 3 days of submittal return.
  - (2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - (1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  - (2) Comply with Document 01500 for controlling dust and dirt, environmental protection, and noise control.

**3.02 RECYCLING CONSTRUCTION WASTE:**

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
  - (1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.
    - (a) Inspect containers and bins for contamination and remove contaminated materials if found.
  - (2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - (3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  - (4) Store components off the ground and protect from the weather.
  - (5) Remove recyclable waste off District property and transport to recycling receiver or processor.
- D. Packaging:
  - (1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  - (2) Polystyrene Packaging: Separate and bag material.
  - (3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  - (4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- E. Site-Clearing Wastes: Chip brush, branches, and trees on site.
- F. Wood Materials:
  - (1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  - (2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

- (1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

**3.03 DISPOSAL OF WASTE:**

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  - (1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.
  - (2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF SECTION

DOCUMENT 01 52 13

**FIELD OFFICES**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

**1.02 SECTION INCLUDES:**

- A. Requirements for Field Offices and Field Office Trailers.

**1.03 SUMMARY:**

- A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.
- B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.
- C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.
- D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.
- E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

**1.04 SUBMITTALS:**

- A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.

- B. Office Trailer Data: One (1) copy of manufacturer's descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.
- C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.
- F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

### **1.05 QUALITY ASSURANCE**

- A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer's specifications, manufacturer's instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.
- B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.
- C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.
- D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.
- E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

### **1.06 REGULATORY REQUIREMENTS**

- A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactment's, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.
- B. California Building Standards Code ("CBSC").
- C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 ("CCR").

- D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

**PART 2 – PRODUCTS**

**2.01 FIELD OFFICE TRAILER**

- A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.
- B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.
- C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, stairs, platforms, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.
  - (1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.
  - (2) Stairs, Platform: Properly finished stairs, platforms, and ramps.
  - (3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.
  - (4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like, there shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.
  - (5) HVAC: **[PROVIDE DESCRIPTION OR DELETE]**
  - (6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.
  - (7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.
  - (8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.

- (9) Answering Machine: One (1) unit, two (2)-line; digital.

**2.02 FIELD OFFICE TRAILER ITEMS**

- A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:
- (1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.
  - (2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.
  - (3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.
  - (4) Waste Baskets: Two (2) waste baskets, one at each desk.
- B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.
- (1) File Cabinet: One (1) file cabinet: four (4) drawer; lateral; steel locking.
  - (2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.
  - (3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.
  - (4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.
  - (5) Plan Rack: One (1) wheel mounted plan rack.
  - (6) Waste Baskets: One (1) large waste basket.
  - (7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.
  - (8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:
    - (a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.
    - (b) Network: Ethernet or Token Ring network ready, Plug-and-Play.



- (c) Print, send/receive facsimile from any connected workstation.
  - (d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.
  - (e) Print Speed: Twenty (20) pages per minute, minimum.
  - (f) Copies: Twenty (20) copies per minute, minimum.
  - (g) Document Handler: Forty (40) sheet, minimum
  - (h) Collator: Forty (40) bin, minimum, with stapling.
  - (i) Duplexing: Capable.
  - (j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.
  - (k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.
  - (l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).
  - (m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.
  - (n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.
  - (o) Halftone: Sixty-four (64) levels.
  - (p) Redial: Automatic and Manual.
- (9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:
- (a) Unlimited Service Calls.
  - (b) Same Day Response.
  - (c) All parts, labor, preventative maintenance and mileage.
  - (d) All chemicals, such as toner, fixing agent, and the like.

- (e) System training and setup.
- (10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.
  - (a) Location: As directed by District.
  - (b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.
  - (c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

### **2.03 UTILITY AND SERVICES**

- A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.
- B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

### **2.04 FINISHES**

- A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.
- B. Finish: Color as selected by District from manufacturer standard palette.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

- A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.
- B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels;

provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.

- C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.
- D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.
- E. Location: As directed by District.
- F. Fire Resistance: Construct and install in accordance with UL requirements.
- G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.
- H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.
  - (1) Frequency: Two (2) times per week, minimum.
- I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF DOCUMENT

**DOCUMENT 01 64 00**

**OWNER-FURNISHED PRODUCTS**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Materials and Equipment.

**1.02 SECTION INCLUDES:**

- A. Requirements for the following:
  - (1) Installing Owner-furnished materials and equipment.
  - (2) Providing necessary utilities, connections and rough-ins.

**1.03 DEFINITIONS**

- A. Owner: District, who is providing/furnishing materials and equipment.
- B. Installer Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

**1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING:**

- A. Receive, store and handle products in accordance with the manufacturer's instructions.
- B. Protect equipment items as required to prevent damage during storage and construction.

**PART 2 – PRODUCTS**

**2.01 GENERAL PRODUCT REQUIREMENTS:**

- A. Installer Contractor's Responsibilities:
  - (1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.

- (2) Provide mounting and utility rough in for all items where required.
  - (a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installer Contractor(s) Responsibilities:

- (1) Owner-Furnished/Contractor Installed ("OFICI"): Furnished by the Owner; installed by the Installer Contractor.
  - (a) General: Owner and Installer Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
  - (b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.
  - (c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installer Contractor.
  - (d) The Installer Contractor shall:
    - 1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.
    - 2) Coordinate timely delivery. Installer Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installer Contractor shall assume responsibility for such defects and omissions.
    - 3) Store materials and equipment until ready for installation and protect from loss and damage. Installer Contractor is responsible for providing adequate storage space.
    - 4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
    - 5) Uncrate, assemble, and set in place.
    - 6) Provide adequate supports.

- 7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supplying labor and material required and making mechanical, plumbing, and electrical connections required to operate equipment.
- 8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
- 9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.
- 10) Provide the contract-required warranty/guarantee for all work, materials/equipment and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

- (1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.
- (2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

**2.02 FURNISHED MATERIALS AND EQUIPMENT**

- A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. Install equipment items in accordance with the manufacturer's instructions.
- B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.
- C. Make electrical and mechanical connections as indicated and required.
- D. Touch-up and restore damaged or defaced finishes to the District's satisfaction.

**3.02 CLEANING AND PROTECTION**

- A. Repair or replace items not acceptable to the Architect.
- B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the District.

END OF DOCUMENT

SECTION 01 66 00

**PRODUCT DELIVERY, STORAGE, AND HANDLING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;
- B. Special Conditions.

**1.02 PRODUCTS**

- A. Products are as defined in the General Conditions.
- B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.
- C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

**1.03 TRANSPORTATION AND HANDLING**

- A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.
- B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.
- C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

**1.04 STORAGE AND PROTECTION**

- A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.
- C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.



- D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.
- E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.
- F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

**PART 2 – PRODUCTS** Not Used.

**PART 3 - EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 71 23

**FIELD ENGINEERING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;
- B. Special Conditions;
- C. Site-Visit Certification.

**1.02 REQUIREMENTS INCLUDED:**

- A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:
  - (1) Survey work required in execution of the Project.
  - (2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

**1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:**

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

**1.04 SURVEY REFERENCE POINTS:**

- A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.
- B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
  - (1) Make no changes or relocation without prior written notice to District and Architect.
  - (2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

- (3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

**1.05 RECORDS:**

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

**1.06 SUBMITTALS:**

- A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.
- B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
- C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

**PART 2 – PRODUCTS** Not Used.

**PART 3 - EXECUTION**

**3.01 COMPLIANCE WITH LAWS:**

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

**3.02 NONCONFORMING WORK:**

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

DOCUMENT 01 73 29

**CUTTING AND PATCHING**

**1. PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;
- B. Special Conditions;
- C. Hazardous Materials Procedures and Requirements;
- D. Hazardous Materials Certification;
- E. Lead-Based Paint Certification;
- F. Imported Materials Certification.

**1.02 CUTTING AND PATCHING:**

- A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:
  - (1) Make several parts fit together properly.
  - (2) Uncover portions of Work to provide for installation of ill-timed Work.
  - (3) Remove and replace defective Work.
  - (4) Remove and replace Work not conforming to requirements of Contract Documents.
  - (5) Remove Samples of installed Work as specified for testing.
  - (6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
  - (7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.
- B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of

installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

- C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

**1.03 SUBMITTALS:**

- A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:
  - (1) The work of the District or other trades.
  - (2) Structural value or integrity of any element of Project.
  - (3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.
  - (4) Efficiency, operational life, maintenance or safety of operational elements.
  - (5) Visual qualities of sight-exposed elements.
- B. Contractor's Request shall also include:
  - (1) Identification of Project.
  - (2) Description of affected Work.
  - (3) Necessity for cutting, alteration, or excavations.
  - (4) Affects of Work on District, other trades, or structural or weatherproof integrity of Project.
  - (5) Description of proposed Work:
    - (a) Scope of cutting, patching, alteration, or excavation.
    - (b) Trades that will execute Work.
    - (c) Products proposed to be used.
    - (d) Extent of refinishing to be done.
  - (6) Alternates to cutting and patching.

- (7) Cost proposal, when applicable.
- (8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.
- (9) Written permission of other trades whose Work will be affected.

**1.04 QUALITY ASSURANCE:**

- A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.
- B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

**1.05 PAYMENT FOR COSTS:**

- A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.
- B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

**PART 2 - PRODUCTS**

**2.01 MATERIALS:**

- A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.
- B. Materials to be cut and patched include those damaged by the performance of the Work.

**PART 3 – EXECUTION**

**3.01 INSPECTION:**

- A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.
- B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

**3.02 PREPARATION:**

- A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.
- B. Contractor shall provide devices and methods to protect other portions of Project from damage.
- C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

**3.03 ERECTION, INSTALLATION AND APPLICATION:**

- A. With respect to performance, Contractor shall:
  - (1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
  - (2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.
  - (3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.
- B. Contractor shall employ original installer or fabricator to perform cutting and patching for:
  - (1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.
  - (2) Sight-exposed finished surfaces.
- C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances,

and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

- D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.
- E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with requirements of the Contract Documents and as required to match surrounding areas and surfaces.
- F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT



DOCUMENT 01 76 00

**ALTERATION PROJECT PROCEDURES**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;
- B. Special Conditions.

**PART 2 - PRODUCTS**

**2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:**

- A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.
- B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

**PART 3 - EXECUTION**

**3.01 EXAMINATION:**

- A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.
- B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

**3.02 PREPARATION:**

- A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.
- B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

- C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.
- D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.
- E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

**3.03 INSTALLATION:**

- A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.
- B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.
- C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.
- D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
- E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

**3.04 TRANSITIONS:**

- A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

**3.05 ADJUSTMENTS:**

- A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

- B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.
- C. Contractor shall trim existing doors as necessary to clear new floor finish and refinish trim as required.
- D. Contractor shall fit Work at penetrations of surfaces.

**3.06 REPAIR OF DAMAGED SURFACES:**

- A. Contractor shall patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- B. Contractor shall repair substrate prior to patching finish.

**3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:**

- A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.
- B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.
- C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified the Contract Documents, including without limitation, the Drawings.

**3.08 FINISHES:**

- A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.
- B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

**3.09 CLEANING:**

- A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

DOCUMENT 01 77 00

**CONTRACT CLOSEOUT AND FINAL CLEANING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of Work;
- B. Special Conditions;
- C. Temporary Facilities and Controls.

**1.02 CLOSEOUT PROCEDURES**

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

**1.03 FINAL CLEANING**

- A. Contractor shall execute final cleaning prior to final inspection.
- B. Contractor shall clean interior and exterior glass and surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.
- C. Contractor shall clean equipment and fixtures to a sanitary condition.
- D. Contractor shall replace filters of operating equipment.
- E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.
- G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site.

**1.04 ADJUSTING**

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

**1.05 RECORD DOCUMENTS AND SHOP DRAWINGS**

- A. Contractor shall legibly mark each item to record actual construction, including:
  - (1) Measured depths of foundation in relation to finish floor datum.
  - (2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.
  - (3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - (4) Field changes of dimension and detail.
  - (5) Details not on original Contract Drawings
  - (6) Changes made by modification(s).
  - (7) References to related Shop Drawings and modifications.
- B. Contractor will provide one set of Record Drawings to District.
- C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

**1.06 INSTRUCTION OF DISTRICT PERSONNEL**

- A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months.
- C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.
- E. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

**1.07 SPARE PARTS AND MAINTENANCE MATERIALS**

- A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.
- B. Contractor shall provide District all required Operation and Maintenance Data.

**PART 2 – PRODUCTS** Not used.

**PART 3 – EXECUTION** Not used.

END OF DOCUMENT

DOCUMENT 01 78 23

**OPERATION AND MAINTENANCE DATA**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of the Work;
- B. Special Conditions.

**1.02 QUALITY ASSURANCE:**

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

**1.03 FORMAT:**

- A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").
- B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.
- C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.
- D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.
- E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

**1.04 CONTENTS, EACH VOLUME:**

- A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants,

Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

- B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.
- E. Text: The Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Contractor shall bind in one copy of each.

#### **1.05 MANUAL FOR MATERIALS AND FINISHES:**

- A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.
- E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

#### **1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:**

- A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall



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include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

- B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.
- C. Contractor shall include color coded wiring diagrams as installed.
- D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.
- G. Contractor shall include manufacturer's printed operation and maintenance instructions.
- H. Contractor shall include sequence of operation by controls manufacturer.
- I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Contractor shall provide control diagrams by controls manufacturer as installed.
- K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).
- O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

### **1.08 SUBMITTAL:**

- A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor's start of Work.
- B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.
- C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.
- D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

**PART 2 – PRODUCTS** Not Used.

**PART 3 – EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 78 36

**WARRANTIES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Warranty/Guarantee Information;
- B. Special Conditions.

**1.02 FORMAT**

- A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.
- B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.
- C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier, and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.
- D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

**1.03 PREPARATION:**

- A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty until the date of completion is determined.
- B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.
- C. Contractor shall co-execute submittals when required.
- D. Contractor shall retain warranties until time specified for submittal.

**1.04 TIME OF SUBMITTALS:**

- A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.
- B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.
- C. For items of work delayed beyond date of completion, provide updated submittal within ten days after acceptance, listing the date of acceptance as start of warranty period.

**PART 2 - PRODUCTS** Not Used.

**PART 3 – EXECUTION** Not Used.

END OF DOCUMENT

DOCUMENT 01 78 39

**RECORD DOCUMENTS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS AND PROVISIONS:**

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Documents on Work;
- B. Special Conditions.

**PART 2 - RECORD DRAWINGS**

**2.01 GENERAL:**

- A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible (opaque) plans of the original Contract Drawings.
- B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible (opaque) plans of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible (opaque) plans at the conclusion of the Project following review of the blueline prints.
- C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.
- D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.
- E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

**2.02 RECORD DRAWING INFORMATION:**

- A. Contractor shall record the following information:
- (1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.
  - (2) Actual numbering of each electrical circuit.
  - (3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.
  - (4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.
  - (5) Installed location of all cathodic protection anodes.
  - (6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.
  - (7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
  - (8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

- B. Contractor shall provide additional drawings as necessary for clarification.
- C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."

**PART 3 - RECORD SPECIFICATIONS****3.01 GENERAL:**

Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.

**PART 4 - MAINTENANCE OF RECORD DOCUMENTS**

**4.01 GENERAL**

- A. Contractor shall store Record Documents apart from documents used for construction as follows:
  - (1) Provide files and racks for storage of Record Documents.
  - (2) Maintain Record Documents in a clean, dry, legible condition and in good order.
- B. Do not use Record Documents for construction purposes.

**PART 5 – PRODUCTS** Not Used.

END OF DOCUMENT

**END OF DOCUMENTS  
FOR  
PROJECT MANUAL**



# **SPECIFICATION SECTIONS FOR PROJECT MANUAL**



**COLLEGE OF MARIN  
INDIAN VALLEY CAMPUS  
BUILDING 11 RENOVATION  
100% CONSTRUCTION DOCUMENTS  
DSA NO. 01-116787 (BACKCHECK)**

**PROJECT ADDRESS**

COLLEGE OF MARIN INDIAN VALLEY CAMPUS  
1800 IGNACIO AVENUE  
NOVATO, CA 94949

**OWNER**

MARIN COMMUNITY COLLEGE DISTRICT  
835 COLLEGE AVENUE  
KENTFIELD, CA 94904

**DATE**

SEPTEMBER 07, 2017

**ARCHITECT**

BRICK INC.  
PROJECT NO. 16-148.01





**COLLEGE OF MARIN  
INDIAN VALLEY CAMPUS  
BUILDING 11 RENOVATION  
100% CONSTRUCTION DOCUMENTS  
DSA NO. 01-116787 (BACKCHECK)**

**PROJECT ADDRESS**

COLLEGE OF MARIN INDIAN VALLEY CAMPUS  
1800 IGNACIO AVENUE  
NOVATO, CA 94949

**OWNER**

MARIN COMMUNITY COLLEGE DISTRICT  
835 COLLEGE AVENUE  
KENTFIELD, CA 94904

**DATE**

SEPTEMBER 07, 2017

**ARCHITECT**

BRICK INC.  
PROJECT NO. 16-148.01

SECTION 00 01 01

TITLE PAGE

**BID/PROJECT MANUAL**

BUILDING 11 RENOVATION

Project Description:

Interior renovation of an existing 1970's two-story building with an approx. 6400 sf. ft. renovation area comprising mainly of the entire second floor and partial scope of the 1<sup>st</sup> floor. The newly renovated area will house the campus Human Resource Department administrative offices. The existing building structure is composed of deep pile concrete columns, glue laminated beams, floor joists and roof rafters. An existing elevator and interior stairwell will remain. The renovation scope of work includes the following:

1<sup>st</sup> floor:

- New mechanical, lighting, fire alarm and fire protection design
- New ceiling finishes
- New accessible drinking fountain
- Reconfigure existing restrooms
- Replacement of all exterior windows

2<sup>nd</sup> floor:

- New office layout
- New mechanical electrical, lighting, plumbing, fire alarm, fire protection, security, audio and visual systems
- Two single-stall unisex restroom
- Small kitchenette/workroom
- Replacement of all exterior windows
- Addition of new window openings
- Interior storefront for offices and meeting rooms
- Add batt wall insulation and interior wall finish at existing exterior walls
- Addition of skylight
- Replace existing roof membrane and insulation above existing roof deck

General:

- New exterior trellis slats
- New sidewalk repair and replacement

- New VRF system, pad and utility hook up to serve Bldg. 11 and space to add additional VRF for future connection to Admin. cluster bldgs.
- New sitework for fire protection system

END OF SECTION

DOCUMENT 00 01 07

SEALS PAGE

ENGINEER:

Brick Inc.  
Matt Combrink  
1266 66<sup>th</sup> Street Suite 1  
Emeryville, CA 94608

LICENSE NUMBER:

C-31415

Seal



DIVISION OF THE STATE ARCHITECT  
IDENTIFICATION STAMP

APPL. 01-116787

AC J FLS WANG SSS WANG

DATE 9/12/2017

Signature

A handwritten signature in blue ink, appearing to be "M. Combrink", written over a horizontal line.

Date

9.6.17

END OF DOCUMENT

DOCUMENT 00 01 07

SEALS PAGE

CIVIL ENGINEER:

CSW | ST2.  
Kirk Bovitz  
45 Leveroni Ct.  
Novato, CA 94949

LICENSE NUMBER:

RCE-74631

Seal



Kirk Bovitz                      9/1/17  
Signature                                      Date

END OF DOCUMENT

DOCUMENT 00 01 07

SEALS PAGE

STRUCTURAL ENGINEER:

IDA  
Stephen DeJesse  
1629 Telegraph Ave. Suite 300  
Oakland, CA 94612

LICENSE NUMBER:

S03527      Stephen DeJesse

Seal



  
Signature

9-7-17  
Date

END OF DOCUMENT



DOCUMENT 00 01 07

SEALS PAGE

ENGINEER:

Harjot Sidhu  
PAE  
48 Golden Gate Ave  
San Francisco, CA  
94102

LICENSE NUMBER:

E-18943

Seal



*HS*

Signature

09-07-17

Date

DOCUMENT 00 01 07

SEALS PAGE

ENGINEER:

Marco Alves  
PAE  
48 Golden Gate Ave  
San Francisco, CA  
94102

LICENSE NUMBER:

M-33075

Seal



Signature

7/7/2017

Date

END OF DOCUMENT



DOCUMENT 00 01 07

SEALS PAGE

ENGINEER:

John H. Kaiser  
Sigma Engineering  
3517 Marconi Ave, Ste 204  
Sacramento, Ca 95821

LICENSE NUMBER:

M. 31434

Seal



  
Signature

9/6/18  
Date

END OF DOCUMENT

DOCUMENT 00 01 07

SEALS PAGE

ENGINEER:

Simplex Grinnell  
6952 Preston Ave  
Livermore, CA  
94551

LICENSE NUMBER:

E8122

Seal



Signature

A handwritten signature in blue ink, appearing to be "R. Juachon", written over a horizontal line.

Date

5/25/17

END OF DOCUMENT

DOCUMENT 00 01 10

TABLE OF CONTENTS

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DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

00 01 01	Title Page
00 01 07	Seals Page
00 01 10	Table of Contents
00 01 15	List of Drawings
00 01 21	Project Directory

**DIVISION 02 – EXISTING CONDITIONS**

02 40 00	Demolition (civil)
02 41 19	Selective Demolition

**DIVISION 03 – CONCRETE**

03 30 00	Cast-in Place Concrete
03 54 00	Gypsum Cement Underlayment

**DIVISION 04 – MASONRY (NOT USED)**

**DIVISION 05 – METALS**

05 12 00	Structural Steel Framing
05 04 00	Cold-Formed Metal Framing
05 50 00	Metal Fabrications

**DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES**

06 10 00	Rough Carpentry
06 40 05	Exterior Finish Carpentry
06 40 23	Architectural Woodwork

**DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

07 21 00	Building Insulation
07 25 00	Weather Barriers
07 27 26	Fluid Applied Membrane Air Barriers
07 31 13	Asphalt Shingles
07 62 00	Sheet Metal Flashing and Trim
07 92 00	Joint Sealants

**DIVISION 08 – OPENINGS**

08 11 13	Hollow Metal Doors and Frames
08 14 16	Flush Wood Doors
08 31 13	Access Doors and Frames
08 41 13	Interior Entrances and Glazing Systems
08 51 14	Aluminum Windows
08 71 00	Door Hardware
08 80 00	Glazing

**DIVISION 09 – FINISHES**

09 22 16	Non-Structural Metal Framing
09 29 00	Gypsum Board
09 30 00	Tiling
09 51 23	Acoustical Ceilings
09 65 13	Resilient Base and Accessories
09 65 19	Resilient Tile Flooring
09 68 13	Tile Carpeting
09 68 16	Sheet Carpeting
09 72 00	Wall Coverings
09 83 00	Acoustic Finishes
09 91 00	Painting and Coating

**DIVISION 10 – SPECIALTIES**

10 22 33	Accordion Folding Partitions
10 26 00	Wall and Door Protection
10 28 00	Toilet Accessories
10 85 00	Exterior Acoustical Specialties



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**DIVISION 11 – EQUIPMENT**

11 31 00 Appliances

**DIVISION 12 - FURNISHINGS**

12 24 13 Roller window Shades

**DIVISION 13 – SPECIAL CONSTRUCTION (NOT USED)**

**DIVISION 14 – CONVEYING EQUIPMENT (NOT USED)**

**DIVISION 21 – FIRE PROTECTION**

21 13 13 Fire Protection System

**DIVISION 22 – PLUMBING**

22 05 00 Common Work Results for Plumbing  
22 05 19 Meters and Gages for Plumbing  
22 05 23 General Duty Valves and Specialties for Plumbing  
22 05 29 Hangers and Supports and Anchors for Plumbing Piping  
22 05 48 Vibration and Seismic Controls for Plumbing Piping and Equipment  
22 05 53 Identification for Plumbing Piping and Equipment  
22 05 90 Pressure Testing for Plumbing Systems  
22 05 93 Testing, Adjusting and Balancing for Plumbing  
22 07 00 Insulation for Plumbing  
22 21 13 Pipe and Pipe Fittings and Plumbing  
22 25 00 Plumbing Water Treatment  
22 30 00 Plumbing Equipment  
22 40 00 Plumbing Fixtures

**DIVISION 23 – HEATING, VENTILATING, and AIR CONDITIONING (HVAC)**

23 05 00 Common Work Results for HVAC  
23 05 14 Variable Frequency Drives for HVAC Equipment  
23 05 19 Meters and Gages HVAC  
23 05 23 General Duty Valves and Specialties for HVAC  
23 05 29 Hangers, Supports and Anchors for HVAC  
23 05 48 Vibration and Seismic Controls for HVAC Piping and Equipment  
23 05 53 Identification of HVAC Piping and Equipment  
23 05 90 Pressure Testing for HVAC Systems  
23 05 93 Testing, Adjusting and Balancing for HVAC  
23 07 00 Insulation for HVAC  
23 09 00 Instrumentation and Controls for HVAC  
23 31 01 HVAC Ducts and Casing-Low Pressure  
23 33 00 Air Duct Accessories  
23 34 00 HVAC Fans  
23 81 00 Decentralized Unitary HVAC Equipment

**DIVISION 25 – INTEGRATED AUTOMATION (NOT USED)**

**DIVISION 26 – ELECTRICAL**

26 05 00	Common Work Results For Electrical
26 05 19	Low-Voltage Electrical Power Conductors and Cables
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 33	Raceways and Boxes for Electrical Systems
26 05 53	Identification for Electrical Systems
26 05 73	Overcurrent Protective Device Coordination Study
26 05 80	Electrical Testing
26 08 00	Commissioning Of Electrical Systems
26 09 13	Electrical Power Monitoring and Control
26 09 43	Network Lighting Controls
26 24 16	Panelboards
26 27 26	Wiring Devices
26 29 00	Motor Controllers
26 50 00	Lighting

**DIVISION 27 – COMMUNICATION**

27 00 00	Communication Horizontal Cabling
27 40 00	Audiovisual Systems
27 51 26	Assistive Listening System

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

28 10 00	Access Control
28 20 00	Video Surveillance System

**DIVISION 31 – EARTHWORK**

31 10 00	Site Clearing
31 23 33	Trenching and Backfilling

**DIVISION 32 – EXTERIOR IMPROVEMENTS**

32 12 23	Aggregate Base
32 12 16	Asphaltic Concrete Paving
32 17 23	Pavement Marking

**APPENDIX**

Owner Performance Requirements
Report No. 2 Acoustics and Noise Control
Acoustic Partition Details

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Report No. 3 VRF Units Exterior Noise Control

- A Fabric Wrapped Panel Information
- B Low Pressure HVAC Systems Acoustic Requirements and Performance Criteria
- C Plumbing System Noise and Vibration Control
- D Sound Masking Design Guidelines and Performance Criteria
- E Operable Partition Acoustic Requirements and Design Guidelines

Acoustics Product Data Sheets

Lighting Cut Sheets

Plumbing Cut Sheets

Restroom Accessories Cut Sheets

Door Hardware Cut Sheets

END OF DOCUMENT

DOCUMENT 00 01 15

**LIST OF DRAWINGS**

DRAWINGS

Sheet number    Description

GENERAL

G0.0        TITLE SHEET  
G0.1        PROJECT INFORMATION, GENERAL NOTES  
G0.2        SYMBOLS AND LEGEND, PLUMBING CALCS  
G1.0        EGRESS ANALYSIS PLAN - FIRST FLOOR  
G1.1        EGRESS ANALYSIS PLAN - SECOND FLOOR  
G2.0        ACCESSIBLE PATH OF TRAVEL PLAN  
G3.0        ACCESSIBILITY DETAILS  
G3.1        ACCESSIBILITY DETAILS  
G3.2        ACCESSIBILITY DETAILS  
G4.0        CAL-GREEN CHECKLIST  
G4.1        CAL-GREEN CHECKLIST  
G5.0        TITLE 24 COMPLIANCE FORMS - ENVELOPE  
G5.1        TITLE 24 COMPLIANCE FORMS - FENESTRATION

CIVIL

C1.0        SITE UTILITIES  
C2.0        SITE ACCESSIBILITY

ARCHITECTURE

A1.0        CAMPUS ACCESSIBILITY PLAN  
A1.1        PROPOSED SITE PLAN  
A1.2        DEMOLITION FLOOR PLANS  
A1.3        DEMOLITION ROOF PLAN  
A2.1        FIRST FLOOR PLAN  
A2.2        SECOND FLOOR PLAN  
A2.3        ROOF PLAN  
A2.4        FINISH & SIGNAGE PLANS  
A2.5        ROOF  
A3.1        BUILDING ELEVATIONS - SOUTH  
A3.2        BUILDING ELEVATIONS - EAST  
A3.3        BUILDING ELEVATIONS - NORTH  
A3.4        BUILDING ELEVATION - WEST  
A3.11       BUILDING SECTIONS  
A3.12       BUILDING SECTIONS  
A5.1        INTERIOR ELEVATIONS  
A5.2        INTERIOR ELEVATIONS  
A6.1        REFLECTED CEILING PLAN - FIRST FLOOR  
A6.2        REFLECTED CEILING PLAN - SECOND FLOOR CEILING LEVEL  
A6.3        REFLECTED CEILING PLAN - SECOND FLOOR BEAM LEVEL  
A7.1        DOOR, WINDOW AND STOREFRONT SCHEDULE  
A8.1        EXTERIOR DETAILS  
A8.2        EXTERIOR DETAILS - MECH. ENCLOSURES

**MARIN COMMUNITY COLLEGE DISTRICT**

**DRAWINGS  
DOCUMENT 00 01 15-1**

A8.3	TRELLIS DETAILS
A9.0	INTERIOR DETAILS
A9.1	INTERIOR DETAILS
A9.2	INTERIOR DETAILS
A9.3	INTERIOR DETAILS - CEILING
A9.4	INTERIOR DETAILS - CEILING
A9.5	INTERIOR DETAILS - CEILING
A9.6	INTERIOR DETAILS - CEILING
A9.7	INTERIOR DETAILS
A9.8	INTERIOR DETAILS
A9.9	INTERIOR DETAILS - ACOUSTIC
A9.10	INTERIOR DETAILS - MILLWORK
A9.11	DETAILS - INTERIOR DOORS & STOREFRONT
A9.20	ELEVATOR PLANS AND SECTION
A9.21	ELEVATOR DETAILS

**STRUCTURAL**

S1.1	GENERAL NOTES, SYMBOLS AND ABBREVIATIONS
S2.1	FRAMING PLANS
S3.1	FRAMING ELEVATIONS
S3.2	FRAMING ELEVATIONS
S4.1	DETAILS

**MECHANICAL**

M001	MECHANICAL SYMBOLS, LEGENDS AND ABBREVIATIONS
M002	MECHANICAL EQUIPMENT SCHEDULE
M003	MECHANICAL EQUIPMENT SCHEDULE
M004	MECHANICAL TITLE 24 DOCUMENTATION
M005	MECHANICAL TITLE-24 DOCUMENTATION
M006	MECHANICAL TITLE 24 DOCUMENTATION
M007	MECHANICAL CAL-GREEN DOCUMENTATION
M101	MECHANICAL DEMO FIRST FLOOR PLANS
M102	MECHANICAL DEMO SECOND FLOOR PLAN
M103	MECHANICAL DEMO ROOF PLAN
M201	MECHANICAL FIRST FLOOR PLAN HVAC
M202	MECHANICAL SECOND FLOOR PLAN HVAC
M203	MECHANICAL ROOF PLAN
M501	MECHANICAL DETAILS
M502	MECHANICAL DETAILS
M601	MECHANICAL FLOW DIAGRAMS
M701	MECHANICAL CONTROL DIAGRAMS

**ELECTRICAL**

E001	ELECTRICAL SYMBOLS, LEGENDS AND ABBREVIATIONS
E002	ELECTRICAL LUMINARE SCHEDULE
E003	ELECTRICAL M&E COORDINATION SCHEDULE
E010	ELECTRICAL SITE PLAN
E201	ELECTRICAL FIRST FLOOR PLAN LIGHTING
E202	ELECTRICAL SECOND FLOOR PLAN LIGHTING
E203	ELECTRICAL SECOND FLOOR TOP OF BEAM PLAN LIGHTING
E301	ELECTRICAL FIRST FLOOR POWER PLAN

E302	ELECTRICAL SECOND FLOOR POWER PLAN
E601	ELECTRICAL DETAILS
E602	ELECTRICAL DETAILS
E603	ELECTRICAL DETAILS
E701	ELECTRICAL SINGLE LINE DIAGRAMS
E801	ELECTRICAL PANEL SCHEDULE
E802	ELECTRICAL PANEL SCHEDULES
E901	ELECTRICAL TITLE 24 COMPLIANCE FORMS
E902	ELECTRICAL TITLE 24 COMPLIANCE FORMS
E903	ELECTRICAL TITLE 24 COMPLIANCE FORMS
E904	ELECTRICAL TITLE 24 COMPLIANCE FORMS
E905	ELECTRICAL TITLE 24 COMPLIANCE FORMS

**PLUMBING**

P001	PLUMBING SYMBOLS, LEGENDS AND ABBREVIATIONS
P002	PLUMBING EQUIPMENT SCHEDULE
P003	PLUMBING EQUIPMENT SCHEDULE
P100	PLUMBING DEMO UNDERGROUND PLAN
P101	PLUMBING DEMO FIRST FLOOR PLAN
P102	PLUMBING DEMO SECOND FLOOR PLAN
P200	PLUMBING UNDERGROUND PLAN
P201	PLUMBING FIRST FLOOR PLAN
P202	PLUMBING SECOND FLOOR PLAN
P501	PLUMBING DETAILS

**TELECOM**

T0.00	TEL-COM COVER PAGE
T3.01	TEL-COM FIRST FLOOR PLAN
T3.02	TEL-COM SECOND FLOOR PLAN
T4.00	TEL-COM A/V FUNCTIONAL DIAGRAMS AND DETAILS
T5.00	TEL-COM DETAILS

**FIRE PROTECTION**

FP-1	WET SYSTEM SITE PLAN
FP-2	WET SYSTEM FIRST FLOOR REFLECTED CEILING PLAN
FP-3	WET SYSTEM FIRST FLOOR PIPING PLAN
FP-4	WET SYSTEM SECOND FLOOR REFLECTED CEILING PLAN
FP-5	WET SYSTEM SECOND FLOOR PIPING PLAN
FP-6	WET SYSTEM FIRST AND SECOND FLOOR BUILDING SECTION

**FIRE ALARM**

FA-001	COVER SHEET
FA-002	GENERAL INFORMATION
FA-100	SITE PLAN
FA-101	DEVICE PLACEMENT PLAN - 1 <sup>ST</sup> FLOOR
FA-102	DEVICE PLACEMENT PLAN - 2 <sup>ND</sup> FLOOR
FA-201	RISER DIAGRAM
FA-501	PANEL DETAIL
FA-502	NAC PANEL DETAIL
FA-601	CALCULATIONS AND SCHEDULES
FA-701	WIRING TYPICALS

INDIAN VALLEY CAMPUS  
BUILDING 11 RENOVATION

COLLEGE OF MARIN  
MARIN COMMUNITY COLLEGE DISTRICT

FA-702 WIRING TYPICALS  
FA-703 WIRING TYPICALS  
FA-704 WIRING TYPICALS

END OF DOCUMENT

DOCUMENT 00 01 21

PROJECT DIRECTORY

**CLIENT**

MARIN COMMUNITY COLLEGE  
COLLEGE OF MARIN  
835 COLLEGE AVENUE  
KENTFIELD, CA 94904  
T: 415-848-8101  
GREG NELSON, VP FINANCE AND COLLEGE OPERATIONS  
GNELSON@MARIN.EDU

**ARCHITECT**

BRICK ARCHITECTURE AND INTERIORS  
1266 66TH STREET, SUITE 1  
EMERYVILLE, CA 94608  
T: 510.488-6727  
ROB ZIRKLE, PRINCIPAL  
MATT COMBRINK, PRINCIPAL  
MATTISON LY, PROJECT ARCHITECT  
MLY@BRICK-INC.COM

**CIVIL**

CSW STUBER STROEH ENGINEERING GROUP  
45 LEVERONI COURT  
NOVATO, CA 94949  
T: 415.883-9850  
KIRK BOVITZ, KIRK@CSWST2.COM  
JIM GROSSI, JIMG@CSWST2.COM

**STRUCTURAL**

IDA ENGINEERS  
1629 TELEGRAPH AVE. SUITE 300  
OAKLAND, CA 94612  
T: 510.834-1629  
STEPHEN DEJESSE, PRESIDENT  
SRDEJESSE@IDA-SE.COM  
MIRO SEKEL, ENGINEER  
MSEKEL@IDA-SE.COM

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END OF DOCUMENT

**SECTION 02 40 00**

**DEMOLITION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specifications for the demolition and removal of structures, including backfilling of resultant excavations and depressions, as indicated.
- B. Extent of demolition work shall be as follows:
  - 1. Buildings and structure foundations, footings, and foundation systems shall be completely removed to the base of the foundation.
  - 2. Utility services to facilities to be removed or demolished shall be disconnected, cut, and capped.
- C. Restoration of existing structures and facilities to remain in place which are damaged by demolition and removal operations.

**1.02 RELATED SECTIONS**

- A. Section 31 10 00 - Site Clearing

**1.03 REFERENCES**

- A. American National Standards Institute (ANSI)  
ANSI A10.6 Safety Requirements for Demolition Operations
- B. California Code of Regulations (CCR)  
CCR Title 8, Chapter 4, Subchapter 4 – Construction Safety Orders  
CCR Title 24, Part 2, California Building Code, Chapter 33, Section 3303, Protection of Pedestrians during Construction or Demolition

**1.04 PERMITS**

- A. Obtain all special permits and licenses and give all notices required for performance and completion of the demolition and removal work, hauling, and disposal of debris.

**1.05 SUBMITTALS**

- A. Demolition Plan
  - 1. Submit a comprehensive demolition plan, describing the proposed sequence, methods, and equipment for demolition, removal, and disposal of structure(s); include salvage if required. Do not proceed with demolition until the designated approval authority has approved the demolition plan.

B. Shop Drawings

1. Include drawings in plan of all structures to be demolished. Indicate stages or phases of the demolition work.

C. Permits

1. Submit copies of demolition, hauling, and debris disposal permits and notices for record purposes. Include description of proposed haul routes.

1.06 WASTE DISPOSAL AND RECYCLING

- A. The Owner has implemented strict recycling and waste management policies for all waste materials removed from his property as a result of construction and demolition activity. These include:

- Asphalt
- Concrete, concrete block, concrete masonry units (CMU), slump stone (decorative concrete block), and rocks
- Asphalt Concrete
- Brick
- Paper, including bond, newsprint, cardboard, mixed paper, packing materials, and packaging
- Cement Fiber Products, including shingles, panels, siding
- Paint
- Rigid Foam
- Glass
- Plastics
- Carpet and Pad
- Beverage Containers
- Insulation
- Gypsum Wallboard
- Porcelain Plumbing Fixtures
- Fluorescent Light Tubes, per local Sanitary Service regulations
- Green materials (i.e., tree trimmings and land clearing debris)

- Metals including, but not limited to, stud trim, ductwork, piping, reinforcing steel (rebar), roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze (ferrous and non-ferrous)
  - Soils
  - Wood, including clean dimensional wood, pallet wood, plywood, oriented strand board (OSB), particleboard
- B. The successful bidder will be required to account for all waste materials removed from the Project, and to recycle, salvage, or reuse, to the maximum practicable extent, all of the materials listed above. If the successful bidder believes that recycling, salvage, or reuse of any of these materials is impracticable, the bidder must so inform the Owner before initiation of the Project, and secure Owner's written authorization for an alternative method of disposal.
- C. The successful bidder will be required to develop and maintain a plan which documents procedures to recycle, salvage, or reuse the materials listed above, including separation and recycling procedures and markets for each material recovered. This plan must also address training and communications, recordkeeping, and reporting requirements to assure that all waste materials are accounted for. As the project proceeds, this plan is to be updated with the quantities of each waste that are actually reused salvaged, recycled, or disposed of, and the markets to which these materials are directed, so that it provides documentation in a single source of waste management performance on the Project.
- D. The Owner retains the right to inspect, and subsequently approve or disapprove any and all recycling end markets, reuse or salvage outlets, and/or waste disposal facilities that are involved in the receipt of recyclables and/or waste materials generated from the Project. Disapproval of such a market or outlet may be based on past or current violations of federal or state environmental, health, or safety laws, improper disposal activities, risk or liability exposure, or any other reason deemed sufficient by the Owner.
- E. The successful bidder shall maintain records for each type of material removed from the job site (including materials that are not recycled), provided the name(s) of specific end destinations for all materials removed (whether recycled or disposed of), and provide weights and measures of all materials removed. Every load of waste material must be weighed and these scale weights must be reported to the Owner on a monthly basis, retailing material types and net weights. The Owner retains the right to certify weights of sample loads of materials leaving the project site, and compare these to the weights submitted by the successful bidder. The Owner retains the right to request copies of original scale tickets for any and all materials removed from the Project up to two (2) years following the project completion.

#### 1.07 SITE CONDITIONS

- A. Erect and maintain temporary bracing, shoring, lights, barricades, signs, and other measures as necessary to protect the public, workers, and adjoining property from damage from demolition work, all in accordance with applicable codes and regulations.
- B. Open depressions and excavations occurring as part of this work shall be barricaded and posted with warning lights when accessible through adjacent property or through public access. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
- C. Protect utilities, pavements, and facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by demolition operations.

- D. **Protection of Utilities:** Protect active sewer, water, gas, electric, and other utilities; and drainage and irrigation lines indicated or, when not indicated, found or otherwise made known to the Contractor before or during demolition work.
- E. Maintain existing utilities and protect from damage as necessary to satisfy the requirements of jurisdictional utility companies and related codes and regulations.
- F. Make arrangements with affected utility companies and Owners to provide the information and services necessary to coordinate and complete the Work.
- G. Do not disconnect or shut down any part of the existing utilities and services, except by permission of authorities having jurisdiction. Submit schedule of estimated shut-down time in order to obtain such permission, and notify all interested parties, neighbors, utilities, and municipal and county authorities, as required.
- H. Utilities to be removed shall not be removed until shut-down time can be kept to a minimum. Do not remove an existing utility line or service until the replacement line, crossover, or capping is ready to be performed.
- I. Notify the Engineer and utility owners 72 hours before performing any excavation work. Notify affected utilities by calling Underground Service Alert (USA) at 1-800-227-2600. Contact utility owners not covered by USA, by calling the affected utility owners directly.
- J. Protect active underground utilities from damage. If underground utilities are damaged in any way, notify the Engineer and affected utilities immediately for corrective action.
- K. **Noise and Dust Abatement:** Comply with requirements specified in Section 01 50 00 - Temporary Facilities and Controls. In addition, provide continuous noise and dust abatement as required to prevent disturbance and nuisance to the public and workers and to the occupants of adjacent premises and surrounding areas. Dampen or cover areas affected by demolition operations as necessary to prevent dust nuisance.
- L. The Contract Drawings and related documents may not represent all surface conditions at the site and adjoining areas. The known surface conditions are as indicated, and shall be compared with actual conditions before commencement of work.
- M. Existing utilities and drainage systems below grade are located from existing documents and from surface facilities such as manholes, valve boxes, area drains, and other such surface fixtures.
- N. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under construction, notify the Engineer in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provided is not interrupted, and do not proceed with the work until written instructions are received from the Engineer.
- O. Thicknesses of existing pavements are from previous construction documents, and do not imply the actual depth or thickness of the total pavement or base material, where it occurs. Remove pavement of whatever thickness as required.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS, EQUIPMENT, AND FACILITIES**

- A. Furnish all materials, tools, equipment, devices, appurtenances, facilities, and services as required for performing the demolition and removal work.

## **PART 3 - EXECUTION**

### **3.01 PRESERVATION OF REFERENCE MARKERS**

- A. Record the locations and designation of survey markers and monuments prior to their removal. Provide three reference points for each survey marker and monument removed, established by a licensed civil engineer or land surveyor currently registered in the State of California.
- B. Store removed markers and monuments during demolition work, and replace them upon completion of the work. Re-establish survey markers and monuments in conformance with the recorded reference points. Forward to the Engineer a letter verifying re-establishment of survey markers and monuments, signed by a licensed civil engineer or land surveyor currently registered in the State of California.

### **3.02 DEMOLITION**

- A. Perform demolition in accordance with the approved Demolition Plan.
- B. Operational procedures shall be in accordance with the approved Demolition Plan.
- C. Demolish concrete and masonry in small sections. Perform demolition with small tools as much as possible. Blasting will not be permitted.
- D. Cap or plug sanitary sewer in accordance with the utility owner's standard details and instructions. Cap and plug pipe and other conduits abandoned due to demolition, with approved type caps and plugs as required by the utility owners.
- E. Backfill and compact depressions caused by excavations, demolition, and removal in accordance with the requirements of Section 31 20 00 - Earth Moving.

### **3.03 RESTORATION OF EXISTING STRUCTURES AND FACILITIES**

- A. All damage to existing structures and facilities, including utilities, which are to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of demolition and removal operations. The cost of repairing existing structures and facilities damaged by the Contractor's operations shall be at the Contractor's expense.

### **3.04 CLEANUP**

- A. Provide a clean and orderly site.

**END OF SECTION**

**SECTION 02 41 16**  
**SELECTIVE DEMOLITION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Demolition, patching and matching adjacent assemblies.
- B. Scope of Work: College of Marin Representative is not aware of hazardous materials in the building. If the Contractor encounters hazardous materials, the Contractor shall stop work immediately and contact the College of Marin.
- C. Related Sections:
  - 1. Section 01 50 13 "Construction Waste Management and Disposal."

**1.3 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.

**1.4 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to College of Marin that may be uncovered during demolition remain the property of College of Marin.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to College of Marin.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Demolition Activities: Indicate the following:



1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping of utility services.

C. **Predemolition Photographs:** Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations.

D. **Landfill Records:** Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

#### 1.6 QUALITY ASSURANCE

A. **Regulatory Requirements:** Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. **Standards:** Comply with ANSI/ASSE A10.6 and NFPA 241.

#### 1.7 PROJECT CONDITIONS

A. **Buildings immediately adjacent to demolition area will be occupied.** Conduct demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
2. **Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.**

a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

B. **College of Marin assumes no responsibility for utilities to be demolished.**

1. **Conditions existing at time of inspection for bidding purpose will be maintained by College of Marin as far as practical.**

C. **Hazardous Materials:**

1. **If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify College of Marin. Hazardous materials will be removed by College of Marin under a separate contract.**

D. **On-site storage or sale of removed items or materials is not permitted.**

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by College of Marin. College of Marin does not guarantee that existing conditions are same as those indicated in Project Record Documents.

**3.2 PREPARATION**

- A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities to be demolished.
  - 1. College of Marin will arrange to shut off indicated utilities when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
  - 4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- B. Existing Utilities: See plumbing and electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

**3.3 PROTECTION**

- A. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
  - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
  - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
  - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
  - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 5. Provide protection to ensure safe passage of people around demolition area and to and from occupied portions of adjacent buildings and structures.
  - 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to demolition operations.
  - 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

- B. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

### 3.4 DEMOLITION, GENERAL

- A. General: Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
- B. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from College of Marin and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.

### 3.5 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.
- B. Where existing assemblies are disturbed because of demolition procedures, patch assemblies to match adjacent assemblies.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction. See Section 017419 "Construction Waste Management and Disposal" for recycling and disposal of demolition waste.

### 3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before demolition operations began.
  - 1. Clean roadways of debris caused by debris transport.

END OF SECTION

**SECTION 03 30 00**

**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Material certificates.
- B. Material test reports.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

**1.05 FIELD CONDITIONS**

- A. Cold-Weather Placement: Comply with ACI 306.1.
  - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- B. Hot-Weather Placement: Comply with ACI 301.

## PART 2 - PRODUCTS

### 2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301.
  - 2. ACI 117.

### 2.02 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

### 2.03 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

### 2.04 CONCRETE MATERIALS

- A. Cementitious Materials:
  - 1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
  - 2. Fly Ash: ASTM C 618, Class F.
  - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.
  - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C 260/C 260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M.

## 2.05 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use water-reducing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

## 2.06 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Normal-Weight Concrete:
  1. Minimum Compressive Strength: 3000 psi at 28 days.
  2. Slump Limit: 4 inches, plus or minus 1 inch.
  3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

## 2.07 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.08 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.01 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

### 3.02 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.03 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.04 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

**3.05 FINISHING FORMED SURFACES**

- A. **Rough-Formed Finish:** As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

**3.06 CONCRETE PROTECTING AND CURING**

- A. **General:** Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. **Evaporation Retarder:** Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

**3.07 CONCRETE SURFACE REPAIRS**

- A. **Defective Concrete:** Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

**3.08 FIELD QUALITY CONTROL**

- A. **Special Inspections:** Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

**END OF SECTION**



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**SECTION 03 54 00**

**GYP SUM UNDERLAYMENT**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Description of Work: Work of this section includes underlayment for interior finish flooring and is not limited to the following:
1. Gypsum Underlayment covering normal project conditions and applications.

**1.02 REFERENCES**

- |                                    |                                                                                                                                                                                                          |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. Underwriters Laboratory         | Fire Resistance Volume 1<br><a href="http://www.ul.com">www.ul.com</a>                                                                                                                                   |
| B. GREENGUARD Certified            | GREENGUARD and GREENGUARD Gold Certified<br><a href="http://www.greenguard.org">www.greenguard.org</a>                                                                                                   |
| C. ASTM E336 and E1007             | Field Sound Transmission Class (F-STC), Field Impact Insulation Class (F-IIC)                                                                                                                            |
| D. ASTM C472M                      | Compressive strength of gypsum concrete                                                                                                                                                                  |
| E. ASTM F2170                      | Standard Test Method for Determining Relative Humidity in Concrete Floor Slab                                                                                                                            |
| F. ASTM F2419                      | Standard Test Method for Installation of Thick Poured Gypsum Concrete and Preparation of Surface to Receive Resilient Flooring                                                                           |
| G. ASTM F2678                      | Standard Practice for Preparing Panel Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring |
| H. Finished Floor Goods Procedures | Maxxon Procedures for Attaching Finished Floor Goods to Maxxon Underlayments<br><a href="http://www.maxxon.com">www.maxxon.com</a>                                                                       |

**1.03 SUBMITTALS**

- A. Product Data: Submit product data with project materials clearly identified for each required product or system.
- B. UL Directory Fire Resistance Test information.
- C. Acoustical Data: Submit sound tests according to IBC code criteria ASTM E492 (IIC) and ASTM E90 (STC) or ASTM E1007 (F-IIC) and E336 (F-IIC).

**1.04 SYSTEM REQUIREMENTS**

- A. Performance Requirements:
1. Gyp-Crete Floor Underlayment:
    - i) Compressive strength up to 3,000 psi
    - ii) Density 110 pounds per cubic foot (1,762 kg/m<sup>3</sup>)

### 1.05 QUALITY ASSURANCE

#### A. Performance Standards:

1. All materials, unless otherwise indicated, shall be manufactured by Maxxon Corporation and shall be installed in accordance with its current printed directions and by a Maxxon Corporation Authorized Applicator.
2. Underlayment mix shall be tested for a slump using a 2" (i.d.) x 4" (50 mm x 101 mm) cylinder resulting in a patty size of 8 1/2" (216 mm) plus or minus 1 inch (25 mm) diameter.
3. Compressive strength tested in accordance with ASTM C 472M.

### 1.06 DELIVERY, STORAGE AND HANDLING

- #### A. All materials shall be delivered in their original unopened packages and protected from damage and exposure from the elements. Damaged or deteriorated materials shall be removed from the premises.

### 1.07 PROJECT CONDITIONS

- #### A. Before, during and after installation of product, building interior shall be enclosed, with adequate ventilation and heat maintained at a temperature above 50 °F (10 °C) to allow for drying of product.

## PART 2 GENERAL

### 2.01 MATERIALS

#### A. Acceptable Manufacturers:

1. Ardex; Bonsal American, an Oldcastle company; ProSpec Level Set G.
2. Conspec by Dayton Superior; Conflow Supreme.
3. Euclid Chemical Company (The); Flo-Top.
4. Maxxon Corporation Gyp-Crete Floor Underlayment.
5. USG Corporation.
6. Or equal.

#### B. Maxxon Floor Primer:

1. Material Standard: Comply with specifications outlined in manufacturer's Design and Installation Guide for wood.

#### C. Mix Water:

1. Material Standard: Potable, free from impurities and from a domestic source.

#### D. Sand Aggregate:

1. Sand shall meet Maxxon Sand Specification 101.

#### E. Maxxon Overspray Primer Sealer:

1. Seal all areas that receive glue down floor goods with Maxxon Overspray according to manufacturer's specifications.

#### F. Maxxon Acrylic Primer Sealer (Alternate to Overspray):

1. Seal all areas that receive glue down floor goods with Maxxon Acrylic according to manufacturer's specifications.

#### G. Maxxon Reinforcement or Maxxon CSM (Crack Suppression Mat):

1. Install approved reinforcement as per manufacturer recommendations.

#### H. Sound Mat: Install per the Project Acoustical Report. Gypsum based underlayment to be installed over:

1. 1/4 inch Quiet Curl 55-025 MC, or Acousti-Mat II, or equal and 1 in. Gyp-crete at hard surface finish flooring.
2. 1 1/4 in. gyp-crete at carpet areas.

## PART 3 EXECUTION

### 3.01 EXAMINATION

#### A. Site Verification of Conditions:

1. Installation shall not begin until the building is enclosed, including roof, windows, doors, and any other apertures.
2. Wood substrate shall be structurally sound, properly fastened, and dry. Contractor shall clean subfloor to remove mud, oil, grease, and other contaminating factors before arrival of the authorized applicator.
3. Wood substrate:
  - i) The wood subfloor must be adequate to withstand live and dead loads with a deflection limitation of L/360.
  - ii) Wood should be agency approved 23/32" (1.8cm) T & G subfloor sheathing.

### 3.02 REQUIREMENTS

- A. Leak Prevention:
  1. Fill cracks and voids in subfloor where leakage of slurry could occur.
- B. Priming subfloor:
  1. Prime substrate according to manufacturer's recommendations.
- C. Application:
  1. Install in accordance with reference standards and manufacturer's instructions.

### 3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Mixing Proportions:
  1. General Requirements: Mix proportions and methods shall be in strict accordance with product manufacturer recommendations.
- B. Application:
  1. Acousti-Mat Installations: Install Acousti-Mat following manufacturer's recommendations and specifications
  2. Pour floor topping to recommended thickness. Immediately spread and screed product to a smooth surface. Expansion joints in all types of work shall be brought through the underlayment.
- C. Drying:
  1. The general contractor must provide and maintain correct environmental conditions to keep the building clean and dry, and protect against infestation of moisture from a variety of potential sources. The general contractor must supply mechanical ventilation and heat if necessary to remove moisture from the area until the Gyp-Crete is dry.
  2. Protection from Heavy Loads: During construction, place temporary wood planking over Gyp-Crete wherever it will be subject to heavy wheeled or concentrated loads.

### 3.04 PREPARATION FOR INSTALLATION OF GLUE DOWN FLOOR GOODS

- A. Sealing:
  1. Seal all areas that receive glue down floor goods with Maxxon Overspray or Maxxon Acrylic according to the Maxxon Corporation's specifications. Any floor areas where the surface has been damaged shall be cleaned and sealed regardless of floor covering to be used. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.
  2. Maxxon UWR can be used over Maxxon underlayments in low traffic areas such as utility rooms, storage rooms and closets, as a protective surface.
- B. Moisture Testing:
  1. Follow the respective floor goods manufacturers' recommendations for relative humidity requirements. When manufacturer does not have a relative humidity requirement, refer to Maxxon's *Procedures for Attaching Finished Floor Goods to Maxxon Underlayments* brochure.
- C. Finished Floor Goods:
  1. There are many reference standards for the installation procedures and recommendations for finished flooring applications over gypsum underlayments. These include instructions of the

manufacturers of the finished flooring, adhesives and thin-set as well as national agency reference standards. The national standards are listed below:

Flooring Type	Reference Standard
Resilient	ASTM F2419

See Maxxon Corporation's *Procedures for Attaching Finished Floor Goods to Maxxon Undertayments* brochure for guidelines for installing finished floor goods. This procedure is not a warranty and is to be used as a guideline only.

**END OF SECTION**

**SECTION 05 12 00**  
**STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Structural steel.
  - 2. Grout.

**1.02 DEFINITIONS**

- A. **Structural Steel:** Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For fabricator and testing agency.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Field quality-control and special inspection reports.

**1.05 QUALITY ASSURANCE**

- A. **Fabricator Qualifications:** A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. **Welding Qualifications:** Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303.
  - 2. AISC 360.

## **PART 2 - PRODUCTS**

### **2.01 STRUCTURAL-STEEL MATERIALS**

- A. Plate and Bar: ASTM A 36/A 36M.
- B. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- C. Welding Electrodes: Comply with AWS requirements.

### **2.02 BOLTS, CONNECTORS, AND ANCHORS**

- A. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Straight, weldable.
  - 2. Finish: Plain.
- B. Headed Anchor Rods: [ASTM F 1554, Grade 36].
  - 1. Configuration: Straight, weldable.
  - 2. Finish: Plain.

### **2.03 PRIMER**

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

### **2.04 GROUT**

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

### **2.05 FABRICATION**

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

### **2.06 SHOP CONNECTIONS**

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

### **2.07 SHOP PRIMING**

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Galvanized surfaces.
  - 4. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
  - 2. SSPC-SP 3, "Power Tool Cleaning."
  - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## 2.08 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
- C. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify, with certified steel erector present locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 ERECTION



- A. **Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.**
- B. **Baseplates:** Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. **Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."**

### 3.03 FIELD CONNECTIONS

- A. **Weld Connections:** Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

### 3.04 FIELD QUALITY CONTROL

- A. **Special Inspections:** Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.
- B. **Testing Agency:** Owner will engage a qualified testing agency to perform tests and inspections.
- C. **Bolted Connections:** Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. **Welded Connections:** Visually inspect field welds according to AWS D1.1/D1.1M.

**END OF SECTION**

**SECTION 05 40 00**

**COLD-FORMED METAL FRAMING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Exterior non-load-bearing wall framing.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.
- B. Product certificates.
- C. Product test reports.
- D. Evaluation Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

**1.04 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

**PART 2 - PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

- A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Wall Studs: AISI S211.

## 2.02 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Coating: G90 or equivalent.

## 2.03 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated on Drawings.
2. Flange Width: 1-5/8 inches.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs as indicated on plans.

## 2.04 FRAMING ACCESSORIES

- A. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

## 2.05 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by.

## 2.06 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780/A 780M.

# PART 3 - EXECUTION

## 3.01 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

- C. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

### 3.02 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

### 3.03 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.04 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

**3.05 FIELD QUALITY CONTROL**

- A. **Testing:** Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

**3.06 REPAIRS AND PROTECTION**

- A. **Galvanizing Repairs:** Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

**END OF SECTION**

**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
1. Steel framing and supports for countertops.
- B. Related Sections:
1. Section 07 62 00 "Sheet Metal Flashing and Trim."
  2. Section 07 92 00 "Joint Sealants."
  3. Section 09 91 00 "Painting and Coating" for finishing metal fabrications assemblies, unless otherwise noted.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For the following:
1. Paint products.
  2. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Samples: For each finish specified. Minimum 4 in. square.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified professional engineer.
- B. Welding certificates.

- C. **Paint Compatibility Certificates:** From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. **Delegated-Design Submittal:** For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Professional Engineer shall be registered in the State of California.

#### 1.6 QUALITY ASSURANCE

- A. **Welding Qualifications:** Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. **Welding Qualifications:** Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

#### 1.7 PROJECT CONDITIONS

- A. **Field Measurements:** Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

#### 1.8 COORDINATION

- A. **Coordinate selection of shop primers with topcoats to be applied over them.** Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. **Coordinate installation of anchorages and steel weld plates and angles for casting into concrete.** Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

### PART 2 - PRODUCTS

#### 2.1 METALS, GENERAL

- A. **Metal Surfaces, General:** Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

#### 2.2 FERROUS METALS

- A. **Steel Plates, Shapes, and Bars:** ASTM A 36/A 36M.
- B. **Z-shapes:** ASTM A 36; galvanize per ASTM A 153.
- C. **Slotted Channel Framing:** Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches.
2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.

## 2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

## 2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  1. Provide stainless-steel fasteners for fastening aluminum.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 2.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
  1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Plain Washers: Round, ASME B18.22.1.
- H. Lock Washers: Helical, spring type, ASME B18.21.1.
- I. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- J. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- K. Post-Installed Anchors: Torque-controlled expansion anchors.
  1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
  2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.



## 2.5 MISCELLANEOUS MATERIALS

- A. **Welding Rods and Bare Electrodes:** Select according to AWS specifications for metal alloy welded.
- B. **Galvanizing Repair Paint:** High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. **Bituminous Paint:** Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. **Nonshrink, Metallic Grout:** Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.

## 2.6 FABRICATION, GENERAL

- A. **Shop Assembly:** Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. **Cut, drill, and punch metals** cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. **Form bent-metal corners** to smallest radius possible without causing grain separation or otherwise impairing work.
- D. **Form exposed work** with accurate angles and surfaces and straight edges.
- E. **Weld corners and seams** continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. **Form exposed connections** with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. **Fabricate seams and other connections** that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. **Cut, reinforce, drill, and lap metal fabrications** as indicated to receive finish hardware, screws, and similar items.
- I. **Provide for anchorage of type indicated;** coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

## 2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## 2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products. Galvanize all exterior steel assemblies, unless otherwise noted.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. **Fastening to In-Place Construction:** Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. **Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.**
- F. **Corrosion Protection:** Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
- 3.2 **INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS**
- A. **General:** Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. **Anchor supports for operable partitions securely to and rigidly brace from building structure.**
- 3.3 **ADJUSTING AND CLEANING**
- A. **Touchup Painting:** Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099100 "Painting".
- B. **Galvanized Surfaces:** Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

**SECTION 06 10 00**

**ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Framing with dimension lumber.

**1.02 INFORMATIONAL SUBMITTALS**

**A. Evaluation Reports: For the following, from ICC-ES:**

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Post-installed anchors.

**PART 2 - PRODUCTS**

**2.01 WOOD PRODUCTS, GENERAL**

**A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.**

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

**B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less; no limit for more than 2-inch nominal thickness unless otherwise indicated.**

**2.02 WOOD-PRESERVATIVE-TREATED LUMBER**

**A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground. Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.**

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

- B. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings.

#### 2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings.

#### 2.04 DIMENSION LUMBER FRAMING

- A. Framing: No. 1 grade.
  - 1. Application: Framing other than interior partitions not indicated as load bearing.
  - 2. Species:
    - a. Douglas fir-larch; WCLIB or WWPA.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION, GENERAL**

- A. **Framing Standard:** Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set rough carpentry to required levels and lines, with members **plumb**, true to line, cut, and fitted. Fit rough carpentry accurately to other construction.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- E. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
  - 3. ICC-ES evaluation report for fastener.

#### **3.02 PROTECTION**

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF SECTION**

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**SECTION 06 40 05**

**EXTERIOR FINISH CARPENTRY**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Work Included: Exterior Finish Carpentry, complete, as shown and specified.
- B. Work Specified Elsewhere:
  - 1. Interior Architectural Woodwork: Section 06 40 23.

1.2 SUBMITTALS

- A. Product Data: Submit for College of Marin Representative's action. Submit manufacturer's literature and installation instructions for each material and accessory, clearly notating each specified requirement.
- B. Shop Drawings: Submit for College of Marin Representative's action. Prepare details at a scale not less than 3 in. = 1 ft. Coordinate shop drawings with assemblies in Work Specified Elsewhere.
- C. Samples: Submit for College of Marin Representative's action. Label samples to indicate product, characteristics, and location in the Work. Samples will be reviewed for color and appearance only. Furnish sufficient samples to establish the full range of colors and textures for materials exposed in the finished work. Compliance with other requirements is the responsibility of the Contractor.
  - 1. Actual width by 12 in. long.
- D. Quality Assurance/Quality Control Submittals: Submit for College of Marin Representative's information.
  - 1. Certificates:
    - a. Installer's Qualifications.

1.3 QUALITY ASSURANCE

- A. Qualified Installer: Installer to have 5 years experience in the installation of specified materials on comparable projects. The firm shall have the approval of the materials manufacturer.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, and regulations of Authorities Having Jurisdiction (AHJs). Obtain necessary approvals from AHJs.
- C. Must meet 2016 California Building Code Chapter 7A Section 707A.

1.4 DELIVERY, STORAGE, AND HANDLING



- A. Delivery: Do not deliver exterior architectural woodwork until painting, finishing, and overhead work is complete in applicable spaces.
- B. Storage: Store architectural woodwork in building, out of the way of other construction activities, at a relative humidity of 50 percent to 55 percent at 70 degrees F.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS**

- A. Woodwork Summary: Exterior wood sunshades. Install Exterior Finish Carpentry on existing metal armatures.
- B. Exterior trellis slats: Resysta “Hollow Profile RESP3423412”, or equal, as approved by the District. Finish: Burma. Made from polymers, rock salt, mineral oil, and rice husks.
  - 1. Class A fire rated.
  - 2. Finish prior to installation. Refer to Section 09 91 00 “Painting and Coating.”

## **PART 3 – EXECUTION**

### **3.1 GENERAL**

- A. Manufacturer’s Instructions: Prepare substrates and install the work, including components and accessories in accordance with the manufacturer’s instructions, except where more stringent requirements are shown or specified. Examine the areas to receive the Work and remedy detrimental conditions.
- B. Field Dimensions: Verify dimensions and conditions in field and adjust Architectural Woodwork in the shop to accommodate field conditions.

### **3.2 INSTALLATION**

- A. Installation Tolerances:
  - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 in. in 10 ft.; 1/4 in. over total length.
  - 2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 1/4 in., limit offset from true alignment to less than 1/32 in.
  - 3. Offsets In End-To-End Or Edge-To-Edge Alignment Of Consecutive Members: 1/16 in. maximum offset in any alignment.

### **3.3 ADJUSTING AND CLEANING**

- A. Defective Work: Touch-up, refinish, or replace damaged, stained, scratched, or otherwise disfigured portions of the Work to the satisfaction of the College of Marin Representative.

### **3.4 PROTECTION**

- A. General: Protect Exterior Architectural Woodwork against damage until Work is accepted.

**END OF SECTION**

**SECTION 06 40 23**

**ARCHITECTURAL WOODWORK**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:

1. Plastic laminate cabinets.
2. Finished plywood cabinets.
3. Plastic laminate paneling at elevators.
4. Accompanying countertops.
5. Wood Handrails.

- B. Related Requirements:

1. Section 06 20 23 "Interior Finish Carpentry."
2. Section 07 92 00 "Joint Sealants."
3. Section 09 22 16 "Non-Structural Metal Framing" for backing strips.

**1.3 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.4 ACTION SUBMITTALS**

- A. Shop Drawings: Meeting the requirements of Architectural Woodwork Standards. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate casework.
4. Apply a WI Certified Compliance Program label to the first page of the Shop Drawings.

- B. Samples for Verification:

1. 6 in square sample of each exposed finish.
2. Four panels, with Veneer representative of and selected from flitches to be used for transparent-finished cabinets and paneling. Samples shall be at least 8 by 10 inches, for

each species and cut. Include at least one face-veneer seam. Finish each sample with the intended finish.

3. Lumber for transparent finish, not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
4. Exposed cabinet hardware and accessories, one unit for each type and finish.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For the following:
  1. Composite wood and agrifiber products.
- C. Woodwork Quality Standard Compliance Certificates: WI Quality Certification Program certificates.

#### 1.6 QUALITY ASSURANCE

- A. Quality Standard: Architectural Woodwork Standards, (AWS), latest edition, jointly published by Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturers Association of Canada.
  1. If there is a conflict between the requirements of the AWS and the Drawings and/or Specifications, the Drawings and specifications shall govern.
- B. Woodwork Institute Certified Compliance Program (CCP)
  1. Before delivery to the job site provide a Woodwork Institute Certified Compliance Certificate indicating the millwork products to be provided, and certifying that they meet the requirements of the AWS for the Grade or Grades specified, as well as the requirements of the Contract Documents.
  2. Provide a Woodwork Institute Certified Compliance Label on each elevation of casework and on each plastic laminate top.
  3. On completion of installation provide a Woodwork Institute Certified Compliance Program certificate certifying that installation meets the requirements of the AWS and of the Plans and Specifications.
  4. All fees charged by the Woodwork Institute for their Certified Compliance Program are the responsibility of the millwork manufacturer and/or installer, and shall be included in their bid.
- C. Woodwork Institute Certified Seismic Installation Program (CSIP)
  1. Before walls and ceilings are closed, provide a Woodwork Institute CSIP inspection report indicating that backing for casework attachment is installed as required, or itemizing each location where backing is missing or improperly located.
  2. All fees charged by the Woodwork Institute for their Certified Seismic Installation Program are the responsibility of the casework installer, and shall be included in their bid.
- D. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is licensee of the Woodwork Institute Certified Compliance Program.

- E. **Installer Qualifications:** A licensee of Woodwork Institute's Certified Compliance Program and Certified Seismic Installation Program. **Testing Agency Qualifications:** For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver casework until painting and similar operations that could damage woodwork have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

#### 1.8 FIELD CONDITIONS

- A. **Environmental Limitations:** Do not deliver or install cabinetwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. **Field Measurements:** Where casework is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. **Established Dimensions:** Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

#### 1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that Architectural Woodwork can be supported and installed as indicated.
- B. **Hardware Coordination:** Distribute copies of approved hardware schedule specified in Section 087110 "Door Hardware" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

### PART 2 - PRODUCTS

#### 2.1 ASSEMBLIES

- A. Plastic laminate panels for elevator walls

- B. Kitchen: plastic laminate casework.
- C. Reception desk: polycarbonate panel by Pentaglas, alum channel by Schluter
- D. Reception desk countertop: 3/4" finish plywood, pre-finished, cabinet grade: Europly plus or equal, as approved by the District.
- E. Adjacent Flooring to Reception Desk: 1/2 in. plywood, pre-finished, cabinet grade: Europly plus or equal, as approved by the District. Match reception desk countertop finish.
- F. Quartz countertops

## 2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND DOORS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate casework indicated for construction, finishes, installation, and other requirements.
  - 1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- B. Grade: Custom.
- C. Core: MDF, ANSI 208.2 Grade 130. Provide marine grade MDF at sinks – minimum 3 ft. to either side of sink.
  - 1. Manufactured with no added urea formaldehyde.
  - 2. At rated corridors and where required by Local Authorities Having Jurisdiction (AHJ): Fire Retardant MDF certified to US Class 1/A (E-84) flame spread and smoke generation rating. Sierra Pine Medite FR or equal.
- D. Type of Construction: Frameless.
- E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- F. Exposed Exterior Surfaces: High-Pressure Decorative Laminate: NEMA LD 3, grades as required by Woodwork quality standard.
- G. Exposed Interior Surfaces: High-Pressure Decorative Laminate matching the exposed exterior surfaces.
- H. Semi-Exposed Surfaces: Melamine
- I. Edge Band: ABS matching the color and pattern of the exposed laminate.
- J. Dust Panels: Provide 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- K. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure laminate, NEMA LD 3, Grade BKL.
- L. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Drawer Sides: Seven or nine ply hardwood plywood with no internal voids, or solid hardwood.
  2. Drawer Bottoms: Hardwood Plywood.
  3. Construction method: Dowels or dovetails.
- M. Colors, Patterns, and Finishes: Laminart, or equal, as approved by the District.

### 2.3 PLASTIC-LAMINATE-FACED PANELS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate casework indicated for construction, finishes, installation, and other requirements.
1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- B. Grade: Custom.
- C. Core: MDF, ANSI 208.2 Grade 130.
1. Manufactured with no added urea formaldehyde.
- D. Edge Band: ABS matching the color and pattern of the exposed laminate.
- E. Z-clips for hanging panels: Aluminum. Doug Mockett, Monarch, or equal, as approved by the District.

### 2.4 FINISHED PLYWOOD CORE CASEWORK

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades for construction, finishes, installation, and other requirements.
1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. If there are any conflicts between the AWS and the Contract Documents, the Contract Documents shall govern.
- B. Grade: AWS Premium Grade.
- C. Laminating adhesives shall contain no added urea-formaldehyde.
- D. Exposed Surfaces:
- E. Plywood Core: DOC PS-1, Exterior A-C.
1. Manufactured with no added urea formaldehyde.
  2. Europly Plus, or equal, as approved by the District.
- F. Plywood Core Finish: Match College of Marin Representative's sample.

### 2.5 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
1. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
  2. Moisture Resistant MDF: ANSI 208.2 Grade 155 MR-50.
- 2.6 POLYCARBONATE PANELS
- A. Product: CPI Daylighting "Pentaglas", or equal, as approved by the District.
1. Thickness: 12 mm.
  2. Color: White.
- 2.7 COUNTERTOPS
- A. Quartz Surfacing: Caesarstone, or equal, as acceptable to the District. Basis of Design Caesarstone "Calacatta Nuvo."
- 2.8 HARDWARE AND ACCESSORIES
- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087001 "Door Hardware."
- B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:
1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.
- D. Wire Pulls: Back mounted, solid metal, 6 inches long, 5/16 inch in diameter.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- F. Drawer Slides: BHMA A156.9.
1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
  2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
  3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
  4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
  5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
  6. For computer keyboard shelves, provide Grade 1.

- 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.
- G. Door Locks: BHMA A156.11, E07121.
- H. Drawer Locks: BHMA A156.11, E07041.
- I. Exposed Hardware Finishes: Satin stainless steel.
- J. For concealed hardware, provide manufacturer's standard painted finish or stainless steel finish.

2.9 MISCELLANEOUS MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.10 FABRICATION

- A. Arrange casework in shop or other suitable space in proposed sequence for examination by College of Marin Representative. Mark units with temporary sequence numbers to indicate position in proposed layout.
  - 1. Lay out one elevation at a time if approved by College of Marin Representative.
  - 2. Notify College of Marin Representative seven days in advance of the date and time when layout will be available for viewing.
  - 3. Provide lighting of similar type and level as that of final installation for viewing layout unless otherwise approved by College of Marin Representative.
  - 4. Rearrange paneling as directed by College of Marin Representative until layout is approved.
  - 5. Do not trim end units and other nonmodular-size units to less than modular size until after College of Marin Representative's approval of layout.
  - 6. Obtain College of Marin Representative's approval of layout before start of assembly. Mark units and Shop Drawings with assembly sequence numbers based on approved layout.
- B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify College of Marin Representative seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.



- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

#### 2.11 WOOD HANDRAILS

- A. Provide wood handrails, as shown on Drawings. Lumber to be Grade AA quality. Provide transparent finish, per Section 09 91 00 "Painting and Coating."

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Before installation, condition casework to average prevailing humidity conditions in installation areas.
- B. Before installing casework, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

#### 3.2 INSTALLATION

- A. Grade: Install casework to comply with same grade as item to be installed.
- B. Assemble casework and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install casework level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut casework to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Casework: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install casework with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws or toggle bolts through metal backing or metal framing behind wall finish.
- F. Touch up finishing work specified in this Section after installation of woodwork.

#### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective casework, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.

- C. Clean casework on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

**END OF SECTION**

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**SECTION 07 21 00**  
**BUILDING INSULATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Glass-fiber blanket insulation and Sound Attenuation Blankets.
  - 2. Rigid insulation at the roof.
- B. Related Sections:
  - 1. Section 07 25 00 "Weather Barriers."
  - 2. Section 07 31 13 "Asphalt Shingles."

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Plans and Elevations indicating extent of each type of exterior insulation.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

**1.5 QUALITY ASSURANCE**

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

**PART 2 - PRODUCTS**

**2.1 GLASS-FIBER BLANKET INSULATION**

- A. Unfaced, Glass-Fiber Blanket Insulation and Sound Attenuation Blankets: Provide type as shown on Drawings. ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 64; passing ASTM E 136 for combustion characteristics. Johns Manville or accepted equal. R-value as indicated on drawings.

## 2.2 RIGID INSULATION

- A. Roof Insulation: Polyisocyanurate Insulation: ASTM C1289, Type II, Class 1, Grade 2 (20 psi). GAF "EnergyGuard" insulation, or equal, as approved by the District. Each board to be 2.6" thick.

## 2.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to rain at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

## 2.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

## 2.5 INSTALLATION OF RIGID INSULATION AT ROOF

- A. Fasten in accordance with wind uplift requirements for the roof system. Stagger end joints and tightly abut insulation units.

END OF SECTION

**SECTION 07 25 00**

**WEATHER BARRIERS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes self-adhering sheet air and water barriers for walls and roofs.
- B. Related Requirements:
  - 1. Section 07 31 13 "Asphalt Shingles."
  - 2. Section 07 62 00 "Sheet Metal Flashing and Trim."
  - 3. Section 07 92 00 "Joint Sealants".

**1.3 DEFINITIONS**

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
  - 1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
  - 2. Include details of interfaces with other materials that form part of air barrier.
  - 3. Details shall be project specific beyond those typically published by the product manufacturer showing intended substrates and integrations with adjacent systems.
  - 4. Submit shop drawings to manufacturer for review and approval prior to submitting to College of Marin Representative.
  - 5. Provide plans and elevations to indicate extent of materials and location of details.

**1.5 INFORMATIONAL SUBMITTALS**

- A. **Qualification Data:** For Installer.
- B. **Product Certificates:** From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with air barrier.
- C. **Product Test Reports:** For each air-barrier assembly, for tests performed by a qualified testing agency.
- D. **Warranties:** Special warranties specified in this Section.

#### 1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** An entity specializing in the installation of air barrier systems with a minimum 5 years documented experience that employs installers and supervisors who are trained and approved by manufacturer.
  - 1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.
- B. **Manufacturer Qualifications:** Company specializing in production of waterproofing and air barrier systems with minimum 10 years documented continuous experience in the manufacture of permeable water-resistive air barrier products and employing experienced in-house technical and field observation personnel qualified to provide expert technical support.
- C. **Preinstallation Conference:** Conduct conference at Project site after approval of complete submittal. Review requirements for air barrier, including surface preparation specified under other Sections, substrate condition and pretreatment, temporary weather protection, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original containers with seals unbroken, wrapped in a polythene sleeve, labeled with manufacturer's name, and product brand name.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Protect stored materials from direct sunlight.

#### 1.8 FIELD CONDITIONS

- A. **Environmental Limitations:** Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
  - 1. Protect substrates from environmental conditions that affect air-barrier performance.
  - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

#### 1.9 WARRANTY

- A. **Contractor's Labor and Material Guarantee:** Correct defective Work at no cost to the College of Marin.
  - 1. **Warranty Period:** 1 year from the date of Final Completion in accordance with Document 00 65 36 – Warranty Form Contractor's Guarantee.

- B. **Special Manufacturer's Warranty:** Warranty all work under this section in a written document endorsed by the Manufacturer:
  - 1. **Warranty Period:** 10 years from date of Final Completion.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. **Source Limitations:** Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. **General:** Air barrier shall be capable of performing as a continuous weather barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

### **2.3 ROOF UNDERLAYMENT**

- A. **Sheet:** Self-adhered roofing underlayment. GCP Applied Technologies "Ice & Water Shield", or equal as approved by the District.
  - 1. **Material:** Cold applied, self adhering membrane composed of a high strength polyethylene film coated on one side with a layer of rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the polyethylene.
  - 2. **Color:** Gray-black.
  - 3. **Membrane Thickness:** 40 mil (1.02 mm) ASTM D3767 procedure A (Section 9.1).
  - 4. **Tensile Strength, Membrane:** 250 psi (1720 kN/m<sup>2</sup>) ASTM D412 (Die C modified).
  - 5. **Elongation, Membrane:** 250% ASTM D412 (Die C modified).
  - 6. **Low Temperature Flexibility:** Unaffected @ -20°F (-29°C) ASTM D1970.
  - 7. **Adhesion to Plywood:** 3.0 lbs/in. width (525 N/m) ASTM D903.
  - 8. **Permeance (Max):** 0.05 Perms (2.9 ng/m<sup>2</sup>s Pa) ASTM E96.
  - 9. **Material Weight Installed (Max):** 0.3 lb/ft<sup>2</sup> (1.3 kg/m<sup>2</sup>) ASTM D461.
  - 10. **Primer:** Water-based Perm-A-Barrier WB Primer by GCP Applied Technologies, Inc.

### **2.4 ACCESSORY MATERIALS**

- A. **General:** Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier membrane.
- B. **Termination Mastic:** Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade. Grace Bituthene Liquid Membrane, or equal as approved by the District.
- C. **Adhesive and Tape:** Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- D. **Joint Sealant:** ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 079200 "Joint Sealants."



### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
  - 1. Install modified bituminous strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

#### 3.3 INSTALLATION

- A. General: Install modified bituminous sheets and accessory materials according to air-barrier manufacturer's written instructions and according to recommendations in ASTM D 6135.
  - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous air-barrier sheet produced for low-temperature application. Do not install low-temperature sheet if ambient or substrate temperature is higher than 60 deg F.
- B. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
  - 1. Install modified bituminous strips centered over vertical inside corners. Install 3/4-inch fillets of termination mastic on horizontal inside corners.
- C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.

- D. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.
  - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- E. Apply and firmly adhere modified bituminous sheets horizontally over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.
  - 1. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.
  - 2. Roll sheets firmly with a manufacturer approved hand roller to enhance adhesion to substrate.
- F. Apply continuous modified bituminous sheets over modified bituminous strips bridging substrate cracks, construction, and contraction joints.
- G. Seal top of through-wall flashings to air-barrier sheet with an additional 6-inch- wide, modified bituminous strip.
- H. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with compatible sealant.
- I. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.
  - 1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
- J. Connect and seal exterior wall air-barrier membrane continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- K. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
  - 1. Modified Bituminous Transition Strip: Roll firmly with a manufacturer approved hand roller to enhance adhesion.
- L. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.
- M. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- N. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 inches beyond repaired areas in all directions.

- O. Do not cover air barrier until it has been tested and inspected by College of Marin's testing agency.
  - P. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.
- 3.4 CLEANING AND PROTECTION
- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
    - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
    - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
  - B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION**

SECTION 07 27 26  
FLUID-APPLIED MEMBRANE AIR BARRIERS

1.PART 1 GENERAL

1.1. SECTION INCLUDES

- A. Application of membrane air barrier as indicated in the Drawings complete with accessories, detailing membrane, and sealants.

1.2. REFERENCES

- A. ASTM C 1471 - Standard Guide for the Use of High Solids Content Cold Liquid-Applied Elastomeric Waterproofing Membrane on Vertical Surfaces.

1.3. SYSTEM DESCRIPTION

- A. An ultraviolet-resistant, vapor-permeable membrane air barrier applied in a high build thickness by roller, trowel, spray, or brush forming a weather resistive barrier.

1.4. SUBMITTALS

- A. Submit product data sheets for all products supplied under this Section. Include manufacturer's instructions regarding limitations of use.
- B. Submit manufacturer's standard details for the specified system.
- C. Submit material safety data sheets for all products supplied under this Section.
- D. Submit certificates and/or reports required within this Section.
- E. Submit proposed work plan including proposed methods of application and sequencing indicating integration with products of other trades.

1.5. QUALITY ASSURANCE

- A. Qualifications:
  - 1. Mechanics: Experienced in applying waterproof membranes in liquid form.
- B. Perform Work in accordance with the manufacturer's written instructions, ASTM C 1471, and this Section.
- C. Applicator to designate job foreman who will be present while membrane is being installed.
- D. Maintain at least one copy of manufacturer's written instructions, applicable details, and this Section on site at all times during installation.

**E. Mock-ups:**

1. Provide membrane air barrier installation for mock-ups required in other Sections.
2. Mock-up should demonstrate installation method, including preparation and primary application method of membrane;
3. Mock-up may be tested for adhesion to substrate;

**F. Field Samples: Provide one field sample of not less than 100 square feet at location determined during pre-installation meeting.**

1. Field sample should include at least one transition to a dissimilar material or flashing;
2. Field sample should demonstrate installation method, including preparation and primary application method of membrane;
3. Field sample may be tested for adhesion to substrate;
4. Approved field sample may remain part of work.

**G. Pre-installation Meetings: Secure attendance of General Contractor, architect, applicator foreman, waterproofing consultant, and representatives of any related trades.**

1. Discuss location and requirement for field samples;
2. Discuss and clarify provisions for integrating Work of this Section with Work of other trades;
3. Discuss schedule;
4. Discuss any questions regarding details or requirements.

**1.6. DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- B. Store roll materials on end in original packaging until ready to use.
- C. Store all materials in covered area out of direct sunlight and inclement weather and in temperatures above 40 degrees F.

**1.7. PROJECT CONDITIONS**

- A. Perform Work only when conditions are acceptable to the manufacturer of the materials being installed.

**1.8. WARRANTY**

- A. Provide five year material warranty against reversion, degradation, delamination or other failure of air barriers materials.

## 2.PART 2 PRODUCTS

### 2.1. MANUFACTURERS

- A. Henry Company, 2911 Slauson Avenue, Huntington Park, CA 90255 (800) 486-1278; www.henry.com

### 2.2. MATERIALS

- A. Liquid Applied Air Barrier: Air Bloc 33 as manufactured by Henry Co., a one component elastomeric bitumen, spray or trowel at a rate of 6 gallons per 100 square feet (wet film thickness of 96 mils).

### 2.3. ACCESSORIES

- A. Detailing Membrane: Blueskin Breather as manufactured by Henry.
- B. Detailing Membrane Primer: Aquatac as manufactured by Henry.
- C. Reinforcing Tape: 2 inch wide glass fiber tape.
- D. Detailing Sealant: Henry 925 BES.
- E. Miscellaneous: Masking Tape, plastic sheeting and other accessories required for the performance of the work.

## 3.PART 3 EXECUTION

### 3.1. EXAMINATION

- A. Site Verification of Conditions: Verify that surfaces and conditions are ready to accept the Work of this section. Notify contractor in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

### 3.2. PREPARATION

- A. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants.
- B. Plywood surfaces should be surface dry and not more than 15% moisture content unless otherwise agreed upon during pre-installation meeting.
- C. Concrete surfaces should be cured for a minimum of 28 days and/or shall pass an adhesion test.

### 3.3. APPLICATION

- A. Reinforcing Tape:

1. All joints, seams, or cracks in sheathing substrate up to 1/4 inch in width shall be detailed with reinforcing tape.
2. Embed reinforcing tape in trowel application of liquid air barrier over joint, seam or crack.

**B. Detailing Membrane:**

1. Apply primer for self-adhering sheet membranes at rate recommended by manufacturer. Allow 30 minute open time. Reprime surfaces not covered within same work day.
2. Apply self-adhered detailing membranes over all substrate seams and transitions over 1/4 inch in width and as detailed.
3. Ensure minimum 2 inch overlap at all end and side laps.
4. Roll membrane completely with hand roller to ensure full adhesion.

**C. Liquid Applied Air Barrier:**

1. Apply membrane by trowel or spray over entire surface as indicated, to a wet film thickness of 96 mils. Completely cover detailing membrane. Overlap applicable transition flashings or material a minimum of 2 inches, or as detailed. Spray or trowel around all projections ensuring a complete and continuous air seal.

**3.4. REPAIR/RESTORATION**

- A. Repair damaged membrane by abrading membrane down to sound material, cleaning membrane with clear water, and applying new membrane over existing at original specified rate.

**3.5. FIELD QUALITY CONTROL**

- A. Continually verify applied thickness during installation using wet mil gauge. Cured membrane may be tested wherever there is a question of adequate thickness. Cured membrane should average approximately 60 mils thick but in any case should be no less than 55 dry mils at any location, exclusive of any reinforcing.
- B. Manufacturer's Field Services: Provide at least one site visit by manufacturer's representative to observe installation.

**3.6. CLEANING**

- A. Promptly remove overspray or splatters from adjacent surfaces not scheduled to received work of this Section.

**3.7. PROTECTION**

- A. Provide adequate protection for installed membrane from the work of other trades.

**END OF SECTION**

**SECTION 07 31 13**  
**ASPHALT SHINGLES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Asphalt shingles.
  - 2. Roof cover board.
- B. Related Requirements:
  - 1. Section 07 25 00 "Weather Barriers" for roofing underlayment.

**1.3 DEFINITION**

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

**1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples for Verification: For the following products, of sizes indicated:
  - 1. Asphalt Shingles: Full size.

**1.6 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by manufacturer and witnessed by a qualified testing agency.



- C. **Sample Warranty:** For manufacturer's warranty.
- 1.7 **CLQSEOUT SUBMITTALS**
- A. **Maintenance Data:** For asphalt shingles to include in maintenance manuals.
- 1.8 **MAINTENANCE MATERIAL SUBMITTALS**
- A. **Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.**
    - 1. **Asphalt Shingles:** 100 sq. ft. of each type, in unbroken bundles.
- 1.9 **QUALITY ASSURANCE**
- A. **Installer Qualifications:** An authorized representative who is trained and approved by manufacturer.
- 1.10 **DELIVERY, STORAGE, AND HANDLING**
- A. **Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.**
  - B. **Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.**
  - C. **Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.**
  - D. **Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.**
- 1.11 **FIELD CONDITIONS**
- A. **Environmental Limitations:** Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.
- 1.12 **WARRANTY**
- A. **Manufacturer's Warranty:** Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
    - 1. **Failures include, but are not limited to, the following:**
      - a. **Manufacturing defects.**
    - 2. **Material Warranty Period:** 30 years from date of Substantial Completion.

- B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt-shingle roofing that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLY

- A. GAF Timberline HD 'Birchwood', or equal as approved by District. Provide complete shingle roof system, including, but not limited to: starter shingles and ridge cap shingles.
1. Class A fire rated per UL 790.
  2. Passes ASTM D 7158, Class H.
  3. ASTM D 3018, Type 1.
  4. ASTM D 3161, Class F.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
- B. Wind Speed: Provide roofing system to withstand 115 mph window speed, Exposure Category C, per CBC 2016.
- C. Must meet 2016 California Building Code Chapter 7A.

### 2.3 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, sharp-pointed, with a minimum 3/8-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
1. Shank: Barbed.
  2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Roof Cover Board: Georgia-Pacific "Densdeck", or equal, as approved by the District.

### 2.4 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 UNDERLAYMENTS

- A. Install roof insulation in accordance with Section 07 21 00 "Building Insulation."
- B. Install underlayment in accordance with Section 07 25 00 "Weather Barriers."

#### 3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."
  - 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Rake Drip Edges: Install rake drip-edge flashings over underlayment and fasten to roof deck.
- D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

#### 3.4 ASPHALT-SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip with self-sealing strip face up at roof edge.
  - 1. Install starter strip along rake edge.

- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- E. Fasten asphalt-shingle strips with a minimum number of roofing nails located according to manufacturer's written instructions.

### 3.5 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
  - 1. Owner: <Insert name of Owner>.
  - 2. Address: <Insert address>.
  - 3. Building Name/Type: <Insert information>.
  - 4. Address: <Insert address>.
  - 5. Area of the Work: <Insert information>.
  - 6. Acceptance Date: <Insert date>.
  - 7. Warranty Period: <Insert time>.
  - 8. Expiration Date: <Insert date>.
- B. AND WHEREAS Roofing Installer has contracted to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
  - 1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
    - a. Lightning;
    - b. Peak gust wind speed exceeding 115 mph;
    - c. Fire;
    - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    - e. Vapor condensation on bottom of roofing; and
    - f. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by College of Marin.
  - 2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by College of Marin or by another responsible party so designated.

3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
4. During Warranty Period, if College of Marin allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If College of Marin engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified College of Marin in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
6. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
6. College of Marin shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off College of Marin from other remedies and resources lawfully available to College of Marin in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with College of Marin or a subcontract with College of Marin's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <insert day> day of <insert month>, <insert year>.

1. Authorized Signature: <insert signature>.
2. Name: <insert name>.
3. Title: <insert title>.

END OF SECTION

**SECTION 07 62 00**

**SHEET METAL FLASHING AND TRIM**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Sheet Metal Flashing and Trim.
  - 2. Formed roof-drainage sheet metal fabrications.
- B. Related Requirements:
  - 1. Section 07 31 13 "Asphalt Shingles."
  - 2. Section 09 91 00 "Painting."

**1.3 COORDINATION**

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

**1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site after approval of a completer submittal.
  - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
  - 3. Review requirements for insurance and certificates if applicable.
  - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

**1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.

5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is FM Approvals approved.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

#### 1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of a minimum of 5 years of successful in-service performance.
  1. For copings and roof edge flashings that are FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
- B. Installer Qualifications: Engage an experienced Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a minimum 5 year fabrication and installation record of successful in-service performance.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

#### 1.10 PROJECT CONDITIONS

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. **General:** Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. **Sheet Metal Standard for Flashing and Trim:** Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. **Thermal Movements:** Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. **Temperature Change:** 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 SHEET METALS

- A. **General:** Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. **Metallic-Coated Steel Sheet:** Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation. Paint exposed flashing in the field in accordance with Section 09 91 00 "Painting."
  - 1. **Surface:** Smooth, flat.
- C. **Aluminum Sheet:** ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
  - 1. **Exposed Coil-Coated Finish:**
    - a. **Two-Coat Fluoropolymer:** AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. **Color:** Match College of Marin Representative's sample.

## 2.3 MISCELLANEOUS MATERIALS

- A. **General:** Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. **Fasteners:** Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  - 1. **General:** Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. **Exposed Fasteners:** Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. **Blind Fasteners:** High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    - c. **Spikes and Ferrules:** Same material as gutter; with spike with ferrule matching internal gutter width.



- C. Solder:
  - 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- J. Slip Sheet: Red Rosin Paper, by W.R. Meadows.

#### 2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 2. Obtain field measurements for accurate fit before shop fabrication.
  - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- F. Do not use graphite pencils to mark metal surfaces.
- G. Saddles: Fabricate one-piece, watertight saddles that are mechanically fastened and soldered watertight at intersections in plane.

## 2.5 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Gutters and trim to be made from 0.050 aluminum with fluoropolymer finish, as specified herein.
- B. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
  - 1. Gutter Screens: Global Gutter Screens, Inc., or equal, as approved by the District.
- C. Downspouts: Fabricate downspouts to shapes and dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 2. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 3. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 4. Torch cutting of sheet metal flashing and trim is not permitted.
  - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
  - 1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
  1. At typical laps, provide a sealed butt joint with a 12 inch wide backer plate. At exposed horizontal flashing, such as copings, provide a backer plate with a 6 inch wide cover plate. Manufacturer fabricated flashings shall be lapped a minimum of 4 inches and set in a bed of sealant.
  2. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  3. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
  1. Do not use torches for soldering.
  2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  3. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

### 3.3 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

### 3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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**SECTION 07 92 00**

**JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

B. Related Sections:

1. Section 08 80 00 "Glazing" for glazing sealants.
2. Section 09 29 00 "Gypsum Board" for sealing perimeter joints.
3. Section 09 30 00 "Tiling" for sealing tile joints.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
  1. Joint-sealant application, joint location, and designation.
  2. Joint-sealant manufacturer and product name.
  3. Joint-sealant formulation.
  4. Joint-sealant color.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

- C. **Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate:** For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. **Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. **Warranties:** Sample of special warranties.

#### 1.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. **Source Limitations:** Obtain each kind of joint sealant from single source from single manufacturer.
- C. **Product Testing:** Test joint sealants using a qualified testing agency.
  - 1. **Testing Agency Qualifications:** An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
  - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. **Mockups:** Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

#### 1.6 PROJECT CONDITIONS

- A. **Do not proceed with installation of joint sealants under the following conditions:**
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.7 WARRANTY

- A. **Contractor's Labor and Material Guarantee:** Correct defective Work at no cost to the College of Marin.
  - 1. **Warranty Period:** 2 years from the date of Final Completion in accordance with Document 00 65 36 – Warranty Form Contractor's Guarantee.
- B. **Special Manufacturer's Warranty:** Warranty all work under this section in a written document endorsed by the Manufacturer.
  - 1. **Warranty Period:** 10 years from date of Final Completion.

- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  2. Disintegration of joint substrates from natural causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. **Compatibility:** Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. **Liquid-Applied Joint Sealants:** Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. **Suitability for Immersion in Liquids.** Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. **Stain-Test-Response Characteristics:** Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. **Suitability for Contact with Food:** Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. **Colors of Exposed Joint Sealants:** As selected by College of Marin Representative from manufacturer's full range.

### 2.2 SILICONE JOINT SEALANTS

- A. **Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant:** ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. **Products:** Subject to compliance with requirements, provide one of the following, or equal as approved by District:
    - a. Dow Corning Corporation; 790.
    - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
    - c. Sika Corporation, Construction Products Division; SikaSil-C990.
    - d. Tremco Incorporated; Spectrem 1.



### 2.3 URETHANE JOINT SEALANTS

- A. **Single-Component, Nonsag, Urethane Joint Sealant:** ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. **Products:** Subject to compliance with requirements, provide the following, or equal as approved by District:
    - a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
    - b. Tremco Incorporated; Vulkem 921.

### 2.4 LATEX JOINT SEALANTS

- A. **Latex Joint Sealant:** Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. **Products:** Subject to compliance with requirements, provide one of the following, or equal as approved by District:
    - a. BASF Building Systems; Sonolac.
    - b. Pecora Corporation; AC-20+.
    - c. Tremco Incorporated; Tremflex 834.

### 2.5 PREFORMED JOINT SEALANTS

- A. **Preformed Silicone Joint Sealants:** Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
- B. **Products:** Subject to compliance with requirements, provide the following, or equal as approved by District:
1. Dow Corning Corporation; 123 Silicone Seal.
  2. GE Advanced Materials - Silicones; UltraSpan US1100.
  3. Pecora Corporation; Sil-Span.
  4. Sealex, Inc.; ImmerSeal.

### 2.6 JOINT SEALANT BACKING

- A. **General:** Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. **Cylindrical Sealant Backings:** ASTM C 1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. **Bond-Breaker Tape:** Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

### 2.7 MISCELLANEOUS MATERIALS

- A. **Primer:** Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. **Cleaners for Nonporous Surfaces:** Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. **Masking Tape:** Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. **Surface Cleaning of Joints:** Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Remove laitance and form-release agents from concrete.
  - 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. **Joint Priming:** Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. **Masking Tape:** Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

#### **3.3 INSTALLATION OF JOINT SEALANTS**

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
  - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

### 3.4 FIELD QUALITY CONTROL

- A. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

**END OF SECTION**

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**SECTION 08 11 13**

**HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes hollow-metal work.
- B. Related Requirements:
  - 1. Section 08 71 00 "Door Hardware" for door hardware for hollow metal doors.
  - 2. Section 08 80 00 "Glazing" for glazing in hollow metal doors.

**1.3 DEFINITIONS**

- A. **Minimum Thickness:** Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

**1.4 COORDINATION**

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

**1.5 ACTION SUBMITTALS**

- A. **Product Data:** For each type of product.
  - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. **Shop Drawings:** Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 4. Locations of reinforcement and preparations for hardware.
  - 5. Details of each different wall opening condition.
  - 6. Details of anchorages, joints, field splices, and connections.
  - 7. Details of accessories.
  - 8. Details of moldings, removable stops, and glazing.

9. Details of conduit and preparations for power, signal, and control systems.
  10. Provide door cutout for lockset hardware. See door cutout template in door hardware schedule.
- C. **Schedule:** Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. **Product Test Reports:** For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each slacked door to permit air circulation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following, or equal as approved by District:
1. Amweld International, LLC.
  2. Ceco Door Products; an Assa Abloy Group company.
  3. Curries Company; an Assa Abloy Group company.
  4. Door Components, Inc.
  5. Steelcraft; an Allegion company.
  6. Stiles Custom Metal, Inc.
- B. **Source Limitations:** Obtain hollow-metal work from single source from single manufacturer.

#### 2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. **Commercial Doors and Frames:** NAAMM-HMMA 861. At locations indicated in the Door and Frame Schedule.

1. **Physical Performance:**
  - a. **Level A** according to SDI A250.4.
  - b. **Must meet 2016 California Building Code Chapter 7A Section 708A Exterior Windows and Doors**
2. **Doors:**
  - a. **Type:** As indicated in the Door and Frame Schedule.
  - b. **Thickness:** 1-3/4 inches
  - c. **Face:** Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 coating.
  - d. **Edge Construction:** Continuously welded with no visible seam.
  - e. **Core:** Steel stiffened.
    - 1) **Thermal-Rated Doors:** Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
3. **Frames:**
  - a. **Materials:** Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum G60 coating.
  - b. **Construction:** Full profile welded.
4. **Louvers:** Provide louvers for doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
5. **Exposed Finish:** Prime.

### 2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. **Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.**
- B. **Heavy-Duty Doors and Frames:** SDI A250.8, Level 2; SDI A250.4, Level B..
  1. **Doors:**
    - a. **Type:** As indicated in the Door and Frame Schedule.
    - b. **Thickness:** 1-3/4 inches (44.5 mm).
    - c. **Face:** Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm).
    - d. **Edge Construction:** Model 1, Full Flush.
    - e. **Edge Bevel:** Bevel lock and hinge edges 1/8 inch in 2 inches (3.2 mm in 51 mm).
    - f. **Core:** Manufacturer's standard.
    - g. **Fire-Rated Core:** Manufacturer's standard laminated mineral board core for fire-rated and temperature-rise-rated doors.
  2. **Frames:**
    - a. **Materials:** Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
    - b. **Construction:** Full profile welded.
  3. **Exposed Finish:** Prime.



## 2.4 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
  - 2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

## 2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Section 088000 "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.6 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
1. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
  2. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
  3. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
  4. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
  5. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
  3. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches high.
      - 2) Four anchors per jamb from 60 to 90 inches high.
      - 3) Five anchors per jamb from 90 to 96 inches high.
      - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    - b. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
  4. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
2. Provide loose stops and moldings on inside of hollow-metal work.
3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

## 2.7 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and lap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SOI A250.11 or NAAMM-HMMA 840 as required by standards specified.
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-rated openings, install frames according to NFPA 80.

- b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
  - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
  - d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - e. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
    - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
    - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

**END OF SECTION**

**SECTION 08 14 16**  
**FLUSH WOOD DOORS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:

- 1. Solid-core doors with transparent finished faces.
- 2. Factory fitting flush wood doors to frames and factory machining for hardware.

- B. Related Requirements:

- 1. Section 08 71 00 "Door Hardware" for hardware of both swing doors and sliding doors.
- 2. Section 08 80 00 "Glazing" for glass view panels in flush wood doors.

**1.3 ACTION SUBMITTALS**

- A. **Product Data:** For each type of door. Include details of core and edge construction and trim for openings.

- B. **Shop Drawings:** Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

- 1. Dimensions and locations of blocking.
- 2. Dimensions and locations of mortises and holes for hardware.
- 3. Dimensions and locations of cutouts.
- 4. Undercuts.
- 5. Requirements for veneer matching.
- 6. Doors to be factory finished and finish requirements.
- 7. Provide door cutout for lockset hardware. See door cutout template in door hardware schedule.

- C. **Samples for Verification:**

- 1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

- a. Provide Samples for each transparent veneer finish and opaque finish.

**1.4 INFORMATIONAL SUBMITTALS**

- A. **Sample Warranty:** For special warranty.

1.5 QUALITY ASSURANCE

- A. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
  2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  3. Warranty Period for Solid-Core Interior Doors: Life of installation.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal as approved by District:
1. Algoma Hardwoods, Inc.
  2. Eggers Industries.
  3. Graham Wood Doors; an Assa Abloy Group company.
  4. Marshfield Door Systems, Inc.
- B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
- B. WDMA I.S.1-A Performance Grade: Heavy Duty.
- C. Particleboard-Core Doors:
  - 1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2, made with binder containing no urea-formaldehyde.
  - 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
  - 3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

### 2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
  - 1. Grade: Premium, with Grade AA faces.
  - 2. Species: Match College of Marin Representative's sample.
  - 3. Cut and Match: Match College of Marin Representative's sample.
  - 4. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
  - 5. Core: Particleboard.
  - 6. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
  - 7. Construction: Seven plies, either bonded or nonbonded construction.
  - 8. WDMA I.S.1-A Performance Grade: Heavy Duty.

### 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
  - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
  - 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.



## 2.5 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish.
  - 3. Sheen: Satin.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

**SECTION 08 31 13**

**ACCESS DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Access doors and frames for walls and ceilings.
- B. Related Requirements:
  - 1. Section 09 29 00 "Gypsum Board."

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
  - 3. Provide door cutout for lockset hardware. See door cutout template in door hardware schedule.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

**PART 2 - PRODUCTS**

**2.1 ACCESS DOORS AND FRAMES AT TILED WALLS**

- A. **Product:** Karp Type DSC-214M Stainless Steel, or equal. Door to be 14 gauge stainless steel, fitted flush with flange of frame. Frame to be 16 gauge stainless steel. Flange of frame to be nominal 1 in. wide.

## 2.2 METAL ACCESS DOORS AT CEILINGS

- A. **Fire-Rated Gypsum Board Partitions:** Karp Type KRP-250, or equal as approved by District. 16-gauge steel doors and frames.

## 2.3 FABRICATION

- A. **General:** Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. **Metal Surfaces:** For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. **Doors and Frames:** Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
  - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
  - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
- D. **Latching Mechanisms:** Furnish number required to hold doors in flush, smooth plane when closed.
  - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
  - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

## 2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. **Appearance of Finished Work:** Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. **Stainless-Steel Finishes:**
  - 1. **Surface Preparation:** Remove tool and die marks and stretch lines, or blend into finish.
  - 2. **Polished Finishes:** Grind and polish surfaces to produce uniform finish, free of cross scratches.

- a. Run grain of directional finishes with long dimension of each piece.
- b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- c. Directional Satin Finish: No. 4.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

#### **3.3 ADJUSTING**

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

**END OF SECTION**

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**SECTION 08 41 13**

**INTERIOR ENTRANCES AND GLAZING ASSEMBLIES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Office and Meeting Room Storefronts.
- B. Related Requirements:
  - 1. Section 07 92 00 "Joint Sealants."
  - 2. Section 08 80 00 "Glazing."

**1.3 PREINSTALLATION MEETINGS**

- A. Pre-installation Conference: Conduct conference at Project site.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type of exposed finish required. Provide large format samples of the following:
  - 1. Each Aluminum Framing Finish: min. 1 ft. long extrusion with applied finish.
- C. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- D. Provide door cutout for lockset hardware. See door cutout template in door hardware schedule.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Product Test Reports: For aluminum-framed entrances and glazing assemblies, for tests performed by manufacturer and witnessed by a qualified testing agency.

- C. **Quality-Control Program:** Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
- D. **Source quality-control reports.**
- E. **Field quality-control reports.**
- F. **Sample Warranties:** For special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

- A. **Maintenance Data:** For aluminum-framed entrances and glazing assemblies to include in maintenance manuals.

#### 1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. **Product Options:** Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by College of Marin Representative, except with College of Marin Representative's approval. If changes are proposed, submit comprehensive explanatory data to College of Marin Representative for review.

#### 1.8 WARRANTY

- A. **Special Warranty:** Manufacturer and Installer agree to repair or replace components of aluminum-framed entrances and glazing assemblies that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. **Failures include, but are not limited to, the following:**
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Failure of operating components.
  - 2. **Warranty Period:** Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS, GENERAL

- A. **Source Limitations:** Obtain aluminum-framed entrances and glazing assembly materials and accessories from single source from single manufacturer or from source approved by the entrances and glazing assemblies' manufacturer.

## 2.2 MANUFACTURERS

- A. **Office Storefront Manufacturer:** Oldcastle "FG 2000", or equal, as approved by the District. Provide clear anodized finish. System coordinates with wood sliding doors specified in Section 08 14 16 "Flush Wood Doors."
- B. **Source Limitations:** Obtain all components of aluminum-framed entrance and glazing assemblies, including accessories, from single manufacturer.

## 2.3 FRAMING

- A. **Framing Members:** Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- B. **Backer Plates:** Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. **Brackets and Reinforcements:** Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. **Materials:**
  - 1. **Aluminum:** Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. **Sheet and Plate:** ASTM B 209.
    - b. **Extruded Bars, Rods, Profiles, and Tubes:** ASTM B 221.
    - c. **Extruded Structural Pipe and Tubes:** ASTM B 429/B 429M.
    - d. **Structural Profiles:** ASTM B 308/B 308M.

## 2.4 GLAZING

- A. **Glazing:** Comply with Section 08 80 00 "Glazing."

## 2.5 ACCESSORIES

- A. **Fasteners and Accessories:** Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.
  - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. **Anchors:** Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. **Concrete and Masonry Inserts:** Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

## 2.6 FABRICATION

- A. **Form or extrude aluminum shapes before finishing.**



- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.7 ALUMINUM FINISHES

- A. Refer to Section 09 96 00 "High Performance Coatings." Color to be selected by College of Marin Representative from manufacturer's standards for specified system.

## 2.8 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

- A. **General:**
1. Comply with manufacturer's written instructions.
  2. Do not install damaged components.
  3. Fit joints to produce hairline joints free of burrs and distortion.
  4. Rigidly secure nonmovement joints.
  5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- B. **Metal Protection:**
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components plumb and true in alignment with established lines and grades.
- D. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- E. Install glazing as specified in Section 08 80 00 "Glazing."
- F. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- G. **Entrance Doors:** Install doors to produce smooth operation and tight fit at contact points.
1. **Field-Installed Entrance Door Hardware:** Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 ERECTION TOLERANCES

- A. **Erection Tolerances:** Install aluminum-framed entrances and glazing assemblies to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. **Maintenance Tools and Instructions:** Furnish a complete set of specialized tools and maintenance instructions as needed for College of Marin's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. **Initial Maintenance Service:** Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION

SECTION 08 51 13  
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes aluminum windows for exterior locations.
- B. Related Requirements:
  - 1. Section 07 92 00 "Joint Sealants."
  - 2. Section 08 80 00 "Glazing."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
  - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
  - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
  - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: For aluminum windows.

1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
  - C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
  - D. Samples for Initial Selection: For units with factory-applied finishes.
    1. Include Samples of hardware and accessories involving color selection.
  - E. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
    1. Exposed Finishes: 2 by 4 inches
    2. Exposed Hardware: Full-size units.
  - F. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For manufacturer and Installer.
  - B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
  - C. Field quality-control reports.
  - D. Sample Warranties: For manufacturer's warranties.
- 1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
  - B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- 1.7 WARRANTY
- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
    1. Failures include, but are not limited to, the following:
      - a. Failure to meet performance requirements.
      - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
      - c. Faulty operation of movable sash and hardware.
      - d. Deterioration of materials and finishes beyond normal weathering.
      - e. Failure of insulating glass.
    2. Warranty Period:

- a. Window: [10] <Insert number> years from date of Substantial Completion.
- b. Glazing Units: [Five] [10] [20] <Insert number> years from date of Substantial Completion.
- c. Aluminum Finish: [10] [20] <Insert number> years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturer: International Window Corp. "No. 6280", or equal as approved by the District. Provide block framed fixed and sliding types. Provide manufacturer's aluminum wire screens at sliding windows.
- B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

### 2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
  1. Window Certification: AAMA certified with label attached to each window.
  2. Windows shall comply with Section 1709.5 of the 2013 California Building Code as adopted by the city of Novato including, but not limited to, performance and anchorage.
  3. Windows shall be tested and labeled as required by Section 1709.5.1 or shall be tested according to 1709.5.2
  4. Testing required by 1709.5.2 shall be in accordance with ASTM E330 and the design wind loads determined in Section 1605.3.
  5. Glazing shall comply with Section 2403 of the 2013 California Building Code.
  6. Water Penetration Resistance: No water infiltration when tested in accordance with ASTM E1105 procedure B for four cycles of five minutes each at a differential pressure of 15 percent of the positive design wind load from 1605.3.
  7. Testing shall demonstrate compliance with, as a minimum, the requirements for Performance Class "LC" and optional Performance Grade "40" in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 for air infiltration, water penetration, and structural performance.
  8. Exterior window shall meet 2016 California Building Code Chapter 7A., Materials and Construction Methods for Exterior Wildfire Exposure.

### 2.3 ALUMINUM WINDOWS

- A. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
- B. Insulating-Glass Units: ASTM E 2190. Refer to Section 08 80 00 "Glazing."
- C. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material

compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. **Exposed Hardware Color and Finish:** As selected by College of Marin Representative from manufacturer's full range.

## 2.4 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- D. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- E. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 ALUMINUM FINISHES

- A. Provide two-coat fluoropolymer coating that meets AAMA 2605. College of Marin Representative shall select color from manufacturer's standards.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

#### 3.3 FIELD QUALITY CONTROL

- A. Initial Testing: The College of Marin may engage a qualified consultant to perform field tests on the installed windows, in accordance with ASTM E1105 Procedure B (cyclic) for four cycles at the pressure noted herein, to verify compliance with specified requirements.
  - 1. The testing will be conducted throughout the duration of the project and shall be scheduled for selected windows as soon as practical after perimeter sealant joints have cured (approximately 7 - 10 days after installation or as recommended by the sealant manufacturer).
  - 2. Cost of testing, including staging, temporary assemblies, access to utilities, and other facilities required by the testing consultant will be at College of Marin's expense.
  - 3. College of Marin's consultant will issue a written report in accordance with ASTM E1105 documenting the test results.
- B. Re-Testing: Installations which fail the test shall be modified and retested by the Contractor.
  - 1. Scope of retesting will be determined by College of Marin's consultant based on results of previous tests and inspections.



3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
  - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION

**SECTION 08 71 00**

**DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 SUMMARY:**

A. Section Includes: **Finish Hardware** for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for aluminum doors.
3. Door hardware for wood doors.
4. Door hardware for other doors indicated.
5. Keyed cylinders as indicated.

B. Related Sections:

1. Division 6: Rough Carpentry.
2. Division 8: Aluminum Doors and Frames
3. Division 8: Hollow Metal Doors and Frames.
4. Division 8: Wood Doors.
5. Division 26 Electrical
6. Division 28: Electronic Security

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 -Fire Doors and Windows
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
5. UL10C – Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
8. ICC – International Building Code

D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

E. Allowances

1. Refer to Division 1 for allowance amount and procedures.

F. Alternates

1. Refer to Division 1 for Alternates and procedures.
- 1.2 SUBSTITUTIONS:
- A. Comply with Division 1.
- 1.3 SUBMITTALS:
- A. Comply with Division 1.
  - B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.
  - C. Product Data: Manufacturer's specifications and technical data including the following:
    1. Detailed specification of construction and fabrication.
    2. Manufacturer's installation instructions.
    3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
    4. Submit 6 copies of catalog cuts with hardware schedule.
    5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2
  - D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
    1. List groups and suffixes in proper sequence.
    2. Completely describe door and list architectural door number.
    3. Manufacturer, product name, and catalog number.
    4. Function, type, and style.
    5. Size and finish of each item.
    6. Mounting heights.
    7. Explanation of abbreviations and symbols used within schedule.
    8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
  - E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
    1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.
  - F. Samples: (If requested by the Architect)
    1. 1 sample of Lever and Rose/Escutcheon design, (pair).
    2. 3 samples of metal finishes
  - G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.
    1. Operating and maintenance manuals: Submit 3 sets containing the following.

- a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Name, address, and phone number of local representative for each manufacturer.
  - d. Parts list for each product.
2. Copy of final hardware schedule, edited to reflect, "As installed".
  3. Copy of final keying schedule
  4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
  5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

#### 1.4 QUALITY ASSURANCE

##### A. Comply with Division 1.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.
  - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
  - b. Hardware Schedule shall be prepared and signed by an AHC.
4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
6. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
  - a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
  - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.
6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

##### B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

##### A. Packing and Shipping: Comply with Division 1.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

##### B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

- A. Refer to Conditions of the Contract
- B. Manufacturer's Warranty:
  - 1. Closers: Ten years
  - 2. Exit Devices: Five Years
  - 3. Locksets & Cylinders: Three years
  - 4. All other Hardware: Two years.

1.8 OWNER'S INSTRUCTION:

- A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.
  - 1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
  - 2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
  - 3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

<u>Item:</u>	<u>Manufacturer:</u>	<u>Approved:</u>
Hinges	Stanley	
Continuous Hinges	Stanley	
Locksets	Best	No Substitution
Cylinders	Best	No Substitution
Exit Devices	Precision	Von Duprin

Closers	Stanley D-4550	LCN4040XP, Norton 7500
Automatic Operators	Stanley D-4990	No Substitution
Push/Pull Plates	Trimco	Don Jo, Hager
Push/Pull Bars	Trimco	Don Jo, Hager
Protection Plates	Trimco	Don Jo, Hager
Overhead Stops	ABH	Rixson, Glynn Johnson
Door Stops	Trimco	Don Jo, Hager
Flush Bolts	Trimco	Don Jo, Hager
Coordinator & Brackets	Trimco	Don Jo, Hager
Threshold & Gasketing	National Guard	Reese, Pemko

## 2.2 MATERIALS:

### A. Hinges: Shall be Five Knuckle Ball bearing hinges

1. Template screw hole locations
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.
4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non Removable Pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
15. UL10C listed for Fire rated doors.

### B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener
3. UL10C listed for 3 hour Fire rating
4. Non-handed
5. Lifetime warranty
6. Provide Fire Pins for 3-hour fire ratings
7. Sufficient size to permit door to swing 180 degrees

### C. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles
5. Conform to ANSI 117.1
6. Maximum 2 7/16 inch case projection with non-ferrous cover
7. Separate adjusting valves for closing and latching speed, and backcheck

8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
9. Full rack and pinion type closer with 1½" minimum bore
10. Mount closers on non-public side of door, unless otherwise noted in specification
11. Closers shall be non-handed, non-sized and multi-sized.

D. Low Energy Operators shall:

1. Conform to ANSI/BHMA A156.19 as a low energy power opening device.
2. Be listed under UL228, UL325, UL108, UL10C, UBC 7.2 and FCC listed.
3. Shall be non-handed.
4. Be rated for door panels weighing up to 350 lbs (160 kg).
5. The manual door closer within the Low Energy Operator shall be adjusted to meet Americans with Disabilities Act (ADA) 5 lbs opening force [Push-Side applications only]
6. Operator shall be isolated from mounting plate with rubber mounts to mitigate the transmission of forces between the door and the operator.
7. Shall have a position encoder to communicate with microprocessor.
8. Incorporate a resettable powered operation counter that tracks both powered and non-powered cycling of the Operator.
9. Incorporate the following adjustable settings:
  - i. Hold Open Timer, to 28 seconds
  - ii. Open Speed
  - iii. Backcheck Speed
  - iv. Vestibule Sequence Timer
10. Include DIP switch controls for:
  - i. On board diagnostics
  - ii. Power close
  - iii. Push and Go operation
  - iv. Time delay logic for electrified hardware components
11. Include terminals for auxiliary controls including:
  - i. Activation devices; provide two discrete inputs
  - ii. Vestibule sequencing
12. Control switches including:
  - i. Day/Night open (illuminated)
  - ii. Power On-Off
13. Includes adhesive Low Energy Operator mounting templates.
14. R-14 Aluminum Allow Materials
15. For non-powered operation, the unit shall function as a standard door closer with adjustable spring force size 1 thru 6.

E. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

F. Mop plates: Provide with four beveled edges ANSI J103, 4 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

G. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

2.3 FINISH:

- A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
- B. Powder coat door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.4 KEYS AND KEYING:

- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.
- B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.
- C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- E. Furnish keys in the following quantities:
  - 1. 1 each Grand Masterkeys
  - 2. 4 each Masterkeys
  - 3. 2 each Change keys each keyed core
  - 4. 15 each Construction masterkeys
  - 5. 1 each Control keys
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.



**3.2 HARDWARE LOCATIONS:**

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
  - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
  - 2. Recommended locations for Architectural Hardware for flush wood doors (DHI).
  - 3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

**3.3 INSTALLATION:**

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Conform to local governing agency security ordinance.
- C. Install conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.
  - 1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.
- D. Installed hardware using the manufacturers fasteners provided. Drill and lap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

**3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT**

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
  - 1. Check and adjust closers to ensure proper operation.
  - 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
    - a. Verify levers are free from binding.
    - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
  - 3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

**3.5 SCHEDULE OF FINISH HARDWARE:**

### Manufacturer List

<u>Code</u>	<u>Name</u>
NA	National Guard
SD	Stanley Door Closers
ST	Stanley
TR	Trimeco

### Option List

<u>Code</u>	<u>Description</u>
MC	Metal Cover
B4E	Beveled 4 Edges
CSK	Counter Sunk Screw Holes
LDW	Less Door Width

### Finish List

<u>Code</u>	<u>Description</u>
626	Satin Chromium Plated
628	Satin Aluminum, Clear Anodized
630	Satin Stainless Steel
689	Aluminum Painted
US26D	Chromium Plated, Dull

### Hardware Sets

#### SET #1

Doors: 201, 202, 203, 204, 206, 206, 207A, 207B, 208

3 Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1 Secure All Lock System	by Others (with BEST 9K series, 15D Lever)		
1 Wall Bumper	1270CVSV	626	TR
1 Gasketing	S88D Head & Jambs		PE

#### SET #2

Doors: 209, 213

3 Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1 Secure All Lock System	by Others (with BEST 9K series, 15D Lever)		
1 Door Closer	4040XP EDA	689	LC
1 Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1 Wall Bumper	1270CVSV	626	TR
1 Gasketing	S88D Head & Jambs		PE

**SET #3**

Doors: 210, 211

3 Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1 Secure All Lock System	SA-CRR (with BEST 9K series, 15D Lever)		
2 Kickplate	K0050 10" x 2" LDW B4E CSK (Each side of door)	US32D	TR
1 Wall Bumper	I270CVSV	626	TR
1 Gasketing	S88D Head & Jambs		PE

**SET #4**

Doors: E100A, E100

1 Low Energy Operator	CLD-4990	628	SD
2 Full Length Actuator Plate	10LPR36-IJW	630	BEA
2 Kickplate	K0050 10" x 2" LDW B4E CSK	630	TR

NOTE: (E) Secure All Lock System and BEST 15D lever to remain. Balance of hardware to remain. U.O.N.

**SET #4.1**

Doors: E215

2 Kickplate	K0050 10" x 2" LDW B4E CSK	630	TR
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NOTE: (E) Secure All Lock System and BEST 15D lever to remain. Balance of hardware to remain. U.O.N.

**SET #5**

Doors: E102A, E110, ES1A, E105

1 Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
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NOTE: (E) Secure All Lock System and BEST 15D lever to remain. Balance of hardware to remain. U.O.N.

**SET #5.1**

Doors: E108

1 Low Energy Operator	CLD-4990	628	SD
2 Full Length Actuator Plate	10LPR36-HW	630	BEA
1 Secure All Lock	SA-CRR (with BEST 9K series, 15D Lever)		
1 Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR

NOTE: Balance of hardware to remain. U.O. N.

**SET #5.2**

Doors: E109

1 Secure All Lock	SA-CRR (with BEST 9K series, 15D Lever)		
2 Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR

NOTE: Balance of hardware to remain. U.O.N.

**SET #6**

Doors: 112

3 Hinges	FBB179 4 1/2 X 4 1/2 NRP	US26D	ST
1 Secure All Lock System	by Others (with BEST 9K series, 15D Lever)		
2 Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1 Floor Stop	1211	626	TR
1 Door Shoe	215AV		PE
1 Gasketing	S88D Head & Jambs		PE

**SET #6.1**

Doors: S1

3 Hinges	FBB179 4 1/2 X 4 1/2	US26D	ST
1 Secure All Lock System	by Others (with BEST 9K series, 15D Lever)		
1 Door Closer	4040XP EDA	689	LC
2 Kick Plate	K0050 10" x 2" LDW B4E CSK	630	TR
1 Wall Bumper	1270CVSV	626	TR
1 Gasketing	S88D Head & Jambs		PE

**SET #6.2**

**NOT USED**

**SET #7**

Doors: G1, G2

10 Hinges	FBB199 5 X 4 1/2 NRP	US32D	ST
2 Door Pull	1165 x 40" O/A	US32D	TR
1 Padlock	A6460		AM
1 Hasp	A825		AM
1 Cane Bolt	SP 1009-18"		ST

END OF SECTION

**SECTION 08 80 00**

**GLAZING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Windows.
  - 2. Doors.
- B. Related Sections:
  - 1. Section 08 11 13 "Hollow Metal Doors and Frames."
  - 2. Section 08 41 13 "Interior Entrances and Glazing Systems."
  - 3. Section 08 51 13 "Aluminum Windows."

**1.3 DEFINITIONS**

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

**1.4 PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B. **Delegated Design:** Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
1. **Design Wind Pressures:** As required by Applicable Codes.
  2. **Design Wind Pressures:** Determine design wind pressures applicable to Project according to the California Building Code, based on heights above grade indicated on Drawings.
  3. **Vertical Glazing:** For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
  4. **Thickness of Patterned Glass:** Base design of patterned glass on thickness at thinnest part of the glass.
  5. **Maximum Lateral Deflection:** For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
  6. **Differential Shading:** Design glass to resist thermal stresses induced by differential shading within individual glass lites.
  7. **Provide tempered or laminated glazing** where required to meet safety glazing requirements of Local Authorities Having Jurisdiction (AHJ). Glazing must meet 2016 California Building Code Chapter 7A, Materials and Construction Methods for Exterior Wildfire Exposure.
- C. **Thermal Movements:** Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. **Temperature Change:** 120 deg F, ambient; 180 deg F, material surfaces.
- D. **Must meet local jurisdiction for Wildland Urban Interface (WUI) requirements.** Insulated glass with at least one pane of tempered glass (exterior pane).

#### 1.5 PRECONSTRUCTION TESTING

- A. **Preconstruction Adhesion and Compatibility Testing:** Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
  2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
  4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

#### 1.6 ACTION SUBMITTALS

- A. **Product Data:** For each glass product and glazing material indicated.
- B. **Glass Samples:** For each type of glass product other than clear monolithic vision glass; 12 inches square.
1. Tinted glass.

2. Patterned glass.
3. Coated glass.
4. Insulating glass with tempered pane on exterior
5. Tempered glass.

- C. Glazing Accessory Samples: For gaskets, sealants, and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers and manufacturers of insulating-glass units with sputter-coated, low-e coatings.
- B. Product Certificates: For glass and glazing products, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass and insulating glass.
1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Warranties: Sample of special warranties.

#### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain coated float glass, and insulating glass from single source from single manufacturer for each glass type.
- F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

- G. **Glazing Publications:** Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: GANA's "Glazing Manual."
  2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
  3. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- H. **Safety Glazing Labeling:** Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- I. **Fire-Protection-Rated Glazing Labeling:** Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- J. **Insulating-Glass Certification Program:** Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- K. **Preinstallation Conference:** Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  2. Review temporary protection requirements for glazing during and after installation.
- 1.9 **DELIVERY, STORAGE, AND HANDLING**
- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.
- 1.10 **PROJECT CONDITIONS**
- A. **Environmental Limitations:** Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.



## 1.11 WARRANTY

- A. **Contractor's Labor and Material Guarantee: Correct defective Work at no cost to the College of Marin.**
  - 1. **Warranty Period: 1 year from the date of Final Completion in accordance with Document 00 65 36 – Warranty Form Contractor's Guarantee.**
  
- B. **Special Manufacturer's Warranty: Warranty all work under this section in a written document endorsed by the Manufacturer:**
  - 1. **Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.**
    - a. **Warranty Period: 10 years from date of Final Completion.**
  - 2. **Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.**
    - a. **Warranty Period: 10 years from date of Final Completion.**
  - 3. **Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.**
    - a. **Warranty Period: 10 years from date of Final Completion.**

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. **Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.**
  - 1. **Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.**
  
- B. **Strength: Provide glass products to meet local building codes. Where safety glass is required, provide tempered glass or laminated glass. Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article.**

- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
  2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
  4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

## 2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  2. For uncoated glass, comply with requirements for Condition A.
  3. For coated vision glass, comply with requirements for Condition C (other coated glass).

## 2.3 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  2. Spacer: Aluminum with black, color anodic finish.
  3. Desiccant: Molecular sieve or silica gel, or a blend of both.
  4. Exterior glazing pane to be tempered glass per 2016 CBC Section 708A Exterior Windows and Doors.

## 2.4 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
  2. Interlayer Thickness: Provide thickness not less than needed to comply with requirements.
  3. Interlayer Color: Refer to Drawings.

## 2.5 GLAZING SEALANTS

- A. General:

1. **Compatibility:** Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. **Suitability:** Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. **Colors of Exposed Glazing Sealants:** As selected by College of Marin Representative from manufacturer's full range.

**B. Glazing Sealant:** Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT. Black color.

1. **Products:** Subject to compliance with requirements, provide the following, or equal:
  - a. Dow Corning Corporation; 790.
  - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
  - c. Pecora Corporation; 890.
  - d. Sika Corporation, Construction Products Division; SikaSil-C990.
  - e. Tremco Incorporated; Spectrem 1.

**2.6 GLAZING TAPES**

**A. Back-Bedding Mastic Glazing Tapes:** Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

**2.7 MISCELLANEOUS GLAZING MATERIALS**

**A. General:** Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

**B. Cleaners, Primers, and Sealers:** Types recommended by sealant or gasket manufacturer.

**C. Setting Blocks:** Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## 2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing laps are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing lape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

**SECTION 09 22 16**  
**NON-STRUCTURAL METAL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
  - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
- B. Related Requirements:
  - 1. Section 09 21 16 "Gypsum Board Shaft Wall Assemblies".
  - 2. Section 09 29 00 "Gypsum Board".

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

**PART 2 - PRODUCTS**

**2.1 PERFORMANCE REQUIREMENTS**

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

**2.2 FRAMING SYSTEMS**

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated. No other coating is acceptable.
- B. Standard Studs and Runners: ASTM C 645.
  - 1. Steel Studs and Runners:



- a. Minimum Base-Metal Thickness: 25 gauge, unless otherwise indicated on Drawings.
- C. Slip-Type Head Joints: Provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
  3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Products: Subject to compliance with requirements, provide the following, or equal as approved by the District:
      - 1) ClarkDietrich Building Systems; BlazeFrame DSL Slotted Deflection Track
      - 2) MBA Building Supplies; FlatSteel Deflection Track.
      - 3) Steel Network Inc. (The); VertiTrack VTD Series.
      - 4) Superior Metal Trim; Superior Flex Track System (SFT).
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
- E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.
  1. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  1. Minimum Base-Metal Thickness: 25 gauge, unless otherwise indicated on Drawings.
  2. Depth: 7/8 in. unless otherwise indicated on Drawings.
  3. Product: Clark Dietrich RC Deluxe.
- G. Resilient Furring Channels: 0.053 inch uncoated steel thickness, with minimum 1/2-inch-wide flanges. ClarkDietrich Building Systems Resilient Channel RC Deluxe, or equal as approved by the District.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
  1. Depth: As indicated on Drawings.
  2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- B. Hanger Attachments to Concrete:
  - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
    - a. Type: Postinstalled, expansion anchor.
  - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, in size indicated on Drawings.
- E. Carrying Channels, typical at Gypsum Board Ceilings, unless otherwise indicated on Drawings: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges. 1 1/2 in. deep and spaced at 48 in. on center, unless otherwise indicated on Drawings.
- F. Furring Members:
  - 1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep. 25 gauge, fastened and perpendicular to carrying channels at 16 in. on center, typical, at gypsum board ceilings unless otherwise indicated on Drawings.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock. Provide where indicated on Drawings.
  - 1. Products: Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    - b. Chicago Metallic Corporation; Drywall Grid System.
    - c. USG Corporation; Drywall Suspension System.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

#### **3.3 INSTALLATION, GENERAL**

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

#### **3.4 INSTALLING FRAMED ASSEMBLIES**

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
  - 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
  - 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. **Slip-Type Head Joints:** Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  2. **Door Openings:** Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
  3. **Other Framed Openings:** Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. **Fire-Resistance-Rated Partitions:** Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. **Firestop Track:** Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  5. **Sound-Rated Partitions:** Install framing to comply with sound-rated assembly indicated.
- D. **Direct Furring:**
1. Screw to wood framing.
  2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- E. **Z-Furring Members:**
1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- F. **Installation Tolerance:** Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.
- ### 3.5 INSTALLING SUSPENSION SYSTEMS
- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
  2. Carrying Channels (Main Runners): 48 inches o.c.
  3. Furring Channels (Furring Members): 16 inches o.c.

- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not attach hangers to steel roof deck.
  - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 7. Do not attach hangers to rolled-in hanger lugs of composite steel floor deck.
  - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

**SECTION 09 29 00**

**GYPSUM BOARD**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Moisture-resistant gypsum board.
4. Acoustical gypsum board.
5. Acoustical Sealant.

B. Related Requirements:

1. Section 07 21 00 "Building Insulation" for Sound Attenuation Blankets.
2. Section 09 22 16 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
3. Section 09 21 16.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product.

- B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

**1.4 QUALITY ASSURANCE**

- A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Install mockups for the following:
    - a. Each level of gypsum board finish indicated for use in exposed locations.
  - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
  - 3. Simulate finished lighting conditions for review of mockups.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

#### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide the following, or equal as approved by the District:
1. American Gypsum.
  2. CertainTeed Corp.
  3. Georgia-Pacific Gypsum LLC.
  4. National Gypsum Company.
  5. USG Corporation.
  6. Saint Gobain.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
  2. Long Edges: Tapered.
- C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
  2. Long Edges: Tapered.
- D. Water Resistant Gypsum Board: Glass-Mat Gypsum Board (Siliconized Gypsum Board) (SGB) – Exterior and Perimeter Wall Locations: ASTM C1177M, gypsum based board with water-resistant treated core, fully embedded glass fiber mats on both sides with a polymer modified gypsum surface and acrylic face coating, 1200 wide by longest lengths practicable. Thickness unless specified otherwise-16 mm thickness; ends square cut, tapered.
1. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  2. Exposure Warranty: Manufacturers standard 12-month warranty.
  3. Product: DensGlass Fireguard sheathing by Georgia-Pacific Gypsum LLC.
  4. Acceptable Alternate Products: Subject to the requirements of this article 'CGC Securock Glass-Mat Sheathing Type X' manufactured by CGC Inc. or 'GlasRoc Sheathing Type X 5/8" ' by CertainTeed Corp.
- E. Acoustical Gypsum Board: Quiet Rock "510", or equal as approved by the District.

2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges. Provide at bathtub and shower enclosures, trash termination room, janitor's closet and other locations indicated on Drawings.



1. Products: Subject to compliance with requirements, provide the following, or equal as approved by the District:
  - a. Georgia-Pacific Gypsum LLC; DensShield FireGuard.
2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

## 2.5 TRIM ACCESSORIES

### A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
  - a. Cornerbead.
  - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - c. L-Bead: L-shaped; exposed long flange receives joint compound.
  - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - e. F-Bead: F-shaped; exposed long flange receives joint compound.
  - f. Z-Bead: Z-shaped; exposed long flange receives joint compound.
  - g. Expansion (control) joint.

### B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide the following, or equal as approved by the District:
  - a. Fry Reglet Corp.
  - b. Gordon, Inc.
  - c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

## 2.6 JOINT TREATMENT MATERIALS

### A. General: Comply with ASTM C 475/C 475M.

### B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

### C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

2. **Embedding and First Coat:** For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. **Fill Coat:** For second coat, use setting-type, sandable topping compound.
  4. **Finish Coat:** For third coat, use setting-type, sandable topping compound.
  5. **Skim Coat:** For final coat of Level 5 finish, use setting-type, sandable topping compound
- D. **Joint Compound for Tile Backing Panels:**
1. **Tile Backer Units:** As recommended by backer unit manufacturer.

## 2.7 AUXILIARY MATERIALS

- A. **General:** Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. **Laminating Adhesive:** Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. **Steel Drill Screws:** ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. **Fire and Acoustical Joint Sealant:** Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. **Products:** Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Pecora Corporation; AC-20 FTR.
    - b. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
    - c. USG Corporation; SHEETROCK Acoustical Sealant.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Face layer of gypsum board is to be held back ¼ in. from intersecting surfaces and sealed airtight with acoustical sealant. Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD, IMPACT-RESISTANT, AND WATER-RESISTANT GYPSUM BOARDS

- A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
  3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
  4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- B. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
  2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
  3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
  4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- D. Fire-Rated Gypsum Assemblies: Refer to Section 07 92 00 "Joint Sealants" for sealants at fire-rated assemblies.
1. Marking and identification. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
    - a. Be located in accessible concealed floor, floor-ceiling or attic spaces;
    - b. Be repeated at intervals not exceeding 30 feet (914 mm) measured horizontally along the wall or partition; and
    - c. Include lettering not less than 0.5 inch (12.7 mm) in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS," or other wording.

Exception: Walls in Group R-2 occupancies that do not have a removable decorative ceiling allowing access to the concealed space.

### 3.4 APPLYING TILE BACKING PANELS

- A. Tile Backing Panels: ANSI A108.11, at showers, tubs, and where indicated.
- B. Where tile backing panels about other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners unless otherwise indicated.
  - 2. Bullnose Bead: Use at outside corners.
  - 3. LC-Bead: Use at exposed panel edges.
  - 4. L-Bead: Use where indicated.
  - 5. U-Bead: Use at exposed panel edges.
- C. Aluminum Trim: Install in locations indicated on Drawings.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 3: Where indicated on Drawings.
  - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

- 5. Level 5: At locations indicated on the Drawings as accent, graphics and specialty walls.
  - a. Primer and its application to surfaces are specified in Section 099100 "Painting."
- E. Tile Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

**END OF SECTION**

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**SECTION 09 30 00**

**TILING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Porcelain tile.
  - 2. Waterproof membrane.
- B. Related Sections:
  - 1. Section 09 29 00 "Gypsum Board" for tile backer board.

**1.3 DEFINITIONS**

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Dynamic Coefficient of Friction: Not less than 0.42 per ANSI A137.1.

**1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.



- B. **Shop Drawings:** Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. **Samples for Initial Selection:** For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- D. **Samples for Verification:**
  - 1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
  - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
  - 3. Full-size units of each type of trim and accessory for each color and finish required.
  - 4. Metal edge strips in 6-inch lengths.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For qualified Installer.
- B. **Master Grade Certificates:** For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. **Product Certificates:** For each type of product, signed by product manufacturer.
- D. **Material Test Reports:** For each tile-setting and -grouting product and special purpose tile.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. **Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.**
  - 1. **Tile and Trim Units:** Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
  - 2. **Grout:** Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

#### 1.8 QUALITY ASSURANCE

- A. **Source Limitations for Tile:** Obtain tile of each type and color or finish from one source or producer.
  - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. **Source Limitations for Setting and Grouting Materials:** Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. **Source Limitations for Other Products:** Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Waterproof membrane.
2. Metal edge strips.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store liquid materials in unopened containers and protected from freezing.
- D. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

#### 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

### PART 2 - PRODUCTS

#### 2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

#### 2.2 TILE PRODUCTS

- A. Wall: Crossville Inc, "Retro Active" Porcelain, or equal, as approved by the District. Size: 5 3/4" x 11 3/4", 5/16" thickness.

- B. Floor: Dal Tile, "Unity" Porcelain, or equal, as approved by the District. Size: 12"x24". Provide floor cove base and cove base corner tile to match the floor tile.

### 2.3 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.
  - 1. Products: Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Noble Company (The); Nobleseal TS.

### 2.4 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Custom Building Products.
    - b. Laticrete International, Inc.
    - c. MAPEI Corporation.
  - 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
  - 3. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
  - 4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

### 2.5 GROUT MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Custom Building Products.
    - b. Laticrete International, Inc.
    - c. MAPEI Corporation.
  - 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

### 2.6 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 "Joint Sealants."
  - 1. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
  - 1. Products: Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Dow Corning Corporation; Dow Corning 786.
    - b. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
    - c. Laticrete International, Inc.; Latacil Tile & Stone Sealant.
    - d. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
    - e. Tremco Incorporated; Tremsil 600 White.

## 2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; white zinc alloy exposed-edge material.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
  - 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
  - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
  - 1. Products: Subject to compliance with requirements, provide the following, or equal as approved by the District:
    - a. Bonsal American; an Oldcastle company; Grout Sealer.
    - b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
    - c. C-Cure; Penetrating Sealer 978.
    - d. Custom Building Products; Surfaceguard Grout and Tile Sealer.

## 2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.

- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
  - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with College of Marin Representative.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

#### 3.3 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors in wet areas.
    - b. Tile floors composed of tiles 8 by 8 inches or larger.

- c. Tile floors composed of rib-backed tiles.
  - B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
  - C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
  - D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
  - E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
    - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
    - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
    - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
  - F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
    - 1. Ceramic Mosaic Tile at Walls and Floors: 1/16 inch.
    - 2. Glazed Wall Tile: 1/16 inch.
  - G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
  - H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
    - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
  - I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
  - J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- 3.4 WATERPROOFING INSTALLATION
- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
  - B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
  - C. Acoustical Underlayment: Install in accordance with manufacturer's recommendations.

### 3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
  - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.6 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
  - 1. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.
    - a. Thin-Set Mortar: Latex- portland cement mortar.
    - b. Grout: Polymer-modified sanded grout.

**END OF SECTION**

**SECTION 09 51 23**

**ACOUSTICAL CEILINGS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes acoustical tiles and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
  - 1. Acoustical Tile: Set of 6-inch- square Samples of each type, color, pattern, and texture.
  - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Size and location of initial access modules for acoustical tiles.
  - 4. Items penetrating finished ceiling including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access tiles.
  - 5. Perimeter moldings.
- D. Qualification Data: For testing agency.
- E. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.



- G. Field quality-control reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Acoustical Ceiling Tiles: Full-size tiles equal to 2 percent of quantity installed.
  2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Build mockup of typical ceiling area as shown on Drawings.
  2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
  1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. **Seismic Performance:** Acoustical ceiling shall withstand the effects of earthquake motions determined according to 2016 California Building Code.
- B. **Surface-Burning Characteristics:** Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. **Flame-Spread Index:** Comply with ASTM E 1264 for Class A materials.
  - 2. **Smoke-Developed Index:** 450 or less.

## 2.2 MANUFACTURERS

- A. **Typical Product:** Armstrong World Industries "Ultima no. 1914", or equal as approved by the District. 2 ft. by 4 ft. panel with beveled tegular edges.
- B. **For Areas with a 2 ft. by 2 ft. diffuser:** Armstrong World Industries "Ultima no. 1911", or equal as approved by the District. 2 ft. by 2 ft. panel with beveled tegular edges.
- C. **Suspension System:** Armstrong World Industries "Prelude XL", or equal as approved by the District.

## 2.3 ACOUSTICAL TILES, GENERAL

- A. **Source Limitations:**
  - 1. **Acoustical Ceiling Tile:** Obtain each type from single source from single manufacturer.
  - 2. **Suspension System:** Obtain each type from single source from single manufacturer.
- B. **Glass-Fiber-Based Tiles:** Made with binder containing no urea formaldehyde.
- C. **Acoustical Tile Standard:** Provide manufacturer's standard files of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
  - 1. **Mounting Method for Measuring NRC:** Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
  - 2. **Acoustical tiles shall be made from plant-based materials and shall contain no formaldehyde.**
- D. **Acoustical Tile Colors and Patterns:** Match appearance characteristics indicated for each product type.
  - 1. **Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by College of Marin Representative from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.**

## 2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. **Metal Suspension-System Standard:** Provide manufacturer's standard direct-hung, heavy-duty metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

- B. **Attachment Devices:** Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. **Anchors in Concrete:** Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
    - a. **Type:** Post-installed expansion anchors.
    - b. **Corrosion Protection:** Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
  2. **Power-Actuated Fasteners in Concrete:** Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- C. **Wire Hangers, Braces, and Ties:** Provide wires complying with the following requirements:
1. **Zinc-Coated, Carbon-Steel Wire:** ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  2. **Size:** Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- D. **Hanger Rods:** Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. **Angle Hangers:** Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.
- F. **Seismic Stabilizer Bars:** Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- G. **Seismic Struts:** Manufacturer's standard compression struts designed to accommodate seismic forces.
- H. **Seismic Clips:** Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in place. Armstrong BERQ-2, or equal as approved by the District.

## 2.5 METAL TRIM

- A. **Extruded-Aluminum Edge Moldings, Shadow Mold edge trim and Trim:** Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
1. **Aluminum Alloy:** Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for Alloy and Temper 6063-T5.
  2. **Baked-Enamel or Powder-Coat Finish:** Minimum dry film thickness of 1.5 mils. Comply with ASTM C 635/C 635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

#### 3.3 INSTALLATION

- A. General: Install acoustical tile ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. Secure angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  - 8. Do not attach hangers to steel deck lags.
  - 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.

10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
  11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
  2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical tiles with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut tiles at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical tiles as follows:
    - a. As indicated on reflected ceiling plans.
  2. For reveal-edged tiles on suspension-system runners, install tiles with bottom of reveal in firm contact with top surface of runner flanges.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

**END OF SECTION**

**SECTION 09 65 13**

**RESILIENT BASE AND ACCESSORIES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Resilient base.
  - 2. Metal edge strips.
- B. Related Sections:
  - 1. Section 09 65 19 "Resilient Tile Flooring."
  - 2. Section 09 68 13 "Tile Carpeting."

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

**1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

**1.5 QUALITY ASSURANCE**

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

#### 1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
  1. 48 hours before installation.
  2. During installation.
  3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

#### 2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide the following, or equal as approved by the District:
  1. Johnsonite Commercial Flooring "Baseworks."
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
  1. Style and Location:
    - a. Style A, Straight: Provide in areas with carpet.
    - b. Style B, Cove: Provide in areas with resilient flooring.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches, unless otherwise noted.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Site formed.
- G. Inside Corners: Site formed.
- H. Colors: As indicated by manufacturer's designations.

## 2.2 INSTALLATION MATERIALS

- A. **Trowelable Leveling and Patching Compounds:** Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. **Metal Edge Strips:** Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. **Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.**
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. **Proceed with installation only after unsatisfactory conditions have been corrected.**
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. **Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.**
- B. **Do not install resilient products until they are the same temperature as the space where they are to be installed.**
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- C. **Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.**

### 3.3 RESILIENT BASE INSTALLATION

- A. **Comply with manufacturer's written instructions for installing resilient base.**
- B. **Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.**
- C. **Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.**
- D. **Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.**
- E. **Do not stretch resilient base during installation.**



- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

#### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum horizontal surfaces thoroughly.
  - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

**END OF SECTION**

**SECTION 09 65 19**  
**RESILIENT TILE FLOORING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Rubber floor tile.
- B. Related Sections:
  - 1. Section 09 65 13 "Resilient Base and Accessories."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 1. Show details of special patterns.
- C. Samples: Full-size units of each color and pattern of floor tile required.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- F. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for floor tile including resilient base and accessories.
    - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by College of Marin Representative.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless College of Marin Representative specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

### 2.2 LINOLEUM TILE

- A. R1 - reception area: Forbo "Marmoleum Black Hole T3707", or equal as approved by the District.
- B. R2- kitchen: Forbo "Marmoleum Graphite T3048", or equal as approved by the District.

### 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range recommended by flooring manufacturer.
  4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations.
- C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  1. Remove adhesive and other blemishes from exposed surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.

- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

**END OF SECTION**

**SECTION 09 68 13**

**TILE CARPETING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes modular, carpet tile.
- B. Related Requirements:
  - 1. Section 07 26 16 "Concrete Vapor Treatment."
  - 2. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
  - 2. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.
  - 4. Type of installation.
  - 5. Pattern of installation.
  - 6. Pattern type, location, and direction.
  - 7. Pile direction.
  - 8. Type, color, and location of insets and borders.
  - 9. Type, color, and location of edge, transition, and other accessory strips.
  - 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: Full-size Sample.
  - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockups at locations and in sizes shown on Drawings.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

#### 1.9 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.



- B. **Environmental Limitations:** Do not deliver or install carpet tiles until spaces are enclosed and weatheright, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

#### 1.10 WARRANTY

- A. **Special Manufacturer's Warranty:** Warranty all work under this section in a written document endorsed by the Manufacturer. Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, loss of face fiber, and delamination.
  - 3. Warranty Period: 10 years from date of Final Completion.

### PART 2 - PRODUCTS

#### 2.1 CARPET TILE

- A. **Product:** Shaw contract, Directional Tile, style no. 5T071, or equal, as approved by the District. Color name: Distance 69597, 18"x18"
  - 1. Construction: Multi-Level Pattern Loop
  - 2. Fiber: Eco Solution Q® Nylon
  - 3. Backing: EcoWorx® Tile
  - 4. Dye Method: 100% Solution Dyed
  - 5. Tufted Weight:15.0

#### 2.2 INSTALLATION ACCESSORIES

- A. **Trowelable Leveling and Patching Compounds:** Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Refer to Section 09 65 13 "Resilient Base and Accessories" for transition strips.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. **Concrete Subfloors:** Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
  2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
  3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use flowable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer .
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove yarns that protrude from carpet tile surface.
  - 2. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

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**SECTION 09 68 16**

**SHEET CARPETING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:

- 1. Tufted carpet.

- B. Related Requirements:

- 1. Section 02 41 16 "Selective Demolition" for removing existing floor coverings.
- 2. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet.
- 3. Section 09 68 13 "Tile Carpeting" for modular carpet tiles.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

- 1. Include manufacturer's written data on physical characteristics and durability.
- 2. Include manufacturer's written installation recommendations for each type of substrate.

- B. Shop Drawings: For carpet installation, showing the following:

- 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
- 2. Carpet type, color, and dye lot.
- 3. Seam locations, types, and methods.
- 4. Type of subfloor.
- 5. Type of installation.
- 6. Pattern type, repeat size, location, direction, and starting point.
- 7. Pile direction.
- 8. Types, colors, and locations of insets and borders.
- 9. Types, colors, and locations of edge, transition, and other accessory strips.
- 10. Transition details to other flooring materials.

- C. Samples for Initial Selection: For each type of product.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
- D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet: 12-inch-square Sample.
  2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
  3. Carpet Seam: 6-inch Sample.
  4. Mitered Carpet-Border Seam: 12-inch-square Sample. Show carpet pattern alignment.
- E. Product Schedule: For carpet. Use same designations indicated on Drawings.
- F. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For installer.
  - B. Product Test Reports: For carpet, for tests performed by a qualified testing agency.
  - C. Sample Warranties: For special warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
    1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
    2. Precautions for cleaning materials and methods that could be detrimental to carpet.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Comply with CRI's "CRI Carpet Installation Standard."
  - B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.
- 1.7 FIELD CONDITIONS
- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
  - B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
  2. Failures include, but are not limited to, the following:
    - a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
    - b. Loss of tuft bind strength.
    - c. Excess static discharge.
    - d. Delamination.
  3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- A. Carpet broadloom: Shaw contract Shade Gradient, color name: Element 34583, or equal, as approved by the District.
1. Size: 12 Foot (3.66 M)
  2. Construction: Graphic Loop
  3. Product Type: Broadloom
  4. Fiber: Eco Solution Q® Nylon
  5. Backing: Ultraloc®
  6. Dye Method: 100% Solution Dyed
  7. Tufted Weight:30.0
- B. Contrasting Stripe: Provide carpeted stripes on top and bottom treads of each stair run. Interior stairs shall have the upper approach and lower tread marked by a stripe providing clear visual contrast. The stripe shall be 2 inches wide and placed parallel to, and not more than 1 inch from, the nose of the step or upper approach. The stripe shall extend the full width of the step or upper approach and shall be of material that is at least as slip resistant as the other treads of the stair (carpet).

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard" and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

#### 3.3 CARPET INSTALLATION

- A. Comply with CRI's "CRI Carpet Installation Standard" and carpet manufacturer's written installation instructions for the following:
  - 1. Stair installation.
- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
  - 1. Stretch-in Carpet Installation: Install carpet cushion seams at 90-degree angle with carpet seams.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.



- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

**3.4 CLEANING AND PROTECTION**

- A. Perform the following operations immediately after installing carpet:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
  - 2. Remove yarns that protrude from carpet surface.
  - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI's "CRI Carpet Installation Standard."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

**END OF SECTION**

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**SECTION 09 72 00**

**WALL COVERINGS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Vinyl wall covering for markerboards.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.
- B. Shop Drawings: Show location and extent of each wall-covering type. Indicate seams and termination points.
- C. Samples: For each type of wall covering and for each color, pattern, texture, and finish specified, 12 in. square.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

**1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For wall coverings to include in maintenance manuals.

**1.6 FIELD CONDITIONS**

- A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity

conditions at levels intended for occupants after Project completion during the remainder of the construction period.

1. **Wood-Veneer Wall Coverings:** Condition spaces for not less than 48 hours before installation.
- B. **Lighting:** Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.
- C. **Ventilation:** Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. **Fire-Test-Response Characteristics:** As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. **Surface-Burning Characteristics:** Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. **Flame-Spread Index:** 25 or less.
    - b. **Smoke-Developed Index:** 450 or less.

### 2.2 VINYL WALL COVERING FOR MARKERBOARDS

- A. **Basis of Design:** Koroseal Wallaikers "M-248 Mag-Rite", or equal, as approved by the District. Provides magnetic and writing surface.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
  - 1. **Moisture Content:** Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
  - 2. **Gypsum Board:** Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
- D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- E. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

### 3.3 WALL-COVERING INSTALLATION

- A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
  - 1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.
- D. Install wall covering without lifted or curling edges and without visible shrinkage.
- E. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.
- F. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
- G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

### 3.4 CLEANING

- A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.
- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION

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**SECTION 09 83 00**

**ACOUSTIC FINISHES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. **Work Included:** Acoustic Finishes, complete, as shown and specified. Section includes the following:
  - 1. Acoustical Core Panels.
  - 2. Acoustical Panel at Underside of Stair.
  
- B. **Work Specified Elsewhere:**
  - 2. Backing Plates: Section 09 21 16.

**1.2 REFERENCES**

- A. **General:** Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation occurs in the referenced standards, it shall be considered mandatory. In the event of conflict, the more stringent standard or requirement shall govern.
  - 1. American Society for Testing and Materials (ASTM)
    - a. ASTM E84 "Surface Burning Characteristics of Building Materials".

**1.3 SUBMITTALS**

- A. **Product Data:** Submit for College of Marin Representative's action. Submit manufacturer's literature and installation instructions for each material and accessory, clearly notating specified requirements.
  
- B. **Shop Drawings:** Submit for College of Marin Representative's action. Submit shop drawings for the installation of the Work. On elevation, show fabric direction, panel seams, cutouts, and other details as necessary to clearly indicate arrangement of panels and materials. In details, show method of attachment to wall.
  
- C. **Samples:** Submit for College of Marin Representative's action. Furnish sufficient samples to establish full range of colors and textures for materials exposed in the finished Work. Label samples to indicate product and location in the Work. Samples will be reviewed for appearance only. Compliance with other requirements is the responsibility of the Contractor.
  - 1. Fabric: 12 in. square of each specified type.
  
- D. **Quality Assurance/Quality Control Submittals:** Submit for College of Marin Representative's information.
  - 1. **Certificates:**
    - a. **Document Review:** Submit a written statement signed by the Contractor and the Applicator stating that the Contract Documents, shop drawings and

product data have been reviewed with qualified manufacturer representatives. The statement shall certify that selected materials are proper, compatible with contiguous materials and adequate for the application shown.

b. **Installer's Qualifications.**

G. **Closeout Submittals:** Submit for College of Marin's documentation.

1. **Maintenance Data** for fabric.

## 1.6 PRODUCT HANDLING

A. Take measures as required to ensure materials are not damaged or deformed. Store products in flat position in properly ventilated, dry space. Use suitable means to prevent materials from lying in direct contact with the ground.

## 1.7 PROJECT CONDITIONS

A. **Environmental Requirements:** Store materials for 1 day prior to installation in area of installation to achieve temperature stability.

## PART 2 – PRODUCTS

### 2.1 ASSEMBLIES

A. **Acoustical Core Panels:** F-Sorb "Acoustical Core System", or equal, as acceptable to the District.

1. **Finish and Color:** As selected by the College of Marin Representative from Manufacturer's standards.

B. **Acoustical Panel at Underside of Stair:** LBI/Boyd "EcoCore Panels", or equal, as acceptable to the District. 2 in. thick. Mounting as shown on Drawings.

## PART 3 - EXECUTION

### 3.1 GENERAL

A. **Manufacturer's Instructions:** Prepare substrates and install the work, including components and accessories, in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified. Examine the areas to receive the Work and remedy detrimental conditions.

B. **General:** Install Work plumb, level, aligned, and secured to substrates per manufacturer's recommendations.

### 3.2 CLEANING

A. **General:** On completion of installation, clean soiled surfaces and remove debris. Provide suitable protection to maintain Work of this Section clean and free of defects at Substantial Completion.



**END OF SECTION**

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**SECTION 09 91 00**

**PAINING AND COATING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. **Work Included:** Painting, complete as shown and specified.
- B. **Work Specified Elsewhere:**
  - 1. **Shop Priming of Ferrous Metal Items:** Sections 05 50 00, 081113, and other applicable sections.
  - 2. **Shop Finishing of Architectural Woodwork and Casework:** Section 06 40 23.

**1.2 SYSTEM DESCRIPTION**

- A. **General:** Paint every interior and exterior surface, except as otherwise shown or as follows:
- B. **Surfaces Not to be Painted:**
  - 1. **Factory-finished items specified in various Sections.**
  - 2. **Prefinished wall, ceiling, and floor coverings.**
  - 3. **Painting specified elsewhere and included in respective Sections, including but not necessarily limited to, shop priming.**
  - 4. **Code-Required Labels:** Keep equipment identification and fire rating labels free of paint.
  - 5. **Surfaces concealed in walls and above ceilings except as specifically indicated otherwise.**
  - 6. **Ducts, piping, conduit, and equipment concealed in walls and ceilings, unless specifically indicated otherwise.**

**1.3 SUBMITTALS**

- A. **Product Data:** Submit for College of Marin Representative's action. Submit manufacturer's literature and installation instructions for each material and accessory, clearly notating specified requirements.
- B. **Samples:** Submit for College of Marin Representative's action. Furnish sufficient samples to establish full range of colors and textures for materials exposed in the finished Work. Label samples to indicate product and location in the Work. Samples will be reviewed for appearance only. Compliance with other requirements is the responsibility of the Contractor.
  - 1. **Opaque Colors and Finishes:** Submit samples, on hardboard, using materials accepted for Project, of each color and paint finish selected with texture to

- simulate actual conditions. Prepare three samples, 8-1/2 inches by 11 inches, with required number of paint coats clearly visible.
2. **Transparent and Stained Finishes:** Prepare samples on species and quality of wood to be used in the Work. Re-submit as requested until acceptable sheen, color, and texture are achieved. Label and identify each sample as to location and application.
- C. **Quality Assurance/Quality Control Submittals:** Submit for College of Marin Representative's information.
1. **Certificates:**
    - a. **Document Review:** Submit a written statement signed by the Contractor and the Applicator stating that the Contract Documents, shop drawings and product data have been reviewed with qualified manufacturer representatives. The statement shall certify that selected materials are proper, compatible with contiguous materials and adequate for the application shown.
    - b. **Installer's Qualifications**

#### 1.4 QUALITY ASSURANCE

- A. **Qualified Installer:** Installer to have 5 years' experience in the installation of specified materials on comparable projects. The firm shall have the approval of the materials manufacturer.
- B. **Regulatory Requirements:** Comply with applicable requirements of the laws, codes, and regulations of Authorities Having Jurisdiction (AHJs), including the Air Quality Management District. Obtain necessary approvals from AHJs.
- C. **Visual Mock-Up(s):** As directed by the College of Marin Representative, apply on actual wall surfaces where designated, samples of each and any color selected for final review.
  1. On at least 100 square feet of surface as directed, provide full-coat finish samples until required sheen, color and texture are obtained.
  2. Duplicate painted finishes of prepared samples.
  3. Simulate finished lighting conditions for review of in-place work.
- D. **Labeling:** Include following on label of each container:
  1. Manufacturer's name and product name.
  2. Generic type of paint.
  3. Manufacturer's stock number.
  4. Color.
  5. Instructions for reducing, where applicable.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. **Packing, Shipping, Handling, and Unloading:** Deliver material in sealed containers with labels legible and intact.
- B. **Storage and Protection:**
  - 1. Store only acceptable Project materials on Project site.
  - 2. Restrict storage to paint materials and related equipment.

**1.6 PROJECT/SITE CONDITIONS**

- A. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be stored and applied.
- B. Do not apply finish in areas where dust is being generated.

**1.7 SCHEDULING**

- A. **Gypsum Board:** Verify with Section 092116 that skim coat has been applied to surfaces scheduled to receive semi-gloss and gloss paints. Do not proceed until completed.

**1.8 MAINTENANCE**

- A. **Extra Materials:** At completion of Work, deliver to College of Marin extra stock of paint of one gallon of each color used of each coating material used. Tightly seal and clearly label containers.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. **General:** Kelly Moore, Benjamin Moore, or equal, or as acceptable to the District. Product designations of Kelly Moore are specified as standard.
- B. **Substitutions:** For consideration, accompany substitution proposals, with manufacturer's data and current statement from a recognized independent testing agency stating that each substitution for finish coat is equal to or better than specified product.

**2.2 MATERIALS**

- A. **General:** Provide materials selected for coating system for each type of surface which are the product of single manufacturer.
- B. **Unsuitability of Specified Products:** Claims concerning unsuitability of any materials specified will not be entertained, unless such claim is made in writing to the College of Marin Representative before Work is started.

**2.3 COLORS**

- A. **Color Schedule:** College of Marin Representative will prepare color schedule with samples for guidance of painter and reserves right to select, allocate, and vary colors on

different surfaces throughout building. Colors may be selected by College of Marin Representative from manufacturer's standard palette or be custom mixed.

- B. **Mixing:** Deliver paints and stains ready mixed to Project site.

## 2.4 PAINT SYSTEMS

- A. **Schedule:** Only major areas are scheduled. Treat miscellaneous and similar items and areas within room or space with similar system.
- B. **Number of Coats:** Where number of coats is specified, it is only as a minimum requirement. Apply additional coats, at no additional cost to College of Marin, if necessary to completely hide base material, produce uniform color, and provide satisfactory finish result.
- C. **Systems Specifications:** These specifications are a guide and are meant to establish procedure and quality. Confer with College of Marin Representative to determine exact finish desired.
- D. **Acceptance of Final Colors:** Do not apply final coats of paint for either exterior and interior systems until colors have been accepted by College of Marin Representative.
- E. **Exterior Painting Systems:**
1. **Galvanized Steel, Zinc-Rich Painted Steel, and Aluminum:**
    - a. **Prime Coat:** Kelly-Moore KM5725 DTM Acrylic Primer Finish.
    - b. **Body Coat:** Kelly-Moore 1215 Color Shield Exterior Acrylic Semi-Gloss Enamel. KM 5885 DTM High Performance Acrylic Semi-Gloss Enamel
    - c. **Finish Coat:** Kelly-Moore 1215 Color Shield Exterior Acrylic Semi-Gloss Enamel. KM 5885 DTM High Performance Acrylic Semi-Gloss Enamel
  2. **Woodwork, Opaque Finish:**
    - a. **Prime Coat:** Kelly-Moore 255 Acry-Shield 100% Acrylic Exterior Wood Primer.
    - b. **Body Coat:** Kelly-Moore 1215 Color Shield Exterior Acrylic Semi-Gloss Enamel.
    - c. **Finish Coat:** Kelly-Moore 1215 Color Shield Exterior Acrylic Semi-Gloss Enamel.
  3. **Woodwork, Transparent Finish:** United Gilsonite Laboratories ZAR Clear Wood Sealer. Provide 2 coats, or as otherwise required per Visual Mock-up.
- F. **Interior Painting Systems:**
1. **Cementitious Surfaces:**
    - a. **Enamel:**

- 1) Prime Coat: Kelly-Moore 971 Acry-Plex Interior PVA Primer/Sealer.
  - 2) Body Coat: Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel.
  - 3) Finish Coat: Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel.
2. Gypsum Board:
- a. Enamel:
    - 1) Prime Coat: Kelly-Moore 971 Acry-Plex Interior PVA Primer/Sealer.
    - 2) Body Coat: Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1050 KM Professional Interior Acrylic Semi-Gloss Enamel.
    - 3) Finish Coat: Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1050 KM Professional Interior Acrylic Semi-Gloss Enamel.
  - b. Acrylic Epoxy Finish:
    - 1) Prime Coat: Kelly-Moore 971 Acry-Plex Interior PVA Primer/Sealer.
    - 2) Finish Coats: -Devco Tru-Glaze – WB 4426 semi-gloss epoxy finish , not less than 3 mils dry film thickness. Sierra Performance S-16 Epoxy Acrylic Wall & Trim Semi-Gloss Enamel.
3. Metal:
- a. Enamel:
    - 1) Prime Coat: Shop-applied under other applicable Section. (Touch up with KM 5725 DTM Acrylic Primer Finish.
    - 2) Body Coat: Same as finish coat.
    - 3) Finish Coat: Kelly-Moore 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel.KM 5885 DTM High Performance Acrylic Semi-Gloss Enamel
  - b. Acrylic Epoxy Finish:
    - 1) Prime Coat: Shop-applied under other applicable Sections.
    - 2) Finish Coats: Devco Tru-Glaze-WB 4426 Semi-Gloss Epoxy Finish, not less than 3 mils DFT.

Sierra Performance S-16 Epoxy Acrylic Wall & Trim Semi-Gloss Enamel.

4. **Wood:**
  - a. **Prime Coat:** Sierra Performance S-30 Griptec Multi-Surface Primer.
  - b. **Body Coat:** Kelly-Moore 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel.
  - c. **Finish Coat:** Kelly-Moore 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel.

G. **Miscellaneous Interior Painting Systems:**

1. **Ductwork at Grilles and Diffusers:** Flat black Satin Glide 128-200 latex enamel or Kelly-Moore 1240-407 Flat Carbon (Black). Apply to visible interior surfaces of ductwork.
2. **Exposed Insulated Pipes and Ductwork:**
  - a. **Sealer:** 1 coat Kelly-Moore 971 Acry-Plex Interior PVA Primer/Sealer. Omit sealer where glass fabric jackets are used.
  - b. **Body and Finish Coats:** As specified for exposed non-insulated pipes, conduits, and ductwork.
3. **Exposed Non-Insulated Pipes and Ductwork:** Including conduit.
  - a. **Cast-Iron Pipe:**
    - 1) **Prime Coat:** KM 5725 DTM Acrylic Primer Finish
    - 2) **Body Coat:** Same as finish coat.
    - 3) **Finish Coat:** Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1050 KM Professional Interior Acrylic Semi-Gloss Enamel.
  - b. **Other Pipes, Conduit, and Ductwork:**
    - 1) **Prime Coat:** As specified for ferrous and non-ferrous metals as applicable.
    - 2) **Body Coat:** Same as finish coat.
    - 3) **Finish Coat:** Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1050 KM Professional Interior Acrylic Semi-Gloss Enamel.
4. **Factory Finished Equipment:** Satisfactorily refinish surfaces damaged before, during, or after installation as directed; use Kelly-Moore 1050 KM Professional Interior Acrylic Semi-Gloss Enamel.



5. **Finish Hardware:** Specified with USP finish under Section 087100, paint as specified for metal. Color and gloss to match doors and frames as applicable, unless otherwise specified.
  6. **Plywood Backing:** In Telephone and Electric Closets; one coat Kelly-Moore 1010 KM Professional Interior Acrylic Eggshell Enamel or 1050 KM Professional Interior Acrylic Semi-Gloss Enamel.
  7. **Protective Overspray:** On sprayed-on fireproofing; 2 coats Kelly-Moore 485 KM Professional Interior Acrylic Flat Wall Paint.
  8. **Stair Nosings:**
    - a. **General:** On top and bottom nosing of each run, paint 2-inch-wide stripe parallel to and not more than one inch from edge.
    - b. **Application:** Type and number of coats recommended by paint manufacturer for durability and slip-resistance on applicable type substrate; contrasting color as selected.
- H. **Pipe Identification:**
1. **General:** Per ANSI A13.1; buried pipe, electrical conduit, and pipe in concealed spaces such as furred spaces and shafts not included.
  2. **Color Scheme:** ANSI Z53.1 in combination with legend and flow markers; intermittent displays. Locale and space as specified for legend and flow markers. Safety colors as specified under applicable mechanical Section.
  3. **Legend:** Stencil letters of colors, type, and sizes per ANSI A13.1. Tags for identification of pipes less than 3/4-inch overall outside diameter, including valves and fittings; provided under applicable mechanical Section.
  4. **Flow Markers:** Provide each type with appropriate size arrows to indicate flow direction in pipe; same color as legend.
  5. **Visibility:** Locate legend and flowmarkers for easy visibility from operating floor; space not over 20 feet with at least one per room.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. **Manufacturer's Instructions:** Prepare substrates, apply primers and apply the work, including components and accessories in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified. Examine the areas to receive the Work and remedy detrimental conditions.

#### **3.2 SURFACE PREPARATION**

- A. **General:** Remove scale, dirt, dust, grit, rust, wax, grease, efflorescence, loose material, and other foreign matter detrimental to proper adhesion of paint.
- B. **Cementitious Surfaces:**

1. **General:** Repair minor cracks and holes; roughen when necessary to assure good adhesion.
  2. **Alkali Conditions:** Test surfaces for presence of alkali. If present, neutralize as recommended by paint manufacturer, after drying remove precipitate by brushing. Do not paint if PH is above 12.
- C. **Gypsum Board:**
1. **Narrow, Shallow Cracks and Small Holes:** Fill with spackling compound.
  2. **Deep, Wide Cracks and Deep Holes:** Rake out, dampen with clear water, and fill with thin layers of gypsum board joint compound.
  3. **Curing:** Allow to dry.
  4. **Sanding:** Sand smooth after drying; do not raise nap of paper on gypsum board.
- D. **Metals:**
1. **Chipped or Abraded Areas in Shop Coatings:** Touch-up using appropriate primer.
  2. **Galvanized Surfaces:** Apply a wash coat of Jasco's Prep 'n' Prime. Allow to dry completely.
  3. **Stainless Steel:** Scarify surfaces before applying prime coat.
- E. **Cement Plaster:**
1. **Fill cracks and irregularities with Portland cement grout or patching mortar to provide uniform surface texture.**
  2. **Surfaces shall not be painted until they have completely cured and have a stabilized moisture content, but in no case less than 30 days from completion of surface.**
- F. **Wood:**
1. **General:** If required, sandpaper surfaces smooth before applying primer. Thoroughly clean knots; apply thin coat of knot sealer over surfaces shown to receive opaque finish.
  2. **Back Priming:** Back prime surfaces installed against cementitious surfaces; give particular attention to sealing cross-grained surfaces.
  3. **Puttying:**
    - a. **General:** Fill nail holes, cracks, and other depressions flush with putty after prime coat application. Allow putty to dry; sandpaper smooth before applying body coat.
    - b. **For Opaque Finish:** Linseed oil type putty.

- G. **Old Work:** Sand, wire brush, or scrape painted surfaces to remove loose, scaling paint and to reduce gloss. Wash soiled surfaces.
- H. **Protection:**
  - 1. **General:** Properly protect floors and other adjacent work by drop cloths or other suitable coverings. In areas scheduled for painting, maintain wrappings and factory-applied protection provided by other trades.
  - 2. **Hardware and Other Obstructions:** Remove or protect factory finished items such as hardware, plates, lighting fixtures, grilles, and similar items placed prior to painting. Reposition or remove protection upon completion of each space. Equipment adjacent to surfaces requiring paint disconnected, moved, reset, and reconnected by respective trades.
  - 3. **Fire Precautions:** At end of each work day, place in metal containers or remove from premises, solvent soaked cloths, waste, and other materials which constitute a fire hazard.
- I. **Moisture Content:** Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer.

### 3.3 APPLICATION

- A. **General:** Apply paint per manufacturer's instructions and as specified. Thoroughly stir paint and keep at uniform consistency during application. Apply paint evenly, free from drops, ridges, waves, laps, and brush marks; finished surface uniform in sheen, color, and texture. Apply succeeding coats to unscarred and completely integral base coats; slightly vary color of undercoats to distinguish them from preceding coat. Allow sufficient time between coats to assure proper drying. Sandpaper smooth interior finishes between coats.
- B. **Prime Coat:** Do not thin primers in excess of manufacturer's printed directions. Apply by brush, unless otherwise specified, within 8 hours after cleaning.
- C. **Body and Finish Coats:** Do not thin; apply by brush, roller or spray.
- D. **Drying Time:** Comply with recommendations of product manufacturer for drying time between succeeding coats.
- E. **Moldings and Ornaments:** Leave clean and true to details with no undue amount of paint in corners and depressions.
- F. **Edges of Paint:** Where adjoining other materials or colors, make clean and sharp with no overlapping.
- G. **Refinishing:** Refinish entire wall where portion of finish is deemed not acceptable.
- H. **Precaution:** Do not paint over fusible links, UL labels, or sprinkler heads.
- I. **Exposed Plumbing and Mechanical Items:** Finish items without factory finish such as conduits, pipes, access panels, and items of similar nature to match adjacent wall and ceiling surfaces, unless otherwise directed.

### 3.4 CLEANING

- A. General: Touch up and restore finish where damaged. Remove spilled, splashed, or spattered paint from surfaces. Do not mar surface finish of item being cleaned.
- B. Storage Space: Leave clean and in condition required for equivalent spaces in Project.

END OF SECTION

**SECTION 10 22 33**

**ACCORDION FOLDING PARTITIONS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Manually operated, accordion folding partitions.

**1.3 DEFINITIONS**

- A. STC: Sound Transmission Class.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Design accordion folding partitions, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Seismic Performance: Accordion folding partitions shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Acoustical Performance: Provide accordion folding partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
  - 1. Sound-Transmission Requirements: Accordion folding partition assembly tested in a laboratory for sound transmission loss performance according to ASTM E 90, calculated according to ASTM E 413, and rated for not less than the STC value indicated.
  - 2. Acoustical Performance Requirements: Installed accordion folding partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for STC 50.

**1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Indicate storage and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

2. Indicate facing-material seam locations if any.
- C. Samples for Initial Selection: For each type of exposed material, facing material, and finish indicated.
1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed material, facing material, and finish indicated, prepared on Samples of size indicated below:
1. Textile: Full width by not less than 36-inch-long section of [fabric] [carpet] from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
  2. Facing Material: Manufacturer's standard-size unit, not less than 3 inches square.
  3. Edge Material: Not less than full width by 3 inches long.
  4. Hardware: Manufacturer's standard exposed door-operating device.
- E. Delegated-Design Submittal: For accordion folding partitions indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.
1. Design Calculations: Calculate requirements for seismic restraints.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Suspended ceiling components.
  2. Structural members to which suspension systems will be attached.
  3. Size and location of initial access modules for acoustical tile.
  4. Items penetrating finished ceiling, including the following:
    - a. HVAC ductwork, outlets, and inlets.
    - b. Speakers.
    - c. Sprinklers.
    - d. Smoke detectors.
- B. Qualification Data: For Installer.
- C. Seismic Qualification Certificates: For accordion folding partitions, accessories, and components, from manufacturer.
- D. Product Certificates: For each type of accordion folding partition, from manufacturer.
- E. Material Certificates: For each textile dye lot, signed by manufacturers.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each accordion folding partition.
- G. Field quality-control reports.
- H. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. **Operation and Maintenance Data:** For accordion folding partitions to include in maintenance manuals. In addition to items specified in Division 01, include the following:
  - 1. Facing materials and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
  - 2. Seals, hardware, track, carriers, and other operating components.

1.8 QUALITY ASSURANCE

- A. **Installer Qualifications:** An employer of workers trained and approved by manufacturer.
- B. **Fire-Test-Response Characteristics:** Provide partitions with finishes meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. **Surface-Burning Characteristics:** As determined by testing per ASTM E 84.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.

1.9 PROJECT CONDITIONS

- A. **Field Measurements:** Verify actual dimensions of accordion folding partition openings by field measurements before fabrication.

**PART 2 - PRODUCTS**

2.1 ACCORDION FOLDING PARTITION

- A. **Product:** Panelfold "Scale 12", or equal as approved by the District.
- B. **Accordion Folding Partition:** Accordion folding frame with hinged sections designed for horizontal extension and retraction, covered with decorative facing material, reinforced for hardware attachment, supported by overhead suspension system, and equipped with manufacturer's standard air-release method to prevent billowing.
- C. **Facing Material:** Tek-Wall 1000 Panel Fabrics and Woventex Panel Fabrics, or equal, as acceptable to the District.
  - 1. **Color/Pattern:** As selected by College of Marin's Representative from manufacturer's full range.

2.2 COMPONENTS

- A. **Posts and Seals:** Provide types of posts and seals that produce accordion folding partitions complying with performance requirements.

1. Posts: Steel or aluminum; formed with deep-nesting and interlocking interfaces and fabricated to ensure rigidity of accordion folding partition.
  2. Perimeter Seals: Manufacturer's standard vinyl, neoprene, or woven silica vertical seals, horizontal top and bottom seals, and closures for lead posts and jams.
- B. Hardware: Manufacturer's standard manually operated pulls, latches, locks, and bolts as required to operate accordion folding partitions; with decorative, protective finish.
- C. Trim: Manufacturer's standard with decorative, protective finish.
- D. Tiebacks: As required to maintain accordion folding partitions in stacked position; with manufacturer's standard finish.

### 2.3 SUSPENSION SYSTEMS

- A. Suspension Tracks: Steel or aluminum designed for type of operation, size, and weight of accordion folding partition indicated. Size track to support partition operation and storage without damage to suspension system, accordion folding partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
1. Track: Surface mounted.
    - a. Head Closure Trim: Integral with track for protecting overhead surfaces; with factory-applied, decorative, protective finish.
  - B. Carriers: Trolley system as required for size and weight of partition and for easy, quiet operation; with six-wheel ball-bearing carriers at lead post and two-wheel ball-bearing carriers at intermediate panel supports.
    1. Wheels: Manufacturer's standard.
  - C. Track Switches and Accessories: Manufacturer's standard switches as required for type of operation, storage, track configuration, and layout indicated.
  - D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.

### 2.4 WOOD MATERIALS, GENERAL

- A. Accordion Folding Partitions are made from high density particle board.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of accordion folding partitions.



- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by accordion folding partition manufacturer's written installation instructions. Install accordion folding partitions level and plumb, with tight joints and uniform appearance, and free of deformation and surface and finish irregularities.
- B. Install accordion folding partitions and accessories after other finishing operations, including painting, have been completed.

### 3.3 ADJUSTING

- A. Adjust accordion folding partitions to operate smoothly, without warping or binding. Lubricate hardware and other moving parts.
- B. Adjust storage pocket doors to operate smoothly and easily, without binding or warping. Check and readjust operating hardware. Confirm that latches and locks engage accurately and securely without forcing or binding.

### 3.4 CLEANING

- A. Clean soiled surfaces of accordion folding partitions, to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train College of Marin's maintenance personnel to adjust, operate, and maintain accordion folding partitions.

END OF SECTION

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**SECTION 10 26 00**

**WALL AND DOOR PROTECTION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Corner guards.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each type of wall and door protection showing locations and extent.
  - 1. Include plans, elevations, sections, and attachment details.
- C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.
  - 1. Include Samples of accent strips and accessories to verify color selection.
- D. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
  - 1. Corner Guards: 12 inches long.

**1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
  - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
  - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
  - 2. Keep plastic materials out of direct sunlight.
  - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
    - a. Store corner-guard covers in a vertical position.

## PART 2 - PRODUCTS

### 2.1 CORNER GUARDS

- A. Surface-Mounted, Polycarbonate Corner Guards: Nystrom "Lexan CGLS-2-S-D" Corner Guards, or equal, as approved by the District.
  - 1. Material: Clear polycarbonate.
  - 2. Mounting: Surface.
  - 3. Mounting Method: Mechanical.
  - 4. Size: 2" wing, 48" height.
  - 5. Length: As required for application.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
  - 1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. **Installation Quality:** Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

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**SECTION 10 28 00**

**TOILET ACCESSORIES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:

- 1. Washroom accessories.
- 2. Door hook for office doors.

- B. Related Sections:

- C. Coordination:

- 1. Contractor shall provide thicker partitions where recessed accessories are indicated to be installed.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include the following:

- 1. Construction details and dimensions.
- 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- 3. Material and finish descriptions.
- 4. Features that will be included for Project.
- 5. Manufacturer's warranty.

- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

- 1. Identify products using designations indicated.

**1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

**1.5 QUALITY ASSURANCE**

- A. **Source Limitations:** For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 1.6 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. **Stainless Steel:** ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. **Fasteners:** Screws, bolts, and other devices of same material as accessory unit and lamper-and-theft resistant where exposed, and of galvanized steel where concealed.

#### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. **Schedule:** The following products are listed as the Basis of Design. Provide the following, or equal as approved by the District. Finishes to be stainless steel with brushed finish, unless otherwise noted.
  1. **Grab Bars:** Bobrick B-6806. 1 ½ in. diameter grab bars with snap flange. Length as shown.
  2. **Seat Cover:** Safe-T-Guard ½ Fold Seat Cover Dispenser 57710 White
  3. **Sanitary Napkin Disposal:** Bobrick B-270 Contura Series Surface-Mounted Sanitary Napkin Disposal.
  4. **Toilet Paper Dispenser:** JRT Combination Tissue Dispenser, 09551 Smoke
  5. **Mirror:** Bobrick B-165 2436. Mirror with Stainless Steel Channel Frame.
  6. **Soap Dispenser:** Bobrick B4112 Contura Series. Surface-Mounted Soap Dispenser
  7. **Paper Towel Dispenser:** Bobrick B-262. Classic Series Surface-Mounted Paper Towel Dispenser.
  8. **Waste Receptacles:** B-2250 Floor Standing Stainless Steel Waste Receptacle
  9. **Hook:** Sugatsune Item No. EU-50. Type 316 stainless steel fork hook.

#### 2.3 FABRICATION

- A. **General:** Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.



- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to College of Marin Representative.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf , when tested according to ASTM F 446.

#### **3.2 ADJUSTING AND CLEANING**

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

**END OF SECTION**

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## SECTION 11 31 00

### APPLIANCES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes:
  - 1. Appliances and service equipment, to be furnished by the Contractor and installed by the Contractor (CFCI).
  - 2. Appliances and service equipment, to be furnished by the Owner (District) and installed by the Contractor (DFCI); included for information.
- B. Related Requirements:
  - 1. Architectural Wood Casework: Section 06 41 00.
  - 2. Rough-in and Connection of Plumbing, Mechanical, and Electrical Services as Required for Operation: Divisions 22, 23, and 26.

##### 1.02 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures:
  - 1. Action Submittals shall be submitted in accordance with Section 01 3000, "Submittals."
  - 2. Closeout Submittals shall be submitted in accordance with Section 01 7836, "Warranties," and Section 01 7839, "Project Record Documents."
- B. Coordination:
  - 1. Coordinate sequence of installation with work of other Sections.
  - 2. Coordinate location and placement of utilities for appliances and equipment.
  - 3. Coordinate fabrication of casework to receive build-in microwave oven with Section 06 41 00 "Architectural Wood Casework."

##### 1.03 ACTION SUBMITTALS

- A. Product Data: Manufacturer's catalog cuts of equipment with model numbers and optional accessories to be provided clearly marked.

##### 1.04 CLOSEOUT SUBMITTALS

- A. Service agreement.
- B. Warranties as specified.

##### 1.05 MAINTENANCE

- A. Service: Provide any required servicing on appliances for period of 3 months after installation during regular working days at no cost to the Owner.

##### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

- B. **Source Limitations:** Obtain appliances from single source and each type of appliance from single manufacturer.
- C. **Regulatory Requirements:** Comply with the following:
  - 1. **NFPA:** Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. **ANSI:** Provide gas-burning appliances that comply with ANSI Z21 Series standards.
  - 3. **Energy Ratings:** Provide energy guide labels with energy cost analysis (annual operating costs) and efficiency information as required by Federal Trade Commission.
  - 4. **UL Standards:** UL labels required.
- D. **Accessibility:** Where residential appliances are indicated to comply with accessibility requirements, comply with the ADA "Guidelines for Accessible Design."

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver appliances in manufacturer's undamaged protective containers, after spaces are ready to receive them.
- B. Comply with additional requirements specified in Section 01 66 00 "Product Delivery Storage and Handling."

### 1.08 WARRANTY

- A. **Warranties:** Furnish District with manufacturer's standard form warranties in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period except as qualified below:
  - 1. **Electric Ranges:** Full 5-year warranty including parts and labor.
  - 2. **Microwave Oven:** Full 5-year warranty including parts and labor.
  - 3. **Refrigerator Sealed System:** Full 5-year warranty including parts and labor.
    - a. **Sealed Refrigeration System:** Full 5-year warranty including parts and labor.
    - b. **Other Components:** Full 2-year warranty including parts and labor.

## PART 2 - PRODUCTS

### 2.01 APPLIANCES AND EQUIPMENT

- A. **District Furnished and Contractor Installed Appliances (OFICI):**
  - 1. The following appliances will be furnished by the District for installation by the Contractor at locations shown on the Drawings:
    - a. Not Used
- B. **Contractor Furnished and Contractor Installed Appliances (CFCI):**
  - 1. **General:**
    - a. Where model numbers scheduled are not current, provide equal features on a current model as acceptable to the District.
    - b. The color of all appliances will be stainless steel, except as otherwise noted.
    - c. Selected ENERGY STAR qualified appliances, office equipment and electronics for at least 50 percent (by rated-power) of equipment installed as part of the scope of work.
  - 2. The following appliances will be furnished by the Contractor for installation by the Contractor at locations shown on the Drawings:
    - a. Refrigerator: GE Series ENERGY STAR 11.6 CU Top-freezer refrigerator. GPE12FGK/KWW

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Comply with manufacturer's written instructions.
- B. Locate utilities in accordance with appliance layout shown and connection locations on each appliance and item of equipment.
- C. Connection materials and their installation, not typically included as part of an appliance installer's scope of work and required for the proper installation and operation of the appliances, shall be included as part of the Work of this Contract. Insulate sufficiently to prevent electrolysis between dissimilar metals.
- D. Provide shut-off valves, electrical outlets, capped exhaust ducts, and other items for operation of equipment in accordance with manufacturer's instructions, governing authorities, as shown, and specified.
- E. Built-in Equipment:
  - 1. Securely anchor units to supporting cabinets or countertops with concealed fasteners.
  - 2. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- F. Freestanding Equipment:
  - 1. Place units in final locations after finishes have been completed in each area.
  - 2. Verify that clearances are adequate to properly operate equipment.
- G. Utilities: Comply with plumbing and electrical requirements.
- H. Not Used
- I. Adjust installed equipment to operate in manner satisfactory to Architect.

#### **3.02 FIELD QUALITY CONTROL**

- A. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. **Tests and Inspections:**
  - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
  - 2. **Leak Test:** After installation, test for leaks. Repair leaks and retest until no leaks exist.
  - 3. **Operational Test:** After installation, start units to confirm proper operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- C. An appliance will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

**SECTION 12 24 13**  
**ROLLER WINDOW SHADES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

1. Manually operated roller shades with single and double rollers.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.  
2. Section 07 92 00 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

**1.3 ACTION SUBMITTALS**

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 10 inches square. Mark interior face of material if applicable.  
2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long for each type of roller shade indicated.  
3. Installation Accessories: Full-size unit, not less than 10 inches long.

E. Product Schedule: For roller shades.

1.4 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For Installer.
- B. **Product Certificates:** For each type of shadeband material.
- C. **Product Test Reports:** For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. **Operation and Maintenance Data:** For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. **Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.**
  - 1. **Roller Shades:** Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** Fabricator of products.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. **Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.**

1.9 FIELD CONDITIONS

- A. **Environmental Limitations:** Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. **Field Measurements:** Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify College of Marin Representative of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. **Source Limitations:** Obtain roller shades from single source from single manufacturer. **Basis of Design:** Hunter Douglass RB 500 recessed pocket ceiling mount.

### 2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. **Chain-and-Clutch Operating Mechanisms:** With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. **Bead Chains:** Stainless steel.
    - a. **Loop Length:** Full length of roller shade.
    - b. **Limit Stops:** Provide upper and lower ball stops.
    - c. **Chain-Retainer Type:** Clip, jamb mount.
- B. **Rollers:** Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
- C. **Mounting Hardware:** Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- D. **Roller-Coupling Assemblies:** Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. **Shadebands:**
  - 1. **Shadeband Material:** Light-filtering fabric.
  - 2. **Shadeband Bottom (Hem) Bar:** Steel or extruded aluminum covered with shadeband material.
- F. **Installation Accessories:** Installation type as shown on Drawings.

### 2.3 MANUALLY OPERATED SHADES WITH DOUBLE ROLLERS

- A. **Chain-and-Clutch Operating Mechanisms:** With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. **Bead Chains:** Stainless steel.
    - a. **Loop Length:** Full length of roller shade.
    - b. **Limit Stops:** Provide upper and lower ball stops.
    - c. **Chain-Retainer Type:** Clip, jamb mount.
- B. **Rollers:** Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands

indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. **Double-Roller Mounting Configuration:** Offset, outside roller over and inside roller under.
  2. **Shadeband-to-Roller Attachment:** Manufacturer's standard method.
- C. **Mounting Hardware:** Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- D. **Roller-Coupling Assemblies:** Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. **Inside Shadebands:**
1. **Shadeband Material:** Light-filtering fabric.
  2. **Shadeband Bottom (Hem) Bar:** Steel or extruded aluminum.
    - a. **Type:** Enclosed in sealed pocket of shadeband material.
- F. **Outside Shadebands:**
1. **Shadeband Material:** Light-blocking fabric.
  2. **Shadeband Bottom (Hem) Bar:** Steel or extruded aluminum.
    - a. **Type:** Enclosed in sealed pocket of shadeband material.
- G. **Installation Accessories:** Provide installation type as shown on Drawings.

## 2.4 SHADEBAND MATERIALS

- A. **Shadeband Material Flame-Resistance Rating:** Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. **Light-Filtering Fabric:** Woven fabric, stain and fade resistant.
1. **Basis of Design:** Hunter Douglass "GreenScreen Evolve", or equal, as approved by the District. Color to be selected by College of Marin Representative. 3% openness.
  2. **Type:** 100% fiberglass.
  3. **Weave:** Basketweave.
- C. **Light-Blocking Fabric:** Opaque fabric, stain and fade resistant.
1. **Basis of Design:** Hunter Douglass "Avila Twilights", or equal, as approved by the District. Color to be selected by College of Marin Representative. 0% openness.
  2. **Type:** 100% polyester with acrylic foam backing.

## 2.5 ROLLER SHADE FABRICATION

- A. **Product Safety Standard:** Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

- B. **Unit Sizes:** Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
  - 1. **Between (Inside) Jamb Installation:** Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
- C. **Shadeband Fabrication:** Fabricate shadebands without battens or seams to extent possible, except as follows:
  - 1. **Vertical Shades:** Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
  - 2. **Railroaded Materials:** Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 ROLLER SHADE INSTALLATION**

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. **Opaque Shadebands:** Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

#### **3.3 ADJUSTING**

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

#### **3.4 CLEANING AND PROTECTION**

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

- C. Replace damaged roller shades that cannot be repaired, in a manner approved by College of Marin Representative, before time of Substantial Completion.

END OF SECTION

**SECTION 21 13 13**  
**Fire Sprinkler System**

**PART 1 - GENERAL**

**1.01 APPLICABLE REQUIREMENTS**

- A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 01 - General Requirements, and other Sections in Division 21 specified herein.

**1.02 DEFINITIONS**

- A. Pipe sizes used in this Section are nominal pipe size (NPS) specified in inches.
- B. Working plans as used in this Section refer to documents (including drawings and calculations) prepared pursuant to requirements in NFPA 13 for obtaining approval of authority having jurisdiction.
- C. NICET - National Institute For Certification In Engineering Technologies
- D. Other definitions for fire protection systems are included in referenced NFPA standards.

**1.03 DESCRIPTION OF WORK**

- A. The work includes the design and construction of a complete and fully operable automatic sprinkler system as described in this Section of the Specification and as shown on the contract construction drawings and shall be in accordance with rules, regulations and standards as required by the following authorities having jurisdiction. There shall be one wet sprinkler system and one Pre-action sprinkler system installed.
  - 1. State having jurisdiction.
  - 2. City having jurisdiction.
  - 3. Building Department.
  - 4. Fire Prevention Division, Fire Marshal's Office.
- B. Work to be in accordance with criteria of the following design and installation standards:
  - 1. National Fire Protection Association.
    - a. No. 13 - Sprinkler Systems, 2016
    - b. No. 14 - Standpipes & Hose Systems. 2013
    - c. No. 70 - National Electrical Code.
    - d. No. 101-Life Safety Code.
  - 2. Underwriters Laboratories, Inc.
  - 3. Industrial Risk Insurance Underwriters.
  - 4. Owner's insurance agency.
- C. Work includes but is not limited to the following:
  - 1. Automatic Wet Type Sprinkler System.
  - 2. Provide all pipe, fittings, sprinklers, valves, signs, flow switches, tamper switches, protective painting, test connections, drains and tests necessary to make the entire system complete and operative.
  - 3. Coordinate with plumbing contractor for capacity of all sprinkler main, test, and auxiliary drain connections.
  - 4. Valve tags and instruction plates shall be mounted and/or hung per local fire department requirements.
  - 5. All sleeves and inserts.

#### 1.04 SUBMITTALS

- A. **Product Data:** Submit electronic PDF copy of manufacturer's technical data and installation instructions for fire protection materials and products.
1. Thirty days after the awarding of contract, contractor shall submit list of manufacturer's names and model numbers for review and comment to architect. This list shall identify any prior approved substituted items contractor wishes to use. Do not submit technical data until list has been approved. This is mandatory.
  2. Prior to construction submit for review and comment items including but not be limited to the following:
    - a. Coordinated layout drawings. Lettering shall be minimum 1/8" high.
    - b. Sprinklers and escutcheons - designating area of use.
    - c. Valves, valve boxes, flow switches, and tamper switches.
    - d. Provide Fire Marshal approval numbers for flow switches and tamper switches.
    - e. Pipe, fittings, sway bracing, inserts, anchors and hangers.
    - f. Inspector's test and drain station.
    - g. Fire department connections.
- B. **Working Plans:** Prepare scaled working plans for fire protection pipe and fittings including, but not necessarily limited to, pipe and tube sizes, locations, and elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Indicate interface between and spatial relationship to piping and adjacent equipment.
1. Spacing of fire sprinklers shall be coordinated with lights, air conditioning outlets, sound speakers, architectural reflected ceiling plan; obstruction from light fixtures and other architectural features; and sprinkler piping shall be coordinated with HVAC ductwork & piping, plumbing, electrical conduit, cable trays and structure prior to the installation. Drawings shall be composite type including mechanical, plumbing and lighting equipment with sprinkler and sprinkler drain piping.
- C. **Submittal Drawings:** Submit shop drawings to Agency having jurisdiction for approval bearing engineer of record stamp bearing preparer's C-16 Stamp licensed. Submit six approved copies, bearing stamp and/or signature of authority having jurisdiction to the Engineer for review and comment.
1. Contractor shall submit sprinkler head locations to architect for approval.
  2. Each calculation shall include legible schematic of system showing all hydraulic reference points.
- D. **Hydraulic Calculations:** Prepare hydraulic calculations of fire protection systems. Submit to authority having jurisdiction for approval. Submit six approved copies, bearing stamp, and/or signature of Agency having jurisdiction to Owner's representative for review and comment.
1. Contractor shall submit published piping friction loss data from manufacturer with hydraulic calculations.
- E. **Certificate of Installation:** Submit certificate upon completion of fire protection piping work, which indicates that work has been tested in accordance with NFPA 13, and also that system is operational, complete, and has no defects.
- F. **Maintenance Data:** Submit maintenance data and parts lists for fire protection materials and products. Include this data, product data, shop drawings, approval drawings, approval calculation, certificate of installation, and record drawings in maintenance manual; in accordance with requirements of the General Conditions and of Division 01.
- G. **Operating and Maintenance Instructions:** Provide the Owner with three sets of operating and maintenance instructions covering completely the operation and maintenance of sprinkler equipment and controls.

#### 1.05 DESIGN DESCRIPTION

- A. This section of the specification combined with any of the contract drawings are intended as a guide to establish a basis of design for the systems required.

- B. Contractor shall examine the Architectural, Interior Design, Structural, Mechanical and Electrical drawings, layout and install a completely hydraulically sized sprinkler system for all areas. Space shall be provided for any valves and equipment to be used.
  - 1. System shall start 1'-0" above finish floor grade. Fire main beyond 5'-0" perimeter is provided under Division 33 work.
- C. Office Areas: The main building shall be served with a wet type sprinkler system. A main riser shall be located as noted on Civil plans.
- D. File Storage 101 room shall have a Pre-Action (Double Interlock) fire sprinkler system.
- E. Base Building construction shall include upright heads with areas with no ceiling. Areas with ceilings, including finished core areas, lobbies, corridors or as noted herein shall have uprights above ceilings areas and recessed pendent heads installed as part of the base building construction. Unfinished areas shall be provided with upright type heads.
- F. Pressure restricting devices shall be installed on any branch outlet exceeding 100 PSI.
- G. All electrical devices used for this system shall be compatible with the fire alarm system, refer to Division 26.
- H. Seismic Requirement: All automatic sprinkler systems to be seismically braced (for CA).  
Seismic Requirement: All automatic sprinkler and standpipe system to be seismically braced and anchored for CBC Seismic Zone.
  - 1. Do not use NFPA Earthquake Zone Chart.

#### **1.06 HYDRAULIC DESIGN CRITERIA**

- A. System shall be a straight line or gridded system per NFPA No. 13 with the following exceptions:
  - 1. For all systems the design area shall be the hydraulically most demanding rectangular area.
  - 2. Minimum pressure for any sprinkler head shall not be less than 7 psi.
- B. Total Combined Inside & Outside Hose Allowances: Hydraulic calculations shall include an allowance for hose streams, added at the point of connection to the water supply.
- C. Safety Factor: 10 Psi, or 10 percent of static and residual pressure, whichever is greater to be used if current water flow within Six month is provided
- D. Office Areas, Restrooms, Employee Breakroom, Customer Lounge Area, Mezzanine, Server Room and other Light Hazard Areas: Light Hazard Classification: Water density of 0.10 GPM per square foot calculated for an area of 1500 square feet in the most remote location.
- E. Mechanical Mezzine, Storage Area: Ordinary Group I Hazard Classification: Water density of .15 GPM per square foot calculated for an area of 1500 square feet in the most remote location.
- F. Maximum floor areas protected by any one sprinkler system riser:
  - 1. Light Hazard: 52,000 sq.ft.
  - 2. Ordinary Hazard: 52,000 sq.ft.
  - 3. Extra Hazard: 40,000 sq. ft.
- J. Flow Data: Standard Water Information. Contractor is to verify flow data (static pressure, residual pressure and GPM flowing) available at site and provide design for available pressure and flow with one year.

#### **1.07 RELATED WORK SPECIFIED ELSEWHERE**

- A. Division 26: Electrical. Coordinate for electrical wiring of detectors, flow alarm switches, tamper switches, fire alarm bell, for electrical wiring of fuel oil and water tank level alarms, connection by life safety section for remote monitoring and starting of fire pump, and power to fire pumps as applicable. All electrical devices used for this system shall be compatible with the fire alarm system. Coordinate with electrical for electric fire pump motor size and emergency generator sizing.

- B. Division 09: Finishes.
- C. Division 02: Existing Conditions. Coordinate with General Contractor for excavation for the underground water supply system.

#### 1.08 QUALITY ASSURANCE

- A. The Contractor for the fire protection installation shall be duly qualified Fire Protection Contractor, experienced and regularly engaged in the installation of fire protection systems with a license classification of C-16. Where local authorities require additional licensing of the Fire Protection Contractor, and/or workmen, such a license shall be mandatory for a prospective Contractor.
  - 1. Contractor is to verify flow data (static pressure, residual pressure and GPM flowing) available at site and provide design for available pressure and flow.
  - 2. The Fire Protection contractor shall be the Engineer of Record for the automatic sprinkler system.
  - 3. Permits - The Fire Protection Contractor shall obtain permits for the installation or construction as required for approval and installation of the fire protection system. The Fire Protection Contractor shall submit working plans to the authorities having jurisdiction to obtain approval.

#### 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01. Handle components carefully to prevent damage, denting, and scoring. Do not install damaged components. Damaged components shall be replaced with new components.
- B. Store/protect products under provisions of Division 01. Store components in clean, dry place. Protect from weather, dirt, water, construction debris, and physical damage.

#### 1.10 GUARANTEE

- A. Provide a one-year (12 months) guarantee under provisions of Division 01. The guarantee shall include parts, shipping, labor, travel costs, living expenses, required fees, and any other associated cost or expense to repair or replace products or systems. The guarantee period is to begin on the date of acceptance of the fire protection installation by the Owner.

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. All products to be commercial grade, new and of the manufacturer's latest design model. Products manufacturers outside of North America will not be accepted without written approval from engineer prior to submission of bid.
- B. All products to be UL listed and/or FM approved, except for items, which are not required to be listed by code.
- C. All products shall be delivered and stored in original containers. Containers shall be clearly marked or stamped with manufacturer's name and rating.

#### 2.02 PIPE AND FITTINGS - ABOVE GROUND

- A. General: The piping products listed below by manufacturer's name and model numbers are the only acceptable materials listed for this project. Substitutions of pipe must be submitted and approved in writing by the architect prior to bid. No copper pipe shall be allowed in the wet fire sprinkler system.
- B. Piping or fittings that show substantial rust or breaks in coating will be removed and replaced.
- C. Allied Tube & Conduit: Schedule 40 black steel, 40/Dyna-Thread, ASTM A-135 stamped on pipe, Stockham, Grinnell or Warwick Class 150 threaded malleable, ASTM A197, ASTM A126,
- D. Allied Tube: Scheduled 10 black steel pipe, ASTM A-135 stamped on pipe, Dyna-Flow / Super Flo, ASTM A-795 Type E, Grade A.



- E. Shop-weld thread-o-lets may be used in lieu of tee fittings, but field (site) welding will not be permitted.
- F. Mechanical Couplings: Victaulic grooved couplings style 07, 75 or 77, or equal by Gruvlok.
- G. Mechanical Tees: Victaulic style 920, Gruvlok. U-bolt mechanical tees are not acceptable.
- H. Flexible sprinkler connector for sprinkler application: VicFlex Sprinkler Fittings or equal Factory Mutual approved system.
- I. Use rigid couplings where flexibility is not required or provide necessary sway bracing.
- J. All Grooved pipe shall be rolled grooved ends.
- K. Prohibited Piping and Fittings: Copper pipe, CPVC pipe, "Fireflow", XL, "Eddylite" by Bullmoose pipe are not allowed. POZ-LOK, U-bolt Victaulic style 921 mechanical tees, Victaulic style 99 Roust-A-Bout, Victaulic style 90 Plainlock, Hooker style fitting, quick disconnect, boltless, snap-joint, field drilling or welding of any main or branch lines, and any device specifically prohibited by the local authority having jurisdiction is not allowed. No unions shall be permitted for any size pipe. Plain end fittings are not allowed.

### 2.03 PIPE AND FITTINGS - UNDERGROUND

- A. Class 52 ductile iron pipe and fittings, white, cement lined, mechanical or Tyton joint fittings. Piping to be factory encased with 8 mil polyethylene tube or sheet. Fittings to be double field wrapped with 2" wide, 20 mil vinyl tape, 50% overlap.
- B. Manufacturer: United States Pipe and Foundry, Griffin or Pacific States, only.
- C. All underground piping for fire mains shall be installed, clamped, anchored, flushed and hydrostatically pressure tested according to the requirements of the authorities and/or agencies having jurisdiction, and NFPA Pamphlets Nos. 13 and 24 and F. M. Handbook of Industrial Loss Prevention.
- D. Anchor underground riser stub to nearest underground connection by means of rodding. Retaining glands with setscrews above grade are not allowed.

### 2.04 UNDERGROUND PIPE COATING:

- A. All underground ferrous piping shall be covered with:
  - 1. Either two coats of 10 Mill Scotch Wrap No. 51, or with;
  - 2. "XTRU-COAT" prefabricated extruded cover with joints sealed with two coats of 10 Mill Scotch Wrap #51.
  - 3. Or approved equal.

### 2.05 THRUST BLOCKS

- A. Provide thrust blocks at changes in pipe direction, changes in pipe sizes, dead-end stops and at valves.
- B. Calculate area of undisturbed earth of thrust block based on actual soil conditions and water test pressure of 200 Psi.
- C. Concrete and reinforcing steel shall be as specified in Division 03 and 05. All concrete shall be Class A, unless specified otherwise.
- D. Miscellaneous nuts and bolts shall be stainless steel.

### 2.06 RODS AND CLAMPS

- A. Socket clamps shall be stainless steel; four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.
- B. Rods shall be stainless steel, 3/4" diameter.

### 2.07 SPRINKLER HEADS - GENERAL

- A. Sprinkler heads shall be regular automatic closed-type heads of ordinary degree temperature rating except that sprinkler heads installed in the vicinity of heating equipment or in special occupancy areas shall be of the temperature rating as described in NFPA No. 13.

- B. Provide quick response heads in all new light hazard occupancies.
- C. Provide corrosion-resistant sprinkler heads where they are exposed to weather, moisture or corrosive vapors.
- D. The Contractor shall furnish spare heads. The heads shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating head installed. In addition to the spare heads, the contractor shall furnish not less than two special sprinkler head wrenches. Refer to NFPA 13 section; "Stock of Spare Heads".

**2.08 SPRINKLER HEADS AND ESCUTCHEONS**

- A. Sprinkler heads installed shall be upright or pendent, as conditions require, and shall be of the following type and finish for the areas designated. Unless otherwise specified, sprinklers shall be small frame type, center bulb capsule for finished areas, fusible link for unfinished areas, and 1/2" orifice, unless otherwise required. Extended coverage sprinkler heads are not allowed.

<u>Building Area</u>	<u>Sprinkler Head</u>	<u>Sprinkler Finish</u>	<u>Escutcheon Finish</u>	<u>Temp. Deg.</u>
Unfinished & Office, Garage & Mechanical Rooms	Upright/Pendant	Brass	None	165°F
Electrical, Telephone & Switchgear Rooms	Upright	Brass	None	286°F
Finished Ceilings	Semi-recessed Pendant	Chrome	Chrome	165°F
Soffit	Flush Sidewall	White	White	165°F
Sidewall	Horizontal Sidewall	Brass	None	165°F

- B. Manufacturer: Reliable, Star, Viking, or Tyco, or Equal.

**2.09 VALVING**

- A. 1 1/2" or Smaller:
  1. Control Valve: OS&Y rising stem type gate valve bronze body, bonnet and disc, copper alloy stem, threaded ends, 175 PSI WOG min. Provide with tamper switch.
  2. Check Valve: Swing check type with bronze body, cap and disc, threaded ends, 175 PSI WOG min.
  3. Drip Valve: 3/4", cast brass automatic ball drip type, threaded ends, 175 PSI WOG min.
  4. Testing Valve: 1-1/4", test and drain, sight glass, 1/2" test orifice, lever operated, 300 psi WOG. Drain to mop sink or drain riser.
  5. Main Drain Valve: 2", angle gate valve, bronze body, copper alloy stem, threaded ends, 175 psi WOG. Drain to mop sink or drain riser.
- B. 2" or Larger:
  1. Control Valve: Butterfly valve with tamper switch, ductile iron body, nickel plated ductile iron disc, stainless steel stem and Buna-N seat, 175 PSI WOG min.
  2. Control Valve: OS&Y rising stem type gate valve, cast iron body and bonnet, bronze stem, seat and disc, flanged ends, 175 PSI WOG min. Provide with tamper switch.
  3. Check Valve: Swing check type with cast iron body, bolted cap and disc, flanged ends, 175 PSI WOG min.
  4. Manufacturer: Victaulic, Grinnell, Stockham, Milwaukee, Mueller, Kennedy, Elkart or AGF.

5. Pre-Action Valve: Victaulic Fire Lock – NXT Valve for Double Interlock system for Evidence Storage room. Victaulic Fire Lock Series 745 Firelock Fire –Pac for M.D.F / Radio Vault room.

#### 2.10 WET SPRINKLER CHECK VALVE

- A. Contractor shall provide, where required, a completely engineered vertical check valve, and trim assembly. Victaulic, Grinnell, Tyco, or Equal.

#### 2.11 UNDERGROUND WATER VALVE

- A. Resilient seated gate, valve, non-rising stem, 2" square valve nut, ductile iron construction with epoxy coated surfaces, both interior and exterior, 250 PSI, mechanical joint ends. Provide yard box and cover.
- B. Manufacture: American Darling, Clow, Dresser, or U.S. Pipe.

#### 2.12 VALVE BOXES

- A. Cast iron valve boxes for shutoff valves buried in ground shall be complete with bellbottoms, extension piece, top and cover. Boxes shall be suitable for the types of valves with which they are used. All valve boxes shall have a concrete collar flush with grade.
- B. Lids shall have the applicable letters embossed upon the top surface. Tagging shall match existing lids.
- C. Manufacturer: Tyler, ITT Grinnell, or equal.

#### 2.13 PRESSURE REDUCING VALVES

- A. Sprinkler System: Rough bronze body with red enameled hand wheel with integral check valve of the pressure reducing type. Outlet pressure shall not exceed 165 PSI at maximum system pressures. Pressure settings to be field adjustable.
  1. Manufacturer: Zum #Z-3004
- B. Fire Service: 150 class pressure rating, cast iron body with brass main valve trim, control system cast bronze with stainless steel trim
  1. Manufacturer: Cla-Val #90-21UL.

#### 2.14 PRESSURE RELIEF VALVE

- A. Provide 3/4" pressure relief valve on discharge side of Sprinkler system pressure reducing valve. Set to a maximum of 175 PSI.
  1. Manufacturer: AGF or Equal.

#### 2.15 BACKFLOW PREVENTER

- A. Provide listed backflow prevention device as required by local codes and ordinances. Backflow prevention devices installed in the vertical position shall be approved for that orientation.
- B. Double check detector check valve assembly: Epoxy coated, ductile iron construction, 175 Psig working pressure, complete with two spring loaded "Y" type check valves, "Y" strainer with hose bibb on suction side of assembly, two OS&Y gate valves, test cocks, bypass water meter and bypass doublecheck. Ames Model 3001SS, Febco #856-DCDA, Watts #709-DCDA-OSY, Wilkins #950DA or approved equal
- C. Reduced pressure backflow preventor: Ductile iron construction, 150 Psig working pressure, complete with two spring loaded "Y" type check valves, "Y" strainer with hose bibb on suction side of assembly, one differential relief valve, two OS&Y gate valves and test cocks. Unit shall be tapped on both sides to accommodate installation of test cocks. Febco #860 RPA, Wilkins #975DA, Watts #909-RPDA or approved equal.
- D. Detector check valve assemblies: Ductile iron construction, 150 psig working pressure, complete with spring loaded check valve, two OS&Y gate valves and four test cocks. Febco #800 or approved equal.

#### 2.16 INTEGRAL INSPECTORS ALARM TEST AND SYSTEM DRAIN

- A. Combination system drain and visible orifice insert/sight glass for testing system alarm; with screwed or grooved inlet and outlet connections, Malleable iron hand wheel, EPDM valve seats, maximum working pressure 300 Psi, 1/2" orifice insert, Bronze housing, UL listed and FM Approved, Victaulic TestMaster II style 720, or approved equal.
- B. Water pressure gauge, range 0-300 Psi, in 5 Psi increments, brass case - 3-1/2" diameter, 1/4" NPT male pipe connection, UL listed. Locate pressure gage on riser per code. Star Sprinkler, Ashcroft or approved equal.
- C. Pressure gauge test valve, brass 1/4" screwed ends, 300 Psi WOG. United or approved equal.
- D. All relief, main, auxiliary and equipment drains shall be routed separately to floor drain or air gap fitting (by plumbing).

#### 2.17 TAMPER SWITCHES

- A. Switch shall be mounted so as not to interfere with normal operation of the valve and be adjusted to operate when handle of valve has traveled more than one-fifth the distance of its normal operating position. Electrical Contractor shall provide conduit from switch to fire alarm panel.
- B. Housing shall be of aluminum, acid-treated, primed and finished in baked red enamel. Removal of housing shall cause switch to operate. Inside shall be single pole, double throw micro switch with connection for electrical conduit.
- C. Install on all control valves.
- D. Manufacturer: Potter-Electric, Notifier, Ellenco, or Simplex.

#### 2.18 WATER FLOW ALARM - VANE TYPE

- A. Indicator shall be for either vertical or horizontal installation. Indicator shall not be installed in a fitting that changes direction of water flow and shall have a sensitivity setting to signal any flow of water that equals or exceeds the discharge from one sprinkler head. Provide retarding device to prevent false alarms from line surges.
- B. Whenever a water flow alarm is installed in the piping system, an approved floor control valve shall be provided upstream of the alarm indicator. In addition, a drain is required downstream of the alarm indicator.
- C. Each water flow alarm shall be wired to a Fire System. All wiring and conduits as required will be provided under Division 26. An alarm will automatically activate the local fire alarm system.
- D. Manufacturer: Potter-Electric, Ellenco, Notifier, or Simplex.

#### 2.19 EXTERIOR ALARM

- A. Electric bell, 10" diameter, U.L. listed, weather-proof back box housing, 120 VAC, 99 dB at 10 FT, Potter model PBA12010 or equal.
- B. Electric Horn: Potter-Electric, Ellenco, Notifier, or Simplex weatherproof, 120 VAC.

#### 2.20 FIRE DEPARTMENT CONNECTIONS

- A. Flush wall mounted unit or freestanding unit with individual clapper valves, plugs and chains, locations as indicated on drawings. Escutcheon plate to be lettered as follows: "AUTO SPRINKLER". Unit shall be polished chrome or brass finish, mounted 36" above finished grade. Number of inlets required shall be in accordance with regulations of the Fire Marshal or local fire department.

#### 2.21 FIRE DEPARTMENT HOSE VALVES

- A. Fire Department Valves: 2-1/2" brass construction female to male angle valve with cap and chain, rough chrome finish and mounted 48" above finished floor.

- B. Pressure Reducing Fire Department Valves: 2-1/2" tamper proof, automatic pressure reducing, all brass male to female angle, rated at 400 PSI rough brass finish, mounted 48" above finished floor.
- C. Manufacturer: Croker, Elkhart, Powhattan Brass, Potter-Roemer or Zurn.

#### 2.22 POST INDICATOR VALVE

- A. Indicator post valve and indicator post. Clow # 2925 or approved equal.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. This system to be installed by an experienced firm regularly engaged in the installation of automatic sprinkler system as specified by the requirements of the Specifications.

#### 3.02 PERFORMANCE OF WORK

- A. Examine areas and conditions under which materials are to be installed. Layout the system to suit the different types of construction and equipment as indicated on the drawings and in accordance with NFPA Pamphlet No. 13, 14, 20 and 24.
- B. Work to start immediately after authorization has been given to proceed so that the overall progress of the construction is not delayed.
- C. Coordinate with other trades as necessary to properly interface components of the sprinkler system.
- D. Follow manufacturer's directions and recommendations in all cases.
- E. The omission from the drawings or Specifications of any details of construction, installation, materials, or essential specialties shall not relieve the Contractor from furnishing the same in place for a complete system.

#### 3.03 TEMPORARY FIRE PROTECTION

- A. Provide all temporary valve, piping, Siamese connections and other components as directed by the fire agency office during all phases of construction.

#### 3.04 INSTALLATION - GENERAL

- A. Fire protection system shall be installed in accordance with the approved Drawings. The finished ceiling is not to be erected until all fire protection piping has been installed, tested, and inspected. Sprinkler heads located in the electrical equipment, elevator, or similar rooms shall be furnished with deflectors to prevent water spray on equipment.
- B. Before connection to the overhead piping, all underground piping shall be flushed with water flowing at velocity and quantity required by the installation standards specified above in this Section of the Specifications.
- C. The arrangement of all pipes shall conform to all architectural requirements and field conditions, shall be as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and shall be neatly spaced. Offsets will be permitted only where required to permit the pipes to follow the walls. Standard fittings shall be used for offsets. All risers shall be erected plumb and true, shall be parallel with the walls and other pipes, and shall be neatly spaced. All work shall be coordinated with HVAC, Plumbing, Electrical and Structural work in order to avoid interference and unnecessary cutting of floors or walls. All underground or concealed work shall be inspected before the construction is closed up.
- D. All sprinkler heads to be installed in ceilings throughout the scope of work building as listed in Section 2.6. All areas without ceilings shall have rough brass upright or pendent heads as shown on drawings.
- E. Sprinkler heads in all finished areas are to be installed on a true axis line in both directions, with maximum deviation from the axis line of 1/8 inch plus or minus and shall be plus or minus 1" within center of tile. At the completion of the installation, if any heads are found to exceed the above-mentioned tolerance, they shall be removed and reinstalled.

- F. No pipes or other apparatus shall be installed so as to interfere in any way with full swing of doors.
- G. The arrangement, positions, and connections of pipes, drains, valves, etc., shall be as required by NFPA Pamphlet #13 for all areas to be sprinkler. However, the right is reserved by the Architect to change the location of any item to accommodate conditions, which may arise during progress of the work, without additional compensation for such changes provided that no additional heads are required prior to the installation of the work.
- H. Where required, piping shall be installed concealed in building construction, or through steel beams, to obtain adequate head room.
- I. All pipe throughout the job shall be reamed smooth before being installed. Pipe shall not be split, bent, flattened, or otherwise injured either before or during installation.
- J. Provide protective pans under pipes passing over high voltage electrical bus duct or switchgear equipment. The pan shall be constructed of 12 gauge black iron with a 6 inch lip, the corners being welded to make the pans watertight. Each pan shall be given three coats of Rust-Oleum paint and shall be supported by pipe hangers. The pan shall drain clear of the bus duct or switchgear.
- K. All pipe interiors shall be thoroughly cleaned of foreign matter before installation, and shall be kept clean during installation by plugging or other approved means. Piping shall be covered with visqueen during storage. Piping that shows signs of rusting will be removed from job site and replaced.
- L. Field Connections: Any modifications to system required by field conditions, physical equipment changes or compliance with code regulations shall be made promptly without cost to Owner.
- M. Interference: No piping or sprinkler devices shall interfere with the operations of any door, window or mechanical and electrical systems. No part of this system shall visibly be installed in the physical parameter of any window. Sprinkler mains and branch piping shall not interfere with light fixtures and HVAC diffusers.
- N. Threaded Pipe: Threads shall be clean cut, standard and lapped. Threads shall be made up using flaked graphite and lubricating oil, piping compound or Teflon tape applied to the male threads only.
- O. Grooved Pipe: Installation shall be as prescribed in the Victaulic Piping Manual only. Holes in the piping are to be made in the fabrication shop, not at the job site. Contractor shall provide at the project site a sample of each type of coupling (threaded, standard grooved coupling and mechanical type), showing complete assembly with pipe connections.
- P. Keep all pipe and other openings closed to prevent entry of foreign matter. Cover all equipment and apparatus to protect against dirt, water, chemical or mechanical damage, before and during construction period. Restore to original condition all apparatus and equipment damaged prior to final acceptance, including restoration of damaged shop coats of paint.
- Q. Location of sprinkler piping is critical.
  - 1. Where ceiling space is at a minimum under beams location of ductwork takes precedence, coordinate accordingly.
  - 2. Include in base bid (3) two-hour coordination meetings with Owner, Architect, and Engineer for coordination of sprinkler pipe routing.
  - 3. Coordinate beam and shear wall penetrations with Structural Engineer. Obtain written approval for all beam penetrations from Structural Engineer.
- R. Tracer wire shall be wrapped and taped to non-metallic underground piping at maximum 20 foot intervals.

### 3.05 EXCAVATION AND BACKFILL

- A. Trench and excavation work shall be done in a neat workmanlike manner, of the depth required by the authorities and/or agencies having jurisdiction. Pipe crown shall not be less than 30 inches below the finished ground surface. After the pipe has been properly tested and

inspected, trench shall be backfilled with sand, or an approved sandy material, to a depth of 6 inches above the pipe. Backfill material shall be consolidated by tamping or by saturating with water and vibrating. Subsequent backfill shall consist of the original excavated material, free of organic matter, placed in 6 inch layers and compacted layer by layer by means of power driven vibrators.

- B. Replace to original condition all turf, plants, concrete, asphalt, or other improvements disturbed by trenching. In graded, unpaved areas, backfill trenches with crown 8 inches above the surrounding surface.

### **3.06 SLEEVES AND FLASHINGS**

- A. Wherever pipes are exposed and pass through walls, floors, partitions or ceilings, they shall be fitted with chromium plated steel escutcheons held in place with setscrews. Care shall be taken to protect the escutcheons during the course of construction.
- B. Penetrations through fire rated walls and floors shall be sealed with listed mastic of similar fire rating.

### **3.07 HANGERS, INSERTS, SUPPORTS, AND SWAY BRACING**

- A. Hangers and supports shall be installed per NFPA #13 sections on Hangers and Protection of Piping Against Damage Where Subject to Earth-quake. Provide restraint from movement at end sprinkler on branch line per NFPA 13.
- B. Bending of threaded hanger rod is not allowed. All powder driven anchor pins in concrete are not allowed.

### **3.08 SAFETY TESTING & VERIFICATION**

- A. Flush, test, and inspect sprinkler piping systems according to NFPA 13 Chapter "System Acceptance."
- B. Provide NFPA 13 Contractor's Material & Test Certificate Form 85A for above ground piping and Form 85B for underground piping.
- C. Provide manpower to test the function and performance of all Life Safety System components and devices per floor and per zone basis in accordance with the local requirements.

### **3.09 IDENTIFICATION**

- B. Provide hydraulic design data nameplates on the riser of each sprinkler system in accordance with NFPA 13
- C. Equipment such as valves, drains, etc., shall be provided with signs that identify type of equipment and service. The tag shall be securely fastened to the handle or spindle of the valve by a brass chain. Furnish four schedules of valves so tagged. There shall also be furnished four diagrammatic charts showing schematically the complete sprinkler system with major control valves and numbers thereof. One set of Schedules and charts shall be mounted in glazed frames located where directed.

### **3.10 AS-BUILT RECORD DRAWINGS AND CERTIFICATION**

- A. As-built Record Drawings are to be kept up-to-date and the Master Copy kept at the job site. Prior to final acceptance of work being approved, these drawings are to be turned over to the Owner's Representative for approval.
- B. Written certification from the insuring agents, and authorities having jurisdiction that the tests were satisfactory.
- C. After installation is complete and tests satisfactorily approved, deliver test certificates and approval by the local Fire Authorities and the FMA to the architect. Final acceptance of sprinkler/standpipe system by Owner's Representative shall be contingent upon receipt of certificate and approval from authorities having jurisdiction and for the delivery of final As-Built Drawings.

**END OF SECTION**

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**SECTION 22 05 00**

**COMMON WORK RESULTS FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of This Section, Common Work Results for Plumbing, apply to all Sections in Division 22, Plumbing.
- C. All Sections of Division 22, Plumbing are interrelated. When interpreting any direction, material, and method specified in any section of Division 22, Plumbing consider it within the entirety of Work in Division 22, Plumbing.

**1.02 SUMMARY**

- A. The intent of Division 22, Plumbing and the accompanying Drawings is to provide a complete and workable facility with complete systems as shown, specified and required by applicable codes. Include all work specified in Division 22, Plumbing and shown on the accompanying Drawings, including appurtenances, connections, etc., in the finished job.
- B. Division 22, Plumbing and the accompanying Drawings are complementary and as binding as if called for by both. Items shown on the Drawings are not necessarily included in the Specifications and vice versa. Specifications supersede drawings in case of conflict.
- C. Imperative language is frequently used in Division 22, Plumbing. Except as otherwise specified, requirements expressed imperatively are to be performed by the Contractor.
- D. The Drawings that accompany the Division 22, Plumbing, are diagrammatic. They do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Offsets and transitions assumed at a minimum at each duct crossing, structural penetrations through shear walls or beams, structural grids where ceiling heights are restricted, and at piping mains. Follow the Drawing as closely as is practical to do so and install additional bends, offsets and elbows where required by local conditions from measurements taken at the Building, subject to approval, and without additional cost to the Owner. The right is reserved to make any reasonable changes in fixture location prior to roughing-in, without cost impact.

**1.03 RELATED WORK**

- A. The General and Supplemental Conditions apply to this Division, including but not limited to:
  - 1. Drawings and specifications.
  - 2. Public ordinances, permits.
  - 3. Include payments and fees required by governing authorities for work of this Division.

- B. Division 01, General Requirements, applies to this Division.

#### 1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Products and equipment prohibited from containing pentabrominated, octabrominated and decabrominated diphenyl ethers. Where products or equipment within this specification contain these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.
2. General:
  - a. Conform work and materials to local and State codes, and Federal, State and other applicable laws and regulations.
3. Responsible for obtaining and payment for permits, licenses, and inspection certificates required in accordance with provisions of Contract Documents.

- B. New materials and equipment. Work of good quality, free of faults and defects and in conformance with the Contract Documents.

- C. Build and install apparatus to deliver its full rated capacity at the efficiency for which it was designed.

- D. Operate the entire plumbing system and apparatus at full capacity without objectionable noise or vibration.

- E. Install equipment level and true. Use housekeeping pads and curbs to account for floor or roof slope.

F. Materials and Equipment:

1. Meet detailed requirements of the Drawings and Specifications and suitable for the installation shown. Equipment not meeting requirements will not be acceptable, even though specified by name along with other manufacturers.
2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer. Component parts of the entire system need not be products of same manufacturer.
3. Furnish materials and equipment of size, make, type, and quality herein specified.
4. Equipment scheduled by performance or model number considered the basis of the design. If other specified manufacturer's equipment is provided in lieu of the basis of design equipment the contractor is responsible for changes and costs which may be necessary to accommodate this equipment, including different sizes and locations for connections, different electrical characteristics, different dimensions, different access requirements or any other differences which impact the project.

G. Workmanship:

1. General:
  - a. Install materials in a neat and professional manner.

2. **Manufacturer's Instructions:**
  - a. Follow manufacturer's directions where they cover points not specifically indicated.
  - b. If in conflict with the Drawings and Division 22, Plumbing, obtain clarification before starting work.

H. **Cutting and Patching:**

1. Cutting, patching, and repairing for the proper installation and completion of the work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting performed by skilled craftsmen of each respective trade in conformance with the appropriate Division of Work.
2. Additional openings required in building construction made by drilling or cutting. Use of jackhammer is specifically prohibited.
3. Fill holes which are cut oversize so that a tight fit is obtained around the sleeves passing through.
4. Do not pierce beams or columns without permission of Architect and then only as directed.
5. Restore new or existing work cut or damaged to its original condition. Where there are alterations disturb lawns, paving, walks, etc., repair, refinish, and leave in condition existing prior to commencement of work.

**1.05 SUBMITTALS**

A. **Shop Drawings:**

1. The Contract Drawings indicate the general layout of the piping, and various items of equipment. Coordination with other trades and with field conditions will be required. Prepare Shop Drawings of piping, and equipment installations. Prepare Shop Drawings as new drawings prepared by Contractor and not reproductions or tracings of Architect's Drawings. Overlay drawings with shop drawings of other trades and check for conflicts. Drawings the same size as Architect's Drawings with title block similar to Contract Drawings and identifying Architect's Drawing number or reference drawings. Full dimensioned drawings including both plan and elevation dimensions. Shop drawings cannot be used to make scope changes.
2. Prepared in three-dimensional format.
3. Include but are not limited to:
  - a. Plumbing site plan drawn to same scale as Site Plan.
  - b. Complete floor plans with plumbing to a minimum of 1/4-inch equals 1-foot scale.
  - c. Plumbing in mechanical rooms to a minimum of 1/2-inch equals 1-foot scale.
  - d. Sections of congested areas to a minimum of 1/2-inch equals 1-foot scale.
  - e. Fabricated Equipment: Scale and drawing sizes to suit contractor except equipment not less than 1/2-inch equals 1-foot scale.
  - f. Above Ground: Superplot plans with a colored overlay of all trades including, but not limited to the following:
    - 1) HVAC Piping
    - 2) HVAC Equipment
    - 3) Plumbing Piping and Equipment
    - 4) Sprinklers
    - 5) Lighting
    - 6) Lighting Controls

- 7) Cable Tray
  - 8) Fire Alarm Devices
  - 9) Electrical Power Conduit
  - 10) Ceiling system to a minimum of 1/2-inch equals 1-foot scale.
  - g. Below Ground: Superplot plans of below ground work with a colored overlay of all trades including, but not limited to the following:
    - 1) Structural Footings and Foundation
    - 2) HVAC Piping
    - 3) Civil Piping
    - 4) Plumbing Piping
    - 5) Power conduit to a minimum of 1/2-inch equals 1-foot scale.
  - h. Beam penetration drawings indicating beam penetrations meeting the requirements indicated on the floor plans and on the structural drawings to a minimum of 1/4-inch equals 1-foot scale.
  - i. Slab penetration drawings of HVAC, plumbing, sprinklers, lighting and electrical to a minimum of 1/4-inch equals 1-foot scale.
4. Submit shop drawings for review prior to beginning fabrication. Additional shop drawings may be requested when it appears that coordination issues are not being resolved in the field or when there is a question as to whether contract documents are being complied with or the design intent is being met.

**B. Product Data:**

1. Submit product data for review on scheduled pieces of equipment, on equipment requiring electrical connections or connections by other trades, and as required by each specification section or by Drawing notes. Include manufacturer's detailed shop drawings, specifications and data sheets. Data sheets include the following:
  - a. Capacities
  - b. RPM
  - c. BHP
  - d. Pressure Drop
  - e. Design and Operating Pressures
  - f. Temperatures and Similar Data
2. Manufacturer's abbreviations or codes are not acceptable.
3. List the name of the motor manufacturer and service factor for each piece of equipment.
4. Indicate equipment operating weights including bases and weight distribution at support points.
5. In the case of equipment such as wiring devices, time switches, valves, etc., specified by specific catalog number, a statement of conformance will suffice.

**C. Submission Requirements:**

1. Shop Drawings and Product Data:
  - a. Refer to Division 01, General Requirements for additional requirements related to submittals.
  - b. Submit electronic copies of shop drawings and product data for Work of Division 22, Plumbing in PDF format with each item filed under a folder and labeled with its respective specification section number, article, and paragraph and mark, if applicable.

- c. Include a complete index in the original submittal. Indicate both original items submitted and note stragglers that will be submitted at a later date to avoid delay in submitting.
- d. The bulk of the shop drawings and product data, excepting Controls and Instrumentation, included with the original submittal. Controls and Instrumentation submittals may lag but complete when submitted. Partial submittals will not be accepted. Other stragglers submitted after return of the original binder include a tab similar to that originally submitted. Upon receipt of the returned late submittal, insert them in the previously submitted binder.

D. Contractor Responsibilities:

1. Submit submittals at one time and are in proper order.
2. Ensure equipment will fit in the space provided.
3. Assure that deviations from Drawings and Specifications are specifically noted in the submittals. Failure to comply will void review automatically.

**1.06 RECORD DRAWINGS**

- A. Refer to Division 01, General Requirements for requirements.

**1.07 OPERATING AND MAINTENANCE MANUAL, PARTS LISTS, AND OWNER'S INSTRUCTIONS**

- A. Refer to Division 01, General Requirements for additional requirements.
- B. Submit three bound copies of manufacturer's operation and maintenance instruction manuals and parts lists for each piece of equipment or item requiring servicing. Show literature on 8-1/2-inches by 11-inches sheets or catalogs suitable for side binding.
- C. Submit data when the work is substantially complete, packaged separately, and clearly identified in durable 3-ring binder. Include name and contact information for location of source parts and service for each piece of equipment.
- D. Clearly mark and label in each submittal, the piece of equipment provided with the proper nameplate and model number identified. Provide wiring diagrams for electrically powered equipment.
- E. Instruct Owner thoroughly in proper operation of equipment and systems, in accordance with manufacturer's instruction manuals. Operating instructions cover all phases of control.
- F. Furnish competent engineer knowledgeable in this building system for minimum of five 8 hour days to instruct Owner in operation and maintenance of systems and equipment. Keep a log of this instruction including dates, times, subjects, and those present and present such log when requested by Architect.

**1.08 PROJECT CONDITIONS**

A. Existing Conditions:

1. Prior to bidding, verify and become familiar with existing conditions by visiting the site, and include factors which may affect the execution of this Work.
2. Include related costs in the initial bid proposal.

- B. Coordinate exact requirements governed by actual job conditions. Check information and report any discrepancies before fabricating work. Report changes in time to avoid unnecessary work.
- C. Coordinate shutdown and start-up of existing, temporary, and new systems and utilities. Notify Owner, City, and Utility Company.

#### 1.09 WARRANTY

- A. Provide a written guaranty covering the work of this Division (for a period of one calendar year from the date of acceptance by the Owner) as required by the General Conditions.
- B. Provide manufacturer's written warranties for material and equipment furnished under this Division insuring parts and labor for a period of one year from the date of Owner acceptance of Work of this Division.
- C. Correct warranty items promptly upon notification.

#### 1.10 PROVISIONS FOR LARGE EQUIPMENT

- A. Make provisions for the necessary openings in building to allow for admittance of equipment.

#### 1.11 TEST REPORTS AND CERTIFICATES

- A. Submit one copy of test reports and certificates specified herein to the Architect.

#### 1.12 SUBSTITUTIONS

- A. Submit requests for product substitutions in accordance with the Instructions to Bidders and the General and Supplemental Conditions.

### PART 2 - PRODUCTS

#### 2.01 ACCESS PANELS

- A. Furnish under this Division as specified in another Division of work.

#### 2.02 PIPE SLEEVES

- A. Interior Wall and Floor Sleeves: 18 gauge galvanized steel, or another pre-approved system.
- B. Interior Wall and Floor Sleeves, Fire Rated: Fire rated and water tight system approved by Authority Having Jurisdiction and Owners Insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping material, size and service.
- C. Exterior Wall Sleeves: Cast iron.
- D. On Grade Floor Sleeves: Same as exterior wall sleeves.
- E. Water Tight Sleeves: Combination steel pipe sleeves with water stop and anchor plate; Link Seal Model WS, mated with synthetic rubber links interlocked with bolts and nuts; Link Seal Model LS.

### 2.03 FLOOR, WALL AND CEILING PLATES

- A. Furnish stamped split type plates as follows:
  - 1. Floor Plates: Cast brass, chromium plated
  - 2. Wall and Ceiling Plates: Spun aluminum

### 2.04 MACHINERY GUARDS

- A. Furnish guards for protection on rotating and moving parts of equipment. Provide guards for metal fan drives and motor pulleys, regardless of being enclosed in a metal cabinet.
- B. Design guards so as not to restrict airflow at fan intets resulting in reduced capacity.
- C. Provide shaft holes in guards for easy use of tachometers at pulley centers. Easily removable for pulley adjustment or removal and changing of belts.
- D. Meet OSHA requirements including back plates.
- E. Provide inlet and outlet screens on fans in plenums or where exposed to personnel.

### 2.05 ELECTRICAL EQUIPMENT

- 1. General: Equipment and installed work as specified under Division 26, Electrical.
- B. Coordinate with the electrical Drawings and electrical contractor for minimum electrical equipment bracing requirements based on the available interrupting current (AIC) rating at the bus of the panelboard or switchboard serving the piece of equipment. Provide equipment that meets the bracing requirement.
  - 1. Refer to Equipment Schedules on the Drawings for motor horsepower, voltage, and phase.
  - 2. Refer to individual product sections for additional motor requirements.
  - 3. Built-in thermal overload protection, or protected externally with separate thermal overload devices with low voltage release or lockout. Hermetically sealed motors have quick trip devices.
- C. Equipment Wiring:
  - 1. Provide interconnecting wiring within or on a piece of mechanical equipment with the equipment unless shown otherwise. This does not include the wiring of motors, starters and controllers provided under Division 26, Electrical.
- D. Control Wiring: Provide control wiring for plumbing equipment
- E. Codes: Electrical equipment and products bear the Underwriters label as required by governing codes and ordinances.

### PART 3 - EXECUTION

#### 3.01 ACCESS PANELS

- A. Install in accord with manufacturer's recommendations, coordinated with architectural features.
- B. Provide 2-hour fire rated doors where required bearing the UL label.
- C. Furnish 18-inch by 18-inch panels for ceilings and for access to equipment in soffits and shafts, and 12-inch by 12-inch for walls unless indicated otherwise.
- D. Furnish where indicated and where required to access valves, trap primers, shock arresters, and other appurtenances requiring operation, service, or maintenance. Submit proposed locations for review prior to installation.

#### 3.02 SLEEVES

- A. Interior Floor and Wall Sleeves:
  - 1. Provide sleeves large enough to provide 3/4-inch clearances around pipe or ductwork. Where pipe or ductwork is insulated, insulation pass continuously through sleeve with 3/4-inch clearance between insulation and sleeve.
  - 2. Penetrations through mechanical room and fan room floors made watertight by packing with safig insulation and sealing with Tremco Dymeric Sealant or approved system.
- B. Sleeves Through Rated Floors and Walls: Similar to interior sleeves except install fire rated system approved by Authority Having Jurisdiction and Owners insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping material, size and service.
- C. Exterior Wall Sleeves Below Grade:
  - 1. Provide water tight sleeves. Install at pipes entering building below grade and where shown. Adjust to provide positive hydrostatic seal.
  - 2. Responsible for following manufacturer's procedure for installing and tightening seal. Secure sleeves against displacement.
- D. On Grade Floor Sleeves: Same as below grade exterior wall sleeves, caulked from inside.
- E. Exterior Wall Sleeves Above Grade: Similar to interior wall sleeves except caulk outside with Tremco Dymeric Sealant.
- F. Layout work prior to concrete forming. Do cutting and patching required. Reinforce sleeves to prevent collapse during forming and pouring.
- G. Floor sleeves maintain a water barrier by providing a water tight seal or they extend 1-inch above finished floor except through mechanical equipment room floors and shafts where sleeves extend 2-inches above finished floor level. Sleeves through roof extend 8-inches above roof. Wall sleeves flush with face of wall unless otherwise indicated. Waste stacks using carriers have sleeves flush with floor and sealed. Sleeves through planters extend 8-inches above planter base.



- H. Do not support pipes by resting pipe clamps on floor sleeves. Provide supplementary members so pipes are floor supported.
- I. Special sleeves detailed on drawings take precedence over this Section.

### 3.03 CLEANING

- A. General: Clean plumbing equipment, fixtures and piping of stampings and markings (except those required by codes), iron cuttings, and other refuse.
- B. Painted Surfaces: Clean scratched or marred painted surfaces of rust or other foreign matter and paint with matching color industrial enamel, except as otherwise noted.
- C. Additional requirements are specified under specific Sections of this Division.

### 3.04 EQUIPMENT PROTECTION

- A. Keep pipe and conduit openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, conduit, fixtures, equipment, and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore damaged or contaminated fixtures, equipment, or apparatus to original conditions or replace at no cost to the Owner.
- B. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.
- C. Cover or otherwise suitably protect equipment and materials stored on the job site.

### 3.05 ACCESSIBILITY

- A. General: Locate valves, thermometers, cleanout fittings and other indicating equipment or specialties requiring frequent reading, adjustments, inspection, repairs, and removal or replacement conveniently and accessibly with reference to the finished building.
- B. Thermometers and Gauges: Install thermometers and gauges so as to be easily read from the floors, platforms, and walkways.

### 3.06 FLOOR, WALL AND CEILING PLATES

- A. Install on piping and ductwork passing through finished walls, floors, ceilings, partitions, and plaster furrings. Plates completely cover opening around pipe.
- B. Secure wall and ceiling plates to pipe, insulation, or structure.
- C. Plates not to penetrate insulation vapor barriers.
- D. Plates not required in mechanical rooms or unfinished spaces.

### 3.07 PAINTING

- A. General:
  - 1. Coordinate painting of mechanical equipment and items with products and methods in conformance with the appropriate Division of Work, Painting.

2. Exposed work under this division receives either a factory painted finish or a field prime coat finish, except:
  3. Exposed copper piping.
  4. Aluminum jacketed outdoor insulated piping.
- B. Equipment Rooms and Finished Areas:
1. Insulation: Not painted.
  2. Hangers, Uninsulated Piping, Miscellaneous Iron Work, Structural Steel Stands, Uninsulated Tanks, and Equipment Bases: Paint one coat of black enamel.
  3. Steel Valve Bodies and Bonnets: One coat of black enamel.
  4. Brass Valve Bodies: Not painted.
  5. Equipment:
    - a. One coat of grey machinery enamel.
    - b. Do not paint nameplates.
- C. Concealed Spaces (above ceilings, not visible):
1. Insulation: Not painted.
  2. Hangers, Uninsulated Piping, Miscellaneous Iron Work, Valve Bodies and Bonnets: Not painted.
- D. Exterior Steel: Wire brush and apply two coats of rust-inhibiting primer and one coat of grey exterior machinery enamel.
- E. Exterior Black Steel Pipe: Wire brush and apply two coats of rust-inhibiting primer and one coat of exterior enamel. Painting schemes comply with ANSI A13.1.

### 3.08 ADJUSTING AND CLEANING

- A. Before operating any equipment or systems, make thorough check to determine that systems have been flushed and cleaned as required and equipment has been properly installed, lubricated, and serviced. Check factory instructions to see that installations made accordingly and that recommended lubricants have been used.
- B. Use particular care in lubricating bearings to avoid damage by overlubrication and blowing out seals. Check equipment for damage that may have occurred during shipment, after delivery, or during installation. Repair damaged equipment as approved or replace with new equipment.

### 3.09 ELECTRICAL EQUIPMENT

- A. Do not install piping for plumbing systems not serving electrical space in switchgear room, transformer vault, telephone room, or electric closet except as indicated.
- B. Piping for plumbing systems not to pass over switchboards or electrical panelboards. Where conflicts exist, bring to attention of Architect.

### 3.10 EQUIPMENT CONNECTIONS

- A. **Make final connections to equipment specified in sections other than Division 22, Plumbing of the specifications and Owner furnished equipment in accordance with manufacturer's instructions and shop drawings furnished and as indicated.**
  
- B. **Piping:**
  - 1. **Connections include hot and cold water, deionized water, distilled water, natural gas, medical gases, medical air, and vacuum, dental air and vacuum, lab air and vacuum, sanitary waste and vent, lab waste and vent and fuel oil.**
  
  - 2. **Provide valves and specialties as specified and as detailed on the Drawings. Provide increasers, reducers, and any other fittings required for complete installation.**
  
  - 3. **Independently support piping connections to prevent undue strain on equipment.**
  
- C. **Refer to Division 11, Equipment for requirements.**

**END OF SECTION**

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**SECTION 22 05 19**

**METERS AND GAUGES FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Thermometers, Water
  - 2. Pressure Gauges

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Products listed in this Section.
  - 2. Water flow meters, include graph of output signal vs. gpm for each device.
  - 3. Operating and Maintenance Data.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Thermometers, Water
  - 1. Ashcroft
  - 2. Weiss
  - 3. Terice
  - 4. Marsh
  - 5. Weksler
  - 6. Tel-Tru
  - 7. Other Manufacturers: Submit substitution request.

B. Pressure Gauges:

1. Marsh
2. Ashcroft
3. Weiss
4. Terice
5. Weksler
6. Tel-Tru
7. Other Manufacturers: Submit substitution request.

2.02 THERMOMETERS, WATER

A. Description: Direct drive 5-inch dial type, stainless steel case, separable sockets, stem length to penetrate minimum of 1/2 pipe diameter, adjustable face, extension necks where required to clear insulation.

B. Range:

Plumbing Systems	Temperature	Graduations
Domestic Cold Water	25-125 degrees F	1 degrees F
Domestic Hot Water	30-180 degrees F	2 degrees F

2.03 PRESSURE GAUGES

A. Description: 4-1/2-inch dial, molded black polypropylene turret case.

B. Range:

Plumbing Systems	Pressure (psi)	Graduations (psi)
Domestic Cold Water	0-160 psi	1 psi
Domestic Hot Water	0-160 psi	1 psi
Other ranges may be listed on Drawings in which case they take precedence		

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Provide meters and gauges where shown on Drawings.
- B. Install gauges and meters as required and as recommended by equipment manufacturer or their representative.
- C. Extend connections, wells, cocks, or gauges to a minimum of 1-inch beyond insulation thickness of the various systems.
- D. Locate gauges so that they may be conveniently read at eye level or easily viewed and read from the floor or from the most likely viewing area.
- E. Install instruments over 6-feet 6-inches above floor, to be viewed from the floor, with face at 30 degrees to horizontal.

**3.02 INSTALLATION - PRESSURE GAUGES**

- A. Provide instrument gauge cock at inlets. Locate pressure gauge taps for measuring pressure drop or increase across pumps, etc., as close to the device as possible.

**END OF SECTION**

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**SECTION 22 05 23**

**GENERAL DUTY VALVES AND SPECIALTIES FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Gate Valves
  - 2. Globe Valves
  - 3. Check Valves
  - 4. Ball Valves
  - 5. Butterfly Valves
  - 6. Balancing Valves
  - 7. Specialty Valves
  - 8. System Specialties
  - 9. Strainers

**1.03 SUBMITTALS**

- A. Submit product data.

**1.04 DEFINITIONS**

- A. CWP            Cold working pressure
- B. EPDM          Ethylene propylene copolymer rubber
- C. NBR           Acrylonitrile-butadiene, Buna-N, or nitrile rubber
- D. NRS           Nonrising stem
- E. OS&Y        Outside screw and yoke

- F. RS Rising stem
- G. PTFE Polytetrafluoroethylene plastic
- H. SWP Steam working pressure
- I. Lead Free: Refers to the wetted surface of pipe, fittings, and fixtures in potable water systems that have a weighted average lead content  $\leq 0.25$  percent per Safe Drinking Water Act as amended January 4th 2011. Section 1417 \*Add specific state requirements as needed.

#### 1.05 QUALITY ASSURANCE

- A. ASME Compliance:
  - 1. ASME B16.10 for ferrous valve dimensions.
  - 2. ASME B31.9 for building services piping valves.
- B. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. General: Where only NIBCO figure numbers are listed, equivalent products by those specified below are acceptable.
  - 1. Valves:
    - a. Gate, Globe, Swing Check:
      - 1) Apollo
      - 2) Victaulic
      - 3) Crane
      - 4) Kennedy
      - 5) Stockham
      - 6) Milwaukee
      - 7) Walworth
      - 8) Hammond
    - b. Silent Check:
      - 1) Mueller
      - 2) Metraflex
      - 3) Victaulic
      - 4) Bell and Gossett
      - 5) Milwaukee
      - 6) Gruvlok
    - c. Balancing:
      - 1) Bell and Gossett
      - 2) Armstrong
      - 3) Tour and Anderson
      - 4) NIBCO
    - d. Butterfly:
      - 1) Apollo
      - 2) Victaulic
      - 3) Gruvlok
      - 4) Crane

- 5) Walworth
- 6) Milwaukee
- 7) Metraflex
- e. Ball:
  - 1) Gruvlok
  - 2) Apollo
  - 3) Crane
  - 4) Hammond
  - 5) Milwaukee
  - 6) Victaulic

- 2. Specialty Valves:
  - a. Gas Pressure Regulator:
    - 1) Actaris
    - 2) Maxitrol
    - 3) Fisher
    - 4) Other Manufacturers: Submit substitution request.

- B. Other Manufacturers: Submit substitution request.
- C. Use only one manufacturer.
- D. Valve ends may be threaded, flanged, soldered, or grooved, as applicable to piping system. Refer to Section 22 21 13, Pipe and Pipe Fittings Plumbing for allowable fittings.

## 2.02 GATE VALVES

- A. Lead Free Bronze Gate: Lead Free Silicon Bronze corrosion resistant body and trim, screwed bonnet, solid wedge, NSR, 300 psi CWP, NIBCO S/T-113-LF.
- B. Lead Free Iron Gate: Class 125, OS&Y, Cast or Ductile Iron body, Stainless steel or Lead Free silicon bronze corrosion resistant trim, OS&Y pattern, solid wedge, 200 psi rating; NIBCO F-607-RWS or F-619-RWS.

## 2.03 GLOBE VALVES

- A. Bronze Globe and Angle Globe: Bronze body, bronze mounted, renewable composition disc, 150 psi rating; NIBCO 235 or 335.
- B. Bronze Globe and Angle Globe High Pressure: Bronze body, stainless steel disc, union bonnet, 300 psi steam; NIBCO 276-AP or 376-AP.

## 2.04 CHECK VALVES

- A. Horizontal Y-Pattern Bronze Swing Check: Bronze body, bronze mounted, regrinding bronze disc, 150 psi steam rating, 300 psi WOG; NIBCO 433-Y.
- B. Lead Free Y-Pattern Horizontal Bronze Swing Check: Lead Free Silicon Bronze corrosion resistant body, and trim, PTFE renewable seat and disc, 300 psi CWP; NIBCO S/T 413-Y-LF.
- C. Horizontal Iron Swing Check: Iron body, bronze mounted, renewable seat and disc, 125 psi steam, 200 psi WOG; NIBCO 918.
- D. Lead Free Horizontal Iron Swing Check: Iron body, wafer style, renewable seat and disc, 200 CWP psi rating, 200 psi Non-Shock Cold Working Pressure; NIBCO W-910-LF.

## 2.05 BALL VALVES

- A. Lead Free Bronze Ball: Two piece, full port, Lead Free silicon bronze body, Stainless steel or silicon bronze trim, Reinforced PTFE or TFE seats, 600 psi CWP NIBCO T/S-585-80-LF or T/S-585-66-LF.

## 2.06 BUTTERFLY VALVES

- A. Lead Free Butterfly Valve: Ductile iron body, Lead Free Aluminum Bronze disc and stainless steel stem, with lever handle and locking feature on valves 6-inches and less, gear operator on valves 8-inches and over; stem neck length to accommodate insulation where applicable, EPDM liner, 200 psi water; NIBCO LD- 2000N-3/5.

## 2.07 BALANCING VALVE

- A. Lead-Free Calibrated: Bronze, Ametal (copper-alloy), or ductile iron body, brass globe or ball, differential pressure readout valves with integral checks, calibrated plate, integral pointer, suitable for tight shutoff, memory stops, threaded, grooved or soldered ends, 250 psi water, NSF/ANSI 61 compliant, Bell and Gossett Lead-Free Circuit Setter Plus.

## 2.08 SPECIALTY VALVES

- A. Gauge Cocks: Brass, tee handle, male to female, 200 psi working pressure, 1/4 inch; Apollo 41 series.
- B. Drain Valves: Bronze globe valve or full port ball valve, garden hose end, cap and chain 3/4 inch size.

## 2.09 SYSTEM SPECIALTIES

- A. Manual Air Vents: Coin type; Dole 9 or approved equal.
- B. Pressure/Temperature Test Plug:
  - 1. Acceptable Manufacturers:
    - a. Peterson Engineering, Inc.
    - b. Universal Lancaster
    - c. Sisco
    - d. Trerice.
    - e. Other Manufacturers: Submit substitution request.
  - 2. General: 1/2-inch NPT fitting to receive either a temperature or pressure probe 1/8-inch OD, fitted with a color coded and marked cap with gasket.
  - 3. Material: Solid brass with valve core of Nordel.
  - 4. Rating: Minimum 300 psig at 275 degrees F.
  - 5. Gauges and Thermometers: Supply Owner with two pressure gauge adapters with 1/8-inch OD probe and two five-inch stem pocket test thermometers 25 degrees F to 125 degrees F for chilled water, 40 degrees F to 240 degrees F for heating water.

**2.10 STRAINERS**

**A. Acceptable Manufacturers:**

1. Armstrong
2. McAlear
3. Sarco
4. Steamflo
5. Mueller R.P. & C.
6. Other Manufacturers: Submit substitution request.

**B. Wye Pattern:**

1. Bronze: Lead free bronze body, 250 psi, 1/16-inch perforated Type 304 stainless screen.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Provide valves at connections to equipment where shown or required for equipment isolation.
- B. Provide separate support for valves where necessary.
- C. Provide drain valves in low points in the piping system, at coils and equipment, and as indicated.
- D. Coordinate gas pressure regulator selection with inlet pressure available at the regulator and the capacity and outlet pressure required by the equipment served.
- E. Install in accordance with manufacturer's recommendations.
- F. Locate gas cocks and gas regulator readily accessible for servicing.
- G. Provide approved gas cock immediately upstream of each gas pressure regulator.
- H. Provide separate vent to the outside for each regulator.

**3.02 APPLIED LOCATIONS PLUMBING VALVES**

**A. In piping 2-inches and smaller:**

System	Valve Types				
	Gate	Globe	Swing Check	Ball	Butterfly
Domestic Hot	Lead Free Bronze	Lead Free Bronze	Lead Free Bronze	Lead Free Bronze	Not Allowed
Domestic Cold	Lead Free Bronze	Lead Free Bronze	Lead Free Bronze	Lead Free Bronze	Not Allowed

B. In piping 2-1/2-inches and larger:

System	Valve Types				
	Gate	Globe	Swing Check	Ball	Butterfly
Domestic Hot	Lead Free Iron	Lead Free Iron	Lead Free Iron	Not Allowed	Lead Free Ductile Iron
Domestic Cold	Lead Free Iron	Lead Free Iron	Lead Free Iron	Not Allowed	Lead Free Ductile Iron

- C. Calibrated balancing valves on domestic hot water. Size balancing valves based on the published performance curve characteristics for the scheduled flow rate for each location to ensure proper operation at design conditions.
- D. Silent check valves on pump discharge for domestic cold water, solar hot water, reclaimed water, cold process water, process grey water.
- E. Check valves on vertical discharge of sump pumps and sewage ejector pumps, iron swing check with outside weight and lever. Mount in piping at 45 degree angle.
- F. Provide gauge cock for all pressure gauges.

**3.03 VALVE IDENTIFICATION**

- A. General: Identify valves to indicate their function and system served.
- B. Refer to Section 22 05 53, Identification for Plumbing Piping and Equipment.

**3.04 CHAIN OPERATORS**

- A. Valves in equipment rooms or fan rooms used for equipment or coil isolation and more than 8-feet above floor installed with stem horizontal and equipped with chain wheels and chains extending to 6 feet above floor.

**3.05 INSTALLATION**

- A. Manual Air Vents:
  - 1. Install at high points where automatic air vents are not used, where noted, and where required for proper venting of system.
  - 2. Install in accordance with manufacturer's recommendations.
- B. Install grooved joints in accordance with the manufacturer's published installation instructions.
- C. Mold and produce gaskets by the coupling manufacturer, and suitable for the intended service. Coupling manufacturer's factory trained representative to provide on-site training for the contractor's field personnel in the use of grooving tools and installation of grooved joint products. Representative to periodically visit the project site to ensure best practices in grooved installation are being followed. Distributor's representative is not considered qualified to conduct the training of field visits.
- D. Test Plugs: Install where indicated and in accordance with the manufacturer's recommendations.

- E. **Pressure Reducing Valves:** Install where indicated and in accordance with manufacturer's recommendations with 3 valve bypass.
  
- F. **Water Relief Valves:**
  - 1. Install where indicated, and in accordance with manufacturer's instructions.
  - 2. Pipe discharge to nearest floor drain using Schedule 40 steel pipe.
  
- G. **Strainer:**
  - 1. **Applied Locations Plumbing:**
    - a. Bronze wye, in piping 2-inch and smaller; domestic water, solar hot water, reclaimed water, cold process water, process grey water.
    - b. Cast iron, in piping 2-1/2-inch and larger; solar hot water, reclaimed water, cold process water, process grey water
    - c. Cast iron, high pressure wye, in piping 2-1/2-inch and larger; domestic water.
  
- H. **Backwater Valves:**
  - 1. Install backwater within vault indicated.
  - 2. If vault not indicated (shallow bury application), provide soil pipe extension to install ferrule and cover at top and flush with floor surface.

**END OF SECTION**

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**SECTION 22 05 29**

**HANGERS, SUPPORTS, AND ANCHORS FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Supports, Anchorage and Restraint
  - 2. Pipe Attachments
  - 3. Pipe Rollers, Insulation Protection Shields and Insulation Protection Saddles
  - 4. Building Attachments
- B. Related Sections include:
  - 1. Section 22 05 48, Vibration and Seismic Controls for Plumbing Piping and Equipment
  - 2. Section 22 07 00, Insulation for Plumbing
  - 3. Section 22 21 13, Pipe and Pipe Fittings Plumbing

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Shop Drawings of contractor fabricated piping support structures.
  - 2. No other submittals required under this section.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Supports, Anchorage and Restraint:
  - 1. Unistrut
  - 2. Superstrut

3. Powerstrut and Kinline
  4. B-Line Systems
  5. AnvilStrut
- B. Pipe Attachments:
1. Anvil
  2. Superstrut
  3. B-Line Systems
  4. Tolco
  5. ERICO
- C. Pipe Rollers, Insulation Protection Shields and Insulation Protection Saddles:
1. Anvil or equivalent
  2. Super Strut
  3. B-Line Systems
  4. Tolco
  5. ERICO
- D. Building Attachments:
1. Anvil as listed or equivalent products
  2. Elcen
  3. Superstrut
  4. B-Line Systems
  5. Tolco
  6. ERICO

## 2.02 SUPPORTS, ANCHORAGE AND RESTRAINT

### A. General:

1. Provide pipe and equipment hangers and supports in accordance with the following:
  - a. Equipment, supports, and seismic restraints for conduit, piping, and ductwork are not shown on the Drawings, the contractor responsible for their design.
  - b. Resist seismic forces as specified in the latest edition of the International Building Code for the seismic zone in which the project is constructed.
  - c. Seismic restraint not to introduce excessive stresses in the piping caused by thermal expansion or contraction.

- d. Connections to structural framing not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.
  - e. In accordance with the latest edition of the SMACNA Seismic Restraint Manual - Guidelines for Mechanical Systems for the Seismic Hazard Level corresponding to the seismic zone in which the project is constructed.
  - f. In accordance with the applicable code.
  - g. Follow provisions described in Section 22 05 48, Vibration and Seismic Controls for Plumbing Piping and Equipment.
- B. Engineered Support Systems: Design, detail, and bear the seal of a professional engineer registered in the State having jurisdiction.
1. Supports and seismic restraints for suspended piping and equipment.
  2. Support frames such as pipe racks or stanchions for piping and equipment which provide support from below.
  3. Equipment and piping support frame anchorage to supporting slab or structure.
- C. Fabricate support members from welded standard structural shapes, pipe, and plate to carry the necessary rollers, hangers, and accessories as required.
- D. Support piping less than 4-inch pipe size from or by prefabricated roll-formed channels with necessary accessories to adequately support piping system.
- E. Supports and Accessories: Preformed roll-formed channels and accessories with matching compatible accessories as shown, as specified, and as required.
- F. Dissimilar Metal Protection: Hydra-Zorb cushions or Cush-a-strip.
- G. Clamps: Super Strut Series 700 through 702 or AnvilStrut Series 1000 through 1200.

### 2.03 PIPE ATTACHMENTS

- A. Uninsulated Horizontal Copper Piping:
1. 2-inch and Smaller: Anvil CT-65, CT-69, CT-99C.
  2. Larger than 2-inch:
    - a. Anvil 260 field or factory copper plated, plastic coated or other recognized industry methods.
    - b. Electricians' tape is unacceptable.
- B. Insulated Horizontal Copper Pipe with Hangers Inside of Insulation: Same as Uninsulated Horizontal Copper Pipe.
- C. Insulated Horizontal Copper Pipe with Hangers Outside of Insulation:
1. 2-inch and Smaller: Anvil 65, 70, 104 or 260.
  2. Larger than 2-inch: Anvil 260.
- O. Other Uninsulated Horizontal Pipe:
1. 2-inch and Smaller: Anvil 65, 70, 104 or 260.

2. Larger than 2-inch: Anvil 260.
- E. Other Insulated Horizontal Pipe With Hangers Inside of Insulation:
1. 2-inch and Smaller: Anvil 65, 70, 104, 260 or 300.
  2. Larger than 2-inch: Anvil 260.
- F. Other Insulated Horizontal Pipe with Hangers Outside of Insulation:
1. 2-inch and Smaller: Anvil 65, 70, 104 or 260.
  2. Larger than 2-inch: Anvil 260.
- G. Riser Clamps Copper Pipe:
1. 4-inch and Smaller: Anvil CT-121, CT-121C or 261C.
  2. Larger than 4-inch: Anvil 261C.
- H. Riser Clamps Other Piping: Anvil 261.

#### 2.04 PIPE ROLLERS, INSULATION PROTECTION SHIELDS AND INSULATION PROTECTION SADDLES

- A. Pipe Rollers: Anvil 174 or 274 as required. Size for pipe plus insulation for insulated pipe.
- B. Insulation Protection Shields: Anvil 167.
- C. Insulation Protection Saddles: Anvil 160 through 166A as required. Saddles for copper pipe, factory or field copper plated.

#### 2.05 BUILDING ATTACHMENTS

- A. Beam Hangers:
1. On piping 6-inch and smaller: Anvil 86 with retaining clip Figure 89.
  2. On piping larger than 6-inch: Anvil 228, or 292.
- B. Inserts:
1. Anvil 152 malleable iron or 281 steel inserts.
  2. Inserts sized for required rod to support load being carried.
- C. Expansion Plugs: Similar and equal to Phillips red-head self-drilling flush shell selected for safety factor of 4.
- D. Powder actuated fasteners with silencers as approved by Architect.

### PART 3 - EXECUTION

#### 3.01 HANGERS AND SUPPORTS

##### A. General:

1. Install support systems as detailed and in accordance with manufacturer's recommendations. Provide pipe racks, pipe stands, trapeze hangers, etc., as required and as detailed on the Drawings.
2. Provide adjustable hangers for pipes complete with inserts, adjusters, bolts, nuts, swivels, all-thread rods, etc., except where specified otherwise.
3. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping and do not support piping from other piping.
4. Except as otherwise indicated for exposed continuous pipe runs, install hangers, and supports of same type and style as installed for adjacent similar piping.
5. Install cast iron piping in accordance with Cast Iron Soil Pipe Industry (CISPI) Standards.
6. Support piping within 2-feet of each change of direction on both sides of fitting.

##### B. Insulated Piping Systems:

1. Refer to Section 22 07 00, Plumbing Insulation, for insulation requirements.
2. Insulated Piping Systems with Vapor Barrier Insulation:
  - a. Install hangers outside of insulation.
  - b. On piping 1-1/2-inch and larger, provide insulation protection shields at each support location.
3. Insulated Piping Systems with Non-Vapor Barrier Insulation: As specified for Insulated Piping Systems with Vapor Barrier Insulation.
4. Insulation Protection:
  - a. Band insulation protection shields firmly to insulation to prevent slippage.
  - b. Tack weld insulation protection saddles to steel pipe. Braze saddles to copper pipe.

##### C. Vertical Piping:

1. Support with U-clamps fastened to wall to hold piping away from wall unless otherwise approved.
2. Riser clamps on steel pipe to be directly welded to pipe. Riser clamps on copper pipe to be installed directly under fitting.
3. Risers that are not subject to thermal change to be supported at each floor of penetration.

4. Risers that are subject to thermal change require engineered supports. Size supports to carry forces exerted by piping system when in operation. Riser supports follow provisions described in Section 22 05 48, Vibration and Seismic Controls for Plumbing Piping and Equipment.

**D. Horizontal Piping:**

1. Trapeze Hangers:
  - a. Multiple pipe runs where indicated supported on channels with rust resistant finish.
  - b. Provide necessary rods and supporting steel.

2. Support Spacing:

- a. Provide support at minimum spacing per MSS SP-69-1996 Pipe Hangers and Supports - Selection and Application:

- 1) Support piping within 2-feet of each change in direction.
- 2) Steel Pipe, Copper Tubing:

Minimum Pipe Size	Maximum Span Steel	Maximum Span Copper	Rod Size
1-inch and smaller	7-feet	5-feet	1/4-inch
1-1/4-inch to 2-inch	8-feet	8-feet	3/8-inch
2-1/2-inch to 3-inch	11-feet	9-feet	1/2-inch
4-inch to 5-inch	14-feet	12-feet	1/2-inch
6-inch	17-feet	14-feet	1/2-inch
8-inch or larger	19-feet	16-feet	5/8-inch

- 3) Plumbing Piping: Support in accordance with local plumbing code.
- 4) Plastic Pipe: Supported a maximum of 3-feet on center for piping 1-inch and smaller and 4-feet on center for piping 1-1/4-inch and larger with rod sizes as recommended by the manufacturer.
- 5) Piping provided with acoustical lagging wrap supported a maximum of 5-feet on center. Install hangers outside of acoustical lagging.

**E. Building Attachments:**

1. Fastening or attaching to steel deck (without concrete fill) is prohibited. It will be necessary to support piping from structural members, beams, joists, or provide intermediate angle iron supporting members between joists. Supports may be attached to concrete filled steel deck with load limitations shown on the structural drawings or otherwise obtained from the structural engineer.
2. Provide horizontal bracing on horizontal runs 1-1/2 inch and larger and exceeding 50-feet in length at 75-foot intervals and as required to provide stabilized piping systems.
3. Provide additional structural steel angles, channels, or other members required to support piping where structures do not occur as required for proper support.
4. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.

**END OF SECTION**

**SECTION 22 05 48**

**VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Neoprene Waffle Pad, Type 1
  - 2. Restrained Neoprene Mount, Type 2
  - 3. Springs, Type 3
  - 4. Springs with Restraints, Type 4
  - 5. Base with Springs, Type 5
  - 6. Inertia Base with Springs, Type 6
  - 7. Isolating Spring Hangers, Type 7
  - 8. Isolating Neoprene Hangers, Type 8
  - 9. Isolating Sleeves
  - 10. Seismic Restraints
  - 11. Flexible Sphere Connector
  - 12. Flexible Hose Connector
  - 13. Expansion Joint/Seismic Connector
- B. Related Sections include:
  - 1. Section 22 05 29 Hangers, Supports and Anchors for Plumbing

### 1.03 QUALITY ASSURANCE

- A. Select a single manufacturer and furnish isolation required, except packaged equipment with integral isolators meeting all the isolation and seismic requirements of this specification.
- B. Isolation performance requirements are indicated in the specifications. All deflections indicated are nominal static deflections for specific equipment supported.
- C. Seismic snubbers, restrained isolator housings, and cable system components have anchorage preapproval OPA number from QSHPD in the State of California verifying the maximum certified load ratings.
- D. Isolator Stability and Rated Capacity:
  - 1. Spring diameters not less than 0.8 of the compressed height of the spring at rated load.
  - 2. Springs have a minimum additional travel to solid equal to 50 percent of the rated deflection.
- E. Seismic Restraints:
  - 1. Restraint of equipment and piping to be in accordance with the current state and local Building Code.
  - 2. Calculations in accordance with current state and local Building Code.

### 1.04 SUBMITTALS

- A. Submit the following:
  - 1. Submit Shop Drawings showing complete details of construction for steel and concrete bases including:
    - a. Equipment mounting holes.
    - b. Dimensions
    - c. Isolation selected for each support point
    - d. Details of mounting brackets for isolator
    - e. Weight distribution for each isolator
    - f. Code number assigned to each isolator
  - 2. Submit product data and calculation sheets for isolators, showing:
    - a. Size, type, load rating, and rated deflection of each required isolator.
    - b. Percent of vibration transmitted based on the lowest disturbing frequency of the equipment.
- B. Installation report as specified in PART 3 of this Section.
- C. Operation and maintenance data.

### 1.05 EQUIPMENT VIBRATION ISOLATION

- A. Provide a balanced set of vibration isolators for each piece of equipment listed in the Equipment Schedules.



- B. Isolation work to include, but not necessarily be limited to, the following:
  - 1. Isolation support of motor-driven equipment.
  - 2. Inertia base frames in conjunction with isolation.
  - 3. Isolation support of piping and piping risers.
  - 4. Penetration isolation of pipework and conduits through walls, floors, or ceilings.
  - 5. Flexible connections of piping to equipment.
- C. Each piece of rotating equipment must meet a reasonable criterion for maximum vibration levels at each bearing, while in operation. The criteria for varying operating speeds are given as follows:
  - 1. Rotating equipment operating peak vibration velocities must not exceed 0.08 in./sec.
  - 2. If it is discovered that the operating vibration velocities exceed this criteria, the equipment repaired or replaced at no expense to the owner until approval of the equipment is given by the engineer.
- D. Provide components or materials not specially mentioned herein, but necessary to the proper vibration isolation of the equipment.

#### 1.06 CONTRACTOR RESPONSIBILITY

- A. Vibration isolation devices, including auxiliary steel bases and pouring forms, designed and furnished by a single manufacturer or suppliers.
- B. Adequately restrain equipment and piping to resist seismic forces. Design and select restraint devices to meet seismic requirements as defined in the latest issue of the International Building Code under Earthquake Design and applicable state and local codes.
- C. Selection, installation, adjustment and performance of vibration isolators which will meet the requirements given on the plans or in the specifications.
- D. Provide Engineering drawings, details, supervision, and instruction to assure proper installation and performance.
- E. Provide whatever assistance necessary to ensure correct installation and adjustment of the isolators.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. General:
  - 1. Amber Booth
  - 2. Mason Industries, Inc.

3. Kinetics Corporation
  4. Vibrex
  5. Approved equal, meeting the conditions and requirements specified herein.
- B. Neoprene Waffle Pad, Type 1:
1. Mason Type Super W or Super WM
  2. HG Grommet; Similar Amber-Booth
  3. Kinetics Corporation
- C. Restrained Neoprene Mount, Type 2:
1. Mason Type BR
- D. Springs, Type 3:
1. Mason Type SLF
  2. Amber-Booth Type SW
  3. Kinetics Corporation
  4. Vibrex
- E. Springs with Restraints, Type 4:
1. Mason type SSLR or SLRS with seismic restraints
  2. Amber-Booth
  3. Kinetics Corporation Model FYS
  4. Vibrex
- F. Base with Springs, Type 5:
1. Mason
  2. Amber-Booth
  3. Kinetics Corporation
  4. Vibrex
- G. Inertia Base with Springs, Type 6:
1. Mason
  2. Amber-Booth

3. Kinetics Corporation
  4. Vibrex
- H. Isolating Spring Hangers, Type 7:
1. Mason 30N
  2. Amber-Booth
  3. Consolidated Kinetics
  4. Vibrex
- I. Isolating Neoprene Hangers, Type 8:
1. Mason HD
  2. Amber-Booth
  3. Consolidated Kinetics
  4. Vibrex
- J. Isolating Sleeves:
1. Potter-Roemer PR Isolators
  2. Grinnell Semco Trisolators
- K. Flexible Sphere Connector:
1. Mason Type SFU, SFDEJ or SFEJ
- L. Flexible Hose Connector:
1. Mason Type BSS, FFL, MN, CPS or CPSB
  2. HCl
  3. Metraflex

## 2.02 NEOPRENE WAFFLE PAD, TYPE 1

- A. 3/4-inch thick neoprene waffle pads with pattern repeating on 1/2-inch centers.
- B. Select Duro rating for maximum deflection at average load rating.
- C. Include load distribution steel plate as required.
- D. Include anchor bolt grommet as required.

**2.03 RESTRAINED NEOPRENE MOUNT, TYPE 2**

- A. Bridge-bearing neoprene mountings have a minimum static deflection of 0.2-inches and all directional seismic capability.
- B. Ductile iron casting containing two separated and opposing molded neoprene elements.
- C. Prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation.
- D. Compound shock absorbing neoprene materials to bridge-bearing specifications.

**2.04 SPRINGS, TYPE 3**

- A. Free standing springs without housings.
- B. 1/4-inch thick molded neoprene cup with steel reinforcement washer or neoprene acoustical friction pads between base plate and support.
- C. Leveling bolt mounting with height saving brackets.
- D. Springs mounted outboard of channels.
- E. Attach baseplate screws using neoprene bushings and washers.
- F. Spring diameters not less than 0.8 of the compressed height of the spring at rated load.

**2.05 SPRINGS WITH RESTRAINTS, TYPE 4**

- A. Same as springs except housing with seismic restraints to be added.
- B. Seismic restraint with molded all directional neoprene bushings an integral part of isolator.
- C. Seismic restraint selected for minimum safety factor of 2 from ultimate seismic capacity.
- D. Spring mount must have neoprene cup or pad inside the seismic housing to allow anchoring of the housing baseplate without short circuiting pad.

**2.06 BASE WITH SPRINGS, TYPE 5**

- A. Steel Isolating Frame:
  - 1. Mason WFSL with WF steel beams with a minimum depth of 10 percent of the span between supports.
  - 2. Provide external height saving brackets.

**2.07 INERTIA BASE WITH SPRINGS, TYPE 6**

- A. Inertia Bases:
  - 1. Mason BMK or KSL with 1/2-inch square bar reinforcing, integral height saving brackets and steel templates with anchor bolts sleeves.

2. Bases must be sized to fit stanchions for pump elbows or suction diffusers.
3. Depth of base equal to 8 percent of the span between supports, 6-inch minimum.

#### **2.08 ISOLATING SPRING HANGERS, TYPE 7**

- A. Combination rubber-in shear and steel spring isolators installed on the hanger rods.
- B. Proper deflection to allow the piping to deflect as a unit with the pump isolators.
- C. Hangers designed for 30 degree angular movement.
- D. Minimum Deflection: 1-inch

#### **2.09 ISOLATING NEOPRENE HANGERS, TYPE 8**

- A. Double deflection neoprene hangers, minimum static deflection of 0.35-inches.
- B. Provide projecting bushing to prevent steel to steel contact.

#### **2.10 ISOLATING SLEEVES**

- A. Provided for piping through walls and floors of penthouses and chiller room.
- B. Size for piping as required.

#### **2.11 SEISMIC RESTRAINTS**

- A. General Requirements:
  1. Provide for equipment and piping, both supported and suspended.
  2. Bracing of piping in accordance with the code and with the provisions set forth in the SMACNA seismic restraint manual.
  3. Structural requirements for the restraints, including their attachment to the building structure, reviewed and approved by the structural engineer.
  4. Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.
- B. Supported Equipment:
  1. All-directional seismic snubbers consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene.
  2. Replaceable bushing and a minimum of 1/4-inch thick. Rated loadings not to exceed 1000 psi.
  3. Incorporate an air gap of 1/4-inch be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces.
  4. Removeable snubber end caps to allow inspection of internal clearances. Neoprene bushings rotated to ensure no short circuits exist before systems are activated.

5. Snubber Mason Industries, Inc. Type Z-1225

C. Bracing of Pipes:

1. Provide seismic bracing of all piping as detailed below to meet the building code requirements:
  - a. Exception:
    - 1) Piping suspended by individual hanger's 12-inches or less in length, as measured from the top of the pipe to the bottom of the support where the hanger is attached, need not be braced where the following criteria are met.
      - a) Seismic braces are not required on high deformability piping when the  $I_p=1.0$  and provisions are made to avoid impact with larger pipe or mechanical components or to protect the pipe in the event of such impact and the nominal pipe size is 3-inches diameter or less.
      - b) Seismic braces are not required on high deformability piping when the  $I_p=1.5$  and provisions are made to avoid impact with larger pipe or mechanical components or to protect the pipe in the event of such impact and the nominal pipe size is 1-inch diameter or less.
2. Seismic braces for pipes on trapeze hangers may be used.
3. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints, or where pipes connect to equipment.
4. Cast iron pipe of all types, glass pipe, and any other pipe jointed with a shield and clamp assembly, where the top of the pipe is 12-inches or more from the supporting structure, braced on each side of a change in direction of 90 degrees or more. Riser joints on unsupported sections of piping braced or stabilized between floors.
5. Vertical Risers:
  - a. Laterally supported with a riser clamp at each floor.
  - b. For buildings greater than six stories high or for piping subject to thermal change risers engineered individually.

D. Suspended Equipment and Piping:

1. Seismic cable restraints consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint.
2. Pre-stretch cable to achieve a certified minimum modulus of elasticity. Cable end connections steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement.
3. Cable Assemblies: Mason Industries, Inc Type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod and the clevis or SCBV if clamped to a beam.
4. Steel angles, sized to prevent buckling, clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies Mason Industries, Inc. Type SRC or UC.
5. Pipe clevis cross-bolt braces are required in all restraint locations. Special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross brace Mason Industries, Inc. Type CCB.

## 2.12 FLEXIBLE SPHERE CONNECTOR

- A. Flexible EPDM pipe connectors manufactured of multiple plies of Kevlar tire cord fabric and EPDM; both molded and cured in hydraulic rubber presses. Do not use steel wire or rings as pressure reinforcement.
- B. Connectors up to and including 2-inch diameter may have a single sphere and threaded ends. Connectors 2-1/2-inch and larger manufactured with twin spheres up to 12-inches and a single sphere on larger sizes and floating steel flanges recessed to lock the connectors raised face EPDM flanges.
- C. Rated a minimum of 150 psi at 220 degrees F. Pre-extended as recommended by the manufacturer to prevent additional elongation under pressure.

## 2.13 FLEXIBLE HOSE CONNECTOR

- A. Flexible stainless steel hoses manufactured using type 304 stainless steel hose and braid with one fixed and one floating raised face carbon steel plate flange.
- B. Sizes 2-1/2-inch and smaller may have threaded male nipples or copper sweat ends. Grooved ends are acceptable in all sizes in grooved piping systems. Weld ends are not acceptable. Copper sweat end hoses for water service all copper or bronze construction.
- C. Close pitch annular corrugations for maximum flexibility and low stiffness. Tested hose stiffness at various pressures must be included in the submittals.
- D. Capable of continuous operation at 150 psi and system test pressure when installed in piping systems.
- E. Same size as the pipe it connects and have pipe thread connectors on both ends with male or female end adapters as required.

## 2.14 EXPANSION JOINT/SEISMIC CONNECTOR

- A. T304 stainless steel hose and braid, Schedule 40 radius elbows and 180 degree bend, flange or weld end Schedule 40 fittings. ASA certified when used for natural gas service. Metraflex Metaloop only.
- B. Connector accepts differential support displacement without damaging pipe, equipment connections, or support connections.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Do not install equipment or pipe which makes rigid contact with the building.
- B. Installation or use of vibration isolators must not cause any change of position of equipment or piping which would result in stresses in piping connections or misalignment of shafts or bearings. In order to meet this objective, equipment and piping maintained in a rigid position during installation. Load not transferred to the isolator until the installation is complete and under full operational load.

- C. Correct, at no additional cost, all installations which are defective in workmanship or materials.

### 3.02 PREPARATION

- A. Treat isolators, including springs, hardware, and housing, with a corrosion protective coating of epoxy powder or electro galvanizing.
- B. Coat steel frames exposed to weather with a rustproof metal primer.
- C. Provide hot dipped galvanizing on steel frames as indicated on the plans for corrosion protection in severe conditions.

### 3.03 INSTALLATION

- A. General:
  - 1. Install isolation where indicated on the Drawings by type and location and where indicated below.
  - 2. Mark assigned code number on isolators and bases to assure placement in the proper location.
  - 3. Anchor isolator seismic housing baseplate to floor.
  - 4. Provide rubber grommets and washers to isolate the bolt from the building structure. Do not destroy the isolation efficiency destroyed when bolting the isolators to the building structure.

### 3.04 SEISMIC RESTRAINTS

- A. General:
  - 1. Install and adjust seismic restraints so that the equipment and piping support is not degraded by the restraints.
  - 2. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.
- B. Supported Equipment:
  - 1. Each vibration isolation frame for supported equipment have a minimum of four seismic snubbers mounted as close as possible to the vibration isolators and/or the frame extremities.
  - 2. Care must be taken so that the 1/4-inch air gap in the seismic restraint snubber is preserved on all sides in order that the vibration isolation potential of the isolator is not compromised. This requires that the final snubber adjustment be completed after the vibration isolators are properly installed and the installation approved.
- C. Bracing of Pipes:
  - 1. Branch lines may not be used to brace main lines.



2. **Transverse Bracing:** Maximum 40-feet, except where a lesser spacing is indicated in the SMACNA tables for bracing of pipes
3. **Longitudinal bracing** at 80-feet maximum except where a lesser spacing is indicated in the tables. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity to resist both the seismic load and the additional force induced by expansion and contraction.
4. A rigid piping system not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.
5. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24 inches of the elbow or tee.
6. Subject to confirmation by field inspection, seismic bracing is not required on piping when the piping is supported by rod hangers and the hangers in the entire run are 12-inches or less in length from the top of the pipe to the supporting structure, hangers are detailed to avoid bending of the hangers and their attachments and provisions are made for piping to accommodate expected deflections.

**D. Suspended Equipment, Piping, Cable Method:**

1. Adjust cables to a degree of slackness approved by the Structural Engineer.
2. Uplift and downward restraint nuts and Mason type RW neoprene covered steel rebound washers for the Type 6 hangers adjusted with a maximum 1/4-inch clearance.

**3.05 FIELD QUALITY CONTROL**

- A. **Installation Report:** Isolation manufacturer's representative confirms that isolation is installed correctly and submit report stating that isolators are installed as shown on Shop Drawings, isolators are free to work properly, and that installed deflections are as scheduled and as specified.

**END OF SECTION**

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**SECTION 22 05 53**

**IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Valve Identification
  - 2. Piping Markers
  - 3. Equipment Identification

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Valve Tag Directory: Submit for approval prior to fabrication of valve tags.
  - 2. Equipment Nameplate Directory: Submit for approval prior to fabrication.
  - 3. Operating and Maintenance Data: Include a copy of valve tag and equipment nameplate directories in each set of Operating and Maintenance manuals.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Piping Markers:
  - 1. W.H. Brady
  - 2. Seton
  - 3. Marking Systems, Inc. (MSI)
  - 4. Other Manufacturers: Submit substitution request.

**2.02 VALVE IDENTIFICATION**

**A. Valve Tags:**

1. General: Identify valves with metal tags, legends to be stamped or embossed. Indicate function of the valve and its normal operating position.

56 HW	(NUMBER AND CONTENT OF PIPE)
ISOLATION	(VALVE FUNCTION)
NO	(NORMAL OPERATION POSITION)

2. Size: Valve tags 2-inch diameter with 1/4-inch high letters.
3. Material: Use 0.04-inch brass tags.
4. Automatic Valves and Regulating Valves: Use 1/16-inch thick laminated 3-ply plastic, center ply white, outer ply red, lamicaid, or equal. Form letters by exposing center ply.
5. Buildings Systems: Contact the Owner for coordination with existing building tagging system and supplementary information required for specific systems before valve tagging begins.

- B. Valve Tag Directory:** Include tag number, location, exposed or concealed, service, valve size, valve manufacturer, valve model number, and normal operating position of valve.

**2.03 PIPING MARKERS**

- A. Label pipes with all-vinyl, self-sticking labels or letters.**

- B. For pipe covering sizes up to and including 3/4-inch outside diameter, select labels with 1/2-inch letters.**

- C. For sizes from 3/4 to 2-inch outside diameter, 3/4-inch letters, above 2-inches outside diameter, 2-inch letters.**

- D. Identify and color-code pipe markers as follows with black directional arrows.**

PLUMBING SERVICE	PIPE MARKER*	BACKGROUND COLOR
COLD WATER	DOMESTIC COLD WATER	GREEN
HOT WATER	DOMESTIC HOT WATER SUPPLY	YELLOW
	DOM. HOT WATER RECIRC	YELLOW OR GREEN
SANITARY WASTE	SANITARY WASTE	GREEN
STORM DRAIN	STORM DRAIN	GREEN
OVERFLOW DRAIN	OVERFLOW DRAIN	GREEN
VENT	VENT	GREEN
* Directional arrow applied adjacent to pipe marker indicating direction of flow.		
** Provide custom marker labels for piping for which no standard manufactured marker is available. Submit sample for approval.		

**2.04 EQUIPMENT IDENTIFICATION**

**A. Nameplates:**

1. Tag pumps, converters, and miscellaneous items of mechanical equipment with engraved nameplates.

2. 1/16-inch thick, 3-inch by 5-inch laminated 3-ply plastic, center ply white, outer ply black. Form letters by exposing center ply.
  3. Identify unit with code number as shown on Drawings and area served.
- B. Equipment Nameplate Directory:
1. List pumps, and other equipment nameplates.
  2. Include Owner and Contractor furnished equipment.
  3. List nameplate designation, manufacturer's model number, location of equipment, area served or function, disconnect location, and normal position of HOA switch.

### PART 3 - EXECUTION

#### 3.01 VALVE IDENTIFICATION

- A. Valve Tags:
1. Attach to valve with a brass chain.
  2. Valve tag numbers continuous throughout the building for each system.
  3. Obtain a list for each system involved from the Owner.
- B. Valve Tag Directory: Post final copy in Operation and Maintenance Manual.

#### 3.02 PIPING MARKERS

- A. Unless recommendations of ANSI A13.1 are more stringent, apply labels or letters after completion of pipe cleaning, insulation, painting, or other similar work, as follows:
1. Every 20-feet along continuous exposed lines.
  2. Every 10-feet along continuous concealed lines.
  3. Adjacent to each valve and stub-out for future.
  4. Where pipe passes through a wall, into and out of concealed spaces.
  5. On each riser.
  6. On each leg of a T.
  7. Locate conspicuously where visible.
  8. Provide pipe identification (over insulation) for reclaimed water systems in accordance with current local codes and rulings.
- B. Apply labels or letters to lower quarters of the pipe on horizontal runs where view is not obstructed or on the upper quarters when pipe is normally viewed from above.

- C. Apply arrow labels indicating direction of flow. Arrows to be the same color and sizes as identification labels.
- D. Install tags on specialty gas piping valves with brass chain.

**3.03 EQUIPMENT IDENTIFICATION**

- A. Nameplates: Attach to prominent area of equipment, with sheet metal screws, brass chain, or contact cement as applicable.
- B. Nameplate Directory: Post final copy in Operation and Maintenance Manual.

**END OF SECTION**

**SECTION 22 05 90**

**PRESSURE TESTING FOR PLUMBING SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Pressure Testing of Piping System

**1.03 QUALITY ASSURANCE**

- A. Code Compliance: Perform required tests in the presence of the authority having jurisdiction.
- B. Owner Witness: Perform all tests in the presence of the Owner's representative.
- C. Engineer Witness: The Engineer or Engineer's representative reserves the right to observe all tests or selected tests to assure compliance with the specifications.
- D. Simultaneous Testing: Test observations by the authority having jurisdiction, the Owner's Representative, and the Engineer's representative need not occur simultaneously.

**1.04 SUBMITTALS**

- A. Submit the following test reports:
  - 1. Certificate of completion, inspection and test by authority having jurisdiction on required piping systems.
  - 2. Certificate of test approval by Owner's representative on all systems.
  - 3. Engineer's representative will record witnessed tests.

**PART 2 - PRODUCTS – NOT APPLICABLE**

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Piping:
  - 1. Test prior to concealment, insulation being applied, and connection to equipment, fixtures, or specialties.
  - 2. Conduct tests with all valves but those used to isolate the test section 10 percent closed.
- B. Leaks: Repair leaks and retest until stipulated results are achieved.
- C. Notification:
  - 1. Advise the Construction Manager 72 hours in advance of each test.
  - 2. Failure to so notify will require test to be rescheduled.
- D. Testing Equipment: Provide necessary pumps, gauges, connections, and similar items required to perform the tests.

#### **3.02 TESTING REQUIREMENTS**

- A. Domestic Water Systems:
  - 1. Test entire system by closing openings in piping except highest opening and filling system with water to point of overflow.
  - 2. Keep water in system under test for a minimum of 45 minutes before inspection starts.
  - 3. Test at full working pressure for 2 hours with no drop allowed. Locate and repair leaks.
- B. Piping - General:
  - 1. Test piping as noted below, with no leaks or loss in pressure for time indicated.
  - 2. Testing Procedure:
    - a. Check systems to assure compliance with revision Drawings. Check pressure and temperature rating of all valves to assure compliance with Owner's design standard.
    - b. Check safety valves for pressure settings. In the event adjustments or corrections are required to assure conformance with drawings, they should be made prior to proceeding with the testing activity. Do not exceed pressure ratings of installed equipment.
    - c. Install and test gauges and test medium source connections made to convenient process connections. After completion of testing, the gauges and source connection removed and the specified process attachments replaced as shown on drawings.
    - d. Test joints with bubble leak detecting solution when pressure reading indicates leakage. The specified test pressure held as previously specified without loss in pressure.
    - e. Use gauges cleaned for O2 service.

**END OF SECTION**



**SECTION 22 05 93**

**TESTING, ADJUSTING, AND BALANCING FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes Testing and Balance of the following:
  - 1. Domestic Hot Water Recirculation Systems
- B. Related Sections include:
  - 1. Section 23 09 00, Instrumentation and Controls for HVAC

**1.03 QUALITY ASSURANCE**

- A. Acceptable Testing and Balancing Firms:
  - 1. RSA Analysis
  - 2. National Air Balance
  - 3. AIRCO Commercial Services
  - 4. United Mechanical Incorporated
- B. Other Firms: Submit substitution requests prior to bid date.
- C. Testing and Balancing Firm Qualifications:
  - 1. Procure the services of an independent balance and testing agency, approved by the Architect, which specializes in the balancing and testing of plumbing, heating, ventilating, and air conditioning systems, to balance, adjust and test water circulating and air moving equipment and air distribution or exhaust systems as herein specified.
  - 2. Testing agency to provide proof of having successfully completed at least five projects of similar size and scope.
  - 3. Testing and balancing work done under direct supervision of registered professional engineer who has been employed by the Agency a minimum of one year prior to start of project.

- D. **Industrial Standards:**
1. **NEBB, American Society of Heating, Refrigerating**
  2. **Air Conditioning Engineers (ASHRAE)**
  3. **American National Standards Institute (ANSI) as follows:**
    - a. **NEBB: Comply with Procedural Standards for Testing, Adjusting Balancing of Environmental Systems.**
    - b. **ASHRAE: Comply with recommendations pertaining to measurements, instruments, and testing, adjusting and balancing.**
    - c. **ANSI:**
      - 1) **S1.4 Specifications for sound level meters.**
      - 2) **S1.11 Specifications for Octave-Band and Fractional-Octave-Band analog and digital filters.**
- E. **Instrument Certification: Instruments used accurately calibrated and certified within six months of balancing and maintained in good working order.**
- F. **Test Observation: If requested, conduct test in the presence of the Architect or the Architect's representative.**
- G. **Pre-Balancing Conference:**
1. **Review with the Engineer prior to starting balancing, general techniques.**
  2. **Conference must occur prior to measuring existing conditions.**
  3. **Measuring of existing conditions must occur prior to any demolition or new work.**
  4. **Review existing conditions and systems to be affected by the project**

#### 1.04 SUBMITTALS

- A. **Submit the following:**
1. **Balancing Log:**
    - a. **Include water outlets, actual field measured water volume, and percentage of design volumes.**
    - b. **Provide drawings identifying location of outlets.**
  2. **Equipment Data Sheets:**
    - a. **Indicate actual equipment performance, model numbers, bearing and belt data, motor nameplate data, and final balanced motor data.**
  3. **Additional Data: Submit additional data as provided by Associated Air Balance Council (AABC) Standard forms.**
  4. **Number of Copies: Submit six copies of the above completed information to the Engineer for review and insertion into the Operating and Maintenance Data.**
  5. **Instrument Certification: When requested, submit certificate of calibration for equipment to be used.**
- B. **Record data on NEBB forms or forms approved by the Architect.**

### 1.05 PROJECT CONDITIONS

- A. Where existing systems are to be adjusted, establish flow rates in all branches prior to making any modifications to system. Submit preliminary report indicating existing conditions prior to making any modifications to existing systems. Adjust central equipment as required and restore unmodified branches and outlets to original condition. Obtain existing system drawings from Owner and become familiar with extent and nature of existing systems.
- B. Do not perform final testing, adjusting, and balancing work until equipment has been completely installed and operating continuously as required.
- C. Conduct testing and balancing with clean strainers and filters in place. Clean strainers, etc., prior to performing hydronic testing and balancing.

### 1.06 WARRANTIES

- A. In addition to the Requirements of the Contract, include an extended warranty of six months after completion of test and balance work during which time the Architect at his discretion may request a recheck or resetting of any equipment or device listed in the test reports.

## PART 2 - PRODUCTS – NOT APPLICABLE

## PART 3 - EXECUTION

### 3.01 DOMESTIC HOT WATER POINT OF USE MIXING VALVES

- A. General: Make measurements in accordance with Industrial Standards specified above. Record on appropriate forms.
- B. Preliminary:
  - 1. List complete data of tested equipment and verify against Contract Documents.
  - 2. Open line valves to full open position.
- C. Distribution:
  - 1. Adjust water flow for design conditions.
  - 2. Set mixing valve to achieve desired leaving water temperature.
  - 3. Set memory stops and mark position of adjuster on balancing valves.

### 3.02 AUTOMATIC CONTROL SYSTEM

- A. In cooperation with control manufacturer's representative, set and adjust automatically operated devices to achieve required sequence of operations.
- B. Testing organization to verify controls for proper calibration and list controls requiring adjustment by control system installer.

**3.03 COORDINATION**

- A. Coordinate work with other trades to ensure rapid completion of the project.
- B. Deficiencies noted during the course of balancing in the mechanical installation promptly reported to the Architect to allow corrective action to proceed.
- C. Provide periodic review of progress as requested.

**END OF SECTION**

**SECTION 22 07 00**

**INSULATION FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The provisions of Division 22, Plumbing Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Pipe Insulation
  - 2. Pipe Acoustical Wrap
  - 3. Block Insulation
  - 4. Accessories Piping
- B. Related Sections include:
  - 1. Section 22 05 29, Hangers, Supports and Anchors for Plumbing

**1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Insulating products prohibited from containing pentabrominated, octabrominated and decabrominated diphenyl ethers. Where products within this specification contain these banned substances, provide complying products from approved manufacturers with equal performance characteristics.
  - 2. Flame and Smoke Ratings: Installed composite flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by UL 723 or ASTM E84.
  - 3. Energy Codes: Local Building and Energy Codes govern where insulation performance requirements for thickness exceeds thickness specified.
- B. Protection: Protect against dirt, water, chemical, or mechanical damage before, during, and after installation. Repair or replace damaged insulation at no additional cost.
- C. Source Quality Control:
  - 1. Service: Use insulation specifically manufactured for service specified.
  - 2. Labeling: Insulation labeled or stamped with brand name and number.

3. Insulation and accessories not to provide nutritional or bodily use to fungi, bacteria, insects, rats, mice, or other vermin. Asbestos free and no interaction with corrosively with equipment, piping, or ductwork.

#### 1.04 SUBMITTALS

- A. Submit the following:
  1. **Product Data:** For each type including density, conductivity, thickness, jacket, vapor barrier, and flame spread and smoke developed indices.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Equivalent products by the following:
  1. Johns Manville
  2. Knauf
  3. Owens Corning
  4. CertainTeed
- B. Use one manufacturer for insulation.
- C. Other Manufacturers: Submit substitution request.

#### 2.02 PIPE INSULATION

- A. Fiberglass:
  1. Split sectional or snapon type with 0.23 per inch maximum thermal conductivity (K-factor) at 75 degrees F mean temperature, 850 degrees F maximum service rating and white, vapor barrier jacket with pressure sensitive closure system.
  2. **Manufacturer:** Johns Manville Microlok HP.
- B. Elastomeric:
  1. Expanded closed cell, 0.27 per inch maximum K-factor at 75 degrees F mean temperature, 220 degrees F maximum service rating with fitting covers and paintable surface.
  2. **Manufacturer:**
    - a. Armacell AP Armaflex
    - b. Rubatex
    - c. K-Flex
  3. **Color:**
    - a. **Concealed Locations:** Black
    - b. **Exposed Locations:** White.

## 2.03 PIPE ACOUSTICAL WRAP

### A. Barrier

1. Construct 0.10-inch thick mass loaded, limp vinyl sheet bonded to a layer of reinforced aluminum foil on one side.
2. Nominal density of 1 pound per square foot and minimum STC rating of 28.
3. Minimum thermal conductivity value of 0.29 and a rated service temperature range of -40 degrees F to 220 degrees F.
4. Flame spread index of no more than 10 and a smoke development index of less than 40.

B. Decoupling Layer: Combination of 1-inch fiberglass batting, nonwoven porous scrim-coated glass cloth, quilted together in a matrix of 4-inch diamond stitch pattern which encapsulates the glass fibers.

C. Composite Material: Fabricated to include a nominal 6-inch wide barrier overlap tab extending beyond the quilted fiber glass to facilitate a leak-tight seal around field joints.

## 2.04 BLOCK INSULATION

A. Fiberglass: 1-1/2-inch thick unless specified or shown otherwise with 3 pcf nominal density, 0.23 per inch maximum K-factor at 75°F mean temperature and 450°F maximum operating temperature limit.

## 2.05 ACCESSORIES PIPING

### A. Adhesives:

1. General: Maximum Flame Spread/Smoke Developed Rating of 25/50, SCAQMD Rule 1168 compliant.
2. Fiberglass: Integral closure system.
3. Calcium Silicate: Benjamin Foster 30-36.
4. Elastomeric: Armacell 520 BLV.

### B. Cements:

1. Insulating: Ryder.
2. Heat Transfer: Chemax Tracit-300.

C. Wire Mesh: 1-inch mesh with 20 gauge annealed steel wire.

### D. Pipe Fitting Covers:

1. One piece PVC insulated pipe fitting covers.
2. Zeston, Ceel-Co.

- E. Grooved Coupling Insulation:
  - 1. One piece PVC insulated fitting cover.
  - 2. Zeston, Ceel-Co.
- F. Metal Pipe Jacket: 0.016-inch thick aluminum jacket with formed fitting covers, aluminum snap straps and sealant.
- G. Cloth Facing: Presized fiberglass cloth.
- H. Tapes:
  - 1. Pressure sensitive, weather resistant, and for temperatures up to 150 degrees F.
  - 2. Zeston Z-tape.
- I. Paint: Ultraviolet resistant latex paint with special adherence capabilities to the PVC fitting covers, elastomeric, aluminum facing, Kraft paper, tapes and adhesives.

**PART 3 - EXECUTION**

**3.01 GENERAL**

- A. Workmanship:
  - 1. Installation: Insulation installed in first class, neat professional manner.
  - 2. Applicators: Employed by firm that specializes in insulation work.
- B. Preparation: Surfaces of piping and equipment clean, free of oil or dirt, and dry before insulation is applied.
- C. Stamps: ASME stamps, UL labels, and similar stamps and labels are not covered.

**3.02 PLUMBING PIPE AND EQUIPMENT INSULATION APPLIED LOCATIONS**

A. Insulation Applied Locations – Plumbing Piping:

System	Pipe Size	Insulation Type	Insulation Thickness	Notes
Domestic Hot Water Supply/Return, Above Grade	1-1/2-inch and smaller	Fiberglass, all-purpose jacket or Elastomeric	1 1/2-inch	Note 1 Note 2
	Above 1-1/2-inch	Fiberglass, all-purpose jacket	2-inch	Note 1
Note 1: Cover with metal pipe jacket where exposed to weather, and over heat trace cable. Note 2: Elastomeric insulation not allowed over heat trace cable.				

- B. The following piping is not insulated:
  - 1. Domestic cold water



2. Waste and vent, except where heat traced.
  3. Priming lines except where heat traced.
- C. Insulation include the following:
1. Fittings
  2. Unions
  3. Flanges
  4. Mechanical Couplings
  5. Valve Bodies
  6. Valve Bonnets
  7. Piping through Sleeves except Valve Bonnets
  8. Unions and Flanges need not be insulated on the following systems:
    - a. Domestic Hot Water
    - b. Inside Building
- D. Insulate valves and irregular fittings with section of pipe insulation and insulating cement, securely fastened, and finished with 6 ounce canvas and Foster 30-36 lagging adhesive.
- E. Flanges, valves, strainers, not requiring a vapor barrier to insulate with removable replaceable pads fabricated of 1-inch layer of Pittsburgh Corning Temp Mat sandwiched between inner and outer layer of 8 oz. glass cloth held together with stainless staples with sufficient stainless lacing hooks to hold pad firmly to flange or valve with minimum 3-inch overlap onto adjacent pipe insulation using 18 gauge SS facing wire.
- F. Expansion Joints and Flexible Connectors: Pipe insulation or block of same material and thickness as adjacent piping.

### 3.03 PIPING INSTALLATION

A. General:

1. Joints: Coat both sides of complete joining area with applicable adhesive.
  - a. Longitudinal Joints: Make joints on top or back of pipe to minimize visibility. Except foam plastic, seal with closure system or 3-inch wide tape.
  - b. Butt Joints: Butt lightly together and, except for foam plastic, seal with 3-inch wide lape or butt straps.
  - c. Multiple Layered Insulation: Joints staggered.
2. Access: Strainer and other items requiring service or maintenance with easily removable and replaceable section of insulation to provide access.
3. Voids: Fill all voids, chipped corners and other openings with insulating cement or material compatible with insulating material. In insulation with Heat Tracing: Where piping is shown or specified to be heat traced, bed heat tape into heat transfer cement with insulation over heat tape and cement.

4. Seal joints, seams, and fittings of metal watertight jackets at exterior locations.
- B. Fiberglass Insulation: Exterior insulation encased in metal jacket.
- C. Calcium Silicate Insulation:
1. Secure with 18-gauge wire embedded into insulation.
  2. Cover with continuous vapor barrier jacket.
- D. Elastomeric Insulation:
1. Slit full length and snap around pipe.
  2. Make cuts perpendicular to insulating surface leaving no cut section exposed.
  3. Do not stretch insulation to cover joints or fittings.
  4. Seal joints in elastomeric insulation with adhesive.
  5. Exterior insulation painted with two coats of specified paint in accordance with the manufacturer's instructions and encase in metal jacket.
  6. Sealing joints with tape will not be allowed.
- E. Fittings: Insulation specified with continuous vapor barrier, the vapor barrier must not be violated.
1. On Elastomeric Insulation: Fittings covered with covers made up of mitered sections of insulation or with formed pipe fitting covers.
  2. In Other Insulation: Fittings covered with insulation to the same level of the adjoining insulation or fill with insulating cement. Finish with pipe fitting covers or cloth facing and tape.
- F. Unions, Mechanical Joints, Valves, Etc.:
1. General:
    - a. As specified for fittings.
    - b. Minimum thickness same as specified for piping.
  2. Unions: Build up insulation at least 1/2-inch beyond adjoining insulation.
  3. Flanges: With square corners. Where flanges are not insulated, terminate adjacent insulation so flange bolts can be removed.
  4. Flanged Valves: Insulation with square corners.
- G. Vapor Barrier Insulation:
1. Refer to Section 22 05 29, Hangers, Supports, and Anchors for Plumbing for support requirements.
  2. Piping which requires vapor barrier protection of continuous vapor barrier, which may not be pierced or broken.

3. The following piping systems require vapor barrier protection:
    - a. Domestic cold water.
    - b. Industrial cold water.
    - c. Non-potable cold water.
    - d. Other piping systems with a nominal operating temperature below 65 degrees F.
  4. Vapor Barrier Insulation:
    - a. Insulation for pipe requiring vapor barrier protection 1-1/4-inch or smaller, insulation continuous through pipe hangers and rollers.
    - b. For pipe 1-1/2-inch and larger, 18-inch section of calcium silicate, same thickness as pipe insulation with continuous vapor barrier jacket at each hanger or roller. Provide pipe shield specified in Section 22 05 29, Hangers, Supports, and Anchors for Plumbing.
- H. Non-Vapor Barrier Insulation:
1. Refer to Section 22 05 29, Hangers Supports and Anchors for Plumbing for support requirements.
  2. For pipe 1-1/4-inch or smaller, insulation continuous through pipe hangers and rollers.
  3. For pipe 1-1/2-inch and larger, 18-inch section of calcium silicate, same thickness as pipe insulation. Provide pipe shield specified in Section 22 05 29, Hangers Supports and Anchors for Plumbing.
- I. Acoustical Wrap:
1. Install in accordance with the manufacturer's instructions.
  2. Applied locations for piping systems where specified or indicated on drawings.

### 3.04 EQUIPMENT INSTALLATION

- A. General: Install true and smooth. Insulation over curved surfaces conform to curves of surface.
1. Access:
    - a. Insulated removable heads, water boxes, pump casings, access, etc., that require service, inspection or maintenance provided with covers or section that are easily removable and replaceable.
    - b. Reinforce openings in adjacent insulation with metal beading. In vapor barriered insulation, coat joints with vapor barrier mastic.
  2. Voids, Depressions and Cavities: Fill voids, chipped corners, and other openings with insulating cement or material compatible with insulating material.
  3. Vapor Barrier Insulation: Barrier not to be pierced or broken.
    - a. Coat defects with vapor barrier mastic and patched with insulation facing or tape.
    - b. Staples brush coated with vapor barrier coating.
    - c. Cover raw edges coated with vapor barrier mastic sealed to equipment surface.
  4. Non-Vapor Barriered Insulation:
    - a. Patch tears with insulation facing or tape.
    - b. Cover and neatly bevel raw edges to equipment surface.

5. **Multilayered Insulation:** With staggered joints.
- B. **Fiberglass Block:**
1. **Anchors:** Lug nuts 10 gauge black annealed iron wire welded to metal surfaces.
  2. **Banding:** Block secured to surface with 1/2-inch wide stainless steel bands maximum 18-inches on center and secured to anchors.
  3. **Insulating Cement:** Block covered with insulating cement minimum thickness of 1/2-inch with smooth finish.
  4. **Vapor Barrier System:** Apply continuous coat of vapor barrier mastic.
  5. **Finish:** Finish with cloth facing secured with adhesive and lapped a minimum of 2 inches. Defects touched up with finishing cement.
- C. **Elastomeric Blanket:**
1. **Cut insulation to size, make corners with mitering cuts to preclude raw edges, continuously cement insulation to equipment with adhesive.**
  2. **Cement both surfaces of joints and bolt tightly together and cover raw edges with two coats of adhesive.**
- D. **Expansion Joints:** Covered with larger size pipe insulation to allow full movement and be removable, ends turned back to pipe, coat with vapor barrier mastic on joints in vapor barriered system and finished with cloth facing cemented to insulation with adhesive.

### 3.05 FIELD QUALITY CONTROL

- A. **Field Test:** Test and approve systems prior to installation of insulation.
- B. **Existing Insulation:**
1. **Repair existing insulation damaged during construction.**
  2. **Make neat connections where new and existing insulation meet.**
  3. **Where existing piping, or equipment is removed, cover existing surfaces neatly to match existing.**

**END OF SECTION**

**SECTION 22 21 13**

**PIPE AND PIPE FITTINGS PLUMBING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Section 22 05 00, Common Work Results for Plumbing apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Cast Iron Soil Pipe, Service Weight (No-Hub)
  - 2. Cast Iron Soil Pipe, Service Weight (Hub and Spigot)
  - 3. Black Steel Pipe, Schedule 40
  - 4. Galvanized Steel Pipe
  - 5. Copper Pipe
  - 6. Flanged Joints
  - 7. Unions
  - 8. Solder and Brazing
  - 9. Utility Markers
  - 10. Flexible Connector
- B. Related Sections Include:
  - 1. Section 22 25 00, Plumbing Water Treatment

**1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Piping material and installation to meet requirements of the local plumbing, fire, and building codes and serving utility requirements.
  - 2. Provide chlorination of domestic cold and hot water piping in accordance with County and State health requirements.

- B. Grooved Joint Couplings and Fittings:
  - 1. Products of a single manufacturer.
  - 2. Grooving tools of the same manufacturer as the grooved components.
  - 3. Castings used for coupling housings, fittings, valve bodies, etc., date stamped for quality assurance and traceability.
- C. Pipe Cleaning: If pipe gets plugged or should foaming of water systems occur, disconnect piping, reclean, and reconnect without additional expense to the Owner.
- D. Correct damages to the building or systems resulting from failure to properly clean the system without additional expense to the Owner.
- E. Products with a wetted surface installed in potable water systems UL classified in accordance with ANSI / NSF-61 for potable water service, and certified to the low lead requirements of NSF-372.

#### 1.04 SUBMITTALS

- A. Submit the following:
  - 1. List of piping materials indicating the service it is being used for. (Do not submit piping product data).
  - 2. Product data on mechanical couplings and related components, double wall fuel oil pipe and fittings, and polypropylene waste and vent pipe.
- B. Test Reports and Certificates: Submit certificates of inspections and pipe tests to Owner.
- C. Other: Make certified welders' certificates available.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. As indicated.

#### 2.02 CAST IRON SOIL PIPE, SERVICE WEIGHT (NO-HUB)

- A. General: A code approved hubless system conforming to Cast Iron Soil Pipe Institute Standard 301.
- B. Pipe and Fittings: Service weight hubless cast iron conforming to ASTM A 888, marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International. Tyler, AB&I, or Charlotte.
- C. Gaskets: Compression type conforming to ASTM C 564.
- D. Couplings: Above Grade: Band type coupling in conformance with Cast Iron Soil Pipe Institute (CISPI) 310-90, consisting of stainless steel clamp and corrugated shield assemblies with a neoprene sealing sleeve ANSI A21.6, ANSI A21.10 Fittings.

- E. Service: Above Grade: Sanitary waste, storm and overflow drain.

### 2.03 CAST IRON SOIL PIPE, SERVICE WEIGHT (HUB AND SPIGOT)

- A. General: Code approved hub and spigot pipe and fitting system conforming to ASTM A74 marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International.
- B. Gaskets: Compression type gaskets conforming to ASTM C564.
- C. Service: Below Grade: Sanitary waste, storm and overflow drain.

### 2.04 BLACK STEEL PIPE, SCHEDULE 40

- A. General:
  - 1. Fittings and joints must be UL listed for use with pipe chosen for use.
  - 2. Listing restrictions and installation procedures per state and local authorities must be followed.
- B. Pipe: Schedule 40 conforming to ASTM A 135 or A 53.
- C. Fittings:
  - 1. 150 pound screwed malleable iron on 2 inches and below, Schedule 40 welding fittings conforming to ASTM A 234 for 2-1/2 inches and above or mechanical couplings on select piping as herein specified.
  - 2. Fittings below grade; welding fittings.
  - 3. Elbows on pumped systems long radius type.
  - 4. Short radius elbows not acceptable for use except as approved on a case by case basis.
- D. Service: Natural gas piping and vent lines.

### 2.05 GALVANIZED STEEL PIPE

- A. Pipe: Schedule 40 conforming to ASTM A 135 or A 53.
- B. Fittings:
  - 1. 150 pound screwed galvanized malleable iron on 2-inch and below, Victaulic, Gruvlok, Gustin-Bacon, or Mech Line full flow galvanized, grooved end on 2-1/2-inch and above.
  - 2. Provide grooved type gasketed couplings and fittings for pipe 2-1/2-inch and above.
- C. Service: Miscellaneous indirect waste piping.

### 2.06 COPPER PIPE

- A. Pipe: Hard drawn copper tubing, Class L or K, ASTM B 88.

**B. Fittings:**

1. Wrought copper, 150 psi; ANSI B16.22 for soldered joints, ANSI B16.50 for brazed joints; Chase, Revere, Mueller or approved equal.
2. System using mechanically extracted collars in main with branch line inserted to not obstruct flow may be used on domestic water piping above ground, similar to T-drill.

**C. Service:**

1. Domestic hot and cold water piping below ground (Type K, hard drawn) on piping 3 inches and smaller.
2. Domestic hot and cold water piping above ground (Type L, hard drawn) on piping 4 inches and smaller.
3. Trap priming lines (Type L, annealed).
4. Cold water above grade (Type L) on piping 4-inch and smaller.
5. Miscellaneous drains and overflows.

**2.07 FLANGED JOINTS**

A. Cast iron or steel for screwed piping and forged steel welding neck for welded line sizes. Pressure rating and drilling match the apparatus, valve, or fitting to which they are attached.

B. ANSI B16.1; 150 pound for system pressures to 150 psig; 300 pound for system pressures 150 psig to 400 psig.

**C. Gaskets:**

1. Flanged services, except steam and pumped condensate, Garlock 3700 or equal, 1/8-inch thick, non-metallic type.
2. Steam and pumped condensate; Flexitaulic Style CG or equal, 1/8-inch thick, semi-metallic type.
3. Make joint using American Standard hexagon head bolts, lock washers, and nuts (per ASTM A307 GR.B) for service pressures to 150 psig; alloy steel stud bolts, lock washer, and American Standard hexagon head nuts (per ASTM A307 GR.B) for service pressures 150 psig to 400 psig.
4. Use length of bolt required for full nut engagement.
5. Provide electro-cad plated bolts and nuts on cold and chilled water lines.

**2.08 UNIONS**

A. 150 psi malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe. 200 psi WOG bronze, ground joint, solder type for copper tubing.



B. Dielectric Fittings:

1. Nationally listed, have a dielectric thermoplastic interior lining, and meet requirements of ASTM F1545.
2. Suitable for the pressure and temperature to be encountered.

**2.09 SOLDER AND BRAZING**

A. Brazed Joints:

1. Wrought Copper Piping Fittings: Westinghouse Phos-Copper or Dyna-Flow by J.W. Harris Co., Inc.
2. Applied locations:
  - a. Below grade piping.
  - b. Above grade piping larger than 2-inches for the following services: Cold water, domestic hot and cold water.
  - c. Joints in Domestic Hot and Cold Water Piping: Use mechanically extracted collars. Braze in accordance with Copper Development Association Copper Tube Handbook using BCUF series filler material.

B. Soldered Joints:

1. Wrought Copper Pipe Fittings: All-State 430 with Duzall Flux, Engelhard Silvabrite with Engelhard General Purpose Flux or J.W. Harris Co.
2. Valves, Cast Fittings or Bronze Fittings: Harris Slay-Silv-15 or Handy & Harmon Sil-Fos.
3. Applied locations: Above grade piping 2-inch and smaller for the following services: Domestic hot and cold water, trap priming lines.

**2.10 UTILITY MARKERS**

- A. Provide plastic tape utility markers over buried piping. Provide identification on tape.
- B. Material to be Brady Identoline plastic tape, 6-inch, Seton, or as approved.

**2.11 FLEXIBLE CONNECTOR**

A. Expansion Joint/Seismic Connector:

1. T304 stainless steel hose and braid, Schedule 40 radius elbows and 180° bend, flange or weld end Schedule 40 fittings. ASA certified when used for natural gas service. Metraflex Metaloop only.
2. Accept differential support displacement without damaging pipe, equipment connections, or support connections.
3. In steel piping systems, three Victaulic flexible couplings may be used in lieu of a flexible connector for vibration attenuation and stress relief at equipment connections. Place in close proximity to the vibration source.

B. Service:

1. Vent lines
2. Miscellaneous drains and overflows.
3. Domestic hot and cold water piping.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

A. Measurements, Lines and Levels:

1. Check dimension at the building site and establish lines and levels for work specified in this Section.
2. Establish inverts, slopes, and manhole elevations by instrument, working from an established datum point. Provide elevation markers for use in determining slopes and elevations in accordance with Drawings and Specifications.
3. Use established grid and area lines for locating trenches in relation to building and boundaries.

**3.02 EXCAVATION AND BACKFILL**

A. General:

1. Perform necessary excavation and backfill required for the installation of mechanical work in accord with Division 02, Existing Conditions.
2. Repair pipelines or other work damaged during excavation and backfilling.

B. Excavation:

1. Excavate trenches to the necessary depth and width, removing rocks, roots, and stumps. Include additional excavation to facilitate utility crossovers, additional offsets, etc.
2. Excavation material is unclassified.
3. Width of trench adequate for proper installation of piping.
4. Widen the trench if not wide enough for a proper installation.

C. Bedding:

1. Cast iron, steel, and copper piping on full bedded on sand.
2. Place a minimum 4-inch deep layer on the leveled trench bottom for this purpose. Remove the sand to the necessary depth for piping bells and couplings to maintain contact of the pipe on the sand for its entire length.
3. Lay other piping on a smooth level trench bottom so that contact is made for its entire length.

D. Backfill:

1. Place in layers not exceeding 8 inches deep, and compact to 95 percent of standard proctor maximum density at optimum moisture content.
2. Earth backfill free of rocks over 2 inches in diameter and foreign matter. Disposal of excess material as directed.
  - a. Interior: Backfill under interior slabs, bank sand or pea gravel.
  - b. Exterior:
    - 1) Excavated material may be used outside of buildings.
    - 2) The first 4-inches are sand, and final 12-inch layer course soil.

3.03 PIPING INSTALLATION

- A. Install unions in non-flanged piping connections to apparatus and adjacent to screwed control valves, traps, and appurtenances requiring removal for servicing so located that piping may be disconnected without disturbing the general system.
- B. Install piping as to vent and drain. Install according to manufacturer's recommendations.
- C. Support piping independently at apparatus so that its weight not to be carried by the equipment.
- D. Run piping clear of tube cleaning or removal/replacement access area on heat exchangers, water heaters, etc.
- E. Utility Marking:
  1. Installed over the entire length of the underground piping utilities.
  2. Install plastic tape along both sides and the center line of the trenches at the elevation of approximately 12 inches above the top of utility.
- F. Dielectric Fittings:
  1. Provide dielectric couplings, unions, or flanges between dissimilar metals.
  2. Provide dielectric couplings as required to isolate cathodically protected piping and equipment.
- G. No-Hub Couplings: Install per manufacturer's instructions.

3.04 PIPING JOINTS

- A. Pipe and fittings joined using methods and materials recommended by manufacturer in conformance with standard practice and applicable codes. Cleaning, cutting, reaming, grooving, etc. done with proper tools and equipment. Hacksaw pipe cutting prohibited. Peening of welds to stop leaks not permitted.
- B. Copper Piping: Pipe cut evenly with cutter, ream to full inside diameter; end of pipe and inside of fitting thoroughly cleaned and polished. Uniformly heat joint and capillary space completely filled with solder or braze material, leaving full bead around entire circumference.
- C. No couplings installed in floor or wall sleeves.

D. Steel Piping:

1. Screwed Joints:
  - a. Pipes cut evenly with pipe cutter reamed to full inside diameter with burrs and cuttings removed.
  - b. Joints made up with Teflon liquid dope or Teflon tape applied to male threads only, leaving two threads bare.
  - c. Joints tightened so that not more than two threads are left showing.
  - d. Junctions between galvanized steel waste pipe and bell of cast iron pipe made with tapped spigot or half coupling on steel pipe to form spigot end and caulked.
2. Flanged Joints:
  - a. Pressure rating of flanges match valve or fitting joined.
  - b. Coat joint gaskets with graphite and oil.

E. Welded Joints:

1. Preparation for Welding: Bevel piping on both ends before welding:
  - a. Use following weld spacing on butt welds:

Nominal Pipe Wall Thickness	Spacing	Bevel
1/4-inch or less	1/8-inch	37-1/2
Over 1/4-inch, less than 3/4-inch	3/16-inch	27-1/2
  - b. Before welding, remove corrosion products and foreign material from surfaces.
2. Welded Joints:
  - a. Joints made by arc-welding process using certified welders.
  - b. Port openings of fittings must match the inside diameter of the pipe to which they are welded.
  - c. Use full radius welding elbows for turns, use welding tees.
  - d. Reducing fittings must be used for size reduction.
  - e. Weldolets may be used for branches up through one-half the pipe size of the main to which they are attached.
  - f. Nipples are not allowed.
3. Welding Operation:
  - a. After deposition, clean each layer of weld metal to remove slag and scale by wire brushing or grinding. Chip where necessary to prepare for proper deposition of next layer.
  - b. Weld reinforcement no less than 1/16-inch not more than 1/8-inch above normal surface of jointed sections. Reinforcement crowned at center and taper on each side to surfaces being joined. Exposed surface of weld present professional appearance and be free of depressions below surface of jointed members.
  - c. Do not weld when temperature of base metal is lower than 0 degrees F. Material to be welded during freezing temperatures made warm and dry before welding is started. Metal warm to the hand or approximately 60 degrees F.
4. Above Grade No-Hub Couplings: Install in accordance with manufacturer recommendations.

3.05 INSTALLATION, PIPE WRAP

- A. Apply per manufacturer's written instructions.
- B. Apply wrapping to fittings in field after installation.

**3.06 ADJUSTING AND CLEANING**

A. General:

1. Clean interior of piping before installation.
2. Flush sediment out of piping systems after installation before connecting plumbing fixtures to the piping.
3. When placing the water systems in service during construction, clean each system prior to being placed in service.
4. Clean strainers prior to placing in service.

**END OF SECTION**

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**WSECTION 22 25 00**

**PLUMBING WATER TREATMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Section 22 05 00, Common Work Results for Plumbing apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Plumbing Water Treatment

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Shop Drawings
  - 2. Product Data
  - 3. Operating and Maintenance Data
  - 4. Certificate of Completion
  - 5. Treatment Reports

**PART 2 - PRODUCTS**

**2.01 MANUFACTURER**

- A. US Water Services
- B. Nalco
- C. Mogul
- D. Chemax
- E. Chemcoa
- F. DuBois Chemicals
- G. Other Manufacturer/Suppliers: Submit substitution request.

## 2.02 PLUMBING WATER TREATMENT

### A. Domestic Water Chlorination:

1. Chlorination accomplished by personnel in employed of firm licensed to do this type of work.
2. Potable water systems disinfected prior to use as outlined within the current state or local Plumbing Code or as prescribed by the Health Authority, whichever requirements are more stringent.
3. Chemicals: Sodium Hypochlorite 12.5 percent EPA registered for drinking water application.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

#### A. Plumbing Domestic Water Systems:

1. Provide 1/2-inch injection point on incoming water line immediately after the backflow device.
2. Flush system with fresh water to remove dirt and construction debris.
3. Open fixtures to develop slow rate of flow through system.
4. Injection Sodium Hypochlorite solution at a rate to achieve greater at 100ppm chlorine at fixtures.
5. Flush entire system so no chlorine is present.
6. Submit bacteriological samples to a certified laboratory to certify that the water is suitable for drinking. Deliver certificate stating purity of water to the Architect.

### 3.02 FINAL ADJUSTMENT

- A. When the systems are accepted by the Owner the chemical treatment supplier to make final adjustments in the required concentrations.
- B. Submit report of indicating initials and final concentrations and system chemistry.

END OF SECTION



**SECTION 22 30 00**

**PLUMBING EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Section 22 05 00, Common Work Results for Plumbing, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Water Heaters
- B. Related Sections include:
  - 1. Section 22 40 00, Plumbing Fixtures

**1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements: Water heaters to meet state energy code requirements.

**1.04 SUBMITTALS**

- A. Submit the following:
  - 1. Product data for each item specified.
  - 2. Operating and Maintenance Data

**PART 2 - PRODUCTS**

**2.01 WATER HEATERS**

- A. Electric Tankless Water Heater:
  - 1. Acceptable Manufacturer:
    - a. Eemax
    - b. Chronomite
    - c. Envirotech
    - d. Other Manufacturers: Submit substitution request.
  - 2. General: Wall mounted instantaneous water heater complete with but not limited to the following:
    - a. Replaceable element cartridge insert.

- b. Replaceable inlet filter.
  - c. Constant flow regulator.
  - d. Compression type water connections.
  - e. UL listed
3. Reference schedule on drawings for model number, KW rating, voltage, GPM, and rate of temperature rise.

**PART 3 - EXECUTION**

**3.01 ELECTRIC TANKLESS WATER HEATER**

- A. Install per manufacturer's installation guidelines and in accordance to applicable codes.

**END OF SECTION**

**SECTION 22 40 00**

**PLUMBING FIXTURES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The provisions of Section 22 05 00, Common Work Results for Plumbing HVAC apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Fixture Trim
  - 2. Plumbing Fixtures
  - 3. Drainage Products

**1.03 QUALITY ASSURANCE**

- A. Water Closets: Maximum Performance (MaP) score of no less than 800.
- B. Faucets: Certify to NSF/ANSI 61 and California AB1953.
- C. Electric Water Coolers and Drinking Fountains: Certified to NSF/ANSI 61 and California AB1953.
- D. Emergency Eyewash and Emergency Shower Equipment: Comply with ANSI Standard Z358.1.

**1.04 SUBMITTALS**

- A. Submit the following:
  - 1. Product data for each item specified.
  - 2. Operating and Maintenance Data:
    - a. Sensor Operated Faucets
    - b. Sensor Operated Flush Valves.
  - 3. Mounting heights for fixtures.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. **Manufacturers are stated for each fixture specified. The following manufacturers are also acceptable, except when indicated only.**
- B. **Drainage Products and Carrier Products:**
  - 1. J.R. Smith
  - 2. Josam
  - 3. Sioux Chief
  - 4. Zurn
  - 5. Wade
  - 6. Watts Drainage
  - 7. Woodford
  - 8. Mifab
- C. **Fixtures:**
  - 1. American Standard
  - 2. Kohler
  - 3. Sloan
  - 4. Toto
- D. **Seats:**
  - 1. Kohler
  - 2. Olsonite
  - 3. Church
  - 4. Beneke
  - 5. Bemis
- E. **Mixing Valves:**
  - 1. Powers
  - 2. Leonard
  - 3. Symmons

4. Chicago
- F. Stainless Steel Products:
1. Elkay
  2. Just
  3. Franke
- G. Water Filter
1. Pentek
  2. Aqua pure
  3. Watts PURE
- H. Faucets:
1. Chicago
  2. Delta Commercial
  3. Symmons
  4. Moen Commercial
  5. Hansgrohe
- I. Metering Faucets:
1. Chicago
  2. Symmons
- J. Disposals and Hot Water Dispenser:
1. In-Sink-Erator
- K. Flush Valves:
1. Sloan
  2. Zurn
- L. Sensor Operated Flush Valves:
1. Sloan
  2. Zurn
- M. Sensor Operated Faucets:
1. Sloan

2. Chicago
  3. Delta Commercial
  4. Moen Commercial
- N. Shock Arrestors:
1. PPP
  2. J.R. Smith
- O. Trap Primer Stations:
1. PPP.
- P. Exposed Waste and Supply Piping Insulation Kits:
1. Truebro
  2. McGuire
- Q. Other Manufacturers:
1. Submit substitution request.

## 2.02 FIXTURE TRIM

- A. Supply Stops: Chicago cast brass rigid riser supplies with loose key angle stops, wall flanges, NPT female inlet, chrome plate finish; equivalent NPT McGuire (LK series), Brasscraft (SCR series), or NPT stops by fixture supplier.
- B. Traps:
1. For floor drains, provide coated cast iron P-trap; recessed, screw jointed or bell and spigot.
  2. For other fixtures, provide 17 gauge, chrome plated cast brass P-Traps with solder bushings, and clean-out.
- C. Support Rims:
1. Hudee stainless steel rims, if sink not furnished with integral rim.
- D. Vacuum Breakers:
1. Chicago Faucet
  2. A.W. Cash
  3. Febco, chrome plated.

## 2.03 PLUMBING FIXTURES

### A. WC-1 Water Closet (ADA):

1. P-1A option: American Standard Afwall series, vitreous china, wall mounted, elongated bowl, siphon jet action, 1-1/2-inch top spud, white color finish, mounted at ADA mounting height.
2. P-1B option: American Standard Madera series, vitreous china, floor mounted, elongated bowl, siphon jet action, 1-1/2-inch top spud, white color finish, mounted at ADA mounting height.
3. Zurn AquaVantage AV series manual exposed dual action flush valve with triple filtered fixed bypass diaphragm. (1.6/1.1 GPF)
4. Kohler Lustra series white open-front seat, less cover with external check hinge including 300 series stainless steel post and pintles to stop seat at 11 degrees beyond vertical.
5. J.R. Smith Series 200 chair carrier.

### B. U-1 Urinal (ADA):

1. Kohler Dexter series, vitreous china, wall mounted washout urinal with 3/4-inch top spud, white color finish, mounted at ADA mounting height.
2. Sloan Ecos Plus series, battery powered, sensor activated flush valve with battery backup, and dual filtered fixed bypass diaphragm. (0.125 GPF).
3. J. R. Smith Series 600 floor mounted urinal support.

### C. L-1 Lavatory (Commercial, ADA):

1. Kohler Brenham wall mounted, 21-15/16-inch by 19-3/4-inch, vitreous china, 4-inch centers, wall hung, concealed arm carrier.
2. Zurn AquaSense series faucet, battery powered by 4 AA batteries, electronic sensor operated, 0.5 GPM spray head, vandal resistant complete.
3. J.R. Smith Series 700-Z concealed arm, floor mounted carrier or Smith Series 800 wall plate.
4. Sloan mechanical point of use mixing valve installed below deck.
5. TrueBro Lav Shield 2018-OK-B to fit Kohler Brenham. Lavatory rough in should be performed to allow mounting room for water heater behind enclosure.

### D. S-1 Sink:

1. Elkay Lustertone Series, 23-1/2-inch by 18-1/4-inch by 4-7/8-inch single compartment 18 gauge, 3 hole, self-rimming, type 304 stainless steel sink, Perfect Drain Strainer assembly.
2. Hansgrohe Focus Series faucet with polished chrome plated solid brass body construction, single lever mixing valve, 10-inch cast brass spout, high temperature limit stop, 1.75 GPM pressure compensating laminar flow outlet, vandal resistant complete.

- E. DF-1 Drinking Fountain (ADA):
  - 1. Elkay EZH20 series dual height wall hung water cooler with bottle filling station
  - 2. Surface mounted
  - 3. Push pad operated bubblers
  - 4. Anti-microbial bubbler guards
  - 5. Bottle Filler:
    - a. Sensor activated
    - b. 20 second automatic shut-off
    - c. 1.1 GPM
  - 6. Water Chiller:
    - a. 8 GPH, 50 degree F water at 90 degree F ambient and 80 degree F inlet water temperature.
    - b. 120V, single phase, 5 FLA
  - 7. 3000 gallon water filter

## 2.04 DRAINAGE PRODUCTS

- A. HB-1 Hose Bibb: Chicago 952 Series, chrome-plated, removable key, 3/4-inch hose thread, integral vacuum breaker.
- B. FD-1 Floor Drain: J.R. Smith 2005 Series, round nickel bronze vandal resistant grate, cast iron body with flashing collar and adjustable strainer head and no-hub outlet.
- C. WCO Wall Cleanout: J.R. Smith 4530 Series, round stainless steel vandal resistant cover and screw.
- D. FCO Floor Cleanout: J.R. Smith 4020 Series, round vandal resistant, nickel bronze top.
- E. Trap Priming Valves:
  - 1. Precision Plumbing Products Prime-time electronic trap priming manifold including but not limited to: atmospheric vacuum breaker, pre-set 24 hour clock, manual over ride, 120V slow closing solenoid valve, calibrated manifold for equal water distribution.
  - 2. Components pre-installed in recessed steel cabinet with SS access door.
- F. Water Hammer Arrester: Precision Plumbing Products Model SC (Maintenance-Free).

## PART 3 - EXECUTION

### 3.01 FIXTURE TRIM

- A. Provide plumbing fixture trim where applicable on fixtures, including but not limited to supply stops, traps, support rims, flush valve, and vacuum breakers.



- B. Provide rough-in and final piping connection to fixtures. Carefully review construction documents to assure that fixtures are provided with necessary services for a complete operating system.
- C. Rigidly secure rough-in piping, carriers and supports, and other service piping to structure.

### 3.02 PLUMBING FIXTURES

- A. Americans with Disabilities Act:
  - 1. Those fixtures indicated by ADA complies with and be installed in accordance with Americans with Disabilities Act Guidelines (ADAAG). Follow building codes where applicable building code requirements are more stringent than ADAAG guidelines.
  - 2. Water Closets:
    - a. Mounting height of ADA water closet 17-inches to 19-inches from floor to top of the toilet seat.
    - b. Mount flush valve for ADA water closets on wide side of enclosure.
  - 3. Lavatories:
    - a. Mounting height of ADA lavatories at a maximum height of 34 inches from floor to rim.
    - b. Provide insulation kits on exposed hot water and waste piping beneath ADA lavatories.
  - 4. Sinks: Provide insulation kits on exposed hot water and waste piping beneath ADA sinks.
  - 5. Urinals: Mounting height of ADA water closet at a maximum height of 17-inches from floor to to rim.
- B. Fixture Mounting Heights: Fixtures standard rough-in catalogued heights unless shown otherwise on the Architectural Drawings.
- C. Water Supplies: When both hot and cold water to a fixture is required, connect the hot on the left and the cold on the right.
- D. Floor Mounted Supports and Chair Carriers:
  - 1. Secure floor mounted supports and chair carriers to slab with a minimum of 1/2-inch bolts.
  - 2. Install supports and carriers per manufacturer's installation instructions.
- E. Lavatories:
  - 1. Public Toilet Room: Grid strainers.
  - 2. Those lavatories indicated as ADA are ADA compatible. Coordinate with Architect to verify if wall hung lavatories are to be installed at ADA height.
- F. Floor Drain and Floor Sinks:
  - 1. Set top flush with finished floor.

2. Provide flashing clamp for drain bodies installed in floors provided with waterproof membranes.
- G. Cleanout:
1. Where shown or required.
  2. Cover set flush with finished surface.
- H. Water Hammer Arresters: Provide where shown and where recommended by Plumbing Drainage Institute (PDI).
- I. Water Coolers and Drinking Fountains:
1. Water-bearing materials comply with the Safe Drinking Water Act of 1986 and the Lead Contamination Control Act of 1988. The waterway system of the unit manufactured of copper components and other completely lead-free materials.
  2. Water cooler refrigerants will be non-CFC.
  3. Provide fixture manufacturer's wall mounting plate or floor mounted support for wall-hung water coolers or drinking fountains.
- J. Mixing Valves: Provide piping connections per manufacturer's installation instructions.
- K. Wall hung lavatories with pop-up waste assemblies: Verify there is no vertical pull rod assembly conflict with lavatory backsplash prior to submitting product data.

### 3.03 PRIMING VALVES

- A. Prime floor drains, floor sinks and similar traps. Use minimum 3/8-inch type K annealed copper tubing. Primer line to be continuous and without joints.
- B. Where priming valves are installed in finished rooms, conceal in wall and provide access panel.
- C. Coordinate locations of electronic trap primer stations with electrical contractor for 120V service.

**END OF SECTION**

**SECTION 23 05 00**

**COMMON WORK RESULTS FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.
- C. Sections of Division 23, HVAC are interrelated. When interpreting any direction, material, and method specified in any section of Division 23, HVAC, consider it within the entirety of Work in Division 23, HVAC.

**1.02 SUMMARY**

- A. The intent of Division 23, HVAC Specifications and the accompanying Drawings is to provide a complete and workable facility with complete systems as shown, specified and required by applicable codes. Include Work specified in Division 23, HVAC and shown on the accompanying Drawings, including appurtenances, connections, etc., in the finished job.
- B. The Division 23, HVAC Specifications and the accompanying Drawings are complementary. Items shown on the Drawings are not necessarily included in the Specifications and vice versa. Specifications supersede drawings in case of conflict.
- C. Imperative language is frequently used in Division 23, HVAC Specifications. Except as otherwise specified, requirements expressed imperatively are to be performed by the Contractor.
- D. The Drawings that accompany the Division 23, HVAC Specifications are diagrammatic. They do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Offsets and transitions assumed at a minimum at each duct crossing, structural penetrations through shear walls or beams, structural grids where ceiling heights are restricted, and at piping mains. Follow the Drawing as closely as is practical to do so and install additional bends, offsets and elbows where required by local conditions from measurements taken at the Building, subject to approval, and without additional cost to the Owner. The right is reserved to make any reasonable changes in outlet location prior to roughing-in, without cost impact.

**1.03 RELATED WORK**

- A. The General and Supplemental Conditions apply to this Division, including but not limited to:
  - 1. Drawings and specifications.
  - 2. Public ordinances, permits.
  - 3. Include payments and fees required by governing authorities for work of this Division.

- B. Division 01, General Requirements, General Requirements, applies to this Division.

#### 1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Products and equipment prohibited from containing pentabrominated, octabrominated, and decabrominated diphenyl ethers. Where products or equipment within this specification contain these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.
2. General: Work and materials conforms to the local and State codes, and Federal, State and other applicable laws and regulations.
3. Contractor responsible for obtaining and payment for permits, licenses, and inspection certificates required in accordance with provisions of Contract Documents.

B. Materials and equipment: New and defective free. Work good quality, free of faults and defects and in conformance with the Contract Documents.

C. Apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.

D. The entire mechanical system and apparatus operate at full capacity without objectionable noise or vibration.

E. Install equipment level and true. Housekeeping pads and curbs account for floor or roof slope.

F. Materials and Equipment:

1. Each piece of equipment furnished meet detailed requirements of the Drawings and Specifications and suitable for the installation shown. Equipment not meeting requirements will not be acceptable, even though specified by name along with other manufacturers.
2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer. Component parts of the entire system need not be products of same manufacturer.
3. Furnish materials and equipment of size, make, type, and quality herein specified.
4. Equipment scheduled by performance or model number considered the basis of the design. If other specified manufacturer's equipment is provided in lieu of the basis of design equipment the contractor is responsible for changes and costs which may be necessary to accommodate this equipment, including different sizes and locations for connections, different electrical characteristics, different dimensions, different access requirements or any other differences which impact the project.

G. Workmanship:

1. General: Install materials in a neat and professional manner.
2. Manufacturer's Instructions: Follow manufacturer's directions where they cover points not specifically indicated. If they are in conflict with the Drawings and Division 23, HVAC Specifications, obtain clarification before starting work.

H. Cutting and Patching:

1. Cutting, patching, and repairing for the proper installation and completion of the work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting performed by skilled craftsmen of each respective trade in conformance with the appropriate Division of Work.
2. Additional openings required in building construction made by drilling or cutting. Use of jackhammer is specifically prohibited.
3. Fill holes which are cut oversize so that a tight fit is obtained around the sleeves passing through.
4. Do not pierce beams or columns without permission of Architect and then only as directed.
5. Restore new or existing work cut or damaged to its original condition. Where alterations disturb lawns, paving, walks, etc., the surfaces repaired, refinished, and left in condition existing prior to commencement of work.

1.05 SUBMITTALS

A. Shop Drawings:

1. Indicate the general layout of the piping, ductwork, and various items of equipment. Coordination with other trades and with field conditions will be required. For this purpose, prepare Shop Drawings of piping, ductwork and equipment installations. Shop Drawings new drawings prepared by Contractor and not reproductions or tracings of Architect's Drawings. Overlay drawings with shop drawings of other trades and check for conflicts. Drawings the same size as Architect's Drawings with title block similar to Contract Drawings and identifying Architect's Drawing number or any reference drawings. Fully dimensioned including both plan and elevation dimensions. Shop drawings cannot be used to make scope changes.
2. Prepared in two-dimensional format.
3. Include but are not limited to:
  - a. Complete floor plans with sheet metal and HVAC piping to a minimum of 1/4-inch equals 1-foot scale.
  - b. Sheet metal and HVAC piping of mechanical and fan rooms to a minimum of 1/2-inch equals 1-foot scale.
  - c. Sections of congested areas to a minimum of 1/2-inch equals 1-foot scale.
  - d. Controls and Instrumentation: Scale and drawing sizes to suit controls supplier.
  - e. Fabricated Equipment: Scale and drawing sizes to suit contractor except equipment not less than 1/4-inch equals 1-foot scale.
  - f. Superplot plans of above ground work with a colored overlay of trades including, but not limited to, HVAC piping, HVAC equipment, plumbing piping and equipment, sprinklers, lighting, lighting controls, cable tray, fire alarm devices, electrical power conduit, and ceiling system to a minimum of 1/2-inch equals 1-foot scale.
  - g. Superplot plans of below ground work with a colored overlay of trades including, but not limited to, structural footings and foundation, HVAC piping, civil piping, plumbing piping, and power conduit to a minimum of 1/2-inch equals 1-foot scale.
  - h. Beam penetration drawings indicating beam penetrations meeting the requirements indicated on the floor plans and on the structural drawings to a minimum of 1/4-inch equals 1-foot scale.

- i. Slab penetration drawings of HVAC, plumbing, sprinklers, lighting and electrical to a minimum of 1/4-inch equals 1-foot scale.
  - j. Fabrication drawings of radiant ceiling panels, architectural metal ceiling, including panel penetrations for lighting, sprinkler heads, fire alarm devices, and any other penetrations.
4. Submit shop drawings for review prior to beginning fabrication. Additional shop drawings may be requested when it appears that coordination issues are not being resolved in the field or when there is a question as to whether contract documents are being complied with or the design intent is being met.

**B. Product Data:**

1. In general, submit product data for review on scheduled pieces of equipment, on equipment requiring electrical connections or connections by other trades, and as required by each specification section or by Drawing notes. Include manufacturer's detailed shop drawings, specifications and data sheets. Data sheets include capacities, RPM, BHP, pressure drop, design and operating pressures, temperatures, and similar data. Manufacturer's abbreviations or codes are not acceptable.
2. List the name of the motor manufacturer and service factor for each piece of equipment.
3. Indicate equipment operating weights including bases and weight distribution at support points.
4. In the case of equipment such as wiring devices, time switches, valves, etc., specified by specific catalog number, a statement of conformance will suffice.

**C. Submission Requirements:**

1. Shop Drawings and Product Data:
  - a. Refer to Division 01, General Requirements for additional requirements related to submittals.
  - b. Submit electronic copies of shop drawings and product data for Work of Division 23, HVAC in PDF format with each item filed under a folder and labeled with its respective specification section number, Article and paragraph and mark if applicable.
  - c. Include a complete index in the original submittal. Indicate both original items submitted and note stragglers that will be submitted at a later date to avoid delay in submitting.
  - d. The bulk of the shop drawings and product data, excepting Controls and Instrumentation, included with the original submittal. Controls and Instrumentation submittals may lag but complete when submitted. Partial submittals will not be accepted. Other stragglers submitted after return of the original binder includes a tab similar to that originally submitted. Upon receipt of the returned late submittal, insert them in the previously submitted binder.

**D. Contractor Responsibilities:**

1. Submit submittals one time and are in proper order.
2. Ensure that equipment will fit in the space provided.
3. Assure that deviations from Drawings and Specifications are specifically noted in the submittals. Failure to comply will void review automatically.

**1.06 AS-BUILT DRAWINGS**

- A. Provide 3D model and record drawings at the end of the project on CD-ROM.
- B. 3D model in the following format:
  - 1. Revit
- C. Record Drawings: Provide hard copies and pdf format.
  - 1. Drawings include the following:
    - a. Project Specific Title block.
    - b. Notations reflecting the as built conditions of any additions to or variations from the construction documents provided as part of the BIM coordination, RFIs, ASIs, Owner Changes and Field Coordination.

**1.07 OPERATING AND MAINTENANCE MANUAL, PARTS LISTS, AND OWNER'S INSTRUCTIONS**

- A. Refer to Division 01, General Requirements for additional requirements.
- B. Submit three bound copies of manufacturer's operation and maintenance instruction manuals and parts lists for each piece of equipment or item requiring servicing. Literature on 8-1/2-inch by 11-inch sheets or catalogs suitable for side binding. Submit data when the work is substantially complete, packaged separately, and clearly identified in durable 3-ring binder. Include name and contact information for location of source parts and service for each piece of equipment. Clearly mark and label in each submittal, the piece of equipment provided with the proper nameplate and model number identified. Provide wiring diagrams for electrically powered equipment.
- C. Instruct Owner thoroughly in proper operation of equipment and systems, in accordance with manufacturer's instruction manuals. Operating instructions cover phases of control.
- D. Furnish competent engineer knowledgeable in this building system for minimum of five 8-hour days to instruct Owner in operation and maintenance of systems and equipment. Keep a log of this instruction including dates, times, subjects, and those present and present such log when requested by Architect.

**1.08 PROJECT CONDITIONS**

- A. Existing Conditions: Prior to bidding, verify and become familiar with existing conditions by visiting the site, and include factors which may affect the execution of this Work. Include related costs in the initial bid proposal.
- B. Coordinate exact requirements governed by actual job conditions. Check information and report discrepancies before fabricating work. Report changes in time to avoid unnecessary work.
- C. Coordinate shutdown and start-up of existing, temporary, and new systems and utilities. Notify Owner, the City and Utility Company.

**1.09 WARRANTY**

- A. Provide a written guaranty covering the work of this Division (for a period of one calendar year from the date of acceptance by the Owner) as required by the General Conditions.

- B. Provide manufacturer's written warranties for material and equipment furnished under this Division insuring parts and labor for a period of one year from the date of Owner acceptance of Work of this Division.
- C. Correct warranty items promptly upon notification.

#### 1.10 PROVISIONS FOR LARGE EQUIPMENT

- A. Make provisions for the necessary openings in building to allow for admittance of equipment.

#### 1.11 TEST REPORTS AND CERTIFICATES

- A. Submit one copy of test reports and certificates specified herein to the Architect.

#### 1.12 SUBSTITUTIONS

- A. Submit requests for product substitutions in accordance with the Instructions to Bidders and the General and Supplemental Conditions.

### PART 2 - PRODUCTS

#### 2.01 ACCESS PANELS

- A. Furnish under this Division as specified in another Division of work.

#### 2.02 PIPE AND DUCT SLEEVES

- A. Interior Wall and Floor Sleeves: 16 gauge galvanized steel, or another pre-approved system.
- B. Interior Wall and Floor Sleeves (fire rated): Fire rated and water tight system approved by Authority Having Jurisdiction and Owners Insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping material, size and service.
- C. Exterior Wall Sleeves: Cast iron
- D. On Grade Floor Sleeves: Same as exterior wall sleeves.
- E. Water Tight Sleeves: Combination steel pipe sleeves with water stop and anchor plate; Link Seal Model WS, mated with synthetic rubber links interlocked with bolts and nuts; Link Seal Model LS.

#### 2.03 FLOOR, WALL AND CEILING PLATES

- A. Furnish stamped split type plates as follows:
  - 1. Floor Plates: Cast brass, chromium plated.
  - 2. Wall and Ceiling Plates: Spun aluminum.

#### 2.04 MACHINERY GUARDS

- A. Furnish guards for protection on rotating and moving parts of equipment. Provide guards for metal fan drives and motor pulleys, regardless of being enclosed in a metal cabinet.



- B. Design guards so as not to restrict air flow at fan inlets resulting in reduced capacity.
- C. Provide shaft holes in guards for easy use of tachometers at pulley centers. Guards easily removable for pulley adjustment or removal and changing of belts.
- D. Meet OSHA requirements including back plates.
- E. Provide inlet and outlet screens on fans in plenums or where exposed to personnel.

**2.05 ELECTRICAL EQUIPMENT**

- A. General: Equipment and installed work as specified under Division 26, Electrical.
- B. Coordinate with the electrical Drawings and electrical contractor for minimum electrical equipment bracing requirements based on the available fault current rating at the bus of the panelboard or switchboard serving the piece of equipment. Provide equipment with a Short Circuit Current Rating (SCCR) that meets the bracing requirement.
- C. Motors – AC Induction:
  - 1. Furnish as integral part of driven equipment.
  - 2. Drip proof induction type with ball bearings unless noted otherwise.
  - 3. Motors 1 hp and above premium energy efficient type, except for emergency equipment motors.
  - 4. Built to NEMA Standards for the service intended.
  - 5. Rated for voltage specified, suitable for operation within the range of 10 percent above to 10 percent below the specified voltage.
  - 6. Energy Efficient Motors:
    - a. Baldor
    - b. Westinghouse
    - c. General Electric
    - d. Or approved equal.
  - 7. Meet the efficiency standards identified in the table below as determined using the IEEE Method B test at full load.

MINIMUM MOTOR EFFICIENCIES					
		RPM			
		IEEE 112B Efficiency			
HP	KW	900	1200	1800	3600
1	0.75	--	82.5	85.5	80.0
1.5	1.15	--	86.5	86.5	85.5
2	1.53	--	87.5	86.5	86.5
3	2.3	84.0	89.5	89.5	88.5
5	3.8	85.5	89.5	89.5	89.5
7.5	5.6	87.5	91.7	91.7	91.0
10	7.5	88.5	91.7	91.7	91.7
15	7.5	88.5	91.7	92.4	91.7
20	15.9	90.2	92.4	93.0	92.4
25	18.8	91.0	93.0	93.6	93.0
30	22.5	91.0	93.6	94.1	93.0

MINIMUM MOTOR EFFICIENCIES					
		RPM IEEE 112B Efficiency			
40	30.0	91.7	94.1	94.5	93.6
50	37.5	92.4	94.1	94.5	94.1
60	45.0	93.0	94.5	95.0	94.1
75	56.3	93.0	95.0	95.4	94.5
100	75.0	93.0	95.4	95.4	95.0
125	93.8	94.5	95.4	95.4	95.4
150	112.5	94.5	95.8	95.8	95.4
200	150.0	94.5	95.8	96.2	95.8
250	187.5	94.5	95.1	96.2	95.1
300	225.0	94.5	95.3	96.2	95.3
350	225.0	94.5	95.3	96.2	95.3
400	300.0	94.5	95.4	96.2	95.4
450	337.5	94.5	95.5	96.2	95.5
500	375.0	94.5	95.6	96.2	95.6

8. Refer to Equipment Schedules on the Drawings for motor horsepower, voltage, and phase.
  9. Refer to individual product sections for additional motor requirements.
  10. Furnish motors on belt drive equipment of nominal nameplate horsepower not less than 120 percent of equipment brake horsepower required for performance specified.
  11. Built-in thermal overload protection, or be protected externally with separate thermal overload devices with low voltage release or lockout. Hermetically sealed motors have quick trip devices.
  12. Motors controlled by variable frequency drives inverter duty rated and have Class F insulation or better. Withstand repeated voltage peaks of 1600 volts with rise times of 0.1 microseconds and greater in accordance with NEMA Standard MG1 Part 31.
  13. Motors served from variable frequency drives equipped with shaft grounding system which provides a path for current to flow between the shaft and motor frame. SGS or equal.
  14. Motors located in environment air plenums not tied to air handling functions totally enclosed type motors.
  15. Motors installed on cooling towers totally enclosed type TEFC.
- D. Motors – Electronic Commutation (EC):
1. Furnished as integral part of driven equipment.
  2. Permanently lubricated with ball bearings unless noted otherwise.
  3. Internal motor circuitry converts AC power supplied to the motor to DC power to operate the motor.
  4. Speed controllable down to 20 percent of full speed.
  5. Motor efficiency at a minimum of 85 percent at all speeds.

6. Refer to Equipment Schedules on the Drawings for motor horsepower, voltage, and phase.
  7. Refer to individual product sections for additional motor requirements.
  8. Built-in thermal overload protection, or be protected externally with separate thermal overload devices with low voltage release or lockout. Hermetically sealed motors have quick trip devices.
  9. Motors located in environment air plenums not tied to air handling functions totally enclosed type motors.
- E. Starters: Provided under Division 26, Electrical, suitable for performing the control functions required, with the exception of self-contained equipment and where the starters are furnished as part of the control package.
- F. Equipment Wiring:
1. Interconnecting wiring within or on a piece of mechanical equipment provided with the equipment unless shown otherwise.
  2. This does not include the wiring of motors, starters and controllers provided under Division 26, Electrical.
- G. Control Wiring: Control wiring for mechanical equipment provided under Section 23 09 00, Instrumentation and Controls for HVAC.
- H. Codes: Electrical equipment and products bear the UL label as required by governing codes and ordinances.

### **PART 3 - EXECUTION**

#### **3.01 ACCESS PANELS**

- A. Install in accord with manufacturer's recommendations, coordinated with architectural features.
- B. Provide 2-hour fire rated doors where required bearing the UL label.
- C. Furnish 18-inch by 18-inch panels for ceilings and for access to equipment in soffits and shafts, and 12-inch by 12-inch for walls unless indicated otherwise.
- D. Furnish where indicated and where required to access valves, fire/smoke dampers, trap primers, shock arresters, and other appurtenances requiring operation, service or maintenance. Submit proposed locations for review prior to installation.

#### **3.02 SLEEVES**

- A. Interior Floor and Wall Sleeves:
1. Provide sleeves large enough to provide 3/4-inch clearances around pipe or ductwork.
  2. Where pipe or ductwork is insulated, insulation pass continuously through sleeve with 3/4-inch clearance between insulation and sleeve.

3. Penetrations through mechanical room and fan room floors watertight by packing with safin insulation and sealing with Tremco Dymeric Sealant or approved system.
- B. Sleeves Through Rated Floors and Walls: Similar to interior sleeves except install fire rated system approved by Authority Having Jurisdiction and Owners insurance underwriter, with rating equal to floor or wall penetration, and designed specifically for the floor or wall construction, piping or duct material, size and service.
- C. Sleeves specified or indicated at fire damper penetrations take precedence over this article.
- D. Exterior Wall Sleeves Below Grade:
  1. Provide water tight sleeves. Install at pipes entering building below grade and where shown.
  2. Adjust to provide positive hydrostatic seal.
  3. Follow manufacturer's procedure for installing and tightening seal.
  4. Secure sleeves against displacement.
- E. On Grade Floor Sleeves: Same as below grade exterior wall sleeves, caulked from inside.
- F. Exterior Wall Sleeves Above Grade: Similar to interior wall sleeves except caulk outside with Tremco Dymeric Sealant.
- G. Layout work prior to concrete forming. Do cutting and patching required. Reinforce sleeves to prevent collapse during forming and pouring.
- H. Floor sleeves maintain a water barrier by providing a water tight seal or they extend 1-inch above finished floor except through mechanical equipment room floors and shafts where sleeves extend 2-inches above finished floor level. Sleeves through roof extend 8-inches above roof. Wall sleeves flush with face of wall unless otherwise indicated.
- I. Do not support pipes by resting pipe clamps on floor sleeves. Supplementary members provided so pipes are floor supported.
- J. Special sleeves detailed on drawings take precedence over this Section.

### 3.03 CLEANING

- A. General: Clean mechanical equipment, piping and ductwork of stampings and markings (except those required by codes), iron cuttings, and other refuse.
- B. Painted Surfaces: Clean scratched or marred painted surfaces of rust or other foreign matter and paint with matching color industrial enamel, except as otherwise noted.
- C. Additional requirements are specified under specific Sections of this Division.

### 3.04 EQUIPMENT PROTECTION

- A. Keep pipe, ductwork and conduit openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, conduit, ductwork, equipment and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore damaged or contaminated fixtures, equipment, or apparatus to original conditions or replace at no cost to the Owner.
- B. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.
- C. Cover or otherwise suitably protect equipment and materials stored on the job site.

### 3.05 ACCESSIBILITY

- A. General: Locate valves, thermometers, cleanout fittings and other indicating equipment or specialties requiring frequent reading, adjustments, inspection, repairs, and removal or replacement conveniently and accessibly with reference to the finished building.
- B. Thermometers and Gauges: Install thermometers and gauges so as to be easily read from the floors, platforms, and walkways.

### 3.06 FLOOR, WALL, AND CEILING PLATES

- A. Install on piping and ductwork passing through finished walls, floors, ceilings, partitions, and plaster furrings. Plates completely cover opening around pipe and duct.
- B. Secure wall and ceiling plates to pipe, insulation, or structure.
- C. Plates not to penetrate insulation vapor barriers.
- D. Plates not required in mechanical rooms or unfinished spaces.

### 3.07 PAINTING

- A. General: Coordinate painting of mechanical equipment and items with products and methods in conformance with the appropriate Division of Work, Painting. Exposed work under this division receives either a factory painted finish or a field prime coat finish, except:
  - 1. Exposed copper piping.
  - 2. Aluminum jacketed outdoor insulated piping.
- B. Equipment Rooms and Finished Areas:
  - 1. Insulation: Not painted.
  - 2. Hangers, Uninsulated Piping, Miscellaneous Iron Work, Structural Steel Stands, Uninsulated Tanks, and Equipment Bases: Paint one coat of black enamel.
  - 3. Steel Valve Bodies and Bonnets: One coat of black enamel.
  - 4. Brass Valve Bodies: Not painted.

5. **Equipment:**
    - a. One coat of grey machinery enamel.
    - b. Do not paint nameplates.
  6. **Grilles, Diffusers, Registers:** Paint sheet metal and visible ductwork behind grilles, diffusers and registers flat black.
- C. **Concealed Spaces (above ceilings, not visible):**
1. **Insulation:** Not painted.
  2. **Hangers, Uninsulated Piping, Miscellaneous Iron Work, Valve Bodies and Bonnets:** Not painted.
- D. **Exterior Steel:** Wire brush and apply two coats of rust-inhibiting primer and one coat of grey exterior machinery enamel.
- E. **Roof Mounted Equipment:** Paint two coats of exterior machinery enamel. Color as selected by Architect. Where factory standard finish is indicated in the equipment specification, it is assumed that the standard finish is painted.
- F. **Exterior Black Steel Pipe:** Wire brush and apply two coats of rust-inhibiting primer and one coat of exterior enamel. Painting schemes comply with ANSI A13.1.

### 3.08 ADJUSTING AND CLEANING

- A. **Before operating any equipment or systems,** make thorough check to determine that systems have been flushed and cleaned as required and equipment has been properly installed, lubricated, and serviced. Check factory instructions to see that installations have been made accordingly and that recommended lubricants have been used.
- B. **Use particular care in lubricating bearings to avoid damage by over-lubrication and blowing out seals.** Check equipment for damage that may have occurred during shipment, after delivery, or during installation. Repair damaged equipment as approved or replace with new equipment.

### 3.09 ELECTRICAL EQUIPMENT

- A. **Ductwork or piping for mechanical systems not serving electrical space not installed in switchgear room, transformer vault, telephone room, or electric closet except as indicated.**
- B. **Ductwork or piping for mechanical systems not to pass over switchboards or electrical panelboards. Where conflicts exist, bring to attention of Architect.**

### 3.10 EQUIPMENT CONNECTIONS

- A. **Make final connections to equipment specified in sections other than Division 23, HVAC of the specifications and Owner furnished equipment in accordance with manufacturer's instructions and shop drawings furnished and as indicated.**
- B. **Piping:**
  1. **Connections include steam supply, steam vent, and condensate.**

2. Provide valves and specialties as specified and as detailed on the Drawings. Provide increasers, reducers, and any other fittings required for complete installation.
  3. Support piping connections independently to prevent undue strain on equipment.
- C. Ductwork: Make exhaust connections to fume hoods, emergency generator radiators, and any other processing, laboratory, or kitchen equipment in strict accordance with manufacturer's instructions.
- D. Engine Exhaust: Make connections as necessary for complete working installation to the emergency generators as indicated and specified.

**END OF SECTION**

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**SECTION 23 05 14**

**VARIABLE FREQUENCY DRIVES FOR HVAC EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Variable Frequency Drives
- B. Related Section include:
  - 1. Section 23 09 00, Instrumentation and Controls for HVAC

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Product data on variable frequency drives and related components.
  - 2. Startup log/check list showing successful operation.
  - 3. Operation and maintenance data.

**PART 2 - PRODUCTS**

**2.01 VARIABLE FREQUENCY DRIVES**

- A. Acceptable Manufacturers:
  - 1. Reliance
  - 2. Toshiba
  - 3. ABB
  - 4. Emerson
  - 5. Yaskawa
  - 6. Square D

7. Siemens
8. Safronics
9. Allen-Bradley
10. Danfoss
11. Cerus
12. Other Manufacturers: Submit substitution request.

**B. General Description:**

1. Variable Frequency AC Motor Drive (VFD):
  - a. Pulse width modulated (PWM) inverter type.
  - b. Designed to convert 60 Hz input power to adjustable frequency output power to provide positive speed control to standard induction motors.
  - c. Dedicated variable torque design for specific use with centrifugal loads.
2. Provide completely solid state variable frequency power and logic unit.
3. Speed control to be stepless throughout the range under variable torque load on continuous basis. Speed controlled by remote building energy management system providing 4-20MA input signal to drive and remote start/stop signal. Coordinate with Section 23 09 00, Instrumentation and Controls for HVAC.
4. Provide adjustable frequency control with diode bridge/capacity input designed to provide high, constant power factor of 0.95 regardless of load or speed and eliminate SCR line noise.
5. Equipment will be designed and manufactured in accordance with applicable current NEMA and IEEE recommendations and be designed for installation per NEC. Equipment will be UL listed and bear the UL label.
6. Control suitable for operation in ambient temperatures of 32 degrees F to 104 degrees F.
7. Factory tested with an AC induction motor 100 percent loaded and temperature cycled within an environmental chamber at 104 degrees F.

**C. Self-Protection and Reliability Features:**

1. Adjustable current limit to 60 percent to 110 percent of drive rating.
2. Adjustable instantaneous overcurrent trip.
3. Under voltage trip.
4. Over temperature trip.
5. Short circuit protection phase to phase and phase to ground faults phase rotation insensitive.
6. Momentary power loss, more than 17 milliseconds.

7. Transient protection against normal transients and surges in incoming power line.
8. Orderly shutdown in event of any of above conditions, drive designed to shut down safely without component failure.
9. Provide visual indication and manual reset.

D. Standard Features:

1. Drive Logic: Microprocessor based
2. Control Logic: Isolated from power circuitry.
3. Standalone operation to facilitate start up and troubleshooting procedures.
4. UL 508C listed for drives serving a single motor or UL 508A listed for drives serving multiple motors, for use on distribution systems with 22,000 AIC.
5. Output voltages equal to applied input voltage.
6. Isolated signal inputs.
7. Frequency Stability. Output frequency will be held to +0.1 percent of maximum frequency regardless of load, +10 percent input voltage change or temperature changes within ambient specification.
8. Built-in digital display indicates output frequency, voltage, and current and provides indication of over current, over voltage, current limit, ground fault, over temperature, input power on, minimum or maximum speed adjustment, power on, fault condition. Display on panel face.
9. Start/Stop Control - Controlled decelerated stop.
10. Primary and secondary fused for a control circuit transformer.
11. Minimum and maximum speed control.
12. Adjustable Accel/Decel - independently adjustable 10-100 second.
13. Hand-Off auto switches.
14. Programmable Auto Restart - after power outage.
15. Provide fused disconnect, including auxiliary contacts to isolate control circuit when disconnect is in "off" position, except fused disconnects not required where packaged equipment is provided with a single point connection with single point disconnect and internal overcurrent protection for VFD and motors.
16. Remote contacts for fault, and on/off status.
17. Adjustable motor output voltage.
18. Analog output voltage of 0-10 VDC, -20 MA proportional to control output frequency.

19. Provide a NEMA 1 enclosure for indoor applications and NEMA 3R enclosure for outdoor applications to isolate each motor starter and control section with its associated disconnect switch.
20. Manual speed control for each motor.
21. Manual bypass (3 contactor) to provide ability to service control while motor is operational.
22. Provide RF, and EMI, noise suppression network to limit RF and EM interference.
23. Provide isolated analog output signals for volts, amps, and frequency, from each VFD for connection to the building energy management system.
24. Provide line (input) reactors.
25. Provide output filters for VFD's located more than 25 conductor feet from the motor they serve. Output reactors permit VFD's to be located up to 350-feet from the motors they serve.
26. Design VFD to catch spinning load in forward and reverse direction.
27. Harmonic Calculations: Perform on manufacturer supplied Harmonic Analysis program to provide conformance with IEEE 519-1992.

E. Communications:

1. Provide factory installed communication chip for direct network connection to DDC Control System specified in Section 23 09 00, Instrumentation and Controls for HVAC. Interface allows for control and interface functions specified herein and in Section 23 09 00, Instrumentation and Controls for HVAC. Interface control functions and information includes, but not be limited to the following:
  - a. Start/Stop
  - b. Change Directions
  - c. Drive Fault
  - d. Drive Fault Codes
  - e. Reset Drive
  - f. Percent Output
  - g. Speed
  - h. Power
  - i. Drive Temp
  - j. KWH
  - k. Run Time
2. Provide isolated analog output signals for volts, amps and frequency from each VFD for connection to the DDC Control System specified in Section 23 09 00, Instrumentation and Controls for HVAC.
3. Provide RS485 communications port and programming software capability.

F. Drives for smoke control systems:

1. The drive must be protected in an environment that meets manufacturer recommendation.

2. Do not permit the motor to run into the service factor of the motor.
3. Settings for drive operation and proper speed control cannot be stored in volatile memory subject to loss in a power loss.
4. Smoke detection system must meet UL 864 standard, UL 508.
5. The VFD must be capable of operation from a contact closure from an alarm panel.  
When override/alarm panel is active:
  - a. Drive operates at a preset speed.
  - b. Drive ignores keypad commands to include Auto, OFF, or Hand Mode or even removal of keypad panel.
  - c. Drive ignores commands from communication links.
  - d. Drive ignores digital inputs except override activation/deactivation, Run Enable and Start Enable.
  - e. Drive displays message indicating it is operating in override operation.
  - f. No safeties are to be wired to the VFD. The VFD is only used for smoke and purge control. The VFD is to ignore faults when operating in Override Mode.

### **PART 3 - EXECUTION**

#### **3.01 VARIABLE FREQUENCY DRIVE INSTALLATION**

- A. Install VFD in accordance with manufacturer's written installation instructions.
- B. Install on strut support stand.
- C. Provide one drive for each motor as scheduled.

#### **3.02 START UP**

- A. General: Comply with manufacturer's instructions for startup.
- B. Provide under direct supervision of the manufacturer's representative with factory trained personnel.

#### **3.03 FIELD QUALITY CONTROL**

- A. Prior to installation, manufacturer's representative coordinate variable speed drive control interface with the controls contractor and verify that intended installation (controls, wiring, etc.) complies with the manufacturer's recommendations.
- B. Field Test: Except where initial variable speed drive operation clearly shows the performance meets or exceeds the requirements, test to show compliance. Tests performed by the manufacturer's representative in the presence of the Engineer.

**END OF SECTION**

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**SECTION 23 05 19**

**METERS AND GAUGES FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Thermometers - Water
  - 2. Pressure Gauges - General
  - 3. Differential Pressure Gauges
  - 4. Water Meter

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Products listed in this section.
  - 2. Water flow meters, include graph of output signal vs. gpm for each device.
  - 3. Operating and Maintenance Data.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Thermometers - Water:
  - 1. Ashcroft
  - 2. Weiss
  - 3. Terice
  - 4. Marsh
  - 5. Weksler

6. Tel-Tru
  7. Other Manufacturers: Submit substitution request.
- B. Pressure Gauges - General:
1. Marsh
  2. Ashcroft
  3. Weiss
  4. Terice
  5. Weksler
  6. Tel-Tru
  7. Other Manufacturers: Submit substitution request.
- C. Differential Pressure Gauges:
1. Between Rooms: Dwyer magnahelic Model 2000-00, 0-0.25 inches of water range.
  2. Across Filters: Dwyer magnahelic Model 2002-AF, 0-2.0 inches of water range with air filter gauge accessory package.
- D. Water Meter:
1. Hersey
  2. Badger
  3. Sparling.
  4. Other Manufacturers: Submit substitution request.

## 2.02 THERMOMETERS - WATER

- A. Direct drive 4-1/2-inch dial type, stainless steel case, separable sockets, stem length to penetrate minimum of 1/2 pipe diameter, adjustable face, extension necks where required to clear insulation.
- B. Range:

HVAC Systems	Temperature	Graduations
Heating Water	30-240 degrees F	2 degrees F

## 2.03 PRESSURE GAUGES - GENERAL

- A. Description: 4-1/2-inch dial, molded black polypropylene turret case.
- B. Range:

HVAC Systems	Pressure	Graduations
Heating Water	0-100 psi	1 psi



#### 2.04 DIFFERENTIAL PRESSURE GAUGES

- A. Description: Surface mounted diaphragm-actuated dial type with zero pointer adjustment. Provide 4-inch minimum dial diameter with black figures on a white background.
- B. Tubing: Copper; polytube may be used if concealed inside walls.

#### 2.05 WATER METER

- A. Description:
  - 1. Disc type meter, bronze split casing, magnetic drive.
  - 2. Heavy duty gear train, completely sealed, circular meter, totalize in cubic feet with sweep hand.
  - 3. Comply with AWWA performance standards.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION - GENERAL

- A. Provide meters and gauges where shown on Drawings.
- B. Install gauges and meters as required and as recommended by equipment manufacturer or their representative.
- C. Extend connections, wells, cocks, or gauges to a minimum of 1-inch beyond insulation thickness of the various systems.
- D. Locate gauges so that they may be conveniently read at eye level or easily viewed and read from the floor or from the most likely viewing area, i.e., platform, catwalk, etc.
- E. Install instruments over 6-feet-6-inches above floor, to be viewed from the floor, with face at 30 degrees to horizontal.

#### 3.02 INSTALLATION - PRESSURE GAUGES

- A. Provide instrument gauge cock at inlets.
- B. Locate pressure gauge taps for measuring pressure drop or increase across pumps, coils, etc., as close to the device as possible.

#### 3.03 WATER METER

- A. Installed in accord with manufacturer's recommendations and as shown on the Drawings.

**END OF SECTION**

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**SECTION 23 05 23**

**GENERAL DUTY VALVES AND SPECIALTIES FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Gate Valves
  - 2. Globe Valves
  - 3. Check Valves
  - 4. Ball Valves
  - 5. Butterfly Valves
  - 6. Balancing Valve
  - 7. Automatic Flow Control Valves
  - 8. Pressure Independent Control Valve
  - 9. Specialty Valves
  - 10. System Specialties
  - 11. Integrated Coil Piping Connector
  - 12. Diaphragm Expansion Tank System
  - 13. Bladder Expansion Tank System
  - 14. Water Buffer Tank
  - 15. Air Separator – High Efficiency Coalescing
  - 16. N-Line Air Purger
  - 17. Pressure Reducing Valve (Closed Hydronic System Feed)
  - 18. Water Relief Valves

19. Strainers
20. Suction Diffusers
21. Triple Duty Valve
22. Water Filters
23. Differential Pressure Regulator Valve

### 1.03 SUBMITTALS

- A. Submit product data.
- B. Submit balancing valve schedule with manufacturer, model, size, flow rate and pressure drop.
- C. Submit automatic flow control valve schedule with manufacturer, model, size, flow rate and pressure drop.
- D. Submit pressure independent control valve schedule with manufacturer, model, size, flow rate and pressure drop.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER VALVES

- A. General: Where only NIBCO figure numbers are listed, equivalent products by those specified below are acceptable.
- B. Gate Valves:
  1. Apollo
  2. Victaulic
  3. Crane
  4. Kennedy
  5. Stockham
  6. Milwaukee
  7. Walworth
  8. Hammond
- C. Globe Check:
  1. Apollo
  2. Victaulic
  3. Crane

4. Kennedy
  5. Stockham
  6. Milwaukee
  7. Walworth
  8. Hammond
- D. Check Valves:
1. Mueller
  2. Metraflex
  3. Victaulic
  4. Bell and Gossett
  5. Milwaukee
  6. Gruvlok.
- E. Ball Valves:
1. Gruvlok
  2. Apollo
  3. Crane
  4. Hammond
  5. Milwaukee
  6. Victaulic
- F. Butterfly Valves:
1. Apollo
  2. Victaulic
  3. Gruvlok
  4. Crane
  5. Walworth
  6. Milwaukee
  7. Metraflex

G. Balancing Valve:

1. DeZurik
2. Homestead
3. Bell and Gossett
4. Armstrong
5. Walworth
6. Taco
7. Wheatley
8. Tour & Andersson
9. Victaulic
10. Gruvlok
11. NIBCO

H. Automatic Flow Control Valves

1. Griswold
2. Flow Design
3. Other Manufacturers: Submit substitution request.

I. Pressure Independent Control Valve

1. Belimo.
2. Oventrop.
3. Other Manufacturers: Submit substitution request.

J. Specialty Valves

K. System Specialties

1. Manual Air Vents:
  - a. Coin type
  - b. Dole 9
  - c. Or approved equal.
2. Automatic Air Vents:
  - a. Hoffman 78
  - b. Amtrol
  - c. Armstrong
  - d. Spirax-Sarco Engineering
  - e. Spirotherm Spirolop

- f. Other Manufacturers: Submit substitution request.
  - 3. Pressure/Temperature Test Plug:
    - a. Peterson Engineering, Inc.
    - b. Universal Lancaster
    - c. Sisco
    - d. Trerice
    - e. Other Manufacturers: Submit substitution request.
- L. Integrated Coil Piping Connector
  - 1. Griswold Controls
  - 2. HGi
- M. Diaphragm Expansion Tank System
  - 1. Amtrol
  - 2. Bell & Gossett
  - 3. Armstrong
  - 4. Wheatley
  - 5. Taco
  - 6. Other Manufacturers: Submit substitution request.
- N. Bladder Expansion Tank System
  - 1. Amtrol, Bell & Gossett
  - 2. Armstrong
  - 3. Wheatley
  - 4. Taco
  - 5. Other Manufacturers: Submit substitution request.
- O. Air Separator – High Efficiency Coalescing
  - 1. Spirotherm Spirovent.
  - 2. CALEFFI.
  - 3. Other Manufacturers: Submit substitution request.
- P. N-Line Air Purger
  - 1. American Air Purger Model 720 eliminator.
  - 2. Other Manufacturers: Submit substitution request.

**Q. Pressure Reducing Valve (Closed Hydronic System Feed)**

1. Bell & Gossett
2. Armstrong
3. Taco
4. Amtrol
5. Cash Acme
6. Other Manufacturers: Submit substitution request.

**R. Water Relief Valves**

1. Consolidated
2. Kunkle Valve
3. B&G, Armstrong
4. Cash Acme
5. Other Manufacturers: Submit substitution request.

**S. Strainers**

1. General:
  - a. NIBCO
  - b. Armstrong
  - c. McAlear Mfg. Co.
  - d. Sarco, Inc.
  - e. Steamflo
  - f. Mueller
  - g. R.P. & C. Company
  - h. Titan Flow Control
  - i. Other Manufacturers: Submit substitution request.
2. Grooved Coupling Systems:
  - a. Gruvlok
  - b. Victaulic

**T. Suction Diffusers**

1. General
  - a. Bell & Gossett
  - b. Armstrong
  - c. Taco
  - d. Amtrol
  - e. Wheatley
  - f. Paco
  - g. Mueller
  - h. Other Manufacturers: Submit substitution request.



2. Grooved Piping Systems:
  - a. Gruvlok
  - b. Victaulic
  
- U. Triple Duty Valve
  1. General:
    - a. B&G Triple Duty Valve
    - b. Armstrong
    - c. Amtrol
    - d. Wheatley
    - e. Paco
    - f. Mueller
    - g. Taco
    - h. Other Manufacturers: Submit substitution request.
  
  2. Grooved Piping Systems
    - a. Gruvlok
    - b. Victaulic
  
- V. Water Filters
  1. Pall
  2. Millipore
  3. Other Manufacturers: Submit substitution request.
  
- W. Differential Pressure Regulator Valve
  1. Jordan Mark 67D
  2. Hoffman
  3. Clayton
  4. Other Manufacturers: Submit substitution request.
  
- X. Other Manufacturers: Submit substitution request.
  
- Y. Use one manufacturer on valves.
  
- Z. Threaded, flanged, soldered, or grooved valve ends, as applicable to piping system. Refer to Section 23 21 13, Pipe and Pipe Fittings HVAC for allowable fittings.

## 2.02 GATE VALVES

- A. Bronze Gate: Bronze body, bronze trim, bronze screwed bonnet; solid wedge, 150 psi steam rating (use bonnet on steam service), 300 psi WOG, NIBCO 134.
  
- B. Bronze Gate, High Pressure: Bronze body, bronze union bonnet, solid wedge, 200 psi steam; NIBCO 154.

### 2.03 GLOBE VALVES

- A. Bronze Globe and Angle Globe: Bronze body, bronze mounted, renewable composition disc, 150 psi rating; NIBCO 235 or 335.

### 2.04 CHECK VALVES

- A. Horizontal Bronze Swing Check: Bronze body, bronze mounted, regrinding bronze disc, 150 psi steam rating, 300 psi WOG; NIBCO 433-Y.
- B. Vertical and Silent Check Valves:
  - 1. 250 pounds WOG, iron body, stainless steel trim, globe type with flanged ends; NIBCO 960.
  - 2. 300 psig CWP, ductile iron body, stainless steel spring and shaft, Victaulic Series 716.
  - 3. 230 psig CWP, AGS grooved end ductile iron body, stainless steel spring, shaft, and disc, EPDM seat, Victaulic Series W715.
- C. Vertical and Silent Check Valves: 250-lb. WOG, iron body, stainless steel trim, wafer type; NIBCO W-960.

### 2.05 BALL VALVES

- A. Bronze Ball: Bronze cast body or forged brass, chrome-plated full port ball, with handle, Teflon seat, 300 psi WOG, 150 psi steam; NIBCO 585-70 or Victaulic Series 589.
- B. PVC Ball: PVC Body, trunnion mounted, Teflon seat, Viton seals, socket type connection; True Blue GSR Asahi.

### 2.06 BUTTERFLY VALVES

- A. Copper Grooved Piping System Butterfly Valve: Nylon coated or Cast bronze body per Copper Development Agency-836, ductile iron disc encapsulated with EPDM coating, lever handle up to 6-inches, gear operator on valves 8-inches and greater, stem length to accommodate insulation, 300 psi water; Victaulic Series 608, per ASTM A-584.
  - 1. Grooved ends manufactured to copper-tubing sizes. Flaring tube or fitting ends to accommodate alternate sized couplings is not permitted.

### 2.07 BALANCING VALVE

- A. Calibrated:
  - 1. Y-pattern globe style design. Valve to perform the following functions: Precision flow measurement, precision flow balancing, memory stops, positive shut-off to a minimum of 250 psi, drain port suitable for hose bibb fitting. Threaded or solder ends for 1/2-inch through 2-inches. 1/2-inch valve capable of balance to 0.5 GPM. Grooved or flanged ends for 2-1/2-inches through 12-inches. Tour & Andersson, Armstrong CBV, Gruvlok GBV, NIBCO CBV 1710, 737.
  - 2. Size balancing valves based on the published performance curve characteristics for the scheduled flow rate for each location to ensure proper operation at design conditions.

## 2.08 AUTOMATIC FLOW CONTROL VALVES

- A. Furnish automatic pressure compensating flow control valves.
- B. Valves factory set and calibrated within 5 percent of indicated water flow rate. Provide taps for measuring of flows with quick disconnect valves.
- C. Field adjustable flow rate with adjustable flow control cartridge.
- D. Provide identification tags for each valve indicating type, flow characteristics, etc.
- E. Pressure range for each valve is shown on Drawings.
- F. 150 psi operating pressure.
- G. Provide strainers and isolation valves separately from flow control valves, where required.
- H. Size flow control valves based on the published performance curve characteristics for the scheduled flow rate for each location to ensure proper operation at design conditions.

## 2.09 PRESSURE INDEPENDENT CONTROL VALVE

- A. Acceptable Manufacturers:
- B. Description:
  - 1. Chilled Water and Heating Water Control Valves: Dynamic, modulating, 2-way control device.
  - 2. Dynamic control valve accurately controls flow, independent of system pressure fluctuation, from 0 to 100 percent full rated flow.

## 2.10 SPECIALTY VALVES

- A. Gauge Cocks: Brass, tee handle, male to female, 200 psi working pressure, 1/4 inch; Conbraco 41 series.
- B. Drain Valves: Bronze globe valve or full port ball valve, garden hose end, cap and chain 3/4 inch size.

## 2.11 SYSTEM SPECIALTIES

- A. Automatic Air Vents: Water main type, cast brass body, built-in check valve, 1/8-inch I.P.S. top tapping for moisture discharge, 3/4-inch size, 150 psi operating pressure.
  - 1. General: 1/2-inch N.P.T. fitting to receive either a temperature or pressure probe 1/8-inch O.D., fitted with a color coded and marked cap with gasket.
  - 2. Material: Solid brass with valve core of NORDEL.
  - 3. Rating: Minimum 300 psig at 275 degrees F.
  - 4. Gauges and Thermometers: Supply Owner with two pressure gauge adapters with 1/8-inch O.D. probe and two five-inch stem pocket test thermometers 25 degrees - 125 degrees F for chilled water, 40 degrees -240 degrees F for heating water.

## 2.12 INTEGRATED COIL PIPING CONNECTOR

- A. Full port forged brass isolation valves with integral union and pressure temperature port, strainer where indicated, flow meter, balance valve with memory stop, air vents, and drains.
- B. Use of integrated flexible braided hoses is not acceptable.
- C. Provide integrated flexible hose assembly. Flexible hoses meet the requirements of Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.
- D. Use the same manufacturer as approved assembly supplier listed in this section or other approved manufacturers listed for each component in other sections of this specification.
- E. Meet the specifications for each component as listed on other sections of the specification.
- F. Capable of continuous operation at 150 psi and system test pressure when installed in piping systems.
- G. Assembly the same size as the pipe it connects and have pipe thread connectors on both ends with male or female end adapters as required, except the balancing valve may be a smaller size as required to balance the flow.

## 2.13 DIAPHRAGM EXPANSION TANK SYSTEM

- A. Expansion Tank:
  - 1. Diaphragm type of welded steel, constructed and stamped in accordance with ASME Code for 125 psi working pressure.
  - 2. Support with steel legs or bases for vertical installation or steel saddles for horizontal installation.
  - 3. Precharge with compressed air to minimum fill pressures.

## 2.14 BLADDER EXPANSION TANK SYSTEM

- A. Expansion Tank:
  - 1. Bladder type of welded steel, constructed and stamped in accordance with ASME Code for 125 psi working pressure.
  - 2. Support with steel legs or bases for vertical installation or steel saddles for horizontal installation.
  - 3. Precharge with compressed air to minimum fill pressures as indicated.
  - 4. Replaceable bladder.

## 2.15 WATER BUFFER TANK

- A. Vertical tank constructed of heavy gauge carbon steel with internal baffle, welded support stand and drain and vent connections.
- B. Rated for 125 psig working pressure in accordance with ASME Boiler and Pressure Vessel Code Section VIII, Division 1.

- C. Flanged inlet and outlet pipe connections.
- D. Capacity and connection sizes per schedule on Drawings.

#### 2.16 AIR SEPARATOR – HIGH EFFICIENCY COALESCING

- A. Turbulence suppressive type air eliminator to separate microbubbles and to remove stationary air pockets through absorption. Brass or steel body with centerlined inlet and outlet for in-line piping. Valved side tap to bleed large amounts of air during system fill.
- B. Integrated brass venting mechanism on top. Blowdown connection port at bottom.
- C. Maximum working pressure, 150 psi. Maximum working temperature 250 degrees F. Maximum allowable water velocity, 4ft/second. Maximum pressure drop 0.5-feet.
- D. Air elimination efficiency of 100 percent free air, 100 percent entrained air, 99.6 percent dissolved air.
- E. Dirt separation efficiency of 80 percent of particles 30 micron and larger with 100 passes.

#### 2.17 IN-LINE AIR PURGER

- A. Description: Fabricated steel air purger with screwed inlet and outlet, disked air entrapment head, purger, and drain coupling.
- B. Eliminator:
  - 1. Use the same manufacturer capable of eliminating air as fast as it can be separated.
  - 2. Design so air cannot be drawn into the system if negative pressures occur.
- C. Size: Purger to be line size.

#### 2.18 PRESSURE REDUCING VALVE (CLOSED HYDRONIC SYSTEM FEED)

- A. Description: Self-filling type with low inlet pressure check valve, removable strainer, adjustable range, and set point as indicated on the Drawings.
- B. Construction:
  - 1. Iron body for steel piping installation, brass body for copper piping installation.
  - 2. Brass working parts.
- C. Size: 3/4-inch unless shown otherwise.

#### 2.19 WATER RELIEF VALVES

- A. Bronze or steel body, stainless steel or bronze, pressure settings to 160 psi at 250 degrees F, conforming to Section IV of ASME Code, size per manufacturer's recommendations based on Code, setting as indicated; Kunkle Model 537.

## 2.20 STRAINERS

### A. Wye Pattern:

1. Bronze: Bronze body, 250 psi, 1/16-inch perforated type 304 stainless screen.
2. Ductile Iron: Ductile iron body, 300 psi, 1/16 or 1/8-inch 304 stainless steel screen.
3. Cast Iron: Cast iron body, 125 psi, 1/16-inch perforated type 304 stainless screen.
4. Cast Iron, High Pressure: Cast iron body, 250 psi, 1/16-inch perforated type 304 stainless screen.

### B. Basket Pattern: Semi-steel body, 125 psi WOG, flanged, 1/8-inch perforated type 304 stainless steel screen, closed bottom basket, clamped or bolted cover.

## 2.21 SUCTION DIFFUSERS

### A. Description:

1. Angle type body with inlet straightening vanes and combination orifice cylinder-diffuser-strainer with 3/16-inch diameter openings.
2. Provide inlet vane length equal to 2-1/2 times pump connection diameter.
3. Provide adjustable support foot to carry the weight of suction piping, drain plug, and pressure gauge tap.

### B. Construction:

1. Cast iron body rated for 175 psig operating pressure at 300 degrees F.
2. Provide steel inlet vanes on closed systems, stainless steel on open systems and domestic water systems.
3. Provide steel orifice cylinders on closed systems, stainless steel on open systems and domestic water systems.
4. Provide bronze mesh start-up strainers on closed systems and domestic water systems, none on open systems.

### C. Selection:

1. Outlet Size: Match pump inlet size.
2. Inlet Size:
  - a. Match pipe size upstream.
  - b. Maximum of 2 psi drop without start-up strainer.

## 2.22 TRIPLE DUTY VALVE

### A. Description: Straight or angle pattern non-slam check valve with spring loaded disc and calibrated throttling/shut-off feature.

- B. Construction: Cast iron body construction, 175 psi working pressure at 300 degrees F operating temperature.
- C. Selection:
  - 1. Same size as pipe size on Drawings.
  - 2. Maximum pressure drop 5 feet at design flow rate.

## 2.23 WATER FILTERS

- A. Heating Water:
  - 1. Housing:
    - a. Carbon steel housing suitable for holding two filter elements with quick release EPR O-ring and cartridge seals suitable for operation at 300 degrees F.
    - b. Element seal by tie rod and seal nut onto element gasket.
    - c. Unit rated for 150 psig operation.
    - d. Manufacturer: Pall MCC.
  - 2. Filter Cartridge:
    - a. Industrial style filter cartridge constructed of epoxy resin-impregnated cellulose medium.
    - b. Pleated to provide high surface area with the corrugated medium supported by a perforated 300 series stainless steel core and end caps.
    - c. Filter able to withstand 75 psi differential pressure in normal outside to inside flow direction.
    - d. Nominal filtration rating of 98 percent on particles 10 micrometers and larger.
    - e. Manufacturer: Pall Corporation Epocel Series

## 2.24 DIFFERENTIAL PRESSURE REGULATOR VALVE

- A. Externally piloted differential pressure regulating valve. Ductile iron construction, stainless steel and bronze trim and 316 SS seats.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Provide valves at connections to equipment where shown or required for equipment isolation.
- B. Install valves and strainers in accessible locations and same size as connected piping (not the size of the equipment connection), except balancing valves sized by contractor to properly balance the flow.
- C. Provide separate support for valves where necessary.
- D. Provide drain valves in low points in the piping system, at coils and equipment, and as indicated.

### 3.02 APPLIED LOCATIONS HVAC VALVES

A. In piping 2-inches and smaller:

System	Valve Types				
	Gate	Globe	Swing Check	Ball	Butterfly
Heating Water	At Boiler Only	Bronze	Bronze	Bronze	Not Allowed
Chemical Treatment	Not Allowed	Bronze	Bronze	Bronze	Not Allowed

B. In piping 2-1/2-inches and larger:

System	Valve Types				
	Gate	Globe	Check	Ball	Butterfly
Heating Water	Iron	Iron	Iron, Swing	Not Allowed	Ductile Iron
Chemical Treatment	Iron	Iron	Iron, Swing	Not Allowed	Ductile Iron

- C. Calibrated y-pattern globe balancing valves 1/2-inch through 12-inches, on water coils and in piping systems in accordance with manufacturer's recommendations.
- D. Automatic flow control valves on water coils and in piping systems in accordance with manufacturer's recommendations to automatically balance water flow in piping loops as indicated.
- E. Pressure Independent Control Valve on water coils and in piping systems in accordance with manufacturer's recommendations. Coordinate with Section 23 09 00, Instrumentation and Controls for HVAC.
- F. Provide gauge cock for pressure gauges.
- G. Provide gate valves with pressure type packing glands for heating water boiler shutoff applications. Meet requirements of ASME Boiler and Pressure Vessel Code, Section IV, Article 7 for Stop Valves.

### 3.03 VALVE IDENTIFICATION

- A. General: Identify valves to indicate their function and system served.
- B. See Section 23 05 53, Identification for HVAC Piping and Equipment.

### 3.04 CHAIN OPERATORS

- A. Install valves in equipment rooms or fan rooms used for equipment or coil isolation and more than 8 feet above floor with stem horizontal and equipped with chain wheels and chains extending to 6-feet above floor.

### 3.05 INSTALLATION

A. Manual Air Vents:

1. Install at high points where automatic air vents are not used, where noted, and where required for proper venting of system.
2. Install in accordance with manufacturer's recommendations.



**B. Automatic Air Vents:**

1. **Install automatic air vents at high points where air can collect in water systems where indicated. Route drain lines from vent to nearest floor drain.**
2. **Install 3/4-inch globe shut-off valve ahead of air vent. Install ball valve where bucket drainage is required.**

**C. Grooved Mechanical Pipe Valve End Connections:**

1. **Refer to Section 23 21 13, Pipe and Pipe Fittings HVAC for allowed service installations.**
2. **Install in accordance with the manufacturer's published installation instructions.**
3. **Mold and produce gaskets by the coupling manufacturer, and suitable for the intended service.**
4. **The coupling manufacturer's factory trained representative:**
  - a. **Provide on-site training for the contractor's field personnel in the use of grooving tools and installation of grooved joint products.**
  - b. **Periodically visit the project site to ensure best practices in grooved installation are being followed.**
  - c. **A distributor's representative is not considered qualified to conduct the training or field visits.**

**D. Test Plugs: Install where indicated and in accordance with the manufacturer's recommendations.**

**E. Coil Connectors:**

1. **Applied Locations: Integrated coil connectors are prohibited except where specifically indicated below or on the drawings.**
2. **Make connections in accordance with Section 23 21 13, Pipe and Pipe Fittings HVAC.**

**F. Expansion Tanks:**

1. **Support with steel rods and brackets from structure or from structural steel stand as required.**
2. **Pipe valve drain to over floor drain.**

**G. Water Buffer Tank:**

1. **Install as shown on Drawings and in accordance with the manufacturer's recommendations.**
2. **Insulate per Section 23 07 00, Insulation for HVAC.**
3. **Pipe valve drain to over floor drain.**

**H. Air Separator:**

1. **Install as shown on Drawings and in accordance with the manufacturer's recommendations.**

2. Suspend from structure with steel rods or brackets or support from steel stand as required.
  3. Bleed system air at start-up according to manufacturer's recommendations.
- I. In-Line Air Purger:
1. Install purger and eliminator as shown on Drawings and in accordance with the manufacturer's printed recommendations.
  2. Support separately from structure with spring isolators as required.
  3. Install bronze globe shut-off valve between the purger and eliminator.
  4. Pipe discharge to nearest floor drain using Schedule 40 galvanized steel pipe.
- J. Pressure Reducing Valves: Install where indicated and in accordance with manufacturer's recommendations with 3 valve bypass.
- K. Water Relief Valves:
1. Install where indicated, and in accordance with manufacturer's instructions.
  2. Pipe discharge to nearest floor drain using Schedule 40 steel pipe.
- L. Strainer:
1. Provide valved blow off for each strainer of same size as plugs with maximum size of 1-1/2 inches.
  2. Pipe blow off full size and terminate over floor drains except finned tube, reheat coils, fan coils, terminal units, and unit heaters.
  3. Applied Locations HVAC:
    - a. Bronze wye, in piping 2-inch and smaller, medium and high pressure steam and condensate.
    - b. Basket, in piping 2-1/2-inch and larger, condenser water inlet to pumps.
- M. Suction Diffusers:
1. Install on inlets of pumps where indicated in accordance with manufacturer's recommendations.
  2. Support suction diffuser and piping from same surface as pump base is supported unless shown otherwise. Adjust foot so that pump inlet does not carry piping weight.
  3. Pipe pressure gauges to gauge port, and blow down to drain with ball shut-off valve.
  4. After operating pumps for seven days, clean strainer and remove start-up strainer.
- N. Triple Duty Valve:
1. Install on discharge of pumps where indicated.
  2. Support with additional members as required.

- O. **Water Filters:**
  - 1. **Install per manufacturer's recommendations where shown.**
  - 2. **After system is accepted by Owner, provide one set of filters for each filter station.**
- P. **Differential Pressure Regulating Valve: Install per manufacturer's recommendations where shown on plans.**

**END OF SECTION**

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**SECTION 23 05 29**

**HANGERS, SUPPORTS, AND ANCHORS FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Supports
  - 2. Anchors
  - 3. Pipe Rollers, Insulation Protection Shields and Insulation Protection Saddles
  - 4. Building Attachments
  - 5. Roof Mounted Equipment Support
- B. Related Sections include:
  - 1. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment
  - 2. Section 23 07 00, Insulation for HVAC
  - 3. Section 23 21 13, Pipe and Pipe Fittings HVAC

**1.03 QUALITY ASSURANCE**

- A. Provide pipe and equipment hangers and supports in accordance with the following:
  - 1. When supports, anchorages, and seismic restraints for equipment, and supports and seismic restraints for conduit, piping, and ductwork are not shown on the Drawings, the contractor will be responsible for their design.
  - 2. Seismic restraints and anchorages resist seismic forces as specified in the latest edition of the International Building Code for the seismic zone in which the project is constructed.
  - 3. Connections to structural framing not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

4. **Seismic Restraints:**
  - a. Do not introduce excessive stresses in the piping caused by thermal expansion or contraction.
  - b. In accordance with the latest edition of the SMACNA, Seismic Restraint Manual Guidelines for Mechanical Systems" for the Seismic Hazard Level corresponding to the seismic zone in which the project is constructed.
  - c. In accordance with the applicable code.
  - d. Follow provisions described in Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.
- B. **Engineered Support Systems:** The following support systems designed, detailed, and bear the seal of a professional engineer registered in the State having jurisdiction.
  1. Supports and seismic restraints for suspended piping and equipment.
  2. Support frames such as pipe racks or stanchions for piping and equipment which provide support from below.
  3. Equipment and piping support frame anchorage to supporting slab or structure.

#### 1.04 SUBMITTALS

- A. Submit the following:
  1. Shop Drawings of contractor fabricated support structures.
  2. **Structural Details and Calculations:** Submit structural details and calculations substantiating that building structure, anchorages, and fabricated steel braces can safely withstand maximum calculated loads.
  3. No other submittals required under this section.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Supports:
  1. Unistrut
  2. Superstrut
  3. Powerstrut
  4. Kinline
  5. B-Line Systems
  6. AnvilStrut
- B. Anchors:
  1. Anvil

2. Superstrut
  3. B-Line Systems
  4. Tolco
  5. ERICO
- C. Pipe Rollers, Insulation Protection Shields and Insulation Protection Saddles
1. Anvil
  2. Super Strut
  3. B-Line Systems
  4. Tolco
  5. ERICO
- D. Building Attachments
1. Anvil
  2. Elcen
  3. Superstrut
  4. B-Line Systems
  6. Tolco
  6. ERICO
- E. Roof Mounted Equipment Support
1. Greenheck - GES

## 2.02 SUPPORTS

- A. Fabricate support members from welded standard structural shapes, pipe, and plate to carry the necessary rollers, hangers, and accessories as required. Support piping less than 4-inch pipe size from or by prefabricated roll-formed channels with necessary accessories to adequately support piping system.
- B. Supports and Accessories: Preformed roll-formed channels and accessories with matching compatible accessories as shown, as specified, and as required.
- C. Dissimilar Metal Protection: Hydra-Zorb cushions or Cush-a-strip.
- D. Clamps: Super Strut Series 700 through 702 or AnvilStrut Series 1000 through 1200.

### 2.03 ANCHORS

- A. Uninsulated Horizontal Copper Piping:
  - 1. 2-inch and Smaller: Anvil CT-65, CT-69, CT-99C.
  - 2. Larger than 2-inch: Anvil 260 field or factory copper plated, plastic coated or other recognized industry methods. Electricians' tape is unacceptable.
- B. Insulated Horizontal Copper Pipe with Hangers Inside of Insulation: Same as Uninsulated Horizontal Copper Pipe.
- C. Insulated Horizontal Copper Pipe with Hangers Outside of Insulation:
  - 1. 2-inch and Smaller: Anvil 65, 70, 104 or 260.
  - 2. Larger than 2-inch: Anvil 260.
- D. Other Uninsulated Horizontal Pipe:
  - 1. 2-inch and Smaller: Anvil 65, 70, 104 or 260.
  - 2. Larger than 2-inch: Anvil 260.
- E. Other Insulated Horizontal Pipe With Hangers Inside of Insulation:
  - 1. 2-inch and Smaller: Anvil 65, 70, 104, 260 or 300.
  - 2. Larger than 2-inch: Anvil 260.
- F. Other Insulated Horizontal Pipe with Hangers Outside of Insulation:
  - 1. 2-inch and Smaller: Anvil 65, 70, 104 or 260.
  - 2. Larger than 2-inch: Anvil 260.
- G. Riser Clamps Copper Pipe:
  - 1. 4-inch and Smaller: Anvil CT-121, CT-121C or 261C.
  - 2. Larger than 4-inch: Anvil 261C.
- H. Riser Clamps Other Piping: Anvil 261.

### 2.04 PIPE ROLLERS, INSULATION PROTECTION SHIELDS AND INSULATION PROTECTION SADDLES

- A. Pipe Rollers:
  - 1. Anvil 174 or 274 as required.
  - 2. Size for pipe plus insulation for insulated pipe.
- B. Insulation Protection Shields: Anvil 167.



- C. Insulation Protection Saddles:
  - 1. Anvil 160 through 166A as required.
  - 2. Saddles for copper pipe, factory or field copper plated.

## 2.05 BUILDING ATTACHMENTS

- A. Beam Hangers:
  - 1. On piping 6-inch and smaller: Anvil 86 with retaining clip Fig. 89.
  - 2. On piping larger than 6-inch: Anvil 228, or 292.
- B. Inserts: Anvil 152 malleable iron or 281 steel inserts. Inserts sized for required rod to support load being carried.
- C. Expansion Plugs: Similar and equal to Phillips "red-head" self-drilling flush shell selected for safety factor of 4.
- D. Powder actuated fasteners with silencers as approved by Architect.

## 2.06 ROOF MOUNTED EQUIPMENT SUPPORT

- A. Equipment Supports:
  - 1. Welded aluminum or galvanized steel construction suitable for use on insulated (GESR) or non-insulated (GESS) flat roof decks, wood nailer, engineered to support gravity and seismic loads of supported equipment.
  - 2. Account for roof slope to provide level mounting surface for equipment.

## PART 3 - EXECUTION

### 3.01 HANGERS AND SUPPORTS

- A. General:
  - 1. Install support systems as detailed and in accordance with manufacturer's recommendations. Provide pipe racks, pipe stands, trapeze hangers, etc., as required and as detailed on the Drawings.
  - 2. Provide adjustable hangers for pipes complete with inserts, adjusters, bolts, nuts, swivels, all-thread rods, etc., except where specified otherwise.
  - 3. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping and do not support piping from other piping.
  - 4. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

5. Support piping within 2-feet of each change of direction on both sides of fitting.

**B. Insulated Piping Systems:**

1. Refer to Section 23 07 00, Insulation for HVAC for insulation requirements.
2. Insulated Piping Systems with Vapor Barrier Insulation:
  - a. Install hangers outside of insulation.
  - b. On piping 1-1/2-inch and larger, provide insulation protection shields at each support location.
3. Heating Water (over 230 degrees F):
  - a. As specified for Insulated Piping Systems with Vapor Barrier Insulation.
4. Other insulated Piping Systems with Non-Vapor Barrier Insulation:
  - a. At the contractor's option, hangers may be installed inside or outside of insulation for piping 2-inch and smaller.
  - b. If hangers are installed outside of insulation, provide insulation protection shields at support locations on piping 1-1/2-inch and larger.
  - c. On piping larger than 2-inch, provide insulation saddles at each support location.
5. Other insulated Piping Systems with Non-Vapor Barrier Insulation:
  - a. As specified for Insulated Piping Systems with Vapor Barrier Insulation.
6. Insulation Protection:
  - a. Band insulation protection shields firmly to insulation to prevent slippage.
  - b. Tack weld insulation protection saddles to steel pipe. Braze saddles to copper pipe.

**C. Vertical Piping:**

1. Support with U-clamps fastened to wall to hold piping away from wall unless otherwise approved.
2. Riser clamps on steel pipe to be directly welded to pipe. Riser clamps on copper pipe to be installed directly under fitting.
3. Risers that are not subject to thermal change to be supported at each floor of penetration.
4. Risers that are subject to thermal change require engineered supports. Size supports to carry forces exerted by piping system when in operation. Riser supports follow provisions described in Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

**D. Horizontal Piping:**

1. Trapeze Hangers: Multiple pipe runs where indicated supported on channels with rust resistant finish. Provide necessary rods and supporting steel.
2. Support Spacing: Provide support at minimum spacing per MSS SP-69-1996 Pipe Hangers and Supports - Selection and Application:
  - a. Support piping within 2-feet of each change in direction.

b. **Steel Pipe, Copper Tubing:**

Minimum Pipe Size	Maximum Span Steel	Maximum Span Copper	Rod Size
1-inch and smaller	7-feet	5-feet	1/4-inch
1-1/4-inch to 2-inch	8-feet	8-feet	3/8-inch
2-1/2-inch to 3-inch	11-feet	9-feet	1/2-inch
4-inch to 5-inch	14-feet	12-feet	1/2-inch
6-inch	17-feet	14-feet	1/2-inch
8-inch or larger	19-feet	16-feet	5/8-inch
10-inch	20-feet	18-feet	3/4-inch
12-inch	23-feet	19-feet	7/8-inch
14-inch	25-feet		1-inch
16-inch	27-feet		1-inch

c. Plastic Pipe: Supported a maximum of 3-feet on center for piping 1-inch and smaller and 4-feet on center for piping 1-1/4-inch and larger with rod sizes as recommended by the manufacturer.

d. Provide piping with acoustical lagging wrap supported a maximum of 5-feet on center. Install hangers outside of acoustical lagging.

**E. Building Attachments:**

1. Fastening or attaching to steel deck (without concrete fill) is prohibited. It will be necessary to support piping from structural members, beams, joists, or provide intermediate angle iron supporting members between joists. Supports may be attached to concrete filled steel deck with load limitations shown on the structural drawings or otherwise obtained from the structural engineer.
2. Provide horizontal bracing on horizontal runs 1-1/2-inch and larger and exceeding 50-feet in length at 75-foot intervals and as required to provide stabilized piping systems.
3. Provide additional structural steel angles, channels, or other members required to support piping where structures do not occur as required for proper support.
4. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.

**F. Roof Mounted Equipment Supports:**

1. Select appropriate model for insulated or uninsulated roof deck.
2. Install per manufacturer's instructions.
3. Account for roof slope to provide level mounting service for equipment.

**END OF SECTION**

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**SECTION 23 05 48**

**VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Neoprene Waffle Pad
  - 2. Restrained Neoprene Mount
  - 3. Springs
  - 4. Springs With Restraints
  - 5. Base With Springs
  - 6. Inertia Base
  - 7. Isolating Spring Hangers
  - 8. Isolating Neoprene Hangers
  - 9. Rooftop Air Handling Unit Isolation Curb
  - 10. Isolating Sleeves
  - 11. Seismic Restraints
  - 12. Flexible Sphere Connector
  - 13. Flexible Hose Connector
- B. Isolation of mechanical equipment as indicated on the Drawings and specified herein.
- C. Seismic restraint of equipment, piping, and ductwork.
- D. Related Sections include:
  - 1. Section 23 05 29, Hangers, Supports and Anchors for HVAC

2. Section 23 31 01, HVAC Ducts and Casing-Low Pressure
3. Section 23 31 02, HVAC Ducts and Casing-Medium Pressure

### 1.03 QUALITY ASSURANCE

- A. Single manufacturer select and furnish isolation required, except packaged equipment with integral isolators meeting the isolation and seismic requirements of this Specification.
- B. System of vibration isolators and seismic controls designed, detailed, and bear the seal of a professional engineer registered in the State having jurisdiction.
- C. Isolation performance requirements are indicated in the specifications. Deflections indicated are nominal static deflections for specific equipment supported.
- D. Seismic snubbers, restrained isolator housings and cable system components have anchorage preapproval OPM number from OSHPD in the State of California verifying the maximum certified load ratings.
- E. Isolator Stability and Rated Capacity:
  1. Spring diameters not less than 0.8 of the compressed height of the spring at rated load.
  2. Springs have a minimum additional travel to solid equal to 50 percent of the rated deflection.
- F. Seismic Restraints:
  1. Restraint of equipment, piping and ductwork to be in accordance with the current state and local Building Code.
  2. Calculations in accordance with current state and local Building Code.

### 1.04 SUBMITTALS

- A. Submit the following:
  1. Submit Shop Drawings showing complete details of construction for steel and concrete bases including:
    - a. Equipment mounting holes.
    - b. Dimensions
    - c. Isolation selected for each support point.
    - d. Details of mounting brackets for isolator.
    - e. Weight distribution for each isolator.
    - f. Code number assigned to each isolator.
  2. Submit product data and calculation sheets for isolators, showing:
    - a. Size, type, load rating, and rated deflection of each required isolator.
    - b. Percent of vibration transmitted based on the lowest disturbing frequency of the equipment.
  3. Structural Details and Calculations: Submit structural details and calculations substantiating that building structure, anchorages, and fabricated steel braces can safely withstand maximum calculated loads.

- B. Installation report as specified in PART 3 of this Section.
- C. Operation and maintenance data.

#### 1.05 EQUIPMENT VIBRATION ISOLATION

- A. Provide a balanced set of vibration isolators for each piece of equipment listed in the Equipment Schedules.
- B. Isolation work to include, but not necessarily be limited to, the following:
  - 1. Isolation support of motor-driven equipment.
  - 2. Inertia base frames in conjunction with isolation.
  - 3. Isolation support of air-handling housings.
  - 4. Isolation support of piping, piping risers, and ductwork.
  - 5. Penetration isolation of pipework, ductwork, and conduits through walls, floors, or ceilings.
  - 6. Flexible connections of ductwork and piping to equipment.
- C. Each piece of rotating equipment must meet a reasonable criterion for maximum vibration levels at each bearing, while in operation. The criteria for varying operating speeds are given as follows:
  - 1. Rotating equipment operating at peak vibration velocities must not exceed 0.08-inch/second.
  - 2. If it is discovered that the operating vibration velocities exceed this criteria, the equipment repaired or replaced at no expense to the owner until approval of the equipment is given by the Engineer.
- D. Provide components or materials not specially mentioned herein, but necessary to the proper vibration isolation of the equipment.

#### 1.06 CONTRACTOR RESPONSIBILITY

- A. Vibration isolation devices, including auxiliary steel bases and pouring forms, design and furnish by a single manufacturer or supplier.
- B. Adequately restrain equipment, piping, and ductwork to resist seismic forces. Design and select restraint devices to meet seismic requirements as defined in the latest issue of the International Building Code under Earthquake Loads and applicable state and local codes.
- C. Have the following responsibilities:
  - 1. Selection, installation, adjustment and performance of vibration isolators which will meet the requirements given on the plans or in the Specifications.
  - 2. Provide Engineering drawings, details, supervision, and instruction to assure proper installation and performance.

3. Provide whatever assistance necessary to ensure correct installation and adjustment of the isolators.

## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Neoprene Waffle Pad
  1. Mason Type Super W or Super WM and HG Grommet
  2. Kinetics Corporation.
- B. Restrained Neoprene Mount
  1. Mason Type BR
- C. Springs
  1. Mason Type SLF
  2. Amber-Booth Type SW
  3. Kinetics Corporation
  4. Vibrex
- D. Springs With Restraints
  1. Mason Type SSLR or SLRS with seismic restraints
  2. Kinetics Corporation Model FYS
  3. Vibrex
- E. Base with Springs
  1. Mason WFSL
  2. Kinetics Corporation
  3. Vibrex
- F. Inertia Base
  1. Mason BMK or KSL
  2. Kinetics Corporation
  3. Vibrex
- G. Isolating Spring Hangers
  1. Mason 30N, similar Amber-Booth



2. Consolidated Kinetics
  3. Vibrex
- H. Isolating Neoprene Hangers
1. Mason HD
  2. Consolidated Kinetics
  3. Vibrex
- I. Rooftop Air Handling Unit Isolation Curb
1. Mason RSC, similar Amber-Booth
  2. Kinetics Corporation
  3. Vibrex
- J. Isolating Sleeves
1. Potter-Roemer PR isolators
  2. Grinnell Semco Trisolators
- K. Seismic Restraints
1. Mason Industries.
- L. Flexible Sphere Connector
1. Mason Type SFU, SFDEJ, or SFEJ
- M. Flexible Hose Connector
1. Mason Type FFL, MN, CPS or CPSB
  2. HCl
  3. Metraflex

## 2.02 TYPE 1 - NEOPRENE WAFFLE PAD

- A. 3/4-inch thick neoprene waffle pads with pattern repeating on 1/2-inch centers.
- B. Select Duro rating for recommended deflection at average load rating.
- C. Include load distribution steel plate as required.
- D. Include anchor bolt grommet as required.

## 2.03 TYPE 2 - RESTRAINED NEOPRENE MOUNT

- A. Bridge-bearing neoprene mountings directional seismic capability.

- B. Provide minimum deflection of 0.2-inch.
- C. Ductile iron casting containing two separated and opposing molded neoprene elements.
- D. Elements prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation.
- E. Shock absorbing neoprene materials compounded to bridge-bearing specifications.

#### 2.04 TYPE 3 - SPRINGS

- A. Free standing springs without housings.
- B. Provide minimum deflection of 1-inch.
- C. 1/4-inch thick molded neoprene cup with steel reinforcement washer or neoprene acoustical friction pads between base plate and support.
- D. Mounting: Leveling bolts with height saving brackets.
- E. Springs mounted outboard of channels.
- F. Attach baseplate screws using neoprene bushings and washers.
- G. Diameter not less than 0.8 of the compressed height of the spring at rated load.
- H. Additional travel to solid equal to 50 percent of the rated deflection.
- I. Submittals to include the following:
  - 1. Spring Diameters
  - 2. Deflection
  - 3. Compressed Spring Height
  - 4. Solid Spring Height

#### 2.05 TYPE 4 - SPRINGS WITH RESTRAINTS

- A. Same as springs except housing with seismic restraints to be added.
- B. Seismic restraint with molded directional neoprene bushings an integral part of isotator.
- C. Seismic restraint selected for minimum safety factor of 2 from ultimate seismic capacity.
- D. Spring mount must have neoprene cup or pad inside the seismic housing to allow anchoring of the housing baseplate without short circuiting pad.
- E. Minimum clearance of 1/4-inch maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action.
- F. Restraining Bolts: Neoprene bushing between the bolt and the housing.
- G. Limit stops out of contact during normal operation.

**2.06 TYPE 5 - BASE WITH SPRINGS**

- A. Steel base with wide flange beams and springs.
- B. Provide minimum clearance of 1-inch.
- C. Depth of base equal to 10 percent of the span between supports, 6-inch minimum.
- D. Provide external height saving brackets.

**2.07 TYPE 6 – INERTIA BASE**

- A. Steel Inertia Base with 1/2-inch square bar reinforcing, for field grout.
- B. Provide minimum clearance of 1-inch.
- C. Bases must be sized to fit stanchions for pump elbows or suction diffusers.
- D. Depth of base equal to 8 percent of the span between supports, 6-inch minimum.
- E. Provide integral height saving brackets and steel templates with anchor bolts sleeves.

**2.08 TYPE 7 - ISOLATING SPRING HANGERS**

- A. Combination rubber-in shear and steel spring isolators installed on the hanger rods.
- B. Provide minimum deflection of 1-inch.
- C. Proper deflection to allow the piping to deflect as a unit with the equipment isolators.
- D. Neoprene element and the cup neoprene bushing bushings projecting through the steel box.
- E. Hangers designed for 30 degree angular movement.
- F. Minimum Deflection: 1-inch

**2.09 TYPE 8 – ISOLATING NEOPRENE HANGERS**

- A. Double deflection neoprene hangers.
- B. Provide minimum static deflection of 0.35-inch.
- C. Provide projecting bushing to prevent steel to steel contact.

**2.10 TYPE 9 – ROOFTOP AIR HANDLING UNIT ISOLATION CURB**

- A. Rooftop unit spring isolation curb.
- B. Provide minimum deflection of 2-inches.
- C. Steel springs laterally stable and rest on 1/4-inch thick neoprene acoustical pads.
- D. Hardware plated and the springs provided with a rust resistance finish.

- E. Curb waterproofing consists of a continuous flexible flashing attached over the lower curb waterproofing.
- F. Spring locations accessibility to adjust springs.
- G. Curb provides continuous support for equipment and be constructed to resiliently resist wind and seismic forces.
- H. Construction of curb must not enable rigid connection between vibrating equipment and building structure.
- I. Provide provisions for sloped roof, plenum curb, tall curb, and duct openings where required by installation conditions.

## 2.11 ISOLATING SLEEVES

- A. Provide for piping through walls and floors of penthouses and chiller room. Size for piping as required.

## 2.12 SEISMIC RESTRAINTS

### A. General Requirements:

- 1. Provided for equipment, piping and ductwork, both supported and suspended.
- 2. Bracing of piping and ductwork in accordance with the code and with the provisions set forth in the SMACNA seismic restraint manual.
- 3. The structural requirements for the restraints, including their attachment to the building structure, reviewed and approved by the Structural Engineer.
- 4. Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.

### B. Supported Equipment:

- 1. All-directional Seismic Rubbers: Interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene.
- 2. Replaceable bushing and minimum of 1/4-inch thick. Rated loadings not to exceed 1000 psi.
- 3. An air gap of 1/4-inch incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces.
- 4. Snubber End Caps:
  - a. Removable to allow inspection of internal clearances.
  - b. Rotated neoprene bushings be rotated to ensure no short circuits exist before systems are activated.
- 5. Snubber: Mason Industries, Inc. Type Z-1225

C. Bracing of Pipes:

1. Provide seismic bracing of piping as detailed below to meet the building code requirements:
  - a. Exception: Piping suspended by individual hangers need not be braced where the following criteria are met.
    - 1) Distance between the top of the pipe to the bottom of the support structure is 12-inches or less.
    - 2) Seismic braces are not required on high deformability piping when the  $I_p=1.0$  and provisions are made to avoid impact with larger pipe or mechanical components or to protect the pipe in the event of such impact and the nominal pipe size is 3-inch diameter or less.
    - 3) Seismic braces are not required on high deformability piping when the  $I_p=1.5$  and provisions are made to avoid impact with larger pipe or mechanical components or to protect the pipe in the event of such impact and the nominal pipe size is 1-inch diameter or less.
2. Seismic braces for pipes on trapeze hangers may be used.
3. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints, or where pipes connect to equipment.
4. Cast iron pipe of types, glass pipe, and any other pipe joined with a shield and clamp assembly, where the top of the pipe is 12-inches or more from the supporting structure, braced on each side of a change in direction of 90 degrees or more. Riser joints on unsupported sections of piping braced or stabilized between floors.
5. Vertical risers laterally supported with a riser clamp at each floor. For buildings greater than six stories high or for piping subject to thermal change risers engineered individually.

D. Bracing of Ductwork:

1. Brace rectangular ducts with cross sectional areas of 6 square feet and larger. Brace flat oval ducts in the same manner as rectangular ducts. Brace round ducts with diameters of 28-inches and larger. Brace flat oval ducts the same as rectangular ducts of the same nominal size.
2. Exception: No bracing is required if the duct is suspended by hangers 12-inches or less in length, as measured from the top of the duct to the bottom of the support where the hanger is attached.
3. Transverse bracing occurs at the interval specified in the SMACNA tables or at both ends if the duct run is less than the specified interval. Install at each duct turn and at each end of a duct run, with a minimum of one brace at each end.
4. Longitudinal bracing occur at the interval specified in the SMACNA tables with at least one brace per duct run. Transverse bracing for one duct section may also act as longitudinal bracing for a duct section connected perpendicular to it if the bracing is installed within four feet of the intersection of the ducts and if the bracing is sized for the larger duct. Duct joints conform to SMACNA duct construction standards.
5. Install duct flex connections at equipment connections to accept expected differential displacement and protect the equipment connection from damage.

E. Suspended Equipment and Piping and Ductwork:

1. Seismic cable restraints consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint.
2. Cable must be pre-stretched to achieve a certified minimum modulus of elasticity. Cable end connections steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement.
3. Cable assemblies type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod and the clevis or SCBV if clamped to a beam, as manufactured by Mason Industries, Inc.
4. Steel angles or strut, sized to prevent buckling, clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies type SRC or UCC as manufactured by Mason Industries, Inc.
5. Pipe clevis cross-bolt braces are required in restraint locations. Special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross brace type CCB as manufactured by Mason Industries, Inc.

**2.13 FLEXIBLE SPHERE CONNECTOR**

- A. Flexible EPDM pipe connectors manufactured of multiple plies of Kevlar tire cord fabric and EPDM; both molded and cured in hydraulic rubber presses. No steel wire or rings used as pressure reinforcement.
- B. Connectors up to and including 2-inch diameter may have a single sphere and threaded ends. Connectors 2-1/2-inch and larger manufactured with twin spheres up to 12-inches and a single sphere on larger sizes and floating steel flanges recessed to lock the connectors raised face EPDM flanges.
- C. Rated a minimum of 150 psi at 220 degrees F. Connections pre-extended as recommended by the manufacturer to prevent additional elongation under pressure.

**2.14 FLEXIBLE HOSE CONNECTOR**

- A. Manufactured using type 304 stainless steel hose and braid with one fixed and one floating raised face carbon steel plate flange.
- B. Sizes 2-1/2-inch and smaller may have threaded male nipples or copper sweat ends. Grooved ends are acceptable in sizes in grooved piping systems. Weld ends are not acceptable. Copper sweat end hoses for water service use copper or bronze construction.
- C. Close pitch annular corrugations for maximum flexibility and low stiffness. Tested hose stiffness at various pressures must be included in the submittals.
- D. Continuous operation at 150 psi and system test pressure when installed in piping systems.
- E. Same size as the pipe it connects and have pipe thread connectors on both ends with male or female end adapters as required.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Do not install any equipment or pipe which makes rigid contact with the building. "Building" includes slabs, beams, studs, walls, etc.
- B. The installation or use of vibration isolators must not cause any change of position of equipment or piping which would result in stresses in piping connections or misalignment of shafts or bearings. In order to meet this objective, equipment and piping maintained in a rigid position during installation. Do not transfer the load to the isolator until the installation is complete and under full operational load.
- C. Correct, at no additional cost, installations which are defective in workmanship or materials.

#### **3.02 PREPARATION**

- A. Treat isolators, including springs, hardware and housing, with a corrosion protective coating of epoxy powder or electro galvanizing.
- B. Coat steel frames exposed to weather with a rustproof metal primer.
- C. Provide hot dipped galvanizing on steel frames as indicated on the plans for corrosion protection in severe conditions.

#### **3.03 INSTALLATION**

- A. General:
  - 1. Install isolation where indicated on the Drawings by type and location and where indicated below.
  - 2. Mark assigned code number on isolators and bases to assure placement in the proper location.
  - 3. Anchor isolator seismic housing baseplate to floor.
  - 4. Provide rubber grommets and washers to isolate the bolt from the building structure. Do not destroy the isolation efficiency when bolting the isolators to the building structure.
- B. Application of type of isolators needs to verified with EOR, ASHRAE requirements from Applications – Noise and Vibration Control, or as specified by project acoustical and vibration control consultant.
- C. Type 1 – Neoprene Waffle Pad:
  - 1. Service:
    - a. Boilers
    - b. Floor Mounted Indoor Air Handling Units
    - c. Floor Mounted Air Conditioners
    - d. Floor Mounted Heat Pumps

- D. Type 2 – Restrained Neoprene Mount:
  - 1. Service:
    - a. Boilers
    - b. Roof Exhaust Fans
    - c. Ceiling Exhaust Fans
    - d. Inline Centrifugal Fans
  
- E. Type 4 – Springs with Restraints:
  - 1. Service:
    - a. Boilers
  
- F. Type 5 – Base with Springs:
  - 1. Service:
    - a. Centrifugal Fans
    - b. Indoor Air Handling Units Mounted to Building Structure
  
- G. Type 6 – Inertia Base with Springs:
  - 1. Service:
    - a. Centrifugal Pumps:
      - 1) Fill with concrete to provide base weight equal to 2 times supported weight, including equipment, piping, and fluid.
      - 2) Support heels of pump suction and discharge elbows from base.
      - 3) Secure pump and heel supports with inserts and grout.
  
- H. Type 7 – Isolating Spring Hangers:
  - 1. Service:
    - a. In-Line Circulating Pumps
    - b. Piping rigidly connected to rotating equipment
    - c. Inline Centrifugal Fans
    - d. Split-System Air Conditioning Unit
    - e. Split-System Heat Pump
  
- I. Type 8 – Isolating Neoprene Hanger:
  - 1. Service:
    - a. In-Line Circulating Pumps
    - b. Split-System Air Conditioning Unit
    - c. Split-System Heat Pump
  
- J. Type 9 – Rooftop Air Handling Unit Isolation Curb:
  - 1. Service:
    - a. Rooftop Mounted Air Handling Units

### 3.04 SEISMIC RESTRAINTS

#### A. General:

- 1. Install and adjust seismic restraints so that the equipment, piping, and ductwork support is not degraded by the restraints.



2. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.

**B. Supported Equipment:**

1. Each vibration isolation frame for supported equipment has a minimum of four seismic snubbers mounted as close as possible to the vibration isolators and/or the frame extremities.
2. Care must be taken so that the 1/4-inch air gap in the seismic restraint snubber is preserved on all sides in order that the vibration isolation potential of the isolator is not compromised. This requires that the final snubber adjustment be completed after the vibration isolators are properly installed and the installation approved.

**C. Bracing of Pipes:**

1. Branch lines may not be used to brace main lines.
2. Transverse bracing 40 feet maximum, except where a lesser spacing is indicated in the SMACNA tables for bracing of pipes
3. Longitudinal bracing 80-feet maximum except where a lesser spacing is indicated in the tables. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity to resist both the seismic load and the additional force induced by expansion and contraction.
4. Fuel oil, gas, cast iron pipe of types, glass pipe and any other pipes joined with four band shield and clamp assembly braced at 1/2 the spacings shown above.
5. A rigid piping system not braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.
6. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24-inches of the elbow or tee.
7. Branch lines may not be used to restrain main lines.
8. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
9. Subject to confirmation by field inspection, seismic bracing is not required on piping when the piping is supported by rod hangers and the hangers in the entire run are 12-inches or less in length from the top of the pipe to the supporting structure, hangers are detailed to avoid bending of the hangers and their attachments and provisions are made for piping to accommodate expected deflections.

**D. Bracing of Ductwork:**

1. Transverse restraints occur at 30-foot intervals or at both ends of the duct run if less than the specified interval. Install at each duct turn and at each end of a duct run.

2. Longitudinal restraints occur at 60-foot intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4 feet of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints conform to SMACNA duct construction standards.
  3. Hanger straps must be positively attached to the duct within 2-inches of the top of the duct with a minimum of two number 10 sheetmetal screws.
  4. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.
  5. Walls, including gypsum board nonbearing partitions, which have ducts running through them, may replace a typical transverse brace. Provide solid blocking around duct penetrations at stud wall construction.
  6. Install unbraced ducts with a 6-inch minimum clearance to vertical ceiling hanger wires.
- E. Suspended Equipment, Piping, and Ductwork Cable Method:
1. Adjust cables to a degree of slackness approved by the Structural Engineer.
  2. The uplift and downward restraint nuts and Mason type RW neoprene covered steel rebound washers for the Type 6 hangers adjusted so there is a maximum 1/4-inch clearance.
  3. C-clamps for attachment to the bottom of I-beams must incorporate a restraining strap.

### 3.05 FIELD QUALITY CONTROL

- A. Installation Report: Isolation manufacturer's representative confirm that isolation is installed correctly and submit report stating that isolators are installed as shown on Shop Drawings, isolators are free to work properly, and that installed deflections are as scheduled and as specified.

END OF SECTION

**SECTION 23 05 53**

**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Valve Identification
  - 2. Piping Markers
  - 3. Equipment Identification
  - 4. Concealed Equipment Identification

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Valve Tag Directory: Submit for approval prior to fabrication of valve tags.
  - 2. Equipment Nameplate Directory: Submit for approval prior to fabrication.
  - 3. Operating and Maintenance Data: Include a copy of valve tag and equipment nameplate directories in each set of Operating and Maintenance manuals.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Piping Markers:
  - 1. W.H. Brady
  - 2. Seton
  - 3. Marking Systems, Inc. (MSI)
  - 4. Other Manufacturers: Submit substitution request.

B. Concealed Equipment Identification:

1. W.H. Brady
2. Seton
3. Other Manufacturers: Submit substitution request.

2.02 VALVE IDENTIFICATION

A. Valve Tags:

1. General: Identify valves with metal tags, legends to be stamped or embossed. Indicate the function of the valve and its normal operating position; i.e.,

56 HW	(NUMBER AND CONTENT OF PIPE)
ISOLATION	(VALVE FUNCTION)
NO	(NORMAL OPERATION POSITION)

2. Size: Valve tags 2-inch diameter with 1/4-inch high letters.
3. Material: Use 0.04-inch brass tags.
4. Automatic Valves and Regulating Valves:
  - a. Use 1/16-inch thick laminated 3-ply plastic, center ply white, outer ply red, lamicaid, or equal.
  - b. Form letters by exposing center ply.
5. Buildings Systems: Contact the LinkedIn for coordination with existing building lagging system and supplementary information required for any specific system before valve lagging begins.

B. Valve Tag Directory:

1. Tag Number
2. Location
3. Exposed or Concealed
4. Service
5. Valve Size
6. Valve Manufacturer
7. Valve Model Number
8. Normal Operating Position of Valve

2.03 PIPING MARKERS

- A. Label pipes with vinyl, self-sticking labels or letters.
- B. For pipe covering sizes up to and including 3/4-inch outside diameter, select labels with 1/2-inch letters.

- C. For sizes from 3/4 to 2-inch outside diameter, 3/4-inch letters, above 2-inches outside diameter, 2-inch letters.
- D. Identify pipe markers and color coded as follows with black directional arrows.

HVAC SERVICE	PIPE MARKER *	BACKGROUND COLOR
HEATING WATER	HEATING WATER SUPPLY	YELLOW OR GREEN
	HEATING WATER RETURN	YELLOW
REFRIGERANT SUCTION	REFRIGERANT SUCTION	YELLOW
REFRIGERANT LIQUID	REFRIGERANT LIQUID	GREEN
REFRIGERANT HOT GAS	REFRIGERANT HOT GAS	YELLOW
* Directional arrow applied adjacent to pipe marker indicating direction of flow.		

**2.04 EQUIPMENT IDENTIFICATION**

- A. Nameplates:
  - 1. Tag pumps, air handling supply units, fans, terminal units, converters, and miscellaneous items of mechanical equipment with engraved nameplates.
  - 2. 1/16-inch thick, 3-inch by 5-inch laminated 3-ply plastic, center ply white, outer ply black. Form letters by exposing center ply.
  - 3. Identify unit with equipment tag as shown on Drawings and area served.
  - 4. Permanently identify access points to fire dampers, smoke dampers, and combination fire and smoke dampers on the exterior of the duct by a label with letters 1/2-inch in height reading the following:
    - a. Fire Damper
    - b. Smoke Damper
    - c. Fire/Smoke Damper
  - 5. Label constructed from same material as equipment nameplates.
- B. Equipment Nameplate Directory:
  - 1. List Pumps
  - 2. Air Handlers
  - 3. Terminal Units
  - 4. Other Equipment Nameplates
- C. Include Owner and Contractor furnished equipment.
- D. List the following on the nameplate:
  - 1. Designation
  - 2. Model Number
  - 3. Location of Equipment
  - 4. Area Served or Function

5. Disconnect Location
6. Normal Position of HOA Switch

## 2.05 CONCEALED EQUIPMENT IDENTIFICATION

- A. Adhesive Laminated Tape:
  1. 3/4 width transparent clear tape with black lettering.
  2. Lettering in ALL CAPS Helvetica font 24 point.

## PART 3 - EXECUTION

### 3.01 VALVE IDENTIFICATION

- A. Valve Tags:
  1. Attach to valve with a brass chain.
  2. Valve tag numbers continuous throughout the building for each system.
- B. Valve Tag Directory: Post final copy in Operation and Maintenance Manual.

### 3.02 PIPING MARKERS

- A. Unless recommendations of ANSI A13.1, 1981 are more stringent, apply labels or letters after completion of pipe cleaning, insulation, painting, or other similar work, as follows:
  1. Every 20-feet along continuous exposed lines.
  2. Every 10-feet along continuous concealed lines.
  3. Adjacent to each valve and stubout for future.
  4. Where pipe passes through a wall, into and out of concealed spaces.
  5. On each riser.
  6. On each leg of a T.
  7. Locate conspicuously where visible.
- B. Apply labels or letters to lower quarters of the pipe on horizontal runs where view is not obstructed or on the upper quarters when pipe is normally viewed from above.
- C. Apply arrow labels indicating direction of flow.
- D. Arrows the same color and sizes as identification labels.

### 3.03 EQUIPMENT IDENTIFICATION

- A. Nameplates: Attach to prominent area of equipment, either with sheet metal screws, brass chain, or contact cement as applicable.

- B. Nameplate Directory: Post final copy in Operation and Maintenance Manual.

### 3.04 CONCEALED EQUIPMENT IDENTIFICATION

- A. Where valves or equipment are located above ceilings or behind walls provide adhesive tape indicating the item (valve tag, equipment tag, etc.) at the access location (T-bar ceiling grid, access door, etc.).
- B. Applicable equipment includes, but is not limited to, the following:
  - 1. Terminal Units
  - 2. Fans
  - 3. Isolation Valves
  - 4. Fire Smoke Dampers
  - 5. Pumps
  - 6. Control Valves

**END OF SECTION**

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**SECTION 23 05 90**

**PRESSURE TESTING FOR HVAC SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes: Pressure testing of piping and ductwork systems.

**1.03 QUALITY ASSURANCE**

- A. Code Compliance: Perform required tests in the presence of the authority having jurisdiction.
- B. Owner Witness: Perform tests in the presence of the Owner's representative.
- C. Engineer Witness: The Engineer or Engineer's representative reserves the right to observe tests or selected tests to assure compliance with the specifications.
- D. Simultaneous Testing: Test observations by the authority having jurisdiction, the Owner's representative and the Engineer's representative need not occur simultaneously.

**1.04 SUBMITTALS**

- A. Submit the following:
  - 1. Test Reports:
    - a. Submit certificate of completion, inspection and test by authority having jurisdiction on required piping systems.
    - b. Submit certificate of test approval by Owner's representative on systems.
    - c. For ductwork testing, submit the Test Report.
    - d. Contain description of the testing procedure and results, including recommendation for any remedial actions needed.
    - e. The Engineer's representative will record witnessed tests.

**PART 2 - PRODUCTS – NOT APPLICABLE**

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. **Piping:** Test prior to concealment, insulation being applied, and connection to equipment, fixtures, or specialties. Conduct tests with valves but those used to isolate the test section 10 percent closed.
- B. **Ductwork:** Test prior to connection to equipment and before applying insulation.
- C. **Leaks:** Repair leaks and retest until stipulated results are achieved.
- D. **Notification:** Advise the Construction Manager 72 hours in advance of each test. Failure to so notify will require test to be rescheduled.
- E. **Testing Equipment:** Provide necessary pumps, gauges, connections and similar items required to perform the tests.

#### **3.02 TESTING REQUIREMENTS**

- A. **Medium Pressure Ductwork:**
  - 1. Test ductwork systems at 4-inch static pressure, using a Pacific Air Products Port-O-Lab or Rolok, or a McGill Airflow leak detective testing machine or approved equivalent.
  - 2. Conduct testing in accordance with latest published version of the SMACNA HVAC Air Duct Leakage Test Manual.
  - 3. Prior to testing verify that ductwork has been sealed to meet the SMACNA Seal Class A. for joints, seams and at duct wall penetrations.
  - 4. Leakage less than or meet the requirement of the following SMACNA Leakage Classes:
    - a. Rectangular Metal – Class 6
    - b. Round or Flat Oval – Class 3
  - 5. Maximum allowable leakage is defined as Cubic Feet per Minute (CFM) air leakage per 100 square feet surface area of duct section tested.
  - 6. Test ductwork.
- B. **Low Pressure Ductwork:**
  - 1. Test systems at 2-inch static pressure, using a Pacific Air Products Port-O-Lab or Rolok, or a McGill Airflow leak detective testing machine or approved equivalent.
  - 2. Conduct testing in accordance with latest published version of the SMACNA HVAC Air Duct Leakage Test Manual.
  - 3. Prior to testing verify ductwork has been sealed to meet the SMACNA Seal Class C. for joints.
  - 4. Less than or meet the requirement of the following SMACNA Leakage Classes:
    - a. Rectangular Metal – Class 24
    - b. Round or Flat Oval – Class 12

- 5. Maximum allowable leakage is defined as CFM air leakage per 100 SF surface area of duct section tested.
  - 6. Test representative sample totaling no less than 25 percent of the installed ductwork.
- C. Ductwork for Smoke Control Systems:
- 1. Leak test ducts to 1.5 times the maximum design pressure.
  - 2. Leakage not to exceed 5 percent of design flow.
- D. Piping - General: Test piping as noted below, with no leaks or loss in pressure for time indicated. Repair or replace defective piping until tests are completed successfully:

HVAC Systems	Test Pressure	Test Medium	Test Duration
Refrigerant piping	300 psig	Nitrogen	4 hours
Heating water	150 psig	Water	4 hours

\* The outer casing field welds at piping closures field tested for leaks. Pressurize with compressed air at 15 psig and apply a soap solution and check for leaks.

**END OF SECTION**

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**SECTION 23 05 93**

**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Testing and Balancing of Air Systems
  - 2. Testing and Balancing of Hydronic Systems
  - 3. Testing and Balancing of Miscellaneous Mechanical Equipment
- B. Related Sections include:
  - 1. Section 22 08 00, Commissioning for Plumbing
  - 2. Section 23 09 00, Instrumentation and Controls for HVAC

**1.03 QUALITY ASSURANCE**

- A. Acceptable Testing and Balancing Firms:
  - 1. RSA Analysis
  - 2. National Air Balance
  - 3. AIRCO Commercial Services
  - 4. United Mechanical Incorporated
- B. Other Firms: Submit substitution requests prior to bid date.
- C. Testing and Balancing Firm Qualifications:
  - 1. Procure the services of an independent balance and testing agency, approved by the Architect, which specializes in the balancing and testing of plumbing, heating, ventilating, and air conditioning systems, to balance, adjust and test water circulating and air moving equipment and air distribution or exhaust systems as herein specified.

2. Testing agency to provide proof of having successfully completed at least five projects of similar size and scope. Perform test under direct supervision of registered professional engineer who has been employed by the Agency a minimum of one year prior to start of project.
  3. Certification: Certified by National Environmental Balancing Bureau (NEBB).
- D. Industrial Standards: Conform to NEBB, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), and American National Standards Institute (ANSI) as follows:
1. NEBB: Comply with Procedural Standards for Testing, Adjusting Balancing of Environmental Systems.
  2. ASHRAE: Comply with recommendations pertaining to measurements, instruments, and testing, adjusting and balancing.
  3. ANSI:
    - a. S1.4 Specifications for sound level meters.
    - b. S1.11 Specifications for Octave-Band and Fractional-Octave-Band analog and digital filters.
- E. Instrument Certification: Accurately calibrate and certify instruments used within six months of balancing and maintained in good working order.
- F. Test Observation: Conducted in the presence of the Architect or the Architect's representative.
- G. Pre-Balancing Conference:
1. Prior to starting balancing, general techniques review with the Engineer. This conference must occur prior to measuring existing conditions.
  2. Measuring of existing conditions must occur prior to any demolition or new work.
  3. The conference will review existing conditions and systems to be affected by the project.

#### 1.04 SUBMITTALS

- A. Submit the following:
1. Balancing Log: Include air and water outlets, actual field measured air and water volume, and percentage of design volumes. Provide drawings identifying location of outlets.
  2. Equipment Data Sheets: Indicate actual equipment performance, model numbers, bearing and belt data, motor nameplate data, and final balanced motor data.
  3. Additional Data: Submit additional data as provided by Associated Air Balance Council (AABC) Standard forms.
  4. Number of Copies: Submit six copies of the above completed information to the Engineer for review and insertion into the Operating and Maintenance Data.
  5. Instrument Certification: When requested, submit certificate of calibration for equipment to be used.

- B. Record data on NEBB forms or forms approved by the Architect.

#### 1.05 PROJECT CONDITIONS

- A. Where existing systems are to be adjusted, establish flow rates in branches prior to making any modifications to system. Submit preliminary report indicating existing conditions prior to making modifications to existing systems. Adjust central equipment as required and restore unmodified branches and outlets to original condition. Obtain existing system drawings from Owner and become familiar with extent and nature of existing systems.
- B. Do not perform final testing, adjusting, and balancing work until heating, ventilating, and air conditioning equipment has been completely installed and operating continuously as required.
- C. Conduct air testing and balancing with clean filters in place. Clean strainers, etc., prior to performing hydronic testing and balancing.

#### 1.06 WARRANTIES

- A. In addition to the Requirements of the Contract, include an extended warranty of six months after completion of test and balance work during which time the Architect at his discretion may request a recheck or resetting of any equipment or device listed in the test reports.

### PART 2 - PRODUCTS – NOT APPLICABLE

### PART 3 - EXECUTION

#### 3.01 GENERAL REQUIREMENTS

- A. Balance to maximum measured flow. Deviation from specified values of  $\pm 10$  percent at terminal device and  $\pm 5$  percent at equipment, or mean sound level deviation of 15 decibels. Advise Engineer if deficiencies are generally noted to enable proper corrective actions.

#### 3.02 AIR SYSTEMS

- A. General: Make measurements in accord with Industrial Standards specified above. Record on appropriate forms.
- B. Preliminary:
  - 1. Identify and list size, type, and manufacture of equipment to be tested including air outlets and inlets.
  - 2. Use manufacturer's ratings for equipment to make required calculations except where field test shows ratings to be impractical.
- C. Central System:
  - 1. Set speed to provide air volume at farthest run without excess static pressure. Provide additional sheaves and belts as required to accomplish speed adjustment.
  - 2. Read and adjust air supply, return, and exhaust fan units to deliver design conditions at minimum OSA and at 100 percent OSA.

3. Adjust automatic dampers, outside air, return air, and exhaust dampers for design conditions.
4. Read static air pressure conditions on air handling equipment including filter and coil pressure drops and total pressure across the fan. A Dwyer Series 400 air velocity meter only used for final static pressures at equipment and where critical readings are required.
5. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
6. Read and record motor data and amperage draw.
7. For variable volume systems, establish minimum static pressure required at sensing point to permit operation over entire VAV range. Adjust supply and return fan speed so that at maximum demand the associated VFD is controlling the motor of motor nameplate RPM to 100 percent. Adjust return fan speed so that return air volumes track with supply air volume minus exhaust air volume.

D. Distribution:

1. Evaluate building and room pressure conditions to determine adequate supply and return air conditions. Balance building to be slightly positive to outdoors.
2. Evaluate building and room pressure conditions to determine adequate performance of the system to maintain temperatures without draft.
3. Perform multipoint pitot traverses to confirm instrumentation, shaft tightness, fan operation, etc. Pitot traverses performed using a Dwyer Series 400 air velocity meter only with applicable duct probe.
4. Mark balancing dampers.

E. Fire Life Safety Systems:

1. Balance, adjust, and test the stair and elevator pressurization components in order to pass the city test as described in Section 23 09 00, Instrumentation and Controls for HVAC. Rebalance the system as necessary until it passes the city tests.

### 3.03 HYDRONIC SYSTEMS

- A. General: Make measurements in accord with Industrial Standards specified above. Record on appropriate forms.
- B. Preliminary:
  1. List complete data of tested equipment and verify against Contract Documents.
  2. Open line valves to full open position, close coil by-pass stop valves, then set mixing control valve to full coil flow.
  3. For each pump:
    - a. Verify rotation.
    - b. Test and record pump shut-off head.
    - c. Test and record pump wide-open head.



4. Verify proper system pressures.
  5. Verify air vents in high points of water are properly installed and operating freely.
- C. Central Equipment:
1. Check conditions at coils for required performance at design conditions.
  2. Check conditions at primary source equipment for performance of design conditions.
  3. Read and record pump heads, motor data, and amperage draw.
- D. Distribution:
1. Read and adjust water flow for design conditions.
  2. Set memory stops and mark position of adjuster on balancing valves.

#### **3.04 AUTOMATIC CONTROL SYSTEM**

- A. In cooperation with control manufacturer's representative, set and adjust automatically operated devices to achieve required sequence of operations.
- B. Testing organization verifies controls for proper calibration and list controls requiring adjustment by control system installer.

#### **3.05 COORDINATION**

- A. Coordinate work with other trades to ensure rapid completion of the project.
- B. Promptly report deficiencies noted during the course of air balancing in the mechanical installation to the Architect to allow corrective action to proceed.
- C. Provide periodic review of progress as requested.

**END OF SECTION**

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**SECTION 23 07 00**

**INSULATION FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Pipe Insulation
  - 2. Ductwork Blanket Insulation
  - 3. Ductwork Board Insulation
  - 4. Duct Insulation, Internal
  - 5. Duct, Pipe and Terminal Unit Acoustical Wrap
  - 6. Duct Enclosure, Fire Rated
  - 7. Accessories Piping
  - 8. Accessories Ductwork
- B. Related Sections include:
  - 1. Section 23 05 29, Hangers, Supports and Anchors for HVAC
  - 2. Section 23 31 01, HVAC Ducts and Casing – Low Pressure
  - 3. Section 23 31 02, HVAC Ducts and Casing – Medium Pressure

**1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Prohibit insulating products from containing pentabrominated, octabrominated, and decabrominated diphenyl ethers. Where products within this specification contain these banned substances, provide complying products from approved manufacturers with equal performance characteristics.
  - 2. Flame and Smoke Ratings: Installed composite flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by UL 723 or ASTM E84.

3. **Energy Codes:** Local Building and Energy Codes govern where insulation performance requirements for thickness exceeds thickness specified.

**B. Protection:**

1. Protect against dirt, water, chemical, or mechanical damage before, during, and after installation.
2. Repair or replace damaged insulation at no additional cost.

**C. Source Quality Control:**

1. **Service:** Use insulation specifically manufactured for service specified.
2. **Labeling:** Insulation labeled or stamped with brand name and number.
3. Insulation and accessories not to provide nutritional or bodily use to fungi, bacteria, insects, rats, mice, or other vermin, not to react corrosively with equipment, piping, or ductwork, and asbestos free.

#### 1.04 SUBMITTALS

**A. Submit the following.**

1. **Product Data:** For each type including density, conductivity, thickness, jacket, vapor barrier, and flame spread and smoke developed indices.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

1. **Pipe Insulation:**
  - a. **Fiberglass:**
    - 1) Johns Manville Microlok HP
  - b. **Calcium Silicate:**
    - 1) Johns Manville Thermo-12 Gold
  - c. **Elastomeric:**
    - 1) Armacell/AP Armaflex
    - 2) Rubatex
    - 3) K-Flex
  - d. **Cellular Glass:**
    - 1) Pittsburgh Corning Foamglas
    - 2) Pittwrap SS Jacket
2. **Ductwork Blanket Insulation:**
  - a. **Fiberglass:**
    - 1) Johns Manville Microlite Type 100
  - b. **Semi-Rigid Fiberglass:**
    - 1) Johns Manville Micro-Flex
  - c. **Elastomeric:**
    - 1) Armacell Armaflex

3. Ductwork Board Insulation:
  - a. Semi-Rigid Fiberglass:
    - 1) Micro-Aire Duct Board Type LP
  - b. Rigid Fiberglass:
    - 1) Johns Manville Diffuser Board
4. Duct Insulation, Internal:
  - a. Round Ductwork:
    - 1) CertainTeed
    - 2) Johns Manville
  - b. Rectangular Ductwork:
    - 1) CertainTeed
    - 2) Johns Manville
    - 3) Knauf
    - 4) Owens Corning
5. Duct, Pipe and Terminal Unit Acoustical Wrap:
  - a. Kinetics Noise Control model KNM-100ALQ.
6. Duct Enclosure, Fire Rated:
  - a. Johns Manville
  - b. Firemaster
  - c. Firewrap

## 2.02 PIPE INSULATION

- A. Fiberglass: Split sectional or snap-on type with 0.23 per-inch maximum thermal conductivity (K-factor) at 75 degrees F mean temperature, 850 degrees F maximum service rating and white, vapor barrier jacket with pressure sensitive closure system.
- B. Calcium Silicate: Sectional with 14 pcf nominal density, 0.40 maximum K-factor at 300 degrees F mean temperature and 1200 degrees F maximum service rating.
- C. Elastomeric:
  1. Expanded closed cell, 0.27 per-inch maximum K-factor at 75 degrees F mean temperature, 220 degrees F maximum service rating with fitting covers and paintable surface.
  2. Color:
    - a. Concealed Locations: Black
    - b. Exposed Locations: White.
- D. Cellular Glass:
  1. Light weight rigid glass foam insulation, 0.34 per-inch maximum K factor at 75 degrees F mean temperature, 900 degree degrees F maximum service rating.
  2. Field applied jacketing, woven glass fabric, bituminous resin, poly-ethylene film.
- E. Polyurethane Foam:
  1. Cellular rigid polyurethane foam insulation, minimum 90 percent closed cell, 2 pcf density, compressive strength of 30 psi at 75 degrees F, 0.16 per-inch maximum K-factor at 75 degrees F mean temperature, 230 degrees F maximum service rating.

- F. High Temperature Polyurethane Foam:
  - 1. Cellular rigid polyurethane foam insulation, minimum 90 percent closed cell, 2 pcf density, compressive strength of 35 psi, 0.16 per-inch maximum K-factor at 75 degrees F mean temperature, 400 degrees F maximum service rating.
  - 2. Insulation capable of handling intermittent temperature spikes of 450 degrees F for one hour.
- G. Mineral Wool: Sectional mineral wool, 8 psf density, 0.31 per-inch maximum K-factor at 75 degrees F temperature, 1200 degrees F maximum service rating.

### 2.03 DUCTWORK BLANKET INSULATION

- A. Fiberglass: 1.0 pcf nominal density, 0.25 per-inch maximum K-factor at 75 degrees F mean temperature, 250 degrees F minimum operating temperature limit.
  - 1. Exposed: FSK facing (foil scrim Kraft) or vinyl - white appearance.
  - 2. Concealed with Vapor Barrier: FSK reinforced foil and paper.
  - 3. Concealed without Vapor Barrier: Facing not required.
- B. Semi-Rigid Fiberglass: 2.5 pcf nominal density, 0.24 per-inch maximum K-factor, at 75 degrees F mean temperature, 250 degrees F minimum operating temperature limit.
  - 1. Exposed: FSK facing (foil scrim Kraft) or vinyl-white appearance.
  - 2. Concealed with Vapor Barrier: FSK reinforced foil and paper.
  - 3. Concealed without Vapor Barrier: Facing not required.
- C. Elastomeric: Expanded closed cell sheets, 0.27 per-inch maximum K-factor at 75 degrees F mean temperature and 220 degrees F minimum operating temperature limit.

### 2.04 DUCT INSULATION, INTERNAL

- A. Fiberglass Duct Liner.
  - 1. Thermal Conductance: k-0.23 in accordance with ASTM C518 and ASTM C177 at 75 degrees F mean temperature.
  - 2. Maximum Operating Temperature: 250 degrees F as determined by ASTM C 411.
  - 3. Maximum Air Velocity: 8,000 fpm as determined by ASTM C 1071.
  - 4. Fungi Resistance:
    - a. Does not breed or promote as determined by ASTM C1338.
    - b. No growth as determined by ASTM G21.
  - 5. Bacteria Resistance: No growth as determined by ASTM G22.
  - 6. Flame-spread index of 25 or less as determined by ASTM E 84 or UL 723.
  - 7. Smoke development index of 50 or less as determined by ASTM E 84 or UL 723.

8. Acoustical Absorption Coefficients:
  - a. NRC value as tested in accordance with ASTM C423, type A mounting:
    - 1) 1-inch thickness: Minimum NRC 0.70
    - 2) 2-inch thickness: Minimum NRC 0.90

## 2.05 DUCT, PIPE AND TERMINAL UNIT ACOUSTICAL WRAP

### A. Barrier:

1. Construct barrier of a 0.10-inch thick mass loaded, limp vinyl sheet bonded to a layer of reinforced aluminum foil on one side.
2. Nominal density of 1 pound per square-foot and minimum STC rating of 28.
3. Minimum thermal conductivity value of 0.29 and a rated service temperature range of - 40 degrees F. to 220 degree F.
4. Flame spread index of no more than 10 and a smoke development index of less than 40.

### B. Decoupling Layer:

1. Combination of 1-inch fiberglass batting, non-woven porous scrim-coated glass cloth, quilted together in a matrix of 4-inch diamond stitch pattern, which encapsulates the glass fibers.

### C. Composite Material: Fabricated to include a nominal 6-inch wide barrier overlap lab extending beyond the quilted fiber glass to facilitate a leak-tight seal around field joints.

## 2.06 DUCT ENCLOSURE, FIRE RATED

### A. Johns Manville:

1. 2-hour Rated: Johns Manville, Super Firetemp M, minimum 3-inch thickness, ASTM E2336, 2-hour rated assembly.
2. 1-hour Rated: Johns Manville, Super Firetemp L, minimum 2-1/4-inch thickness, ASTM E2336, 1-hour rated assembly.
3. Joint: Johns Manville, Super Calstik adhesive, modified sodium silicate adhesive.

### B. Firemaster: Thermal Ceramics Firemaster duct wrap ceramic fiber blanket, minimum 3-inch total thickness, ASTM E2336, 2-hour rated assembly.

### C. Firewrap: Unifrax Firewrap duct wrap fiberglass blanket, 1-1/2-inch thickness for 1-hour rated assembly, 3-inch thickness for 2-hour rated assembly. ASTM E2336.

## 2.07 ACCESSORIES PIPING

### A. Adhesives:

1. General: Maximum Flame Spread/Smoke Developed Rating of 25/50, SCAQMD Rule 1168 compliant.
2. Fiberglass: Integral closure system.

3. Calcium Silicate: Benjamin Foster 30-36.
  4. Elastomeric: Armacell 520 BLV.
- B. Cements:
1. Insulating: Ryder.
  2. Heat Transfer: Chemax Tracit-300.
- C. Wire Mesh: 1-inch mesh with 20 gauge annealed steel wire.
- D. Pipe Fitting Covers: One piece PVC insulated pipe fitting covers. Zeston, Ceel-Co.
- E. Grooved Coupling Insulation: One piece PVC insulated fitting cover. Zeston, Ceel-Co.
- F. Metal Pipe Jacket: 0.016-inch thick aluminum jacket with formed fitting covers, aluminum snap straps and sealant.
- G. Cloth Facing: Presized fiberglass cloth.
- H. Tapes: Pressure sensitive, weather resistant, and for temperatures up to 150 degrees F. Zeston Z-tape.
- I. Paint: Ultraviolet resistant latex paint with special adherence capabilities to the PVC fitting covers, elastomeric, aluminum facing, Kraft paper, tapes, and adhesives.

## 2.08 ACCESSORIES DUCTWORK

- A. Adhesives:
1. General: Maximum Flame Spread/Smoke Developed Rating of 25/50, SCAQMD Rule 1168 compliant.
  2. Fiberglass: Benjamin Foster 85-62, Design Polymerics 2501/2502
  3. Elastomeric: Armacell 520 BLV
  4. Duct Insulation, Internal: Foster 85-62, Design Polymerics 2501/2502
- B. Weld Pins: Duro-Dyne with NC-1 nylon stop clips
- C. Cements:
1. Insulating: Ryder.
  2. Heat Transfer: Chemax Tracit-300
- D. Wire Mesh: 1-inch mesh with 20 gauge annealed steel wire.
- E. Mastic: Chicago Mastic:
1. Vapor Barrier: 17-475
  2. Outdoor Mastic: 16-110 white



- F. Cloth Facing: Presized fiberglass cloth
- G. Tapes: Pressure sensitive, weather resistant, and for temperatures up to 150 degrees F. Zeston Z-tape.
- H. Paint: Ultraviolet resistant latex paint with special adherence capabilities to the PVC fitting covers, elastomeric, aluminum facing, Kraft paper, tapes, and adhesives.

**PART 3 - EXECUTION**

**3.01 GENERAL**

- A. Workmanship:
  - 1. Installation: Insulation installed in first class, neat professional manner.
  - 2. Applicators: Employ by firm that specializes in insulation work.
- B. Preparation: Surfaces of piping, ductwork, and equipment clean, free of oil or dirt, and dry before insulation is applied.
- C. Stamps: ASME stamps, UL labels, and similar stamps and labels not covered.

**3.02 HVAC PIPE AND EQUIPMENT INSULATION APPLIED LOCATIONS**

A. Insulation Applied Locations – HVAC Piping:

System	Pipe Size	Insulation Type	Insulation Thickness	Notes
Heating Water (to 200 degrees F)	1-1/4-inch and smaller	Fiberglass	1-1/2-inch	Note 1
	1-1/2-inch and above	Fiberglass	2-inch	Note 1
Heating Water (to 250 degrees F)	3-1/2-inch and smaller	Fiberglass	2-1/2-inch	Note 1
	4-inch and above	Fiberglass	3-inch	Note 1
Refrigerant Suction Hot Gas	1-1/4-inch and smaller	Elastomeric	1-inch	Note 3
	1-1/2-inch and above	Elastomeric	1-1/2-inch	Note 3
Variable Refrigerant Flow (VRF) System Refrigerant Piping	1-inch and smaller	Elastomeric	1/2-inch	Note 4
	1 1/8-inch and above	Elastomeric	1-inch	Note 4
Air Separators and Storage Tanks	All	Fiberglass	3-1/2-inch	
	All	Elastomeric	3-1/2-inch	Note 3
Note 1: Cover with metal pipe jacket where exposed to weather and over heat trace cable. Note 2: Refer to specification 23 20 14 for additional pre-insulated piping systems requirements. Note 3: Elastomeric insulation not allowed over heat trace cable. Note 4: Or per VRF manufacturer installation recommendations.				

- B. The following piping is not insulated:
  - 1. Refrigerant relief valve discharge.
- C. Include fittings, unions, flanges, mechanical couplings, valve bodies, valve bonnets, piping through sleeves, except valve bonnets, unions and flanges need not be insulated on the following systems:
  - 1. Hot water heating inside building.
- D. Piping insulation is not required between the control valve and coil on run-outs when the control valve is located within 4-feet of the coils and the pipe size is 1-inch or less.
- E. Valves, humidifier bodies, and irregular fittings insulated with section of pipe insulation and insulating cement, securely fastened, and finished with 6 ounces canvas and Foster 30-36 lagging adhesive.
- F. Option on flanges, valves, strainers, not requiring a vapor barrier to insulate with removable replaceable pads fabricated of 1-inch layer of Pittsburgh Corning Temp Mat sandwiched between inner and outer layer of 8 ounces glass cloth held together with stainless staples with sufficient stainless lacing hooks to hold pad firmly to flange or valve with minimum 3-inch overlap onto adjacent pipe insulation using 18 gauge SS lacing wire.
- G. Expansion Joints and Flexible Connectors: Pipe insulation or block of same material and thickness as adjacent piping.
- H. Boiler Breeching and Steel Stack: Insulate with 2-inch thick calcium silicate block.
- I. Gas Flues: 1-1/2-inch thick calcium silicate block.

### 3.03 PIPING INSTALLATION

- A. General:
  - 1. Joints: Coat both sides of complete joining area with applicable adhesive.
    - a. Longitudinal Joints: Make joints on top or back of pipe to minimize visibility. Except foam plastic, seal with closure system or 3-inch wide tape.
    - b. Butt Joints: Butt lightly together and, except for foam plastic, seal with 3-inch wide tape or butt straps.
    - c. Multiple Layered Insulation: Joints staggered.
  - 2. Access: Strainer and other items requiring service or maintenance with easily removable and replaceable section of insulation to provide access.
  - 3. Voids:
    - a. Fill voids, chipped corners and other openings with insulating cement or material compatible with insulating material.
    - b. In insulation with Heat Tracing: Where piping is shown or specified to be heat traced, bed heat tape into heat transfer cement with insulation over heat tape and cement.
  - 4. Seal joints, seams, and fittings of metal watertight jackets at exterior locations.
- B. Fiberglass Insulation: Exterior insulation encased in metal jacket.

C. Calcium Silicate Insulation:

1. Secure with 18-gauge wire embedded into insulation.
2. On systems with vapor barrier, coat complete with vapor barrier mastic.
3. Cover with cloth facing secured with applicable adhesive.
4. Exterior insulation encased in metal jacket.

D. Cellular Glass Insulation (pre-insulated piping):

1. Install per manufacturer's instructions.
2. Factory apply insulation and jacket to carrier piping and fittings.
3. Apply bituminous wrap jacket.
4. Installation to be liquid and vapor tight.

E. Elastomeric Insulation:

1. Slit full length and snap around pipe.
2. Make cuts perpendicular to insulating surface leaving no cut section exposed.
3. Do not stretch insulation to cover joints or fittings.
4. Seal joints in elastomeric insulation with adhesive.
5. Exterior insulation painted with two coats of specified paint in accordance with the manufacturer's instructions and encase in metal jacket.
6. Sealing joints with tape will not be allowed.

F. Polyurethane Foam Insulation (pre-insulated piping):

1. Install per manufacturer's instructions.
2. Factory apply insulation and jacket to carrier piping and fittings.
3. Spray applied or injected with one shot into the annular space between carrier pipe and jacket
4. Liquid and vapor tight insulation.

G. Mineral Wool Insulation (pre-insulated piping):

1. Install per manufacturer's instructions.
2. Insulation and jacket factory applied to the carrier piping and fittings.
3. Band sectional insulation on pipe with stainless steel banding on 18 centers.
4. Liquid and vapor tight insulation.

- H. Fittings: Insulation specified with continuous vapor barrier, the vapor barrier must not be violated.
1. On Elastomeric Insulation: Fittings covered with covers made up of mitered sections of insulation or with formed pipe fitting covers.
  2. In Other Insulation: Fittings covered with insulation to the same level of the adjoining insulation or fill with insulating cement. Finish with pipe fitting covers or cloth facing and tape.
- I. Unions, Mechanical Joints, Valves, etc.:
1. General:
    - a. As specified for fittings.
    - b. Minimum thickness same as specified for piping.
  2. Unions: Build up insulation at least 1/2-inch beyond adjoining insulation.
  3. Flanges: With square corners. Where flanges are not insulated, terminate adjacent insulation so flange bolts can be removed.
  4. Flanged Valves: Insulation with square corners.
- J. Vapor Barrier Insulation:
1. Refer to Section 23 05 29 Hangers, Supports, and Anchors for HVAC, for support requirements.
  2. Piping which requires vapor barrier protection has a continuous vapor barrier, which may not be pierced or broken. The following piping systems require vapor barrier protection:
    - a. Chilled water including radiant cooling water.
    - b. Brine water.
    - c. Refrigerant suction.
    - d. Other piping systems with a nominal operating temperature below 65 degrees F.
  3. Vapor Barrier Insulation.
    - a. Insulation for pipe requiring vapor barrier protection 1-1/4-inch or smaller, insulation continuous through pipe hangers and rollers.
    - b. For pipe 1-1/2-inch and larger, 18-inch section of calcium silicate, same thickness as pipe insulation with continuous vapor barrier jacket at each hanger or roller. Provide pipe shield specified in Section 23 05 29, Hangers, Supports, and Anchors for HVAC.
- K. Non-Vapor Barrier Insulation:
1. Refer to Section 23 05 29 for support requirements.
  2. At contractor's option, insulation may be interrupted at supports. Butt insulation tight to support.
  3. If contractor elects to continue insulation at supports, installation as specified for piping systems with vapor barrier installation.
  4. Void between saddle and pipe filled with insulation.

L. **Non-Vapor Barrier Insulation:**

1. Refer to Section 23 05 29, Hangers, Supports, and Anchors for HVAC for support requirements.
2. For pipe 1-1/4-inch or smaller, insulation continuous through pipe hangers and rollers.
3. For pipe 1-1/2-inch and larger, 18-inch section of calcium silicate, same thickness as pipe insulation. Provide pipe shield specified in Section 23 05 29, Hangers, Supports, and Anchors for HVAC.

**3.04 EQUIPMENT INSTALLATION**

A. **General:** Install true and smooth. Insulation over curved surfaces conform to curves of surface.

1. **Access:** Insulated removable heads, water boxes, pump casings, access, etc., that require service, inspection or maintenance provided with covers or section that are easily removable and replaceable. Reinforce openings in adjacent insulation with metal beading. In vapor barriered insulation, coat joints with vapor barrier mastic.
2. **Voids, Depressions and Cavities:** Voids, chipped corners and other openings filled with insulating cement or material compatible with insulating material.
3. **Vapor Barriered Insulation:** Where insulation is specified to have a vapor barrier. No broken or pierced barrier.
  - a. Coated with vapor barrier mastic and patched with insulation facing or tape.
  - b. Staples brush coated with vapor barrier coating.
  - c. Raw edges coated with vapor barrier mastic covered and cover sealed to equipment surface.
4. **Non-Vapor Barriered Insulation:**
  - a. Patch with insulation facing or tape.
  - b. Cover raw edges and neatly bevel to the equipment surface.
5. **Multilayered Insulation:** With staggered joints.

B. **Calcium Silicate and Fiberglass Block:**

1. **Anchors:** Lug nuts 10 gauge black annealed iron wire welded to metal surfaces.
2. **Banding:** Block secured to surface with 1/2-inch wide stainless steel bands maximum 18-inches on center and secured to anchors.
3. **Insulating Cement:** Block covered with insulating cement minimum thickness of 1/2-inch with smooth finish.
4. **Vapor Barriered System:** On vapor barriered system, apply continuous coat of vapor barrier mastic.
5. **Finish:** Finish with cloth facing secured with adhesive and lapped a minimum of 2-inches. Defects touched up with finishing cement.

C. Elastomeric Blanket:

1. Cut insulation to size, make corners with mitering cuts to preclude raw edges, continuously cement insulation to equipment with adhesive.
2. Cement both surfaces of joints and butt tightly together and cover raw edges with two coats of adhesive.

D. Expansion Joints:

1. Covered with larger size pipe insulation to allow full movement and be removable, ends turned back to pipe, coat with vapor barrier mastic on joints in vapor barriered system, and finished with cloth facing cemented to insulation with adhesive.

E. Boiler Breeching, Steel Stacks and Gas Flues:

1. As specified under calcium silicate block except air space 1-inch from metal with air space vented to room and atmosphere.

3.05 DUCT INSULATION APPLIED LOCATIONS

A. General:

1. External insulation with continuous vapor barriers unless specifically noted otherwise.
2. Internally lined completely to grille or diffuser or to indicated terminal points. Dimension shown are net inside of liner.
3. Internally lined ductwork need not be externally insulated.
4. In addition to locations described in specification, internally line medium, low, return and exhaust air ductwork where shown on drawings.

B. Insulation Applied Location – HVAC Ductwork:

System	Location	Duct Type	Insulation Type	Thickness	Notes
Medium Pressure Supply*	Exposed or Visible (Including above a cloud ceiling)	Rectangular	Internally Lined	1-1/2-inch	
		Round/Oval	Internally Lined	1-1/2-inch	
	Concealed or in mechanical rooms	All	Fiberglass Blanket	1-1/2-inch	
	Exposed Outside Building Envelope	All	Internally Lined	3-inch	
	15-foot upstream and downstream of fans	All	Internally Lined	1-1/2-inch unless otherwise indicated	
		Rectangular	Internally Lined	1-1/2-inch	

System	Location	Duct Type	Insulation Type	Thickness	Notes
Low Pressure Supply*	Exposed or Visible (Including above a cloud ceiling)	Round	Internally Lined	1-1/2-inch	Note 3
	Concealed or in mechanical rooms	All	Fiberglass Blanket	1-1/2-inch	
	Exposed Outside Building Envelope	All	Internally Lined	3-inch	Note 3
	Under Slab Ductwork	All	Internally Lined	2-inch	
	Downstream of Air Terminal Units	All	Internally Lined	1-1/2-inch	Note 1 Note 3
	15-foot upstream and downstream of fans	All	Internally Lined	1-1/2-inch unless otherwise indicated	Note 3
Return Air* (not insulated except)	Concealed Outside Building Envelope	All	Externally insulated without vapor barrier	2-inch	
	Exposed Outside Building Envelope	All	Internally Lined	2-inch	Note 3
	Under Slab Ductwork	All	Internally Lined	2-inch	Note 3
	15-foot upstream and downstream of fans	All	Internally Lined	1-inch unless otherwise indicated	Note 3
Exhaust Air* (not insulated except)	15-foot upstream and downstream of fans	All	Internally Lined	1-inch unless otherwise indicated	Note 3
	In Toilet Rooms, 10-foot downstream of exhaust grilles	All	Internally Lined	1-inch	Note 3
Outside Air (untempered)	Exposed or Visible (Including above a cloud ceiling)	Rectangular	Internally Lined	2-inch	
		Round	Internally Lined	2-inch	Note 3
	Concealed or in mechanical rooms	All	Fiberglass Blanket	2-inch	

System	Location	Duct Type	Insulation Type	Thickness	Notes
Supply and Return Plenums	All	All	Internally Lined	2-inch	Note 2
Transfer Air	All	All	Internally Lined	1-inch	Note 3
<p>* In addition to applied locations listed in this table, provide internally lined ductwork where indicated on drawings.</p> <p>Note 1: Except ductwork downstream of terminal units serving patient care areas in hospitals</p> <p>Note 2: Insulation not required on factory fabricated insulated housings and plenums (AHP).</p> <p>Note 3: Where round or oval ductwork is indicated, provide double walled round/oval ductwork as specified in Section 23 31 02, HVAC Ducts and Casing-Medium Pressure, or provide internally lined rectangular ductwork with equivalent free area may be substituted.</p>					

### 3.06 DUCTWORK INSTALLATION

#### A. General:

1. Install in accordance with manufacturer's instruction.
2. Continuous vapor barrier. Coat with vapor barrier mastic and patch with facing or tape. Joints between insulation and access with vapor barrier mastic.
3. Insulation at access panels to be removable or attached to panel with edges of panel and opening reinforced with metal beading.

#### B. External Blanket Insulation:

1. Insulation secured to ductwork with 20-gauge snap wires 24-inches on center and joints.
2. Joints and seams lapped a minimum of 3-inches and sealed with jacket tape.

#### C. Board Insulation:

1. Rectangular ducts with weld pins spaced a maximum of 18-inches on center in both directions.
2. Corners made with joints, bending insulation around corners not allowed.
3. Joints and seams butted tight together.
4. Butt joints with 3-inch wide tape.
5. Corners finished with 3-inch wide tape.

#### D. Internal Duct Liner:

1. Air stream coated surface.
2. Weld pins spaced maximum of 15-inch on center in both directions and within 2-inches of corners and joints. Weld pins flush with liner surface.
3. Complete duct surface coated with adhesive and insulation pressed tightly thereto.
4. Provide edges at terminal points with metal beading and heavily coated with adhesive.



5. Heavily coat joints and corners with adhesive.
  6. Damaged areas replaced or heavily coated with adhesive.
- E. Duct Enclosure - Fire Rated:
1. Installation: Per manufacturer's instructions.
  2. Joints:
    - a. Cement attached boards to one another.
    - b. Butter mating surfaces with a 1/8-inch layer adhesive.
    - c. Secure fiberglass type material with stainless steel banding, Type 304.
  3. Support:
    - a. Duct enclosure may be hung from a conventional trapeze arrangement.
    - b. Provide adequate support at the bottom of vertical runs.
    - c. Multi-Story Vertical Runs: Support Firetemp enclosure at each story penetration with an angle iron collar attached to the Firetemp.
  4. Expansion: Provide adequate clearance at the end of straight runs to allow for expansion of the metal duct inside the enclosure.
- F. Plenums: Insulation on floors protected by wire mesh.
- G. Blank-Off Panels: Insulation, enclosed with sheet metal on all sides. Joints with vapor barrier mastic and taped.
- H. Volume Dampers: Where volume dampers do not allow for continuous insulation, terminate insulation clear of handle sweep, and finish edges to maintain vapor barrier and to prevent damage to the insulation.

### 3.07 DUCT, PIPE AND TERMINAL UNIT ACOUSTICAL WRAP

- A. Installed in accordance with the manufacturer's instructions.
- B. Applied locations for piping and duct systems:
  1. Variable and constant volume terminal units with maximum air volumes over 2000 cfm. Wrap installed such that control devices are easily accessible without circumventing the acoustical value.
  2. Where specified or indicated on drawings.

### 3.08 FIELD QUALITY CONTROL

- A. Field Test: Test and approve systems prior to installation of insulation.
- B. Existing Insulation:
  1. Repair existing insulation damaged during construction.
  2. Make neat connections where new and existing insulation meet.

3. Where existing piping, ductwork or equipment is removed, cover existing surfaces neatly to match existing.
4. Where existing insulation is damaged or missing, notify the architect prior to performing to work.

**END OF SECTION**

**SECTION 23 09 00**

**INSTRUMENTATION AND CONTROLS FOR HVAC**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The provisions of Division 23, HVAC, Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Control Devices
  - 2. DDC Field Panels
  - 3. Connection to Existing Network
  - 4. BACnet Compatibility
  - 5. Operator Interface System
  - 6. Application Programs
  - 7. Input/Output Functions
  - 8. Uninterruptable Power Supply
  - 9. Energy Management System
- B. Related Sections include:
  - 1. Section 22 05 93, Testing, Adjusting and Balancing for Plumbing
  - 2. Section 23 21 13, Pipe and Pipe Fittings HVAC
  - 3. Section 23 08 00, Commissioning for HVAC

**1.03 QUALITY ASSURANCE**

- A. Provide control work by single company with specialists in the type of work required, so that only one control manufacturer is responsible for control and automation work for project.
- B. Provide coordination with other contractors or subcontractors for work required by other trades for accomplishment of control work.

- C. Prior to substantial completion, controls contractor must demonstrate to Owner that system is operating per the Specifications and final adjustments have been made as approved.
- D. System, including components and appurtenances, configured and installed to yield a Mean Time Between Failure (MTBF) of at least 1,000 hours.

#### 1.04 SUBMITTALS

- A. System Drawings: Prepare on AutoCAD format and include the following:
  - 1. Equipment installation, block diagrams, and wiring diagrams.
  - 2. DDC panel physical layout and schematics.
  - 3. Sensor and control wiring and installation drawings which identify each component and show interconnected or interlocked components.
  - 4. Material and equipment descriptive material such as catalog cuts, diagrams, performance curves, and other data to demonstrate conformance with specifications.
  - 5. Details of connections to power sources, including grounding.
  - 6. Details of surge protection device installations.
  - 7. Instrumentation and control diagrams.
  - 8. Complete a written description of control sequences.
  - 9. List of connected data points, including DDC panels to which they are connected, and input device (sensor, etc.).
  - 10. Valve and damper schedules indicating flows, pressure drops, CVs, and actuator type.
  - 11. Graphics: System graphics for review prior to implementation of programming.
- B. Equipment Data: Complete data for materials, including field and system equipment.
- C. Software Data:
  - 1. Submittals consist of complete descriptions of system, command, and applications software as specified.
  - 2. Include description of control sequences which are software based using detailed logic flow diagrams.
  - 3. Diagrams indicate logic used to achieve control sequence of calculation specified, and show relationship between control sequence and application software packages specified.
- D. Testing Submittals:
  - 1. Provide test plan and test procedures for approval.

2. Explain in detail, step-by-step actions and expected results to demonstrate compliance with the requirements of this specification and methods for simulating necessary conditions of operation to demonstrate performance of the system.
  3. Test plan and test procedures demonstrate capability of system to monitor and control equipment and to accomplish control and monitoring specified.
- E. Operation and Maintenance Manuals:
1. Provide three complete sets of manuals bound in loose-leaf binders within 30 days after completing acceptance tests.
  2. Identify each manual's contents on cover.
  3. Manuals include names, addresses, and telephone numbers of each subcontractor installing equipment and systems and of nearest service representatives for each item of equipment and each system.
  4. Place tab sheets at beginning of each chapter or section and at beginning of each appendix.
  5. Final copies delivered after completion of the acceptance tests include modifications made during installation, checkout, and acceptance.
  6. Operation and Maintenance Manuals to include hardware manual, software manual, operations manual, and maintenance manual.
  7. Hardware Manual: Furnish a hardware manual describing equipment provided, including:
    - a. General description and specifications.
    - b. Installation and checkout procedures.
    - c. Equipment electrical schematics and layout drawings.
    - d. System schematics and I-O wiring lists.
    - e. Alignment and calibration procedures.
  8. Software Manual:
    - a. Describe furnished software.
    - b. Oriented to programmers and describe calling requirements, data exchange requirements, data file requirements and other information necessary to enable proper integration, loading, testing, and program execution.
    - c. Provide one software manual per Operator's Terminal.
  9. Operator's Manual: Provide procedures and instructions for operation of the system, including:
    - a. DDC Panels and Peripherals
    - b. System start-up and shutdown procedures.
    - c. Use of system, command, and applications software.
    - d. Alarm Presentation
    - e. Recovery and Restart Procedures
    - f. Report Generation
    - g. System Schematic Graphics
    - h. Provide one Operator's Manual per Operator's Terminal
  10. Maintenance Manual: Provide descriptions of maintenance for equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.

11. **Acceptance Test Forms:** Maintenance manual includes copies of signed-off acceptance test forms.

#### 1.05 ACCEPTANCE TESTING AND TRAINING

##### A. Site Testing:

1. **General:** Provide personnel, equipment, instrumentation, and supplies necessary to perform testing. Owner or Owner's representative will witness and sign off on acceptance testing.
2. **Acceptance Test:** Demonstrate compliance of completed control system with contract documents. Demonstrate using approved test plan, physical and functional requirements.

##### B. Training:

1. **General:**
  - a. Conduct training courses for designated personnel in operation and maintenance of system.
  - b. Oriented to specific system being installed under this contract.
  - c. Provide trainee with two additional copies provided for archival at project site.
  - d. Manuals include detailed description of the subject matter for each lesson.
  - e. Delete copies of audiovisuals to Owner.
  - f. Training day is defined as 8 hours of classroom instruction, including two, 15-minute breaks and excluding lunch time, Monday through Friday, during normal first shift in effect at training facility.
  - g. Notification of any planned training given to the Owner's representative at least 15 days prior to the training.
2. **Operator's Training I:**
  - a. Teach first course at supplier's facility for period of two consecutive training days.
  - b. Upon completion, each student, using appropriate documentation, perform elementary operations with guidance and describe general hardware architecture and functionality of system.
3. **Operator's Training II:**
  - a. Teach second course at project site for a period of one training day after completion of Contractor's field testing.
  - b. Include instruction on specific hardware configuration of installed system and specific instructions for operating the installed system.
  - c. Upon completion, each student able to start system, operate the system, recover the system after failure, and describe the specific hardware architecture and operation of system.
4. **Operator's Training III:**
  - a. Teach third course at project site for period of one training day no later than six months after completion of the acceptance test.
  - b. Structure course to address specific topics that students need to discuss and to answer questions concerning operation of system.
  - c. Upon completion, students fully proficient in system operation and have no unanswered questions regarding operation of installed system.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS/INSTALLERS

- A. **Acceptable Manufacturers/Installers:**
1. Automated Logic by Airco Automation
  2. Delta Controls by Trinity EMCS
  3. Alerton by Syzerco
  4. APOGEE system by Siemens Building Technologies.
  5. Johnson Controls by JCI
  6. Unless otherwise noted, installed by manufacturer.
  7. Trane installed by Trane
- B. **Other Manufacturers:** Submit substitution request.

### 2.02 SYSTEM DESCRIPTION

- A. **General:**
1. Provide a complete control system, consisting primarily of electronic direct digital control devices.
  2. System consists of modular and distributed microprocessor based control and monitoring units connected together by communications trunks. Capable of global data sharing and communication between controllers.
  3. System architecture distributed and not rely on central processing unit (CPU) for sharing point data between controllers, or for control functions requiring data from other controllers.
  4. Multipurpose controller(s) consisting of CPU, system program, memory, power supply, and input/output drivers which communicated with terminal equipment controllers through a communications network.
  5. Provide operator's interface.
  6. Provide equipment, installation, wiring, and accessories as required but not necessarily specified to accomplish operations as described.
- B. **Environmental Conditions:** The
1. Rate DDC panels and other field equipment for continuous operation under ambient environmental conditions of 35 degrees F to 120 degrees F dry bulb and 10 percent to 95 percent relative humidity, noncondensing.
  2. Instrumentation and control elements rated for continuous operation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered for the installation.

3. Install control devices in an enclosure suitable for the installed environment.

C. System Accuracy and Display:

1. DDC system to control space temperature with a range of 50 degrees F to 85 degrees F  $\pm 1$  degrees F for conditioned space (display to nearest 0.5 degrees F); 15 degrees F to 130 degrees F  $\pm 1$  degrees F for unconditioned space (display to nearest 0.5 degrees F). Return air humidity controlled to 20 percent RH to 35 percent RH  $\pm 3$  percent RH.
2. DDC system to control duct temperature with a range of 40 degrees F to 140 degrees F  $\pm 1$  degrees F (display to nearest 0.5 degrees F).
3. Water temperature with a range of 30 degrees F to 100 degrees F  $\pm 1$  degrees F (display to nearest 0.5 degrees F); the range of 100 degrees F to 300 degrees F  $\pm 2$  degrees F (display to nearest 0.5 degrees F); and water temperatures for the purpose of performing BTU calculations using differential temperatures to  $\pm 0.5$  degrees F using matched sensors (display to nearest 0.5 degrees F).
4. Pressure with a range for the specific application  $\pm 5$  percent of range.

## 2.03 MATERIALS AND EQUIPMENT

A. Piping:

1. General:
  - a. Label tubing with numbers shown on control drawings.
  - b. Provide sufficient gauges so that the input and output pressures of each device may be determined at or near its location. Show gauges on control diagram. Provide a gauge at each AO point.
  - c. Air Mains: 3/8-inch OD minimum; branch air lines sized 1/4-inch OD minimum. 5/32-inch tubing may be used in multi-tube sheathes only.
  - d. Run piping parallel to established lines, installed in neat and professional manner.
2. In Mechanical Rooms and Other Exposed Locations:
  - a. Hard drawn copper tubing with soldered fittings, with compression fittings only at control instruments and controlled devices.
  - b. At supplier's option, soft copper or polyethylene tubing may be used in accessible areas, supported in an enclosed gutter or conduit.
3. In concealed locations such as above ceilings and within walls of finished spaces, plenum rated polyethylene tubing may be used.
4. Use Type L hard drawn copper tubing for pneumatically actuated smoke dampers and control devices providing smoke control functions.

B. Duplex Instrument Air Supply Station:

1. Provide supply air to HVAC and plumbing control equipment, including terminal units, fan powered boxes, fans, etc. Include devices in air compressor sizing calculations.
2. Provide a complete standby for both the compressor and dryer. Arrange standby compressor to provide required amount of compressed air whenever system pressure drops below temperature control manufacturer's recommended operating pressure. Starting of standby compressor completely automatic to provide uninterrupted service. Sufficient capacity to supply the entire building under normal conditions with compressor running at full load not over 33 percent of the time.



3. Provide reciprocating piston type compressors with design life of not less than 20,000 hours elapsed running time before major overhaul is required. Oil lubricated compressors utilizing cylinder lubrication in which oil is directly introduced into compression chambers or in which crankcase fumes are directed into suction inlets will not be permitted. Oil consumption not to exceed three fluid ounces per 100,000 scfm of delivered air. Piston speeds not to exceed 450-feet per minute.
  4. Provide each compressor with intake air cleaner, discharge stop valve, and pressure relief valve. Relief valve, placed between compressor and the discharge stop valve, set for pressure of 10 psi above control switch cutout pressure. Cleanable and impingement type intake air cleaners.
  5. Each compressor driven by electric motor wound for the current available. Control by pressure operated, enclosed pilot switch connected to motor starter. Pressure switches for start/stop control set to operate between 80 and 100 psi. Equip system with electrical duplex controller, starters, and disconnect switches, thus permitting automatic alternate operation of each system and automatic simultaneous operation upon demands exceeding capacity of either system.
  6. Provide each compressor and motor with a cast iron or steel base mounted on air tank or on separate concrete foundation. Provide vibration isolation per Section 23 05 48, Vibration and Seismic Controls of HVAC Piping and Equipment, ASME approved. Size for no more than 12 compressor starts per hour, 33 percent run time.
  7. Provide compressor with filtering and air drying system on leaving side. Supply at required rate, air having a dew point of not more than 20 degrees F at 20 psi and having entrained particle size of not more than 5 microns. Self contained air drying system, mechanical refrigeration type using air-cooled condenser.
  8. Condensing Unit:
    - a. Provide devices for automatic draining of condensed water and oil.
    - b. Electrically interlocked through relay or temperature sensing device, so whenever condensing unit fails to operate, it will alarm at the operator's terminal.
  9. Moisture Eliminator: Provide before final filter.
  10. Alarm: Alarm activated by air pressure failure.
  11. Refrigeration Unit Motor:
    - a. Suitable for continuous operation at 40 degrees C ambient temperature.
    - b. Capacity rated with ambient temperature.
    - c. Rated with ambient temperature of not more than 120 degrees F and with minimum suction temperature of 35 degrees F.
    - d. In accordance with the Safety Code for Mechanical Refrigeration, USASI-B-9.1.
- C. Controls and Power Wiring:
1. General:
    - a. Electric equipment and wiring in accordance with Division 26, Electrical.
    - b. Manual or automatic control and protective or signal devices required for operation specified, and control wiring required for controls and devices.
  2. Wiring:
    - a. Field and Subfield Panels:
      - 1) Voltage in panels not to exceed 120V.

- 2) Devices wired to higher voltages, mount in suitable individual enclosures or group in separate control panel.
  - 3) Coordinate electrical power supply with Division 26, Electrical.
  - b. **Motor Control Centers:** Responsibility for correct voltage of holding coils and starter wiring in pre-wired motor control centers interfacing with automatic controls is included hereunder.
  - c. Wiring for DDC systems communications buses two conductor minimum 18 gauge foil-shielded, stranded twisted pair cable rated at 300 VDC or more than 80 degrees C.
3. **Communications Links Surge Protection:**
    - a. Protect communications equipment against surges induced on communications link.
    - b. Cables and conductors which serve as communications links to have surge protection circuits installed that meet the requirements of REA PE-60d.
  4. **Communications Links Overvoltage Protection:**
    - a. Protect communications equipment against overvoltage on communications link conductors.
    - b. Cables and conductors which serve as communications links have overvoltage protection for voltages up to 480 VAC rms, 60 Hz installed.
    - c. Instrument fuses or fusible resistors are acceptable for this application.
  5. **Power Line Surge Protection:**
    - a. Protect equipment connected to AC circuits from power line surges.
    - b. Do not use fuses for surge protection.
- D. **Control Panels:**
1. Provide wall-mounted control panels to contain relays, terminal strips, power supplies and other equipment in building control system.
  2. UL listed, minimum NEMA 1, minimum 14 gauge steel with stiffeners, continuous hinge doors, locking handles, single point latch.
- E. **Section 23 52 00, Heating Boilers:**
1. Mount boiler management system (BMS) control panels.
  2. Provide and install wiring required for boiler controls.

## 2.04 CONTROL DEVICES

- A. **Temperature Instruments:**
1. **Room Temperature Sensors:** Platinum RTD type with accuracy of  $\pm 0.4$  degrees F at 70 degrees F; operating range 30 to 120 degrees F; linear to DDC system; single point sensing element in wall-mounted ventilated enclosure with insulating backplate if mounted on exterior wall.
    - a. Sensor not to have digital readout display.
    - b. Sensor has user adjustment based on DDC programmed offset.
  2. **Duct Temperature Sensors:** Platinum RTD element with accuracy of  $\pm 0.5$  degrees F at 32 degrees F, averaging type consisting of array of single point sensing elements, securely mounted in duct or plenum; operating range 0 to 100 degrees F; linear signal; 20-foot element.

3. **Outside Air Temperature Sensor:** Platinum RTD element with accuracy of  $\pm 0.5$  degrees F at 32 degrees F; Range -60 to 100 degrees F, single element, linear, with weather and sun shield for exterior mounting.
  4. **Low Temperature Limit Thermostat:** Minimum 20-foot capillary sensing element, triggering on low temperature as sensed by any 6-inch segment; snap acting, normally open contacts, manual reset, line voltage.
  5. **Liquid Immersion Temperature Sensor:** Platinum RTD element, with accuracy of  $\pm 0.5$  degrees F at 32 degrees F, stainless steel well and assembly, range 40 to 240 degrees F.
  6. **Pneumatic Room Thermostat:** Two-pipe relay type with concealed adjustment, and no thermometer, blank cover secured with Allen screws.
- B. **Humidity Instruments:**
1. **Space Humidity Sensors:** Operating range 10 to 95 percent relative humidity, accuracy  $\pm 5$  percent, surface mounted ventilated enclosure for wall mounting.
    - a. Sensor to not have digital readout display.
    - b. Sensor to have user adjustment based on DDC programmed offset.
  2. **Duct Humidity Transmitter:** Capacitive type sensor and transmitter, linear output signal, automatic temperature compensating, air filter,  $\pm 2$  percent RH accuracy from 0 to 100 percent RH, industrial quality.
- C. **Motorized Control Dampers:**
1. **Multi-blade air foil type**, except where either dimension is less than 10 inches a single blade may be used. Maximum blade length to be 48 inches. Provide parallel blades for positive or modulating mixing service and opposed blades for throttling service. Blades to be interlocking, minimum 16 gauge galvanized steel.
  2. **Compression type edge seals and side seating stops.** Reinforced damper blades have continuous full-length axle shafts, axle to axle linkage, and/or operating jackshafts as required to provide coordinated tracking of blades. Over 25 SF in area to be in two or more sections, with interconnected blades. Maximum air leakage of 3 cfm per square foot at 1-inch wg pressure. Provide automatic dampers except those specified to be provided with units. Tested in accordance with AMCA Standard 500. Based on Ruskin CD-60.
- D. **Motorized Valves:**
1. Equip with equal percentage with tight shutoff. Two position valves line size (full port two position ball valves), modulating water valves sized at 5 psi drop or as shown on the Drawing.
  2. Screwed ends except 2-1/2-inch and larger valves with flanged ends.
  3. Select valves to modulate smoothly at system pressures and flows.
  4. Select valves with close-off ratings and spring ranges designed to operate at the maximum flows and maximum available pump heads scheduled without leakage.

5. Bubble tight butterfly valves acceptable on 2-1/2-inch lines and above for two-position action only.
  6. Air handling unit heating and cooling coil valves sized for 5 psi drop, unless otherwise noted on drawings.
- E. Valve and Damper Operators:
1. Electronic modulating actuators with low voltage DC or current positioning signal.
  2. Each actuator have the current limiting circuitry incorporated in its design to prevent damage to the actuator.
  3. Provide modulating actuators and accept 0-10 VDC or 2-10 VDC or 4-20 mA input signal.
  4. Actuators provide the minimum torque required for proper close-off against the system pressure for the required application.
  5. Spring return feature permits normally open or normally closed positions of the valve or damper.
  6. Direct shaft mount rotational actuators have external adjustable stops to limit the travel in either direction.
  7. Actuators powered by 24 VAC.
- F. Flow Switches:
1. Provide McDonnell Miller or approved equal.
  2. Install in piping in such a manner so as to eliminate nuisance fluttering.
  3. Provide time delay relays where required to eliminate false alarms when equipment is started.
  4. Differential pressure type.
  5. Current switches set for pump or fan normal current ranges are acceptable.
- G. Electric Solenoid Operated Pneumatic (EP) Valve:
1. EP valves have three part operation -- common, normally open, and normally closed. EP valves.
  2. Rated for 25 psig when used in control system operation at 20 psig or less or rated at 150 psig when used in control system operation from 25 to 100 psig.
- H. Differential Pressure Switch:
1. Required for proof of flow on fans and pumps.
  2. Setpoint adjustable with operating range of 0.5 to 12-inches W.G. for fans, and 5 to 30-feet wc for pumps.
  3. Close when set pressure differential is met or exceeded.

- I. **Differential Pressure Transducer:**
  - 1. Provides value of pressure drop across filter bank through DDC system.
  - 2. Operating range 0 to 2-inches wc, linear, accurate to  $\pm 2.5$  percent of span.
- J. **Duct Static Pressure Transmitter:**
  - 1. Operating range 0 to 5-inches wc for duct mounted transmitter and 0 to 5-inches wc for fan high limit transmitters.
  - 2. Sensors either diaphragm or rigid element bellows, electronic type.
  - 3. Provide transmitter with stop cock and tubing for attaching portable pressure gauge.
  - 4. Sensing tube securely mounted in duct with appropriate fitting.
  - 5. Accuracy  $\pm 1$  percent of span, maximum response time 1 second.
- K. **Current Transformer:**
  - 1. Current status switch, adjustable setpoint 1-135A,  $\pm 1$  percent of range, capable of monitoring motor's status and detection of belt breaking or slipping.
  - 2. Hawkeye 700, or approved equal.
- L. **Building Static Pressure Transmitter:**
  - 1. Operating range of -0.1 to 0.1-inches wc, linear to DDC system.
  - 2. Sensing tubes located inside and outside building use shielding and/or surge tanks to minimize effects of wind.
  - 3. Accuracy  $\pm 1$  percent of span.
- M. **Piping Pressure Transmitter:**
  - 1. Operating range 0 to 50 psig, linear to DDC.
  - 2. Provide threadolet for mounting to pipe installed by others .
  - 3. Accuracy  $\pm 1$  percent of range.
- N. **Products of Combustion Detectors:** Duct smoke detectors are provided under Division 28, Electronic Safety and Security with single set of SPDT auxiliary contacts for control contractor connection.
- Q. **Emergency Stop Switch:** Red, mushroom type, pull out to operate.
- P. **End Switches:** Turret head type SPDT. Square D Class 9007, Type C54B2, or equal.
- Q. **VAV Actuators:**
  - 1. Proportional 24 VAC actuators using a 4 to 20 mA range of control signals.

2. Automatically stop at end of travel and include a permanently lubricated gear train.
3. Furnished by the controls manufacturer and factory installed and tested by the terminal unit manufacturer.

R. Carbon Dioxide Sensor:

1. Infrared sensing, Carbon Dioxide gas monitor. Based on Airtest TR9290 series.
2. Detection Range: 0-2000 ppm
3. Accuracy: +/- 3 percent of measured value
4. Response Time: 2 minutes
5. Outputs: 0-10V, 4-20 mA
6. Calibration: Self-calibrating, calibration not required
7. Power Requirement: 24 VAC/VDC  $\pm$ 20 percent, 50-60Hz (half-wave rectified)
8. Operating Temperature Range: 32 degrees F to 122 degrees F
9. Operating Humidity Range: 0 percent - 95 percent RH, Non-Condensing
10. Display: Sensor [be provided] [not be provided] with digital display.

S. Water and Steam Flow Meters:

1. Provide Vortex flow meter that provides output signals, which are linear with the flow rate.
2. Accuracy +/- 1 percent of measurement for volumetric flow rates greater than 5 percent of specified maximum flow rate for each building.
3. Flowmeters provide specified accuracy when installed and configured for upstream minimum straight runs of 24 inches.
4. Vortex flow meters will be Intelligent microprocessor-based, with integral LCD digital Display/Configurator allowing complete commissioning and operation without external programming devices.
5. Meter design will permit maintenance and repair of flow sensor and electronics without removing the meter from line or shutting down steam flow.
6. Flowmeter: Turn down ration of 50:1 or higher.
7. Meter have ANSI 150 flanged end connections, wafer style not acceptable.
8. Flange size of the adjoining pipe the same nominal size as the flow meter.
9. Mount flow meter in a straight, unobstructed pipe with a minimum of 10 pipe diameters upstream of the meter and 5 pipe diameters downstream, compensating for any induced flow effects according to manufacturer's recommendations.
  - a. Maximum Operating Pressure: 400 psi
  - b. Output Signal: Analog 4-20mA signal

- c. Supply Voltage: 24VDC
- d. Interrogation: FoxCom version
- e. Based on: FoxBoro I/A Series Intelligent Vortex Flow Meter 83

**T. Water Flow Meters: Provide insertion electromagnetic flow meters.**

- 1. Accuracy:  $\pm 1$  percent of reading from 0.25-20 ft/sec
- 2. Liquid Temperature Range: 15-300 degrees F
- 3. Maximum Operating Pressure: 400 psi
- 4. Output Signal: Analog 4-20mA signal
- 5. Pipe Size Range: Minimum 3-inch
- 6. Installation: 15 pipe diameters up and 5 pipe diameters down, or manufactures recommendations
- 7. Display: Sensor [be provided] [not be provided] with digital display. [Provide BTU meter Onicon system 10]
- 8. Based On: Onicon F-3500

**U. Natural Gas Sub-Meter**

- 1. Electromagnetic flow meter, insertion type.
  - a. Accuracy:  $\pm 1$  percent of reading from 500-7000 SFPM
  - b. Output Signal: Analog 4-20 mA signal
  - c. Display: Digital
  - d. Based On: Onicon F-5100

**V. Airflow Stations:**

- 1. Air Flow Station (Duct Mounted):
  - a. Acceptable Manufacturers:
    - 1) Ebtron
    - 2) Kurz
  - b. General: Electronic air measuring system consisting of thermistor based sensor grid and microprocessor based electronics.
  - c. Sensor Probes: Thermistors probes and linear ICs, aluminum casing, duct mounted, wiring Teflon or kynar coated and encased, 20 degrees F to 160 degrees F operating range, weather resistant finish, flanged welded aluminum frame.
  - d. Microprocessor and Electronics: Solid state microprocessor, permanent non-volatile memory, regulated power supply, software based system, 0-5 vdc, 0-10 vdc, or 4-20 mA signals, linear flow and temperature outputs, line surge and transient protection.
  - e. Performance:
    - 1)  $\pm 2$  percent,  $\pm 20$  fpm across total calibrated range of 0 to 5000 fpm, for duct mounted, 0-10,000 fpm for fan inlet mounted, repeatability better than  $\pm 0.4$  percent of reading.
    - 2) Pressure drop not to exceed 0.005-inch wg at 2000 fpm.
  - f. Based On: Ebtron-Duct mounted XP000 series.

2. **Air Flow Station (Fan Inlet):**
  - a. **Acceptable Manufacturers:**
    - 1) Ebtron
    - 2) Air Monitor
    - 3) Paragon
    - 4) Pace
    - 5) Or approved equal.
  - b. Fan inlet airflow traverse probe, multiple total and static pressure sensors place at concentric area centers along exterior surface of cylindrical probe, internally connected to averaging manifolds.
  - c. Dual end support swivel brackets suitable for mounting in fan inlet bell, aluminum construction, hard anodized finish.
  - d. Probes capable of producing steady, non-pulsating signals of standard total and static pressure, without need for flow corrections or factors with an accuracy of 3 percent of actual flow over a fan operating range of 5 to 1 capacity turndown.
  - e. Based On: Fan Inlet XF000 series.
3. **Automatic Air Flow Station Measuring Damper:**
  - a. **Acceptable Manufacturers:**
    - 1) Ruskin IAQ50X
    - 2) Greenheck AMD-42
    - 3) Tamco/Ebtron Air-IQ
    - 4) Or approved equal.
  - b. **Description:** Automatic control damper with integral electronic airflow measuring system.
  - c. **Dampers:**
    - 1) Multi-blade, airfoil type, extruded aluminum.
    - 2) Full-length axle shafts.
    - 3) Damper blades operate in unison.
    - 4) Dampers exceeding 25 SF in area in two or more sections.
    - 5) Assembled depth not to exceed 18 inches.
    - 6) Leakage rating not to exceed 4 cfm/sf at 1-inch static pressure when tested in accordance with AMCA Standard 500D.
  - d. **Damper Actuator:**
    - 1) 24 VAC electric modulating.
  - e. **Air Flow Measurement Assembly:** Includes airflow measuring station, controller, and associated tubing and connections.
    - 1) **Measuring Range:** 300 fpm to 2,000 fpm velocity.
    - 2) **Accuracy:**  $\pm 5$  percent of reading.
    - 3) Solid state microprocessor.
    - 4) Linear flow output.
    - 5) Line surge and transient protection.
    - 6) **Input Signal:** 0-10 VDC.
    - 7) **Output Signal:** 0-10 VDC.

W. **Airflow Transmitters:**

1. Provide transmitter with 4-20 mA output signal, accurate to  $\pm 0.25$  percent for full range, range selected based on the actual flow element and expected velocity pressure, and linear output on velocity turndown of 10 to 1. Setra Model C264.
2. Provide a calibration certificate for each unit.



**X. Window Switch: Magnetic contact switch.**

1. **Acceptable Manufacturers:**
  - a. Sentrol
  - b. GE Security
  - c. Other Manufacturers: Submit substitution request
2. **Magnetic type contact switch, flush mount, concealed within window frame.**
3. **Switch provides input to Building Management System on status of window (open/closed).**

**Y. Leak Detection System:**

1. **Provide complete system including alarm module with audible alarm and contacts for connection to building DDC control system, sensing cable, leader cable, jumper cables, end terminations, hold-down clamps and other required accessories.**
2. **Tracetek by Tyco Thermal Controls, or equal.**

**2.05 DDC FIELD PANELS**

**A. Multipurpose Controllers:**

1. **Stand-alone microprocessor based panels, enclosed in sturdy metal enclosure with two standard RS232 interface ports, network communications module, power supply, and battery back-up.**
2. **Panels will be used to connect field sensors and control devices. Fully supervised to detect failures. Construct panel so that functions are implemented on replaceable circuit boards to permit field maintenance. Panels completely field programmable through portable terminal. Minimum 8-hour battery backup system.**
3. **Link panels with data trunk cable to other controllers and Operator's Terminals to distribute information. Field panels continuously exchange data through trunk cable without requiring output to input wiring between panels. Arrange system so operations are maintained without the central computer being connected to the system.**
4. **Upon failure of the DDC field panel, including transmission failure, the panel automatically forces the controls to remain in the last command status.**
5. **Provide a real time clock with calendar maintaining seconds, minutes, hours, and days of the week, accurate to  $\pm 10$  seconds per day.**
6. **Provide sufficient memory to perform specified and shown DDC field panel functions and operations, including spares. Each DDC panel to have 10 percent minimum spare memory board spacing.**
7. **DDC field panel contain hardware to support power fail automatic restart.**
8. **Provide locking type mounting cabinets with common keying.**
9. **DDC field panel have built-in diagnostics to display to operator interface terminal any sensor transmitting signal out of its design range.**

10. Control logic done with software resident in each local DDC panel. Auxiliary relays may be used only when required for load contact rating.

11. Panels UL listed.

**B. Terminal Equipment Controller:**

1. Provide for each piece of equipment, as specified. Include point inputs and outputs as necessary to perform specified control sequences.
2. Each controller performing space temperature control provided with a matching room temperature sensor. Include terminal jack to monitor hardware and software associated with controller.
3. Include setpoint adjustment dial, temperature indicator, and override switch for each sensor.
4. Override Switch:
  - a. Override night setback mode to normal (day) mode when activated by occupant.
  - b. Adjustment dial and override switch may be locked out, overridden, or limited through software from central work station or portable terminal.
5. Independent of other network communications. Receive real time data from central work station or multipurpose controller.
6. Proportional, integral, and derivative (PID) algorithms field adjustable.
7. Data base and sequence of operation programs stored in non-volatile EEPROM and EPROM.
8. Controllers networked through communications link to the multipurpose controller.
9. Power controllers from 24 VAC source. Provide dedicated power source. Coordinate with Division 26, Electrical
10. VAV box controllers include differential pressure transducer connected to manufacturers standard velocity sensor, and include provisions for both automatic and manual calibration of transducer to ensure against drift. Incorporate algorithm to allow for modulation of hot water heating valve, and supplementary hot water radiation valve. Fan-powered terminal units control series or parallel fan as appropriate. Provide fan status proof current switch.

**2.06 CONNECTION TO EXISTING NETWORK**

- A. General: Communication between peer-to-peer DDC control panels via TCP/IP over the existing Ethernet system.
- B. Provide software and system integration to seamlessly integrate to the existing server for common system graphics, alarming, paging out of alarms via existing paging system.

**2.07 BACNET COMPATIBILITY**

- A. DDC System and components BACnet Data Communications Protocol compliant.

- B. System fully integrated and installed as a complete package of BACnet compliant controls and instrumentation.
- C. Capable of seamless BACnet integration with existing BACnet compliant devices as well as future BACnet compliant devices.
- D. No portals or third party devices required for integration with existing or future equipment.
- E. Devices utilized in the BACnet interface BACnet Testing Laboratories (BTL) listed and labeled.

## 2.08 OPERATOR INTERFACE SYSTEM

### A. Operator Workstation:

1. Provide personal computer that performs data access, operator's commands, alarm management, requests for reports, file generation, diagnostics, and modifications. Control system not dependent on Operator Workstation for operation. Computer to be used for operator interface.
  - a. CPU: Windows compatible computer using current microprocessor technology operating at minimum of 2.8 GHz with 512 MB RAM.
  - b. Display Unit: Minimum 17-inch (nominal) flat screen color monitor, supporting a minimum display resolution of 1280x1024 pixels, with separate controls for color contrast and brightness, and non-reflective screen.
  - c. Video Card: Minimum 64 MB RAM capable of supporting a minimum of 1280x1024 resolution with a minimum of 32 Bit color.
  - d. Drives: Minimum 120 G byte hard disc, CD Read/Write, DVD player.
  - e. Alphanumeric Keyboard and Mouse: Provide an alphanumeric keyboard with standard 96 character ASCII set output. Provide a "mouse" input device with pad.
  - f. Printers: System printers are to be of the color ink jet type operating under software control as specified in the software section of this specification.
  - g. Operating System: Windows XP, 2000 or comparable.

### B. Web-Based Access:

1. Provide a web-based controls interface with at least 3 user login accounts and password each with the capability of different access privileges that performs data access, operator's commands, alarm notification, requests for reports, file generation, diagnostics, and modifications.
2. Controls accessible in mechanical room by direct connection from a laptop to a data port.
3. Provide a temporary computer located on-site in the mechanical room until the commissioning, testing, and balancing has been completed.
4. Provide a temporary computer located on-site in the mechanical room, with software and capabilities necessary to support commissioning, testing, and balancing and other activities required for project completion.

### C. Graphics: Provide a complete graphics package with the following features:

1. Provide separate schematic diagram depicting each system. Diagrams to show major components such as fans, dampers, heating and cooling coils, humidifiers, pumps, heat exchangers, chillers, boilers, towers, ductwork, piping, etc., arranged to convey to viewer system configuration and flow of each system.

2. Provide plot plan, riser plan, and selected floor plans of buildings with the location of each mechanical room and major equipment location indicated.
3. Provide symbols superimposed on each schematic to indicate each control device including control valves, damper motors, temperature sensors, pressure sensors, etc. Provide real time dynamic displays of the temperature, humidity, pressure, flow rate, run status, alarm status, and etc., adjacent to each control symbol. Arrange CPU to update each displayed analog and digital value minimum of every 15 seconds.
4. Provide indication of setpoints, with each setpoint value located adjacent to each sensed value.
5. Provide means to allow the user to easily change or add graphics via computer assisted drawing function utilizing freehand mouse.
6. Provide means to allow user to transfer repeated system schematics and symbols between graphics without redrawing them. Provide symbol library arranged to store commonly used symbols.
7. Provide a telescoping or zoom program to allow use to move from plot plan to mechanical room plan to system graphic to control device display by simply clicking the mouse.
8. Provide dual function windowing program to allow user to view a split screen and toggle between simultaneous operations.

**D. Trend Data Collection and Historical Data:**

1. Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. System point may be trended automatically at time-intervals, time-synchronized intervals, change of value, or by event user-definable.
2. Collect and store trend data on hard disk for future diagnostics and reporting. Automatic trend collection may be scheduled of zones, events, and reports. Archive to network drives or removable disk media for future retrieval.
3. Allow the user to view trended point data. Display data in both tabular and graphical format. Reports may be customized to include individual points or predefined groups of selected points. Provide additional functionality to allow predefined groups of up to 250 trended points to be easily transferred online to Microsoft Excel.
4. Provide the following trend data for review by the commissioning agent:
  - a. Adequate trending data maintained to evaluate system performance and diagnose system problems. Controls Contractor is responsible for trending points necessary to evaluate controlled equipment. Controls Contractor to coordinate with the Cx regarding trend intervals and specific points to be trended. The following systems trended and trend data provided for review by the engineer and commissioning agent at 15-minute intervals unless otherwise directed.
  - b. Building electrical, natural gas, domestic water, heating water flow.
  - c. Monitored temperatures including but not limited to space, supply, return, outside air, mixed air, chilled water, heating water, steam, pumped condensate, and etc.
  - d. Occupancy modes as they apply to each piece of controlled equipment including but not limited to optimal start, occupied, unoccupied, temporarily occupied (override, etc.), night low limit, night high limit, night purge.
  - e. Motor run commands and motor proofs for fans and pumps.

- f. VFD Speeds for controlled equipment.
- g. Measured airflows for both air handlers and volume control units.
- h. Damper positions for both air handlers and volume control units.
- i. Heating and cooling valve positions.
- j. Occupancy sensor indications used for HVAC control.
- k. Set points including but not limited to occupied and unoccupied space temperature, supply air temperature, hydronic supply temperature, radiant heating and cooling temperature, pumping pressure, fan static pressure, etc.
- l. Supporting information necessary to evaluate setpoint reset sequences.
- m. Operating schedules for controlled equipment.
- n. Loop tuning variables.

## 2.09 APPLICATION PROGRAMS

- A. General: Provide user-programmable DDC system programs with library of base-level predefined functions with user specified parameters.
- B. Time of Day Scheduling:
  - 1. Six schedules for equipment operation.
  - 2. Seven unique days per schedule.
  - 3. Program individual time cycle capability for each piece of equipment.
- C. Control Priorities:
  - 1. Provide an effective order of control priorities such that each succeeding level of optimization does not interfere with a more critical function. Alarm actions and manual commands from the operator to override lower level functions (such as duty cycling or scheduling).
  - 2. Events, initiated outside the DDC system causing equipment shutdown automatically reset when events causing the shutdown is cleared, such as power failure or fire alarm, (when fire alarm system is cleared and reset, air handlers, etc., sequentially restart).
  - 3. Alarms within the control system (such as freeze protection), mechanical equipment (such as air handlers) restart after the alarm condition is manually reset.
- D. Alarms: Provide the following alarm processing capabilities:
  - 1. Connected status or analog point may be designated as alarm input point.
  - 2. Start/stop points with status feedback as well as associated analog alarms have a user-programmable inhibit time assigned to each point to prevent nuisance alarms from occurring during startup of HVAC equipment.
  - 3. Each alarmable point have change-of-state priority assignment assignable at 3 levels. One each for its level of criticality.
    - a. Low : Maintenance alarms
    - b. High: Critical HVAC equipment alarms
    - c. Emergency: Life safety alarms.

4. User may designate which conditions of alarm cause alarms to be initiated for display. The user may also designate alarm message for alarm condition and for return to normal condition as desired. Each message may be up to 32 characters in length and up to 32 messages are available in each digital management system.
  5. Provide for orderly display of alarms based on criticality (i.e., if two or more alarms occur simultaneously); alarm with highest level of priority displayed first.
  6. User may designate which conditions of alarm cause alarms to be initiated for display. User may also designate alarm message for alarm condition and for return to normal condition as desired. Each message may be up to 80 characters in length.
  7. Provide automatic phone dialing feature with the capability to report a general alarm recorded message.
- E. Security: Support multi-level password access with the following minimum access levels:
1. Read-only level, without capability of changing any part of software.
  2. Adjustment level, allowing operator to adjust setpoints and schedules, force outputs on/off, but not to modify programming.
  3. Full programming access.
  4. Supports additional levels of programming access.
- F. Power Failure: In the event of the loss of normal power, orderly shutdown of controllers to prevent the loss of database or operating system software. Non-volatile memory incorporated for critical controller configuration data, and battery backup provided to support the real-time clock and volatile memory for a minimum of 72 hours.
1. During a loss of normal power, the control sequences go to the normal system shutdown conditions.
  2. Upon restoration of normal power and after a minimum off-time delay, the controller automatically resumes full operation without manual intervention through a normal soft-start sequence.
  3. Should a controller memory be lost for any reason, the operator workstation automatically reloads the program without intervention by the system operators.
- G. Providing load shedding software package.
- H. Preventive maintenance software package.

## 2.10 INPUT/OUTPUT (I/O) FUNCTIONS

- A. Analog Inputs (AI):
1. Monitor each analog input, perform A-to-D conversion, and hold the digital value in a buffer for interrogation.
  2. Provide signal conditioning for each analog input.
  3. Individually calibrate analog inputs for zero and span, in hardware or in software.

4. Minimum 12 bit A to D resolution.
- B. Analog Outputs (AO):
1. Accept digital data, perform D-to-A conversion, and output a signal compatible with the operator.
  2. Individually calibrate analog outputs for zero and span.
  3. Provide short circuit protection.
  4. Minimum 8 bit D to A resolution.
- C. Digital Inputs (DI):
1. Accept ON/OFF, OPEN/CLOSE or other change of state (two-state data) indications.
  2. Provide isolation and protection against input voltage up to 180 Vac peak.
- D. Digital Outputs (DO):
1. Provide contact closures for momentary and maintained operation of output devices.
  2. Closures have a minimum duration of 0.1 second.

## 2.11 UNINTERRUPTABLE POWER SUPPLY

- A. General:
1. Provide an uninterruptable power supply (UPS) for each DDC field panel.
  2. UPS fed by 120V AC emergency power circuits.
  3. Floor or wall mountable.
- B. Provide MGE Pulsar UPS or pre-bid approved equal.
- C. UL 1778 listing.
- D. Base sizing on peak current requirements of connected load plus 15 percent factor of safety
- E. Provide manufacturer's standard three-year comprehensive warranty, including batteries.

## 2.12 ENERGY MANAGEMENT SYSTEM

- A. General
1. Provide a complete system consisting of metering instruments, communications between components; communications network; dataloggers; protocol converters and other appurtenances as required for a complete system.
  2. Meters, network controllers, and Ethernet gateways provided with non-volatile flash memory sufficient to maintain system programming indefinitely.

**B. Data Acquisition Network**

1. Connect meters to DDC system via TCP/IP communications over ethernet LAN. Communications in BACnet/IP protocol.
2. The system may utilize Modbus for communication with field devices over local RS-485 communications links.
3. Connection to the building Ethernet network made at the nearest wall data outlet in a mechanical or electrical room.
4. Limit cabling lengths between devices in accordance with manufacturers published requirements.

**C. Data Access and Display**

1. Measured values, both instantaneous readings and historical data, available to any user on any computer with an Internet connection without requiring a specific operating system or proprietary software that is not publically available freeware.
2. Assign metering a unique network address and by entering that address or corresponding URL into a web browser, HTML web pages of data available for that device.
3. Specific browser software permitted to be required to access system features beyond the measured values.

**D. Data Format**

1. Synchronize to a single time base so that events on the system can be compared at different locations on the system using a common time base. Time base synchronized with DDC system.
2. Store data in DDC system database.

**E. Software**

1. Seamless BACnet/IP integrated with building Direct Digital Control, DDC system, and have the ability to display individual meter output data.
2. Calculation engine to virtually calculate, display, and store-derived values.
3. Download meter data every 15 minutes.

**F. Interface and Display**

1. Provide 32-inch LED flat panel display.
2. Scroll through display features in 20 second intervals (adjustable).
3. Display:
  - a. Monthly Utility Total Energy (kbtu) and EUI (kbtu/sf/yr) bar chart overlaid with the prior year by month. Use different colors to indicate the contribution of gas and electricity to each monthly total bar.



- b. Monthly System Total Energy (kbtu) and EUI (kbtu/sf/yr) bar chart overlaid with the prior year by month. Use different colors to indicate the contribution of each end use (Mechanical, plug loads, plumbing, and lighting) to each monthly total bar.
- c. Current Day's end use energy demand (kW) overlaid with the annual weekday and weekend average demand (kW), and temperature in a line chart. Provide separate slides for Lighting and Plug Load end uses.
- d. Current Day's end use energy demand (kbtu/hr) overlaid with the annual weekday and weekend average demand (kbtu/hr), and temperature in a line chart. Provide separate slides for Mechanical and Plumbing Load end uses.
- e. Energy Meter Gauge indicating real-time end use energy demand (kW and W/sf) for Lighting and Plug Loads.
- f. Energy use pie chart indicating percent of annual energy from each enduses (Mechanical, Plumbing, Plug Loads and Lighting).
- g. Monthly water usage (gallons) and WUI (gallons/person/year) bar chart overlaid with the prior year by month.

#### G. Current Sensors and Transformers

1. Current Transformers, 5A:
  - a. Submetering:
    - 1) Accuracy: 1.0 percent (10 percent-100 percent of Current Transformer rating).
    - 2) Split-core: Flex-core, Hawkeye, Square-D, Veris.
2. Current Sensors; 0-5 VDC, 330 milli-volt:
  - a. Submetering:
    - 1) Accuracy: 1.0 percent (10 percent-100 percent of Current Transformer rating).
    - 2) Manufacturers: Square-D, Magnelab, Veris, Sentron.

#### H. Electrical Energy Meters

1. Measured values: Real kWh, Reactive kVARh, Apparent kVAh, kW, power factor, RMS power and current per phase.
2. Voltage: monitored circuit voltage indicated in documents.
3. Current Transformers: Provide milli-volt compatible meters where milli-volt Current Transformers are used.
4. Minimum Current Transformer input amperage (5 Amp Current Transformer only): 10A.
5. Sampling rate: minimum 3kHz.
6. Submetering Meter Accuracy: +/-1 percent accuracy (10 percent to 100 percent of Current Transformer rating).
7. Manufacturers: Veris E50, Siemens, Square D.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Operator Workstation: Locate as shown or submit proposed location where not shown.

- B. **Mounting Panels:** Locate panels where shown on Drawings or near item of equipment to be controlled, but not on equipment itself.
- C. **DDC Field Panels:**
  - 1. Provide number of panels required to accommodate DI, DO, AI, and AO points and hardware and software to accomplish specified control sequenced.
  - 2. Locate panels in mechanical or electrical rooms
  - 3. Submit proposed locations for approval prior to preparing control drawings.
- D. **Pneumatic Signals:** The use of pneumatic signals to start and stop motors is not allowed.
- E. **Electrical:**
  - 1. Provide control wiring for control devices and control panels.
  - 2. Run control wiring in mechanical rooms or locations susceptible to damage in conduit. Plenum rated cable may be used in other locations.
  - 3. Provide power wiring for control devices and control panels. Utilize designated circuits in electrical power panels. Refer to Electrical Drawings. If no circuits are designated for DDC Controls, submit detailed request for use of spare circuits at no additional cost.
  - 4. Install power wiring in conduit.
  - 5. **Grounding:** Instrumentation and communication grounding installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.
  - 6. Control voltage limited to maximum of 120V.
  - 7. Where relay coil is connected to load side of motor starter to energize with motor operation, external control circuit properly fused with fuse block located in respective starter enclosure.
  - 8. Where relays are used to control single-phase motors directly, provide contacts rated for not less than horsepower rating of largest motor switched by relay.
- F. **Identification:** Provide engraved nameplates identifying switches, lights and starters, and each control device where control function is not readily apparent.
- G. **Room Thermostats and Room Sensors**
  - 1. **Wall Thermostats and Room Sensors with User Adjustment:** Mount at height of 48 inches above finished floor.
  - 2. **Wall Thermostats and Room Sensors without User Adjustment:** Mount at height of 60 inches above finished floor.
  - 3. Provide insulating back on thermostats mounted on exterior walls.
  - 4. Provide one thermostat for each zone of temperature control.

5. Submit proposed locations for approval prior to preparing control drawings, where not shown or alternate location is proposed.
- H. Carbon Dioxide Sensor
1. Mount sensor at 5 feet above finished floor or as indicated on the plans.
  2. Provide sensor quantity as indicated on plans or as required by sensor coverage rating (max. 20-foot radius).
  3. Alarm above 850 ppm.
  4. Refer to sequence of operations for more information on sensor use.
- I. Airflow Station (Duct-Mounted):
1. Install grid array in ductwork according to manufacturer's recommendations.
  2. Provide gasket between frame and duct.
- J. Airflow Station (Fan Inlet): Install in fan inlet bell in accordance with the manufacturer's instructions.
- K. Automatic Air Flow Station Measuring Damper: Install in accordance with the manufacturer's recommendations.
- L. Leak Detection System: Refer to Drawings for required locations and extent of area to be covered. Install in accordance with the manufacturer's instructions.
- M. Window Switch:
1. Installation of window switches in accordance with window manufacturer's requirements and not to void window warranty.
  2. Provide necessary components for a complete installation.
  3. Coordinate with window manufacturer for factory or field installation of components.
  4. Align magnet with proximity switch.
  5. Coordinate installation with Architect and other trades.

### 3.02 ENERGY METERS

- A. Configure system wiring so metering instrument can be isolated and removed from the system without the need to de-energize any power or protective circuit. This requirement may be met in one of two ways:
1. Connections to the metering instrument may be made using separable terminal blocks.
  2. Terminal Blocks:
    - a. Short the Current Transformer circuit prior to breaking the metering instrument circuit on removal and make the metering instrument circuit prior to unshorting the current transformer circuit on insertion.

- b. Transformer and line voltage terminals finger safe when left disconnected and energized.
  3. Connections to the metering instrument may be made through test blocks with disconnecting switches for line and neutral voltage circuits and shorting switches for current transformer circuits.
- B. System wiring within switchgear of switchboard assembly type SIS, termination of In accordance with manufacturer's published requirements.
- C. Provide overcurrent protection for metering equipment based on manufacturer's guidelines and the available fault current at the measurement point. This requirement may be met in one of three ways:
  1. Meter within 30 feet of Current Transformers:
    - a. Provide meter housing with integral fusing.
    - b. Provide circuit breaker or fused disconnecting means adjacent to equipment monitored.
    - c. Provide PT with integral fusing.
  2. Meter over 30 feet from Current Transformers:
    - a. Provide circuit breaker disconnect at equipment location for meter point and individual conductor fusing at meter equipment location.
- D. Provide Current Transformers sized based on minimum circuit ampacity listed on equipment nameplate or circuit overcurrent protection device rating.
- E. Provide Current Transformer conductors sized per manufacturer's published requirements based on length of run.
- F. NEMA 1 housing unless noted otherwise. Meters located in a rooftop or exterior environment NEMA 3R housing.
- G. Provide additional NEMA enclosures as necessary for Current Transformers in order to provide manufacturer recommended clearances between separate Current Transformers.
- H. Calibrate instrumentation based on National Institute of Standards and Technology, NIST, procedures.

**END OF SECTION**

**SECTION 23 31 01**

**HVAC DUCTS AND CASING-LOW PRESSURE**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Supports, Anchorage And Restraints
  - 2. Sheetmetal Ductwork
  - 3. Single Wall Housing Plenums
  - 4. Flexible Ducts
  - 5. Acoustical Lined Plenums
  - 6. Exposed or Visible Ductwork In Finished Spaces
  - 7. Stainless Steel Ductwork
  - 8. Aluminum Ductwork
- B. Related Sections include:
  - 1. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping Equipment
  - 2. Section 23 07 00, Insulation for HVAC
  - 3. Section 23 33 00, Air Duct Accessories
  - 4. Section 22 30 00, Plumbing Equipment

**1.03 QUALITY ASSURANCE**

- A. **Installer Qualifications:** Work performed by qualified, experienced mechanics, in accordance with the manual of Duct and Sheet Metal Construction of the Sheet Metal and Air Conditioning Contractors National Association and these Specifications.

**B. Regulatory Requirements:**

1. Entire ductwork system, including materials and installation, installed in accordance with NFPA 90A.
2. Ductwork and components UL 181 listed, Class I air duct, flame rating not to exceed 25 and smoke rating not to exceed 50.

**1.04 SUBMITTALS**

**A. Submit the following:**

1. Provide catalog data on each product specified hereunder.
2. Schedule of duct construction standards.
3. Provide shop drawings showing materials and construction details for single wall housing plenum.
4. Provide shop drawings showing construction details, support, and seismic restraint of ductwork distribution systems.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

**A. Supports, Anchorage And Restraints:**

1. Mason Industries.

**B. Flexible Ducts:**

1. Thermaflex M-KE
2. Gen Flex IMP-25S
3. Other Manufacturers: Submit substitution request.

**2.02 SUPPORTS, ANCHORAGE AND RESTRAINTS**

**A. General:**

1. When supports, anchorages, and seismic restraints for equipment, and supports and seismic restraints for ductwork are not shown on the Drawings, and response for design.
2. Resist seismic forces as specified in the latest edition of the International Building Code for the seismic zone in which the project is constructed.
3. Seismic restraints follow provisions described in Section 23 05 48, Vibration and Seismic Control for HVAC Piping and Equipment.
4. Seismic restraints not to introduce stresses in the ductwork caused by thermal expansion or contraction.

5. Connections to structural framing not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.
- B. Suspended Ductwork: Seismic restraints in accordance with the latest edition of the SMACNA, Seismic Restraint Manual - Guidelines for Mechanical Systems for the seismic hazard level corresponding to the seismic zone in which the project is constructed.
- C. Engineered Support Systems: The following support systems designed, detailed, and bear the seal of a professional engineer registered in the State having jurisdiction:
  1. Supports and seismic restraints for suspended ductwork and equipment.
  2. Support frames for ductwork and equipment which provide support from below.
  3. Equipment and ductwork support frame anchorage to supporting slab or structure.

### 2.03 SHEETMETAL DUCTWORK

- A. Fabricate from galvanized steel, unless noted otherwise.
- B. Minimum gauge, duct construction, joint reinforcing, fittings, hangers, and supports in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible, Latest Edition.
- C. Duct Classification: Ducts considered low pressure when design velocities are 2000 fpm or less and maximum static pressure is 2-inches wg positive or negative.
  1. The following ductwork constructed in accordance with minimum reinforcement requirements for static pressure class of 1/2-inch wg positive or negative.
    - a. Supply ductwork downstream from terminal units.
    - b. Supply, return or exhaust ductwork serving fans scheduled to operate at less than 1/2-inch wg
    - c. Supply, return, or exhaust branch ductwork which serves one or two inlets/outlets.
  2. The following ductwork constructed in accordance with minimum reinforcement requirements for static pressure class of 1-inch wg positive or negative.
    - a. Supply, return, or exhaust ductwork serving fans scheduled to operate at less than 1-inch wg. On supply fans pressure drops for louvers, coils, clean filters, and sound traps may be deleted from scheduled fan static.
    - b. Supply, return, or exhaust ductwork serving multiple duct branches where contractor can demonstrate that pressures will not exceed 1-inch wg positive or negative.
    - c. Boiler direct vent combustion air intake ductwork.
    - d. Water heater direct vent combustion air intake ductwork.
  3. The following ductwork constructed in accordance with minimum reinforcement requirements for static pressure class of 2-inches wg, positive or negative.
    - a. Supply, return, or exhaust ductwork serving fans scheduled to operate at pressures greater than 1-inch wg positive or negative.
- D. Longitudinal seams on rectangular duct, pittsburgh or Button punch snap lock. Snap lock seams for round duct may be used only on ducts classified for 1/2-inch wg. Longitudinal seams for round ducts using lap and rivet, spot weld, or fillet weld may be used only on ducts classified for statics 1-inch wg or less.
- E. Joining and reinforcing systems manufactured by Ductmate, Roloc, or TDC are acceptable. Ductmate 35 is equivalent to SMACNA J, and Ductmate 25 is equivalent to SMACNA F.

- F. Use of adjustable round elbows not permitted.

#### 2.04 SINGLE WALL HOUSING PLENUMS

- A. Fabricate from galvanized steel, unless otherwise noted.
- B. Minimum gauge not less than 18 gauge except panels 10-feet-1-inch or longer 16 gauge.
- C. Housing panels constructed in accordance with the latest edition of SMACNA HVAC Duct Construction Standards – Metal and Flexible.
- D. Minimum pressure classification for single wall housing panels is 2-inches wg positive or negative.
- E. Maximum allowable panel width 24-inches with standing interlocking seams.
- F. Openings in panels for air inlets/outlets, or access doors reinforced per SMACNA standards.
- G. Provide intermediate reinforcing and/or bracing when spans are 8-feet or longer.
- H. Line interior surfaces of single wall plenums with minimum of 2-inch thick acoustical lining.
- I. Access Doors:
  - 1. Construct of 20-gauge galvanized steel, double wall construction.
  - 2. Install in opening in plenum panel reinforced with 10-gauge channel.
  - 3. Doors mounted on three hinges and seat against neoprene gaskets.
  - 4. Doors in plenums at humidifiers have 12-inch by 12-inch double glass inserts from observation.
  - 5. Doors 24-inch by 60-inch height unless otherwise indicated.

#### 2.05 FLEXIBLE DUCTS

- A. Flexible air duct with CPE or metal film liner permanently bonded to coated spring steel wire helix with 1-inch thick fiberglass insulation blanket covered with fiberglass reinforced metal film vapor barrier jacket.
- B. Duct rated for 6-inch wg positive and 1-inch wg negative.

#### 2.06 ACOUSTICAL LINED PLENUMS

- A. Panels:
  - 1. Double wall insulated panel consisting of 20-gauge galvanized steel perforated interior panel, 4-inch thick fiberglass insulation, and 18-gauge outer panel.
  - 2. Panels located downstream of final filters have solid inside panel or sheet Mylar liner between inside perforated panel and insulation.



3. Panels of tongue and groove construction with adjacent panels held rigidly in position by self-interlocking joint effective inside or out. As alternate panels may be joined with H-channels.
- B. Housing Construction:
1. Capable of withstanding pressures up to 4-inches WG positive on supply ductwork and 4-inches WG negative on return and exhaust ductwork.
  2. Deflection at design pressure not to exceed 1/200 of span.
- C. For spans 12-feet or greater, provide additional structural reinforcement.

## 2.07 EXPOSED OR VISIBLE DUCTWORK IN FINISHED SPACES

- A. Round:
1. Material:
    - a. Round or flat oval, machine formed, spiral lock-seam galvanized sheet metal ductwork of thicknesses as listed for sheet metal duct.
    - b. Paintable surface.
  2. Fittings: Machine formed, shop fabricated, with welded seams, designed for easiest air flow, similar to United Sheetmetal numbers listed.
    - a. Mitered Elbow with Turning Vanes: Type EV-90-2.
    - b. Radius Elbows: Type E090-5. Similar for less than 90 degree elbows.
    - c. Tees: Type Con-T-1.
    - d. Reducing Fittings: May be used unless noted otherwise.
- B. Rectangular:
1. Same as for sheet metal ductwork but paintable surface.
  2. Inside reinforcing.
  3. Use special care to prevent imperfections in the metal surface.

## 2.08 STAINLESS STEEL DUCTWORK

- A. Ductwork listed below and ductwork indicated on drawings constructed of 18 gauge minimum stainless steel with 2D finish concealed and No. 4 finish exposed. Type 304 or 316 as indicated.
- B. Seams: Welded and liquid tight.
- C. Accessories:
1. Stainless steel including dampers
  2. Damper Hardware
  3. Turning Vanes

## 2.09 ALUMINUM DUCTWORK

- A. Ductwork listed below and ductwork indicated on drawings constructed of 3003-H-14 alloy aluminum. Gauge of metal and construction details to be determined by using minimum equivalent thickness and reinforcing for galvanized steel tables in SMACNA.
- B. Longitudinal seams, Pittsburgh type.
- C. Button punch snap lock seams not allowed.

## PART 3 - EXECUTION

### 3.01 APPLIED LOCATIONS

- A. Supply ductwork on downstream side of terminal box. Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.
- B. Supply Ductwork from Spin-In Fittings to Supply Outlet Collar Connection: Flexible duct, maximum 4-foot length.
- C. Return Air Trunk Ductwork from End Run to Unit Connection: Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.
- D. Exhaust Ductwork: Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.
- E. Ductwork between Transfer Grilles: Galvanized sheet metal ductwork, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.
- F. Exposed or Visible Ductwork in Finished Spaces: Sheet metal as specified for application, lined where indicated on the Drawings or as specified in Section 23 07 00, Insulation for HVAC.
- G. Acoustical lined plenums on inlet and outlet of rooftop units. Plenum size sufficient for duct connections as shown on plans, minimum plenum size and same as unit opening.
- H. Stainless Steel Ducts: Type 304, 10-feet downstream of showers or duct mounted humidifiers.
- I. Aluminum ducts:
  - 1. Dedicated shower exhaust systems.
  - 2. Shower and moisture laden air exhaust branch ducts up to the point of connection to the main exhaust system.

### 3.02 INSTALLATION

- A. Ductwork:
  - 1. Seal traverse joints with an approved mastic during joining procedure or lape after joining to provide airtight duct system.

2. Low pressure ductwork hanger and support systems in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible. Wire supports are not allowed.
  3. Provide supplementary steel for support of ductwork in shafts and between building structural members.
  4. Fabricate changes in direction to permit easy air flow, using full 1.5D radius bends or fixed turning vanes in square elbows. Radius elbows less than 1.5D radius, splitter vanes.
  5. Change in duct size or shape necessitated by interference made using rectangular equivalents of equal velocity.
  6. Where pipe, structural member, or other obstruction passes through a duct, provide streamlined sheet metal collar around member and increase duct size to maintain net free area. Fit collar and caulk to make air tight.
- B. Sound Attenuation (Internal Insulation):
1. Provide sound attenuation duct where shown and as specified under Section 23 07 00, Insulation for HVAC.
  2. Duct dimensions shown are net inside attenuating material.
- C. Dampers:
1. Install where shown and where necessary to complete final balancing of system.
  2. Install regulators as specified in Section 23 33 00, Air Duct Accessories for each specific project condition.
  3. Leave dampers locked wide open in preparation for balancing.
- D. Extractors: Install behind supply grilles and registers where shown.
- E. Flexible Connectors:
1. Make connections to fans and other rotating equipment with flexible connectors with 2-inch minimum clearance between casing and ductwork.
  2. Not required on internally spring isolated units.
- F. Spin-in Fittings:
1. Install at branch takeoffs to outlets using round or flex duct.
  2. Connect to flexible duct with draw band strap and minimum of two wraps of duct tape.
  3. Leave dampers locked wide open.
- G. Flexible Ducts:
1. Make connections at ends using draw band strap and a minimum of 2 wraps of duct tape.

2. Suspend center spans from structure above using wire as required by code. Connect to manufacturer's eyelet on jacket or use 1-inch wide galvanized steel strap with single loop at top and smooth edges.
3. Suspending duct by laying it on the ceiling is prohibited.
4. Avoid crimping flex duct. Changes in direction made using 2D radius. Duct connections to grilles, registers and diffusers using less than 2D radius bends are not acceptable. Where space is constricted, use sheet metal elbows or Thermaflex Flex Boots (or equal).

**H. Ductwork, Grease Hood Exhaust:**

1. Slope minimum of 1/4-inch per\*foot of run toward the hood. Where horizontal ducts exceed 75-feet in length, slope minimum of 1-inch per\*foot of run.
2. Install access doors at every change in direction and maximum of 10-feet on center.
3. Provide access doors and allow penetrations for sprinklers as required by Fire Protection section of these specifications.
4. Install ductwork in a rated shaft as specified under other divisions of work.

**I. Ductwork, Exposed or Visible in Finished Areas:**

1. Use extreme care in handling and installing.
2. Replace dented or damaged sections.
3. Install ductwork straight and true, parallel to building lines.
4. Make connections with pop rivets using couplings where applicable. Grind raw edges smooth and apply paintable sealant to cover imperfections.
5. Remove excess sealant to provide a finished joint.
6. Provide floor, wall, and ceiling plates as specified in Section 23 05 00, Common Work Results for HVAC.
7. Finish, clean and prime ductwork and hangers for painting.

**J. Single Wall Housing Plenums:**

1. Install housing plenums in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible, latest edition.
2. Joints and seams sealed with high pressure duct sealer or gaskets and fastened with bolts, screws, or pop rivets.
3. Pipe, duct, conduit, and control penetrations sealed to prevent air leakage using close off sheets and strips.
4. Securely anchor housing panels to floor or roof curbs.
5. Block outside air or return air dampers open to prevent damage during construction until automatic control system is operational and adjusted.

6. Provide access doors where indicated on drawings and where required to provide access for cleaning and maintenance. Access doors installed to open against air pressure.
  7. Slope plenum and connected ductwork to drain towards the exterior louver or building exterior opening.
  8. For single wall plenums installed behind exterior louvers or wall openings, slope plenum floor and connected ductwork at 1/4-inch/foot to drain towards the exterior louver or opening.
  9. For single wall plenums installed below roof ventilators or roof openings, slope floor of plenum at 1/4-inch/foot to drain connection. Pipe drain connection to floor drain.
- K. Stainless Steel Duct: Install stainless steel ductwork similar to galvanized ductwork per SMACNA standards.
- L. Aluminum Duct:
1. Slope minimum of 1/4-inch per foot of run toward the grille.
  2. Install similar to galvanized duct work per SMACNA standards.
  3. Provide dielectric protection when joining aluminum duct to steel duct by utilizing neoprene flexible connections or other approved method.
  4. Use aluminum straps and hangers to support aluminum, ductwork.

### 3.03 FIELD QUALITY CONTROL

- A. Coordination with Balance Agency:
1. Provide services of a sheet metal person familiar with the system ductwork to provide assistance to the balancing agency during the initial phases of air balancing in locating sheet metal dampers.
  2. Install missing dampers required to complete final balancing.

**END OF SECTION**

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**SECTION 23 33 00**

**AIR DUCT ACCESSORIES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Medium Pressure Duct Accessories
  - 2. Low Pressure Duct Accessories
  - 3. Fire and Smoke Dampers
- B. Related Sections include:
  - 1. Section 23 31 01, HVAC Ducts and Casing-Low Pressure
  - 2. Section 23 31 02, HVAC Ducts and Casing-Medium Pressure
  - 3. Section 23 09 00, Instrumentation and Controls for HVAC

**1.03 QUALITY ASSURANCE**

- A. Work performed by qualified, experienced mechanics in accordance with the manual of Duct and Sheet Metal Construction of the National Association of Sheet Metal and Air Conditioning Contractors and these Specifications.
- B. Install entire ductwork system, including materials and installation, in accordance with NFPA 90A.
- C. Flexible connectors, flexible equipment connections, tapes, and sealants listed as UL 181, Class I air duct. Flame spread rating not to exceed 25 and smoke developed rating not to exceed 50.

**1.04 SUBMITTALS**

- A. Submit the following: Product data for Duct Accessories.
  - 1. Medium Pressure Duct Accessories:
    - a. Acoustical Turning Vanes
    - b. Access Doors

- c. Bell Mouth Fittings
- d. Duct Sealer
  
- 2. Low Pressure Duct Accessories:
  - a. Constant Airflow Regulators
  - b. Access Doors
  - c. Backdraft Dampers
  - d. Water Eliminators
  - e. Roof Jack
  - f. Automatic Dampers
  - g. Duct Sealer
  
- 3. Fire and Smoke Dampers:
  - a. Combination Smoke and Fire Dampers
  
- B. Operation and Maintenance Data: Automatic dampers, Combination smoke and fire dampers, air flow station.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Medium Pressure Duct Accessories:
  - 1. Duct Sealer:
    - a. McGill Airseal Zero
    - b. Design Polymerics DP 1090.
    - c. Other Manufacturers: Submit substitution request.
  
  - 2. Flexible Equipment Connector:
    - a. Duro Dyne Corporation
    - b. Ventfabrics
  
  - 3. Acoustical Turning Vanes:
    - a. AirSan Acoustitum
    - b. Or approved equal.
  
  - 4. Access Doors:
    - a. United Sheetmetal APR or ASR
    - b. Metco
    - c. Semco
    - d. Cesco
    - e. Ruskin
    - f. Nailor-Hart
    - g. Or approved equal.
  
- B. Low Pressure Duct Accessories:
  - 1. Flexible Equipment Connector:
    - a. Duro Dyne Corporation
    - b. Ventfabrics
  
  - 2. Extrators:
    - a. Carnes
    - b. Anemostat



- c. Barber-Coleman
- d. Nailor-Hart
- e. Or approved equal.

- 3. Access Doors:
  - a. Air Balance
  - b. Ruskin
  - c. Metco
  - d. Duro Dyne Corporation
  - e. Cesco
  - f. Nailor-Hart
  - g. Or approved equal.
- 4. Backdraft Dampers:
  - a. Air Balance
  - b. Ruskin
  - c. Cesco
  - d. Advanced Air
  - e. Nailor-Hart
  - f. Or approved equal.

C. Fire and Smoke Dampers:

- 1. Where Ruskin is the only manufacturer indicated, equivalent products may be furnished.

**2.02 MEDIUM PRESSURE DUCT ACCESSORIES**

A. Duct Sealer:

- 1. Description:
  - a. Suitable for indoor/outdoor use, including application in moist conditions, rated to 10-inch wg.
  - b. Maximum Flame Spread/Smoke Developed Rating of 25/50, maximum VOC of 420 g/L less water.
  - c. SCAQMD Rule 1168 compliant.

B. Flexible Equipment Connector:

- 1. Description: Woven fiberglass fabric with neoprene coating, air-tight, water-tight, fire retardant.
- 2. Minimum Density: 30 oz. per sq. yd.
- 3. Temperature Range: -20 degrees F to 200 degrees F
- 4. Pressure Range: -10-inch wg to +10-inch wg

C. Turning Vane Assemblies:

- 1. Sheet Metal Vanes: Multiple radius hollow vane air foil type with 4-1/2-inch inside radius, galvanized steel construction.
- 2. Runners: Embossed type.

D. Acoustical Turning Vanes:

1. Multiple radius air foil type, perforated steel construction with fiberglass fill.

E. Access Doors:

1. Round, oval or rectangular to match duct, single wall to open against positive duct pressure, fastened with spring clips, pressure seal gasket, fastened with chain. Double wall access doors similar except provide insulated frame and insulated door.

F. Bell Mouth Fittings: Round or flat oval, radius of 0.20 D minimum.

**2.03 LOW PRESSURE DUCT ACCESSORIES**

A. Damper Regulators:

1. Ventlok model numbers used, similar products by Young, Duro Dyne Corporation or approved equal are acceptable.
2. Dial Regulator:
  - a. Concealed or exposed duct in unfinished spaces, blade lengths 18-inch and less, 3/8-inch, Ventlok 635, or 638 for insulated duct.
  - b. For blade lengths, 19-inches and above, similar except 1/2-inch shafts.
3. Dial Regulator: Exposed duct finished space, 3/8-inch, Ventlok 640.
4. Dial Regulator:
  - a. Concealed, not accessible, blade lengths 18-inch and less, 3/8-inch Ventlok 666 regulator with 680 mitered gear assembly where right angle turn is necessary.
  - b. Blade lengths 19-inches and above, similar except 1/2-inch shafts.
5. End Bearings:
  - a. Ducts rated to 1-inch WG, open end, Ventlok 607.
  - b. Ducts rated above 1-inch WG, closed end, Ventlok 609.
  - c. Exposed ductwork, finished spaces, Ventlok 609.
  - d. Spring end bearings not allowed.

B. Constant Airflow Regulator:

1. Constant volume pressure regulator, round or rectangular, as conditions dictate, UL listed for flame and smoke generation.
2. Factory assembled and calibrated assembly, no field adjustment necessary.
3. Regulators maintain constant airflow +/- 10 percent of scheduled airflow rates within operating the pressure range of the system.
4. Units to have flange connection.
5. Provide 5-year warranty.
6. Based on: CAR by American Aldes or approved equal.

C. Volume Damper Fabrication:

1. Single blade dampers reinforced or crimped for rigidity, with pivot rod extending through duct. Dampers over 12-inches high use multiple opposed blade damper. Single blade damper no larger than 12-inches by 48-inches. Multiple blade damper factory fabricated, Ruskin MD-35 or equal.
2. Minimum gauge and duct construction in accordance with SMACNA, HVAC Duct Construction Standards, latest edition.
3. Splitter and butterfly dampers fabricated of 18 gauge galvanized steel.
4. Dampers of length suitable to close branch ducts without damper flutter.
5. Damper blade must be aligned with handle and index pointer.

D. Flexible Equipment Connector:

1. Description: Woven fiberglass fabric with neoprene coating, air-tight, water-tight, fire retardant.
2. Minimum Density: 30 oz. per sq. yd.
3. Temperature Range: -20 degrees F to 200 degrees F
4. Pressure Range: -10-inch wg to +10-inch wg

E. Extractors (EX): Gang operated blades, steel construction, blades at 1-inch centers, slide operator set 15 degrees into main trunk duct, Titus AG-45 with No. 1 operator.

F. Spin-in Fittings:

1. Sheet Metal Duct:
  - a. Straight pattern sheet metal spin-in fitting with scoops designed for connection to sheet metal ductwork, volume damper, and locking quadrant.
  - b. Construction with spot welds or rivets.
  - c. Button-punch fabrication prohibited.
2. Fiberglass Duct:
  - a. Straight pattern sheet metal spin-in fitting with scoops designed for connection to fiberglass ductwork volume damper, and locking quadrant.
  - b. Spot weld or rivet construction.
  - c. Button-punch fabrication prohibited.

G. Duct Sealer:

1. Based On:
  - a. McGill Airseal Zero
  - b. Design Polymerics DP 1090
2. Description:
  - a. Suitable for indoor/outdoor use, including application in moist conditions, rated to 10-inch wg.
  - b. Maximum Flame Spread/Smoke Developed Rating of 25/50, maximum VOC of 420 g/L less water.

c. SCAQMD Rule 1168 compliant.

H. Duct Tape for Sheet Metal:

1. ARNO C520 duct tape similar United
2. Duro Dyne Corporation
3. Nashua

I. Tape and Adhesive/Activator System for Sheet Metal: Hardcast, Polymer Adhesives.

J. Turning Vane Assemblies:

1. Sheet Metal Vanes: Multiple radius hollow vane air foil type 2-inch (small vane) or 4-1/2-inch (large vane) inside radius, galvanized steel construction.
2. Runners: Push-on type.
3. Acoustical Vanes: Multiple radius air foil type, perforated steel construction with fiberglass fill. AirSan Acoustiturn or as approved.

K. Access Doors:

1. Doors complete with steel frame, steel door with backing plate, cam latches (two on units 14-inch by 14-inch and larger), hinge, and gasketing. Insulate doors on insulated or lined ducts.
2. Grease Duct Access Door: Construct of metal thickness equal to metal duct, doors air, and grease tight with hinge and hand operable latches. Ductmate.
3. Size:

Duct Width or Duct Diameter	Net Access Door Opening
Up to 8-inch	6-inch by 6-inch
9-inch to 12-inch	8-inch by 8-inch
13-inch to 20-inch	12-inch by 12-inch
21-inch to 30-inch	16-inch by 14-inch
31-inch to 42-inch	18-inch by 14-inch
Over 42-inch	Two 16-inch by 14-inch

L. Backdraft Dampers:

1. Description: Gravity operated, vinyl edged, metal bladed backdraft dampers.

M. Drip Pans: Provide Type 304 stainless steel drip pans for cooling coils and exhaust heat recovery coils on built-up units as indicated.

N. Louver Blank-off Panels:

1. At air intake or exhaust louvers which are only partially active area, blank off inactive area with sheet metal closure panels caulked airtight secured to louver frame and insulated with 2-inch rigid fiberglass insulation per Section 23 07 00, Insulation for HVAC.

O. Roof Jack: Enamel finish steel with back draft damper and bird screen. Broan 636, or equal.

P. Automatic Dampers:

1. Description:
  - a. Multi-blade air foil type, except where either dimension is less than 10-inches a single blade may be used. Maximum blade length to be 48-inches.
  - b. Provide parallel blades for positive or modulating mixing service and opposed blades for throttling service.
  - c. Blades to be interlocking, minimum 16 gauge galvanized steel.
2. Compression type edge seals and side seating stops.
3. Reinforced blades, have continuous full length axle shafts, axle to axle linkage, and/or operating jackshafts to provide coordinated tracking of blades.
4. Dampers over 25 square-feet in area to be in two or more sections, with interconnected blades. Maximum air leakage of 3 cfm per square foot at 1-inch wg pressure.
5. Provide automatic dampers except those specified to be provided with units. Tested in accordance with AMCA Standard 500. Based on Ruskin CD-60.
6. Damper Operators: Refer to Section 23 09 00, Instrumentation and Controls for HVAC.
7. Manufacturers:
  - a. Ruskin
  - b. Greenheck
  - c. Air Balance
  - d. Cesco
  - e. Or equal.

**2.04 FIRE AND SMOKE DAMPERS**

A. Dynamic Fire Dampers:

1. Code Compliance: Provide dynamic fire dampers with a UL 555 label for fire rating indicated and in conformance with NFPA 90A.
2. Integrally hinged, folding blade curtain type, for installation in ductwork complete with 160 degrees F fire link and retainer.
3. Suitable for horizontal or vertical installation as required. Furnish stainless steel closure springs and cam lock for complete damper closure on dampers to be installed in vertical air flow positions.
4. Medium pressure, 1-1/2-hour: For use in partitions up to 2-hour rating with damper out of air stream. Ruskin Model DIBD2, Style C for rectangular, Style CR for round, style CO for oval.
5. Medium pressure, 3-hour: for use in partitions over 2-hour rating with damper out of air stream. Ruskin Model DIBD23, Style C for rectangular, Style CR for round, Style CO for oval.
6. Low pressure, 1-1/2-hour: For use in partitions up to 2-hour rating with damper out of air stream for supply.
  - a. Ruskin Model DIBD2 Style B for supply.
  - b. Ruskin Model DIBD2 Style A for return or exhaust.

7. Low pressure, 3-hour: For use in partitions over 2-hour rating with damper out of air stream for supply.
  - a. Ruskin Model DIBD23 Style B for supply.
  - b. Ruskin Model DIBD23 Style A for return or exhaust.
8. Provide factory installed and wired UL listed duct smoke detector for 0-3000 fpm flow, Ruskin Model DSDN as part of assembly. Provide contactor from smoke detector to fire alarm system.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install devices as shown on the Contract Drawings and per manufacturer's recommendations.
- B. Medium Pressure Duct Accessory installation specified under Section 23 31 02, HVAC Ducts and Casing-Medium Pressure.
- C. Low Pressure Duct Accessory installation specified under Section 23 31 01, HVAC Ducts and Casing-Low Pressure.
- D. Smoke Dampers and Combination Fire and Smoke Dampers:
  1. Install dampers in accordance with NFPA 90A and manufacturer's written recommendations.
  2. Size and locate dampers as shown on Drawings.
  3. Where dampers are not accessible for servicing by removing an outlet, provide access doors for servicing. Doors compatible with the duct in which they are installed.
- E. Access Doors: Install where indicated and at duct mounted coils, humidifiers, automatic control dampers, smoke dampers, fire dampers, airflow stations, to provide access for cleaning and maintenance.
- F. Back Draft Dampers: Install where indicated and at the discharge (or inlet) of exhaust fans where automatic dampers are not indicated.
- G. Automatic Dampers: Install where indicated and are not specified with equipment or in Section 23 09 00, Instrumentation and Controls for HVAC. Coordinate damper operators with Section 23 09 00, Instrumentation and Controls for HVAC.
- H. Drip Pans:
  1. Install under each cooling coil and exhaust heat recovery coil as indicated.
  2. Provide drain connection from each drip pan and pipe to nearest floor drain through trap.
  3. Drip pans over 6-feet in length require drain connections from both ends.
  4. Pitch drip pans in direction of air flow and to drain.

1. Louver Blank-off Panels: Install blank-off panels on unused portions of louvers.

**END OF SECTION**

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**SECTION 23 34 00**

**HVAC FANS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The provisions of Section 23 05 00, Common Work Results for HVAC apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Centrifugal Fans
  - 2. Roof Exhaust Fans
  - 3. Roof Vents
  - 4. Inline Centrifugal Fans

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Shop Drawings: Showing dimensions, details of construction.
  - 2. Product Data: Showing performance of fans.
  - 3. Operation and Maintenance Data
  - 4. Submit certified sound power ratings for each fan.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Centrifugal Fans:
  - 1. Pace
  - 2. Trane
  - 3. Barry
  - 4. Twin City

5. Peerless
6. Aerovent
7. Acme
8. Greenheck
9. Cook
10. Other Manufacturers: Submit substitution request.

**B. Roof Exhaust Fans:**

1. Carnes
2. Penn
3. Greenheck
4. Cook
5. Acme
6. Twin City
7. Other Manufacturers: Submit substitution request.

**C. Roof Vent:**

1. Carnes
2. Penn
3. Greenheck
4. Acme
5. Cook
6. Twin City
7. Other Manufacturers: Submit substitution request.

**D. Inline Centrifugal Fans**

1. Greenheck
2. Penn
3. Cook
4. Acme
5. Carnes

6. Twin City
7. Other Manufacturers: Submit substitution request.

## 2.02 CENTRIFUGAL FANS

- A. Description: Centrifugal or utility type centrifugal fans as indicated, standard factory finish, AMCA rated.
- B. Fans:
  1. Single width, single inlet, double width, double inlet, forward curved, backward inclined, or air foil blades as scheduled.
  2. Welded steel housing with sloped cut-off plates, spun steel or die formed inlet cone, welded steel supports.
  3. Statically and dynamically balanced in the factory as an assembly within its own bearings with a maximum full amplitude shaft deflection at bearings not to exceed 0.001-inch at 1200 RPM to meet ANSI S 2.19 G2.5 balance quality grade.
  4. Grease packed pillow block sealed bearings with not less than two pillow blocks per fan assembly. L-10 bearing life of 80,000 hours minimum per AFBMA Standards.
- C. Motor:
  1. Integrally mounted, 1800 rpm maximum, with pre-lubricated sealed ball bearings.
  2. Refer to Section 23 05 00 for energy efficient motor requirements.
- D. Drive:
  1. Sized for 150 percent of motor horsepower, cast iron adjustable sheaves, V-belt type, sheaves statically and dynamically balanced, multiple belt drives on units over 2 HP.
  2. Metal guard over drive, OSHA approved.
  3. Provide fixed sheaves units over 5 HP.
  4. Replace fan sheaves as necessary to obtain desired results.
  5. Include allowance for one sheave change for fans with fixed sheaves.
  6. For fans used as part of a life safety system, provide 1-1/2 times the number of belts required, with a minimum of 2.
- E. Provide vibration isolation as indicated on drawings and in accordance with Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.
- F. Smoke Control Fans: Provide UL listing as Power Ventilators for Smoke Control Systems where used as a smoke control fan.
- G. Fans exposed to weather have heavy gauge protective covers over bearings and shaft assembly.

- H. Fan outlets with removable angles and bolts for attaching flexible connections or discharge dampers.
- I. Scroll on fans used for kitchen grease exhaust, dishwasher exhaust, and cart wash exhaust, which are subject to moist air streams fully welded and have scroll drains.
- J. Provide automatic motor operated discharge dampers where indicated. Damper as specified in Section 23 09 00, Instrumentation and Controls for HVAC.
- K. Provide fans as indicated with AMCA Type B spark resistant construction.
- L. Provide fans as indicated with protective coating on fan wheel and interior of fan housing. Apply coating before balancing fans and repair breaks in coating which occur during balancing. Coating one 6 mil coat of white plasite 7122 and one 6 mil coat of black plasite 7122.
- M. Sound power level (10W-12W) at fan inlet and discharge when producing CFM at static pressure not to exceed following in octave band:

FAN	Octave Band Center Frequency (HZ)							
ID	63	125	250	500	1000	2000	4000	8000

### 2.03 ROOF EXHAUST FANS

- A. General Description: Provide curb mounted centrifugal roof exhauster.
- B. Fans:
  - 1. Single width, single inlet, airfoil blades as indicated.
  - 2. Statically and dynamically balanced in the factory as an assembly within its own bearings with a maximum full amplitude shaft deflection at bearings not to exceed 0.003-inch at 1200 RPM to meet ANSI S 2.19 G6.3 balance quality grade.
  - 3. Grease packed pillow block sealed bearings with not less than two pillow blocks per fan assembly.
- C. Smoke Control Fans: Provide UL listing as Power Ventilators for Smoke Control Systems where used as a smoke control fan.
- D. Motor:
  - 1. Integrally mounted, 1800 rpm maximum, with pre-lubricated sealed ball bearings.
  - 2. Provide two speed motors where indicated.
  - 3. Refer to Section 23 05 00, Common Work Results for HVAC for energy efficient motor requirements.
- E. Drive:
  - 1. Sized for 150 percent of motor horsepower, cast iron adjustable sheaves, V-belt type, sheaves statically and dynamically balanced, multiple belt drive on units over 2 HP.
  - 2. For fans used as part of a life safety system, provide 1.5 times the number of belts required, with a minimum of 2.

- F. Drive: Direct drive matched to fan loads.
- G. Fan wheel and motor mounted on integral double deflection neoprene isolators.
- H. Accessories:
  - 1. Bird screen
  - 2. Integral Motor Starter
  - 3. Disconnect Switch under Enclosure
  - 4. Roof Curb
- I. Account for roof slope to provide level mounting service for equipment.
- J. Curb height accounts for roof insulation depth and flashing requirements.
- K. Provide automatic motorized control damper, aluminum blades with felt edges.

#### 2.04 ROOF VENT

- A. General Description:
  - 1. Provide low profile, louvered penthouse, constructed of heavy gauge extruded aluminum blades with mitered corners, welded, suitable for curb mounting, with bird screen and automatic motorized control damper.
  - 2. Sizes as indicated on drawings.
  - 3. Account for roof slope to provide level mounting service for equipment.
- B. General Description:
  - 1. Heavy gauge galvanized steel, low silhouette, roll formed rib sections, exterior baked enamel finish with interior grey prime coat, suitable for curb mounting, with bird screen and automatic motorized control damper.
  - 2. Account for roof slope to provide level mounting service for equipment.

#### 2.05 INLINE CENTRIFUGAL FANS

- 1. General Description: Inline centrifugal, belt driven, cabinet fan, AMCA rated, backward inclined wheel, heavy gauge steel housing adequately braced with edges sealed, externally mounted 1800 rpm motor, hinged access doors.
- 2. Refer to Section 23 05 00, Common Work Results for HVAC for energy efficient motor requirements.
- B. Smoke Control Fans: Provide UL listing as "Power Ventilators for Smoke Control Systems" where used as a smoke control fan.
- C. Drive:
  - 1. Multiple belt with fixed sheave and OSHA approved metal guard.

2. Size drive for 150 percent of motor horsepower.
  3. Fans used as part of a life safety system, provide 1-1/2- times the number of belts required, with a minimum of 2.
- D. Vibration Isolation: Provide vibration isolation as indicated on drawings and in accordance with Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION, GENERAL**

- A. Provide flexible connections on inlet and discharge duct connection. Flexible connection for vane axial fans to be barium loaded vinyl.

#### **3.02 CENTRIFUGAL FANS**

- A. Suspend from structure with isolating hanger rods or mount on isolator base.
- B. Extend scroll drain to over floor drain with pipe size the same as outlet size.
- C. Lubricate bearings as recommended by the bearing manufacturer.
- D. Startup: After installation and before starting:
  1. Check fan isolation for freedom of motion.
  2. Perform pre-startup tasks as recommended by the manufacturer.
  3. Perform a field vibration test to statically and dynamically balance the fan as an assembly with maximum vibration velocity measured at the fan bearings of 0.15 in/sec over the full range of operational speeds (filter-out reading). Submit vibration test results.

#### **3.03 ROOF EXHAUST FANS**

- A. Mount fan on roof curb in accordance with the manufacturer's recommendations. Anchor fan to curb and curb to roof. Coordinate roof opening size and curb location.
- B. Connect ductwork.

#### **3.04 ROOF VENT**

- A. Mount roof vent on roof curb in accordance with the manufacturer's recommendations. Anchor roof vent to curb and curb to roof. Coordinate roof opening size and curb location.
- B. Make ductwork connections.

#### **3.05 INLINE CENTRIFUGAL FAN**

- A. Mount in ductwork using Vibration Isolation as specified in Section 23 05 48 Vibration and Seismic Controls for HVAC Piping and Equipment, and as indicated on drawings.

- B. Connect ductwork using flexible connections.
- C. Arrange for unobstructed access to access door.

**END OF SECTION**

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**SECTION 23 81 00**

**DECENTRALIZED UNITARY HVAC EQUIPMENT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. The provisions of Division 23, Heating, Ventilation and Air Conditioning (HVAC) Section 23 05 00, Common Work Results for HVAC, apply to work specified in this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Variable Refrigerant Flow (VRF) System
- B. Related Sections include:
  - 1. Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment
  - 2. Section 23 09 00, Instrumentation and Controls for HVAC, Instrumentation and Controls for HVAC
  - 3. Section 23 09 93, Sequence of Operations for HVAC Controls

**1.03 SUBMITTALS**

- A. Submit the following:
  - 1. Shop drawings showing details of construction, dimensions, arrangement of components, isolation, filters, etc.
  - 2. Product data showing performance data, standard items, and accessories, operating weight.
  - 3. Flow diagrams and pipe sizing for refrigerant systems.
  - 4. Operating and maintenance data.
  - 5. Testing Submittals:
    - a. Provide test plan and test procedures for approval.
    - b. Explain in detail, step-by-step, actions and expected results to demonstrate compliance with the requirements of this specification and methods for simulating necessary conditions of operation to demonstrate performance of the system.
    - c. Test plan and test procedures demonstrate capability of system to monitor and control equipment and to accomplish control and monitoring specified.

#### 1.04 ACCEPTANCE TESTING AND TRAINING

- A. Site Testing:
  - 1. General:
    - a. Provide personnel, equipment, instrumentation, and supplies necessary to perform testing by a representative authorized by the manufacturer.
    - b. Owner or Owner's representative will witness and sign off on acceptance testing.
  - 2. Acceptance Test:
    - a. Demonstrate compliance of completed control system with contract documents.
    - b. Use approved test plan, physical and functional requirements of project
- B. Training:
  - 1. General:
    - a. A representative authorized by the manufacturer conduct training courses for designated personnel in operation and maintenance of system.
    - b. Orient training to specific system being installed under this contract.
    - c. Provide training manuals for each trainee, with two additional copies provided for archival at project site.
    - d. Manuals include detailed description of the subject matter for each lesson.
    - e. Copies of audiovisuals delivered to Owner.
    - f. Training day is defined as 8 hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during normal first shift in effect at training facility.
    - g. Notification of planned training given to the Owner's representative at least 15 days prior to the training.
  - 2. Operator's Training I:
    - a. Teach at a convenient location for a period of one training day.
    - b. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations with guidance and describe general hardware architecture and functionality of system.
  - 3. Operator's Training II:
    - a. Teach at project site for a period of one training day after completion of contractor's field testing.
    - b. Course includes instruction on specific hardware configuration of installed system and specific instructions for operating the installed system.
    - c. Upon completion, each student should be able to start system, operate the system, recover the system after failure, and describe the specific hardware architecture and operation of system.
  - 4. Operator's Training III:
    - a. Teach at project site for period of one training day no later than six months after completion of the acceptance test.
    - b. Course will be structured to address specific topics that students need to discuss and to answer questions concerning operation of system.
    - c. Upon completion, students should be fully proficient in system operation and have no unanswered questions regarding operation of installed system.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

#### A. Variable Refrigerant Flow (VRF) System:

1. Mitsubishi (City Multi)
2. Daikin (VRV)
3. LG (Multi-V)
4. Basis of Design is Mitsubishi (City Multi). Responsible for changes required from basis of design, such as pipe quantity and routing, control coordination, and power requirements if a different manufacturer is selected.

### 2.02 VARIABLE REFRIGERANT FLOW SYSTEM (VRF)

#### A. Indoor Unit – Wall Mounted:

1. Description:
  - a. Wall mount ductless fan-coil unit.
  - b. Furnish complete unit including the following:
    - 1) Cabinet
    - 2) Wall Mounting Kit and Accessories
    - 3) Refrigerant Line Set
    - 4) Electronic Expansion Valve
    - 5) Fan and Motor Assembly
    - 6) Cooling Coil
    - 7) Condensate Drain Pan and Filter.
  - c. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.
2. Cabinet:
  - a. 18 gauge steel, removable panels for access to components.
  - b. Provide drain connection.
3. Fan and Motor:
  - a. Evaporator fan assembly with one or two line-flow fan(s) direct driven by a single motor.
  - b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.
  - c. Fan consists of two speeds:
    - 1) High
    - 2) Low
4. Coil/Piping:
  - a. Indoor Coil: Direct expansion type for nonferrous construction with smooth plate fins on copper tubing.
  - b. Condensate Pan: Locate under coil.
  - c. Insulate both refrigerant lines
5. Filter: Filter return using a removable, washable filter.

6. Electrical:
    - a. Furnish starters, contactors and disconnects.
    - b. Arrange for single point electrical connection.
  7. Condensate Pump:
    - a. Where condensate pump is indicated, provide condensate pump with hard-wired electrical connection.
    - b. Pipe drain to floor drain.
- B. Indoor Unit – Ceiling Cassette:
1. Description:
    - a. Ceiling-recessed cassette fan-coil unit.
    - b. Furnish complete unit including cabinet, ceiling mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan and filter.
    - c. Unit as scheduled on drawing, factory-tested and assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.
  2. Cabinet:
    - a. Ceiling-recessed cassette constructed of 18 gauge steel, removable panels for access to components.
    - b. Provide drain connection.
    - c. Painted finish.
    - d. Cabinet Panel: Provisions for a field installed filtered outside air intake.
    - e. Branch ducting allowed from cabinet. Fix grille to bottom of cabinet allowing one-way blow.
  3. Fan and Motor:
    - a. Evaporator fan to have an assembly with one or two line-flow fan(s) direct driven by a single motor.
    - b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.
    - c. Consist of two speeds:
      - 1) High
      - 2) Low
  4. Coil/Piping:
    - a. Indoor Coil: Direct expansion type of nonferrous construction with smooth plate fins on copper tubing.
    - b. Condensate Pan: Locate under coil.
    - c. Insulate both refrigerant lines.
  5. Filter: Return air filtered by means of an easily removable, washable filter.
  6. Electrical:
    - a. Furnish starters, contactors and disconnects.
    - b. Arrange for single point electrical connection.
  7. Condensate Pump:
    - a. Provide external condensate pump with hard-wired electrical connection when required.
    - b. Pipe drain to floor drain.

C. Indoor Unit – Ceiling Concealed Ducted:

1. Description:
  - a. Ceiling-concealed ducted fan coil designed to mount above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply.
  - b. Furnish complete unit including cabinet, mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan and filter.
  - c. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.
2. Cabinet:
  - a. Space saving, ceiling-concealed, ducted and have provisions for a field installed filtered outside air intake.
  - b. Constructed of 18 gauge steel, removable panels for access to components.
  - c. Provide drain connection.
3. Fan and Motor:
  - a. Evaporator fan an assembly with one or two lines-flow fan(s) direct driven by a single motor.
  - b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.
  - c. Fan consist of two speeds, High and Low.
4. Coil/Piping:
  - a. Indoor Coil: Direct expansion type of nonferrous construction with smooth plate fins on copper tubing.
  - b. Condensate Pan: Locate under coil.
  - c. Insulate both refrigerant lines.
5. Filter: Filter return air using standard factory installed return air filter.
6. Electrical:
  - a. Furnish starters, contactors and disconnects.
  - b. Arrange for single point electrical connection.
7. Condensate Pump:
  - a. Provide external condensate pump with hard-wired electrical connection when required.
  - b. Pipe drain to floor drain.
8. Condensate Drain Pan Sensor: Provide secondary condensate drain pan sensor interlocked to turn off unit upon detection. Based on Mitsubishi DPLS series.

D. Indoor Unit – Floor Standing Concealed or Exposed:

1. Description:
  - a. Consist of a floor-standing indoor section.
  - b. Furnish complete unit including cabinet, mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan, and filter.

- c. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.
  2. Cabinet:
    - a. 18 gauge steel, removable panels for access to components.
    - b. Provide drain connection.
    - c. Exposed Units: Painted finish.
    - d. Concealed Units: Sheet metal finish.
  3. Fan and Motor:
    - a. Evaporator fan an assembly with one or two line-flow fan(s) direct driven by a single motor.
    - b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.
    - c. Consists of two speeds:
      - 1) High
      - 2) Low
  4. Coil/Piping:
    - a. Indoor Coil: Direct expansion type of nonferrous construction with smooth plate fins on copper tubing.
    - b. Condensate Pan: Locate under coil.
    - c. Insulate both refrigerant lines.
  5. Filter: Return air filtered by means of an easily removable, washable filter.
  6. Electrical:
    - a. Furnish starters, contactors and disconnects.
    - b. Arrange for single point electrical connection.
  7. Condensate Pump:
    - a. Provide external condensate pump with hard-wired electrical connection when required.
    - b. Pipe drain to floor drain.
- E. Indoor Unit – Ceiling Exposed:
  1. Description:
    - a. Ceiling-suspended ductless fan-coil unit.
    - b. Furnish complete unit including cabinet, ceiling mounting kit and accessories, refrigerant line set, electronic expansion valve, fan and motor assembly, cooling coil, condensate drain pan, and filter.
    - c. Unit as scheduled on drawing, factory-tested and assembled, factory wired, refrigerant-to-air heat exchanger, fan/motor assembly, compressor, controls and safety devices, control circuit transformer, shipped in one piece with ARI certification and UL listing.
  2. Cabinet: 18 gauge steel, removable panels for access to components. Provide drain connection.
  3. Fan and Motor:
    - a. Evaporator fan an assembly with one or two line-flow fan(s) direct driven by a single motor.

- b. Statically and dynamically balanced and run on a motor with permanently lubricated bearings.
  - c. Consists of two speeds:
    - 1) High
    - 2) Low
  4. Coil/Piping:
    - a. Indoor coil direct expansion type for nonferrous construction with smooth plate fins on copper tubing.
    - b. Condensate pan located under the coil.
    - c. Insulate both refrigerant lines.
  5. Filter: Return air filtered by a removable, washable filter.
  6. Electrical:
    - a. Furnish starters, contactors and disconnects.
    - b. Arrange for single point electrical connection.
  7. Condensate Pump: Where condensate pump is indicated, provide condensate pump with hard-wired electrical connection.
- F. Outdoor Unit:
1. Description:
    - a. Provide air cooled heat pump (with heat recovery system for simultaneous heating and cooling) designed for outdoor installation with factory supplied supports, properly assembled and tested at the factory.
    - b. Completely weatherproof and include compressor, condenser coils, condensing fans, motor refrigerant reservoir, charging valve, controls and a holding charge of refrigerant.
    - c. Provide guards on condenser fans and coil guard. Power coated finish.
    - d. Completely factory assembled, piped, wired, and tested.
    - e. Both refrigerant lines insulated between the outside and inside units.
    - f. Sound rating no higher than 63 dB(A).
    - g. Modular in design and allow for side-by-side installation with minimum spacing.
    - h. Provide accessories and kits required for a complete installation including field connection of heat pump units.
  2. Cabinet: The casing(s) fabricated of galvanized steel, bonderized and finished with baked enamel.
  3. Condenser Fans and Motors:
    - a. Direct driven variable speed propeller type fans with permanently lubricated motors.
    - b. Provide fans with a raised guard to prevent contact with moving parts.
    - c. Outdoor Unit: Vertical discharge airflow.
  4. Refrigerant Circuits:
    - a. Units hold a charge of R410A refrigerant.
    - b. Include back seating service valve and gauge ports in liquid and suction lines.
    - c. Provided refrigerant filter-dryer.
    - d. Refrigeration circuit of the condensing unit consists of the following:
      - 1) Scroll Compressor
      - 2) Motors
      - 3) Fans
      - 4) Condenser Coil
      - 5) Electric Expansion Valve

- 6) Solenoid Valves
  - 7) 4-Way Valve
  - 8) Distribution Headers
  - 9) Capillaries
  - 10) Filters
  - 11) Shut-Off Valves
  - 12) Oil Separators
  - 13) Service Ports
  - 14) Liquid Receivers
  - 15) Accumulators
5. **Outdoor Coil:** Nonferrous construction with lanced or corrugated plat fins on copper tubing.
  6. **Compressors:**
    - a. Furnish inverter driven scroll hermetic sealed compressor isolation and sound muffling.
    - b. Overload and inherent winding thermostat protection to prevent burn out.
    - c. Provide crankcase heater.
    - d. Multiple compressors manifolded for single joint connection on liquid and suction lines.
    - e. Capacity completely variable down to 16 percent of rated capacity.
  7. **Controls:**
    - a. Provide high and low pressure cutouts, contractors and internal overload protection on motors.
    - b. Provide low ambient operation to 0 degrees F outside to maintain condensing temperature on part load operation.
    - c. Provide short cycle timer.
  8. **Warranty:** Provide five year warranty on compressors.
- G. **Branch Circuit Controller:**
1. **General:**
    - a. Galvanized steel finish.
    - b. Completely factory assembled, piped and wired.
    - c. Each unit run tested at the factory.
    - d. Mount indoors and operate so that different zones served by each controller can be in heating and cooling mode simultaneously.
  2. **Cabinet:**
    - a. House a liquid-gas separator and multiple refrigeration control valves.
    - b. Contain tube-in-tube heat exchangers.
    - c. Casing: Fabricated of galvanized steel.
  3. **Refrigerant Valves:**
    - a. Furnish unit with multiple two position refrigerant valves.
    - b. Circuit: Two-position liquid line valve and a two-position suction line valve.
    - c. When connecting a 54,000 BTU-h or larger indoor unit section, two branch circuits joined together at the branch controller to deliver an appropriate amount of refrigerant the two refrigerant valves operate simultaneously.
    - d. Linear electronic expansion valves used to control the variable refrigerant flow.



4. **Integral Drain Pan:** Provide integral condensate pan and drain.
  - a. Provide external condensate pump with hard-wired electrical connection when required.
  - b. Pipe drain to floor drain.
5. **Electrical:**
  - a. Furnish starters and contactors.
  - b. Arrange for single point electrical connection.

H. **VRF Controls:**

1. Network together using a high-speed communication bus and wiring as recommended by manufacturer.
2. Provide control wiring and control power wiring for a complete and operational system.
3. **Room Thermostat:**
  - a. Provide locally programmable 7-day thermostats with automatic change over, fan on-auto switch, system off-auto switch, and individual set point for heating and cooling with backlit LCD display.
  - b. Provide minimum of four independent programmable temperature periods per day.
  - c. Provide error codes in the event of system abnormality/error.
  - d. Provide one thermostat per unit unless otherwise indicated.
  - e. Provide 10 percent spare stock to owner.
  - f. Based on: Mitsubishi Deluxe MA Controller.

I. **Controls Interface:**

1. Equip with network port and network type data transfer interface with the DDC controller.
2. The following interface required:
  - a. BACnet protocol compatible with the system specified in Section 23 09 00, Instrumentation and Controls for HVAC.
  - b. Alarms read to DDC controller.
  - c. The following analog signals read to the DDC controller as a minimum: Space temperature.
  - d. The following status signals be read to the DDC controller as a minimum:
    - 1) Occupied Cycle
    - 2) Unoccupied Cycle
    - 3) Warmup
    - 4) Override
    - 5) Supply Fan
    - 6) Compressors
    - 7) Heating/Cooling Operation

J. **Controls Interface:**

1. The packaged equipment controls equipped with a network port and network type data transfer interface with the system specified in Section 23 09 00, Instrumentation and Controls for HVAC.
2. Input and output points, setpoints and functions identified in the Sequences of Operation accessible to the DDC control system.
3. Provide 4-hour owner training for tenant billing system.

4. Provide billing options including customization of energy bill, remote meter reading, energy bill formatting, generation of energy bill, and delivery of energy bill to owner.
5. Provide current sensing devices installed at electrical panels and circuits including associated wiring routed in conduit required for a complete tenant metering system.

### **PART 3 - EXECUTION**

#### **3.01 VARIABLE REFRIGERANT FLOW SYSTEM**

##### **A. Installation:**

1. Install in location shown on the Drawings. Level unit and secure to structure. Provide secondary structural base where required to attached to structure. Provide vibration isolators where indicated.
2. Make piping connections and unit installation per manufacturer's recommendations and installation guides.
3. Size and run refrigerant piping between fan coil unit(s), branch circuit controller(s) and condensing unit(s) per manufacturer's recommendations.
4. Insulate refrigerant piping as specified in Section 23 07 00, Insulation for HVAC.
5. Pipe coil drain pan to floor drain per manufacturers installation guide.
6. Provide secondary drain protection via a sensor in the drain pain overflow. Field wire interlock to shut down the unit upon sensing of moisture.
7. Make refrigerant piping connections, install refrigeration accessories and charge system. Provide additional refrigerant as required for proper operation at design capacities.
8. Provide interconnecting power and control wiring.

##### **B. Controls:**

1. Install controls.
2. Provide devices, materials, equipment, software, wiring, interconnecting power, labor and engineering necessary to achieve the Sequences of Operation described in Section 23 09 93, Sequence of Operations for HVAC Controls.

##### **C. Start-up:**

1. Comply with manufacturer's instructions. Startup checklist to be provided by the manufacturer and completed by the contractor prior to startup.
2. Startup to be witnessed and signed off on by the manufacturer's representative.
3. Install filters before operating unit.
4. Ensure proper refrigerant and air flow before operating unit compressor.

**END OF SECTION**

**SECTION 26 05 00**

**COMMON WORK RESULTS FOR ELECTRICAL**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.
- C. Sections of Division 26, Electrical are interrelated. When interpreting direction, material, and method specified in Section of Division 26, Electrical, consider it within the entirety of Work in Division 26, Electrical.

**1.02 SUMMARY**

- A. This Section includes Design-Build work:
  - 1. The intent of Division 26, Electrical Specifications and Drawings is to provide a complete and workable facility, with complete systems as required by applicable codes, as indicated, and as specified.
  - 2. Include work specified in Division 26, Electrical and as indicated on Drawings. Include appurtenances, connections, fasteners, and accessories required to make a complete working system, whether indicated or not indicated.
  - 3. Refer to Division 01, General Requirements.
- B. Division 26, Electrical and the accompanying Drawings are complementary, and what is called for by one as binding as if called for by both.
  - 1. Items shown on the Drawings are not necessarily included in the Specifications and vice versa.
  - 2. In case of conflict, Specifications supersede Drawings.
- C. Imperative language used in Division 26, Electrical addresses the Contractor, as specified in Division 01, General Requirements.

**1.03 REFERENCES**

- A. The latest adopted revisions of the publications listed below apply to these Specifications as referenced:
  - 1. IBC International Building Code
  - 2. NEC National Electrical Code

- |    |      |                                                  |
|----|------|--------------------------------------------------|
| 3. | NFPA | National Fire Protection Association             |
| 4. | NEMA | National Electrical Manufacturers Association    |
| 5. | NECA | National Electrical Contractors Association      |
| 6. | ANSI | American National Standards Institute            |
| 7. | IEEE | Institute of Electrical and Electronic Engineers |
| 8. | UL   | Underwriters Laboratories                        |

#### 1.04 SYSTEM DESCRIPTION

##### A. Ground Systems:

1. Provide complete ground systems indicated.
2. Include conduit system, transformer housings, switchboard frame, and neutral bus, motors, and miscellaneous grounds required by Contract Documents and by applicable codes.

##### B. System Identification:

1. Clearly identify elements of the Project electrical system to indicate the loads served, or the function of each item of equipment, connected under this work.
2. Comply with requirements of Division 26, Electrical, and with applicable codes.

##### C. Drawings:

1. Drawings are diagrammatic. They do not show every offset, bend, tee, or elbow, which may be required to install work in the space, provided and avoid conflicts with other construction.
  - a. Prior to installing work, take field dimensions, and note conditions available for, installation.
  - b. Follow the Drawings as closely as practical to do so, and install additional bends, offsets, and elbows where required by installation conditions.
    - 1) Additional offsets, bends, and other connectors are subject to approval by Project Engineer.
    - 2) Install additional offsets, bends, and other connectors without additional cost to Owner.
  - c. The right to make reasonable changes in outlet location prior to roughing in is reserved to the Owner's Representative.
2. Luminaire Designations:
  - a. Lower case letters adjacent to devices or luminaires indicate switching arrangement or circuit grouping.
  - b. Numbers adjacent to devices indicate circuit connection.
3. Circuits and Switching:
  - a. Do not change branch circuiting and switching indicated; nor combine homeruns, without Engineer's prior approval.
  - b. Do not combine or change feeder runs.

4. **Circuit Conductors:**
  - a. Cross or hash marks on conduit runs indicate quantity of No. 12 copper branch circuit conductors, unless otherwise noted.
  - b. Where such marks do not appear, provide quantity of circuit conductors to the outlets shown to perform the control or circuiting indicated.
  - c. Include ground, travelers, and switch legs required by the circuiting arrangement indicated.
  - d. Provide a dedicated neutral conductor with each circuit. Do not use a shared neutral conductor between phases unless, requested or directed.

#### 1.05 SUBMITTALS

- A. Comply with Division 01, General Requirements.
- B. Contractor Responsibilities:
  1. Submit submittals one time and in proper order.
  2. Ensure equipment will fit in the space provided.
  3. Deviations from the Drawings and Specifications specifically noted in the submittals. Failure to comply will automatically void implied approval for use of the equipment on this project.
- C. Shop Drawings and Equipment Data:
  1. Combine electrical shop drawings and equipment data in Submittal binders.
  2. Include in Submittal binders:
    - a. Complete index of materials and equipment as required by Specifications to be documented by submittals.
    - b. Fully describe equipment furnish per manufacturer's detailed specifications.
- D. Installation Drawings:
  1. Submit prior to starting installation.
  2. Show outlets, devices, terminal cabinets, conduits, wiring, and connections required for the complete system described.
- E. Record Drawings:
  1. Keep record drawings up to date as the work progresses.
  2. Show changes, deviations, addendum items, change orders, corrections, and other variations from the Contract Drawings.
  3. Keep record drawings at the jobsite and available for the Architect's review.
  4. At the completion of the work, incorporate deviations from the installation drawings to indicate as-built conditions.
- F. Operation and Maintenance Data:
  1. As specified in Division 01, General Requirements.

2. Provide updates to separate manuals or chapters for each system as follows:
    - a. Fire Alarm System
    - b. Lighting System
    - c. Lighting Control System
    - d. Power Metering And Monitoring System
  3. Description of system.
  4. Operating Sequence and Procedures:
    - a. Step-by-step procedure for system start-up, including a pre-start checklist.
      - 1) Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.
    - b. Detailed instruction in proper sequence, for each mode of operation (i.e., day-night, staging of equipment).
    - c. Emergency Operation:
      - 1) If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under those conditions.
      - 2) Include here only those alternate methods of operations (from normal) which the operator can follow when there is a partial failure or malfunctioning of components or other unusual condition.
    - d. Shutdown Procedure:
      - 1) Include instructions for stopping and securing the equipment after operation.
      - 2) If a particular sequence is required, give step-by-step instructions in that order.
  5. Preventive Maintenance:
    - a. Schedule for preventive maintenance.
      - 1) State the recommended frequency of performance of each preventive maintenance task such as cleaning, inspection, and scheduled overhauls.
    - b. Cleaning: Provide instructions and schedules for routine cleaning and inspection with recommended lubricants.
    - c. Inspection: If periodic inspection of equipment is required for operation, cleaning, or other reasons, indicate the items to be inspected and give the inspection criteria.
    - d. Provide instructions for lubrication and adjustments required for preventive maintenance routines. Identify test points and given values for each.
  6. Manufacturers' Brochures:
    - a. Include manufacturers' descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views, and renewal parts lists.
    - b. Clearly define manufacturers' standard brochures so that the information applying to the actual installed equipment.
  7. Results of performance testing, as specified in PART 3 of this Section.
- G. Submittals Procedures:
1. Review and recommendations by the Architect or Engineer are not to be construed as change authorizations.
  2. Either if discrepancies are discovered between the materials or equipment submitted, and the Contract Documents, prior to or after the data is processed, the Contract Documents govern.

### 1.06 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Provide work and materials conforming to:
    - a. Local and State codes.
    - b. Federal and State laws and regulations.
    - c. Other applicable laws and regulations.
  2. Obtain and pay for permits, licenses, and inspection certificates required by authorities having jurisdiction.
  3. Pay other fees required by governing authorities for work of this Division.
- B. Install only electrical products listed by a recognized testing laboratory, or approved in writing by the local inspection authority as required by governing codes and ordinances.

### 1.07 SITE VISITATION

- A. Visit the site prior to bidding and become familiar with existing conditions and other factors which may affect the execution of the work. Complete coordination of installation of equipment with prior bid packages previously issued. Include related costs in the initial bid proposal.

### 1.08 COORDINATION

- A. Coordinate Work of This Division with other trades to ensure proper installation of electrical equipment.
1. Review Drawings of other trades or crafts to avoid conflicts with cabinets, counters, equipment, structural members, and other possible impediments to electrical work.
  2. Report potential conflicts to the Architect prior to rough-in.
  3. Proceed with rough-in following Architect's directives to resolve conflicts.
  4. Architectural Drawings govern.
- B. Verify the physical dimension of each item of electrical equipment to fit the available space. Contractor's responsibility includes:
1. Coordination of the equipment to fit into the available space.
  2. Access routes through the construction.
- C. Layout Drawings:
1. Equipment arrangement shown on Drawings is diagrammatic to indicate general equipment sizing and spatial relationship. Include, as part of distribution equipment submittal, a scaled floor plan, which includes equipment shown with their submitted sizes. Include feeder conduit routing, both aboveground and underground, including termination points at equipment. Submit for Engineer's review prior to commencing work.
  2. Provide additional wiring details at switchboards, motor control centers, and other areas where work is of sufficient complexity to warrant additional detailing for coordination.

3. Submit layout drawings for approval prior to commencing field installation.
- D. Where electrical connections are required for equipment provided as Work of other Divisions, coordinate rough in and wiring requirements for that equipment with its supplier and installer prior to commencing work. Notify Architect and Engineer of discrepancies between the actual rough in and wiring requirements, and those identified on Drawings for resolution prior to installation.
- E. Arrange raceways, wiring, and equipment to permit ready access to switches, motors, and control components.
  1. Keep doors and access panels clear.
- F. Coordinate electrical, telephone, and other utility services with the appropriate serving utility.
  1. No additional compensation will be allowed the Contractor for connection fees or additional work or equipment required by the serving utility, but not covered in the Drawings or Specifications.
- G. Coordinate underground work with other contractors working on the site.
  1. Coordinate particularly with contractors installing storm sewer, sanitary sewer, water, and irrigation lines to avoid conflicts.
  2. Common trenches may be used with other trades, providing clearances required by codes and ordinances are maintained.
- H. Coordinated Shop Drawings.
  1. Prepare in two-dimensional format.
  2. Include but are not limited to:
    - a. Superplot plans of above ground work with a colored overlay of trades including, but not limited to, HVAC piping, HVAC equipment, plumbing piping and equipment, sprinklers, lighting, lighting controls, cable tray, fire alarm devices, electrical power conduit, and ceiling system to a minimum of 1/2-inch equals 1-foot scale.
    - b. Superplot plans of below ground work with a colored overlay of trades including, but not limited to, HVAC piping, plumbing piping, and power conduit]to a minimum of 1/2-inch equals 1-foot scale.
    - c. Beam penetration drawings indicating beam penetrations meeting the requirements indicated on the floor plans and on the structural drawings to a minimum of 1/4-inch equals 1-foot scale.
    - d. Slab penetration drawings of HVAC, plumbing, sprinklers, lighting and electrical to a minimum of 1/4-inch equals 1-foot scale.
    - e. Fabrication drawings of radiant ceiling panels, architectural metal ceiling, including panel penetrations for lighting, sprinkler heads, fire alarm devices, and other penetrations.

#### 1.09 CHANGE ORDERS

- A. Supplemental cost proposals by the Contractor accompanied with a complete itemized breakdown of labor and materials. At the Architect's request, make available estimating sheets for the supplemental cost proposals. Separate and allocate labor for each item of work.



### 1.10 WARRANTY

- A. Provide a written warranty covering the work of this Division as required by the General Conditions.
  - 1. Incandescent Lamps: Excluded from this warranty.
- B. Apparatus:
  - 1. Free of defects of material and workmanship and in accord with the Contract Documents.
  - 2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.
  - 3. Operate at full capacity without objectionable noise or vibration.
- C. Include in Contractor's warranty for Work of Division 26, Electrical system damage caused by failures of system components.

### 1.11 ALLOWANCES

- A. Comply with Division 01, General Requirements.

### 1.12 ALTERNATES

- A. Comply with Division 01, General Requirements.
- B. Refer to Electrical Drawings for detailed information relating to the appropriate alternates.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Where specified materials or methods conflict with applicable codes, the more stringent requirement applies.
- B. Provide apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.
- C. Ensure that entire electrical system operates at full capacity without objectionable noise or vibration.
- D. Materials and Equipment:
  - 1. Use materials and equipment that are:
    - a. New
    - b. Quality meeting or exceeding specified standards.
    - c. Free of faults and defects.
    - d. Conforming to Contract Documents.
    - e. Of size, make, type, and quality specified.
    - f. Suitable for the installation indicated.
    - g. Manufactured in accordance with NEMA, ANSI, UL, or other applicable standards.
    - h. Otherwise as specified in Division 01, General Requirements.

2. Equipment not meeting requirements will not be acceptable, even though specified by name.
3. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer.
  - a. Component parts of the entire system need not be products of same manufacturer.
4. Basis of Design:
  - a. Consider the Basis of Design equipment scheduled or specified by performance or model number.
  - b. If other equipment is provided in lieu of the Basis of Design equipment, assume responsibility for changes and costs which may be necessary to accommodate this equipment, including, but not limited to:
    - 1) Different sizes and locations for connections.
    - 2) Different dimensions.
    - 3) Different access requirements.
    - 4) Other differences.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

##### **A. General:**

1. Provide a complete properly operating system for each item of equipment specified.
2. Install materials in a neat and professional manner.
3. Comply with equipment manufacturer's written instructions, the best industry practices, and the Contract Documents.
4. Comply with latest published NECA Standard of Installation, and provide competent supervision.

##### **B. Clarification:**

1. Where there is a conflict among manufacturer's instruction, best practice, and the Documents, request clarification from the Architect prior to rough-in.
2. Architect's decision will be final.
3. Remove and correct work installed without clarification at no cost to the Owner.

##### **C. Existing concrete, block, or brick walls are considered not accessible and may require use of Surface Mounted Raceway (SMR) if existing concealed raceway and device boxes are not available for reuse or do not meet the intent of the design (i.e., proximity to egress path, point of use, etc.). Coordinate route and installation where SMR is required with the Architect/Engineer prior to rough-in. Responsible for reinstalling SMR routed without such prior approval to the Architect's satisfaction.**

- D. Existing stud walls (wood or metal) with or without blocking with plaster, plasterboard, or paneling finish are considered accessible with accessible ceiling, attic, tunnel, or crawl space above, below, or adjacent. Remove, patch, and repair finished surface as required to conceal rough in for new device locations. If it is determined that a specific instance will not permit concealment of rough-in due to obstructions such as beams, headers, and other structural elements, prior approval before rough-in from the Architect is required.

### 3.02 INSTALLATION IN RATED CONSTRUCTION

- A. Install intumescent material around ducts, conduits, and other electrical elements penetrating rated construction.
- B. Comply with firestop materials manufacturer written instructions to prevent spread of smoke or fire through sleeves or block-outs penetrating rated fire barriers.
- C. Provide firestop materials specified in Division 07, and as follows:
  - 1. Capable of passing a 3-hour test per ASTM E-814 (UL 1479).
  - 2. Consisting of material capable of expanding nominally eight times when exposed to temperatures of 250 degrees F-350 degrees FF.
  - 3. An alternate method utilizing intumescent materials in caulk or putty complying with Division 07, Thermal and Moisture Protection Section, "Through-Penetration Firestop Systems" may be used.

### 3.03 EXCAVATION AND BACKFILL

- A. Perform necessary excavation and backfill for the installation of electrical work in compliance with Division 31, Earthwork.
- B. Direct Burial Cable or Non-Metallic Conduit:
  - 1. Minimum 3-inch cover of sand or clean earth fill placed around the cable or conduit on a leveled trench bottom.
  - 2. Lay steel conduit on a smooth level trench bottom, so that contact is made for its entire length.
  - 3. Where the electrical conduit is being laid, remove water from trench.
- C. Place backfill in layers not exceeding 8-inches deep and compact to 95 percent of maximum density at optimum moisture to preclude settlement.
  - 1. Interior: Bank sand or pea gravel.
  - 2. Exterior: Excavated material with final 8-inches clean soil.
- D. Following backfilling, grade trenches to the level of surrounding soil. Dispose excess soil at the site as directed.
- E. Provide 6-inches wide vinyl tape marked ELECTRICAL in backfill, 12-inches below finished grade, above all high voltage cable or conduit runs.

- F. Coordinate patching of all asphalt or concrete surfaces disturbed by this work with General Contractor.

### 3.04 NOISE CONTROL

- A. Minimize transmission of noise between occupied spaces.
- B. Outlet Boxes:
  - 1. Do not install outlet boxes on opposite sides of partitions back to back.
  - 2. Do not use straight through outlet boxes, except where indicated.
- C. Conduit:
  - 1. Route conduit along corridors or other "noncritical" space to minimize penetrations through sound rated walls, or through non-sound-rated partitions between occupied spaces.
  - 2. Grout solid and airtight penetrations through sound rated partitions.
  - 3. Use flexible connections or attachments between independent wall structures.
    - a. Do not rigidly connect (i.e., bridge) independent wall structures.
- D. Do not install contactors, transformers, starters, and similar noise-producing devices on walls that are common to occupied spaces, unless otherwise indicated.
  - 1. Where such devices are indicated to be mounted on walls common to occupied spaces, use shock mounts, or otherwise isolate them to prevent the transmission of noise to the occupied spaces.
- E. Ballasts, contactors, starters, transformers, and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and replaced.

### 3.05 EQUIPMENT CONNECTIONS

- A. General:
  - 1. Provide complete electrical connections for items of equipment requiring such connections, including incidental wiring, materials, devices, and labor necessary for a finished working installation.
  - 2. Verify the location and method for connecting to each item of equipment prior to roughing-in.
  - 3. Check the amperage, maximum overcurrent protection, voltage, phase, and similar attributes of each item of equipment before rough in and connection.
- B. Motor Connections:
  - 1. Make motor connections for the proper direction of rotation.
  - 2. Minimum Size Flex for Mechanical Equipment: 1/2-inch; except at small control devices where 3/8-inch flex may be used.

3. **Exposed Motor Wiring:** Jacketed metallic flex with minimum 6-inches slack loop.
  4. Do not test run pump motors until liquid is in the system.
- C. Control devices and wiring relating to the HVAC systems are furnished and installed under Division 23; except for provisions or items indicated in Division 26, Electrical Drawings and Specifications.

### 3.06 EQUIPMENT SUPPORT

- A. **Minimum Support Capacity:** Provide fastening devices and supports for electrical equipment, luminaires, panels, outlets, and cabinets capable of supporting not less than four times the ultimate weight of the object or objects fastened to or suspended from the building structure.
- B. **Luminaire Supports:**
1. Support luminaires from the building structure.
  2. Use supports that provide proper alignment and leveling of luminaires.
  3. Where permitted at exposed luminaires, install flexible connections neat and straight, without excess slack, and attached to the support device.
- C. Support junction boxes, pull boxes, or other conduit terminating housings located above the suspended ceiling from the floor above, roof, or penthouse floor structure to prevent sagging or swaying.
- D. **Conduits:**
1. Support suspended conduits 1-inch and larger from the overhead structural system with metal ring or trapeze hangers and threaded steel rod having a safety factor of four.
  2. Conduits smaller than 1-inch installed in ceiling cavities, may be supported on the mechanical system supports when available space and support capacity has been coordinated with the subcontractor installing the supports.
  3. Anchor conduit installed in poured concrete to the steel reinforcing with No. 14 black iron wire.
- E. Powder actuated or similar shot-in fastening devices will not be permitted for electrical work except by special permission from the Architect.

### 3.07 ACCESS DOORS

- A. Location and size of access doors is Work of Division 26, Electrical.
- B. Furnishing and installation of access doors is work of Division 08.

### 3.08 ALIGNMENT

- A. Install panels, cabinets, and equipment level and plumb, parallel with structural building lines.
- B. Install distribution equipment and electrical enclosures fitted neatly, without gaps, openings, or distortion.

- C. Properly and neatly, close unused openings with approved devices.
- D. Fit surface panels, devices, and outlets with neat, appropriate, trims, plates, or covers without overhanging edges, protruding corners, or raw edges.

### 3.09 CUTTING AND PATCHING

- A. General:
  - 1. Comply with Division 01, General Requirements.
  - 2. Restore to original condition new or existing work cut or damaged by installation, testing, and removal of electrical Work.
  - 3. Patch and finish spaces around conduits passing through floors and walls to match the adjacent construction, including painting or other finishes.
  - 4. Clean up and remove dirt and debris.
- B. Make additional required openings by drilling or cutting. Use of jackhammer is prohibited.
- C. Cut oversize fill holes so that a tight fit is obtained around the objects passing through.
  - 1. In rated construction, comply with Division 07, Thermal and Moisture Protection.
- D. Obtain Architect's permission and direction prior to piercing beams or columns.
- E. Where alterations disturb lawns, paving, walks, and other permanent site improvements, repair and refinish surfaces to condition existing prior to commencement of work.

### 3.10 PROTECTION OF WORK

- A. Protect electrical work and equipment installed under this Division against damage by other trades, weather conditions, or other causes.
  - 1. Equipment found damaged or in other than new condition will be rejected as defective.
- B. Keep switchgear, transformers, panels, luminaires, and electrical equipment covered or closed to exclude dust, dirt, and splashes of plaster, cement, paint, or other construction material spray.
  - 1. Equipment not free of contamination is not acceptable.
- C. Provide enclosures and trims in new condition, free of rust, scratches, and other finish defects.
  - 1. If damaged, properly refinish in a manner acceptable to the Architect.

### 3.11 UNINTERRUPTED SERVICE

- A. Maintain electrical service to functioning portions of the building throughout construction.
- B. Pre-arrange with Owner outages necessary for new construction.
  - 1. Comply with Division 01, General Requirements.

2. Apply for scheduled shutdowns minimum 4 weeks prior to time needed and reconfirm a minimum of 72 hours prior to time needed.
  3. Contractor is liable for damages resulting from unscheduled outages or for those not confined to the pre-arranged times. Damages include costs incurred by the Owner and by the Owner's tenants.
- C. Maintain signal and communication systems and equipment in operation at all times.
1. Outages of these systems treated the same as electrical power outages.
- D. Maintain telephone services in accordance with Division 01, General Requirements.

### 3.12 DEMOLITION AND SALVAGE

A. General:

1. Remove or relocate electrical wiring, equipment, luminaires, etc., as may be encountered in removed or remodeled areas in the existing construction affected by this work.
2. Disconnect electrical service to hard-wired equipment scheduled for removal under other Divisions of Work.
3. Wiring which serves usable existing outlets restored and routed clear of the construction or demolition.
4. Safely cut off and terminate wiring abandoned and removed to leave site clean.

B. Reuse of Existing:

1. Existing concealed conduits in good condition may be reused for installation of new wiring where available.
2. Existing undamaged, properly supported surface conduits may be reused where surface conduits are called for, if the installation meets workmanship requirements of the Specifications.
3. Where new wiring is added or existing wiring disturbed in existing branch circuit raceways, existing wires replaced with new.

C. Salvage and Disposal:

1. Removed materials, not containing hazardous waste, not scheduled for reuse become the property of the Contractor for removal from the site, except for those items specifically indicated on the Demolition Drawings for salvage or reuse.
2. Materials containing, or possibly containing, hazardous waste identified for removal and disposal by the Owner's Hazardous Waste Contractor.
3. Neatly store salvaged items at one location at the site where directed by the Owner's Representative.
4. Salvage properly operating circuit breakers from panels scheduled for removal and use to replace faulty or inadequate breakers in existing panels scheduled to remain.

### 3.13 WIRING IN PRECAST CONSTRUCTION

- A. Coordinate installation of electrical conduit, boxes, fittings, anchors, and miscellaneous items concealed in precast concrete assemblies with the General Contractor.
- B. Where electrical items are required to be installed in concrete assemblies precast off-site, it will be the Electrical Contractor's responsibility to place the electrical items necessary in the concrete at the off-site locations or pay for the General Contractor to make arrangements for the installation of these items in the precast assemblies. Electrical Contractor held responsible for the proper placement and locations of electrical items at the off-site location.

### 3.14 COMPLETION AND TESTING

- A. General:
  - 1. Comply with Division 01, General Requirements.
- B. Upon completion, test systems to show that installed equipment operates as designed and specified, free of faults and unintentional grounds.
  - 1. Schedule system tests so that several occur on the same day.
  - 2. Coordinate testing schedule with construction phasing.
  - 3. Conduct tests in the presence of the Architect or its representative.
  - 4. Notify Architect of tests 48 hours in advance.
- C. Engage a journeyman electrician with required tools to conduct equipment tests. Arrange to have the equipment factory representative present for those tests where the manufacturer's warranty could be impacted by the absence of a factory representative.
- D. Perform tests per the requirements of each of the following systems:
  - 1. Fire Alarm System
  - 2. Lighting System
  - 3. Lighting Control System
  - 4. Power Metering and Monitoring System
- E. Provide a written record of performance tests and submit with operation and maintenance data.

### 3.15 COMMISSIONING

- A. Complete phases of work so the system, equipment, and components can be checked out, started, calibrated, operationally tested, adjusted, balanced, functionally tested, and otherwise commissioned. Complete systems, including subsystems, so they are fully functional.



- B. Perform commissioning as specified in Section 01 91 00, General Commissioning Requirements, the technical sections, and Section 26 08 00, Commissioning of Electrical Systems.
1. Unless specified otherwise in the technical sections, provide factory startup services for the following items of equipment:
    - a. Lighting Control Systems
- C. Participation in Commissioning:
1. Provide skilled technicians to checkout, startup, calibrate, and test systems, equipment, and components.
  2. The Engineer reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment or system.
- D. Resolution of Deficiencies:
1. Complete corrective work in a timely fashion to permit timely completion of the commissioning process. Experimentation to render system performance permitted.
- E. Verification and Documentation:
1. One each test is performed, have the commissioning manager observe the physical responses of the system and compare them to the specified requirements to verify the test results.
  2. Submit site observation reports for deficiencies in the system.
  3. Record the result of individual checks or tests on the pre-approved checklist, test, and report form from the commissioning plan and submit results for review.

**END OF SECTION**

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**SECTION 26 05 19**

**LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Conductors - 600V
  - 2. Power Limited Wiring
  - 3. Conductors - Fire Pump Circuits
  - 4. MC Branch Circuit Cable
  - 5. Connectors - 600V and Below
- B. Related Sections include:
  - 1. Section 26 05 26, Grounding and Bonding for Electrical Systems
  - 2. Section 26 05 33, Raceways and Boxes for Electrical Systems
  - 3. Section 26 05 53, Identification for Electrical Systems
  - 4. Section 26 05 80, Electrical Testing

**1.03 REFERENCED STANDARDS**

- A. ASTM: American Society For Testing and Materials:
  - 1. ASTM B 3      Soft or Annealed Copper Wire
  - 2. ASTM B 8      Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
  - 3. ASTM B 33     Tinned Soft or Annealed Copper Wire for Electrical Purposes
- B. ICEA: Insulated Cable Engineers Association:
  - 1. S-95-658      Non-shielded 0-2 kV Cables

- C. IEEE: Institute of Electrical and Electronic Engineers:
  - 1. IEEE 383 Type Test of Class IE Electric Cables, Field Splices, and Connections
- D. UL: Underwriters Laboratories:
  - 1. UL 44 Rubber-Insulated Wires and Cables
  - 2. UL 83 Thermoplastic-Insulated Wires and Cables
  - 3. UL 1277 Type TC Power and Control Tray Cable

#### 1.04 SUBMITTALS

- A. Submit product data for the following materials:
  - 1. Single conductor 600V power and control conductors.
  - 2. MC Cable
- B. Submittals of the following materials consist only of a listing of the manufacturer's name and the applicable catalog numbers of the items to be utilized.
  - 1. Connectors
  - 2. Branch Circuit Conductor Splices
  - 3. Splices with Compression Fitting and Heat-Shrinkable Insulator
- C. Submit cable test data per testing requirements of PART 3.

#### 1.05 QUALITY ASSURANCE

- A. Copper Conductors. Indicated sizes considered minimum for ampacities and voltage drop requirements.
- B. Conductors for special systems as recommended by the equipment manufacturer except as noted.
- C. Deliver conductors to the job site in cartons, protective covers, or on reels.

#### PART 2 - PRODUCTS

- A. Conductors - 600V:
  - 1. General
  - 2. Essex
  - 3. Southwire
  - 4. Or equivalent.

- B. MC Branch Circuit Cable:
  - 1. AFC Cable Systems
  - 2. Southwire
  - 3. Okonite
- C. Connectors - 600V and Below:
  - 1. Burndy
  - 2. Anderson
  - 3. Or equivalent.

**2.02 CONDUCTORS – 600V**

- A. Type:
  - 1. Copper: 12 AWG minimum size unless noted otherwise. 12 AWG and 10 AWG, solid or stranded, 8 AWG or larger, Class B concentric or compressed stranded.
  - 2. Aluminum: 1/0 AWG minimum size unless noted otherwise. Compact stranded conductors, AA-8000 series electrical grade aluminum alloy.
  - 3. Conductors with continuous colored jackets are acceptable; refer to color-coding in PART 3.
  - 4. Conductors with manufacturers no lube continuous jacket coatings are acceptable.
- B. Insulation:
  - 1. THHN/THWN-2 for conductors 6 AWG and smaller.
  - 2. XHHW-2 for conductors 4 AWG and larger.
- C. Thru wiring in fluorescent luminaires rated for 90 degree C minimum.

**2.03 POWER LIMITED WIRING**

- A. Copper, stranded or solid as recommended by the system manufacturer.
- B. Insulation appropriate for the system and location used.

**2.04 MC BRANCH CIRCUIT CABLE**

- A. Sheath:
  - 1. Steel or Aluminum, of the interlocking metal type, continuous and close fitting.
  - 2. Sheath not considered a current carrying or grounding conductor.

- B. Conductors:
  - 1. Solid copper, of the same ampacity as the conduit/wire system indicated for the specific location.
  - 2. Provide separate green insulated grounding conductors in circuits where an isolated ground is called for.
- C. Provide HCF rated cable for health care facility construction as code required.
- D. Feeder style MC Cable with steel or aluminum armor for feeders greater than 100A.

## 2.05 CONNECTORS – 600V AND BELOW

- A. Branch Circuit Conductor Splices:
  - 1. Live spring type, Scotchlok, Ideal Wire Nut, Buchanan B-Cap, or 3M Series 560 self-stripping type.
  - 2. Push in self-locking type connectors, WAGO.
- B. Cable Splices:
  - 1. Compression tool applied sleeves, Kearney, Burndy, or equivalent with 600V heat shrink insulation.
  - 2. Submit proposed splice location to the Engineer for review, except where indicated on the plans
- C. Terminator Lugs for Stranded Wire:
  - 1. 10 AWG Wire and Smaller: Spade flared, tool applied.
  - 2. 8 AWG Wire and Larger: Compression tool applied.
  - 3. Setscrew type terminator lugs furnished as an integral part of switches and circuit breakers will be acceptable.

## PART 3 - EXECUTION

### 3.01 CONDUCTORS

- A. Pulling compounds may be used for pulling conductors. Clean residue from the conductors and raceway entrances after the pull is made.
- B. Pulleys or Blocks:
  - 1. Use for alignment of the conductors when pulling.
  - 2. Pulling in accordance with manufacturer's specifications regarding pulling tensions, bending radii of the cable, and compounds.

- C. Make up and insulate wiring promptly after installation of conductors. Do not pull wire in until bushings are installed and raceways terminations are completed. Do not pull wire into conduit embedded in concrete until after the concrete poured and forms stripped.
- D. Provide a dedicated neutral conductor with each branch circuit, do not use a shared neutral conductor between phases unless specifically requested or directed.
- E. For remodel work or where shared neutrals are used by equipment such as systems furniture, provide a breaker handle tie as required for the phases sharing the neutral conductor.
- F. Aluminum conductors for feeders between switchboards, distribution panels, panelboards, motor control centers, dry type transformers, and busway units.
  - 1. Aluminum Conductors:
    - a. Do not utilized for feeders 100A or smaller.
    - b. Not allowed for branch circuits or equipment connections.
    - c. Refer to the feeder schedule on the drawings for conductor and conduit sizes.

**3.02 MC CABLE**

- A. MC Cable: Allowed only where concealed within wall or ceiling cavities.
- B. MC Cable:
  - 1. Do not use for branch circuit homeruns to branch panelboards.
  - 2. EMT or RMC conduit utilized for branch circuit homeruns to branch panelboards.
  - 3. Provide enclosures and terminals to transition from MC Cable to building wire as required.

**3.03 CONNECTORS**

- A. Terminate control and special systems with a tool applied spade flared lug when terminating at a screw connection.
- B. Screw and bolt type connectors made up tight and retightened after an 8 hour period.
- C. Apply tool applied compression connectors per manufacturer's recommendations and physically checked for tightness.

**3.04 COLOR CODING**

- A. Color code secondary service, feeders, and branch circuit conductors. Phase color code to be consistent at feeder terminations, A-B-C left-to-right, A-B-C top-to-bottom, or A-B-C front-to-back. Color code is as follows:

120/240V 208Y/120V	Phase	480V 480Y/277V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray*
Green	Ground**	Green
* or white with colored (other than green) tracer		
**Ground for isolated ground receptacles green with yellow tracer.		

- B. Use solid color compound or solid color coating for 12 AWG and 10 AWG branch circuit conductors and neutral sizes.
- C. Phase conductors 8 AWG and larger color code using one of the following:
  - 1. Solid color compound or solid color coating.
  - 2. Stripes, bands, or hash marks of color specified above.
  - 3. Colored as specified using 3/4-inch wide tape. Apply tape in half overlapping turns for a minimum of three inches for terminal points and in junction boxes, pull boxes, troughs, manholes, and handholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Apply tags to cable stating size and insulation type where cable markings are tape covered.
- D. Switch legs, travelers, etc., consistent with the phases to which, connected or a color distinctive from that listed.
- E. Color-coding of the flexible wiring system conductors and connectors.
- F. For modifications and additions to existing wiring systems, color-coding conform to the existing wiring system.

### 3.05 FIELD TESTING

- A. 600V Rated Conductors: Test for continuity. Conductors 100A and over in meggered after installation and prior to termination. Provide the megger, rated 1,000V DC, and record and maintain the results, in tabular form, clearly identifying each conductor tested.
  - 1. Replace cables when test value is less than 15 megohms.
  - 2. Cable test submittal include results, equipment used, and date.

**END OF SECTION**



**SECTION 26 05 26**

**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Ground Conductors
  - 2. Connectors
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 33, Raceways and Boxes for Electrical Systems
  - 3. Section 26 05 80, Electrical Testing
  - 4. Section 26 24 16, Panelboards
  - 5. Section 26 27 26, Wiring Devices
  - 6. Section 26 29 00, Motor Controllers

**1.03 QUALITY ASSURANCE**

- A. Provide complete ground systems as indicated. Include conduit system, transformer housings, switchboard frame and neutral bus, motors, and miscellaneous grounds required.
- B. Provide 600V insulated main bonding jumper for utility company connection between ground bus in switchgear lineup and ground termination point or service ground in transformer vault as directed by the utility.
- C. Provide an insulated ground conductor in every conduit or raceway containing power conductors.
- D. Continue existing system as specified herein and shown on the Drawings.

## **PART 2 - PRODUCTS**

### **2.01 GROUND CONDUCTORS**

- A. Green insulated copper for use in conduits, raceways, and enclosures.
- B. Bare copper for ground grids and grounding electrode systems.

### **2.02 CONNECTORS**

- A. Cast, setscrew, or bolted type.
- B. Form poured, exothermic welds.
- C. Grounding lugs where provided as standard manufacturer's items on equipment.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. **Grounding Conductors:** Sized in accordance with Article 250, Tables 250.66 and 250.122 of the National Electrical Code.
- B. **Grounding Conductor Connectors:** Make up tight, located for future servicing, and ensure low impedance.
- C. **Ground the electrical system, the cold-water service, structural steel, and transformers to the building ground grid.**
- D. **Plug-in Receptacles:** Bonded to the boxes, raceways, and grounding conductor.

### **3.02 EQUIPMENT**

- A. Provide separate green insulated equipment ground conductor in non-metallic and flexible electrical raceways.
- B. Ground luminaires, panels, controls, motors, disconnect switches, exterior lighting standards, and noncurrent carrying metallic enclosures. Use bonding jumpers, grounding bushings, lugs, buses, etc., for this purpose.
- C. Provide grounding bushings on feeder conduit entrances to panels and equipment enclosures and bond bushings to enclosures with minimum 10 AWG conductor. Connect the equipment ground to the building system ground. Use the same size equipment ground conductors as phase conductors, up through 10 AWG.

**END OF SECTION**

**SECTION 26 05 29**

**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Hangers
  - 2. Pipe Straps
  - 3. Support of Open Cabling
- B. Related Sections include:
  - 1. Section 26 05 33, Raceways and Boxes for Electrical Systems
  - 2. Section 26 24 16, Panelboards
  - 3. Section 26 50 00, Lighting

**1.03 REFERENCED STANDARDS**

- A. International Building Code (IBC)
- B. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

**PART 2 - PRODUCTS**

**2.01 HANGERS**

- A. Kindorf B-906-2A Channel, H-119-D washer, C105 strap, minimum 1/2-inch rod with ceiling flange, or equal.

**2.02 PIPE STRAPS**

- A. Two-hole galvanized or malleable iron.

### 2.03 SUPPORT OF OPEN CABLING

- A. Support of Open Cabling: Label NRTL for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
  - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
  - 2. Lacing bars, spools, J-hooks, and D-rings.
  - 3. Straps and other devices.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Provide electrical equipment supports.
- B. Install vertical support members for equipment, straight and parallel to building walls.
- C. Provide independent supports to structural member for electrical fixtures, materials, or equipment installed in or on ceiling, walls, or in void spaces and/or over furred or suspended ceilings.
- D. Do not use other trades' fastening devices to support electrical equipment materials or fixtures.
- E. Do not use supports and/or fastening devices to support other than one particular item.
- F. Support conduits within 18-inches of outlets, boxes, panels, cabinets, and deflections.
- G. Provide complete seismic anchorage and bracing for the vertical and lateral restraint of conduit, cable trays, bus ducts, and electrical equipment as required by IBC Chapter 6 and the most recent version of the SMACNA Seismic Restraint Manual for Seismic Hazard Level (SHL) A. Submit shop drawings of bracing systems to the Architect for review and bear the seal of a professional engineer registered in the State of California.

### 3.02 LUMINAIRES

- A. Light-Duty Ceiling Systems:
  - 1. Attach 12 gauge hanger wire from each corner of the luminaire to the structure above.
  - 2. Positively and securely, attach luminaire within 6-inches of each corner to the suspended ceiling-framing member by mechanical means.
- B. Intermediate-Duty Ceiling Systems:
  - 1. Positively and securely, attach luminaire within 6-inches of each corner to the suspended ceiling-framing member by mechanical means.
  - 2. Attach 12 gauge hanger wire within 3-inches of each corner of each luminaire.
  - 3. Connect two 12 gauge slack wires from the luminaire housing to the structure above for luminaires weighing less than 56 pounds.

4. Support luminaires weighing 56 pounds or more directly from the structure above with approved hangers attached to each corner of the luminaire.

C. Heavy-Duty Ceiling Systems:

1. Positively and securely, attach luminaire within 6 inches of each corner to the suspended ceiling-framing member by mechanical means.
2. Connect two 12-gauge slack wires from the luminaire housing to the structure above for luminaires weighing less than 56 pounds.
3. Support luminaires weighing 56 pounds or more directly from the structure above with approved hangers attached to each corner of the luminaire.

### 3.03 PULL AND JUNCTION BOXES

A. Pull and junction boxes installed within the cavity of a suspended ceiling that is not a fire rated assembly may be attached to the suspended ceiling framing members, provided the following criteria are met:

1. Installation complies with the ceiling system manufacturer's instructions.
2. Pull or junction box is not larger than 100 cubic inches.
3. Support to the main runner with two fastening devices designed for framing member application and positively attach or lock to the member.
4. Serves branch circuits and associated equipment in the area.
5. Pull or junction box is within 6-feet of the luminaires supplied.
6. Framing members are not rotated more than 2 degrees after installation.
7. Install within the cavity of a suspended ceiling may be attached to independent support wires, provided the following criteria are met:
  - a. Independent support wires are taut and connected at both ends, one end to the ceiling framing member and the other to the structure above.
  - b. No larger than 100 cubic inches.
  - c. Secure to the independent support wires by two fastening devices designed for the application.
  - d. Independent support wires in a fire-rated ceiling are distinguishable by color, tagging, or other effective means.

### 3.04 CABLES AND RACEWAY

A. Cables and raceway installed within the cavity of a suspended ceiling may be attached to independent support wires provided the following criteria are met:

1. Independent support wires are taut and connected at both ends, one end to the ceiling framing member and the other to the structure above.
2. Raceways no larger than 1-inch trade size and cables and bundled cables are not larger than 1-inch diameter including insulation.

3. Not more than three raceways or cables supported by independent support wire and supported within the top or bottom 12-inches.
  4. Cables for telecommunications, data processing, Class 2 power-limited signaling systems, fiber optics, and other power limited systems are securely fastened within 2 feet of each termination and at intervals not to exceed 5-feet or per the manufacturer's installation instructions.
  5. Secure raceways at intervals required for the type of raceway installed.
  6. Secure cables and raceway to independent support wires by fastening devices and clips designed for the purpose.
  7. Independent support wires are distinguishable by color, tagging, or other effective means.
- B. Cables and raceway installed within the cavity of a suspended ceiling may be supported with trapezes constructed of steel rods and channels provided the following criteria are met:
1. The size of the rods, channel, and fastening devices are suitable for the anticipated weight.
  2. The spacing of the trapezes meets that required for the type of raceway installed.
  3. Secure to a trapeze by straps designed for the purpose.
  4. Cables and raceway do not support other raceway or cables.
  5. An appropriately sized seismic bracing system is installed.

**END OF SECTION**

**SECTION 26 05 33**

**RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Metallic Conduits
  - 2. Non-Metallic Conduits
  - 3. Wireways
  - 4. Fittings
  - 5. Metallic Boxes
  - 6. Floor Boxes
  - 7. Non-Metallic Boxes
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 26, Grounding and Bonding for Electrical Systems
  - 3. Section 26 05 29, Hangers and Supports for Electrical Systems
  - 4. Section 26 05 53, Identification for Electrical Systems

**PART 2 - PRODUCTS**

**2.01 GENERAL**

- A. Raceways and conduits of specified types for electrical system wiring, except where clearly indicated otherwise.
- B. Fittings, boxes, hangers, and appurtenances required for the conduits and raceways.

- C. Size raceways and conduits as indicated. Where no size indicated, conduit may be the minimum code permitted size for the quantity of conductors installed, based upon NEC tables for conductors with type THW insulation.

## 2.02 METALLIC CONDUITS

### A. Rigid Metal Conduit (RMC):

- 1. Smooth surfaced heavy wall mild steel tube of uniform thickness and temper, reamed and threaded at each end and protected inside and out with galvanizing, sherardizing, or equivalent process.
- 2. Comply with NEC Article 344.

### B. Intermediate Metallic Conduit (IMC):

- 1. Smooth surface, intermediate wall mild steel tube of uniform thickness and temper, reamed and threaded at each end, and protected inside and out with galvanizing, sherardizing, or equivalent process.
- 2. Comply with NEC Article 342.

### C. Electrical Metallic Tubing (EMT):

- 1. Smooth surface, thin wall mild steel tube of uniform thickness and temper, galvanized or sherardized on the outside, and enameled on the interior.
- 2. Comply with NEC Article 358.

### D. Flexible Conduits (Flex):

- 1. Flexible Metallic Conduit:
  - a. Interlocking single strip steel construction, galvanized inside and out after fabrication.
  - b. Comply with NEC Article 348.
- 2. Liquid Tight:
  - a. Similar to flexible metallic conduit, except encased in a liquid tight polyvinylchloride or equivalent outer jacket over the flexible steel core.
  - b. Comply with NEC Article 350.

## 2.03 NON-METALLIC CONDUITS

### A. Rigid Non-Metallic Conduit:

- 1. Type II PVC Schedule 40 or 80, suitable for use with 90 degree C rated wire.
- 2. Conform to UL Standard 651 and carry appropriate UL listing for above and below ground use.

## 2.04 WIREWAYS

- A. Troughs: Steel, painted, square in cross section, preformed knockouts on standard spacing, screw cover.



- B. Fittings: Tees, elbows, couplings as required for configuration shown on the Drawings.

## 2.05 FITTINGS

### A. RMC and IMC:

1. Threaded Locknuts: Sealing type where used with NEMA 2, 3, 3R, 4, and 12 enclosures.
2. Threaded Bushings: 1-1/4-inch and larger, insulated, grounding type as required under Section 26 05 26, Grounding and Bonding for Electrical Systems.
3. Threaded Couplings: Standard threaded of the same material and as furnished with conduit supplied. Erickson type couplings may be used where required to complete conduit runs larger than 1-inch.

### B. EMT:

1. Connectors: Steel compression ring or steel set screw type for conduit termination, with insulated throat, suitable for conditions used. Use lay-in grounding type bushings where terminating grounding conductors.
2. Couplings: Steel compression ring or steel set screw type, concrete tight.

- C. Threadless: RMC and IMC couplings and box connectors may be steel threadless, compression ring or set screw type for use with conduits 1-inch and smaller where installed in poured concrete locations or where limited working space makes threaded fittings impractical.

### D. Weatherproof Connectors: Threaded

- E. Expansion Couplings: Equivalent to O.Z. type EX with jumper.

- F. Seal-Offs: With filler fiber, compound, and removable cover.

## 2.06 METALLIC BOXES

- A. Flush and Concealed Outlet Boxes: Galvanized stamped steel with screw ears for device ring mounting, knock-out plugs, mounting holes, fixture studs if required, RACO or equivalent.

- B. Surface Outlet Boxes: Galvanized stamped steel same as above for use on ceilings; cast steel or aluminum with threaded hubs or bosses for use on walls.

### C. Large Boxes:

1. Boxes exceeding 4-11/16-inches when required welded steel construction with screw cover and painted, steel gauge as required by physical size.
2. Manufacturers:
  - a. Hoffman
  - b. Circle AW
  - c. Equal as approved by the district.

### D. Systems:

1. Boxes for systems devices as recommended by the systems manufacturer, suitable for the equipment installed.

2. Equip with grounding lugs, brackets, device rings, etc., as required.

## 2.07 FLOOR BOXES

- A. Combination concealed power, data and communications services floor box with flush-hinged door and cover assembly. Nominal 12-inch by 6-inch by 3-inch stamped steel concrete tight box with multiple conduit entrances and pre-pour and after-pour adjusting screws.
  1. Heavy gauge steel doorplate suitable for carpet cut-in.
  2. High impact thermoplastic trim and carpet flange, finish by Architect.
  3. Tilted steel service plates for power and signal devices.
  4. Hubbell 3SFB-SS series or equal.
- B. Large capacity combination concealed power, data, and communications services floor box with flush-hinged door and cover assembly. Nominal 12-inch by 10-inch by 3-inch stamped steel concrete tight box with four service compartments, multiple conduit entrances and pre-pour and after-pour adjusting screws. Cover to prevent water, dirt, and debris from entering the power and communication devices. UL listed for use with tile, carpet or wood floor finishes.
  1. Die cast aluminum cover and cable doors suitable for carpet or tile cut-ins.
  2. Cover and carpet flange, finish by Architect.
  3. Four steel service plates for power, signal and future devices.
  4. Wiremold RFB4-SS series or equal.
- C. Flush fire-rated poke-through power and data floor device with slide open device covers. Nominal 7-inch diameter trim flange, 4-inch diameter core, 3/4-inch service conduits, and power junction box. 2 hour UL listed assembly suitable for use with tile or carpet floor finishes.
  1. High impact thermoplastic faceplate, carpet flange and slide device covers, finish by Architect.
  2. Carpet flange and faceplate and slide device covers, finish by Architect.
  3. One pre-wired 20A duplex receptacle.
  4. Two Cat 6 modular inserts.
  5. Wiremold RC3 Series or equal.
- D. Flush in floor junction boxes and those serving pedestal fittings concrete tight square stamped steel, fully adjustable with multiple conduit entrances and a round cover assembly.
  1. Cover assembly and plate, finish by Architect.
  2. Brushed aluminum power pedestal with single 20A duplex receptacle.
  3. Brushed aluminum data communications pedestal.

4. Wiremold R880 Series boxes and 500 Series pedestals or equal.

## 2.08 NON-METALLIC BOXES

- A. PVC, molded enclosures, threaded hubs.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Conceal conduits in finished spaces. Concealed conduits run in a direct line with long sweep bends and offsets. Where RMC and IMC embedded is in concrete below grade or in damp locations make watertight by painting the entire male thread with Rustoleum metal primer or equivalent before assembly.
- B. Route exposed conduit parallel or at right angles to structural building lines and neatly offset into boxes. Conduits attached directly to building surfaces closely follow the surfaces. Conduit fittings used to saddle under beams. Drilling or notching of existing beams, trusses on structural members coordinated with Architect prior to commencing.
- C. Rigidly secure RMC and IMC terminations at boxes, cabinets, and general wiring enclosures with double locknuts and bushings or approved fittings. Screw in conduit and engage at least five threads in hub where conduit boxes with threaded hubs or bosses are used. Use insulating bushings for conduits 1-1/4-inches or larger.
- D. Keep conduit and raceways closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete, or foreign objects. Clean and dry raceways before installation of wire and at the time of acceptance.
- E. Pack spaces around conduits with polyethylene backing rods and seal with polyurethane caulking to prevent entrance of moisture where conduits are installed in sleeves or block-outs penetrating moisture barriers.

### 3.02 CONDUIT

- A. RMC:
  1. Use in areas for wiring systems.
  2. Install for exposed runs of medium voltage circuits outside of the electrical rooms.
  3. Install where subject to mechanical injury.
  4. Install with threaded fittings made up tight.
- B. IMC:
  1. Use for medium voltage circuits where concealed or where exposed in the electrical rooms.
  2. Use for circuits rated 600V and less where not in contact with earth or fill.
  3. Install with threaded fittings made up tight.

C. EMT:

1. Use in other dry protected locations for circuits rated 600V and less.
2. Securely support and fasten whether exposed or concealed at intervals of nominally every 8-feet and within 24-inches of each outlet, ell, fitting, panel, etc.

D. Flex:

1. Use for connections to vibration producing equipment and where installation flexibility is required with a minimum 12-inches slack connection.
2. Limit flex length to 36-inches for exposed equipment connections and 72-inches in concealed ceiling and wall cavities.
3. Use PVC jacketed flex in wet locations, areas subject to washdown, and exterior locations.

E. PVC:

1. Type II Schedule 40 and 80 PVC may be used underground and in and under interior slabs, poured concrete walls, and where scheduled or noted on the Drawings.
2. Make connections with waterproof solvent cement.
3. Provide RMC at 60 degree and larger bends and where penetrating slabs.

### 3.03 RACEWAYS

- A. Surface metal wireways may be installed at locations to serve motor starters or other control devices where required by a multitude of wiring interconnections or physical layout.

### 3.04 FITTINGS

- A. Assemble continuous and secured metallic raceways and conduits to boxes, panels, etc., with appropriate fittings to maintain electrical continuity. Cut square and reamed smooth conduit joints with fittings drawn up tight.
- B. Do not use Crimp-on, tap-on, indenter type, malleable iron, or cast set screw fittings.

### 3.05 BOXES

A. General:

1. Outlet Boxes: Code required size to accommodate wires, fittings, and devices.
2. Provide multi-gang boxes as required to accept devices installed with no more than one device per gang.
3. Equip metallic boxes with grounding provisions.

**B. Size and Type:**

1. Flush wall switch and receptacle outlets used with conduit systems 4-inches square, 1-1/2-inches or deeper, with one or two-gang plaster ring, mounted vertically. Where three or more devices are at one location, use one piece multiple gang tile box or gang box with suitable device ring.
2. Wall bracket and ceiling surface mounted luminaire outlets 4-inch octagon 1-1/2 inches deep with 3/8-inch fixture stud where required. Wall bracket outlets have single gang opening where required to accommodate luminaire canopy. Provide larger boxes or extension rings where quantity of wires installed requires more cubic capacity.
3. Junction boxes installed in accessible ceiling or wall cavities or exposed in utility areas minimum of 4-inches square, 1-1/2 inches deep with appropriately marked blank cover.
4. Boxes for the special systems suitable for the equipment installed. Coordinate size and type with the system supplier.

**C. Pull Boxes**

1. Provide pull boxes where shown for installation of cable supports or where required to limit the number of bends in any conduit to not more than three 90-degree bends.
2. Use galvanized boxes of code-required size with removable covers installed so that covers will be accessible after work is completed.

**D. Installation:**

1. Mount boxes and outlets at nominal centerline heights shown on the drawings.
2. Adjust heights in concrete masonry unit (CMU) walls to prevent devices or finish plates from spanning masonry joints.
3. Recessed Boxes
  - a. Flush with finished surfaces or not more than 1/8-inch back, level and plumb.
  - b. Long screws with spacers or shims for mounting devices will not be acceptable.
  - c. No combustible material exposed to wiring at outlets.
4. Covers for flush mounted boxes in finished spaces extend a minimum of 1/4-inch beyond the box edge to provide a finished appearance. Finish edge of cover to match cover face.
5. Boxes installed attached to a stud in sheet rock walls equipped with opposite side box supports equivalent to Caddy 760. Install drywall screw prior to finish taping. Methods used to attach boxes to studs not to cause projections on the face of the stud to prevent full-length contact of sheet rock to the stud face.

**3.06 PULL WIRES**

- A. Install nylon pull lines in empty conduits larger than 1-inch where routing includes 25-feet or more in length or includes 180 degrees or more in bends.

- B. Where conduits requiring pull lines are stubbed out and capped, coil a minimum of 36-inches of pull line and tape at termination of conduit for easy future access. Label pull lines as to conduit starting or terminations point and intended future use.

**END OF SECTION**

**SECTION 26 05 53**

**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Labels
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 33, Raceways and Boxes for Electrical Systems
  - 3. Section 26 09 43, Network Lighting Controls
  - 4. Section 26 24 16, Panelboards
  - 5. Section 26 27 26, Wiring Devices
  - 6. Section 26 29 00, Motor Controllers
  - 7. Section 26 50 00, Lighting
  - 8. Section 28 30 00, Fire Detection and Alarm

**PART 2 - PRODUCTS**

**2.01 LABELS**

- A. Pre-printed: Permanent material pre-printed with black on white, with adhesive backing, Brady, 3M or equivalent.
- B. Engraved Laminated Plastic:
  - 1. 3-ply laminated plastic, colors indicated herein, with beveled edges, engraved letters, and stainless steel screw attachment.
  - 2. Nameplate length to suit engraving.

3. Adhesive attachment is not acceptable.
- C. Clear Plastic Tape:
1. Black (normal) or red (emergency or standby) 12 point Helvetica medium text, clear adhesive backing, field printed with proper equipment for device labeling.
  2. Manufacturers:
    - a. Brother P-Touch
    - b. Dyno-tape
    - c. Kroy
    - d. Equal as approved the District.
- D. Wire Markers: White with black numbers, adhesive-backed tape on dispenser roll, Brady, 3M or equivalent.
- E. Feeder Conduit Marking:
1. Provide one-piece snap-around vinyl feeder conduit markers for feeder conduits.
  2. Provide custom label, black letters on orange background indicating destination equipment, 1-1/4-inch high letters (minimum) – Seton Setmark Pipe Marker Series.
  3. Provide additional one-piece snap-around vinyl label, black letters on orange background for voltage designation (i.e., 277/480V, 120/208V).
  4. Secure labels to conduits using plastic tie wrap, two per label.
- F. Marker Pen: Black permanent marker suitable for writing on metallic surfaces.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Nameplate and text coloring:
1. Normal Black nameplate with white lettering.
  2. Standby Yellow nameplate with black lettering.

#### 3.02 BRANCH CIRCUIT PANELBOARDS

- A. Provide engraved laminated plastic nameplate on the face of each panelboard centered above the door as follows:
1. Line 1: Equipment identification (e.g., PANEL 4HA). Text height: 1/2-inch.
  2. Line 2: Equipment voltage, phase and wire quantity (e.g., 480Y/277V, 3PH, 4W). Text height: 3/8-inch.
- B. Indicate feeder source, feeder wire size, and feeder breaker or fuse size with plastic tape labels on the inside of the panel door.



- C. Provide typewritten panel directories, with protective, clear transparent covers, accurately accounting for every breaker installed including spares.
  - 1. Schedules use the actual room designations assigned by name or number near completion of the work and not the space designation on the Drawings. Confirm final room designations with Architect and Owner prior to completion of work.
  - 2. Each load description includes a room or area designation whether indicated on the Drawings or not.

### 3.03 EQUIPMENT

- A. Provide engraved laminated plastic nameplate on the face of disconnect switches, motor starters, relays, contactors, and etc., indicating equipment served (e.g., AHU-1) and equipment load (e.g., 20 hp). Provide additional engraved laminated plastic nameplate indicating serving panel designation and circuit number.
- B. Provide clear plastic tape label for relays, contactors, time switches and miscellaneous equipment provided under this Division of work indicating equipment served.

### 3.04 FEEDER CONDUIT

- A. Provide feeder conduit marker for electrical feeders.
- B. Provide markers when exiting source equipment and located along the entire conduit length 20-feet on centers in exposed areas, above ceilings, and upon entering or leaving an area or room.

### 3.05 DEVICES

- A. Label each receptacle plate with preprinted clear plastic tape indicating serving panel and circuit number (e.g., PANEL 2PA-5). Clean oils, dirt, and foreign materials from plate prior to label application. Label receptacles connected to a GFCI protected circuit downstream from the protecting device.

### 3.06 RACEWAYS AND BOXES

- A. Label pull boxes and junction boxes for systems with paint or marker pen on box cover identifying system. Where box covers are exposed in finished areas, label inside of cover.
- B. Color label covers as follows:
  - 1. 480Y/277V wiring      Orange
  - 2. 208Y/120V wiring      Black
  - 3. Fire Alarm              Red
  - 4. Communications        Green
  - 5. Security                  Blue
- C. Label each end of pull wires left in empty conduits with tags or tape indicating location of other end of wire.

### 3.07 SYSTEMS

- A. Complex control circuits may utilize combination of colors with each conductor identified throughout using wraparound numbers or letters. Use the number or letters shown where the Drawings or operation and maintenance data indicate wiring identification.
- B. Label the fire alarm and communication equipment zones, controls, indicators, etc., with machine-printed labels or indicators appropriate for the equipment installed as supplied or recommended by the equipment manufacturer.

### 3.08 EXISTING EQUIPMENT

- A. Provide new nameplates and labels for existing distribution equipment in accordance with panel descriptions shown on the Drawings. Provide new labels for feeder devices where labels are non-existent, incorrect, or confusing on existing distribution panels affected by this work.
- B. Equip existing branch circuit panelboards scheduled to remain with new, accurate, typed, circuit directories where circuiting changes are made.

**END OF SECTION**

**SECTION 26 05 73**

**OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Studies and Analysis
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 29 00, Motor Controllers

**1.03 REFERENCES**

- 1. IEEE 141 Recommended practice for electrical power distribution and coordination of industrial and commercial power systems
- 2. IEEE 242 Recommended practice for protection and coordination of industrial and commercial power systems
- 3. IEEE 399 Recommended practice for industrial and commercial power system analysis
- 4. IEEE 1584 Guide for performing arc-flash hazard calculations
- 5. NFPA 70 National Electrical Code, latest addition
- 6. NFPA 70E Standard for Electrical Safety in the Workplace, latest addition

**1.04 SUBMITTALS**

- A. Overcurrent Device Coordination Study
- B. Device Setting Recommendations
- C. Arc Flash Hazard Analysis and report
- D. Arc Flash Equipment Labeling Recommendations

E. Arc Flash Label Example

**PART 2 - PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Emerson
- B. Equal as approved by the District.

**2.02 STUDIES AND ANALYSIS**

- A. Overcurrent Device Coordination Study:
  - 1. Provide a coordination study for the electrical overcurrent devices to assure proper equipment and personnel protection.
  - 2. Present an organized time-current analysis of each protective device in series from the individual device back to the source. Reflect the operation of each device during normal and abnormal current conditions.
  - 3. Complete and submit prior to procurement of electrical distribution equipment including: switchgear, switchboards, panelboards, disconnects and overcurrent protection devices.
  - 4. Demonstrate selective coordination of the emergency system in conformance with National Electrical Code Section 700. Standby and Optional standby systems on the load side of automatic transfer switches are required to coordinate with overcurrent protection devices on the line side of automatic transfer switches.
  - 5. Bring to the attention of the Engineer devices that fail to selectively coordinate as required to meet code.
  - 6. Provide alternative options and/or scenarios for devices that fail to coordinate and demonstrate methods/devices needed to selectively coordinate for the engineers review and acceptance.
  - 7. Provide pertinent information required by the preparers to complete the study.
  - 8. Include a system one-line diagram and protective coordination curves.
    - a. Determine the required settings of protective devices to assure selective coordination.
    - b. Graphically illustrate on log paper that adequate time separation exists between series devices.
    - c. Plot the specific time-current characteristics of each protective device so that upstream devices are clearly depicted on one sheet.
    - d. Time Current Curves: Develop for both phase and ground protective devices.
    - e. Provide the following specific information shown on the coordination curves:
      - 1) Device identification.
      - 2) Voltage and current ratio for curves.
      - 3) 3-phase and 1-phase ANSI damage points for each transformer.
      - 4) No-damage, melting, and clearing curves for fuses.
      - 5) Cable damage curve.
      - 6) Transformer inrush points.
      - 7) Maximum short circuit cut-off point.

- 8) Motor starting locked rotor curves.
- 9) Clearly marked short circuit current levels through each protective device and branch.
- f. Develop a table that summarizes the settings selected for the protective devices. Included the following:
  - 1) Device identification.
  - 2) Circuit breaker sensor rating, long-time, short-time, instantaneous settings, and time bands.
  - 3) Fuse rating and type.
  - 4) Ground fault pickup and time delay.
  - 5) Provide characteristic time-current curves for each adjustable overcurrent protective device showing pickup settings, time delay bands and device operating times. Include trip adjustment time dials and available settings corresponding to each characteristic time-current curve.

**B. Arc Flash Hazard Analysis:**

1. Provide an Arc Flash Hazard Study per the requirements set forth in NFPA 70E. The arc flash hazard analysis performed according to the IEEE 1584 equations that are presented in NFPA70E.
2. Use study to determine:
  - a. Arc flash incident energies.
  - b. Arc flash boundaries.
  - c. Shock hazard boundaries.
  - d. Personal protective equipment (PPE) for energized electrical equipment.
3. Provide the following information for each system mode of operation and documented. The study includes:
  - a. Equipment name and voltage.
  - b. Equipment device name and ANSI function (i.e., 51/50).
  - c. Equipment type (i.e., switchgear, MCC, panel, VFD, etc.).
  - d. Equipment arc gap.
  - e. Bolted and estimated arcing fault current at the fault point (equipment) in symmetrical amperes. The estimated arcing current should be based on the arcing current equations used.
  - f. Trip time, opening time, and total clearing time (total Arc time) of the protective device.
  - g. Worst-case arc flash boundary for each bus/equipment in the model.
  - h. Worst-case arc flash hazard incident energy in cal/cm<sup>2</sup> for each bus/equipment in the model.
  - i. Worst-case personal protective equipment (PPE) for each bus/equipment in the model.
  - j. Show five different working distances for each distance.
  - k. Indicate Danger/Hazardous areas where incident energy is greater than 40 cal/cm<sup>2</sup> and provide recommendations to reduced arc flash energy levels for these areas.
  - l. Flag results where 85 percent arcing current provided worst-case results.
4. Arc flash study report format:
  - a. Introduction
  - b. Methodology
  - c. Backup Information
  - d. Key Assumptions
  - e. IEEE 1584-2002 Considerations
  - f. Arc flash reduction options: Overcurrent protective device changes.
  - g. Explanation of data in arc flash hazard report tables.

- h. NFPA 70E Information.
    - 1) Shock hazards with covers removed.
    - 2) Shock hazard approach boundaries.
      - a) Limited Approach Boundary
      - b) Restricted Approach Boundary
      - c) Prohibited Approach Boundary
    - 3) Arc Flash Hazard Boundaries
  - i. Results of arc flash hazard analysis for high voltage, medium voltage, and low voltage systems, including:
    - 1) Working Distances
    - 2) Energy Levels
    - 3) PPE Requirements
    - 4) Recommendations to reduce arc flash hazard energy and exposure.
  - j. Arc Flash Hazard Report
  - k. Electronic File
5. Provide labels for the project.

### **PART 3 - EXECUTION**

#### **3.01 SETTINGS AND ADJUSTMENT**

- A. Set and adjust breakers in the distribution system per the recommendations of the coordination study and settings table.
- B. Provide protective covers and locking devices on breakers to secure settings from accidental changes.

#### **3.02 ARC FLASH WARNING LABELS**

- A. Provide a 3-1/2-inch by 5-inch thermal transfer type label of high adhesion polyester for each work location analyzed.
- B. Labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the Owner and after any system changes, upgrades, or modifications have been incorporated in the system.
- C. The label includes the following information, at a minimum:
  1. Location Designation
  2. Nominal Voltage
  3. Flash Protection Boundary
  4. Hazard Risk Category
  5. Incident Energy
  6. Working Distance
  7. Engineering Report Number, Revision Number, and Issue Date
- D. Machine printed labels with no field markings.

- E. One arc flash label provided for each, unit substation primary and secondary side, switchboard, switchgear section, motor control center, panelboard, and busway.

**3.03 ARC FLASH TRAINING**

- A. Train the Owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). Training certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) of equivalent.

**END OF SECTION**

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**SECTION 26 05 80**  
**ELECTRICAL TESTING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Testing Equipment
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 26, Grounding and Bonding for Electrical Systems
  - 3. Section 26 09 13, Electrical Power Monitoring and Control
  - 4. Section 26 09 43, Network Lighting Controls
  - 5. Section 26 24 16, Panelboards
  - 6. Section 26 29 00, Motor Controllers
  - 7. Section 28 30 00, Fire Detection and Alarm

**1.03 TESTING CRITERIA**

- A. General:
  - 1. Perform field tests and operational checks to assure that electrical equipment, both contractor and Owner supplied, is operational within industry and manufacturer's tolerances and is installed in accordance with design specifications.
  - 2. The tests and operational check determine the suitability for energization.
  - 3. Schedule tests and give a minimum of one week's advance notice of time and date to the Architect and Owner for major systems tests specified in this Section.
  - 4. Testing company provides the equipment and technical personnel to perform tests and inspections. At Contractors expense, furnish personnel necessary to assist in the testing and inspection.

5. When tests and inspections are complete, attach a label to the devices tested. Provide on the label, the name of the testing company, date of tests, and initials of the Engineer who performed the tests.

**B. Responsibilities:**

1. Clean the equipment, torque down accessible bolts according to the equipment manufacturer's instructions, perform routine insulation resistance tests on branch and feeder circuits, continuity checks on branch and control wiring, and rotation tests for distribution and utilization equipment.
2. Furnish a complete set of current plans and specifications to the testing company prior to commencement of testing. At each test site, provide test control power necessary to perform the tests specified. Consult the test organization as to the specific power requirements. Notify the testing organization when the equipment and systems are ready for their inspections and testing. After review by the testing engineer, correct deficiencies noted by the testing company.
3. Responsible for having the manufacturer of each equipment and/or system provide factory trained representatives(s) that will perform required functional testing, checkout, and repairs in order to pronounce the equipment and/or systems meet the requirements of these specifications and Drawings and it is ready for startup testing and commissioning by the testing organization as specified hereafter.
4. Furnish settings of protective devices by the Engineer, in conjunction with Utility.
5. Testing organization to notify Engineer prior to the commencement of testing. The testing organization, set, and adjust the protective devices and associated auxiliary timing devices in accordance with the values furnished by the Engineer. The testing organization maintains a written record of tests and, upon completion of the test, include them in a final report. Detail deficiencies in the system material, workmanship, or design.

**C. Implementation:**

1. Safety practices comply with applicable state and local safety orders, as well as with the Occupational Safety and Health Act (OSHA). Compliance with the National Fire Protection Association (NFPA) standard NFPA 70E, and the Accident Prevention Manual for Industrial Operations of the National Safety Council.
2. Tests, other than phase rotation and operational tests, only performed on apparatus that is deenergized. The testing company's lead test engineer for the project designated safety representative and supervise testing observations and safety requirements. Do not proceed with Work until determined that it is safe to do so.
3. Power Circuits: Conductors shorted to ground by a hotline grounding device approved for the purpose. Provide warning signs and protective barriers as necessary to conduct the tests safely.

**D. Reports:**

1. General: Provide full documentation of tests in the form of a report.
2. Test report includes the following sections:
  - a. Scope of Testing
  - b. Equipment Tested
  - c. Description of Test

- d. Test Results
  - e. Conclusions and Recommendations
  - f. Appendix, including Test Forms
3. Record each piece of equipment on a data sheet listing the condition of the equipment as found and as left. Include recommendations for necessary repair and/or replacement parts. Indicate on data sheets the name of the engineer who tested the equipment and the date of the test completion.
  4. Submit record copies of the completed test report no more than 30 days after completion of the testing and inspection.

#### 1.04 REFERENCES

- A. The testing and inspection comply with applicable sections of the applicable codes and standards listed in Section 26 05 00, Common Work Results of Electrical of the project specifications.
- B. The inspection and testing comply with the project plans and specifications, as well as with the manufacturer's drawings, instruction manuals, and other applicable data that may be provided by the Engineer, for the apparatus tested.

#### 1.05 QUALIFICATIONS

- A. Testing Organization:
  1. Independent division of the manufacturer of the assembled products being tested. If an outside testing organization is utilized, a representative of the manufacturer under contract by the testing company. Be present during testing to ensure the testing is performed properly and that any deficiencies discovered are promptly corrected.
  2. Full service company that employs factory trained test engineers capable of troubleshooting, as well as identifying power equipment problems.
  3. Perform Work outlined under the full time, onsite supervision of a graduate engineer with a minimum of 5 years of field testing experience.
  4. Upon request, submit proof of its qualifications.

### PART 2 - PRODUCTS

#### 2.01 TESTING EQUIPMENT

- A. Testing agency to have calibration program which maintains applicable test instrumentation within rated accuracy. Traceable accuracy to the National Bureau of Standards in an unbroken chain. Calibrate instruments calibrated in accordance with the following frequency schedule:
  1. Field Instruments: 6 months maximum.
  2. Laboratory Instruments: 12 months.
  3. Leased Specialty Equipment: 12 months (where accuracy is guaranteed by lessor). Dated calibration labels visible on test equipment.

**PART 3 - EXECUTION**

**3.01 EQUIPMENT TO BE TESTED**

- A. Section 26 09 13, Electrical Power Monitoring and Control:
  - 1. Instrument Transformers: Perform tests listed in the NETA 2007 Acceptance Testing Specifications for Instrument Transformers, Section 7.10.
  - 2. Metering Functions: Perform tests listed in the NETA 2007 Acceptance Testing Specifications for Metering, Section 7.11.
- B. Section 26 24 16, Panelboards:
  - 1. Panelboards: Perform tests listed in the NETA 2007 Acceptance Testing Specifications for Switchgear and Switchboard Assemblies, Section 7.1. Only those tests applicable to panelboards need be performed, no electrical tests of the circuit breakers need to be performed.
- C. Section 26 29 00, Motor Controllers
- D. Section 28 30 00, Fire Alarm and Detection:
  - 1. Fire Alarm System: Perform tests listed in Section 28 30 00, Fire Alarm and Detection.

**END OF SECTION**

**SECTION 26 08 00**

**COMMISSIONING FOR ELECTRICAL**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.
- C. The Work of this Section is supplemental to and does not supersede any other requirements of the Contract Documents.

**1.02 SUMMARY**

- A. The commissioning process is described in Section 01 91 00, Commissioning.
- B. Provide all labor and materials required to complete the commissioning of those Division 26, Electrical, systems and equipment identified as Commissioned Systems and Equipment in Section 01 91 00, Commissioning.
- C. Related Sections include:
  - 1. Section 01 91 00, Commissioning
  - 2. All Sections of Division 26, Electrical.

**1.03 SUBMITTALS**

- A. Refer to Section 01 91 00, Commissioning.

**1.04 COMMISSIONING SCOPE OF WORK - COMMISSIONING AGENT**

- A. Refer to Section 01 91 00, Commissioning.

**1.05 COMMISSIONING SCOPE OF WORK - CONTRACTOR**

- A. Refer to Section 01 91 00, Commissioning.

**PART 2 - PRODUCTS**

**2.01 TEST EQUIPMENT**

- A. Refer to Section 01 91 00, Commissioning.

**PART 3 - EXECUTION**

**3.01 MEETINGS**

- A. Refer to Section 01 91 00, Commissioning.

**3.02 INSTALLATION, CHECK-OUT, START-UP AND PREFUNCTIONAL CHECKS**

- A. Refer to Section 01 91 00, Commissioning.

**3.03 FUNCTIONAL TESTING**

- A. Refer to Section 01 91 00, Commissioning.

**3.04 TRAINING OF FACILITY OPERATING STAFF AND BUILDING OCCUPANTS**

- A. Refer to Section 01 91 00, Commissioning.

**END OF SECTION**

**SECTION 26 09 13**

**ELECTRICAL POWER MONITORING AND CONTROL**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Microprocessor-Based Metering Equipment
  - 2. System Architecture
  - 3. Metering and Monitoring Functions
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 26, Grounding and Bonding for Electrical Systems
  - 3. Section 26 05 33, Raceways and Boxes for Electrical Systems
  - 4. Section 26 05 53, Identification for Electrical Systems
  - 5. Section 26 05 80, Electrical Testing
  - 6. Section 26 24 16, Panelboards

**1.03 REFERENCES**

- A. Microprocessor metering equipment UL listed, CSA certified and meet IEEE Standard C37.90.1 for surge protection.

**1.04 SUBMITTALS**

- A. Product data:
  - 1. Microprocessor metering equipment product literature with description of operational capability to perform specified metering functions and software analysis features, and communication protocol.
  - 2. Published operators' manuals for the microprocessor metering equipment.

- B. Operation and Maintenance Manuals:
  - 1. Final set up and operators' manuals.
  - 2. Instruction books and/or leaflets.
  - 3. Recommended renewal parts list.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Cutler-Hammer
- B. General Electric
- C. Square D Company
- D. Siemens
- E. Equal as approved by the District.

### 2.02 MICROPROCESSOR-BASED METERING EQUIPMENT

- A. General:
  - 1. Provide a complete system consisting of instrument transformers, metering instruments, trip units with metering functions; communications between components; communications with the building computer network; computers; operator interfaces at the switchgear; operator interfaces via networked computers; and other appurtenances as required for a complete system.
    - a. Overall system communications TCP/IP over a dedicated Ethernet LAN. The system support a LAN comprised of either Category 5 cable at 10baseT or fiber optics at 100baseFX or a mix thereof.
    - b. The system may also utilize Modbus/TCP for communication with field devices over an RS-485 communications link at speeds up to 38.4k baud.
    - c. Connection to the building Ethernet network made at a single Ethernet gateway.
  - 2. Configure system wiring so metering instrument can be isolated and removed from the system without the need to deenergize power or protective circuit. This requirement may be met in one of two ways:
    - a. Connections to the metering instrument may be made using separable terminal blocks. The terminal blocks for CT circuits short the CT circuit prior to breaking the metering instrument circuit on removal and make the metering instrument circuit prior to unshorting the CT circuit on insertion. CT and PT or line voltage terminals finger safe when left disconnected and energized.
    - b. Connections to the metering instrument may be made though test blocks with disconnecting switches for line and neutral voltage circuits and shorting switches for CT circuits.
  - 3. Terminate system wiring on spade or ring terminals, except that only ring terminals utilized on CT circuits. System wiring within switchgear of switchboard assembly type SIS.



4. Alarm and waveform capture set points may be created by the system operator based on the parameters defined below being greater than or less than value selected by the system operator.
5. Display, whether at the local display of a metering instrument or through software, auto range between units, kilo units or Mega units such that the absolute values less than 1,000 read as units, absolute values less than 1,000,000 but not less than 1,000 read as kilo units, and values of 1,000,000 or greater read as Mega units, except that voltage readings in units of Volts and kilovolts not be utilized.
6. Measured values, both instantaneous readings and historical data, available to users on a computer on the Ethernet network in the building without the use of proprietary software, or requiring particular operating system. To facilitate this, each metering device assigned a unique network address and by entering that address or corresponding URL into a web browser, HTML web pages of data available for that device. Specific browser software permitted to be required to access system features beyond the measured values.
7. System settings and operational parameters only accessible through a maximum of five specific user computers, require the use of proprietary software, and fully password protected.
8. Synchronize complete system to a single time base so that events on the system can be compared at different locations on the system using a common time base.
9. Capable of monitoring Modbus devices for which register values are defined.
10. System requirements indicated are minimum requirements, additional features and increased accuracy is permitted.
11. Historical data resides on the system, independent of external personal computers. Industrial computers included as integral components of the system and mounted within a switchgear enclosure may be used to supplement the storage capacity of the various metering devices in the system. Sufficient data storage space included so that each instantaneous value listed can be logged on one minute increments and maintained for 36 hours. After 36 hours, data retained at 15 minute intervals for 35 days. After 35 days, data retained at 1 hour intervals for a minimum of one year.

**B. Shared Components:**

1. Permitted to share components with the protective systems specified in Section 26 13 13, Medium-Voltage Circuit Breaker Switchgear and Section 26 11 16, Secondary Unit Substations provided that such sharing does not compromise the protective functions and that such sharing does not compromise the equipment of this section.
2. It is anticipated that the PTs specified in Section 26 13 13, Medium-Voltage Circuit Breaker Switchgear will be shared and that there will not be separate PTs for the metering of the medium voltage systems.
3. Where the accuracy of the protective relay metering functions or circuit breaker trip unit metering functions are sufficient to meet the requirements listed below, those metering functions may be used in lieu of separate metering instruments.

**PART 3 - EXECUTION**

**3.01 FIELD TESTING**

- A. Verify complete system operation including hardware, software and communication devices.
- B. Test components per the requirements of Section 26 05 80, Electrical Testing.

**3.02 SYSTEM OPERATOR TRAINING**

- A. Provide onsite training for the Owner's system operations personnel. The training course minimum of 16 hours of classroom instruction and cover system operation and troubleshooting, alarm and waveform capture set points, system programming, web page customization for the user interface, and recommended periodic maintenance.
- B. Provide a local or toll-free phone number to provide assistance to the Owner's operations personnel in the operation of the system for a minimum of five years. Costs associated with this assistance included in the original system cost.

**3.03 MANUFACTURER'S CERTIFICATION**

- A. A qualified factory-trained manufacturer's representative certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- B. Provide 4 copies of the manufacturer's representative's certification.

**END OF SECTION**

**SECTION 26 24 16**

**PANELBOARDS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Branch Panelboards
  - 2. Identification
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 26, Grounding and Bonding for Electrical Systems
  - 3. Section 26 05 33, Raceways and Boxes for Electrical Systems
  - 4. Section 26 05 53, Identification for Electrical Systems
  - 5. Section 26 05 73, Overcurrent Protective Device Coordination Study
  - 6. Section 26 05 80, Electrical Testing

**1.03 SUBMITTALS**

- A. Shop Drawings
- B. Product Data
  - 1. Detailed component material list.
  - 2. Voltage rating, amperage rating, bussing material, fault rating, wiring lugs capacity, mounting method, physical size, exterior finish and options.
  - 3. Individual circuit breaker product data sheets.
  - 4. Panel schedules indicate circuit breakers in the same orientation as the construction documents.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Panelboards use the same manufacturer as existing panelboards as part of this project.

### 2.02 BRANCH PANELBOARDS

A. Branch Circuit Panels:

1. Bolt-on circuit breaker type fitted with metallic flush lift latches and locks keyed alike.
2. Deliver panel keys to the Owner at completion of the project.

B. Short Circuit Current Rating (SCCR):

1. Fully rated at a value greater than the maximum available short circuit current that can be expected at the panelboard location in the electrical system.
2. Series rating is not permitted.

C. Cabinets:

1. Cabinet rough-in boxes code gauge steel, with dead front covers.
2. Flush panels have flush doors with concealed hinges and mounting clamps.
3. Surface panels have metal face trims with no sharp edges or corners.
4. Surface panel cabinets fabricated without knockouts and finished to match face trim.
5. Panels have door in door hinged trim fronts that provides full access to wiring compartment.

D. Wiring Gutters:

1. Minimum of 4-inches wide except where feeder conductors enter where a minimum of 6-inches clear.
2. Feeder conductors to enter directly in line with lug terminals wherever practicable.
3. Provide separate feeder studs for each feeder conductor compression lug.

E. Bussing:

1. Provide one continuous bus bar per phase.
2. Provide copper or electrical grade aluminum alloy sized as indicated on the drawings and in accordance with UL standards to limit temperature rise on current carrying part to a maximum of 149 degrees F above an ambient temperature of 104 degrees F maximum.
3. Full size insulated neutral bars included for panels indicated to have a neutral.
4. Bus bar taps for panels with single pole branches arranged for sequence phasing of the branch circuit devices.

- F. **Ground Bus:** Provide in each panelboard and include the following:
1. Have the same rating as the neutral bus.
  2. Contain a ground conductor terminal for each available circuit in the panelboard.
  3. Size terminals for branch circuit equipment grounding conductors.
- G. **Isolated Ground Bus:** Provide in each panelboard as indicated and included the following:
1. Insulate from the panelboard enclosure.
  2. Same rating as the neutral bus.
  3. Contain a ground conductor terminal for each available circuit in the panelboard.
  4. Have terminals sized for the branch circuit equipment grounding conductors.
- H. **Interiors:**
1. Main lug only unless otherwise indicated, with dead front shield covering the bus, and bus connectors, with mounting hardware and bussing for spaces indicated for future installation of devices.
  2. Dead front construction for interior trim.
  3. Cover unused mounting spaces with preformed knockouts.
- I. **Main Circuit Breaker:**
1. Where indicated, equip panels indicated with main circuit breakers sized as scheduled and mounted behind door at top of panel for top entrance feeders, and bottom of panel for bottom entrance feeders.
  2. Where main circuit breaker size is not indicated, ampere rating match feeder ampacity or panelboard rating, whichever is less.
    - a. Molded case, thermal magnetic bolt-on type and sized as indicated on the Drawings. Circuit breaker have an overcenter, trip-free, toggle mechanism that provide quick-make, quick-break contact action. Indicate open, closed, or tripped by handle position, with common internal trip crossbar to provide simultaneous tripping for poles.
    - b. Circuit breakers have a permanent trip action with thermal and magnetic trip elements in each pole. Each thermal element factory calibrated to operate in a 104 degrees F ambient environment. Thermal elements ambient compensating above 104 degrees F.
    - c. Provide the main circuit breaker with a padlock-able lock-off device to provide capability to be locked in the open position.
- J. **Branch Circuit Breakers:**
1. Provide with amperage rating, and number of poles as indicated in the Panelboard Schedules.
  2. Bolt-on type circuit breakers.

3. Overcenter toggle mechanism that provide quick-make, quick-break contact action. Circuit breakers have thermal and magnetic trip elements in each pole. Two and three pole circuit breakers have an internal common trip crossbar to provide simultaneous tripping.
  4. Exposed faceplates of circuit breakers flush with one another.
  5. Short circuit capacity rating to withstand the maximum short circuit duty that can be expected at the breaker location in the electrical system. Minimum short circuit rating for circuit breakers: 10,000 AIC for 120V and 208V breakers, 14,000 AIC for 277V and 480V breakers.
  6. Circuit breakers used for switching duty UL listed for that purpose and marked SWD.
  7. Provide each branch circuit breaker with a factory padlock-able lock-off provisions.
- K. Provide shunt trips, alarms, and auxiliary switches as shown on the Drawings.
- L. Provide Arc Fault Circuit Interrupter (AFCI) breakers as shown on the Drawings or as required by Code.
- M. Provide Ground Fault Interrupter (GFI) Circuit breakers as shown on the drawings or as required by Code. GFI breakers serving heat trace circuits 30 ma ground fault trip rating.
- N. Surge Protective Device (SPD): Provide an integral or separate SPD with panelboards that are part of an emergency NEC 700 required system. Refer to Section 26 43 13, Surge Protective Devices for requirements.

## 2.03 IDENTIFICATION

- A. Identify branch circuit breakers with individual circuit numbers adjacent to each breaker with a typewritten card to identify the load controlled by that breaker.
- B. Provided with complete schedules of panelboards as designed prior to start of construction. Schedules will include circuit breaker arrangement, load schedules, and ratings for use in identification of circuits and coordination.
- C. Refer to Section 26 05 53, Identification of Electrical Systems for additional requirements.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install panelboards in accordance with manufacturer's recommendations.
- B. Install panelboards plumb and level, located as shown on the Drawings up 6-feet – 6-inches to top unless noted otherwise.
- C. Keep area above panelboard clear of equipment foreign to the electrical installation. Coordinate installation with other trades.
- D. Provide identification and panel schedules as specified in Section 26 05 53, Identification of Electrical Systems.

- E. Provide the required SPD and associated overcurrent device for emergency NEC 700 systems, install per manufacturers recommendations.

**3.02 SALVAGE**

- A. Utilize circuit breakers in existing panels that are to remain. Where faulty or inadequate breakers are found in these panels, replace with suitable breakers from panels removed during demolition.

**3.03 SPARE CONDUITS**

- A. Install a spare 3/4-inch conduit from flush panels for each three single pole breakers or spaces provided. Terminate conduits above accessible ceiling or as directed.

**END OF SECTION**

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**SECTION 26 27 26**

**WIRING DEVICES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Line Voltage Wall Switches
  - 2. Receptacles
  - 3. Plates
- B. Related Sections include:
  - 1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  - 2. Section 26 05 26, Grounding and Bonding for Electrical Systems
  - 3. Section 26 05 53, Identification for Electrical Systems
  - 4. Section 26 05 80, Electrical Testing

**1.03 SUBMITTALS**

- A. Product Data

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Line Voltage Wall Switches:
  - 1. Hubbell
  - 2. Leviton
  - 3. Arrow-Hart
  - 4. Pass & Seymour

5. Equal as approved by the District.

**B. Receptacles:**

1. Use same manufacture as the Line Voltage Wall Switches.
2. Hubbell
3. Leviton
4. Arrow-Hart
5. Pass & Seymour
6. Equal as approved by the District.

**C. Plates:**

1. Hubbell
2. Leviton
3. Arrow-Hart
4. Pass & Seymour
5. Equal as approved by the District.

**2.02 MATERIALS**

- A. Extra heavy duty grade wiring devices, with special devices as noted on the Drawings. Should the Drawings indicate a device other than those listed. Device of same grade and manufacture as specified below. Furnish a matching plug connector for special purpose devices that do not have the common 120V NEMA 5-20R configuration.
- B. Lighting switches and duplex receptacles installed have similar appearance characteristics unless noted otherwise.

**2.03 LINE VOLTAGE WALL SWITCHES**

**A. Line Voltage Switches:**

1. 20A rated, 277V, quiet type, extra heavy duty, heavy duty nylon toggle handle, back and side wired with screw terminal connections.
2. As noted on the drawings provide:
  - a. Pilot light switch: lighted clear toggle.
  - b. Momentary Contact Switches: 15A, SPDT, center off.
  - c. Key Switches: 20A, 277V, back and side wired with screw terminal connections.

**B. EPO Pushbutton Switch:**

1. Red mushroom head push-off, pull-on with concentric guard, 2-1/4 inch diameter, non-illuminated, heavy duty operator.

2. Provide clear hinged louver to prevent accidental operation.
  3. Provide laminated engraved nameplate attached with stainless steel screws indicating Emergency Power Off and load served.
- C. Except as noted herein, device exposed finish color as follows:
1. Normal Power: per Architect
  - 2.

## 2.04 RECEPTACLES

- A. Standard Straight Blade Duplex Receptacle:
1. 3-wire, 2-pole with grounding, extra heavy duty, 20A rated, NEMA 5-20R configuration, back and side wired with screw terminal connections.
    - a. Provide hospital grade in patient care areas as required by NEC.
    - b. Provide tamper-resistant as noted on the drawings or NEC required.
    - c. Provide isolated ground as noted on the drawings or NEC required.
    - d. Provide surge suppression receptacles as noted on the drawings.
  2. Ground Fault Interrupting straight blade duplex receptacle:
    - a. Heavy duty, 3-wire, 2 pole with grounding, self-testing, green "ON" LED to indicate power, red "ON" LED to indicate ground fault condition, 20A rated, NEMA 5-20R configuration, back and side wired with screw terminal connections.
      - 1) Provide hospital grade in patient care areas as required by NEC.
      - 2) Provide tamper-resistant as noted on the drawings or where NEC required.
      - 3) Provide weather-resistant rating at exterior locations as required by NEC.
- B. Clock Outlets: As noted on the drawings and compatible with the specified clock system.
- C. Special Purpose Receptacles: As noted on Drawings with NEMA configurations.
- D. Exposed Device Color, unless otherwise noted, is as follows:
1. Normal power: Gray or as selected by Architect.
  2. Isolated Ground: Orange
  3. Surge Suppression: Blue

## 2.05 PLATES

- A. Flush Finish Plates per Architect.
- B. Surface Covers: Galvanized or cadmium plated steel, 1/2-inch raised industrial type with openings appropriate for device installed.
- C. Weatherproof: Extra-Duty while in use covers, UL 514D listed, commercial quality diecast aluminum construction, NEMA 3R rated, gasketed, built-in padlock provisions, built-in cord strain relief provisions, gray powder-coated finish, vertical mounting as required for application or other covers of similar construction for other receptacle configurations.

- D. Identification: Identify receptacle plates with a pre-printed label indicating serving panel and branch circuit number. Refer to Section 26 05 53, Identification for Electrical Systems.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Devices and finish plates installed plumb with building lines. Install wall mounted receptacles vertically at centerline height shown on the Drawings.
- B. Finish plates and devices are not installed until final painting is complete. Scratched or splattered finish plates and devices will not be accepted.
- C. Switches, receptacles and/or other devices ganged into a common enclosure provided with a separation barrier between devices where the combined circuit voltages within the enclosure exceeds 300V.
- D. Provide GFCI receptacles as shown on the drawings or as NEC required. Provide a GFCI type duplex receptacle in each required location, do not sub-feed normal receptacles downstream of the GFCI receptacle to obtain the GFCI rating.
- E. Provide receptacles with GFCI, tamperproof, weather-resistant or hospital grade ratings as shown on the drawings, appropriate for the installation or required by NEC.

#### **3.02 CORD CAPS**

- A. Special plugs provided with the receptacles given to the Owner in their cartons with a letter stating the date and the Owner's representative that received the materials.

#### **3.03 COORDINATION**

- A. Electrical Drawings indicate the approximate location of devices. Refer to Architectural elevations, sections, and details for exact locations.
- B. Coordinate with equipment installer the locations and methods of connection to devices mounted in cabinets, counters, work benches, service pedestals and similar equipment.

#### **3.04 TESTING**

- A. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct defective wiring.

**END OF SECTION**

**SECTION 26 29 00**  
**MOTOR CONTROLLERS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including **General and Supplementary Conditions and Division 01, General Requirements Specification Sections**, apply to this Section.
- B. Provisions of Division 26, **Electrical Section 26 05 00, Common Work Results for Electrical**, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Motor Starters
  - 2. Disconnects
  - 3. Fuses
  - 4.
- B. Related Sections include:
  - 1. Section 26 05 19, **Low Voltage Electrical Power Conductors and Cable**
  - 2. Section 26 05 26, **Grounding and Bonding for Electrical Systems**
  - 3. Section 26 05 53, **Identification for Electrical Systems**
  - 4. Section 26 05 73, **Overcurrent Protective Device Coordination Study**
  - 5. Section 26 05 80, **Electrical Testing**

**1.03 SUBMITTALS**

- A. Shop drawings, including the following information.
  - 1. Field Dimensions
  - 2. Description of Materials and Finishes
  - 3. Component Connections
  - 4. Anchorage Methods.
  - 5. Installation Procedures

- B. Product Data
- C. Operating and Maintenance Data
- D. Overload (heater) Sizing: A final listing of motors and the heater size installed for that motor.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Motor Starters and Visible Blade Disconnects:
  - 1. Same manufacture as the distribution equipment specified in Section 26 24 13, Switchboards, Allen Bradley or approved equivalent.
- B. Horsepower Rated Toggle Switches:
  - 1. Arrow Hart
  - 2. General Electric
  - 3. Hubbell
  - 4. Pass & Seymour

### **2.02 GENERAL**

- A. Provide manual or magnetic motor starters of the proper characteristics for equipment as indicated.
- B. Provide switches of proper characteristics as disconnecting means.

### **2.03 MOTOR STARTERS**

- A. Manual Starters:
  - 1. NEMA ICS 2, AC general purpose Class A manually operated toggle type full voltage controller for fractional horsepower induction motors, quick-make, quick-break, with thermal overload protection and suitable enclosures.
- B. Magnetic Starters, Non-reversing:
  - 1. NEMA ICS 2, AC general purpose, full voltage across the line non-reversing type, 120V coils, overload relays in each leg, running pilot lights, one normally closed and one normally open auxiliary contacts, 120V control transformers and suitable enclosures.
  - 2. Overload relays ambient compensated bimetallic type with interchangeable heater packs.
  - 3. Overload adjustable, have single-phase sensitivity, and manual or automatic reset.
  - 4. Suitable for the addition of at least four auxiliary contacts of arrangement normally open or normally closed.
  - 5. Provide with a NO and a NC auxiliary contacts.

6. Minimum fault interrupting rating of 10,000A.
- C. Magnetic Starters, Reversing:
1. NEMA ICS 2, AC general purpose.
  2. Reversing starters consist of two contactors and a single overload relays assembly.
  3. Include electrical interlock and integral adjustable time delay transition between FORWARD and REVERSE rotation.
  4. Starters electrically and mechanically interlocked to prohibit line shorts and both starters being energized simultaneously.
- D. Magnetic Starters, Two Speed:
1. NEMA ICS 2, AC general purpose.
  2. Include electrical interlock and integral adjustable time delay transition between SLOW and FAST speeds.
  3. Electrically and mechanically interlocked to prohibit both starters being energized simultaneously.
- E. Combination Starter/Disconnect, (Circuit Breaker):
1. Combine magnetic motor starter as described above and motor circuit protector or thermal magnetic circuit breaker disconnect in a common enclosure.
- F. Motor Circuit Protector:
1. NEMA AB 1, circuit breaker with integral instantaneous magnetic trip in each pole.
  2. Externally operated handle, giving positive visual indication of its ON-OFF position.
- G. Thermal Magnetic Circuit Breaker:
1. NEMA AB 1, with integral thermal and instantaneous magnetic trip in each pole.
  2. Circuit protector externally operated handle, giving positive visual indication of its ON-OFF position.
- H. Combination Starter/Disconnect, Disconnect Switch Type:
1. Combine magnetic motor starter as described above and non-fused or fused disconnect switch in a common enclosure. Switch type as indicated on the drawings. Switch has an externally operated handle that gives positive visual indication of its ON-OFF position.
  2. Non-fused Switch Assemblies:
    - a. NEMA KS 1, enclosed knife switch with enclosed, but visible blades. Switch rated as indicated on the drawings.
  3. Fused Switch Assemblies:
    - a. NEMA KS 1, enclosed knife switch. Fuse clips accept Class R fuses. Switch and fuse sizes as indicated on the drawings.

- I. Starter Contacts:
  - 1. Totally enclosed, double break, silver-cadmium-oxide power contacts.
  - 2. Contact inspection or replacement possible without disturbing line or load wiring.
- J. Overload Relay:
  - 1. NEMA ICS with one-piece thermal unit construction.
  - 2. Interchangeable thermal units.
  - 3. Replaceable overload relay control circuit contact.
  - 4. Thermal units required for starter to operate.
- K. Enclosure:
  - 1. NSI/NEMA ICS 6, Type 1 as indicated, or as required to meet the conditions of installation.
- L. Equip starters with H-O-A selector switches, start-stop stations, or other auxiliary control device listed. Where no auxiliary devices are listed, equip each starter with an H-O-A switch.
- M. Provide a control circuit transformer in each starter. Size transformer to accommodate the contactor(s) and control circuit loads. Include primary and secondary fuses in ungrounded conductors.
  - 1. Provide one normally open and one normally closed auxiliary contacts in each starter, unless additional auxiliary contacts are required. NEMA ICS 2.
- N. Provide starter units with control terminal blocks. Terminal blocks rated at 20-Amperes and accessible from inside the unit with the unit door is opened.
- O. Push Buttons: Unguarded, recessed type
- P. Indicating Lights, LED type:
  - 1. Green for run.
  - 2. Red for stopped unless otherwise indicated.

#### 2.04 DISCONNECTS

- A. Safety and disconnect switches NEMA type HD (heavy duty), quick-make, quick-break, dual rated with electrical characteristics as required by the system voltage and the load served. Equip switches with defeatable cover interlock.
- B. Enclosures NEMA I for indoor use, unless specifically noted otherwise and NEMA 3R where installed exposed to the weather or designated by the subscript WP.
- C. Fusible or non-fusible as designated on Drawings.



## 2.05 FUSES

- A. UL Class RK-5 dual element, time delay, current limiting type. The overload thermal time delay element spring actuated soldered copper assembly in a separate sand free compartment. The short circuit current limiting section copper alloy links encased in quartz sand.
- B. Capable of holding 500 percent of rated current for a minimum of 10 seconds, and carry a UL listed minimum interrupting rating of 200,000A rms symmetrical.

## PART 3 - EXECUTION

### 3.01 MOTOR STARTERS

- A. Provide the motor starting equipment as shown on the Drawings and coordinate motor overload starter relays.
- B. Install the starters at the respective equipment unless shown otherwise.
- C. Install freestanding starters on metal channel support structure.
- D. Starters that are installed on exterior walls installed with minimum 1/2-inch channel on wall to allow air space between starter and wall.
- E. Where fusible units are provided, install fuses as indicated on the drawings.
- F. Install thermal overloads (heaters) in each starter in accordance with the manufacturer's recommendations for that motor and the type of associated load. Coordinate proper size when individual power factor capacitors are utilized at the motor.

### 3.02 DISCONNECT SWITCHES

- A. Provide code required disconnect switches under this work.
- B. Non-fusible disconnect switches required when equipment is not in sight of the branch circuit panel or starter may be horsepower rated, toggle type in suitable enclosure, mounted at or on the equipment.

### 3.03 FUSES

- A. Install fuses for motor protection to best protect the motor without nuisance tripping. Should fuse sizes require changing from what is shown due to variance between the original design information and actual equipment installed, fuses sized in accordance with NEC. Do not size fuses smaller than the starter heaters on motor circuits.
- B. Provide one complete set of spare fuses of each amperage used on this project. Store spare fuses in the spare fuse cabinet.

### 3.04 COORDINATION

- A. Verify the characteristics and the motor full load current for each motor installed, using the actual motor nameplate data. Select and install the proper running overload devices in the starter as per the manufacturer's instructions. Provide the proper overload protection is a part of this Division of the work.

- B. Prepare table of motor full load currents and installed overload devices and submit to the Architect.

**END OF SECTION**

**SECTION 26 50 00**

**LIGHTING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements, apply to this Section.
- B. Provisions of Division 26, Electrical Section 26 05 00, Common Work Results for Electrical, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes:
  - 1. Lenses
  - 2. Reflector Cones
  - 3. Lamps
  - 4. Lamp Sockets
  - 5. Ballasts
  - 6. Fluorescent Emergency Ballasts
  - 7. Fluorescent Luminaires
  - 8. Linear Fluorescent Luminaires
  - 9. Compact Fluorescent Luminaires
  - 10. High Intensity Discharge Luminaires
  - 11. Incandescent Luminaires
  - 12. Low Voltage Luminaires
  - 13. LED Luminaires
  - 14. Track Lighting Systems
  - 15. Custom Luminaires
  - 16. Cold Cathode Systems
  - 17. Neon Systems

- B. Related Sections include:
1. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
  2. Section 26 05 26, Grounding and Bonding for Electrical Systems
  3. Section 26 09 43, Network Lighting Controls
  4. Section 26 27 26, Wiring Devices

### 1.03 QUALITY ASSURANCE

- A. The lighting design for this project was based on luminaire types and manufacturers as specified.
- B. Specified manufacturers are pre-qualified to bid on products where specified. Inclusion of manufacturer and product series does not relieve specified manufacturer from providing product as described in luminaire schedule; modifications to standard product, if required, include with initial bid.
- C. Items noted or equivalent do not require prior approval but included with the shop drawing submittal.
- D. Other or approved manufacturers and products:
1. Submit substitution request prior to bid, complying with requirements of Division 01, General Requirements.
  2. Determine approval by review of the following luminaire characteristics where applicable.
  3. Lack of pertinent data on characteristics constitutes justification for rejection of the submittal.
    - a. Performance:
      - 1) Distribution
      - 2) Utilization
      - 3) Average brightness/maximum brightness.
      - 4) Spacing to mounting height ratio.
      - 5) Visual comfort probability.
    - b. Construction:
      - 1) Engineering
      - 2) Workmanship
      - 3) Rigidity
      - 4) Permanence of materials and finishes.
    - c. Installation Ease:
      - 1) Captive parts and captive hardware.
      - 2) Provision for leveling.
      - 3) Through-wiring ease.
    - d. Maintenance:
      - 1) Relamping ease.
      - 2) Ease of replacement of ballast and lamp sockets.
    - e. Appearance:
      - 1) Architectural integration.
      - 2) Light tightness.
      - 3) Neat, trim styling.
      - 4) Conformance with design intent.

**1.04 GENERAL REQUIREMENTS:**

- A. Provide lighting outlets indicated on the Drawings with a luminaire of the type designated and appropriate for the location.
- B. Where a luminaire type designation has been omitted and cannot be determined by the Contractor, request a clarification from the Architect in writing and provide a suitable luminaire type as directed.
- C. Coordinate installation of luminaires with the ceiling installation and other trades to provide a total system that is neat and orderly in appearance.
- D. Luminaires located in fire rated assemblies rated for use in such assemblies or have assembly maintained by the installer through the use of appropriate construction techniques to maintain the assembly rating. It is the responsibility of the contractor to maintain the assembly rating and provide required components during construction. Coordinate luminaires impacted with Division 01, General Requirements and life safety documents.
- E. Install remote ballasts in enclosures as required by luminaire specified. Locate remote ballasts as shown on drawings; where no location is shown, provide recommendation for approval prior to commencing field installation. Remote mounted ballasts located within the distance limitations specified by the ballast manufacturer.
- F. Coordinate voltage requirements to each luminaire as indicated on drawings.
- G. Verify luminaires carry a valid UL or ELT listing.
- H. Procure luminaires through a distributor located within 200 miles of the project site with a valid business license in the state the project is located.
- I. Upon request of the Architect, Engineer, or Owner, provide back-up pricing in a unit cost breakdown per luminaire. Back-up pricing includes distributor net pricing, contractor net pricing, final owner pricing and mark-ups and discounts (lot price or all-or-none) associated with the luminaires.
- J. Lighting related change orders include back-up pricing noted above for review by the engineer and lighting designer.

**1.05 SUBMITTALS**

- A. Submit the following in accordance with Section 26 05 00, Common Work Results for Electrical:
  - 1. Shop Drawings, to include:
    - a. Product Data. Provide manufacturer's published product data information.
    - b. Luminaire dimensions on a fully dimensioned line drawing.
    - c. Lamp information.
    - d. Lamp socket information.
    - e. Ballast information using ballast manufacturers published product data information. Submit multiple ballasts for single luminaire if compatible with ballast specification included in contract documents. Include certification of lamp and ballast compatibility for submitted ballasts.
    - f. Mounting details including clips, canopies, supports, and methods for attachment to structure.
    - g. UL Labeling information.

- h. Photometric Reports consisting of:
    - 1) Candlepower distribution curves: Provide five plane candlepower distribution data at no more than 5 degree vertical angle increments.
    - 2) Coefficient of utilization table.
    - 3) Zonal lumen summary including overall luminaire efficiency.
    - 4) Luminaire luminance: Provide measured maximum brightness data for luminaires with reflectors and average brightness data for luminaires with refractors.
    - 5) Spacing to mounting height ratio. If parallel and perpendicular ratios differ, provide data on each plane.
    - 6) VCP calculations (where applicable): For general office lighting luminaires, provide typical VCP calculations for ceiling heights between 9-feet and 12-feet at 1-foot increments, for room sizes 20-feet by 20-feet and 30-feet by 30-feet.
  - i. Special requirements of the specification.
2. Operation and maintenance data. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hard-cover binder for review. After review, Architect will deliver one copy to Owner.
- a. One complete set of final submittals of actual product installed, including product data and shop drawings. Include product data for actual ballast installed where applicable.
  - b. List of lamps used in Project, cross-referenced to fixture types, with specific manufacturer's names and ordering codes.
  - c. Relamping instructions for lamps that require special precautions (tungsten halogen, metal halide, etc.).
  - d. Lighting fixture cleaning instruction, including chemicals to be used or avoided.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.
- B. Luminaire assemblies UL listed.
- C. Luminaires UL listed appropriate to mounting conditions and application.
- D. Each luminaire family type (downlights, parabolics, etc.) supplied by only one manufacturer.
- E. Recessed luminaires installed in fire rated ceilings and using a fire rated protective cover thermally protected for this application and carry a fire rated listing.
- F. Luminaires installed under canopies, roofs or open areas and similar damp or wet locations UL listed and labeled as suitable for damp or wet locations.

### 2.02 LENSES

- A. Prismatic Acrylic:
  - 1. 12-inch by 24-inches and Larger: Extruded of clear virgin acrylic plastic, 0.125-inch minimum overall thickness, 0.1-inch nominal unpenetrated thickness, Pattern 12 with flat sided female prisms running at 45 degrees off panel axis unless otherwise specified in the luminaire schedule. Concave prisms are not acceptable.
  - 2. As specified in the Luminaire Schedule.

- B. Opal Acrylic:
  - 1. Extruded or injection molded of virgin acrylic plastic, 0.08-inch minimum overall thickness.
  - 2. As specified in the Luminaire Schedule.
- C. Opal Acrylic Overlay: High transmittance type, extruded of virgin acrylic plastic, 0.04-inch overall thickness, with minimum 80 percent light transmittance.

### 2.03 REFLECTOR CONES

- A. Spun of uniform gauge aluminum, free of spinning marks or other defects.
- B. Integral trim flange.
- C. Color and finish as specified in Luminaire Schedule.
- D. Alzak® process, low iridescent type.
- E. Supply luminaires using Alzak® reflector cones by the same manufacturer unless directed otherwise in Luminaire Schedule.

### 2.04 LAMPS

- A. Special types as indicated in Luminaire Schedule.
- B. Lens:
  - 1. Mechanically secured from within the housing.
  - 2. Interior linear prisms with smooth exterior.
- C. Louvers and Reflectors:
  - 1. White Reflectors: Steel or aluminum, minimum 22 gauge, with hard baked white enamel finish with minimum 85 percent reflectance.
  - 2. Alzak Reflectors: Low iridescent semi-specular or as indicated in the Luminaire Schedule, Alzak® or Coilzak® with minimum reflectance of 90 percent.
- D. Suspension:
  - 1. Suspension Devices, type as specified in the Luminaire Schedule:
    - a. Aircraft Cable: Stainless steel type - 3/32-inch nominal diameter, stranded, with positive pressure, field adjustable clamp at fixture connection.
    - b. Rigid Pendant: 1/2-inch nominal diameter or as specifically shown on drawings. Supplied by fixture manufacturer when available as standard product. At fixture end of stems, provide earthquake type swivel fitting to permit 45 degree swing away from vertical. Flat canopy to permit splice inspection after installation.
    - c. Chain hangers: Length to suit fixture mounting height if shown or as field conditions dictate. Use two heavy duty chains with S hooks at each suspension point. Length to suit mounting height as shown on Drawings.
    - d. Suspension system must permit ±1/2-inch minimum vertical adjustment after installation.

2. Supports:
  - a. Provide internal safety cable from fixture body to stud in outlet box.
  - b. Carry fixture weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code.
3. Feed Point:
  - a. Flat-plate canopy to cover outlet box, with holes for support cable and power cord, concealed fasteners to permit splice inspection after installation.
  - b. At the electrified connection provide straight cord feed. Provide a separate feed point where emergency feed is required.
  - c. Power cord: white multi-conductor cord, parallel to support cable (aircraft cable); within pendant (rigid pendant); or flexible conduit (chain hanger).
  - d. Provide a separate feed point where emergency feed is required.
4. Non-feed Points:
  - a. 1/2-inch OD polished chrome end sleeve, inside threaded 1/4-inch-20, with 2 - inch diameter. Flat white plate to cover hole in ceiling. Top of cable with ball swaged on end, to fit inside sleeve.
  - b. Contractor to provide support above ceiling as required.
5. Suspension method allows adjustment to be made in hanging length to allow for variance in ceiling height.
6. Exposed paintable suspension components have the same finish and color as the luminaire housing.

## 2.05 LOW VOLTAGE LUMINAIRES

- A. Dimensions: Proper for the various wattage noted on the plans and as recommended by the luminaire manufacturer or as specified.
- B. Recessed luminaires: Equip with protective thermal cutout and a through-wiring junction box accessible from the ceiling opening of the luminaire.
- C. Adjustable Lamp Mechanisms: To have aiming stops which can be permanently set to position lamp vertically and rotationally.
- D. Transformers: Provide proper lamp voltage to low voltage lamps.
  1. Integral:
    - a. Magnetic: Encapsulated for silent operation, securely mounted to the luminaire and removable through the aperture for hard ceiling installations or remote where shown on drawings.
    - b. Electronic: Do not provide electronic transformers unless directed in the Luminaire Schedule.
  2. Remote:
    - a. Magnetic: Encapsulated for silent operation, securely mounted accessible in location shown on drawings. Provide code-sized primary and secondary circuit protection via [fuses] [thermal magnetic circuit breakers], quantity of secondary circuits as required to serve specified load.
    - b. Electronic: Do not provide electronic transformers unless directed in the Luminaire Schedule.



- E. Finish:
  - 1. Visible surfaces to be of color and texture as directed in Luminaire Schedule.
  - 2. Concealed interior and exterior luminaire surfaces to be matte black.

## 2.06 LED LUMINAIRES

- A. Dimensions: Proper for the various wattage noted on the plans and as recommended by the luminaire manufacturer or as specified.
- B. Recessed luminaires: Must be rated for use in recessed applications. If required by the owner or design team, the manufacturer must produce test data proving the product is rated for use in recessed applications.
- C. CRI: Minimum Color Rendering Index (CRI) of 80 or higher.
- D. Color Temperature:
  - 1. Refer to luminaire schedule.
  - 2. Do not exceed a +/- tolerance of greater than 2 McAdam Ellipses. Over the life of the luminaire.
- E. Adjustable Lamp Mechanisms: To have aiming stops which can be permanently set to position lamp vertically and rotationally.
- F. Power Supply
  - 1. Integral:
    - a. Rated for use with the LED array specified. Warranty array and driver as an assembly. 5 year full replacement, non-pro rated warranty is required on electronic components.
  - 2. Remote:
    - a. Rated for use with the LED array specified. Warranty array and driver as an assembly. 5 year full replacement, non-pro rated warranty is required on electronic components.
- G. Finish: Visible surfaces to be of color and texture as directed in Luminaire Schedule. Matt black concealed interior and exterior luminaire surfaces or as recommended by the luminaire manufacturer.
- H. Testing: LED luminaires must meet the IES LM-79-08 and LM 80-08 testing requirements. Manufacturer to provide verification of testing compliance upon request of the design team, contractor or owner.
- I. Disposal and replacement: LED manufacturer is responsible for the disposal of expired LED arrays and heat sinks. Clearly label fixture with return information, disposal procedures and manufacturer disposal contact information. Owner will pay for shipping.
  - 1. Manufacturer is required to inform the owner of new power requirements and /or lumen output values if new replacement components prior to shipping replacement parts.

2. Label disposal and replacement information inside the luminaire and in the project operation and maintenance manuals along with O&M requirements listed in Division 01 of the specifications.

## 2.07 TRACK LIGHTING SYSTEMS

- A. Lighting Track:
  1. Extruded aluminum track with extruded poly-vinyl insulator.
  2. 20A, copper conductor strips with separate ground to provide electrical and mechanical connection for the specified track mounted luminaires.
  3. Number of circuits as indicated in luminaire schedule, with separate neutrals per circuit.
  4. Provide connectors, elbows, stems, feed ends, end caps and fittings to make a complete system.
- B. Track Fittings:
  1. Provide positive mechanical and electrical connection for track heads to track.
  2. Removable fitting either twists into or snaps into specified lighting track.
- C. Luminaire dimensions: Proper for the various wattage noted on the plans and as recommended by the luminaire manufacturer or as specified.
- D. Adjustable Lamp Mechanisms: Adjustable aiming which can be set to position lamp vertically and rotationally.
- E. Transformers: Provide proper lamp voltage to low voltage lamps. Magnetic transformers encapsulated for silent operation. Integrally mount Magnetic and electronic transformers to luminaire.
- F. Finish: Visible surfaces to be of color and texture as directed in Luminaire Schedule.
- G. Labels: Track and track fittings compatible and be UL labeled and listed as a system.

## 2.08 CUSTOM LUMINAIRES

- A. Custom luminaire manufacturer no less than five years of continuous experience in the design and manufacture of custom lighting elements of the type and quality shown.
- B. Specifications and drawings are intended to convey the features, function and character of the custom luminaire only and do not necessarily illustrate every component or detail required in the finished piece of equipment.
- C. Include details and components that are necessary for the proper appearance and functioning of the custom luminaire.
- D. Provide operational sample prototype luminaire for review and revision, if specified, of each custom luminaire type. Install and connect sample prototype luminaire by the contractor in a mutually acceptable location for demonstration and evaluation by the design team. Final judges on determining whether the prototype sample complies with specification is up to the Architect and Lighting Consultant.

## 2.09 COLD CATHODE SYSTEMS

- A. General:
  - 1. UL listed and labeled as a system.
  - 2. **Manufacturer:** AT least ten years continuous experience in producing cold cathode lighting systems with replaceable lamps.
- B. Lamp:
  - 1. Cold cathode T8, 3500 Kelvin tri-phosphor, 240 MA, with in-line or right angle electrodes as directed in the luminaire schedule.
  - 2. Straight or curved 1-inch diameter lamps as shown on Drawings.
  - 3. Interchangeable lamps in similar configurations.
- C. Socket: Surface mounted, in-line telescopic or right angle as shown in Luminaire Schedule, white finish.
- D. Transformer: Remote, 240 M.A., HPF.

## 2.10 NEON SYSTEMS

- A. General:
  - 1. UL listed components.
  - 2. **Manufacturer:** At least ten years continuous experience in fabricating and installing architectural neon lighting systems.
- B. Lamps: Neon, 5MM glass, color as indicated on Luminaire Schedule, with 90 degree or in line electrodes as required for continuous illumination.
- C. Transformer: Remote, sized to lamp runs, NEMA 1 soundproof enclosure.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Meet general requirements of NFPA 70, National Electric Code.
- B. Mounting heights specified on drawings:
  - 1. Wall Mounted Luminaires: Centerline of luminaire.
  - 2. Pendant Mounted Luminaires: Bottom of luminaire unless specifically identified in the Luminaire Schedule or on drawings.
- C. Support:
  - 1. Support by separate means from the building structure and not from the ceiling system, ductwork, piping or other systems.

2. Final decision as to adequacy of support and alignment will be given by the Architect.
- D. Level luminaires, align in straight lines, and locate as shown on the architectural elevations and reflected ceiling plan.
- E. Manufacturer's labels or monograms not visible after luminaire is installed, but must be included for future reference.
- F. When lamping tungsten halogen luminaires use silk gloves to insert lamps.
- G. DO not energize tungsten halogen luminaires during construction to prevent dust build up on lamp, socket and lamp chamber. Lamping occurs as last stage of construction.
- H. Recessed Luminaires:
  1. Trims fit neatly and tightly to the surfaces in which they are installed without light leaks or gaps.
  2. Install heat resistant non-rubber gaskets to prevent light leaks or moisture from entering between luminaires trim and the surface to which they are mounted.

### 3.02 COORDINATION OF WORK

- A. Architectural Reflected Ceiling Plans take preference as to the exact placement of the luminaires in the ceiling.
- B. Determine ceiling types in each area and provide suitable accessories and mounting frames where required for recessed luminaires. Luminaire catalog numbers do not necessarily denote specific mounting accessories for type of ceiling in which a luminaire may be installed.

### 3.03 AIMING

- A. Aim luminaires with proper lamps installed.
- B. Aim directional luminaires, including but not limited to luminaires described in the Contract Documents or by the luminaire manufacturer as aimable, adjustable, or asymmetric as follows:
  1. Provide the lighting pattern for which the luminaire is designed.
  2. Provide the lighting pattern as shown on the drawings.
  3. Predetermined aiming points as shown on the drawings.
  4. Where aiming cannot be determined, request, in writing, clarification from the Architect, indicating luminaires needing clarification.
- C. Re-aim luminaires as determined by Architect during final project walkthrough.
- D. Install adjustable luminaires with dead zone of rotation away from intended aiming point.

### 3.04 PROJECT CLOSEOUT

- A. Leave luminaires clean at the time of acceptance of the work. If luminaires are deemed dirty by the Architect at completion of the work, clean them at no additional cost. Protective plastic wrap is to be removed from parabolic luminaires just prior to owner acceptance.

- B. Provide fixtures with new lamps operating at time of final acceptance. Exception: For fluorescent dimming fixtures, provide minimum 100 hour/maximum 200 hour, continuously lit lamps or per ballast manufacturer's recommendations.
- C. Where incandescent lamps are used for construction lighting. Replace lamps with new lamps just prior to occupancy by the owner.

**END OF SECTION**

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**SECTION 27 00 00**

**COMMUNICATIONS HORIZONTAL CABLING**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. PROVIDE ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT REQUIRED FOR THE COMPLETE INSTALLATION OF ALL COMMUNICATIONS HORIZONTAL CABLING FOR ALL SYSTEMS, INCLUDING BUT NOT LIMITED TO:
  - 1. 27 15 01.00 – COMMUNICATIONS HORIZONTAL CABLING APPLICATIONS
  - 2. 27 15 01.13 - VIDEO SURVEILLANCE CABLES
  - 3. 27 15 01.15 – ACCESS CONTROL CABLES
  - 4. 27 15 01.16 – VOICE COMMUNICATIONS CABLES
  - 5. 27 15 01.23- AUDIO/VIDEO CABLING

**1.02 SCOPE OF WORK**

- A. PROVIDE AND INSTALL A COMPLETE AND FUNCTIONAL HORIZONTAL CABLE PLANT FOR THE FOLLOWING SYSTEM LOCATIONS AS SHOWN ON THE CONSTRUCTION DRAWINGS, INCLUDING BUT NOT LIMITED TO, ALL NECESSARY PASSIVE COMPONENTS, TO ALLOW FULL OPERATION OF THE WIRING INFRASTRUCTURE UPON COMPLETION:
  - 1. VOICE/DATA LOCATIONS.
  - 2. WIRELESS ACCESS POINT LOCATIONS.
  - 3. VIDEO SURVEILLANCE LOCATIONS.
  - 4. ACCESS CONTROL LOCATIONS.
- B. ALL CABLES AND RELATED TERMINATIONS, SUPPORT AND GROUNDING HARDWARE SHALL BE FURNISHED, INSTALLED, WIRED, TESTED, LABELED, AND DOCUMENTED BY THE TELECOMMUNICATIONS CONTRACTOR AS DETAILED IN THIS DOCUMENT.
- C. PRODUCT SPECIFICATIONS, GENERAL DESIGN CONSIDERATIONS, AND INSTALLATION GUIDELINES ARE PROVIDED IN THIS DOCUMENT. QUANTITIES OF TELECOMMUNICATIONS OUTLETS, TYPICAL INSTALLATION DETAILS, CABLE ROUTING AND OUTLET TYPES WILL BE PROVIDED AS AN ATTACHMENT TO THIS DOCUMENT. IF THE BID DOCUMENTS ARE IN CONFLICT, FORMAL CLARIFICATION SHALL BE OBTAINED FROM IN THE FORM OF QUESTION CLARIFICATION REQUEST. THE SUCCESSFUL VENDOR SHALL MEET OR EXCEED ALL REQUIREMENTS FOR THE CABLE SYSTEM DESCRIBED IN THIS DOCUMENT.
- D. ALL ACTIVE NETWORK COMPONENTS SUCH AS ROUTERS, SWITCHES, HUBS, FIBER OPTIC TRANSCEIVERS, WIRELESS COMMUNICATIONS SYSTEM TRANSCEIVERS, ANTENNAE, BASE STATIONS AND CONCENTRATORS OR SERVERS SHALL BE SUPPLIED BY THE OWNER.

**1.03 REGULATORY REFERENCES AND INCORPORATED DOCUMENTS**

- A. THE FOLLOWING INDUSTRY STANDARDS ARE THE BASIS FOR THE STRUCTURED CABLING SYSTEM DESCRIBED IN THIS DOCUMENT.

1. TIA/EIA-568-C.1 COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING
  2. TIA/EIA-568-C.0 GENERAL REQUIREMENTS
  3. TIA/EIA-568-C.2 STANDARD BALANCED TWISTED PAIR CABLING COMPONENTS
  4. TIA/EIA-568-C.2.10 SPECIFICATIONS FOR AUGMENTED CATEGORY 6 CABLING
  5. TIA/EIA-568-C.3 OPTICAL FIBER CABLING COMPONENTS STANDARD
  6. TIA/EIA - 942 TELECOMMUNICATIONS INFRASTRUCTURE FOR DATA
  7. TIA/EIA-569-A COMMERCIAL BUILDING STANDARD FOR TELECOM PATHWAYS
  8. TIA/EIA-606-A ADMIN STANDARD FOR THE TELECOM INFRASTRUCTURE
  9. J-STD-607-A COMMERCIAL BUILDING GROUNDING/BONDING
  10. NFPA 70 NATIONAL ELECTRIC CODE (NEC)
  11. ISO 11801 GENERIC CABLING FOR CUSTOMER PREMISES
- B. IF THERE IS A CONFLICT BETWEEN APPLICABLE DOCUMENTS, THEN THE MORE STRINGENT REQUIREMENT SHALL APPLY. ALL DOCUMENTS LISTED ARE BELIEVED TO BE THE MOST CURRENT RELEASES OF THE DOCUMENTS. THE CONTRACTOR HAS THE RESPONSIBILITY TO DETERMINE AND ADHERE TO THE MOST RECENT RELEASE WHEN DEVELOPING THE PROPOSAL FOR INSTALLATION.
- C. THIS DOCUMENT DOES NOT REPLACE ANY CODE, EITHER PARTIALLY OR WHOLLY. THE CONTRACTOR MUST BE AWARE OF LOCAL CODES THAT MAY IMPACT THIS PROJECT.

#### 1.04 CONTRACTOR QUALIFICATIONS

- A. CONTRACTOR MUST POSSESS A VALID STATE CONTRACTOR'S LICENSE.
- B. TO THE SATISFACTION OF THE COLLEGE OF MARIN THE CONTRACTOR MUST PROVE THEIR EXPERIENCE AND QUALIFICATIONS BY SUBMITTING:
  1. AT LEAST (3) SUCCESSFULLY, COMPLETED PROJECTS OF COMPARABLE SIZE AND COMPLEXITY WITH IN THE LAST THREE YEARS.
  2. MUST HAVE AN RCDD ON STAFF.
  3. BE A REGISTERED PANDUIT CERTIFIED PARTNER AND ABLE TO OFFER A 25 YEAR PANDUIT CERTIFICATION PLUS SYSTEM WARRANTY.

#### 1.05 SUBMITTALS



- A. SUBMIT COMPLETE LIST OF ALL ITEMS OF MATERIALS TO BE FURNISHED, AND INSTALLED TO THE OWNER FOR COMPLIANCE REVIEW PRIOR TO PURCHASING THE MATERIALS. SUBMITTALS SHALL INCLUDE:
1. COMPLETE BILL OF MATERIALS AND EQUIPMENT, INCLUDING A COMPLETE LISTING OF THE CHARACTERISTICS OF THE EQUIPMENT AS SPECIFIED.
  2. ONE LINE DIAGRAM INDICATING ALL SYSTEM CONNECTIONS, ALL CLOSET LOCATIONS, RACK ARRANGEMENTS, CABINETS, AND WORKSTATION OUTLETS.
  3. LIST OF INSTRUMENTATION TO BE USED FOR SYSTEM TESTING, INCLUDING CERTIFICATE OF MANUFACTURERS CALIBRATION.
  4. 1/4TH SCALE PLAN OF ALL TELECOMMUNICATIONS ROOMS AND CLOSETS, INDICATING PROPOSED LAYOUT OF ALL EQUIPMENT AND CABLE TRAYS, TROUGHES, AND RUNWAYS.
- B. SUBMIT CONTRACTOR'S QUALIFICATIONS AS OUTLINED IN SECTION 1.04 ABOVE.

## PART 2 - PRODUCTS

### 2.06 HORIZONTAL CABLING-

- A. ALL HORIZONTAL CABLING WILL BE A GENSPEED 6000 CATEGORY 6, CMR RATED UTP CABLE:
- B. PART NUMBER: 7133900
- C. OR EQUAL AS APPROVED BY DISTRICT.

### 2.07 PATCH CORDS-

- A. PANDUIT TX6-28 CATEGORY 6 UTP PATCH CORDS.
- B. PROVIDE THE FOLLOWING QUANTITIES:
1. (30) BLUE 10'
  2. (10) YELLOW 10'
  3. (10) RED 10'
  4. (10) PURPLE 10'
- C. PART NUMBER: UTP28SP10XX, (XX = COLOR).
- D. OR EQUAL AS APPROVED BY DISTRICT

### 2.08 BACKBONE CABLING -

- A. USE EXISTING BACK BONE CABLING.

### 2.09 JACKS -

- A. PANDUIT MINI-COM TX6 PLUS UTP JACK MODULES
- B. PART NUMBER: CJ688TGXX (XX = COLOR OF JACK)
- C. OR EQUAL AS APPROVED BY DISTRICT.

### 2.10 FACEPLATES

- A. PANDUIT MINI-COM CLASSIC SERIES SLOPED FACEPLATES WITH LABEL AND LABEL COVER
- B. PART NUMBER: CFPL\*WHY (\* = # OF PORTS; XX = COLOR IS WHITE)
- C. OR EQUAL AS APPROVED BY DISTRICT.

2.11 PATCH PANELS

- A. PANDUIT MINI-COM ALL METAL SHIELDED MODULAR PATCH PANELS
- B. PART NUMBER: CP\*\*BLY (\*\* = # OF PORTS)
- C. OR EQUAL AS APPROVED BY DISTRICT

2.12 HORIZONTAL WIRE MANAGER

- A. PANDUIT NETMANAGER HIGH CAPACITY HORIZONTAL CABLE MANAGER
- B. PART NUMBER: NMF4
- C. OR EQUAL AS APPROVED BY DISTRICT

**PART 3 - EXECUTION**

3.13 WORK STATIONS LOCATIONS:

A. DATA LOCATIONS:

- 1. EACH LOCATION CONSISTS OF (3) CAT6 DATA CABLES.
- 2. TERMINATE CABLE 1 WITH A BLUE JACK
- 3. TERMINATE CABLE 2 WITH AN ORANGE JACK
- 4. TERMINATE CABLE 3 WITH A GREEN JACK.
- 5. THESE CABLES ARE MOUNTED IN A WHITE 4-PORT SLOPED FACEPLATE.
  - a. SNAP THE BLUE JACK INTO POSITION #1.
  - b. SNAP A WHITE BLANK INTO POSITION #2
  - c. SNAP THE ORANGE JACK INTO POSITION #3
  - d. SNAP THE GREEN JACK INTO POSITION #4.

B. WIRELESS ACCESS POINT LOCATION:

- 1. EACH LOCATION CONSISTS OF (2) CAT 6 DATA CABLES WIRELESS ACCESS POINT LOCATIONS.
- 2. BOTH CABLES ARE TERMINATED WITH PURPLE JACKS.
- 3. MOUNT JACKS IN A 2-PORT WHITE SLOPED FACEPLATE.

C. VIDEO SURVEILLANCE LOCATIONS:

- 1. EACH LOCATION CONSISTS OF (1) CAT 6 DATA CABLE.
- 2. TERMINATE THE CABLE WITH YELLOW CAT 6 JACK.
- 3. MOUNT JACK IN A 1-PORT FACEPLATE.

D. ACCESS CONTROL LOCATIONS:

- 1. EACH LOCATION CONSISTS OF (1) CAT6 DATA CABLE.
- 2. TERMINATE THE CABLE WITH A RED CAT6 JACK.
- 3. MOUNT JACK IN A 1-PORT FACEPLATE.

E. ALL JACKS SHALL BE TERMINATED USING THE T568B WIRING SCHEME. THE EIGHT-POSITION MODULE SHALL EXCEED THE CONNECTOR REQUIREMENTS OF THE TIA/EIA CATEGORY 6 STANDARD. THE JACK TERMINATION TO 4-PAIR, 100-OHM SOLID UNSHIELDED TWISTED PAIR CABLE SHALL BE ACCOMPLISHED BY USE OF A FORWARD MOTION TERMINATION CAP AND SHALL NOT REQUIRE THE USE OF A PUNCH DOWN OR INSERTION TOOL

F. CABLES SHALL BE DRESSED AND TERMINATED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE TIA/EIA-568-C DOCUMENT, MANUFACTURER'S RECOMMENDATIONS AND BEST INDUSTRY PRACTICES.

G. PAIR UNTWIST AT THE TERMINATION SHALL NOT EXCEED 3.18MM (0.125 INCH).

H. BEND RADIUS OF THE CABLE IN THE TERMINATION AREA SHALL NOT BE LESS THAN 4 TIMES THE OUTSIDE DIAMETER OF THE CABLE.

- I. THE CABLE JACKET SHALL BE MAINTAINED TO WITHIN 25MM (ONE INCH) OF THE TERMINATION POINT.
- 3.14 HORIZONTAL CABLE INSTALLATION**
- A. CABLE SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND BEST INDUSTRY PRACTICES.
  - B. A PULL CORD (NYLON; 1/8" MINIMUM) SHALL BE CO-INSTALLED WITH ALL CABLE INSTALLED IN ANY CONDUIT.
  - C. CABLE RACEWAYS SHALL NOT BE FILLED GREATER THAN THE TIA/EIA-569-A MAXIMUM FILL FOR THE RACEWAY TYPE
  - D. CABLES SHALL BE INSTALLED IN CONTINUOUS LENGTHS FROM ORIGIN TO DESTINATION (NO SPLICES).
  - E. THE CABLE'S MINIMUM BEND RADIUS AND MAXIMUM PULLING TENSION SHALL NOT BE EXCEEDED.
  - F. IF A J-HOOK OR TRAPEZE SYSTEM IS USED TO SUPPORT CABLE BUNDLES ALL HORIZONTAL CABLES SHALL BE SUPPORTED AT A MAXIMUM OF 48 TO 60 INCH (1.2 TO 1.5 METER) INTERVALS. AT NO POINT, SHALL CABLE(S) REST ON ACOUSTIC CEILING GRIDS OR PANELS.
  - G. HORIZONTAL CABLES SHALL BE BUNDLED IN GROUPS OF NO MORE THAN 25 CABLES. CABLE BUNDLE QUANTITIES MORE THAN 25 CABLES MAY CAUSE DEFORMATION OF THE BOTTOM CABLES WITHIN THE BUNDLE AND DEGRADE CABLE PERFORMANCE.
  - H. CABLE SHALL BE INSTALLED ABOVE FIRE-SPRINKLER SYSTEMS AND SHALL NOT BE ATTACHED TO THE SYSTEM OR ANY ANCILLARY EQUIPMENT OR HARDWARE. THE CABLE SYSTEM AND SUPPORT HARDWARE SHALL BE INSTALLED SO THAT IT DOES NOT OBSCURE ANY VALVES, FIRE ALARM CONDUIT, BOXES, OR OTHER CONTROL DEVICES.
  - I. CABLES SHALL NOT BE ATTACHED TO CEILING GRID OR LIGHTING FIXTURE WIRES. WHERE SUPPORT FOR HORIZONTAL CABLE IS REQUIRED, THE CONTRACTOR SHALL INSTALL APPROPRIATE CARRIERS TO SUPPORT THE CABLING.
  - J. ANY CABLE DAMAGED OR EXCEEDING RECOMMENDED INSTALLATION PARAMETERS DURING INSTALLATION SHALL BE REPLACED BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE AT NO COST TO THE OWNER.
  - K. CABLES SHALL BE IDENTIFIED BY A SELF-ADHESIVE LABEL IN ACCORDANCE WITH THE SYSTEM DOCUMENTATION SECTION OF THIS SPECIFICATION AND ANSITIA/EIA-606-A. THE CABLE LABEL SHALL BE APPLIED TO THE CABLE BEHIND THE FACEPLATE ON A SECTION OF CABLE THAT CAN BE ACCESSED BY REMOVING THE COVER PLATE.
  - L. UNSHIELDED TWISTED PAIR CABLE SHALL BE INSTALLED SO THAT THERE ARE NO BENDS SMALLER THAN FOUR TIMES THE CABLE OUTSIDE DIAMETER AT ANY POINT IN THE RUN AND AT THE TERMINATION FIELD.
- 3.15 TERMINATION ROOM:**
- A. CABLES SHALL BE DRESSED AND TERMINATED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE TIA/EIA-568-C STANDARD, MANUFACTURER'S RECOMMENDATIONS AND BEST INDUSTRY PRACTICES.
  - B. BEND RADIUS OF THE CABLE IN THE TERMINATION AREA SHALL NOT EXCEED 4 TIMES THE OUTSIDE DIAMETER OF THE CABLE.
  - C. CABLES SHALL BE NEATLY BUNDLED IN GROUPS OF 24 CABLES AND DRESSED TO THEIR RESPECTIVE PATCH PANEL. EACH PANEL SHALL BE FED BY AN INDIVIDUAL BUNDLE SEPARATED AND DRESSED BACK TO THE POINT OF CABLE ENTRANCE INTO THE RACK OR FRAME.
  - D. THE CABLE JACKET SHALL BE MAINTAINED AS CLOSE AS POSSIBLE TO THE TERMINATION POINT.
  - E. EACH CABLE SHALL BE CLEARLY LABELED ON THE CABLE JACKET BEHIND THE PATCH PANEL AT A LOCATION THAT CAN BE VIEWED WITHOUT REMOVING THE

BUNDLE SUPPORT TIES. CABLES LABELED WITHIN THE BUNDLE, WHERE THE LABEL IS OBSCURED FROM VIEW SHALL NOT BE ACCEPTABLE.

**3.16 COPPER TERMINATION TR**

- A. CABLES SHALL BE DRESSED AND TERMINATED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE ANSI/TIA-568-C STANDARD, MANUFACTURER'S RECOMMENDATIONS AND BEST INDUSTRY PRACTICE.
- B. PAIR UNTWIST AT THE TERMINATION SHALL NOT EXCEED 3.18MM (0.125 INCH). BEND RADIUS OF THE CABLE IN THE TERMINATION AREA SHALL NOT EXCEED 4 TIMES THE OUTSIDE DIAMETER OF THE CABLE.
- C. CABLES SHALL BE NEATLY BUNDLED AND DRESSED TO THEIR RESPECTIVE PANELS OR BLOCKS. EACH PANEL OR BLOCK SHALL BE FED BY AN INDIVIDUAL BUNDLE SEPARATED AND DRESSED BACK TO THE POINT OF CABLE ENTRANCE INTO THE RACK OR FRAME.
- D. THE CABLE JACKET SHALL BE MAINTAINED TO WITHIN 25 MM (ONE INCH) OF THE TERMINATION POINT.
- E. EACH CABLE SHALL BE CLEARLY LABELED ON THE CABLE JACKET BEHIND THE PATCH PANEL AT A LOCATION THAT CAN BE VIEWED WITHOUT REMOVING THE BUNDLE SUPPORT TIES. CABLES LABELED WITHIN THE BUNDLE, WHERE THE LABEL IS OBSCURED FROM VIEW SHALL NOT BE ACCEPTABLE.

**3.17 FIRE STOP SYSTEM**

- A. ALL PENETRATIONS THROUGH FIRE-RATED BUILDING STRUCTURES (WALLS AND FLOORS) SHALL BE SEALED WITH AN APPROPRIATE FIRESTOP SYSTEM. THIS REQUIREMENT APPLIES TO THROUGH PENETRATIONS (COMPLETE PENETRATION) AND MEMBRANE PENETRATIONS (THROUGH ONE SIDE OF A HOLLOW FIRE RATED STRUCTURE). ANY PENETRATING ITEM I.E., RISER SLOTS AND SLEEVES, CABLES, CONDUIT, CABLE TRAY, AND RACEWAYS, ETC. SHALL BE PROPERLY FIRE STOPPED. FIRESTOP SYSTEMS SHALL BE UL CLASSIFIED TO ASTM E814 (UL 1479) AND SHALL BE APPROVED BY A QUALIFIED PROFESSIONAL ENGINEER (PE), LICENSED (ACTUAL OR RECIPROCAL) IN THE STATE WHERE THE WORK IS TO BE PERFORMED. A DRAWING SHOWING THE PROPOSED FIRESTOP SYSTEM, STAMPED/EMBOSSSED BY THE PE SHALL BE PROVIDED TO THE OWNER'S TECHNICAL REPRESENTATIVE PRIOR TO INSTALLING THE FIRESTOP SYSTEM(S).

**3.18 ALL FIRESTOP SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND SHALL BE COMPLETELY INSTALLED AND AVAILABLE FOR INSPECTION BY THE LOCAL INSPECTION AUTHORITIES PRIOR TO CABLE SYSTEM ACCEPTANCE. THE FIRESTOP SOLUTION MUST BE DHEC APPROVED.**

**3.19 GROUNDING AND BONDING**

- A. THE FACILITY SHALL BE EQUIPPED WITH A TELECOMMUNICATIONS BONDING BACKBONE (TBB). THIS BACKBONE SHALL BE USED TO GROUND ALL TELECOMMUNICATIONS CABLE SHIELDS, EQUIPMENT, RACKS, CABINETS, RACEWAYS, AND OTHER ASSOCIATED HARDWARE THAT HAS THE POTENTIAL TO ACT AS A CURRENT CARRYING CONDUCTOR. THE TBB SHALL BE INSTALLED INDEPENDENT OF THE BUILDING'S ELECTRICAL AND BUILDING GROUND AND SHALL BE DESIGNED IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED IN THE ANSI/J-STD-607-A TELECOMMUNICATIONS BONDING AND GROUNDING STANDARD.
- B. THE MAIN ENTRANCE FACILITY/EQUIPMENT ROOM IN EACH BUILDING SHALL BE EQUIPPED WITH A TELECOMMUNICATIONS MAIN GROUNDING BUS BAR (TMGB). EACH TELECOMMUNICATIONS ROOM SHALL BE PROVIDED WITH A TELECOMMUNICATIONS GROUND BUS BAR (TGB). THE TMGB SHALL BE CONNECTED TO THE BUILDING ELECTRICAL ENTRANCE GROUNDING FACILITY. THE INTENT OF THIS SYSTEM IS TO PROVIDE A GROUNDING SYSTEM THAT IS EQUAL IN POTENTIAL TO THE BUILDING ELECTRICAL GROUND SYSTEM. THEREFORE, GROUND LOOP CURRENT POTENTIAL IS MINIMIZED BETWEEN TELECOMMUNICATIONS EQUIPMENT AND THE ELECTRICAL SYSTEM TO WHICH IT IS ATTACHED.

- C. ALL RACKS, METALLIC BACKBOARDS, CABLE SHEATHS, METALLIC STRENGTH MEMBERS, SPLICE CASES, CABLE TRAYS, ETC. ENTERING OR RESIDING IN THE TR OR ER SHALL BE GROUNDED TO THE RESPECTIVE TGB OR TMGB USING A MINIMUM #6 AWG STRANDED COPPER BONDING CONDUCTOR AND COMPRESSION CONNECTORS.
- D. ALL WIRES USED FOR TELECOMMUNICATIONS GROUNDING PURPOSES SHALL BE IDENTIFIED WITH A GREEN INSULATION. NON-INSULATED WIRES SHALL BE IDENTIFIED AT EACH TERMINATION POINT WITH A WRAP OF GREEN TAPE. ALL CABLES AND BUS BARS SHALL BE IDENTIFIED AND LABELED IN ACCORDANCE WITH THE SYSTEM DOCUMENTATION SECTION OF THIS SPECIFICATION.
- E. THE TBB SHALL BE DESIGNED AND/OR APPROVED BY A QUALIFIED PE, LICENSED IN THE STATE THAT THE WORK IS TO BE PERFORMED. THE TBB SHALL ADHERE TO THE RECOMMENDATIONS OF THE J-STD-607-A STANDARD, AND SHALL BE INSTALLED IN ACCORDANCE WITH BEST INDUSTRY PRACTICE.
- F. A LICENSED ELECTRICAL CONTRACTOR SHALL PERFORM INSTALLATION AND TERMINATION OF THE MAIN BONDING CONDUCTOR TO THE BUILDING SERVICE ENTRANCE GROUND.

### 3.20 IDENTIFICATION AND LABELING

- A. THE CONTRACTOR SHALL DEVELOP AND SUBMIT FOR APPROVAL A LABELING SYSTEM FOR THE CABLE INSTALLATION. THE OWNER WILL NEGOTIATE AN APPROPRIATE LABELING SCHEME WITH THE SUCCESSFUL CONTRACTOR. AT A MINIMUM, THE LABELING SYSTEM SHALL CLEARLY IDENTIFY ALL COMPONENTS OF THE SYSTEM: RACKS, CABLES, PANELS AND OUTLETS. THE LABELING SYSTEM SHALL DESIGNATE THE CABLES ORIGIN AND DESTINATION AND A UNIQUE IDENTIFIER FOR THE CABLE WITHIN THE SYSTEM. RACKS AND PATCH PANELS SHALL BE LABELED TO IDENTIFY THE LOCATION WITHIN THE CABLE SYSTEM INFRASTRUCTURE. ALL LABELING INFORMATION SHALL BE RECORDED ON THE AS-BUILT DRAWINGS AND ALL TEST DOCUMENTS SHALL REFLECT THE APPROPRIATE LABELING SCHEME.
- B. ALL LABEL PRINTING WILL BE MACHINE GENERATED BY PANDUIT PANMARK SOFTWARE AND PANDUIT DESKTOP AND HAND-HELD PRINTERS USING INDELIBLE INK RIBBONS OR CARTRIDGES. SELF-LAMINATING LABELS WILL BE USED ON CABLE JACKETS, APPROPRIATELY SIZED TO THE OD OF THE CABLE, AND PLACED WITHIN VIEW AT THE TERMINATION POINT ON EACH END. OUTLET, PATCH PANEL AND WIRING BLOCK LABELS SHALL BE INSTALLED ON, OR IN, THE SPACE PROVIDED ON THE DEVICE.

### 3.21 TESTING AND ACCEPTANCE

#### 3.22 GENERAL

- 1. ALL CABLES AND TERMINATION HARDWARE SHALL BE 100% TESTED FOR DEFECTS IN INSTALLATION AND TO VERIFY CABLING SYSTEM PERFORMANCE UNDER INSTALLED CONDITIONS PER THE REQUIREMENTS OF ANSI/TIA/EIA-568-C-1 SECTION 11. ALL PAIRS OF EACH INSTALLED CABLE SHALL BE VERIFIED PRIOR TO SYSTEM ACCEPTANCE. ANY DEFECT IN THE CABLING SYSTEM INSTALLATION INCLUDING BUT NOT LIMITED TO CABLE, CONNECTORS, FEED THROUGH COUPLERS, PATCH PANELS, AND CONNECTOR BLOCKS SHALL BE REPAIRED OR REPLACED TO ENSURE 100% USEABLE CONDUCTORS IN ALL CABLES INSTALLED.
  - 2. ALL CABLES SHALL BE TESTED IN ACCORDANCE WITH THIS DOCUMENT, THE ANSI/TIA/EIA STANDARDS, THE PANDUIT® CERTIFICATION PLUSSM SYSTEM WARRANTY GUIDELINES AND BEST INDUSTRY PRACTICE. IF ANY OF THESE ARE IN CONFLICT, THE CONTRACTOR SHALL BRING ANY DISCREPANCIES TO THE ATTENTION OF THE PROJECT TEAM FOR CLARIFICATION AND RESOLUTION.
- B. COPPER CHANNEL TESTING

1. ALL TWISTED-PAIR COPPER CABLE LINKS SHALL BE TESTED FOR COMPLIANCE TO THE REQUIREMENTS IN ANSI/TIA/EIA/568-C.2 FOR THE APPROPRIATE CATEGORY OF CABLING INSTALLED.

### 3.23 SYSTEM DOCUMENTATION

- A. UPON COMPLETION OF THE INSTALLATION, THE TELECOMMUNICATIONS CONTRACTOR SHALL PROVIDE THREE (3) FULL DOCUMENTATION SETS TO THE ENGINEER/END USER FOR APPROVAL. DOCUMENTATION SHALL INCLUDE THE ITEMS DETAILED IN THE SUB-SECTIONS BELOW.
- 1.01 DOCUMENTATION SHALL BE SUBMITTED WITHIN TEN (10) WORKING DAYS OF THE COMPLETION OF EACH TESTING PHASE. THIS IS INCLUSIVE OF ALL TEST RESULTS AND DRAFT AS-BUILT DRAWINGS. DRAFT DRAWINGS MAY INCLUDE ANNOTATIONS DONE BY HAND. MACHINE GENERATED (FINAL) COPIES OF ALL DRAWINGS SHALL BE SUBMITTED WITHIN 30 WORKING DAYS OF THE COMPLETION OF EACH TESTING PHASE. AT THE REQUEST OF THE ENGINEER, THE TELECOMMUNICATIONS CONTRACTOR SHALL PROVIDE COPIES OF THE ORIGINAL TEST RESULTS.
    - B. THE ENGINEER MAY REQUEST THAT A 10% RANDOM FIELD RE-TEST BE CONDUCTED ON THE CABLE SYSTEM, AT NO ADDITIONAL COST, TO VERIFY DOCUMENTED FINDINGS. TESTS SHALL BE A REPEAT OF THOSE DEFINED ABOVE. IF FINDINGS CONTRADICT THE DOCUMENTATION SUBMITTED BY THE TELECOMMUNICATIONS CONTRACTOR, ADDITIONAL TESTING CAN BE REQUESTED TO THE EXTENT DETERMINED NECESSARY BY THE ENGINEER, INCLUDING A 100% RE-TEST. THIS RE-TEST SHALL BE AT NO ADDITIONAL COST TO THE OWNER.
    - C. TEST RESULTS DOCUMENTATION SHALL BE PROVIDED IN ELECTRONIC FORMAT WITHIN THREE WEEKS AFTER THE COMPLETION OF THE PROJECT. THE MEDIA SHALL BE CLEARLY MARKED ON THE OUTSIDE FRONT COVER WITH THE WORDS "PROJECT TEST DOCUMENTATION", THE PROJECT NAME, AND THE DATE OF COMPLETION (MONTH AND YEAR). THE RESULTS SHALL INCLUDE A RECORD OF TEST FREQUENCIES, CABLE TYPE, CONDUCTOR PAIR AND CABLE (OR OUTLET) I.D., MEASUREMENT DIRECTION, REFERENCE SETUP, AND CREW MEMBER NAME(S). THE TEST EQUIPMENT NAME, MANUFACTURER, MODEL NUMBER, SERIAL NUMBER, SOFTWARE VERSION AND LAST CALIBRATION DATE WILL ALSO BE PROVIDED AT THE END OF THE DOCUMENT. UNLESS THE MANUFACTURER SPECIFIES A MORE FREQUENT CALIBRATION CYCLE, AN ANNUAL CALIBRATION CYCLE IS ANTICIPATED ON ALL TEST EQUIPMENT USED FOR THIS INSTALLATION. THE TEST DOCUMENT SHALL DETAIL THE TEST METHOD USED AND THE SPECIFIC SETTINGS OF THE EQUIPMENT DURING THE TEST AS WELL AS THE SOFTWARE VERSION BEING USED IN THE FIELD TEST EQUIPMENT.
    - D. THE FIELD TEST EQUIPMENT SHALL MEET THE REQUIREMENTS OF ANSI/TIA/EIA-568-C. THE APPROPRIATE LEVEL III TESTER SHALL BE USED TO VERIFY CATEGORY 6 CABLING SYSTEMS.
    - E. PRINTOUTS GENERATED FOR EACH CABLE BY THE WIRE (OR FIBER) TEST INSTRUMENT SHALL BE SUBMITTED AS PART OF THE DOCUMENTATION PACKAGE. ALTERNATELY, THE TELECOMMUNICATIONS CONTRACTOR MAY FURNISH THIS INFORMATION IN ELECTRONIC FORM. THE MEDIA SHALL CONTAIN THE ELECTRONIC EQUIVALENT OF THE TEST RESULTS AS DEFINED BY THE SPECIFICATION ALONG WITH THE SOFTWARE NECESSARY TO VIEW AND EVALUATE THE TEST REPORTS.
    - F. WHEN REPAIRS AND RE-TESTS ARE PERFORMED, THE PROBLEM FOUND AND CORRECTIVE ACTION TAKEN SHALL BE NOTED, AND BOTH THE FAILED AND PASSED TEST DATA SHALL BE DOCUMENTED.
    - G. THE AS-BUILT DRAWINGS ARE TO INCLUDE CABLE ROUTES AND OUTLET LOCATIONS. THEIR SEQUENTIAL NUMBER AS DEFINED ELSEWHERE IN THIS DOCUMENT SHALL IDENTIFY OUTLET LOCATIONS. NUMBERING, ICONS, AND DRAWING CONVENTIONS

USED SHALL BE CONSISTENT THROUGHOUT ALL DOCUMENTATION PROVIDED. THE OWNER WILL PROVIDE FLOOR PLANS IN PAPER AND ELECTRONIC (DWG, AUTOCAD REL. 14, PDF) FORMATS ON WHICH AS-BUILT CONSTRUCTION INFORMATION CAN BE ADDED. THESE DOCUMENTS WILL BE MODIFIED ACCORDINGLY BY THE TELECOMMUNICATIONS CONTRACTOR TO DENOTE AS-BUILT INFORMATION AS DEFINED ABOVE AND RETURNED TO THE OWNER.

- H. THE CONTRACTORS SHALL ANNOTATE THE BASE DRAWINGS AND RETURN A HARD COPY (SAME PLOT SIZE AS ORIGINALS) AND ELECTRONIC (PDF) FORM.

**END OF SECTION**

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**SECTION 27 40 00**

**AUDIOVISUAL SYSTEMS**

**1 PART 1- GENERAL**

**1.1 PROJECT SCOPE**

- A. This section covers the requirements for an integrator to design, provide equipment for, and install instructional classroom technology. This is intended to supply a complete instructional technology classroom that can be arranged in multiple configurations. There will be a multimedia display as primary projection. Flexibility, integration of multiple technologies and sources, and multiple user groupings are essential to this concept. As an example, all audio and image sources should be capable of being shown on the screen and heard in the classroom. The work covered in this document consists of furnishing all labor, material and services necessary to install a complete audiovisual system as indicated on the project drawings and in these specifications.
- B. Deliverables: Prior to ordering materials or commencing any construction activities, the Integrator shall provide the Owner with a complete bill of materials, including all quantities of components, devices, equipment, and wiring required to complete this work. Submit product data, including manufacturer's data sheets for all proposed system components. Submit three copies with all specific items that will be provided clearly indicated and any options highlighted.

**2 PART 2 - PRODUCTS**

**2.1 SYSTEMS DESCRIPTION**

- A. The Extron PVS 407D is part of the PlenumVault System and is used in conjunction with the Extron PVT series of transmitters and Extron speakers. It has four video and audio twisted pair inputs, two HDMI inputs, and one HDMI output, and incorporates a built-in audio amplifier. The switcher accepts a combination of up to six HDMI digital signals, four of which can be computer video signals with stereo audio, and supports up to two analog VGA signals on the wall plates.
- B. A seventh input is a switchable analog audio only input for line-level audio such as an Apple iPod® or MP3 player. The dedicated auxiliary (Aux) mixed input on rear panel is always active, and it is independent of the switchable audio inputs (1-7).
- C. As part of the Extron PlenumVault system, the PVS 407D can be installed above a suspended ceiling in the Extron PVM 220 plenum rated enclosure, or installed at ceiling level within the Extron PMK 560 Pole Mount Kit. Alternatively, it can be mounted in either the Extron WMK 160 or USFM 100 wall mount kits that can be installed on a wall close to a projector or display device.
- D. The PVS 407D switcher is used in conjunction with the Extron digital PVT wall plates, (such as the PVT HDMI RGB), and the VoiceLift microphone system. It is equipped with an integrated 50 watt rms stereo amplifier capable of driving 4 or 8 ohm speakers.
- E. The switcher supports all standard single link HDMI 1.4 signals at resolutions up to 1920x1200 @ 60 Hz and HDTV resolutions up to 1080p @ 60 Hz, with 12-bit color. The switcher and the

PVT wall plates feature EDID Minder technology, which automatically manages the EDID information between the display device and each HDMI and RGB input source.

- F. The switcher has DSP audio processing incorporated that provides advanced control of ducking and other audio features.
- G. The switcher is also equipped with Ethernet control via the rear panel LAN ports, and supports audio file playback for pre-recorded announcements.
- H. The PVS 407D is ENERGY STAR® qualified. The switcher is an energy efficient product that conserves energy and reduces running costs. Provide a complete Audiovisual System for small to medium sized classrooms. The system switching and audio amplification equipment shall be securely mounted and concealed in an enclosure mounted near the display device. Audio and image source equipment can be connected to the system and displayed via four, active (powered) interface panels located throughout the room. The audio and image signals from source devices shall be transmitted from the active interface panels over standard UTP cabling architecture.

## 2.2 INPUTS EQUIPMENT

- A. The room will be equipped with a standard easy to operate interface (a tactile button-keypad layout). The audio system may be monaural or stereo for program sound. The instructional media system will be controlled by a control system with a control panel mounted near the instructor area. System parameters can be monitored, administered and controlled over the data network. The instructional media equipment will be located within proximity to the instructor area or through a Graphical User Interface (GUI) on a computer to allow for ease of operation during instruction.
- B. The PlenumVault switcher receives the video and audio signals sent from PVT Wall plates, which can be located up to 150 feet away. The signals are sent over shielded twisted pair (STP) cable.
- C. In addition, there are two HDMI inputs (inputs 5 and 6) for HDMI source inputs, such as Apple TV® or Extron ShareLink devices. DVI inputs can also be connected to these two HDMI connectors when using the appropriate DVI adapter.
- D. The PVS 407D switcher has a separate analog audio input (input 7) that can be switched with the other six inputs. In addition, there is a dedicated port for connecting the optional VoiceLift microphone system, and another port for connecting an optional Priority Page Sensor.
- E. The System components shall all be correctly listed and labeled by Underwriters Laboratories Incorporated (UL) for their intended use.
- F. All products shall be new and under warranty at the time of installation. B-stock, previously installed, refurbished or used equipment shall not be provided on this project.
- G. The Integrator shall provide all options, accessories and hardware necessary to meet the function of the design even if they are not specifically listed (i.e. mounting kits, separate or additional power supplies, input modules, transformers, etc.).

## 2.3 OUTPUTS, CONTROL AND CONFIGURATION

- A. The PVS 407D has one HDMI output, an amplified audio output, and a line out audio output for assistive listening or recording devices
- B. The PlenumVault switcher can be controlled from either the front panel buttons, or software via the front panel USB, rear panel LAN ports, or RS-232 control via a MediaLink controller.
- C. The switcher has an RS-232 port which can be connected to a MediaLink Controller for remote control of the switcher. An IR pass-through port is available for routing IR transport control signals from a controller to the source device.
- D. In addition, the PVS 407D can be configured and controlled using the Extron Simple Instruction Set (SIS) of commands or through the Extron Product Configuration Software (PCS) program connected via the front panel USB port and TCP/IP connection. The female USB mini B connector located on the front panel can also be used for configuring the switcher settings and flash upgrading the firmware. Firmware upgrades can also be made remotely over the network by connecting to one of the four rear panel LAN ports.
- E. Four 10/100 Base-T network switch ports are also provided allowing network connectivity for multiple other devices, such as MLC controller, TouchLink panel and Ethernet controlled products, using a single LAN drop within the installation location.
- F. Three front panel controls allow the user to adjust the independent input gains, the VoiceLift microphone input level, and the Page Sensor sensitivity
- G. Audio & Speech Reinforcement:
  - 1. Speakers - In suspended ceiling applications, one (1) pair of Extron FF120 speakers are used.
    - a. These speakers feature a low profile, 3.25" deep, aluminized composite enclosure, rectangular shape with a metal grille.
    - b. The coverage angle of the speaker offers an extraordinarily wide dispersion area of 170 degrees, providing a very wide room coverage pattern.
    - c. Meeting the regulatory compliance safety specifications of NFPA90A, NFPA70; UL Listed for use in plenum airspaces; meets UL 2043 for heat and smoke release, meets UL 1480 for commercial and professional audio
    - d. The speakers feature a frequency response of 68 Hz to 18 kHz – 10 db, half space.
    - e. The power capacity is 16 watts of continuous pink noise or 32 watts of continuous program media.
    - f. The nominal impedance is 8 ohms.
    - g. The input connector uses (1) 5mm captive screw for 1 input
    - h. Connection from the PVS switcher to the FF120 speaker is provided by Plenum rated 18 Gauge Speaker Cable Extron SPK-18.
  - 2. VoiceLift Wireless IR Microphone:

- a. The integrated wireless microphone is lightweight and designed to be worn around the neck with a lanyard or clipped on the belt or lapel. The instructor's voice is picked up by the microphone and transmitted wirelessly to the receiver mounted on the ceiling near the center of the room or on an unobstructed wall. The signal is then passed to the line level aux mix input of the amplifier. This is used to amplify the sound level in the classroom up to approximately 15 dB above ambient room noise.
- b. Speech is mixed with the program audio and distributed out of the four (4) each speaker for even room coverage. Each microphone shall have volume control, a power switch and an auxiliary input to use for a MP3 player or other audio source. The IR microphone system can operate on two IR frequencies.
- c. The microphone will have an instant alert feature that may be configured to allow the instructor to request assistance in the classroom.

### 3. VoiceLift Wireless IR Receiver

- a. The receiver has a round base with dome shaped translucent cover. This allows for surface mounting on the ceiling and concealed wiring above the ceiling using plenum rated cables run to the dedicated VoiceLift Receiver input of the PVS Switcher.
- b. This device acts as the receiver of up to two room microphones and transmits their audio signal to the PVS Switcher for mix into the program content of presented material. The receiver has a contact closure that when wired and configured to the digital input of the MLC, can trigger instant alert messages to a designated text or email account.

### 4. VoiceLift Wireless IR Microphone Charging Station

- a. This device is constructed of high impact ABS plastic and acts as a holding and charging station of up to two of the Extron VoiceLift wireless IR microphones. It ships with its own power supply that acts as a recharging station for the two microphones.

### 5. Data Connectivity

The audio video system shall include a IP Link enabled MediaLink controller that allows remote monitoring, scheduling and control of the system over a network.

### 6. Energy Efficiency

The audio video system shall incorporate energy conservation features to reduce consumption and lower operating costs.

- a. The system shall incorporate an Auto Power Save Mode with fast power-up that automatically deactivates the audio amplifier after 30 minutes of inactivity. It quickly returns to full power status in less than one second upon signal detection
- b. The system shall incorporate a Standby Mode that allows the amplifier and twisted pair transmitters to be deactivated when not in use.
- c. The system shall incorporate monitoring and scheduling of system peripherals, such as sources and displays, to deactivate them when not in use or alert to unauthorized use.

### 3 PART 3 - EXECUTION

#### 3.1 GENERAL

- A. All equipment and enclosures described in this specification shall be installed plumb and square per manufacturer's instructions.
- B. All equipment, except that designated as movable, portable or loose equipment, shall be secured and permanently attached to the permanent structure in a manner which will require the use of a tool (e.g.: screw driver, nut driver, etc.) for removal.
- C. All supports shall meet or exceed the load requirements of the intended application with a minimum safety factor of five.
- D. Provide support structure and hardware with a SAE Grade 8 load rating (min.).

#### 3.2 ACCEPTABLE MANUFACTURERS - SYSTEMS

##### A. Manufacturer

Extron Electronics  
1230 South Lewis Street  
Anaheim, Ca 92805  
714.491.1500 or 800.633.9876

##### B. System

4 Input PlenumVault System, part number XX-XXX-XXXXXX

- C. Substitutions: Exceptions to the specifications are not acceptable. College Standard system, No substitutions are permitted.
- D. All equipment part numbers shall be listed in the bill of materials and the system drawings specifications.

#### 3.3 EXAMINATION

- A. Site Verification of Conditions: Verify that related conditions, including equipment that has been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. All devices connected to equipment specified in this section shall bear the UL label and comply with the applicable National Electrical Code (NEC) standards.

#### 3.4 INSTALLATION

- A. Integrator shall furnish all equipment, labor, system setup, and other services necessary for the proper installation of the products/system as indicated on the drawings and specified herein. System setup information shall include each component proper mounting and alignment and properly verified signal pathways and operation. Proper operational and network support control functions shall be verified.

- B. Install in accordance with manufacturer's handling and installation instructions.
- C. Install in accordance with all local and pertaining codes and regulations
- D. Utilize an Integrator with demonstrated experience in projects of similar size and complexity.
- E. Equipment shall be configured and in ready to use condition at the end of installation.
- F. Energize and commission equipment in accordance with manufacturer's instructions.
- G. Configure MLC 226 IP Plus Series using Global Configurator

### 3.5 PROTECTION AND CLEANING

- A. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- B. Repair or replace damaged components before Substantial Completion of the project.
- C. Remove temporary tags, coverings, and construction debris from interior and exterior surfaces of the equipment. Remove construction debris from equipment area and dispose of properly.

END OF SECTION 27 40 00

SECTION 27 51 26

ASSISTIVE LISTENING SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide materials, equipment, fabrication, installation and tests a portable Assistive Listening System for (3) Offices in Building 11.

1.02 RELATED WORK

- A. Section 16050: Basic Electrical Materials and Methods

1.03 SUBMITTALS

- A. Provide submittals for materials and equipment in accordance with Section 16010: Basic Electrical Requirements.

PART 2 - PRODUCTS

2.01 THREE (3) WIRELESS FM TRANSMITTER WITH DIGITAL TUNING, LISTEN #LT-700-216 AND LAPEL MICROPHONE, LISTEN #LA-261.

2.02 SIX (6) WIRELESS FM RECEIVERS, LISTEN #LR-300-072, TWO PER OFFICE.

- A. Two (2) ear speakers, Listen #LA164 per office.
- B. Two (2) neck loops, Listen #LA-166 per office.

2.03 ONE (3) CASES, LISTEN #LA-306.

2.04 PROVIDE 2-AA DURACELL OR EQUAL BATTERIES FOR EACH TRANSMITTER AND RECEIVER.

2.05 QUANTITY OF FM RECEIVERS AS REQUIRED BY CODE, EQUAL TO 4% OF THE MULTIPURPOSE ROOM OCCUPANCY (SQUARE FOOTAGE OF COMPLETE MULTIPURPOSE ROOM DIVIDED BY SEVEN OCCUPANTS PER SQUARE FOOT), SINGLE CHANNEL, WRIST STRAP; LISTEN #LR-400-72 WITH EAR SPEAKER, LISTEN#LA-164. PROVIDE 2-AA DURACELL OR EQUAL BATTERIES PER EACH RECEIVER.

2.06 EQUIVALENT SYSTEM MANUFACTURERS (72 MHZ): PHONIC EAR, GENTNER

PART 3 - EXECUTION

3.01 INSTALLATION, TESTING AND TRAINING

- A. Test the transmitter and each receiver for proper operation. Store the transmitter and receiver in the original packages and store at a site location determined by the District.

- B. Provide a training seminar of minimum one hour duration to instruct school personnel in the operation of the system. Provide three copies of an Owner's Manual with individual catalog and specification sheets, and maintenance instructions at this time.

3.02 WARRANTY

- A. Provide documentation of the manufacturer's standard warranty of the equipment.

END OF SECTION



SECTION 28 10 00

ACCESS CONTROL SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION

Provide, install, program, configure and activate equipment that shall provide a complete and functional, centrally controlled Access Control and Alarm Monitoring System (ACAMS) with local and remote monitoring capabilities. The system shall be completely "turn-key" and shall include all the components listed in Section 2a of this specification.

- A. Work Included - The specified system shall be comprised of four primary components described below:
  - 1. Central Server shall be rack mountable and housed in a telecommunication closet with connection to a facility's LAN. The server shall be managed with a user-friendly GUI based software platform for system control and shall be capable of running a single building or an entire campus. The server shall be equipped with sufficiently sized core processors and memory to control and manage a campus with a minimum of 3,000 doors and be upgradable to 10,000 doors. The server software shall include:
    - a. Dynamic user fields to program system parameters, personal user information and other programmable features. All access privileges are defined at the server but then downloaded to the doors where access enforcement takes place.
    - b. Alarms that identify a system problem (i.e. low battery) or alarm states (i.e. door ajar or forced entry) and any required corrective action by the system administrator. Alarms shall be visible at the server screen or can be sent via email or text to authorized personnel.
    - c. System Partitioning: optional function that provides the ability to partition the system to enable local administrators to create programming changes within their authorized zones. Partitioning rights and zones shall be set up and controlled by the Master Administrator.
    - d. Availability of zones (collections of door locks, buildings, etc) and user access groups (collection of scheduled access to rooms) minimize the labor necessary to define allowed access throughout a campus. An access group can have up to 500 door schedules and a user can be a member of up to 100 access groups.
    - e. The server shall provide constant monitoring of the health of the entire access control system.
    - f. Multi-layer encryption provides system security to help ensure the system cannot be hacked or compromised by outside influences with malicious intent.
      - 1) System must use at least AES128 (or equivalent) symmetric encryption on all communication links.

- 2) All devices and server shall be authenticated by PKI (Public Key Infrastructure).
  - 3) Each device (lock or key) shall have a separate encryption certificate.
  - 4) System administrator shall have the capability to periodically change encryption certificates.
  - g. Server may be programmed locally (using SSL) or remotely via VPN tunnel.
  - h. Easy interface with the most common Enterprise Resource Planning (ERP) applications.
  - i. Access history shall be maintained for up to one year and must be easily accessible.
2. Wireless router (access point) provides all communication between the Central Server and the wireless access control units. Each router shall:
- a. Be connected to the Central Server using CAT5E or higher network cabling.
  - b. Have the ability to be powered via Power-over-Ethernet (POE) or using an external 5V DC power supply.
  - c. Contain internal back-up batteries capable of providing up to 6 hours of continuous operation time.
  - d. Utilize Extreme Low Power RF communication technology operating at 2.4GHz in the ISM band that does not interfere with, or receive interference from, other existing wireless platforms.
  - e. Have a communication range of up to 1800 feet in open space and the ability to control up to 1000 lock units within the communication range. Internal walls and other obstructions could reduce the range and the number of lock units controlled by each router. Careful planning and site surveys shall be required to determine the best locations for wireless routers.
    - 1) For redundancy, best practice shall be to design the system to allow each lock to communicate with at least two routers.
  - f. Multi-layer encryption provides system security to help ensure the system cannot be hacked or compromised by outside influences with malicious intent.
    - 1) System must use at least AES128 (or equivalent) symmetric encryption on all communication links.
    - 2) All devices and server shall be authenticated by PKI (Public Key Infrastructure).
    - 3) Each device (lock or key) shall have a separate encryption certificate.
    - 4) System administrator shall have the capability to periodically change encryption certificates.
3. Wireless access control unit with or without locking hardware. Units designed with locking hardware shall be available in either mortise or cylindrical style lock sets. The access control units must also be compatible with Von Duprin Series 98/99 exit devices. Both shall be equipped with access control electronics and door open/ajar sensor integrated into the unit. These lock units shall be mounted directly in the door within range of at least one Wireless Router. Wireless access control units without lock hardware (powered wall readers) shall be used in conjunction with powered main doors, motorized garage or gate openers. These devices shall operate as definable range sensors with direct connection to the powered openers.

For individual device mounting details, please see associated drawings. Wireless access control units shall:

- a. Utilize patented Extreme Low Power RF communication technology that does not interfere with or receive interference from other existing wireless platforms.
- b. Run on three AA standard alkaline batteries for mortise or cylindrical lock sets, typical battery life with normal usage up to 4 years. Exit devices shall be equipped with 6 C-cell batteries and have this same lifetime. Powered wall readers shall run on voltage (12V/24V) supplied from the electronic door activation equipment. Backup batteries are also standard in each powered wall reader.
- c. Use approved Access Control List (ACL). Software for each unit shall be downloaded from the central server and locally stored. All access control decisions shall be made at the unit giving the system the ability to continue operating as normal in the event of a power failure.
- d. Be capable of supporting up to 1000 users, with upgradable memory for up to 70,000 users.
- e. Use Multi-layer encryption which provides system security to help ensure the system cannot be hacked or compromised by outside influences with malicious intent. Each lock shall have its own encryption key, which can be modified as desired via secure over-the-air administrative command.
  - 1) System must use at least AES128 (or equivalent) symmetric encryption on all communication links.
  - 2) All devices and server shall be authenticated by PKI (Public Key Infrastructure).
  - 3) Each device (lock or key) shall have a separate encryption certificate.
  - 4) System administrator shall have the capability to periodically change encryption certificates.
- f. Employ tamper protection and alarm issuance when the door lock is struck by a heavy object or tampered with in any way.
- g. Obtain secure over-the-air firmware upgrades. Code changes shall be complete in less than one minute.
- h. Store up to 30 calendars to create different work schedules for all user groups.
- i. Have access control by time and date; may be programmed as on-going access or single events, all decision making resident in the lock.
- j. Have access data logging and door ajar sensing via sensors integrated into the lock unit. Rules for door ajar alarm shall be user definable.
- k. Be capable of controlling multiple types of portals, i.e. office doors, main doors, gates, garages, etc.
- l. Have programmable activation distances which can be different for each lock unit types (i.e. office doors can have activation distance of a few inches to several feet while garage access can be up to sixty feet.)
- m. Be either 1) fully self contained for installation within inside doors or 2) independent controllers that interface with main door or garage automatic opening systems, including panic hardware and handicap requirements. The latter unit shall interoperate with ADA push-button requirements.
- n. Be capable of enabling real-time lockdown (<1 minute for 3,000 doors) for an

- entire campus or any subset of a campus without the need for partitioning.
- 1) During lockdown, first responders shall not be prevented from entering a building as long as they have a valid key. For response to an afterhours or emergency event, a Knox box shall be installed outside the main entrance where a "master" key shall be located. A minimum of one router shall be placed within an acceptable communication range of the Knox box to allow periodic updates to the "master" key located within.
  - 2) There shall be at least 4 user-defined threat levels to determine if an individual is allowed access during lockdown.
  - 3) A user's access group shall define the maximum threat level at which access is allowed.
- o. Constantly monitor battery usage and:
- 1) generate a "low battery voltage caution alarm" when voltage drops below a user defined threshold.
  - 2) generate an "imminent failure warning alarm" when voltage drops below a critical threshold in which a lock is not guaranteed to operate.
- p. Allow egress from inside a room/building without a "request to exit" device.
- q. Enable an "office mode" setting such that:
- 1) A door shall be automatically unlocked per a specified schedule, including days of the week, start and end times, start and end dates, and holiday calendar.
  - 2) An enhanced office mode shall be available whereby a door goes into the unlocked state only after the first valid user checks in. The standard office mode schedule is then followed.
  - 3) The unlocked condition shall have the ability to be manually overridden at the door by the door "owner." The state of the door can be changed manually an unlimited number of times during the day.
- r. Be equipped with an "auxiliary power supply" that will enable a door to be opened with a valid key, even when the internal batteries are below critical level.
- s. Have the ability to add "tailgate detection" equipment to ensure that only authorized individuals enter a building.
4. Hands-free transceiver (U-Key) carried by all users that require access to any lock on campus. Hands-free transceiver shall:
- a. Utilize patented Extreme Low Power RF communication technology that does not interfere with or receive interference from other existing wireless platforms.
  - b. Run on standard off-the-shelf coin cell battery and have typical battery life with normal usage of up to 4 years.
  - c. Use Multi-layer encryption which provides system security to help ensure the system cannot be hacked or compromised by outside influences with malicious intent.
    - 1) System must use at least AES128 (or equivalent) symmetric encryption on all communication links.
    - 2) All devices and server shall be authenticated by PKI (Public Key Infrastructure).
    - 3) Each device (lock or key) shall have a separate encryption certificate.
    - 4) System administrator shall have the capability to periodically change

- encryption certificates.
- d. Have multi-distance capability allowing a single key to be capable of activating an unlimited number of different types of doors, each at a different range. The range is programmed into the door lock via the server.
  - e. In addition to multi-distance capability, control shall be available within a transceiver so each user can have custom tailored lock activation distance depending on their physical need (i.e. wheelchair vs. normal user). The transceiver shall also operate automatic door openers when activation distance is reached.
  - f. Have the ability to remove lost transceivers from the system by either the system administrator and/or the user. The user shall have the ability to deactivate and report a lost or stolen key via the internet through a secure web portal. Reactivation may only be performed by the system administrator.
  - g. Shall receive firmware upgrades performed periodically through secure over-the-air communication with the router.
  - h. Have the ability to access stored user information including a picture of a key holder at a monitoring station to ensure the individual being granted access is the key owner.

## 1.02 BASIC DEFINITIONS

### A. Abbreviations:

- 1. ACAMS Access Control and Alarm Monitoring System
- 2. IDF Intermediate Distribution Frame
- 3. IP Internet Protocol
- 4. MDF Main Distribution Frame
- 5. Server Central Server Room
  - f. Regional Server Regional Server in MDF
  - g. SCR Security Control Room
  - h. SSL Secure Sockets Layer
  - i. VPN Virtual Private Network
  - j. PoE Power over Ethernet

## 1.03 PERFORMANCE

Furnish and install a complete ACAMS which meets or exceeds the following performance requirements.

- A. NEC Class II standards:
  - 1. Furnish and install the ACAMS in such a way that it is fully compliant with the Class II limited power requirements of the NEC.
- B. Underwriters' Laboratories Compliance:
  - 1. Locking units mounted directly on doors must meet all UL standards for Fire Tests of Door Assemblies. The balance of ACAMS will fully satisfy all UL 294 requirements, both in terms of its design and documentation, and also in the completed installation.

- C. **Ethernet Connectivity:**
  - 1. Furnish and install ACAMS hardware and software possessing the ability to connect routers, servers and workstations over an existing LAN or WAN.
  
- D. **Report Management**
  - 1. The system shall have integrated reports that can be used to analyze user activity, including event and access logs.
  
- E. **Alarm Presentation**
  - 1. Alarm management screen must have the following attributes and functions:
    - a. ACAMS software must present alarms on the alarm screen in a "double-sort" fashion, with priority as the first sort, and initiation time as the second sort. Sort order must refresh in real time upon each addition or deletion of active alarm events.
    - b. Must have the ability to govern permissions granted to alarm management screen operators, and the option to deny them the ability to modify sort preferences.
  
- F. **Administrator Permissions**
  - 1. Furnish and install ACAMS which offers a "matrix" approach to the granting of administrator permissions. Provide different groups of administrators with the ability to manipulate any programmable set of system functions to which they are granted permission.
  - 2. Provide the capability of limiting or controlling administrators' ability to view, edit, add or delete any fields or attributes of the database.
  
- G. **Operator Audit Trail**
  - 1. Create a record of, and provide the ability to create reports of, all operator actions within the ACAMS software, including:
    - a. The time a change was made by an operator.
    - b. The operator's name.
    - c. The item's state before the change was made.
    - d. The item's state after the change.

#### 1.04 SYSTEM TRAINING

- A. System integrator shall furnish personnel to execute the training plan.
- B. Establish a specific schedule that meets the convenience of customer.
- C. Provide training literature and outlines at the beginning of each session.
- D. **Operator and management training:**
  - 1. Provide a minimum of 24 hours total operator and management training time, with a mixture of class time and on-call time.
  - 2. Include system operation and database management.

- E. Technical maintenance training:
  - 1. Provide a minimum of 8 hours total technical maintenance training time.

#### 1.05 DATABASE ASSISTANCE

- A. System integrator shall coordinate with the administrator to set up the initial database requirements and formats. Provide appropriate forms and written instructions. Provide examples of the sequence of completion for all related forms.

#### 1.06 SUBMITTALS

- A. Provide submittals as required.
- B. At time of bid, provide a letter stating that the security integrator is a factory certified installation contractor.
- C. Submit proposed shop test schedule and procedure.
- D. Submit training plan and schedule.
- E. Submit as-built documentation.
- F. Submit spare parts list, if any. See Section 3.07.

### PART 2 - PRODUCTS

#### 2.1 WORK INCLUDED

1. Furnish and install a complete and operable system as described in these specifications and in the associated drawings. It shall be the responsibility of the integrator to provide a complete and operable system.
2. Review the Drawings and Schedules to identify any additional components required to provide a complete and operable system. Verify all quantities with those shown on the design Drawings and Details.
3. The ACAMS central components shall all be from the same system manufacturer.

#### 2.2 MATERIALS

1. Furnish and install a complete ACAMS which includes the following equipment:
  - a. Central Server
  - b. Software
  - c. PoE switches (provided by customer)
  - d. Wireless Router (Access Points)
  - e. Wireless Access Control Units (lock units or sensors)
  - f. Transceivers (U-Keys)
  - g. Network cabling to wireless routers and power wall readers (can be

supplied by customer or system integrator)

2. The following optional items shall be provided as a part of the ACAMS.
  - a. VPN equipment for remote oversight and programming, if required
  - b. Automatic key readers for ease of data entry at key issue and key return station.
  - c. Auxiliary power supply that enables entry even when batteries are exhausted.
  - d. In-car unit for gate access.
3. Customer or system integrator shall be responsible for the installation, termination, testing and labeling of all network cabling connecting the Wireless Routers to the Central Server. Network cabling shall include all patch cords from patch panel to switch and switch to server.
4. Furnish and install all materials identified in the Drawings. Integrator shall perform a detailed site survey to confirm item unit counts and quantities with customer and/or System Designer.
5. Carefully review all details for exact type and quantity of parts and devices required to support field and head end security apparatus.
6. Furnish and install materials, equipment, software, and any other apparatus or support necessary to comply with the requirements articulated above in Part 1.01, DESCRIPTION.

### PART 3 - EXECUTION

#### 3.1 GENERAL INSTALLATION

1. Aesthetics are an important consideration in installation. Install all components to provide aesthetically pleasing results. Coordinate the actual locations of all visible components in advance with customer.
2. Provide appropriate conductors for all security devices, per details in the plan drawings.
3. Locate and install all security devices and components in accordance with the details and floor plans. Integrator shall determine best locations for devices in the field, based on results of the previously performed site survey.
4. Install all accessible components with tamperproof security fasteners.
5. Comply with the wire marking provisions.
6. Before commencing installation, confirm that the necessary electrical power and grounding provisions are available to meet the security system manufacturer's stated requirements.
7. Customer or system integrator shall be responsible for installing and pulling wire and cable at required locations.



8. System integrator shall be responsible for SecureALL system door hardware installation.

### 3.2 SYSTEM INSTALLATION

1. Confirm that the locking hardware for individual doors is consistent with the SecureALL security design.
2. System Workstations. Install:
  - a. Loaded Client workstation software on the server located in the MDF rack.
  - b. Remote workstation, for remote access by the security manager. Software and configuration only, PC to be customer provided.
3. Central Server and associated equipment. Install in the MDF room, refer to plans and details.
4. Install all door controllers per plans and details.

### 3.3 SYSTEM PROGRAMMING

1. Program the system database. Program the system "from the ground up" using consistent programming and naming conventions.
2. Program the hardware as defined in the Detail Package and on the Drawings.
3. Coordinate with the customer in the use of setting up the permissions for the system and definition of naming convention and abbreviations.
4. Point descriptions:
  - a. Input a description for each point.
  - b. Use descriptions that are consistent in form and character.
  - c. Use all uppercase characters.
  - d. Use consistent abbreviations throughout the database. If a word is abbreviated in one location, always use the same abbreviation.
    - i. Submit any additions or changes to customer for approval before loading the point descriptions in the database.
  - e. Geographic directions:
    - i. Use N for North, S for South, E for East, and W for West.
    - ii. Use only NE, NW, SE, or SW for combined directions.
    - iii. Use a single character (or combined characters) between two spaces preceding the name to qualify a building area, room, door, or device.
  - f. Order of Information:
    - i. Fixed and consistent sequence: building (1 character), space, floor (2 characters), space, room or area, space, description of device or object
    - ii. Examples.
      1. 7 01 LBY DR
      2. 7 01 LBY FIRE PNL ALM
      3. 9 04 BLDG OFFICE

### 3.4 SYSTEM TESTING

1. Site Test: After the system is installed:
  - a. Perform the appropriate system tests.
  - b. In addition, perform all manufacturer-recommended tests.

### 3.5 FINAL ACCEPTANCE TESTING

1. Integrator to perform field inspection and testing.
2. Integrator to provide the following As-Built documents:
  - a. Drawings to define the system configuration and settings.
  - b. Testing sheets to be filled out per point.
  - c. IP addresses provided for all devices, as required.
  - d. Cut sheets provided for each device.

### 3.6 WARRANTY SERVICE

1. Provide limited manufacturers' warranty that shall warrant the goods against faulty workmanship or the use of defective materials, and that such goods will conform to Seller's written specifications, drawings, and other descriptions for a period of two (2) years.
2. Service organization:
  - a. Factory-trained by system manufacturer.
  - b. Location within 100 miles of the job site.
3. Fully qualified repair and maintenance personnel within the service organization:
  - a. Available on a next day basis, 365 days a year.
  - b. Generally able to respond within a maximum 4-hour response time during normal business hours.
4. Normal Service for Equipment:
  - a. Defined as minor repairs, adjustments, or any service required for the system to be fully functional, and which, at the customer's discretion, does not fall into the category of Emergency Service.
  - b. Provide at no additional cost to customer during normal business hours, between 7:00 a.m. and 5:00 p.m., Monday through Friday.
  - c. Respond on a same-day basis for service calls requested by phone before 1:00 p.m. on a weekday.
  - d. If warranty service is requested after 1:00 p.m. on a weekday, or at any time on a weekend, respond on the next working day before 1:00 p.m.
5. Emergency service for Equipment:
  - a. Emergency service is defined as repairs, adjustments, parts, replacement of parts, or any service required to make the system fully functional and is beyond the category of Normal Service, at the option of the customer.

- b. Provide at additional cost to customer according to labor rate schedule contractually agreed upon.
  - c. Respond within a 4-hour period, 24-hours per day, 365 days per year.
  - d. Upon award of contract, provide customer with a cost estimate for emergency service.
6. **Maintenance Service for Software:**
  - a. Provide at no additional cost to customer.
  - b. Respond within the next business day, during normal business hours.
7. Provide full factory technical support and same day shipping of replacement parts for all equipment.

### 3.7 SPARE PARTS

1. Prepare a list of all items that have a history of requiring repair or replacements of 6 months or less, are critical to the operation of the system, or are known to be long lead items for replacement.
2. Provide an inventory of spare parts for the items listed, as agreed with customer. These parts may be stored on site or at Contractor's storage facility, depending upon the criticality of the part and general availability.
  - a. 10 electronic keys
  - b. 5 door units
  - c. 1 wireless router

**END OF SECTION**

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**SECTION 28 20 00**  
**VIDEO SURVEILLANCE SYSTEM**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. All equipment and materials used shall be standard components, regularly manufactured, regularly utilized in the manufacturer's system.
- B. All systems and components shall have been thoroughly tested and proven in actual use.
- C. All systems and components shall be provided with the availability of a toll free 24-hour immediate technical assistance for either the dealer/installer at no charge.
- D. All systems and components shall be provided with an explicit manufacturer warranty.
- E. All Cameras, NVRs, DVRs, and Workstations shall be available to be shipped pre-configured and programmed to the systems requirements by the manufacturer.

**1.02 VIDEO MANAGEMENT SOFTWARE - GENERAL:**

- A. The Video Management Software (VMS) shall meet the requirements of business and government surveillance applications. The software shall be unique and power a line of Network Video Recorders, Digital Video Recorders, Encoders/Decoders, IP Cameras and Workstations. The software shall provide a complete and comprehensive application for the operation and maintenance of a video surveillance system. It shall provide full live digital video and audio surveillance over a standard 100/1000Base-T network by the use of a GUI incorporating video display areas, toolbars, control palettes, and interactive site map displaying system components.
- B. The software shall be available in two versions. One version shall provide full functionality except for recording capability. The second version shall have full functionality plus recording capability. Both versions of the software shall also be available either as a software package or preloaded in a workstation.
- C. The software shall offer network connectivity to other family components and share all video and control data over the network using standard network protocol. The number of network-connected components shall only be limited by the number of assigned IP addresses. There shall be no licensing fee for any cameras or edge devices manufactured by the VMS provider.
- D. The software shall provide an open platform that allows integration with ONVIF compliant commercial off-the-shelf (COTS) devices, such as: IP cameras, encoders and IP edge devices, including standard resolution and megapixel cameras, from numerous industry-leading manufacturers; licensing fees shall be charged on a per-camera basis and there shall be no license limit based on the number of cameras installed at a site. It shall support Unicast or Multicast according to the edge device capability.
- E. The software shall run on a COTS workstation with a minimum of Intel Core i5 processor, 4 GB of RAM and 5 GB of disk space. The software shall run on the Microsoft® Windows® Microsoft Windows 7 Professional 32 or 64-bit; and Windows 2003, 2008 or 2012 Server operating systems.

- F. The software, without any degradation to video quality, shall simultaneously offer:
1. 16-channel continuous video playback.
  2. 16-channel video playback transmission to the network.
  3. 16-channel continuous video receiving from the network.
  4. Recording of up to 95 cameras on a single NVR, depending on resolution, quality and fps settings.
  5. User selectable video archiving of pre-existing recordings.
  6. Video export in AVI, MPEG-4 or Xvid and viewable on a standard DVD and media player.
  7. Video archives in a verified, secure USB, CD or DVD format.
  8. Support for the GUI to display on a widescreen monitor (16:9/16:10).
- G. The software shall offer features including the simultaneous display, playback, distribution and archive of multiple channels of video and audio. Cameras, microphones and sensors shall be the primary input devices. Each channel of video and audio data shall have the capability of being displayed, played back, distributed and archived simultaneously across several servers and clients across the network. The software shall allow recording (version dependent) and viewing at different frame rates (fps). Each sensor channel shall support a NO or NC device. A bookmark feature shall be available.
- H. A web-based interface shall be provided to access the VMS from any standard web browser enabled device. It shall provide live viewing, playback and PTZ controls. Groups shall be accessible through the web viewer. A Mobile App shall be available for both Apple and Android smart phones and tablets. The mobile application shall be able to view live or recorded video from any device on the system. It shall be able to view concurrent multiple video stream, up to 4 on phones and 9 on tablets. The mobile application shall have full control of PTZ, including presets, and quick and simple playback. Pinch to zoom on live and recorded video shall be available.
- I. The software shall allow control of a DVR or NVR using a keypad or serial host connected to the serial port. The keypad or serial host shall have the ability to start or stop video, play back video, control PTZ movement and start and stop macros.
- J. The software shall support playback from the main screen without losing live video viewing in the following formats:
1. Edge Playback - by using a right mouse-click, the user can playback video from any edge device that supports edge recording directly from the user interface of the edge device.
  2. Quick playback - by using a right mouse-click, the user will be able to select and launch playback for a specific camera in a pre-defined number of seconds before the live image. The playback window will open adjacent to the live one.
  3. Playback from time - shall allow setting the playback to start from a specific date, time and database on the network. This shall allow playing back the same camera several times.
- K. The software shall be provided on DVD or USB format in a suitable case.
- L. An integral Events Management System (EVM) shall enable the Digital Video Recording and Management Network Software to interface with an external control/management system, for example, a License Plate Recognition System, and correlate recorded and live video to events received from the external control system. The EVM shall receive external data over an IP network in various formats, including XML, from the external system. The data shall be stored in a SQL database maintained on a standalone or shared server. The

SQL server shall use Microsoft® SQL Server® 2012 Express Edition database software, which is available as a free download from Microsoft as a minimum. The full SQL server version shall run as well.

- M. The EVM system shall be easily configurable from within the Digital Video Recording and Management Network Software. Using the internal events settings, a user shall be able to set up the following:
1. Define where the EVM database shall be located. Options include the local machine or external server.
  2. Select whether a display message shall pop up to inform a user when an event has occurred and define the look of the message and how long it displays. An option for no message display shall also be provided.
  3. Trigger alarms or the execution of a macro upon an event occurrence. An option shall be provided to trigger both an alarm and a macro.
  4. Assign cameras and/or microphones to an event by associating a particular camera, microphone or camera/microphone combination to a condition or set of conditions received from the external control system. The user shall have to option to filter received events by employing "equal to", "not equal to" and "contains" operands.
  5. Configure the database by creating information fields, and specifying their display properties, field type (numeric or alpha-numeric) and whether they may be edited or not.
  6. Maintain the database by allowing the user to backup, restore or clear the database. The system shall offer to ability to filter by date, the clearing of the database. For example, clear all events older than August 1, 2010.
  7. The system shall display a snapshot providing a still photo of the event, time of the event, camera name and other details. For recorded events, the user can specify a time up to 59 seconds for the snapshot to save prior to the event occurring on the video. This shall enable the user to see if there were any significant actions that occurred prior to the event.
  8. Create Events Queries that shall search the database and retrieve events as specified in the queries. Events Queries shall have the ability to be saved and run at any time.
- N. The VMS shall be support an Access Control System. The Access Control System can map to any camera in the VMS system to view or record them.
- O. Users shall have the ability to generate Events History Reports which shall contain all information related to an event. The user shall have the option to display the reports in either a list or thumbnail view. The reports shall contain camera and site names and event dates and times. Selecting an event in either view will enable to user to play back video for the event. Controls shall be provided to specify whether playback should begin when the event occurred or up to 30 minutes prior to the event occurring. The user shall have to option to add notes about the event to the database and to save a snapshot (jpg) of the event for reference purposes. The system shall also display information regarding edits, if any were made to the video.

### 1.03 VIDEO MANAGEMENT SOFTWARE – SETUP, CONFIGURATION AND SECURITY

- A. The software shall offer a full multi-user authorization login application. This application shall offer levels of authorization based on defined sites and functions. In addition, a full setup utility shall be available for the Administrator to configure authorizations. A user shall be able to log in by default, as an Administrator or Guest. Guest authorization shall be configurable for specific system operations. Authorization rights setup shall be performed using the Site Authorization screen. Group rights shall be available to configure by specific

site. Rights shall provide authority to perform all system functions. The software shall offer a full multi-user authorization process as follows:

1. User groups shall be created once globally and shall function in all components connected to the network. Active directories of users and groups on other servers shall be able to be imported.
2. Users shall be created once globally and shall be given rights to particular groups.
3. Groups shall be authorized and given specific access to each unit, permitting "function-specific" profiles. Individual user authorizations within the groups shall allow certain users access to certain cameras.
4. Users created and authorized for each unit shall be able to log in to any recorder and workstation and automatically have their group rights for that machine follow them.
5. There shall be no virtual limit on the number of groups and users that can be authorized in the software on DVRs or NVRs.
6. The number of groups and users authorized on the IP cameras and encoders/decoders will be limited to 20 groups and 100 users.
7. The software shall allow for each group to be authorized or denied access, per component, to:
  - a. Login.
  - b. Logout.
  - c. Site List.
  - d. Setup.
    - 1) Network Setup & Site Name
    - 2) User and Group Management
    - 3) Site Authorization
    - 4) Auto Login
    - 5) Macro Create-Edit
    - 6) Alarm Setup
    - 7) Authentication Settings
    - 8) Camera, Microphone and Device Setup
    - 9) Pre & Post Alarm
    - 10) Storage Database Utilities
    - 11) Auto Record
    - 12) Exit to OS
    - 13) RS-232/422/485 Setup
    - 14) Picture Quality and Resolution Setup
    - 15) Registration
    - 16) Manual Record and Playback Setup
    - 17) Central Failure Notification
    - 18) Recording Verification
    - 19) Auto/Manual fps Setup
    - 20) Texting and Email
    - 21) Display Settings
    - 22) Remote cameras and alarm names
    - 23) Data storage allocation
    - 24) Low Bandwidth
    - 25) Language Translation Utility (LTU) Setup
    - 26) Map Sets
    - 27) Reset Nucleus
    - 28) Backup and Restore
    - 29) Settings Summary
    - 30) Scheduler for Macros
    - 31) Camera Grouping
    - 32) Vicon and Non-Vicon Open Standard Cameras
    - 33) Non-Vicon Open Standard Camera Format



- 34) Video Analytics Engine
  - 35) Scheduling, display and alarm notification
  - 36) Remote pre/post alarm recording
  - 37) Backup utility for setup configuration
  - 38) Video masking
  - 39) Thumbnail Search
  - 40) Recording Management
  - e. Reports.
    - 1) Device Status
    - 2) Alarm History
    - 3) Recording Status
    - 4) Audit Log
    - 5) RVS Log
    - 6) CFN Log
    - 7) Save Logs
  - f. Scheduler/Macro.
    - 1) Run Macro
    - 2) Stop Macro
    - 3) Stop all Macro & Scheduler
    - 4) Resume Scheduler
    - 5) Show Macro
  - g. Shutdown
  - h. Manual Record
  - i. Stop
  - j. Video Quality
  - k. Change fps
  - l. Change Low Bandwidth
  - m. Site Map
  - n. Groups
  - o. Picture
  - p. Audio
  - q. Controls
  - r. Matrix
  - s. Export Image
  - t. Print
  - u. PTZ
  - v. Playback
- B. All users created shall be able to log in to any workstation on the system. A user, given appropriate access, shall be able to remotely configure all components connected to the network. The programming shall include the complete operation of the recorders, including but not limited to:
- 1. Network Settings and Site Name
  - 2. Site Authorization
  - 3. Auto Login
  - 4. Storage Database
  - 5. Registration
  - 6. Macro Editor
  - 7. Schedule for Macros
  - 8. Alarms
  - 9. Manual Record and Quality Buttons on Screen
  - 10. Recording Verification
  - 11. Authentication
  - 12. Map Sets

- 13. RS232/422/485 Controls
- 14. LTU

- C. The software shall permit viewing of live video from any camera connected to any recorder on the network.
- D. The software shall allow for the simultaneous recording of the same camera in two locations over the network (version dependent).
- E. The software shall provide the ability to save any event that was tagged as an alarm (video motion detection, video loss or input received from the EVM system) to be saved to a separate database, where it cannot be overwritten. The feature shall be named Video Vault.
- F. An Archive Wizard shall be provided that simplifies the process of creating archives and saving video to removable media, such as: CD, DVDs or solid-state drives. An embedded player shall be packaged with each archived video clip for playback on any machine.
- G. The software shall provide an advanced method for creating and executing extensive software commands. This shall be achieved by the use of macros. Macro configuration shall be defined for recorded cameras and microphones, command duration, recording location (version dependent), local viewing, device ID, picture quality, refresh mode, recording rate (fps) (version dependent), related devices (sensors) and alarm activation.
- H. Macros shall allow an authorized user to create and schedule software commands that shall include but not be limited to:
  - 1. Sequencing cameras, including multi-screen displays, in a local and remote recorder.
  - 2. Execute remote macros existing on recorders currently connected to the network.
  - 3. Record cameras at different qualities and frame rates from any recorder on the network (version dependent).
  - 4. Send alarm condition to any recorder and workstation on the network. By the use of macros, an authorized user shall be able to program the destination component of the alarm condition.
  - 5. Run applications or batch files, such as: open a word processor, spreadsheet program, calculator, media player or start a batch program to run additional tasks.
  - 6. Run an audio file on alarm; for example, audible instructions.
  - 7. Send an email, text message, start video or any other task that can be initiated by a batch file in response to a Central Failure Notification (CFN) or Recording System Verification (RVS) notification.
  - 8. An authorized user shall be able to program and execute macros remotely without the need to be physically located at the recorder that the macros will be programmed on.
  - 9. The Schedule/Macro button shall allow the running of preconfigured combinations of camera, sensor and PTZ programmed routines.
  - 10. Macro scheduling shall include but is not limited to:
    - a. Days of the week when a macro is active.
    - b. Start and end time for when a macro is active.
    - c. If a macro is to run continuously or not.
    - d. A macro shall be able to run every:
      - 1) 5 min, 10 min, 1/4 hour, 1/2 hour, 3/4 hour, 1 hour, 2 hours, 3 hours, 4 hours, 6 hours, 8 hours, 12 hours.
      - 2) A macro shall be able to be scheduled to run for 1-256 cycles.
- I. The network and sites configuration shall allow:

1. **Set up of a System Nucleus and Backup Nucleus.** The Backup Nucleus shall maintain an updated backup of all System Nucleus settings for recovery in case of failure. The system shall provide failover and redundancy and be fully operational in the event of a System Nucleus failure. Each device shall have an updated backup table to allow operation should the System Nucleus fail. A Network Settings menu shall provide a comprehensive worksheet for each networked device. When all units have been set up, the resulting connected devices shall define the site.
  2. **Site Authorization: Workstation shall be set up using remote recorder or workstation GUI.** Site name and authorization shall be established by User and Group. Permissions shall be assigned for all system functions. Authorization settings shall be able to be sent to other Workstations and duplicated.
  3. **Time synchronization of all components on the network.**
  4. **All appropriate networking features including each server IP, Subnet and Gateway.**
- J. **Device configuration shall have the ability to be configured for system recognition and operation. Valid devices shall be:**
1. **Cameras, fixed or with integrated PTZ**
  2. **Microphones**
  3. **Sensors**
  4. **Relays**
- K. **All devices shall be assigned a unique ID number and title descriptor. PTZ cameras shall be setup for RS-422 protocol and supported with existing manufacturer's drivers where applicable.**
- L. **There shall be a Central Failure Notification (CFN) System used to identify all possible site errors. The CFN shall be accessible from only the Nucleus unit. The log shall be in a time/date order and be manually reviewed for errors.**
- M. **There shall be a Site Map feature. It shall allow the installation and configuration of a custom screen map used to identify and access site-installed components (recorders, cameras, microphones, etc.). The ideal map shall be a jpg image format in the size of 980 x 735 pixels. In addition, text boxes and sub-maps shall be added to maps, further defining the layout. The utility shall also provide full installation, configuration and editing of maps. Maps of smaller sizes shall have the ability to be moved anywhere on the screen.**
- N. **There shall be a Language Translation Utility (LTU). It shall allow a manual translation of the entire GUI into any language that uses varying alpha-numeric character sets. The utility shall also store files to enable changing from one language to another.**
- O. **The system shall provide alarm notification via e-mail, text messaging, and work station text. Macros shall be created to view/listen and record video and audio, PTZ cameras at preset positions, trigger alarms over the network and send email or text message for alarms or on schedule.**
- P. **Storage Database Utilities shall allow setup and usage of detected hard disks locally. Any networked recorder, workstation or server shall be a candidate to add to the picture database. Once established, any recorder shall use established hard disks for recording data.**
- Q. **Alarm Setup: Recorder alarms shall be established by adding detectors and configuring motion detection on video. The triggering of the recorder's detectors shall be used to send alarms to remote units and generate email or text messages. In addition, detectors shall be able to be edited and deleted.**

- R. **Authentication:** The video from the recorder's cameras shall be enabled to verify the authentication of the video and present an authentication symbol on the displayed video for both live and recorded playback.

#### 1.04 VIDEO MANAGEMENT SOFTWARE – USER INTERFACE

- A. **The software** installed in both recorders and workstations shall be similar in:
1. **Graphical User Interface**, therefore an operator shall need to learn only one interface for both control and programming of the system.
  2. **Functions**, offering the ability to remotely configure most system components from any recorder or workstation.
  3. The application shall display a **Main Window** and **Login Window**, where all configuration and operation shall be accomplished.
  4. The login window shall consist of a **User Name** and **Password** field.

The user interface shall serve both operators and system administrators. For the operator, the controls shall be laid out in a familiar VCR type control array, with Playback, Stop, fast forward, still, slow motion, etc. right under the viewing panes. The workspace area shall enable the operator to select the number of panes to display, view system activity, select quality levels and perform many other functions without having to drill down through menus or search for these commonly used functions. The interface shall also react to user interaction. For example, when a PTZ camera is selected, a full set of controls shall be provided, enabling the operator to control the camera and all of its functions. The system administrator shall easily access functions such as scheduling macros and producing reports from the toolbar at the top of the Main Window. The Setup button on the toolbar shall provide access to the System Settings menu. The System Settings menu shall provide access to all of the features of the software.

- B. **The Main Window** shall provide the following:
1. **The Site and Device List** depicting all recorders, servers and workstations connected to the network.
  2. **Within the Site and Device List**, each unit shall be depicted with all connected devices such as:
    - a. Cameras connected, differentiating between PTZ and fixed cameras.
    - b. Microphones.
  3. **A multi-screen display area** that allows for screen displays of:
    - a. Single Camera
    - b. Quad
    - c. 3 x 3
    - d. 4 x 4
    - e. 8-way
    - f. Full screen of any of the above selected multi-screens shall allow for the viewing of the particular multi-screen in full screen mode by hiding the graphical user interface.
  4. **PTZ controls:**
    - a. When a Vicon protocol PTZ camera is selected, an operator shall be able to:
      - 1) Control pan, tilt, zoom, iris and focus.
      - 2) Execute preset positions.
      - 3) Program preset positions.
      - 4) Complete programming of menus embedded in the selected dome.
      - 5) All PTZ programming and control shall be achieved remotely without requiring an operator to be present at the recorder the PTZ camera is connected to.

- 6) PTZ control shall be performed dynamically onscreen, not requiring an operator to click on arrows to move the PTZ camera.
  - 7) The PTZ control shall be fully variable by dynamically moving the cursor across the video display.
  - b. Other PTZ protocols shall be supported by the VMS.
  5. Access to all available programming menus.
  6. On-demand recording of video currently viewed shall allow for the recording of any camera from any recorder connected to the network.
- C. The Site and Device List shall provide a physical list of all known network site areas and connected cameras, PTZ cameras and microphones. The cameras, PTZ cameras and microphones shall be represented by graphical symbols. The user shall also have the option of showing the cameras and devices by logical camera grouping instead of the Site List. Components in the Site and Device List shall be selectable and configurable. PTZ controls shall offer:
1. When a PTZ camera is selected, an operator shall be able to:
    - a. Control pan, tilt, zoom, iris and focus.
    - b. Execute preset positions.
    - c. Program preset positions.
    - d. Complete programming of menus embedded in the selected dome.
    - e. All PTZ programming and control shall be achieved remotely without requiring an operator to be physically located at the recorder the PTZ is connected to.
    - f. PTZ control shall be performed on the video screen without the need for an operator to click on any arrows depicting direction of the device to be moved.
    - g. The PTZ control shall be fully variable and shall permit an operator to obtain higher pan and tilt speeds by simply clicking-and-dragging the mouse cursor on the video screen.
- D. Viewing of live cameras shall be performed by:
1. Clicking on the desired camera in the Site and Device List.
  2. "Drag-and-Drop" operation of cameras from the Site and Device List to the appropriate multi-screen space.
  3. "Drag-and-Drop" operation of the recorder from the Site and Device List to the appropriate multi-screen space.
  4. "Drag and Drop" operations from a camera group list to the appropriate multi-screen space.
  5. "Drag and Drop" operations from a graphical map to the appropriate multi-screen space.
- E. The Navigator Window shall graphically display recorded video. It shall contain all function buttons necessary to access the video on-screen. These functions include but are not limited to:
1. A scalable timeline shall be available to define "from" and "to" time/date intervals of video and audio.
  2. Cameras and microphones shall be selected from the Navigator List and displayed in the timeline in different colors for video and audio
  3. The display mode shall be selected from a palette to configure the number of cameras played back.
  4. An "Export Video" button shall be used to create a video clip in the following formats: AVI, MPEG, Xvid of the selected single camera video segment.
  5. A "Museum Search" button shall be available to search selected video segments for "Area of Interest" (AOI) events using a scalable sensitivity setting. A "Thumbnail Search" button shall be available to quickly search all ONVIF recorded video, using 16

- thumbnail images spread evenly across a specifiable time range. A single click on thumbnail launches playback. An interface shall be provided to export video.
6. A Play button shall be available to display the Main Window with the Video Display Area containing the selected video segments ready for review.
  7. Video retrieval in the Navigator Window shall be performed by:
    - a. Selecting the Display Mode for required number of cameras.
    - b. Selecting the device (recorder or workstation) where video was previously stored or archived.
    - c. Selecting the cameras and microphones to be played back.
    - d. By "Drag-and-Drop," similar to the live view, selected cameras and microphones are inserted into the multi-screen displays so that an operator can view a mix of previously recorded cameras and live video on the same screen.
    - e. The timeline shall provide a graphical interface depicting color-coded bars that indicate video previously recorded as well as all alarmed video and audio.
    - f. Video indicator bar shall indicate recording with no sensed motion
    - g. Any recorders on the network shall be capable of playing back, by utilizing the multi-screen displays, a mix of videos previously recorded on any other server on the network, or archived.
    - h. The Navigator Window shall offer the ability to playback cameras:
      - 1) One by one.
      - 2) Time synchronized (precise timeline when the cameras were recorded).
      - 3) By double-clicking any alarm report line or alarm window.
- F. Access to programming and more advanced screens shall be done by means of an immobile, permanently docked toolbar located on the top live screen. The toolbar shall provide access to the following major functionality of the system:
1. The Scheduler/Macro.
  2. Reports.
  3. Setup.
  4. Logout and Shutdown buttons.
- G. The operator shall have the ability to launch web pages or any other type of web-based information such as embedded HTML or PDF documents from within the user interface. Along with informational websites such as traffic, weather or news reports, internal operating procedures such as operation during emergencies, lockdowns, severe weather, etc. shall be launched and controlled from the VMS system and have passcode protected authorization.
- H. Authentication shall be configured using the Authentication Settings screen. Authentication display shall be configured by site and affect the destination video. A check box shall be available to enable video authentication and view the status of the video generated. The video authentication scheme shall utilize a 128 bit MD5 algorithm.

#### 1.05 VIDEO MANAGEMENT SOFTWARE – VIDEO QUALITY

- A. The encoders and IP cameras shall employ a compression algorithm based on:
1. Optimized MPEG-4, JPEG (Normal and Full) and H.264. The software running on the DVRs and NVRs shall support the algorithms used by the devices.
  2. User selectable levels of resolution (quality) depending on camera not requiring a need to restart the application or the digital video recorder. It shall be selectable using a 4-position bar from the main screen. There shall be 4 levels of resolution (4 CIF, 2 CIF, CIF, and HCIF) with 2 levels of compression comprising 8 quality levels total, which shall be accessible from the Setup menu selections.

- B. User selectable resolution shall include capture sizes (camera dependant) of:
1. 360 x 122 pixels, 432 x 146, PAL.
  2. 360 x 244 pixels, 432 x 293, PAL.
  3. 720 x 244 pixels, 864 x 293, PAL.
  4. 720 x 488 pixels, 864 x 586, PAL.
  5. 1280 x 720 pixels (0.9 MP)
  6. 1280 x 1024 pixels (1.3 MP)
  7. 1600 x 1200 pixels (2.0 MP)
  8. 1920 x 1080 pixels (2.1 MP)
  9. 2048 x 1536 pixels (3.1 MP)
  10. 2592 x 1944 pixels (5.0 MP)

#### 1.06 VIDEO MANAGEMENT SOFTWARE – ADD-INS

- A. An Access Control system shall be available for integration with digital video recording management and network software. The Access Control (VAX) system shall meet the requirements of business and government access control systems. The system shall monitor and control facility access as well as video detection, temperature and communications loss monitoring. The system shall provide control and access to users on Local Area Networks (LAN), Wide Area Networks (WAN), wireless networks and the Internet. The system shall provide video viewing playback and PTZ control from the VMS.
- B. A License Plate Recognition (LPR) system option shall be available to enable the digital video recording management and network software to integrate with an external license plate recognition system. The external LPR system shall link to the Events Management (EVM) system and video and license plate data captured by the LPR system shall be provided to the EVM system, where the data shall be stored along with the related digital video management system video. Event thumbnail images of the license plates and corresponding video may be called up for viewing and review. Operators shall have the ability to generate "white lists" and "black lists" of plate numbers thereby classifying certain reads to automate events, such as alarms, based upon a vehicle's status.

#### 1.07 VIRTUAL MATRIX DISPLAY CONTROLLER OPTION

- A. A Virtual Matrix Display Controller (VMDC) shall be available for digital video recording management and network software. The VMC shall provide the following capabilities:
1. Display any camera on the network on any monitor on the network.
  2. Allow the use of both 4 x 3 and 16 x 9 monitors.
  3. Allow control of the system from VMDC PC GUI, PLC or a keypad.
  4. Supports 4 keypads and up to 5 monitors per workstation.
  5. Map capability.
- B. A keypad shall be provided to provide the following functions:
1. Control PTZ functions.
  2. Control camera switching to monitor.
  3. Control quick playback to monitor.
- C. The VMDC shall be available as software ready to be installed on a suitable PC, preinstalled on a rack or tower unit.

#### 1.08 ENCODER OPTIONS

- A. Encoders shall be available that convert analog camera inputs into streamed IP video data:
1. A four channel unit shall be available that shall be an H.264 encoder.

2. A single channel unit shall be available that shall be an H.264 encoder.
3. An 8-channel unit shall be available.
4. A 16 channel unit shall be available.

#### 1.09 APPROVED MANUFACTURERS

- A. The Digital Video Recording Management and Network software shall be Vicon's Model VWS-SWV8 (software only), VWS-PCV8 (preloaded workstation) or VPK-SWV8 (software only), VPK-XTBV8 (preloaded PEAK NVR, where XX is the hard drive size).
- B. The Virtual Matrix System software shall be Vicon's Model VMDC-SWV8 (software only), VMDC-2V8, 4V8, or 6V8 (preloaded tower PC with 2, 4 or 6 monitor outputs) or VMDC-2V8, 4V8 or 6V8-RK (preloaded rack PC with 2, 4 or 6 monitor outputs). This shall have a separate specification.
- C. The LPR shall be integration with a partner.
- D. The keypad shall be Vicon model V1500C-SCCS-1. This shall have a separate specification.
- E. The encoders shall be Vicon models H264-ENCDR (4-channel), VN-901T (single-channel) EXPRESS-8 (8-channel) and EXPRESS-16 (16-channel). These shall have separate specifications.
- F. Digital Video Recording Management and Network Workstation shall be available to be shipped pre-configured and programmed to the systems requirements by the manufacturer. Virtual Matrix Systems shall be available to be shipped pre-configured and programmed to the systems requirements by the manufacturer. The keypad and encoders shall be available to be shipped pre-configured and programmed to the systems requirements by the manufacturer.

#### 1.10 DIGITAL NETWORK VIDEO RECORDER

- A. The digital network video recorder (NVR) shall be a PC computer with a Microsoft® Windows® 7 Embedded\* (64-bit) operating system. It shall be fully equipped with the Digital Video Management Software. The workstation shall require an external monitor, keyboard and mouse for operation.
- B. As a minimum, the NVR shall have Intel® Core™ i5 processor. It shall have a minimum of 4 GB of RAM memory, a minimum 250 GB hard drive, USB ports, and monitor outputs (DVI and HDMI).
- C. The NVR shall be housed in a desktop or rack-mount case with all suitable connectors available on the back panel. It shall be constructed of steel and plastic materials. It shall also be operated indoors in a temperature range not to exceed 32 to 104° F (0 to 40° C) and a humidity range not to exceed 0 to 95% relative, in a non-condensing atmosphere. The NVR shall employ a Universal Voltage Power Supply requiring 105 - 240 VAC @ 50 - 60 Hz. A rack-mounting kit shall be provided.
- D. The NVR shall offer internal hard-drive storage with the following capacities:
  1. 500 GB.
  5. 1 TB.
  6. 1.5 TB.
  7. 2 TB.
  8. 3 TB.



- 9. 5 TB.
- 10. 6 TB.

E. The NVR shall be preloaded with ViconNet Video Management Software.

\*A full windows O.S. is available on request. \*\*The desktop and 1U rack-mount versions support up to a certain drive size. Larger drive capacity is available, but may require a larger tower or 2U chassis. Contact your sales representative.

### 1.11 ELECTRICAL SPECIFICATIONS

- A. Input Voltage: 105-240 ±10% VAC, 50/60 Hz.
- B. Current: 0.66 A @ 115VAC; 0.33 A @ 240 VAC.
- C. Power Consumption: 76 W.
- D. CPU: Intel® Core™ i5.
- E. RAM Memory: 4 GB minimum.
- F. Heat Output: 266 blu/hour.
- G. Operating System Hard Drive: 250 GB minimum.
- H. Storage: 500 GB to 6 TB. Depending on model.
- I. Operating System: Microsoft Windows 7 Embedded.
- J. LAN Interface: 100/1000 Base T Ethernet interface on main board.
- K. DVD Drive: Internal DVD/CD/RW drive not available on most units; external USB DVD can be used.
- L. Front Panel Controls/Indicators: Power, network and hard drive activity LEDs, USBs.
- M. Certifications: FCC Class A, CE.

### 1.12 MECHANICAL SPECIFICATIONS

- A. Application: Indoor.
- B. Mounting: Standard desktop or rack unit mounted in a standard EIA compliant rack, 19 in. (483 mm) wide opening. Rack height is 1.75 in. (44 mm) or 1 RU.
- C. Dimensions-Rack: Width (W): 19.0 in. (483 mm).  
Depth (D): 16 in. (406mm).  
Height (H): 1.75 in. (44.45 mm), 1 RU.
- D. Dimensions-Desktop: Width (W): 2.13 in. (44 mm).  
Depth (D): 6.59 in. (167.5 mm).  
Height (H): 6.59 in. (167.5 mm).
- E. Weight-Rack: 18.2 lb. (8.3 kg) approximately.
- F. Weight- Desktop: 8.1 lb. (3.7 kg) approximately.
- G. Construction: Steel and plastic.
- H. Color: Black.

### 1.13 ENVIRONMENTAL SPECIFICATIONS

- A. Operating Temperature Range: 32 to 104°F (0 to 40°C).
- B. Operating Humidity Range: 0 to 95%, non-condensing.

#### 1.14 CERTIFICATIONS

- A. CE
- B. FCC, Class A

#### 1.15 WARRANTY

- A. 3 years, parts and labor

#### 1.16 APPROVED MANUFACTURERS

- A. The ViconNet Digital Video Recording Management and NVR shall be Vicon's VPK-XTBVY where X is the hard drive size and Y is the ViconNet version; the rack version shall be VPK-XTBVY-R1 where X is the hard drive size and Y is the ViconNet version. The ViconNet Digital Video Recording Management and Network Workstation desktop version shall be Vicon's VWS-PCVX where X is the ViconNet version; the rack version shall be VWS-PCVX-R1 where X is the ViconNet version.
- B. Digital Video Recording Management and Network Workstation shall be available to be shipped pre-configured and programmed to the systems requirements by the manufacturer.

#### 1.17 FIXED DOME VANDALPROOF DAY/NIGHT IP CAMERA

- A. The fixed dome, true day/night camera shall incorporate a fixed camera/lens combination. The camera domes shall be available as indoor/outdoor models. The cameras shall offer in-ceiling mounting or surface-mounting. The cameras shall also have the ability to be mounted to a standard 4 x 4 electrical box. An adapter shall be available for pendant mounting on a standard 1 ½ NPT fitting.
- B. The day/night camera shall be available in SD (D1) 720p and 1080p versions. Models with IR illuminators shall be available. The cameras shall provide dual/triple streaming video and support H.264, M-PEG-4 and M-JPEG compression.
- C. The cameras shall be constructed with a metal housing with a clear, high-impact, polycarbonate plastic dome and black mask. All camera models shall be protected with tamper-resistant screws.
- D. The cameras shall work on a 10-BaseT or 100Base-TX network interface.
- E. The cameras shall have an internal heater, powered by 24 VAC input power. The cameras shall also be powered by 12 VDC or PoE.
- F. The camera position shall have a three-axis adjustment, allowing for adjustment of pan (355°), tilt (70° from vertical) and lens rotation (roll), for any angle of view required. A 3 to 9 mm varifocal autoiris lens shall be included to adapt to changing lighting conditions.
- G. The camera shall be designed for easy installation and setup. The extensive web browser menus shall allow set up of white balance, AGC, backlight compensation, digital wide dynamic range, motion detection, digital zoom, privacy masks and many other functions.

#### 1.18 FIXED DOME CAMERA AND OPTICS SPECIFICATIONS

A. Imaging Device:	1/2.8-inch progressive scan RGB CMOS
B. Day/Night Performance:	True day/night (IR cut filter)
C. Digital Zoom:	1 – 10X (client software)
D. Sensitivity:	Color: 0.08 fc (0.8 lux); B&W: 0.02 fc (0.2 lux); DSS: 0.001 fc (0.01 lux); IR Color: 0.02 fc (0.2 lux); IR B&W: 0.0 fc/lux, IR On @ f/1.2 lens at 50 IRE
E. Max. Resolution:	1080p, 720p and SD (D1) models
F. IR Distance (IR models only):	65 ft (20 m) (with 24 IR LEDs)
G. Zoom/Focus Adjust:	Screw lever adjustable (manual) or motorized focus and zoom
H. Automatic Gain Control (AGC):	Selectable
I. Backlight Compensation:	On/Off
J. Motion Detection:	
K. Privacy Mask:	8 zones/size
L. Dynamic Noise Reduction:	Selectable: On/Off
M. Iris Control:	Automatic
N. White Balance:	Automatic/Light Source
O. Electronic Shutter Speed:	1/4-1/20,000 sec
P. Focal Length:	3-9 mm
Q. Aperture:	f/1.2
R. Field of View:	Horizontal: 93°-31.7°

#### 1.19 ELECTRICAL SPECIFICATIONS

A. Input Voltage:	24 VAC, 12 VDC or PoE.
B. Current:	12 VDC No IR/ IR: 250/470 mA; 24 VAC IR/No IR: 300/520 mA; PoE: 70/1300 mA. Heater: 0.6 A (24 VAC only).
C. Power Consumption:	12 VDC No IR/ IR: 3/4 W; 24 VAC IR/No IR: 3.3/6.5 W; PoE: 3.5/6.4 W. Heater: 20 W (24 VAC only).
D. Connectors:	Power: screw terminal. Network/PoE: RJ-45. Alarm: screw terminal. Audio: jacks. Micro SD card slot. Composite output provided for installation.

#### 1.20 NETWORK VIDEO TRANSMISSION SPECIFICATIONS

A. Compression:	H.264, MPEG-4, M-JPEG.
B. Video Streams:	10 concurrent sessions maximum.
C. Video Resolution:	1920x1080 (1080p), 1280x720 (720p), 704x480/576 (D1), 352x240/288 (CIF), 640x480 (VGA), 320x240 (QVGA), model dependent.
D. Frame Rate:	2.5-30 fps (2.1-25 fps PAL).
E. Network Interface:	10Base-T, 100Base-TX.
F. Streams:	Dual or triple streaming.

- G. Web Browser: Internet Explorer, Safari, Firefox, Google Chrome, Opera.

**1.21 OPERATIONAL**

- A. Alarm Capabilities: 1 in, 1 out. Alarm out,.
- B. Control Display: Web browser menu-driven system allowing full configuration of the camera
- C. Tilt and Horizontal Adjustment: Pan, 355°; tilt, 70° from vertical and rotation about its axis (roll/azimuth).
- D. Lens Adjustment: Manual: Focus: focus lever screw. Zoom: zoom lever screw. Motorized zoom and focus models.

**1.22 ENVIRONMENTAL SPECIFICATIONS**

- A. Operating Temperature: Without Heater (12 VDC/PoE): 14 to 122° F (-10 to 50°C).  
With Heater: -40 to 122° F (-40 to 50°C).
- B. Humidity: Up to 90% relative, non-condensing

**1.23 MECHANICAL SPECIFICATIONS**

- A. Construction: Die cast aluminum base with clear polycarbonate plastic dome and black mask. Tamperproof screws.
- B. Dimensions: Height: 5.0" (127.4 mm); 7.5" (188 mm) with pendant mount.  
Housing Diameter: 6.06" (154 mm).  
Dome Diameter: 4.3" (109.97 mm).
- C. Weight: 2.5 lb (1.1 kg)
- D. Camera Mount: Indoor or outdoor. Surface or flush, in-ceiling mount (with optional mounting kit), pendant on standard 1 ½" NPT (with optional pendant adapter). May be mounted to a 4x4 electrical box without the need for an adapter plate.

**1.24 CERTIFICATIONS**

- A. CE
- B. UL
- C. FCC, Class A
- D. IP66
- E. IK10

**1.25 WARRANTY**

- A. 3 years, parts and labor

**1.26 APPROVED MANUFACTURERS**

- A. The fixed dome, color camera shall be Vicon Industries Model V920D Series.
- B. The fixed dome, day/night camera shall be available to be shipped pre- configured and programmed to the systems requirements by the manufacturer.

**1.27 NETWORK PTZ CAMERA DOME**

- A. The compact network dome shall be comprised of a camera/lens and pan/tilt drive in an attractive covert enclosure. It shall be sold in a variety of prepackaged configurations with choices in environment, mounting configuration, camera resolution, and lower dome types. A pressurized and high-impact version shall be available.
- B. The motorized dome shall employ a modular design with an internal CPU and a customer interface board that provides connections for an external power supply input, four alarm inputs, one relay output and network wiring. On-board memory shall be retained in the housing; installation and servicing shall be easy.
- C. The network dome shall provide network video transmission using either MPEG-4, open platform H.264 or M-JPEG compression. The dome shall support ONVIF open architecture connectivity to enable third party software recording. The camera dome shall transmit high quality video across the network for remote viewing and recording and shall be configurable remotely from network digital video recorders and master workstations
- D. Alarm inputs shall be individually programmable for their functional state (enabled or disabled), reporting state (report on or off), active state (high or low), acknowledge mode (manual, momentary or automatic), automatic acknowledge dwell time control, set and reset action (action when triggered or reset) and displayed title text. The relay output shall be output type (momentary or latching).
- E. Programmable titling shall be provided for the camera and every preset position, alarm, relay, and sector. Titles shall be enabled or disabled individually or globally. The overall position of the titles and display frame position shall be programmable. The capability to fade titles after a programmable time shall be provided.
- F. There shall be 79 individual programmable preset positions available, each having a variable preset solve speed of 1 sec (nominal) and accuracy of 0.1°. The dome's 360 degree view shall be programmable for a maximum of 16 sectors. Each sector shall have the capability to be blanked out (no video display). In addition, the blanked out area shall be scalable. The number and size of sectors shall be programmable and have a custom title.
- E. There shall be eight tours available with 32 steps per tour. Tour steps shall include preset positions with speed control, relay control, alarm acknowledge, save/recall camera status, repeat tour, call another tour, call an autotour and dwell timing control. There shall be two autotours available with 256 pan, tilt and zoom functions per autotour. Timing shall be dynamic or as is actually programmed with the joystick and push buttons.
- F. Pan and tilt functions shall be programmable. Maximum manual pan and tilt speeds shall be programmable. Maximum pan speed shall be 400 degrees/sec and maximum tilt speed shall be 150 degrees/sec. Pan and tilt speeds shall also be scalable to the zoom setting.
- G. Two camera/lens combinations shall be available. The first camera/lens shall be a 1/3-in. solid state progressive scan CCD day/night 1.3 megapixel (720p) with a 4.7-84.6 mm varifocal lens (optical 30x zoom). The second camera/lens shall be a 1/2.8-in. solid state progressive scan CMOS day/night 2.0 megapixel (1080p) with a 4.7-94 mm varifocal lens (optical 20x zoom). The camera shall feature wide dynamic range to provide the highest quality image with excellent contrast.
- H. The camera shall provide high level, programmable functions. Configuration of the dome shall be done through a web browser interface. The gain control shall be adjustable. The shutter speed shall be automatic or manual. The camera shall have white balance gain using

red and blue scales. Backlight compensation or Wide Dynamic Range shall be programmable. Synchronization shall be internal.

- I. The outdoor/high-impact/pressurized pendant model shall be mounted using a die-cast aluminum housing and 1-1/2 inch NPT threaded fitting and shall include a molded thermoplastic sunshield and additional environmental control.
- J. A real time clock and scheduler shall be available on all models. Up to 64 events shall be able to be scheduled for action at a programmed time of day. Events that may be scheduled include a preset, turning a relay on or off, enabling or disabling an alarm, and calling a tour or an autotour.
- K. 16 individual zoom-scalable programmable privacy masks shall be available for simultaneous display on screen; 80 total shall be available.
- L. Programmable azimuth and compass display shall be available. The compass shall be programmed for absolute North and shall display 8 compass headings (N, NE, E, SE, S, SW, W, NW). Pan and tilt degrees shall be displayed with a 1° resolution.
- M. Motion detection capability shall be available. There shall be 12 predefined zones for motion detection. Each zone has 3 sensitivity levels. Programmable actions may be associated with each detection zone, including calling another preset, turning a relay on or off, and calling a tour or an autotour.
- N. The capability to freeze an image during a preset solve shall be available. The control shall be global and affect all preset solves. The freeze of an image during preset solve conserves bandwidth and storage when recording using a motion compensated recording system.
- O. The capability to flip (invert) the video image shall be available. This feature is useful when mounting units in an inverted position. All pan/tilt and compass displays are automatically adjusted for the inverted image.
- P. Multilanguage menu system shall be provided, including English, Spanish, French, German and Italian.
- Q. The dome shall have a maximum video transmission rate of 30 fps (25 fps PAL).
- R. Audio input shall be provided.
- S. The dome shall be capable of 10 simultaneous viewing/recording streams per camera.

#### 1.28 NETWORK VIDEO TRANSMISSION

- A. Compression: H.264, M-JPEG
- B. Video Output: 720p: 1280 x 720 @ 30 fps  
1080p: 1920 x 1080 @ 30 fps
- C. Programming Interface: ONVIF, NTCIP or Vicon API
- D. Protocols: IP, HTTP, RTSP/RTP, DNS client, FTP, SMTP, PPPoE, TCP/IP, DHCP, UDP, Multicast, NTP, DDNS, IGMP, ARP, SOAP, WSDL, WS-Discovery

#### 1.29 CAMERA SPECIFICATIONS

E. Imaging Device:	720p: 1/3-inch solid state progressive scan CCD 1080p: 1/2.8-inch solid state progressive scan CMOS
F. Effective Picture Elements:	720p: 1348 x 976 (H x V) 1080p: 2096 x 1097 (H x V)
G. Synchronization In:	Internal
H. Horizontal Resolution:	720p: 600 TVL (color and B&W) 1080p: 900 TVL (color and B&W)
I. Shutter Speed:	720p: Automatic/Manual: 1/4 to 1/10,000 sec 1080p: Automatic/Manual: 1/0.75 to 1/30,000 sec
J. Gain Control:	Automatic/Manual
K. WDR :	On/Off selectable
L. Backlight Compensation:	On/Off selectable
M. Sensitivity:	720p: Color: 0.18 fc (1.8 lux) B&W: 0.002 fc (0.02 lux) @50IRE, f/1.6, 1/4s, IR off 1080p: Color: 0.16 fc (1.6 lux) B&W: 0.004 fc (0.04 lux) @50IRE, f/1.6, 1/8s, IR off
N. Iris Control:	Automatic
O. Digital Noise Reduction:	On/Off selectable (1080p version)
P. Video Focus:	Automatic/Manual (near-far)
Q. White Balance:	Automatic/Manual; red/blue gain adjustable
R. Lens:	720p: 4.7 – 84.6 mm, f/1.6 (wide) - f/2.8 (tele); 55.2° – 3.2° horizontal angle of view 1080p: 4.7 – 94 mm, f/1.6 (wide) - f/3.5 (tele); 55.2° – 2.9° horizontal angle of view

### 1.30 ELECTRICAL SPECIFICATIONS

A. Input Voltage:	18-30 VAC. (Will operate within spec on voltages up to 32 VAC. For voltages between 30-32 VAC, use a Class 3 indoor/dry or outdoor/wet power supply.) PoE+ on indoor unit only.
B. Current (@ 24 VAC):	Indoor: 1.0 A Outdoor: 2.2 A
C. Power Consumption:	Indoor: 20 W max Outdoor: 70 W max, including heater.
D. Heat Equivalent:	Indoor: 70 btu/hr Outdoor: 245 btu/hr
E. Power Connector:	2-position removable screw terminal block
F. Network Connector:	RJ-45 CAT 5
G. Audio Connector:	2 1/8-in. phono jacks
H. Alarm Input:	8-position removable screw terminal block
I. Video Out:	RJ-45 connector
J. Relay:	4-position removable screw terminal block.
K. Radio Frequency Emission Rating:	FCC Class A

### 1.31 ENVIRONMENTAL SPECIFICATIONS

A. Operating Temperature:	Indoor: 32° to 131°F (0° to 55°C) Outdoor: -40° to 131°F (-40° to 55°C) continuous rotation
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### 1.32 PHYSICAL SPECIFICATIONS

A. Diameter:	Outdoor Pendant
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Diameter: 9.0-in. (228 mm).  
Height: 10.3-in. (262 mm).  
Lower Dome: 5.9-in. (150 mm)

B. Weight: Outdoor Pendant: 7.2 lb (3.3 kg).

### 1.33 MECHANICAL SPECIFICATIONS

A. Application: Outdoor/Impact-Resistant; IP66, NEMA 4X;  
NEMA TS2-2003 V02.06  
Pressurized; IP67; NEMA TS2-2003 V02.06  
Indoor Pendant; IP52  
Indoor In-Ceiling; IP51

### 1.34 CERTIFICATIONS

A. FCC, Class A  
B. CE  
C. ONVIF compliant

### 1.35 WARRANTY

A. 3 years, parts and labor

### 1.36 APPROVED MANUFACTURERS

- A. The camera dome shall be Vicon Industries Model Surveyor HD series:  
720p/1.3MP models:  
SN130W (Outdoor Pendant)  
SN130M (High-Impact)  
SN130P (Pressurized)
- 1080p/2MP models:  
SN220W-L (Outdoor Pendant)  
SN220M-L (High-Impact)  
SN220P-L (Pressurized)
- B. The network PTZ dome camera shall be available to be shipped pre- configured and programmed to the systems requirements by the manufacturer.

### 2.37 OUTDOOR FIXED IP CAMERA DOME

- A. The indoor/outdoor fixed camera dome shall incorporate a varifocal camera/lens combination. The camera dome shall be available for indoor/outdoor surface mounting. The high-resolution day/night camera shall be available with an integral 3-13 mm manual varifocal fixed iris lens or 2.8-8.5 mm motorized varifocal remote focus, autoiris lens. Day/night operation shall be achieved using a built-in IR-cut filter. IR illuminators shall be available; IR distance shall be 50 ft (15 m) with 22 IR LEDs. A clear polycarbonate lower dome that is secured by tamperproof screws shall be included.
- B. The camera position shall have a three-direction adjustment, allowing for adjustment of pan, tilt and lens rotation (azimuth/roll), for any angle of view required.
- C. The camera dome shall be powered by PoE.



- D. The camera dome shall have simultaneous dual streaming video and support H.264 and M-JPEG compression. The camera shall be available in 4 resolutions, 1 MP (720p) and 2 MP (1080p), 3 MP and 5 MP. The camera dome shall transmit full duplex, bi-directional (two-way) audio that is synchronized with the H.264 video stream.
- E. Camera features shall include electronic iris, AGC, BLC, white balance, flip and rotate, and motion detection; WDR (1, 2, 3 MP versions only),
- F. The camera dome shall meet the FCC requirements for a Class A device. It shall include support for the industry-standard ONVIF interface. It shall be IP66-rated (NEMA 4) to withstand rain, dust and vandalism and IK10 rated for impact resistance.
- G. The camera dome shall provide a slot for an SD card for local storage.
- H. The fixed-position camera dome shall meet or exceed the following design and performance specifications.

**2.38 DAY/NIGHT IP CAMERA DOME SPECIFICATIONS**

- A. Imaging Device: 1/3.2-inch progressive scan CMOS; NE model: 1/2.7-inch
- B. Max. Resolution: 1 megapixel (720p), 2 megapixel (1080p), 3 megapixel and 5 megapixel models
- C. Shutter Speed: 1/8000 sec
- D. Automatic Gain Control: On/Off selectable
- E. Sensitivity: Color: 1-3 MP: 0.2 lux, 5 MP: 0.3 lux; B&W: 0.05 lux without IR
- F. Tilt and Horizontal 3-axis adjustment: pan (360°), tilt (90°) and roll (lens Adjustment: may be rotated on its axis 350°)
- G. Lens Adjustment: Model Dependent: Manual focus and zoom adjustment, fixed iris or motorized zoom and focus, autoiris
- H. Focal Length: 3-13 mm manual varifocal; 2.8-8.5 mm motorized varifocal
- I. Horizontal Field of View: 3-13 mm day/night: 32°- 93°; 3-13 mm WDR/IR: 26°- 95°; 2.8-8.5 mm WDR/IR: 37°- 90°; 2.8-8.5 mm 3 MP: 39°- 95°; 2.8-8.5 mm 5 MP: 39°- 99°
- J. IR Distance: 50 ft (150 m) with 22 IR LEDs; IR range of 800-940 nm

**2.39 ELECTRICAL SPECIFICATIONS**

- A. Input Voltage: PoE
- B. Power Consumption: PoE: <4 W
- C. Connectors: Power: PoE RJ-45  
Video/Data: RJ-45  
I/O Relay, Audio In/Out, Analog Output: Requires optional cable or backbox  
Slot for SD card
- D. Radio Frequency Emission Rating: FCC Class A; CE

**2.40 ENVIRONMENTAL SPECIFICATIONS**

- A. Operating Temperature: -30° to 122°F (-34° to 50°C)
- B. Humidity: 10% to 80% relative, non-condensing

## 2.41 PHYSICAL SPECIFICATIONS

- A. Construction: Die-cast aluminum base; aluminum trim ring  
Dome: clear polycarbonate; lampproof screws
- B. Dimensions: Height: 3.9 in. (100 mm),  
Diameter: 6.0 in. (152 mm)  
Dome Diameter: 3.86 in. (98 mm)
- C. Weight: Approximately 2 lb (0.9 kg)

## 2.42 MECHANICAL SPECIFICATIONS

- A. Camera Mount: Surface mount
- B. Adjustments: 3 axis adjustment, pan (360°), tilt (90°) and roll/azimuth (350°)

## 2.43 NETWORK VIDEO SPECIFICATIONS

- A. Communication Platform: Open platform; compatible with ViconNet Digital Video Management System
- B. Compression: H.264; MPEG-4; M-JPEG
- C. LAN Interface: 10 Base-T/100 Base-TX, Multicast
- D. Video Channels: Dual streaming
- E. Max. Resolution/Frame Rate: 720p: 1280x720  
1080p: 1920x1080  
3 MP: 2048x1536  
5 MP: 2560x1920  
720p/1080p: 30 fps; 3 MP: 20 fps; 5 MP: 10 fps
- F. Web Browser: Internet Explorer, Firefox, Google Chrome, Safari
- G. Users: Live viewing for up to 10 clients
- H. Image Settings: Auto exposure; flip horizontal and vertical and rotate 180°; configurable brightness, contrast, saturation, and sharpness; auto white balance, AGC; BLC; WDR (1,2,3 MP versions); motion detection; AC lighting control (50 or 60 Hz)
- I. Supported Protocols: TCP/IP, HTTP, HTTPS, RTSP, RTP, CIFS, SMTP, DHCP, NTP, DNS, UDP, uPnP, ARP, SNMP, ICMP, Zeroconf, APIPA, Telnet, multicast

## 2.44 CERTIFICATIONS

- A. CE
- B. FCC, Class A
- C. IP66
- D. NEMA4
- E. IK10
- F. RoHS
- G. ONVIF
- H. PSIA

## 2.45 WARRANTY

- A. 3 years, parts and labor

**2.46 APPROVED MANUFACTURERS**

- A. The outdoor fixed color IP dome camera shall be Vicon Industries Models IQM55WR-B5, IQM61NE-B5, IQM61WR-B5, IQM61WR-A4, IQM62NE-B5, IQM62WR-B5, IQM62WR-A4, IQM63WR-A4 and IQM65NR-A4.

**2.47 OUTDOOR FIXED IP CAMERA DOME**

- A. The outdoor IP camera shall incorporate a varifocal camera/lens combination. The camera shall include an integral for wall/ceiling/parapet mounting and a power/data back box. The high-resolution day/night camera shall be available with a wide choice of integral manual varifocal IR corrected fixed iris lenses. Day/night operation shall be achieved using a built-in IR-cut filter.
- B. The camera position shall allow for adjustment of pan (360°) and tilt (180°) for any angle of view required.
- C. The camera dome shall be powered by PoE, 12-24 VDC or 24 VAC.
- D. The camera dome shall have simultaneous dual streaming video and support H.264 and M-JPEG compression. The camera shall be available in 5 resolutions, 1 MP (720p), 2 MP (1080p), 3 MP, 5 MP. Camera features shall include electronic iris, WDR (1, 2, 3 MP versions only), AGC, BLC, white balance, flip and rotate, and motion detection.
- E. The camera dome shall meet the FCC requirements for a Class B device. It shall include support for the industry-standard ONVIF interface. It shall be IP66-rated (NEMA 4) to withstand rain, dust and vandalism.
- F. The camera shall meet or exceed the following design and performance specifications.

**2.48 DAY/NIGHT IP CAMERA DOME SPECIFICATIONS**

- A. Imaging Device: 1/3-inch CMOS; 1/2.5-inch CMOS (5 MP);  
1/2.3-inch CMOS (12 MP)
- B. Max. Resolution: 1 megapixel (720p), 2 megapixel (1080p), 3 megapixel,  
5 megapixel and 12 megapixel (4K) models
- C. Shutter Speed: 1/20,000 sec; 1/8000 (12 MP)
- D. Automatic Gain Control: On/Off selectable
- E. Sensitivity: Color: 1-3 MP/12 MP: 0.2 lux, 5 MP: 0.3 lux; B&W: 0.05 lux  
without IR @f/1.4
  
- F. Tilt and Horizontal Pan (360°) and tilt (180°)
- G. Lens Adjustment: Manual focus and zoom adjustment; fixed iris
- H. Focal Length: 1 MP: 12-40, 4-12 or 3.3-10 mm varifocal  
2/3 MP: 12-40, 4-12, 3.3-10 or 1.8-3 mm varifocal;  
5 MP: 12-40, 4-12 or 1.8-3 mm varifocal;  
12 MP: 4.5-10 mm varifocal
- I. Horizontal Field of View: 3.3-10 mm: 27°-70°; 4-12 mm: 30°-74°  
12-40 mm: 9°-18°; 1.8-3 mm: 75°-106°  
4.5-10 mm: 41°-80°

**2.49 ELECTRICAL SPECIFICATIONS**

- E. Input Voltage: PoE, 12-24 VDC or 24 VAC
- F. Current: PoE: 0.2 A; 12 VDC: 0.7 A; 24 VAC/VDC: 0.3 A
- G. Power Consumption: <8 W including heater
- H. Connectors: Power: PoE RJ-45  
Video/Data: RJ-45

- I. Radio Frequency Emission Rating: FCC Class B; CE

## 2.50 ENVIRONMENTAL SPECIFICATIONS

- A. Operating Temperature: -22° to 122°F (-30° to 50°C)
- B. Humidity: 10% to 80% relative, non-condensing
- C. Ratings: IP66/NEMA 4

## 2.51 PHYSICAL SPECIFICATIONS

- A. Construction: Cast aluminum enclosure/arm/back box; polycarbonate lens cover; tamperproof screws
- B. Dimensions: Height: 9.58 in. (243.2 mm),  
Width: 5.18 in. (131.7 mm),  
Diameter: 15.36 in. (390.1 mm)
- C. Weight: Approximately 6.25 lb (2.839 kg)

## 2.52 MECHANICAL SPECIFICATIONS

- A. Camera Mount: Surface mount (wall/ceiling/parapet)
- B. Adjustments: 3 axis adjustment, pan (360°), tilt (180°)

## 2.53 NETWORK VIDEO SPECIFICATIONS

- A. Communication Platform: Open platform; compatible with ViconNet Digital Video Management System, ONVIF/PSIA
- B. Compression: H.264; MPEG-4; M-JPEG available
- C. LAN Interface: 10 Base-T/100 Base-TX, Multicast
- D. Video Channels: Dual streaming
- E. Max. Resolution/Frame Rate: 720p: 1280x720  
1080p: 1920x1080  
3 MP: 2048x1536  
5 MP: 2592x1944  
12 MP: 4000x3000  
720p: 60 fps; 1080p: 30 fps; 3 MP: 20 fps; 5 MP: 10 fps; 12 MP:

15 fps

- F. Web Browser: Internet Explorer, Firefox, Chrome, Safari, Mozilla, Opera
- G. Users: Live viewing for up to 10 clients
- H. Image Settings: Auto exposure; flip horizontal and vertical and rotate 180°; configurable brightness, contrast, saturation, and sharpness; auto white balance, AGC; BLC; WDR (1,2,3 MP versions); motion detection; remote back focus
- I. Supported Protocols: TCP/IP, HTTP, HTTPS, RTSP, RTP, CIFS, SMTP, DHCP, NTP, DNS, UDP, uPnP, ARP, SNMP, ICMP, Zeroconf, AIPPA, Telnet, multicast.

#### 2.54 CERTIFICATIONS

- A. CE
- B. UL, cUL
- C. FCC, Class B
- D. IP66
- E. NEMA4
- F. RoHS 2
- G. ONVIF
- H. PSIA

#### 2.55 WARRANTY

- A. 3 years, parts and labor

#### 2.56 APPROVED MANUFACTURERS

- A. Campus standard – Vicon Industries
- B. The outdoor IP camera shall be Vicon Industries Models IQ861NE-V6, IQ861NE-V7, IQ861NE-V17, IQ861WE-V6, IQ861WE-V7, IQ861WE-V17, IQ862NE-V6, IQ862NE-V7, IQ862NE-V17, IQ862NE-W2, IQ862WE-V6, IQ862WE-V7, IQ862WE-V17, IQ862WE-W2, IQ863NE-V6, IQ863NE-V7, IQ863NE-V17, IQ863NE-W2, IQ863WE-V6, IQ863WE-V7, IQ863WE-V17, IQ863WE-W2, IQ865NE-V6, IQ865NE-V7, IQ865NE-W2, IQ8712NE-V18.
- C. Or equal as approved by the District.

**END OF SECTION**

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**SECTION 31 10 00**

**SITE CLEARING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specifications for clearing, grubbing and disposing of vegetation, including bushes, brush, trees, stumps, fallen timber, logs, roots, rubbish, refuse trash, and debris within the indicated site limits.
- B. Protection from injury or defacement of trees and other vegetation and objects indicated to be preserved.
- C. Removal, salvage, or other disposition of slabs, footings and foundations; existing pavement, curbs and gutters, sidewalks, headwalls, walls, and steps; utility service facilities; guardrail and posts, highway and street signs and fences; and other miscellaneous structures and site improvements which interfere with construction.

**1.02 REFERENCES**

- A. California Code of Regulations, Title 8, Chapter 4, Subchapter 4 Construction Safety Orders.
- B. California Code of Regulations, Title 24, Part 2, California Building Code, Chapter 33, Site Work, Demolition and Construction.
- C. State of California, Department of Transportation (Caltrans), Standard Specifications.

**1.03 JOBSITE CONDITIONS**

- A. Stockpile salvaged material in a secured location.
- B. Clear and restore areas used for the Contractor's convenience. Restore such areas to their original condition, and provide mulching, seeding and planting as required.
- C. Protect survey markers and monuments, existing improvements, and adjacent properties from removal and damage.
- D. Give written notices to utility companies and municipal departments requesting discontinuance of services to areas which will be affected by the site preparation work.

**PART 2 - EXECUTION**

**2.01 MATERIALS AND EQUIPMENT**

- A. Furnish all materials, tools, equipment, facilities, and services as required for performing site clearing and preparation work.

### **PART 3 - EXECUTION**

#### **3.01 CLEARING AND GRUBBING**

- A. Perform clearing and grubbing as necessary to remove vegetation and objectionable material from the site. Clear the site within the limits indicated, and remove cleared materials and debris from the site.
- B. Remove stumps and roots completely in excavation areas and under embankments where the original ground level is within 3.5 feet of subgrade or slope of embankments. In embankment areas, where the original ground level is more than 3.5 feet below the subgrade or slope of embankment, cut off trees, stumps, and brush to within six inches of the ground.
- C. Do not start earthwork operations in areas where clearing and grubbing are not complete, except that stumps and large roots may be removed concurrently with excavation.
- D. Where the work includes requirements for wood chip mulch, acceptable material from clearing and grubbing activities may be used to produce such mulch.

#### **3.02 TREE BRANCHES**

- A. Remove tree branches overhanging trackways, roadways, and other designated areas of the site to within 20 feet of finish grade. Cut off branches neatly and close to the tree boles. Remove other branches as necessary to present a balanced appearance. Treat scars resulting from tree branch removal with a heavy coat of an approved asphaltic tree paint.

#### **3.03 REMOVAL**

- A. Remove existing pavements, structures, and site improvements which interfere with construction, where demolition is not indicated.
- B. Remove walls and masonry construction to a minimum depth of two feet below existing ground level in areas where such items do not interfere with construction.
- C. Slabs may be broken for drainage and left in place where they are not detrimental to the structural integrity of the fill or structure to be placed above.

#### **3.04 DISPOSAL OF REMOVED MATERIALS AND DEBRIS**

- A. Dispose of removed materials, waste, trash, and debris in a safe, acceptable manner, in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction.
- B. Burying of trash and debris on the site will not be permitted. Burning of trash and debris at the site will not be permitted.
- C. Remove trash and debris from the site at frequent intervals so that its presence will not delay the progress of the work.
- D. Removed materials, waste, trash, and debris shall become the property of the Contractor and shall be removed from the District's property and disposed of in a legal manner. Location of disposal site and length of haul shall be the Contractor's responsibility.



3.05 SALVAGE

- A. Items or materials to be salvaged are indicated on the Contract Drawings and in the Contract Specifications.
- B. Protect metallic coatings on salvaged items. Remove adhering concrete from salvaged items.
- C. Repair, or replace with new material, salvaged material damaged or destroyed due to Contractor's negligence.

END OF SECTION

**SECTION 31 23 33**

**TRENCHING AND BACKFILLING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specifications for excavating, backfilling and compacting for the installation of pipe and pipeline appurtenances (i.e. manholes, catch basins, area drains, etc.)

**1.02 RELATED SECTIONS**

- A. Section 32 11 23 – Aggregate Base

**1.03 REFERENCES**

- A. North Marin Water District Standard Specifications - Latest Edition
- B. Novato Sanitary District Standard Specifications - Latest Edition
- C. PG&E Standard Specifications - Latest Edition
- D. AT&T Standard Specifications - Latest Edition
- E. Marin County Uniform Construction Standards, May 2008
- F. California Plumbing Code - Latest Edition
- G. Caltrans Standard Specifications and Drawings - Latest Edition

**PART 2 - PRODUCTS**

**2.01 BACKFILL MATERIAL**

- A. Trench backfill shall consist of Class 2 Aggregate Base, unless otherwise noted.

**2.02 PIPING MATERIAL**

- A. All piping material shall conform to respective utility agency and the California Plumbing Code.

**2.03 BURIED WARNING AND IDENTIFICATION TAPE**

- A. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

1. Warning Tape Color Codes.
  - Red: Electric
  - Yellow: Gas, Oil; Dangerous Materials.
  - Orange: Telephone and Other Communications.
  - Blue: Water Systems.
  - Green: Sewer Systems.
  - White: Steam Systems.
  - Grey: Compressed Air.
2. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
3. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3-feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

#### 2.04 DETECTION WIRE FOR NON-METALLIC PIPING

- A. Detection wire shall be insulated single strand, solid copper wire with a minimum of 12 AWG.

### PART 3 - EXECUTION

#### 3.01 EXCAVATION

##### A. GENERAL

1. Keep trench dry throughout construction operations.
2. Trench excavation shall follow the alignment of the pipe or utility centerline.
3. No more than 100 LF of trench shall be open at one time.

##### B. Shoring and Bracing

1. Contractor is responsible for any damage or injury resulting from his construction operations. Contractor shall perform, at his own expense, all necessary repair work or reconstruction.
2. Contractor will be responsible for all shoring with bracing design and installation.

C. Excavation Required Beyond Trench Limits

1. Excavation (bell holes) where necessary in the sides and bottom of the trench at pipe joint locations shall be large enough to make joints and permit inspection.
2. Excavation to a greater depth than shown on the plans may be ordered by the Project Geotechnical Consultant if the native material at the bottom of the trench will not provide proper support for the pipe or if the excavation is in rock.
3. Remove all adjacent, saturated material where pipeline leaks occur.

3.02 UTILITIES

A. Location

1. Approximate known locations of underground utilities and structures are indicated on the plans. Contractor shall determine exact location of underground utilities and structures prior to construction.
2. Adjustments of pipe alignment and elevation will be authorized by the Owner where exploratory work indicates the need.

B. Excavation Around Utilities

1. Excavation and other work under or adjacent to utilities shall not interfere with their safe operations and use.
2. Probe carefully to determine the exact location of utility and hand excavate where necessary to avoid damage.
3. In the event of damage incurred during construction near such structures or property, Contractor shall immediately notify the Owner and other appropriate utility or public safety authorities and shall arrange for immediate repairs at Contractor's expense.

C. Tunneling Under Utilities

1. Tunneling may be allowed for short distances with the approval from the Project Geotechnical Consultation

3.03 BLASTING

- A. Blasting will not be permitted.

3.04 BACKFILL OF TRENCHES

- A. Prior to backfilling, the trench shall be cleared of all wood and debris.
- B. Backfill pipeline trenches to the level of the original ground surface or the underside of the pavement base course.
- C. Backfill material shall not be dropped directly on the pipe.

- D. Carefully remove timbering, sheeting, shoring and sheet piling, according to the instructions of the shoring system designer or the manufacturer, using methods that will minimize caving. If caving is occurring, the shoring system will be required to remain in place up to one to six inches above the top of the pipe.
- E. Jetting of trench backfill is not permitted.
- F. If trench has been excavated below the specified depth, that portion of the trench shall be backfilled with Class 2 or select material and compacted before pipe installation, at the Contractor's expense.
- G. If pipe or conduit has less than 18 inches of final cover, trench shall be backfilled with Control Density Fill (CDF) to a depth specified by the Engineer.

**END OF SECTION**

**SECTION 32 11 23**  
**AGGREGATE BASE**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specifications for furnishing, spreading, and compacting aggregate base course for pavements as indicated.

**1.02 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - ASTM D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
  - ASTM D3017 Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- B. State of California, Department of Transportation (Caltrans), Standard Specifications:
  - Section 17 Watering
  - Section 26 Aggregate Bases
- C. State of California, Department of Transportation (Caltrans), Standard Test Methods:
  - Calif. Test 201 Method of Soil and Aggregate Sample Preparation Aggregates
  - Calif. Test 202 Method of Tests for Sieve Analysis of Fine and Coarse Aggregates
  - Calif. Test 205 Method of Determining Percentage of Crushed Particles
  - Calif. Test 216 Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates
  - Calif. Test 217 Method of Test for Sand Equivalent
  - Calif. Test 229 Method of Test for Durability Index
  - Calif. Test 301 Method of Test for Resistance "R" Value of Treated and Untreated Bases, Subbases and Basement Soils by the Stabilometer

**PART 2 - PRODUCTS**

**2.01 AGGREGATE BASE MATERIAL**

- A. Class 2 aggregate base shall be free of vegetable matter and other deleterious substances. Coarse aggregate, material contained on the No. 4 sieve, shall consist of material of which 25

percent by weight shall be crushed particles as determined by California Test Method No. 205. Class 2 aggregate base shall conform to one of the following gradings, determined in accordance with California Test Method No. 202:

Percentage Passing Sieves for 3/4" maximum

Sieve  
Sizes

2 inch	----
1 1/2 inch	----
1 inch	100
3/4 inch	90-100
No. 4	35-60
No. 30	10-30
No. 200	2-9

B. Class 2 aggregate base shall conform to the following additional requirements:

Tests	Test Method No. Calif.	Requirements
Resistance (R-Value)	301	78 min.
Sand Equivalent	217	22 min.
Tests	Test Method No. Calif.	Requirements
Durability Index	229	35 min.

2.02 SOURCE QUALITY CONTROL

A. Submit certificate of compliance for approval prior to installation of material.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Call for an inspection by the Engineer and obtain written acceptance of the prepared subgrade or subbase before proceeding with the placement of aggregate base course.
- B. The subgrade or subbase to receive aggregate base course, immediately prior to spreading, shall conform to the compaction and elevation tolerances indicated for the material involved and shall be free of standing water and loose or extraneous material.



### 3.02 INSTALLATION STANDARDS

- A. Aggregate base course shall be applied over the prepared subgrade or subbase and compacted in accordance with Section 26 of the Caltrans Standard Specifications.
- B. Aggregate base course shall be minimum uniform thickness after compaction of dimensions indicated. Where not indicated, compacted thickness shall be six inches for driveways/sidewalks and eight inches for roadways.
- C. All compaction expressed in percentages in this section refers to the maximum dry density as determined by California Test Method No. 216.

### 3.03 SPREADING OF MATERIAL

- A. Aggregate for base course shall be delivered as uniform mixture of fine and coarse aggregate and shall be spread in layers without segregation.
- B. Aggregate base course material shall be free from pockets of large and fine material. Segregated materials shall be remixed until uniform.
- C. Aggregate base material shall be moisture-conditioned to near optimum moisture content in accordance with the applicable requirements of Section 17 of the Caltrans Standard Specifications.
- D. Aggregate base course six inches and less in thickness may be spread and compacted in one layer. For thicknesses greater than six inches, the base course aggregate shall be spread and compacted in two or more layers of uniform thickness not greater than six inches each.

### 3.04 COMPACTING

- A. Relative compaction of each layer of compacted aggregate base material shall be not less than 95 percent as determined by California Test Method No. 216.
- B. Thickness of finished base course shall not vary more than 3/4 inch from the indicated thickness at any point. Base which does not conform to this requirement shall be reshaped or reworked, watered, and recompact to achieve compliance with specified requirements.
- C. The surface of the finished aggregate base course at any point shall not vary more than 3/4 inch above or below the indicated grade.

3.05 FIELD QUALITY CONTROL

- A. Perform field tests in accordance with ASTM D2922 to determine compliance with specified requirements for density and compaction of aggregate base material, and with ASTM D3017 to determine moisture-content compliance of the installed base course.

END OF SECTION

**SECTION 32 12 16**

**ASPHALTIC CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specifications for providing asphaltic concrete paving as indicated.

**1.02 RELATED SECTIONS**

- A. Section 32 11 23 – Aggregate Base
- B. Section 32 17 23 – Pavement Marking

**1.03 REFERENCES**

- A. State of California, Department of Transportation (Caltrans), Standard Specifications
  - Section 39 Asphalt Concrete
  - Section 92 Asphalts
  - Section 93 Liquid Asphalts
  - Section 94 Asphaltic Emulsions
- B. State of California, Department of Transportation (Caltrans), Standard Test Methods
  - Calif. Test 202 Method of Tests for Sieve Analysis of Fine and Coarse Aggregates
  - Calif. Test 304 Method of Preparation of Bituminous Mixtures for Testing
  - Calif. Test 366 Method of Test for Stabilometer Value
  - Calif. Test 375 Determining the In Place Density and Relative Compaction of AC Pavement

**1.04 PROTECTION**

- A. Protect concrete pavements and walks, curbs and bases, and other improvements adjacent to the operations with suitable materials. The Contractor shall be responsible for any damage caused by the Contractor's employees or equipment and shall make necessary repairs. Building and other surfaces shall be covered with paper or other protection, where required. All damage caused by the Contractor's operations shall be prepared or replaced as required.

## **PART 2 - PRODUCTS**

### **2.01 BASE COURSE MATERIAL**

- A. Class 2 Aggregate Base. Percentage composition by weight of aggregate base material shall conform to the 3/4 inch maximum grading when determined by California Test 202.

### **2.02 TACK COAT (VERTICAL SURFACES)**

- A. Tack Coat: Diluted SS-1 or SS-1h emulsion or undiluted RS-1 emulsion in conformance with Section 94 or the Caltrans Standard Specifications.

### **2.03 ASPHALT PAVING MATERIALS**

- A. Paving Asphalt: All purpose, aged residue, steam refined, PG 64-16 grade, in accordance with Section 92 of the Caltrans Standard Specifications.
- B. Aggregate: Type A, with the grading of the combined aggregate conforming to 1/2 inch maximum size, medium grading, as specified in Section 39 of the Caltrans Standard Specifications.
- C. Mixing Facilities: Asphalt concrete surfacing material shall be furnished from an approved commercial asphalt central mixing plant.

### **2.04 SOURCE QUALITY CONTROL**

- A. Contractor shall submit Certificate of Compliance from manufacturer for approval prior to installation.

### **2.05 A.C. DIKE/BERM**

- A. A.C. dikes shall be per Caltrans Standard A87, Type B. Dikes shall be installed by means of a continuance automatic curbing machine.
- B. A.C. berms shall be installed as detailed in the drawing.

## **PART 3 - EXECUTION**

### **3.01 PLACING OF BASE COURSE**

- A. The Contractor shall call for an inspection by the Engineer and obtain written approval of the subgrade before proceeding with the base course.
- B. Base course shall be minimum uniform thickness after compaction of dimensions indicated. Where not indicated, compacted thickness shall be six inches for parking stalls and eight inches for roads, driveways, and aisles of parking areas.
- C. Base course shall be placed over finished subgrade and compacted in accordance with Section 32 11 00 - Aggregate Base.

- D. After base course has been completed, the Contractor shall call for an inspection by the Engineer and obtain written approval before proceeding with application of the asphalt wearing surface.

### 3.02 PLACING ASPHALT CONCRETE

- A. Areas to be paved shall be covered with a layer of hot asphalt concrete surfacing not less than the thickness indicated after compaction. Where not indicated, compacted thickness shall be two inches for parking stalls and three inches for roads, driveways, and aisles of parking areas.
- B. Paving asphaltic concrete shall be delivered, laid, rolled, and finished in accordance with Section 39 of the Caltrans Standard Specifications.
- C. Before placing asphalt concrete, a tack coat (paint binder) shall be applied to all vertical surfaces against which asphalt concrete surfacing will be placed. Tack coat (paint binder) shall be applied in accordance with Section 39-4 of the Caltrans Standard Specifications at the rate of from 0.02 to 0.10 gallons per square yard.
- D. Finish surface of the wearing course shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, cold joints, or other irregularities.
- E. Finish paving shall conform to slopes, lines, and finish grades indicated, and shall drain properly. Where adjacent surfaces are intended to be flush (as at concrete gutters, walks, and paving), they shall conform smoothly at all joints.
- F. Ridges, indentations, and other objectionable marks left in the surface of the asphalt concrete by paving or rolling equipment shall be eliminated by rolling. The use of equipment that leaves ridges, indentations, or other objectionable marks in the asphalt concrete shall be discontinued, and other acceptable equipment shall be employed.
- G. Where cold joints are indicated or necessary, cut back the placed and compacted cold asphalt a minimum of three inches with a concrete or masonry power saw, so that a vertical face of compacted full thickness material is exposed. Treat this surface with a tack coat before proceeding with the placement of new asphaltic concrete surfacing.
- H. Finish paving shall conform to finish elevations within plus or minus 0.01 of a foot and shall be level to within plus or minus 1/4 inch in 10 feet when measured with a 10 foot straightedge in any direction.

### 3.03 FIELD QUALITY CONTROL

- A. The Contractor shall control the quality of the work and shall provide adequate testing to assure compliance with these Specifications.
- B. After completion of paving work, all paving shall be flooded with water, and any resulting "ponds" shall be ringed with chalk. Such hollows shall be corrected with addition of asphalt paving materials and rerolling until all paving is completely level and free from hollows and high spots.
- C. The Engineer shall perform in-place density and compaction tests of the completed pavement in accordance with California Test 375 to determine compliance with specified requirements. Test shall be performed as often as necessary to verify compliance, but not less frequently than the following:

1. One test for each street or driveway intersection for which asphalt pavement replacement is required.
2. One test for every 1,000 square yards of asphalt pavement at locations where the paved area exceeds 1,000 square yards.

#### 3.04 MAINTENANCE OF PAVEMENT

- A. Upon completion of final rolling, traffic shall not be permitted on the finished pavement for at least six hours, and until the asphalt concrete has cooled sufficiently to withstand traffic without being deformed.
- B. Finished pavement shall be maintained in finished clean condition until the work is accepted by the District.

**END OF SECTION**

**SECTION 32 17 23**  
**PAVEMENT MARKING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specifications for providing traffic striping and control markings on pavement, parking stall striping, and painted curbs as indicated.

**1.02 RELATED SECTIONS**

- A. Section 32 12 16 – Asphaltic Concrete Paving

**1.03 REFERENCES**

- A. State of California, Department of Transportation (Caltrans), Standard Specifications/ Manuals
  - Section 84 Traffic Stripes and Pavement Markings
  - Section 85 Pavement Markers
  - Traffic Manual Standard Drawings Latest Edition
- B. State of California, Department of Transportation (Caltrans), Standard Test Methods
  - Calif. Test 669 Testing for Specification Compliance of Non-Reflective and Reflective Pavement Markers
- C. California Air Resources Board (CARB)
  - CARB/VOC Permissible Content of Volatile Compounds (VOC in Paints)

**1.04 SUBMITTALS**

- A. Shop Drawings

Submit drawings and diagrams, indicating stripe width of roadway divider stripes and parking stalls, configuration and dimensions of directional arrows, style and size of letters for "compact car" designation, configuration and dimensions of international handicapped symbol, and any other traffic control markings on pavement, such as "in" and "out" or "enter" and "exit" designations.

- B. Certificate of Compliance

Submit evidence or affidavit which certifies that paint to be used complies with latest CARB/VOC regulations.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Traffic Line Paint

Provide paint conforming to the requirements of Section 84 of the Caltrans Standard Specifications, white in color for traffic striping, parking stalls, and other control markings on pavement, yellow in color for traffic control markings where indicated, blue in color for handicapped parking stalls, red in color for curbs where no parking is indicated, white in color for curbs where passenger discharge and pickup is indicated.

#### B. Thermoplastic Traffic Stripes and Pavement Markings

Provide thermoplastic traffic stripes and pavement markings where indicated, including glass beads, conforming to the requirements of Section 84 of the Caltrans Standard Specifications.

#### C. Paint for parking stalls and ADA Striping shall be waterborne, white, State Specification PTWB-01R2 (March 2010)

#### D. Markers

Provide markers and adhesive in accordance with Section 85 of the Caltrans Standard Specifications.

Markers for hydrants 4" x 4" x ¾", blue prismatic, high-impact plastic conforming to ASTM D-788, Grade 8 and shall conformed to the local Fire Protection District Standards. The hydrant markers shall be attached to the pavement using a hot melt bituminous adhesive conforming to Section 85 of the Standard Specifications.

## PART 3 - EXECUTION

### 3.01 APPLICATION

- A. Provide traffic striping and control markings on pavement and parking stalls in accordance with the layout, configurations, and dimensions indicated on the Contract Drawings or Construction Drawings and approved shop drawings.
- B. Paint application equipment shall conform to the requirements of the Caltrans Standard Specifications. Place markers in accordance with Section 85 of the Caltrans Standard Specifications.
- C. Traffic control markings and parking stalls shall be applied with the use of substantial cutout patterns and templates, or with striping equipment which applies straight, uniform width, sharp lines. Coverage of paint shall be thorough and complete in accordance with the paint manufacturer's instructions and recommendations.
- D. Where "enter" and "exit" control markings are side-by-side on pavements, indicating two-way traffic, such as "enter and "exit" designations shall be different colors, such as white and yellow, with a centerline separating the two directions of traffic.
- E. Traffic control markings and parking stalls shall be sharp and accurate, straight where required, without fuzziness at edges of lines.



- F. Accessible parking stalls shall include the International Accessible Symbol.
- G. At completion, Contractor shall check the work thoroughly and shall touch-up traffic control markings and parking stalls which are not distinct or thorough in coverage, or which are not uniform in color.
- H. Pavement markers shall be placed according to the State Traffic Manual details, except as modified by the project plans or Engineer. All missing and/or broken reflectors shall be replaced within the project limits. The blue reflector shall be installed in the center of the traffic lane adjacent to each fire hydrant. It is the contractor's responsibility to locate each fire hydrant. Pavement markers shall be applied within four days of resurfacing.

### 3.02 FIELD QUALITY CONTROL

- A. Perform tests in accordance with Caltrans Test 669 to verify compliance with Specification requirements.

END OF SECTION

# APPENDIX

Owner Performance Requirements

Report No. 2 Acoustics and Noise Control

Acoustic Partition Details

Report No. 3 VRF Units Exterior Noise Control

- A Fabric Wrapped Panel Information
  - B Low Pressure HVAC Systems Acoustic Requirements and Performance Criteria
  - C Plumbing System Noise and Vibration Control
  - D Sound Masking Design Guidelines and Performance Criteria
  - E Operable Partition Acoustic Requirements and Design Guidelines
- Acoustics Product Data Sheets
- Lighting Cut Sheets
- Plumbing Cut Sheets
- Restroom Accessories Cut Sheets
- Door Hardware Cut Sheets

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## OWNER PERFORMANCE REQUIREMENTS

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ACOUSTIC ARTS AND ENGINEERING

# College of Marin, Building 11 Renovation Project #1

May 25, 2017

## Report No. 1 rev1.

### Owner Performance Requirements - Acoustics

Tim Schmidt  
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#### INTRODUCTION

The following outlines acoustic design criteria and performance requirements for the Building 11 Renovation Project located on the Indian Valley Campus of the College of Marin in Novato, California.

The existing 2 story building will be re-purposed to include new administrative offices and meeting rooms for human resources occupying the second floor. The 2<sup>nd</sup> floor will be reconfigured. A central reception/lounge area will be surrounded by perimeter offices, storage rooms, a kitchenette, an elevator, toilet rooms, and meeting rooms. Existing offices, the elevator, the IT room, and restrooms on the first floor will be maintained. The first floor finishes and mechanical systems will be replaced.

The acoustics scope includes the following design items:

- interior noise and reverberation control
- sound isolation
- impact isolation
- control of building services noise and vibration
- exterior noise insulation

The transmission of speech and activity noise to meeting rooms and private offices is a key concern on the second floor. The second floor will be occupied by the Human

Resources department. Concurrent conversations and unrelated speech in the Lounge may be distracting in the offices or meeting rooms. Acoustically sealed doors and separations are recommended. A sound masking system is also recommended to further improve acoustic privacy. The sound masking system itself may be installed in the future as part of a separate project.

## ACOUSTIC STANDARDS

Acoustic design *requirements* are based on industry accepted acoustic design practices and standards, and fundamental principles for achieving satisfactory acoustic conditions for worship spaces, presentation spaces, offices, and classrooms.

The following design standards apply:

- ASTM E90      Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- ASTM E413     Classification for Rating Sound Insulation
- ASTM C423     Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

## DESIGN GUIDELINES

The following industry design guidelines should be used to establish acoustic criteria and requirements:

- 1)      American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2011 ASHRAE Handbook – HVAC Applications, Chapter 48.3, Table 1, or current version.
- 2)      ASTM E 557, Standard Guide for the Installation of Operable Partitions

## REGULATORY CODES

The project design must comply with the acoustic performance requirements included in the following regulatory codes:

- 1)      California Green Building Standards Code (Part 11 of Title 24, California Code of Regulations). Version 2016 Green Building Standards Code, effective January 1, 2017.



## ACOUSTIC DESIGN CRITERIA

### EXTERIOR NOISE

Located away from roadways and with low volumes of local traffic, exterior noise levels due to transportation sources are not a concern. Standard exterior wall constructions and insulated glazing are sufficient to protect interior spaces from traffic noise associated with the roadway and parking area closest to the site. During my site visit I observed that the site was relatively quiet with a sound scape comprised mostly of creek noise, birds, wind, etc.

### PROJECT GENERATED NOISE

New outdoor mechanical equipment is proposed near the building 11 and will serve Buildings 8 – 12. Noise from the outdoor mechanical equipment will impact the project without proper noise controls.

The existing windows will be replaced with insulated glazing units (IGU). The second floor will have a mix of fixed and operable windows. The preferred noise control strategy is to enclose the outdoor mechanical equipment with solid constructions, to shield all offices from a direct view of the equipment, and to reduce the noise levels at the source

Buildings 8 through 12 will be occupied from 6:30 a.m. to 10:30 p.m. Monday through Friday, and on Saturdays from 6:30 a.m. to 12:00 p.m. It is reasonable to assume minimal foot traffic around the buildings outside of these times.

#### **VRF units**

The primary outdoor noise emissions from the project will be from VRF units located adjacent to Building 11, on the east side. A total of 4 VRF condenser units will be located on the pad which is approximately 8 ft from the East Side of Building 11. It is expected that these will be running continuously while the buildings are occupied. VRF noise will potentially impact nearby buildings as well as Building 11.

Project generated noise from the operation of the VRF units should not exceed 35 dBA at the exterior walkways.

A solid, acoustical barrier around the VRF units will help to shield the closest offices on Level 1. The exact location and size of the barrier to be determined. The primary objective is to achieve line of sight shielding to the surrounding buildings and particularly the offices with operable windows.

## REVERBERATION TIME

A key acoustic parameter used to characterize interior acoustic performance is the reverberation time. The T60 metric is a common measure (in seconds) of reverberation and quantifies the persistence of sound in an enclosed space. The T60 is defined by the time required for an acoustic signal to drop 60 decibels in level starting from the interruption of a loud signal. For example; a T60 of 1.4s is associated with a space where an 80-decibel sound drops to 20 decibels in 1.4 seconds. The T60 can be a single number specified at the 500 Hz or 1k Hz octave bands, or as the average time over a wider range of frequencies.

The single number T60 performance criteria shall be the average of T60 values in octave bands 500 Hz, 1000 Hz, and 2000 Hz, and will include no more than 0.1s variation between adjacent bands.

## MEETING ROOM

The following outlines reverberation time requirements for the Meeting Room.

- Room reverberation time (T60) at or below 0.8s (unoccupied), and with the meeting rooms combined.
- The T60 shall be either the maximum value or the average of all values in octave bands 500 Hz, 1000 Hz, and 2000 Hz, and shall have no more than 0.2s variation between these adjacent bands.
- The following table presents recommended octave band T60 criteria:

**Table 1: Reverberation Time Criteria**

Room Condition	Recommended Maximum Reverberation Time, T60 (seconds) <sup>1,2</sup>						
	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz
Unoccupied	1.2	1.0	0.9	0.8	0.7	0.65	0.6

Table notes:

1. Measured or modeled reverberation time in each octave band from 250 Hz to 4k Hz should be characterized by a smooth decay and without significant dual slopes to at least 30dB below the start of the decay slope.
2. No perceptible flutter echo or audible discrete late sound reflections.

## RECEPTION / LOUNGE

This space will have a high ceiling and large room volume. This generally increases the reverberation time.

- Room reverberation time (T60) at or below 1.2 s (unoccupied).
- The T60 performance shall be the average of T60 values in octave bands 500 Hz, 1000 Hz, and 2000 Hz.

## PRIVATE OFFICES

- Room reverberation time (T60) at or below 0.8 s (unoccupied).
- The T60 performance shall be the average of T60 values in octave bands 500 Hz, 1000 Hz, and 2000 Hz, and will include no more than 0.1s variation between adjacent bands.

## FILE ROOM

- No acoustic requirements

## SOUND ISOLATION

### Doors

The project does not require a confidential level of acoustic privacy in any interior spaces. However, improved acoustic performance is recommended between offices, meeting rooms, and also across walls with entry doors. Doors are typically the weak link in the acoustic separation and sound flanking around the door bottom, or through gaps between the door panel and the jamb can significantly reduce the acoustic performance of the door.

Type DR1 is an acoustically non-rated door type but is acoustically sealed on three sides. This is recommended in all private offices and meeting rooms which will be carpeted. This is an acoustically improved standard solid wood door with acoustic seals at jambs and door head. Where there is carpeting the door bottom will not be sealed. By keeping the gap at the door bottom as small as possible the flanking is controlled. Vision lites in the door should also be specified with thick glazing and perimeter gaskets.

### Partitions

Solid, full height, acoustically rated partitions are recommended between occupied spaces.

The following presents basic sound isolation criteria for interior separations on level 2. Note that existing partitions on level 1 will not be upgraded. These constructions are not acoustically tested and/or may not meet the recommended criteria.

**Private Office / Private Office**

partition:	STC 45, Type A1
door:	no door

**Private Office / Reception**

partition:	STC 32 – 35 (storefront glazing)
door:	acoustically sealed type DR-1

**Office / Elevator Shaft**

partition:	STC 54 (shaft + furred wall), Type A3
door:	no door

**Meeting Room / Private Office**

partition:	STC 50, Type A2
door:	no door

**Meeting Room / Reception Area**

partition:	STC 45, Type A1
door:	sliding door (acoustically treated/sealed)

**Meeting Room / Meeting Room**

partition:	operable partition rated STC 50
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**Office / Restroom (Level 1)**

partition:	existing - with a partial furred wall.
door:	no door

**BUILDING SERVICES NOISE**

The building ventilation systems, plumbing systems, and other systems must be designed to minimize noise and to achieve a subjectively neutral background ambient sound in the key offices and meeting spaces.

The following table presents recommended maximum background noise limits for building services equipment and systems:

**Table 2: Noise Criteria**

<b>Room Description</b>	<b>Background Sound Level LAeq</b>	<b>Noise Criteria NC</b>
Stair well	40	35
Private Office	35	30
Meeting Rooms	35	30
Reception / Lounge	40	35
Corridors/Toilet	40	35
Kitchenette	40	35

Table notes:

1. Audible noise due to operation of HVAC sources should have no noticeable vibration induced noise content, rumble, distinct tones, or impulsive characteristics. Sound levels are based on all equipment operating normally and together.
2. Maximum sound level at any location in the room as measured at ear height and minimum 4 ft from any wall or sound reflective surface.

Noise emissions from low pressure mechanical systems should be controlled by specifying quiet fan units. FCUs located above the offices should be located away from the Reception/Lounge. Sheet metal and flexible ducts should be installed above the hard lid ceilings, and configured to achieve good airflow (non-turbulent) conditions.

Duct air velocities should not exceed the recommended air velocities for the project based on NC criterion of space served. Refer to maximum recommended duct velocities.

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REPORT NO. 2 ACOUSTICS AND NOISE  
CONTROL

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ACOUSTIC ARTS AND ENGINEERING

# College of Marin, Building 11 Renovation Project #1

March 10, 2017

## Report No. 2 – Acoustics and Noise Control Acoustic Design Recommendations

Tim Schmidt  
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### INTRODUCTION

The following outlines acoustic design strategies and detailed recommendations for the Building 11 Renovation Project located on the Indian Valley Campus of the College of Marin in Novato, California.

The existing 2 story building will be re-purposed to include new administrative offices, meeting rooms, as well as a common Reception/Lounge area.

The following acoustic design items are addressed:

- Interior noise and reverberation control
- sound isolation
- impact isolation
- control of building services noise and vibration
- exterior noise insulation

Exterior noise control recommendations related to proposed outdoor mechanical equipment will be issued separately (Report No 3).

Refer to the previously issued Owner Performance Requirements for acoustic design requirements and design criteria for each space.



March 10, 2017

Acoustics

## INTERIOR ACOUSTICS

The following outlines interior acoustic strategies and preliminary finish recommendations for each space:

### **Reception / Lounge**

The Reception / Lounge will be open to the deck and will have a relatively large room volume. This space will be more reverberant due to the large volume. The entire open area on the second floor will have an exposed ceiling deck. The existing deck is a wood plank construction and will be mostly sound reflective.

A key interior acoustics concern is general noise intrusion from activity and talking in and around the stairwell and open areas to the perimeter meeting rooms and private offices.

This reception area is expected to be used for breaks and may have concurrent conversations and casual meetings. The offices and meeting rooms are for HR and will be used for sensitive discussions. Therefore, control of speech transmission warrants acoustically sealed separations, at a minimum at the perimeter offices.

The offices will be occupied by the HR department and occupants may be discussing issues of a personal nature. Since the client has not requested a high level of acoustic privacy between these areas the design strategy calls for cost effective systems as much as possible, while avoiding acoustically rated doors and glazing. It is assumed that the meeting rooms are not be as acoustically sensitive as the offices.

The reception area should be acoustically treated with sound absorptive finishes to control noise and sound reflections. Carpeting is specified throughout and batt insulation will be installed above the ceilings of the perimeter offices and meeting rooms (exposed to the reception area volume). These finishes will help to reduce general room reverberation and may be sufficient.

Future acoustical improvements to the reception area may be achieved by surface mounting wall treatments such as fabric wrapped wall panels. These will be beneficial if the reception area is more active/noisy than expected. Wall panels can generally be easily installed after the building is occupied.

A sound masking system is recommended if sensitive meetings and discussions from the meeting rooms should not be overheard in the open work area. Note that a sound masking system should only be installed in the open area, not in private offices.

The following outlines the acoustic finishes recommended for this space:

*Surface above Offices and Meeting Rooms:*

- Exposed batt insulation is recommended on top of the surfaces above the private offices and meeting rooms. This is for reverberation control in the high ceiling space (reception). Standard, unfaced batt insulation (R19 or thicker) may be specified. A minimum coverage area of 50% is recommended.

Recommended products:

Standard, unfaced, R19 batt insulation, cotton, or fiberglass.

*Floor:*

- Current design indicates ¼" thick carpet tiles in all areas. Standard commercial carpet is sufficient to dampen walking/impact noise. Carpet pad is not required.

*Wall Finishes:*

- In the future, after the building is occupied and the room activity level is better understood, some wall areas may be treated with surface mounted acoustic wall panels. These should be specified with a minimum NRC 0.85. A fabric wrapped panel or a digital printed art panel may also be installed.

Install a minimum of 48 ft<sup>2</sup> coverage area distributed between at least 3 wall surfaces in the Open Area to start. Exact layout tbd.

Recommended products:

Decoustics, Type AP Panel (see data sheet 1A).

Lamvin, fabric wrapped panel (see data sheet 1B).

Wall Technology, fabric wrapped panel (see data sheet 1C).

A sound masking system is recommended if sensitive meetings and discussions should not be overheard in the open work area. A sound masking system should only be installed in the open area. Refer to appended guidelines and requirements.

## **PRIVATE OFFICES**

The following outlines the acoustic finishes recommended for private offices:

### **Ceilings:**

- The ceiling will be gyp bd and will not be acoustically treated.

### **Floor:**

- Current design indicates ½" thick carpet tiles in all offices. Standard commercial carpet is sufficient to dampen walking/impact noise from the second floor. Carpet pad is not required.

### **Wall Finishes:**

- Wall surfaces in private offices do not require acoustic finishes.

## **MEETING ROOM**

The following outlines the acoustic finishes recommended for this space:

### **Ceilings:**

- The ceiling will be gyp bd and will not be acoustically treated.

### **Floor:**

- Current design indicates ½" thick carpet tiles. Standard commercial carpet is sufficient to dampen walking/impact noise. Carpet pad is not required.

### **Wall Finishes:**

- Operable walls will have felt material to improve the acoustics of the meeting rooms. However, when the operable wall is closed the benefit of the felt is no longer relevant. Also note that the space will be more reverberant when the meeting rooms are combined.
- Acoustic wall panels are recommended in the meeting room and should be specified with a minimum NRC 0.85. A tackable panel may be used.

Minimum total 24 ft<sup>2</sup> coverage area is recommended across several wall surfaces for each meeting room with most of the treatment installed on the end walls. These treatments are important if the rooms are used for teleconferencing which requires that the reverberation and echoes be controlled.

Wall panels can generally be easily installed after the building is occupied.

**Recommended products:**

Decoustics, Type AP Panel (see data sheet 1A).

Lamvin, fabric wrapped panel (see data sheet 1B).

Wall Technology, fabric wrapped panel (see data sheet 1C).

## **STAIR**

The following outlines the acoustic finishes recommended for this space:

***Ceilings:***

- The stair will be open to the main open area on level 2.

***Wall Finishes:***

- Not required.

***Stair Treads:***

- Carpet is recommended on stair treads.
- The stairs will be maintained and are currently noisy due to resonance related to foot fall impact. The stair framing should be reinforced and treads stiffened with additional materials and screw attachment.  
  
Stiffening plates of plywood can be screw attached to the existing treads from the bottom and with additional adhesive applied to the full area of the reinforcing plates. The screws should be spaced every 12".
- Current design indicates ¼" thick carpet. Standard commercial carpet is sufficient to dampen walking/impact noise. Carpet pad is not required.
- The void under the stairs should be insulated with a rigid polyester fiber insulation board at the back wall of the janitor storage space. Data sheets have been provided.

## **TOILETS**

Noise intrusion from the restrooms is concern. The toilet fixtures should be selected for quiet operation.

Electric hand dryers are not recommended as these tend to generate high levels of noise and may transmit through the wall to the offices. Where hand dryers are a priority select hand dryers with a low air speed and a quiet noise rating. Recommendations are pending.

March 10, 2017

Acoustics

### *File Room*

- Acoustic wall finishes are not required

## SOUND ISOLATION - RECOMMENDATIONS

Refer to schematic level details for partitions issued previously.

The following outlines sound isolation strategies and preliminary partition recommendations for each separation:

### Floor Construction

I understand that the floor separation includes a 3" thick layer of lightweight concrete over 3/8" thick plywood over 3 x 6 T&G planking. The joists are at least 16" deep. The clearance (air space) above the first floor finish ceiling is roughly 3'-3".

The ceiling tile specified for the lower floor spaces is an Armstrong Ultima Beveled Tegular Tile ceiling with a CAC 40 and NRC 0.75 rating.

The floor separation should include minimum R19, un-faced, batt insulation in the joist cavity.

### Interior Partitions:

Refer to schematic details (acoustic types) issued previously

- Solid partitions with 25 metal stud framing, 24" on center are proposed.
- Interior partitions separating enclosed offices: Type A1
- Partitions separating the Private Offices from Meeting Rooms should be Type A2
- Partitions separating the Private Offices from a restroom should be Type A3
- Outlets in the demising partitions should be sealed with putty pads, and all joints should be filled with acoustical sealant.

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March 10, 2017

Acoustics

At sensitive areas that require an upgraded constructions or where equipment noise is a concern such as in the elevator machine room or the IT room the following measures may be needed – to be confirmed:

1. Additional gypsum board layers.
2. Add extra layer of damped gypsum board such as Quiet Rock damped gypsum board Type 510 ES may be installed over existing partitions that will be maintained.

## Door Types

Doors should be solid wood panel doors installed with perimeter acoustic compression seals such as Type S88 by Pemko or equal by Zero International. Refer to attached data sheets for information. Vision lites in solid doors will reduce the sound isolation performance unless high performance glazing and airtight gaskets are specified.

## Sliding Doors at Meeting Rooms

The sliders at the meeting rooms are aluminum framed glass. Glass has limited acoustical performance and sliding doors are challenging to acoustically seal on the top, bottom, and one side.

If the meeting rooms will be used for teleconferencing a slightly higher level of acoustic privacy is recommended. Tele-conference participants often use a higher than normal voice level to be understood. This is particularly relevant in larger meetings with a single microphone in the center of a table, and with a large distance from the microphone to the talker. If the speech privacy is a priority the meeting room sliding doors should be designed with seals, including bottom seals, and special treatments to mitigate speech transmission between the meeting rooms and the Reception/Lounge.

The sliding doors as proposed cannot be fitted with bottom seals or top seals, or seals at outside end of the door panels.

- A carpeted floor finish is recommended under the door to help reduce flanking under the door.
- The door should be installed with minimal clearance/gap under the door, between the door panels, and between the door and the wall.
- A minimum ½" thick glazing recommended.
- Acoustical compression seals should be specified at the meeting stiles. Refer to attached data sheet.

March 10, 2017

Acoustics

## Operable Partition in the Meeting Room

The operable partition in the Meeting Room should be acoustically rated and the surround designed to reduce sound flanking. Note that high performance operable partitions are heavier and can be very costly, and the acoustic performance of the separation is limited. Modern Fold operable partition systems (or equal manufacturer) may be specified with performance ratings ranging from STC 41 up to STC 55. A minimum STC 47 system is recommended for this project. Please confirm that this if a higher degree of acoustic separation is required between these two rooms.

Refer to appended acoustic requirements and guidelines for operable partitions.

## Ceilings

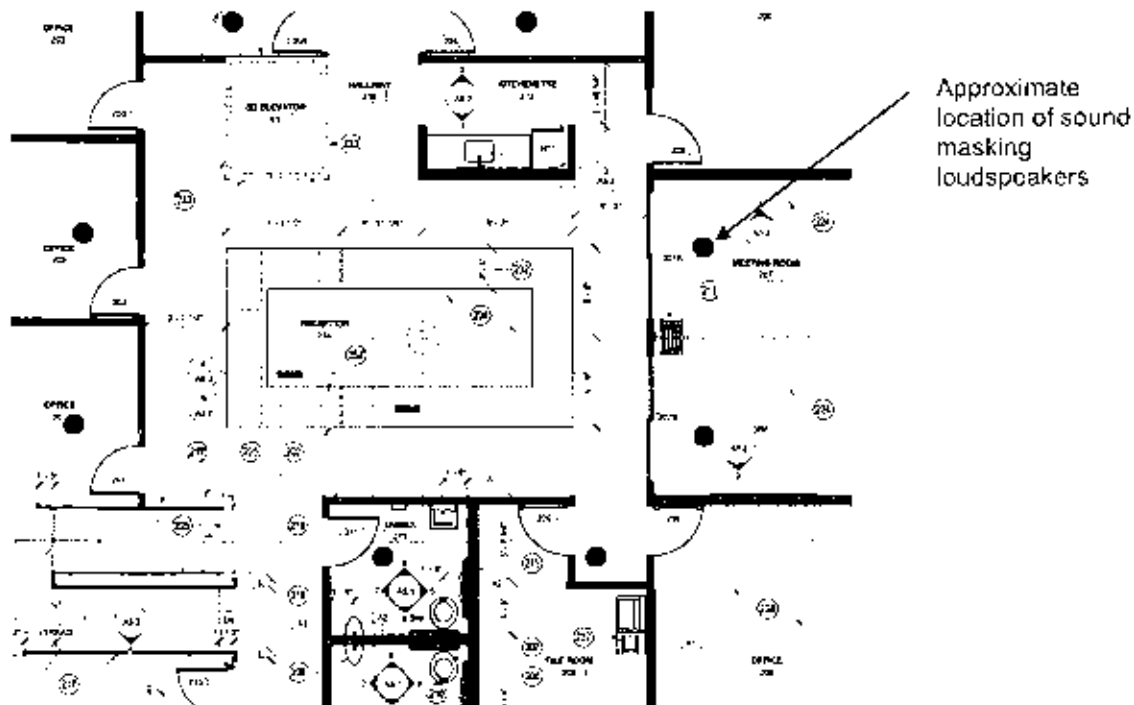
1. Ceilings in the offices and meeting rooms on the second floor will be gypsum board. The demising walls may terminate at this ceiling. Specify a minimum 5/8" thick Type X gypsum board ceiling. All fixtures should be acoustically sealed. Recessed fixtures should be enclosed with a gypsum board enclosure, taped and caulked airtight.
2. Mechanical equipment should be mounted on vibration isolation pads, on separate framing from the ceiling.
3. Return air openings in sensitive private offices, and in the meeting rooms should have an acoustically lined sheet metal elbow (boot) that has 1" thick duct lining on all interior surfaces. The elbow should extend a minimum distance of 20" from the inside corner. Refer to appended schematic detail for transfer air.
4. The open return air openings in non-sensitive offices with normal privacy requirements may have an acoustically tested and approved wrapped, flexible boot such as Flexaboot® by Build Right Products, LLC. See the following website for information.

<http://flexaboot.com>

Refer to appended schematic detail for transfer air.

## SOUND MASKING

A sound masking system is recommended if sensitive meetings and discussions should not be overheard in the open work area. A sound masking system should only be installed in the open reception/lounge area. Refer to Appendix E for guidelines and also see data sheets for recommended electronic sound systems that may be specified for this project. The following layout shows the recommended layout for the loudspeakers. There should be a minimum of 8 loudspeakers installed. These should be installed so they cannot be seen, and pointed up toward the exposed deck.



## MECHANICAL AND PLUMBING NOISE CONTROL

Noise and vibration control comments are pending review of the MEP design documents.

All rotating or vibrating equipment should be vibration isolated. All new and existing mechanical equipment should be located remotely from acoustically sensitive spaces and/or enclosed in an insulated enclosure with solid gypsum board constructions providing noise control.

Vibration isolation mounts and sleeves are recommended at all active plumbing pipes.

Refer to appended mechanical noise control guidelines (Appendix B and C) for general strategies to maintain low ambient sound levels due to operation of mechanical and plumbing systems.



## ELEVATOR

Noise and vibration control requirements are not included in this review. Noise from the elevator machine room is a potential concern. The elevator is currently out of order.

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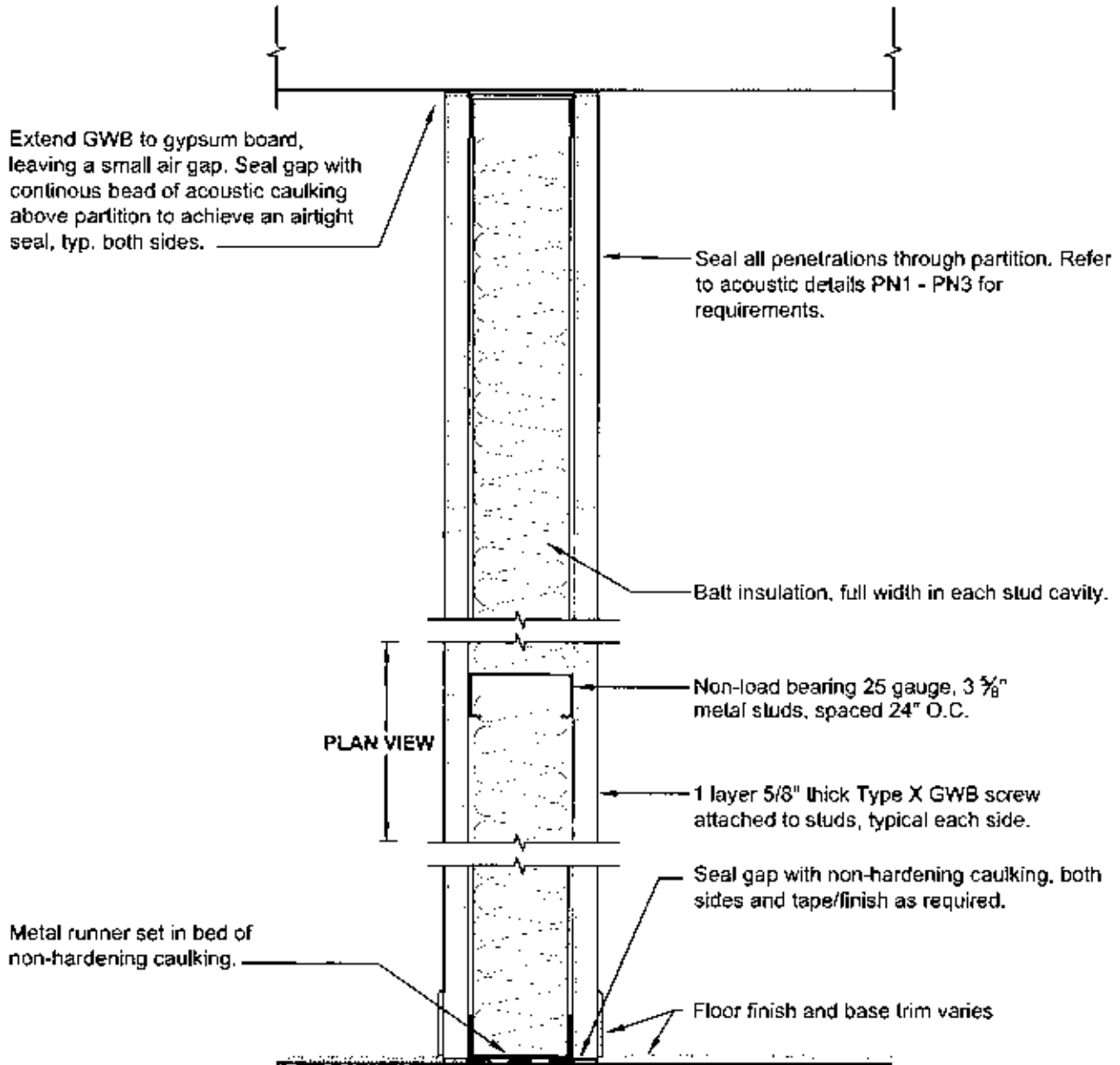
## ACOUSTIC PARTITION DETAILS

## ACOUSTIC PARTITIONS - GENERAL NOTES:

1. Install multiple layers of GWB with staggered panel joints offset by minimum of 18".
2. Caulk and tape all joints and gaps in outer layers of GWB including all perimeter edges. Use acoustical caulking or approved non-hardening caulk.
3. Install electrical, AV, and teledata outlets with steel junction boxes.
4. Avoid back to back outlet configurations. Offset wall outlets on opposite sides of wall by at least 2 stud cavities, or at least 36" vertical.
5. Active piping, ductwork, or conduit connected to vibrating equipment shall not be rigidly supported or have contact with partition. Coordinate with trades installing these systems to maintain physical separation between these systems and ecoustically rated partitions.
6. Stud size and spacing affects the sound rating of partitions. Partitions installed with alternate stud sizes and/or configurations (deviating from those indicated in acoustic details) may have a different STC rating. Alternate stud configurations must be reviewed and approved for acoustic performance. STC ratings are based on metal stud construction with a 20" - 24" spacing.
7. Seal all gaps and joints in acoustically rated GWB constructions with acoustic caulking applied in conformance to ASTM C919.
8. GWB well constructions should have  $\frac{1}{4}$ " gap at bottom. Fill gap with continuous bead of approved non-hardening caulking, both sides and tape/finish as required.

<b>PROJECT:</b> College of Marin Building 11 Renovation  <b>CLIENT:</b> brick.	<b>SOUND RATED PARTITION NOTES</b> Notes	<b>TITLE:</b> <b>N1</b>  <b>ISSUE DATE:</b> March 7, 2017
<b>SCALE:</b> NTS <b>ENG:</b> TS <b>PHASE:</b> Construction Documents Phase		

Design Information Only - Not For Construction



## TYPE A1

STC 46

Ref. STC Test NRC: TL-93-352

1. STC performance is estimated and/or determined by laboratory tests with partitions installed under ideal conditions. Laboratory tests and estimated ratings are provided for comparison and do not guarantee the installed performance of interior constructions.

PROJECT:  
College of Marin  
Building 11 Renovation

CLIENT:  
brick.

## SOUND RATED PARTITION TYPES

Typical Sound Isolation Detail

SCALE: NTS

ENG: TS

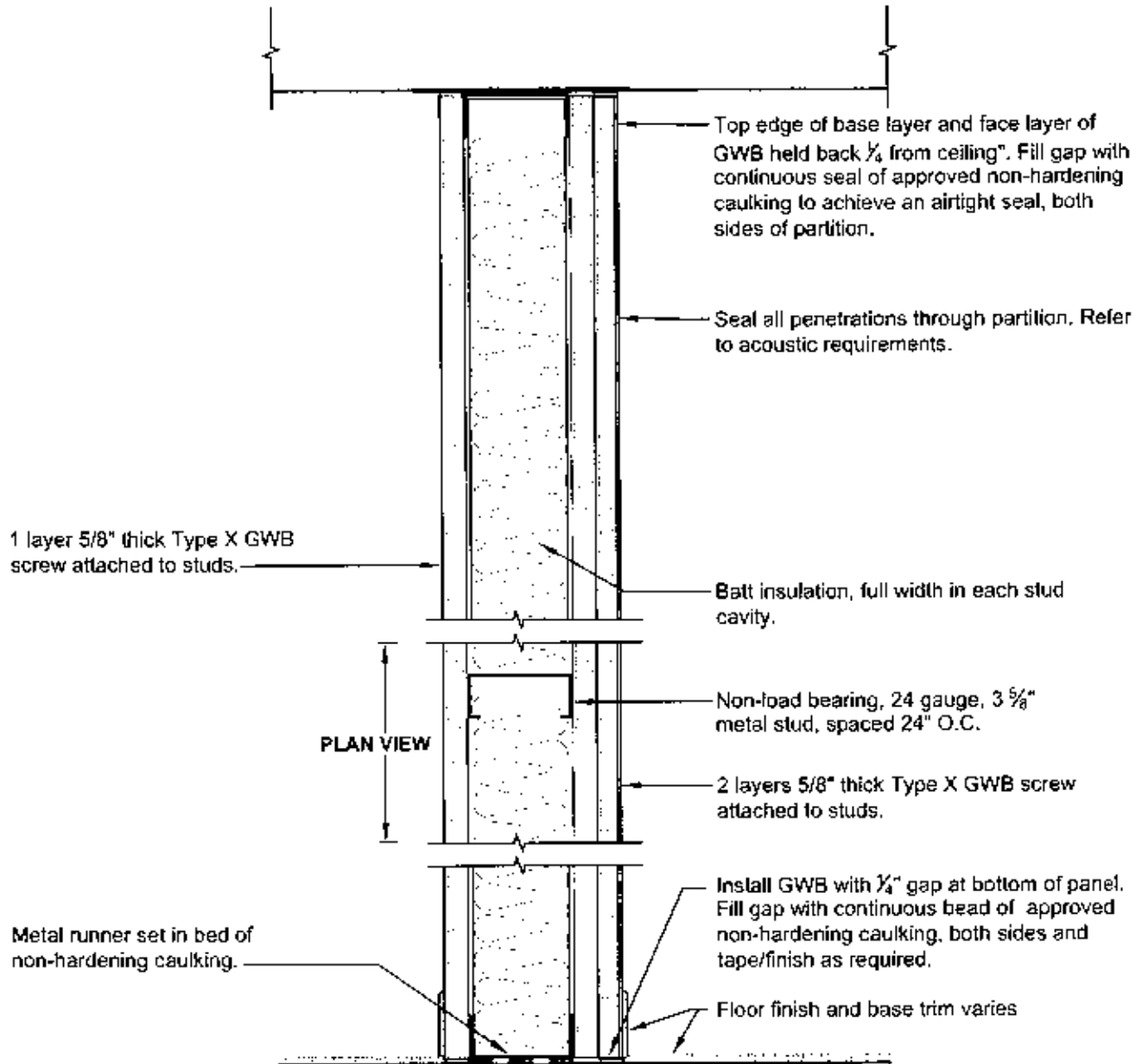
PHASE: Construction Documents Phase

TITLE:

# A1

ISSUE DATE: March 7, 2017

Design Information Only - Not For Construction



## TYPE A2

STC 52

Ref. STC Test NRC: TL-92-420

1. STC performance is estimated and/or determined by laboratory tests with partitions installed under ideal conditions. Laboratory tests and estimated ratings are provided for comparison and do not guarantee the installed performance of interior constructions.

PROJECT:  
College of Marin  
Building 11 Renovation

CLIENT:  
brick.

## SOUND RATED PARTITION TYPES

Typical Sound Isolation Detail

SCALE: NTS

ENG: TS

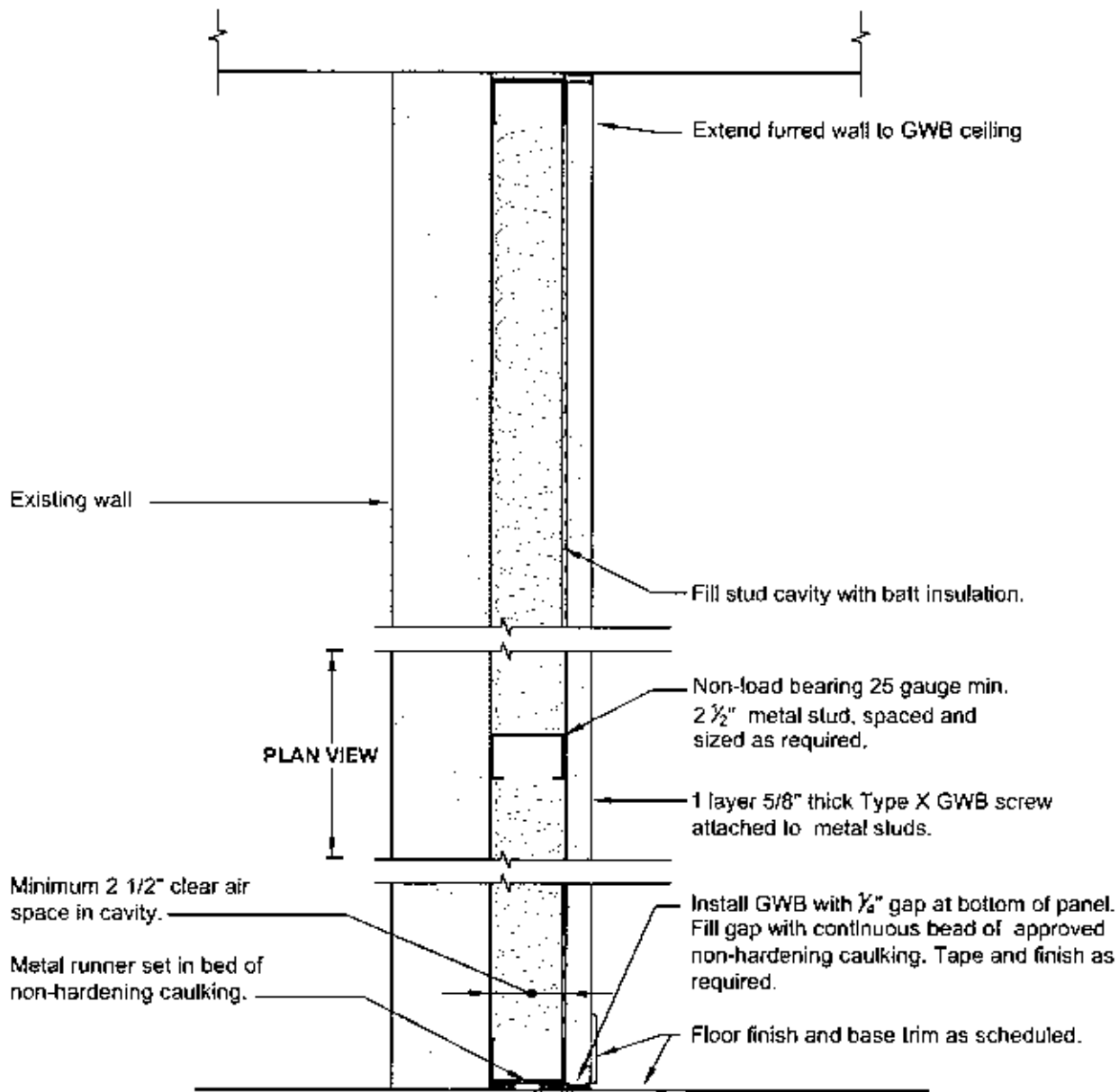
PHASE: Construction Documents Phase

TITLE:

# A2

ISSUE DATE: March 7, 2017

Design Information Only - Not For Construction



### TYPE A3

## Existing wall with additional furred wall

PROJECT:  
College of Marin  
Building 11 Renovation

CLIENT:  
brick.

## SOUND RATED PARTITION TYPES

Typical Sound Isolation Detail

SCALE: NTS

ENG: TS

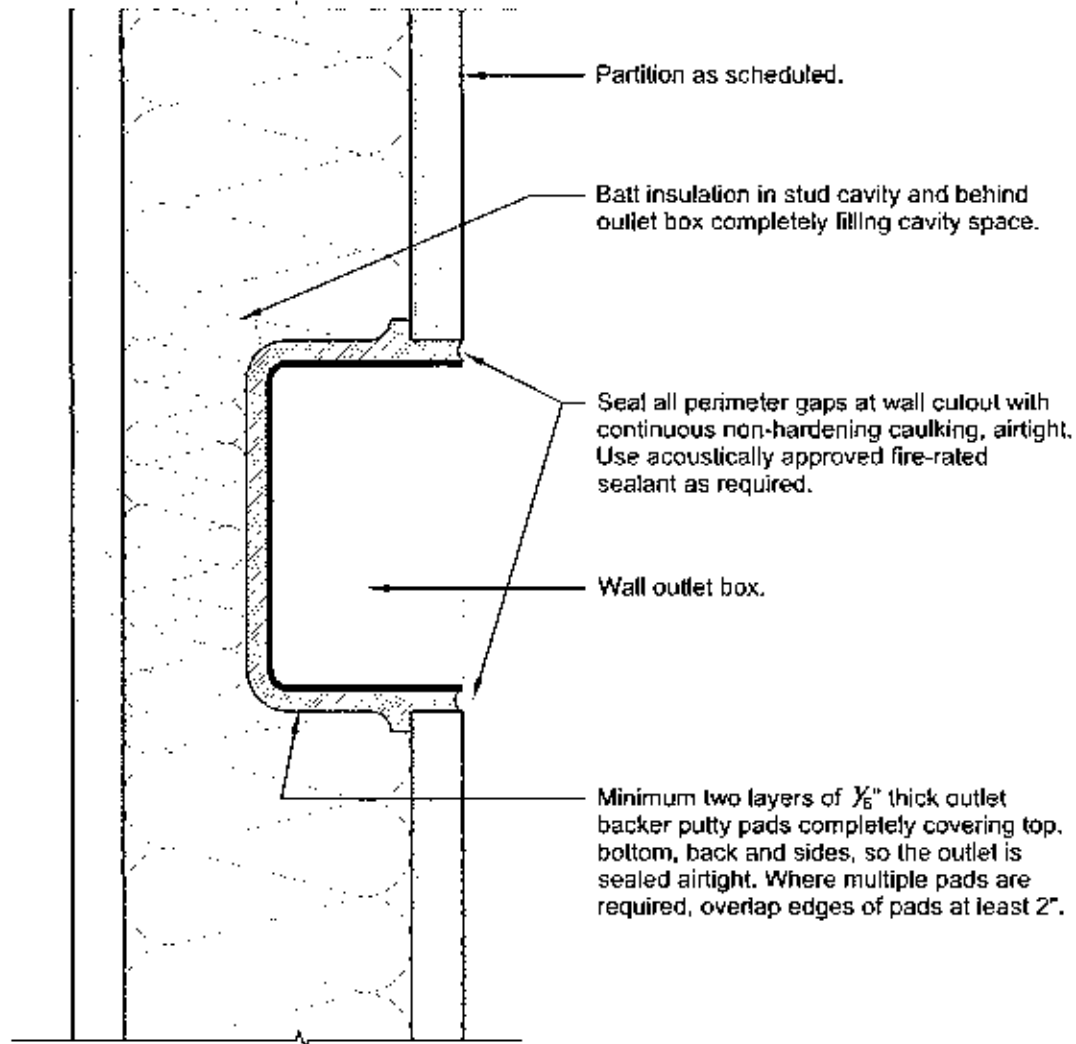
PHASE: Construction Documents Phase

TITLE:

# A3

ISSUE DATE: March 7, 2017

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#### NOTES

1. All outlets, including data and telephone outlets in acoustically rated partitions to be installed in steel junction boxes.
2. Do not locate outlets on opposite sides of partitions sharing the same stud cavity. Provide a minimum of 24" offset between outlets on opposite sides of wall. Outlets on opposite sides of STC 55 or higher partition should be offset by at least two studs or 36" vertical distance.
3. For fire rated walls use acoustically approved fire rated outlet box pads.

PROJECT:  
College of Marin  
Building 11 Renovation

CLIENT:  
brick.

## OUTLET BOX INSTALLATION

Typical Sound Isolation Detail

SCALE: NTS

ENG: TS

PHASE: Construction Documents Phase

TITLE:

# PN1

ISSUE DATE: March 7, 2017

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Insulated hollow metal door frame filled with minimum 6 lb density insulation.

Seal airtight between frame and wall with continuous non-hardening resilient sealant, both sides.

Note: Precision alignment is key to the acoustic performance. Door installer to confirm that the door can be installed with  $\frac{1}{16}$ " compression of acoustic seals and that the recommended width of the gap at door bottom is maintained to  $\pm \frac{1}{16}$ ".

Acoustical door gasketing such Type 188 by Zero International or Pemko Type S88. Apply continuous at door head and jambs.

Minimum 1-3/4" thick solid-core wood or insulated hollow metal door, minimum 4 lb/sf. Vision lites minimum  $\frac{3}{8}$ " thick glazing sealed airtight with perimeter gaskets.

Maximum  $\frac{1}{4}$ " gap under door.

Carpet in both rooms.

**Carpeted Floor**

Metal or solid wood threshold, as required for ADA compliance, bedded in acoustic sealant with a neoprene compression door stop. Zero International Type 565, or equal by Pemko.

Door installed so perimeter seals on all 4 sides are compressed when door is closed.

Hard finish floor

**Hard Floor Finish**

Maximum  $\frac{1}{2}$ " gap under door.

Where no threshold installed, specify an automatic door bottom such as Type 367 (surface) or Type 360 (mortised) by Zero International, or equal by Pemko.

Hard finish floor

**Hard Floor Finish Floor (Alternate)**

**DOOR TYPE DR1**

Note:  
Not a rated system. Acoustic performance depends on door panel rating and installation.

PROJECT:  
College of Marin  
Building 11 Renovation

**INTERIOR DOOR REQUIREMENTS**

TITLE:  
**DR1**

CLIENT:  
brick.

Typical Sound Isolation Detail

SCALE: NTS

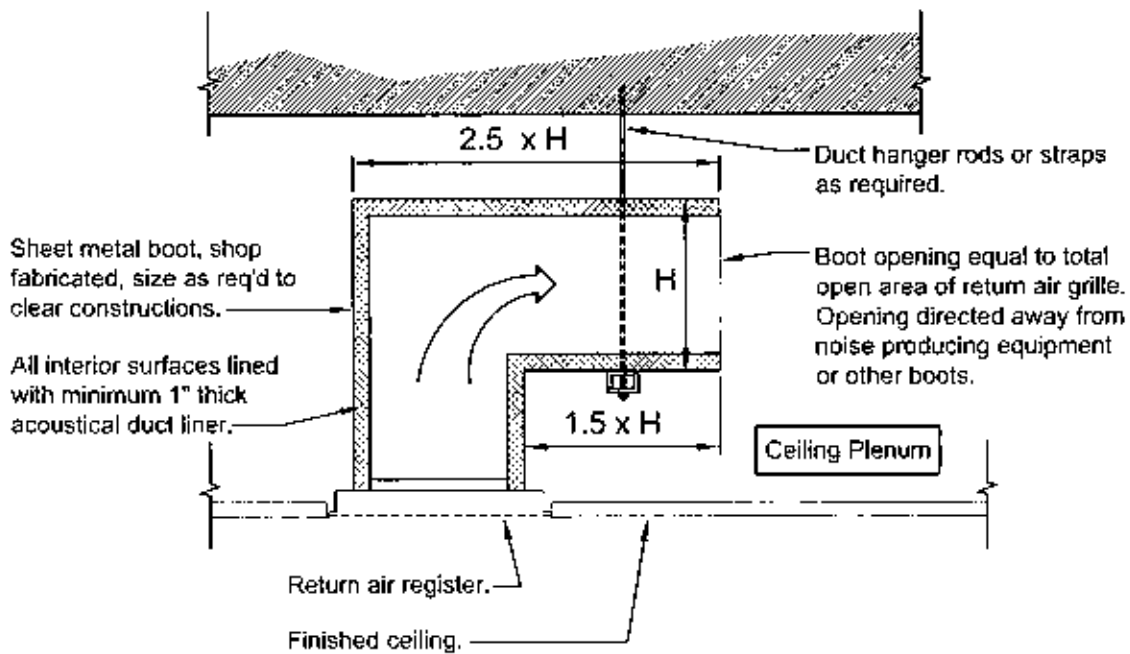
ENG: TS

PHASE: Construction Documents Phase

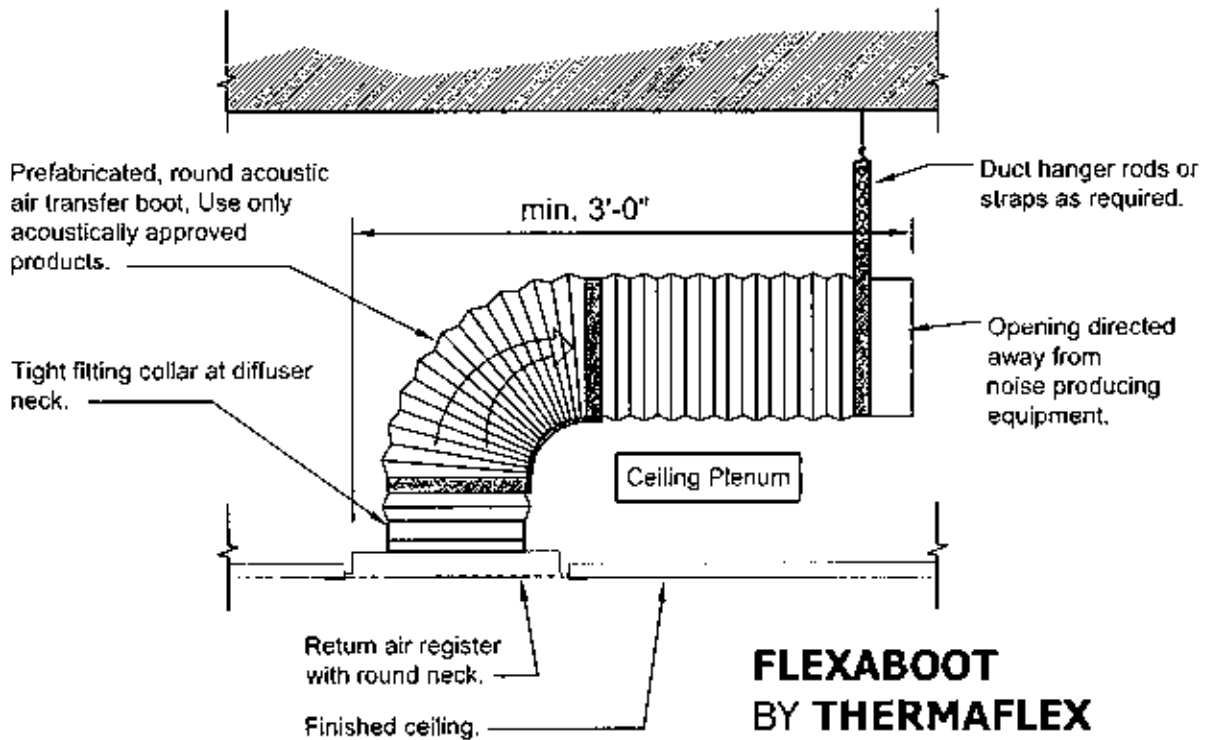
ISSUE DATE: March 7, 2017



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**Section View** Section View  
not to scale



**Section View**  
not to scale

**FLEXABOOT**  
**BY THERMAFLEX**  
1-800-459-4822  
[www.wereflexible.com](http://www.wereflexible.com)

PROJECT:  
College of Marin  
Building 11 Renovation

CLIENT:  
brick.

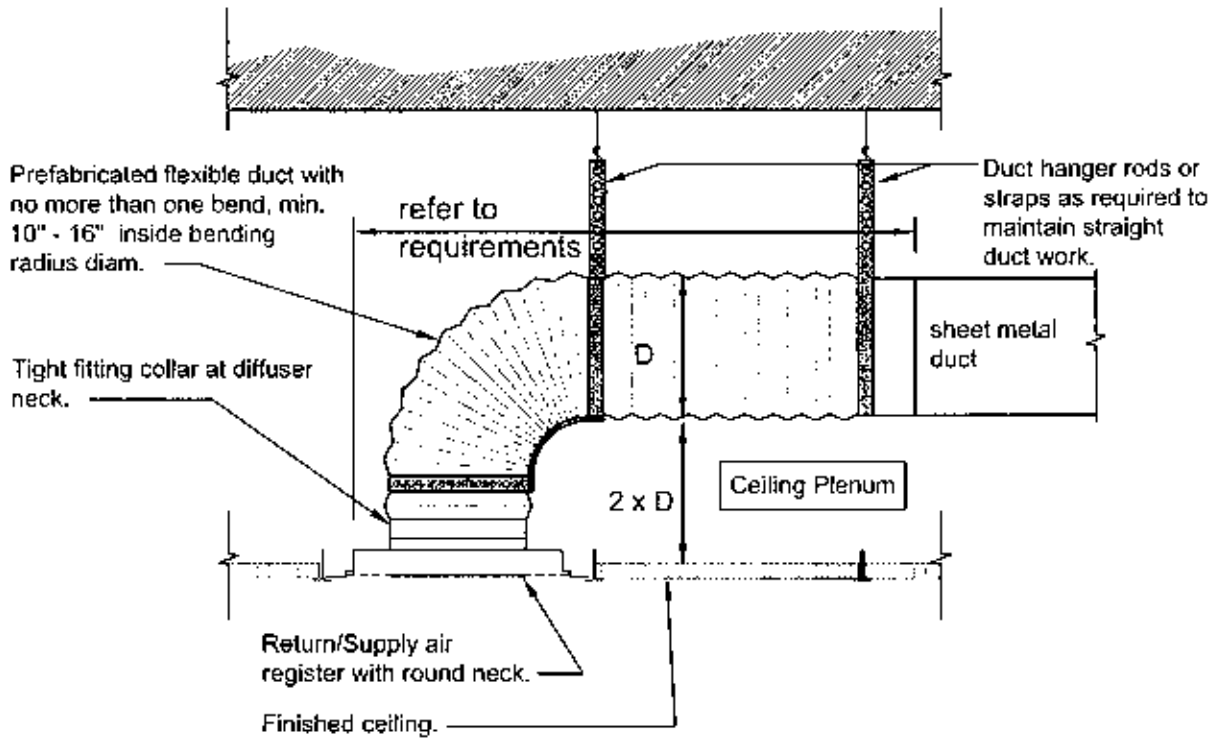
**Return Air Boot Detail at Meeting Rooms**  
Typical Sound Isolation Detail

TITLE:  
**RA1**

ISSUE DATE: March 7, 2017

SCALE: NTS    ENG: TS    PHASE: Construction Documents Phase

Design Information Only - Not For Construction



### Typical Flex Duct Connection

not to scale

PROJECT:  
College of Marin  
Building 11 Renovation

CLIENT:  
brck.

## Flexible Duct Connection

Typical Mechanical Detail

SCALE: NTS

ENG: TS

PHASE: Construction Documents Phase

TITLE:

# M1

ISSUE DATE: March 7, 2017

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REPORT NO. 3 VRF UNITS EXTERIOR NOISE  
CONTROL



## College of Marin Bldg 11 Renovation (Project No. 1) VRF Units Exterior Noise Control

March 10, 2017

Report No. 3, revision 1

Tim Schmidt  
tschmidt@acousticae.com

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### Summary

This report outlines revised noise control recommendations for four VRF heat recovery units to be located near the Building 11 at the College of Marin Indian Valley campus in Novato, California.

There will be 3 units located on a slab on grade just to the north east of Building 11.

Without noise control measures the VRF units operating together, are expected to generate the following noise levels around the site:

Building 11	55 - 59 dBA
Building 9	48 - 52 dBA
Outdoor deck	48 dBA
Pedestrian walkway	47 dBA

The VRF units should be enclosed with a solid barrier wall to reduce noise levels transmitted to the most sensitive receivers which include the outdoor pedestrian walkways, the deck, and the meeting rooms in Building 11. The meeting rooms have operable windows.

The barrier should be solid and sized to achieve as close as possible to the recommended outdoor noise criteria (Refer to OPR).

Fig 1 below shows the proposed VRF locations:

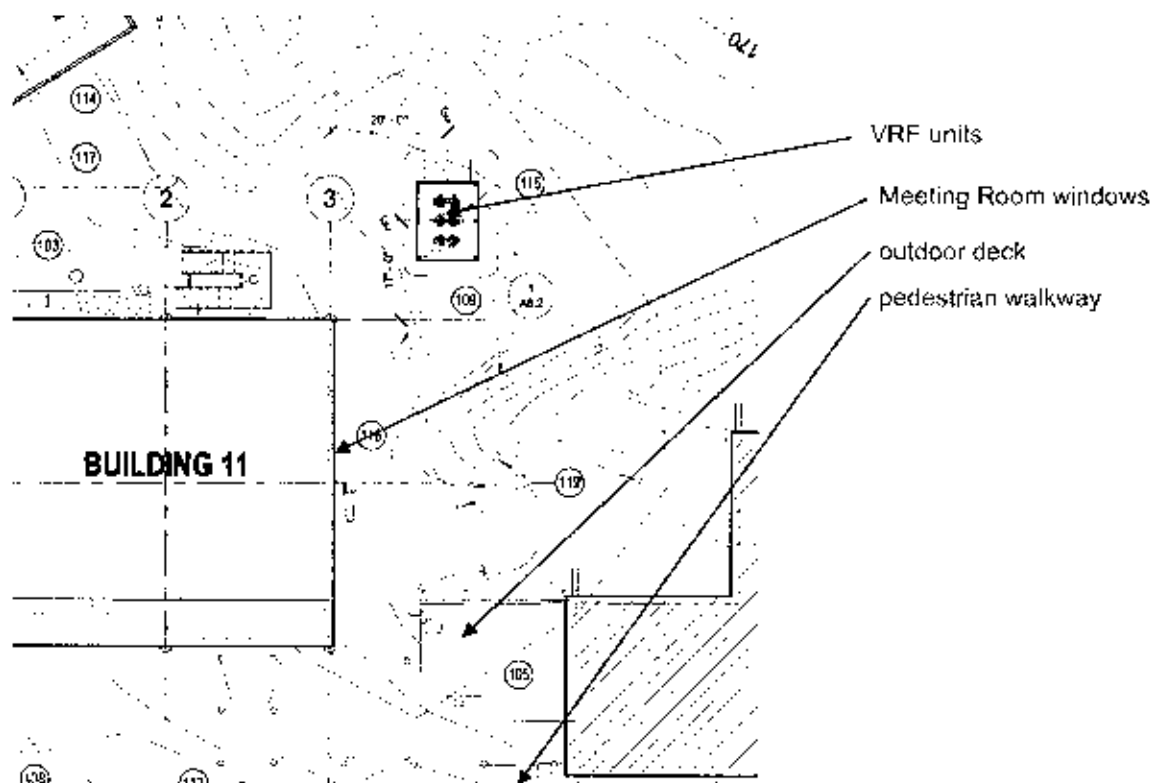


FIG 1: Proposed VRF locations and surrounding receivers

## Recommended Noise Control Measures

A solid acoustical enclosure is recommended with at least two completely solid sides around the VRF units to mitigate the noise emissions to acceptable levels around the site. The priority is to reduce VRF noise at the pedestrian walkways and outdoor deck located directly to the south of the equipment, as well as sensitive upper floor meeting rooms in Building 11 and offices in Building 9.

With a barrier design as recommended below the upper floor offices in Building 9 and the meeting rooms in Building 11 will be shielded from direct equipment noise.

Due to the shorter distance to the equipment and direct line of sight into the enclosure, the north east corner office in Building 11 will be exposed to exterior noise levels greater than 50 dBA. This is the worst case condition. Note that the noise barrier would need to extend as high as 13 ft in order to provide shielding at this 2<sup>nd</sup> floor corner office.

With the recommended measures outlined below the upper floor Meeting Room in Building 11 will be exposed to exterior noise levels below 45 dBA. Interior noise levels with the windows slightly open would be below 39 dBA.

In general; upper floor windows in the adjacent buildings will have insulated glazing. With all windows closed, the interior noise levels in all offices facing the equipment will be well below 45 dBA.

The required noise reduction can be achieved with an acoustic enclosure with the following characteristics:

1. Install a continuous solid barrier around 2 sides of the VRF equipment pad with no gaps or holes in the solid section. Extend partially on one side per the following below schematic plan layout.

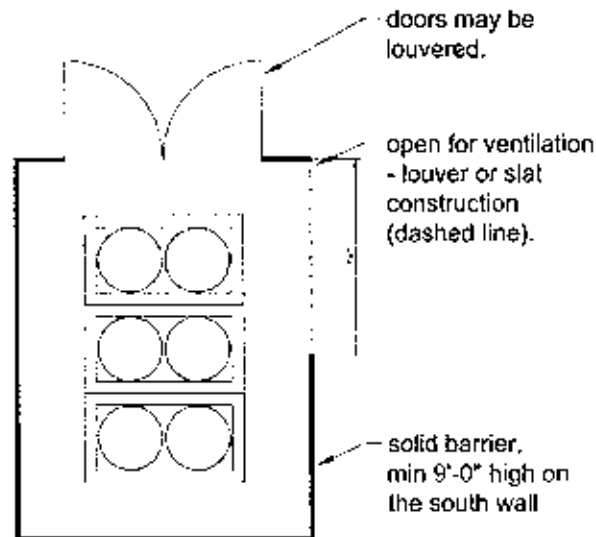


FIG 2: Proposed VRF enclosure – plan layout

2. The barrier should be no less than 9 ft high at the side facing building 11, assuming that the top of the VRF units are no higher than 5'-0" above the slab, and no less than 4ft below the highest part of the barrier per the following schematic detail:

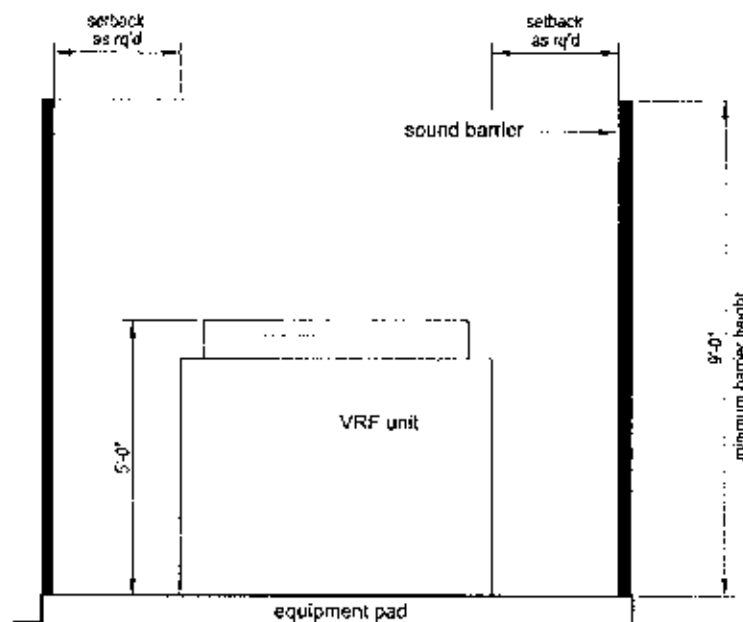


FIG 3: Proposed VRF enclosure – section (facing south)

3. The solid barrier elements can be a single membrane and should have a surface density no less than  $2.2 \text{ lbs/ft}^2$ .

A solid construction such as marine grade plywood may be used and should be at least  $3/4$ " thick. Alternatively; a solid, minimum 16 Ga sheet metal barrier may be installed. The exterior of the enclosure may be finished per aesthetic preference. I understand that the enclosure should be a consistent height. Therefore the enclosure should be 9 ft tall all around.

4. Ventilation and access will be required. An acoustically rated louver is not required. Open slats are acceptable on 1 side of the enclosure per Fig 2. The minimum louver area should be confirmed by the mechanical engineer. The louver may extend to the top of the barrier. Noise emitted from the VRF units to the parking area will be sufficiently reduced due to distance. The parking area does not require protection from the VRF equipment.
5. The access doors may be louvered for most of the door panel area for ventilation.

↻ End of Document ↻



# APPENDIX A

College of Marin – Building 11 Renovation, Project #1  
Acoustic Design Guidelines

Fabric Wrapped Panel Information

March 10, 2017

## Appendix A - Fabric Wrapped Acoustic Panel Information

The following outlines general information and includes contact information for product representatives for high performance acoustic wall panels and fabric:

### Acoustical fabrics for high performance wall panels:

#### *Guilford of Maine Textiles:*

Guilford of Maine Type: FR701 or equal

Guilford of Maine  
5300 Corporate Grove Drive SE  
Suite 200  
Grand Rapids, MI 49512  
phone 800 544 0200  
fax 616 554 2255  
e-mail:  
[quilfordsales@interfacefabrics.com](mailto:quilfordsales@interfacefabrics.com)

#### *Knoll Textiles*

"Transparent series" of textiles

[http://www.knoll.com/products/textileCatProducts.jsp?cat\\_id=116](http://www.knoll.com/products/textileCatProducts.jsp?cat_id=116)

Local representative:

KnollTextiles  
317 montgomery St.  
San Francisco, CA 94104  
415-837-2108 phone  
415-623-3401 fax

## Decoustics

<http://www.decoustics.com>

**Type:** AP Panel  
NRC 0.85 – NRC 1.0 (thickness ranges)

#### *Fabric Options:*

<http://www.decoustics.com/products/finishes/Fabric>

#### *Local Representative:*

Mike Dorner  
The Finish Line  
2344 Fairglen Dr.  
San Jose, CA 95125

**Phone:** 650-233-1360

**Email:** <http://www.finishlinereps.com>

## Appendix A - Fabric Wrapped Acoustic Panel Information

### Conwed / Wall Technology

<http://conweddesignscape.com/products/wall-panels/>

**Type:**            **A100 panel**  
                      **NRC 0.85 – NRC 1.0 (thickness ranges)**

***Fabric Options:***

*Guilford, Knoll, Maharam, Carnegie and DesignTex are available.*

***Available Sizes:***

Available thicknesses are 1/2", 3/4", 1", 1-1/2", 2", 3", and 4". Widths are up to 48" and lengths to 12'. Thickness of 1" and 2" are available in 60" x 120". Custom sizes are readily available.

***Local Representative:***

Mike Dorner  
The Finish Line  
2344 Fairglen Dr.  
San Jose, CA 95125

**Phone:** 650-233-1360

**Email:** [finline@ix.netcom.com](mailto:finline@ix.netcom.com)

### Lamvin

<http://www.lamvin.com>

**Type:**            **Sonic Acoustical panels**  
**Type:**            **Sonic Tackable High Impact Panels**  
  
                      **NRC 0.85 – NRC 1.0 (thickness ranges)**

***Fabric Options:***

*Guilford of Main*

**Lamvin, Inc.**

4675 North Avenue Oceanside,  
CA 92056

**Phone:** 800-446-6329, or 760-806-6400

# APPENDIX B

College of Marin – Building 11 Renovation Project  
Project No. 1

Low Pressure HVAC Systems  
Acoustic Requirements and Performance Criteria

March 10, 2017

## HVAC Systems Noise and Vibration Control

## GENERAL

- **Building services noise and vibration control is a critical aspect to designing work environments. The following noise and vibration control strategies are for guidance in the selection and layout low pressure HVAC equipment, attachments, ductwork, dampers, and register. The noise control design for the outdoor VRF units is provided separately.**
- **Where noisy equipment or ductwork is located near sensitive spaces such as meeting rooms or offices, or where ducts pass through acoustically rated constructions these areas require specific review and analysis. Additional review is recommended during installation.**
- **To achieve the recommended interior background noise criteria, the HVAC systems must include necessary noise control measures such as minimum lengths of lined sheet metal ductwork, lined elbows, turning vanes, etc. Sound attenuators may be necessary where limited clearances do not allow for these types of systems. Including noise control elements will generally increase the system pressure across the building mechanical system.**

## STANDARDS

ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

ARI Standards for measurement of noise of mechanical equipment: ARI 260, 270, 370, 575, 880 & 885, or current versions.

AMCA Standards for measurement of noise of mechanical equipment: AMCA 300 & 330 or current versions.

ASTM E-477 – Standard Method for Acoustical Performance of Duct Liner and prefabricated silencers.

## NOISE CRITERIA

Excessive background noise due to operation of the building systems can interfere with speech intelligibility and can be disruptive to occupants, and reduce productivity. Rotating machinery (fans), pumps, compressors, and/or aerodynamic conditions in ducts, terminal units, or at dampers or diffusers can generate significant noise. This noise can be transmitted to occupied spaces through ductwork to room registers, through interior constructions, or as structure-born noise transmitted through building structure, piping, ducts and/or conduits, or other building systems.

## HVAC Systems Noise and Vibration Control

Noise and vibration control systems add to the project cost, so a realistic approach is required when specifying noise criteria. The noise criteria recommended for this project are based on industry accepted performance standards for offices, meeting rooms, and teleconferencing spaces where these standards are aligned with the needs of the client.

The following recommended limits for background sound levels from HVAC, electrical, and plumbing systems are based on 2011 ASHRAE Handbook - HVAC Applications design guidelines.

**Table B1: Background Noise Criteria:**

Room Description	Background Sound Level LAeq	Noise Criteria NC
Stair/corridors	40	35
Private Office	35	30
Meeting Rooms	35	30
Reception / Lounge	40	35
Toilets/File Room	40	35
Kitchenette	40	35

**Table Notes:**

1. NC criteria apply with the room unoccupied, 1m above floor level, and 1m from any vertical surface.
2. Audible noise due to HVAC, plumbing, or electrical sources should have no noticeable vibration induced noise content, rumble, audible tones, or impulsive characteristics. Tonal noise should be at least 5 pts below the recommended levels in Table C1.
3. Noise levels apply to all MEP equipment at full design loads, and operating normally and together.

## DOCUMENTATION

The following additional information must be provided as part of the drawings, specifications, or as supplementary documents and submittals.

- Terminal unit selections and schedule
- Air volume for end devices should be noted on drawings
- AHRI 260 sound data for all new fan units including discharge, inlet and radiated sound power levels
- Sound data for VRF unit casing radiated noise.
- Air velocities at main shafts and main trunks
- Lengths of flexible ductwork, either on the drawings or as a general note
- Indicated where lining is used, clearly indicate if dimensions are sheet metal or clear inside areas
- Plan layouts for all ductwork including cross-sectional dimensions at each section indicated cfm in each section can be determined. Indicate where the air velocities exceed the specifications.
- All fan equipment: sound power levels for inlet, outlet, and casing radiated noise as well as product data sheets.

## NOISE AND VIBRATION CONTROL - GUIDELINES

### General

- Avoid locating noise generating mechanical equipment over noise sensitive rooms such as meeting rooms. The FCUs on level one are generally located above the offices. These are in a plenum and separated from the room by the ceiling. However, it is preferable to locate FCUs in the corridor wherever possible.

### Vibration

- All new fan equipment will require noise control systems and vibration isolation to protect adjacent from noise, and to avoid re-entry noise and structure-borne noise. All service connections (duct, piping and conduit) to fan units should be flexible.
- Typical terminal units located in the ceiling should be mounted on vibration isolators with a minimum 0.35 inches of deflection.
- Fractional horsepower equipment would require minimum vibration isolation, typically neoprene pads sized to provide static deflections in the range of 0.05 to 0.2 inches, depending on equipment location and rpm.

## HVAC Systems Noise and Vibration Control

- Provide vibration isolation for all high capacity circulation pumps, chillers, fans, and all other rotating machinery by means of neoprene, rubber or steel spring isolators by the vibration specification and schedule, based on ASHRAE 2011 Applications Handbook, Chapter 48 (or most current version). Follow these guidelines for selecting vibration isolators including Table 47.
- Locate exhaust fans above non-sensitive spaces and incorporate vibration isolation mounts per ASHREA guidelines.

## Ductwork

- Use balanced geometry for duct branches, duct tees, and transitions to minimize air turbulence and achieve low levels of regenerated noise.
- Provide for return air ducts. If return air is via the open space include acoustic air transfer ducts in the design. Transfer ducts should be made of acoustically lined sheet metal with min. 1" thick duct lining.
- Provide acoustical lining downstream of dampers as necessary to meet the room NC Rating.

## Flex Duct

- Install acoustic flex duct in accordance with SMACNA 1993, Chapter 10.
- Install lengths of acoustic flex duct consistent with meeting the background noise criteria for the space.
- Limit the length of acoustic flex ducts as follows:
 

For NC 40 or greater spaces:	not to exceed 9 ft
For NC 35 spaces:	not to exceed 7 ft
For NC 30 spaces:	not to exceed 5 ft

## Ducted Air Velocities

Duct air velocities should be designed to not exceed the values listed in the following tables. Allocate space early in the design stage for locating large duct mains where needed.

The following are recommended air flow velocity limits as a guideline for ductwork serving occupied spaces (based on NC criterion of space served):



**Table B2: Maximum Air Velocities**

Recommended Maximum Duct Air Velocities <sup>1</sup>		
Noise Criteria (NC/RC)	Maximum Air Velocity (fpm)	
	Rectangular Duct	Round Duct
Main Ductwork above Acoustic Ceiling <sup>2,3</sup>		
40	1,888	3,250
35	1,750	3,000
30	1,475	2,500
Branch Ductwork above Acoustic Ceiling <sup>2</sup>		
40	1,510	2,600
35	1,400	2,400
30	1,106	1,875
Final Ductwork/Flex Ducts above Acoustic Ceilings <sup>2</sup>		
40	944	1,625
35	875	1,500
30	590	1,000

Notes:

<sup>1</sup> These recommended velocities assume good flow conditions through the ductwork with low pressure drop or turbulence across dampers, fittings, and elbows.

**Table B3: Maximum Air Velocities**

Recommended Maximum Air Velocities At Neck of Air Registers Based on "Free Opening" Airflow <sup>1</sup>			
Location	Noise Criteria (NC)	Max. Air Velocity (fpm)	
		Supply Air	Return Air
Meeting Room	NC 30	425	500
Private Office	NC 35	500	600
Circulation, Open Office	NC 40	560	675

## Diffusers, Grilles and Registers

- The selection of high velocity air devices should be restricted to general use areas and circulation corridors.
- Ductwork connecting to a supply air device should be straight (i.e., no offsets or fittings) for at least three duct diameters and the same size as the inlet collar.
- Balancing dampers should not be located within three equivalent duct diameters of the diffusers. Otherwise, ductwork downstream of dampers may need acoustical lining.
- Select diffusers, registers and grilles for an NC rating that is at least 5 points below the recommended NC of the room. Sound from multiple diffusers are additive and therefore the maximum allowable NC rating must be lower than the rating for the space.

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# APPENDIX C

College of Marin – Building 11 Renovation Project (Project #1)  
Acoustic Design Guidelines

Plumbing Systems Noise and Vibration Control

March 10, 2017

## GENERAL

Plumbing and hydronic noise, particularly that attributable to the supply system, can be a cause of annoyance and complaints in office spaces. Equipment selection, piping fluid velocities, location of chases, and selection and proper installation of vibration isolation mounts ultimately contribute to the noise levels from operation of plumbing systems.

The plumbing system design submission should conform to guidelines included in the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) HVAC Application, Chapter 48, 2015 or most current version and shall include quiet equipment and noise control treatments as necessary to meet the background noise criteria for all occupied spaces.

These guidelines aim to minimize noise from plumbing fixtures, pumps and other plumbing equipment and systems.

The following outlines the general requirements for noise control:

1. Install resilient piping attachments to vibration isolate all active pipes including supply pipes, waste pipes, drains, heating and chilled water pipes, and condensing water lines.
2. Isolate all supply piping from the building walls and structure using foam rubber wrapping or resilient clamps and hangers. Enclose major piping in GWB or sheet lagging over a layer of insulation. Carefully seal around the entire pipe.
3. All active piping throughout the project should be vibration isolated routed through occupied areas.
4. General vibration isolation of the piping systems shall be achieved by means of vibration isolation clamps, or neoprene sleeves and oversize clamps. Hard plastic clips are not acceptable.
5. Resilient piping attachments such as Trisolator or Acousto-Plumb should be used at typical active water piping and waste lines. These systems may also be used at primary hydronic piping systems, condensing water lines for air conditioning units in server rooms, or all cooling systems that include onboard compressors as recommended approved by manufacturer. Plumbing systems serving toilet rooms, and mechanical equipment should be resiliently isolated from all framing as well as from other building services.
6. Resilient piping attachments and/or flexible connections shall be used to isolate all non-active pipes or conduit attached to vibrating equipment that generates audible noise or equipment that requires vibration isolation.

7. The following pipes do not require vibration isolation:
  - a. fire sprinkler pipes
  - b. gas lines
  - c. conduit
  - d. low pressure and low flow pipes serving radiant panels and floor systems.
  - e. active piping located away from occupied spaces.
  - f. non active piping or conduit that is not attached to vibrating equipment.
8. All installations of supply piping, waste piping, or drains should be resiliently isolated at all connections to the building structure and/or wall and ceiling framing members.
9. Seal all duct and piping penetrations through partitions airtight with sheet metal angles and/or sleeves, acoustical caulk and backer rod as needed.
10. Resiliently isolate active pipes at all supports per the following methods.
  - a. Metal and strap hangers should be fitted with neoprene isolating material between the strap and pipe, such as HoldRite isolation liners #270 and #271 or 1/8" thick, 40-durometer rubber collars.
  - b. Riser clamps for supply and waste lines should be isolated from structure (deck) using Mason Super W neoprene waffle pads or Holdrite #274 pads, or approved equal under a load bearing metal plate, or with the Hubbard HoldRite Silencer Model #276 isolation system. Ensure that the holes are sized and located as required to avoid contact with vertical pipes.
  - c. Where double stud walls are used, ensure that all plumbing systems are on one side of the partition with no contact with the other side.
  - d. Pipes passing through plates, studs, walls etc. shall have holes 1/2" minimum larger than the pipes' OD (i.e., 1/4" minimum clearance all around), making sure that the pipe remains mechanically isolated after construction. Center pipes within the holes at all penetrations and avoid contact with another system, electrical conduit, or boxes. Any contact caused by misalignment of piping will require correction.

## Plumbing Systems Noise and Vibration Control

- e. Trades installing wall finishes should keep tiles/wall finishes away from pipe stub outs and penetrations and must caulk gaps with acoustical sealant.
  - f. Fire rated acoustical caulking should be used to seal pipe penetrations through fire rated walls and floor plates.
  - g. Pipe penetrations through acoustical partitions must be properly sealed. Include acoustic penetration details in design documents.
11. Reduce the potential for flow noise intruding into sensitive spaces per the following methods:
- a. Limit the pressure of the supply water as much as possible and employ trapped-air water hammer arrestors for water supply pipes serving flush or solenoid valve fixtures to reduce water hammer noise.
  - b. Where pipes are routed across or near occupied rooms size pipes for maximum flow velocities in the range of 4 feet per second (FPS) in 1/2-inch to 1-inch diameter, 6 FPS in 1-1/4" to 3" diameter branch sizes. For pipes 4 inch diameter and larger, maximum allowable flow rate is 8 to 10 FPS.
  - c. Limit pressure at fixtures to 55 psig to reduce noise generation in general areas.
  - d. Limit pressure at fixtures to 40 psig to reduce noise generation near noise sensitive spaces (<NC 35)
  - e. Install air chambers or shock-absorbing devices to prevent water hammer in lines subject to abrupt shut-off.
  - f. Quiet models of faucets and diverter valves should be specified.
12. Typically, toilets are not a concern if located remote from occupied spaces. To avoid excessive noise within toilet rooms, specify quiet devices such as quiet-type, flush valves and taps with full-ported nozzles and non-splash aerators.
13. Plumbing systems should meet the NC criteria for spaces as recommended. Where active main supply pipes are routed above sensitive occupied spaces avoid potential for flow noise per the following guidelines:
- a. NC30 and lower: Gypsum board enclosure or insulation layer with 2 layers of mass loaded vinyl.

**Plumbing Systems Noise and Vibration Control**

- b. NC30 - 40: where active piping is above a low CAC ceiling, wrap in fiberglass and a mass loaded vinyl barrier material.
  - c. NC40 - 46: Wrap in fiberglass and a mass loaded vinyl barrier material OR, where above a continuous ceiling, no mitigation required.
  - d. NC45 and higher: no mitigation required for single pipes. Large diameter pipes and high flow piping installation should be reviewed by an acoustical consultant.
14. Non-insulated piping routed through the service corridor should be vibration isolated using neoprene isolation mounts selected for a minimum 0.4" deflection such as a model RH Vibration Isolation Hanger by Kinetics™ or equal by Mason Industries. This includes pipe risers at shaft. Refer to manufacturer for guidelines for vibration isolation of pipe risers.

**CIRCULATION PUMPS**

Circulation pumps should be mounted using neoprene pads sized to provide static deflection of at least 0.25 inches. Pumps should be isolated from piping by the use of flexible connectors. Flexible connectors should be protected from strain beyond their design limits. Twin sphere neoprene rubber flex connectors are preferred and alternately braided steel hose connectors 6 or more diameters in length installed at right angles to the primary vibration axis of the equipment.

Rigidly pipe in-line pumps and install spring and neoprene vibration isolation hangers supporting the pump and associated piping for at least 3 duct hangers on either side.

# APPENDIX D

College of Marin – Building 11 Renovation Project  
Project No. 1

Emergency Backup Generator  
Acoustic Requirements and Performance Criteria

March 10, 2017



## GENERAL

The noise impact from the emergency generator is limited to the operation of surrounding campus buildings. In general, the generator will not be operated during the typical hours of operation and would not conflict with campus operations unless there is a power outage. The buildings in proximity to the generator are not always occupied. It is assumed that the generator testing can be scheduled during times when these buildings are unoccupied.

During a power outage the generator will be used while the buildings are occupied. A noise control system should be considered for these occasional power outage events. In this case the generator would be operational when the buildings are occupied. However, the noise performance should be considered in the context of non-typical circumstances.

It is noted that the local ambient sound levels around the generator are very low and should be considered in the selection and specification of the generator as well as the selection of the sound barrier enclosure, etc.

The noise control strategies outlined below include guidelines and preliminary design recommendations. The layout, the genset equipment, attachments, enclosure materials, etc. must be confirmed.

## STANDARDS

ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

ARI Standards for measurement of noise of mechanical equipment: ARI 260, 270, 370, 575, 880 & 885, or current versions.

AMCA Standards for measurement of noise of mechanical equipment: AMCA 300 & 330 or current versions.

## MUNICIPAL REQUIREMENTS

Occasional testing (short term noise) from the generator will not conflict with the goals and policies in the Noise Element of the General Plan for the City of Novato, or the noise control goals of the campus. The generator will be tested at times when the buildings are not occupied.

## HVAC Systems Noise and Vibration Control

**NOISE CRITERIA**

For purposes of the sound barrier design, the typical low ambient sound levels are relevant.

It is reasonable to expect that the daytime ambient levels are generally below 45 dBA. The noise emissions from the generator should comply with the following criteria:

- a) 35 dBA Leq 1 hour inside occupied spaces with the windows closed.
- b) 55 dBA Leq 1 hour at the closest exterior walkway.

**RECOMMENDATIONS**

The exact dimensions of the sound barrier are pending final selection of the generator equipment.

The following outlines the acoustic requirements for the genset and the sound barrier.

- 1 Provide all available noise control supplied by the manufacturer including a noise control housing, and include a level 2 noise enclosure and high performance exhaust muffler.
- 2 Install a minimum 11 – 13 ft high sound barrier which has no openings or gaps. The barrier should be located and should include doors as necessary for maintenance, operations, general access, and ventilation. The exact height may vary depending on the sight lines and this may depend on the final plan layout.
- 3 The sound barrier should be well above the height of the Genset housing and should be extended higher where otherwise there is a direct view of the equipment from surrounding buildings. The barrier should be designed to shield outdoor walkways, decks, and upper floor windows from the generator.
- 4 Locate the generator a minimum distance from the noise barrier wall so this equipment is at least 4 ft away from any vertical surface.
- 5 The top of the generator housing should be no less than 2 ft below the top of the sound barrier.
- 6 The exhaust side of the generator will have the highest noise levels. This end of the generator should be oriented away from Building 11 and away from the walkways (toward the creek).

- 7 The barrier wall should be comprised of a metal frame construction (metal studs and bracing as required) with min. 3/4" thick sheathing and exterior cladding as required for weather on both sides. The inside cavity of the wall should be filled with batt insulation throughout. There should be no openings in the barrier. Drainage requirements must be confirmed and an acoustically treated drainage design is required.
- 8 The barrier wall should be at least 4" thick, and should be fully insulated. There should be no gaps or holes in the surface of the barrier.
- 9 The side of the sound barrier closest to Building 11 should be 13 ft high.
- 10 The end of the sound barrier facing the roadway should be minimum 13 ft high
- 11 The other 2 sides of the sound barrier should be minimum 11 ft high.
- 12 Access doors should be solid, insulated metal doors with full perimeter compression seals.
- 13 The generator will need to be ventilated and exhausted. The requirements for the air flow are pending. There will be a large louver at the back end of the enclosure and there may be side louvers. Avoid any louvers that are facing the project or other buildings. Make provisions for 6" deep acoustic louvers.
- 14 The interior surface of the barrier should include sound absorptive materials on at least 3 sides. The barrier panels may include surface mounted panels or be constructed of a modular panel system that has a sound isolating and sound absorptive element. Separate surface mounted acoustic panels should be exterior rated and should cover at least 20% of each interior vertical surface. The absorptive panels should be as high up as possible to be most effective for controlling noise.

An exterior grade sound absorptive panel such as the Empire Panel Type M90 or equal can be used on the interior surfaces. See the following link for information for the Empire Panel system:

<http://www.empireacoustical.com/m90/>

- 15 In plan the generator enclosure (barrier wall) must be set back from the generator (+ housing) with sufficient clearance around the generator and enclosure. I understand that the exhaust side of the generator in the horizontal configuration needs a minimum

of 10 ft to any surface. The other sides need 5 ft. I also assume that there needs to be full access from the road and there will be other systems, panels, structural bracing, and acoustic panels inside the enclosure. This must be coordinated to achieve the access clearance.

- 16 An alternative, but potentially more costly approach is to specify a turn-key sound barrier system such as a modular sound barrier system by Kinetics Noise Control or similar by Noise Barriers LLC. This type of barrier includes integral modular sound isolating panel with a sound absorbing surface. The modular systems are exterior grade and may be rated > STC 25 and NRC > 0.95. The barriers must be designed for wind loads, seismic, and other structural requirements and a structural engineer must provide guidance and stamped design documents for the enclosure design.

Refer to Kinetics Noise Control web site for more information:

<http://www.kineticsnoise.com>

[http://www.kineticsnoise.com/industrial/sound\\_barrier\\_walls.html](http://www.kineticsnoise.com/industrial/sound_barrier_walls.html)

Refer to Noise Barrier's web site for more information:

<http://www.noisebarriers.com>

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# APPENDIX E

College of Marin – Building 11 Renovation Project  
Project No. 1

Sound Masking  
Design Guidelines and Performance Criteria

March 10, 2017

## INTRODUCTION

General background ambient sound is beneficial in open plan office environments and private offices where activity noise and speech can be distracting. A continuous neutral ambient sound effectively masks low levels of speech and other noise sources, but this type of ambient sound is not intrusive or distracting. The preferred type of ambient sound is continuous, diffuse, and spectrally balanced. The sound should be relatively neutral (non-tonal) with a maximum overall sound level of around 45 dBA. Ambient sound levels should be consistent over time, and over a large coverage area, and should be maintained throughout the work areas and along circulation paths.

Typical open office background sound is a mix of ventilation system (HVAC) noise, distant traffic sound transmitted through exterior windows, and general office activity and computer equipment noise. In a large open office this sound becomes more blended and more continuous. An effective masking sound should not be perceived as loud, and should be an appropriate element of the work environment.

In smaller offices, or where there are fewer noise sources, the specific sources become more perceptible and may be more distracting. In other words; the combined sound is not blended. In these environments an electronic sound masking system can be installed to ensure a continuous and conditioned ambient sound. This becomes more relevant where the HVAC systems are quiet, where there is no exterior traffic noise, and particularly where acoustic privacy is important or where occupants require freedom from distraction. Sound masking systems have been found to improve focus and productivity.

Note that sound masking is effective for reducing speech intrusion from sources that are distant from a listener. Because masking sound should not be too loud, no louder than 45 dBA at work stations these systems cannot ensure speech privacy between adjacent work stations. However, in conjunction with solid acoustic barriers and control of room reverberation, a well-designed sound masking system will reduce the distraction from low levels of intrusive speech and other distant noise sources.

Due to the layout and the proximity of the reception to surrounding office and meeting rooms, an electronic sound masking system is recommended for this project, in conjunction with acoustical seals at doors and sound isolating constructions that separate the offices and meeting rooms.

This is generally considered a cost effective solution to improve the speech privacy. However, square foot costs go down as the masking area increases. For this project, the size of the open office is not favorable with respect to reducing costs.

## PERFORMANCE

An artificial sound masking system shall provide a continuous background ambient sound that is tuned/balanced for the acoustics of the space, and evenly covers the office with a non-intrusive masking sound that is at least 45 dBA. Note that this system effectively masks indirect and distant speech at normal speech frequencies (between 300 Hz and 4000 Hz.).

Lencore and Logison are commonly specified sound masking manufacturers. See the following websites for more information:

<http://www.logison.com/support/downloads>

<http://www.lencore.com>

The masking system design will vary according to the coverage patterns of the loudspeakers and the conditions. A detailed layout should be developed by a sound masking system designer. The installed sound masking systems should allow for adjustable level control at each loudspeaker, and should achieve a specific and balanced spectrum of continuous sound per third octave band sound levels presented in Table 1 (below).

A preliminary layout is provided showing a total of 8 loudspeakers located around the perimeter offices, with 2 loudspeakers per side. The loudspeakers should be installed pointed up and set back from the edge of the Reception so that the loudspeakers cannot be seen, and so there is no direct sound.

An appropriate system design process should include a review the final conditions to determine the requirements and optimal loudspeaker placements.

Sound masking should not be installed inside the private offices, or meeting rooms.

The following sound levels are the maximum recommended levels that should be used in the reception/lounge. A sound masking system should allow for fine adjustments of sound level and ultimately should be set according to preference.

**TABLE E1: Maximum Sound Masking Spectrum for Open Plan Work Areas +/- 2 dB**

Octave Band Center Frequency – Hz													
50	63	80	100	125	160	200	250	315	400	500	630	800	1k
48	48	48	47	46	45	44	43	42	41	39	38	36	34
Octave Band Center Frequency – Hz													
1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	45 dBA			
32	30	28	25	23	20	17	15	-	-				





# APPENDIX F

College of Marin Building 11 Renovation Project  
Schematic Design Phase

Operable Partitions  
Acoustic Requirements and Design Guidelines

March 10, 2017

## Operable Partition Guidelines

Operable partitions for sensitive uses should be designed/installed per ASTM E557 - 00(2006) e1, Standard Guide for The Installation of Operable Partitions (or current version). This standard provides general guidelines for the preparation for, application and installation of operable partitions and the surrounding constructions in which the partition system will be installed.

Design issues related to operable walls should be considered early in the design process due to the impact on structural, mechanical, and architectural systems. The following summarizes basic requirements for achieving as close as possible to the rated performance of high performance operable partitions:

### PLENUM CLOSURE

1. Overhead structure must be designed to carry weight of the operable walls. The structural beam requirements should be confirmed with structural engineer. Note that that long spans supporting operable partitions can require very deep beams. The structural systems must be coordinated with mechanical and other systems, and acoustically treated to avoid sound flanking over the operable partition.
2. A sealed closure must be provided above the operable partition to ensure that the acoustic separation is not compromised. Avoid air transfer ducts, or other systems routed across this closure as much as possible. An acoustical review of the manufacturer's closure details are particularly important where ducts or other systems are routed above the operable wall. Air transfer between closed plenum conditions, if needed, should be through acoustically lined 'Z-trap' duct configurations.
3. The acoustical closure above the operable partition should be comprised of least 2 layers of 5/8 "Type X GWB on each side and filled with R30 insulation inside the cavity. All joints should be sealed with acoustic sealant.

**END CONDITIONS**

4. End conditions must terminate at the receiving wall along the entire surface and withstand the pressure of the wall; typically requiring blocking within the wall. The finish details of the closure wall should be a rigid flush finish with no voids or reveals at base boards, ceiling, etc.
5. Storage pocket closure conditions must maintain acoustical separation. The constructions should be coordinated with the operable wall requirements, the vendor, and all shop drawings reviewed by the acoustical consultant.

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ACOUSTIC PRODUCT DATA SHEETS

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# Spectra<sup>®</sup> Classic<sup>™</sup>

THE MOST ADVANCED SELF-CONTAINED  
SOUND MASKING AND PAGING SYSTEM  
IN THE INDUSTRY

 **LENCORE**  
MANUFACTURER. INNOVATOR. LEADER.

# A Sound Solution

The leading choice of innovators and companies throughout the world, **Lencore's Spectra® Classic™** is the most advanced self-contained sound masking and paging system in the industry. The **Spectra Classic** system uniquely addresses speech privacy, masking, paging and audio requirements of today's facilities.

Each system successfully masks intrusive speech, creates privacy and delivers intelligible paging and audio solutions to ensure intended audiences are well informed and comfortable in their environment.

**Spectra Classic's** superior sound quality, unmatched speaker design and built-in sound frequency controls is unrivaled by market competitors. The system's design flexibility allows users to adjust the volume of paging and

audio separately from the masking volume. These features enable **Spectra Classic** to provide three systems (masking, paging and audio) for the price of one.

What makes **Spectra Classic** the superior sound solution is its ease of installation, simplified tuning controls, flexible paging and audio options and the renowned sound that is unmatched in the masking industry for comfort.

## Increasing Office Productivity

Whether for collaborative or individual spaces, **Lencore's Spectra Classic** technology was developed to make the environment comfortable and productive. By creating a positive, uniform field of ambient background sound in applications such as office spaces, conference rooms, healthcare, government facilities, private work areas and more, **Spectra Classic** minimizes the level of audible distraction to allow employees to interact as well as think.

A designed space where distraction is the norm is unproductive. Sound masking is proven, and can be quantified, to provide speech privacy. A comfortable work environment, however, produces productivity. From the comfort of the sound to the ability to customize in small areas, **Lencore's Spectra Classic** is the only system that delivers the unique features necessary to achieve a productive workplace and quickly generate a return on investment.

## Our Advantage is Our Sound

**Lencore** offers the highest quality speakers in the sound masking industry with the widest dispersion that perfectly reproduces the finest masking sound. Our broadband frequency outperforms competitive systems to deliver more privacy and greater comfort. By far the simplest masking system to install and deploy, **Spectra Classic**

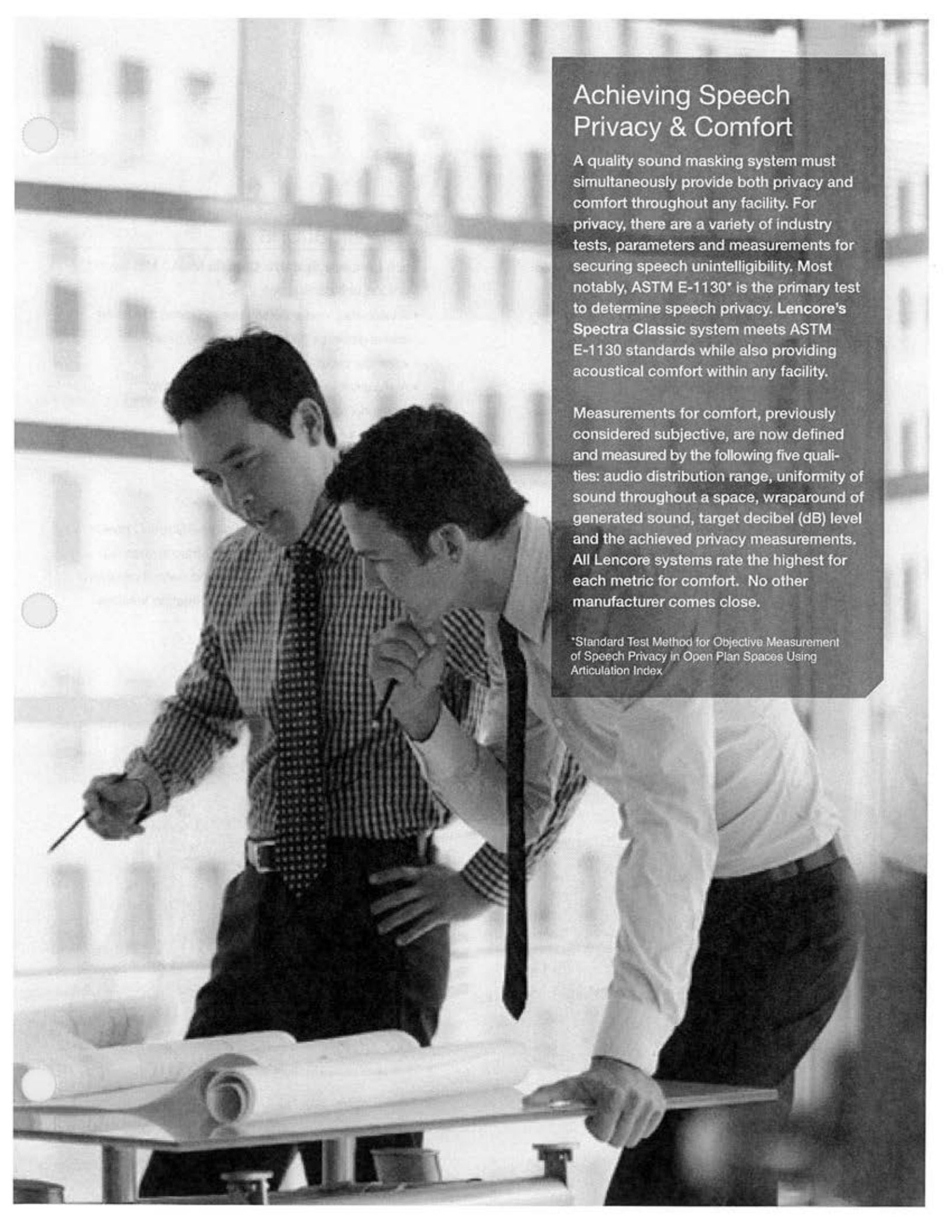
offers in-plenum and direct fired speakers to suit all ceiling applications and types.

**Lencore** also offers specialty products to accommodate a variety of site conditions and requirements.



**Spectra Classic** sound masking units are typically installed above the ceiling tile in the plenum. The units are placed in a grid pattern in order to maximize sound masking coverage for better sound quality, distribution and uniformity.





## Achieving Speech Privacy & Comfort

A quality sound masking system must simultaneously provide both privacy and comfort throughout any facility. For privacy, there are a variety of industry tests, parameters and measurements for securing speech unintelligibility. Most notably, ASTM E-1130\* is the primary test to determine speech privacy. Lencore's Spectra Classic system meets ASTM E-1130 standards while also providing acoustical comfort within any facility.

Measurements for comfort, previously considered subjective, are now defined and measured by the following five qualities: audio distribution range, uniformity of sound throughout a space, wraparound of generated sound, target decibel (dB) level and the achieved privacy measurements. All Lencore systems rate the highest for each metric for comfort. No other manufacturer comes close.

\*Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index

## Spectra Classic Features

- Superior sound quality and uniformity that provides speech privacy and comfort
- Award-Winning Broadband Sound
- Meets ASTM Standards for Speech Privacy
- Complete System Customization
- Energy Efficient and Low Voltage
- UL Listing for Plenum Use
- Over 50% Recycled Content
- Central Volume Controls and Central Timers available

## Spectra Classic Advantages

- E-Sound® and IndePage® Technologies
- SPEC™ Diagnostic Software Tool
- Simple to Install, Tune and Use
- Quantifiable ROI
- 10-Year Full Warranty
- Manufactured in the USA

## Specifications

Each **Lencore Spectra Classic** Main (LM6) Sound Masking unit consists of:

- An individual, non-coherent, pseudo-random masking sound generator (CMOS programmed micro controller circuit)
- Audio amplifiers capable of outputting to two additional secondary sound masking units
- Loudspeaker
- Masking volume and contour controls
- A separate paging volume control

Each main unit also consists of an AC to DC power supply, powered by a 16-18 VAC transformer. Additional central volume controls and central programmable timer options including acclimation features are also available.



## Paging and Audio Systems

**Lencore's Spectra Classic** sound masking system has the ability to incorporate a high quality paging and audio system. With simple wiring and equipment additions, Spectra Classic can handle your paging, music and audio needs. Paging capabilities include: all call paging, zone paging, security paging and emergency paging. Using IndePage Technology, Spectra Classic delivers a superior sound quality and crystal clear paging options that are completely non-directional, uniform and surpass conventional paging systems.

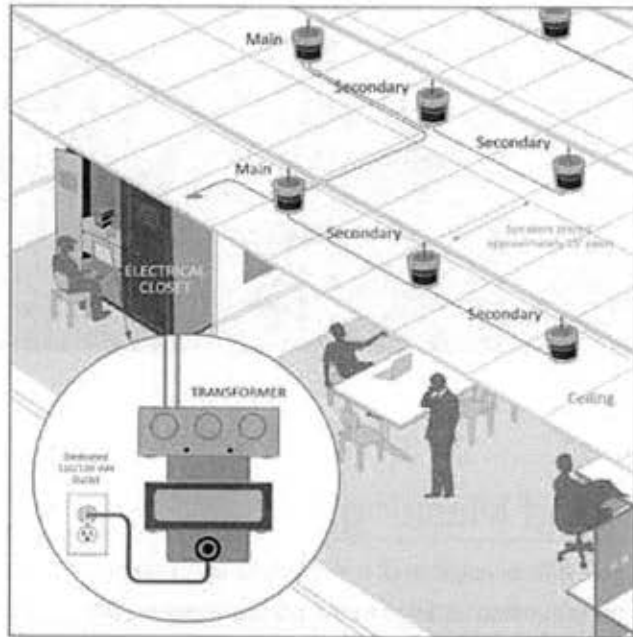
One of the most unique qualities of the **Spectra Classic** paging system is the ability to adjust the page and music volume separately from the masking volume at the speaker level.

## What is Quiet?

Is it the library? Is it the beach?

Traditional reasoning suggests that a library would be the most productive place to work. After all, libraries are recognized as study areas for students all around the globe. However, many find a library difficult to work in as each sound, whether a whisper or the tap of a pen, becomes intrusive and breaks a person's concentration. Research has shown that it takes the average individual twenty minutes to resume their level of performance on an activity prior to being distracted.

The beach, on the other hand, is filled with activity and noise. However, it is a place that is restful and feels quiet. The ocean waves produce a pleasant, random, broadband sound which raises the ambient background level. At the beach you recognize that there is activity around you but you are not distracted by the noise because of the sound generated from the ocean. Sound masking



Spectra Classic is unparalleled in its ability to create speech privacy and is the only system that comes pre-rated to meet the Acoustical Comfort Metric Unit (ACMU).

"takes you to the beach" by providing that same random, broadband sound within your space.

Quiet is privacy and comfort. To achieve quiet you need:

- Speech masked by the ambient background sound
- A full broadband sound
- Random sound with no noticeable wraparound
- Uniform coverage



## Why Sound Masking?

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Acoustics affect critical aspects of a workplace environment, from productivity in office settings to the performance quality in theaters and auditoriums. Intrusive noise is a common complaint and noise from overheard speech is a top concern for today's facilities.

Modern trends in workspace design are moving people out of private offices and into open areas with smaller workstations and lower partition heights. The higher concentration of people in the same work area combined with telephone

conversations and discussions between colleagues can create a disruptive environment.

Today's design trends are creating less efficient acoustical spaces that are affecting employee performance. Distractions create stress and lower productivity. By achieving smart acoustics in a space with both comfort and privacy, collaborative communication can easily coexist with independent work. Sound masking helps decrease intrusive noise, promote collaboration and encourage creativity while delivering acoustical comfort throughout any environment.

## How Sound Masking Works

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Similar to furniture or lighting, acoustics play a key role in the office environment. Sound masking, when properly designed, dynamically improves comfort and collaboration in the workspace.

Sound masking works by introducing a unique, broadband sound complimentary to the speech spectrum that effectively covers indirect speech levels. This scientifically engineered sound is amplified through individual speakers installed above or in the ceiling throughout the space to create a uniform field of sound that ensures temporal and spatial uniformity. The sound masking system "fills" the plenum

and filters down into the space below, without phasing, to gently raise the background sound level. This rise in sound level covers, or masks, unwanted office noise. As a result, noise from overheard speech becomes less intelligible.

**Spectra Classic** delivers innovative and flexible solutions to provide acoustical comfort, speech privacy and create an environment that supports both concentration and communication. **Spectra Classic** offers a variety of speaker options and design layouts to fit varying site conditions and applications.

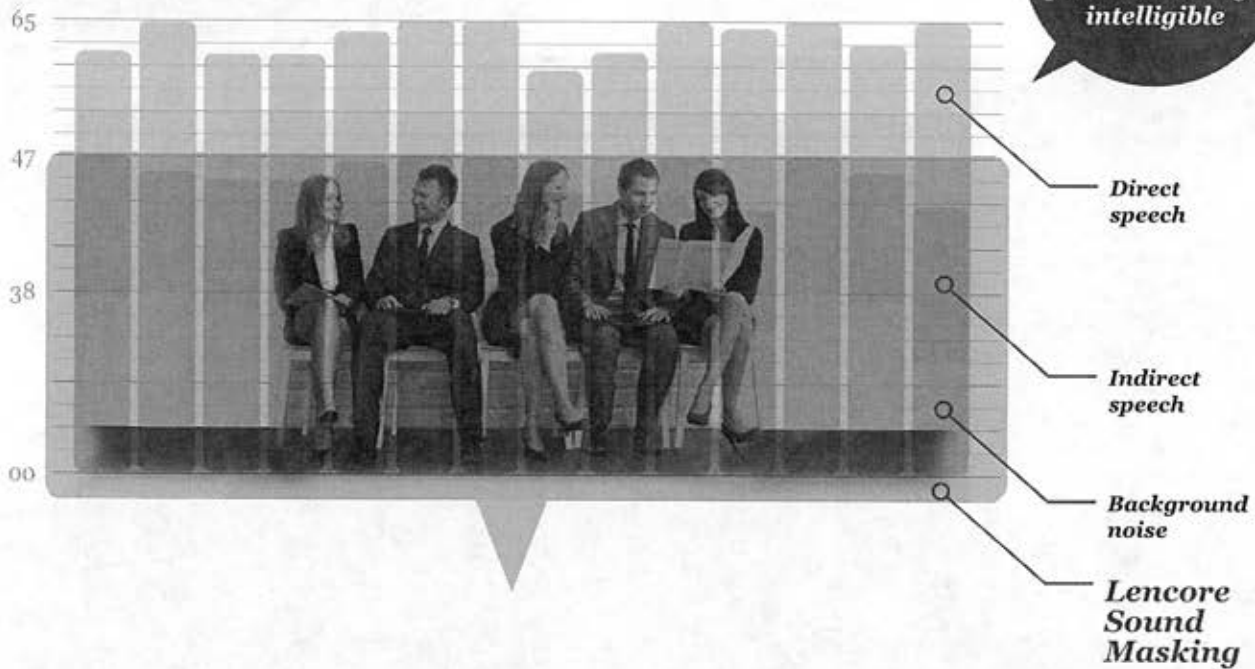
## Improving the Acoustic Performance in Your Space

Reducing real estate related costs is a driving force to shift to open floor plans with fewer assigned workstations and individual spaces. This trend produces an environment with more direct and indirect speech.

**Lencore** sound masking is a proven element that when added to these environments create speech privacy and acoustical comfort. Masking is designed to introduce a gentle noise that covers indirect speech and some background noises - producing a more productive space. The diagram below visually demonstrates the concept in more detail.



Decibel level (dB)



By achieving smart acoustics in a space with both comfort and privacy, collaborative communication can easily coexist with independent work.

- AT&T
- Bank of America Corp.
- Boeing
- Caterpillar
- Chevron
- Cisco Systems
- Coca-Cola
- General Electric
- General Motors
- Google
- Johnson & Johnson
- Kraft Foods
- Lockheed Martin
- Lowe's
- Microsoft
- Morgan Stanley
- Oracle
- PepsiCo
- Pfizer
- Procter & Gamble
- Sprint Nextel
- State Farm Insurance Cos.
- Sunoco
- UnitedHealth Group
- Walgreens
- Walt Disney

At Lencore we believe that PEOPLE MATTER. Our systems transform environments that change people's lives by providing more privacy, greater comfort and improved safety. Our advancements in sound quality, audio distribution, speaker design and software networking solutions have established Lencore as an industry leader.

Founded in 1990, Lencore has installed sound masking, paging, audio and mass notification systems for thousands of companies in over hundreds of millions of square feet across the United States and around the world.

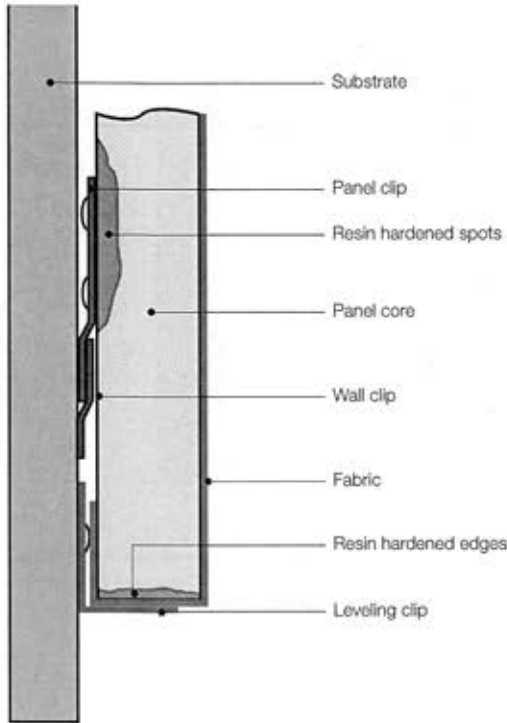
As the premier manufacturer of global solutions for speech privacy and emergency communication systems, Lencore does not believe in one size fits all solutions. We offer clients the choice of networked, in-plenum, direct fired, centralized, decentralized and remote masking, paging and audio systems.

With the most advanced technology and by offering more choices with proven results, Lencore is in the position to meet the challenges and demands that affect your facility.

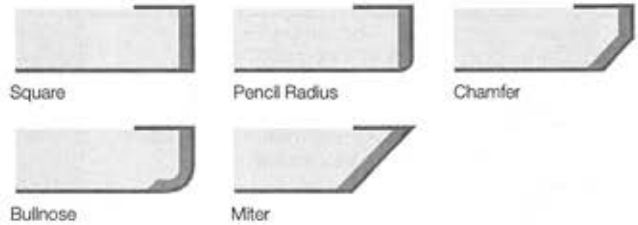
Lencore  
One Crossways Park Drive West  
Woodbury, NY 11797

516.682.9292  
info@lencore.com  
www.lencore.com

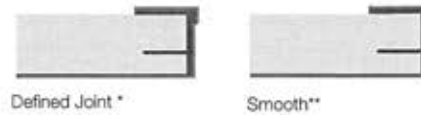
 @lencore1



## Resined Edges



## Metal Edges



\* Available in 1" (25mm), 1-1/2" (38mm) and 2" (50mm)  
 \*\* Available in 1" (25mm) thickness

## DESIGN AND SPECIFICATIONS

### Description

An Acoustical Panel (AP) is a general purpose wall panel consisting of a medium density core with a fabric finish. Panels are recommended for use where they are unlikely to be subjected to abuse or impact. For these types of areas see Decoustics' High Impact Resistant panels.

Panels are supplied complete with factory installed clips for different types of mounting e.g. mechanical, adhesive, magnetic, and hook and loop fastenings.

### Panels

All Decoustics panels are custom fabricated and offered in a variety of sizes, shapes, thicknesses and finishes.

Decoustics panels can be finished with fabric from almost any manufacturer. Prior to use, Decoustics will test all fabric for suitability.

### Design Considerations

When using speakers in ceiling or wall panels, it is recommended the speaker grille be visibly mounted at the face of the panel. Speaker function creates air movement and any fabric covering the speaker will experience premature soiling.

### Maintenance

Refer to appropriate Decoustics "Cleaning and Maintenance Instructions" for any specific finish.

### Standards, Tests and Approvals

Surface Burning Characteristics (ASTM E-84): All panel components have a Flame Spread rating of less than 25.

Note: Building code requirements may necessitate composite panel testing based on specified finish.

A panel comprised of "Class A" (Flame Spread of 25 or less) components does not necessarily produce a composite panel meeting the "Class A" requirement. Decoustics has a considerable number of composite panel tests on file.

# Decoustics Acoustical Wall Panel (AP)

## Performance Data

FINISH	EDGE OPTIONS	SIZES	CONSTRUCTION	THICKNESS	NRC	WEIGHT
Fabric	<b>Resin:</b> - square - beveled - radiused - stepped  <b>Concealed Extruded Aluminum:</b> - square - beveled	Fabric: up to 48" x 120" (1220mm x 3060mm).  Finish width must be sufficient to cover panel, panel thickness, and wrap a minimum of 1" (25mm) on the back side.	Acoustical Panel consists of a 6 to 7 pcf (96 to 112 kg/m <sup>3</sup> ) medium density core with a fabric finish. Fabric corners are fully tailored (no exposed darting).	3/4" (19mm)	0.70	0.74 psf (3.61 kg/m <sup>2</sup> )
				1" (25mm)	0.85	0.88 psf (4.30 kg/m <sup>2</sup> )
				1-1/2" (38mm)	0.95	1.19 psf (5.81 kg/m <sup>2</sup> )
				2" (50mm)	1.10	1.51 psf (7.37 kg/m <sup>2</sup> )

\* Butt joint is available in 1" and 2" thick panels. Defined joint is available in 1", 1-1/2" and 2" thick panels, bevelled is available for 1" thick panel.

Note: The information provided in this Data Sheet is accurate to the best of our knowledge at the time of printing. However, we reserve the right to make changes when necessary without further notification. Suggested applications may need to be modified to conform with local building codes and conditions. We cannot accept responsibility for products that are not used, or installed, to our specifications. Please refer to our website for most current data.

Note: Only handle panels wearing clean, lightweight, white gloves during installation. Follow manufacturer's printed instructions for installation as well as field cutting of panels.

## Mounting Methods

Mount panels to walls using mechanical fastening, adhesive, magnetic fastening or hook and loop fastening.

Mechanically mount only for panels located above head height (includes slide and engage z-clips, wall clips and/or track).

Use adhesive and mechanical fastening to secure "loop" to wall i.e. stapled with splayed-outward legs.

Consult with fastener manufacturer to determine correct fastener to use for specific substrates, particularly plaster or gypsum board.

Note: It is not always possible to secure panels or mounting hardware to a substrate support such as a steel stud.

Follow manufacturer's printed instructions for installation as well as for field cutting of panels.

## Acoustical Data (ASTM C423: Type F5 Mounting as per ASTM E795).

FINISH	PANEL THICKNESS	FREQUENCY (Hz)						NRC	SAA
		125	250	500	1000	2000	4000		
Fabric	3/4" (19mm)	0.03	0.20	0.52	0.90	1.09	1.03	0.70	0.66
Fabric	1" (25mm)	0.35	0.41	0.84	1.09	1.09	1.02	0.85	0.84
Fabric	1-1/2" (38mm)	0.16	0.58	1.02	1.19	1.10	1.05	0.95	0.95
Fabric	2" (50mm)	0.19	0.87	1.20	1.19	1.08	1.03	1.10	1.05

Acoustic testing was performed on a panel finished with an acoustically transparent fabric. See finishes, fabrics for additional acoustical performance data.

**decoustics**  
SAINT-GOBAIN

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Woodbridge, Ontario L4H 1X9 Canada  
www.Decoustics.com  
Phone: 905-652-5200  
Toll Free: 800-387-3809  
© 07/15 Decoustics  
Code No. CTC-DC-0715-3000-3

  
SAINT-GOBAIN



## Tackable High-Impact Acoustical Wall & Ceiling Panels

### Acoustical Core:

6-7lb. density, rigid fiberglass

DATA SHEET No. 1A

### Facing:

10-20 lb density, molded fiberglass 1/8" thick

### Edges:

Chemically hardened edges to reinforce panel perimeter against warping and damage (aluminum edge available).

### Finish:

Acoustically transparent 100% woven polyester, 66 inches wide, 2-ply, 16 ounce fabric. Fabric is bonded directly to the panel face with all edges wrapped a minimum of 1-1/2 inches to the back of panel to ensure a flat, wrinkle-free surface with tailored corners. Specified and other fabrics and perforated vinyls are available.

### Size and Thickness:

<b>Thickness</b>	5/8", 7/8", 1-1/8", 1-5/8", 2-1/8" (custom thickness available)
<b>Width</b>	Up to 48"
<b>Height</b>	Up to 120"

### Edge Details Available



Bevel



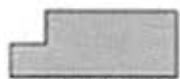
Radius



Mitered



Pencil Radius



Tegular



Square



**NRC 0.85 to 0.95 on 1"**  
**NRC 1.00 to 1.10 on 2"**

### Fire test:

**ASTM E 84**

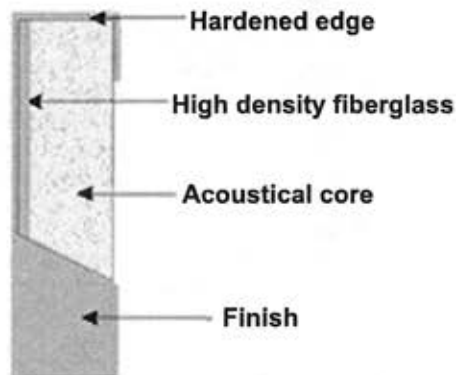
Class I (or A) flame spread rating (tunnel test)

**UBC Standard 8-2**

(corner burn test)

### Mountings available:

- Velcro
- Adhesive
- Impaling clip
- Concealed spline
- Mechanical "Z" clip
- Rotofast clip



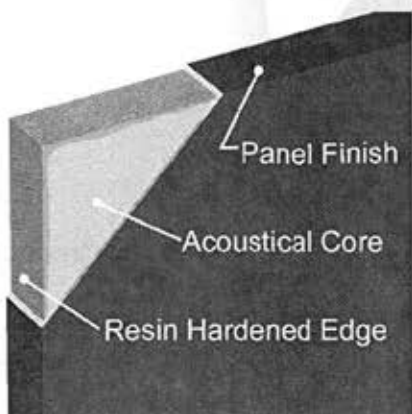


**Wall  
Technology**

CDC Corporation  
An Owens Corning Company

Product Data Sheet

## A100 SERIES ACOUSTICAL PANELS



### APPLICATION

Wall Technology's A100 Series panel is an economical, all purpose acoustical wall and ceiling panel designed for use where sound absorption and value are the main criteria. This series panel is suitable for auditoriums, theatres, offices and libraries; anywhere noise control is needed and critical lighting and high abuse resistance are not factors.

### CONSTRUCTION

The core construction is a dimensionally stable 6-7 PCF fiberglass board with chemically hardened edge protection. Finishes are completely adhered to the face of the panel and returned to the back for a full finished edge. All corners are fully tailored.

### SIZE AVAILABILITY

Available thicknesses are 1/2", 3/4", 1", 1-1/2", 2", 3", and 4". Widths are up to 48", and lengths to 12'. 1" and 2" are available in 60" x 120". Custom size is our standard!

### EDGE DETAIL

All edges are resin hardened, unless otherwise specified. Available choices include: square, radius, bevel, and radius corners.

### FINISHES

A wide variety of fabrics are available from all major brands, including Guilford, Maharam, Knoll, Carnegie, and Designtex. A comprehensive selection of vinyl coverings is available from Webcore, Designtex and Maharam. A USDA-approved Tedlar encapsulation can be provided for areas where sanitation and clean-ability are mandatory.

### MOUNTING

Standard mountings include spot and perimeter adhesive, Z-clip, concealed splines, impaling clips, hook & loop, and magnetic fasteners. Wall Bar to Wall Bar is recommended for ceilings.

### EXCELLENT ACOUSTICAL PERFORMANCE

A100 Acoustical Wall and Ceiling Panels provide excellent acoustical performance for auditoriums, theaters, offices, libraries, and classrooms; virtually anywhere sound absorption is required!

### ACOUSTICAL UL LISTING

A100 fabric wrapped panels have been tested per ASTM C423, Type A mounting by Underwriters Laboratories for your assurance of acoustical performance:

Thickness	NRC
3/4"	.70
1"	.80
1 1/2"	.95
2"	1.05
3"	1.15



### R-VALUE

The R-Value is resistivity to heat or cold, and is an important factor in choosing a finish.

Thickness	R-Value
1"	4.1
1-1/2"	6.2
2"	8.3
3"	12.5
4"	16.6

### FIRE PERFORMANCE

All components have been tested according to ASTM E 84\* and have a **Class I/A** rating.



### RECYCLED CONTENT

A100 Series panels utilize an Owens Corning fiberglass board core that is eligible to bear the Green Cross label for recycled content. The board is certified on average to contain at least 40% recycled glass, with 10% post-consumer and 30% pre-consumer content.

And for your LEED® project, our acoustical panels can help you qualify for recycled content points under the Materials and Resources section.

### 3-YEAR

#### 3-YEAR WALLS AND CEILINGS

A100 Series Acoustical panels have a limited 3-year warranty starting from date of purchase. The panels are warranted to be free from defects in material and workmanship.

See product warranty for details and limitations.

\*The ASTM E 84 standard should be used to measure and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment, which takes into account all of the factors, which are pertinent to an assessment of the fire hazard of a particular end use. Values are reported to the nearest 5 rating.

# A100 SERIES ACOUSTICAL PANELS— SPECIFICATIONS

## PART 1 GENERAL

- 1.1 Work in this section shall be subject to drawings, general conditions, schedules, addenda and other contract documents.
- 1.2 The extent of the acoustical panels is shown on the drawings and in the schedules.
- 1.3 Submit \_\_\_\_\_ (select quantity) samples of each type of acoustical panel as shown on the drawings and in schedules and include appropriate technical information including test data and maintenance instructions. Submit \_\_\_\_\_ (select quantity) fabric selector cards from manufacturer's standard finishes, or designer specified finishes.
- 1.4 Acoustical panels shall be installed according to manufacturer's recommendations and instructions.
- 1.5 Installation of acoustical panels shall not begin until all wet work (plastering, concrete, etc.) is completed and dry. Building shall be properly enclosed and under standard occupancy conditions (temperature of 60-85°F and not more than 70% relative humidity) before installation begins.
- 1.6 The contractor shall be responsible for the examination and acceptance of all surfaces and conditions prior to the acoustical panel installation.
- 1.7 Substitutions or changes will only be permitted by prior approval by the architect.

## PART 2 MATERIALS

- 2.1 Acoustical wall panels shall be Wall Technology Type: A100 Series Acoustical Wall and Ceiling Panels as manufactured by Wall Technology, Inc. / 800 Gustafson Road / Ladysmith, WI 54848. Phone (800) 359-3312 / Fax (800) 359-0106.
- 2.2 Acoustical Panels shall be constructed of a composite core construction of dimensionally stable rigid fiberglass of 6-7 pcf density. Thickness (choose one) 1/2", 3/4", 1", 1-1/2", 2", 3", 4" or custom \_\_\_\_\_ (specify).
- 2.3 Sizes: \_\_\_\_\_ width and \_\_\_\_\_ high or as shown on drawings. Standard maximum size is 48" wide x 120" high (nominal). Custom or larger sizes available; consult manufacturer. Panels are to be manufactured according to field dimensions supplied by the installing contractor. Standard tolerances are  $\pm 1/16$ " in width and length.
- 2.4 Edge profile shall be: Square, radius, full bevel, half-bevel, miter, or custom \_\_\_\_\_ (specify). Corner detail shall be: Square, radius or custom \_\_\_\_\_ (specify). Edge treatment shall be: resin hardened, aluminum or high-pressure laminate (with square edge only), wood (all profiles available) or custom \_\_\_\_\_ (specify).
- 2.5 Panel finish shall be \_\_\_\_\_ (specify finish manufacturer, pattern, color and specifier). Finish shall be applied directly over the face and edges of the panel and returned to the back of the panel to provide a full finished edge. All corners are fully tailored.
- 2.6 Mounting shall be: Adhesive / Resin, Adhesive No Resin, Impaling / Adhesive, Lay-in, Magnet, Rotofast (some limitations), Spline, VELCRO® Panel Clip to Wall Bar, Panel Clip to Double Wall Clip, Wall Bar to Wall Bar (strongly recommended for ceilings), Aluminum Z-Clips, Panel Clips / VELCRO® or custom \_\_\_\_\_ (specify). Leveling angles are supplied if appropriate. Adhesive, miscellaneous fasteners, (i.e. nails, screws, etc.) and standard continuous wall leveling angle are to be supplied by the contractor.
- 2.7 Acoustical Performance – panels shall have a minimum NRC of \_\_\_\_\_ (please specify) in accordance with ASTM C-423 (Type "A" Mounting).
- 2.8 Flammability – All panel components shall have a Class "A" fire rating in accordance with ASTM E-84.
- 2.9 R-Value is \_\_\_\_\_. (Calculated using the R-factor of 4.16 per inch of thickness.)

**Thank you for choosing Wall Technology for your acoustical needs.**

*The information provided above is correct to the best of our knowledge at time of printing. We reserve the right to make changes without prior notification.*

### DISCLAIMER OF LIABILITY

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**www.walltechnology.com**

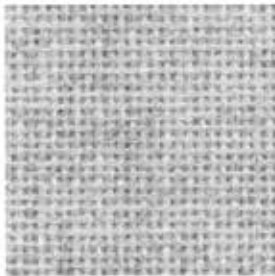
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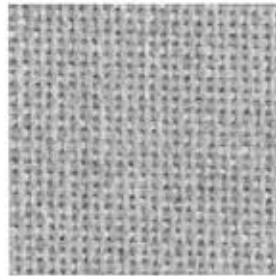


PANEL FABRIC

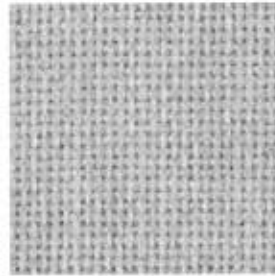
FR 701®  
STYLE 2100



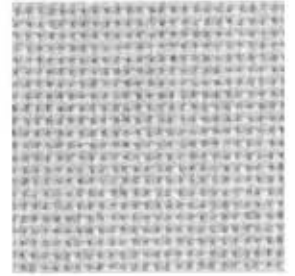
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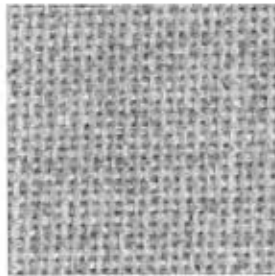
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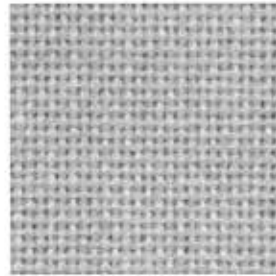
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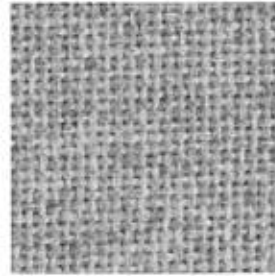
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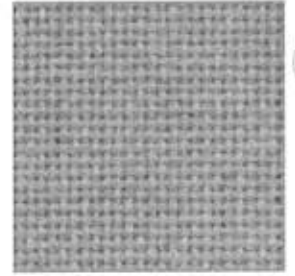
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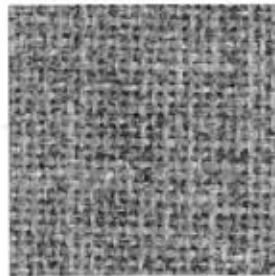
**481 PEARL**



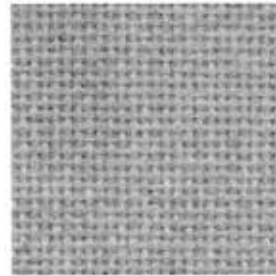
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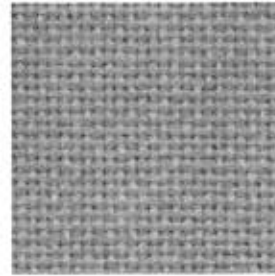
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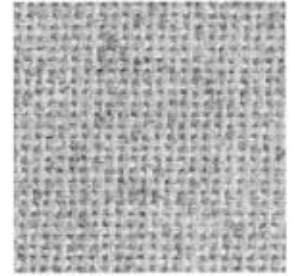
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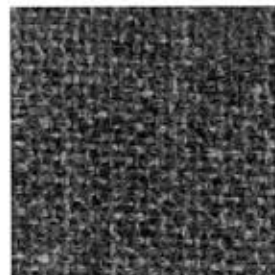
**758 DESERT SAND**



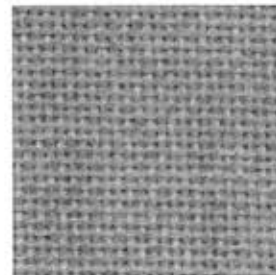
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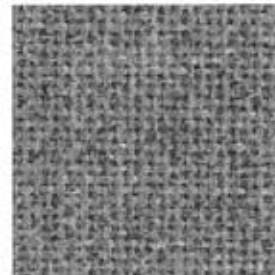
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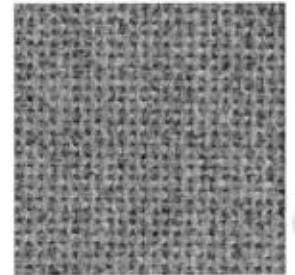
**298 MEDIUM GREY**



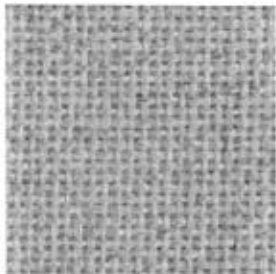
**750 CEMENT MIX**



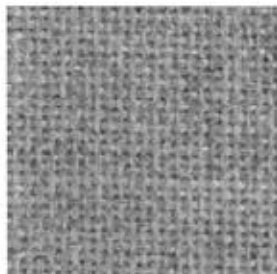
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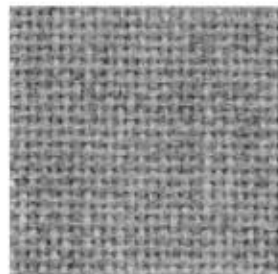
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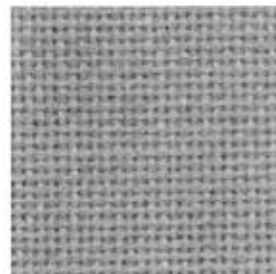
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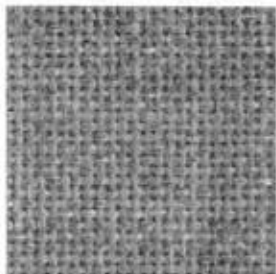
**406** SILVER NEUTRAL



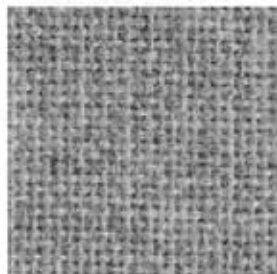
**539** BLEU PAPIER



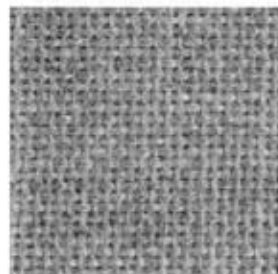
**749** DUNE



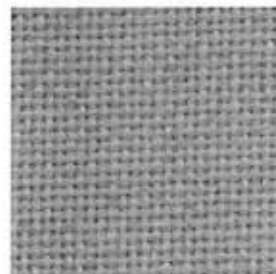
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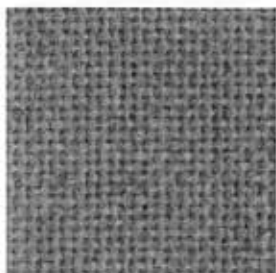
**405** LAVENDER NEUTRAL



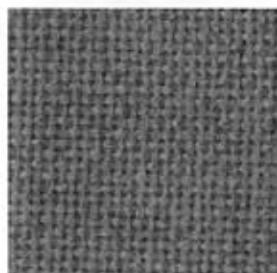
**401** BLUE NEUTRAL



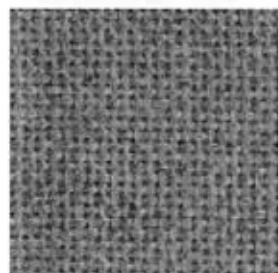
**757** STREAM



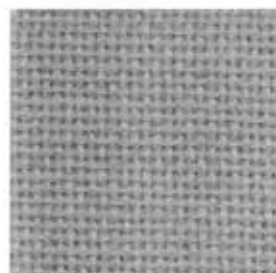
**390** ROSE QUARTZ



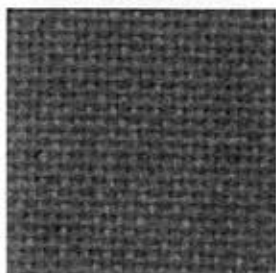
**752** LILAC



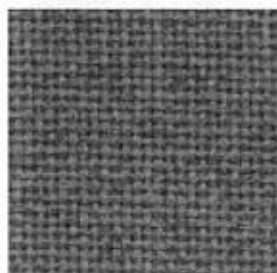
**175** CRYSTAL BLUE



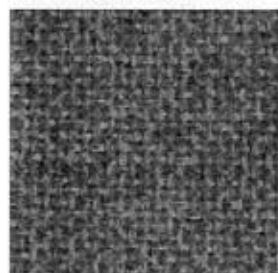
**755** LEAF



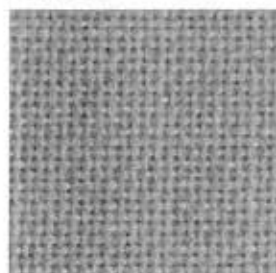
**475** SIENNA



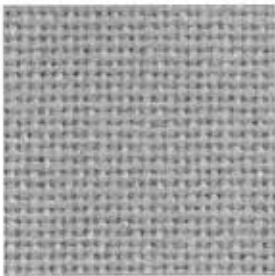
**753** VIOLET



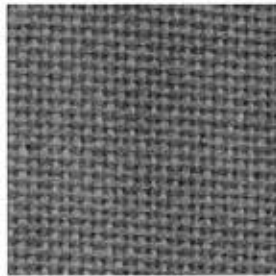
**150** WEDGEWOOD



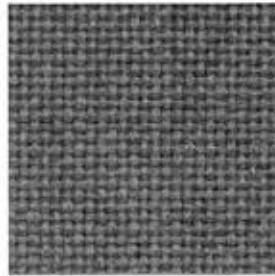
**754** LIGHT MOSS



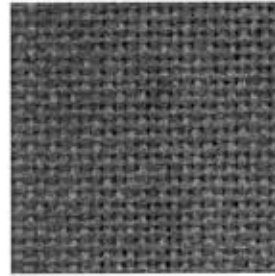
**468** EUCALYPTUS



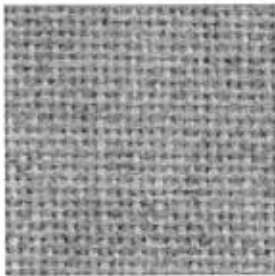
**549** CHROME GREEN



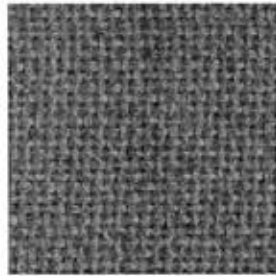
**486** BAYBERRY



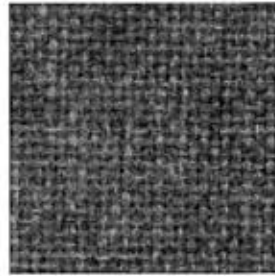
**545** BRONZE



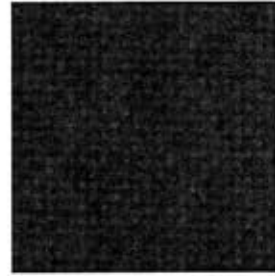
**561** VERTE PAPIER



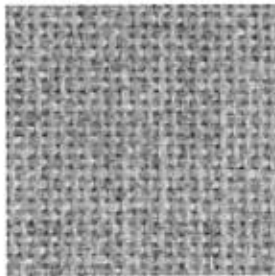
**381** AQUAMARINE



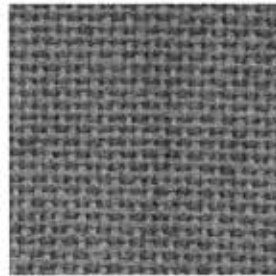
**424** AMETHYST



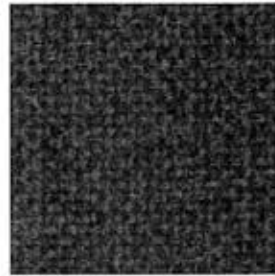
**556** DEEP BURGUNDY



**402** GREEN NEUTRAL



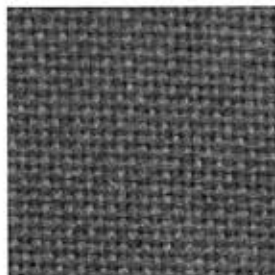
**756** LAKE



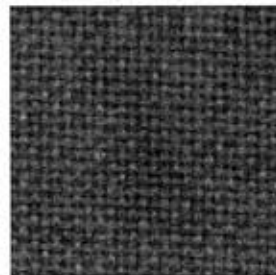
**153** BALTIC



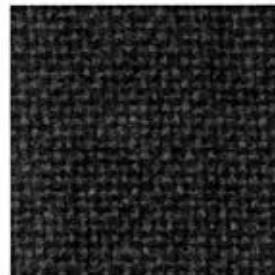
**418** CLARET ACCENT



**467** BLUE SPRUCE



**470** ULTRAMARINE



**553** BLUE PLUM



**408** BLACK

## SPECIFICATIONS

### FR 701\*

PATTERN	2100
CONTENTS	100% Terratex™ Polyester
WEIGHT	16.0 ± 0.5 Oz./Lin. Yd.
WIDTH	66" Useable
REPEAT	None

### CLEANING CODE

W-S	Fabric may be cleaned with mild, water-free solvents or water-based cleaning agents or foam.
-----	----------------------------------------------------------------------------------------------

### PERFORMANCE

TENSILE (ASTM D 5034)	150 Lbs. Min. - Warp and Fill
TEAR (ASTM D 2261)	30 Lbs. Min. - Warp and Fill
MOISTURE REGAIN (ASTM D 2654)	0.5% Max.
COLORFASTNESS TO LIGHT (AATCC 16E)	40 Hrs.
COLORFASTNESS TO CROCKING (AATCC 8)	Class 4 Min. - Dry, Class 4 Min. - Wet

### FLAMMABILITY

ASTM E-84	Class 1 or A
NFPA-701 LARGE SCALE - 1989	Passes
STATE OF CA. TECH. BULLETIN 117 SEC. E (CS-191-53)	Passes

TERRATEX® IS A REGISTERED TRADEMARK OF INTERFACE INTERIOR FABRICS, INC. AND DESIGNATES FABRICS THAT ARE MADE FROM 100% RECYCLED MATERIAL USING INCREASINGLY SUSTAINABLE MANUFACTURING PRACTICES TO PRODUCE A HIGH QUALITY PRODUCT THAT IS RECYCLABLE AT THE END OF ITS USEFUL LIFE.

®  FR 701\* IS INCLUDED IN THE UNDERWRITERS LABORATORY PANEL FABRIC RECOGNITION PROGRAM. ADDITIONAL TESTING OF THE U.L. RECOGNIZED COMPONENT FABRIC IS NOT REQUIRED ON APPROVED PANELS FROM PARTICIPATING MANUFACTURERS.

COLORS MAY VARY SLIGHTLY BETWEEN DYE LOTS.

APPLICATION TESTING OF THIS PRODUCT IS RECOMMENDED.

FR701\* IS A REGISTERED TRADEMARK OF GUILFORD OF MAINE.

THIS SAMPLE IS REPRESENTATIVE OF THE FINISHED COLOR TO BE SUPPLIED AND MAY NOT INDICATE AN EXACT MATCH. WHILE EVERY EFFORT IS MADE TO MATCH THIS COLOR TO A MASTER SAMPLE, SOME VARIATION MAY OCCUR. WE DO NOT RECOMMEND THAT YOU SPECIFY FROM THIS CARD AND CANNOT BE RESPONSIBLE FOR VARIATIONS IN SHADE BETWEEN THIS PRINTED CARD AND ACTUAL FABRIC.



GUILFORD OF MAINE  
5300 CORPORATE GROVE DR. SE  
SUITE 200  
GRAND RAPIDS, MI 49512-5512  
1 800 544 0200 FAX / 616 554 2255

GUILFORD OF MAINE (CANADA), INC.  
254 ST-URBAIN  
GRANBY, QUEBEC J2G 8M8  
CANADA  
450 777 3411 FAX / 450 777 3413

AN INTERFACE COMPANY



lightweight

When considering air distribution for new or retrofit applications, the noise criteria (NC) factor is always considered for supply air outlets but often overlooked for return air outlets. Most HVAC applications include an open plenum design for the return air. The return device is located in the ceiling and the return air is exhausted into the plenum space above the ceiling. This can allow sound transfer to occur between different rooms in a building through the ceiling return air system.

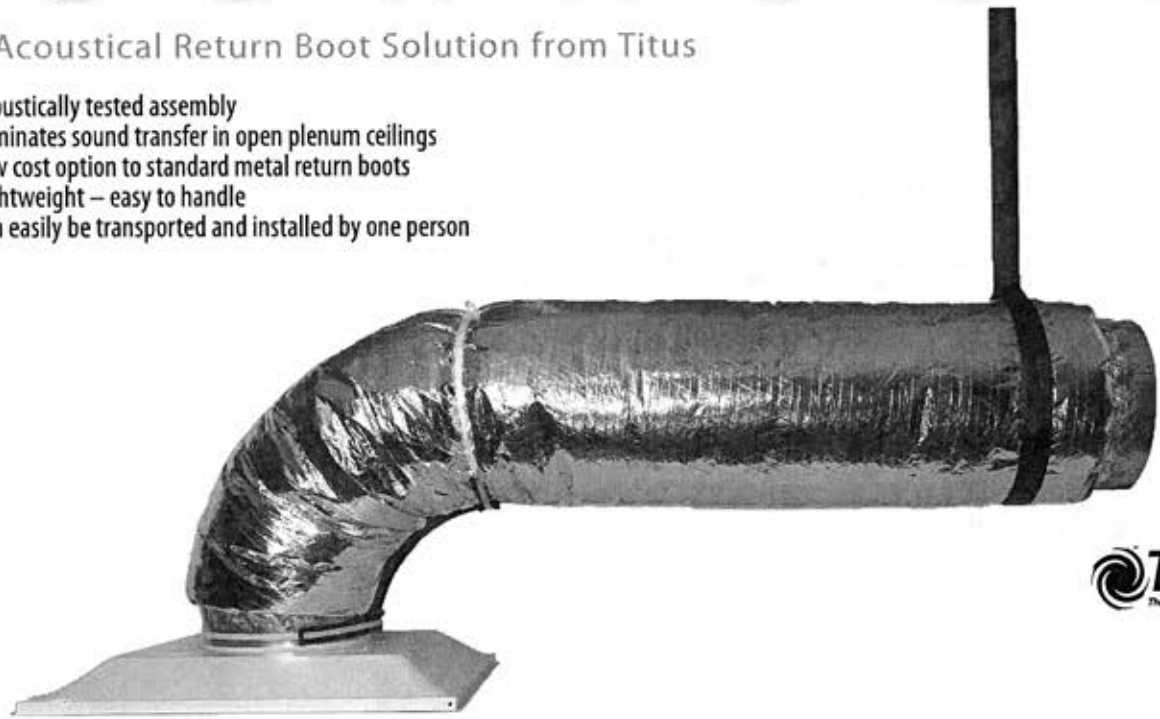
The additional noise is a problem that must be addressed in buildings such as medical offices, schools, and executive offices where privacy is a major concern. To address this issue, Titus offers an acoustical return sound boot that is inexpensive, lightweight, and easy to install. The FlexaBoot assembly consists of a 5' piece of acoustical flex duct, a FlexRight elbow, and all necessary hardware for installation.

easy to install

# FLEXA BOOT

The Acoustical Return Boot Solution from Titus

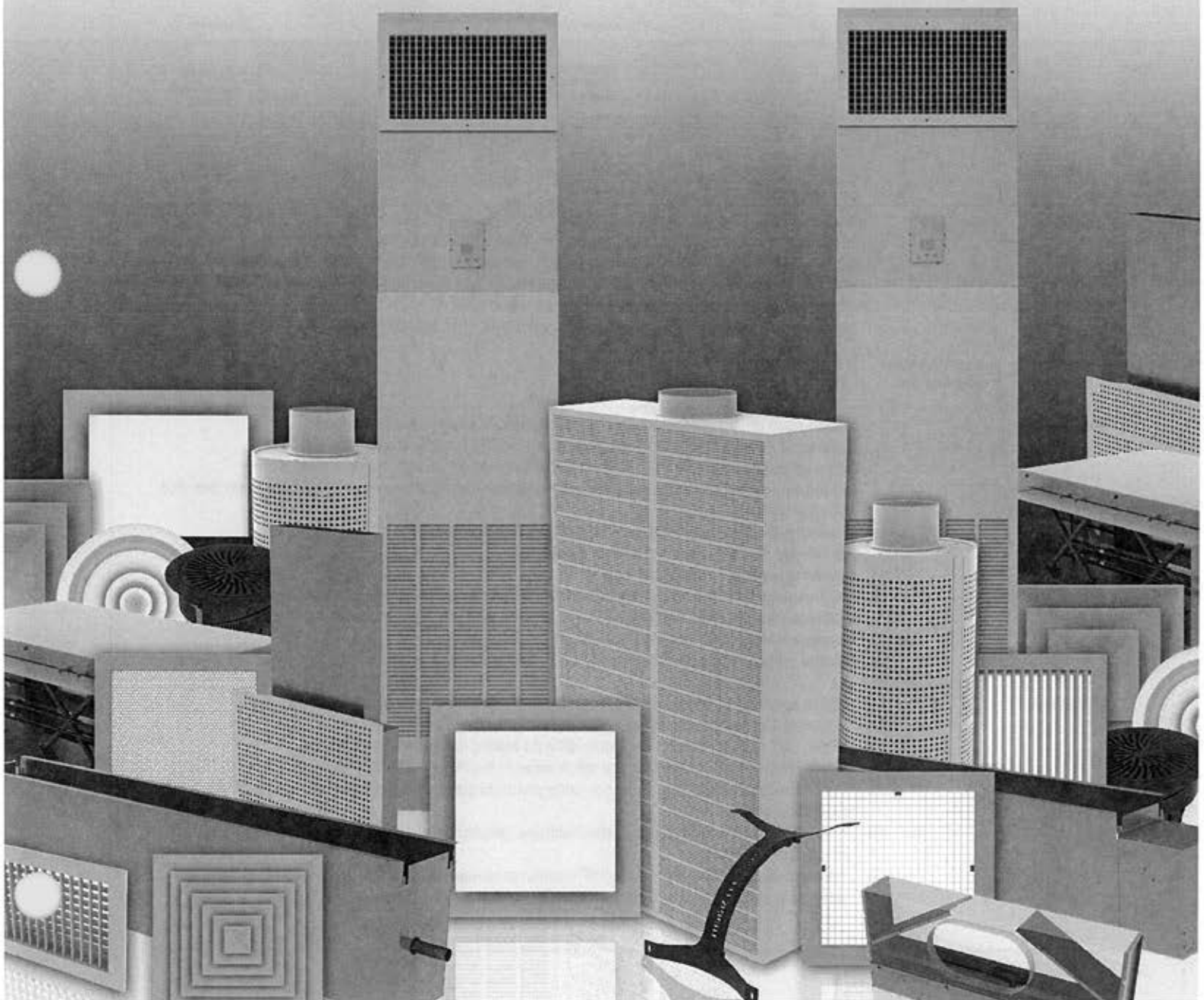
- Acoustically tested assembly
- Eliminates sound transfer in open plenum ceilings
- Low cost option to standard metal return boots
- Lightweight – easy to handle
- Can easily be transported and installed by one person







Titus, The Leader in Air Management has an HVAC solution for any application. Whether it is a ceiling installation or an underfloor application, Titus has the products to meet your needs. Contact your local Titus Representative for more information.



# SHEETROCK® Brand Acoustical Sealant



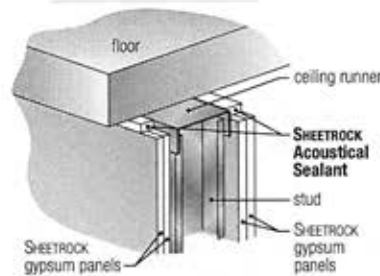
### Makes promised ratings a reality

- Excellent sound-flanking material (supports high STC ratings)
- Superior performance as a fire caulk in UL-classified joint systems
- Ideal for use in smoke and/or sound assemblies
- Meets ASTM C834 specifications for latex sealants
- Grade -18 °C (0 °F) low temperature flexibility, strong bond
- Low VOC

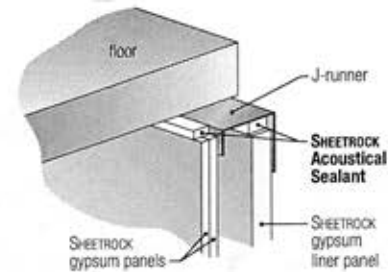
### Description

USG SHEETROCK® Brand Acoustical Sealant is an acrylic, latex-based sound caulk for use as a joint sealant in fire-rated partitions, smoke barriers and sound-rated assemblies.

HW-D-0262 – Conventional Wall



HW-D-0603 – Shaft Wall



**UL Systems**      **Joint Systems**

**Conventional Wall** – BW-S-0013, BW-S-0016, BW-S-0022, BW-S-0026, HW-D-0001, HW-D-0002, HW-D-0262, HW-D-0372, HW-D-0372, HW-D-0504, HW-D-05406, HW-D-0513, HW-D-0518, HW-D-0525, HW-D-0577, HW-D-0584, HW-D-0603, HW-D-0609, HW-D-0610, HW-D-0611, HW-D-0612, HW-D-0613, HW-D-0626, HW-D-0627, HW-D-0628, HW-S-0009, HW-S-0010, HW-D-0032, HW-S-0035, HW-S-0089, HW-S-0094, HW-S-0096, HW-S-0097, HW-S-0098, HW-S-0099, HW-S-0100, HW-S-0101, WW-S-0058, WW-S-0062

**Shaft Wall** – HW-D-0603, HW-D-0609, HW-D-0610, HW-D-0611, HW-D-0612, HW-D-0613, BW-S-0016

**Through-Penetration Firestop Systems**

C-AJ-1020 and W-L-1064

**Advantages**

- Versatile** Easily applied on vertical and horizontal surfaces without sagging, even overhead.
- Sound-tested** As an integral component to maintain high STC/MTC ratings in partitions.
- Surface burning characteristics** Classified by UL with a flame spread of 0 and a smoke developed of 0.
- For use in fire-resistant, sound and smoke partitions** Acceptable for use at the perimeter of most wood- and steel-stud wall assemblies.
- Remains flexible** Dries tough but stays resilient to "give" with movement.
- High adhesion** Bonds tenaciously to a variety of surfaces.
- Attractive appearance** Product is non-staining.
- Easy to dispense** Good working properties ensure fast, efficient application with hand-gun equipment.
- Excellent physical properties** Won't sag on vertical surfaces; good open time; long shelf life.
- Easy cleanup** Latex-based for cleanup with soap and water before drying.
- Classified by UL** as a material for use as a Fill, Void, or Cavity in fire-resistant joint, and through-penetration firestop systems.

**Limitations**

1. Not to be applied to moist areas where frost or condensation is present or in direct contact with water.
2. Protect container from freezing and extreme heat.
3. Maintain 55 °F (13 °C) minimum temperature within the building during and after installation.
4. Product should be stored at a temperature neither below 41 °F (5 °C) nor exceeding 80 °F (26.7 °C).
5. Not to be used in applications where the surrounding materials (partitions, floors, penetrations, etc.) will exceed sustained temperatures of 125 °F.
6. Not for use around CPVC or PVC pipes; consult with pipe manufacturers for compatibility.
7. Not intended to be painted.
8. Do not apply USG SHEETROCK Brand Acoustical Sealant in areas where abuse or abrasion of the sealant is likely.
9. There may be discoloration of sealant when in contact with certain types of metal such as copper.

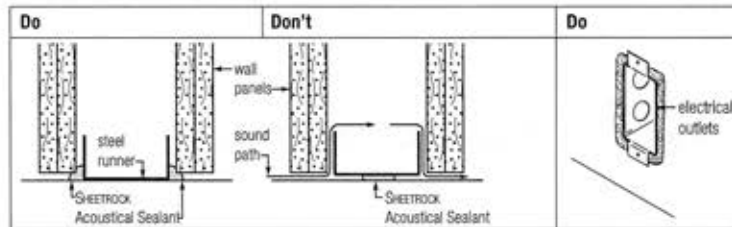
**Directions**      **Preparation**      Before handling, read material safety data sheet and product label for safe usage and health information. Installation of SHEETROCK® Brand Acoustical Sealant should not begin until building is enclosed and building temperatures are maintained at 55 °F (13 °C) minimum. Provide adequate ventilation to carry off excess moisture to insure adequate drying. The performance and adhesion of sealants will be only as good as the surface of which it is applied. Surfaces of the opening and any penetration items to be caulked must be clean, dry, free of dust, debris, and moisture to insure proper adhesion.

**Application**      SHEETROCK Brand Acoustical Sealant shall be applied in accordance with ASTM C919 using conventional caulking equipment. In joint and firestop systems apply the SHEETROCK Brand Acoustical Sealant to minimum thickness specified in the individual fire-rated system.

In shaftwall applications, the maximum separation between bottom of floor and top of liner panel is 1". Max separation between bottom of floor and top of gypsum board sheets at time of installation of joint system is 5/8". The joint system is designed to accommodate a maximum 25 percent compression or extension from its installed width on the finished side of the wall.

For all other joints, the sealant application should be specified by a design professional who should give consideration to using a backer rod or bond tape where the gap exceeds 5/8". In joints too shallow to take backer rod, use a bond breaker tape to prevent three-sided adhesion.

In acoustical applications, apply 1/4" min. bead of sealant to seal perimeter of partition. Apply continuous bead of SHEETROCK Brand Acoustical Sealant around all openings and partition intersections. In penetration applications which are not covered in an individual fire rated system, the thickness of the sealant applied within the opening should be no less than 1/4" and no greater than 5/8" flush with the top surface of the floor or sides of the wall. (Except above the liner panels in shaftwall applications.)



**Product Data**

**Testing and classification:** Meets ASTM C834 Standard Specification for Latex-Based Sealing compounds tested in accordance with ASTM C731, ASTM C732, ASTM C733, ASTM C734, ASTM C736, ASTM D217, ASTM D2202, ASTM D2203, and ASTM D2377. Also tested in accordance with ASTM E84 (surface burning characteristics), ASTM E90 (sound tests) and ASTM E1966 (fire resistant joint systems). ASTM E814 (Through firestop penetrations).

**Surface burning characteristics:** 0/0 (flame spread/smoke developed)

**Color:** Off-white

**Solids:** 73% ± 3%

**Weight:** 12.0–12.8 lb./gal. (in container)

**pH:** 8.5–9.25

**VOC:** <15 g/l

**Shelf life:** 1 year (in original, unopened container) under good storage practices. NOTE: see #4 under Limitations

**Coverage (approximate):** 85 linear ft. of 1/4" bead/29 oz. ctdg.; 37 linear ft. of 3/8" bead/29 oz. ctdg.; 22 linear ft. of 1/2" bead/29 oz. ctdg.; 11 linear ft. of 5/8" bead/29 oz. ctdg.

**Packaging:** 29 oz. (850 ml) cartridge; 5 gal. (18.9 L) pail

- Good Design Practices**
- 1 Inspections**      Periodic inspection of rated barriers is recommended to make sure that any new openings, modifications of previously installed seals, or areas exhibiting physical damage have been properly sealed or repaired.
  - 2 Sound Tests**      Sound tests are conducted under laboratory conditions per ASTM procedures. Comparable field performance depends upon careful attention to details and workmanship. SHEETROCK Brand Acoustical Sealant should be used to seal all assemblies used for sound control and all assembly cutouts, such as those for electrical boxes. Back-to-back penetrations of the diaphragm, flanking paths, door and borrowed-light openings should be avoided.
  - 3 Metal Door and Borrowed-Light Frames**      Apply a continuous bead of SHEETROCK Brand Acoustical Sealant inside door frame throat just before inserting facing panel into frame. Do not terminate gypsum panel against trim return.
  - 4 Additional Information**      See publications in USG Architectural Reference Library; SA100, *Construction Selector*; SA927, *Gypsum Panels and Accessories* (for information on system components); SA727, *USG Fire Stop Systems*; SA926, *USG Shaft Wall Systems Catalog*; and [usgdesignstudio.com/sealant-fire-tests.asp](http://usgdesignstudio.com/sealant-fire-tests.asp)

**Submittal Approvals:**

Job Name	Contractor	Date

**WARNING!**  
 Avoid exposure to fumes. Inhalation of vapor may cause headache, nausea, or irritation of nose, throat, and lungs. Use in a well-ventilated area. Wear a NIOSH/MSHA-approved respirator in poorly ventilated areas. Avoid contact with eyes and skin. Wear safety glasses or goggles for eye protection. If eye contact occurs, immediately flush thoroughly with water for 15 minutes. If irritation persists, consult physician. Prolonged or

repeated contact with skin can cause irritation. Wear waterproof gloves and protective work clothing for skin protection. If skin contact occurs, wash thoroughly with soap and water. If irritation persists, consult physician. Do not ingest. If ingested, consult physician immediately. Product safety information: **800 507.8899** or **usg.com**. **KEEP OUT OF REACH OF CHILDREN.**

**Trademarks**  
 The following trademarks used herein are owned by United States Gypsum Company or a related company: SHEETROCK, USG, USG in stylized letters and the red and maroon design elements on the pail and cartridge.

**Note**  
 Products described here may not be available in all geographic markets. Consult your U.S. Gypsum Company sales office or representative for information.

**Notice**  
 We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from date it was or reasonably should have been discovered.

**Safety First!**  
 Follow good safety and industrial hygiene practices during handling and installation of all products and systems. Take necessary precautions and wear the appropriate personal protective equipment as needed. Read material safety data sheets and related literature on products before specification and/or installation.



Manufactured by  
 United States Gypsum Company  
 550 West Adams Street  
 Chicago, IL 60661

**800 USG.4YOU (874.4968)**  
**usg.com**

J678/rev. 3-13  
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**ECOCORE PANELS**

**RECYCLED CONTENT  
TACKABLE PROPERTIES  
HIGH IMPACT SURFACE**

**Panel Composition:**

100% Polyester (60% PET-Recycled Fiber, 40% PET-Virgin Fiber). Chemically hardened edges.

**Sizes:**

Custom sizes available up to 48" X 120". Custom shape and design options also available.

**Finishes:**

Select from Vertical Interior Solutions approved panel fabrics. C.O.M. accepted after approval of suitability.

**Mounting Methods:**

Adhesive & Finish Nail, Z-Clips, Edge Clips, Hook & Loop

**Fire Rating:**

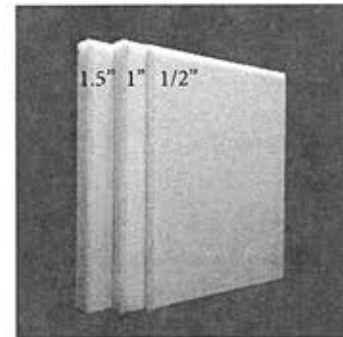
All panel components meet or exceed Class "A" requirements as determined by ASTM E-84 Tunnel Test.

**Warranty:**

All products are warranted against workmanship and manufacturing defects for two (2) years from date of purchase.

**Ecocore is a High Impact Resilient core produced from 100% Polyester material that can be used in place of traditional cores commonly utilized in Acoustical and Tackable panel systems.**

**Ecocore contains 60% Post Consumer recycled content which may contribute to LEED points.**



Benefits

- Formaldehyde Free
- No Binding Agents
- Consistent Color
- Does Not Promote Mildew
- Tackable
- Dust Free
- No Odor
- Extremely Resilient

Edge Detail:



Bevel



Square

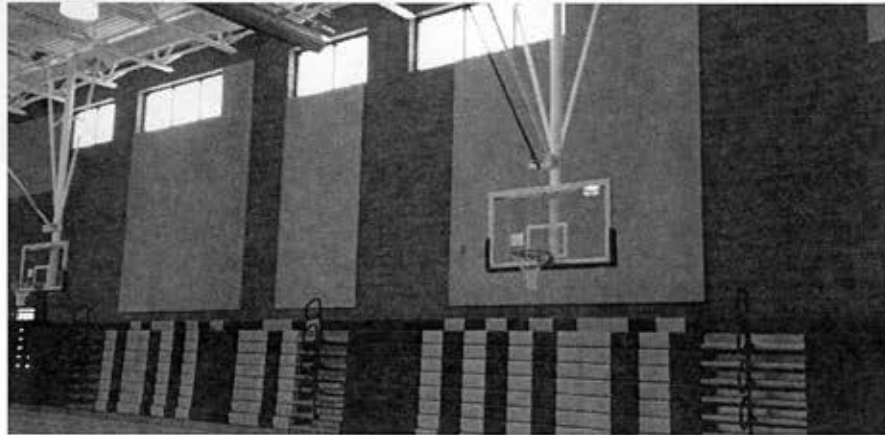
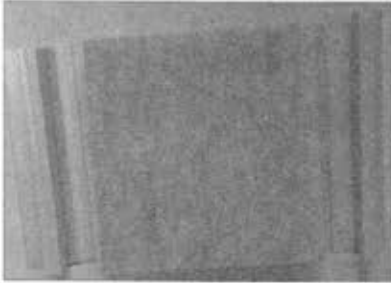
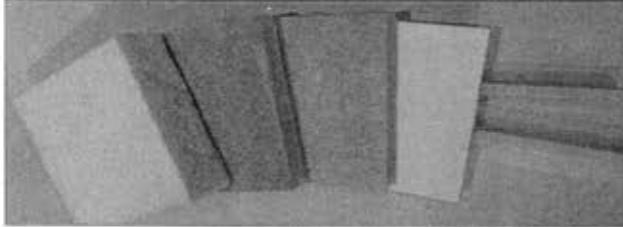


Mitre

Product #	Thickness	Absorption Coefficients				NRC
		250 Hz	500 Hz	1000 Hz	2000 Hz	
ECO-050	1/2"	0.10	0.26	0.65	0.88	0.45
ECO-100	1"	0.28	0.66	1.02	1.03	0.75
ECO-150	1 1/2"	0.61	0.82	1.04	1.00	0.85

# F-SORB™

## ACOUSTICAL CORE SYSTEM



### F-SORB™

System Thicknesses:

- 1/2" system
- 1" system
- 2" system

**F-SORB™** acoustical core is installed with mechanical fasteners into the substrate and between stretched fabric track systems

**F-SORB™** acoustical core comes in light grey, tan or white. The light grey color is standard unless specified otherwise

### Noise Reduction Coefficients:

NRC 1/2" Thick	0.55
NRC 1" Thick	0.75
NRC 2" Thick	0.90

- **F-SORB™** is an environmentally friendly, polyester acoustical panel developed for building interiors and exteriors for acoustics.
- **F-SORB™** is a 70% post-consumer polyester-fiber, Class A fire-rated sound absorption product for walls, ceiling and duct applications.
- **F-SORB™** is 100% recyclable.
- **F-SORB™** Polyester fiber resists mold, mildew and bacteria.
- **F-SORB™** is acoustically identical to fiberglass in performance.
- **F-SORB™** is hypoallergenic, dust-free and formaldehyde-free.
- **F-SORB™** is easy to handle and simple to apply.
- Great for offices, schools, movie theaters, churches and studio installations.
- **F-SORB™** acoustical core has a 6 LB face that is tackable and impact resistant.
- NO VOC 's. Does not use binders or chemicals. No risk of skin irritation or respiratory problems.
- Standard acoustical core panel color is Light Grey. Tan and White are available.

### Standard Panel Specs:

1/2" acoustical core is 6 LB Density

1" acoustical core is a 6 LB Density face on a 4 LB core

2" acoustical core is a 5 LB Density

Standard Sheet size is 4' x 8'

[www.f-sorb.com](http://www.f-sorb.com)

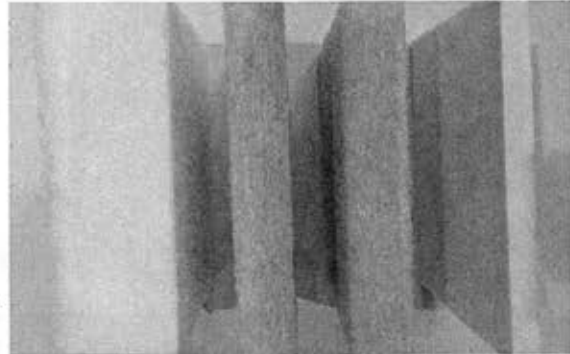
15115 NE 90th Street, Suite 4A, Redmond, WA 98052 PH 425-881-1124 FAX 425-881-1114

# F-SORB™

## ACOUSTICAL CORE SYSTEM

### Flexibility in Acoustical Applications and Installation:

- ◆ F-SORB works well in Stretched Fabric Systems.
- ◆ It provides a tackable surface in most applications.
- ◆ Conforms to a wide variety of acoustical applications.
- ◆ Versatility to fit any layout design.
- ◆ Rebounds to impact.
- ◆ Can be used without fabric facings in exposed applications.



### Key Features:

Acoustical Absorption: Noise absorbed based on mounting type.

NRC: 1/2" NRC 0.70 - 0.80	1" NRC 0.90 - 1.00		E TYPE MOUNTING
1/2" NRC 0.50 - 0.60	1" NRC 0.70 - 0.80	2" NRC 0.85 - 0.95	A TYPE MOUNTING
1/2" NRC 0.55 - 0.65	1" NRC 0.75 - 0.85	2" NRC 0.90 - 1.00	B TYPE MOUNTING
			1" FURRING

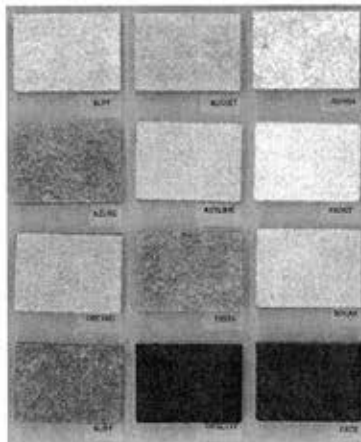
### Standard Colors available:

**F-SORB™** Light Grey

**F-SORB™** Tan

**F-SORB™** White

### Custom Colors Available:



[www.f-sorb.com](http://www.f-sorb.com)

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## ACOUSTICAL SYSTEMS

WORLDWIDE ACOUSTICAL PRODUCTS & SERVICE

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PH: (719) 846-2300

FAX: (719) 846-7466

*Email: [empireacoustical@rmi.net](mailto:empireacoustical@rmi.net)*

*Texas Location:*

1106 South Mays, #240

Round Rock, TX 78664

PH: (512) 828-3138

FAX: (512) 233-1757

*Email: [johnnie@mckeowninternational.com](mailto:johnnie@mckeowninternational.com)*

**[www.empireacoustical.com](http://www.empireacoustical.com)**

## EMPIRE ACOUSTICAL SYSTEMS

Celebrating 20 years of custom engineering, fabrication, and installation of



- **ACOUSTICAL ENCLOSURES**
- **NOISE BARRIERS**
- **SOUND ABSORPTIVE WALL MOUNTINGS**



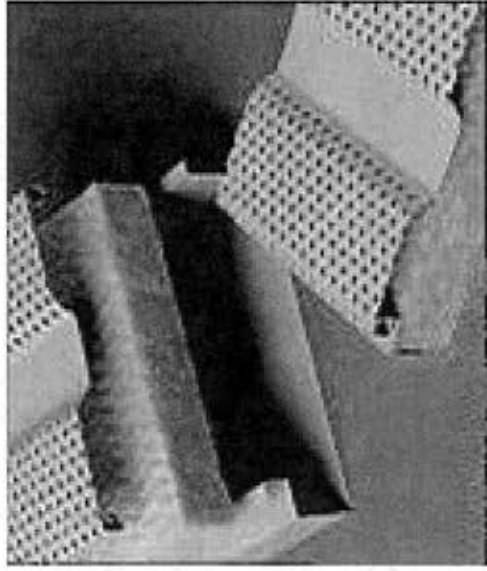
Our cost – effective, light weight metal panels are designed to meet your specific noise control problems.

Maintaining the highest acoustical properties available, our systems are engineered for easy installation and no maintenance.

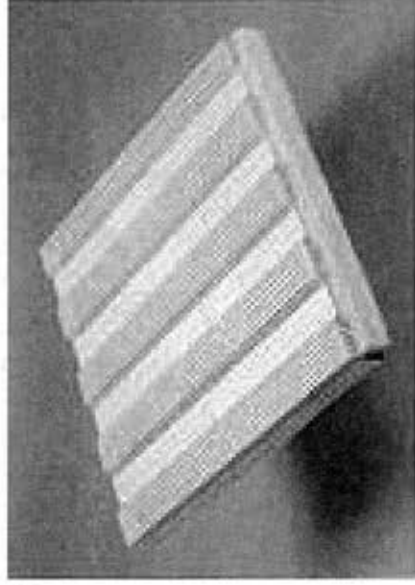


## PRODUCTS

Empire Acoustical Systems noise control products are fabricated from galvanized steel or similar metals and have two basic applications.



The **Silent Screen panel** is engineered for noise enclosures and barrier walls where structural integrity, sound absorption and transmission loss are of major concern.



The **M-90 panel** is used on walls for sound absorption applications.

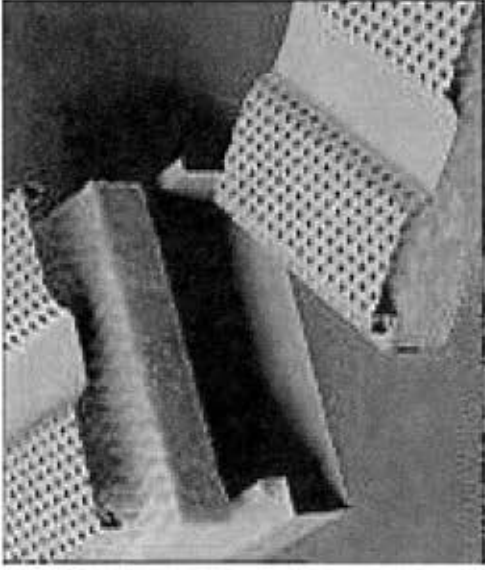


## **ADVANTAGES OF THE EMPIRE ACOUSTICAL SYSTEMS ACOUSTICAL PANEL**

- Engineered products to meet clients' specific acoustical requirements
- Fabricated from quality materials as specified by ASTM standards
- Cost effective designs
- Addresses difficult applications for harsh working environments
- Ease of installation
- Maintenance free and easy to remove
- Aesthetically pleasing

## SILENT SCREEN PANELS

- Designed to provide sound absorption and sound transmission loss
- Consists of individual sections, 12 inches wide
- Mounts horizontally on top of one another or
- Mounts vertically side by side
- Each section contains a 2 - 4 inches deep 16 gauge - 22 gauge tray
- Tray filled with 6 pound density mineral wool, covered with 22 gauge perforated face panel



Sounds striking the perforated side will pass through the perforations and be absorbed by the acoustical material, and some will be reflected back to the source of the noise.

The remaining sound which is transmitted through the barrier, is substantially reduced.

The standard **Silent Screen Panel** has a sound absorptive value of NRC 1.05 and STC of 35.

# SILENT SCREEN PANELS TYPICAL WALL ASSEMBLY

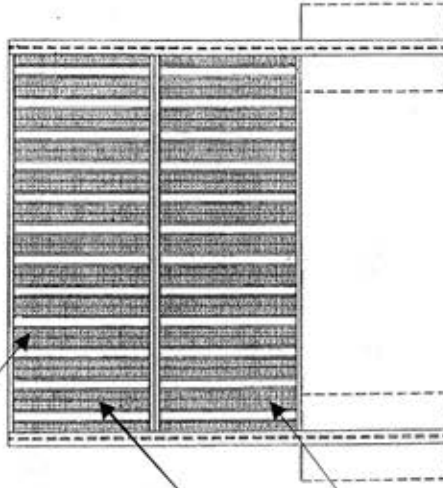
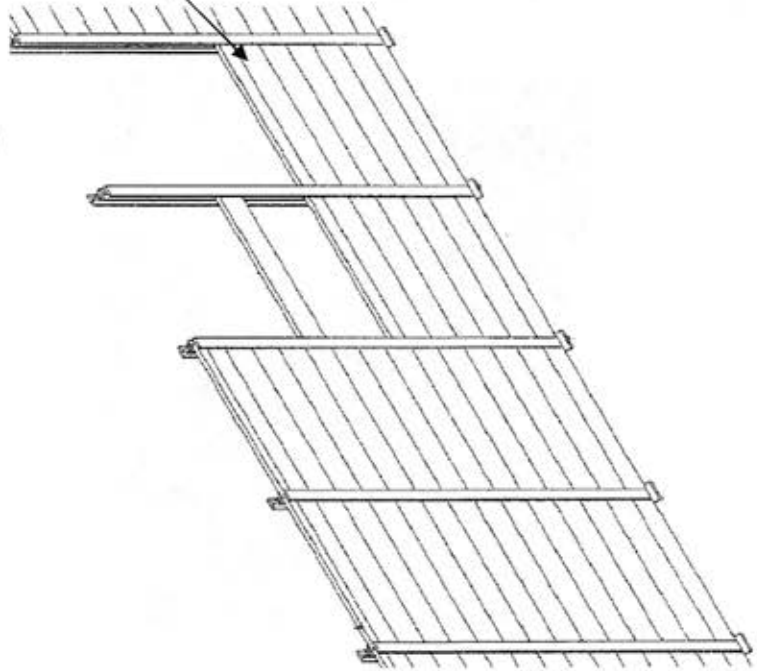
FABRICATED FROM 22 AND 16 GAUGE SHEET STEEL - INSTALLED HORIZONTALLY OR VERTICALLY - TYPICALLY 12 INCHES WIDE AND 2 3/4 INCHES THICK

FACE PANEL - COLD - FORMED STEEL GALVANIZED IN ACCORDANCE WITH ASTM A-653, CLASS G-90. MAY BE GALVANIZED OR PRE-COATED FOR AESTHETIC APPEAL.

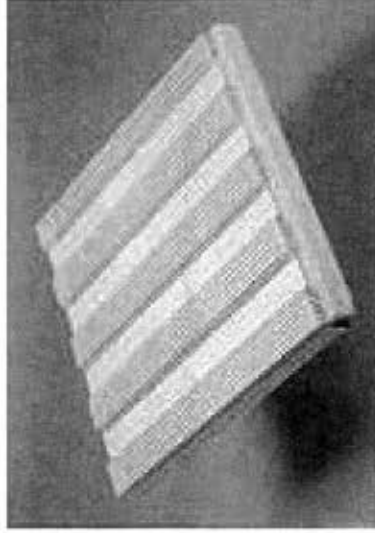
BACK TRAY - COLD - FORMED STEEL GALVANIZED IN ACCORDANCE WITH ASTM A-653, CLASS G-90 WITH A 12 INCH WIDTH. MAY BE GALVANIZED OR PRE-COATED FOR AESTHETIC APPEAL.

PERFORATION - COLD-FORMED STEEL WITH 3/16 INCH DIAMETER PERFORATIONS IN A 3/8 INCH STAGGERED PATTERN.

ACOUSTICAL INSULATION - MINERAL ROCK WOOL - 2 INCHES THICK WITH A 6 POUNDS PER CUBIC FOOT DENSITY CONFORMING TO FEDERAL SPECIFICATION HH-1-558B AND ASTM E-136.



## M-90 ABSORPTIVE PANEL



- Designed for wall-mounting indoor and outdoor applications
- Consists of 24 inch wide panel sections
- Available in 2– 4 inch thicknesses
- Available in lengths up to 12 feet
- Absorptive material is 6 pound density mineral wool

**M-90** panels are sound absorptive backless panels that fit on an existing wall or barrier structure. The **M-90** panels are fabricated from galvanized sheet steel with a 22 gauge thickness and are nested with Z or J channel clips horizontally attached to the existing walls.

The standard **M-90 Absorptive Panel** has a sound absorptive value of NRC 1.10

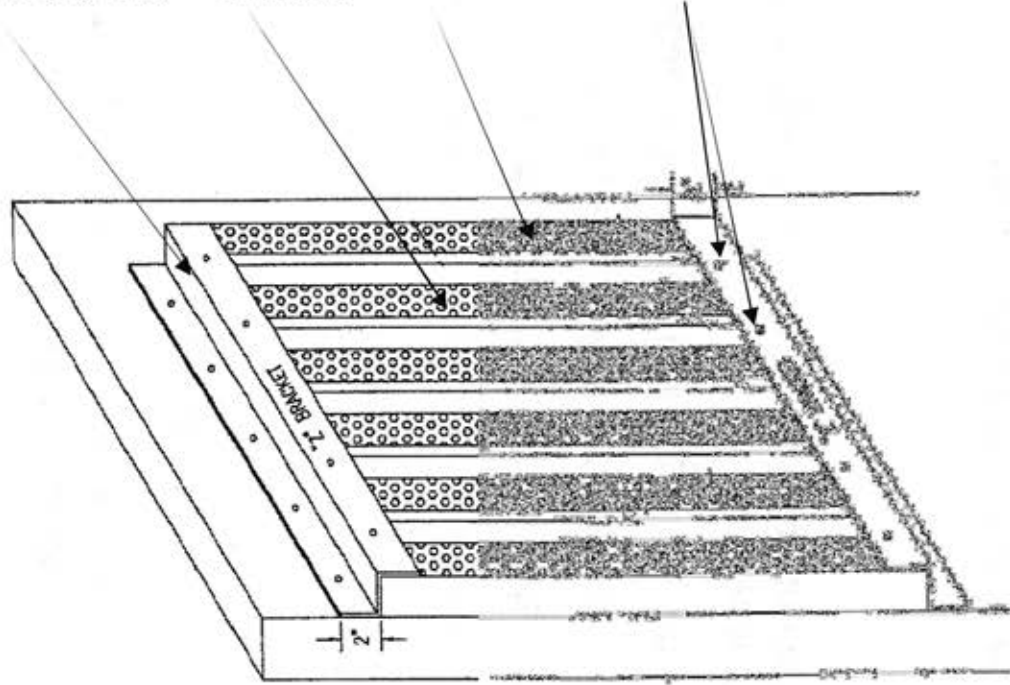
# M-90 ABSORPTIVE PANEL WALL MOUNTING DETAIL

Z BRACKET - COLD-FORMED STEEL GALVANIZED IN ACCORDANCE WITH ASTM A-653, CLASS G-90, WITH TWO 2 INCH LEGS AND 2-5/8 INCH DEEP. MAY BE GALVANIZED AND THEN PRE-COATED FOR AESTHETIC APPEAL.

PERFORATION - COLD - FORMED STEEL WITH 3/16 INCH DIAMETER PERFORATIONS IN A 3/8 INCH STAGGERED PATTERN.

ACOUSTICAL INSULATION - MINERAL ROCK WOOL - 2 INCHES THICK WITH A 6 POUNDS PER CUBIC FOOT DENSITY CONFORMING TO FEDERAL SPECIFICATION HH-1-558B AND ASTM E-136.

ANCHOR BOLTS - TYPICALLY GALVANIZED, SELF-DRILLING, HEXAGON WASHER HEAD SCREW. MAY BE STAINLESS STEEL OR COLOR COATED TO MATCH PANELS.



PANELS - SHEET STEEL, GALVANIZED IN ACCORDANCE WITH ASTM A-653, CLASS G-90

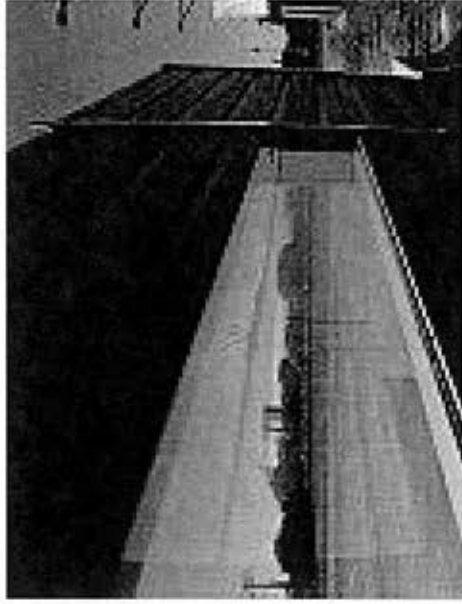
PANELS - INSTALLED VERTICALLY TO FOLLOW CONTOUR OF WALL

PANEL WIDTH - TYPICALLY 24 INCHES WIDE

PANEL LENGTH - TYPICALLY UP TO 12 FEET LONG

## VISTA PANEL

- Designed for applications where visibility is required for safety or monitoring purposes
- Abrasive and ultraviolet resistant
- Available in 22 gauge – 16 gauge cold formed steel
- Minimum cover width of 12 inches
- Perforated face panel interlocks to the back tray without fasteners
- Polycarbonate panel minimum 3/16 inch thick



**VISTA** panels are easily combined with mineral wool filled panels or double wall panels to solve a wide variety of sight and sound problems.

The standard **VISTA** Absorptive Panel has a noise reduction coefficient value of NRC 1.05 or greater.

# VISTA PANEL

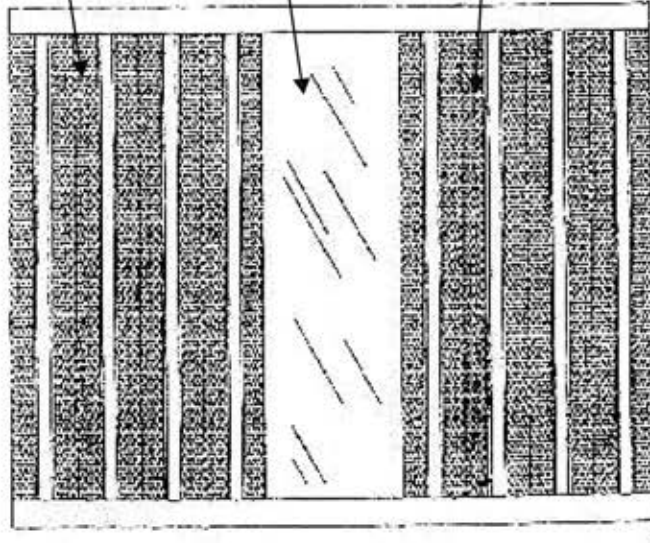
## TYPICAL DETAILS

PANELS – COLD-FORMED STEEL GALVANIZED IN ACCORDANCE TO ASTM A-653, CLASS G-90.

PANELS – MINIMUM COVER WIDTH OF 12 INCHES

PANELS – THICKNESS OF 22 TO 16 GAUGE

BOLTS AND FASTENERS – SHALL CONFORM TO ASTM A-307 AND GALVANIZED PER ASTM A-164 OR STAINLESS STEEL AS REQUIRED.



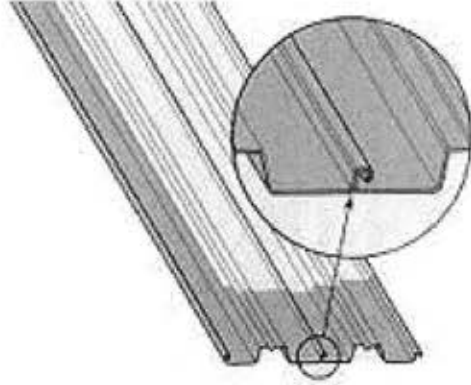
PERFORATED FACE PANEL – ROLL-FORMED ASTM A-446 PERFORATED STEEL PANEL WITH 3/16 INCH DIAMETER PERFORATIONS ON A 3/8 INCH STAGGERED PATTERN.

POLYCARBONATE PANEL – MONOLITHIC AND LAMINATED MADE OF HIGH IMPACT, ULTRAVIOLET LIGHT RESISTANT SHEETS. MINIMUM 3/16 INCH THICK.

ACOUSTICAL INSULATION – MINERAL ROCK WOOL – 2 INCHES THICK WITH A 6 POUNDS PER CUBIC FOOT DENSITY CONFORMING TO FEDERAL SPECIFICATION HH-1-558B AND ASTM E-136.



## ANGLE-LOK REFLECTIVE PANEL



- Designed to provide sound transmission loss only
- Interlocking sections, typically 12 inches wide
- Horizontal or vertical mounting
- 18 gauge sheet steel
- 22 gauge galvanized flashing and caps
- Intermediate girths available

**ANGLE-LOK Reflective Panels** provide a lightweight, aesthetically pleasing noise wall and acoustical barrier.

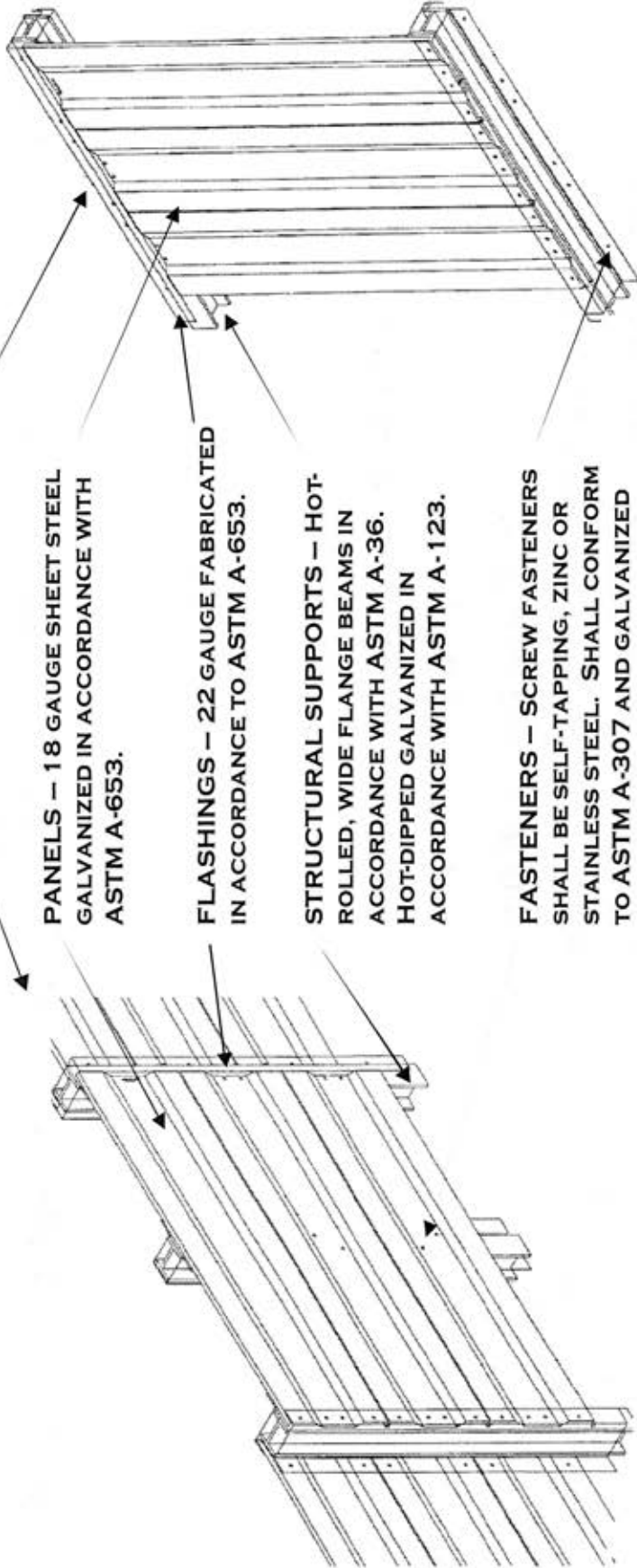
The standard **ANGLE-LOK Reflective Panel** has a sound transmission class value of at least **STC 22**.

# ANGLE-LOK REFLECTIVE PANEL

## TYPICAL DETAILS

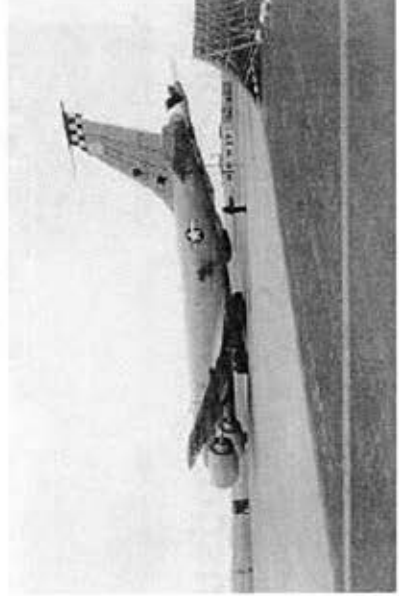
Panels are a minimum of 12 inches wide and are designed to interlock with adjacent panels.

Panels are suited for either horizontal or vertical mounting.



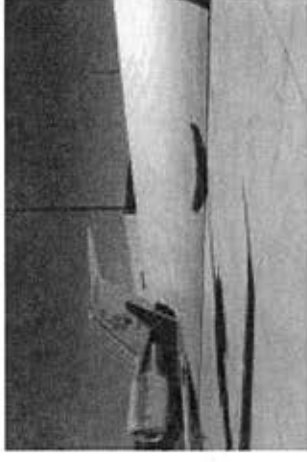
## APPLICATIONS

- Transportation Noise Control
- Temporary Construction Noise Walls
- Airport & Mass Transit Noise Control
- Industrial Applications
- Utility Noise Control
- Commercial and Residential Applications



## APPLICATIONS

### Transportation Noise Control

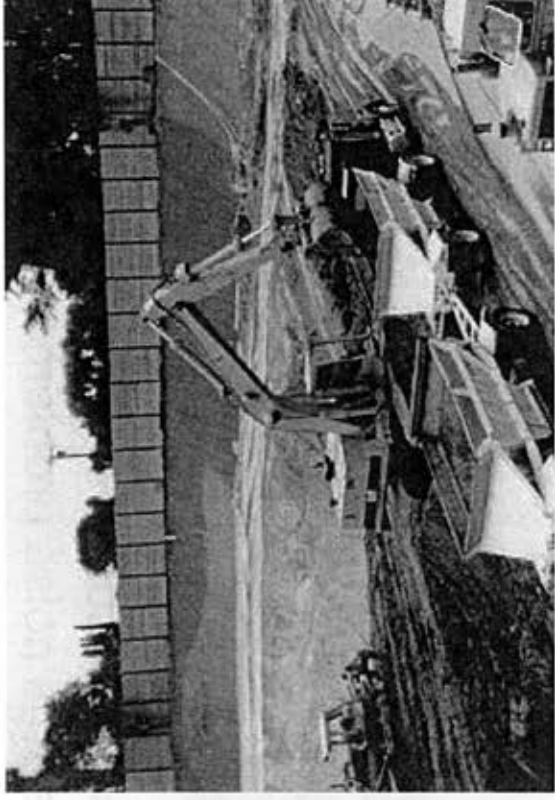


- **SILENT SCREEN** – Used where both sound absorption and transmission loss are essential
- **ANGLE-LOK** – Used where non-absorptive sound barriers are not required
- **M-90** – Used where an existing reflective wall needs modification to reduce reflective noise levels



## APPLICATIONS

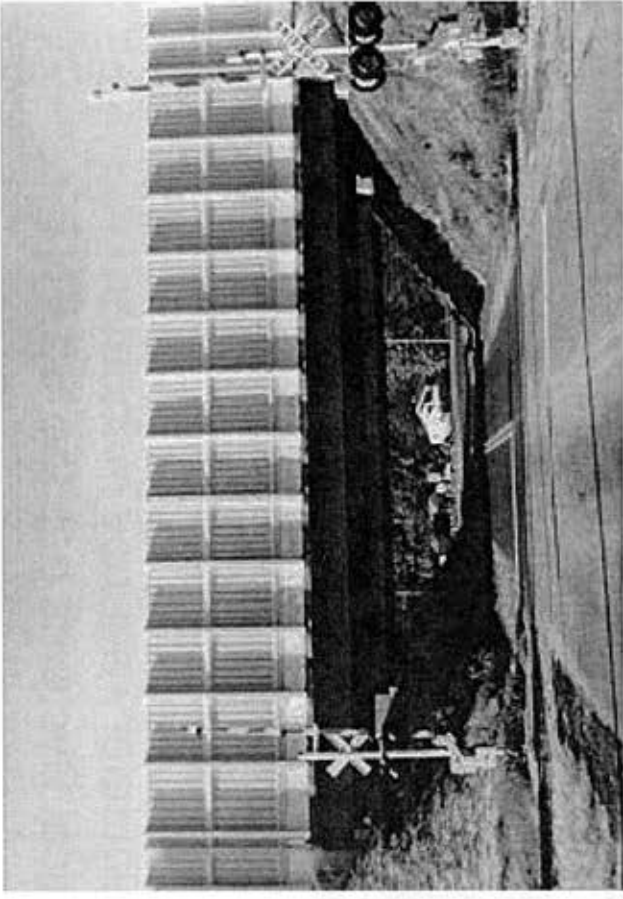
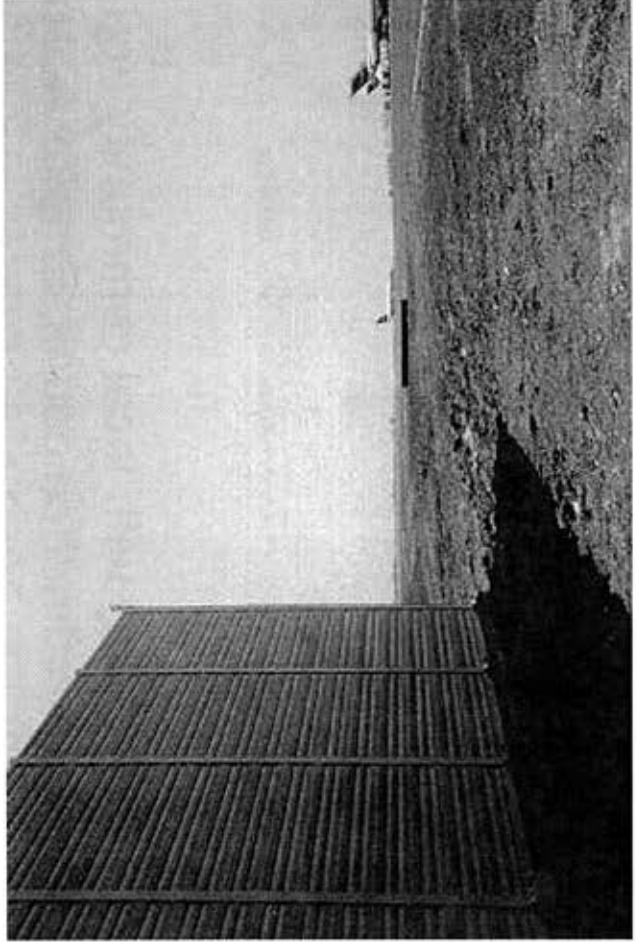
### Temporary Construction Noise Walls



To comply with local community and regulatory agency mandated noise ordinance codes, Empire Acoustical Systems has the **SILENT SCREEN**, **VISTA SCREEN** and **M-90** panels to conform to these mandates.

## APPLICATIONS

### Airport & Mass Transit Noise Control



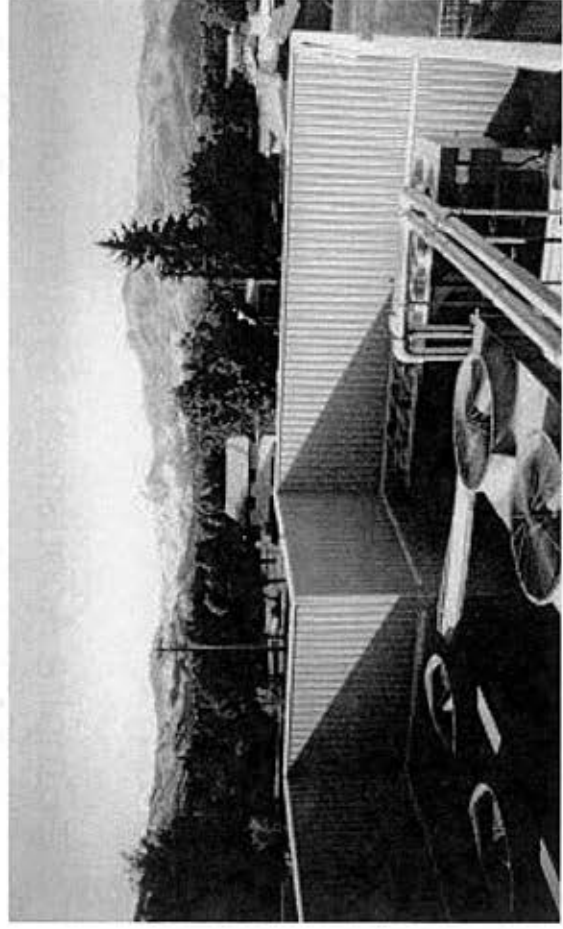
Empire Acoustical Systems has developed absorptive and reflective panels to solve most airport and mass transit systems noise problems.

Having worked closely with an engineering firm and the FAA, Empire Acoustical Systems has developed a series of acoustical noise control products specifically addressing noise generated from taxiing aircraft and airport mobile equipment.

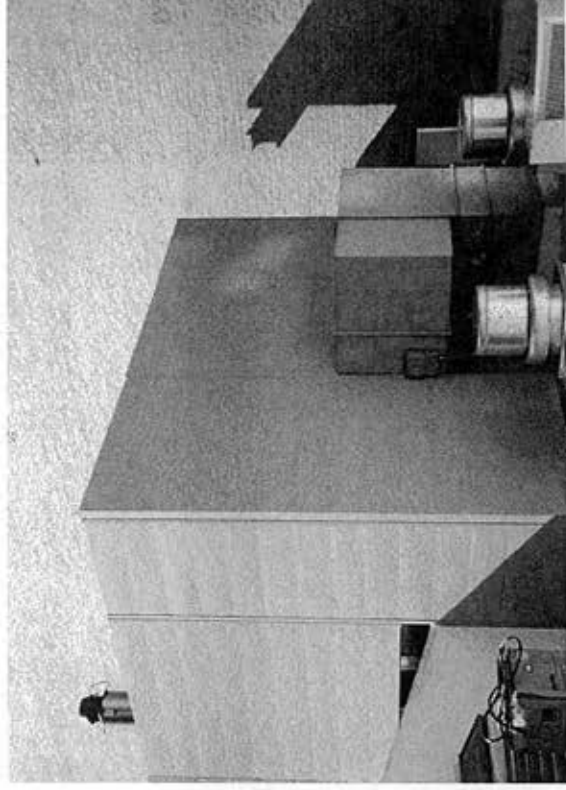
These panels - the **BLAST BARRIER**, **VISTA PANEL** and the **M-90 PANEL** - are easy to install and readily dismantled.

## APPLICATIONS

### Industrial Applications



Rooftop

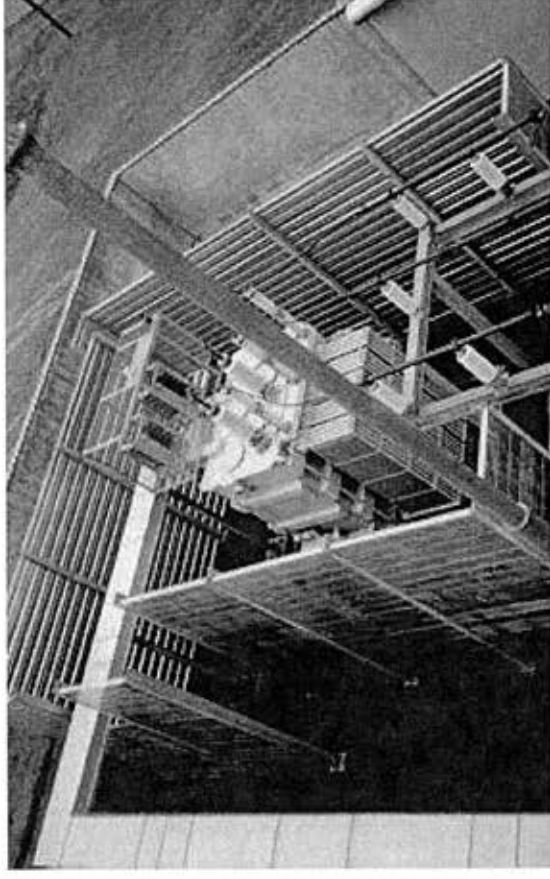
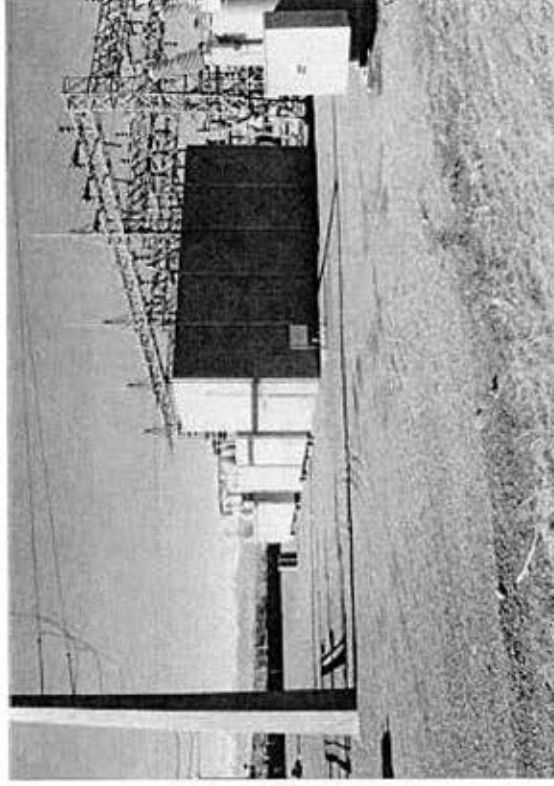


Utility Barrier

To comply with local, OSHA and EPA noise regulations standards, Empire Acoustical Systems offer the following products: **VISTA PANEL, SILENT SCREEN PANEL, M-90 PANEL**, Curtain Walls, and Reflective Screens which provide solutions to your industrial noise problems.

## APPLICATIONS

### Utility Noise Control Applications



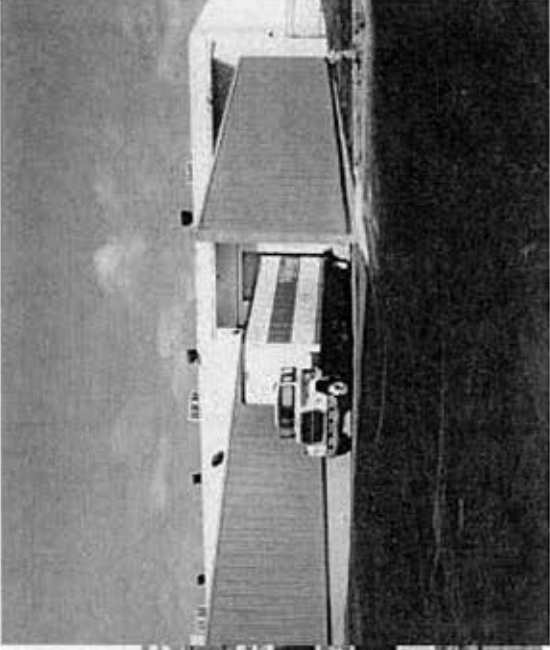
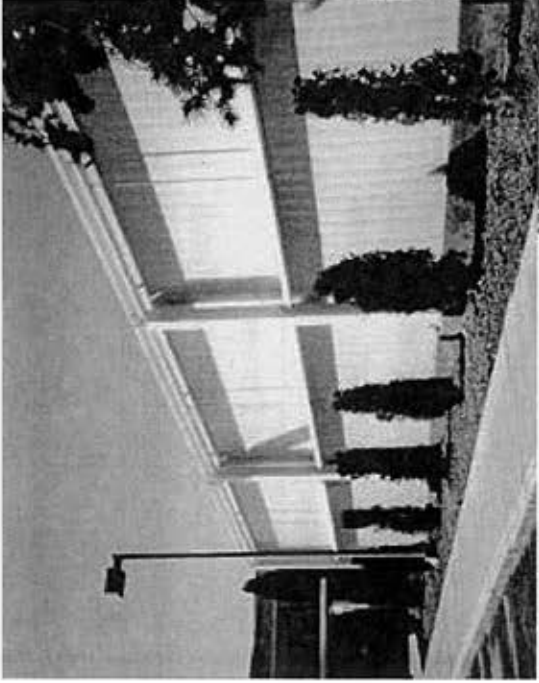
Empire Acoustical Systems offers a unique noise abatement system to abate the noise problems that face power station and electrical utility engineers.

This system is relatively maintenance free, easy to install, and has a cellular fabricated panel that has a pleasing appearance.



## APPLICATIONS

### Commercial and Residential Applications



Not only does Empire Acoustical Systems noise control barriers and enclosures provide excellent sound absorption and reflective properties but that are also practical and aesthetically pleasing.

Our panels may be supplied in a galvanized finish, primed for field paint or factory powder coated. All ancillary items are supplied in matching colors.

## TESTING RESULTS

Our products have been tested by Riverbank Acoustical Laboratories, who are accredited by the U.S. Department of Commerce, National Institute of Standards and Technology for ASTM sound absorption and sound transmission loss test procedures.

### RIVERBANK ACOUSTICAL LABORATORIES

#### Overview of Acoustical Data

PRODUCT	TEST REPORT	STC RATING	NRC RATING
Empire "Silent Screen" 2.75" Thick Absorptive Panel 22 gauge Backtray	RAL-TL88-150' RAL-A87-370	26	1.00
Empire "Silent Screen" 2.75" Thick Absorptive Panel 18 gauge Backtray	RAL-TL91-239 RAL-A87-370	30	1.00
Empire "Silent Screen" 2.75" Thick Absorptive Panel 16 gauge Backtray	RAL-TL92-204 RAL-A95-63	35	1.05
Empire "M-90" Wall Absorptive Panel 22 gauge	RAL-A90-1	---	1.10
Empire "M-90" Wall Mounting 2.5" Thick 14 gauge Backer Panel	RAL-TL90-71 RAL-A90-1	37	1.10
Empire "Angle-Lok" Reflective Panel	RAL-TL98-127	22	---

# TESTING RESULTS

## M-90 PANEL

RIVERBANK ACOUSTICAL LABORATORIES

1512 BATAVIA AVENUE  
NEVA, ILLINOIS 60134

OF  
IIT RESEARCH INSTITUTE  
**REPORT**

708/232-0104  
FOUNDED 1891 BY  
WALLACE CLEMENT SABINE

RIVERBANK ACOUSTICAL LABORATORIES

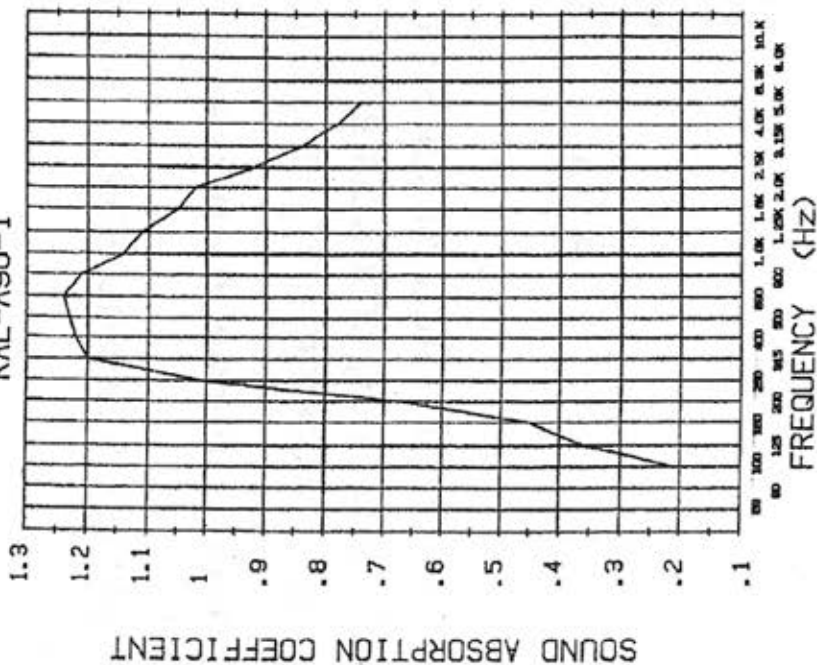
1512 BATAVIA AVENUE  
GENEVA, ILLINOIS 60134

OF  
IIT RESEARCH INSTITUTE  
**REPORT**

708/232-0104  
FOUNDED 1891 BY  
WALLACE CLEMENT SABINE

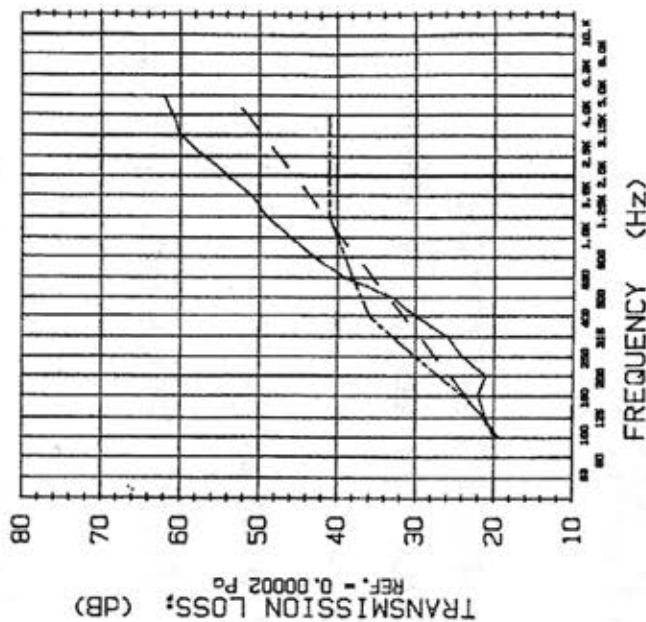
### TRANSMISSION LOSS REPORT RAL-TL90-71

### SOUND ABSORPTION REPORT RAL-A90-1



THE RESULTS REPORTED ABOVE APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT. NO RESPONSIBILITY IS ASSUMED FOR PERFORMANCE OF ANY OTHER SPECIMEN.  
ACCREDITED BY DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY  
ACCREDITATION PROGRAM FOR SELECTED TEST METHODS FOR ACOUSTICS.

NRC = 1.1



— TRANSMISSION LOSS  
- - - SOUND TRANSMISSION CLASS CONTOUR  
- - - MASS LAW CONTOUR

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ACCREDITATION PROGRAM FOR SELECTED TEST METHODS FOR ACOUSTICS.  
THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTE  
OR IMPLY PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY NIST.



## ACOUSTICAL SYSTEMS

Here at Empire Acoustical Systems, we are committed to provide problem-solving products and technical assistance to maximize noise control in working and living environments.

We have serviced the noise control industry for over 20 years.

Our products are durable, virtually maintenance free, lightweight and easy to install.

All necessary trim pieces and hardware are included.

Spray painted graffiti is easily removed with common solvents (when using the Kynar paint system).



## ACOUSTICAL SYSTEMS

Please contact one of our offices and our staff will assist you in meeting your noise control needs.

**Colorado Location:**

**36744 Constitution Drive**

**Trinidad, CO 81082**

**PH: (719) 846-2300**

**FAX: (719) 846-7466**

**Email: [empireacoustical@rmi.net](mailto:empireacoustical@rmi.net)**

**Texas Location:**

**1106 South Mays, #240**

**Round Rock, TX 78664**

**PH: (512) 828-3138**

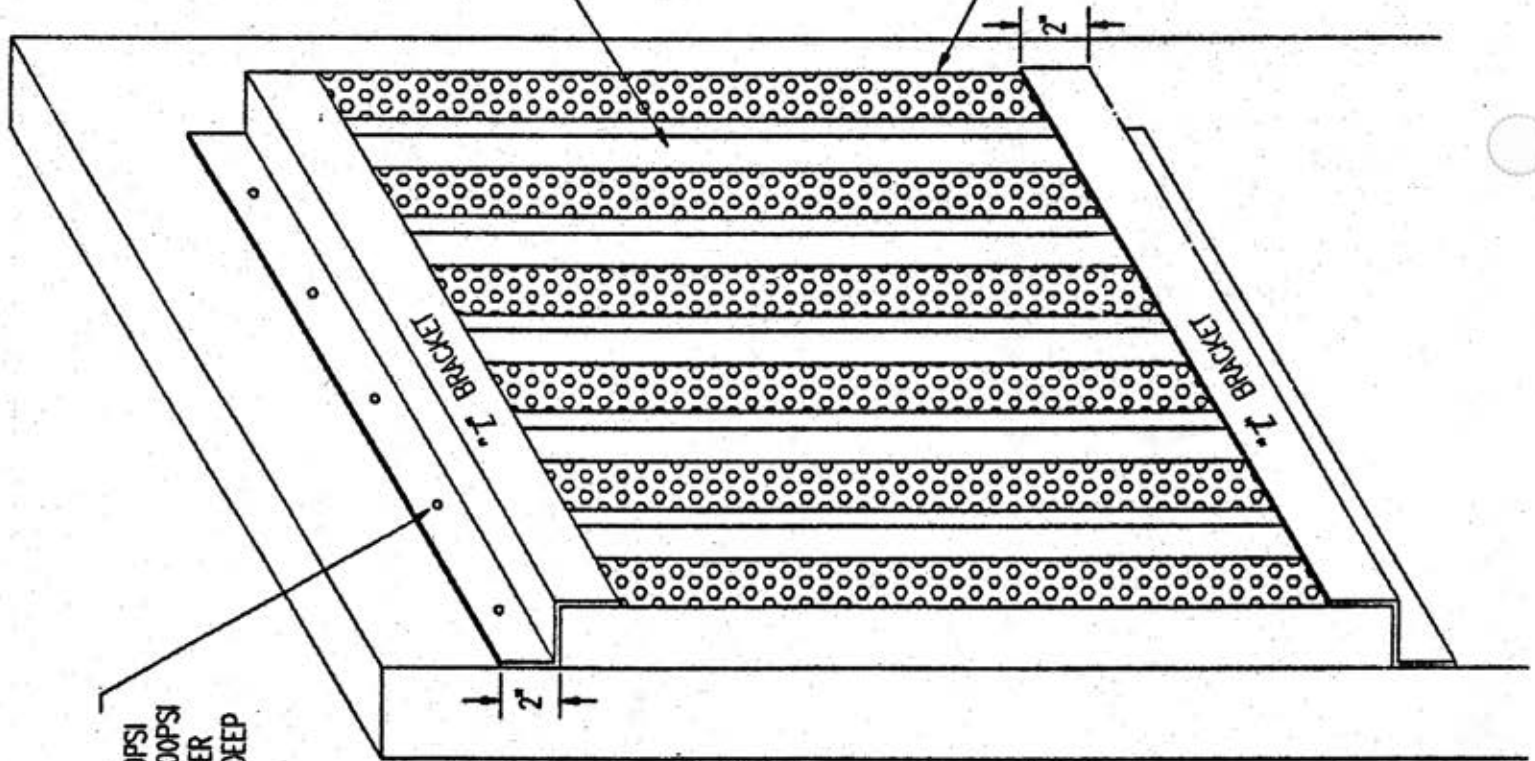
**FAX: (512) 233-1757**

**Email: [johnnie@mckeowninternational.com](mailto:johnnie@mckeowninternational.com)**

Website: [www.empireacoustical.com](http://www.empireacoustical.com)

**WORLDWIDE ACOUSTICAL PRODUCTS & SERVICE**

# M90 ACOUSTICAL PANEL WALL MOUNTING DETAIL



5/16" -SH5624 U.S. ANCHOR  
BOLTS PULLOUT 1740 AT 3500PSI  
CONCRETE SHEAR 1460 AT 3500PSI  
CONCRETE BOLTS 1/4" DIAMETER  
BOLT HOLES 5/16" X 2 1/4" DEEP  
(DRILLED IN FIELD)


\*PANEL WIDTH=24-30 INCHES  
\*PANEL LENGTH=UP TO 12 FEET

NOTES:

- Z BRACKET=16 GAGE
- STRUCTURAL QUALITY ASTM A-446 GALVANIZED PANELS TO BE INSTALLED VERTICALLY TO FOLLOW CONTOUR OF CONCRETE WALL
- NO SHIMS OR SEALING COMPOUND
- HORIZONTAL ALIGNMENT  $\pm 1/4" / 20$  FEET
- FOR METAL TO METAL FASTENING ZINC PLATED STRUCTURAL SELF DRILLING SCREWS WITH WASHERS NO.1/4" -14 3/8" HEX HEAD

SOUND ABSORBING MATERIAL SHALL BE A MINERAL WOOL BATT INSTALLED IN THE CAVITY OF THE PANEL AND BE 2" THICK. THE MINERAL WOOL SHALL BE A MINIMUM OF 6LBS. PER CUBIC FOOT DENSITY AND CONFORM WITH FEDERAL SPECIFICATION HH-1-5588 AND ASTM STANDARDS C612 AND E136.

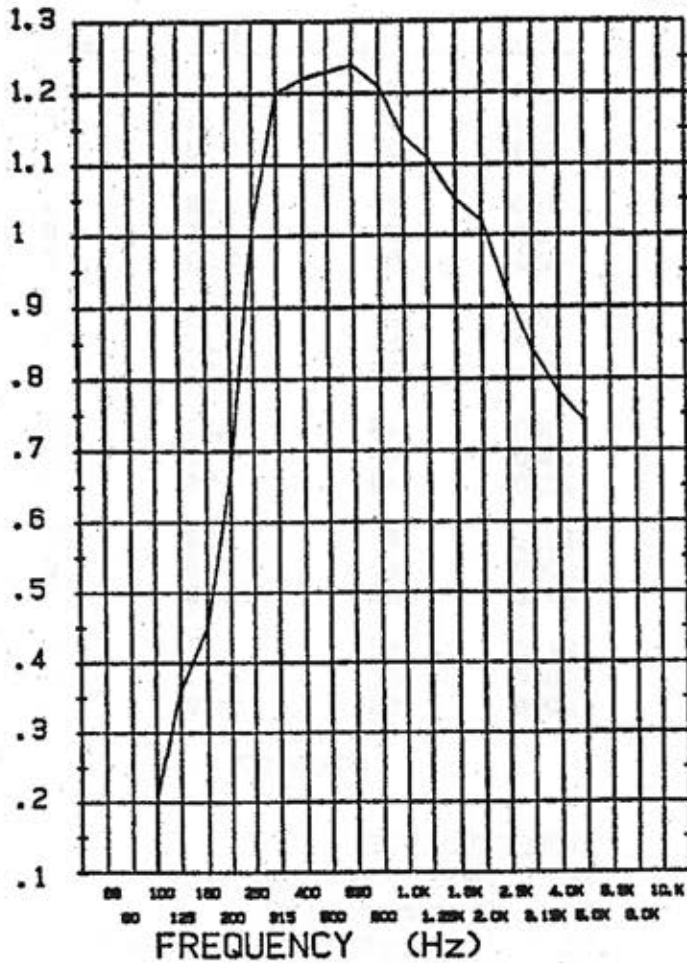
NOT DRAWN TO SCALE

 <p><b>EMPIRE</b> ACOUSTICAL SYSTEMS</p>	
M-90 ACOUSTICAL PANEL	
WALL MOUNTING DETAIL	
dwg# m90113	G.L.R.
<del>89-PANEL-MOUNTING-WALL</del> <del>WASHERS</del> <del>NO.1/4" -14 3/8"</del>	

# RIVERBANK ACOUSTICAL LABORATORIES EMPIRE ACOUSTICAL SYSTEMS

## SOUND ABSORPTION REPORT RAL-A90-1

SOUND ABSORPTION COEFFICIENT



FREQUENCY (Hz)  
NRC = 1.1

TEST RESULTS

1/3 Octave Center Frequency (Hz)	Absorption Coefficient	Total Absorption In Sabins	% Of Uncertainty With 95% Confidence Limit
100	0.21	14.96	0.79
** 125	0.36	25.93	0.71
160	0.45	32.26	0.79
200	0.67	48.21	0.60
** 250	1.01	72.51	0.41
315	1.20	86.75	0.35
400	1.22	87.65	0.51
** 500	1.23	88.40	0.56
630	1.24	88.96	0.60
800	1.21	86.76	0.54
** 1000	1.14	82.14	0.65
1250	1.11	79.66	0.55
1600	1.05	75.26	0.61
** 2000	1.02	73.74	0.64
2500	0.92	66.31	0.68
3150	0.84	60.14	0.55
** 4000	0.78	56.01	0.61
5000	0.74	53.26	0.63

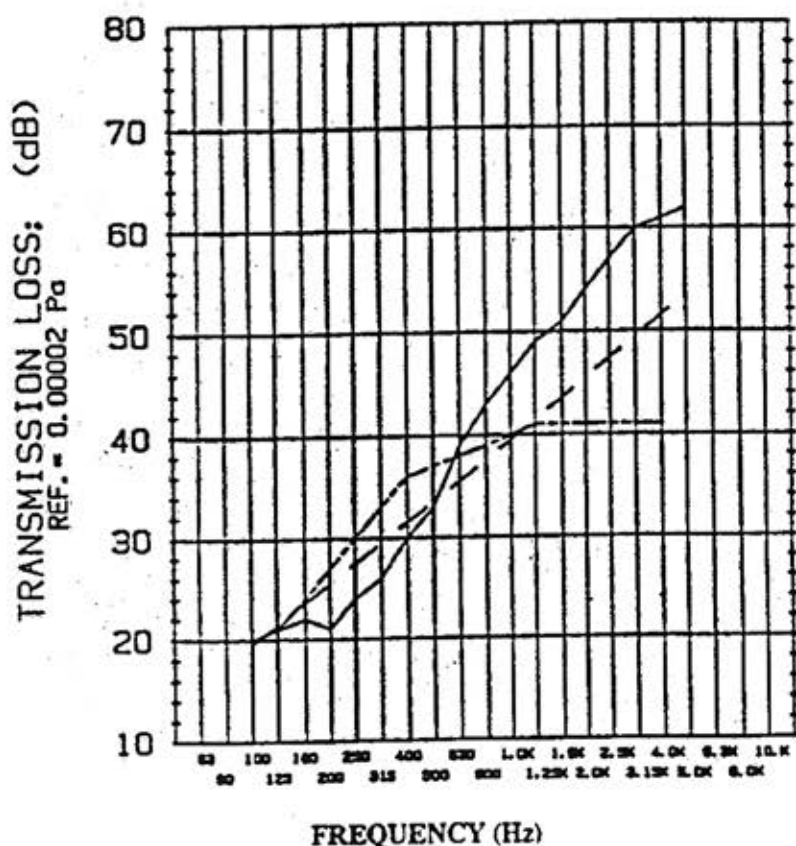
NRC = 1.10

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as M-90 panels with sound absorbing treatment. The overall dimensions of the specimen as measured were 2.44 m (96 in.) wide by 2.74 m (108 in.) long and 6.4 cm (2.5 in.) thick. The specimen consisted of four units. Each unit was 61.0 cm (24 in.) wide by 2.74 m (108 in.) long. The specimen was tested in the laboratory's 292 m<sup>3</sup> (10,311 ft<sup>3</sup>) test chamber. The description of the specimen was as follows: The specimen consisted of four M-90 panels. Each panel was fabricated out of 0.76 mm (0.030 in.) thick, 22 ga minimum, painted steel. Each panel face had alternating perforated and unperforated segments that ran the entire length. Each of the five perforated segments were raised (fluted) nominally 15.9 mm (0.625 in.) and measured 7.6 cm (3 in.) wide on the two ends and 3.9 cm (3.5 in.) wide at the three intermediate locations. The combined perforated segments of each panel covered nominally 40.6 cm (16 in.) of each 61.0 cm (24 in.) wide face. The perforations were 4.8 mm (0.1875 in.) diameter holes spaced on 9.5 mm (0.375 in.) centers. The perforations represented a 17% open area. The four unperforated segments of each panel measured 5.1 cm (2 in.) wide. Each panel was fully lined with 61.0 cm (24 in.) wide sections of 6 pcf, 5.1 cm (2 in.) thick mineral fiber batt material, designated by the manufacturer as Delta Board. A visual inspection verified the description of the specimen. The weight of the specimen as measured was 72 kg (159 lbs) an average of 11 kg/m<sup>2</sup> (2.2 lbs/ft<sup>2</sup>). The area used in the calculations was 6.7 m<sup>2</sup> (72 ft<sup>2</sup>). The room temperature at the time of the test was 21°C (70°F) and 59% relative humidity.

# RIVERBANK ACOUSTICAL LABORATORIES EMPIRE ACOUSTICAL SYSTEMS

## Report RAL-TL90-71



——— Transmission Loss  
 - - - - - Sound Transmission Class Contour  
 - · - · - Mass Law Contour

Freq.	T.L.	C.L.	Def.
100	20	0.26	0
125	21	0.31	0
160	22	0.38	2
200	21	0.38	6
250	24	0.35	6
315	26	0.39	7
400	30	0.35	6
500	33	0.27	4
630	39	0.31	0
800	43	0.31	0
1000	46	0.29	0
1250	49	0.25	0
1600	51	0.23	0
2000	54	0.18	0
2500	57	0.13	0
3150	60	0.12	0
4000	61	0.12	0
5000	62	0.10	0

STC = 37

### ABBREVIATION INDEX

Freq. = Frequency, Hertz, (cps)  
 T.L. = Transmission Loss, dB  
 C.L. = Uncertainty in dB, for a 95% confidence limit  
 Def. = Deficiencies, dB < STC contour  
 STC = Sound Transmission Class

### DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as M-90 panels with sound absorbing treatment and 18 Gauge backer plates. The overall dimensions of the specimen as measured were 1.22 m (48 in.) wide by 2.74 m (108 in.) high and 6.4 cm (2.5 in.) thick. The specimen consisted of two units. Each unit was 61.0 cm (24 in.) wide by 2.74 m (108 in.) long. The specimen was placed directly in the laboratory's 1.22 m (4 ft.) by 2.74 m (9 ft.) test opening and was sealed on the periphery (both sides) with a dense mastic. The description of the specimen was as follows: The specimen consisted of two M-90 panels. Each panel was fabricated out of 0.76 mm (0.030 in.) thick, 22 ga minimum, painted steel. Each panel face had alternating perforated and unperforated segments that ran the entire length. Each of the five perforated segments were raised (fluted) nominally 15.9 mm (0.625 in.) and measured 7.6 cm (3 in.) wide on the two ends and 3.9 cm (3.5 in.) wide at the three intermediate locations. The combined perforated segments of each panel covered nominally 40.6 cm (16 in.) diameter holes cm (24 in.) wide face. The perforations were 4.8 mm (0.1875 in.) diameter holes spaced on 9.5 mm (0.375 in.) centers. The perforations represented a 17% wide area. The four unperforated segments of each panel measured 5.1 cm (2 in.) wide. Each panel was fully lined with 61.0 cm (24 in.) wide sections of 6 pcf, 5.1 cm (2 in.) thick mineral fiber batt material, designated by the manufacturer as Delta Board. A sheet of 18 Gauge, nominal 1.2 mm (0.048 in.) thick steel was attached to the back of each panel with self-tapping sheet metal screws. A visual inspection verified the description of the specimen. The weight of the specimen as measured was 69 kg (152 lbs.) an average of 20 kg/m<sup>2</sup> (4.2 lbs/ft<sup>2</sup>). The transmission area used in the calculations was 3.4 m<sup>2</sup> (36 ft<sup>2</sup>). The room temperature at the time of the test was 21°C (70±2°F) and 54±3% relative humidity.





Your **Networked Solution**  
for **Speech Privacy**  
and **Noise Control**



 **SOUND MASKING**

 **PAGING**

 **MUSIC**

## Most Awarded

Over twenty awards for innovation, performance and ease of use, including:



[www.logison.com](http://www.logison.com)

*"The advantages of centralized, networked control of individual speakers, digital accuracy and ease of future reconfiguration or expansion ensure that this latest generation of sound masking technology will keep pace with the ever-changing workplace."*

**Manager of Facilities & General Services**  
Ericsson Canada Inc.

Patents granted in Canada, U.S., Australia, China, Europe.  
Patents pending in Canada, U.S. and other jurisdictions.  
© 2015 K.R. Moeller Associates Ltd. LogiSon and Acoustic Comfort are registered trademarks of 777388 Ontario Limited.



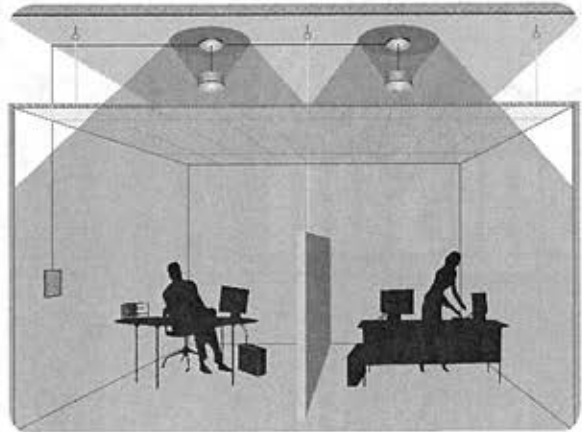
Poor acoustics is the *number one* cause of workplace dissatisfaction and the most significant factor affecting employee performance.

The LogiSon® Acoustic Network addresses this problem by distributing an engineered background sound throughout the workplace. The sound covers conversations and noise, while remaining comfortable and unobtrusive.

This technology is one of the smallest investments you'll make in your facility, but one that can greatly impact your bottom line.

## ➤ Benefits

- Noise control
- Speech privacy
- Improved productivity
- Lower project costs
- Facility flexibility
- Quick ROI



As the inventors of networked sound masking technology, we know that *flexibility* is the key to success.

Why is flexibility important? Because it's not enough to introduce just any sound into your space. It has to be the *right sound*, in the *right place*, at the *right time*.

The LogiSon Acoustic Network provides this superior level of acoustic control and puts it at your fingertips.

## ➤ Applications



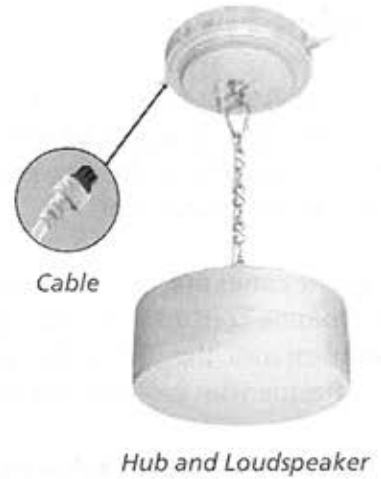
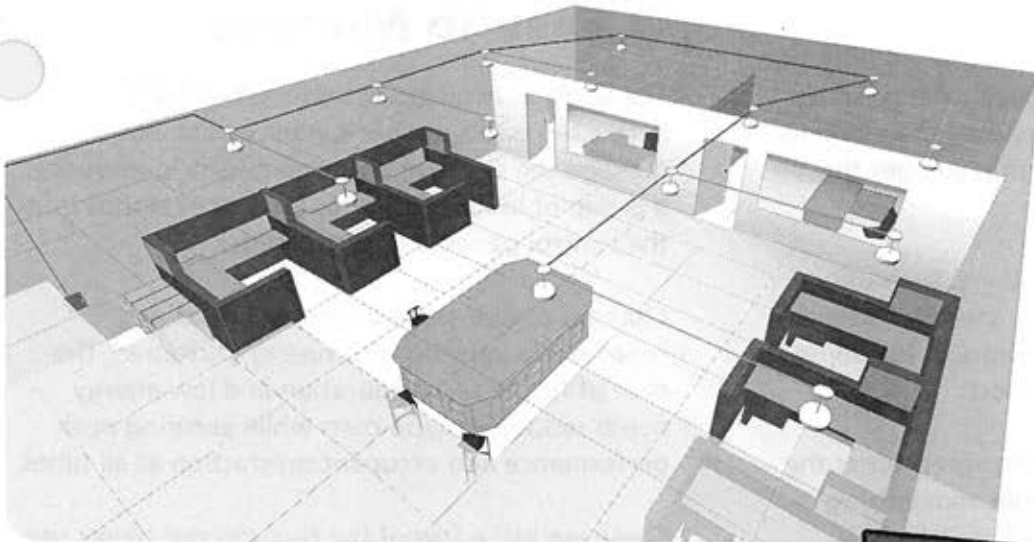
- Banks
- Call Centers
- Commercial Offices



- Courthouses
- Dealerships
- Healthcare Facilities
- Hotels



- Houses of Worship
- Libraries
- Military Facilities
- Schools



Cable

Hub and Loudspeaker

The hubs and loudspeakers are typically installed above the ceiling tiles, but can also be used in hard or open ceilings. The control panel can be mounted on a wall or in an equipment closet. Wiring consists of a single low-voltage cable.



Control Panel

## ➤ One Solution

Smart engineering makes the LogiSon Acoustic Network the right solution for any project. Its *networked-decentralized* architecture is easily scaled to accommodate facilities of all sizes, from a single office to a multi-building campus.

A range of loudspeaker models is available to suit a variety of installation conditions, but the system's backbone is always the same high-performance LogiSon technology. Continuous enhancement since its launch keep it at the forefront of the sound masking industry.

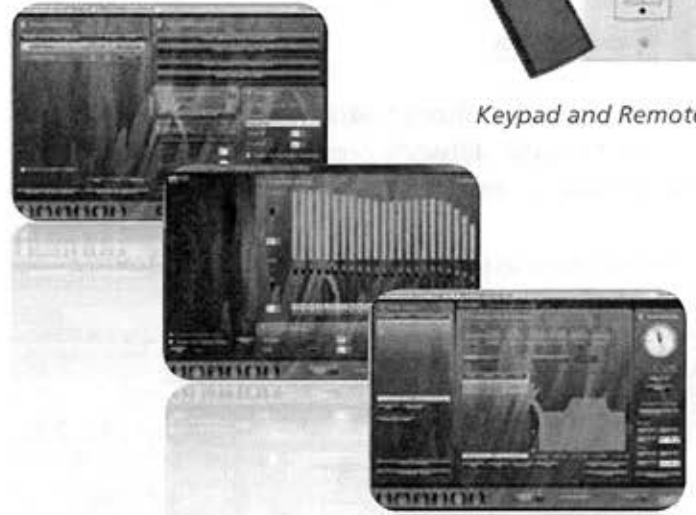


Keypad and Remote

## ➤ Complete

Also need paging or background music? Simply connect a source, such as your telephone system, to the control panel.

Independent sound masking and paging setup mean you never have to compromise. And because zoning is digital rather than hardwired, you can zone whenever and wherever required.



Acoustic Network Manager Software

Components meet UL, FCC, CE and RoHS standards and are approved for use in air-handling plenums.

## ➔ Effective

The LogiSon Acoustic Network is uniquely designed to provide the highest degree of control over the masking sound throughout your facility, ensuring you get the most from your investment.

Adjustment zones are 1 to 3 loudspeakers. Each offers precise volume control in 0.5 dB steps and third-octave equalization over the full masking spectrum, including the low frequencies essential for comfort.

After installation, TARGET Software accurately tunes the masking sound to the desired spectrum, maximizing speech privacy and noise control.

## ➔ Customized

A gradual ramp-up feature can be activated for retrofits. From that point, a sophisticated timer schedules the masking volume to match expected activity levels throughout the day, week or month, as well as on holidays.

Keypads, remotes and a robust software suite give occupants on-demand control of the sound masking and paging according to allowed access levels (e.g. in private offices and meeting rooms).

## ➔ Secure

Performance is monitored 24/7. If an issue occurs, the LogiSon Acoustic Network provides a warning signal and/or sends an email to specified recipients.

*Its contemporary design also makes the LogiSon Acoustic Network the best choice for open ceilings.*



Mark Trew © SHW Group

## ➔ Easy To Manage

The LogiSon Acoustic Network offers both hardware- and software-based control. You can manage the settings and zoning for a loudspeaker, a group of loudspeakers, or an entire campus from the control panel or your computer.

Changes can be made in minutes following renovations, moving furniture or personnel. The ease of future reconfiguration and low energy needs reduce lifecycle costs while ensuring peak performance and occupant satisfaction at all times.

These are just a few of the features our clients use every day to enhance the sound masking system's value and their acoustic comfort®.

## ➔ Proven Performance

The LogiSon Acoustic Network is installed in hundreds of millions of square feet worldwide for clients ranging in size from small business to Fortune 500, including:

A.C. Nielsen	Kraft
Bank of New York	Microsoft
CB Richard Ellis	MillerCoors
CIBC	Modesto Memorial
Citibank	Nokia
Cushman & Wakefield	Polo Ralph Lauren
Deloitte	Procter & Gamble
Ernst & Young	Royal Bank of Canada
GlaxoSmithKline	Smith & Nephew
Hanesbrands	The Hartford
Hilton	Tribeca Grand
IBM	US Navy
Jones Lang LaSalle	Wachovia-Wells Fargo

## ➔ Expert Support

We also provide a complete range of professional services and highly responsive technical support. Talk to your LogiSon Representative today.

📞 905-332-1730 or 1-866-LOGISON

✉ info@logison.com

🏠 [www.logison.com](http://www.logison.com)



# LOWRY'S INC. BOX PADS

## Outlet Box Pads To Reduce Transmitted Air and Sound



BEFORE



AFTER



BEFORE



AFTER

### BASIC USES:

Lowry's electrical box pads are used to seal the back side of electrical boxes, TV jack boxes and telephone outlet boxes to reduce air and sound transmission in shared walls.

### LIMITATIONS:

- Do not use in areas subjected to constant heat above 200 degrees F
- Not to be used in areas requiring a fire rating.
- Do not expose to flame

### PACKAGING:

144 -1/8" x 6" x 8" pads per case

### COLOR:

Putty Gray only

### APPLICATION METHODS:

#### Preparation:

- 1) Properly clean substrate removing dust or debris from the surface to be applied.
- 2) If surface is contaminated with oil or other residue, clean with a solvent wipe followed with a dry rag wipe.

#### Application:

- 1) After the box installation is completed, remove Lowry pad from carton and place the pad centered on the back of the box. Carefully mold and fold around conduit cable entering box.
- 2) Remove paper backing
- 3) Retrofit boxes will need to have the pad applied before the box is put in place. *Do not apply to the inside of the box.*

Note: After drywall or plaster is completed, it may be necessary to complete a perimeter seal with a gun able acoustical sealant between the dry wall and the box in order to create a true sound air barrier. The pad's function is to easily seal nail and knockout holes in boxes to prevent air transmission and sound transmission.

### AVAILABILITY:

Immediately available from multiple Lowry's Inc. locations and most construction, plumbing and electrical supply distributors.

### COMPOSITION:

Polybutene-butyl, inert fillers. (No asbestos)

TECHNICAL DATA	
SHELF LIFE	1 YEAR
SOLIDS	100%
SERVICE TEMP	-30 TO 200 F
ADHESION	GOOD TO METAL AND PLASTIC

**LIMITED WARRANTY:** We warranty our products to be free of defects and manufactured to meet published physical properties. We will provide, at no charge, product to replace any product proved to be defective when applied in accordance with our written instructions. All claims concerning product defects must be made within 12 months of shipment. Absence of such claims in writing during this period will constitute a waiver of all claims with respect of said product. This warranty is in lieu of any and all other warranties expressed or implied.

**LOS ANGELES** - 8501 Telfair Ave. Sun Valley, CA 91352 Phone: (800) 225-8231 (818) 768 4661 Fax: (818) 768-4130

**ORANGE COUNTY** - 1700 Barcelona Cir., Placentia, CA 92807 Phone: (800) 439-4546 (714) 777-1172 Fax: (714) 777-2099

**BAY AREA** - 23030 Kidder St. Hayward, CA 94545 Phone: (800) 252-2449 (510) 785-2404 Fax: (510) 785-2405

**SACRAMENTO** - 2641 Port Street West Sacramento, CA 95691 Phone: (866) 270-7333 (916) 372-7333 Fax: (916) 372-7305

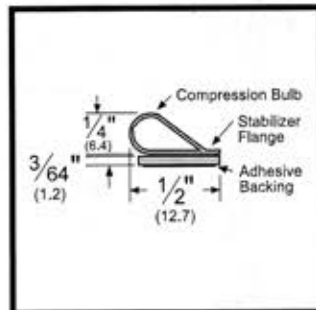
**SAN DIEGO** - 7310 Convoy Ct, San Diego CA 92111 Phone (858) 430-1260 Fax: (858) 268-9662

**PHOENIX** - 3230 Roeser Road, Suite 3, Phoenix, AZ 85040 Phone: (602) 268-7901 Fax: (602) 268-7909

**WEST VALLEY CITY** - 2337 S. Decker Blvd. West Valley City, UT 84119 Phone: (801) 834-6900 Fax: (801) 834-6900

**SILICONSEAL™**

*Adhesive Gasketing - Tested and Classified for Fire and Smoke*



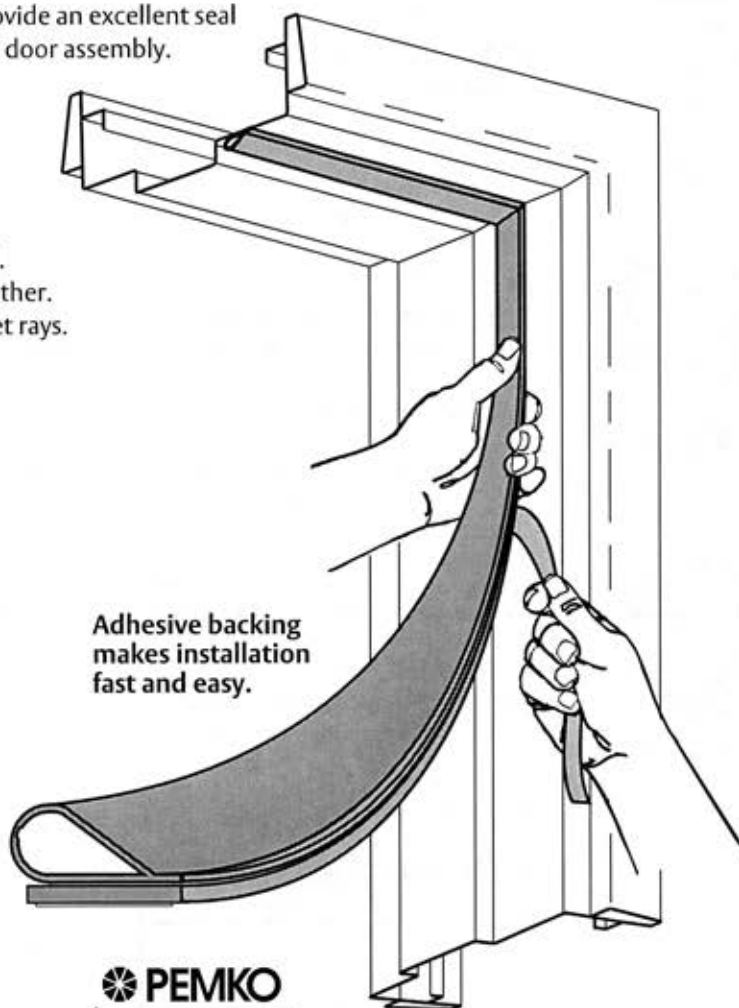
**About Edge Seals:**

Edge Seals are Category G materials that have demonstrated their ability to assist the door in meeting the positive pressure fire test requirements. Category G materials are necessary for use with Category B Door assemblies. Category G Edge Seals may also need a Category H Smoke Seal for a complete fire and smoke assembly.

**About Fire & Smoke Combination Gasketing:**

These combination fire and smoke gaskets provide an excellent seal against fire and smoke transfer around a rated door assembly. These products meet the requirements of Category G and H seals.

- Adhesive backed.
- High temperature silicone.
- Self-extinguishing and non-toxic.
- Longest-lasting commercial grade door seal.
- Seals against smoke, fire, air, sound and weather.
- Unaffected by sunlight, ozone and ultraviolet rays.
- Impervious to fungus and mildew.



**Product / Available Finishes:**

HSS2000xS88BL	Black Silicone/Graphite
HSS2000xS88C	Clear Silicone/Graphite
HSS2000xS88D	Dark Bronze Silicone/Graphite
HSS2000xS88TAN	Tan Silicone/Graphite
HSS2000xS88W	White Silicone/Graphite

**Testing/Ratings:**



**Tools Required:**



**UNITED STATES:**  
VENTURA, CA  
Ph: 800.283.9988  
Fax: 800.283.4050  
MEMPHIS, TN  
Ph: 800.824.3018  
Fax: 800.243.3656

**CANADA:**  
VANCOUVER, BC  
Ph: 877.535.7888  
Fax: 877.535.7444  
TORONTO, ON  
Ph: 866.243.9816  
Fax: 866.243.9817

[www.pemko.com](http://www.pemko.com)

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HSS2000xS88\_WEBINS  
Rev 1 - 07.01.07

## Read Before Installation:



### **Read before installation! Failure to do so may result in improper adhesion.**

**Storage and shelf life:** All adhesive gaskets have a limited shelf life. This product must be used within 6 months of purchase and must be stored between 50°F and 100°F.

**Before installing:** Thoroughly clean the frame with the enclosed cleansing towelette to remove grease, dust or cleanser build-up. Before installation, wait for frame surface to completely dry (evaporate). Some hospital environments have wax or anti-bacterial cleanser build-up. As an alternative or substitute cleanser, use isopropyl (rubbing) alcohol. Note: Mineral spirits or other petroleum based cleaning products should NOT be used.

**Application temperature:** If frames are too cold (below 50°F) or too hot (above 100°F) adhesion may be impaired.

#### **When to install:**

- Installation should take place after construction is completed, flooring is installed and final cleaning is completed.
- Paint on frame must be cured for at least 5-7 days. Paint cannot be wet under dry surface when gaskets are pressed on. Avoid quick-dry primers, which leave a powdery surface preventing sufficient adhesion. When applying to a wood frame, the surface must be non-porous and sealed. Follow standard industry guidelines on sealed wood frames and/or rough surface before applying. Note: Anti-bacterial, anti-fungal or silicone additives in paint may inhibit adhesion.

#### **Application tips and warnings:**

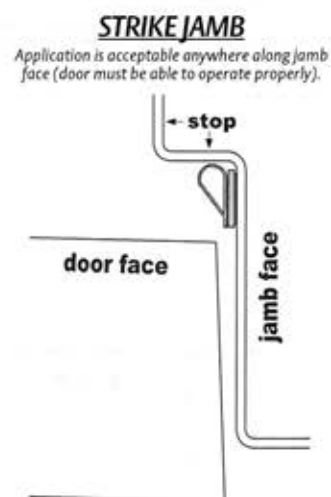
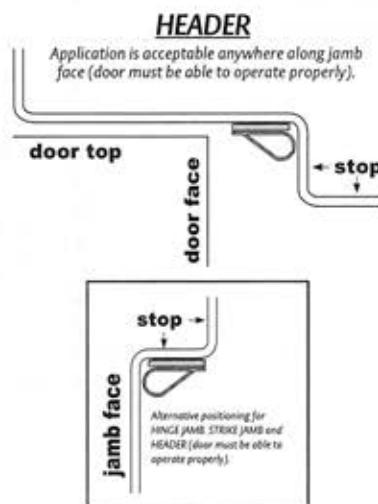
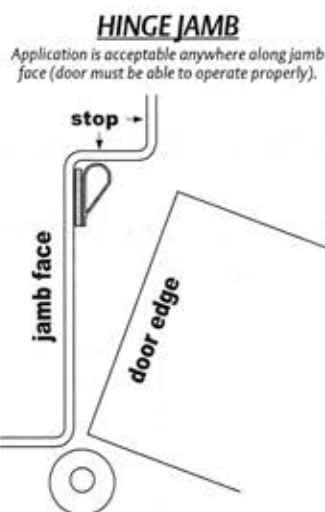
- Do NOT stretch material. Product can retract or shrink if stretched.
- Use very firm, perpendicular pressure when applying. Use wallpaper seam roller to reinforce adhesion after applying.
- Do not stretch material when using seam roller. Run roller with up and down motions.
- Double check adhesion after 2-3 hours before leaving job overnight.
- If gasket separates from frame, press again with firm pressure in place. If adhesive strip is exposed, airborne dust may impede adhesion. Replacement may be necessary.
- Application at header can be awkward due to overhead condition. Be sure to apply enough pressure.

**NOTE:** Adhesion takes delayed set. Immediate removal and resetting can be done if error occurs in initial placement. DO NOT reset after one hour. Full set is reached in 24 hours.

## Installation Instructions:








1. Pre-cut the hinge jamb, strike jamb and header pieces to fit before installing. Do not install as one continuous piece - cut adhesive gasketing at a 45° angle at the corners where the top and sides meet.
2. Remove approximately 24" (61 cm) of backing from the adhesive gasketing strip. Be careful not to touch adhesive or drag the adhesive on ground.
3. Position the adhesive gasketing as illustrated on the lower left. DO NOT STRETCH MATERIAL. The use of a hand roller is highly recommended.
4. Remove the next 24" (61 cm) of paper backing and repeat (2.) until the entire length for a top or side is installed. If a pre-cut length overruns a top or side, stretching has occurred. Immediately remove and reset.
5. Once installed, apply firm pressure along the entire surface of the product to ensure proper adhesion to the frame!

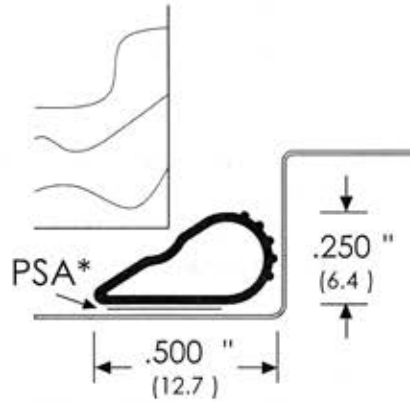


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HSS2000xS88\_WEBINS  
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**FIRE AND SMOKE RATINGS**

-  UL listed
-  ITS Warnock Hersey listed
-  10C Classified
-  Category G listed up to 20 minutes
-  Category H Classified under UL 1784, listed up to 180 minutes



- #188S-Bk
- #188S-Br
- #188S-CI
- #188S-Gy
- #188S-Wh


**Legend:**

- S = Silicone
- S-Bk = Silicone - Black
- S-Br = Silicone - Brown
- S-CI = Silicone - Clear
- S-Gy = Silicone - Gray
- S-Wh = Silicone - White
- \*  PSA Tape

**ANSI/ BHMA**

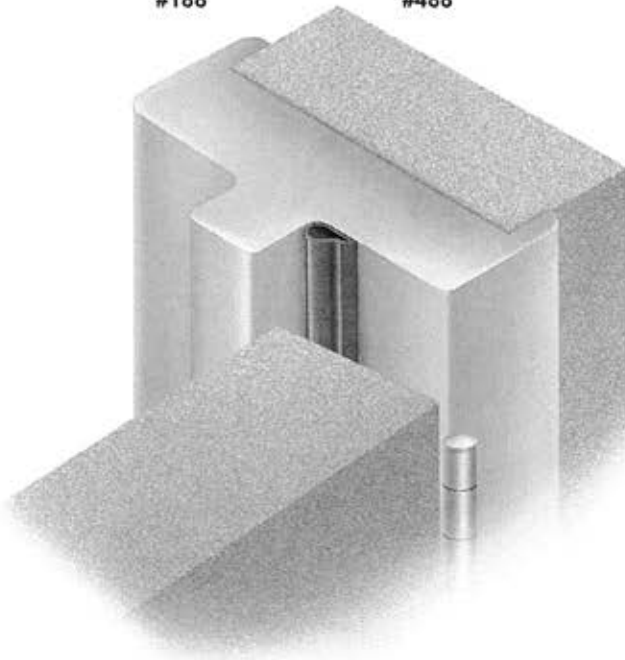
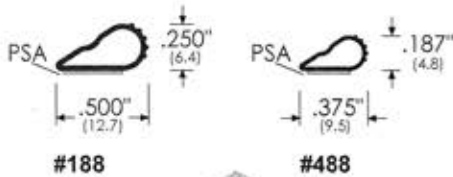
#188S

R0E154

	415 Concord Avenue      tel: 718.585.3230 Bronx, NY 10455      fax: 718.292.2243 email: zero@zerointernational.com web site: www.zerointernational.com	<b>Part No:</b> <span style="font-size: 1.2em;">188</span>	
	<b>Notes:</b>	<b>Part Description:</b> Door Seal - Self Adhesive  Also available in ZAG feature (Anti-Ligature)	
<b>Provided By:</b>	<b>Customer Name:</b>	<b>Job No:</b>	<b>Date:</b>



# #188 / #488 Tear Drop ZERO Compress O-Matic® INSTALLATION INSTRUCTIONS



## Before Installation:

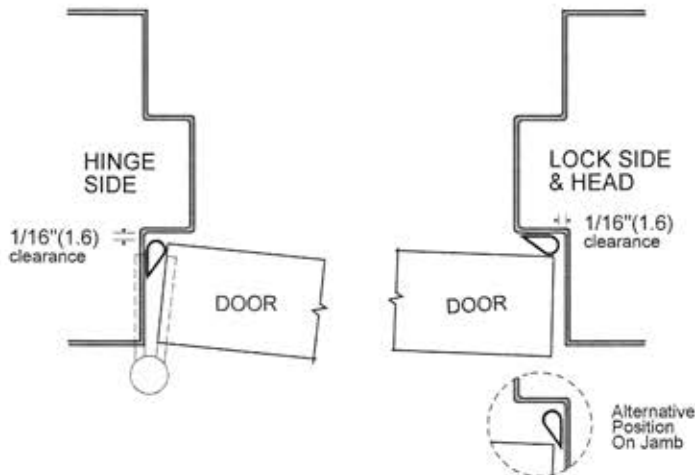
- 1 For proper adhesion, clean surface of frame where the gasketing is to be applied (See illustration). Check for any impediments (dust, dirt, oil, grease, etc.) or loose paint and remove them from the surface area. Solvent cleaner or common detergent cleaner may be used.
- 2 Surface area must be completely dry before the installation process begins.
- 3 Gasketing is best applied at a temperature range of 70 to 90°F (21 to 32°C). Do not apply if temperature falls below 50°F (10°C) or exceeds 100°F (38°C).
- 4 Gasketing should be installed after the doors and frames have been finish painted and the paint has dried.

## To Install:

- 1 Measure and cut the gasket to fit the head and jambs. The first piece of gasketing should be the head piece and applied on the entire length of the head (See illustration below for location on head). Remove the paper backing of self adhesive strip (PSA) about 1' to 2' (304.8 to 609.6mm) at a time. Align and install gasketing into place. Press firmly for proper adhesion.

**IMPORTANT: DO NOT STRETCH THE SEAL DURING INSTALLATION.**

- 2 The lock jamb gasketing should be installed next (Location as illustrated), following procedures as outlined in step 1.
- 3 Install the hinge jamb gasketing last (Location as illustrated), following procedures as outlined in step 1.
- 4 After installation, check to make sure the gasketing does not obstruct the operation of door.



## ZERO INTERNATIONAL

415 Concord Avenue, Bronx, NY 10455-1004  
Tel: 718-585-3230 • Fax: 718-292-2243  
Zero.Customer.Support@allegion.com  
www.zerointernational.com



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# LIGHTING FIXTURE CUTSHEETS

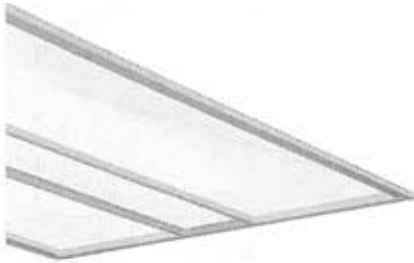
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IC-RATED LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE

## High Performance Recessed (HPR LED) 2x4



Refer to page 2 for all door styles

### DESCRIPTION

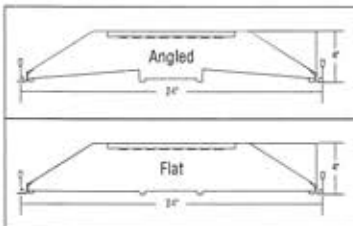
HPR LED is a highly efficient recessed luminaire delivering excellent visual comfort and outstanding performance. Advanced optical design makes HPR LED a powerful solution for low-ceiling applications and eliminates the shadows common to other LED recessed products.

Date

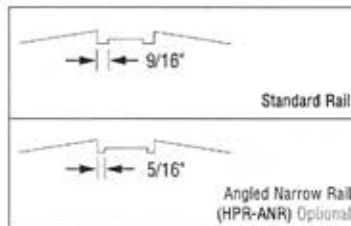
Project

Type

Comments



### DIMENSIONS



### NARROW RAIL OPTION

Available in angled door style with the same center optic choices. The optional narrow rails are approximately 5/16" wide. The standard rails are approximately 9/16" wide.



### 100% SERVICEABLE FROM BELOW

The replaceable light engine and driver are easy to access from below the ceiling.

### ORDERING GUIDE

Sample Number: HPR LED - A - 2x4 - DCO - S - 835 - 277V - SC - C1 - OBO

#### Finelite Series HPR LED

Door Styles (A - Angled, ANR - Angled Narrow Rail, F - Flat, CS - Curved Slotted<sup>1</sup>, DD - Double Diffuse<sup>1</sup>, WAV - Wave<sup>1</sup>)

#### Size (2x4)

Center Optic (DCO - Diffuse Center, SCO - Slotted Center, RCO - Round Center)<sup>2</sup>

Light Output (S - Standard, B - Boosted Standard, H - High, V - Very High)

LED CRI/CCT (830 - 80 CRI min, 3000K, 835 - 80 CRI min, 3500K,

840 - 80 CRI min, 4000K, 930 - 90 CRI min, 3000K,

935 - 90 CRI min, 3500K, 940 - 90 CRI min, 4000K

Voltage (120V, 277V)

Circuiting (SC - Single Circuit)

Ceiling Type (C1 - 1" T-Bar, C2 - 9/16" T-Bar, C3 - screw slot, DW - Drywall Kit)<sup>3</sup>

Integrated Sensors (OBD - Daylight, OBO - Occupancy, OBB - Both)

<sup>1</sup> Curved Slotted, Double Diffuse and Wave door not available with Center Optic options

<sup>2</sup> Only available with Angled (A), Angled Narrow Rail (ANR) and Flat (F) door options

<sup>3</sup> Surface Mount available

Finelite, Inc. • 30500 Whipple Road • Union City, CA 94587-1530 • 510 / 441-1100 • Fax: 510 / 441-1510 • www.finelite.com

Due to continuing product improvements, Finelite reserves the right to change specifications without notice. Please visit www.finelite.com for most current data.

Page 1

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.

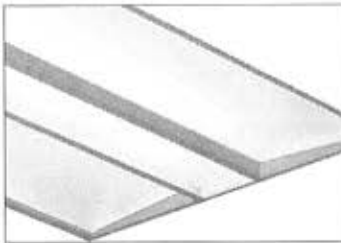


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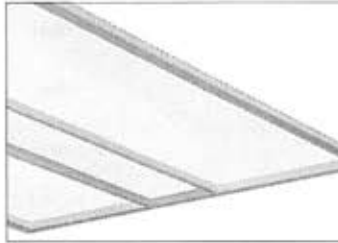
# FINELITE

## High Performance Recessed (HPR LED) 2x4

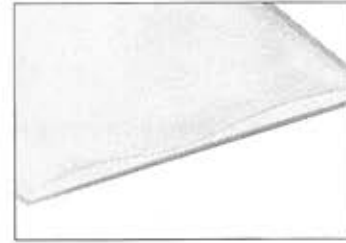
### DOOR STYLES



A - Angled  
ANR - Angled Narrow Rail

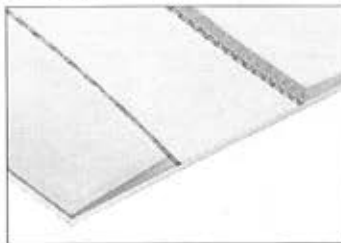


F - Flat

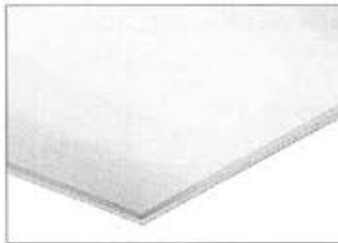


WAV - Wave

### DOOR STYLES

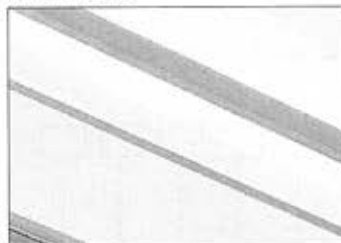


CS - Curved Slotted

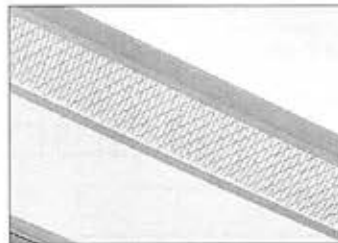


DD - Double Diffuse

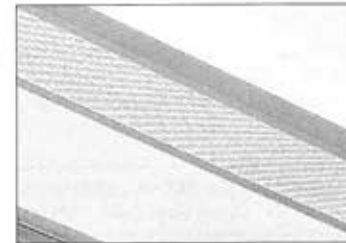
### CENTER OPTICS



DCO - Diffuse Center



SCO - Slotted Center



RCO - Round Center

DCO, SCO, and RCO are only available on Angled (A), Angled Narrow Rail (ANR), and Flat (F) doors.



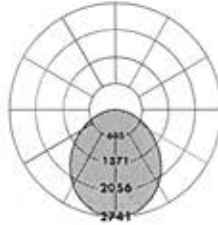
IC-RATED LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE

## High Performance Recessed (HPR LED) 2x4

### PHOTOMETRY

HPR LED-A-2x4-DCO-V  
Very High Output - Angled Rail  
Efficacy: 127 lumens per watt  
Total luminaire output: 6979 Lumens  
55.1 Watts  
Peak Candela Value: 2741 @ 0°  
CCT: 3500K  
ITL LM79 Report 85145



CANDLEPOWER SUMMARY						
	0.0	22.5	45	67.5	ACROSS	Flux
0	2741	2741	2741	2741	2741	
5	2730	2728	2728	2727	2727	259
10	2685	2684	2683	2682	2678	
15	2613	2607	2609	2605	2602	735
20	2511	2506	2502	2498	2498	
25	2380	2374	2371	2366	2367	1091
30	2223	2216	2213	2209	2211	
35	2043	2036	2033	2030	2033	1271
40	1845	1838	1836	1834	1837	
45	1635	1628	1627	1626	1630	1256
50	1417	1412	1412	1410	1413	
55	1200	1195	1196	1195	1187	1069
60	986	984	984	978	974	
65	780	778	774	766	761	766
70	582	583	576	569	565	
75	401	400	393	388	389	420
80	239	236	232	229	229	
85	103	100	97	91	89	111
90	0	0	0	0	0	

Angled (A) and Flat (F) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V**
3772	4742	5416	6979
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V**
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V**
140	135	135	127

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

\* Family Correlation based on 3500K Very High Output (V) test - 120V.  
\*\* Correlation based on source ITL report: 85145

Angled Narrow Rail (ANR) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V*
3680	4626	5283	6808
Power (Watts)			
S*	B*	H*	V*
26.9	35.1	40.5	55.0
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V*
137	132	130	124

### SAMPLE LUMEN ADJUSTMENT CALCULATION

High Output (H) Angled (A) & Flat (F)  
4000K, 90 CRI

Lumen Adjustment Factor = 0.789

Total Light Output =  
5416 lm x 0.789 = 4273 lm

$$\text{Efficacy} = \frac{4273 \text{ lm}}{40.6 \text{ W}} = 105 \text{ lm/W}$$

\*\* Correlation based on ITL report: 85145

\* Family Correlation based on 3500K Very High Output (V) test - 120V.  
\*\* Correlation based on source ITL report: 85151

S - Standard Output, B - Boosted Standard Output,  
H - High Output, V - Very High Output

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Page 3

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



# FINELITE

## High Performance Recessed (HPR LED) 2x4

Wave (WAV) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V†
3821	4804	5486	7069
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V†
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V†
142	136	135	128

\* Family Correlation based on 3500K Very High Output (V) test - 120V.  
† Correlation based on source ITL report: 85837

Curve Slotted (CS) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V†
3569	4486	5124	6602
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V†
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V†
132	127	126	120

\* Family Correlation based on 3500K Very High Output (V) test - 120V.  
† Correlation based on source ITL report: 86020

Double Diffuse (DD) Total Light Output, 3500K, 80 CRI (Lumens)			
S*	B*	H*	V*
3076	3867	4417	5691
Power, 3500K, 80 CRI (Watts)			
S*	B*	H*	V*
27.0	35.2	40.6	55.1
Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V*
114	110	109	103

\* Family Correlation based on 3500K Very High Output (V) test - 120V.  
± Correlation based on source ITL report: 85156

S - Standard Output, B - Boosted Standard Output,  
H - High Output, V - Very High Output

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.





# College of Marin IVC Building 11 Luminaire Cut Sheets

Type: F1



BUY AMERICAN ACT OF 2009 COMPLIANT

## FINELITE

### High Performance Recessed (HPR LED) 2x4

#### SPECIFICATIONS

**CONSTRUCTION:** Die-formed 20-gauge cold-rolled steel housing. All components are hard-tooled to tolerances of +/- 0.010". UV stabilized weather-strip pile gasket with polypropylene backing. Hinged door frame assembly provides easy access to light arrays and driver compartment for servicing from below. Seismic brackets are integrated into the luminaire assembly. Additional wire entrances are positioned on the ends of the housing to allow easy wiring access for the installer.

**REFLECTORS:** Die-formed 20-gauge cold-rolled steel reflectors are finished in 96LG high reflectance matte white powder coat paint.

**AIR RETURN:** Refer to 2x4 Air Return Tech Sheet for more information.

**OPTICAL SYSTEM:** Components include diffuser panels and a central optic element held in place with a frame constructed from die-formed cold-rolled steel. The diffusers are UV-stabilized and impact-resistant frosted virgin acrylic, 0.120" thick. They are either angled toward the central optic or parallel to the ceiling plane. The standard center rails are approximately 9/16" wide. Optional narrow rails are approximately 5/16" wide. Optional wave door includes frosted acrylic panel that undulates from side to side.

**DOUBLE DIFFUSE:** Visible diffuser: UV-stabilized and impact-resistant frosted virgin acrylic, 0.120" thick. Inner diffuser: 0.120" thick with 60% round perforations white/white.

**DOOR STYLE:** Curved Slotted (CS) includes perforated rails that slope inward and a diffuse frosted acrylic center optic.

**CENTER OPTIC OPTIONS:** Only available with Angled (A), Angled Narrow Rail (ANR), and Flat (F) door styles.

**Diffuse Center Optic (DCO):** UV-stabilized and impact-resistant frosted virgin acrylic.

**Slotted Center Optic (SCO):** Die-formed cold-rolled steel panel with a 1/16" x 1/2" rectangular hole pattern. Virgin acrylic overlay.

**Round Center Optic (RCO):** Die-formed cold-rolled steel panel with precision-punched 3/32" round hole pattern arranged in staggered formation. Virgin acrylic overlay.

**LIGHT OUTPUT:** Four lumen packages available, Standard (S), Boosted Standard (B), High (H), and Very High (V). A separate chart summarizes lumen distribution and wattage. Light engines are replaceable.

**LUMEN MAINTENANCE:** 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

**DRIVER:** Replaceable 120V/277V Constant Current Reduction dimming driver standard. Can be wired dimming or non-dimming, 0-10V dimming controls with a range of 10%-100%. Dimming to 1% available, consult factory. Driver is fully accessible from below the ceiling. Power Factor:  $\geq 0.9$ . Total Harmonic Distortion (THD):  $< 20\%$ . Expected driver lifetime: 100,000 hours.

**LUTRON DRIVER OPTIONS:** Lut3W-3-wire, LutES - EcoSystem, Lut2W-2-wire.

**ELECTRICAL:** Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery, Chicago Plenum option. Factory-choice low-profile backup battery available. Bodine BSL722 battery pack also available. Backup batteries deliver 1700 lumens. One quarter of the 2x4 will be illuminated in emergency mode.



**INTEGRATED SENSORS:** Integrated PIR (Passive Infrared) occupancy and/or daylight sensors available. Refer to Occupancy Sensor and Daylight Sensor tech sheets for more info.

**MOUNTING:** Standard flange design works with most lay-in ceiling types. Integral pry-out tabs secure the luminaire to the ceiling grid from above. Tie-in locations for tie-wire on all corners. Consult local code for appropriate tie-wire recommendations. Drywall Kit available. Surface mount and air return versions available; refer to separate tech sheets.

**FINISH:** Housing and door assembly painted with 96 LG high reflectance matte white powder coat paint. Optional adder: Anti-microbial paint. Contact factory.

**FEED:** Optional whips (with flex connectors) supplied in a maximum of 11' lengths. Lead Wires.

**LABELS:** Luminaire and electrical components are ETL-listed conforming to UL 916, 1598, 8750, 924 in the U.S.A. and CAN/CSA C22.2 No. 205, 250, and 141 in Canada. In accordance with NEC Code 410.73 (G), this luminaire contains an internal driver disconnect. Damp Location. IC-rated. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2002/95/EC.

**WEIGHT:** 33 lbs maximum.

**WARRANTY:** 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.

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Page 5

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.

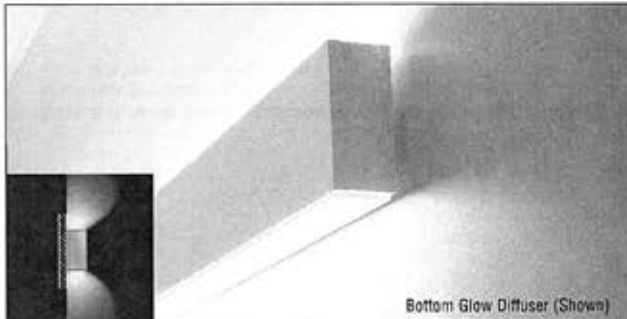
100% Construction Documents  
09/01/2017

17-1095



LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE High Performance 2" Aperture (HP-2) - Wall Mount Indirect/Direct



Date

Project

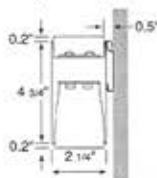
Type

Comments

### DESCRIPTION

High Performance 2" Aperture Wall Mount Indirect/Direct (HP-2 WM-ID) is a patented, linear LED luminaire with Flush, Top Glow™ and Bottom Glow™ options for up- and downlight. The micro shape delivers excellent performance using an advanced optical design and mid-power LEDs to achieve 90% of initial light output at 100,000 hours.

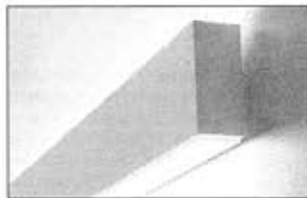
#### Top Glow Diffuser (Standard)



Bottom Glow Diffuser (Optional)



Flush Uplight and Downlight Diffuser (Standard)



#### BOTTOM GLOW DIFFUSER

The optional Bottom Glow diffuser adds a clean line of light along the downlight element.

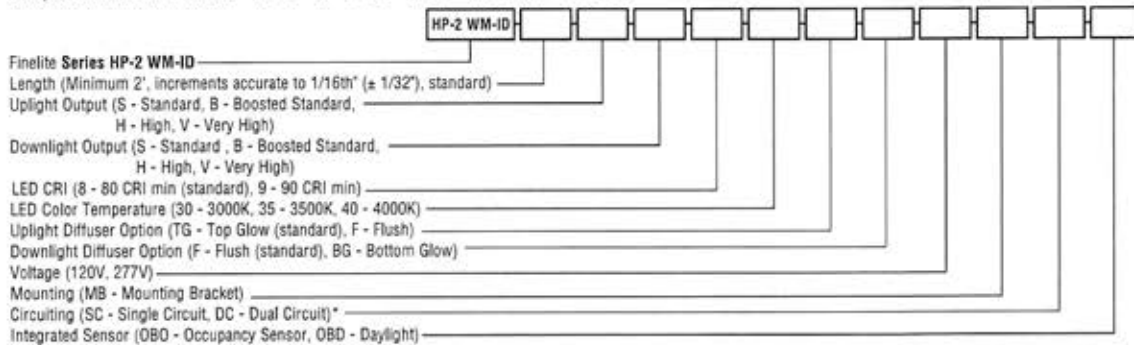
## Tailored Lighting 10 working days

#### TAILORED LIGHTING

Any length greater than 2 feet, in increments down to 1/16th-inch (± 1/32") and 90-degree mitered corners in a single plane.

### ORDERING GUIDE

Sample Number: HP-2 WM-ID - 32' - S - H - 8 - 35 - TG - F - 120V - MB - SC - OBO



\* Contact factory for switching options.

Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732; D727,554 S; D727,550 S, D727,551 S

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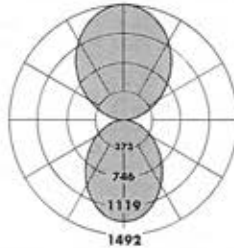
LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE High Performance 2" Aperture (HP-2) - Wall Mount Indirect/Direct

## PHOTOMETRY

Very High Output/ Very High Output - 4' Luminaire  
Distribution: 55% Up (V) / 45% Down (V)  
Efficacy: 94.7 lumens per watt  
Uplight: 3843 lumens (961 lumens/foot)  
Downlight: 3145 lumens (786 lumens/foot)  
Total luminaire output: 6988 lumens (1747 lumens/foot)  
73.8 watts (18.5 watts/foot)

CCT: 3500K  
ITL LM79 Report 85132



0	0.0	22.5	45	67.5	90	Flux
0	1314	1314	1314	1314	1314	
5	1306	1307	1305	1304	1304	124
15	1241	1233	1231	1225	1220	346
25	1114	1098	1089	1076	1064	501
35	942	925	910	887	877	548
45	749	734	718	693	683	552
55	553	542	526	506	499	470
65	368	360	349	337	332	346
75	203	198	192	187	184	204
85	60	59	58	57	55	64
90	0	0	0	0	0	
95	71	68	68	69	70	77
105	244	241	236	235	234	252
115	442	439	437	427	425	431
125	661	649	653	643	638	581
135	884	871	875	866	866	673
145	1099	1084	1088	1084	1077	679
155	1283	1268	1275	1269	1263	585
165	1415	1405	1408	1406	1403	396
175	1482	1482	1482	1482	1481	141
180	1492	1492	1492	1492	1492	

↑ Indirect ↓ Direct

	↑S*	↑B*	↑H*	↑V**
↑S*	2861 [155%   45% ↓]	3262 [160%   40% ↓]	4265 [170%   30% ↓]	5113 [175%   25% ↓]
↑B*	3195 [149%   51% ↓]	3596 [155%   45% ↓]	4600 [165%   35% ↓]	5447 [170%   30% ↓]
↑H*	4030 [139%   61% ↓]	4432 [144%   56% ↓]	5435 [155%   45% ↓]	6282 [161%   39% ↓]
↑V*	4736 [133%   67% ↓]	5137 [138%   62% ↓]	6141 [148%   52% ↓]	6988 [155%   45% ↓]

3000K	0.985
3500K	1.000
4000K	1.032

	↑S*	↑B*	↑H*	↑V**
↑S*	715	815	1066	1278
↑B*	799	899	1150	1362
↑H*	1008	1108	1359	1571
↑V*	1184	1284	1535	1747

3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

	↑S*	↑B*	↑H*	↑V**
↑S*	7.2	8.2	10.7	12.8
↑B*	8.2	9.2	11.7	13.8
↑H*	10.7	11.6	14.2	16.3
↑V*	12.8	13.8	16.3	18.5

**SAMPLE LUMEN ADJUSTMENT CALCULATION**  
High Output (H) / Standard Output (S),  
4000K, 90CRI  
Lumen Adjustment Factor = 0.789

$$\text{Total Light Output} = 4266 \text{ lm} \times 0.789 = 3366 \text{ lm}$$

$$\text{Total Light Output per Foot} = 1067 \text{ lm/ft} \times 0.789 = 841 \text{ lm/ft}$$

$$\text{watts/foot} = 10.7 \text{ W/ft}$$

$$\text{Efficacy} = \frac{841 \frac{\text{lm}}{\text{ft}}}{10.7 \frac{\text{W}}{\text{ft}}} = 78.6 \text{ lm/W}$$

	↑S*	↑B*	↑H*	↑V**
↑S*	98.8	99.4	99.8	99.6
↑B*	97.4	97.8	98.6	98.6
↑H*	94.3	95.2	96.0	96.3
↑V*	92.2	93.0	94.2	94.7

\* Family Correlation based on 4' Luminaire 3500K Very High Output (V) test - 120V.  
\*\* Correlation based on ITL report: 85132  
S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732; D727,554 S; D727,550 S, D727,551 S

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



# FINELITE High Performance 2" Aperture (HP-2) - Wall Mount Indirect/Direct

## SPECIFICATIONS

**CONSTRUCTION:** Precision-cut 6061-T6 extruded aluminum body. Internal joiner system, plug-together wiring, standard.

**ENDCAPS:** Flat diecast aluminum endcaps add 0.25" to each end of luminaire.

**MITERED CORNER:** Illuminated 90° corners in a single plane, with Top Glow™ or Flush uplight diffuser, and/or Flush downlight diffuser, standard. Custom angles are available (90° minimum on inside corners), contact factory.

**REFLECTORS:** Die-formed 24-gauge cold-rolled steel reflectors are finished in 96 LG high reflectance matte white powder coat paint.

**UPLIGHT DIFFUSER:** 12' maximum lens length. Top Glow frost white lens standard, 73% transmissive, 99% diffusion. Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination. Optional: Flush frost white snap-in lens, 73% transmissive, 99% diffusion.

**DOWNLIGHT DIFFUSER:** 12' maximum lens length. Flush frost white snap-in lens standard, 73% transmissive, 99% diffusion. Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination. Optional: Bottom Glow™ frost white snap-in lens option, 73% transmissive, 99% diffusion.

**LIGHT OUTPUT:** Four lumen packages available, Standard Output (S), Boosted Standard Output (B), High Output (H), and Very High Output (V). A separate chart summarizes lumen distribution and wattage. Light engines are replaceable.

**LUMEN MAINTENANCE:** 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

**DRIVER:** Replaceable 120V/277V Constant Current Reduction dimming driver standard. Can be wired dimming or non-dimming. 0-10V dimming controls with a range of 10%- 100%. Dimming to 1% available; consult factory. For lengths 3 feet and greater, separate dimming for uplight and downlight available. Driver is fully accessible from below the ceiling. Power Factor: 0.9. Total Harmonic Distortion (THD) <20%. Expected driver lifetime: 100,000 hours.

**LUTRON DRIVER OPTIONS:** Lut3W-3-wire, LutES-EcoSystem, Lut2W-2-wire.

**ELECTRICAL:** Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery. Factory-choice low-profile backup battery available. 12' minimum luminaire length for low profile battery pack. Backup batteries deliver 1000 lumens. Half of a 4' section will be illuminated in emergency mode.

 **INTEGRATED SENSORS:** Integrated PIR (Passive Infrared) occupancy and/or daylight sensors available with Flush and Bottom Glow downlight diffusers. Refer to Occupancy Sensor and Daylight Sensor tech sheets for more info.

**MOUNTING:** Luminaire hangs securely from mounting brackets fastened directly to the wall for easy installation. Luminaire stands 0.5" off the wall. The mounting bracket is concealed behind the luminaire.

**FINISHES:** Finelite Signal White powder coat standard. Optional Adders: 185 Tiger Drylac's RAL colors.

**FEED:** Standard with one 18-gauge/5-conductor single-circuit feed controlling uplight and downlight together (power and dimming). Specify dual feeds for independent control of uplight and downlight. 14-gauge feed used when luminaire current exceeds 5 amps.

**LENGTHS:** Any length, 2-foot minimum. In increments down to 1/16th-inch (± 1/32"). 12-foot maximum section length.

**LABELS:** Luminaire and electrical components are ETL-listed conforming to UL 1598 in the U.S.A. and CAN/CSA C22.2 No. 250.0 in Canada. In accordance with NEC Code 410.73 (G), this luminaire contains an internal driver disconnect. Damp Location. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2002/95/EC.

**WEIGHT:** 2.9 lb/ft.

**WARRANTY:** 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.

Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732; D727,554 S; D727,550 S, D727,551 S

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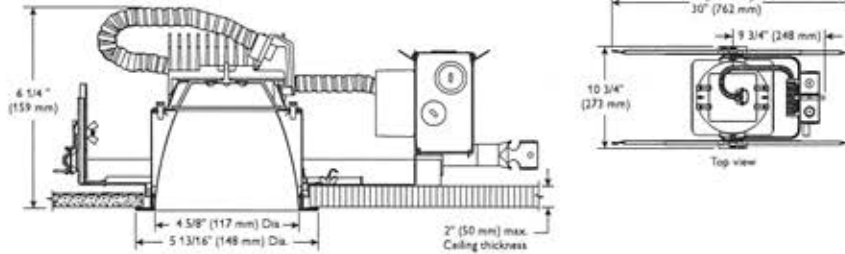
# C4X4L10DL

## Calculite LED 4 1/2" x 4 1/2" downlight

Page 1 of 5

Catalog number:  
Notes:

Type:



**Ordering guide: light engines**

Light engine series	Style	Color	Reflector finish	Flange	Options
C4X4L10	DL (Downlight)	27K (2700K) 30K (3000K) 35K (3500K) 40K (4000K)	CL (Clear) CCL (Comfort clear) CCD (Comfort clear diffuse) CCZ (Champagne bronze) WH (Painted white)	W (Painted white) P (Aperture-matching/polished)	EM (Integral emergency test switch) <sup>1</sup>

Example: C4X4L10DL35KCLWEM

<sup>1</sup> See LED-EM for details and restrictions.

**Ordering guide: frame-in kits**

Frame-in kit series	Installation options	Input voltage	Driver	Options
C4X4L10	N (New construction)	1 (120V) 2 (277V)	Z10V (0-10V dimming) LD (Lutron driver)	EM (Emergency)

Example: C4X4L10N1Z10VEM

**Features**

**Aperture:** 4 5/8" x 4 5/8" (117mm) I.D., 5 13/16" (148mm) O.D.  
**Input wattage:** 20W (+/- 5%)  
**Reflector cone:** Aluminum. Provides 50° cutoff to source & source image. Self-flanged.  
**Depth (including frame-in kit):** 5 3/4" (146mm)  
**Power connection:** Attaches to frame-in kit via push-in connector (on frame). Removable cover provides access.

**Technology**

**LED board:** Array of high brightness royal blue LED's.  
**Remote phosphor technology:** Remote phosphor technology provides increased efficiency and color consistency. Phosphor lens assembly positioned in front of LED array converts blue light to white. Color shift will not exceed +/- 100K over life.  
**Optical mixing chamber:** Philips Lightolier-specific mixing chamber redirects back-reflected light through aperture resulting in 10% increase in efficiency.  
**Thermal management:** Heat sink and thermal design along with clean room assembly ensures specified performance.  
**Rated life:** Based on IESNA LM-80-2008  
 50,000 hours at 70% lumen maintenance.  
**Photometric performance:** Tested in accordance to IESNA LM-79-2008

**Options**

**Dimming capability:** See LED-DIM specification sheet.  
**Emergency capability (integral):** Add "EM" suffix. See LED-EM spec sheet.  
**Emergency capability (inverter):** See LED-LMI specification sheet.

**Labels**

UL (suitable for wet locations), cUL, I.B.E.W.  
 5 year warranty

**PHILIPS  
LIGHTOLIER**



LUMINAIRE CUT SHEET

MARINA VILLAGE

ALAMEDA, CA  
Type: F5

Note: This Fixture Cut Is For Information Only. Refer To Specs For All Catalogue Numbers, Lamps, Finishes, Accessories, Etc

Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



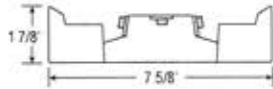
LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE

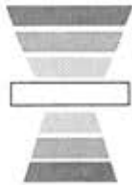
## Series 16 LED Indirect/Direct - 3E

### 3E FEATURES

#### DIMENSIONS & LIGHT ENGINES



#### DIMMING



The uplight and downlight can be dimmed together or separately. 0-10V controls with a range of 10-100%. Dimming to 1% available.

#### OPTIC OPTIONS



#### LUMEN PACKAGES

Available in four outputs.

- Standard Output
- Boosted Output
- High Output
- Very High Output

Date

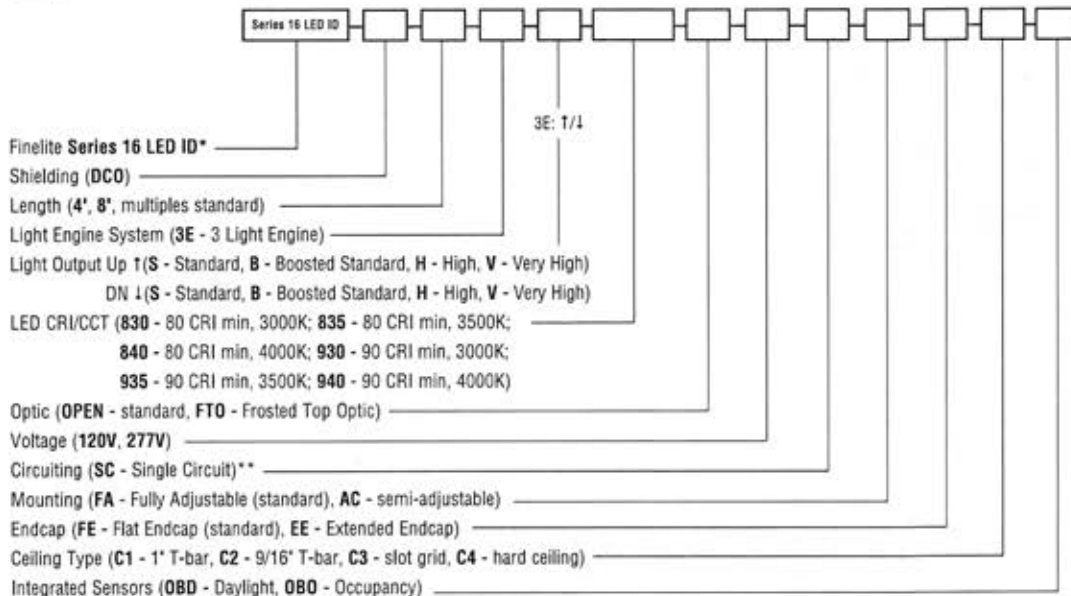
Project

Type

Comments

#### ORDERING GUIDE:

Sample Number: S16 LED ID - DCO - 8' - 3E - S/B - 835 - OPEN - 120V - SC - FA - FE - C1 - OBO



\* Indirect luminaires available on 3E.  
\*\* Contact factory for switching options.



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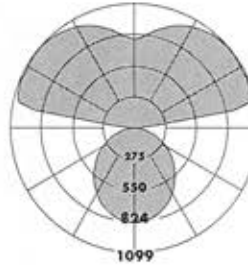
## Series 16 LED Indirect/Direct - 3E

### 3E OPEN PHOTOMETRY - 4 ft. Luminaire



Series16-LED-ID-DCO-3E-V-V-835-OPEN  
Distribution: 67% Up / 33% Down  
Efficacy: 117 Lumens per watt  
Total Luminaire Output: 6657 lumens (1664 lumens/foot)  
56.8 watts (14.2 watts/foot)

CCT: 3500K  
ITL LM79 Report 85122



	0	22.5	45.0	67.5	90.0	Flex
0	839	859	839	839	839	839
5	835	834	834	835	834	79
15	800	795	798	798	794	224
25	728	720	723	722	719	332
35	629	623	624	620	618	389
45	515	510	510	505	503	393
55	394	389	387	383	383	346
65	266	263	261	257	257	258
75	138	137	135	134	133	144
85	30	31	31	31	31	36
90	0	0	0	0	0	0
95	46	271	138	80	76	236
105	202	408	779	1000	1075	740
115	351	528	833	1021	1091	770
125	479	630	884	1045	1097	749
135	583	709	912	1046	1090	677
145	667	761	920	1023	1056	558
155	728	788	899	976	999	408
165	768	793	850	893	907	240
175	786	789	797	807	809	77
180	789	789	789	789	789	

### 3E OPEN

↑ Indirect ↓ Direct

Total Light Output, 3500K, 80 CRI (Lumens) - 4 ft. Luminaire				
	1S*	1B*	1H*	1V**
1S*	2725 [167%   33% ↓]	3194 [172%   28% ↓]	4366 [179%   21% ↓]	5356 [183%   17% ↓]
1B*	2957 [162%   38% ↓]	3426 [167%   33% ↓]	4598 [175%   25% ↓]	5588 [180%   20% ↓]
1H*	3536 [152%   48% ↓]	4005 [157%   43% ↓]	5178 [167%   33% ↓]	6168 [172%   28% ↓]
1V*	4026 [145%   55% ↓]	4495 [151%   49% ↓]	5667 [161%   39% ↓]	6657 [167%   33% ↓]

Light Output, 3500K, 80 CRI (Lumens Per Foot)				
	1S*	1B*	1H*	1V**
1S*	681	799	1092	1339
1B*	739	856	1150	1397
1H*	884	1001	1294	1542
1V*	1006	1124	1417	1664

Power (Watts Per Foot)				
	1S*	1B*	1H*	1V**
1S*	5.7	6.6	9.1	11.2
1B*	6.2	7.1	9.6	11.7
1H*	7.5	8.5	10.9	13.0
1V*	8.6	9.6	12.1	14.2

Efficacy, 3500K, 80 CRI (Lumens Per Watt)				
	1S*	1B*	1H*	1V**
1S*	120	121	120	119
1B*	120	120	120	119
1H*	118	118	119	118
1V*	116	117	117	117

\* Family Correlation based on 4 ft. luminaire 3500K Very High Output (V) test - 120V.  
\*\* Correlation based on ITL report: 85122  
S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

### SAMPLE LUMEN ADJUSTMENT CALCULATION

High Output (H) / High Output (H),  
Open, 4000K, 90CRI

Lumen Adjustment Factor = 0.789

Total Light Output =  
5178 lm x 0.789 = 4085 lm

Total Light Output per Foot =  
1295 lm/ft x 0.789 = 1022 lm/ft

watts/foot = 10.9 W/ft

$$\text{Efficacy} = \frac{1022 \frac{\text{lm}}{\text{ft}}}{10.9 \frac{\text{W}}{\text{ft}}} = 94 \text{ lm/W}$$



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# FINELITE

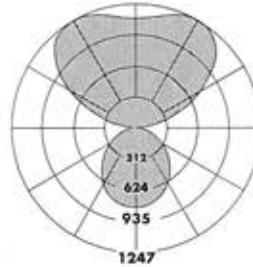
## Series 16 LED Indirect/Direct - 3E

### 3E FROSTED TOP OPTIC (FTO) PHOTOMETRY - 4 ft. Luminaire



For applications where a soft beam edge on wall or vertical surface is desired.

Series16-LED-ID-DCO-3E-V-V-835-FTO  
Distribution: 65% Up / 35% Down  
Efficacy: 108 Lumens per watt  
Total Luminaire Output: 6043 lumens (1511 lumens/foot)  
56.2 watts (14.1 watts/foot)  
CCT: 3500K  
ITL LM79 Report 88524



CANDLEPOWER SUMMARY					
0	22.5	45.0	67.5	90.0	Flux
0	799	799	799	799	799
5	784	794	795	794	794
15	760	755	759	758	758
25	692	685	688	687	684
35	599	592	593	589	587
45	491	486	485	480	477
55	374	370	368	362	361
65	252	250	247	242	242
75	131	130	128	126	126
85	30	30	30	29	29
90	0	0	0	0	0
95	59	63	65	61	58
105	223	240	278	297	303
115	415	455	538	588	607
125	606	671	798	880	911
135	778	851	998	1102	1140
145	916	974	1108	1207	1241
155	1013	1048	1137	1208	1232
165	1070	1080	1123	1154	1188
175	1086	1098	1101	1106	1108
180	1099	1099	1099	1099	1099

### 3E Frosted Top Optics (FTO)

↑ Indirect ↓ Direct

Total Light Output, 3500K, 80 CRI (Lumens) - 4 ft. Luminaire				
	↑S*	↑B*	↑H*	↑V**
↑S*	2474 [165%   35% ↓]	2890 [170%   30% ↓]	3930 [178%   22% ↓]	4808 [182%   18% ↓]
↑B*	2694 [160%   40% ↓]	3110 [165%   35% ↓]	4150 [174%   26% ↓]	5028 [179%   21% ↓]
↑H*	3244 [150%   50% ↓]	3660 [156%   44% ↓]	4700 [165%   35% ↓]	5578 [171%   29% ↓]
↑V*	3709 [144%   58% ↓]	4125 [149%   51% ↓]	5165 [160%   40% ↓]	6043 [165%   35% ↓]

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Light Output, 3500K, 80 CRI (Lumens Per Foot)				
	↑S*	↑B*	↑H*	↑V**
↑S*	618	722	982	1202
↑B*	673	777	1037	1257
↑H*	811	915	1175	1395
↑V*	927	1031	1291	1511

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

Power (Watts Per Foot)				
	↑S*	↑B*	↑H*	↑V**
↑S*	5.6	6.6	9	11.1
↑B*	6.1	7.1	9.5	11.6
↑H*	7.4	8.4	10.8	12.9
↑V*	8.6	9.5	11.9	14.1

### SAMPLE LUMEN ADJUSTMENT CALCULATION

High Output (H) / High Output (H),  
Open, 4000K, 90CRI

Lumen Adjustment Factor = 0.789

$$\text{Total Light Output} = 4700 \text{ lm} \times 0.789 = 3708 \text{ lm}$$

$$\text{Total Light Output per Foot} = 1175 \text{ lm/ft} \times 0.789 = 927 \text{ lm/ft}$$

$$\text{watts/foot} = 10.8 \text{ W/ft}$$

$$\text{Efficacy} = \frac{927 \frac{\text{lm}}{\text{ft}}}{10.8 \frac{\text{W}}{\text{ft}}} = 86 \text{ lm/W}$$

Efficacy, 3500K, 80 CRI (Lumens Per Watt)				
	↑S*	↑B*	↑H*	↑V**
↑S*	110	110	109	108
↑B*	110	110	109	108
↑H*	109	109	109	108
↑V*	108	108	108	108

\* Family Correlation based on 4 ft. luminaire 3500K Very High Output (V) test - 120V.  
\*\* Correlation based on ITL report: 88524  
S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output





# College of Marin IVC Building 11 Luminaire Cut Sheets

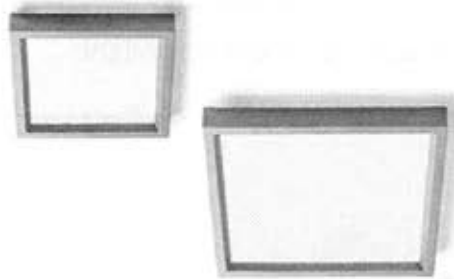
Type: F5

**PHILIPS  
LIGHTOLIER**

**Downlighting**

**SlimSurface LED**

4" and 6" square aperture  
surface mount downlight



Project: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Cat. No. \_\_\_\_\_  
 Type: \_\_\_\_\_  
 Lamps: \_\_\_\_\_ Qty: \_\_\_\_\_  
 Notes: \_\_\_\_\_

SlimSurface LED is a 5/8" thick surface mounted luminaire with the appearance of a recessed downlight. Easy to install into most standard J-boxes, the SlimSurface LED square apertures are available as a 4" 650lm & 6" 1000lm fixture.

**Ordering guide**

example: S4S830K7AL

Family	CRI	CCT	Lumens	Finish	Dimming
<b>S4S</b> SlimSurface 4" Square	8 80 9 90 <sup>1</sup>	27K 2700K 30K 3000K 35K 3500K 40K 4000K	7 650lm	blank White AL Aluminum BK Black  W White AL Aluminum BK Black	blank ELV / Triac (120V)   Z10U 0-10V (120V-277V)
<b>S6S</b> SlimSurface 6" Square	8 80 9 90 <sup>1</sup>	27K 2700K 30K 3000K 35K 3500K 40K 4000K	10 1000lm	blank White AL Aluminum BK Black  W White AL Aluminum BK Black	blank ELV / Triac (120V)   Z10U 0-10V (120V-277V)

1. Configurations using 90 CRI are only available with 2700K CCT.



White



Black



Aluminum

**Features**

- Flange:** One piece plastic flange. Injection molded white, applied aluminum or black.
- Lens:** High transmittance lens allowing for smooth, comfortable light pattern.
- Power supply:** Integral class 2 driver. Factory wired electronic LED driver (see Electrical section for specifications)
- LED Strip:** Utilizes Philips LEDs.
- Lifetime:** Expected lifetime 50,000 hours and backed by a 5-year warranty (see Philips.com/warranties for details).
- Compliance:** Non-conductive fixture for shower light application.

**Electrical**

**Electronic power supply:** RoHS compliant. Class 2 power unit. Unit tolerates sustained open circuit and short circuit output conditions without damage.

**Dimming:** Intended for ELV/Triac (120V) or 0-10V dimming (120V-277V) based on the configuration. Min 90°C supply conductors.

Electrical specifications	Dimming	Input volts	Input frequency	Input current	Input Power	THD Factor	Power Factor	Minimum Operating Temp.
Slim 4" 650lm	Triac	120V	50/60Hz	0.08A	9.5W	<15%	>0.9	-20°C
	0-10V	120V	50/60Hz	0.08A	10.0W	<20%	>0.9	-20°C
		277V	50/60Hz	0.04A	10.2W	<20%	>0.9	-20°C
Slim 6" 1000lm	Triac	120V	50/60Hz	0.13A	14.2W	<15%	>0.9	-20°C
	0-10V	120V	50/60Hz	0.12A	14.5W	<20%	>0.9	-20°C
		277V	50/60Hz	0.06A	14.7W	<20%	>0.9	-20°C

For more details, please see LED-DIM spec sheet.

**Labels**

cULus listed for damp locations (wall mount applications and wet location - covered ceilings). ENERGY STAR® certified.



Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



### S4S & S6S SlimSurface LED

4" and 6" square aperture surface mount downlight

#### Compatibility

Installs into standard J-box applications:



3 1/2" round (plastic)



4" square (plastic)

Not compatible with SSR



4" octagonal (metal)



4" square (metal)

Not compatible with SSR



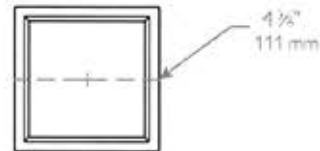
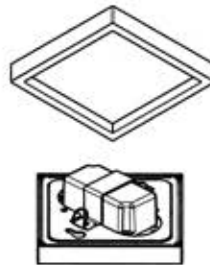
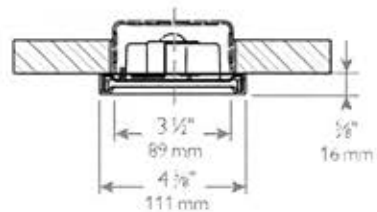
Fire rated J-box

Fire rated classification is per the ceiling and junction box ratings

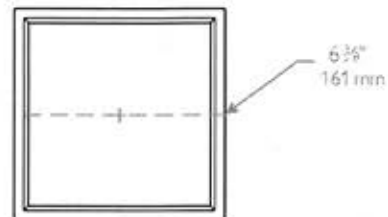
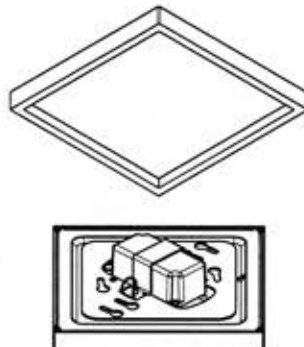
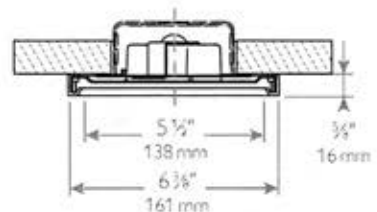
Note: A 2 1/8" deep octagon junction box is recommended for through circuit wiring applications.

#### Dimensions

##### SlimSurface LED 4" downlight



##### SlimSurface LED 6" downlight

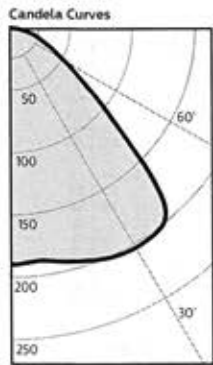




### S4S & S6S SlimSurface LED

4" and 6" square aperture surface mount downlight

#### S4S927K7 • 10W LED, 90CRI, 2700K



Angle	Mean CP	Lumens
0	189	
5	188	
10	189	18
15	193	
20	198	
25	201	93
30	203	
35	202	126
40	196	
45	153	116
50	103	
55	71	66
60	51	
65	39	38
70	28	
75	21	21
80	13	
85	4	5
90	0	

Height to Lighted Plane	Initial center beam foot-candles	Beam dia. (ft)*
5'	8	7.5'
6'	5	9.0'
7'	4	10.5'
8'	3	12.0'
9'	2	13.5'

\* Beam diameter is where foot-candles drop to 50% of maximum.

Spacing on center	Initial center beam foot-candles	Watts per sq.ft.
5'	22.5	0.40
6'	14.7	0.26
7'	10.5	0.19
8'	8.8	0.16
9'	7.0	0.13

38"x38"x10' Room, Workplane 2.5' above floor, 80/50/20% Reflectances

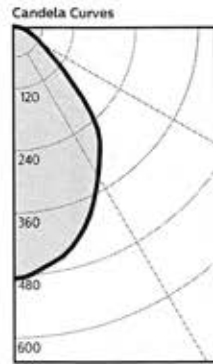
Ceiling	80%				70%		50%		30%		0%	
	70	50	30	10	50	10	50	10	50	10	0	
Wall	Zonal cavity method - Effective floor reflectance = 20%											
RCR	Zonal cavity method - Effective floor reflectance = 20%											
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100
	1	110	106	102	99	104	97	100	94	96	91	87
	2	101	94	88	83	92	82	89	80	85	78	74
	3	93	84	76	70	82	70	79	68	76	67	64
	4	86	75	67	61	73	60	71	59	69	59	56
	5	79	67	59	53	66	52	64	52	62	51	49
	6	73	61	52	46	60	46	58	46	56	45	43
	7	68	55	47	41	54	41	53	41	52	40	38
	8	63	50	42	37	50	37	48	36	47	36	34
	9	59	46	38	33	46	33	45	33	44	33	31
	10	55	43	35	30	42	30	41	30	40	30	28

Zone	Zonal lumens & percentages		CRI and CCT adjustment factors	
	Lumens	%Luminaire		
0-30	166	30.7%	90 CRI 2700K = 84%	80 CRI 2700K = 100%
0-40	292	54.2%	80 CRI 3000K = 100%	80 CRI 3500K = 105%
0-60	474	88.0%		
0-90	539	100.0%	80 CRI 4000K = 109%	

**Report: 943GFR**  
Output lumens: 539 lms  
Spacing Criterion: 1.5  
Beam Angle: 86°  
Input Watts<sup>2</sup>: 91W

Efficacy: 59.3lm/w  
CCT<sup>3</sup>: 2700K  
CRI: 90min

#### S6S927K7 • 14W LED, 90CRI, 2700K



Angle	Mean CP	Lumens
0	486	
5	476	
10	460	45
15	441	
20	410	123
25	373	
30	333	170
35	296	
40	258	184
45	193	147
50	131	
55	90	83
60	65	
65	51	50
70	39	
75	30	30
80	20	
85	9	9
90	0	

Height to Lighted Plane	Initial center beam foot-candles	Beam dia. (ft)*
5'	19	5.5'
6'	14	6.6'
7'	10	7.7'
8'	8	8.8'
9'	6	9.9'

\* Beam diameter is where foot-candles drop to 50% of maximum.

Spacing on center	Initial center beam foot-candles	Watts per sq.ft.
5'	21.8	2.80
6'	14.2	1.84
7'	10.2	1.31
8'	8.5	1.09
9'	6.8	0.88

38"x38"x10' Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Ceiling	80%				70%		50%		30%		0%	
	70	50	30	10	50	10	50	10	50	10	0	
Wall	Zonal cavity method - Effective floor reflectance = 20%											
RCR	Zonal cavity method - Effective floor reflectance = 20%											
Room Cavity Ratio	0	119	119	119	116	116	111	111	106	106	100	
	1	111	107	103	100	105	98	100	95	97	93	88
	2	103	96	90	85	94	84	90	82	87	80	77
	3	95	86	79	74	85	73	82	72	79	71	68
	4	88	78	70	65	77	64	74	63	72	63	60
	5	82	71	63	57	70	57	68	56	66	56	53
	6	76	65	57	51	64	51	62	51	61	50	48
	7	71	59	52	46	59	46	57	46	56	45	43
	8	67	55	47	42	54	42	53	42	52	41	39
	9	63	51	43	38	50	38	49	38	48	38	36
	10	59	47	40	35	47	35	46	35	45	35	33

Zone	Zonal lumens & percentages		CRI and CCT adjustment factors	
	Lumens	%Luminaire		
0-30	338	40.2%	90 CRI 2700K = 84%	80 CRI 2700K = 100%
0-40	522	62.1%	80 CRI 3000K = 100%	80 CRI 3500K = 105%
0-60	753	89.5%		
0-90	841	100.0%	80 CRI 4000K = 109%	

**Report: 957GFR**  
Output lumens: 841 lms  
Spacing Criterion: 1.1  
Beam Angle: 82°  
Input Watts<sup>2</sup>: 13.3W

Efficacy: 63.2lm/w  
CCT<sup>3</sup>: 2700K  
CRI: 90min

1. Tested using absolute photometry as specified in LM79: IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products  
2. Wattage: controlled to within 5%  
3. Correlated Color Temperature: within specs as defined in ANSI\_NEMA\_ANSI C78 377-2008 Specifications for the Chromaticity of Solid State Lighting Products

Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



## S4S & S6S SlimSurface LED

4" and 6" square aperture surface mount downlight

### S4S827K7 • 10W LED, 80 CRI, 2700K

Candela Curves			
Angle	Mean CP	Lumens	
0	223		
5	221	21	
10	221		
15	225	64	
20	229		
25	233	108	
30	237		
35	236	146	
40	224		
45	175	133	
50	121		
55	83	76	
60	60		
65	44	44	
70	33		
75	24	25	
80	15		
85	5	6	
90	0		

<b>Report: 944GFR</b>			
Output lumens:	622 lms	Efficacy:	67.6 lm/w
Spacing Criterion:	1.5	CCT <sup>3</sup> :	2700K
Beam Angle:	101°	CRI:	80 min
Input Watts <sup>2</sup> :	9.2 W		

Single unit data		
Height to Lighted Plane	Initial center beam foot-candies	Beam dia. (ft)*
5'	9	7.5'
6'	6	9.0'
7'	5	10.5'
8'	3	12.0'
9'	3	13.5'

\* Beam diameter is where foot-candies drop to 50% of maximum.

Multiple unit data - RCR 2		
Spacing on center	Initial center beam foot-candies	Watts per sq ft
5'	25.9	0.41
6'	17.0	0.27
7'	12.1	0.19
8'	10.1	0.16
9'	8.1	0.13

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Coefficients of utilization												
Ceiling	80%				70%		50%		30%		0%	
	70	50	30	10	50	10	50	10	50	10	0	
Wall	Zonal cavity method - Effective floor reflectance = 20%											
RCR												
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100
	1	110	106	102	99	104	97	100	94	96	91	87
	2	101	94	88	83	92	82	89	80	85	78	74
	3	93	84	76	70	82	70	79	69	77	67	64
	4	86	75	67	61	74	60	71	59	69	59	56
	5	79	67	59	53	66	53	64	52	62	51	49
	6	73	61	52	46	60	46	58	46	57	45	43
	7	68	55	47	41	55	41	53	41	52	41	38
	8	63	51	42	37	50	37	49	37	47	36	34
	9	59	46	38	33	46	33	45	33	44	33	31
	10	55	43	35	30	42	30	41	30	40	30	28

Zonal lumens & percentages			CRI and CCT adjustment factors	
Zone	Lumens	%Luminaire		
0-30	192	30.9%	90 CRI 2700K = 84%	
0-40	338	54.4%	80 CRI 2700K = 100%	
0-60	547	88.0%	80 CRI 3000K = 100%	
0-90	622	100.0%	80 CRI 3500K = 105%	
			80 CRI 4000K = 109%	

### S6S827K7 • 14W LED, 80 CRI, 2700K

Candela Curves			
Angle	Mean CP	Lumens	
0	625		
5	618	59	
10	604		
15	584	164	
20	546		
25	494	227	
30	440		
35	390	244	
40	337		
45	250	193	
50	170		
55	117	108	
60	85		
65	65	65	
70	51		
75	39	41	
80	27		
85	12	13	
90	0		

<b>Report: 964GFR</b>			
Output lumens:	1113 lms	Efficacy:	83.1 lm/w
Spacing Criterion:	1.1	CCT <sup>3</sup> :	2700K
Beam Angle:	83°	CRI:	80 min
Input Watts <sup>2</sup> :	13.4 W		

Single unit data		
Height to Lighted Plane	Initial center beam foot-candies	Beam dia. (ft)*
5'	25	5.5'
6'	17	6.6'
7'	13	7.7'
8'	10	8.8'
9'	8	9.9'

\* Beam diameter is where foot-candies drop to 50% of maximum.

Multiple unit data - RCR 2		
Spacing on center	Initial center beam foot-candies	Watts per sq ft
5'	24.2	3.68
6'	15.8	2.42
7'	11.3	1.73
8'	9.5	1.44
9'	7.5	1.15

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Coefficients of utilization												
Ceiling	80%				70%		50%		30%		0%	
	70	50	30	10	50	10	50	10	50	10	0	
Wall	Zonal cavity method - Effective floor reflectance = 20%											
RCR												
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100
	1	111	107	103	100	105	98	100	95	97	93	88
	2	103	96	90	85	94	84	90	82	87	80	77
	3	95	86	79	74	85	73	82	72	79	71	68
	4	88	78	70	65	77	64	74	63	72	63	60
	5	82	71	63	57	70	57	68	56	66	56	53
	6	76	65	57	51	64	51	62	51	61	50	48
	7	71	59	52	46	59	46	57	46	56	45	43
	8	67	55	47	42	54	42	53	42	52	41	39
	9	63	51	43	38	50	38	49	38	48	38	36
	10	59	47	40	35	47	35	46	35	45	35	33

Zonal lumens & percentages			CRI and CCT adjustment factors	
Zone	Lumens	%Luminaire		
0-30	449	40.4%	90 CRI 2700K = 84%	
0-40	693	62.3%	80 CRI 2700K = 100%	
0-60	994	89.3%	80 CRI 3000K = 100%	
0-90	1113	100.0%	80 CRI 3500K = 105%	
			80 CRI 4000K = 109%	

1. Tested using absolute photometry as specified in LM79: IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products  
 2. Wattage: controlled to within 5%  
 3. Correlated Color Temperature: within specs as defined in ANSI\_NEMA\_ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products

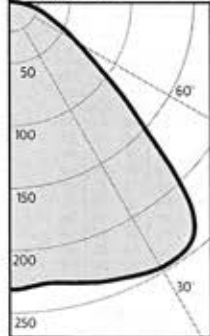


## S4S & S6S SlimSurface LED

4" and 6" square aperture surface mount downlight

### S4S830K7 • 10W LED, 80CRI, 3000K

**Candela Curves**



Angle	Mean CP	Lumens
0	231	22
5	229	
10	230	
15	236	67
20	241	
25	246	113
30	248	
35	247	153
40	237	
45	185	139
50	125	
55	87	80
60	63	
65	47	47
70	34	
75	25	26
80	15	
85	5	6
90	0	

**Report: 945GFR**

Output Lumens:	653 lms
Spacing Criterion:	1.5
Beam Angle:	88°
Input Watts:	9.1W

Efficacy:	71.8lm/w
CCT:	3000K
CRI:	80min

**Single unit data**

Height to Lighted Plane	Initial center beam foot-candles	Beam dia (ft)*
5'	9	7.5'
6'	6	9.0'
7'	5	10.5'
8'	4	12.0'
9'	3	13.5'

\* Beam diameter is where foot-candles drop to 50% of maximum

**Multiple unit data - RCR 2**

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'	27.2	0.40
6'	17.9	0.26
7'	12.8	0.19
8'	10.6	0.16
9'	8.5	0.13

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

**Coefficients of utilization**

Ceiling	80%				70%				50%				30%				0%
	70	50	30	10	50	10	50	10	50	10	50	10	50	10	50	10	
Wall	Zonal cavity method - Effective floor reflectance = 20%																
RCR																	
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100	106	106	100		
	1	110	106	102	99	104	97	100	94	96	91	87	96	91	87		
	2	101	94	88	83	92	82	89	80	85	78	74	85	78	74		
	3	93	84	76	70	82	70	79	69	77	67	64	77	67	64		
	4	86	75	67	61	74	60	71	59	69	59	56	69	59	56		
	5	79	67	59	53	66	52	64	52	62	51	49	62	51	49		
	6	73	61	52	46	60	46	58	46	57	45	43	57	45	43		
	7	68	55	47	41	55	41	53	41	52	40	38	52	40	38		
	8	63	51	42	37	50	37	49	36	47	36	34	47	36	34		
	9	59	46	38	33	46	33	45	33	44	33	31	44	33	31		
	10	55	43	35	30	42	30	41	30	40	30	28	40	30	28		

**Zonal lumens & percentages**

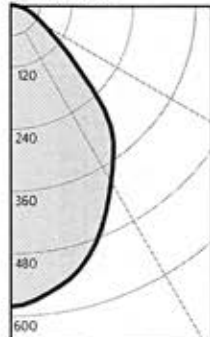
Zone	Lumens	%Luminaire
0-30	202	30.9%
0-40	355	54.3%
0-60	574	87.9%
0-90	653	100.0%

**CRI and CCT adjustment factors**

90 CRI 2700K = 84%
80 CRI 2700K = 100%
80 CRI 3000K = 100%
80 CRI 3500K = 105%
80 CRI 4000K = 109%

### S6S830K7 • 14W LED, 80CRI, 3000K

**Candela Curves**



Angle	Mean CP	Lumens
0	582	54
5	572	
10	551	
15	526	148
20	489	
25	442	203
30	394	
35	351	220
40	307	
45	227	176
50	153	
55	106	99
60	77	
65	59	60
70	45	
75	34	36
80	22	
85	10	10
90	0	

**Report: 958GFR**

Output lumens:	1006 lms
Spacing Criterion:	1.1
Beam Angle:	82°
Input Watts:	13.4W

Efficacy:	75.1lm/w
CCT:	3000K
CRI:	80min

**Single unit data**

Height to Lighted Plane	Initial center beam foot-candles	Beam dia (ft)*
5'	23	5.5'
6'	16	6.6'
7'	12	7.7'
8'	9	8.8'
9'	7	9.9'

\* Beam diameter is where foot-candles drop to 50% of maximum

**Multiple unit data - RCR 2**

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'	26.2	3.33
6'	17.1	2.18
7'	12.2	1.56
8'	10.2	1.30
9'	8.1	1.04

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

**Coefficients of utilization**

Ceiling	80%				70%				50%				30%				0%
	70	50	30	10	50	10	50	10	50	10	50	10	50	10	50	10	
Wall	Zonal cavity method - Effective floor reflectance = 20%																
RCR																	
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100	106	106	100		
	1	111	107	103	100	105	98	100	95	97	93	88	97	93	88		
	2	103	96	90	85	94	84	90	82	87	80	77	87	80	77		
	3	95	86	79	74	85	73	82	72	79	71	68	79	71	68		
	4	88	78	70	65	77	64	74	63	72	63	60	72	63	60		
	5	82	71	63	57	70	57	68	56	66	56	53	66	56	53		
	6	76	65	57	51	64	51	62	51	61	50	48	61	50	48		
	7	71	59	52	46	59	46	57	46	56	45	43	56	45	43		
	8	67	55	47	42	54	42	53	42	52	41	39	52	41	39		
	9	63	51	43	38	50	38	49	38	48	38	36	48	38	36		
	10	59	47	40	35	47	35	46	35	45	35	33	45	35	33		

**Zonal lumens & percentages**

Zone	Lumens	%Luminaire
0-30	405	40.2%
0-40	625	62.1%
0-60	900	89.5%
0-90	1006	100.0%

**CRI and CCT adjustment factors**

90 CRI 2700K = 84%
80 CRI 2700K = 100%
80 CRI 3000K = 100%
80 CRI 3500K = 105%
80 CRI 4000K = 109%

1. Tested using absolute photometry as specified in LM79 IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products  
 2. Wattage: controlled to within 5%  
 3. Correlated Color Temperature: within specs as defined in ANSI\_NEMA\_ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products.



# College of Marin IVC Building 11 Luminaire Cut Sheets

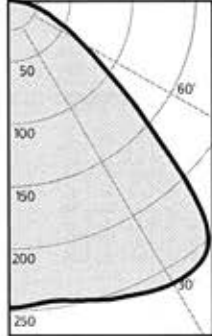
## Type: F5

### S4S & S6S SlimSurface LED

4" and 6" square aperture surface mount downlight

#### S4S835K7 • 10W LED, 80 CRI, 3500 K

##### Candela Curves



Angle	Mean CP	Lumens
0	247	23
5	245	
10	245	
15	249	71
20	255	
25	259	121
30	263	
35	262	163
40	249	
45	194	149
50	135	
55	93	86
60	67	
65	50	50
70	37	
75	27	28
80	17	
85	6	7
90	0	

##### Single unit data

Height to Lighted Plane	Initial center beam foot-candles	Beam dia. (ft)*
5'	10	7.5'
6'	7	9.0'
7'	5	10.5'
8'	4	12.0'
9'	3	13.5'

\* Beam diameter is where foot-candles drop to 50% of maximum.

##### Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'	29.1	0.40
6'	19.1	0.26
7'	13.6	0.19
8'	11.4	0.16
9'	9.1	0.13

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

##### Coefficients of utilization

	80%					70%					50%					30%					0%				
	70	50	30	10	0	70	50	30	10	0	70	50	30	10	0	70	50	30	10	0	70	50	30	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%																								
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100	100	94	96	91	87	81	81	75	75	70	70	64	64
	1	110	106	102	99	104	97	100	94	96	91	87	81	75	70	64	58	53	48	43	37	37	31	31	25
	2	101	94	88	83	92	82	89	80	85	78	74	67	61	55	49	43	37	31	25	19	19	13	13	7
	3	93	84	76	70	82	70	79	69	77	67	64	56	49	43	37	31	25	19	13	7	7	1	1	0
	4	86	75	67	61	74	60	71	59	69	59	56	47	41	35	29	23	17	11	5	5	0	0	0	0
	5	79	67	59	53	66	53	64	52	62	51	49	40	34	28	22	16	10	4	4	0	0	0	0	0
	6	73	61	52	46	60	46	58	46	57	45	43	34	28	22	16	10	4	4	0	0	0	0	0	0
	7	68	55	47	41	55	41	53	41	52	40	38	29	23	17	11	5	5	0	0	0	0	0	0	0
	8	63	51	42	37	50	37	49	36	47	36	34	26	20	14	8	2	2	0	0	0	0	0	0	0
	9	59	46	38	33	46	33	45	33	44	33	31	23	17	11	5	5	0	0	0	0	0	0	0	0
	10	56	43	35	30	42	30	41	30	40	30	28	20	14	8	2	2	0	0	0	0	0	0	0	0

##### Zonal lumens & percentages

Zone	Lumens	%Luminaire
0-30	216	30.9%
0-40	379	54.3%
0-60	614	87.9%
0-90	698	100.0%

##### CRI and CCT adjustment factors

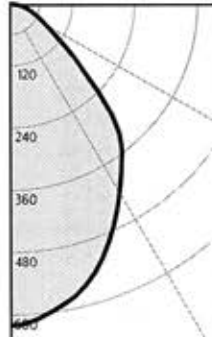
90 CRI 2700K = 84%
80 CRI 2700K = 100%
80 CRI 3000K = 100%
80 CRI 3500K = 105%
80 CRI 4000K = 109%

##### Report: 946GFR

Output lumens:	698 lms	Efficacy:	76.7 lm/w
Spacing Criterion:	1.5	CCT <sup>3</sup> :	3500 K
Beam Angle:	99°	CRI:	80 min
Input Watts <sup>2</sup> :	9.1 W		

#### S6S835K7 • 14W LED, 80 CRI, 3500 K

##### Candela Curves



Angle	Mean CP	Lumens
0	620	58
5	610	
10	589	
15	561	157
20	521	
25	471	217
30	420	
35	375	235
40	327	
45	242	188
50	163	
55	113	106
60	82	
65	63	64
70	48	
75	37	38
80	24	
85	11	11
90	0	

##### Single unit data

Height to Lighted Plane	Initial center beam foot-candles	Beam dia. (ft)*
5'	25	5.5'
6'	17	6.6'
7'	13	7.7'
8'	10	8.8'
9'	8	9.9'

\* Beam diameter is where foot-candles drop to 50% of maximum.

##### Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'	28.6	3.58
6'	18.7	2.35
7'	13.3	1.68
8'	11.2	1.40
9'	8.9	1.12

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

##### Coefficients of utilization

	80%					70%					50%					30%					0%				
	70	50	30	10	0	70	50	30	10	0	70	50	30	10	0	70	50	30	10	0	70	50	30	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%																								
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100	100	94	96	91	87	81	81	75	75	70	70	64	64
	1	111	107	103	100	105	98	100	95	97	93	88	81	75	70	64	58	53	48	43	37	37	31	31	25
	2	103	96	90	85	94	84	90	82	87	80	77	70	64	58	52	46	40	34	28	22	16	16	10	10
	3	95	86	79	74	85	73	82	72	79	71	68	61	55	49	43	37	31	25	19	13	13	7	7	1
	4	88	78	70	65	77	64	74	63	72	63	60	52	46	40	34	28	22	16	10	4	4	0	0	0
	5	82	71	63	57	70	57	68	56	66	56	53	44	38	32	26	20	14	8	2	2	0	0	0	0
	6	76	65	57	51	64	51	62	51	61	50	48	39	33	27	21	15	9	3	3	0	0	0	0	0
	7	71	59	52	46	59	46	57	46	56	45	43	35	29	23	17	11	5	5	0	0	0	0	0	0
	8	67	55	47	42	54	42	53	42	52	41	39	31	25	19	13	7	7	1	1	0	0	0	0	0
	9	63	51	43	38	50	38	49	38	48	38	36	28	22	16	10	4	4	0	0	0	0	0	0	0
	10	59	47	40	35	47	35	46	35	45	35	33	25	19	13	7	7	1	1	0	0	0	0	0	0

##### Zonal lumens & percentages

Zone	Lumens	%Luminaire
0-30	432	40.2%
0-40	667	62.1%
0-60	961	89.5%
0-90	1074	100.0%

##### CRI and CCT adjustment factors

90 CRI 2700K = 84%
80 CRI 2700K = 100%
80 CRI 3000K = 100%
80 CRI 3500K = 105%
80 CRI 4000K = 109%

##### Report: 959GFR

Output lumens:	1074 lms	Efficacy:	80.8 lm/w
Spacing Criterion:	1.1	CCT <sup>3</sup> :	3500 K
Beam Angle:	82°	CRI:	80 min
Input Watts <sup>2</sup> :	13.3 W		

1. Tested using absolute photometry as specified in LM79 IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.  
 2. Wattage: controlled to within 5%.  
 3. Correlated Color Temperature: within specs as defined in ANSI\_NEMA\_ANSI C78 377-2008 Specifications for the Chromaticity of Solid State Lighting Products.

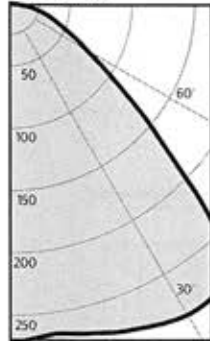


### S4S & S6S SlimSurface LED

4" and 6" square aperture surface mount downlight

#### S4S840K7 • 10W LED, 80 CRI, 4000K

##### Candela Curves



Report: 947GFR

Output lumens:	766 lms
Spacing Criterion:	1.5
Beam Angle:	99°
Input Watts:	9.1W

Angle	Mean CP	Lumens
0	271	
5	269	26
10	269	
15	273	78
20	279	
25	284	133
30	288	
35	287	179
40	272	
45	212	163
50	148	
55	103	94
60	74	
65	55	55
70	41	
75	30	30
80	19	
85	6	8
90	0	

##### Single unit data

Height to Lighted Plane	Initial center beam foot-candles	Beam dia (ft) <sup>1</sup>
5'	11	7.5'
6'	8	9.0'
7'	6	10.5'
8'	4	12.0'
9'	3	13.5'

\* Beam diameter is where foot-candles drop to 50% of maximum.

##### Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq ft.
5'	31.9	0.40
6'	20.9	0.26
7'	15.0	0.19
8'	12.5	0.16
9'	10.0	0.13

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

##### Coefficients of utilization

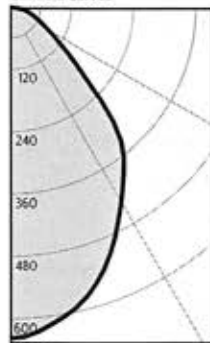
Ceiling	80%				70%		50%		30%		0%	
	70	50	30	10	50	10	50	10	50	10	0	
Wall	70	50	30	10	50	10	50	10	50	10	0	
RCR	Zonal cavity method - Effective floor reflectance = 20%											
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100
1	110	106	102	99	104	97	100	94	96	91	87	87
2	101	94	88	83	92	82	89	80	85	78	74	74
3	93	84	76	70	82	70	79	68	76	67	64	64
4	86	75	67	60	73	60	71	59	69	58	56	56
5	79	67	59	53	66	52	64	52	62	51	49	49
6	73	61	52	46	60	46	58	46	56	45	43	43
7	68	55	47	41	54	41	53	41	51	40	38	38
8	63	50	42	37	50	37	48	36	47	36	34	34
9	59	46	38	33	46	33	45	33	43	33	31	31
10	55	43	35	30	42	30	41	30	40	30	28	28

##### Zonal lumens & percentages

Zone	Lumens	%Luminaire	CRI and CCT adjustment factors
0-30	237	30.9%	90 CRI 2700K = 84%
0-40	416	54.3%	80 CRI 2700K = 100%
0-60	674	87.9%	80 CRI 3000K = 100%
0-90	766	100.0%	80 CRI 3500K = 105%
			80 CRI 4000K = 109%

#### S6S840K7 • 14W LED, 80 CRI, 4000K

##### Candela Curves



Report: 960GFR

Output lumens:	1103 lms
Spacing Criterion:	1.1
Beam Angle:	82°
Input Watts:	13.3W

Angle	Mean CP	Lumens
0	637	
5	626	59
10	604	
15	577	162
20	535	
25	484	223
30	432	
35	385	241
40	336	
45	249	193
50	168	
55	116	109
60	84	
65	65	66
70	49	
75	38	39
80	25	
85	11	12
90	0	

##### Single unit data

Height to Lighted Plane	Initial center beam foot-candles	Beam dia (ft) <sup>1</sup>
5'	25	5.5'
6'	18	6.6'
7'	13	7.7'
8'	10	8.8'
9'	8	9.9'

\* Beam diameter is where foot-candles drop to 50% of maximum.

##### Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq ft.
5'	30.3	3.68
6'	19.8	2.41
7'	14.1	1.72
8'	11.8	1.44
9'	9.4	1.15

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

##### Coefficients of utilization

Ceiling	80%				70%		50%		30%		0%	
	70	50	30	10	50	10	50	10	50	10	0	
Wall	70	50	30	10	50	10	50	10	50	10	0	
RCR	Zonal cavity method - Effective floor reflectance = 20%											
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100
1	111	107	103	100	105	98	100	95	97	93	88	88
2	103	96	90	85	94	84	90	82	87	80	77	77
3	95	86	79	74	85	73	82	72	79	71	68	68
4	88	78	70	65	77	64	74	63	72	63	60	60
5	82	71	63	57	70	57	68	56	66	56	53	53
6	76	65	57	51	64	51	62	51	61	50	48	48
7	71	59	52	46	59	46	57	46	56	45	43	43
8	67	55	47	42	54	42	53	42	52	41	39	39
9	63	51	43	38	50	38	49	38	48	38	36	36
10	59	47	40	35	47	35	46	35	45	35	33	33

##### Zonal lumens & percentages

Zone	Lumens	%Luminaire	CRI and CCT adjustment factors
0-30	443	40.2%	90 CRI 2700K = 84%
0-40	685	62.1%	80 CRI 2700K = 100%
0-60	987	89.5%	80 CRI 3000K = 100%
0-90	1103	100.0%	80 CRI 3500K = 105%
			80 CRI 4000K = 109%

1. Tested using absolute photometry as specified in LM79: IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.  
2. Wattage: controlled to within 5%.  
3. Correlated Color Temperature: within specs as defined in ANSI\_NEMA\_ANSI C78 377-2008 Specifications for the Chromaticity of Solid State Lighting Products.

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Philips Lighting North America Corporation  
200 Franklin Square Drive, Somerset, NJ 08873  
Tel. 855-486-2216

Philips Lighting Canada Ltd.  
281 Hillmount Rd, Markham, ON, Canada L6C 2S3  
Tel. 800-668-9008



**Model: WL-LED200**  
LEDme® Step Light

**WAC LIGHTING**  
Responsible Lighting®

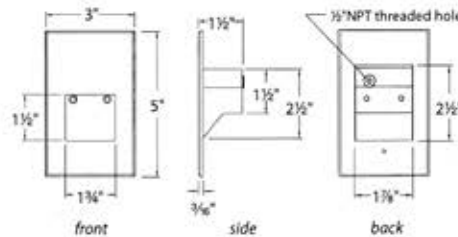


Fixture Type:

Catalog Number:

Project:

Location:



**PRODUCT DESCRIPTION**

Vertical rectangle LEDme® Step Light. Designed for safety and style on stairways, patios, decks, balcony areas, walkways and building perimeters. Features an architectural design. Energy efficient for long-lasting indoor and outdoor lighting solutions. Creates an attractive, romantic impression at night.

**FEATURES**

- 316 marine grade cast stainless steel (SS) available
- Direct wiring, no driver needed
- Low profile, flush to wall aesthetics with no visible hardware
- 40,000 hour rated life
- Balanced lighting, free of shadows with minimum glare
- Up to 200 fixtures can be connected in parallel
- Replaceable LED module
- 5 year WAC Lighting product warranty

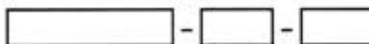
**SPECIFICATIONS**

- Construction:** Die-cast aluminum or 316 marine grade cast stainless steel
- Power:** Direct wiring, no remote driver needed. Input voltage: 120V or 277V AC 50/60Hz
- Light Source:** 3000K CCT Samsung HV-AC High Power LED, CRI: 85  
Optional color lenses. Total power consumption of 3.9W
- Mounting:** Fits into 2" x 4" J-Box with minimum inside dimensions of 3"L x 2"W x 2"H Includes bracket for J-Box mount.
- Dimming:** Dim to 10% with electronic low voltage (ELV) dimmer  
Approved dimmers: Lutron Nova-T NTELV-300 & NTELV-600, Lutron Vietri VTELV-600, Lutron Diva DVELV-300P, Lutron Skylark SELV-300P, Lutron Maestro MAELV-600
- Standards:** IP66, UL & cUL Listed for wet locations

**ORDER NUMBER**

Model #	Color	Finish
WL-LED200 120V	C White 3000K	SS Stainless Steel
WL-LED200F 277V	AM Amber 610nm	BK Black
	RD Red 640nm	WT White
	BL Blue 450nm	BN* Brushed Nickel
		BZ Bronze

\*Brushed Nickel Finish is for interior use only



Example: WL-LED200F-AM-BZ

**FINISHES**



wacighting.com  
Phone (800) 526.2588  
Fax (800) 526.2585

Headquarters/Eastern Distribution Center  
44 Harbor Park Drive  
Port Washington, NY 11050

Central Distribution Center  
1600 Distribution Ct  
Lithia Springs, GA 30122

Western Distribution Center  
1750 Archibald Avenue  
Ontario, CA 91760

WAC Lighting retains the right to modify the design of our products at any time as part of the company's continuous improvement program. MAR 2016

Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.





**Model: WL-LED200**  
LEDme® Step Light

**WAC LIGHTING**  
Responsible Lighting®

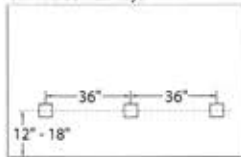
**FIXTURE PERFORMANCE**

Input Voltage	Light Color	Finish	Lumens
<b>WL-LED200</b> 120V	<b>C</b> White	<b>SS</b> Stainless Steel	36
		<b>BK</b> Black	27
		<b>WT</b> White	63
		<b>BN</b> Brushed Nickel	27
		<b>BZ</b> Bronze	29
	<b>AM</b> Amber	<b>SS</b> Stainless Steel	21
		<b>BK</b> Black	16
		<b>WT</b> White	31
		<b>BN</b> Brushed Nickel	16
		<b>BZ</b> Bronze	17
	<b>RD</b> Red	<b>SS</b> Stainless Steel	2
		<b>BK</b> Black	2
		<b>WT</b> White	4
		<b>BN</b> Brushed Nickel	2
		<b>BZ</b> Bronze	2
	<b>BL</b> Blue	<b>SS</b> Stainless Steel	4
		<b>BK</b> Black	3
		<b>WT</b> White	7
		<b>BN</b> Brushed Nickel	3
		<b>BZ</b> Bronze	4

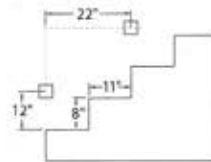
Input Voltage	Light Color	Finish	Lumens
<b>WL-LED200F</b> 277V	<b>C</b> White	<b>SS</b> Stainless Steel	33
		<b>BK</b> Black	23
		<b>WT</b> White	54
		<b>BN</b> Brushed Nickel	23
		<b>BZ</b> Bronze	26
	<b>AM</b> Amber	<b>SS</b> Stainless Steel	18
		<b>BK</b> Black	13
		<b>WT</b> White	27
		<b>BN</b> Brushed Nickel	13
		<b>BZ</b> Bronze	14
	<b>RD</b> Red	<b>SS</b> Stainless Steel	2
		<b>BK</b> Black	1.5
		<b>WT</b> White	3
		<b>BN</b> Brushed Nickel	1.5
		<b>BZ</b> Bronze	2
	<b>BL</b> Blue	<b>SS</b> Stainless Steel	4
		<b>BK</b> Black	3
		<b>WT</b> White	4
		<b>BN</b> Brushed Nickel	3
		<b>BZ</b> Bronze	3

**SPACING RECOMMENDATIONS FOR OPTIMAL LIGHT DISTRIBUTION**

Corridors / Hallways



Stairs - Wall Mount



Stairs - Step Mount



Mount in center of stair as close to the upper tread as possible.  
For best results use one light per step for steps narrower than 5'.

wacighting.com  
Phone (800) 526.2588  
Fax (800) 526.2585

Headquarters/Eastern Distribution Center  
44 Harbor Park Drive  
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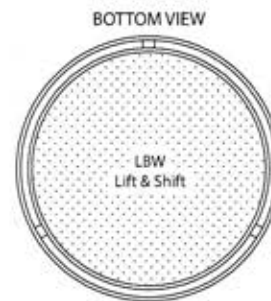
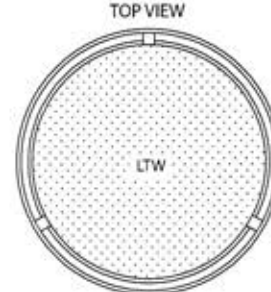
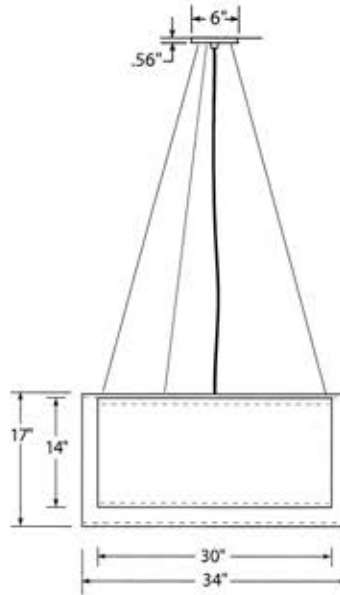
**Shadow Drum 34" Pendant P2034**

*Design modifications are always welcome.*



- Welded steel / aluminum
- Two washable diffusers
- LBW etched white acrylic inner bottom lens
- LTW white acrylic inner top lens
- 6" black or white cord
- Three suspension cables
- Canopy finished to match frame
- Mounts to standard J-box
- Suitable for damp locations

weight: 13 lbs  
 US LISTED  
 MADE IN USA



P2034						
<b>CORD COLOR</b>	<b>FINISH</b>	<b>DIFFUSER 1</b>	<b>DIFFUSER 2</b>	<b>LAMPING</b>	<b>VOLTAGE</b>	
<input type="checkbox"/> Black <input type="checkbox"/> White	F2 Chrome F3 Black F4 Earth F5 Copper F6 Brass F7 Bronze F8 Steel F10 Hammered Copper F11 White	TransLUMENATE* (outer shade) See web for options.	LUMENATE* (inner shade) See web for options.	LED 3/18.9W XICATO UNV 6300 Lumens 3000K 0-10V Dimming  Lamps not included: CFL 2/32W TBX-GX24Q-3 CFL 4/32W TBX-GX24Q-3 INC 3/Med. Base	120V 277V 347V CFL Only	
<b>+ OPTIONS</b>						

**SUSPENSION OPTIONS**

**STM** - Field Cuttable Ball Swivel Stem with 1.78" deep canopy. Specify length in 1" increments.

**CXX3** - Cord Extra (Specify length)

**CXS3** - Cord Braided Silver (not LED)

**CANOPY OPTIONS**

**CAC** - Canopy Alternative Color

**CF105** - Flair Canopy 10.5" Dia

**CSF6** - Swivel Stem on CF6

**CSF105** - Swivel Stem on CF105

**CR432** - Cluster Canopy\* 4.5" x 42"

**CR860** - Cluster Canopy\* 8" x 60"

**C66** - Square Canopy 6"

**C1010** - Square Canopy 10"

\*Specify arrangement and heights.

**LENS OPTIONS**

**LTC4** - Top Lens Clear Acrylic

**LT4** - Top Lens Metal Perf.

**LTO4** - Top Lens Opaque

**LB4** - Bottom Lens Metal Perf.

**LBA4** - Applied LUMENATE\* Bottom Lens

**CFL BALLAST OPTIONS**

**BDLI** - Dimming Ballast Lutron Internal

**BDAL** - Dimming Ballast Advance Internal

**BEI** - Emergency Ballast Internal

Project Name	Specifier Name & Location	Quantity
<input type="text"/>	<input type="text"/>	<input type="text"/>



Notes

Lumetta Inc., 33 Minnesota Ave., Warwick, RI 02888 t 401-691-3994 f 401-921-1310 [www.lumetta.com](http://www.lumetta.com)

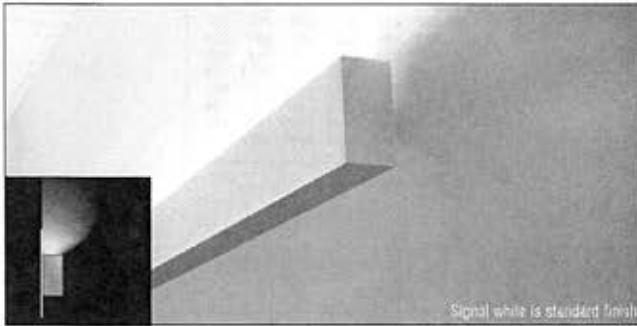
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LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE High Performance 2" Aperture (HP-2) - Wall Mount Indirect



Date

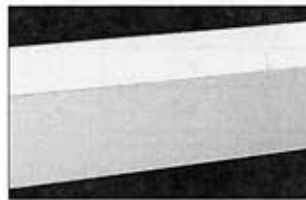
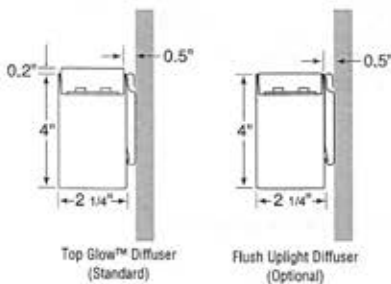
Project COLLEGE OF MARIN - BLDG 11

Type F2B

Comments

### DESCRIPTION

High Performance 2" Aperture Wall Mount Indirect (HP-2 WM-I) is a patented, linear LED luminaire with Flush and Top Glow™ options for the uplight. The micro shape delivers excellent performance using an advanced optical design and mid-power LEDs to achieve 90% of initial light output at 100,000 hours.



### SEAMLESS ILLUMINATION

Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination.

## Tailored Lighting

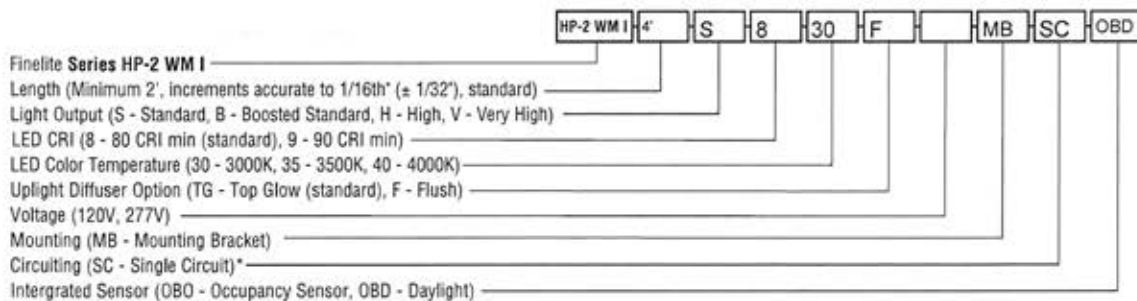
### 10 working days

### TAILORED LIGHTING

Any length greater than 2 feet, in increments down to 1/16th-inch (± 1/32") and 90-degree mitered corners in a single plane.

### ORDERING GUIDE

Sample Number: HP-2 WM I - 32' - S - 8 - 35 - TG - 120V - MB - SC - OBO



\* Contact factory for switching options.

Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732; D727,554 S; D727,550 S, D727,551 S

Finelite, Inc. • 30500 Whipple Road • Union City, CA 94587-1530 • 510 / 441-1100 • Fax: 510 / 441-1510 • www.finelite.com

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.

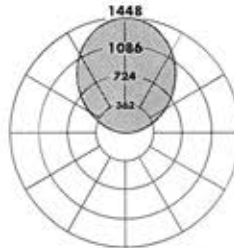


LED BUY AMERICAN ACT OF 2009 COMPLIANT

# FINELITE High Performance 2" Aperture (HP-2) - Wall Mount Indirect

## PHOTOMETRY

Very High Output - 4' Luminaire  
Efficacy: 102.2 lumens per watt  
Total luminaire output: 3749 lumens (937 lumens/foot)  
36.7 watts (9.2 watts/foot)  
Peak Candela Value: 1448 @ 180°  
CCT: 3500K  
ITL LM79 Report 85134



CANDIEPOWER SUMMARY						
	0.0	22.5	45	67.5	90	Flux
90	0	0	0	0	0	
95	72	73	73	72	72	80
105	245	243	240	236	237	254
115	439	436	433	424	422	427
125	651	644	642	633	632	573
135	868	856	859	849	846	660
145	1074	1061	1062	1056	1051	663
155	1249	1235	1241	1235	1229	570
165	1374	1366	1370	1367	1365	386
175	1439	1439	1439	1439	1439	136
180	1448	1448	1448	1448	1448	

Total Light Output, 3500K, 80 CRI (Lumens) - 4' Luminaire			
S*	B*	H*	V**
1535	1929	2916	3749

Lumen Adjustment Factors - 80 CRI	
3000K	0.985
3500K	1.000
4000K	1.032

Light Output, 3500K, 80 CRI (Lumens Per Foot)			
S*	B*	H*	V**
384	482	729	937

Lumen Adjustment Factors - 90 CRI	
3000K	0.746
3500K	0.760
4000K	0.789

Power (Watts Per Foot)			
S*	B*	H*	V**
3.6	4.6	7.0	9.2

Apply a lumen adjustment factor to calculate lumens for the desired CCT and CRI.

Efficacy, 3500K, 80 CRI (Lumens Per Watt)			
S*	B*	H*	V**
106.8	105.7	103.6	102.2

### SAMPLE LUMEN ADJUSTMENT CALCULATION

High Output (H), 4000K, 90 CRI  
Lumen Adjustment Factor = 0.789

$$\text{Total Light Output} = 2916 \text{ lm} \times 0.789 = 2301 \text{ lm}$$

$$\text{Total Light Output per Foot} = 729 \text{ lm/ft} \times 0.789 = 575 \text{ lm/ft}$$

$$\text{watts/foot} = 7.0 \text{ W/ft}$$

$$\text{Efficacy} = \frac{575 \frac{\text{lm}}{\text{ft}}}{7.0 \frac{\text{W}}{\text{ft}}} = 82.1 \text{ lm/W}$$

\* Family Correlation based on 4' luminaire 3500K Very High Output (V) test - 120V.  
\*\* Correlation based on ITL report: 85134  
S - Standard Output, B - Boosted Standard Output, H - High Output, V - Very High Output

Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732; D727,554 S; D727,550 S, D727,551 S

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



LED BUY AMERICAN ACT OF 2009 COMPLIANT

## FINELITE High Performance 2" Aperture (HP-2) - Wall Mount Indirect

### SPECIFICATIONS

**---CONSTRUCTION:** Precision-cut 6061-T6 extruded aluminum body. Internal joiner system, plug-together wiring, standard.

**ENDCAPS:** Flat diecast aluminum endcaps add 0.25" to each end of luminaire.

**MITERED CORNERS:** Illuminated 90° corners in a single plane with Top Glow™ and Flush uplight diffuser options. Custom angles are available (90° minimum on inside corners). Contact factory.

**REFLECTORS:** Die-formed 24-gauge cold-rolled steel reflectors are finished in 96 LG high reflectance matte white powder coat paint.

**UPLIGHT DIFFUSER:** 12" maximum lens length. Top Glow™ frost white lens standard, 73% transmissive, 99% diffusion. Internal secondary diffusers at corners ensure visually seamless, uniform, continuous illumination. Optional: Flush frost white snap-in lens, 73% transmissive, 99% diffusion.

**LIGHT OUTPUT:** Four lumen packages available, Standard Output (S), Boosted Standard Output (B), High Output (H), and Very High Output (V). A separate chart summarizes lumen distribution and wattage. Light engines are replaceable.

**LUMEN MAINTENANCE:** 90% of initial light output (L90) at 100,000+ hours; 70% of initial light output (L70) at 200,000+ hours.

**DRIVER:** Replaceable 120V/277V Constant Current Reduction dimming driver standard. Can be wired dimming or non-dimming. 0-10V dimming controls with a range of 10%-100%. Dimming to 1% available; consult factory. Driver is fully accessible from below the ceiling. Power Factor: 0.9. Total Harmonic Distortion (THD) <20%. Expected driver lifetime: 100,000 hours.

**LUTRON DRIVER OPTIONS:** Lut3W-3-wire, LutES-EcoSystem, Lut2W-2-wire.

**ELECTRICAL:** Optional emergency to generator/inverter wiring, internal generator transfer switch, nightlight wiring, step-dimming driver, backup battery. Factory-choice low-profile backup battery available. 8" minimum luminaire length for low profile battery pack. Backup batteries deliver 1400 lumens. Half of a 4' section will be illuminated in emergency mode.



**INTEGRATED SENSORS:** Integrated PIR (Passive Infrared) occupancy and/or daylight sensors available. Refer to Occupancy Sensor and Daylight Sensor tech sheets for more info.

**MOUNTING:** Luminaire hangs securely from mounting brackets fastened directly to the wall for easy installation. Luminaire stands 0.5" off the wall. The mounting bracket is concealed behind the luminaire.

**FINISHES:** Finelite Signal White powder coat standard. Optional Adders: 185 Tiger Drylac RAL colors.

**FEED:** Standard with one 18-gauge/5-conductor single-circuit feed. 14-gauge feed used when luminaire current exceeds 5 amps. Optional 6" flex conduit whips available.

**LENGTHS:** Any length, 2-foot minimum, in increments down to 1/16th-inch (± 1/32"). 12-foot maximum section length.

**LABELS:** Luminaire and electrical components are ETL-listed conforming to UL 1598 in the U.S.A. and CAN/CSA C22.2 No. 250.0 in Canada. In accordance with NEC Code 410.73 (G), this luminaire contains an internal driver disconnect. Damp Location. Finelite products use electronic components that are RoHS compliant, and the mechanical components of the luminaire have been verified to not knowingly contain any restricted substances listed per RoHS Directive 2002/95/EC.

**WEIGHT:** 2.3 lb/ft.

**WARRANTY:** 10-year performance-based warranty on all standard components. Optional accessories such as emergency battery packs are covered by their individual manufacturer warranties.

Protected by one or more US Patents: 8915613; D702,391; D702,390; D700,732; D727,554 S; D727,550 S, D727,551 S

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



### ECO-LIGHTBAR LED

#### Undercabinet Linear Lighting

##### FEATURES

- 24VDC, 120W/5 amp max
- Two color temperature options:
  - 2,700°K ±50°K, CRI 90
  - 3,000°K ±50°K, CRI 90
- 50,000 hours, 70% lumen maintenance
- MLV dimmable
- Available in three lengths: 12", 24", 36"
- Very low profile – only 5/16" high
- No UV or infrared energy – objects will not discolor or fade over time
- Linkable up to 120W
- Remote power supply
- UL/C-UL listed for damp location 

##### HOUSING / HEAT SINK

- Extruded aluminum housing
- Cool operating temperature

##### MOUNTING

- Standard mounting clips included. Other mounting options available

##### FINISHES

- SA Satin Aluminum
- BZ Bronze

##### Project Notes:

ELB



**ECO-LIGHTBAR**  
50,000-hour LED, 90 CRI  
MLV dimming

- ELB-12-XX-27 12", 6W, 2,700K\* ±50K, 500lm, 90CRI
  - ELB-12-XX-30 12", 6W, 3,000K\* ±50K, 500lm, 90CRI
  - ELB-24-XX-27 24", 12W, 2,700K\* ±50K, 1000lm, 90CRI
  - ELB-24-XX-30 24", 12W, 3,000K\* ±50K, 1000lm, 90CRI
  - ELB-36-XX-27 36", 18W, 2,700K\* ±50K, 1500lm, 90CRI
  - ELB-36-XX-30 36", 18W, 3,000K\* ±50K, 1500lm, 90CRI
- XX=two digit finish code (SA) Satin Aluminum or (BZ) Bronze

##### ACCESSORIES

- 72" Power Feed ELB-PWR-72
- 144" Power Feed ELB-PWR-144
- Mounting Clips- 45° Angle ELB-ANG-MTG
- Mounting Clips- Adjustable ELB-ADJ-MTG
- Mounting Clips- Standard (included) ELB-STN-MTG
- 3" Connector ELB-CON-3
- 6" Connector ELB-CON-6
- 12" Connector ELB-CON-12
- 24" Connector ELB-CON-24
- 36" Connector ELB-CON-36

##### DRIVERS

- 24VDC 20W Electronic Driver D133-E
- 24VDC 40W Electronic Driver D134-E
- 24VDC 60W Electronic Driver D135-E
- 24VDC 100W Electronic Driver D136-E
- 24VDC 150W Electronic Driver D137-E
- 24VDC 300W Electronic Driver D157-E



A Division of Troy-CSL

14508 Nelson Avenue City of Industry, CA 91744 Tel 626-336-4511 Fax 626-336-4266 www.csllighting.com

Rev 092416

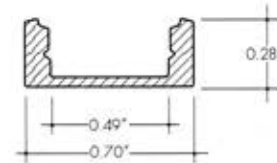
Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



### SlimLine 7 | Extruded aluminum profile



The SlimLine 7 linear aluminum extrusion has been designed to fit many LED lighting needs. Multiple mounting and lens options allow for great flexibility and adaptability for any application. Extrusion and diffuser lenses are also field cuttable. Substantial aluminum mass in profile provides excellent heat sink for high power LEDs. Mounting brackets and endcaps are available in multiple finishes and can be ordered separately (page 2). Linear connector available for extending extrusion runs. Protected by U.S. Patent No. US D649,680 S.



two SlimLine 7 runs and linear connector

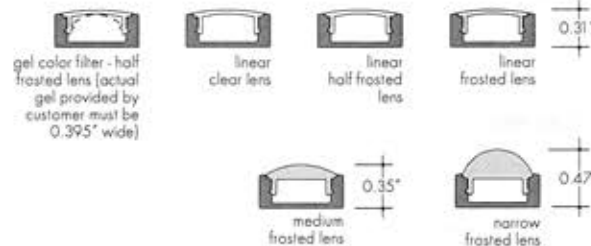
### Technical information

**Finish:** Silver anodized

**Diffuser lens:** polycarbonate, snap-in-place, UV resistant

**Mounting:** multiple mounting brackets (page 2)

	39	78	118
<b>Actual length</b>	39.40"	78.75"	118.19"
<b>Mounting brackets</b>	minimum 3	minimum 3	minimum 4
<b>Available lenses</b>	clear half frosted frosted medium narrow	clear half frosted frosted medium narrow	clear half frosted frosted medium narrow gel color



### Ordering code

MODEL	LENGTH	DIFFUSER	FINISH
SL7	36	C	SA
SL7 - Slimline 7	39 - 39.40" 78 - 78.75" 118 - 118.19"	C - Clear F - Frosted HF - 50% frosted M - Medium N - Narrow G - Gel color filter (view table above for length compatibility)	SA - Silver anodized



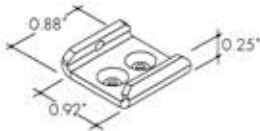
**SlimLine 7** | Extruded aluminum profile

All accessories sold separately.

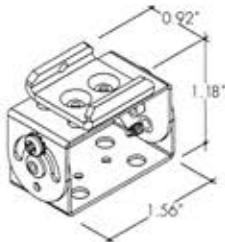
**Mounting brackets**



**MC-SL7-S**  
gray finish, snaps on/off



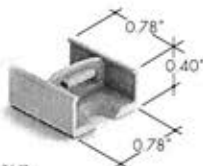
**MC-SL7-A**  
metal finish, secured with set screw



**MC-SL7-ADJ**  
metal finish, adjustable,  
secured with set screw



**MC-SL7-MAG**  
metal finish, magnetic mounting bracket



**LC-SL7**  
linear connector - gray finish

**End-caps**

**EC-SL7-H4** w/powerfeed opening



metal finish, linear lens only

**EC-SL7-M-H3**



**EC-SL7-M-H4** w/powerfeed opening

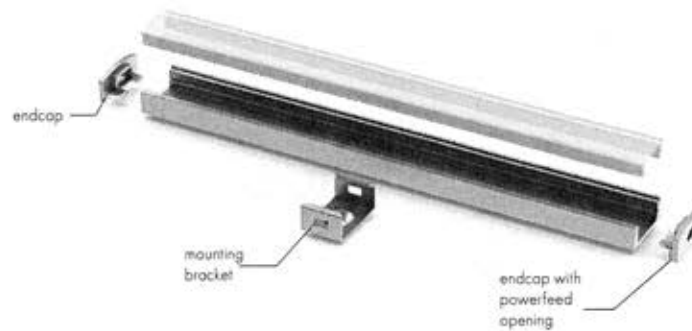
metal finish, medium lens only

**EC-SL7-N-H3**



**EC-SL7-N-H4** w/powerfeed opening

metal finish, narrow lens only







# College of Marin IVC Building 11 Luminaire Cut Sheets

Type: F11

PSV Series - 24V | Wet rated LED power supply



With high efficiency and universal AC input, the PSV series of class 2 power supplies are suitable for indoor & outdoor applications and ideal for use with LED lighting.

Cooling is achieved by free air convection.

**Input voltage**  
90 to 305 VAC

**Output voltage**  
24VDC

**Safety**  
UL 8750

**Dimming**  
0-10V (non dimming option available)

**Warranty**  
5 years



## Technical information

**Frequency**  
47-63Hz

**Power factor**  
>0.92

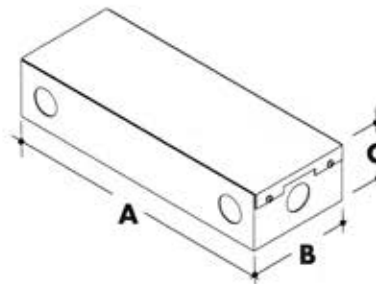
**Efficiency**  
>85%

**Load regulation accuracy**  
± 4%, Current accuracy ± 3%

**Start-up delay**  
100ms at worst case

**Ripple & Noise**  
<20% Peak-peak 20MHz Bandwidth

**Energy star**  
No-load power consumption less than the fixed type constant current 0.5W (at 120V input).



MODELS	PSV Dry Models	PSV Wet Models
<b>A Length</b>	9.2"	9.5"
<b>B Width</b>	3.4"	4.12"
<b>C Depth</b>	1.9"	2.3"

## Ordering code

MODEL	POWER	OUTPUT	DIMMING	LOCATION
PSV	40	24V	U2DIM	D
PSV - PSV Series	40 - 40 W 60 - 60 W 96 - 96 W	24V - 24 Volt	U2DIM - Dimming 0-10V U2ND - Non Dimming	D - Dry Location IP65 - Wet Location

REVO 6

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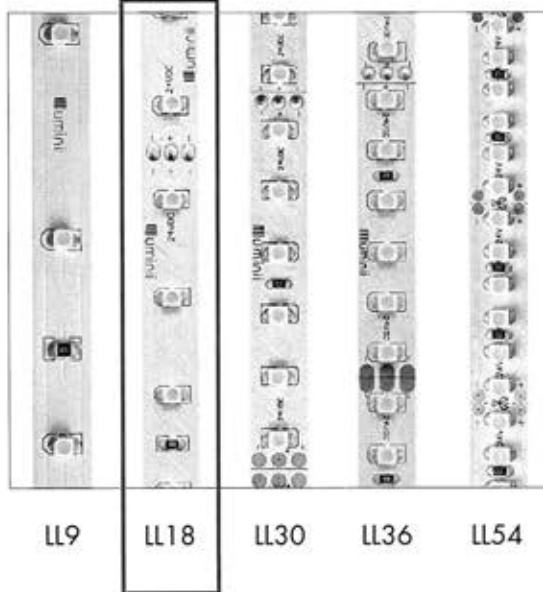
Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lampping, finishes, modifications and/or required accessories.

100% Construction Documents  
09/01/2017

17-1095



### LL Series | Linear LED strip - 24 VDC



Line LED LL series is a small profile high performance LED strip. The durable, but flexible products feature a heavier copper board core for better heat dissipation and even illumination over long runs.

Available in single row configurations ranging from 9 to 54 LEDs per foot with multiple power feed and connector options. Line LED LL series feature outstanding color consistency with single binning and CRI up to 98.

**Mounting**  
LED strip is equipped with 3M™ adhesive transfer tape (9472LE). The strip must be adhered to either a luminii aluminum profile or an unpainted aluminum surface. For other surfaces the HST Aluminum heat sink tape will be required to reach the rated 50,000 hours average life.

**Applications**  
Indoor only - above and below cabinets, cove lighting, counter accent, architectural reveals, under banister, display and book cases, etc.

**Approvals**  
Class 2 damp listed

**Operating voltage**  
24 VDC

**Average life**  
50,000 hours

**Warranty**  
5 years



**LM80**

### Technical information

MODEL	LL9	LL18	LL30	LL36	LL54
LEDS/ft	9	18	30	36	54
Light output 3000K	65 lum/ft	125 lum/ft	227 lum/ft	253 lum/ft	354 lum/ft
Average power consumption (for 15' section)	1.0 W/ft	1.5 W/ft	2.5 W/ft	3.0 W/ft	4.5 W/ft
Cutting increment	6.50"	4.00"	2.50"	2.00"	1.3"
Efficacy lum/watt	65	83	91	84	79
Maximum run length	100 ft	100 ft	48 ft	39 ft	26 ft
Dimensions	0.39" W 0.09" H	0.39" W 0.09" H	0.39" W 0.09" H	0.39" W 0.09" H	0.39" W 0.09" H

Color temperature	CCT INFO/LUMEN MULTIPLIER		TM-30-15	
	Multiplier <small>(Inferred from 3000K)</small>	CRI	R <sub>f</sub>	R <sub>g</sub>
2200K	0.87	82	81	99
2400K	0.73	98	95	101
2700K	0.81	98	95	102
2900K	0.86	97	95	102
3000K	1.00	91	90	101
3500K	1.05	95	90	97
4100K	1.28	93	88	96

### SECTION START/END OPTIONS

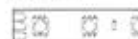
Female connector



Male connector



No connector



Soldered leads (72")



### Ordering code LL18-35K-XX-XX-XX

MODEL	COLOR TEMPERATURE	SECTION START	SECTION END	LENGTH
LL9	22K	F	M	
LL9	22K - 2200K	F - Female connector	F - Female connector	view table above for increment options and maximum run limits
LL18	24K - 2400K	M - Male connector	M - Male connector	
LL30	27K - 2700K	*SL - Soldered lead	*SL - Soldered lead	
LL36	29K - 2900K	wires (72")	wires (72")	
LL54	30K - 3000K	NC - No connector	*NC - No connector	
	35K - 3500K			
	41K - 4100K			

\*LL54 only available in this option



# College of Marin IVC Building 11 Luminaire Cut Sheets

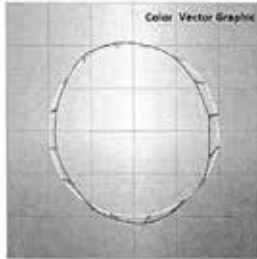
Type: F11

LL Series | Linear LED strip - 24 VDC



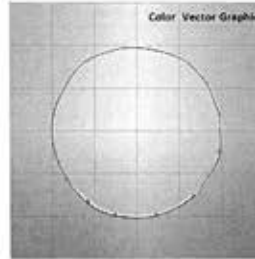
TM-30-15: Data

22K CCT



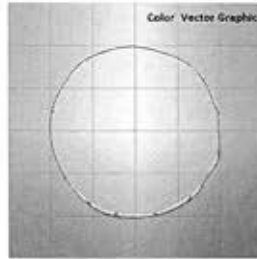
Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	79	-10%	0%
2	79	-8%	8%
3	70	-2%	14%
4	65	2%	8%
5	50	5%	5%
6	50	6%	-5%
7	84	-2%	8%
8	89	-4%	-4%
9	85	-6%	3%
10	78	4%	11%
11	77	2%	14%
12	79	4%	9%
13	88	8%	-7%
14	47	8%	-20%
15	84	0%	-33%
16	75	-7%	-14%

24K CCT



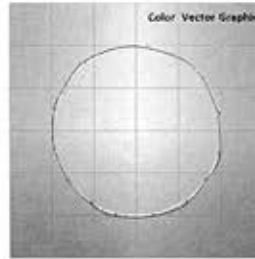
Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	67	-5%	0%
2	67	-1%	0%
3	67	0%	1%
4	65	-3%	-1%
5	66	-1%	2%
6	66	1%	3%
7	67	0%	1%
8	68	1%	0%
9	67	0%	2%
10	65	0%	1%
11	63	3%	4%
12	63	3%	1%
13	55	5%	-6%
14	62	2%	-1%
15	65	-1%	-1%
16	61	0%	-6%

27K CCT



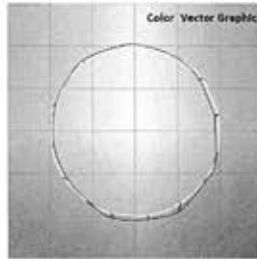
Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	67	-1%	0%
2	68	0%	0%
3	66	0%	1%
4	66	-2%	0%
5	66	0%	2%
6	60	2%	2%
7	66	1%	0%
8	64	1%	-1%
9	68	0%	1%
10	65	0%	3%
11	62	2%	5%
12	65	3%	1%
13	65	2%	-1%
14	65	3%	-3%
15	66	0%	-1%
16	65	1%	-6%

29K CCT



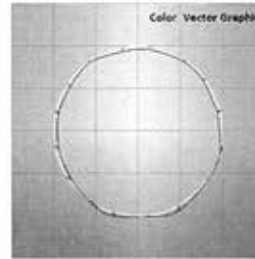
Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	79	-10%	0%
2	79	-8%	8%
3	70	-2%	14%
4	65	2%	8%
5	60	5%	5%
6	60	6%	-5%
7	84	-2%	8%
8	89	-4%	-4%
9	85	-6%	3%
10	78	4%	11%
11	77	2%	14%
12	79	4%	9%
13	88	8%	-7%
14	67	8%	-20%
15	84	0%	-33%
16	75	-7%	-14%

30K CCT



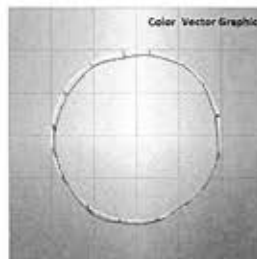
Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	60	-4%	-1%
2	61	-4%	3%
3	66	-1%	7%
4	61	1%	5%
5	62	2%	3%
6	69	8%	-1%
7	62	0%	-4%
8	65	-1%	-2%
9	64	-3%	1%
10	67	-2%	6%
11	64	0%	10%
12	68	6%	4%
13	62	4%	-1%
14	68	6%	-6%
15	69	1%	-7%
16	65	0%	-11%

35K CCT



Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	61	-4%	0%
2	63	-7%	0%
3	62	-2%	2%
4	62	-5%	1%
5	61	-5%	3%
6	66	-1%	1%
7	62	-4%	2%
8	67	-3%	2%
9	60	-4%	5%
10	63	-3%	10%
11	62	2%	10%
12	69	3%	4%
13	65	2%	-1%
14	60	5%	-4%
15	60	1%	-5%
16	68	0%	-6%

41K CCT



Hue Bin	R <sub>f</sub>	Graphic shifts (%)	
		Chroma	Hue
1	68	-4%	1%
2	63	-2%	1%
3	63	-2%	1%
4	69	-4%	-2%
5	68	-7%	-1%
6	63	-4%	0%
7	68	-7%	3%
8	67	-4%	6%
9	62	-3%	12%
10	79	0%	12%
11	63	5%	9%
12	61	4%	0%
13	68	3%	-6%
14	60	-1%	-3%
15	64	0%	-7%
16	68	-1%	-6%

REV 5.3

page 2 of 7

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.

100% Construction Documents  
09/01/2017

17-1095



# College of Marin IVC Building 11 Luminaire Cut Sheets

Type: F11

LL Series | Linear LED strip - 24 VDC



Power consumption per linear foot - loads tested with PSD series of power supplies [page 3]

Length of strip (LF)	LL9		LL18		LL30		LL36		LL54	
	W/ft	Total wattage	W/ft	Total wattage	W/ft	Total wattage	W/ft	Total wattage	W/ft	Total wattage
1	1.20	0.90	1.65	1.65	2.70	2.70	3.25	3.25	5.35	5.30
2	1.20	1.90	1.65	3.30	2.70	5.40	3.25	6.50	5.30	10.60
3	1.20	2.70	1.65	4.95	2.70	8.10	3.25	9.75	5.25	15.80
4	1.20	3.70	1.63	6.58	2.65	10.60	3.20	12.80	5.20	20.60
5	1.15	4.90	1.63	8.21	2.65	13.25	3.20	16.00	5.15	26.00
6	1.15	6.10	1.62	9.83	2.65	15.90	3.15	18.90	5.10	30.80
7	1.15	7.10	1.62	11.45	2.60	18.20	3.15	22.05	5.05	35.70
8	1.10	8.10	1.62	13.07	2.60	20.80	3.10	24.80	5.00	40.00
9	1.10	8.60	1.60	14.67	2.60	23.40	3.10	27.90	4.95	44.80
10	1.10	9.60	1.60	16.30	2.55	25.50	3.05	30.50	4.90	48.90
11	1.05	10.90	1.57	18.07	2.55	28.05	3.05	33.50	4.85	53.30
12	1.05	11.90	1.57	19.64	2.55	30.60	3.00	36.00	4.80	57.40
13	1.05	12.90	1.57	21.21	2.50	32.50	3.00	39.00	4.70	60.60
14	1.05	14.10	1.55	22.76	2.50	35.00	3.00	42.00	4.60	64.30
15	1.00	14.80	1.55	24.31	2.50	37.50	3.00	45.00	4.50	67.40
16	1.00	15.60	1.55	25.86	2.45	39.20	2.95	47.20	4.40	70.50
17	1.00	16.80	1.52	27.38	2.45	41.65	2.95	50.15	4.35	73.40
18	1.00	17.80	1.52	28.90	2.45	44.10	2.90	52.50	4.30	77.00
19	1.00	18.80	1.52	30.42	2.40	45.60	2.90	55.10	4.25	81.30
20	0.95	18.90	1.50	31.20	2.40	48.00	2.85	57.00	4.20	83.50
21	0.95	19.84	1.50	32.70	2.40	50.40	2.85	59.85	4.10	85.70
22	0.95	20.78	1.50	34.20	2.35	51.70	2.80	61.60	4.00	87.10
23	0.95	21.72	1.48	35.68	2.35	54.05	2.80	64.60	3.90	88.80
24	0.95	22.66	1.47	37.15	2.35	56.40	2.75	66.00	3.80	90.10
25	0.95	23.60	1.47	38.62	2.30	57.50	2.75	68.75	3.70	92.30
26	0.95	24.54	1.45	40.07	2.30	59.80	2.70	70.20	3.60	93.60
27	0.95	25.48	1.45	41.52	2.30	62.10	2.70	72.90		
28	0.95	26.42	1.43	42.20	2.25	63.00	2.65	74.20		
29	0.95	27.46	1.42	43.00	2.25	65.25	2.65	76.85		
30	0.95	28.30	1.40	43.70	2.25	67.50	2.60	78.00		
31	0.95	29.06	1.40	45.10	2.20	68.20	2.60	80.60		
32	0.95	29.82	1.38	46.50	2.20	70.40	2.55	81.60		
33	0.95	30.58	1.37	47.70	W	72.60	2.55	84.15		
34	0.95	31.34	1.37	49.00	2.15	73.10	2.50	85.00		
35	0.95	32.10	1.36	50.45	2.15	75.25	2.50	87.50		
36	0.95	32.86	1.36	51.70	2.15	77.40	2.45	88.20		
37	0.95	33.62	1.36	52.50	2.10	77.70	2.45	90.65		
38	0.95	34.38	1.36	53.00	2.10	79.80	2.40	91.20		
39	0.95	35.14	1.35	53.90	2.10	81.90	2.40	93.60		
40	0.90	35.90	1.35	54.40	2.05	82.00				
41	0.90	36.65	1.35	55.75	2.05	84.05				
42	0.90	37.40	1.34	57.09	2.05	86.10				
43	0.90	38.15	1.34	58.43	2.02	86.90				
44	0.90	38.90	1.33	59.76	2.00	88.00				
45	0.90	39.65	1.33	61.07	2.00	90.00				
46	0.90	40.40	1.32	61.97	1.96	90.20				
47	0.90	41.15	1.32	62.70	1.95	91.65				
48	0.90	41.90	1.31	63.50	1.95	93.60				
49	0.90	42.65	1.31	64.05						
50	0.90	43.40	1.30	64.80						
51-60	0.85	50.50	1.30-1.25	65.20-70.80						
61-70	0.80	56.20	1.25-1.20	71.00-76.20						
71-80	0.75	64.50	1.20-1.10	77.00-81.60						
81-90	0.72	65.50	1.10-1.00	82.00-86.20						
91-100	0.70	69.30	1.00-0.95	87.00-91.40						





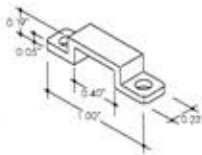
LL Series | Linear LED strip - 24 VDC



### Accessories

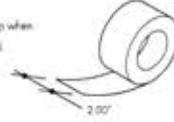
Mounting clip:  
recommended at every 12" when  
lineLED strip is facing down.

Part # CL-1



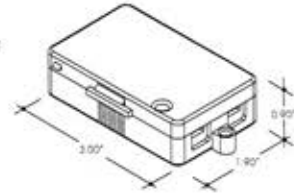
Heat sink tape:  
included with lineLED strip when  
no extrusions are ordered.

Part # HST



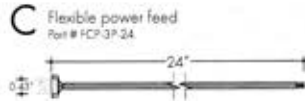
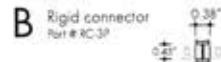
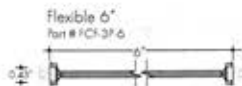
Splice Box:  
low voltage, 4 terminal  
splice box, black.

Part # LVSP-4T-8K

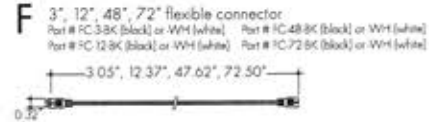
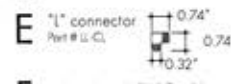
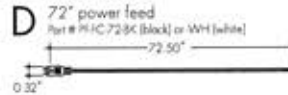


### Connectors

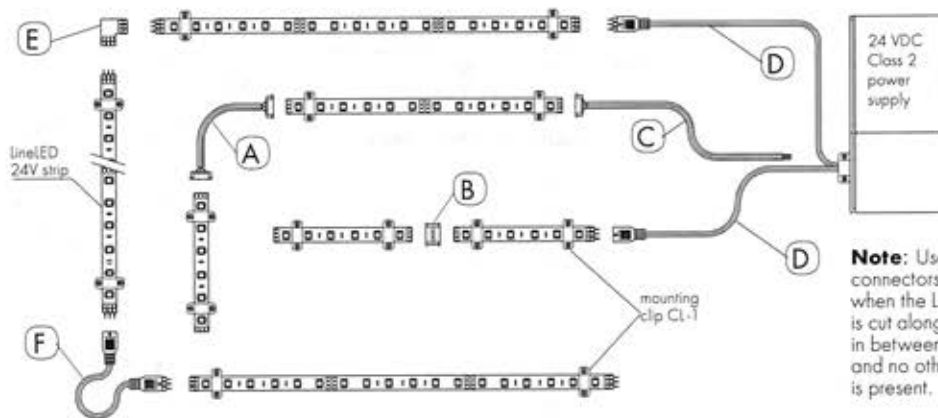
**Field-cut connectors** (will not work with LL54)



**3-pin connectors** (will not work with LL54)



### Sample layout with connectors





### LL Series | Linear LED strip - 24 VDC

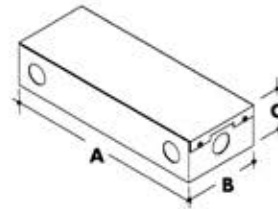
#### Power supply

See fixture and power supply instructions & spec sheet for wiring information. Dimming possible in select models - view Luminii website for list of compatible dimmers.

##### Non-Dimming:

MODEL	POWER	OUTPUT	DIMMING	LOCATION
<b>PSV</b>	<b>40</b>	<b>24V</b>	<b>U2ND</b>	<b>D</b>
PSV - PSV Series	40 - 40 W 60 - 60 W 96 - 96 W	24 - 24 VDC	U2ND - Non Dimming	D - Dry Location IP65 - Wet Location

MODELS	PSV Dry	PSV Wet
<b>A Length</b>	9.2"	9.5"
<b>B Width</b>	3.4"	4.12"
<b>C Depth</b>	1.9"	2.3"

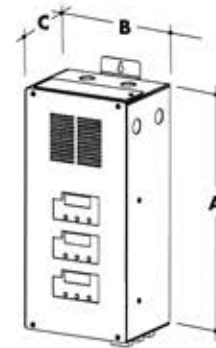


##### Dimming 0-10V:

MODEL	POWER	OUTPUT	DIMMING
<b>PS010V</b>	<b>3X100</b>	<b>24</b>	<b>LIN</b>
PS010V - 0-10V Power Supply dims down to 0%	3X100 - 3 X 100 WATT	24 - 24 VDC	LIN - Linear LOG - Logarithmic

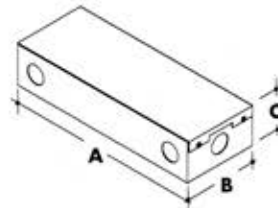
- features eldoLED's LINEARdrive configurable 0-10V drivers

MODELS	PSD010V
<b>A Length</b>	15.75"
<b>B Width</b>	6.60"
<b>C Depth</b>	4.80"



MODEL	POWER	OUTPUT	DIMMING	LOCATION
<b>PSV</b>	<b>40</b>	<b>24V</b>	<b>U2DIM</b>	<b>D</b>
PSV - PSV Series dims down to 5%	40 - 40 W 60 - 60 W 96 - 96 W	24 - 24 VDC	U2DIM - Dimming 0-10V	D - Dry Location IP65 - Wet Location

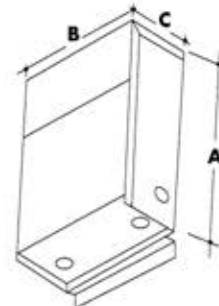
MODELS	PSV Dry	PSV Wet
<b>A Length</b>	9.2"	9.5"
<b>B Width</b>	3.4"	4.12"
<b>C Depth</b>	1.9"	2.3"



##### Dimming Magnetic low voltage:

MODEL	POWER	OUTPUT	INPUT
<b>PSD</b>	<b>48</b>	<b>24</b>	
PSD - PSD Series dims down to 0%	48 - 48 W 96 - 96 W 288 - 288 W (3x 96W)	24 - 24 VDC	Blank - 120 V 240 - 240 V 277 - 277 V

MODELS	PSD 48	PSD 96	PSD 288
<b>A Length</b>	11.25"	11.25"	13.06"
<b>B Width</b>	3.42"	3.42"	8.42"
<b>C Depth</b>	3.42"	3.27"	4.47"





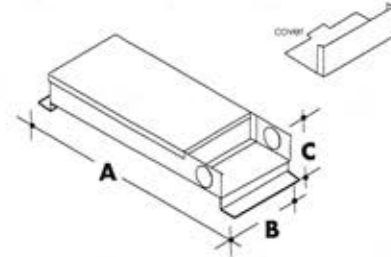
### LL Series | Linear LED strip - 24 VDC

#### Power supply

See fixture and power supply instructions & spec sheet for wiring information. Dimming possible in select models - view Luminii website for list of compatible dimmers.

#### Dimming Electronic low voltage:

MODEL	CIRCUIT x POWER	OUTPUT	INPUT
<b>CVE</b>	<b>48</b>	<b>24V</b>	
CVE - CVE Series dims down to 0.1%	48 - 40W 48X2D - 2 x 40W 48X3D - 3 x 40W 48X4D - 4 x 40W 96 - 96W 96X2D - 2 x 96W 96X3D - 3 x 96W 96X4D - 4 x 96W	24 - 24 VDC	Blank - 120 V 277 - 277 V



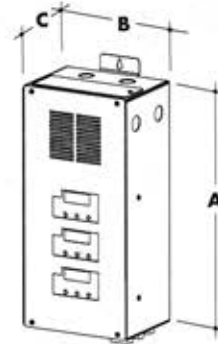
MODELS	Single circuit	Dual circuit	Three circuit	Four circuit
<b>A Length</b>	11.6"	11.5"	11.5"	11.5"
<b>B Width</b>	2.3"	4.0"	5.9"	7.75"
<b>C Depth</b>	1.3"	1.9"	1.9"	1.9"

#### DMX & DALI:

MODEL	POWER	OUTPUT
<b>PSDMX</b>	<b>3X100</b>	<b>24</b>
PSDMX - DMX Power Supply PSDALI - DALI Power Supply dims down to 0%	3X100 - 3 X 100 WATT	24 - 24 VDC

Features eldod's LINEARdrive configurable dimmable drivers.

MODELS	PSDMX	PSDALI
<b>A Length</b>	15.75"	15.75"
<b>B Width</b>	6.60"	6.60"
<b>C Depth</b>	4.80"	4.80"



Luminii is a Lutron OEM Advantage Partner

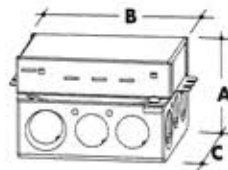
MODEL
<b>LTEA4U1UKL-CV240</b>

Lutron - Hi-lume™ 1% 2-wire LED driver (120V forward phase only)

MODELS	LTEA	L3DA
<b>A Length</b>	4.89"	4.89"
<b>B Width</b>	2.66"	2.66"
<b>C Depth</b>	4.00"	4.00"

MODEL
<b>L3DA4U1UKL-CV240</b>

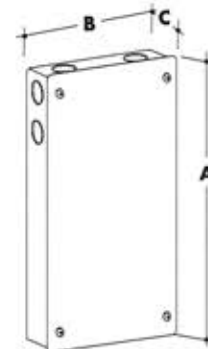
Hi-lume™ 1% EcoSystem Voltage LED Driver



MODEL
<b>L3D0-96W24V-U</b>

Hi-lume™ 0.1% EcoSystem Voltage LED Driver with Soft-On, Fade-to-Block™

MODELS	L3D0
<b>A Length</b>	10.50"
<b>B Width</b>	5.50"
<b>C Depth</b>	2.00"





### LL Series | Linear LED strip - 24 VDC

Optional mounting channels - lens type per channel / light transmission percentage per lens / dimensions

Lens options / light transmission percentage per lens

- Ⓒ Clear      Ⓗ Half (50%) frosted      Ⓐ Narrow
- Ⓕ Frosted      Ⓜ Medium beam frosted      Ⓑ Gel color filter suitable



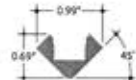
Ⓒ 76%  
Ⓕ 50%

Alu-Round



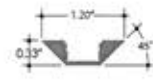
Ⓒ 70%  
Ⓕ 50%  
Ⓗ 61%

Alu-45



Ⓒ 79%  
Ⓕ 58%  
Ⓗ 69%

Alu-Corner



Ⓒ 85%  
Ⓕ 63%  
Ⓗ 75%  
Ⓜ 87%  
Ⓐ 84%  
Ⓑ 78%

Slim Line 7



Ⓒ 85%  
Ⓕ 63%  
Ⓗ 75%  
Ⓜ 87%  
Ⓐ 84%

Recessed Slim Line 7



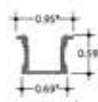
Ⓒ 63%  
Ⓕ 43%  
Ⓗ 54%  
Ⓜ 65%  
Ⓐ 60%  
Ⓑ 54%

Slim Line 15



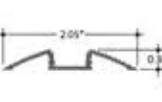
Ⓒ 63%  
Ⓕ 43%  
Ⓗ 54%  
Ⓜ 65%  
Ⓐ 60%

Recessed Slim Line 15



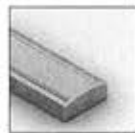
Ⓒ 85%  
Ⓕ 63%  
Ⓗ 75%  
Ⓜ 87%

Alu-Flat



Ⓒ 47%  
Ⓕ 44%

Alu-Wall



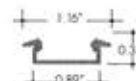
Ⓒ 85%  
Ⓕ 60%  
Ⓗ 71%

Slim Wide 8



Ⓒ 85%  
Ⓕ 60%  
Ⓗ 71%

Recessed Slim Wide 8



Ⓒ 69%  
Ⓕ 44%  
Ⓗ 55%

Slim Wide 15



Ⓕ 34%

Alu-Stair



Ⓕ 34%

Alu-Stair-Carpet



Alu-Edge



### Installation

All mounting channels are field cuttable using miter saw with circular blade suitable for cutting aluminum.

### Ordering

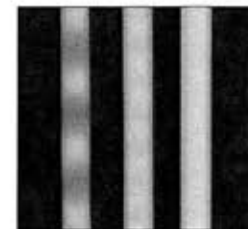
Extrusions are sold separately. View respective specsheets for details on ordering extrusions and their accessories (endcaps, mounting brackets, etc).

### LED Dotting per extrusion

using the frosted lens option

extrusion	LED Models				
	LL9	LL18	LL30	LL36	LL54
SL7, RSL7, ALU-FLAT	CD	CD	CD	CD	SD
ALU-CORNER	CD	CD	CD	CD	SD
SLWB, RSLWB	CD	CD	CD	CD	SD
ALU-45	CD	CD	SD	SD	ND
ALU-WALL	CD	CD	SD	ND	ND
ALU-STAIR	CD	CD	ND	ND	ND
ALU-ROUND	CD	SD	ND	ND	ND
SL15, RSL15	CD	SD	ND	ND	ND
SLW15	CD	SD	ND	ND	ND

CD = Clear Dotting  
SD = Slight Dotting  
ND = No Dotting



Clear Dotting    Slight Dotting    NO Dotting





### FEATURES & SPECIFICATIONS

**INTENDED USE** — Suitable for applications requiring attractive edge-lit exit signage, universal installation and low energy consumption.

**CONSTRUCTION** — Extruded brushed aluminum finish.

Clear acrylic panels- letters measure 6" high with 3/4" stroke, with 100 ft viewing distance rating, based upon UL 924 standard.

For single-face clear panels, EXIT is seen as a reversed image from the back.

**OPTICS** — LEDs mounted on printed circuit board. The typical life of the exit LED lamp is 10 years.

The LED operating frequency is 120Hz.

**ELECTRICAL** — Dual voltage input capacity (120/277V).

**Battery**: (EL Option) — Sealed, maintenance free nickel-cadmium battery delivers 90 minutes capacity to emergency lamps. Test switch provides manual activation of 30-second diagnostic testing for on-demand visual inspection.

Self-diagnostic testing (EL Option Only) for 30 seconds every 30 days and 90 minutes annually. Diagnostic evaluation of LED light source, AC to DC transfer, charging and battery condition.

**INSTALLATION** — EDG — Universal surface (top, end or back) mounting. Canopy provided.

EDGR — Recessed mounting. Bar hanger and brackets provided for both new or restricted ceiling access installation applications. Back wall mount (WM) option.

Universal directional indicators. Field selected and attached.

**LISTINGS** — UL damp location listed 32°-122°F (0°-50°C) standard. Meets UL924, NFPA 101 (current Life Safety Code), NEC and OSHA illumination standards.

**WARRANTY** — 3-year limited warranty. Complete warranty terms located at [www.aculitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.aculitybrands.com/CustomerResources/Terms_and_conditions.aspx)

**NOTE**: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25°C.

Specifications subject to change without notice.

Catalog Number
Notes
Type



EDG (surface mount)



EDGR (recessed mount)

LED Edge-Lit Exits

# EDG EDGR

LED Lamps



#### Specifications

EDG (End Mount)	EDG (Top Mount)
Length: 13-5/8 (34.6)	Length: 13 (33.0)
Depth: 5-1/2 (14.0)	Depth: 4-5/16 (11.0)
Height: 11-1/8 (28.3)	Height: 11-3/4 (29.8)
Shipping Weight: 4 lbs (1.8 kgs)	Shipping Weight: 4 lbs (1.8 kgs)
EDG (Back Mount)	EDGR
Length: 13 (33.0)	Length: 13 (33.0)
Depth: 3 (7.6)	Depth: 1-3/4 (4.4)
Height: 11-1/8 (28.3)	Height: 8 (20.3)
Shipping Weight: 4 lbs (1.8 kgs)	Shipping Weight: 6.8 lbs (3.1 kgs)
	Shipping Weight (WM option): 8.1 lbs (3.7 kgs)

All dimensions are inches (centimeters) unless otherwise noted.

#### ORDERING INFORMATION

For shortest lead times, configure products using **bolded options**.

Example: EDG 1 R EL

Family	Housing color	Number of faces	Letter color	Operations	Options
EDG Surface mount LED edge-lit exit	(blank) Brushed aluminum	1 Single face	R Red on clear (single face only) <sup>1</sup>	(blank) AC only	(blank) None
EDGR Recessed LED edge-lit exit	W White	2 Double face	G Green on clear (single face only) <sup>1</sup>	EL Nickel-cadmium battery	WM Recessed wall mount <sup>6</sup>
			RMR Red on mirror <sup>2</sup>	X2 Lamp wired on two separate AC circuits (specify 120V or 277V) <sup>4</sup>	
			GMR Green on mirror <sup>2</sup>	SD Self-diagnostics <sup>5</sup>	
			RW Red on white <sup>2</sup>		
			GW Green on white <sup>2</sup>		

#### Accessories: Order as separate item.

ELA US12	12" stem kit with brushed aluminum canopy <sup>7</sup>
ELA W US12	12" stem kit with white canopy <sup>7</sup>

#### Notes

- For single-face clear panels, EXIT is seen as a reversed image from the back.
- Available with single and double face.
- White panel standard for double and single face.
- Not available with EL and SD options. Both circuits can be energized at the same time.
- Available with EL option only.
- Available on EDGR single face only.
- See spec sheet ELA-StemKits. Only available for EDG.

EMERGENCY

EDG-EDGR

Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamping, finishes, modifications and/or required accessories.



EDG-EDGR LED, Surface and Recessed Mount Edge-Lit Exits

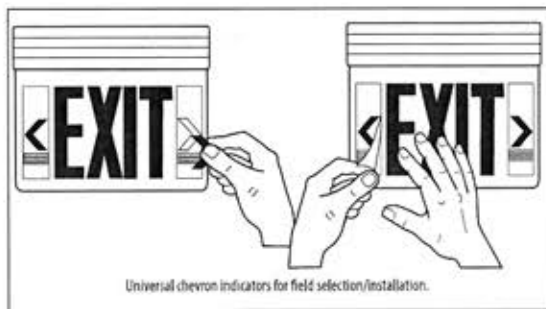
SPECIFICATIONS

ELECTRICAL						
Primary Circuit						
Type	Typical LED life <sup>1</sup>	Supply voltage	EDG		EDGR	
			Input Watts	Max amps.	Input Watts	Max amps.
Red LED AC only	10 years	120	2.5	0.020	3.8	0.030
		277	2.8	0.010	4.5	0.014
Green LED AC only	10 years	120	2.2	0.020	3.8	0.030
		277	2.2	0.010	4.5	0.020
Red LED emergency	10 years	120	3.0	0.030	3.8	0.031
		277	3.1	0.010	4.5	0.015
Green LED emergency	10 years	120	2.6	0.020	3.8	0.031
		277	2.8	0.010	4.5	0.020

BATTERY (EL option)			
Sealed Nickel-Cadmium			
Shelf life <sup>2</sup>	Typical life <sup>2</sup>	Maintenance <sup>3</sup>	Optimum temperature <sup>4</sup>
3 years	7-9 years	none	32-122°F (0-50°C)

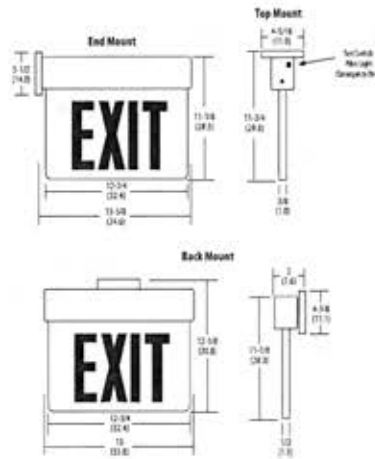
- Notes
- Based on continuous operation. The typical life of the exit LED lamp is 10 years.
  - At 77°F (25°C).
  - All life safety equipment, including emergency lighting for path of egress must be maintained, serviced, and tested in accordance with all National Fire Protection Association (NFPA) and local codes. Failure to perform the required maintenance, service, or testing could jeopardize the safety of occupants and will void all warranties.
  - Optimum ambient temperature range where unit will provide capacity for 90 minutes. Higher and lower temperatures affect life and capacity.

KEY FEATURES

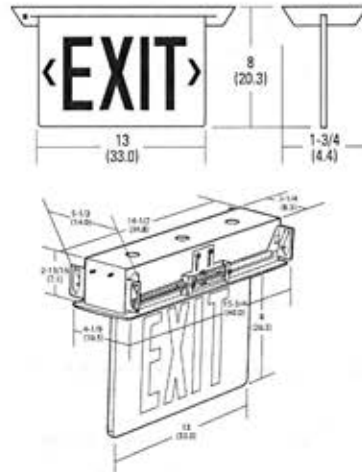


MOUNTING

EDG



EDGR



EDGR WM option



EDG-EDGR

EMERGENCY: One Lithonia Way Conyers, GA 30012 Phone: 800-334-8694 www.lithonia.com

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Refer to Luminaire Schedule for manufacturer's catalog ordering code, required lamplng, finishes, modifications and/or required accessories.

PLUMBING FIXTURE CUTSHEETS

**P1A**

3351.101  
ZZ6000AVWS1DF  
K4666-SC-0

AMERICAN STANDARD  
ZURN  
KOHLER

**P-1A**

AMERICAN STANDARD 1.1/1.6 GPF ELONGATED BOWL TOP SPUD WHITE  
1.6 / 1.1 DF AQUA EXP CLST FV  
ELONGATED OPEN FRONT NO-LID SEAT SELF SUS WHITE



# AFWALL® MILLENNIUM™ FloWise® ELONGATED FLUSHOMETER TOILET

VITREOUS CHINA with EVERCLEAN®

BARRIER FREE

## AFWALL® MILLENNIUM™ FloWise® ELONGATED FLUSHOMETER TOILET with EVERCLEAN®

- Wall-mounted flushometer valve toilet
- Vitreous china
- High Efficiency, Low Consumption. Operates in the range of 1.1 gpf to 1.6 gpf (4.2 Lpf to 6.0 Lpf)
- Meets definition of HET (High Efficiency Toilet) when used with a high efficiency flush valve (1.1 gpf - 1.6 gpf or 1.28/1.1 gpf dual flush)
- Maximum Performance (MaP) score of 1,000 grams at 1.1 gpf - 1.6 gpf
- Permanent EverClean® antimicrobial surface inhibits the growth of stain- and odor-causing bacteria, mold, and mildew on the surface
- Condensation channel
- Concealed trapway design
- Elongated bowl
- Powerful direct-fed siphon jet action
- 1-1/2" inlet spud
- Fully-glazed 2-1/8" trapway
- 10" x 12" water surface area
- Static weight load of 1,000 lbs.\*
- 100% factory flush tested

- 3351.101** Elongated bowl only, top spud
- 3352.101** Elongated bowl only, top spud with slotted rim for bedpan holding
- 3353.101** Elongated bowl only, back spud
- 3354.101** Elongated bowl only, back spud with slotted rim for bedpan holding

### System MaP\* Score:

- 1,000 grams of miso @ 1.1 gpf to 1.6 gpf when used with an American Standard flush valve

\* Maximum Performance (MaP) testing performed by IAPMO R&T Lab. MaP Report conducted by Veritec Consulting, Inc. and Koeller and Company.

### Component Parts:

- 047007-0070A** Inlet Spud (furnished with bowl)

### Nominal Dimensions:

660 x 356 x 381mm  
(26" x 14" x 15")

Recommended working pressure—between 25 psi at valve when flushing and 80 psi static

Fixture only, less seat, bolt caps, and flushometer valve

### Compliance Certifications -

#### Meets or Exceeds the Following Specifications:

- ASME A112.19.2/CSA B45.1 for Vitreous China Fixtures

\* This product is not recommended for bariatric use.



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

### To Be Specified:

- Color:  White
- Seat:
  - American Standard #5901.100 Heavy duty open front less cover
  - American Standard #5905.100 Extra heavy duty open front less cover
- Flushometer Valve:
  - 1.6 gpf:
    - Sensor-Operated: American Standard Selectronic® DC Power #6065.161.002 (Top Spud)  
AC Power #6067.161.002 (Top Spud)
    - Manual: American Standard #6047.161.002 (Top Spud)
  - 1.28 gpf:
    - Sensor-Operated: American Standard Selectronic® DC Power #6065.121.002 (Top Spud)  
AC Power #6067.121.002 (Top Spud)
    - Manual: American Standard #6047.121.002 (Top Spud)
  - 1.6 / 1.1 gpf Dual Flush:
    - Sensor-Operated: American Standard Selectronic® DC Power #6065.761.002 (Top Spud)  
AC Power #6067.761.002 (Top Spud)
  - 1.28 / 1.1 gpf Dual Flush:
    - Sensor-Operated: American Standard Selectronic® DC Power #6065.721.002 (Top Spud)  
AC Power #6067.721.002 (Top Spud)



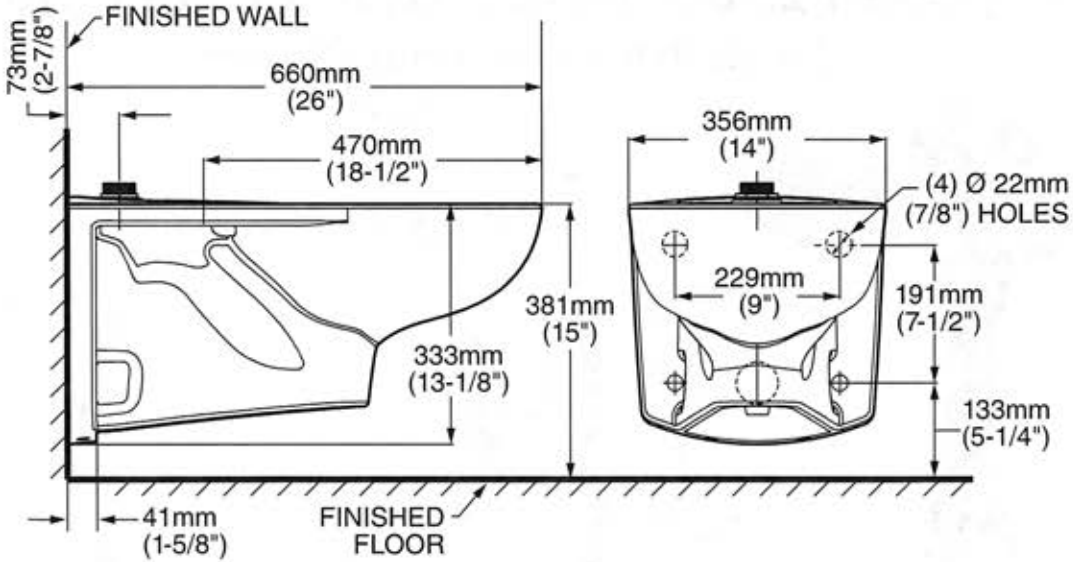
MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE BUILDING FACILITIES - CHECK LOCAL CODES.

- When installed so top of seat is 432 to 483mm (17" to 19") from the finished floor.

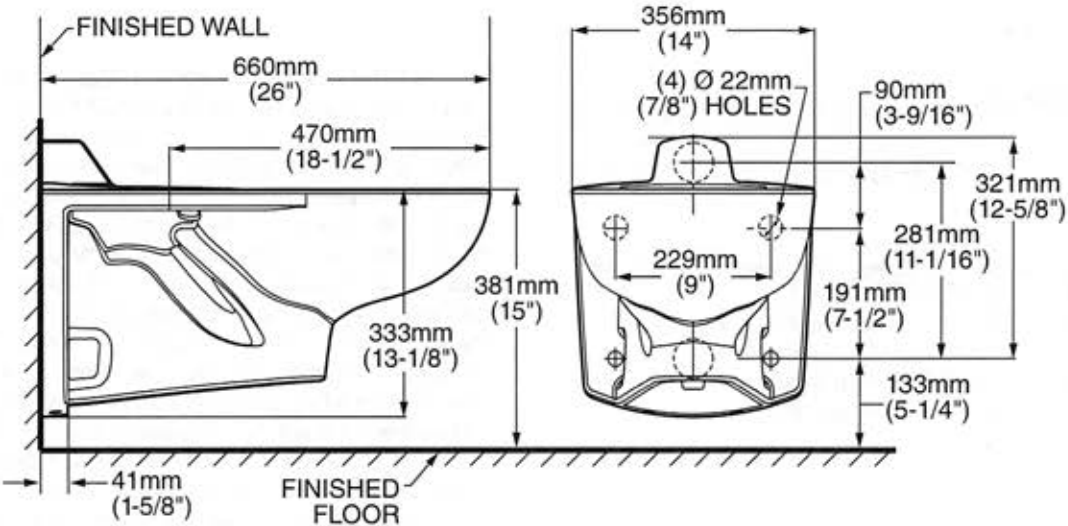
EVERCLEAN®  
Surface



3351.101/3352.101



3353.101/3354.101



**NOTES:**

● Toilet designed to meet ADA accessibility standards when top of seat height set at 432 to 483mm (17" to 19") from finished floor.

PRODUCT 3351 AND 3353 SHOWN, 3352 AND 3354 SAME EXCEPT WITH SLOTTED RIM FOR BED PAN HOLDING.

**WASTE OUTLET SEAL RING MUST BE NEOPRENE OR GRAPHITE-FELT (WAX RING NOT RECOMMENDED).**

SUGGESTED 2mm (1/16") CLEARANCE BETWEEN FACE OF WALL AND BACK OF BOWL.

TO COMPLY WITH AREA CODE GOVERNING THE HEIGHT OF VACUUM BREAKER ON THE FLUSHOMETER VALVE, THE PLUMBER MUST VERIFY DIMENSIONS SHOWN FOR SUPPLY ROUGHING.

FLUSHOMETER VALVE NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY.

CARRIER FITTING AS REQUIRED TO BE FURNISHED BY OTHERS.

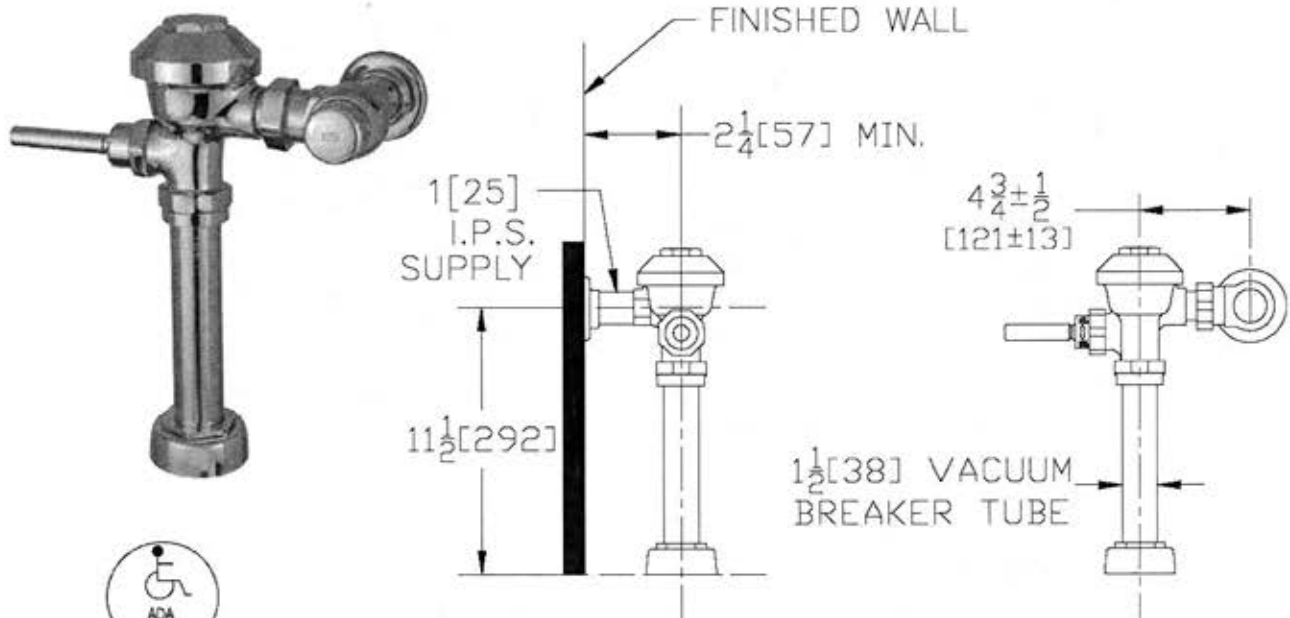
PROVIDE SUITABLE REINFORCEMENT FOR ALL WALL SUPPORT.

**IMPORTANT:** Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages



AquaVantage® AV Model  
TAG \_\_\_\_\_

## Exposed Z6000AV-DF Dual Flush Model Flush Valve For Water Closets



**Flow Options**

<input checked="" type="checkbox"/>	-WS1	Low Consumption Flush (1.6/1.1)
<input type="checkbox"/>	-FF	Full Flush (4.5/3.2)
<input type="checkbox"/>		Standard Flush (3.5/2.5)

**Suffix Options (Check/Specify Appropriate Options)**

_____	-BG	BioCare ADA Handle
_____	-H	Handle on Front of Flush Valve
_____	-YJ	Split Ring Pipe Support
_____	-YK	Solid Ring Pipe Support
_____	-YO	Bumper on Angle Stop
_____		Other

**ENGINEERING SPECIFICATION: ZURN Z6000AV-DF Dual Flush AquaVantage® 'AV' Exposed Closet Flush Valve -** Exposed, quiet diaphragm-type, chrome plated flushometer valve with a polished exterior. The valve is ADA compliant with a non-hold open and no leak dual flush handle feature. Lifting the handle up initiates a reduced flush of 30% for the evacuation of liquid waste. Pushing the handle down actuates a full flush for solid waste. A wall plate is furnished with graphics and instructions for user operations. The valve incorporates the AquaVantage® TPE, chloramine resistant, dual seal diaphragm with a clog resistant, triple filtered by-pass. The valve also includes a high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. The control stop has internal siphon-guard protection, vandal resistant stop cap, sweat solder kit, and a cast wall flange with set screw. All seals and gaskets are made of chloramine resistant materials.



www.GreenSpec.com

This space is for Architectural/Engineering Approval

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ZURN INDUSTRIES, LLC. ♦ COMMERCIAL BRASS OPERATION ♦ 5900 ELWIN BUCHANAN DRIVE ♦ SANFORD NC 27330  
Phone: 1-800-997-3876 ♦ Fax: 919-775-3541 ♦ World Wide Web: www.zurn.com  
In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905-405-8272 Fax: 905-405-1292

AquaVantage® is a registered trademark of Zurn Industries, LLC

Rev. C  
Dwg. No. 81204

Date: 12/21/09  
Product No. Z6000AV-DF

### COMMERCIAL TOILET SEAT

# K-4666/67, K-4670-72, K-4679-81

#### FEATURES

- Elongated or round front
- Solid plastic
- Open or closed front
- Without cover
- With check hinge
- Includes an anti-microbial agent formed into the plastic which inhibits the growth of bacteria and germs on the toilet seat (-A)
- 2" toilet seat makes the following toilet installations ADA compliant where the toilet has a rim-to-floor height of 15" to 17" (K-3546, K-4329, K-4330, K-4386 and K-4396)



#### CODES/STANDARDS APPLICABLE

Specified model meets or exceeds the following:

- None applicable

#### COLORS/FINISHES

- 0 White
- Other Refer to Fixtures Price Book for additional colors

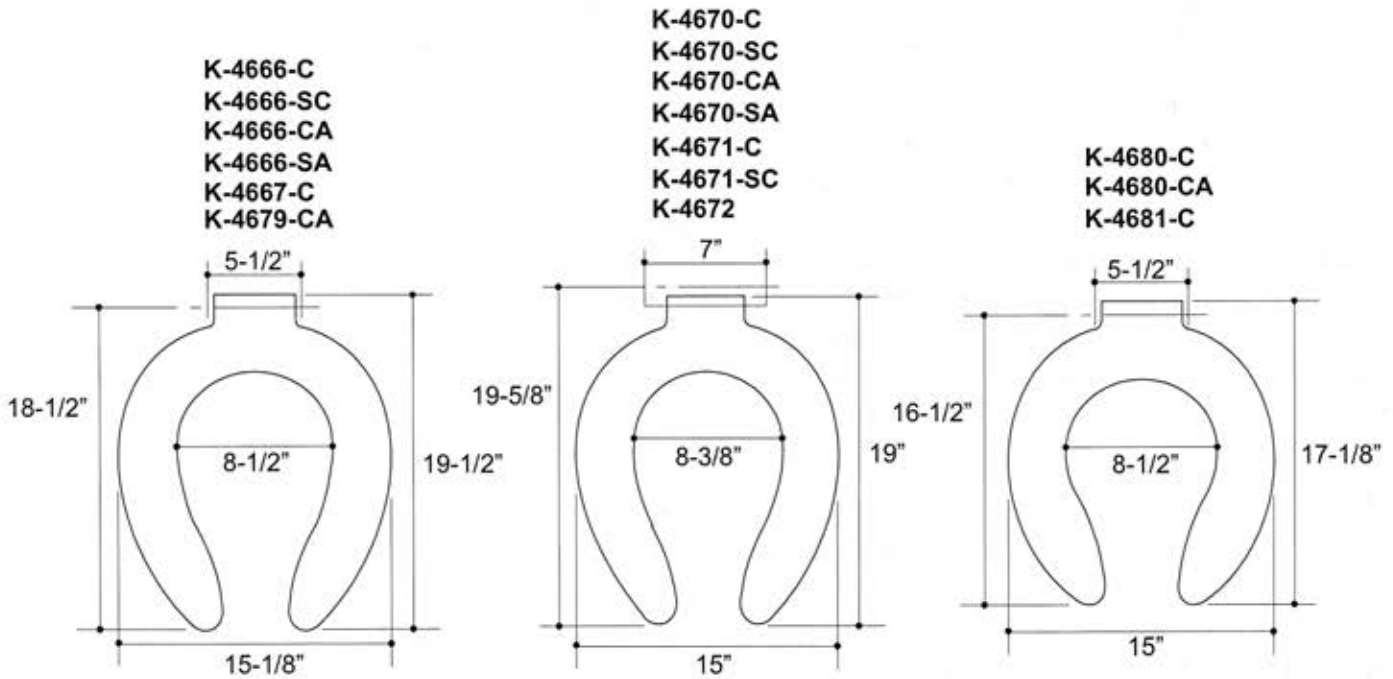
#### SPECIFIED MODEL:

Model	Description	Colors/Finishes
K-4666-C	Extra heavy elongated open front seat with check hinge, less cover	<input type="checkbox"/> 0 White
K-4666-SC	Same as K-4666-C except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4666-CA	Same as K-4666-C except with anti-microbial agent toilet seat	<input type="checkbox"/> 0 White
K-4666-SA	Same as K-4666-CA except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4667-C	Extra heavy elongated open front seat with check hinge, less cover	<input type="checkbox"/> Other _____
K-4670-C	Elongated open front seat with check hinge, less cover	<input type="checkbox"/> 0 White <input type="checkbox"/> Other _____
K-4670-SC	Same as K-4670-C except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4670-CA	Same as K-4670-C except with anti-microbial agent toilet seat	<input type="checkbox"/> 0 White
K-4670-SA	Same as K-4670-CA except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4671-C	Elongated open front seat with check hinge, less cover	<input type="checkbox"/> Other _____
K-4671-SC	Same as K-4671-C except with self-sustaining check hinge	<input type="checkbox"/> Other _____
K-4672	Elongated open front seat with self-raising hinge, less cover	<input type="checkbox"/> 0 White
K-4679-CA	Same as K-4670-C except with anti-microbial agent toilet seat and 1" high bumpers	<input type="checkbox"/> 0 White
K-4680-C	Round open front seat with check hinge, less cover	<input type="checkbox"/> 0 White
K-4680-CA	Same as K-4680-C except with anti-microbial agent toilet seat	<input type="checkbox"/> 0 White
K-4681-C	Round open front seat with check hinge, less cover	<input type="checkbox"/> Other _____

#### PRODUCT SPECIFICATION:

The toilet seat shall be elongated or round front. Toilet seat shall be made of solid plastic. Toilet seat shall be open or closed front. Toilet seat shall be without cover. Toilet seat shall have check hinge. Toilet seat shall have anti-microbial agent which inhibits the growth of bacteria and germs (-A). Toilet seat 2" height makes the following toilet installations ADA compliant where the toilet has a rim-to-floor height of 15" to 17" (K-3546, K-4329, K-4330, K-4386 and K-4396). Toilet seat shall be Kohler Model K-\_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_.





K-4666-C  
 K-4666-SC  
 K-4666-CA  
 K-4666-SA  
 K-4667-C  
 K-4679-CA

K-4670-C  
 K-4670-SC  
 K-4670-CA  
 K-4670-SA  
 K-4671-C  
 K-4671-SC  
 K-4672

K-4680-C  
 K-4680-CA  
 K-4681-C

**PRODUCT DIAGRAM**

**P1B**

3461.576  
ZZ6000AVWS1DF  
K4666-SC-0  
PFWRWHWB

AMERICAN STANDARD  
ZURN  
KOHLER  
PROFLO

**P-1B**

AMERICAN STANDARD 1.1/1.6 GPF ELONGATED BOWL TOP SPUD WHITE  
1.6 / 1.1 DF AQUA EXP CLST FV  
ELONGATED OPEN FRONT NO-LID SEAT SELF SUS WHITE WAX RING W/  
HORN & BOLT KIT



# MADERA™ FloWise® 16-1/2" HEIGHT 1.6/1.1 GPF DUAL FLUSH TOILET SYSTEM

with EVERCLEAN®  
SELECTRONIC® FLUSH VALVE



## MADERA™ FloWise® 16-1/2" HEIGHT 1.6/1.1 GPF DUAL FLUSH TOILET SYSTEM with EVERCLEAN®

- ❑ 3461.576 16-1/2" Height Top Spud Bowl and Selectronic® Flush Valve

### BOWL:

- Floor mount elongated flushometer valve toilet
- Vitreous china
- High Efficiency. Operates in the range of 1.1 gpf to 1.6 gpf (4.2 Lpf to 6.0 Lpf)
- Permanent EverClean® surface inhibits the growth of stain- and odor-causing bacteria, mold, and mildew on the surface
- 10" or 12" rough-in
- 16-1/2" rim height for accessible application
- Condensation channel
- Powerful direct-fed siphon jet action
- Fully glazed 2-1/8" trapway
- 10" x 12" water surface area
- 1-1/2" inlet spud
- 100% factory flush tested
- Less toilet seat
- Model 3461.001

### SELECTRONIC® FLUSH VALVE:

- Light flush (1.1 gpf) if user is in detection zone for less than 60 seconds
- Standard flush (1.6 gpf) if user is in detection zone for 60 seconds or more
- Factory-Installed CR-P2 Lithium Battery
- Self-Cleaning Piston with integral wiper spring significantly reduces clogging and maintenance
- Selectronic® Proximity System with universal sensor provides hygienic, "hands free" operation
- State-of-the-Art Electronics prevent ghost flushing
- Dezincification Resistant semi-red brass alloy
- Fully Mechanical Manual Override Button can flush the valve without power
- Fail-Safe: Valve automatically closes upon loss of power or water pressure and does not need to be reset
- Adjustable Sanitary Flush cleans the fixture & maintains the trap seal.
- Chemical Resistant EPDM Seals for extended life
- Adjustable Tailpiece for rough-in flexibility
- Can be installed left or right handed
- Model 6065.761

### Includes:

- 047007-0070A Inlet Spud (furnished with bowl)
- 481310-100 2 Bolt caps with retainers (furnished with bowl)
- 1" I.P.S. angle stop with back-flow protection and vandal resistant cap
- 1" Sweat solder kit including cover tube and wall flange
- 1-1/2" High back pressure vacuum breaker, spud coupling and flange



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

### High-Efficiency Toilet Systems:

- 20.8% water savings when compared to a 1.6 gpf toilet system

### System MaP\* Score:

- 1,000 grams of miso @ 1.1 and 1.6 gpf

\* Maximum Performance (MaP) testing performed by IAPMO R&T Lab. MaP Report conducted by Veritec Consulting, Inc. and Koeller and Company.

### Battery Life:

- 4 years @ 4,000 flushes per month

### Operating Pressure:

25 psi (flowing) - 80 psi (static)

### Flow Requirement:

25gpm (94.6 L/min.)

### Nominal Fixture Dimensions:

718 x 356 x 419mm (28-1/4" x 14" x 16-1/2")

### To Be Specified:

- ❑ Color:  White
- ❑ Seat:
  - ❑ American Standard #5901.100 Heavy duty open front less cover
  - ❑ American Standard #5905.100 Extra heavy duty open front less cover

EVERCLEAN®  
Surface



# MADERA™ FloWise® 16-1/2" HEIGHT 1.6/1.1 GPF DUAL FLUSH TOILET SYSTEM

with EVERCLEAN®

SELECTRONIC® FLUSH VALVE

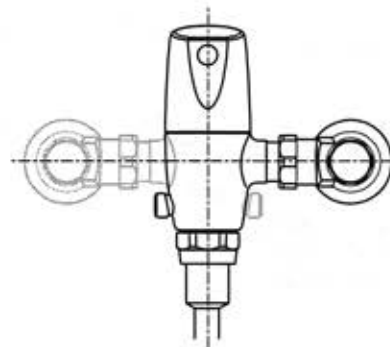
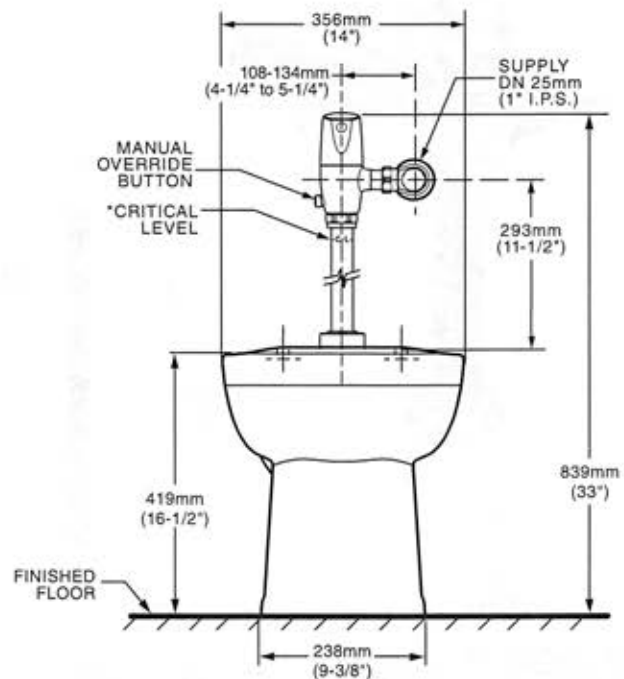
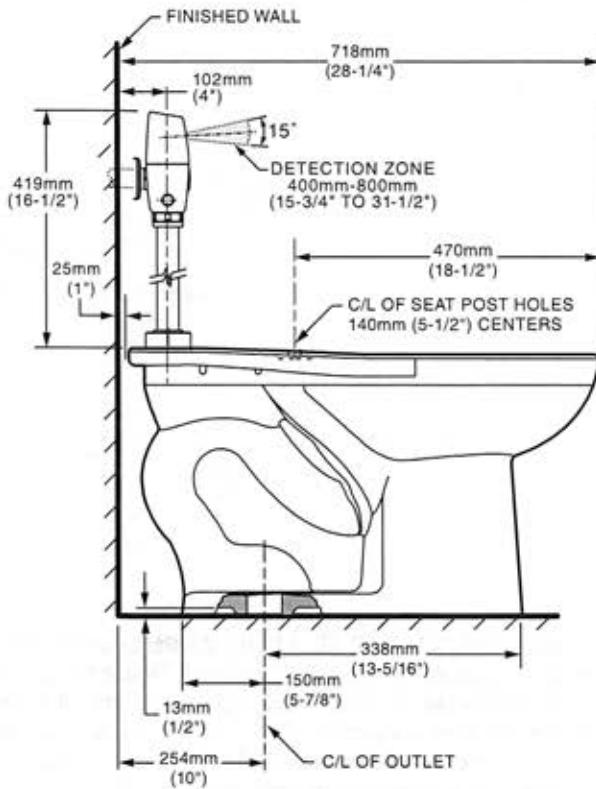
 BARRIER FREE

## Fixture Compliance Certifications - Meets or Exceeds the Following Specifications:

- ASME A112.19.2-2008 / CSA B45.1-08 for Vitreous China Fixtures

## Valve Listings:

- ASSE 1037
- ANSI/ASME A112.19.2
- ADA Compliant



VALVE LEFT or RIGHT HAND INSTALLATION

\*Note: The Critical Line (-C-L-) on Vacuum Breaker must typically be a minimum of 6" (152mm) above fixture. Consult Codes for details.



MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE BUILDING FACILITIES - CHECK LOCAL CODES.

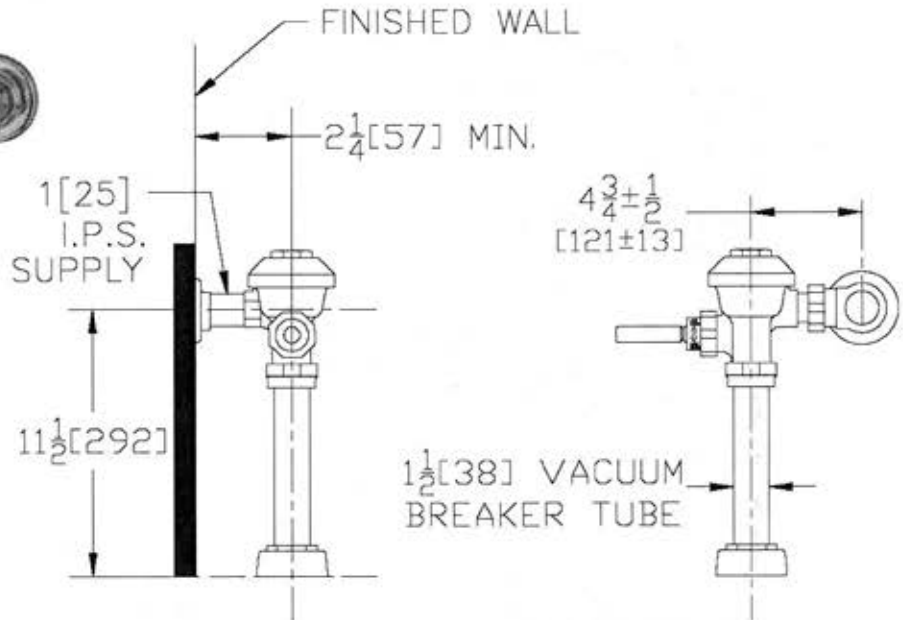
**NOTES:**  
TO COMPLY WITH AREA CODE GOVERNING THE HEIGHT OF VACUUM BREAKER ON THE FLUSHOMETER VALVE, THE PLUMBER MUST VERIFY DIMENSIONS SHOWN FOR SUPPLY ROUGHING. THIS TOILET DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 254MM (10") AND A MAXIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET.

**IMPORTANT:** Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.



AquaVantage® AV Model  
TAG \_\_\_\_\_

## Exposed Z6000AV-DF Dual Flush Model Flush Valve For Water Closets



**Flow Options**

<input checked="" type="checkbox"/>	-WS1	Low Consumption Flush	(1.6/1.1)
<input type="checkbox"/>	-FF	Full Flush	(4.5/3.2)
<input type="checkbox"/>		Standard Flush	(3.5/2.5)

**Suffix Options (Check/Specify Appropriate Options)**

_____	-BG	BioCare ADA Handle
_____	-H	Handle on Front of Flush Valve
_____	-YJ	Split Ring Pipe Support
_____	-YK	Solid Ring Pipe Support
_____	-YO	Bumper on Angle Stop
_____		Other

**ENGINEERING SPECIFICATION: ZURN Z6000AV-DF Dual Flush AquaVantage® 'AV' Exposed Closet Flush Valve** - Exposed, quiet diaphragm-type, chrome plated flushometer valve with a polished exterior. The valve is ADA compliant with a non-hold open and no leak dual flush handle feature. Lifting the handle up initiates a reduced flush of 30% for the evacuation of liquid waste. Pushing the handle down actuates a full flush for solid waste. A wall plate is furnished with graphics and instructions for user operations. The valve incorporates the AquaVantage® TPE, chloramine resistant, dual seal diaphragm with a clog resistant, triple filtered by-pass. The valve also includes a high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. The control stop has internal siphon-guard protection, vandal resistant stop cap, sweat solder kit, and a cast wall flange with set screw. All seals and gaskets are made of chloramine resistant materials.



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Rev. C  
Dwg. No. 81204

Date: 12/21/09  
Product No. Z6000AV-DF

### COMMERCIAL TOILET SEAT

# K-4666/67, K-4670-72, K-4679-81

#### FEATURES

- Elongated or round front
- Solid plastic
- Open or closed front
- Without cover
- With check hinge
- Includes an anti-microbial agent formed into the plastic which inhibits the growth of bacteria and germs on the toilet seat (-A)
- 2" toilet seat makes the following toilet installations ADA compliant where the toilet has a rim-to-floor height of 15" to 17" (K-3546, K-4329, K-4330, K-4386 and K-4396)



#### CODES/STANDARDS APPLICABLE

Specified model meets or exceeds the following:

- None applicable

#### COLORS/FINISHES

- 0 White
- Other Refer to Fixtures Price Book for additional colors

#### SPECIFIED MODEL:

Model	Description	Colors/Finishes
K-4666-C	Extra heavy elongated open front seat with check hinge, less cover	<input type="checkbox"/> 0 White
K-4666-SC	Same as K-4666-C except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4666-CA	Same as K-4666-C except with anti-microbial agent toilet seat	<input type="checkbox"/> 0 White
K-4666-SA	Same as K-4666-CA except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4667-C	Extra heavy elongated open front seat with check hinge, less cover	<input type="checkbox"/> Other _____
K-4670-C	Elongated open front seat with check hinge, less cover	<input type="checkbox"/> 0 White <input type="checkbox"/> Other _____
K-4670-SC	Same as K-4670-C except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4670-CA	Same as K-4670-C except with anti-microbial agent toilet seat	<input type="checkbox"/> 0 White
K-4670-SA	Same as K-4670-CA except with self-sustaining check hinge	<input type="checkbox"/> 0 White
K-4671-C	Elongated open front seat with check hinge, less cover	<input type="checkbox"/> Other _____
K-4671-SC	Same as K-4671-C except with self-sustaining check hinge	<input type="checkbox"/> Other _____
K-4672	Elongated open front seat with self-raising hinge, less cover	<input type="checkbox"/> 0 White
K-4679-CA	Same as K-4670-C except with anti-microbial agent toilet seat and 1" high bumpers	<input type="checkbox"/> 0 White
K-4680-C	Round open front seat with check hinge, less cover	<input type="checkbox"/> 0 White
K-4680-CA	Same as K-4680-C except with anti-microbial agent toilet seat	<input type="checkbox"/> 0 White
K-4681-C	Round open front seat with check hinge, less cover	<input type="checkbox"/> Other _____

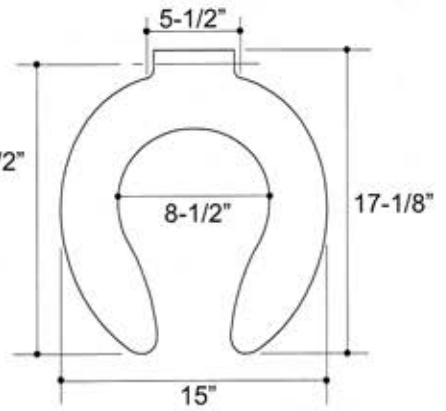
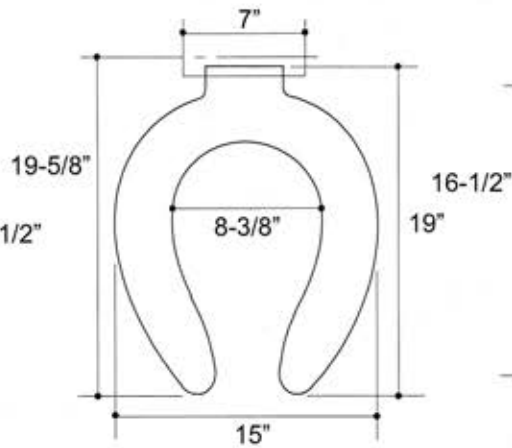
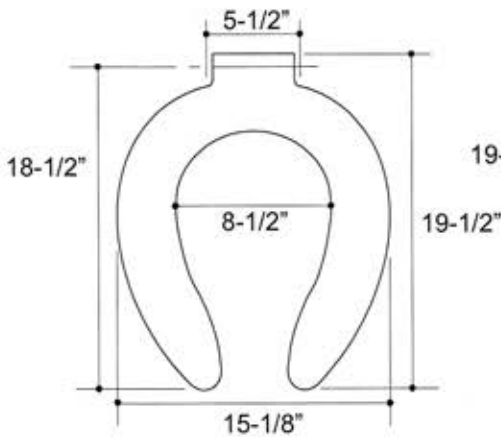
#### PRODUCT SPECIFICATION:

The toilet seat shall be elongated or round front. Toilet seat shall be made of solid plastic. Toilet seat shall be open or closed front. Toilet seat shall be without cover. Toilet seat shall have check hinge. Toilet seat shall have anti-microbial agent which inhibits the growth of bacteria and germs (-A). Toilet seat 2" height makes the following toilet installations ADA compliant where the toilet has a rim-to-floor height of 15" to 17" (K-3546, K-4329, K-4330, K-4386 and K-4396). Toilet seat shall be Kohler Model K-\_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_.

K-4666-C  
 K-4666-SC  
 K-4666-CA  
 K-4666-SA  
 K-4667-C  
 K-4679-CA

K-4670-C  
 K-4670-SC  
 K-4670-CA  
 K-4670-SA  
 K-4671-C  
 K-4671-SC  
 K-4672

K-4680-C  
 K-4680-CA  
 K-4681-C



**PRODUCT DIAGRAM**

**PFWRWHWB****Heavy Duty Wax Bowl Ring  
with Horn and Bolt Kit****Product Features**

- 100% pure petroleum wax gasket for setting any floor type closet bowl
- Wax Bowl Ring fits all floor-type toilet bowls with 3" or 4" waste lines
- ¼" x 2 ¼" solid brass bolt set with double nuts and washers
- Made with a plastic polyethylene flanged horn which extends the discharge opening and provides a positive seal and proper bowl alignment
- 24 per pack
- 15 lbs. carton weight

**Physical/Chemical Properties**

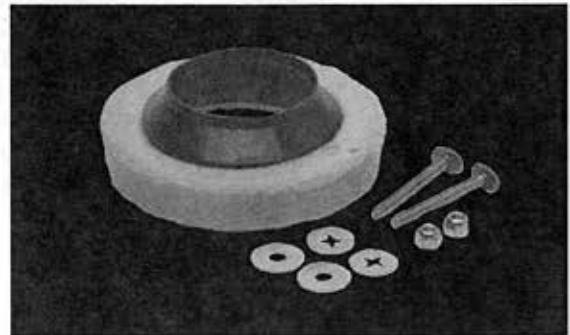
Specific Gravity	0.82 – 0.86
Appearance	Golden Wax
Shelf Life	1 year from manufacture
Melting Point	150° F – 160° F

**Directions for Use**

Wax Ring works best at room temperature to ensure proper flow of wax. All surfaces must be dry and free of putty, scale or other contaminated wax. Remove debris by scraping with putty knife or wire brush. Dust and dry all surfaces before installing gasket. Remove wax ring from wrapping. Place wax firmly over the horn of the outlet on the toilet bowl and set into place over closet bolts, using body weight to compress gasket. Gently twist bowl to spread wax. Tighten flange bolts carefully to prevent cracking or chipping the toilet bowl.

**Precautions**

Read all cautions and directions carefully before using this product. Make sure water supply is shut off before beginning installation. For use on floor closet bowls only. **DO NOT INSTALL ON WET SURFACES.** Keep away from direct sunlight to prevent darkening. Do not store near extreme heat. **KEEP OUT OF REACH OF CHILDREN.**

**PFWRWHWB****Common Applications**

PROFLO Wax Bowl Ring provides a permanent, sanitary, gas and watertight seal on most types of water closets. Wax Bowl Ring will not dry out, harden or deteriorate.

**Ingredients**

Petrolatum (Non-Hazardous)

When used for the intended end use application, this product is considered an "article" as defined in OSHA 29 CFR 1910.1200(c).

**Approvals and Listings**

Meets Federal Specification TT-P-1536A.



**P-2**

K1997-4-0

ZZ6915XL  
ZP690020F  
S3365461  
S3326009  
DEA7601  
PFPTB107  
BOCR19XC  
LSFC116PP  
PFE7  
PF202WH

KOHLER

ZURN  
ZURN  
SLOAN  
SLOAN  
DEARBORN  
PROFLO  
BRASSCRAFT  
LSP  
PROFLO  
PROFLO

**P-2**

WALL MOUNT LAV 4 CC WITH OVERFLOW, SHROUD (K1998-0) NOT INCLUDED

LF CP BATTERY OP FAUCET  
0.5 GPM VR AER MOD Z6901 Z690  
BAK-CHECK ASSEMBLY  
MIX60A KIT MIXING VALVE  
1 1/4" X 6" 17 GA TAILPIECE PO PLUG CAST GRI  
1-1/2 17GA P TRAP CP  
LF 1/2" NOM COMP INLET X 3/8" OD COMP OUTLET  
3/8 COMP X 1/2 FIP 16 S/S SINK CONNECTION  
5/8" OD CP SHALLOW ESC FLANGE  
COVER FOR TRAP / HOT & COLD STOP & SUPPLY



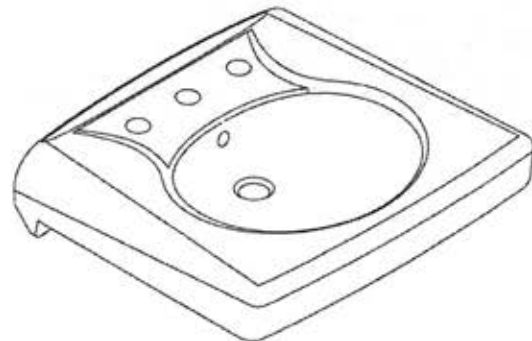
**BRENHAM™**

**WALL-MOUNT LAVATORY  
K-1997**

ADA	TAS
CSA B651	OBC

**Features**

- Vitreous china
- Wall-mount
- With hanger
- With overflow
- Drilled for concealed arm carrier
- 8" (20.3 cm) centers (-8), 4" (10.2 cm) centers (-4), or single-hole (-1)
- Optional soap dispenser hole on left (-L) or right (-R) (single-hole models only)
- 21-15/16" (55.7 cm) x 19-3/4" (50.2 cm)



**Codes/Standards Applicable**

Specified model meets or exceeds the following:

- ADA
- ICC/ANSI A117.1
- TAS
- CSA B651
- OBC
- ASME A112.19.2/CSA B45.1

**Colors/Finishes**

- 0: White
- Other

**Accessories**

- CP: Polished Chrome
- Other

**Specified Model**

Model	Description	Colors/Finishes	
K-1997-1	Wall-mount lavatory – single-hole, less soap dispenser hole	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-1997-1L	Wall-mount lavatory – single-hole, soap dispenser hole on left	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-1997-1R	Wall-mount lavatory – single-hole, soap dispenser hole on right	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-1997-4	Wall-mount lavatory – 4" (10.2 cm) centers, less soap dispenser hole	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-1997-8	Wall-mount lavatory – 8" (20.3 cm) centers, less soap dispenser hole (shown)	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____

Additional lavatories are available without an overflow. Please refer to the Kohler Price Book.

Optional Accessories			
K-8998	P-trap	<input type="checkbox"/> CP	<input type="checkbox"/> Other_____
K-1998	Shroud	<input type="checkbox"/> CP	<input type="checkbox"/> Other_____

**Product Specification**

The wall-mount lavatory shall be made of vitreous china. Product shall be 21-15/16" (55.7 cm) in length and 19-3/4" (50.2 cm) in width. Product shall be available with 8" (20.3 cm) centers (-8), 4" (10.2 cm) centers (-4), or single-hole (-1). Product shall feature an overflow and hanger. Product shall be drilled for a concealed arm carrier. Product shall have an optional soap dispenser hole on left (-L) or right (-R) (single-hole models only). Lavatory shall be Kohler Model K-1997-\_\_\_\_-\_\_\_\_.

# BRENHAM™

## Technical Information

Fixture*:	
Basin area	14-3/8" (40.6 cm) x 12-5/16" (36.5 cm)
Water depth	3-1/4" (8.3 cm)
Hole diameter	
Drain	1-3/4" (4.4 cm)
Spout	1-3/8" (3.5 cm)
Handle	1-3/8" (3.5 cm)
Soap dispenser	1-1/4" (3.2 cm)
* Approximate measurements for comparison only.	

Accessibility rough-in requirements:				
	ADA and TAS	Children's Environment		
		ADA	TAS Ages K-5 yrs	TAS Ages 6-9 yrs
<b>A</b>	34" (86.4 cm)	31" (78.7 cm)	30" (76.2 cm)	32" (81.3 cm)
<b>B</b>	27" (68.6 cm)	24" (61 cm)	26" (66 cm)	28" (71.1 cm)
<b>C</b>	11" (27.9 cm)	11" (27.9 cm)	11" (27.9 cm)	11" (27.9 cm)
<b>D</b>	9" (22.9 cm)	9" (22.9 cm)	9" (22.9 cm)	9" (22.9 cm)
<b>E</b>	8" (20.3 cm)	8" (20.3 cm)	8" (20.3 cm)	8" (20.3 cm)

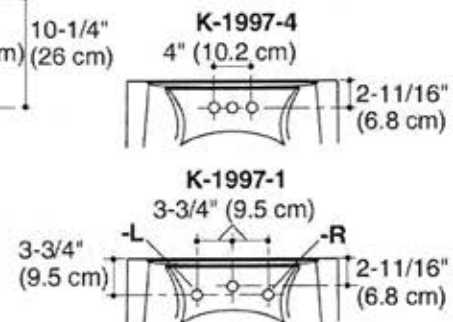
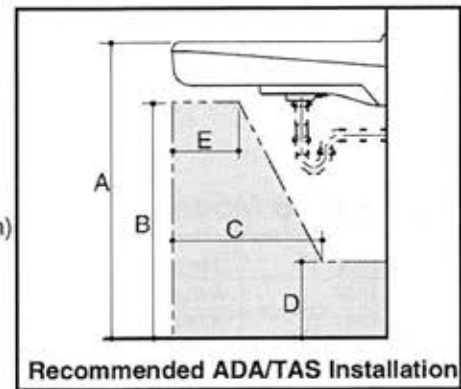
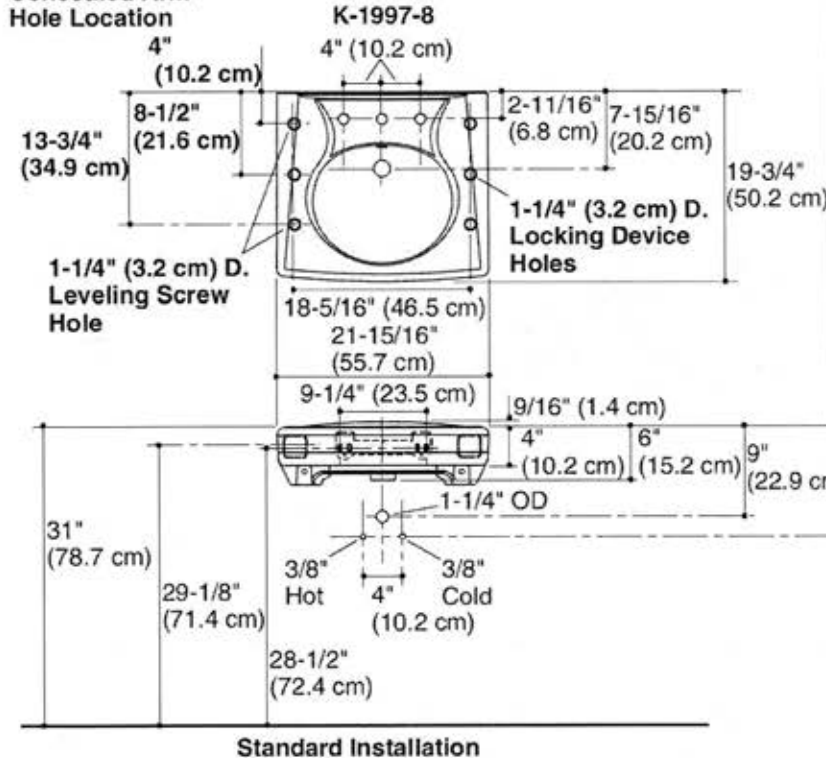
## Installation Notes

Will comply with **ADA** when installed per Section 606 Lavatories of the Act.

Will comply with **CSA B651** when installed per Clause 4.3.3 of the standard.

Will comply with **OBC** when installed per Clause 3.8.3.11.

### Concealed Arm Hole Location



## Product Diagram

BRENHAM™ WALL-MOUNT LAVATORY  
Page 2 of 2  
1100678-4-E

THE BOLD LOOK  
OF **KOHLER.**



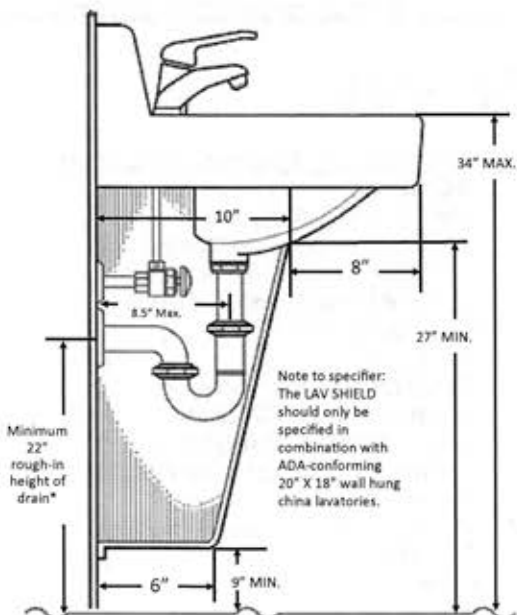
SPECIFICATION

LAV SHIELD®

General Description:

LAV SHIELD® rigid enclosure is dimensionally engineered to comply with ADA requirements, design aesthetics and mechanical cooperation. LAV SHIELD conceals electronic faucet components, mixing valves, trap primers and instantaneous water heaters\*, eliminating vandalism while allowing wheelchair accessibility under lavatories. Available in the standard model for field fit applications or may be ordered as a factory pre-cut which closely follows the underside contours of the lavatory specified.

\*Lavatory "rough in" should be considered to allow mounting room for water heater behind enclosure. Contact TRUEBRO for specifications.



\*Less than 22" rough-in height, certain job conditions or certain lavatories may require an offset tailpiece or offset grid strainer.

Material	Rigid high-impact, stain-resistant, PVC
Nominal Wall	.093"
Finish	Fine haircell
UV Protection	Will not fade or discolor
Durability	Virtually indestructible
Fasteners	7 stainless steel screws and wall anchors provided
Color	China white
Compatibility	Fits all ADA-conforming 20" x 18" wall-hung china lavatories
Paintability	Apply acrylic enamel or Latex
UL Listing	In accordance with ADA Article 4.19.4
Flammability	UL-94 V-0, 5VA ASTM D-635-91 4 (ATB) 2.1 (AEB)
Bacterial/Fungal Resistance	ASTM G21 and G22/Result 0



U.S. and Canadian patents: D373,412 D372,077  
D384,732 D393,700 D390643 79,064 79,063

LAV SHIELD Model #2018 — Standard (to be Field Fit)

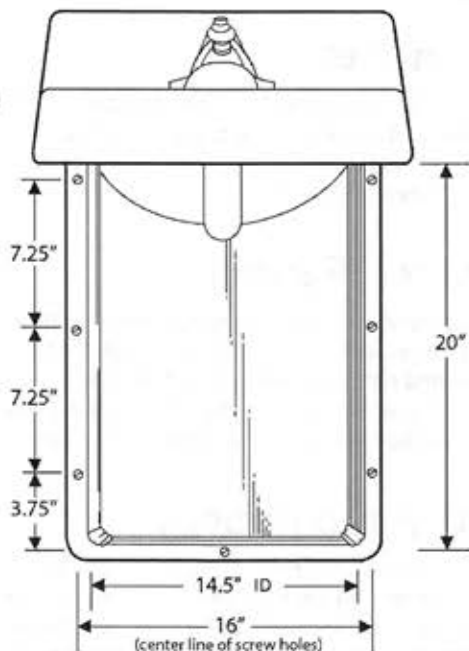
LAV SHIELD Factory Pre-cuts Available:

- Model #2018-AS-C – Am.Std. Comrade
- Model #2018-EL-S – Eljer Signature
- Model #2018-AS-D – Am.Std. Declyn
- Model #2018-EL-U – Eljer Bucknell
- Model #2018-AS-L – Am.Std. Lucerne
- Model #2018-GR-H – Gerber Hayes
- Model #2018-AS-M – Am.Std. Muro
- Model #2018-GR-M – Gerber Monticello
- Model #2018-AS-OL – Am.Std. Old Lucerne
- Model #2018-GR-P – Gerber Plymouth
- Model #2018-AS-P – Am.Std. Penlyn
- Model #2018-KO-B – Kohler Braham
- Model #2018-AS-R – Am.Std. Roxalyn
- Model #2018-KO-C – Kohler Chesapeake
- Model #2018-BD-I – Bradley Imperial
- Model #2018-KO-G – Kohler Greenwich
- Model #2018-BR-M – Briggs Milton
- Model #2018-KO-H – Kohler Hudson
- Model #2018-BR-W – Briggs Whitman
- Model #2018-KO-K – Kohler Kingston
- Model #2018-CR-H – Crane Harwich
- Model #2018-KO-P – Kohler Pinoir
- Model #2018-CR-N – Crane Norwich
- Model #2018-KO-S – Kohler Soho
- Model #2018-CR-W – Crane Westmont
- Model #2018-HB-NS – Mansfield Grand Isle
- Model #2018-CR-Y – Crane Yorkshire
- Model #2018-TO-L – Toto LT307
- Model #2018-EL-B – Eljer Blair
- Model # 2018-ZN-Z – Zurn #Z5344
- Model #2018-EL-D – Eljer Delwyn
- Model # 2018-ZN-NZ – Zurn #Z5344
- Model #2018-EL-M – Eljer Mayburne

Note: All Lav Shields come with standard fasteners.

Model # TRFAST Tamper-resistant screws (Torx Head Screws)

Special Pre-Cut Request: \_\_\_\_\_



Job/Location: \_\_\_\_\_

Designer: \_\_\_\_\_

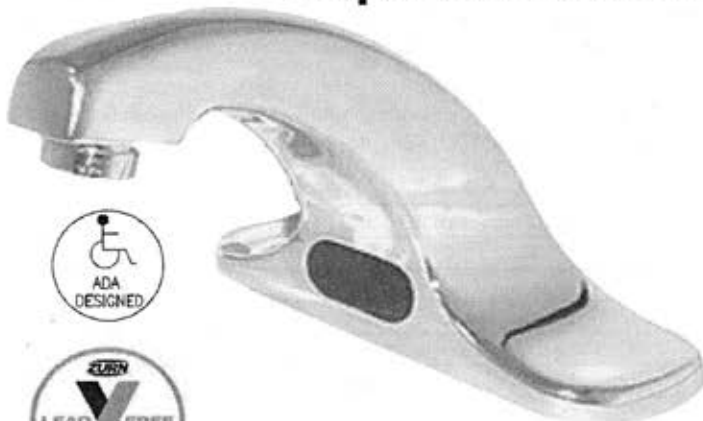




AquaSense®

TAG \_\_\_\_\_

## AquaSense Sensor Faucet



### Suffix Options (Check/Specify Appropriate Options)

_____	-F	.5 GPM Vandal Resistant Aerator
_____	-IA3	Inlet Adaptor (3/8"[10] compression)
_____	-J	1.5 GPM Laminar Flow Control
_____	-K	1.0 GPM Laminar Flow Control
_____	-L	1.0 GPM Vandal Resistant Aerator
_____	-MJ	Mini Junction Box
_____	-MT	Mixing Tee
_____	-MV	Temperature Mixing Valve
_____	-PB	Polished Brass PVD Finish
_____	-SH	Supply Hoses for Mixing Valve
_____	-TMV	Thermostatic Mixing Valve for Multiple Faucets
_____	-TMV-1	Thermostatic Mixing Valve for Single Faucets
_____		Other

Zurn Lead Free products (-XL) are manufactured to comply with state laws and local codes that mandate lead content levels less than one quarter of one percent (0.25%) total lead content by weighted average.

### Z6915-XL AquaSense Battery Powered Faucet

**ENGINEERING SPECIFICATION:** The Z6915-XL sensor faucet is a battery powered sensor faucet with an integral four inch cover plate for retrofit and new construction. The faucet incorporates an infrared convergence-type proximity sensor into the chrome plated cast brass spout. The faucet is furnished complete with sensor module, spout module and in-line filter, 4 "AA" batteries, a 1.5 GPM vandal resistant aerator, an inlet for a 1/2"[13] ball riser, and a single supply hose. Sensor range is factory set for optimum performance.

### Z6915-XL-ACA AquaSense Plug-In Powered Faucet

**ENGINEERING SPECIFICATION:** The Z6915-XL-ACA sensor faucet is a plug-in powered electronic sensor faucet with an integral four inch cover plate for retrofit and new construction. The faucet incorporates an infrared convergence-type proximity sensor into the chrome plated cast brass spout. The faucet is furnished complete with sensor module, spout module, in-line filter, a 1.5 GPM vandal resistant aerator, 6 VDC plug-in power converter, an inlet for a 1/2"[13] ball riser, and a single supply hose. Also included are 4 'AA' batteries that provide battery backup power to the faucet during power outages. Sensor range is factory set for optimum performance.

### Z6915-XL-CWB AquaSense Hardwire Powered Faucet

**ENGINEERING SPECIFICATION:** The Z6915-XL-CWB sensor faucet is a hardwired electronic sensor faucet with an integral four inch cover plate for retrofit and new construction. The faucet incorporates an infrared convergence-type proximity sensor into the chrome plated cast brass spout. The faucet is furnished complete with sensor module, spout module, in-line filter, a 1.5 GPM vandal resistant aerator, connecting wire to power converter, an inlet for a 1/2"[13] ball riser, and a single supply hose. Also included are 4 'AA' batteries that provide battery backup power to the faucet during power outages. Sensor range is factory set for optimum performance.

**NOTE:** For Hardwire applications furnish P6000-HW6 power converter. The P6000-HW6 will power up to 8 sensor faucets. Order P6000-HW6 power converter separately.

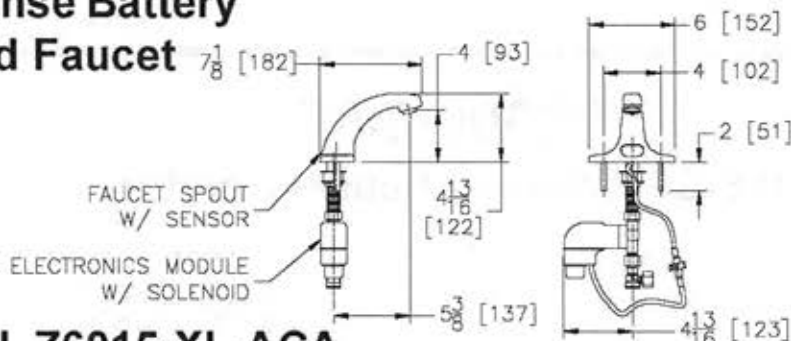
All polished brass (PVD) products come with a limited lifetime warranty on the finish.

ZURN INDUSTRIES, LLC. ♦ COMMERCIAL BRASS OPERATION ♦ 5900 ELWIN BUCHANAN DRIVE ♦ SANFORD NC 27330

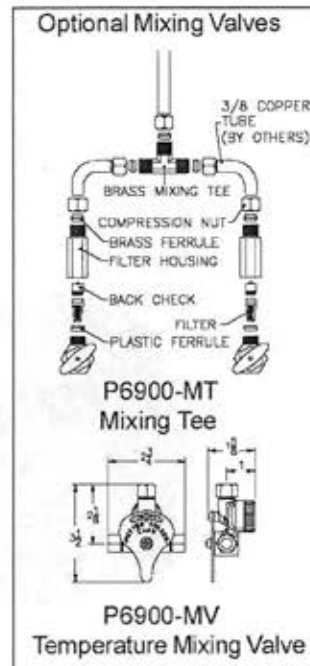
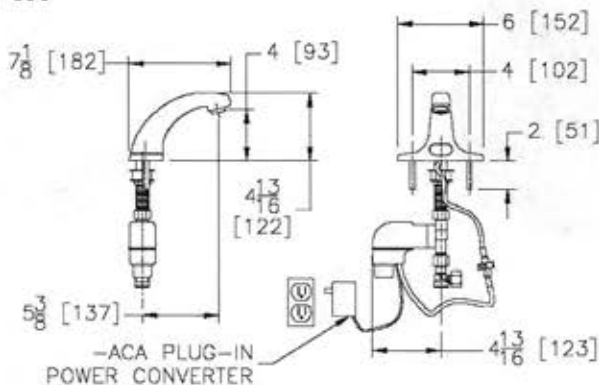
Phone: 1-800-997-3876 ♦ Fax: 919-775-3541 ♦ World Wide Web: www.zurn.com

In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905-405-8272 Fax: 905-405-1292

### TYPICAL Z6915-XL AquaSense Battery Powered Faucet

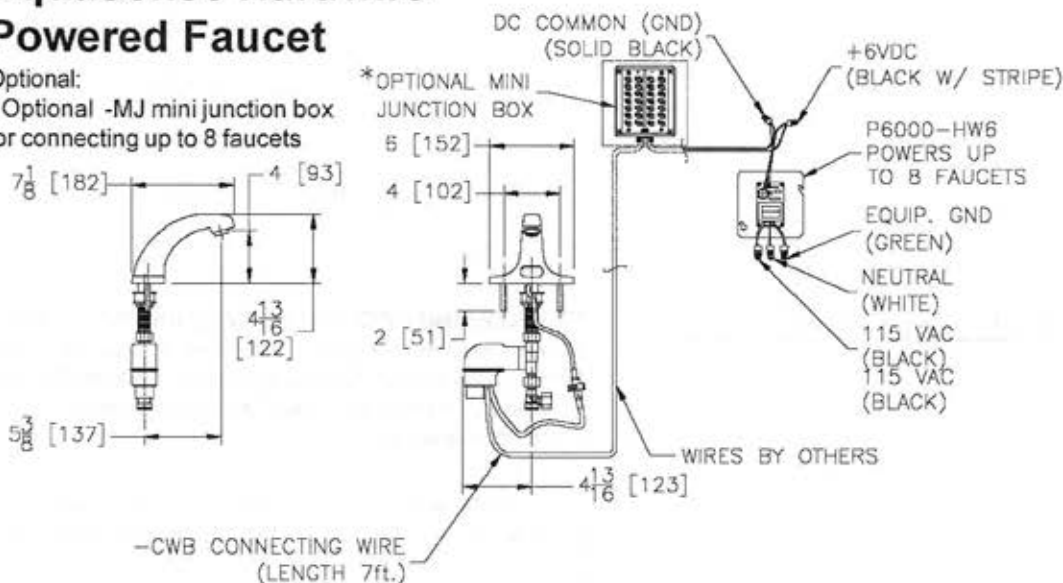


### TYPICAL Z6915-XL-ACA AquaSense Plug-In Powered Faucet



### TYPICAL Z6915-XL-CWB AquaSense Hardwire Powered Faucet

Optional:  
\* Optional -MJ mini junction box for connecting up to 8 faucets



**NOTE: MUST USE EITHER ZURN P6000-HW6 HARDWIRE POWER CONVERTER OR ZURN P6000-PC6 PLUG-IN POWER CONVERTER TO ENSURE PROPER OPERATION. USING A POWER CONVERTER OTHER THAN ZURN MAY RESULT IN OPERATION MALFUNCTION OR UNIT FAILURE.**

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Phone: 1-800-997-3876 • Fax: 919-775-3541 • World Wide Web: www.zurn.com  
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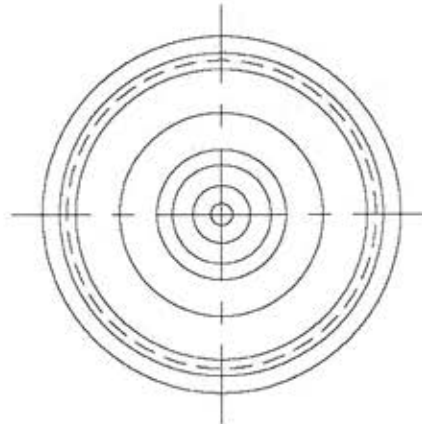
AquaSense® is a registered trademark of Zurn Industries, LLC.



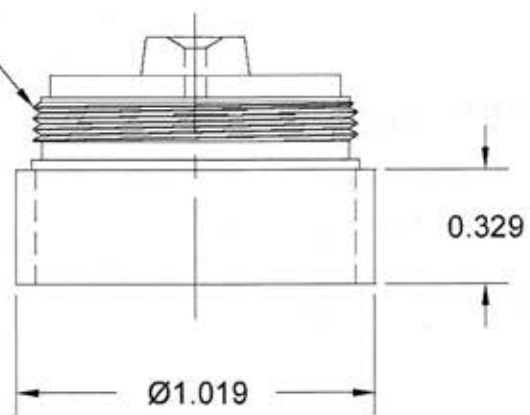
AquaSense® Model

TAG \_\_\_\_\_

## P6900-20-F 0.5 GPM Sensor Faucet Aerator



15/16-27  
UNS-2A



Option on the following sensor faucets

- Z6901
- Z6903-77
- Z6912
- Z6913
- Z6914
- Z6915
- Z6919

**ENGINEERING SPECIFICATION: ZURN P6900-20F 0.5 GPM Sensor Faucet Aerator-** 0.5 gpm vandal resistant male threaded aerator for Zurn Z6900 series of sensor faucets. Furnished with P6900-21 aerator wrench for removal when cleaning is required.

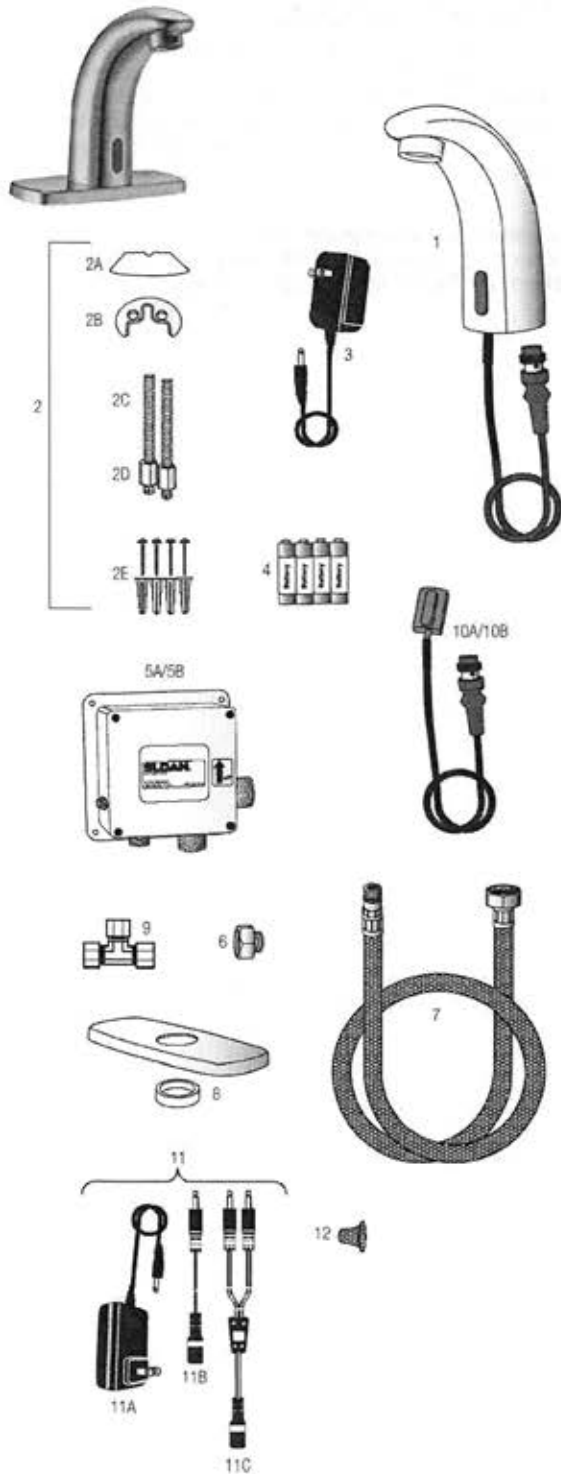
This space is for Architectural/engineering Approval

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**SF-2400/SF-2450**



Hand Hygiene

**PARTS LIST—SF-2400/SF-2450**

Item No.	Code No.	Part No.	Description
1.	—	—	Pedestal Faucet Assembly w/Outlet (Models SF-2400/SF-2450/)
2.	0362004	SFP-4	Mounting Hardware Kit, (Models SF-2100/SF-2150/SF-2400/SF-2450) includes items: 2A, 2B, 2C, 2D and 2E
2A.	—	—	Beveled Gasket
2B.	—	—	Metal Retainer
2C.	—	—	Threaded Studs (2)
2D.	—	—	Retainer Nuts (2)
2E.	—	—	Screws and Anchors for Control Module
3.	0362006	SFP-6	110 VAC/6 VDC Plug-In Adapter (US)
4.	—	—	Batteries-AA size (4)
5A.	0362040	SFP-40-A	Control Module with Adjustable Button (6 pin connector)
5B.	0362008	SFP-8	Control Module (Old Style 4 pin connector)*
6.	—	—	Inlet adapter – 1/2" NPSM to 3/8" Compression Connection (not supplied with most international models)
7.	0362010	SFP-10	Flex Hose, Control Module to Spout
8.	0362011	SFP-11	Trim Plate w/ Spacer (not supplied with most international models)
9.	3365461	ETF-617-A	3/8" Bak-Chek® Tee Compression Fitting
10A.	0362041	SFP-41-A	Sensor Assembly (6 pin connector)
10B.	0362034	SFP-34	Sensor Assembly (Old Style 4 pin connector)*

\* IMPORTANT: Sloan added the range adjustment feature in August 2008 for faucets made prior to August 2008. Use the following replacement parts: SFP-34 and SFP-8

**NOT SHOWN SEPARATELY**

—	0362013	SFP-13	0.5 gpm/1.9 Lpm Spray head
—	0335012	EAF-15	0.5 gpm/1.9 vandal resistant spray head
—	0362023	SFP-23	2.2 gpm/8.3 Lpm Aerator
—	0362024	SFP-24	2.2 gpm/8.3 Lpm vandal resistant aerator
—	0362020	SFP-26	240 VAC/6 VDC Type A Flat Blade (Asia) Plug-in Adapter
—	0362025	SFP-25	240 VAC/6 VDC Type C Round Pin (Euro) Plug-in Adapter
—	0362026	SFP-20	240 VAC/6 VDC Type G Rectangular (UK) Plug-in Adapter
—	0362022	SFP-22	8" Trim Plate

**ACCESSORIES**

11.	0362035	SFP-35-A	100-240 VAC/6 VDC Gang Adapter Kit, includes 11A, 11B and 11C
11A.	0362016	SFP-36-A	100-240 VAC/6 VDC Plug-In Adapter
11B.	0362018	SFP-38	Cable Splitter, 51"/1300 mm (5 included in kit)
11C.	0362017	SFP-37	Cable Extension, 51"/1300 mm

**REPAIR PARTS**

12.	0362015	SFP-15	Strainer (located in water inlet of control module)
-----	---------	--------	-----------------------------------------------------

— In Item No. column = Not shown in illustration  
 — In Code No. and Part No. column = Not sold separately



**SF-2400/SF-2450****TROUBLESHOOTING GUIDE****1. Faucet delivers water in an uncontrolled manner.**

A. Faucet is not working properly.

Contact the Sloan Valve Company Installation Engineering Department at 1-888-SLOAN-14 (1-888-756-2614).

**2. Faucet does not deliver any water when Sensor is activated.**

**INDICATOR: Solenoid valve produces an audible "CLICK."**

A. Water supply stop(s) closed. Open water supply stop(s).

B. Water strainer in control module is clogged. Close supply stops and remove water inlet line at control module. Remove, clean and reinstall strainer and water inlet line. Replace strainer if required.

**INDICATOR: Solenoid valve DOES NOT produce an audible "CLICK."**

A. Batteries low (battery powered models). Replace batteries.

B. Power failure (transformer powered models). Check power supply.

**3. Faucet delivers only a slow flow or dribble when Sensor is activated.**

A. Water supply stop(s) are partially closed. Completely open water supply stop(s).

B. Water strainer in control module is clogged. Close supply stops and remove water inlet line at control module. Remove, clean and reinstall strainer and water inlet line. Replace strainer if required.

C. Aerator is clogged. Remove, clean, and reinstall aerator. Replace aerator if required.

D. Faucet is not working properly.

Contact the Sloan Valve Company Installation Engineering Department at 1-888-SLOAN-14 (1-888-756-2614).

**4. Faucet does not stop delivering water or continues to drip after user is no longer detected.**

A. Faucet is not working properly.

Contact the Sloan Valve Company Installation Engineering Department at 1-888-SLOAN-14 (1-888-756-2614).

**5. The water temperature is too hot or too cold on a Faucet connected to hot and cold supply lines.**

A. Supply Stops are not adjusted properly. Adjust Supply Stops.

**CARE AND CLEANING INSTRUCTIONS**

DO NOT use abrasive or chemical cleaners (including chlorine bleach) to clean faucet that may dull the luster and attack the chrome or special decorative finishes. Use ONLY mild soap and water, then wipe dry with clean cloth or towel. While cleaning the bathroom tile, protect the faucet from any splattering of cleaner. Acids and cleaning fluids will discolor or remove chrome plating.

**When assistance is required, please contact Sloan Valve Company Installation Engineering Department at: 1-888-SLOAN-14 (1-888-756-2614).**

# SLOAN<sup>®</sup>

## OPTIMA ACCESSORIES

### Mechanical Mixing Valve

# MIX-60-A

► **Description**

Below Deck Mechanical Water Mixing Valve for use with a single Sloan Optima<sup>®</sup> faucet.

► **Model**

Model MIX-60-A

Supplied with Sloan Optima and Optima Plus faucets that are specified with the "BDM" (Below-Deck-Mixer) variation.

► **Specifications**

Mechanical Water Mixing Valve with the following features:

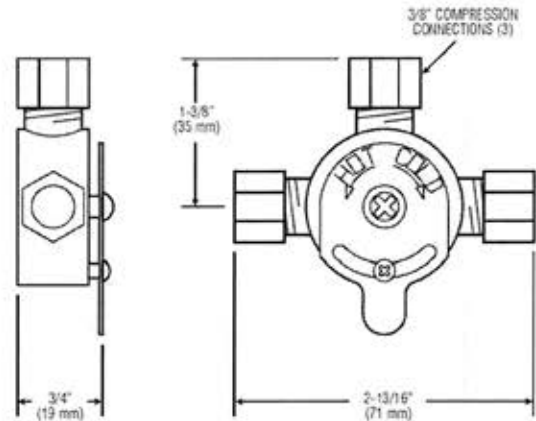
- Designed to install under the lavatory
- Installs in place of the Tee fitting supplied with the faucet prior to the solenoid valve
- Equipped with integral check valves at inlets
- 3/8" compression fittings on inlets and outlet
- Compression sleeves and nuts included
- Lever dial adjustment with lock screw: COLD-HOT
- Brass construction
- Chrome plated finish

► **Flow Capacities**

	SYSTEM PRESSURE					
PSI	20	30	40	50	60	70
BAR	1.4	2.1	2.8	3.4	4.2	4.9
GPM	1.75	2.25	2.75	3.0	3.5	4.0
Lpm	6.62	8.51	10.40	11.35	13.25	15.14



**CAUTION!** This is a mechanical hot and cold mixing valve only! It does **NOT** provide automatic control of water temperature. Hot water in excess of 110°F (43°C) is dangerous and **CAN CAUSE SCALDING!**



# SLOAN.

SLOAN VALVE COMPANY • 10500 SEYMOUR AVE. • FRANKLIN PARK, IL. 60131  
 Phone: 1-800-9-VALVE-9 or 1-847-671-4300 • Fax: 1-800-447-8329 or 1-847-671-4380  
<http://www.sloanvalve.com>

Optima MIX-60-A S.S. — Rev. 1 (08/01)  
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Made in the U.S.A.

Printed in the U.S.A.

This space for Architect/Engineer approval

Job Name \_\_\_\_\_ Date \_\_\_\_\_

Model Specified \_\_\_\_\_ Quantity \_\_\_\_\_

Variations Specified \_\_\_\_\_

Customer/Wholesaler \_\_\_\_\_

Contractor \_\_\_\_\_

Architect \_\_\_\_\_

The information contained in this document is subject to change without notice.



**Dearborn<sup>®</sup>  
Brass**

4675 W. 160th St.  
Cleveland, Ohio 44135  
Ph: (800) 321-9532  
Fax: (800) 321-9535  
www.dearbornbrass.com

**SUBMITTAL SPECIFICATION**

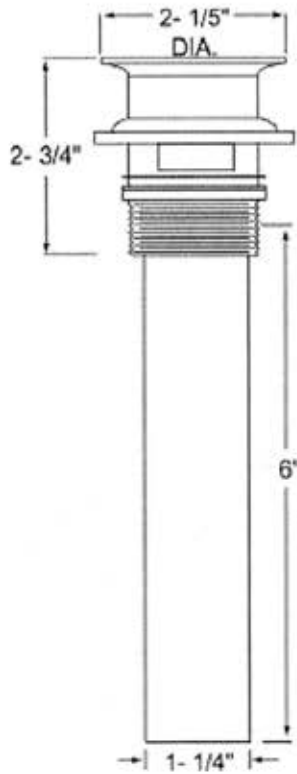
**CAST GRID  
PATENT OUTLET PLUG**

**Engineering Specification:** Dearborn Brass Semi-Cast Grid Patent Overflow Plug with 1-1/4" x 6" – 17 gauge tailpiece.

**Job Reference**

**DESCRIPTION**

- Chrome Finished
- Includes: Cast Grid, P.O. Plug with nuts and washers and 17 gauge tailpiece
- Designed for installation in most commercial applications

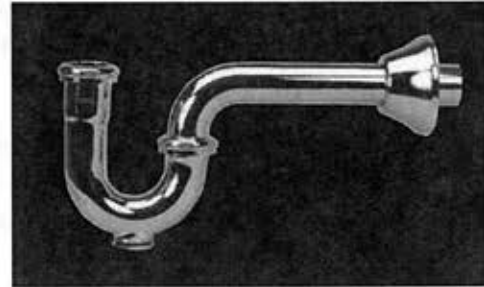
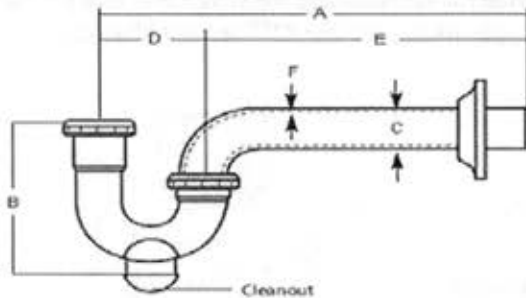


✓	Product No.	Description	Carton Quantity	Carton Weight (lbs)
	760-1	Semi-Cast Grid Patent Overflow Plug with 1-1/4" x 6" – 17 gauge Tailpiece	25	18

Data is subject to manufacturing tolerances.



# Adjustable Tubular P-Traps



PFPTB100

✓ For Submittal	Model Number	Description	Cleanout Y/N	Dimensions										Gauge F	Finish	Flange	Nuts
				A		B		C		D		E					
				in	mm	in	mm	in	mm	in	mm	in	mm				
	PFPTB100	1-1/4 x 1-1/4	No	11	279.4	5	127.0	1-1/4	31.75	3	76.2	8	203	17	Chrome	Box	Brass
	PFPTB101	1-1/4 x 1-1/4	Yes	11	279.4	5 1/4	133.3	1-1/4	31.75	3	76.2	8	203	17	Chrome	Box	Brass
	PFPTB103	1-1/4 x 1-1/2	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Chrome	Box	Brass
✓	PFPTB104	1-1/4 x 1-1/2	Yes	12 1/4	311.1	5 1/4	133.3	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Chrome	Box	Brass
	PFPTB107	1-1/2 x 1-1/2	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Chrome	Box	Brass
	PFPTB108	1-1/2 x 1-1/2	Yes	12 1/4	311.1	5 1/4	133.3	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Chrome	Box	Brass
	PFPTB112	1-1/2 x 1-1/2	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Chrome	Shallow	Brass
	PFPTB102	1-1/4 x 1-1/4 semi-cast	Yes	10 1/8	257.1	4 5/8	117.4	1-1/4	31.75	2 5/8	66.6	7 1/2	190.5	17	Chrome	Shallow	Zinc
	PFPTB106	1-1/4 x 1-1/2 semi-cast	Yes	10 3/8	263.5	5	127	1 1/2	38.1	2 7/8	73.0	7 1/2	190.5	17	Chrome	Shallow	Zinc
	PFPTB109	1-1/2 x 1-1/2 semi-cast	Yes	10 3/8	263.5	5	127	1 1/2	38.1	2 7/8	73.0	7 1/2	190.5	17	Chrome	Shallow	Zinc
	PFPTB110	1-1/2 x 1-1/2 w/ground joint	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Chrome	Box	Brass
	PFPTB111	1-1/4 x 1-1/2 w/ground joint	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	17	Unfinished	Box	Brass
	PFPTB105	1-1/4 x 1-1/2 w/ground joint	No	10 3/4	273.0	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	7 1/2	190.5	17	Chrome	Shallow	Brass
	PFPTB400	1-1/4 x 1-1/4 w/cast body	Yes	11 1/8	282.5	4 5/8	117.4	1-1/4	31.75	2 5/8	66.6	8 1/2	215.9	17	Chrome	Box	Brass
	PFPTB401	1-1/2 x 1-1/4 w/cast body	Yes	11 7/8	301.6	5	127	1 1/2	38.1	2 7/8	73.0	9	228.6	17	Chrome	Box	Brass
	PFPTB402	1-1/2 x 1-1/4 w/cast body	No	11 7/8	301.6	4 7/8	123.8	1 1/2	38.1	2 7/8	73.0	9	228.6	17	Chrome	Box	Brass
	PFPTB403	1-1/2 x 1-1/2 w/cast body	Yes	11 7/8	301.6	5	127	1 1/2	38.1	2 7/8	73.0	9	228.6	17	Chrome	Box	Brass
	PFPTB404	1-1/2 x 1-1/2 w/cast body	No	11 7/8	301.6	4 7/8	123.8	1 1/2	38.1	2 7/8	73.0	9	228.6	17	Chrome	Box	Brass
	PFPTB200	1-1/4 x 1-1/4	No	11	279.4	5	127.0	1-1/4	31.75	3	76.2	8	203	20	Chrome	Box	Zinc
	PFPTB201	1-1/2 x 1-1/2	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	20	Chrome	Box	Zinc
	PFPTB202	1-1/2 x 1-1/2	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	20	Unfinished	Shallow	Brass
	PFPTB300	1-1/4 x 1-1/4	No	10	254.0	5	127.0	1-1/4	31.75	3	76.2	7	177.8	22	Chrome	Box	Zinc
	PFPTB301	1-1/2 x 1-1/2	No	12 1/4	311.1	5 1/8	130.1	1 1/2	38.1	3 1/4	82.5	9	228.6	22	Chrome	Box	Zinc

### Warranty and Codes

This PROFLO product carries a 1-year limited warranty.



**For Residential and Commercial Applications**

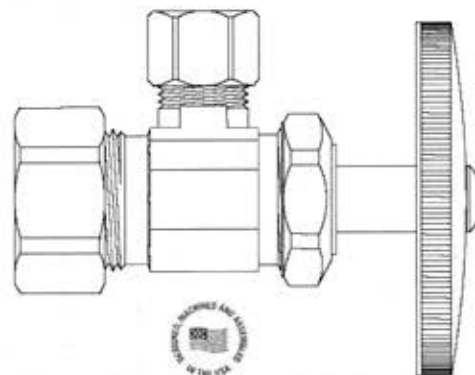
Job Name		Engineer / Architect	
Job Location		Wholesaler	
Submittal Date		Contractor	

## OCR1B/ OCR3B & OCR09/ OCR19/ OCR39/ OCR49 Multi-Turn Angle Stop – Compression x Compression

**Use:** For use in potable water distribution systems. Not intended for recirculating water systems that produce continuous use temperatures above 115° F. For those applications, use our KT™ series ball stops

**Design Features:**

- **Machined one-piece brass body** provides strength, durability, and long-lasting performance
- **Oval knurled handle** provides a secure grip and smooth on/off operation
- **Easy-to-remove handle** help protect against accidental stop operation during rough-ins
- **100% Compliant**



**Operating Specifications:**

**Temperature:** 40° - 140° F  
**Pressure:** 125 PSI maximum

**Standard**

STOP MATERIAL SPECIFICATIONS	
<b>Body</b>	Brass
<b>Stem</b>	POM; brass; or brass, chrome plated
<b>Handle</b>	Zinc die cast, plated; ABS, plated; or Polycarbonate
<b>Handle Screw</b>	Steel, zinc plated
<b>Bib &amp; Packing Washer</b>	Rubber
<b>Packing Nut</b>	Brass or brass, chrome plated
<b>Compression Sleeve</b>	Brass
<b>Compression Nut</b>	Brass, chrome plated

**Compliant**

STOP MATERIAL SPECIFICATIONS	
<b>Body</b>	Compliant brass
<b>Stem</b>	POM; Compliant brass; or Compliant brass, chrome plated
<b>Handle</b>	Zinc die cast, plated; ABS, plated; or Polycarbonate
<b>Handle Screw</b>	Steel, zinc plated
<b>Bib &amp; Packing Washer</b>	Rubber
<b>Packing Nut</b>	Brass or brass, chrome plated
<b>Compression Sleeve</b>	Brass
<b>Compression Nut</b>	Brass, chrome plated

**Standard Part Listing:**

- OCR1B C      3/8" nom compression x 3/8" OD compression, chrome plated
- OCR1B C1    3/8" nom compression x 3/8" OD compression, chrome plated, window box
- OCR1BZ C    3/8" nom compression x 3/8" OD compression, brass stem, chrome plated
- OCR3B C      3/8" nom compression x 1/2" OD compression, chrome plated
- OCR09 C      1/2" nom compression x 1/4" OD compression, chrome plated
- OCR09 C1    1/2" nom compression x 1/4" OD compression, chrome plated, window box
- OCR09 CBT   1/2" nom compression x 1/4" OD compression, chrome plated, bulk

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**BrassCraft®**

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400.28 OCR09/19/39 Multi-Turn Angle Stop - Compr x Compr REV 10/12

## OCR1B/ OCR3B & OCR09/ OCR19/ OCR39/ OCR49

### Multi-Turn Angle Stop – Compression x Compression

#### Standard Part Listing (con't):

<input type="checkbox"/>	OCR09 R	1/2" nom compression x 1/4" OD compression, rough brass
<input type="checkbox"/>	OCR09Z C	1/2" nom compression x 1/4" OD compression, brass stem, chrome plated
<input type="checkbox"/>	OCR09Z R	1/2" nom compression x 1/4" OD compression, brass stem, rough brass
<input type="checkbox"/>	OCR19 C	1/2" nom compression x 3/8" OD compression, chrome plated
<input type="checkbox"/>	OCR19 CBT	1/2" nom compression x 3/8" OD compression, chrome plated, bulk
<input type="checkbox"/>	OCR19 C1	1/2" nom compression x 3/8" OD compression, chrome plated, window box
<input type="checkbox"/>	OCR19 BZ	1/2" nom compression x 3/8" OD compression, oil rubbed bronze
<input type="checkbox"/>	OCR19 NP	1/2" nom compression x 3/8" OD compression, polished nickel
<input type="checkbox"/>	OCR19 NS	1/2" nom compression x 3/8" OD compression, satin nickel
<input type="checkbox"/>	OCR19 P	1/2" nom compression x 3/8" OD compression, polished brass
<input type="checkbox"/>	OCR19 R	1/2" nom compression x 3/8" OD compression, rough brass
<input type="checkbox"/>	OCR19 RB	1/2" nom compression x 3/8" OD compression, rough brass, bulk
<input type="checkbox"/>	OCR19 RBT	1/2" nom compression x 3/8" OD compression, rough brass, bulk
<input type="checkbox"/>	OCR19 R1	1/2" nom compression x 3/8" OD compression, rough brass, window box
<input type="checkbox"/>	OCR19K C	1/2" nom compression x 3/8" OD compression, plastic handle, chrome plated
<input type="checkbox"/>	OCR19K CB	1/2" nom compression x 3/8" OD compression, plastic handle, chrome plated, bulk
<input type="checkbox"/>	OCR19KL1 CB	1/2" nom compression x 3/8" OD compression, less outlet nut, plastic handle, chrome plated, bulk
<input type="checkbox"/>	OCR19KL1 RB	1/2" nom compression x 3/8" OD compression, less outlet nut, plastic handle, rough brass, bulk
<input type="checkbox"/>	OCR19L1 CB	1/2" nom compression x 3/8" OD compression, less outlet nut, chrome plated, bulk
<input type="checkbox"/>	OCR19L1 RB	1/2" nom compression x 3/8" OD compression, less outlet nut, rough brass, bulk
<input type="checkbox"/>	OCR19L4 C100T	1/2" nom compression x 3/8" OD compression, less inlet nut, chrome plated, bulk
<input type="checkbox"/>	OCR19P C	1/2" nom compression x 3/8" OD compression, less handle, handle screw included, chrome plated
<input type="checkbox"/>	OCR19P R	1/2" nom compression x 3/8" OD compression, less handle, handle screw included, rough brass
<input type="checkbox"/>	OCR19PX C	1/2" nom compression x 3/8" OD compression, PEX insert, chrome plated
<input type="checkbox"/>	OCR19PX R	1/2" nom compression x 3/8" OD compression, PEX insert, rough brass
<input type="checkbox"/>	OCR19T CB	1/2" nom compression x 3/8" OD compression, chrome plated, no tray, bulk
<input type="checkbox"/>	OCR19Z C	1/2" nom compression x 3/8" OD compression, brass stem, chrome plated
<input type="checkbox"/>	OCR19Z R	1/2" nom compression x 3/8" OD compression, brass stem, rough brass
<input type="checkbox"/>	OCR29 C	1/2" nom compression x 7/16" OD compression, chrome plated
<input type="checkbox"/>	OCR29 C1	1/2" nom compression x 7/16" OD compression, chrome plated, window box
<input type="checkbox"/>	OCR29 R	1/2" nom compression x 7/16" OD compression, rough brass
<input type="checkbox"/>	OCR29Z C	1/2" nom compression x 7/16" OD compression, brass stem, chrome plated
<input type="checkbox"/>	OCR39 C	1/2" nom compression x 1/2" OD compression, chrome plated
<input type="checkbox"/>	OCR39 CBT	1/2" nom compression x 1/2" OD compression, chrome plated, bulk
<input type="checkbox"/>	OCR39 C1	1/2" nom compression x 1/2" OD compression, chrome plated, window box
<input type="checkbox"/>	OCR39 R	1/2" nom compression x 1/2" OD compression, rough brass
<input type="checkbox"/>	OCR39Z C	1/2" nom compression x 1/2" OD compression, brass stem, chrome plated
<input type="checkbox"/>	OCR49 C	1/2" nom compression x 5/8" OD compression, chrome plated
<input type="checkbox"/>	OCR49Z C	1/2" nom compression x 5/8" OD compression, brass stem, chrome plated

#### Compliant Part Listing:

<input type="checkbox"/>	OCR09X C	1/2" nom compression x 1/4" OD compression, chrome plated
<input type="checkbox"/>	OCR09X C1	1/2" nom compression x 1/4" OD compression, chrome plated, window box

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400.28 OCR09/19/39 Multi-Turn Angle Stop - Compr x Compr REV 10/12

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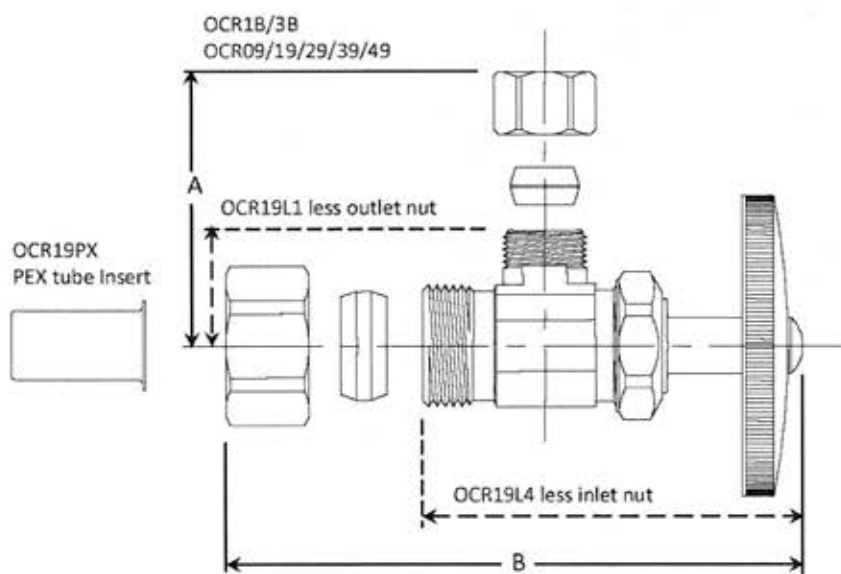
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# OCR1B/ OCR3B & OCR09/ OCR19/ OCR39/ OCR49

## Multi-Turn Angle Stop – Compression x Compression

**Compliant Part Listing (con't):**

- OCR09X R 1/2" nom compression x 1/4" OD compression, rough brass
- OCR19X C 1/2" nom compression x 3/8" OD compression, chrome plated
- OCR19X C1 1/2" nom compression x 3/8" OD compression, chrome plated, window box
- OCR19X R 1/2" nom compression x 3/8" OD compression, rough brass
- OCR19X R1 1/2" nom compression x 3/8" OD compression, rough brass, window box
- OCR19L1X CB 1/2" nom compression x 3/8" OD compression, less outlet nut, chrome plated, bulk
- OCR19L1X RB 1/2" nom compression x 3/8" OD compression, less outlet nut, rough brass, bulk
- OCR19L4X C100T 1/2" nom compression x 3/8" OD compression, less inlet nut, chrome plated, 100 per case
- OCR19PXX C 1/2" nom compression x 3/8" OD compression, PEX insert, chrome plated
- OCR19ZX C 1/2" nom compression x 3/8" OD compression, brass stem, chrome plated
- OCR29X C 1/2" nom compression x 7/16" OD compression, chrome plated
- OCR29X C1 1/2" nom compression x 7/16" OD compression, chrome plated, window box
- OCR29X R 1/2" nom compression x 7/16" OD compression, rough brass
- OCR39X C 1/2" nom compression x 1/2" OD compression, chrome plated
- OCR39X CBT 1/2" nom compression x 1/2" OD compression, chrome plated, bulk
- OCR39X C1 1/2" nom compression x 1/2" OD compression, chrome plated, window box
- OCR39X R 1/2" nom compression x 1/2" OD compression, rough brass



PART DIMENSIONS (Inches)		
Model	DIM. A	DIM. B
OCR1B	1.02	2.75
OCR3B	1.11	2.75
OCR09	1.02	2.75
OCR19	1.02	2.75
OCR19K	1.02	2.75
OCR19L1	.74	2.75
OCR19L4	1.02	2.41
OCR19P	1.02	2.41
OCR19PX	1.02	2.41
OCR29	1.18	2.85
OCR39	1.11	2.85
OCR49	1.18	2.97

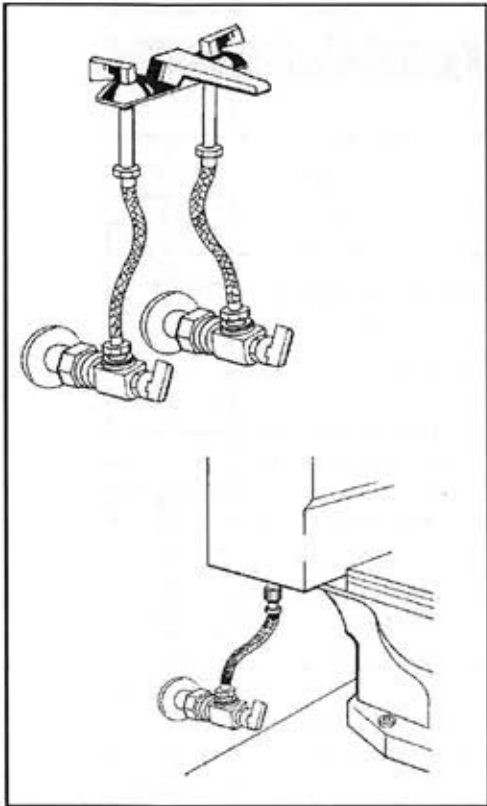
**Listings & Certifications:**

- IAPMO listed to ASME A112.18.1 / CSA B125.1 (File # 0645)
- CSA listed to ASME A112.18.1 / CSA B125.1 (File # 204593)
- Compliant product CSA listed to Low Lead Content Certification Program – Plumbing Products Class 6853-01



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**BrassCraft®**



**MIGHTYFLEX  
STAINLESS STEEL CONNECTORS**  
Specification Sheet

**DESIGN FEATURES**

- Chloramine resistant soft cone.
- Exclusive POWR-TIGHT 12-point crimp-many times industry standard.
- Chloramine resistant tubing
- Withstands dramatic changes in water pressure
- Easy installation, no special tools required

**COMPLIANCES/LISTINGS**

- IAPMO Certified
- NSF Compliant
- ASME A112.18.6

**MATERIAL SPECIFICATION**

- Working Pressure: 160 psi Maximum
- Operating Temperature: 33°F-140°F
- Tubing: Reinforced PVC, NSF 61 Compliant
- Nuts & End fittings - Nickel Plated Brass
- Washers - NSF 61 Compliant



3689 Arrowhead Drive, Carson City, NV 89706  
 Phone (800) 854-3215 Fax (800) 243-1777  
 E-mail sales@lspproducts.com Website www.lspproducts.com

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AF/S-2010 (04-08) Rev 4

Product Submittal	
Job Name	
Date	
Part Number	Quantity
Architect	
Contractor	





## MIGHTYFLEX STAINLESS STEEL CONNECTORS

Specification Sheet

FAUCET CONNECTORS			
PART NUMBER	DESCRIPTION	LENGTH	
SFC-109-PP	1/2" FIP Soft Cone x 3/8" Soft Compression	9"	
SFC-112-PP		12"	
SFC-116-PP		16"	
SFC-120-PP		20"	
SFC-124-PP		24"	
SFC-130-PP		30"	
SFC-136-PP		36"	
SFC-148-PP		48"	
SFC-196-PP		96"	
SFC-312-PP		1/2" FIP Soft Cone x 1/2" Compression Soft Cone	12"
SFC-316-PP			16"
SFC-320-PP			20"
SFC-324-PP			24"
SFC-330-PP			30"
SFC-348-PP	48"		
SFC-409-PP	1/2" FIP Soft Cone x 1/2" FIP Soft Cone	9"	
SFC-412-PP		12"	
SFC-416-PP		16"	
SFC-420-PP		20"	
SFC-424-PP		24"	
SFC-430-PP		30"	
SFC-436-PP		36"	
SFC-448-PP		48"	
SFC-506-PP		6"	
SFC-509-PP		9"	
SFC-512-PP	3/8" Soft Compression x 3/8" Soft Compression	12"	
SFC-516-PP		16"	
SFC-520-PP		20"	
SFC-524-PP		24"	
SFC-530-PP		30"	
SFC-548-PP		48"	
SFC-572-PP		72"	
SFF-112-PP		1/2" FIP Soft Cone x 3/8" Flare	12"
SFF-116-PP	16"		
SFF-120-PP	20"		
SFF-130-PP	30"		
SFF-312-PP	1/2" FIP Soft Cone x 1/2" Flare	12"	
SFF-316-PP		16"	
SFF-320-PP		20"	
SFF-330-PP		30"	

TOILET CONNECTORS		
PART NUMBER	DESCRIPTION	LENGTH
SFT-109-PP	7/8" Soft Cone Ballcock x 3/8" Flare	9"
SFT-112-PP		12"
SFT-116-PP		16"
SFT-120-PP		20"
SFT-309-PP		9"
SFT-312-PP	7/8" Soft Cone Ballcock x 1/2" Flare	12"
SFT-316-PP		16"
SFT-320-PP		20"
SWC-106-PP	7/8" Soft Cone Ballcock x 3/8" Soft Compression	6"
SWC-109-PP		9"
SWC-112-PP		12"
SWC-116-PP		16"
SWC-120-PP	20"	
SWC-306-PP	7/8" Soft Cone Ballcock x 1/2" Compression Soft Cone	6"
SWC-309-PP		9"
SWC-312-PP		12"
SWC-316-PP		16"
SWC-320-PP	20"	
SWC-406-PP	7/8" Soft Cone Ballcock x 1/2" FIP Soft Cone	6"
SWC-409-PP		9"
SWC-412-PP		12"
SWC-416-PP		16"
SWC-420-PP		20"



3689 Arrowhead Drive, Carson City, NV 89706

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Content matter is subject to change at any time. It is the user responsibility to ensure the most updated revisions are obtained.

AF/S-2010 (04-03) Rev 3



# Escutcheons

## Standard Type

### Product Features

- Fits iron pipe and copper tube
- Chrome plated steel and polished brass

### Model Numbers

#### Iron pipe sizes (chrome plated)

PFE1	3/8"
PFE2	1/2"
PFE8	3/4"
PFE9A	1"
PFE10	1-1/4"
PFE11	1-1/2"
PFE16A	2"

#### Iron pipe sizes (polished brass)

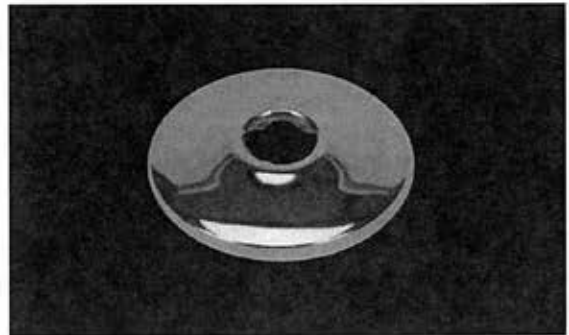
PFE2PB	1/2"
PFE11PB	1-1/2"

#### Copper tube sizes (chrome plated)

PFE7	5/8" OD
PFE9	7/8" OD

#### Copper tube sizes (polished brass)

PFE7PB	5/8" OD
--------	---------



PFE1

### Warranty and Codes

The PROFLO product carries a 1-year limited warranty.

# PF200 Series Trap Covers



### Product Features

- ADA & UFAS Compliant
- No tools required contractor friendly Tear-To-Fit feature makes trimming fast
- Universal design fits virtually all lavatory applications
- Smooth, flush SnapClip™ fasteners firmly secure piping covers in place and are nonabrasive and reusable
- Antimicrobial vinyl maintain sanitary conditions
- Lock Lid™ on valve stops tampering and allows service
- Cleanout nut cap allows service on trap without disassembly
- Internal ribs enhance K valve and soften impact cushioning
- Fire retardant

### Model Numbers

PF200WH	PF202WH	PF205WH	PFEXT299WH
PF201WH	PF203WH	PF299WH	PFEXT200WH

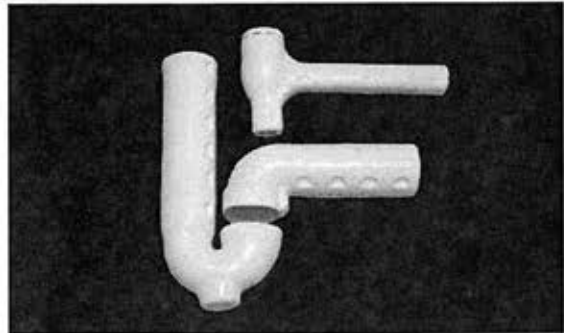
Material	Soft, resilient molded vinyl
Nominal Wall	1/8" constant with internal ribs
Durometer	70-80 – Shore A
UV Protection	Will not fade or discolor
Durability	Virtually indestructible
Trimming	E-Z Tear-To-Fit trim feature (no tools needed)
Fasteners	Internal E-Z Grip fasteners, reusable
Color	China white
Compatibility	Fits all 1-1/4" or 1-1/2" cast brass or tubular P-trap assemblies and 3/8" or 1/2" angle stop assemblies
Paintability	Apply latex paint
Burning Characteristics ASTM D-635	Self extinguished 0 sec (ATB) mm (AEB)
Bacterial/Fungus Resistance	ASTM G21 and G22 – Result: 0 growth
Maintenance	Wipe clean using common detergents

New E-Z Tear-To-Fit feature and E-Z Grip built-in fasteners make installation fast and easy!

1. Tear-To-Fit on internal, dimensioned tear lines for quick, clean, accurate trimming to fit virtually any piping configuration. Covers flex to install over pipes.
2. Press seams together at finger recesses to engage E-Z Grip internal fasteners for a secure, safe, tamper-resistant installation. To remove cover, firmly pull seam apart using a strong grip. To reinstall, press seams back together.

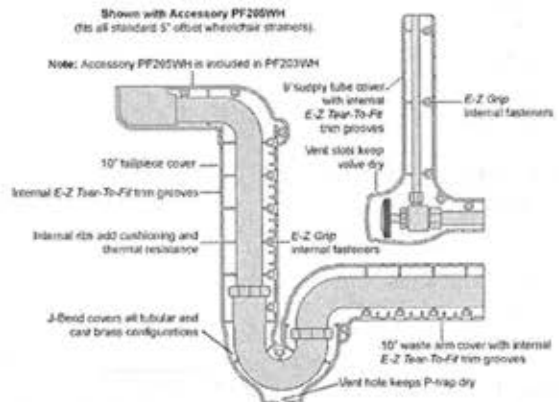
### Warranty and Codes

This PROFLO product carries a 1-year limited warranty. This product meets ADA article 4.19.4; CABO/ANSI 4.20.4; UFAS 4.19.4; California Title 24; UPC/IAPMO ICC; Canada Barrier-Free Code. Made in USA.



PF201WH

### Product Specifications



PF200WH	one P-trap cover
PF201WH	one P-trap cover, one angle valve and supply cover
PF202WH	one P-trap cover, two angle valves and supply covers
PF203WH	one P-trap cover, two angle valves and supply covers, one 5" offset tailpiece wheelchair strainer cover
PF299WH	one angle valve and supply cover
<b>ACCESSORIES</b>	
PF205WH	one 5" offset tailpiece wheelchair strainer assembly
<b>EXTENSIONS</b>	
PFEXT299WH	one 16" extension for water supply
PFEXT200WH	one 16" extension for drain waste or tailpiece



**P3A**

K-5452-ET

KOHLER

**P-3A**

KOHLER DEXTER 1-PINT URINAL



**Dexter™ 0.125 gpf.**  
 1-Pint Urinal  
 K-5452-ET

**Features**

- Washout urinal.
- 3/4" top spud.
- 1-pint or 0.125 gpf ( 0.47 lpf).
- Includes inlet and outlet spuds and hangers.
- Includes anti-backsplash wall.
- 14-3/4" (375 mm) extended rim.

**Material**

- Vitreous china.

**Water Conservation & Rebates**

- WaterSense® compliant when used with WaterSense flushometer.

**Components**

Additional included component/s: 3/4" Inlet Spud, 2" Outlet Spud, and Hanger (1 required).



ADA

**Codes/Standards**

ASME A112.19.2/CSA B45.1  
 DOE - Energy Policy Act 1992  
 EPA WaterSense®  
 ADA  
 ICC/ANSI A117.1

**KOHLER® One-Year Limited Warranty**

See website for detailed warranty information.

**Available Color/Finishes**

*Color tiles intended for reference only.*

Color	Code	Description
	0	White
	96	Biscuit
	47	Almond
	7	Black Black™

USA/Canada: 1-800-4KOHLER (1-800-456-4537)

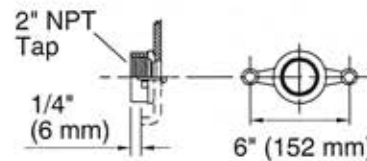
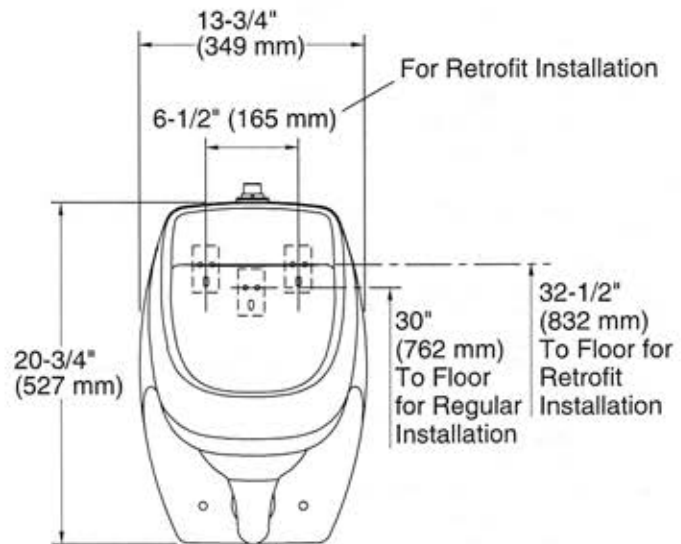
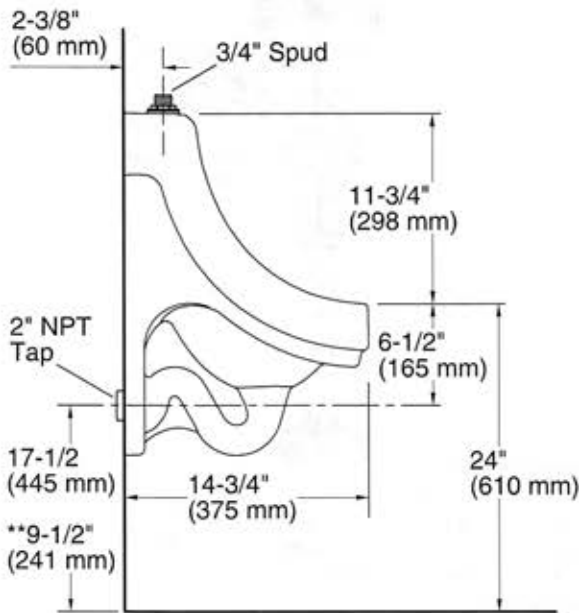
Kohler Co. reserves the right to make revisions without notice to product specifications.

For the most current Specification Sheet, go to [www.kohler.com](http://www.kohler.com).

1-13-2017 05:46

THE BOLD LOOK  
 OF **KOHLER.**

\* Urinal complies with ADA  
 \*\*Recommended outlet height for ADA compliance.



Spud Detail

### Technical Information

All product dimensions are nominal.

Flush outlet technology: Washout

Spud size: 3/4", Inlet, Top

Min. Water per Flush: 0.125 gal (0.5 L)

Max. Water per Flush: 0.125 gal (0.5 L)

Designed for the above water use when installed with a water-saving flushometer.

### Pressure and Supply Requirements

Fixture pressure min 25 psi (172.4 kPa)  
 (static):

Fixture pressure max 80 psi (551.6 kPa)  
 (static):

### Notes

Designed only for use with a 0.125 gpf (0.5 lpf) flushometer.

Install this product according to the installation instructions.

ADA compliant when installed to the specific requirements of these regulations.

## Description

Exposed, battery-powered, sensor-activated Sloan ECOS® electronic urinal flushometer with Smart Sense Technology™.

## Flush Cycle

- Model 8186-0.125 High Efficiency (0.125 gpf/0.5 Lpf)
- Model 8186-0.25 High Efficiency (0.25 gpf/1.0 Lpf)
- Model 8186-0.5 High Efficiency (0.5 gpf/1.9 Lpf)

## Specifications

Quiet, Exposed, Chrome Plated Urinal flushometer for either left or right hand supply with the following features:

For flushing volumes 0.125 gpf and 0.25 gpf:

- Pressure compensating cartridge assembly
- Synthetic rubber seals for chloramine resistance

For flushing volume 0.5 gpf:

- PERMEX® Synthetic Rubber Flex Tube Diaphragm with twin linear filtered bypass and vortex cleansing action
- Flush Accuracy Controlled by CID Technology

For all flushing volumes:

- Latching Solenoid Operator
- Engineered Metal Cover with replaceable Lens Window
- User friendly three (3) second Flush Delay
- Courtesy Flush® Override Button (optional)
- Four (4) Size AA alkaline Batteries included: Duracell® with DURALOCK Power Preserve Technology™-guaranteed for up to 10 years in storage
- "Low Battery" Flashing LED
- Infrared Sensor Range Adjustment Screw
- Initial Set-up Range Indicator Light (first 10 minutes)
- 3/4" I.P.S. Screwdriver Bak-Chek® Angle Stop
- Free Spinning, Vandal Resistant Stop Cap
- Adjustable Tailpiece
- Spud Coupling and Flange for 3/4" Top Spud
- Reduces water usage up to 80% over standard sensor urinal
- ADA Compliant Sloan ECOS® Battery powered Infrared Sensor for automatic "No Hands" operation
- Infrared sensor with multiple-focused, lobular sensing fields for high and low target detection
- High Back Pressure Vacuum Breaker Flush Connection with One-piece Bottom Hex Coupling Nut
- Sweat Solder Adapter with Cover Tube and Cast Wall Flange with Set Screw
- High Copper, Low Zinc Brass Castings for Dezincification Resistance
- Fixed Metering Bypass and No External Volume Adjustment to Ensure Water Conservation
- Stop Seat and Vacuum Breaker molded from PERMEX® Rubber Compound for Chloramine resistance

Valve Body, Tailpiece and Control Stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass. Valve in compliance with the applicable sections of ASSE 1037. Installation conforms to ADA requirements.

## Special Finishes

- PVDPB Polished Brass
- PVDBN Brushed Nickel
- PVDSF Satin Finish

## Variations

- OR With Override

## Accessories

See Accessories Section and Sloan ECOS® accessories section of the Sloan catalog for details on these and other Sloan ECOS® flushometer variations.

## Fixtures



Shown with optional override button



## Manual Operation

Sloan ECOS® electronic urinal flushometers are available without an override button to eliminate unnecessary casual activation. The Sloan ECOS® flushometers are offered with an *optional* Override Button to allow a "Courtesy Flush®" for individual user comfort.

## Automatic Operation

Sloan ECOS® electronic flushometers can also be activated via multi-lobular infrared sensor. By detecting user presence and duration, the Sloan ECOS® Smart Sense Technology™.

## Smart Sense Technology

The Sloan ECOS® flushometer is equipped with Smart Sense Technology™ which applies extended range and logic techniques to significantly reduce water usage in high use urinal applications; such as when a continuous line of people, also known as a queue, forms. In fact during continuous queue, regardless the number of users, the maximum amount of water used is only 2.0 gallons or less. Please contact Sloan for specific details.

## Functional & Hygienic

Touchless, sensor operation eliminates the need for user contact to help control the spread of infectious diseases.

## Warranty

3 year (limited)




This space for Architect/Engineer approval	
Job Name _____	Date _____
Model Specified _____	Quantity _____
Variations Specified _____	
Customer/Wholesaler _____	
Contractor _____	
Architect _____	

**PRODUCT SPECIFICATIONS**

Elkay Lustertone Stainless Steel 23-1/2" x 18-1/4" x 4-7/8", Single Bowl Undermount ADA Sink with Perfect Drain. Sink is manufactured from 18 gauge 304 Stainless Steel with a Lustertone finish, Rear Center drain placement, and Full spray sides and bottom.

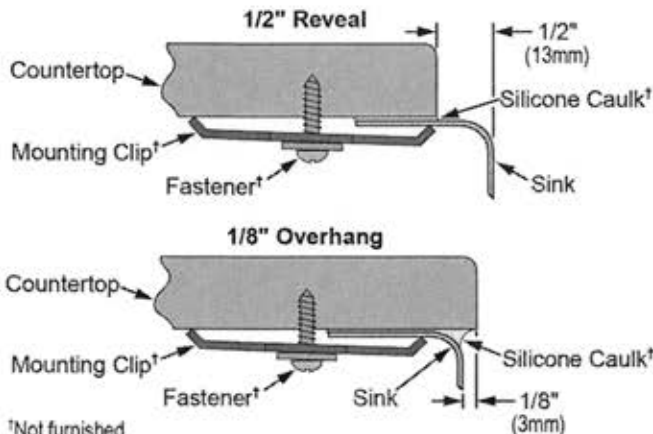
<b>Installation Type:</b>	Undermount
<b>Material:</b>	304 Stainless Steel
<b>Special Features:</b>	Perfect Drain
<b>Finish:</b>	Lustertone
<b>Gauge:</b>	18
<b>Sound Deadening:</b>	Full spray sides and bottom
<b>Number of Bowls:</b>	1
<b>Sink Dimensions:</b>	23-1/2" x 18-1/4" x 4-7/8"
<b>Bowl 1 Dimensions:</b>	21" x 15-3/4" x 4-7/8"
<b>Drain Size:</b>	3-3/8" (86mm)
<b>Drain Location:</b>	Rear Center
<b>Minimum Cabinet Size:</b>	27"
<b>Mounting Hardware:</b>	Undermount brackets sold separately
<b>Template Included:</b>	Yes
<b>Cutout Template #:</b>	1000001400

Template is available for download at [elkay.com](http://elkay.com)

 This sink is compliant to ADA and ANSI/ICC A117.1 accessibility requirements when installed according to the requirements outlined in these standards.

**Perfect Drain:** Seamlessly welded stainless steel collar eliminates the gap between a traditional drain and the sink for a sanitary and gap free installation. An InSinkErator® garbage disposer can be installed on either sink bowl for user convenience. **Patent Pending**

**Installation Profile:**



\*Not furnished  
Designed to affix to the underside of any solid surface countertop.


PART: \_\_\_\_\_ QTY: \_\_\_\_\_  
 PROJECT: \_\_\_\_\_  
 CONTACT: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 NOTES: \_\_\_\_\_  
 APPROVAL: \_\_\_\_\_



**Included with Product:** One LKPD1 Perfect Drain and Strainer

**AMERICAN PRIDE. A LIFETIME TRADITION.**  
Like your family, the Elkay family has values and traditions that endure. For almost a century, Elkay has been a family-owned and operated company, providing thousands of jobs that support our families and communities.

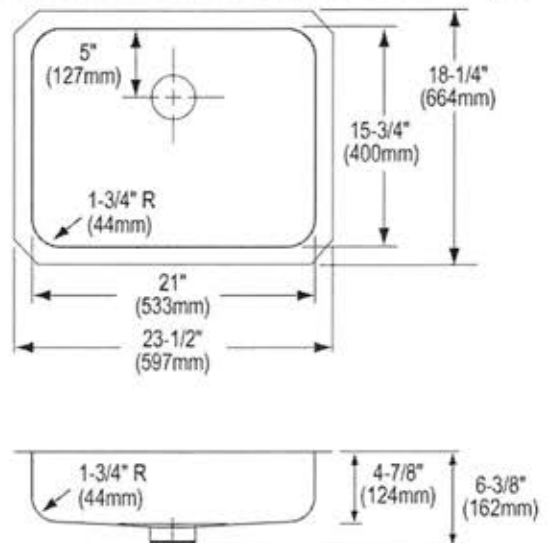


 Sinks are listed by IAPMO® as meeting the applicable requirements of the Uniform Plumbing Code®, International Plumbing Code®, and National Plumbing Code of Canada.

**Product Compliance:** ADA & ICC A117.1  
ASME A112.19.3/CSA B45.4  
BUY AMERICAN ACT  
Accessory: ASME A112.18.2/CSA B125.2

[Clean and Care Manual \(PDF\)](#)  
[Installation Instructions \(PDF\) - 1000002045](#)  
[Installation Instructions \(PDF\) - 74180289 Disposer](#)  
[Installation Instructions \(PDF\) - 74180340-USA Drain](#)  
[Limited Lifetime Warranty \(PDF\)](#)

**Similar models are available with:** additional ADA depths



In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit [elkay.com](http://elkay.com) for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.



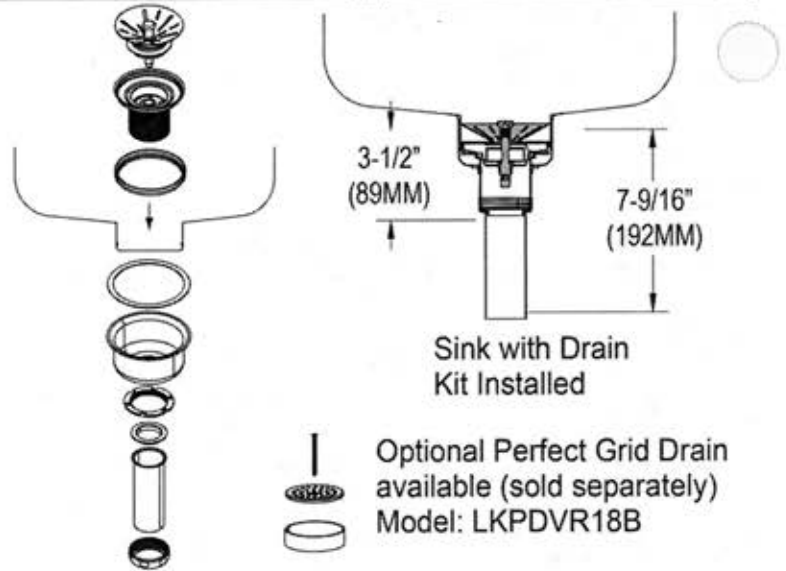
**OPTIONAL ACCESSORIES**

Bottom Grid:	LKWOBG2115SS
Cutting Board:	CB1516*
Drain:	LKPDVR18B, LKPDAD18B, LKDS99
Faucet:	LKGT1041, LKGT2041
Hardware:	LKUCLIP8
Rinsing Basket:	LKWRB2115SS, LKWERBSS
Sinkmate:	LKSMHSL
Soap Dispenser:	LKGT1054
* 1/2" sink reveal required for proper fit.	

**in sink erator**

Elkay<sup>®</sup> Perfect Drain<sup>™</sup> sinks are designed and approved for compatible disposers manufactured by InSinkErator<sup>®</sup> utilizing the Quick Lock<sup>®</sup> mounting configuration. Use of non-approved disposers may void Elkay warranty.

InSinkErator, Quick Lock and the mounting collar configuration are trademarks of Emerson Electric Co.



Sink with Drain Kit Installed

Optional Perfect Grid Drain available (sold separately)  
Model: LKPDVR18B

*In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit [elkay.com](http://elkay.com) for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.*

## Focus

**Focus 2-Spray HighArc Kitchen Faucet, Pull-Down, 1.75 GPM**

Finishes : **Chrome** Part no. : **04505000**



### Description

#### Features

- Swivel range 150°
- Laminar and needle spray
- Toggle spray diverter
- MagFit magnetic sprayhead docking
- Flow: 1.75 GPM
- Ceramic cartridge
- 3/4" compression

#### Optional accessories

- Focus Bar Faucet (#04507USA)
- Base Plate for Focus and Talis S Kitchen Faucets, 10" (#06473USA)

### Item details

List Price

\$ 435.00

### Technology



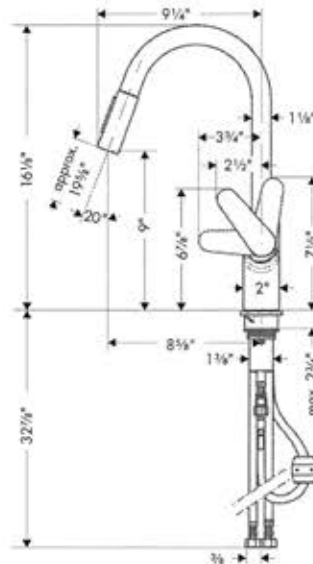
### Compliance



### Product image



### Scale drawing



**FCO-1**  
401-Y0, 410-12

JR Smith

**FCO-1 FLOOR CLEANOUT**  
ACCESS HOUSING WITH ADJUSTABLE ANCHOR FLANGE

# FLOOR CLEANOUTS AND ACCESSORIES

TAG          COTG         

## 400 Series

### Adjustable Floor Cleanout for Non-Membrane Floors, Series 410

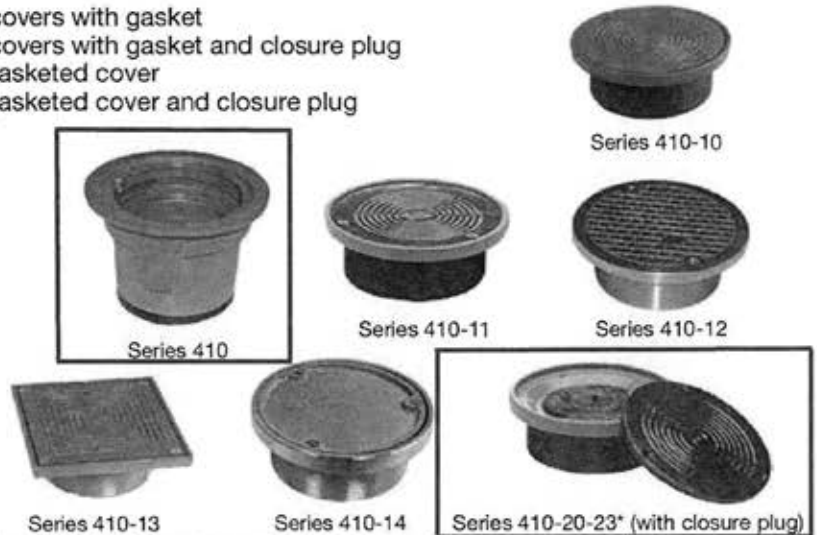
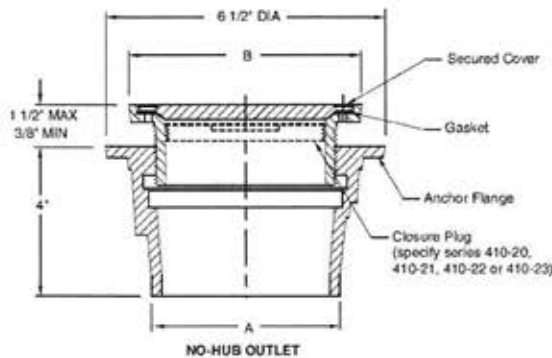
**Product Description:** Designed for use in non-membrane floor areas. Complete with cast iron body coated to protect against corrosion, an adjustable cleanout and a Scoriated gasketed cover.

**Features and Benefits, Body:**

- Designed for non-membrane floors
- Cast iron body coated to protect against corrosion
- Push-on (service weight and extra heavy) and no-hub outlets available in 2", 3" and 4" pipe sizes

**Features and Benefits, Tops:**

- Round and square nickel bronze secured solid covers with gasket
- Round and square nickel bronze secured solid covers with gasket and closure plug
- Round cast iron and cast iron with ductile iron gasketed cover
- Round cast iron and cast iron with ductile iron gasketed cover and closure plug
- 4" NPSM straight threaded shank on tops



Series Number	Description	Outlet Size-"A"	Outlet Type
<input type="checkbox"/> 410-L02	Adjustable Cleanout, Body Only	2"	Push-On, Service Weight or No-Hub CI Pipe
<input type="checkbox"/> 410-L03	Adjustable Cleanout, Body Only	3"	Push-On, Service Weight or No-Hub CI Pipe
<input type="checkbox"/> 410-L04	Adjustable Cleanout, Body Only	4"	Push-On, Service Weight or No-Hub CI Pipe
<input type="checkbox"/> 410-LXH02	Adjustable Cleanout, Body Only	2"	Push-On, Extra Heavy Weight CI or PVC Pipe
<input type="checkbox"/> 410-LXH03	Adjustable Cleanout, Body Only	3"	Push-On, Extra Heavy Weight CI or PVC Pipe
<input type="checkbox"/> 410-LXH04	Adjustable Cleanout, Body Only	4"	Push-On, Extra Heavy Weight CI or PVC Pipe
<input checked="" type="checkbox"/> 410-Y02	Adjustable Cleanout, Body Only	2"	No-Hub
<input checked="" type="checkbox"/> 410-Y03	Adjustable Cleanout, Body Only	3"	No-Hub
<input checked="" type="checkbox"/> 410-Y04	Adjustable Cleanout, Body Only	4"	No-Hub
Series Number	Description	Top Size-"B"	Pipe Size
<input type="checkbox"/> 410-10	Adj. Round Cast Iron Solid Cover (Medium Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-11	Adj. Round CI w/Ductile Iron Solid Cover (Heavy Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input checked="" type="checkbox"/> 410-12	Adj. Round Nickel Bronze Solid Cover (Medium Duty)	6"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-13	Adj. Square Nickel Bronze Solid Cover (Medium Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-14	Adj. Round NB Solid Cover, Tile Recess (Medium Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-20	Adj. Round C.I. Solid Cover, w/Closure Plug (Med. Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-21	Adj. Round C.I. w/D.I. Solid Cover w/Closure Plug (Hvy. Duty)	6"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-22	Adj. Round NB Solid Cover w/Closure Plug (Med. Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-23	Adj. Square NB Solid Cover w/Closure Plug (Med. Duty)	5-3/4"	4" NPSM Straight Threaded Shank

NOTE: Dimensional data is subject to manufacturing tolerances and change without notice.

\*To order with closure plug see 410-20, 21, 22, 23



Built By:  
**JAY R. SMITH MFG. CO.**  
DIVISION OF SMITH INDUSTRIES, INC.

**Series 410**  
SPM 1013  
6/06

**COTG1**  
401-Y0, 410-12

JR Smith

**COTG-1 CLEANOUT TO GRADE**  
ACCESS HOUSING WITH ADJUSTABLE ANCHOR FLANGE

# FLOOR CLEANOUTS AND ACCESSORIES

TAG          COTG         

## 400 Series

### Adjustable Floor Cleanout for Non-Membrane Floors, Series 410

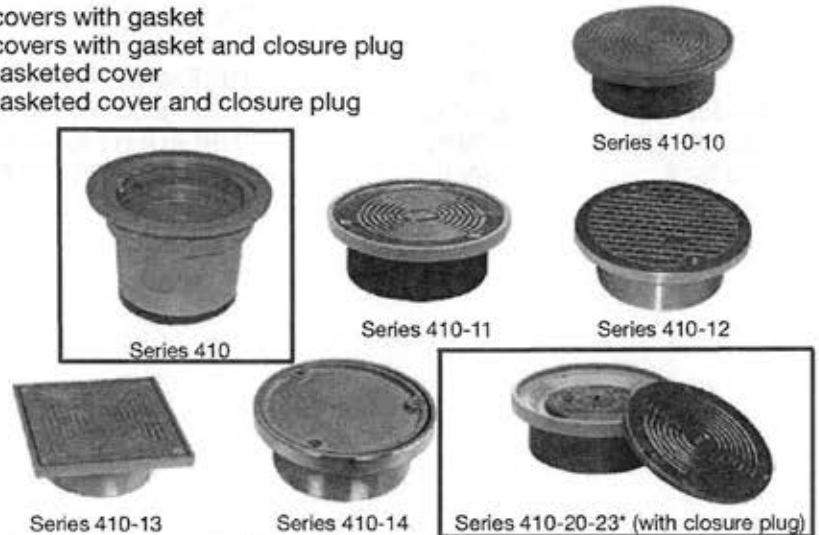
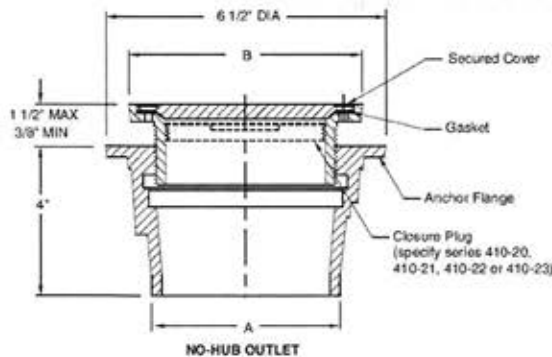
**Product Description:** Designed for use in non-membrane floor areas. Complete with cast iron body coated to protect against corrosion, an adjustable cleanout and a Scoriated gasketed cover.

**Features and Benefits, Body:**

- Designed for non-membrane floors
- Cast iron body coated to protect against corrosion
- Push-on (service weight and extra heavy) and no-hub outlets available in 2", 3" and 4" pipe sizes

**Features and Benefits, Tops:**

- Round and square nickel bronze secured solid covers with gasket
- Round and square nickel bronze secured solid covers with gasket and closure plug
- Round cast iron and cast iron with ductile iron gasketed cover
- Round cast iron and cast iron with ductile iron gasketed cover and closure plug
- 4" NPSM straight threaded shank on tops



Series Number	Description	Outlet Size-"A"	Outlet Type
<input type="checkbox"/> 410-L02	Adjustable Cleanout, Body Only	2"	Push-On, Service Weight or No-Hub CI Pipe
<input type="checkbox"/> 410-L03	Adjustable Cleanout, Body Only	3"	Push-On, Service Weight or No-Hub CI Pipe
<input type="checkbox"/> 410-L04	Adjustable Cleanout, Body Only	4"	Push-On, Service Weight or No-Hub CI Pipe
<input type="checkbox"/> 410-LXH02	Adjustable Cleanout, Body Only	2"	Push-On, Extra Heavy Weight CI or PVC Pipe
<input type="checkbox"/> 410-LXH03	Adjustable Cleanout, Body Only	3"	Push-On, Extra Heavy Weight CI or PVC Pipe
<input type="checkbox"/> 410-LXH04	Adjustable Cleanout, Body Only	4"	Push-On, Extra Heavy Weight CI or PVC Pipe
<input checked="" type="checkbox"/> 410-Y02	Adjustable Cleanout, Body Only	2"	No-Hub
<input checked="" type="checkbox"/> 410-Y03	Adjustable Cleanout, Body Only	3"	No-Hub
<input checked="" type="checkbox"/> 410-Y04	Adjustable Cleanout, Body Only	4"	No-Hub
Series Number	Description	Top Size-"B"	Pipe Size
<input type="checkbox"/> 410-10	Adj. Round Cast Iron Solid Cover (Medium Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-11	Adj. Round CI w/Ductile Iron Solid Cover (Heavy Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input checked="" type="checkbox"/> 410-12	Adj. Round Nickel Bronze Solid Cover (Medium Duty)	6"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-13	Adj. Square Nickel Bronze Solid Cover (Medium Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-14	Adj. Round NB Solid Cover, Tile Recess (Medium Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-20	Adj. Round C.I. Solid Cover, w/Closure Plug (Med. Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-21	Adj. Round C.I. w/D.I. Solid Cover w/Closure Plug (Hvy. Duty)	6"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-22	Adj. Round NB Solid Cover w/Closure Plug (Med. Duty)	5-3/4"	4" NPSM Straight Threaded Shank
<input type="checkbox"/> 410-23	Adj. Square NB Solid Cover w/Closure Plug (Med. Duty)	5-3/4"	4" NPSM Straight Threaded Shank

NOTE: Dimensional data is subject to manufacturing tolerances and change without notice.

\*To order with closure plug see 410-20, 21, 22, 23



Built By:  
**JAY R. SMITH MFG. CO.**  
DIVISION OF SMITH INDUSTRIES, INC.

**Series 410**  
SPM 1013  
6/06

**CO1**

W8552B WADE

W8553B WADE

W8554B WADE

W8556B WADE

W859112B WADE

W8592B WADE

W8593B WADE

W859312B WADE

W8594B WADE

**CO-1 CLEANOUT**CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS  
RAISED HEAD PLUG - 2"CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS  
RAISED HEAD PLUG - 3"CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS  
RAISED HEAD PLUG - 4"CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS  
RAISED HEAD PLUG - 6"

THREADED BRASS RAISED HEAD PLUG - 1-1/2"

THREADED BRASS RAISED HEAD PLUG - 2"

THREADED BRASS RAISED HEAD PLUG - 3"

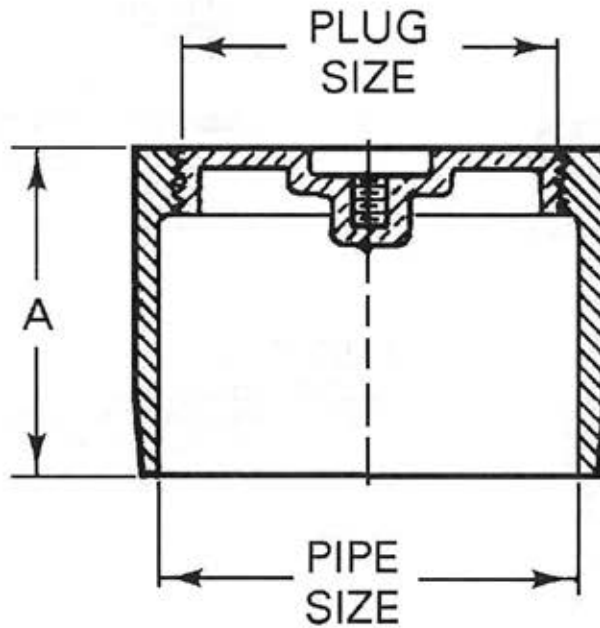
THREADED BRASS RAISED HEAD PLUG - 3-1/2"

THREADED BRASS RAISED HEAD PLUG - 4"

# Cleanout Ferrule w/ Plug

**WADE**

8550 (B orE) Cast Iron cleanout ferrule with spigot outlet and threaded brass raised head, or countersunk plug drilled and tapped for 1/4"-20 screw.



Cat. No.	Pipe Size	A	Plug Size	Wt. Lbs.
8552	2	2 3/4	1 1/2	1.5
8553	3	3	2 1/2	2.5
8554	4	3 1/4	3 1/2	4
8555	5	4 1/2	4	6
8556	6	4 1/2	5	9

**PLUG TYPE**

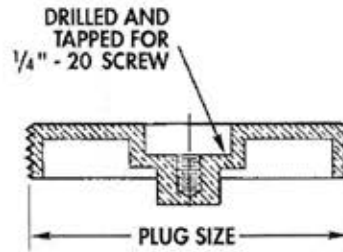
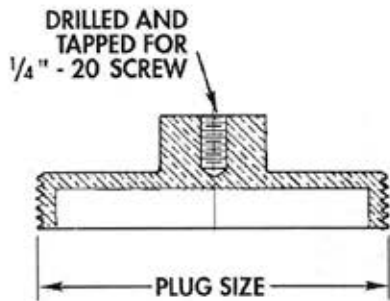
Suffix	Description
B.....	Raised Head Brass Plug
E.....	Countersunk Brass Plug



# Cleanout Plugs

**WADE**

8590 (B orE) Threaded brass raised head, or countersunk plug drilled and tapped for 1/4" -20 screw.



Cat. No.	Plug Size	Wt. Lbs.
<input type="checkbox"/> 8591 1/2	1 1/2	.25
<input type="checkbox"/> 8592	2	.25
<input type="checkbox"/> 8593	3	.50
<input type="checkbox"/> 8593 1/2	3 1/2	.50
<input type="checkbox"/> 8594	4	.75
<input type="checkbox"/> 8595	5	1.00
<input type="checkbox"/> 8596	6	2.00

**PLUG TYPE**

Suffix	Description
<input type="checkbox"/> B.....	Raised Head Brass Plug (Not Available 6")
<input type="checkbox"/> E.....	Countersunk Brass Plug

**WCO-1**  
W8480S

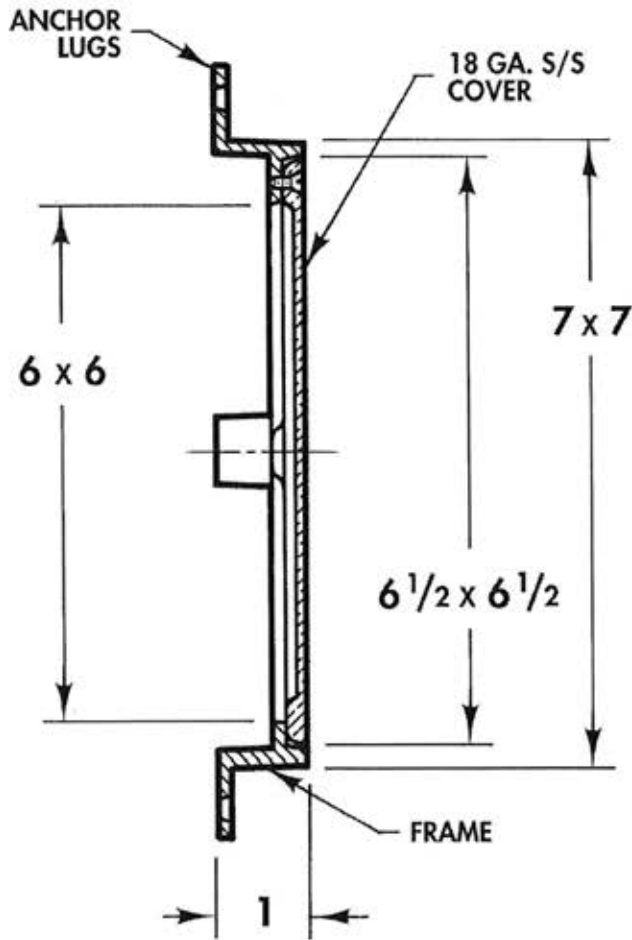
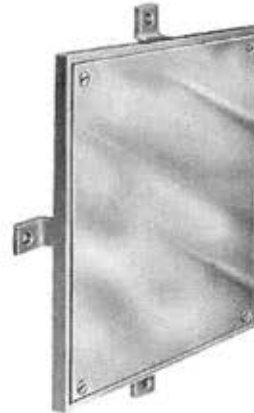
WADE

**WCO-1 WALL CLEANOUT (COPPER TUBING)**  
8" SQUARE NICKEL BRONZE FRAME WITH SECURED SS ACCESS  
COVER

**Wall Access Covers**

**WADE**

**8480S** Square nickel bronze frame with secured smooth stainless steel access cover.



Cat. No.	Wt. Lbs.
8480S	2.5

OPTIONS	
Suffix	Description
179.....	Security Screws

**WCO-2**

W8552B	WADE
W8480R6	WADE
W8553B	WADE
W8480R6	WADE
W8554B	WADE
W8480R6	WADE
W8556B	WADE
W8480R8	WADE

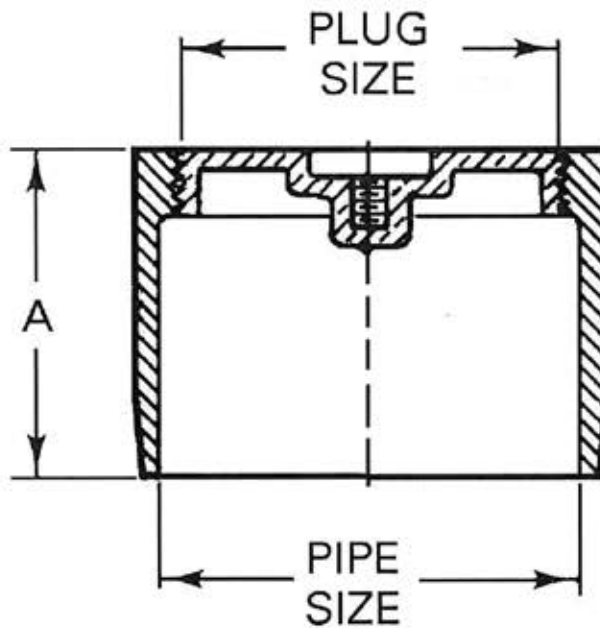
**WCO-2 WALL CLEANOUT (CAST IRON PIPE)**

CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS RAISED HEAD PLUG - 2"
6" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER SCREW
CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS RAISED HEAD PLUG - 3"
6" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER SCREW
CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS RAISED HEAD PLUG - 4"
6" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER SCREW
CLEANOUT FERRULE WITH SPIGOT OUTLET & THREADED BRASS RAISED HEAD PLUG - 6"
8" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER SCREW

## Cleanout Ferrule w/ Plug

**WADE**

8550 (B orE) Cast Iron cleanout ferrule with spigot outlet and threaded brass raised head, or countersunk plug drilled and tapped for 1/4" -20 screw.



Cat. No.	Pipe Size	A	Plug Size	Wt. Lbs.
8552	2	2 3/4	1 1/2	1.5
8553	3	3	2 1/2	2.5
8554	4	3 1/4	3 1/2	4
8555	5	4 1/2	4	6
8556	6	4 1/2	5	9

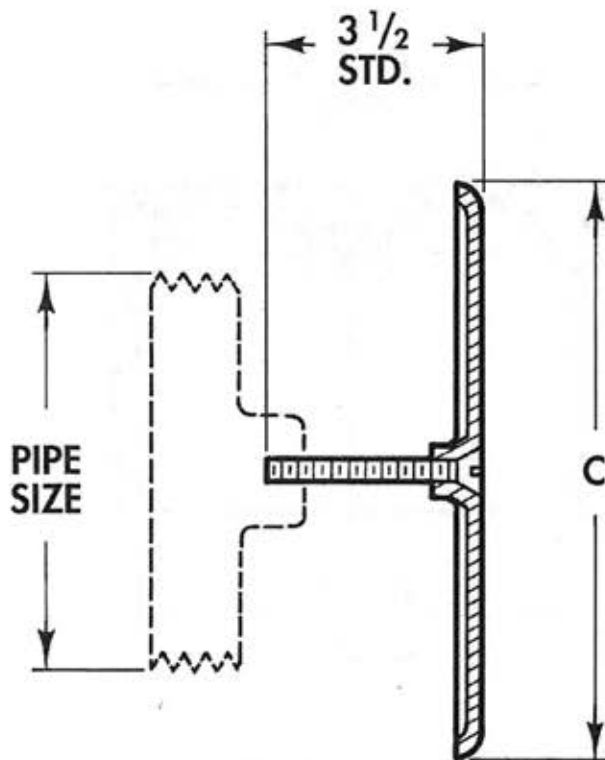
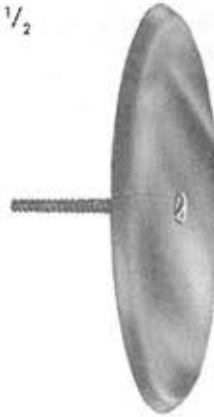
### PLUG TYPE

Suffix	Description
B.....	Raised Head Brass Plug
E.....	Countersunk Brass Plug

**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with  $1/4$ -20x3  $1/2$  center screw.

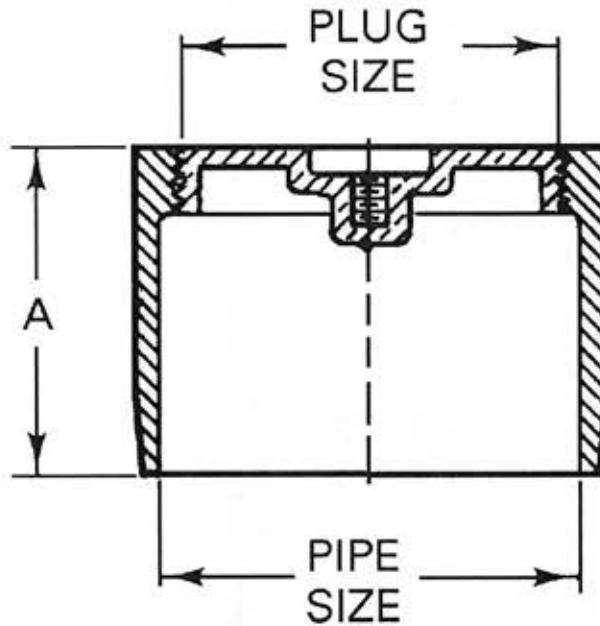


Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 $1/2$ to 3 $1/2$	$1/2$
8480R8	8	4, 5 and 6	$3/4$
8480R10	10	8	$3/4$

**Cleanout Ferrule w/ Plug**

**WADE**

8550 (B orE) Cast Iron cleanout ferrule with spigot outlet and threaded brass raised head, or countersunk plug drilled and tapped for 1/4"-20 screw.



Cat. No.	Pipe Size	A	Plug Size	Wt. Lbs.
8552	2	2 3/4	1 1/2	1.5
8553	3	3	2 1/2	2.5
8554	4	3 1/4	3 1/2	4
8555	5	4 1/2	4	6
8556	6	4 1/2	5	9

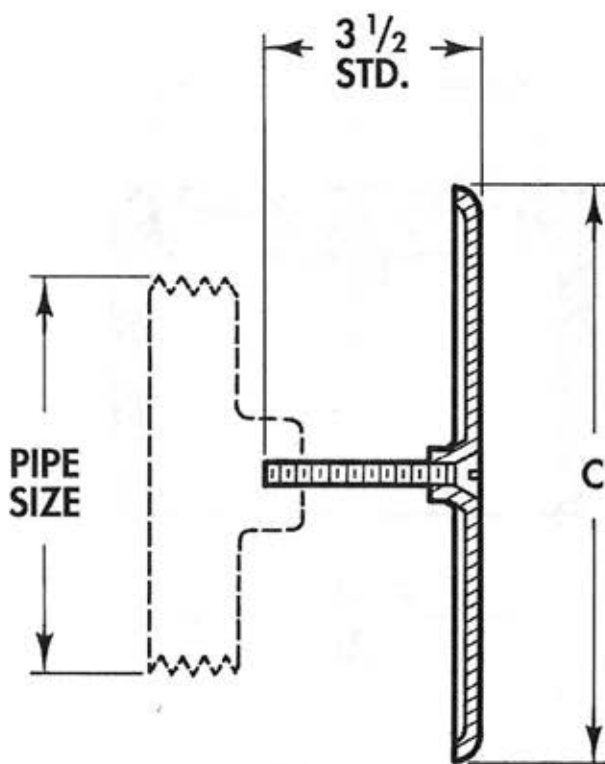
**PLUG TYPE**

Suffix	Description
B.....	Raised Head Brass Plug
E.....	Countersunk Brass Plug

**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with  $\frac{1}{4}$ -20x3  $\frac{1}{2}$  center screw.



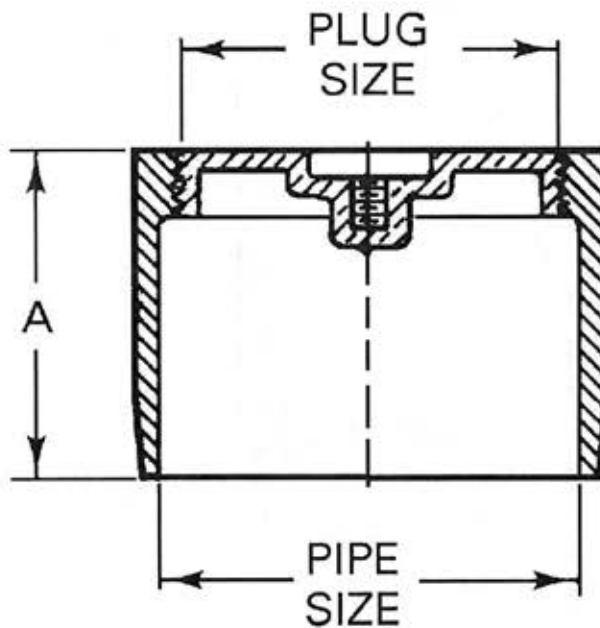
Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	$\frac{1}{2}$
8480R8	8	4, 5 and 6	$\frac{3}{4}$
8480R10	10	8	$\frac{3}{4}$



**Cleanout Ferrule w/ Plug**

**WADE**

8550 (B orE) Cast Iron cleanout ferrule with spigot outlet and threaded brass raised head, or countersunk plug drilled and tapped for 1/4" -20 screw.



Cat. No.	Pipe Size	A	Plug Size	Wt. Lbs.
8552	2	2 3/4	1 1/2	1.5
8553	3	3	2 1/2	2.5
8554	4	3 1/4	3 1/2	4
8555	5	4 1/2	4	6
8556	6	4 1/2	5	9

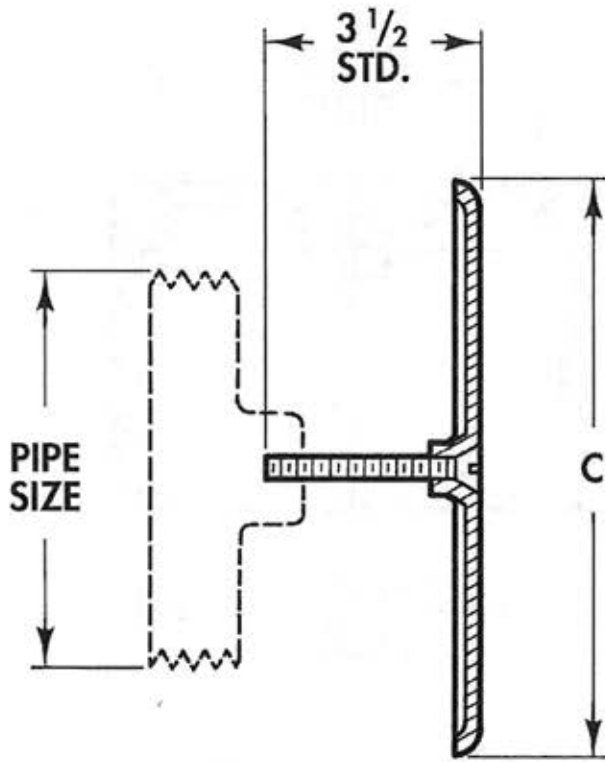
**PLUG TYPE**

Suffix	Description
B.....	Raised Head Brass Plug
E.....	Countersunk Brass Plug

**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with  $1/4$ -20x3  $1/2$  center screw.

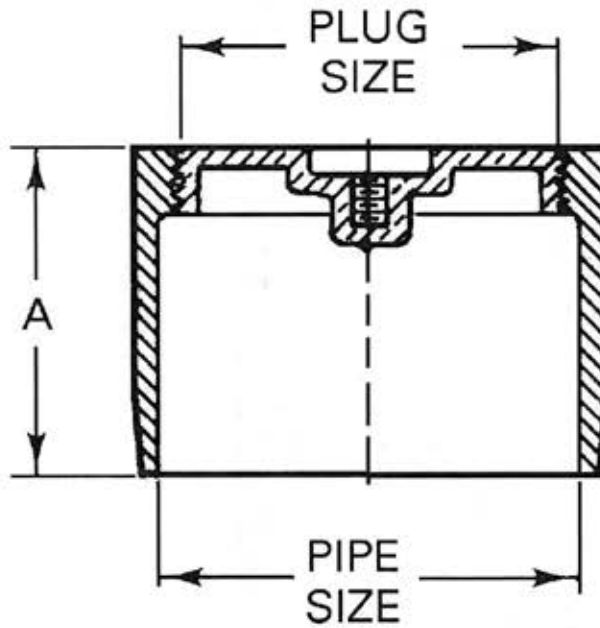


Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 $1/2$ to 3 $1/2$	$1/2$
8480R8	8	4, 5 and 6	$3/4$
8480R10	10	8	$3/4$

**Cleanout Ferrule w/ Plug**

**WADE**

8550 (B orE) Cast Iron cleanout ferrule with spigot outlet and threaded brass raised head, or countersunk plug drilled and tapped for 1/4" -20 screw.



Cat. No.	Pipe Size	A	Plug Size	Wt. Lbs.
8552	2	2 3/4	1 1/2	1.5
8553	3	3	2 1/2	2.5
8554	4	3 1/4	3 1/2	4
8555	5	4 1/2	4	6
8556	6	4 1/2	5	9

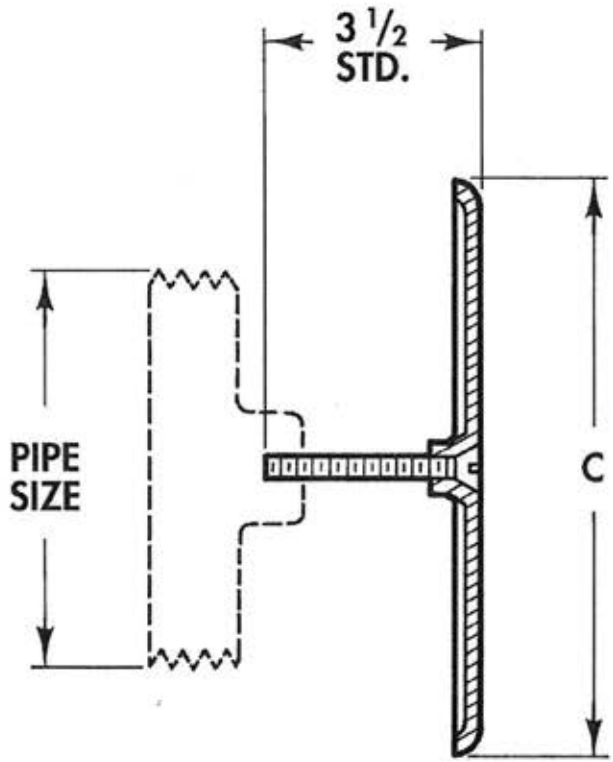
**PLUG TYPE**

Suffix	Description
B.....	Raised Head Brass Plug
E.....	Countersunk Brass Plug

**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with  $\frac{1}{4}$ -20x3  $\frac{1}{2}$  center screw.



Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	$\frac{1}{2}$
8480R8	8	4, 5 and 6	$\frac{3}{4}$
8480R10	10	8	$\frac{3}{4}$

**WCO-3**

W8592B  
W8480R6

WADE  
WADE

W8593B  
W8480R6

WADE  
WADE

W8594B  
W8480R6

WADE  
WADE

**WCO-3 WALL CLEANOUT (STEEL PIPE)**

THREADED BRASS RAISED HEAD PLUG - 2"  
6" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER  
SCREW

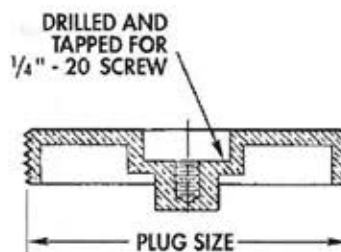
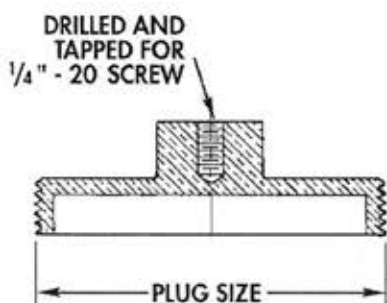
THREADED BRASS RAISED HEAD PLUG - 3"  
6" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER  
SCREW

THREADED BRASS RAISED HEAD PLUG - 4"  
6" ROUND STAINLESS STEEL ACCESS COVER WITH CENTER  
SCREW

# Cleanout Plugs

**WADE**

8590 (B or E) Threaded brass raised head, or countersunk plug drilled and tapped for 1/4" - 20 screw.



Cat. No.	Plug Size	Wt. Lbs.
<input type="checkbox"/> 8591 1/2	1 1/2	.25
<input type="checkbox"/> 8592	2	.25
<input type="checkbox"/> 8593	3	.50
<input type="checkbox"/> 8593 1/2	3 1/2	.50
<input type="checkbox"/> 8594	4	.75
<input type="checkbox"/> 8595	5	1.00
<input type="checkbox"/> 8596	6	2.00

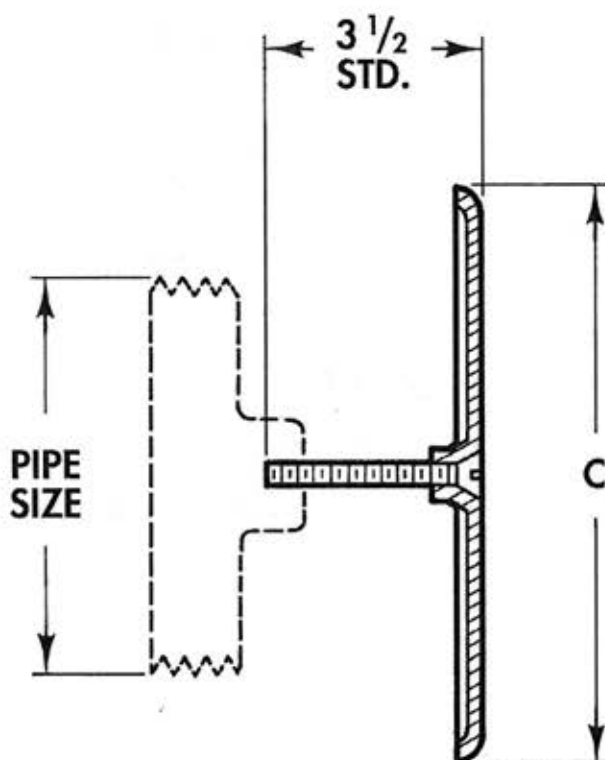
### PLUG TYPE

Suffix	Description
<input type="checkbox"/> B.....	Raised Head Brass Plug (Not Available 6")
<input type="checkbox"/> E.....	Countersunk Brass Plug

**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with 1/4"-20x3 1/2" center screw.

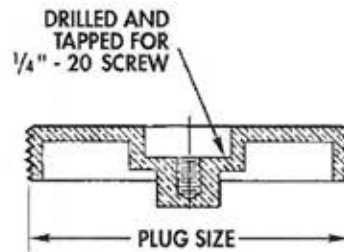
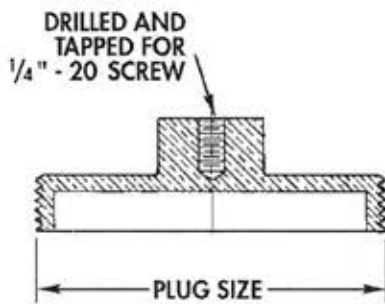


Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 1/2 to 3 1/2	1/2
8480R8	8	4, 5 and 6	3/4
8480R10	10	8	3/4

# Cleanout Plugs

**WADE**

8590 (B or E) Threaded brass raised head, or countersunk plug drilled and tapped for 1/4" - 20 screw.



Cat. No.	Plug Size	Wt. Lbs.
<input type="checkbox"/> 8591 1/2	1 1/2	.25
<input type="checkbox"/> 8592	2	.25
<input type="checkbox"/> 8593	3	.50
<input type="checkbox"/> 8593 1/2	3 1/2	.50
<input type="checkbox"/> 8594	4	.75
<input type="checkbox"/> 8595	5	1.00
<input type="checkbox"/> 8596	6	2.00

**PLUG TYPE**

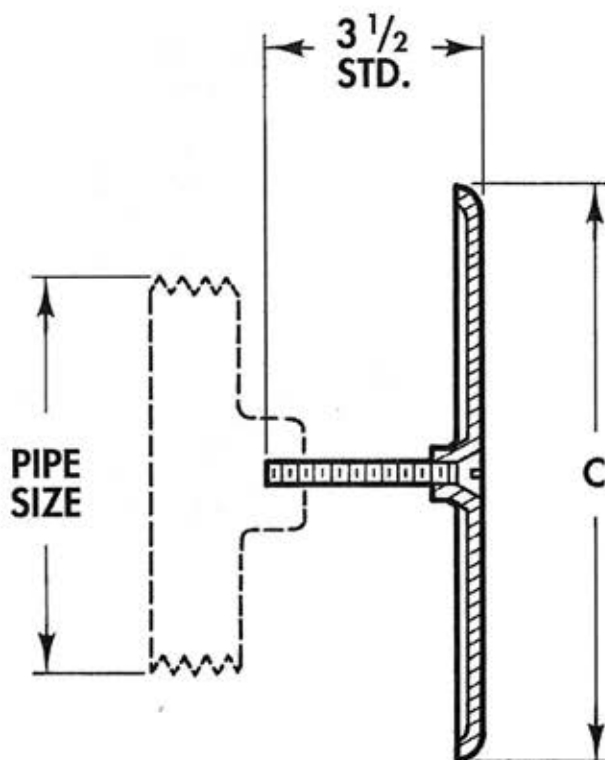
Suffix	Description
<input type="checkbox"/> B.....	Raised Head Brass Plug (Not Available 6")
<input type="checkbox"/> E.....	Countersunk Brass Plug



**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with  $\frac{1}{4}$ -20x3  $\frac{1}{2}$  center screw.

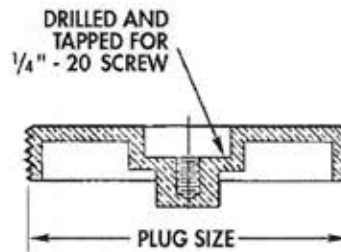
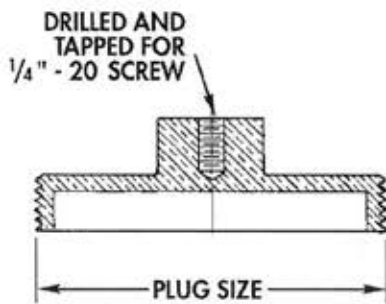


Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	$\frac{1}{2}$
8480R8	8	4, 5 and 6	$\frac{3}{4}$
8480R10	10	8	$\frac{3}{4}$

# Cleanout Plugs

**WADE**

8590 (B or E) Threaded brass raised head, or countersunk plug drilled and tapped for 1/4" - 20 screw.



Cat. No.	Plug Size	Wt. Lbs.
<input type="checkbox"/> 8591 1/2	1 1/2	.25
<input type="checkbox"/> 8592	2	.25
<input type="checkbox"/> 8593	3	.50
<input type="checkbox"/> 8593 1/2	3 1/2	.50
<input type="checkbox"/> 8594	4	.75
<input type="checkbox"/> 8595	5	1.00
<input type="checkbox"/> 8596	6	2.00

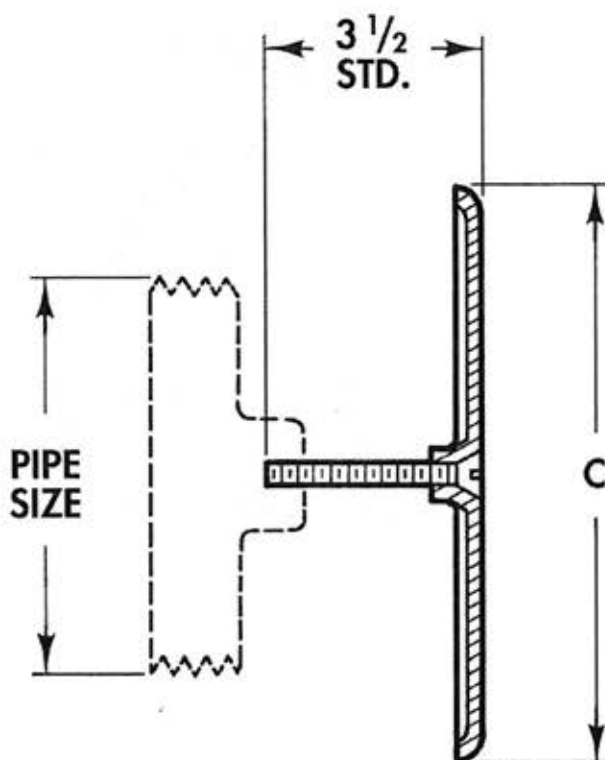
**PLUG TYPE**

Suffix	Description
<input type="checkbox"/> B.....	Raised Head Brass Plug (Not Available 6")
<input type="checkbox"/> E.....	Countersunk Brass Plug

**Wall Access Covers**

**WADE**

**8480R** Round stainless steel access cover with  $\frac{1}{4}$ -20x3  $\frac{1}{2}$  center screw.



Cat. No.	C	Plug Size	Wt. Lbs.
8480R6	6	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	$\frac{1}{2}$
8480R8	8	4, 5 and 6	$\frac{3}{4}$
8480R10	10	8	$\frac{3}{4}$

**WHA-1 WATER HAMMER ARRESTOR (SHOCK  
ABSORBERS)**

**WHA-1**

W5	WADE	BELLOWS TYPE WATER HAMMER ARRESTORS, 1-11 FIXTURE UNITS
W10	WADE	BELLOWS TYPE WATER HAMMER ARRESTORS, 12-32 FIXTURE UNITS
W20	WADE	BELLOWS TYPE WATER HAMMER ARRESTORS, 33-60 FIXTURE UNITS
W50	WADE	BELLOWS TYPE WATER HAMMER ARRESTORS, 61-113 FIXTURE UNITS
W75	WADE	BELLOWS TYPE WATER HAMMER ARRESTORS, 114-154 FIXTURE UNITS
W100	WADE	BELLOWS TYPE WATER HAMMER ARRESTORS, 155-330 FIXTURE UNITS

# Shokstops

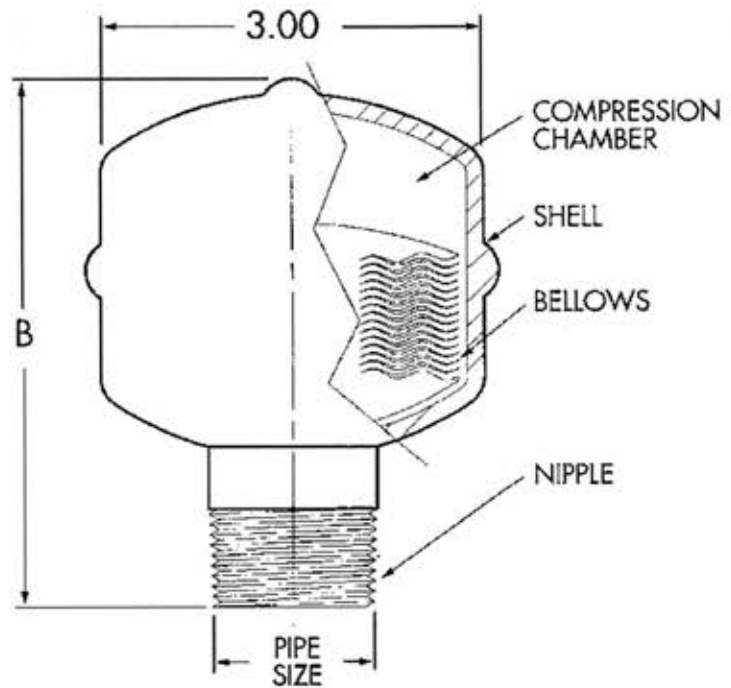
**WADE**

## Suggested Specifications

Wade Shokstops shall be installed as shown on the mechanical engineering plans or shall be sized and located in accordance with Plumbing and Drainage Institute Standard PDI-WH201. Water hammer arrestors shall be Wade Shokstops of all stainless steel construction with welded nested bellows.

## Material and Design Specifications

- Bellows contents: Precharged with Nitrogen
- Bellows: Stainless Steel
- Casing: All Stainless Steel
- Connection: Male N.P.T. thread
- Temperature range: -100°F to +300°F
- Max. operating pressure: 125 P.S.I.
- Max. static pressure: 250 P.S.I.



## Shokstop Data

Cat No.	PDI Rating	Fixture Unit Cap	Pipe Size	B	WT. LBS.
5	A	1-11	3/4	3 1/8	1.0
10	B	12-32	1	4	1.3
20	C	33-60	1	4 5/8	3.0
50	D	61-113	1	5 1/2	4.0
75	E	114-154	1	6 1/4	4.5
100	F	155-330	1	7 1/4	5.0

\*Wade Shokstops are certified under Plumbing and Drainage Institute Standard PDI-WH201 and American Society of Sanitary Engineering Standard ASSE-1010 (Copies of Certifications available upon request.)

# **ELKAY®**

## **Enhanced**

### **INSTALLATION, CARE & USE MANUAL**

Manual de instalación, cuidado y uso  
Manuel d'installation, d'entretien et d'utilisation

#### **LZ™ & EZ™ Series Bottle Filling Stations & Coolers**

*Bebederos y estaciones llenadoras de botellas series LZ™ y EZ™ mejorados*  
*Remplisseuses de bouteille et fontaines à eau fraîche séries LZ™ et EZ™ améliorées*

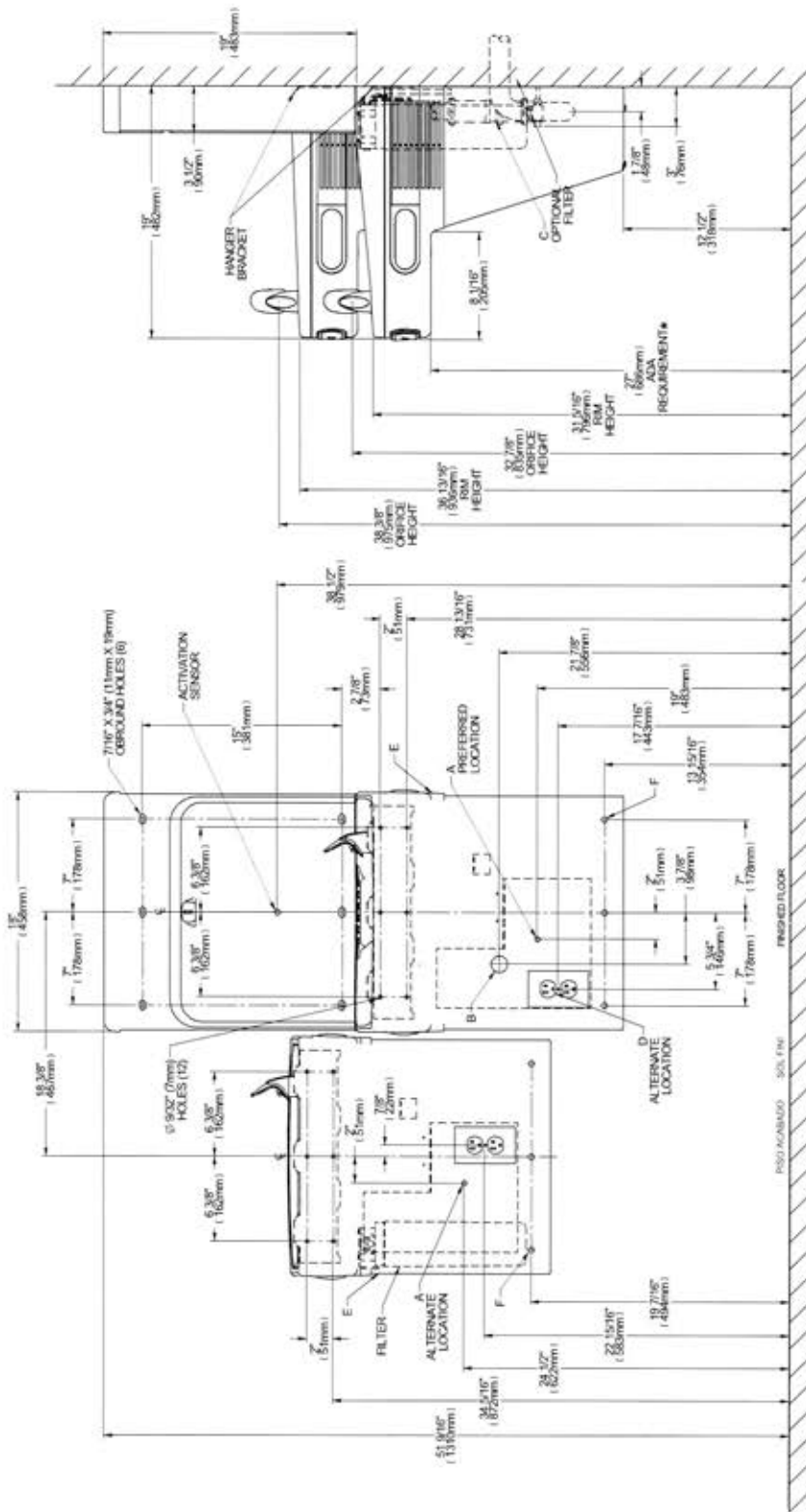


\* Versatile cooler design allows units to be installed either left-hand high and right-hand low or left-low and right high. Basin change may be required. See desired rough-in to help determine if the basin change is necessary.

\* El versátil diseño de bebedero permite que las unidades se instalen ya sea con la parte izquierda alta y la parte derecha baja, o con la parte izquierda baja y la parte derecha alta. Es posible que necesite cambiar la tarja. Consulte el bosquejo deseado para ayudar a determinar si es necesario cambiar la tarja.

\* La conception polyvalente de la fontaine à eau fraîche permet une installation gauche haute et droite basse ou gauche basse et droite haute. Une modification de la fontaine peut s'avérer nécessaire. Voir la disposition de canalisations souhaitée pour déterminer si des modifications de la fontaine sont nécessaires.

**STANDARD ROUGH-IN FOR LEFT-HAND HIGH, BOTTLE FILLER LOW MODELS**  
 BOSQUEJO ESTÁNDAR PARA MODELOS CON LA LLENADORA DE BOTELLAS BAJA Y LA PARTE IZQUIERDA ALTA  
 DISPOSITION DE CANALISATIONS STANDARD, POUR INSTALLATION GAUCHE HAUTE ET REMPLISSEUSE DE BOUTEILLE BASSE



**FIG. 1**

**REDUCE HEIGHT BY 3 INCHES FOR INSTALLATION OF CHILDREN'S ADA COOLER**

Reduzca la altura en 76 mm (3") para la instalación del bebedero con clasificación ADA para niños  
 Réduisez la hauteur de 76 mm (3 PO) pour les installations à la norme ADA enfants

- LEGEND/LEYENDA/LEGENDE**
- A = RECOMMENDED WATER SUPPLY LOCATION 3/8" O.D. UNPLATED COPPER TUBE CONNECT STUB WITH SHUT OFF (BY OTHERS) 3 IN (76mm) MAXIMUM OUT FROM WALL**  
 UBICACIÓN RECOMENDADA DEL SUMINISTRO DE AGUA, TUBERÍA DE COBRE SIN REVESTIMIENTO DE 3/8" DE DIAM. EXT. ADAPTADOR DE CONEXIÓN CON VALVULA DE CIERRE (DE TERCEROS) MÁXIMO A 76 mm (3") DE LA PARED  
 EMPILACEMENT RECOMMANDÉ DE L'ARRIVÉE D'EAU, TUBE EN CUIVRE NON PLAQUÉ DE 3/8 PO DE DIA. EXT. RACCORDÉ A LA CONDUITE D'ALIMENTATION AVEC UN ROBINET D'ARRÊT (NON FOURNI) A 76 mm (3 PO) MAXIMUM DU MUR
  - B = RECOMMENDED LOCATION FOR WASTE OUTLET 1-1/2" O.D. DRAIN STUB 2 IN. OUT FROM WALL**  
 UBICACIÓN RECOMENDADA DE LA SALIDA DE DESECHOS, ADAPTADOR DE DESAGÜE DE 1-1/2" DE DIAM. EXT. A 51 mm (2") DE LA PARED  
 EMPLACEMENT RECOMMANDÉ DE LA SORTIE D'ÉCOULEMENT, CONDUITE D'ÉVACUATION DE 1-1/2 PO DE DIA. EXT. DÉPASSANT DE 51 mm (2 PO) HORS DU MUR
  - C = 1-1/2" TRAP NOT FURNISHED**  
 NO SE INCLUYE SIFÓN DE 1-1/2"  
 SIPHON DE 1-1/2 PO NON FOURNI
  - D = ELECTRICAL SUPPLY (W/ WIRE RECESSED BOX DUPLEX OUTLET\*\*)**  
 SUMINISTRO ELÉCTRICO (C/ CABLE ENCHUFE DE ALAMBRE SALIDA DUPLEX)
  - E = INSURE PROPER VENTILATION BY MAINTAINING 6" (152 mm) (MIN.) CLEARANCE FROM CABINET LOUVERS TO WALL**  
 PARA GARANTIZAR LA VENTILACIÓN ADECUADA, MANTENGA 152 mm (6") (MIN.) DE SEPARACIÓN DESDE LAS REJILLAS DEL GABINETE HASTA LA PARED  
 POUR ASSURER UNE AÉRATION SUFFISANTE, PRÉVOIR UN DÉGAGEMENT DE 152 mm (6 PO) (MIN.) ENTRE LES ÉVÉNENTS DE L'ÉCARTÉ ET LE MUR
  - F = 7/16 BOLT HOLES FOR FASTENING UNIT TO WALL**  
 ORIFICIOS PARA PERNOS DE 7/16" PARA FIJAR LA UNIDAD A LA PARED  
 TROUS DE VIS DE 7/16 PO POUR LA FIXATION DE L'APPAREIL AU MUR
- \*\*NEW INSTALLATIONS MUST USE GROUND FAULT INTERRUPTER (GFCI)  
 \*\*Las nuevas instalaciones deben usar un interruptor de circuito de falla a tierra (GFCI) por sus siglas en inglés)  
 \*\*Les nouvelles installations doivent comporter un disjoncteur différentiel (GFCI)

## HANGER BRACKETS INSTALLATION

- 1) Remove hanger bracket fastened to back of coolers by removing one (1) screw.
- 2) Determine your mounting configuration from the figures shown on pages 2 - 5. **IMPORTANT NOTE: If the bottle filler is to be mounted on the left hand cooler, a basin assembly change will be needed. Refer to instructions on pages 13 - 15 prior to continuing.**
- 3) Mount the hanger bracket as shown in Figures 1 (Pg. 2), 2 (Pg.3), 3 (Pg. 4), and 4 (Pg. 5).  
**NOTE:** Hanger Bracket **MUST** be supported securely. Add fixture support carrier if wall will not provide adequate support. Anchor hanger securely to wall using all six (6) 1/4 in. dia. mounting holes.

### IMPORTANT:

5-7/8 in. (150 mm) dimension from wall to centerline of trap must be maintained for proper fit.

### INSTALLATION OF COOLER

- 4) Hang only the refrigerated cooler on the hanger bracket. Be certain hanger bracket is properly in the slots on the cooler backs as shown in Figures 1 (Pg. 2), 2 (Pg.3), 3 (Pg. 4), and (Fig. 4, Pg. 5).
- 5) Remove the four (4) screws holding the lower front panel at the bottom of each cooler. Remove the front panel by pulling straight down and set aside.
- 6) Unband the loose wires in the refrigerated cooler for the NFC board. (See Figure A below). Stretch it out and thread through the left side of the refrigerated cooler and into the right side of the non-refrigerated cooler. Plug into the board that is behind the filler head. Since this cooler is not yet hanging on the wall, you can tip it forward to view the plug from the back to make it easier to connect.
- 7) Hang the non-refrigerated cooler on the hanger bracket. Be certain hanger bracket is engaged properly in the slots on the cooler backs as shown in Figures 1, (Pg. 2), 2 (Pg. 3), 3 (Pg. 4), and 4 (Pg. 5).
- 8) Secure each cooler frame to wall by installing (2) screws and washers (not supplied). (See Fig. 5, Pg. 9). **Make sure the screws engage in a structural member.**
- 9) Connect the supply water to the filler inlet tube.
- 10) Connect the waterline from the outlet of the filler to the inlet of the evaporator in the refrigerated cooler by inserting it into the quick connector.
- 11) Connect the waterline from the solenoid in the non-refrigerated cooler to the open 1/4" inch tee fitting in the refrigerated cooler.
- 12) Locate the black and white wires coiled inside the non-refrigerated cooler. (See Fig. B below) Uncoil and remove the caps covering the loose ends of each. Find the black and white wires with the extensions inside of the refrigerated cooler and remove the protective caps. Connect the wires from one cooler to the wires inside the other. **NOTE:** White to white, Black to black.
- 13) Find your cooler configuration on page 18 and connect the drain assembly together. The bottle filler drain in the top of the basin must be connected at this time also.
- 14) Install trap. Remove the slip nut and gasket from the trap and install them on the cooler waste line making sure that the end of the waste line fits into the trap. Assemble the slip nut and gasket to the trap and tighten securely.

**IMPORTANT:** If it is necessary to cut the drain, loosen the screw at the black rubber boot and remove tube, check for leaks after re-assembly.

### BOTTLE FILLER INSTALLATION

- 15) Remove two (2) mounting screws with 5/32" Allen wrench holding bottle filler to wall mounting plate (See Fig.7, Pg. 9). Note do not discard mounting screws, they will be needed to secure bottle filler to wall mounting plate.
- 16) Remove wall mounting plate from Bottle Filler (see Fig 7, Pg. 9). Place wall mounting plate against wall on top of basin. Center the wall mounting plate side to side with the basin. Mark the six (6) mounting holes with a pencil (See Fig. 1, Pg. 2). Place tape over wiring harness connection on top of cooler to prevent debris from falling into Connection (See Fig. 6, Pg. 9).
- 17) Remove wall mounting plate from wall. **NOTE:** Mounting plate **MUST** be supported securely. Add fixture support carrier if wall will not provide adequate support.
- 18) Install wall mounting plate to wall using six (6) 7/16" obround mounting holes (mounting bolts not included) (See Fig. 7, Pg. 9). Use appropriate fasteners for your wall type.
- 19) Install gasket on bottom of bottle filler tower with gasket support bracket, (2) washers, & (2) screws (See Fig. 8, 9, Pg. 10).
- 20) Connect water line from cooler to 3/8" john guest fitting. Connect wiring harness to the top of cooler. (See Fig. 11, Pg. 11).
- 21) **Place Bottle Filler on the four (4) hooks on the mounting plate installed on wall. Make sure round boss in gasket fits in hole of basin. (See Fig. 12, Pg. 11).**
- 22) Remove filler from carton, remove protective cap, attach filler to filler head by firmly inserting into head and rotating filter clockwise. Ensure that blue label can be read when filter is installed. (reference Fig. 16, Pg 19.)
- 23) Turn water supply on and inspect for leaks. In both cooler and bottle filler. Fix all leaks before continuing.
- 24) Once cooler and bottle filler have been inspected for leaks and any leaks found corrected, plug cooler into wall.
- 25) Reinstall two mounting screws from first step above. Caution, do not over tighten screws.
- 26) Once power is applied to the cooler the GREEN LED light will illuminate on the bottle filler showing good filter status along with the LCD Bottle Counter.
- 27) Verify proper dispensing by placing cup, hand, or any opaque object in front of sensor area and verify that the water dispenses. Note: the first initial dispenses might have air in line which may cause a sputter. This will be eliminated once all air is purged from the line.
- 28) Once unit tests out, install Lower Panels back on water coolers. (See page 16 for versatile wrapper installation). Units are now ready for use.



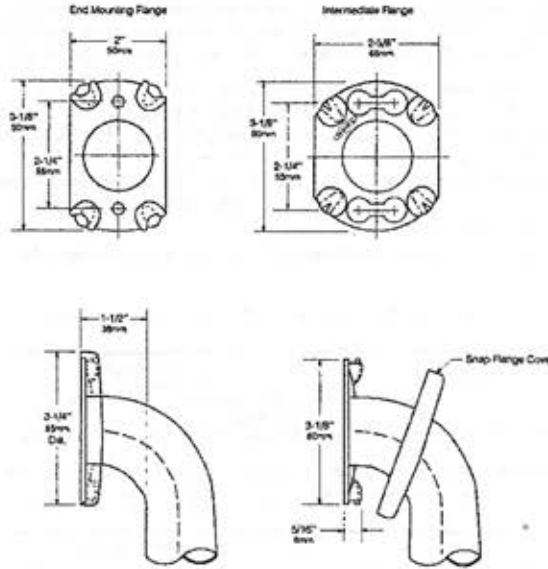
RESTROOM ACCESSORIES CUT SHEETS



# 1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

# B-6806 SERIES

Specify Finish Required:  Satin finish  
 Satin finish with peened gripping surface; add suffix .99 to model number



<p style="text-align: center;"><b>HORIZONTAL</b></p>	<p style="text-align: center;"><b>VERTICAL</b></p>	<p style="text-align: center;"><b>TWO-WALL WHEELCHAIR TOILET COMPARTMENT</b></p>
<p><b>B-6806 x 12, 18, 24, 30, 36, 42, 48</b></p>		<p><b>B-68137</b></p>
<p style="text-align: center;"><b>HORIZONTAL TUB / SHOWER / TOILET COMPARTMENT BAR 24 x 36</b></p>	<p style="text-align: center;"><b>HORIZONTAL TWO-WALL BAR for Shower Stall</b></p>	<p style="text-align: center;"><b>TWO-WALL TOILET COMPARTMENT BAR 42 x 54</b></p>
<p><b>B-68616</b></p>	<p><b>B-6861</b></p>	<p><b>B-6897</b></p>
<p>continued . . .</p>		

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet. The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

**MATERIALS:**

**Grab Bar** — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

**Concealed Mounting Flanges** — 18-8 S, type-304, 1/8" (3mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with two holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

**Snap Flange Covers** — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

**STRENGTH:**

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength.

**Safety Warning:** Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

**INSTALLATION:**

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with two screws in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

**Note:** Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

**Important Notes:**

- 1. Mounting Kits** — Bobrick offers a mounting kit for installing grab bars; one Bobrick mounting kit is required for each flange.

Mounting Kit No.	Description
252-30	Consists of #14 x 2 1/2" type-304 stainless steel, Phillips round-head, sheet-metal screws.

- 2. Grab Bar Fastener** — Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; one Bobrick fastener is required for each flange. Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10-32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

- 3. Optional Anchor Device** — Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. one Bobrick concealed anchor device is required for each flange.

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

**SPECIFICATION:**

Grab bar shall be type-304 stainless steel with satin-finish. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 1/8" (3mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model \_\_\_\_\_ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.



### Safe-T-Gard™ 1/2 Fold Seat cover Dispenser

1/2-fold seat cover dispensing system provides increased protection against germs at an economical cost.



#### Description:

Our Safe-T-Gard(R) seat cover dispensing system solution delivers clean, white seat covers for increased protection against germs at an economical cost. These quality seat covers provide a low-cost alternative to wasteful makeshift seat covers comprising of toilet paper and paper towels prepared by patrons when real seat covers are not provided.

#### Features & Benefits:

- » **Hygienic:** "No Touch" feature minimizes cross-contamination
- » **Help Reduce Clogs:** Dispenses highly dispersible seat covers to reduce clogs caused by the use of costly alternatives, such as toilet paper or paper towels
- » **Durable Dispenser:** With double-pack loading, is easy to install and cost-effective to maintain
- » **Helps Reduce Labor and Maintenance Costs:** Associated with system clogs and restroom litter

#### Product Details

Brand Owner	GP
Brand	Safe-T-Gard™
MFG Part#	57710
Color	White
UP - UPC	073310577104
Each Per Ship Unit	10 Each Per Case
Items Per Each	0 Each
Case Total	10 Each Per Case Ships 1 Each Ecommerce
Dispenser (WxDxH)	16.375" x 2.500" x 11.750"
UNSPSC	47131710
Replaces Item	57724
Buy Multiple	10 EA

#### Case Shipping Info

Case GTIN	00073310577104
Case Gross Wgt	9.800 LBS
Case Net Wgt	8.000 LBS
Case Dimensions (LxWxH)	24.125" x 15.250" x 17.375"
Case Volume	3.699 CFT

#### Each Shipping Info

Each Gross Weight	0.98 LBS
Each Net Wgt	0.8 LBS
Each Dimensions	12.000" x 3.125" x 17.000"
Each Volume	0.369 CFT

#### Unit Shipping Info

TI-Qty/Layer	50
HI-Layers/Unit	4
Unit Qty	200
Unit Dimensions (LxWxH)	48.250" x 39.380" x 69.500"

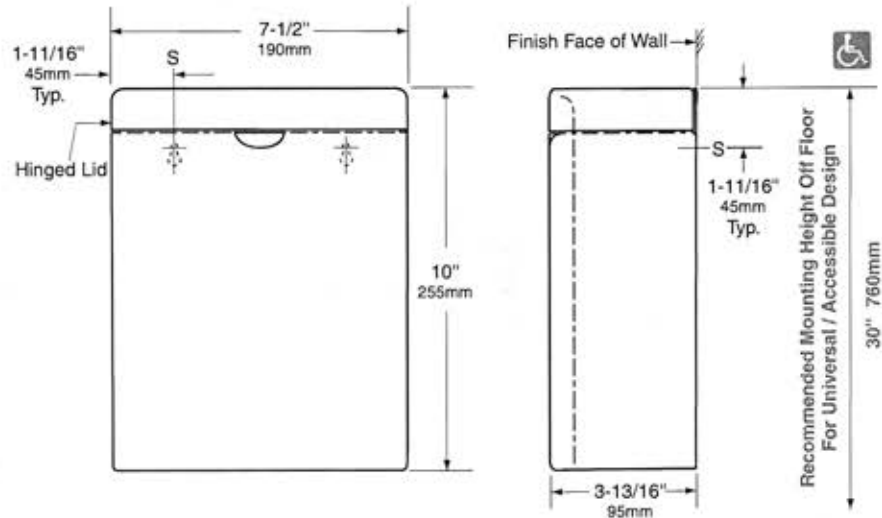


printed:7/18/2017



# ConturaSeries® SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL

# B-270



#### MATERIALS:

**Container** — 18-8, type-304, 22-gauge (0.8mm) stainless steel. All-welded construction. Exposed surfaces have satin finish. Integral finger depression for opening cover. Front of container has same degree of arc as front of cover and other Bobrick ConturaSeries washroom accessories. Radius on side edges of container match corners and edges of cover and other ConturaSeries accessories.

**Cover** — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Drawn, one-piece, seamless construction. Front of cover has same degree of arc as front of container and other Bobrick Contura Series washroom accessories. Radius on corners and edges of cover match side edges of container and other Contura Series accessories. Secured to container with a full-length stainless steel piano-hinge.

#### OPERATION:

Cover flips up for disposal of sanitary napkins and for servicing container.

#### INSTALLATION:

For partitions with particle-board or other solid core, secure with two #8 x 3/4" (4.2 x 19mm) sheet-metal screws (not furnished) at all points indicated by an S, or provide through-bolts, nuts, and washers.

For hollow-core metal partitions, provide solid backing into which sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

For masonry walls, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 3/16" (5mm) toggle bolts or expansion bolts.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws.

#### SPECIFICATION:

Surface-mounted sanitary napkin disposal shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Front of sanitary napkin disposal shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of sanitary napkin disposal shall complement other Bobrick ConturaSeries washroom accessories. Cover shall be drawn, one-piece, seamless construction and secured to container with a full-length stainless steel piano-hinge. Container shall have integral finger depression for opening cover.

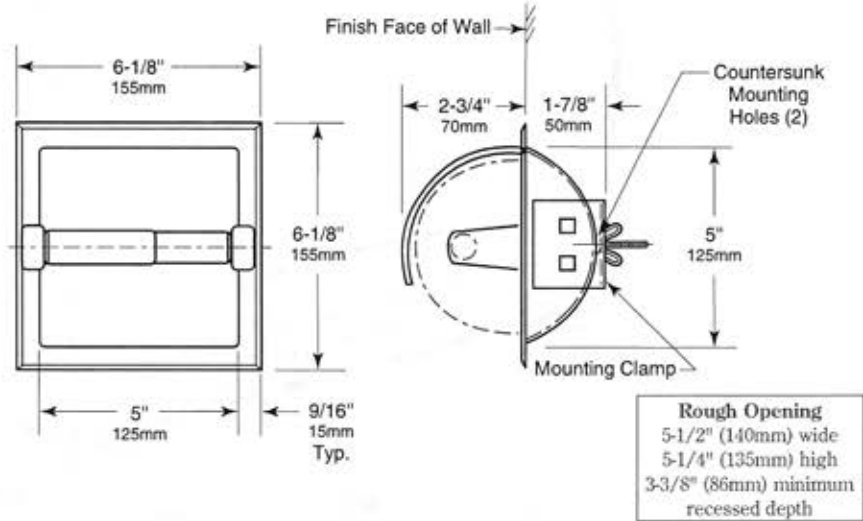
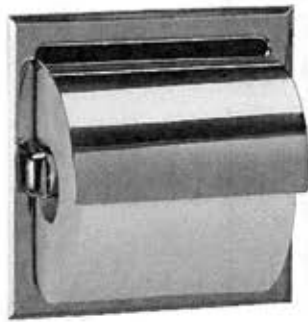
**Surface-Mounted Sanitary Napkin Disposal shall be Model B-270 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.**



# Technical Data

# RECESSED TOILET TISSUE DISPENSER WITH HOOD (FOR STUD WALLS OR COUNTERTOP APRONS)

# B-6697



### MATERIALS:

**Shell and Flange** — 18-8, Type-304, 22-gauge (0.8mm) stainless steel. Drawn and beveled, one-piece, seamless construction with two countersunk mounting holes.

**Support Posts (2)** — Heavy-duty cast zamac with chrome-plated finish.

**Hood** — 18-8 Type-304, 18-gauge (1.2mm) stainless steel. Hood hinged to shell.

**Mounting Bracket** — Plated-steel mounting clamp attaches to back of unit with two sheet-metal screws for installation in stud walls or countertop aprons.

**Spindle** — Chrome-plated plastic. Equipped with heavy-duty internal spring.

*Designer's Note:* Theft-resistant toilet tissue spindle, which is removable only with special key provided, is available as an optional accessory. To specify, add suffix .60 to model number. Example: B-669.60.

### INSTALLATION:

Provide framed rough opening 5-1/2" wide x 5-1/4" high (140 x 135mm). Minimum recessed depth required from finish face of wall or apron is 3-3/8" (86mm).

For installation in stud walls or countertop aprons without backing, loosely attach mounting clamp to back of unit with mounting screws. Insert into rough opening. Adjust mounting clamp so it grips surface inside rough opening. Secure in place by tightening two mounting screws.

For installation in stud walls or countertop aprons with backing, discard mounting clamp furnished with unit. Insert unit only into rough opening and secure with sheet-metal screws furnished. Backing must comply with local building codes.

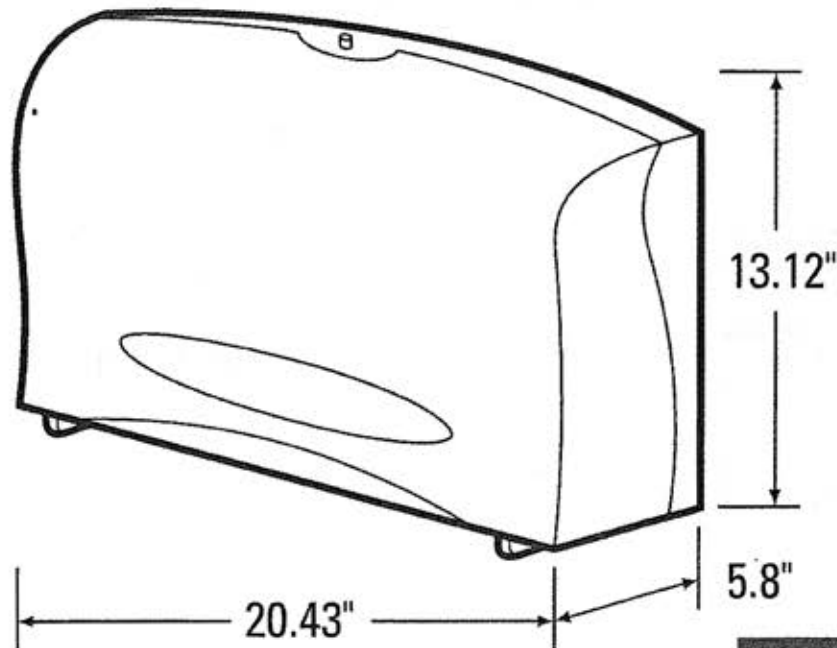
### SPECIFICATION:

Recessed toilet tissue dispenser shall be Type-304 stainless steel with \_\_\_\_\_ (insert one: bright polished or satin) finish. Shell and flange shall be drawn and beveled, one-piece, seamless construction. Unit shall be equipped with 18-gauge (1.2mm) hood hinged to shell and furnished with plated-steel mounting clamp for installation in stud walls or countertop aprons.

\*Spindle shall be chrome-plated plastic with a heavy-duty internal spring.

\*To specify theft-resistant spindle as an optional accessory, add to specification: Theft-resistant toilet tissue spindle shall be removable only with special key provided.

**Recessed Toilet Tissue Dispenser With Hood shall be Model B-6697 of Bobrick Washroom Equipment, Inc. Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.**

**09551**

SMOKE COLOR

## JRT® COMBINATION TISSUE DISPENSER

Dispenser is made of a durable grey plastic body and smoked transparent cover. It can dispense either two full 9.38" diameter rolls or one standard 13" diameter roll plus stub roll. All rolls have a 3.8" width and a 3.25" diameter core. With two full 9.38" rolls it holds more than the equivalent in length of ten standard rolls. Design minimizes run-out, waste, and maintenance time. Features hinged front cover, push button for easy opening or common key lock to reduce pilferage, and tear-off bars on sides and front of dispenser opening. Dispenser is shipped 1 per case.

***Suggested Mounting Height: 30"***

*NOTE: Unless otherwise noted, suggested mounting height is the distance from the floor to the bottom of the dispenser.*

# JRT® COMBO TISSUE DISPENSER

## DISTRIBUIDORA COMBINADA DE PAPEL HIGIÉNICO JRT®

### BOÎTE DISTRIBUTRICE DE DEUX ROULEAUX DE PAPIER HYGIÉNIQUE JRT®

Instruction Sheet  
Instructions

#### MOUNTING INSTRUCTIONS

**IMPORTANT!** For secure mounting, follow these instructions thoroughly. Insure that the proper mounting hardware is used for the appropriate wall type.

1. Mount the dispenser with the bottom edge approximately 30 inches from the floor and 12" from the front edge of the toilet to the centerline of the dispenser. (See Figure 1)
2. Use 5 mounting screws as a minimum to attach the dispenser to a wall.
3. Prior to mounting, ensure the roll holders are positioned for the product that is to be used. (See hub adjustment instructions on reverse side)

#### INSTALACIÓN

**¡IMPORTANTE!** Para que la instalación quede firme, siga estas instrucciones al pie de la letra. Asegúrese de emplear los accesorios de instalación apropiados para el tipo de pared.

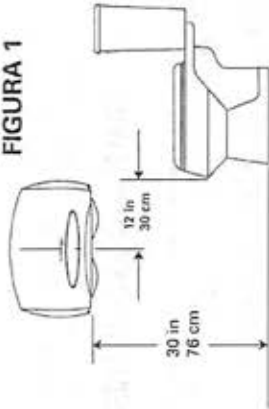
1. Instale la distribuidora con el borde inferior a una altura aproximada de 30 pulgadas (76 cm) del piso y a una distancia de 12 pulgadas (30 cm) del borde del retrete a la línea central de la distribuidora (Figura 1).
2. Fije la distribuidora a la pared con un mínimo de 5 tornillos.
3. Antes de proceder con la instalación, asegúrese de que los portarrollos estén bien colocados de acuerdo con el tipo de producto que va a usar (consulte al reverso las instrucciones sobre el ajuste del cubo).

#### INSTRUCTIONS DE MONTAGE POUR LES BOÎTES DISTRIBUTRICES

**IMPORTANT !** Pour un montage correct, il est recommandé de suivre de près ces instructions. S'assurer d'utiliser le matériel de montage approprié en fonction du type de mur sur lequel il se fera.

1. Monter la boîte distributrice de sorte que le bord inférieur se trouve à environ 30 po (76 cm) du sol, et que le centre de la boîte distributrice soit à 12 po (30 cm) du bord avant de la toilette (Figure 1).
2. Utiliser au moins 5 vis fournies pour fixer la boîte distributrice au mur.
3. Avant le montage, s'assurer que la position des porte-rouleaux est adaptée au produit qui sera utilisé. (Voir les instructions de réglage des moyeux au verso.)

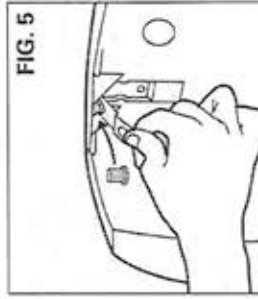
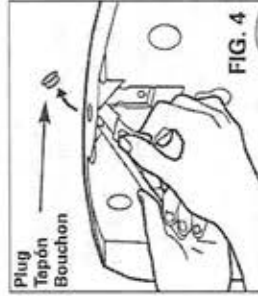
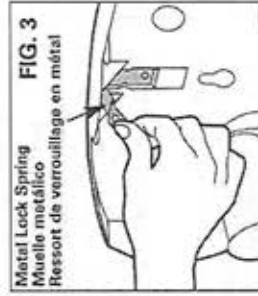
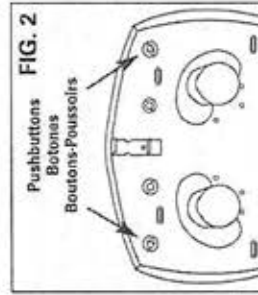
FIGURE 1  
FIGURA 1



#### OPTIONAL PUSHBUTTON LOCK FEATURE

*Dispenser comes with plug in place. To convert to pushbutton operation:*

1. Remove one of the pushbuttons from the back wall of the dispenser (see figure 2).
2. Depress the end of the metal lock spring being careful not to overstress it (see figure 3).
3. Remove the plug if one is installed by pushing on it from the inside (see figure 4).
4. Slide the pushbutton into the hole behind the lock spring (see figure 5).



#### SEGURO OPCIONAL DE BOTÓN

*La distribuidora viene con un tapón instalado; si desea instalar el seguro de botón:*

1. Tome uno de los botones que se encuentran en la pared posterior de la distribuidora (Figura 2).
2. Presione el extremo del muelle metálico cuidando de no aplicar demasiada presión (Figura 3).
3. Si el tapón viene instalado, empujelo desde dentro para extraerlo (Figura 4).
4. Deslice el botón en el orificio por atrás del muelle (Figura 5).

#### DISPOSITIF OPTIONNEL DE BOUTONS-POUSSOIRS DE VERROUILLAGE

*La boîte distributrice est fournie avec des bouchons qui peuvent s'enlever pour installer des boutons-poussoirs. Pour ajouter un bouton-poussoir à la boîte distributrice :*

1. Retirer l'un des boutons-poussoirs situé à l'arrière de la boîte distributrice (Figure 2).
2. Appuyer sans exagérer sur l'extrémité du ressort de verrouillage en métal (Figure 3).
3. Retirer le bouchon s'il y en a un, en le poussant de l'intérieur (Figure 4).
4. Insérer le bouton-poussoir dans l'orifice derrière le ressort de verrouillage (Figure 5).

**AMERICANS WITH DISABILITIES ACT (For use in U.S. only):** Title III of the Americans with Disabilities Act ("ADA") governs, in detail, the placement and operation of dispensers. You should ensure that your mounting and use of dispensers complies with that law as well as the regulations issued under that statute. The mounting suggestions in this document may or may not fulfill the obligations of the ADA with respect to your facility.

**KIMBERLY-CLARK CORPORATION DISCLAIMS LIABILITY FOR PERSONAL INJURIES OR PROPERTY DAMAGES RESULTING FROM INSTALLATION NOT PERFORMED BY KIMBERLY-CLARK.**

**SEE OTHER SIDE FOR LOADING INSTRUCTIONS.**

**LEY DE PROTECCIÓN DEL INVÁLIDO (APLICABLE SÓLO EN EE.UU.):** El Artículo III de la Ley de protección del inválido ("ADA") regula detalladamente la instalación y funcionamiento de distribuidoras. Usted debe asegurarse de que la instalación y el uso de distribuidoras cumpla con dicha ley, así como con los reglamentos expedidos bajo el amparo de sus estatutos. Es posible que las recomendaciones de montaje contenidas en este documento cumplan o no con las estipulaciones de la ADA según las características de su construcción.

**KIMBERLY-CLARK CORPORATION RECHAZA TODA RESPONSABILIDAD POR LESIONES PERSONALES O DAÑOS EN PROPIEDAD AJENA RESULTANTES DE INSTALACIONES NO REALIZADAS POR KIMBERLY-CLARK.**

**CONSULTE LAS INSTRUCCIONES DE RECARGA AL ANVERSO.**

**LOI CONCERNANT LES AMÉRICAINS HANDICAPÉS :** Le titre III de l'Americans with Disabilities Act (ADA) (Loi concernant les Américains handicapés) régit, de façon détaillée, l'emplacement et le fonctionnement des boîtes distributrices. Vous devez veiller à ce que votre méthode de montage et d'utilisation des boîtes distributrices soit conforme à la Loi de même qu'aux règlements y afférents. Les suggestions de montage qui figurent dans le présent document peuvent répondre ou non aux exigences de l'ADA, dépendant du type d'installation.

**KIMBERLY-CLARK CORPORATION DÉCLINE TOUTE RESPONSABILITÉ POUR LES BLESSURES PERSONNELLES OU LES DOMMAGES À LA PROPRIÉTÉ RÉSULTANT D'UNE INSTALLATION N'AYANT PAS ÉTÉ EFFECTUÉE PAR KIMBERLY-CLARK.**

**VOIR DE L'AUTRE CÔTÉ POUR LES INSTRUCTIONS DE CHARGEMENT.**



# JRT® COMBO TISSUE DISPENSER DISTRIBUIDORA COMBINADA DE PAPEL HIGIÉNICO JRT® BOÎTE DISTRIBUTRICE DE DEUX ROULEAUX DE PAPIER HYGIÉNIQUE JRT®

Instruction Sheet  
Instructivo  
Instructions

## HUB ADJUSTMENT INSTRUCTIONS

1. This dispenser is equipped with adjustable roll holder hubs that allow it to dispense two different sizes of Jumbo Roll Tissue.
2. First determine which size Jumbo Roll Tissue product will be used with this dispenser. The dispenser comes preset from the factory for two 9" Jumbo Tissue Rolls.
3. If for use with 12" tissue rolls move the hubs by depressing the hub locking pin (see figure 1).
4. Rotate one hub to the 12" position until it clicks and locks. Rotate the other hub to the stub roll position until it clicks an locks. (It is recommended that the 12" roll be located farthest away from the user when the dispenser is installed).
5. Please Note: Once the dispenser is installed the hub positions can only be changed by loosening the mounting screws and pulling the unit approximately a quarter inch from the wall so that the hub locking pin can be depressed in. Once the adjustment is made the mounting screws are then retightened.

## AJUSTE DE LOS CUBOS

1. Esta distribuidora está equipada con cubos portarrollos ajustables que permiten dosificar dos rollos jumbo de papel higiénico de distinto tamaño.
2. Primero fíjese en el tamaño de los rollos jumbo de papel higiénico que va a instalar en la distribuidora. La distribuidora viene ajustada de fábrica para recibir dos rollos jumbo de papel higiénico de 9 pulgadas.
3. Si piensa a instalar un rollo de 12 pulgadas, presione el seguro de pasador para mover los cubos (Figura 1).
4. Gire uno de los cubos hacia la marca de 12 pulgadas hasta que escuche un chasquido y el cubo se trabe en su lugar. Gire el otro cubo hacia el rollo gastado hasta que escuche un chasquido y el cubo se trabe en su lugar. (Al instalar la distribuidora se recomienda que el rollo de 12 pulgadas quede en el cubo más alejado del usuario.)
5. Nota: Después de instalar la distribuidora, los cubos se podrán cambiar de posición sólo si se los tornillos de instalación se aflojan la unidad se jala aproximadamente a un cuarto de pulgada de la pared a fin de poder presionar hacia dentro el seguro de pasador. Después de ajustar los cubos será necesario volver a apretar los tornillos.

## LOADING INSTRUCTIONS

1. Load so that the tissue unrolls in the center of the dispenser. (see figures 2 and 3)
2. Close cover firmly and lock.

FIGURE 1  
FIGURA 1



FIGURE 2  
FIGURA 2

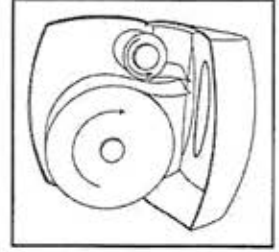
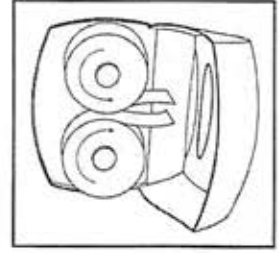


FIGURE 3  
FIGURA 3



## INSTRUCTIONS POUR LE RÉGLAGE DES MOYEUX

1. Cette boîte distributrice est munie de moyeux réglables pour les rouleaux de papier, lui permettant de distribuer deux tailles différentes de rouleaux géants de papier hygiénique.
2. Déterminer d'abord la taille des rouleaux géants de papier que vous utiliserez dans la boîte distributrice. La boîte est livrée de la fabrique réglée pour deux rouleaux géants de papier de 9 po (23 cm).
3. Pour y placer des rouleaux de 12 po (30 cm), déplacer les moyeux en appuyant sur la goupille de verrouillage (Figure 1).
4. Tourner un moyeu à la position prévue pour les rouleaux de 12 po jusqu'à ce qu'un déclic se fasse entendre et que le moyeu se bloque en position. Tourner l'autre moyeu à la position du rouleau partiel jusqu'à ce qu'un déclic se fasse entendre et que le moyeu se bloque en position. (Il est recommandé de placer le rouleau de 12 po le plus loin possible de l'utilisateur lors de l'installation de la boîte distributrice.)
5. Remarque : Une fois la boîte distributrice installée, la position des moyeux ne peut être modifiée qu'en desserrant les vis de montage et en tirant l'élément de 0,25 po (0,6 cm) environ du mur, de manière à pouvoir appuyer sur la goupille de verrouillage. Une fois le réglage fait, les vis de montage peuvent être resserrées.

## INSTRUCTIONS DE CHARGEMENT BOÎTE DISTRIBUTRICE DE PAPIER

1. Charger afin que le papier se déroule au centre de la boîte distributrice. (Figure 2 et 3).
2. Replacer le couvercle et verrouiller.



Technical Data

# MIRROR WITH STAINLESS STEEL CHANNEL FRAME

# B-165 SERIES

## SNAP LOCKING DESIGN (Rear View)

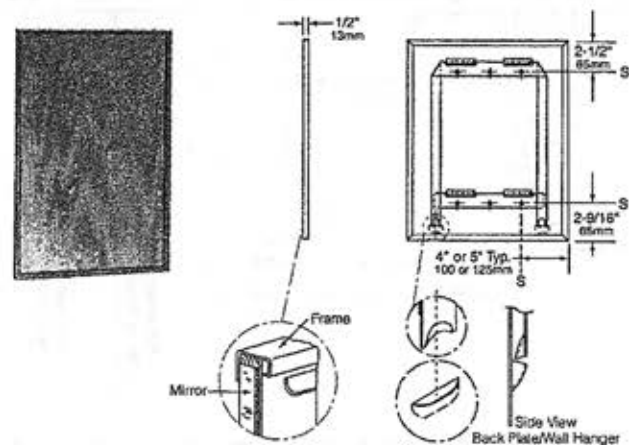


Figure: 1

### STANDARD B-165 SERIES MIRRORS

MODEL NO.	OVERALL SIZE	
	W	H
B-165 1824	18" (46cm)	24" (61cm)
B-165 1830	18" (46cm)	30" (76cm)
B-165 1836	18" (46cm)	36" (91cm)
B-165 2430	24" (61cm)	30" (76cm)
B-165 2436	24" (61cm)	36" (91cm)
B-165 2448	24" (61cm)	48" (122cm)
B-165 2460	24" (61cm)	60" (152cm)

## SCREW LOCKING DESIGN (Rear View)

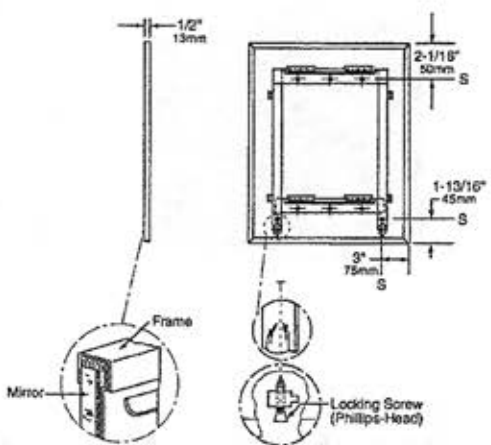


Figure: 2

### STANDARD B-165 SERIES MIRRORS

MODEL NO.	OVERALL SIZE	
	W	H
B-165 4836	48" (122cm)	36" (91cm)

### All Other Size Mirrors

### Designer's Notes:

1. Special-order sizes available on request.
2. Maximum size mirror available, 72" x 60" (183 x 152cm); minimum size, 12" x 12" (30 x 30cm).
3. All Bobrick framed mirrors are manufactured to overall width and height dimensions. EXAMPLE: A 24" x 36" (61 x 91cm) mirror will be furnished 24" x 36" (61 x 91cm) outside-of-frame to outside-of-frame.
4. To specify special sizes use Series Number followed by width then height in inches. EXAMPLE: B-165 2024.
5. Bobrick framed mirrors are manufactured to a tolerance 1/8" (3.2mm).
6. For sufficient space to lift mirror onto wall hanger(s), provide 3-1/4" (85mm) minimum clearance above center line of mounting screw holes.
7. Provide 1" (25mm) minimum clearance at bottom of mirror for engaging locking screws and 1" (25mm) clearance on each side.

### MATERIALS:

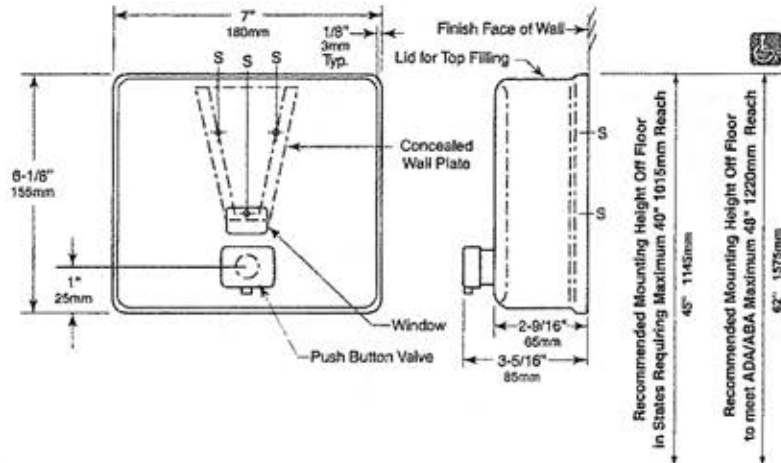
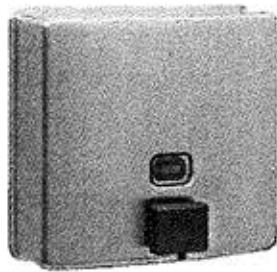
**Frame** — Type-430 stainless steel, 1/2" x 1/2" x 3/8" (13 x 13 x 9.5mm) channel with 1/4" (6mm) return at rear with bright polished finish. One piece frame with 90 degree mitered corners. Galvanized steel back has integral horizontal hanging brackets near the top for hanging the mirror and near the bottom to prevent the bottom of the mirror from pulling away from the wall. Locking devices secure mirror to concealed wall hanger. In Screw Locking Design (see figure 2), concealed Phillips-head locking screws securely fasten mirror to wall hanger.

**Mirror** — No. 1 quality, 1/4" (6mm) select float glass: selected for silvering, electrolytically copper-plated by the galvanic process, and guaranteed for 15 years against silver spoilage. Corners are protected by friction-absorbing filler strips; back is protected by full-size, shock-absorbing, water-resistant, nonabrasive, 3/16" (5mm) thick polyethylene padding.

**Concealed Wall Hanger** — 20-gauge (0.9mm) galvanized steel. Incorporates lower support member, forming rigid rectangle, which engages lower backplate louvers to keep bottom of mirror against wall.

continued . . .

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet. The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

**BOBRICK****Technical Data****ConturaSeries®  
SURFACE-MOUNTED  
SOAP DISPENSER****B-4112****MATERIALS:**

**Container** — Body is 18-8 S, type-304, 20-gauge (1.0mm) stainless steel with satin-finish. Drawn, one-piece, seamless construction. Front has same degree of arc as other Bobrick ConturaSeries washroom accessories. Radius on corners and edges complement other ConturaSeries accessories. Back plate is 22-gauge (0.8mm) stainless steel with 20-gauge (1.0mm) stainless steel mounting bracket attached. Container body and back plate are epoxy-sealed to prevent warping and leakage. Concealed wall plate is 20-gauge (1.0mm) stainless steel. Equipped with a plastic soap refill-indicator window and a locked, hinged stainless steel lid for top filling. Capacity: 40-fl oz (1.2-L).

**Valve** — Black molded plastic push button. Soap head-holding mushroom valve. Stainless steel spring. U-packing seal and duckbill. Antibacterial-soap-resistant plastic cylinder.

**OPERATION:**

Corrosion-resistant valve dispenses commercially marketed all-purpose hand soaps. To prevent corrosion, use only chloride-free pH-neutral liquid soaps. Valve operates with one hand, without tight grasping, pinching, or twisting of the wrist, and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines (including ADAAG in U.S.A.). Window indicates when refill is required. The locked, hinged lid opens for top filling with special key provided. Concealed, vandal-resistant mounting.

**INSTALLATION:**

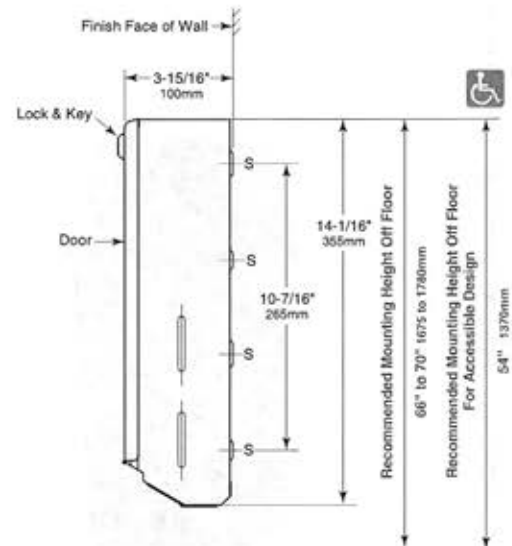
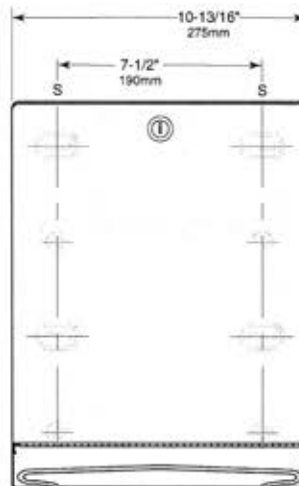
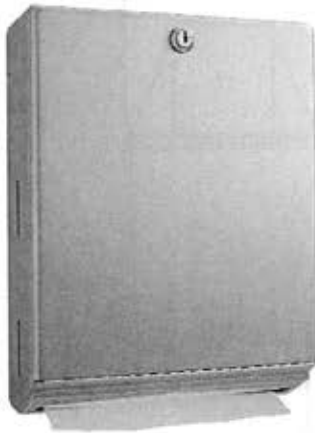
Secure wall plate to the wall with screws furnished at points indicated by an S. Slide mounting bracket of container down onto wall plate and secure unit with furnished locking-screw. For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with screws furnished. For other wall surfaces, provide fiber plugs or expansion shields for use with screws furnished, or provide 1/8" (3mm) toggle bolts or expansion bolts.

**Note:** Surface-mount the dispenser plumb and true with valve 6" (152mm) to right or left of lavatory center. Provide 4" (102mm) minimum clearance from the lid to the underside of any horizontal projection. Push buttons should be located 44" (1120mm) maximum above the finish floor. Where a high reach is over an obstruction (countertop), the high forward reach shall be 48" (1220mm) maximum where the reach depth is 20" (510mm) maximum. Where the reach depth exceeds 20" (510mm) the high forward reach shall be 44" (1120mm) maximum and the reach depth shall be 25" (635mm) maximum.

**SPECIFICATION:**

Surface-mounted soap dispenser shall be type-304 stainless steel with satin-finish. Corrosion-resistant valve shall dispense commercially marketed all-purpose hand soaps. To prevent corrosion, use only chloride-free pH-neutral liquid soaps. Valve shall be operable with one hand and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines (including ADAAG in U.S.A.). Front of soap dispenser shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of soap dispenser shall complement other Bobrick ConturaSeries washroom accessories. Container body and back plate shall be epoxy-sealed to prevent warping and leakage. Soap dispenser shall have concealed, vandal-resistant mounting. Locked, hinged stainless steel lid for top filling shall require special key to open. Capacity shall be 40-fl oz (1.2-L).

Surface-Mounted Stainless Steel Soap Dispenser shall be Model B-4112 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

**BOBRICK****Technical Data****ClassicSeries®  
SURFACE-MOUNTED  
PAPER TOWEL DISPENSER****B-262****MATERIALS:**

**Cabinet** — 18-8, type-304, 22-gauge (0.8mm) stainless steel. All-welded construction. Exposed surfaces have satin finish. Towel tray has hemmed opening to dispense paper towels without tearing.

**Door** — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Secured to cabinet with a full-length stainless steel piano-hinge. Equipped with a tumbler lock keyed like other Bobrick washroom accessories.

**Optional:** Order Bobrick Part No. 262-130 TowelMate® available as an optional accessory. TowelMate accessory allows for paper towels to dispense one at a time without bulging, sagging or falling through the towel tray opening. TowelMate fits Gamco and most manufacturers' similar models.

**OPERATION:**

Unit dispenses C-fold and multifold paper towels 3-1/8" to 3-13/16" (79–97mm) deep. Slots in sides of cabinet indicate refill time. Capacity: 400 C-fold or 525 multifold paper towels. To dispense narrower towels 2-1/2" to 3-1/8" (64–79mm) deep, order optional TowelMate accessory Bobrick Part No. 262-130.

**INSTALLATION:**

Mount unit on wall with four #10 x 1-1/4" (4.8 x 32mm) sheet-metal screws (not furnished) at four of the eight mounting holes indicated by an S (top slots and bottom holes preferable). For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure with sheet-metal screws. For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 1/8" (3mm) toggle bolts or expansion bolts.

**SPECIFICATION:**

Surface-mounted paper towel dispenser shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Door shall be secured to cabinet with a full-length stainless steel piano-hinge and equipped with a tumbler lock keyed like other Bobrick washroom accessories. Paper towel tray shall have hemmed opening to dispense paper towels without tearing. Unit shall be capable of dispensing 400 C-fold or 525 multifold paper towels measuring 3-1/8" to 3-13/16" (79 to 97mm) deep. Narrower paper towels 2-1/2" to 3-1/8" (65 to 79mm) deep may be efficiently dispensed with the use of an optional TowelMate accessory, Bobrick Part No. 262-130. TowelMate accessory allows for paper towels to dispense one at a time without bulging, sagging or falling through the towel tray opening.

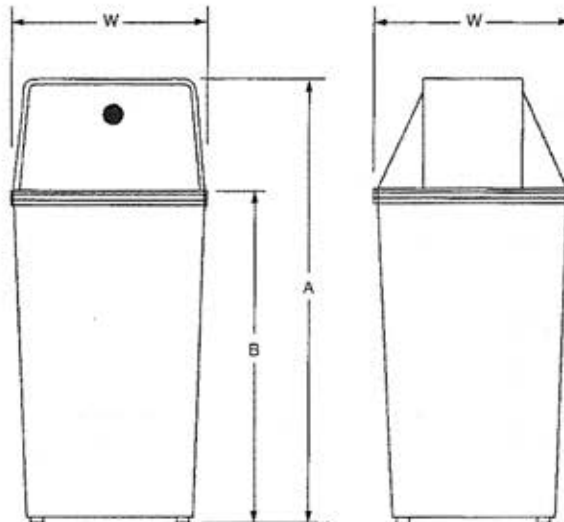
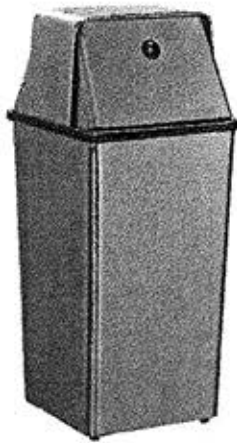
**Surface-Mounted Paper Towel Dispenser shall be Model B-262 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.**



Technical Data

# FLOOR-STANDING STAINLESS STEEL WASTE RECEPTACLES

# B-2250



Model Number	Capacity	A	B	W	Optional Accessory Vinyl Liner Part No.
B-2250	13-gal. (49.2-L)	29-1/2" (750mm)	22" (560mm)	13-3/8" x 13-3/8" (340 x 340mm)	2250-3
B-2260	13-gal. (49.2-L)	Open-Top, No Cover	22" (560mm)	12-1/2" x 12-1/2" (320 x 320mm)	2250-3
* B-2280	21-gal. (79.5-L)	Open-Top, No Cover	30" (760mm)	14" x 14" (355 x 355mm)	2270-3

### MATERIALS:

**Waste Receptacle** — 22-gauge (0.8mm) stainless steel with satin finish. Equipped with vinyl bumper strip and rubber feet. Hooks are provided to attach optional, removable liner (not provided) to upper interior corners.

**Cover** — 22-gauge (0.8mm) stainless steel with satin finish. Two spring-loaded, self-closing doors, which have an international graphic symbol to identify waste disposal, are secured with full-length, stainless steel piano-hinges.

### OPERATION:

Entire cover is removable for easy servicing of receptacle. Vinyl bumper strip and rubber feet on waste receptacle protect wall and floor surfaces.

*Designer's Note:* Vinyl liners for waste receptacle are available from Bobrick as an accessory. Check the chart above for correct liner part number to order.

### SPECIFICATION:

Waste receptacle shall be 22-gauge (0.8mm) stainless steel. Exposed surfaces shall have satin finish. Waste receptacle shall be equipped with vinyl bumper strip and rubber feet. Capacity shall be \_\_\_\_\_ (insert capacity).

Waste Receptacle shall be Model \_\_\_\_\_ (insert model number) of Bobrick Washroom Equipment, Inc. Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

HOOK

LOAD CAPACITY  
8-10 kg  
17.6-22 lbs

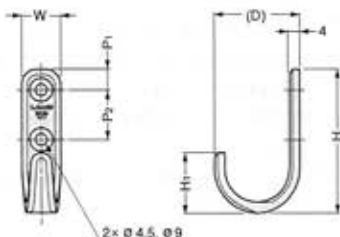
4.1x16  
STAINLESS

STAINLESS  
304  
STEEL

XL-HJT



Mirror Mirror and Satin combination



- 304 stainless steel hooks.
- Available in Mirror (M) or Combination of Mirror and Satin (TT) finish.

Item No.	D	W	H	H <sub>1</sub>	P <sub>1</sub>	P <sub>2</sub>	Load Capacity (kg)	Weight (g)	Box (pcs)	Carton (pcs)
XL-HJT-55/M	33	15	55	23	8	19	10 (22 lbs)	34	30	300
XL-HJT-55/TT		15.5								
XL-HJT-70/M	43	18	70	30	10	23	8 (17.6 lbs)	53	20	200
XL-HJT-70/TT		18.5								

Material	Finish	
	M	TT
304 Stainless Steel	Mirror	Mirror and Satin Combination

HOOK

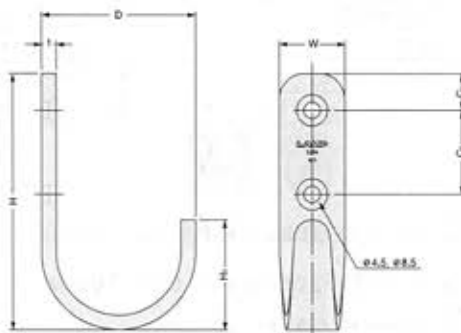
TEST 4  
P659

LOAD CAPACITY  
8-10 kg  
17.6-22 lbs

4.1x16  
STAINLESS

STAINLESS  
304  
STEEL

HJT



- 4mm thick material designed for excellent durability.

Item No.	D	H	H <sub>1</sub>	t	W	C <sub>1</sub>	C <sub>2</sub>	Load Capacity (kg)	Weight (g)	Box (pcs)	Carton (pcs)	Finish	Material
HJT-55	33	55	23	4	15	8	19	10 (22 lbs)	34	30	300	Satin	304 Stainless Steel
HJT-70	43	70	30	4	18	10	23	8 (17.6 lbs)	53	20	200	Satin	304 Stainless Steel
HJT-55SBL	33	55	23	4	15	8	19	10 (22 lbs)	34	30	300	Black	304 Stainless Steel
HJT-70SBL	43	70	30	4	18	10	23	8 (17.6 lbs)	53	20	200	Black	304 Stainless Steel

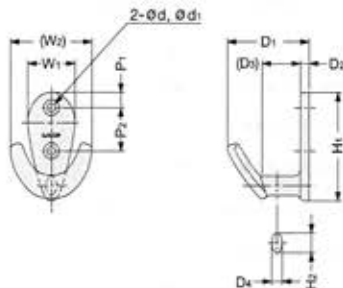
FORK HOOK

LOAD CAPACITY  
20-30 kg  
44-66 lbs

4.1x20  
3.5x20  
STAINLESS

STAINLESS  
316  
STEEL

EU



- Hook with unique design.
- Can hang 3 items at the same time: two on the tips and one on the neck.
- Two-tip shape ideal to hang hats, caps etc.

Item No.	W <sub>1</sub>	W <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	(D <sub>3</sub> )	D <sub>4</sub>	H <sub>1</sub>	H <sub>2</sub>	d	d <sub>1</sub>	P <sub>1</sub>	P <sub>2</sub>
EU-50	22	38 (1-1/2")	38 (1-1/2")	4	17.8	5	50 (1-31/32")	9	4	7.4	7	20
EU-72	32	56 (2-13/64")	52 (2-3/64")	6	23	8	72 (2-53/64")	14	4.6	8.6	10	34

Item No.	Load Capacity (kg)	Weight (g)	Box (pcs)	Carton (pcs)	Material	Finish
EU-50	20 (44 lbs)	42	20	120	316 Stainless Steel	Mirror
EU-72	30 (66 lbs)	118	10	60	316 Stainless Steel	Mirror



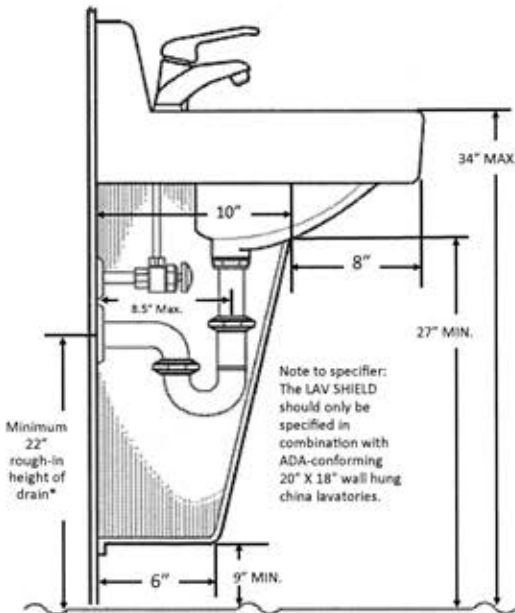
**SPECIFICATION**

**LAV SHIELD®**

**General Description:**

LAV SHIELD® rigid enclosure is dimensionally engineered to comply with ADA requirements, design aesthetics and mechanical cooperation. LAV SHIELD conceals electronic faucet components, mixing valves, trap primers and instantaneous water heaters\*, eliminating vandalism while allowing wheelchair accessibility under lavatories. Available in the standard model for field fit applications or may be ordered as a factory pre-cut which closely follows the underside contours of the lavatory specified.

\*Lavatory "rough in" should be considered to allow mounting room for water heater behind enclosure. Contact TRUEBRO for specifications.



\*Less than 22" rough-in height, certain job conditions or certain lavatories may require an offset tailpiece or offset grid strainer.

Material	Rigid high-impact, stain-resistant, PVC
Nominal Wall	.093"
Finish	Fine haircell
UV Protection	Will not fade or discolor
Durability	Virtually indestructible
Fasteners	7 stainless steel screws and wall anchors provided
Color	China white
Compatibility	Fits all ADA-conforming 20" x 18" wall-hung china lavatories
Paintability	Apply acrylic enamel or Latex
UL Listing	In accordance with ADA Article 4.19.4
Flammability	UL-94 V-0, 5VA ASTM D-635-91 4 (ATB) 2.1 (AEB)
Bacterial/Fungal Resistance	ASTM G21 and G22/Result 0



U.S. and Canadian patents: D373,412 D372,077  
D384,732 D393,700 D390643 79,064 79,063

**LAV SHIELD Model #2018 — Standard (to be Field Fit)**

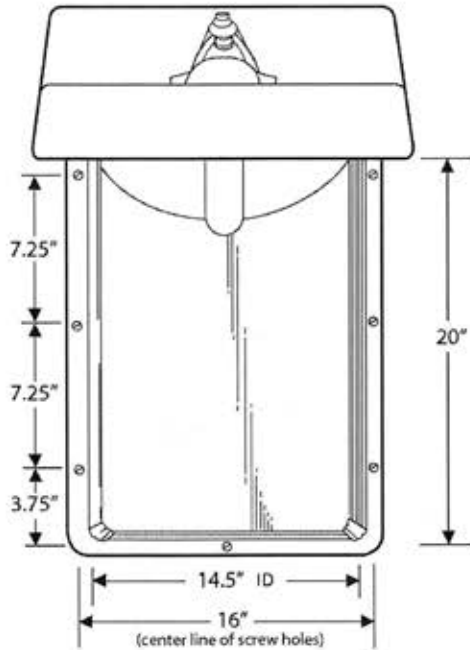
**LAV SHIELD Factory Pre-cuts Available:**

- Model #2018-AS-C – Am.Std. Comrade
- Model #2018-EL-S – Eljer Signature
- Model #2018-AS-D – Am.Std. Declyn
- Model #2018-EL-U – Eljer Bucknell
- Model #2018-AS-L – Am.Std. Lucerne
- Model #2018-GR-H – Gerber Hayes
- Model #2018-AS-M – Am.Std. Muro
- Model #2018-GR-M – Gerber Monticello
- Model #2018-AS-OL – Am.Std. Old Lucerne
- Model #2018-GR-P – Gerber Plymouth
- Model #2018-AS-P – Am.Std. Penlyn
- Model #2018-KO-B – Kohler Braham
- Model #2018-AS-R – Am.Std. Roxalyn
- Model #2018-KO-C – Kohler Chesapeake
- Model #2018-BD-I – Bradley Imperial
- Model #2018-KO-G – Kohler Greenwich
- Model #2018-BR-M – Briggs Milton
- Model #2018-KO-H – Kohler Hudson
- Model #2018-BR-W – Briggs Whitman
- Model #2018-KO-K – Kohler Kingston
- Model #2018-CR-H – Crane Harwich
- Model #2018-KO-P – Kohler Pinoir
- Model #2018-CR-N – Crane Norwich
- Model #2018-KO-S – Kohler Soho
- Model #2018-CR-W – Crane Westmont
- Model #2018-HB-NS – Mansfield Grand Isle
- Model #2018-CR-Y – Crane Yorkshire
- Model #2018-TO-L – Toto LT307
- Model #2018-EL-B – Eljer Blair
- Model # 2018-ZN-Z – Zurn #Z5344
- Model #2018-EL-D – Eljer Delwyn
- Model # 2018-ZN-NZ – Zurn #Z5344
- Model #2018-EL-M – Eljer Mayburne

Note: All Lav Shields come with standard fasteners.

Model # TRFAST Tamper-resistant screws (Torx Head Screws)

Special Pre-Cut Request: \_\_\_\_\_



Job/Location: \_\_\_\_\_

Designer: \_\_\_\_\_



DOOR HARDWARE CUTSHEETS



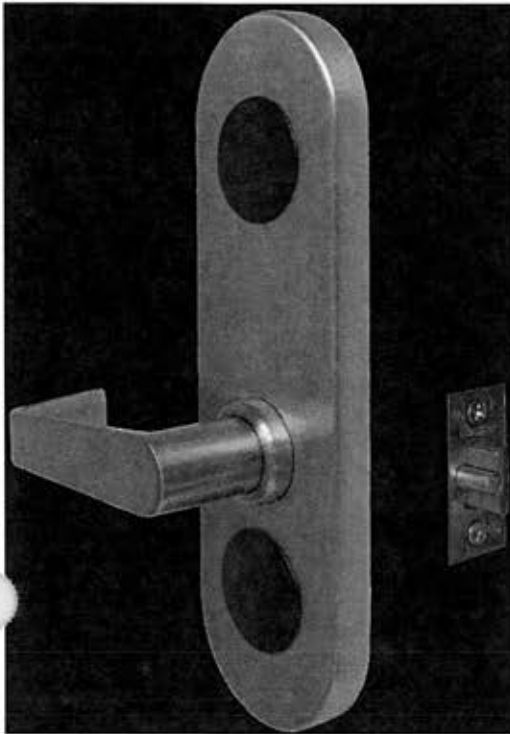


SECUREALL SECURITY REINVENTED<sup>SM</sup>

# FOR INTERIOR DOORS

## Cylindrical Door Reader SA-CDR w/Card Option

### Electrical specifications



Users	Up to 70,000
Audit Trail	6 mos. data stored in server, typical
Credential Verification Time	< 50ms
Visual/Audible Interface	LED and audio beeper
System Interface	SA-Guardian Application Server
Power Supply	4 standard AA alkaline batteries
Battery Life	4 years, typical ; 100K openings
Exterior Operating Temperature	-10° C to +70° C or +14° F to +158° F
Interior Operating Temperature	-10° C to +55° C or +14° F to +131° F
Certifications/Compliance	FCC Part 15 B&C
Reader Technology:	
Hands free UKey:	Hands-free, wireless, PKI, AES
Contactless Smartcard:	ISO 14443, sector cryptography
Bluetooth /Smartphone:	Bluetooth (BLE)
Reader Frequency	2.4 GHz and 13.56 MHz
Reader Range	UKey: 1" to 30 ft, programmable Card and BLE: 1"
Communication Security	PKI, AES-128
Encryption Keys	Device specific, customer controlled
Wireless Communication Protocol	Proprietary: Extreme low power (ELP) protocol & 802.15.4; 14443
Reader/Router Handshake	Automatic
Firmware Updates	PKI; over-the-air
Electrical Warranty	2 years

### Features & Benefits

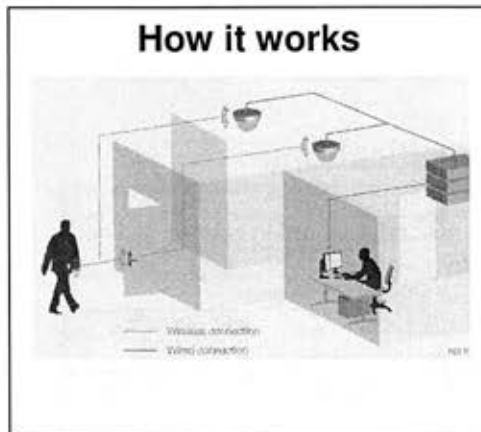
- Hands-free, multi-distance access
- Proximity and Smartcard
- Long range, hands-free asset tracking
- Real-time, extreme low power communication => long battery life
- All access decisions at the door; does not require server link
- Multi-layer hard encryption: PKI +AES
- Device specific encryption keys, controlled by system owner
- Remote & local lockdown
- Over-the-air firmware upgrades
- Manual & programmable office mode
- Integrated door ajar and tamper sensor
- Remote unlock
- No software or lease licenses

### Mechanical specifications

Handing	Universal, non-handed; ADA compliant
Certifications/Compliance	ANSI/BHMA A156.2 Grade 1; UL10c-3 hour
Door Thickness	1-5/8" to 2"
Backset	2-3/4"
Latches	Stainless steel, 17/32" throw
Lever Design	Sentinel
Lever Functionality	Clutched (free wheeling)
Strikes	ASA strike
Keying	Hands-free U-Key™, Card, BLE
Function	Passage, privacy, entry, classroom, storeroom; other functions available upon request
Case Material	Satin stainless steel (630)
Dimensions	O/S 9-3/8" x 3-1/8" x 27/32"
Vandal Protection	Integrated tamper sensors
Door Ajar Alarm	Integrated deadlatch sensor
Mechanical Warranty	2 years

# Cylindrical Door Reader SA-CDR w/Card Option

## SA-CDR Options



Keying	In addition to U-Key™ operation: 10-key pushbutton; BEST or SARGENT SFIC keyway
Lever Design	Quest
Lever Functionality	Non-clutched
Finish	Satin brass (606) Oil rubbed bronze (613) Satin nickel (619) Satin chrome (626)
Strike	T-Strike, Full-lip
Outdoor Usage	Weatherized
Saniguard	Antimicrobial coating

## Frequently asked questions

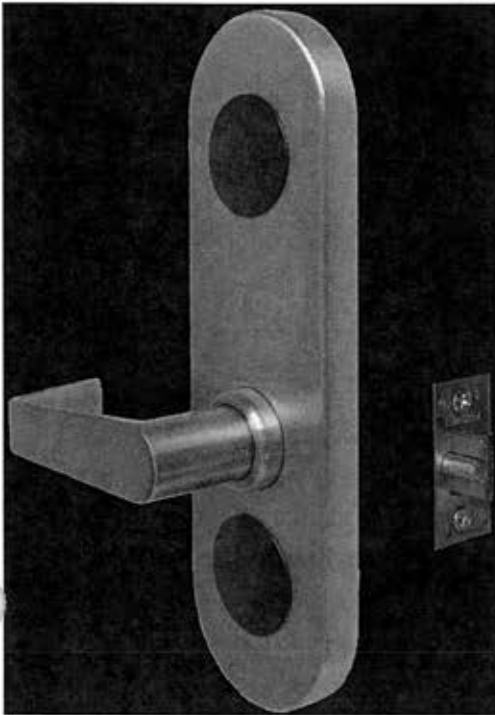
- 1. Do locks come with access options other than a U-Key™?** This lock supports SecureALL U-Key™, Proximity and Smartcard credentials. Options are available to add a cost effective 10-button keypad and/or a mechanical (SFIC) key cylinder.
- 2. Where does access control information reside in the system?** The SA Guardian automatically sends this information to each applicable lock. The lock is then fully capable of making access control decisions without going back to the Server. As locks are battery operated, doors will continue to function, even in the event of a power failure.
- 3. What is tracking capability?** Each lock has the built-in ability to automatically track a hands-free U-Key™ (person or asset) as it passes by the door. It can optionally be turned on.
- 4. How many lock units can be controlled by a single router?** There is no limit to the number of doors that can be controlled by a single router (limited only by building construction) and no licenses are required.
- 5. Can a U-Key™ unlock a door when approached from inside?** SecureALL locks are designed to know whether a U-Key™ is located inside or outside a room. Therefore, a door can never unlock by accident when approached from inside, i.e. looking through a door peephole.
- 6. Does the system send a low battery alarm?** When batteries in any of the system components reach a programmed minimum level, an individual designated by the system administrator is notified, via the client screen, email or text message, that batteries must be changed.
- 7. What level of encryption is incorporated in the system?** SecureALL utilizes multiple levels of encryption (PKI and AES), first to ensure that any equipment being added to a customer's system is genuine, and then to guarantee that end-to-end communication between all layers is secure at the highest possible level. Customers have complete control over encryption keys.
- 8. Can a door be unlocked if the batteries are dead?** An auxiliary power supply is available that energizes the door lock, allowing an authorized U-Key™ entrance to a room.
- 9. Lock installation tools?** Ordinary workbench tools; no special programmer or cable.



SECUREALL SECURITY REINVENTED<sup>SM</sup>

## Cylindrical Door Reader SA-CDR

### Electrical specifications



Users	Up to 70,000
Audit Trail	6 mos. data stored in server, typical
Credential Verification Time	< 50ms
Visual/Audible Interface	LED and audio beeper
System Interface	SA-Guardian Application Server
Power Supply	3 or 4 standard AA alkaline batteries; depends on keying option
Battery Life	4 years, typical
Exterior Operating Temperature	-10° C to +70° C or +14° F to +158° F
Interior Operating Temperature	-10° C to +55° C or +14° F to +131° F
Certifications/Compliance	FCC Part 15 B&C
Reader Technology	Hands-free, wireless
Reader Frequency	2.4 GHz
Reader Range	1" to 30 ft, programmable
Communication Security	PKI, AES-128
Encryption Keys	Device specific, customer controlled
Wireless Communication Protocol	Proprietary: Extreme low power (ELP) protocol & 802.15.4
Reader/Router Handshake	Automatic
Firmware Updates	PKI; over-the-air
Electrical Warranty	2 years

### Features & Benefits

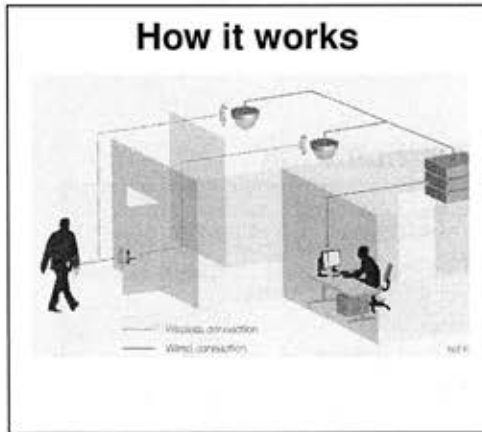
- Hands-free, multi-distance access
- Long range, hands-free asset tracking
- Real-time, extreme low power communication => long battery life
- All access decisions at the door; does not require server link
- Multi-layer hard encryption: PKI +AES
- Device specific encryption keys, controlled by system owner
- Remote & local lockdown
- Over-the-air firmware upgrades
- Manual & programmable office mode
- Integrated door ajar and tamper sensor
- Remote unlock
- No software or lease licenses

### Mechanical specifications

Handing	Universal, non-handed; ADA compliant
Certifications/Compliance	ANSI/BHMA A156.2 Grade 1; UL10c-3 hour
Door Thickness	1-5/8" to 2"
Backset	2-3/4"
Latches	Stainless steel, 17/32" throw
Lever Design	Sentinel
Lever Functionality	Clutched (free wheeling)
Strikes	ASA strike
Keying	Hands-free U-Key <sup>TM</sup>
Function	Passage, privacy, entry, classroom, storeroom; other functions available upon request
Case Material	Satin stainless steel (630)
Dimensions	O/S 9-3/8" x 3-1/8" x 27/32"
Vandal Protection	Integrated tamper sensors
Door Ajar Alarm	Integrated deadlatch sensor
Mechanical Warranty	2 years

# Cylindrical Door Reader SA-CDR

## SA-CDR Options



Keying	In addition to U-Key™ operation: 10-key pushbutton; BEST or SARGENT SFIC keyway; Proximity and Smartcard; Bluetooth
Lever Design	Quest
Lever Functionality	Non-clutched
Finish	Satin brass (606) Oil rubbed bronze (613) Satin nickel (619) Satin chrome (626)
Strike	T-Strike, Full-lip
Outdoor Usage	Weatherized
Saniguard	Antimicrobial coating

## Frequently asked questions

- 1. Do locks come with access options other than a U-Key™?** This lock supports SecureALL U-Key™, Proximity and Smartcard credentials. Options are available to add a cost effective 10-button keypad and/or a mechanical (SFIC) key cylinder.
- 2. Where does access control information reside in the system?** The SA Guardian automatically sends this information to each applicable lock. The lock is then fully capable of making access control decisions without going back to the Server. As locks are battery operated, doors will continue to function, even in the event of a power failure.
- 3. What is tracking capability?** Each lock has the built-in ability to automatically track a hands-free U-Key™ (person or asset) as it passes by the door. It can optionally be turned on.
- 4. How many lock units can be controlled by a single router?** There is no limit to the number of doors that can be controlled by a single router (limited only by building construction) and no licenses are required.
- 5. Can a U-Key™ unlock a door when approached from inside?** SecureALL locks are designed to know whether a U-Key™ is located inside or outside a room. Therefore, a door can never unlock by accident when approached from inside, i.e. looking though a door peephole.
- 6. Does the system send a low battery alarm?** When batteries in any of the system components reach a programmed minimum level, an individual designated by the system administrator is notified, via the client screen, email or text message, that batteries must be changed.
- 7. What level of encryption is incorporated in the system?** SecureALL utilizes multiple levels of encryption (PKI and AES), first to ensure that any equipment being added to a customer's system is genuine, and then to guarantee that end-to-end communication between all layers is secure at the highest possible level. Customers have complete control over encryption keys.
- 8. Can a door be unlocked if the batteries are dead?** An auxiliary power supply is available that energizes the door lock, allowing an authorized U-Key™ entrance to a room.
- 9. Lock installation tools?** Ordinary workbench tools; no special programmer or cable.



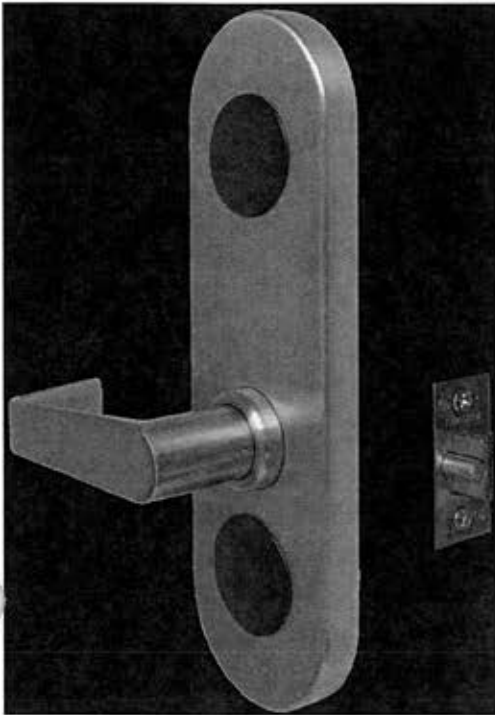
SECUREALL

SECURITY REINVENTED<sup>SM</sup>

# FOR INTERIOR UNISEX RESTROOMS DOORS

## Cylindrical Restroom (Privacy) Reader SA-CRR

### Electrical specifications



Users	Up to 70,000
Audit Trail	6 mos. data stored in server, typical
Credential Verification Time	< 50ms
Visual/Audible Interface	LED and audio beeper
System Interface	SA-Guardian Application Server
Power Supply	3 or 4 standard AA alkaline batteries; depends on keying option
Battery Life	4 years, typical
Exterior Operating Temperature	-10° C to +70° C or +14° F to +158° F
Interior Operating Temperature	-10° C to +55° C or +14° F to +131° F
Certifications/Compliance	FCC Part 15 B&C
Reader Technology	Hands-free, wireless
Reader Frequency	2.4 GHz
Reader Range	1" to 30 ft, programmable
Communication Security	PKI, AES-128
Encryption Keys	Device specific, customer controlled
Wireless Communication Protocol	Proprietary: Extreme low power (ELP) protocol & 802.15.4
Reader/Router Handshake	Automatic
Firmware Updates	PKI; over-the-air
Electrical Warranty	2 years

### Features & Benefits

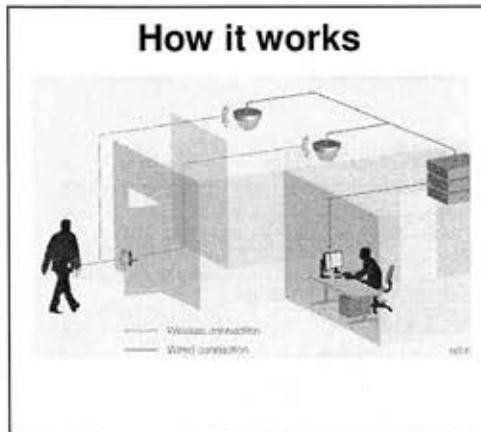
- Privacy button on inside trim piece locks out any credential until inside handle is turned
- Hands-free, multi-distance access
- Real-time, extreme low power communication => long battery life
- All access decisions at the door; does not require server link
- Multi-layer hard encryption: PKI +AES
- Device specific encryption keys, controlled by system owner
- Over-the-air firmware upgrades
- Manual & programmable office mode
- Integrated door ajar and tamper sensor
- Remote unlock
- No software or lease licenses

### Mechanical specifications

Handing	Universal, non-handed; ADA compliant
Certifications/Compliance	ANSI/BHMA A156.2 Grade 1; UL10c-3 hour
Door Thickness	1-5/8" to 2"
Backset	2-3/4"
Latches	Stainless steel, 17/32" throw
Lever Design	Sentinel
Lever Functionality	Clutched (free wheeling)
Strikes	ASA strike
Keying	Hands-free U-Key <sup>TM</sup>
Function	Passage, privacy, entry, classroom, storeroom; other functions available upon request
Case Material	Satin stainless steel (630)
Dimensions	O/S 9-3/8" x 3-1/8" x 27/32"
Vandal Protection	Integrated tamper sensors
Door Ajar Alarm	Integrated deadlatch sensor
Mechanical Warranty	2 years

# Cylindrical Restroom (Privacy) Reader SA-CRR

## SA-CRR Options



Keying	In addition to U-Key™ operation: 10-key pushbutton; BEST or SARGENT SFIC keyway; Proximity and Smartcard; Bluetooth
Lever Design	Quest
Lever Functionality	Non-clutched
Finish	Satin brass (606) Oil rubbed bronze (613) Satin nickel (619) Satin chrome (626)
Strike	T-Strike, Full-lip
Outdoor Usage	Weatherized
Saniguard	Antimicrobial coating

## Frequently asked questions

- 1. How does "Privacy" lock work?** Access to a restroom with an SA-CRR installed works exactly the same as an SA-CDR for any credential. Once inside the restroom, a button located at the upper end of the trim is pressed, which disengages accessibility to the room until the inside handle is depressed. This action resets the lock unit for the next entry. A flashing LED on the outside trim indicates when the restroom is in use.
- 2. Do locks come with access options other than a U-Key™?** This lock supports SecureALL U-Key™, Proximity and Smartcard credentials. Options are available to add a cost effective 10-button keypad and/or a mechanical (SFIC) key cylinder.
- 3. Where does access control information reside in the system?** The SA Guardian automatically sends this information to each applicable lock. The lock is then fully capable of making access control decisions without going back to the Server. As locks are battery operated, doors will continue to function, even in the event of a power failure.
- 4. How many lock units can be controlled by a single router?** There is no limit to the number of doors that can be controlled by a single router (limited only by building construction) and no licenses are required.
- 5. Does the system send a low battery alarm?** When batteries in any of the system components reach a programmed minimum level, an individual designated by the system administrator is notified, via the client screen, email or text message, that batteries must be changed.
- 6. What level of encryption is incorporated in the system?** SecureALL utilizes multiple levels of encryption (PKI and AES), first to ensure that any equipment being added to a customer's system is genuine, and then to guarantee that end-to-end communication between all layers is secure at the highest possible level. Customers have complete control over encryption keys.
- 7. Can a door be unlocked if the batteries are dead?** An auxiliary power supply is available that energizes the door lock, allowing an authorized U-Key™ entrance to a room.
- 8. Lock installation tools?** Ordinary workbench tools; no special programmer or cable.

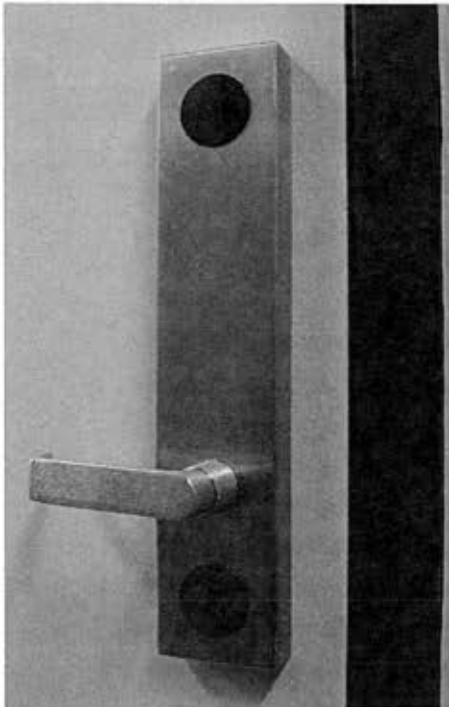


SECUREALL SECURITY REINVENTED<sup>SM</sup>

## Panic Hardware Reader SA-PHR

(designed for new and retrofit installation into non-electrified Von Duprin 98/99 Series Rim hardware)

### Electrical specifications



Users	Up to 70,000
Audit Trail	6 mos. data stored in server, typical
Credential Verification Time	< 50ms
Visual/Audible Interface	LED and audio beeper
System Interface	SA-Guardian Application Server
Power Supply	3 standard C alkaline batteries
Battery Life	8 years, typical
Exterior Operating Temperature	-10° C to +70° C or +14° F to +158° F
Interior Operating Temperature	-10° C to +55° C or +14° F to +131° F
Certifications/Compliance	FCC Part 15 B&C
Reader Technology	Hands-free, wireless
Reader Frequency	2.4 GHz
Reader Range	1" to 30 ft, programmable
Communication Security	PKI, AES-128
Encryption Keys	Device specific, customer controlled
Wireless Communication Protocol	Proprietary: Extreme low power (ELP) protocol & 802.15.4
Reader/Router Handshake	Automatic
Firmware Updates	PKI; over-the-air
Electrical Warranty	2 years

### Features & Benefits

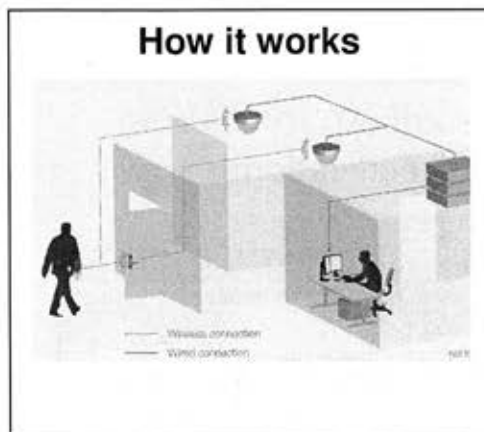
- Hands-free, multi-distance access
- Long range, hands-free asset tracking
- Real-time, extreme low power communication => long battery life
- All access decisions at the door; does not require server link
- Multi-layer hard encryption: PKI +AES
- Device specific encryption keys, controlled by system owner
- Remote & local lockdown
- Over-the-air firmware upgrades
- Manual & programmable office mode
- Integrated door ajar and tamper sensor
- Remote unlock
- No software or lease licenses

### Mechanical specifications

Handing	Handed, field reversible; ADA compliant
Certifications/Compliance	UL10c-3hour
Door Thickness	1-3/4" to 2-1/4"
Backset	2-3/4"
Lever Design	Dane
Lever Functionality	Non-clutched
Keying	Hands-free U-Key™
Function	Passage, entry, classroom
Case Material	Satin stainless (630)
Dimensions	O/S 14-3/8" x 3-1/8" x 1-1/8"
Vandal Protection	Integrated tamper sensors
Door Ajar Alarm	Integrated deadlatch sensor
Mechanical Warranty	2 years

# Panic Hardware Reader SA-PHR

## SA-PHR Options



Keying	In addition to U-Key™ operation: 10-key pushbutton; Proximity and Smartcard; Bluetooth
Lever Design	Quantum
Finish	Satin brass (606) Oil rubbed bronze (613) Satin chrome (626)
Door Thickness	Contact factory for options
Outdoor Usage	Weatherized
Saniguard	Antimicrobial coating

## Frequently asked questions

- 1. What does the PHR kit comprise?** PHR is designed to convert an industry standard VDP-98/99 series exit device into a wireless, centrally controlled lock. The kit includes outside trim, inside trim-cover with built-in SecureALL electronics, latch bolt sensorization package, battery box and local lock-down button.
- 2. Do locks come with access options other than a U-Key™?** All SecureALL locks can be equipped with a cost effective 10-button keypad. Prox and smartcard options also available.
- 3. Where does access control information reside in the system?** The SA Guardian automatically sends this information to each applicable lock. The lock is then fully capable of making access control decisions without going back to the Server. As locks are battery operated, doors will continue to function, even in the event of a power failure.
- 4. What is tracking capability?** Each lock has the built-in ability to automatically track a hands-free U-Key™ (person or asset) as it passes by the door. It can optionally be turned on.
- 5. How many lock units can be controlled by a single router?** There is no limit to the number of doors that can be controlled by a single router (limited only by building construction) and no licenses are required.
- 6. Can a U-Key™ unlock a door when approached from inside?** SecureALL locks are designed to know whether a U-Key™ is located inside or outside a room. Therefore, a door can never unlock by accident when approached from inside, i.e. looking through a door peephole.
- 7. Does the system send a low battery alarm?** When batteries in any of the system components reach a programmed minimum level, an individual designated by the system administrator is notified, via the client screen, email or text message, that batteries must be changed.
- 8. What level of encryption is incorporated in the system?** SecureALL utilizes multiple levels of encryption (PKI and AES), first to ensure that any equipment being added to a customer's system is genuine, and then to guarantee that end-to-end communication between all layers is secure at the highest possible level. Customers have complete control over encryption keys.
- 9. Can a door be unlocked if the batteries are dead?** An auxiliary power supply is available that energizes the door lock, allowing an authorized U-Key™ entrance to a room.





**SECUREALL**

SECURITY REINVENTED<sup>SM</sup>

## The world is demanding greater physical security. We have the solution.

SecureALL's comprehensive commercial security system takes your organization's physical security capabilities to the next level.

Far more than simple doorway access, our integrated software and hardware solution allows optimal control of one campus or many.

SecureALL can help your organization:

**Save time.** Turn-key solution quickly adapts to meet your changing needs.

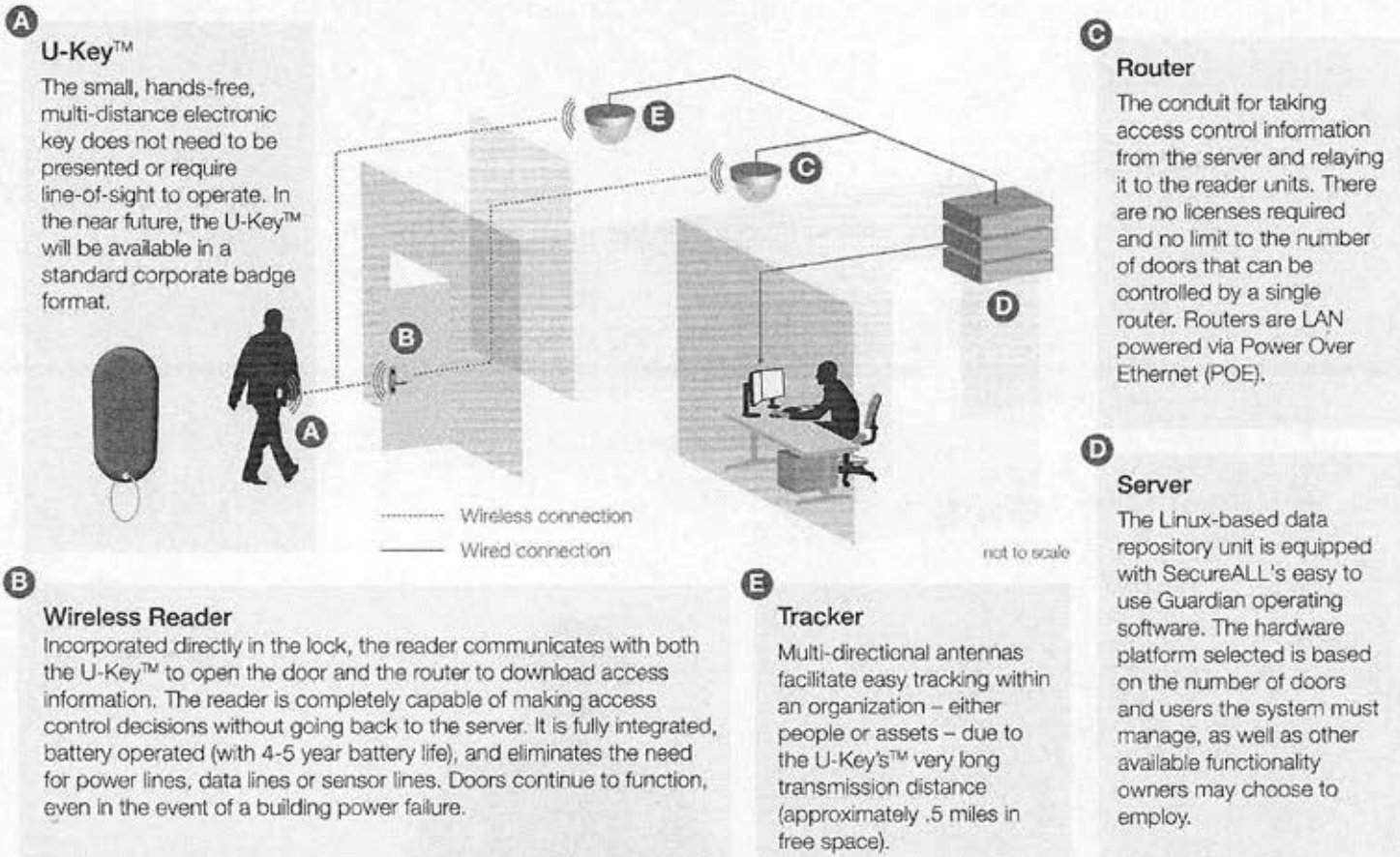
**Save money.** Minimum acquisition, installation, operation and maintenance costs.

**Save lives.** Building or campus-wide lockdown within seconds and people-tracking during an emergency for first responders.



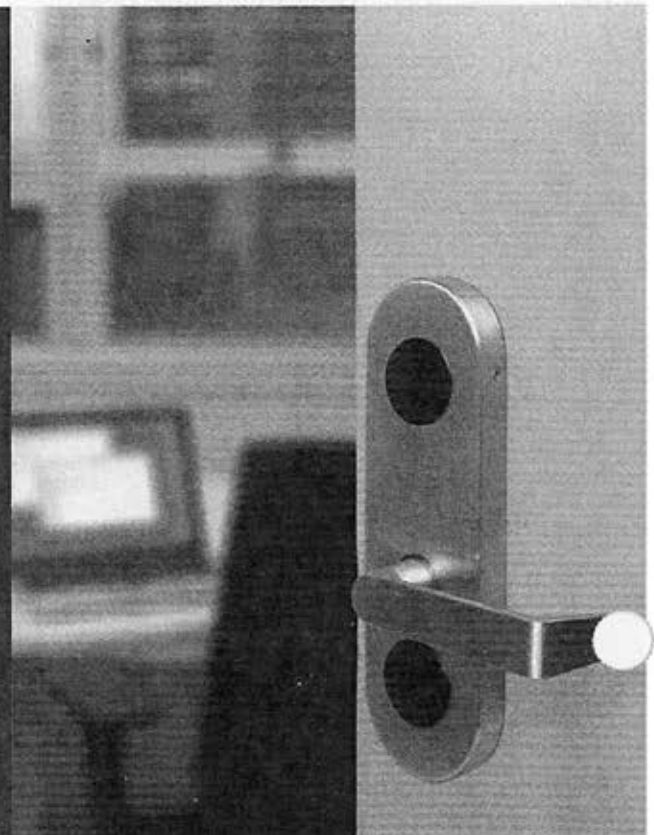
Our innovative, **hands-free U-Key™** can be left in a pocket or handbag for the most convenient and safe access.

# How it works



## Features

- Real-time wireless central control
- Immediate campus lockdown: central, local and reflex
- Effortless, low cost lost-key management
- Remote unlock
- Emergency evacuation management
- Asset tracking
- Simplified access and oversight for people with disabilities
- Single event access and control by day and time
- Non-motion detection
- Equipment tamper protection
- Over-the-air secure firmware downloads



## What makes us different

- 1 **Hands-free:** Patented U-Key™ is left in pocket or handbag. Does not need to be presented and no line-of-sight required. Simply approach the door and it unlocks.
- 2 **Multi-distance:** U-Key™ technology operates a door or elevator at two feet, gate at ten feet, garage at 100 feet, distances programmable by administrator.
- 3 **Safety and convenience:** U-Key™ creates a "virtually" open campus for those allowed entry.
- 4 **Not just access control:** Integrating unique security features, gives actionable information, enabling cost effective, real-time optimal control of a campus.
- 5 **Extensive battery life:** Patented Extreme Low Power (ELP) RF communication technology enables the longest battery life in the industry, 4-5 years.
- 6 **Great value:** Minimum acquisition, installation, operation and maintenance costs.



SecureALL can be used in just about any new construction or retrofit application requiring a high level of security including:

- Commercial Buildings/Corporate Campuses
- Schools, Colleges and Universities
- Retirement Communities
- Hospitals/Medical Centers
- Multi-housing units
- Government and Military
- Transportation Facilities
- Hotels and Motels

## What customers are saying about us

“SecureALL is a complete game changer. We have been looking for a security system with the breadth of features and extremely attractive price point for a long time. Nothing else available comes close to meeting our needs.”

- Joe Sugg

VP of Facilities & Safety  
Santa Clara University

“SecureALL's hands-free key lock system has **dramatically improved the quality of life for our senior residents**. They no longer have to handle, nor find, a key to enter their home, garage or entry doors. The key in their purse or pocket opens everything at a convenient, programmable distance and registers their billing information when they dine. Everyone loves it! The automation saves time and money, while creating satisfied customers. A total win - win.”

- Marianne Nannestad

Executive Director  
The Peninsula Regent,  
San Mateo, CA

“SecureALL is the only system on the market that has combined all of the functions and **gives us all the necessary information** we need to allow us to proactively fix issues before they become major problems, while maintaining a secure environment on our campus.”

- Greg Nelson

VP Finance & College Operations  
College of Marin

## Frequently Asked Questions



### Hardware/Software

**Q: What types of lock devices does SecureALL supply?**

**A:** SecureALL has a full product suite, including mortise locks, cylindrical locks, non-electrified panic exit devices and wall readers for electrified panic exit devices, as well as automatic door openers.

**Q: Will we impact equipment already installed?**

**A:** IT managers need not fear SecureALL will interrupt any wireless equipment they already have in place. All RF communication is in the license-free, 2.4 GHz ISM band. This is a very crowded space. To ensure other devices using the same frequency do not interfere with SecureALL and vice versa, significant filtering has been developed and employed.

**Q: How secure is the system?**

**A:** Multiple levels of encryption are integrated end-to-end into the system, eliminating any possibility of duplication, hacking or spoofing.

**Q: What software does SecureALL employ?**

**A:** The company uses its own proprietary software named "The Guardian." It is an easy to use, intuitive, GUI based software that allows a minimum of administrators to set up, oversee and control an entire campus or multiple campuses. The Guardian is built on a Linux platform, eliminating problems and security issues users face with a Windows operating system. Its 'REST-compliant web services' allows easy integration with 3<sup>rd</sup> party enterprise applications.



### Power Source

**Q: What kind of batteries does the SecureALL system need, and how is data preserved?**

**A:** All SecureALL door locks use standard alkaline cells either AA or C, depending on type of lock. Batteries are easily changed in the field. All information stored in a lock is in flash memory, so there is no concern about losing data already downloaded.

**Q: Why is SecureALL battery life the best in the industry?**

**A:** Battery life is 4-5 years with typical usage. SecureALL has a proprietary Extreme Low Power (ELP) RF communication system that uses approximately 50 times lower power than the best commercially available communication protocol. Even with all additional functionality integrated into the SecureALL system, battery life is at least 2-3 times longer than the competition.



### Electronic Key

**Q: How does a U-Key™ work?**

**A:** The SecureALL Universal Key (or U-Key™) is a hands-free device, carried in pocket or handbag. There are no buttons to press and it does not need to be "presented" to a door to unlock. The same U-Key™ can be used for all SecureALL locks within an organization worldwide or within multiple organizations if each has a Guardian system.

**Q: What form factor does a U-Key™ come in?**

**A:** Presently, U-Keys™ easily fit on a standard keychain. Very shortly, a badge version of the U-Key™ will be available. It will be same size but slightly thicker than a standard corporate badge. It will have all the same functionality as the current U-Key™ but will never require battery replacement.

**Q: How many U-Keys™ can a door support?**

**A:** Lock readers come equipped with different amounts of memory, depending on how many users need access to a door. As a minimum, a reader will accommodate 100 U-Keys™. For main doors, readers can be manufactured for 70,000 U-Key™ users.



### Real-time Lockdown

**Q: How does centralized, real-time lockdown work?**

**A:** Extreme Low Power enables the Guardian Server to be in constant communication with all door lock units. If there is a need to close a campus, one press of a button will initiate lockdown within a few seconds. There is no need to wait until the next communication cycle, as is the case with other locking systems. Lockdown can be set up for a fixed period of time or left on indefinitely until removed.

**Q: How does local lockdown work?**

**A:** If someone inside a building sees a problem outside their room, they can go to the door and manually put their room into lockdown, giving protection to those inside. This action will immediately send a message to those responsible for overseeing lockdown, letting them know an emergency is taking place that requires attention.

**Q: What is "intelligent lockdown"?**

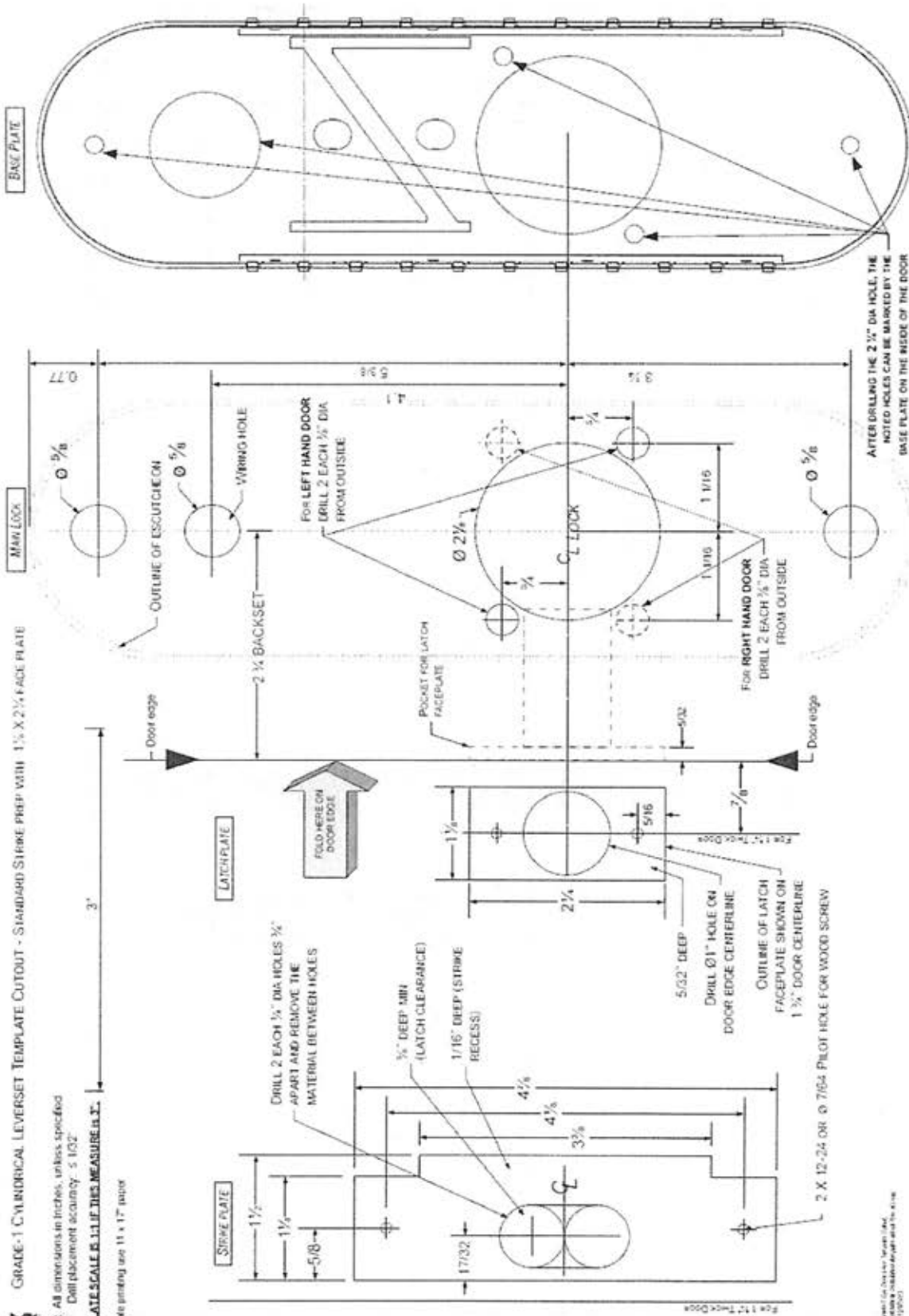
**A:** If several contiguous rooms in a building are put into local lockdown within a few minutes of each other, the system interprets this as a real threat and is capable of putting the entire building (or additional parts of the campus) into lockdown with no human intervention.

**GRADE-1 CYLINDRICAL LEVERSET TEMPLATE CUTOUT - STANDARD STROKE PREP WITH 1 1/2" X 2 1/4" FACE PLATE**

Scale: All dimensions in inches, unless specified  
 Drill placement accuracy: ± .032"

**TEMPLATE SCALE IS 1:1 IF THIS MEASURE IS 3"**

For scale printing use 11 x 17" paper



# APPENDIX A - INSTALLATION TEMPLATE

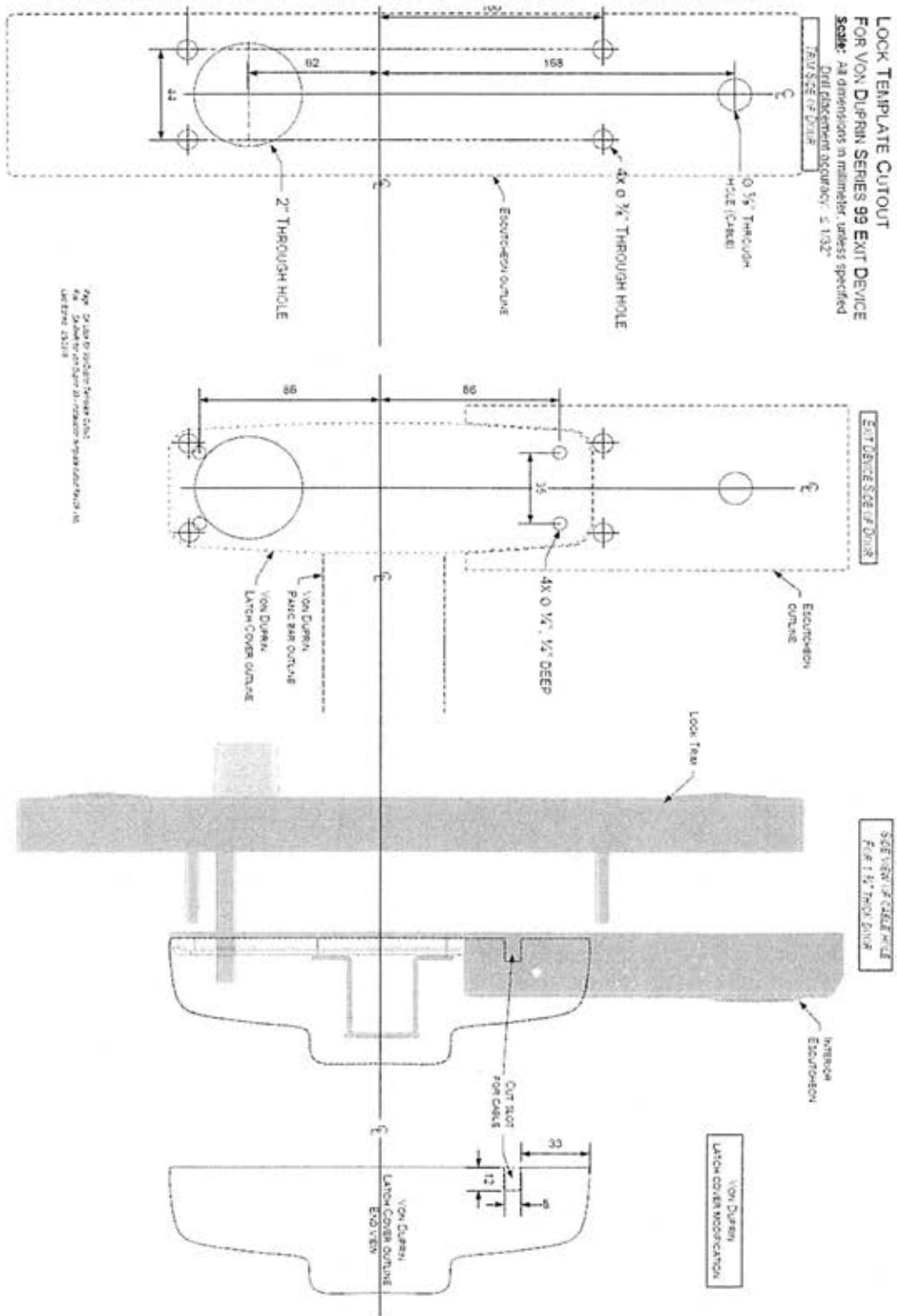
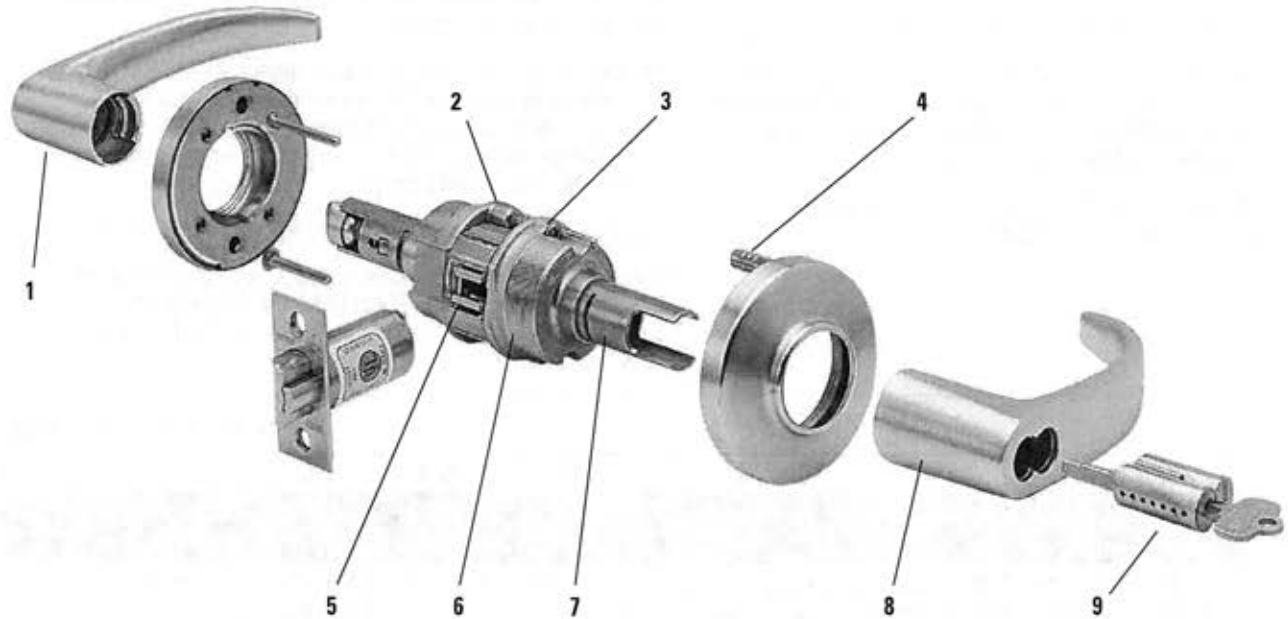


TABLE OF CONTENTS		Page	Page
Features .....	2	Deadlocking Latches & Strikes .....	10
Specifications .....	3	Lever Features & Dimensions .....	5
How to Order .....	3	Function .....	6-9
Shipping Weights .....	4	Strike & Door Preparation .....	11
Lever Styles & Trim .....	4	9K Sample Specifications .....	11
CORMAX™ Patented Keying System .....	10	Service Equipment .....	12

**FEATURES**

1. For versatile applications, lever by knob trim variations are available.
2. Rose locking pin and rose assembly design offers great torque resistance. It prevents the locking pin from twisting, bending, or breaking under attack.
3. The innovative design of the slotted key release cam and locking lug assembly create maximum attack resistance. Even though damaged, the lock still allows key access. In addition, the lever is fully functional from the inside. The hub-mounted torsion spring and strong retractor springs help prevent lever sag and offer a smooth and snappy operation.
4. Strong through-bolt mounting studs increase torque resistance. Heavy rose liner material is highly attack resistant.
5. Strong retractor springs provide resistance to lever sag.
6. Zinc hubs with a shrouded locking lug, guaranteeing higher quality and increased torque resistance.
7. The outside lever sleeve is a seamless one piece construction made of a hardened steel alloy that provides additional reinforcement in the locking lug slot.
8. Lost Motion feature available allowing 45° lever rotation in either direction without engaging retractor assembly.
9. Interchangeable core allows for quick re-keying and customized masterkeying.



9K - EXPLODED



**ADA—Americans With Disabilities Act:**

9K series – The design and operation of the BEST® cylindrical lock meets the intent of the standard for ANSI A117.1 section 404.2.6

**Builders Hardware Manufacturers Association:**

9K series – Listed by BHMA for A156.2, Series 4000, Grade 1.

**Underwriters Laboratories®:**

9K series – Listed by Underwriters Laboratories for use on 3 Hr, A label for single or double swinging doors.

**Florida Building Code and Miami-Dade County Code:**

9K series – 3/16" latch throw – Listed by Florida Building Code and Miami-Dade County at ± 75 PSF for single doors.

9K series – 3/4" latch throw – Listed by Florida Building Code and Miami Dade County at ± 80 PSF for single doors and ± 50 PSF for double doors.

"WS" option must be ordered for the lock to include a "Miami-Dade County Product Control Approved" label for inspection purposes.

**California State Fire Marshal:**

9K series – Listed with California State Fire Marshal.  
9K series 14 & 15 lever conforms with California Title 24.

**Backset** – 2 3/4" standard, 3 3/4" and 5" available.

**Chassis** – Critical latch and chassis components are brass or corrosion-treated steel. 2 1/16" diameter to fit 2 1/8" hole in door. (Conforms to ANSI A115.2). Lost Motion feature available as an option. (see page 5 for options/features).

**Door thickness** – Available for 1 3/4" to 2 1/4" doors only. Spacers available for 1 3/8" doors.

**SPECIFICATIONS**

Finish – (BHMA)	US	DESCRIPTION
605	3	bright brass
606	4	satin brass
611	9	bright bronze
612	10	satin bronze
613	10B	oxidized satin bronze, oil rubbed
618	14	bright nickel plated
619	15	satin nickel plated
622	19	flablack
625	26	bright chromium plated
626	26D	satin chromium plated
690	20	dark bronze

**Antimicrobial Finish**

626AM satin chrome plated with UltraShield™ antimicrobial protected coating



The Stanley Security Solutions UltraShield™ finish inhibits the growth of bacteria and other microbes on the surface of the hardware.

**NOTE:** Stanley's UltraShield™ option is recommended for use on any hardware application where product cleanliness is a high priority. i.e., Hospital/Healthcare, Elderly Care, Education, Transportation, Food-Service, Hospitality.

**Latch** – Solid brass 3/16" throw. Front 2 1/4" x 1 1/8" beveled.

**Lever handles** – Lever handles are a high-quality zinc alloy. Trim components are brass or bronze. Body is approximately 5/8" in diameter; Handle is approximately 4 3/4" long (from center-line of chassis). #14 and #15 levers conform to California Administrative Code Title 19 and Title 24. All three styles of levers conform to the Illinois Accessibility Standard.

**Mounting** – In addition to standard door preparation (ANSI A115.2 for 1 3/4" doors), two additional holes are needed for through-bolts. Through-bolts require two 3/16" diameter holes located at 12 o'clock and 6 o'clock positions. A drill jig can be ordered to insure accuracy of the holes. (see KD303 page 5).

**Projection on door** – Approx. 2 3/4" when mounted on 1 3/4" door.

**Strike** – **STK:** Conforms to ANSI A115.2 (2 3/4" x 1 1/8" with curved lip & box). **S3:** Conforms to ANSI A115.2 for 1 3/4" doors (4 7/8" x 1 1/4" with curved lip). **S3-3/4:** Conforms to ANSI A115.2 for 1 1/4" doors (4 7/8" x 1 1/8" flat)

**HOW TO ORDER**

9K	3	7	AB	15	A	STK	626	Options
Series	Backset	Core Housing	Function Code	Lever Style	Rose Style	Strike Package	Finishes	
9K	3 – 2 3/4" 4 – 3 3/4" 5 – 5"	0 – keyless 7 – 7-pin housing accepts all BEST® cores	AB – entrance D – storeroom L – privacy N – passage R – classroom etc.  pages 6-9	14 – curved return 15 – contour angle return 16 – curved no return  pages 4-5	C – 3" convex D – 3 1/2" convex K – 3" convex - no ring L – 3 1/2" convex - no ring  pages 4-5	STK – 2 3/4" ANSI S3 – 4 7/8" ANSI S3 – 7/8- 7/8" flat strike  page 11	605 606 611 612 613 618 619 622 625 626 690	AL – abrasive lever LL – lead lined LM – lost motion RQE – request to exit** SH – security head screws TL – tactile lever 3/4- 3/4" throw latch 7/8" LTC – flat lip strike <b>NOTE:</b> specify inside (I), outside (O), or both (B) for AL, TL options  page 5

\*Handles are made from a zinc alloy, and have been plated to be equivalent in appearance to the finishes listed.

For information on 9K non-IC products please refer to BEST's non-IC keying products brochure.

\*\*RQE option requires modification to chassis and is sold with assembly unit only.



**SHIPPING WEIGHTS**

The chart is the approximate shipping weight for the standard 9K functions locksets. This weight includes the weight of the lockset with the "#15" style lever, "K" style rose, latch, strike package, and box. Listed separately are the approximate weights for "with core" and "less core" shipments.

Lock Function Nomenclature	Case Quantity	Shipping Weight With core	Shipping Weight Less Core
Y	9		31 lbs.
N	9		40 lbs.
L,NX,P	9		40 lbs.
AB,D,E,H,HJ,R,T	9	42 lbs.	40 lbs.
C,G,I,N,S,W	9	44 lbs.	40 lbs.

**LEVER STYLES AND TRIM**

14C



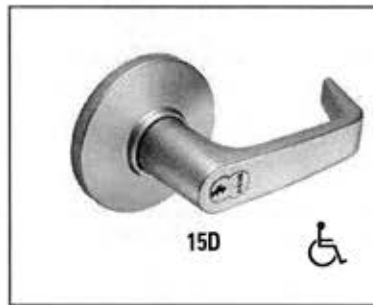
15C



16C



14D



15D



16D



14K



15K



16K



14L



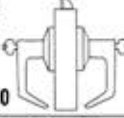

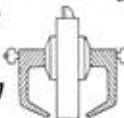

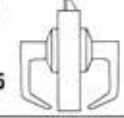





15L



16L



**FUNCTIONS**

Function & Diag. (ANSI No.)	Description	Outside Lever		Inside Lever	
		Latch operated by	Locked by	Unlocked by	Locked by
<b>Double Keyed (Continued)</b>					
<b>IN</b> F110 	<ul style="list-style-type: none"> <li>Rotating inside lever,</li> <li>Rotating outside lever only when not locked by inside or outside key</li> </ul>	<ul style="list-style-type: none"> <li>Turning key in the inside lever,</li> <li>Turning the key in the outside lever</li> </ul>	<ul style="list-style-type: none"> <li>Turning key in the inside lever,</li> <li>Turning the key in the outside lever</li> </ul>	Cannot be locked	Always unlocked
<b>S</b> F80 	<ul style="list-style-type: none"> <li>Turning the key in the inside lever,</li> <li>Turning the key in the outside lever,</li> <li>Rotating the inside or outside lever (if unlocked)</li> </ul>	Turning the key in the outside lever	Turning the key in the outside lever	Turning the key in the inside lever	Turning the key in the inside lever
Turning the key in either lever, locks or unlocks its own lever independently.					
<b>W</b> F87 	<ul style="list-style-type: none"> <li>Turning the key in the inside lever,</li> <li>Turning the key in the outside lever</li> </ul>	Always fixed	Cannot be unlocked	Always fixed	Cannot be unlocked
<b>Keyless</b>					
<b>L</b> F76 	<ul style="list-style-type: none"> <li>Rotating the inside lever</li> <li>Rotating the outside lever only when the inside push button is out</li> </ul>	Pushing the inside button	<ul style="list-style-type: none"> <li>Rotating the outside slotted button,</li> <li>Rotating the inside lever,</li> <li>Closing the door.</li> </ul>	Cannot be locked	Always unlocked
<b>N</b> F75 	<ul style="list-style-type: none"> <li>Rotating the inside lever,</li> <li>Rotating the outside lever</li> </ul>	Cannot be locked	Always unlocked	Cannot be locked	Always unlocked
<b>NX</b> F89 	Rotating the inside lever	Always fixed	Always fixed	Cannot be locked	Always unlocked
<b>P</b> F77 	<ul style="list-style-type: none"> <li>Rotating the inside lever,</li> <li>Rotating the outside lever only when the inside push button is out</li> </ul>	Pushing the inside button	<ul style="list-style-type: none"> <li>Rotating the inside lever,</li> <li>Closing the door</li> </ul>	Cannot be locked	Always unlocked
<b>Y</b> 	Rotating the inside lever			Cannot be locked	Always unlocked
<b>Single Dummy Trim</b> 1DT 	This is a single, surface-mounted lever for an inactive door or a non-latching door				
<b>Double Dummy Trim</b> 2DT 	This is a through bolt mounted pair of matching levers for an inactive door or a non-latching door				

**\*ATTENTION:** Locksets that secure both sides of the door are controlled by building codes and the Life Safety Code. In an emergency exit situation, failure to quickly unlock the inside lever could be hazardous or even fatal.

# STOPS...continue



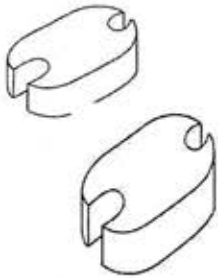
<b>TRIMCO#</b>	<b>1209HA</b>
B	1" DIA
H	3" Rubber
	SS

**Extra Heavy Duty Door Stop**  
 5" long, 1" DIA Stainless Steel Shaft  
 Also available 1209HAHO with hold open feature #1209HO, and #1209HA with extra strong stainless steel shaft and longer rubber.



<b>TRIMCO#</b>	<b>1211</b>
R	.22"
B	1-1/2"
H	1.43"
M	CAST
BHMA	L02141/L02161
	Br, Bz, Pl

**Universal Dome Stop**  
 See 1211 Brochure.



<b>TRIMCO#</b>	<b>1211CH</b>	<b>1211CL</b>
R	3/4"	1/2"
		Al

**Carpet Riser**  
 Specify Stop Finish



<b>TRIMCO#</b>	<b>W1211</b>
R	1/8"
B	1-3/4" x 2"
H	1"
M	Wrought
BHMA	L02141
	Br, Bz, SS

**Universal Dome Stop**  
 Patent #4,209,876



<b>TRIMCO#</b>	<b>1214</b>	<b>1214H</b>	<b>1214CK</b>
B	1-3/4" x 2-1/2"	1-3/4" x 2-1/2"	1-3/4" x 2-1/2"
H	1-3/4"	2-1/4"	2-1/4"
			Supplied with Torx Screws
BHMA	L02121		

Br, Bz, Pl

**Door Stop - Cast - Heavy Duty. (3 fasteners)**  
 1214CK is a heavy duty, high-abuse, school design which reduces tampering and loss of rubber bumper.



<b>TRIMCO#</b>	<b>1214CK x 1268CK</b>
OA	5-7/8" x 2-1/2"

**Heavy-Duty Stop**  
 Pinned, screwed and recessed rubber resists vandalism. Torx. Requires 3" diameter cored hole and Quick-crete.

# WALL BUMPERS



TRIMCO#	1270CV	1270WV	1270CX	1270WX
ID	1-3/8"	1-3/8"	1-3/8"	1-3/8"
OD	2-3/16"	2-3/16"	2-3/16"	2-3/16"
P	1"	1"	1"	1"
M	Cast	Wrought	Cast	Wrought
BHMA	L02251	L02251	L02101	L02101
	Br, Bz, Pl	Br, Bz, Pl, SS	Br, Bz, Pl	Br, Bz, Pl, SS

### Wall Bumper - Combo Pack

Anti-Vandal Rubber  
 Convex (X) available.  
 Concave (V) shown  
 Comes with our combo pack



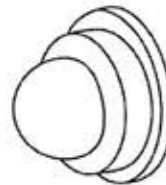
1270CVPV



1270CVSV

### TRIMCO# 1270CVPV / 1270CVSV Wall Bumper

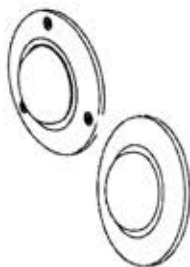
Vandal Proof. Rubber cannot be removed; Anti-Rotation Pin.  
 PV=Prison Version or  
 SV=School Version  
 Also available: Cast, 1270CXPV or 1270CXSV  
 Patent applied for.



### TRIMCO# 1275RP

ID	9/16"
OD	1"
P	9/16"
BHMA	L02101
	Br, Bz, Pl

### Small Wall Bumper WS x RP



### TRIMCO# 1277/79

D	4"
P	3/4"
BHMA	L02111/L02101
	Br, Bz, Pl

**Large Wall Bumper - Cast**  
 Available with concealed or exposed fasteners. Convex (X) only.  
 Please specify fasteners as below\*



1278CV



1278CX

### TRIMCO# 1278CV or 1278CX

OD	1-1/2"
P	1"
BHMA	L02101
	Br, Bz, Pl, Al

**Wall Bumper**  
 WS x RP. Minimal Trim.  
 Anti-Vandal Rubber.  
 Concave (V)  
 Convex (X) Please specify fasteners as below\*

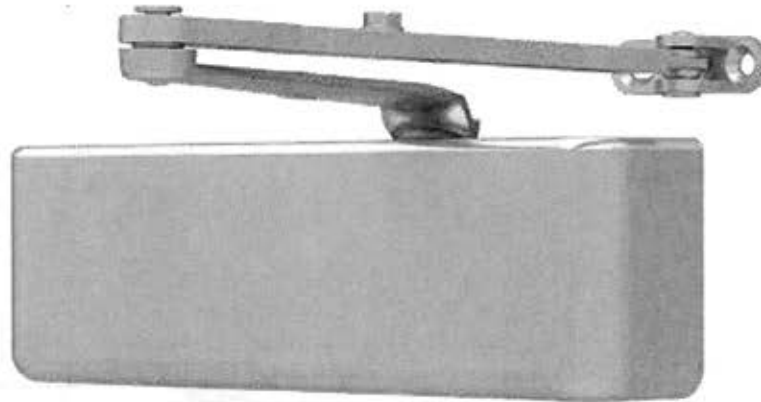
### \*New Wall Bumper Abbreviations:

C = Cast  
 W = Wrought  
 X = Convex  
 V = Concave  
 TB = Toggle Bolt

MS = Machine Screw  
 CP = Combo Pack  
 WS = Wood Screw  
 RP = Rawl Plug  
 PV = Prison Version  
 SV = School Version

# 4040XP Series

Features



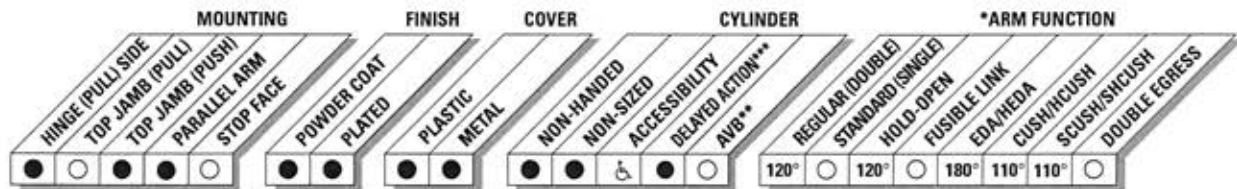
The 4040XP is LCN's most durable and flexible heavy duty closer designed for institutional and other demanding high traffic applications.

<b>Certifications</b>	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 Hour Salt Spray, Meets BAA - Buy American Act
<b>Body Construction</b>	<ul style="list-style-type: none"> <li>■ Cast Iron Body</li> <li>■ Full Complement Bearings</li> <li>■ 1-1/2" Diameter Piston</li> <li>■ 3/4" Diameter Double Heat Treated Pinion Journal</li> </ul>
<b>Fluid</b>	All Weather Liquid X Fluid
<b>Handing</b>	Non-Handed
<b>Templating</b>	Peel-n-Stick templates - 2-1/4" x 5" Mounting Hole Pattern
<b>Size</b>	Adjustable Spring Size 1-6, includes Patented Green Dial
<b>Warranty</b>	30 years

<b>Cover</b>	<ul style="list-style-type: none"> <li>■ Plastic, Standard</li> <li>■ Metal, Optional</li> </ul>
<b>Fasteners</b>	Self Reaming and Tapping Screws (SRT)
<b>Mounting</b>	Hinge (Pull Side), Top Jamb (Push Side), Parallel Arm (Push Side)
<b>Arms</b>	Regular Arm
<b>Finishes/Colors/ Powder Coat</b>	<ul style="list-style-type: none"> <li>■ Aluminum (689)</li> <li>■ Statuary Bronze (690)</li> <li>■ Light Bronze (691)</li> <li>■ Black (693)</li> <li>■ Dark Bronze (695)</li> <li>■ Brass (696)</li> <li>■ Custom colors optional</li> </ul>
	<ul style="list-style-type: none"> <li>■ Optional SRI primer - powder coat only</li> <li>■ Optional plated finishes</li> </ul>

### Special Templates

Customized installation templates or products may be available to solve unusual applications. Contact LCN Product Support for assistance.



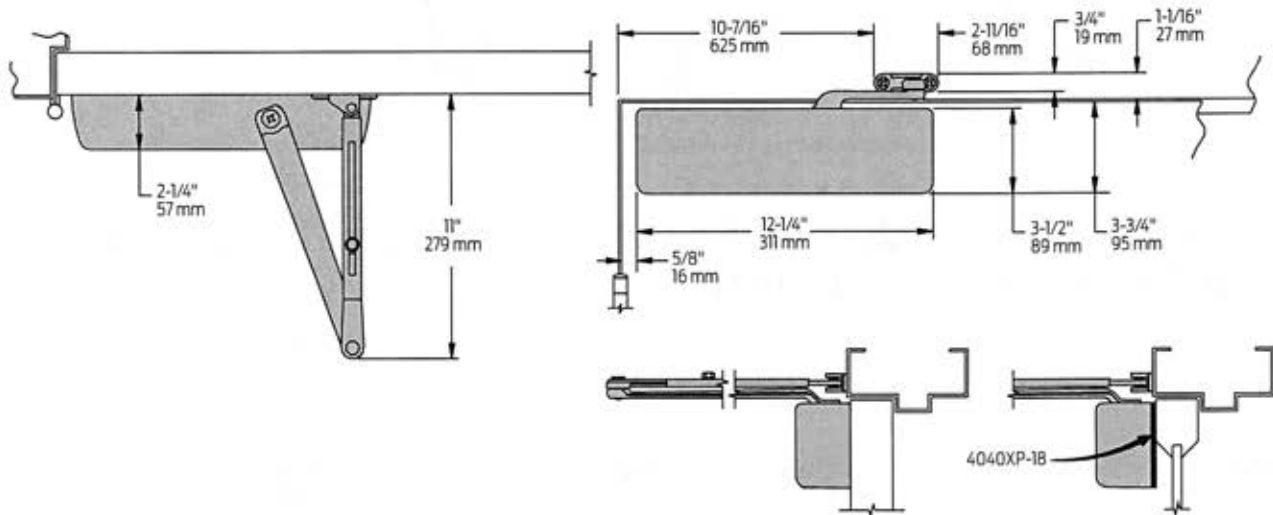
● AVAILABLE  
○ NOT AVAILABLE

♿ Closer available with less than 5.0 lbs. opening force on 36" door.  
 \* Maximum opening/hold-open point with standard template.  
 \*\* Advanced Variable Backcheck.  
 \*\*\* Delay feature incorporates standard 4040 cylinder (not XP).

# 4040XP Series

## Mounting details

### Hinge (Pull Side) Mounting

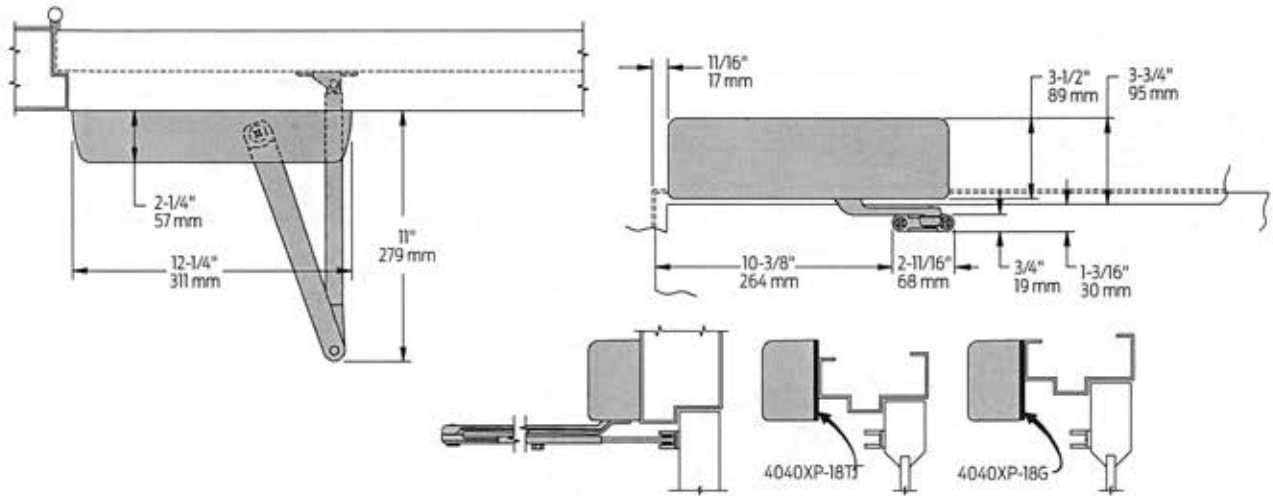


<b>Butt Hinges</b>	<ul style="list-style-type: none"> <li>Should not exceed 5" (127 mm) in width</li> </ul>
<b>Auxiliary Stop</b>	<ul style="list-style-type: none"> <li>Recommended at hold-open point or where a door cannot swing beyond 120°</li> </ul>
<b>Reveal</b>	<ul style="list-style-type: none"> <li>Should not exceed 3/4" (19 mm) for regular arm or hold-open arm</li> </ul>
<b>Top Rail</b>	<ul style="list-style-type: none"> <li>Less than 3-3/4" (95 mm) requires PLATE, 4040XP-18. Plate requires 2" (51 mm) minimum</li> </ul>
<b>Clearance</b>	<ul style="list-style-type: none"> <li>2-3/8" (60 mm) behind door required for 90° installation</li> </ul>
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>Incorporates standard 4041 cylinder, without XP cylinder</li> <li>Delays closing from 120° to 70°</li> <li>Delay time adjustable up to approximately 1 minute</li> </ul>
<b>Maximum Opening</b>	<ul style="list-style-type: none"> <li>Templating allows up to 120°.</li> <li>Hold-open points 90° up to 120° with hold-open arm.</li> </ul>

# 4040XP Series

## Mounting details

### Top Jamb (Push Side) Mounting

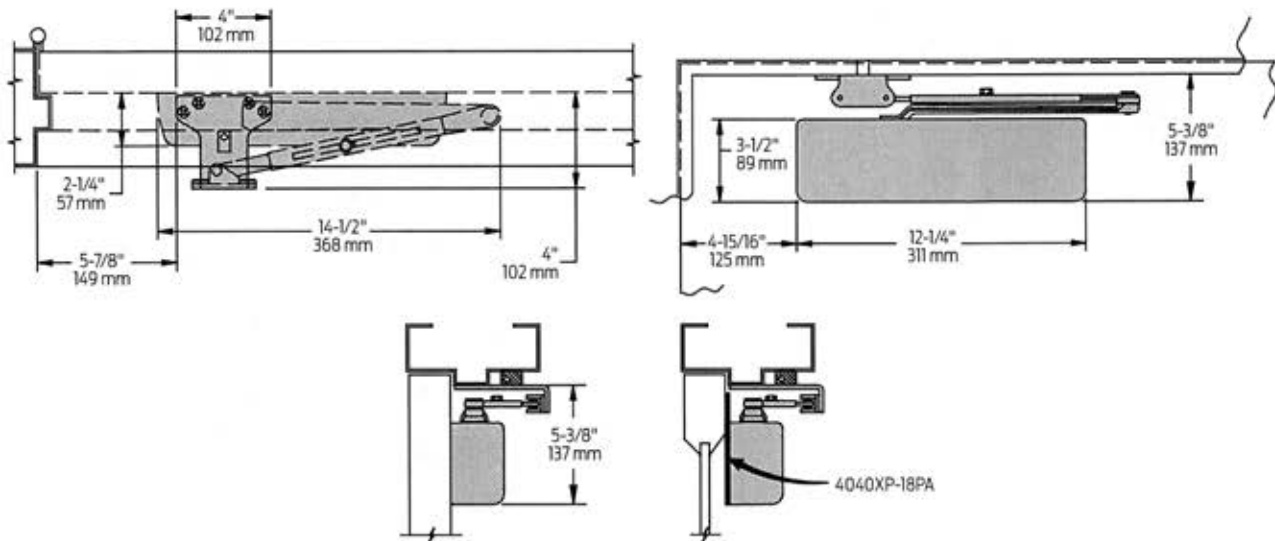


<b>Butt Hinges</b>	Should not exceed 5" (127 mm) in width		
<b>Auxiliary Stop</b>	Recommended at hold-open point or where a door cannot swing beyond 120°		
<b>Reveal</b>	Arm Type	Reveal	Max Opening
	Regular Arm	2-9/16"	Up to 120°
	Long	4-13/16"	Up to 120°
	Hold-Open	2-9/16"	Up to 120°
	Long Hold-Open Arm	8"	Up to 120°
<b>Top Rail</b>	<ul style="list-style-type: none"> <li>Requires 1-1/4" (32 mm) minimum</li> <li>2-1/4" (57 mm) minimum with closer on PLATE, 4040XP-18TJ</li> <li>3" (76 mm) minimum with closer on PLATE, 4040XP-18G</li> </ul>		
<b>Head Frame</b>	<ul style="list-style-type: none"> <li>Less than 3-1/2" (89 mm) requires PLATE, 4040XP-18TJ</li> <li>With flush ceiling, use PLATE, 4040XP-18G. Either plate requires 1-3/4" (44 mm) minimum</li> </ul>		
<b>Maximum Opening</b>	<ul style="list-style-type: none"> <li>Templating allows up to 120°.</li> <li>Hold-open points 85° up to 120° with hold-open arm.</li> </ul>		
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>Incorporates standard 4041 cylinder, without XP cylinder</li> <li>Delays closing from 120° to 70°</li> <li>Delay time adjustable up to approximately 1 minute</li> </ul>		

# 4040XP Series

## Mounting details

### Parallel Arm (Push Side) Mounting



<b>Butt Hinges</b>	Should not exceed 5" (127 mm) in width
<b>Auxiliary Stop</b>	Recommended at hold-open point, where the door cannot swing 180°, or where CUSH-N-STOP arm is not used
<b>Reveal</b>	Should not exceed 7/32" (6 mm)
<b>Top Rail</b>	Less than 5-3/8" (137 mm) measured from the stop requires PLATE, 4040XP-18PA. Plate requires 2" (51 mm) minimum from the stop
<b>Head Frame</b>	Flush or rabbeted requires PA SHOE ADAPTER, 4040XP-419
<b>Stop Width</b>	Minimum 1" (25 mm). CUSH arm requires minimum 1-1/2" (38 mm)
<b>Blade Stop</b>	Clearance requires 1/2" (13mm) BLADE STOP SPACER, 4040XP-61.
<b>Clearance</b>	<ul style="list-style-type: none"> <li>■ 4040XP-62PA shoe is 4" (102 mm) from door face.</li> <li>■ EDA shoe projects 5-1/2" (140 mm) from door face.</li> <li>■ CUSH shoe projects 6" (152 mm) from door face</li> </ul>
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>■ Incorporates standard 4041 cylinder, without XP cylinder</li> <li>■ Delays closing from 120° to 70°.</li> <li>■ Delay time adjustable up to approximately 1 minute.</li> </ul>
<b>Maximum Opening</b>	<ul style="list-style-type: none"> <li>■ 180° opening/hold-open points with all except CUSH arms</li> <li>■ 110° opening/hold-open with CUSH arms</li> </ul>

#### Notes:

- Optional mounting requires PA SHOE, 4040XP-62PA for regular or HOLD-OPEN arms
- Add prefix "P" to closer description (eg. P4040XP)
- P4040XP closer includes 4040XP-201 FIFTH HOLE SPACER to support PA SHOE

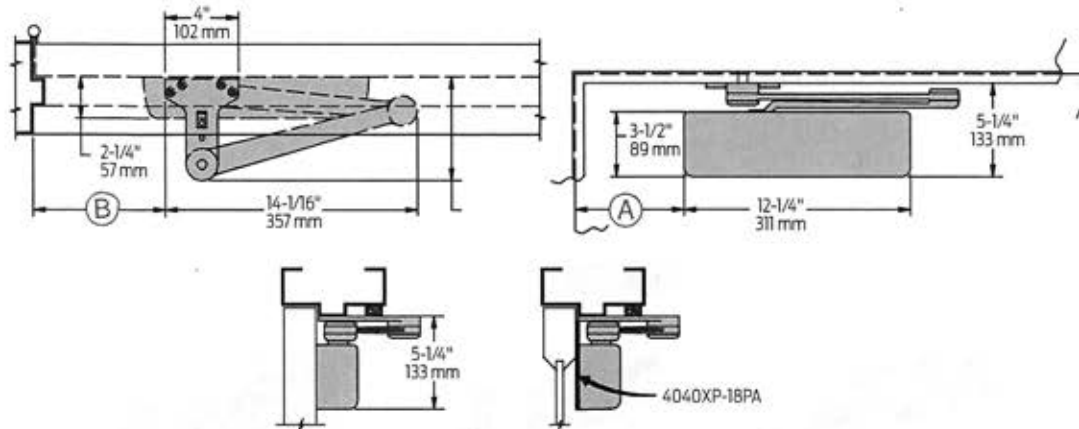


# 4040XP Series

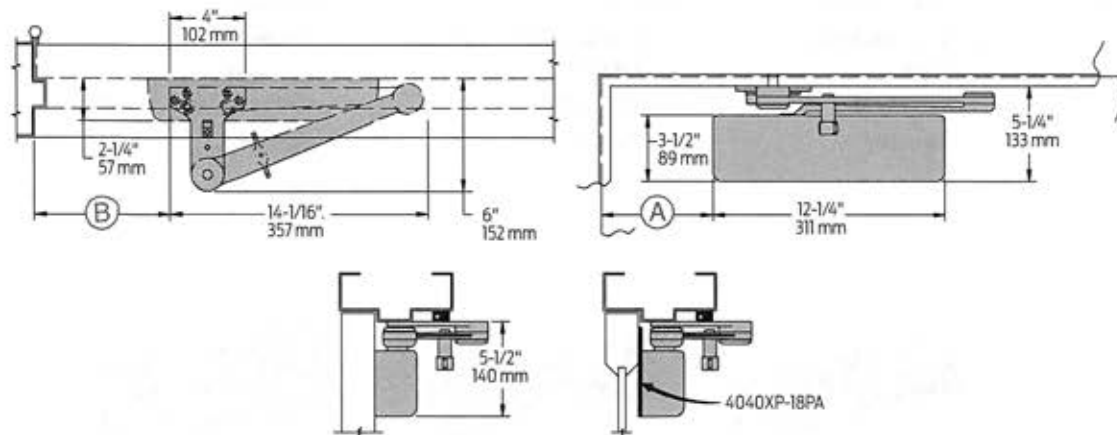
## Mounting details

EDA and CUSH Mounting

### EDA mount



### CUSH mount



<b>Clearance</b>	4040XP-62EDA is 5-1/2" (140 mm) from door face. 6" (152 mm) for CUSH	
<b>Head Frame</b>	Flush or rabbeted requires CUSH FLUSH PANEL ADAPTER, 4040XP-419	
<b>CUSH ARM</b>	Requires SHOE SUPPORT, 4040XP-30 for fifth screw anchorage where reveal is less than 3-1/16" (78 mm)	
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>■ Incorporates standard 4041 cylinder, without XP cylinder.</li> <li>■ Delays closing from maximum opening to ; 115° with 180° template, 95° with 110° template, 85° with 100° template, 75° with 90° template. Delay time adjustable up to approximately 1 minute.</li> </ul>	
<b>Maximum Opening</b>	EDA arm can be templated for points at:	CUSH arms can be templated for opening/hold-open point at:
	110°: A = 6-3/8" (162 mm) B = 7-3/4" (197 mm)	85°: A = 7-15/16" (202 mm) B = 9-1/8" (232 mm)
	or 180°: A = 2-7/8" (73 mm) B = 4-1/4" (108 mm)	90°: A = 7-3/16" (183 mm) B = 8-1/2" (216 mm)
	Hold-open points up to maximum opening with HEDA arm	100°: A = 6-1/16" (154 mm) B = 7-1/4" (184 mm)
		or 110°: A = 5-1/16" (129 mm) B = 6-3/8" (162 mm)

**Notes:**

- 4040XP Series closers ordered with EDA or CUSH arms include 4040XP-201 FIFTH HOLE SPACER to support the shoe
- Spring Cush stop points are approximately 5° more than templated stop point
- Hold open at templated stop points

# 4040XP Series

## Accessories

### Cylinders



**4040XP-3071**  
Cast Iron Cylinder Assembly

- Non-handed
- Heavy duty



**4041-3071 DEL**  
Cast Iron Cylinder Assembly

- Used for delayed action closing
- Non-handed
- Heavy duty

### Covers



**4040XP-72**  
Plastic Cover

- Includes 4040XP-54 snap-on cover clip
- Non-handed
- Standard



**4040XP-72MC**  
Metal Cover

- Handed
- Required for plated finishes and custom powder coat finishes
- Optional

### Installation Accessories



**4040XP-18**  
Plate

- Required for hinge side mount where top rail is less than 3-3/4" (95 mm)
- Requires minimum 2" (51 mm) minimum top rail



**4040XP-18G**  
Plate

- Locates top jamb mounted closer flush with top of head frame face in flush ceiling condition
- Requires 1-3/4" (44 mm) minimum head frame



**4040XP-18TJ**  
Plate

- Centers top jamb mounted closer vertically on head frame where face is less than 3-1/2" (89 mm). Plate requires 1-3/4" (44 mm) minimum head frame



**4040XP-18PA**  
Plate

- Required for parallel arm mounting where top rail is less than 5-1/2" (140 mm), measured from the stop
- Requires 2" (51 mm) minimum top rail



**4040XP-62PA**  
PA Shoe

- Required for parallel arm mounting

## Arms

# 4040XP Series

## Accessories



**4040XP-3077**  
Regular Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal P4041 closer includes PA SHOE, 4040XP-62PA required for parallel arm mounting



**4040XP-3077L**  
Long Arm

- Non-handed
- Includes LONG ROD AND SHOE, 4040XP-79LR for top jamb mount
- Optional



**4040XP-3077ELR**  
Extra Long Arm

- Non-handed
- Includes EXTRA LONG ROD AND SHOE, 4040XP-79ELR for top jamb mount with deep reveal
- Optional



**4040XP-3049**  
Hold-Open Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal, hold-open adjustable shoe
- 4040XP closer includes 4040XP-62PA shoe required for parallel arm mounting
- Optional



**4040XP-3049L**  
Long Hold-Open Arm

- Non-handed
- Includes LONG HEAD AND TUBE, 4040XP-3048L for top jamb mount
- Optional



**4040XP-3077EDA**  
Extra Duty Arm

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional



**4040XP-3049EDA**  
Hold-Open Extra Duty Arm

- Handed
- Parallel arm features forged, solid steel main and forearm for potentially abusive installations
- Hold-open function is adjusted at the shoe
- Optional



**4040XP-3077EDA/62G**  
Extra Duty Arm with 62G

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance
- Optional



**4040XP-3049EDA/62G**  
Hold-Open Extra Duty Arm with 62G

- Handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance. Hold-open function is adjusted at the shoe
- Optional



**4040XP-3077CNS**  
Cush-N-Stop® Arm

- Non-handed
- Features solid forged steel main arm and forearm with stop in soffit shoe.
- Optional



**4040XP-3049CNS**  
HCUSH Arm

- Non-handed
- Hold-open function with templated stop/hold-open points
- Handle controls hold-open function
- Optional



**4040XP-3077SCNS**  
Spring CUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional



**4040XP-3049SCNS**  
Spring HCUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold-open function
- Optional

**Installation Accessories cont.**



**4040XP-30  
CUSH Shoe Support**

- Provides anchorage for fifth screw used with CUSH arms, where reveal is less than 3-1/16" (78 mm)
- Optional



**4040XP-61  
Blade Stop Spacer**

- Required to lower parallel arm shoe to clear 1/2" (13 mm) blade stop
- Optional



**4040XP-419  
PA Flush Panel Adapter**

- Provides horizontal mounting surface for parallel arm shoe on single rabbeted or flush frame
- Optional



**4040XP-62A  
Auxiliary Shoe**

- Requires a top rail of 7" (178 mm)
- Shoe replaces -62PA for parallel arm mounting of regular arm with overhead holder/stop
- Optional



**4040XP-54  
Snap-On Cover Clip**

- Used to secure 4040XP-72 Plastic Cover to cylinder body

**How-to-order 4040XP Series closers**

**1. Select finish**

- Standard Powder Coat \_\_\_\_\_  
Aluminum, Dark Bronze, Statuary,  
Light Bronze, Black, Brass.

**Closer will be shipped with:**

- Standard cylinder
- Standard cover
- Regular arm
- Self-reaming and tapping screws  
unless options listed below are selected.

**Closer options**

**Cylinder**

- Delayed Action (4041 DEL)

**Cover**

- Metal (specify right or left hand) (MC)

**Finish**

- Custom Powder Coat (RAL) \_\_\_\_\_  
(handed metal cover required)
- Plated Finish, US \_\_\_\_\_  
(handed metal cover required)
- SRI primer (use with powder coat finishes only)

**Arm**

- Regular (REG)
- Regular w/62PA (Rw/PA)
- Regular w/62A (R/62A)
- Long (LONG)
- Extra Long (XLONG)
- Hold-Open (H)
- Hold-Open w/62PA (Hw/PA)
- Long Hold-Open (HLONG)
- Extra Duty Arm (EDA)
- Extra Duty Arm with 62G (EDA/62G)
- Hold Open Extra Duty Arm (HEDA)  
(Handed)
- Hold Open Extra Duty Arm with 62  
(HEDA/62G)(Handed)
- Cush-N-Stop (CUSH)
- HCush-N-Stop (HCUSH)
- Spring Cush (SCUSH)
- Spring HCush (SHCUSH)

**Optional Screw Packs**

- TB\* w/Self-Reaming and Tapping (TBSRT)
- Wood & Machine Screw (WMS)
- TB\*, Wood & Machine Screw (TBWMS)
- TORX Machine Screw (TORX)
- TB\* & TORX Machine Screw (TBTRX)  
\* Specify door thickness if other than  
1-3/4".

**Installation Accessories**

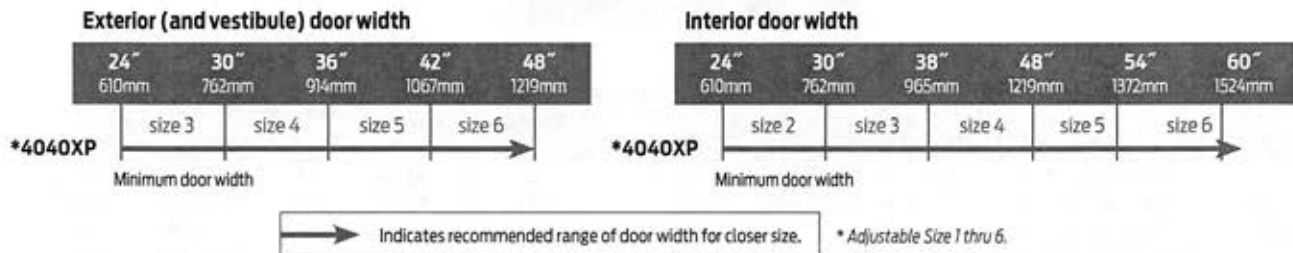
- Plate, 4040XP-18
- Plate, 4040XP-18TJ
- Plate, 4040XP-18G
- Plate, 4040XP-18PA
- CUSH Shoe Support, 4040XP-30
- Blade Stop Spacer, 4040XP-61
- Auxiliary Shoe, 4040XP-62A
- PA Flush Panel Adapter, 4040XP-419

**Special Template**

- ST- \_\_\_\_\_

**Table of sizes**

- 4040XP cylinders are adjustable from size 1 through size 6 and is shipped set to size 3
- Closing power of 4040XP Series closers may be adjusted 50%



**Reduced opening force 4040XP Series closers**

**CAUTION!** Any manual door closer, including those certified by BHMA to conform to ANSI Standard A156.4, that is selected, installed and adjusted based on ADA or other reduced opening force requirements may not provide sufficient power to reliably close and latch a door.

Refer to POWER OPERATORS section for information on systems that meet reduced opening force requirements without effecting closing power.

	DOOR WIDTH	36"	42"	48"
	8.5* lbs.	4040XP	4040XP	4040XP
5.0* lbs.	4040XP	4040XP	4040XP	

\* Maximum opening force.

## 5 KNUCKLE FULL MORTISE HINGES

## Standard Weight Ball Bearing

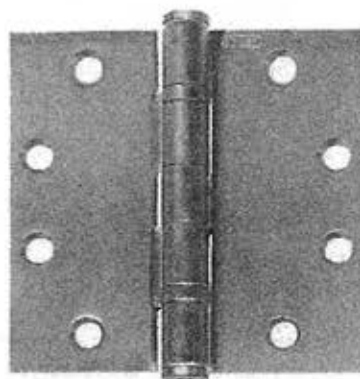
**FBB179** – (ANSI A8112) Steel – polished and plated or phosphated and prime coated for painting

**FBB191** – (ANSI A2112) Brass or bronze – polished and plated or painted

**FBB191 (32)** – (ANSI A5112) Stainless steel – highly polished

**FBB191 (32D)** – (ANSI A5112) Stainless steel – satin finish

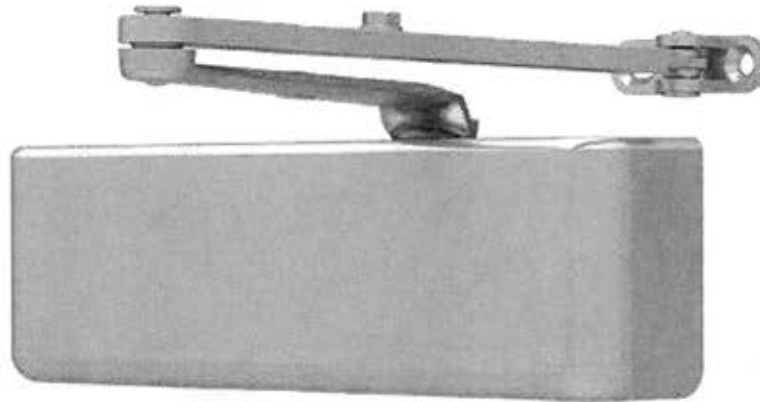
- For medium weight doors of average frequency
- All hinges have template screw hole location for use on either wood or hollow metal doors and frames
- Equipped with two Stanley permanently lubricated non-detachable ball bearings
- Pins in non-ferrous hinges are stainless steel
- Hole in bottom tip for easy pin removal
- Reversible flush tips and pins
- Hinges can be furnished as follows:
  - with raised barrel (RB)
  - with electric wires and/or switches (CE and/or CS)
  - with hospital tips (HT)
  - with decorative tips
  - with security studs
  - with non-removable pins (NRP)



Size Open		Gauge of Metal		Flat Head Screws Per Piece		Quantity Per Box	Quantity Per Case	Case Weight			
Inches	(mm)	Inches	(mm)	Machine	Wood			Bronze		Steel	
								Lbs.	(Kg)	Lbs.	(Kg)
3 1/2 x 3	(89 x 76)	.123	(3.1)	6 - 10-24 x 1/2	6 - 10 x 1	3 EA.	90 EA.	58	(26)	54	(24)
3 1/2 x 3 1/2	(89 x 89)	.123	(3.1)	6 - 10-24 x 1/2	6 - 10 x 1	3 EA.	90 EA.	65	(29)	59	(27)
4 x 3 1/2	(102 x 89)	.130	(3.3)	8 - 12-24 x 1/2	8 - 12 x 1 1/4	3 EA.	48 EA.	43	(19)	39	(18)
4 x 4	(102 x 102)	.130	(3.3)	8 - 12-24 x 1/2	8 - 12 x 1 1/4	3 EA.	48 EA.	45	(20)	42	(19)
4 1/2 x 4	(114 x 102)	.134	(3.4)	8 - 12-24 x 1/2	8 - 12 x 1 1/4	3 EA.	48 EA.	55	(25)	52	(24)
4 1/2 x 4 1/2	(114 x 114)	.134	(3.4)	8 - 12-24 x 1/2	8 - 12 x 1 1/4	3 EA.	48 EA.	59	(27)	55	(25)
5 x 4	(127 x 102)	.146	(3.7)	8 - 12-24 x 1/2	4 - 12 x 1 1/4	3 EA.	30 EA.	41	(19)	39	(18)
5 x 4 1/2	(127 x 114)	.146	(3.7)	8 - 12-24 x 1/2	4 - 12 x 1 1/4	3 EA.	30 EA.	45	(20)	43	(19)
5 x 5	(127 x 127)	.146	(3.7)	8 - 12-24 x 1/2	4 - 12 x 1 1/4	3 EA.	30 EA.	50	(23)	46	(21)
*6 x 4 1/2	(152 x 114)	.160	(4.1)	10 - 1/4-20 x 1/2	5 - 14 x 1 1/2	3 EA.	24 EA.	43	(19)	36	(16)
*6 x 5	(152 x 127)	.160	(4.1)	10 - 1/4-20 x 1/2	5 - 14 x 1 1/2	3 EA.	24 EA.	47	(21)	40	(18)
*6 x 6	(152 x 152)	.160	(4.1)	10 - 1/4-20 x 1/2	5 - 14 x 1 1/2	3 EA.	24 EA.	67	(30)	61	(28)

\* Available in Steel only

Consult factory for other sizes not listed



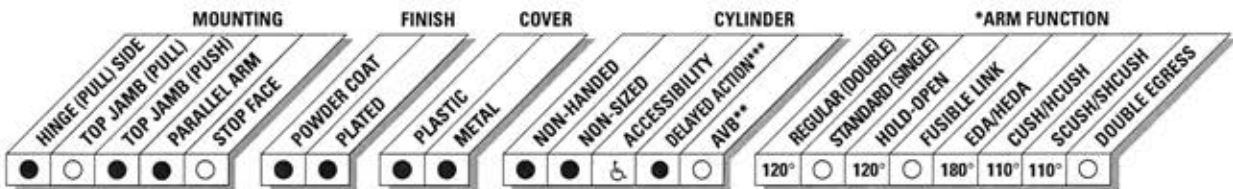
The 4040XP is LCN's most durable and flexible heavy duty closer designed for institutional and other demanding high traffic applications.

<b>Certifications</b>	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 Hour Salt Spray, Meets BAA - Buy American Act
<b>Body Construction</b>	<ul style="list-style-type: none"> <li>■ Cast Iron Body</li> <li>■ Full Complement Bearings</li> <li>■ 1-1/2" Diameter Piston</li> <li>■ 3/4" Diameter Double Heat Treated Pinion Journal</li> </ul>
<b>Fluid</b>	All Weather Liquid X Fluid
<b>Handing</b>	Non-Handed
<b>Templating</b>	Peel-n-Stick templates - 2-1/4" x 5" Mounting Hole Pattern
<b>Size</b>	Adjustable Spring Size 1-6, Includes Patented Green Dial
<b>Warranty</b>	30 years

<b>Cover</b>	<ul style="list-style-type: none"> <li>■ Plastic, Standard</li> <li>■ Metal, Optional</li> </ul>
<b>Fasteners</b>	Self Reaming and Tapping Screws (SRT)
<b>Mounting</b>	Hinge (Pull Side), Top Jamb (Push Side), Parallel Arm (Push Side)
<b>Arms</b>	Regular Arm
<b>Finishes/Colors/ Powder Coat</b>	<ul style="list-style-type: none"> <li>■ Aluminum (689)</li> <li>■ Statuary Bronze (690)</li> <li>■ Light Bronze (691)</li> <li>■ Black (693)</li> <li>■ Dark Bronze (695)</li> <li>■ Brass (696)</li> <li>■ Custom colors optional</li> </ul> <ul style="list-style-type: none"> <li>■ Optional SRI primer - powder coat only</li> <li>■ Optional plated finishes</li> </ul>

**Special Templates**

Customized installation templates or products may be available to solve unusual applications. Contact LCN Product Support for assistance.



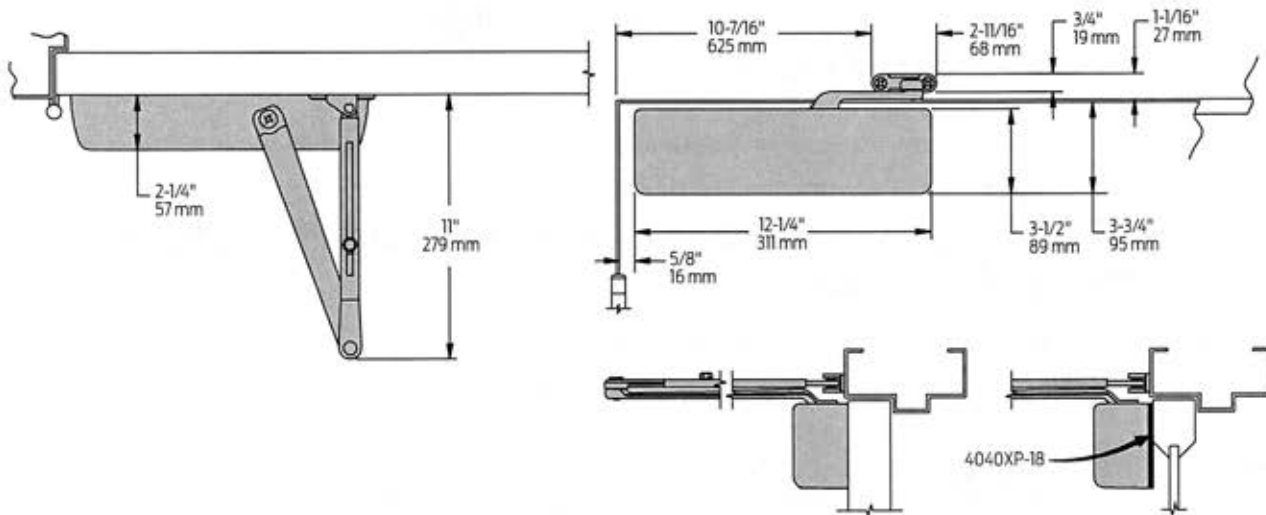
● AVAILABLE  
○ NOT AVAILABLE

♿ Closer available with less than 5.0 lbs. opening force on 36" door.  
\* Maximum opening/hold-open point with standard template.  
\*\* Advanced Variable Backcheck.  
\*\*\* Delay feature incorporates standard 4040 cylinder (not XP).

# 4040XP Series

## Mounting details

### Hinge (Pull Side) Mounting



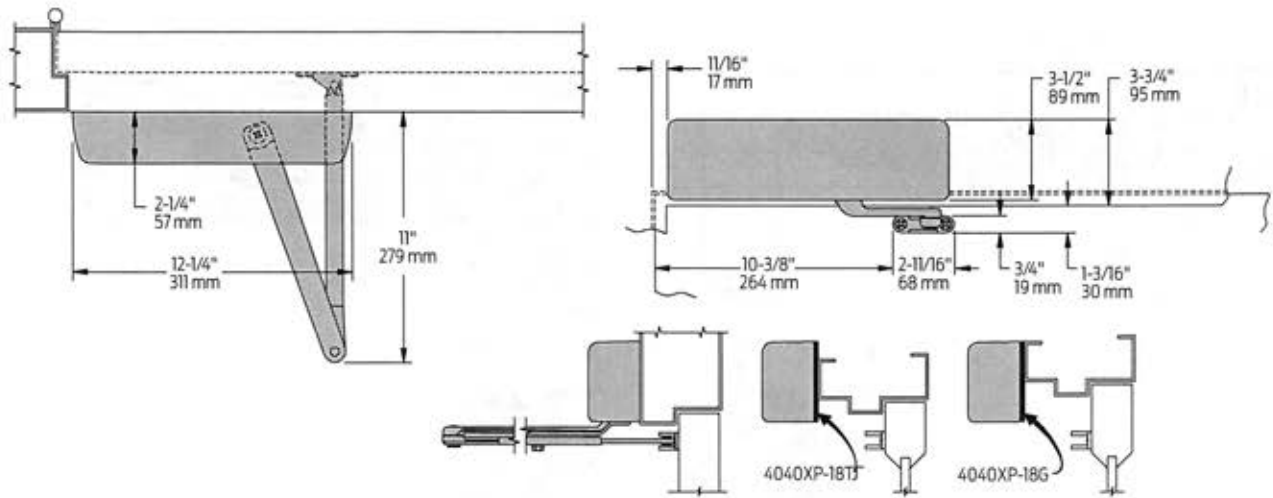
<b>Butt Hinges</b>	<ul style="list-style-type: none"> <li>Should not exceed 5" (127 mm) in width</li> </ul>
<b>Auxiliary Stop</b>	<ul style="list-style-type: none"> <li>Recommended at hold-open point or where a door cannot swing beyond 120°</li> </ul>
<b>Reveal</b>	<ul style="list-style-type: none"> <li>Should not exceed 3/4" (19 mm) for regular arm or hold-open arm</li> </ul>
<b>Top Rail</b>	<ul style="list-style-type: none"> <li>Less than 3-3/4" (95 mm) requires PLATE, 4040XP-18. Plate requires 2" (51 mm) minimum</li> </ul>
<b>Clearance</b>	<ul style="list-style-type: none"> <li>2-3/8" (60 mm) behind door required for 90° installation</li> </ul>
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>Incorporates standard 4041 cylinder, without XP cylinder</li> <li>Delays closing from 120° to 70°</li> <li>Delay time adjustable up to approximately 1 minute</li> </ul>
<b>Maximum Opening</b>	<ul style="list-style-type: none"> <li>Templating allows up to 120°.</li> <li>Hold-open points 90° up to 120° with hold-open arm.</li> </ul>



# 4040XP Series

## Mounting details

### Top Jamb (Push Side) Mounting

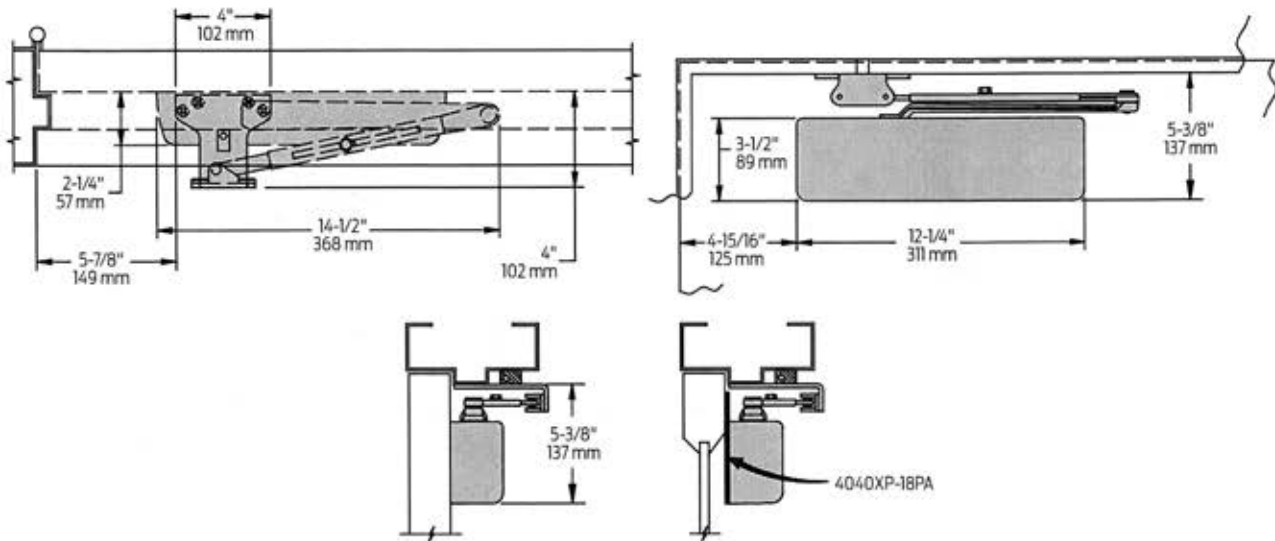


<b>Butt Hinges</b>	Should not exceed 5" (127 mm) in width		
<b>Auxiliary Stop</b>	Recommended at hold-open point or where a door cannot swing beyond 120°		
<b>Reveal</b>	Arm Type	Reveal	Max Opening
	Regular Arm	2-9/16"	Up to 120°
	Long	4-13/16"	Up to 120°
	Hold-Open	2-9/16"	Up to 120°
	Long Hold-Open Arm	8"	Up to 120°
<b>Top Rail</b>	<ul style="list-style-type: none"> <li>Requires 1-1/4" (32 mm) minimum</li> <li>2-1/4" (57 mm) minimum with closer on PLATE, 4040XP-18TJ</li> <li>3" (76 mm) minimum with closer on PLATE, 4040XP-18G</li> </ul>		
<b>Head Frame</b>	<ul style="list-style-type: none"> <li>Less than 3-1/2" (89 mm) requires PLATE, 4040XP-18TJ</li> <li>With flush ceiling, use PLATE, 4040XP-18G. Either plate requires 1-3/4" (44 mm) minimum</li> </ul>		
<b>Maximum Opening</b>	<ul style="list-style-type: none"> <li>Templating allows up to 120°.</li> <li>Hold-open points 85° up to 120° with hold-open arm.</li> </ul>		
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>Incorporates standard 4041 cylinder, without XP cylinder</li> <li>Delays closing from 120° to 70°</li> <li>Delay time adjustable up to approximately 1 minute</li> </ul>		

# 4040XP Series

## Mounting details

### Parallel Arm (Push Side) Mounting



<b>Butt Hinges</b>	Should not exceed 5" (127 mm) in width
<b>Auxiliary Stop</b>	Recommended at hold-open point, where the door cannot swing 180°, or where CUSH-N-STOP arm is not used
<b>Reveal</b>	Should not exceed 7/32" (6 mm)
<b>Top Rail</b>	Less than 5-3/8" (137 mm) measured from the stop requires PLATE, 4040XP-18PA. Plate requires 2" (51 mm) minimum from the stop
<b>Head Frame</b>	Flush or rabbeted requires PA SHOE ADAPTER, 4040XP-419
<b>Stop Width</b>	Minimum 1" (25 mm). CUSH arm requires minimum 1-1/2" (38 mm)
<b>Blade Stop</b>	Clearance requires 1/2" (13mm) BLADE STOP SPACER, 4040XP-61.
<b>Clearance</b>	<ul style="list-style-type: none"> <li>■ 4040XP-62PA shoe is 4" (102 mm) from door face.</li> <li>■ EDA shoe projects 5-1/2" (140 mm) from door face.</li> <li>■ CUSH shoe projects 6" (152 mm) from door face</li> </ul>
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>■ Incorporates standard 4041 cylinder, without XP cylinder</li> <li>■ Delays closing from 120° to 70°.</li> <li>■ Delay time adjustable up to approximately 1 minute.</li> </ul>
<b>Maximum Opening</b>	<ul style="list-style-type: none"> <li>■ 180° opening/hold-open points with all except CUSH arms</li> <li>■ 110° opening/hold-open with CUSH arms</li> </ul>

**Notes:**

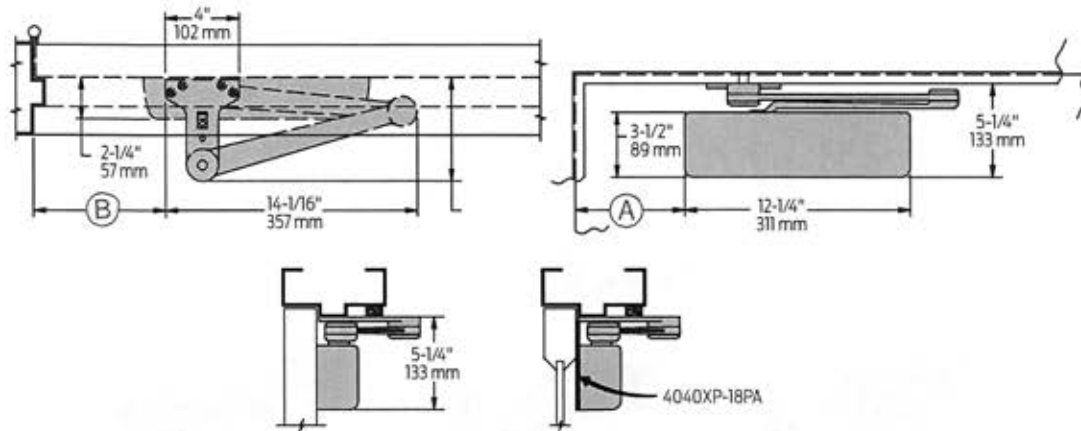
- Optional mounting requires PA SHOE, 4040XP-62PA for regular or HOLD-OPEN arms
- Add prefix "P" to closer description (eg. P4040XP)
- P4040XP closer includes 4040XP-201 FIFTH HOLE SPACER to support PA SHOE

# 4040XP Series

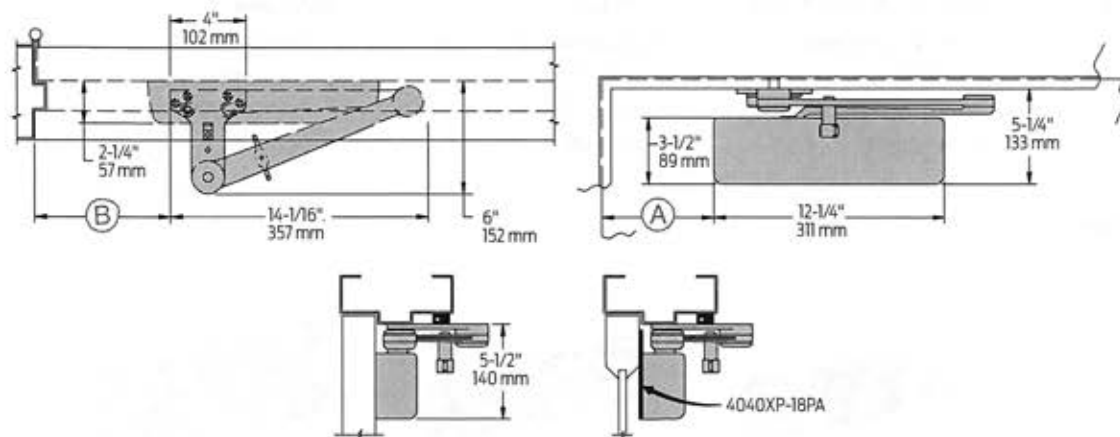
## Mounting details

### EDA and CUSH Mounting

#### EDA mount



#### CUSH mount



<b>Clearance</b>	4040XP-62EDA is 5-1/2" (140 mm) from door face. 6" (152 mm) for CUSH	
<b>Head Frame</b>	Flush or rabbeted requires CUSH FLUSH PANEL ADAPTER, 4040XP-419	
<b>CUSH ARM</b>	Requires SHOE SUPPORT, 4040XP-30 for fifth screw anchorage where reveal is less than 3-1/16" (78 mm)	
<b>Delayed Action</b>	<ul style="list-style-type: none"> <li>■ Incorporates standard 4041 cylinder, without XP cylinder.</li> <li>■ Delays closing from maximum opening to : 115° with 180° template, 95° with 110° template, 85° with 100° template, 75° with 90° template. Delay time adjustable up to approximately 1 minute.</li> </ul>	
<b>Maximum Opening</b>	EDA arm can be templated for points at:	CUSH arms can be templated for opening/hold-open point at:
	110°: A = 6-3/8" (162 mm) B = 7-3/4" (197 mm)	85°: A = 7-15/16" (202 mm) B = 9-1/8" (232 mm)
	or 180°: A = 2-7/8" (73 mm) B = 4-1/4" (108 mm)	90°: A = 7-3/16" (183 mm) B = 8-1/2" (216 mm)
	Hold-open points up to maximum opening with HEDA arm	100°: A = 6-1/16" (154 mm) B = 7-1/4" (184 mm)
		or 110°: A = 5-1/16" (129 mm) B = 6-3/8" (162 mm)

**Notes:**

- 4040XP Series closers ordered with EDA or CUSH arms include 4040XP-201 FIFTH HOLE SPACER to support the shoe
- Spring Cush stop points are approximately 5° more than templated stop point
- Hold open at templated stop points

# 4040XP Series

## Accessories

### Cylinders



**4040XP-3071**  
Cast Iron Cylinder Assembly

- Non-handed
- Heavy duty



**4041-3071 DEL**  
Cast Iron Cylinder Assembly

- Used for delayed action closing
- Non-handed
- Heavy duty

### Covers



**4040XP-72**  
Plastic Cover

- Includes 4040XP-54 snap-on cover clip
- Non-handed
- Standard



**4040XP-72MC**  
Metal Cover

- Handed
- Required for plated finishes and custom powder coat finishes
- Optional

### Installation Accessories



**4040XP-18**  
Plate

- Required for hinge side mount where top rail is less than 3-3/4" (95 mm)
- Requires minimum 2" (51 mm) minimum top rail



**4040XP-18G**  
Plate

- Locates top jamb mounted closer flush with top of head frame face in flush ceiling condition
- Requires 1-3/4" (44 mm) minimum head frame



**4040XP-18TJ**  
Plate

- Centers top jamb mounted closer vertically on head frame where face is less than 3-1/2" (89 mm). Plate requires 1-3/4" (44 mm) minimum head frame



**4040XP-18PA**  
Plate

- Required for parallel arm mounting where top rail is less than 5-1/2" (140 mm), measured from the stop
- Requires 2" (51 mm) minimum top rail



**4040XP-62PA**  
PA Shoe

- Required for parallel arm mounting

## Arms

# 4040XP Series

## Accessories



**4040XP-3077**  
Regular Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal P4041 closer includes PA SHOE, 4040XP-62PA required for parallel arm mounting



**4040XP-3077L**  
Long Arm

- Non-handed
- Includes LONG ROD AND SHOE, 4040XP-79LR for top jamb mount
- Optional



**4040XP-3077ELR**  
Extra Long Arm

- Non-handed
- Includes EXTRA LONG ROD AND SHOE, 4040XP-79ELR for top jamb mount with deep reveal
- Optional



**4040XP-3049**  
Hold-Open Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal, hold-open adjustable shoe
- 4040XP closer includes 4040XP-62PA shoe required for parallel arm mounting
- Optional



**4040XP-3049L**  
Long Hold-Open Arm

- Non-handed
- Includes LONG HEAD AND TUBE, 4040XP-3048L for top jamb mount
- Optional



**4040XP-3077EDA**  
Extra Duty Arm

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional



**4040XP-3049EDA**  
Hold-Open Extra Duty Arm

- Handed
- Parallel arm features forged, solid steel main and forearm for potentially abusive installations
- Hold-open function is adjusted at the shoe
- Optional



**4040XP-3077EDA/62G**  
Extra Duty Arm with 62G

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance
- Optional



**4040XP-3049EDA/62G**  
Hold-Open Extra Duty Arm with 62G

- Handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance. Hold-open function is adjusted at the shoe
- Optional



**4040XP-3077CNS**  
Cush-N-Stop® Arm

- Non-handed
- Features solid forged steel main arm and forearm with stop in soffit shoe.
- Optional



**4040XP-3049CNS**  
HCUSH Arm

- Non-handed
- Hold-open function with templated stop/hold-open points
- Handle controls hold-open function
- Optional



**4040XP-3077SCNS**  
Spring CUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional



**4040XP-3049SCNS**  
Spring HCUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold-open function
- Optional

## 4040XP Series

Accessories

### Installation Accessories cont.



**4040XP-30**  
CUSH Shoe Support

- Provides anchorage for fifth screw used with CUSH arms, where reveal is less than 3-1/16" (78 mm)
- Optional



**4040XP-61**  
Blade Stop Spacer

- Required to lower parallel arm shoe to clear 1/2" (13 mm) blade stop
- Optional



**4040XP-419**  
PA Flush Panel Adapter

- Provides horizontal mounting surface for parallel arm shoe on single rabbeted or flush frame
- Optional



**4040XP-62A**  
Auxilliary Shoe

- Requires a top rail of 7" (178 mm)
- Shoe replaces -62PA for parallel arm mounting of regular arm with overhead holder/stop
- Optional



**4040XP-54**  
Snap-On Cover Clip

- Used to secure 4040XP-72 Plastic Cover to cylinder body

**How-to-order 4040XP Series closers**

**1. Select finish**

- Standard Powder Coat \_\_\_\_\_  
Aluminum, Dark Bronze, Statuary,  
Light Bronze, Black, Brass.

**Closer will be shipped with:**

- Standard cylinder
- Standard cover
- Regular arm
- Self-reaming and tapping screws  
unless options listed below are selected.

**Closer options**

**Cylinder**

- Delayed Action (4041 DEL)

**Cover**

- Metal (specify right or left hand) (MC)

**Finish**

- Custom Powder Coat (RAL) \_\_\_\_\_  
(handed metal cover required)
- Plated Finish, US \_\_\_\_\_  
(handed metal cover required)
- SRI primer (use with powder coat finishes only)

**Arm**

- Regular (REG)
- Regular w/62PA (Rw/PA)
- Regular w/62A (R/62A)
- Long (LONG)
- Extra Long (XLONG)
- Hold-Open (H)
- Hold-Open w/62PA (Hw/PA)
- Long Hold-Open (HLONG)
- Extra Duty Arm (EDA)
- Extra Duty Arm with 62G (EDA/62G)
- Hold Open Extra Duty Arm (HEDA)  
(Handed)
- Hold Open Extra Duty Arm with 62  
(HEDA/62G)(Handed)
- Cush-N-Stop (CUSH)
- HCush-N-Stop (HCUSH)
- Spring Cush (SCUSH)
- Spring HCush (SHCUSH)

**Optional Screw Packs**

- TB\* w/Self-Reaming and Tapping (TBSRT)
- Wood & Machine Screw (WMS)
- TB\*, Wood & Machine Screw (TBWMS)
- TORX Machine Screw (TORX)
- TB\* & TORX Machine Screw (TBTRX)  
\* Specify door thickness if other than  
1-3/4".

**Installation Accessories**

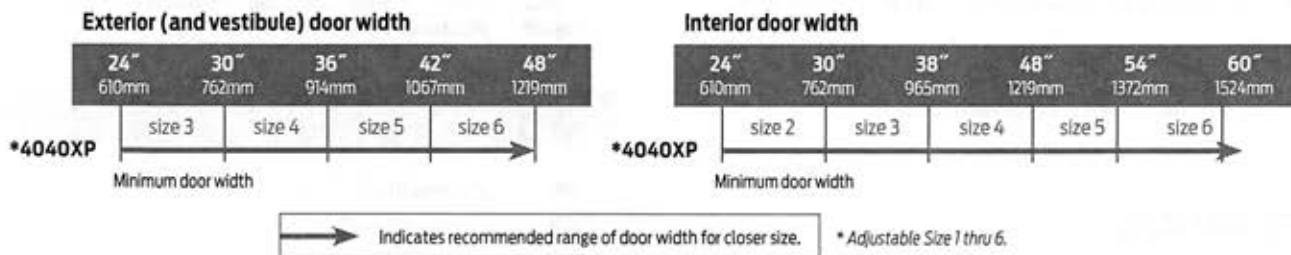
- Plate, 4040XP-18
- Plate, 4040XP-18TJ
- Plate, 4040XP-18G
- Plate, 4040XP-18PA
- CUSH Shoe Support, 4040XP-30
- Blade Stop Spacer, 4040XP-61
- Auxiliary Shoe, 4040XP-62A
- PA Flush Panel Adapter, 4040XP-419

**Special Template**

- ST- \_\_\_\_\_

**Table of sizes**

- 4040XP cylinders are adjustable from size 1 through size 6 and is shipped set to size 3
- Closing power of 4040XP Series closers may be adjusted 50%



**Reduced opening force 4040XP Series closers**

**CAUTION!** Any manual door closer, including those certified by BHMA to conform to ANSI Standard A156.4, that is selected, installed and adjusted based on ADA or other reduced opening force requirements may not provide sufficient power to reliably close and latch a door.

Refer to POWER OPERATORS section for information on systems that meet reduced opening force requirements without effecting closing power.

	DOOR WIDTH	36"	42"	48"
	8.5* lbs.	4040XP	4040XP	4040XP
5.0* lbs.	4040XP	4040XP	4040XP	

\* Maximum opening force.

## Protection Plates



Trimco's **Protection Plates** are offered with many value-added standard features as well as custom options to meet job specifications. Trimco's Protection Plates are manufactured in the U.S.A. from stainless steel, bronze or brass and include pencil bevel on all four edges standard. Other options include heavy bevel, countersinking and custom cutouts. Multiple material options create an offering that is flexible for most any application.

### APPLICATIONS

- Office Buildings
- K-12 Schools
- Hospitality
- Retail & Strip Malls
- Commercial & Industrial Buildings

## DOOR, WALL & FRAME PROTECTION

### PRODUCT FEATURES

- Manufactured in the United States.
- Heavy duty .050" stainless steel, brass, bronze or aluminum material standard. Other materials including .038", .062", .125" and custom options available.
- Pencil beveled on all four sides standard.
- Stretcher plates include heavy bevel, countersink and oval head screws standard.
- Custom cutouts, sizes and shapes available.

### SPECIFICATIONS

#### MATERIAL OPTIONS

**BR** – Brass  
**BZ** – Bronze  
**Al** – Aluminum  
**SS** – Stainless Steel

#### WARRANTY

Limited Lifetime Warranty

#### SERIES

**KA038** Armor plate, .038", 17"-48" high  
**KA050** Armor plate, .050", 17"-48" high  
**KA064** Armor plate, .064", 17"-48" high  
**K0038** Kick plate, .038", 7"-16" high  
**K0050** Kick plate, .050", 7"-16" high  
**K0064** Kick plate, .064", 7"-16" high  
**K0125** Kick plate, .125", 7"-16" high  
**KM038** Mop plate, .038", 6" high or less  
**KM050** Mop plate, .050", 6" high or less  
**KM064** Mop plate, .064", 6" high or less  
**KS050** Stretcher plate, .050", countersunk & heavy B4E  
**KS038** Stretcher plate, .038", countersunk & heavy B4E  
**K6000** Plastic kick plate, 1/8", 4" -48" high

### FINISHES

**605** Polished Brass  
**606** Satin Brass, Dull  
**612** Satin Bronze  
**613** Oil Rubbed Bronze  
**628** Satin Aluminum, Clear Anodized  
**629** Polished Stainless Steel  
**630** Satin Stainless Steel  
**SPEC** Special Options Available



# Protection Plates

## HOW TO SPECIFY & ORDER

### CHOOSE THE FOLLOWING

Type	Height Range	Plate Thickness	Part Number	Finishes	Options
Armor Plates	17"-48"	.038"	KA038	<b>605</b> Polished Brass	<b>B4E</b> Heavy <b>C</b> Sunk <b>Cut</b> Louvre <b>Cut</b> Mortise <b>Cut</b> Rosette <b>RC</b> Round Corner <b>Adhesive</b> Tape Mounted
		.050"	KA050	<b>606</b> Satin Brass	
		.064"	KA064	<b>612</b> Satin Bronze	
Kick Plates	7"-16"	.038"	K0038	<b>613</b> Oil Rubbed Bronze	
		.050"	K0050	<b>628</b> Satin Aluminum, Clear Anodized	
Mop Plates	6" or Under	.064"	K0064	<b>629</b> Polished Stainless Steel	
		.125"	K0125	<b>630</b> Satin Stainless Steel	
		.038"	KM038	<b>SPEC</b> Special Options Available	
		.050"	KM050		
Stretcher Plates	Specify	.064"	KM064		
		.038"	KS038		
		.050"	KS050		
Plastic Kick Plates	4"-48"	.125"	K6000	Standard Black & Grey, Other Colors Available: Khaki Brown, Beige, Dove Grey, Frosty White	

### EXAMPLE

For a 34" x 34" armor plate manufactured from .050" stainless steel, with countersunk and heavy bevel, specify or order: **KA050.630 34" x 34" B4E-Heavy C-Sunk.**

### PLASTIC PUSH PLATE COLOR OPTIONS

#### STANDARD COLORS



1595-60 BLACK



1500-60 GREY

#### OTHER STANDARD COLORS



D50-60 KHAKI  
BROWN



1530-60 BEIGE



D92-60 DOVE  
GREY



1573-60 FROSTY  
WHITE

\* Dimensions are informational only. Templates are available at [www.trimcobbw.com](http://www.trimcobbw.com)

## GENERAL INFORMATION

Non-handed feature is available in a variety of finishes wide range of spring power adjustment. Standard packaging with tri-pack: regular, top-jamb and parallel arm arrangement. Can be ordered with heavy duty arm assembly. ANSI/BHMA A156.4 Grade 1, U.L. listed U.S. & Canada. The cylinder body is made from R-14 die cast aluminum. This alloy provides wear resistance from contact with the piston during the opening and closing cycle. R-14 wear characteristics are similar to that of cast iron. In addition the R-14 aluminum alloy holds the cylinder body dimensionally stable under extreme internal hydraulic pressures.

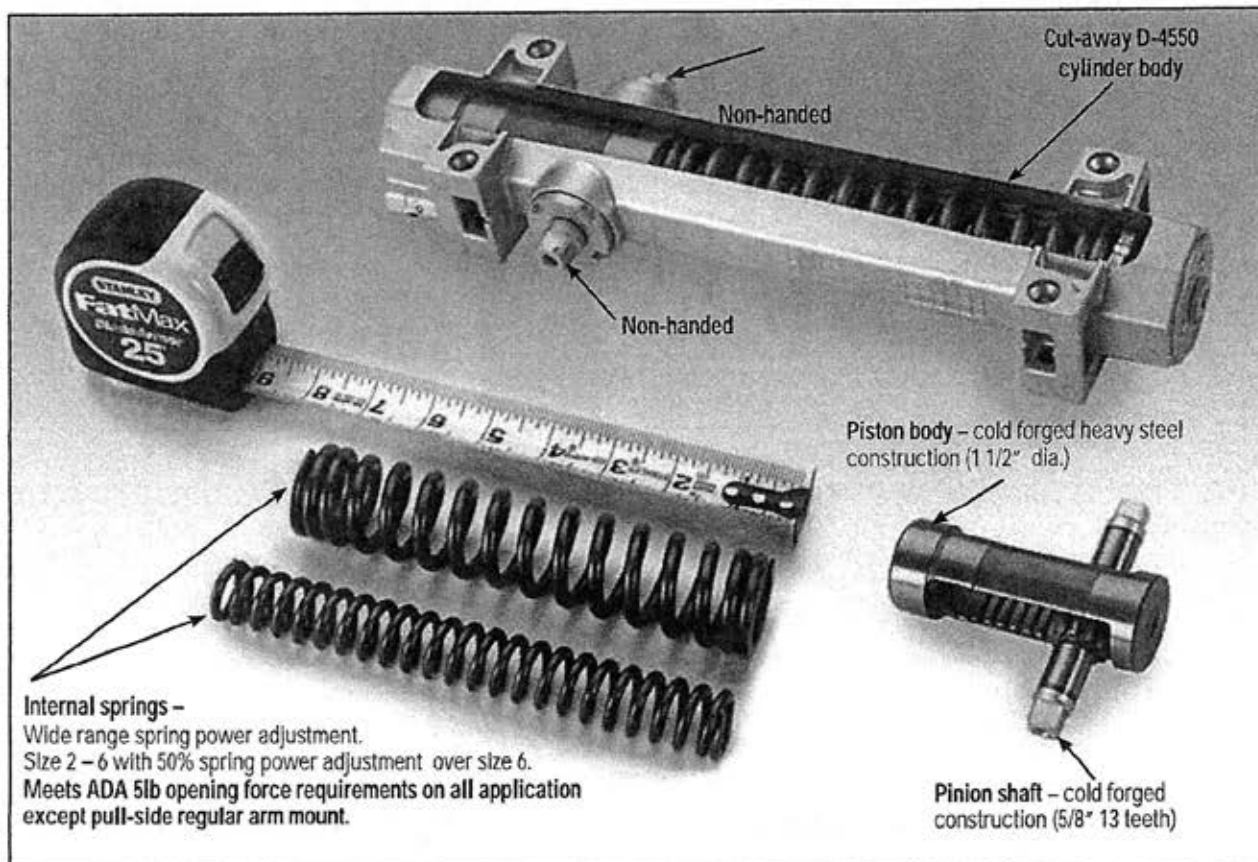
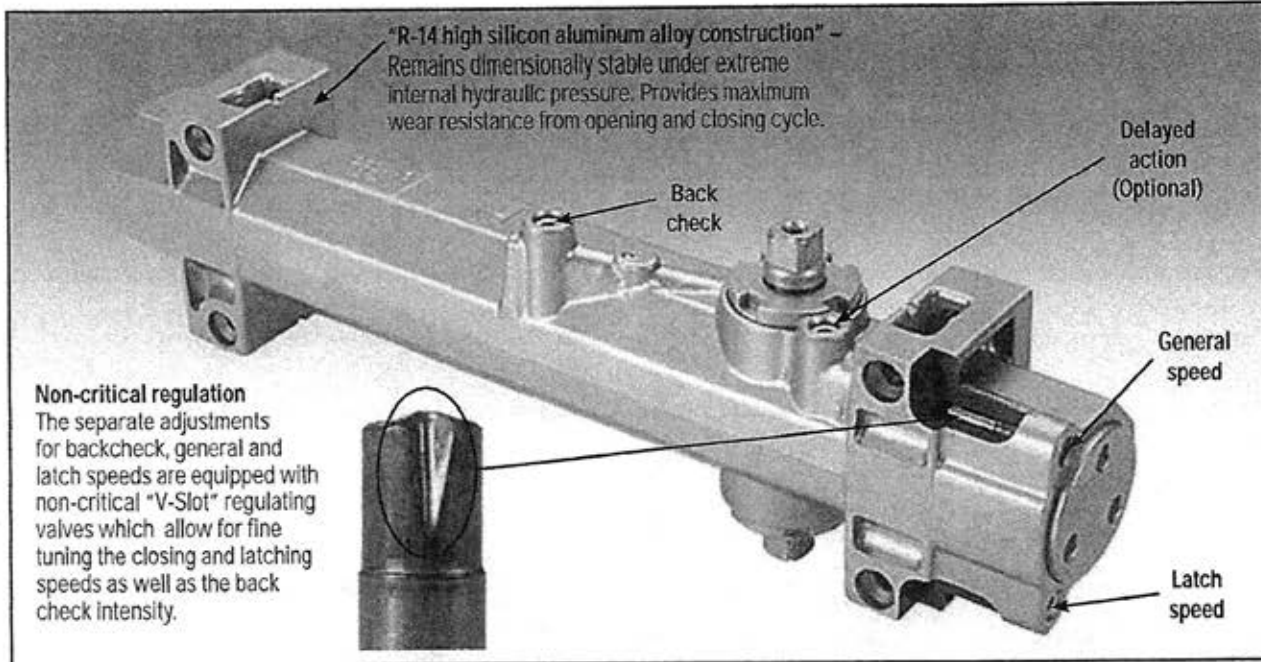


TABLE OF CONTENTS		Page	Page
General Information.....	2-4	Heavy Duty Arm (Push) Application .....	8
How To Order.....	4	Track Rail Arm (Pull) Application.....	9
Standard (Pull) Application.....	5	Electronic Hold Open (Push) Applications.....	10
Parallel Arm (Push) Application.....	6	Electronic Hold Open (Pull) Applications.....	11
Top Jamb (Push) Application.....	7	Accessories.....	12-15

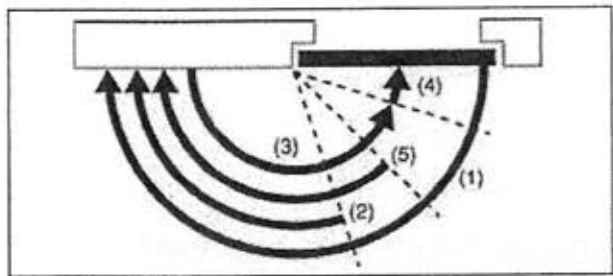


**INTRODUCTION**

The model D4550 Series is Stanley's best performing Heavy Duty Closer. The cylinder body is manufactured using R-14 Silicon Aluminum Alloy providing superior strength and durability on institutional applications. Available in a variety of standard and heavy-duty arm configurations accommodating a broader range of today's growing architectural application requirements.

**Features**

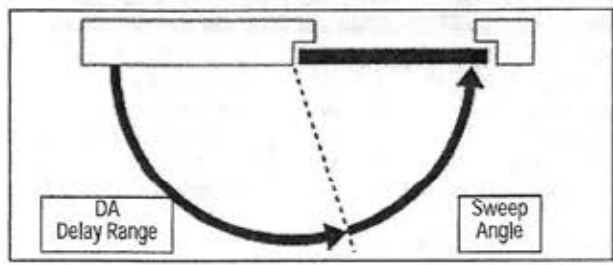
**Fully Hydraulic Checking** Controls the door through the entire opening and closing cycles by providing adjustable backcheck upon opening and adjusting general and latch speeds through the closing cycle.



(1) opening swing, no checking  
 (2) backcheck (3) general speed (4) latch speed (5) advanced variable backcheck

**Delayed Action - Optional**

The D-4550DA / D-4551DA Series Door Closers are equipped with a separate hydraulic valve adjustment to delay the closing speed from 180 to 70 degrees of door opening range. To order add suffix DA to closer number.



**Adjustable Spring Power**

The D-4550/D-4551 Series Door Closers are designed to have the widest range of spring power adjustment available to meet the broadest range of application requirements.

**Advanced Variable Backcheck (AVB) optional**

Cylinder starts backcheck at approximately 45° instead of the normal 75°. Add suffix "AVB" to selected cylinder. When combined with Delayed Action consult factory for special template. (Heavy Duty Arm applications).

**All Season Fluid**

All season fluid eliminates the need for seasonal adjustment

**Closing Power Adjustment**

**D-4550\*** - Size 2 - 6 with 50% spring power adjustment over size 6.  
 \* Meets ADA 5lb opening force requirements on all applications except Pull-Side Regular Arm Mount.

The D-4550 Series is adjusted to size 3 before leaving the factory.

**D-4551\*\*** - Size 1 - 5 with 35% spring power adjustment over size 5.  
 \*\* Meets ADA 5lb opening force requirements.

The D-4551 Series is adjusted to size 2 before leaving the factory.

**Delayed Action**

A delayed action feature is available with this series for all applications and arms. The feature permits the door to close very slowly through the delayed action cycle range.

**Forged Arms**

Heavy duty forged arms are interchangeable between the D-4550 and D-3550 Series Door Closers.

**High Impact Cover**

All D-4550 / D-4551 Series Door Closers are shipped with a high impact self-extinguishing decorative cover.

**Latching Power Adjustment**

The D-4550 / D-4551 Series Door Closers have the provision to adjust the leverage of the arms by changing the pivot position of the arm in the shoe. The shoe itself does not have to be removed from the door or jamb.

**Maintenance Free**

Door Closers mounted in accordance with the provided installation instructions are maintenance free from periodic inspection and adjustment.

**Metal Cover - Optional**

Optional stainless steel, brushed finish metal cover is available

**Non-Handed**

Can be used on both RH and LH doors for both push side and pull side mounting.

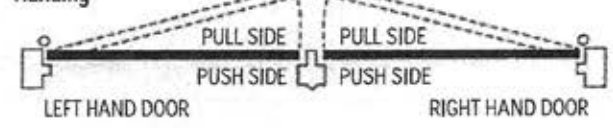
**Special High Silicon Aluminum Alloy Housing**

All D-4550 / D-4551 Series Door Closers are constructed of "STANLEY'S" R14 HIGH SILICON ALUMINUM ALLOY to exceed the ANSI/BHMA A156.4 Grade 1 requirements.

**Special Rust Inhibitor (SRI) - Optional**

For installations where a higher level of corrosive resistance is required.

**Handing**



**D-4550 SERIES**

**GENERAL INFORMATION**

Arm Options Suffix	Description	Page
L	Long Rod Forearm (Top Jams only)	10
H	Standard Hold Open	5
PH	Parallel Hold Open	6
EH	Electronic Hold Open	13, 14
H-EDA	Heavy Duty Arm w/Hold Open	8
S	Heavy Duty Arm w/Stop	8
CS	Heavy Duty Arm w/Compression Stop	8
HS	Heavy Duty Arm w/Hold Open and Stop	8
HCS	Heavy Duty Arm w/Hold Open & Comp. Stop	8
T	Track Mount	10
HT	Track Mount w/Hold Open	10
TCS	Track Compression Stop	10

**Packaging Information:**

All D-4550 / D-4551 Series Door Closers with standard arm sets are packed for mounting on standard, parallel arm or top jamb applications. All closer assemblies are packed 4 per carton. Tracks for track mounted closers are packed separately.

**Through Bolts and Sex Nuts:**

When through bolting is ordered, factory will furnish sex nuts for use with the machine screws furnished with the closer. Nuts are sized to accommodate 1-3/8" or 1-3/4" thick doors. Mounting screw thread size 12/24.

**Finishes:**

- 689- Aluminum painted
- 690- Dark bronze painted
- 691- Light bronze painted
- 693- Black painted
- 695- Dark bronze painted
- 696- Satin brass painted

**ANSI and U.L. Specifications:**



The D-4550/D-4551 Series Door Closers have been Certified to the requirements of the ANSI/BHMA Standard A156.4 - 2000 Grade 1. Available in a variety of ANSI/BHMA finishes. The Stanley Door Closer electro-static finishes surpassed over 100 hours of salt spray exposure.

UL listed with Underwriters' Laboratories, Inc. and Underwriters' Laboratories of Canada for "Self Closing Doors Without Hold-Open Feature". (File number 7525R).

**UL10C - UBC 7.2**

D-4550/D-4550 closers have been tested and certified to meet the positive pressure criterion of UL10C & UBC 7.2 (1997)

**HOW TO ORDER: D-4550/D-4551**

D-455	0	DA	EDA	689	SN
Model. No.	Size	Options	Arm Type	Finishes	Fasteners
D-455	0- See Closing Power Adjustment page 2 1- See Closing Power Adjustment page 2	AVB - advanced variable backcheck (optional) DA - Delayed Action (optional) MC - Metal Cover (optional)	L- Long Rod Forearm (TJ only) H - Standard Hold Open PH - Parallel Hold Open EDA - Heavy Duty Arm EH - Electronic Hold Open H-EDA - Heavy Duty Arm w/Hold Open S - Heavy Duty Arm w/ Stop CS - Heavy Duty Arm w/Compression Stop HS - Heavy Duty Arm w/ Hold Open & Stop HCS - Heavy Duty Arm w/ Hold Open & Compression Stop Std. Packaging - See packaging above T - Track Mount HT - Track Mount w/ Hold Open TCS - Track Compression Stop	689 690 691 693 695 696	SN - Sex Nuts & Bolts Wood & Machine Screws furnished standard SEC - Security Screws

## FULL LENGTH DOOR PULLS



TRIMCO#	1160	1161	1162
D	1"	1-1/4"	1-1/2"
PD	3/4"	1"	1-1/4"
OA	specify	specify	specify
CTC	specify	specify	specify
P	2-1/2"	2-3/4"	3"
CL	1-1/2"	1-1/2"	1-1/2"
END	square	square	square

Br, Bz, Al, SS

Door Pull  
 ADA



TRIMCO#	1163	1164	1165
D	1"	1-1/4"	1-1/2"
PD	3/4"	1"	1-1/4"
OA	specify	specify	specify
CTC	specify	specify	specify
P	2-1/2"	2-3/4"	3"
CL	1-1/2"	1-1/2"	1-1/2"
END	round	round	round

Br, Bz, Al, SS

Door Pull  
 ADA



TRIMCO#	1170	1171	1172
D	1"	1-1/4"	1-1/2"
Offset Post	Cast	Cast	Cast
OA	specify	specify	specify
CTC	specify	specify	specify
P	2-1/2"	2-3/4"	3"
CL	1-1/2"	1-1/2"	1-1/2"
END	square	square	square

Br, Bz, Al, SS

Full Length Offset Door Pull  
 ADA



TRIMCO#	1173	1174	1175
D	1"	1-1/4"	1-1/2"
Offset Post	Cast	Cast	Cast
OA	specify	specify	specify
CTC	specify	specify	specify
P	2-1/2"	2-3/4"	3"
CL	1-1/2"	1-1/2"	1-1/2"
END	round	round	round

Br, Bz, Al, SS

Full Length Offset Door Pull  
 ADA

BR = brackets, CTC = center to center, D = diameter, GP = grip projection,  
 M = material, P = projection, PD = post diameter, OA = overall, CL = clearance

# PLATES



TRIMCO#	KA038	KA038-1	KA050-1	KA050-2	KA050-3
OA	18-36" H	37-48" H	17-24" H	25-42"	43-48" H
M	.038	.038	.050	.050	.050
BHMA			J101	J101	J101

Br, Bz, Al, SS

### Armor Plate

605 finish = 24" height maximum  
 606/609 finishes = 36" height maximum  
 611/612/613 finishes = 36" height maximum  
 Aluminum and SS = 48" height maximum



TRIMCO#	KM038	K038-1	KM050	KM050-1
OA	Under 6" high	4" or under	Under 6" high	4" or under
M	.038	.038	.050	.050
BHMA			J103	

SS only

Br, Bz, Al, SS

### Mop Plate

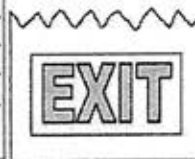


TRIMCO#	K0038	K0050
OA	7"-16" H	7"-16" H
M	.038	.050
BHMA		J102

SS only

Br, Bz, Al, SS

### Kick Plate



### TRIMCO# 10X34.ILLUM.630

.050 Kick Plate  
 with Self-illuminated "EXIT"  
 Sign.   
 Meets UL924 standards



TRIMCO#	KS050
OA	6" H
M	.050

### Stretcher Plate



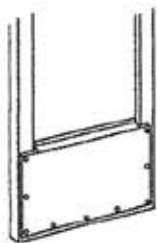
### TRIMCO# K6000

OA	4-48" high
COL	Black, Grey
M	Plastic 1/8"
BHMA	J106

Plastic

### Kick Plate

Other colors and clear are available.



### TRIMCO# KH050

To cover glass on narrow stile aluminum doors.

**NOTE:** All Kick plates are made from solid 260 Brass, 220 Bronze, in Stainless Steel or 5005H34 Aluminum. All edges are relieved. Heavy bevel at extra charge. All .038 Protection plates are Stainless Steel ONLY. Specify countersinking if required. Available with screw or adhesive mount. – Specify when ordering.

# Architectural Door Accessories

# ASSA ABLOY

## Pemko Door Bottoms: Door Shoes

The global leader in  
door opening solutions



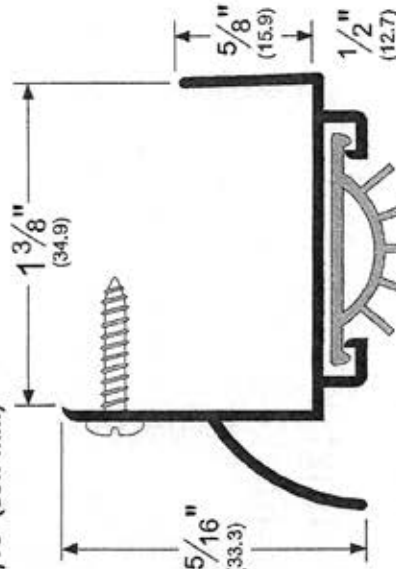
215\_V

AVAILABLE FINISHES: A, BDG, D, G, PW, SN

WIDTH: 1-3/8" (34.9 mm)

PROFILE HEIGHT 1: 1-5/16" (33.3 mm) PROFILE HEIGHT 2: 5/8" (15.9 mm)

TOTAL HEIGHT WITH INSERT: Approx. 1-9/16" (39.7 mm)



A (Mill Finish Aluminum)

BDG (Bright Dip Gold Anodized Aluminum)

D (Dark Bronze Anodized Aluminum)

G (Gold Anodized Aluminum)

PW (Painted White Aluminum)

SN (Satin Nickel Anodized Aluminum)

TITLE:
PREPARED FOR:
PREPARED BY:
DATE:
COMMENTS:

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215\_V\_CUT Rev 1 - 02.14.17

# Architectural Door Accessories

# ASSA ABLOY

Pemko Adhesive Gasketing:  
Siliconseal™ Adhesive-backed  
Fire/Smoke Gasketing

The global leader in  
door opening solutions

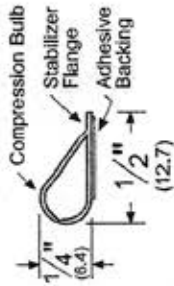


AVAILABLE FINISHES: BL, C, D, GR, TAN, W

AVAILABLE LENGTHS: 17', 18', 20', 21', 25', 30', 204'

WIDTH: 1/2" (12.7 mm)

HEIGHT: 1/4" (6.4 mm)



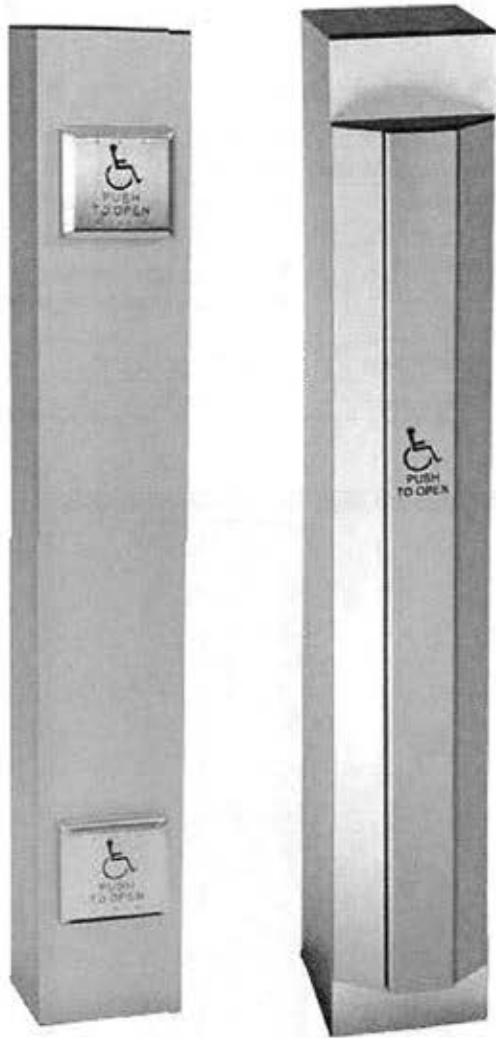
- BL (Black)
- C (Clear)
- D (Dark Brown)
- GR (Gray)
- TAN (Tan)
- W (White)

TITLE:
PREPARED FOR:
PREPARED BY:
DATE:
COMMENTS:



# ADA Compliant Solutions

BOLLARDS AND PUSH PLATE SWITCHES - WIRELESS AND HARDWIRED



For Handicap Access, Automatic Door Activation & Request-to-Exit Applications

- Door Opener Activation
- Access Control Request-to-Exit (RTE)
- Wireless Versatility
- Automatic Door Sequencer Activation




## FEATURES

- Surface wall mount or bollard mount
- Sleek architectural profile
- No square edges to snag, wide sloping sides deflects impact movement naturally to activate column
- Deflects impact from wheeled carts and conveyances
- Impact & vandal resistant design, inhibits prying, tampering
- Weather resistant, no gaps for water or ice penetration
- Choice of SPDT or DPDT, 15 Amps @ 125/250 VAC
- Complies with:
  - American National Standards Institute (ANSI)
    - 1) ANSI A156.19-2002 for Power Assist and Low Energy Power Operated Doors
  - Automatic Door Association Accessibility Guidelines (ADAAG)
    - 1) ADAAG 4.30 Signage, Figure 43(a) Proportions, International Symbol of Accessibility
- Americans With Disabilities Act (ADA) 1990

## SPECIFICATIONS

<b>Mounting Plate</b>	Heavy Duty 1/8" (3.2mm) mounting plate
<b>Faceplate</b>	Heavy 18 Gauge 630/US32D Satin Stainless Steel Standard
<b>Legends</b>	Bold debossing or engraving with black or blue infill
<b>Contacts</b>	SPDT or DPDT, 15 Amps @ 125/250VAC; UL 1054, CSA Listed
<b>Depth</b>	[Narrow & (1) Gang] SPDT-7/8" deep, DPDT-1-3/8" deep, [4 1/2", & 6" square/ round] SPDT-3/4" deep, DPDT-1-5/32" deep

 = can be used with wireless transmitter and receiver



# Ingress-R.E.X Touch Panel Column

## Surface or Bollard Mount



### FEATURES

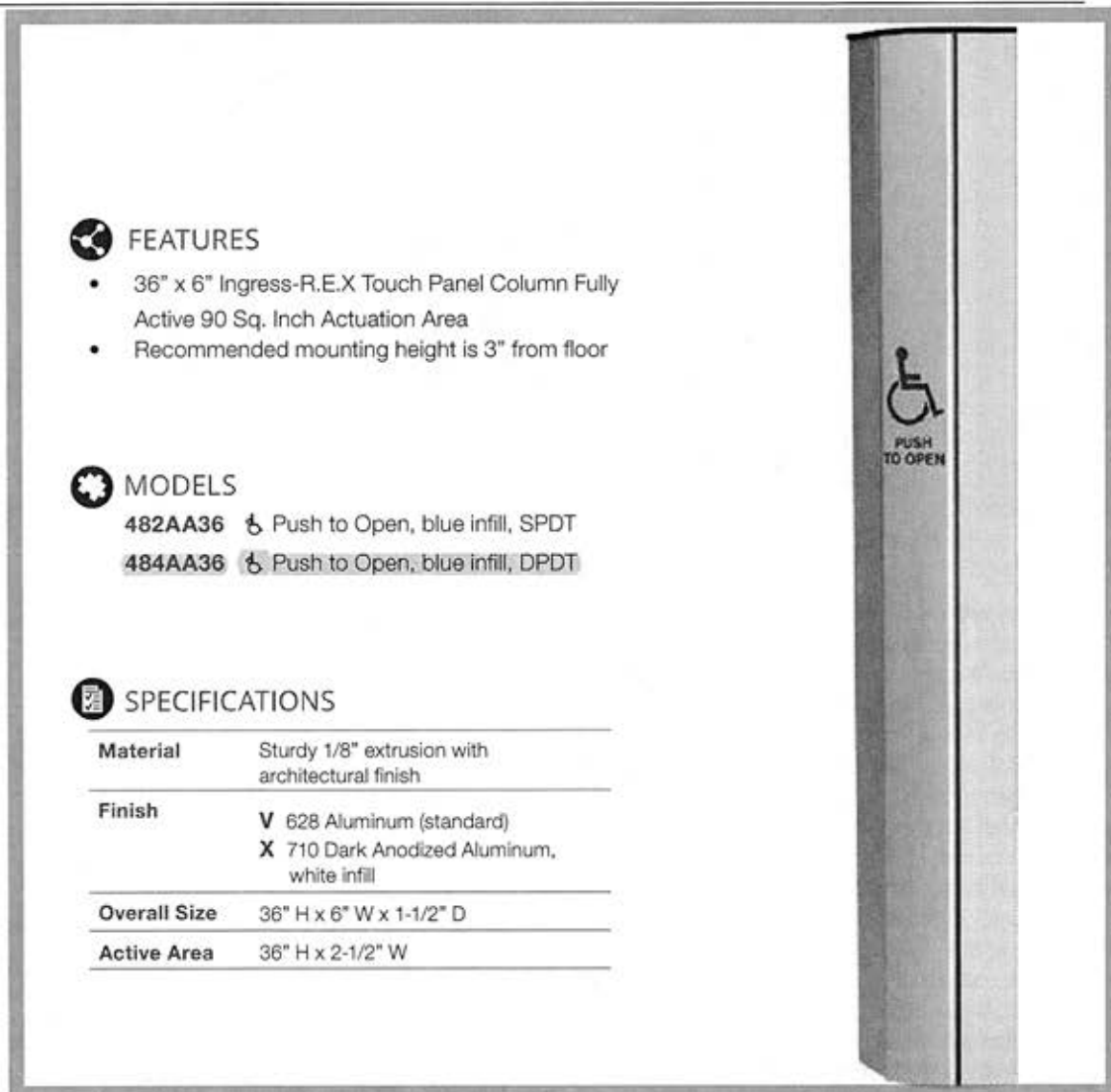
- 9" x 6" Ingress-R.E.X Touch Panel Column
- Fully Active 22-1/2 Sq. Inch Actuation Area

### MODELS

**482AA9** Push to Open, blue infill, SPDT

### SPECIFICATIONS

<b>Centerline Mounting Height</b>	Recommended 34" to 48"
<b>Material</b>	Sturdy 1/8" extrusion with architectural finish
<b>Finish</b>	<b>V</b> 628 Aluminum (standard) <b>X</b> 710 Dark Anodized Aluminum, white infill
<b>Overall Size</b>	9" H x 6" W x 1-1/2" D
<b>Active Area</b>	9" H x 2-1/2" W



### FEATURES

- 36" x 6" Ingress-R.E.X Touch Panel Column Fully Active 90 Sq. Inch Actuation Area
- Recommended mounting height is 3" from floor

### MODELS

**482AA36** Push to Open, blue infill, SPDT

**484AA36** Push to Open, blue infill, DPDT

### SPECIFICATIONS

<b>Material</b>	Sturdy 1/8" extrusion with architectural finish
<b>Finish</b>	<b>V</b> 628 Aluminum (standard) <b>X</b> 710 Dark Anodized Aluminum, white infill
<b>Overall Size</b>	36" H x 6" W x 1-1/2" D
<b>Active Area</b>	36" H x 2-1/2" W



= can be used with wireless transmitter and receiver



# Wireless Transmitter & Receiver

## for Wireless ADA Applications

For Remote Control Versatility for Touch Panel Column and Push Plate Switches.  
75 foot wireless range. less barriers.

### 433MHz Micro Transmitter



#### FEATURES

- Requires a non-metallic surface box or standard bollard cap (non-metallic)
- Pre-Wired for quick installation
- Antenna magnifies signal
- Works with 400RC433

#### MODELS

**400W1-433** 433MHz Micro Transmitter

#### SPECIFICATIONS

<b>Voltage Input</b>	9V Battery (included)
<b>Trigger Input</b>	Momentary, N.O.Dry Contact
<b>Temperature</b>	-20F — 100F
<b>Dimensions</b>	1-9/64" x 15/16" x 7/32"

### 433MHz 1 Channel Nano Receiver

Designed to control automatic door or electrified locking hardware  
with code-hopping technology for increased security.



#### FEATURES

- Works with 400W1-433

#### MODELS

**400RC433** 433MHz 1 Channel Receiver

#### SPECIFICATIONS

<b>Carrier Frequency</b>	433.92 MHz
<b>Relay Numbers</b>	1
<b>Temperature</b>	-4F — 158F
<b>Power Supply</b>	12/24 VAC/DC
<b>Contacts</b>	C-NO
<b>Dimensions</b>	1-1/4" x 2" x 3/4" Deep



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LIT-ADA BOLLARDS PUSH PLATE SWITCHES 08/17

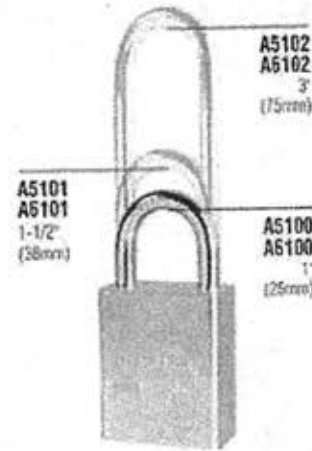
[t] 800.413.8783 ■ 805.494.0622 ■ [f] 866.215.3138 ■ 801 Avenida Acaso, Camarillo, CA 93012 ■ PO Box 3670, Camarillo, CA 93011

### 1-1/2" (38mm) Rectangular Padlocks

For all: body width=1-1/2" (38mm), body thickness=3/4" (19mm), shackle diameter=1/4" (6mm), and horizontal clearance=3/4" (19mm)

Specifications	Models		
5-pin / APTC12	A5100	A5101	A5102
6-pin / APTC14	A6100	A6101	A6102
Shackle Height	1" (25mm)	1-1/2" (38mm)	3" (75mm)

Keying Options – Keyed Alike (KA), Keyed Different (KD), Master Keyed (MK), BumpStop®, Edge®



### REKEYABLE SOLID STAINLESS STEEL PADLOCKS

Weatherbuilt™ Padlock Protection available.

#### A5400 and A6400

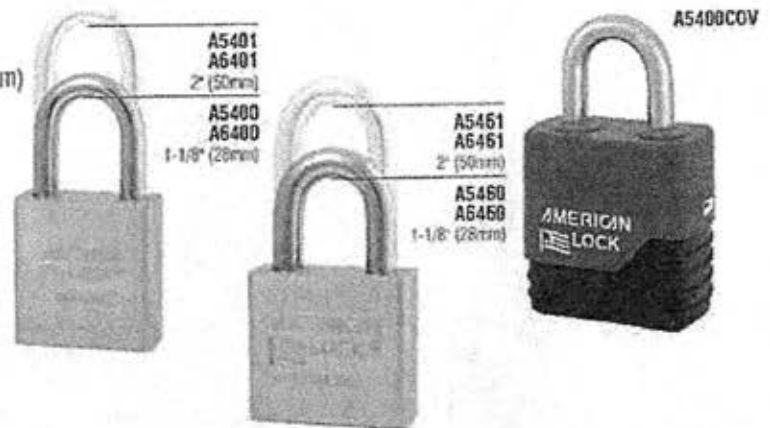
For all: body width=1-3/4" (44mm), body thickness=3/4" (19mm), shackle diameter = 5/16" (8mm) and horizontal clearance=3/4" (19mm)

#### A5460 and A6460

For all: body width=2" (50mm), body thickness=3/4" (19mm), shackle diameter = 3/8" (10mm) and horizontal clearance=3/4" (19mm)

Specifications	Models	
5-pin / APTC12	A5400	A5401
	A5460	A5461
6-pin / APTC14	A6400	A6401
	A6460	A6461
Shackle Height	1-1/8" (28mm)	2" (50mm)

Keying Options – Keyed Alike (KA), Keyed Different (KD), Master Keyed (MK), BumpStop®, Edge®



### NON-REKEYABLE SOLID STEEL PADLOCKS

Designed to secure job boxes and other heavy duty applications. Non-serviceable five-pin APTC12 cylinder can be factory keyed to your requirements.

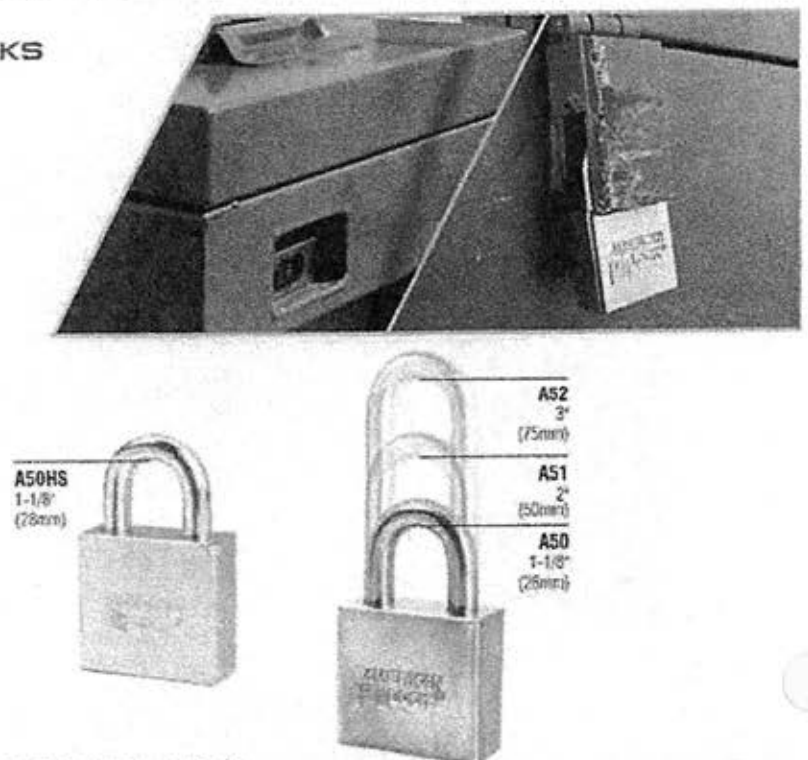
#### A50HS

Fits Knaack and Watchman IV job boxes and has stainless steel pins for additional drill resistance.

For all: body width=2" (50mm), body thickness=7/8" (22mm), shackle diameter=3/8" (10mm) and horizontal clearance=3/4" (19mm)

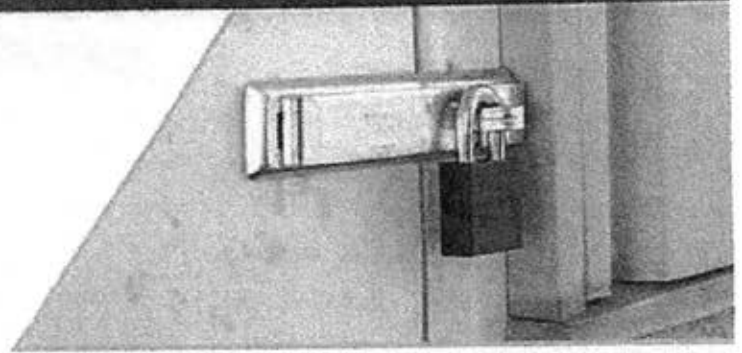
Specifications	Models		
5-pin / APTC12	A50 A50HS	A51	A52
Shackle Height	1-1/8" (28mm)	2" (50mm)	3" (75mm)

Keying Options – Keyed Alike (KA), Keyed Different (KD), Master Keyed (MK), BumpStop®, Edge®

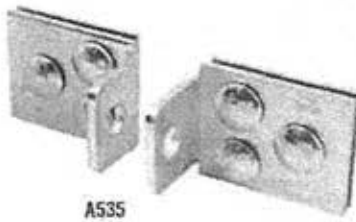


## HEAVY DUTY HASPS

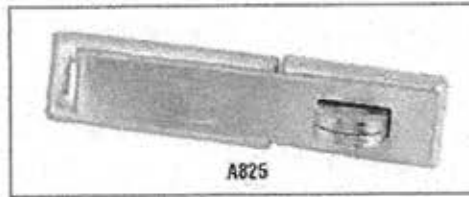
- Hardened steel staple resists cutting, sawing and hammering
- Zinc plated hardened steel for added strength and weatherability
- Mounting hardware included for easy installation
- Models A850, A875, and A885 ideal for corners and angles



Specifications	Models				
	A535	A825	A850	A875	A885
Hasp Dimensions	5" x 2" (127mm x 50mm)	7-1/4" x 1-5/8" (184mm x 41mm)	4-1/4" x 1-5/8" (108mm x 41mm)	6-1/4" x 1-3/4" (159mm x 44mm)	7-3/4" x 1-3/4" (197mm x 44mm)



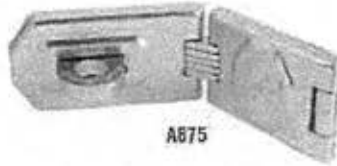
A535



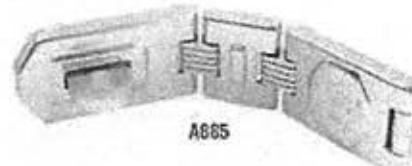
A825



A850



A875

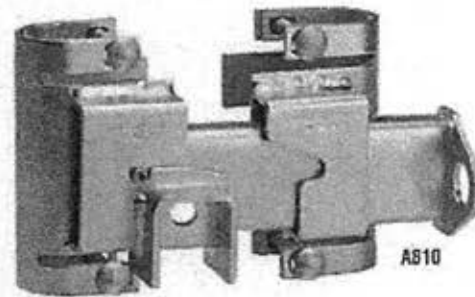


A885

## HEAVY DUTY GATE HASP

### A810

- Use with A700, A5260 or A5200 padlocks
- Patent-pending gate hasp provides maximum security; for double-drive industrial gates with 1-5/8" or 2" frames
- Protects padlocks from cutting
- Simple four-bolt installation, with all mounting hardware included
- Adjustable slide fits gate openings from 3" to 6" wide
- Accepts padlocks with 7/16" diameter shackle and 1" vertical shackle clearance

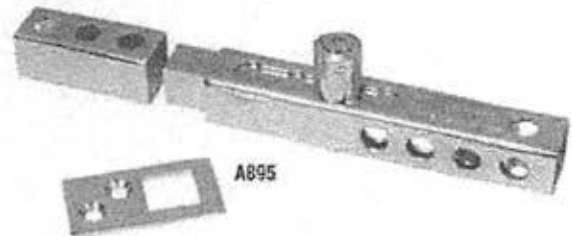


A810

## LOCKING BOLT

### A895

- 3/4" hardened steel locking bolt for maximum strength
- Chrome plated for corrosion resistance; mounting hardware included
- Fully adjustable from 3/4" to 2-3/8"
- Accepts padlocks with 7/16" diameter shackle
- Mounting hardware included



A895


**STANLEY** Hardware

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	<b>1009 Cane Bolt</b> Carded   S532-500   Black   1/2" x 12"
-----------------------------------------------------------------------------------	-----------------------------------------------------------------

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Let the Little Things Make You Happy 

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# COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION

1800 IGNACIO BLVD.  
NOVATO, CA 94949

DSA BACKCHECK  
09.07.17

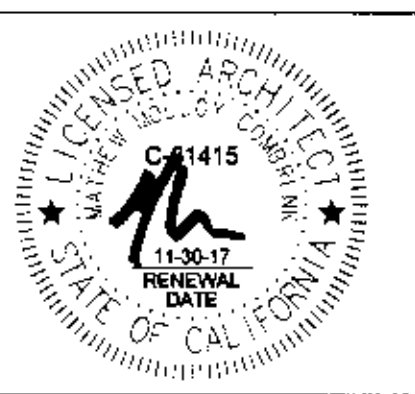
brick

ARCHITECT  
brick  
1266 68th street, suite 1  
emeryville, ca 94608  
510.518.0157  
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835 college avenue  
kenfield, ca 94904

IDENTIFICATION STAMP  
DIV. OF THE STATE ARCHITECT  
OFFICE OF REGULATION SERVICES  
01-116787  
DATE SEP 12 2017

9/07/17	DSA BACK CHECK
5/31/17	DSA PLAN REVIEW
3/10/17	100% CD
rev date	issue



COM IVC Bldg. 11  
renovation

novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
TITLE SHEET

G0.0

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ACOUS.	ACOUSTICAL	LAB	LABORATORY
ADJ.	ADJUSTABLE	LAM	LAMINATE
AGG.	AGGREGATE	LAV.	LAVATORY
AL	ALUMINUM	LT.	LIGHT
APPROX.	APPROXIMATE	MAT.	MATERIAL
ARCH.	ARCHITECTURAL	MAX.	MAXIMUM
A.P.L.	ASSUMED PROPERTY LINE	M.C.	MECANICAL CABINET
A.F.F.	ABOVE FINISH FLOOR	MECH.	MECHANICAL
ADDL.	ADDITIONAL	MEMB.	MEMBRANE
		MET.	METAL
		MFR.	MANUFACTURER
		MIN.	MINIMUM
		M	MIRROR (FRAMED)
		MISC.	MISCELLANEOUS
BD.	BOARD	M.O.	MASONRY OPENING
BTUM.	BUTYLMUM	MTD.	MONUMENT
BLDG.	BUILDING	MULL.	MULLION
BLCKG.	BLOCKING	MG.	MEDICAL GAS PANEL
BM.	BEAM	M.B.	MACHINE BOLT
BOT.	BOTTOM	MK.	MARKER BOARD
BTWN.	BETWEEN	MBH.	MOP AND BROOM HOLDER
		(N)	NEW
CAB.	CABINET	N.I.C.	NOT IN CONTRACT
C.B.	CATCH BASIN	NO. or #	NUMBER
C.T.	CERAMIC TILE	NONM.	NONMETAL
C.C.T.	CUBICLE CURTAIN TRACK	N.T.E.	NOT TO SCALE
C.I.	CAST IRON		
CLG.	CEILING		
CL.	CENTER LINE		
CLR.	CLEAR	O/	OVER
COLUM.	COLUMN	O.A.	OVERALL
CONC.	CONCRETE	O.C.	ON CENTER
CONT.	CONTINUOUS	O.D.	OUTSIDE DIAMETER
CORR.	CORRIDOR	O.P.P.	OPPOSITE
CTS.K.	COUNTERSUNK	O.F.D.	OVERFLOW DRAIN
C.M.U.	CONCRETE MASONRY	O.F.O.	OWNER FURNISHED, OWNER INSTALLED
C.D.U.	COMBINATION DISPENSING UNIT	O.F.C.I.	OWNER FURNISHED, CONTRACTOR INSTALLED
		O.T.A.	OPEN TO ABOVE
D.B.L.	DISABLED ACCESSIBILITY		
DEPT.	DEPARTMENT	PEN.	PENETRATION(S)
D.F.	DRINKING FOUNTAIN	PL.	PLATE
DET.	DETAIL	P.LAM.	PLYWOOD LAMINATE
DIA.	DIAMETER	PLYWD.	PLYWOOD
DIM.	DIMENSION	PR.	PAIR
DISP.	DISPENSER	PTD.	PAPER TOWEL DISPENSER
DN.	DOWN	PTD.	PAINTED
DR.	DOOR	P.A.D.	POWER ACTUATED DEVICE
DS.	DOWNSPOUT	P.I.P.	POURED-IN PLACE
DWG.	DRAWING	P.T.	PRESSURE TREATED
D.D.	DECK DRAIN	PTN.	PARTITION
D.F.	DOUGLAS FIR	PV.	PHOTOVOLTAIC
		O.T.	QUARRY TILE
(E)	EXISTING		
EA.	EACH	R.	RISER
E.J.	EXPANSION JOINT	RAD.	RADIUS
EL.	ELEVATION	R.D.	ROOF DRAIN
ELEC.	ELECTRICAL	REF.	REFERENCE
ELEV.	ELEVATOR	REFR.	REFRIGERATOR
EMERG.	EMERGENCY	REINF.	REINFORCED
ENCL.	ENCLOSURE	REQD.	REQUIRED
EQPT.	EQUIPMENT	RESIL.	RESILIENT
E.W.C.	ELECTRIC WATER COOLER	R.H.	ROBE HOOK
EXP.	EXPANSION	RM.	ROOM
EXT.	EXTERIOR	R.O.	ROUGH OPENING
		RT.	RESILIENT TILE
		RWD.	REDWOOD
		R.W.L.	RAIN WATER LEADER
F.A.	FIRE ALARM	S.C.	SOLID CORE
F.C.O.	FLOOR CLEAN OUT	SCD.	SEAT COVER DISPENSER
F.O.	FLOOR DRAIN	SCHED.	SCHEDULE
FDN.	FOUNDATION	SD.	SOAP DISPENSER
F.E.	FIRE EXTINGUISHER	SECT.	SECTION
F.E.C.	FIRE EXTINGUISHER CAB.	SH.	SHELF
F.H.C.	FIRE HOSE CABINET	SHWR.	SHOWER
FN.	FINISH	SHT.	SHEET
FLUOR.	FLUORESCENT	SIM.	SIMILAR
F.O.C.	FACE OF CONCRETE	S.M.S.	SHEET METAL SCREW
F.O.F.	FACE OF FINISH	SND.	SANITARY NAPKIN DISPOSAL
F.O.S.	FACE OF STUDS	SNV.	SANITARY NAPKIN VENDOR
F.F.	FOLDING SHOWER SEAT	SSD.	SEE STRUCTURAL DRAWINGS
FT.	FOOT OR FEET	STD.	STANDARD
FTG.	FOOTING	STL.	STEEL
FURR.	FURRING	STOR.	STORAGE
F.H.S.	FLAT HEAD SCREW	STR.L.	STRUCTURAL
F.R.	FIRE RETARDANT	SUSP.	SUSPENDED
		TCO.	TOILET SEAT COVER DISPENSER
GA.	GAGE	T.D.	TRENCH DRAIN
GLV.	GALVANIZED	TRE.	TREAD
G.B.R.	GRAB BAR REINFORCEMENT	T.B.	TOWEL BAR
GL.	GLASS	T.O.C.	TOP OF CURB/CONCRETE
GND.	GROUND	TEL.	TELEPHONE
GYP.	GYPSPUM	TER.	TERRAZZO
G.W.B.	GYPSPUM WALL BOARD	T.G.	TONGUE AND GROOVE
GEN.	GENERAL	THK.	THICK
		TK.BD.	TACKBOARD
H.B.	HOSE BIBB	T.P.	TOP OF PAVEMENT/TELEPHONE PANELBOARD
H.C.	HOLLOW CORE	T.P.D.	TOILET PAPER DISPENSER
H.M.	HOLLOW METAL	TEL.	TELEVISION
HORIZ.	HORIZONTAL	TYP.	TYPICAL
HR.	HOOR	T.O.S.	TOP OF STEEL
		T.O.W.	TOP OF WALL
ID.	INSIDE DIAMETER		
INSUL.	INSULATION		
INT.	INTERIOR		
IVT.	INTRAVENOUS TRACK	U.O.N.	UNLESS OTHERWISE NOTED
		VCT.	VINYL COMPOSITION TILE
JAN.	JANITOR	VDB.	VISUAL DISPLAY BOARD
J.T.	JOINT	VERT.	VERTICAL
		VEST.	VESTIBULE
		W/	WITH
		W.C.	WATER CLOSET
		WO.	WOOD
		W.O.	WHERE OCCURS
		WO.	WITHOUT
		WP.	WATERPROOF
		WR.	WASTE RECEPTACLE
		WT.	WEIGHT

**ABBREVIATIONS**

<b>CLIENT:</b> COLLEGE OF MARIN 835 COLLEGE AVENUE KENTFIELD, CA 94904 T: 415-848-8101 GREG NELSON, VP FINANCE AND COLLEGE OPERATIONS GNELSON@MARIN.EDU	<b>LOW VOLTAGE CONSULTANT:</b> DAN DAVIS COMMUNICATION 101 GOLF COURSE DR, SUITE D2 ROHNERT PARK, CA 94928 T: 707-865-6655 DAN@DDCOMM.BIZ
<b>ARCHITECT:</b> BRICK ARCHITECTURE AND INTERIORS 1288 56TH STREET, SUITE 1 EMERYVILLE, CA 94605 T: 510-468-5727 ROB ZIRKLE, PRINCIPAL MATT COMBRINK, PRINCIPAL MATTISON LY, PROJECT ARCHITECT MLY@BRICK-INC.COM	<b>WATERPROOFING CONSULTANT:</b> NEUMANN SLOAT ARNOLD ARCHITECTS 329 JEFFERSON STREET OAKLAND, CA 94607 T: 415-575-4800 BRIAN NEUMANN, PRINCIPAL AMBER ANTRACOLI AMBER@NSPLP.COM
<b>CIVIL:</b> CSW STUBER STROEH ENGINEERING GROUP 45 LEVERON COURT NOVATO, CA 94949 T: 415-883-9850 KIRK BOVITZ, KIRK@CSWST2.COM JIM GROSSI, JIMG@CSWST2.COM	<b>ACQUSTICIAN:</b> ACQUSTIC ARTS AND ENGINEERING 1016 AMITO DRIVE BERKELEY, CA 94705 T: 510-845-2691 C: 415-425-0943 TIM SCHMIDT TSC@ACQUSTICAE.COM
<b>STRUCTURAL:</b> IDA ENGINEERS 1629 TELEGRAPH AVE, SUITE 300 OAKLAND, CA 94612 T: 510-834-1629 X 102 STEPHEN DELLESSE, PRESIDENT SDELLESSE@IDA-SE.COM MIRO SEKEL MSEKEL@IDA-SE.COM	<b>FIRE ALARM AND FIRE PROTECTION:</b> TYCO SIMPLEX GRINNELL 3077 WUJIAN COURT SUITE B SANTA ROSA CA 95407-5764 T: 707-578-3212 FIRE ALARM: RAY JUACHON, PE RICH HUMBERT, 503.955.7058 H.HUMBERT@SIMPLEXGRINNELL.COM ANTON TRAUB 707.303.0686 ATRAUB@SIMPLEXGRINNELL.COM
<b>MECHANICAL, ELECTRICAL, PLUMBING ENGINEERS:</b> PAE ENGINEERS 425 CALIFORNIA ST, SUITE 1200 SAN FRANCISCO, CA 94104 T: 415-544-7707 HARJOT SIDHU HARJOT.SIDHU@PAE-ENGINEERS.COM MARCO ALVES MARCO.ALVES@PAE-ENGINEERS.COM ANDREW MCGANN ANDREW.MCGANN@PAE-ENGINEERS.COM JAMES TILLS JAMES.TILLS@PAE-ENGINEERS.COM	<b>FIRE PROTECTION:</b> JOHN HUGO KAISER, PE TROY LANCASTER 916.944.6966 TROY LANCASTER@TJCO.COM LAURA BURKMAN 925.337.9511 LBURKMAN@SIMPLEXGRINNELL.COM

**PROJECT DIRECTORY**

<b>APPLICABLE STATE &amp; LOCAL CODES</b>	<ul style="list-style-type: none"> <li>2016 CALIFORNIA ADMINISTRATIVE CODE (CAC), PART 1, TITLE 24 C.C.R.</li> <li>2016 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R. (2016 INTERNATIONAL BUILDING CODE VOL. 1 &amp; 2, AND 2016 CALIFORNIA AMENDMENTS)</li> <li>2016 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R. (2014 NATIONAL ELECTRICAL CODE AND 2016 CALIFORNIA AMENDMENTS)</li> <li>2016 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24 C.C.R. (2015 IAPMO UNIFORM MECHANICAL CODE AND 2016 CALIFORNIA AMENDMENTS)</li> <li>2016 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R. (2015 IAPMO UNIFORM PLUMBING CODE AND 2016 CALIFORNIA AMENDMENTS)</li> <li>2016 CALIFORNIA ENERGY CODE (CEC), PART 6, TITLE 24 C.C.R.</li> <li>2016 CALIFORNIA FIRE CODE, PART 8, TITLE 24 C.C.R. (2015 INTERNATIONAL FIRE CODE AND 2016 CALIFORNIA AMENDMENTS)</li> <li>2016 CALIFORNIA EXISTING BUILDING CODE (CEBC), PART 10, TITLE 24 C.C.R. (2015 INTERNATIONAL EXISTING BUILDING CODE AND 2016 CALIFORNIA AMENDMENTS)</li> <li>2016 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN), PART 11, TITLE 24 C.C.R.</li> <li>2016 CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24 C.C.R.</li> <li>2016 TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATION</li> <li>2013 ASME A17.1CSA B44-13 SAFETY CODE FOR ELEVATORS AND ESCALATORS</li> <li>WILDFIRE URBAN INTERFACE ZONE</li> </ul>
<b>PARTIAL LIST OF APPLICABLE STATE STANDARDS</b>	<ul style="list-style-type: none"> <li>NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLERS SYSTEMS (CA AMENDED) 2016 EDITION</li> <li>NFPA 14, STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEMS, 2016 EDITION</li> <li>NFPA 17, STANDARD FOR DRY CHEMICAL EXTINGUISHING SYSTEMS, 2013 EDITION</li> <li>NFPA 17A, STANDARD FOR WET CHEMICAL EXTINGUISHING SYSTEMS, 2013 EDITION</li> <li>NFPA 20, STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION, 2016 EDITION</li> <li>NFPA 22, STANDARD FOR WATER TANKS FOR PRIVATE FIRE PROTECTION, 2013 EDITION</li> <li>NFPA 24, STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES, 2016 EDITION</li> <li>NFPA 72, NATIONAL FIRE ALARM CODE (CA AMENDED) 2016 EDITION</li> <li>NFPA 80, STANDARD FOR FIRE DOORS AND OTHER OPENING PROTECTIVES, 2016 EDITION</li> <li>NFPA 2001, STANDARD ON CLEAN AGENT FIRE EXTINGUISHING SYSTEMS, 2015 EDITION</li> <li>UL 300 STANDARD FOR FIRE TESTING OF FIRE EXTINGUISHING SYSTEMS FOR PROTECTION OF COMMERCIAL COOKING EQUIPMENT 2005 (R2010)</li> <li>UL 464, AUDIBLE SIGNALING DEVICES FOR FIRE ALARM AND SIGNALING SYSTEMS, INCLUDING ACCESSORIES, 2003 EDITION</li> <li>UL 621, STANDARD FOR HEAT DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS, 1999 EDITION</li> <li>UL 1971, STANDARD FOR SIGNALING DEVICES FOR THE HEARING IMPAIRED, 2002 EDITION</li> <li>ICC 300, STANDARD FOR CLEACHERS, FOLDING, AND TELESCOPIC SEATING, AND GRANDSTANDS, 2012 EDITION</li> <li>REFERENCE CODE SECTION FOR NFPA STANDARDS - CBC (SFM) 9604.1</li> <li>ASME A17.1-2016 FOR SECTION 7-3084 PART 7, C.C.R. TITLE 24</li> <li>ASME A17.1-2014 FOR SECTION 7-3084 PART 7, C.C.R. TITLE 24</li> <li>ANSI/BHMA A156.10-1985 AMERICAN NATIONAL STANDARD FOR POWER OPERATED PEDESTRIAN DOORS</li> <li>ANSI A156.19-1984 AMERICAN NATIONAL STANDARD FOR POWER ASSIST AND LOW ENERGY POWER OPERATED DOORS</li> </ul>
<b>APPLICABLE ACCESSIBILITY STANDARDS</b>	<ul style="list-style-type: none"> <li>2016 CALIFORNIA BUILDING CODE (CBC) CHPT. 11B</li> <li>AMERICANS WITH DISABILITIES ACT (ADA) USING 2010 ADA STANDARDS (ADAS) FOR ALL PUBLIC ACCOMMODATION AREAS</li> </ul>

**APPLICABLE CODES**

INTERIOR RENOVATION OF AN EXISTING 1970'S TWO-STORY BUILDING NO. 11 WITH AN APPROX. 9400 SF. FT. RENOVATION AREA COMPRISING MAINLY OF THE ENTIRE SECOND FLOOR AND PARTIAL SCOPE OF THE 1<sup>ST</sup> FLOOR. THE NEWLY RENOVATED AREA WILL HOUSE THE DISTRICT HUMAN RESOURCE DEPARTMENT ADMINISTRATIVE OFFICES. THE EXISTING BUILDING STRUCTURE IS COMPOSED OF DEEP PILE CONCRETE COLUMNS, GLUE LAMINATED BEAMS, FLOOR JOISTS AND ROOF RAFTERS. AN EXISTING ELEVATOR AND INTERIOR STAIR WILL REMAIN. THE RENOVATION SCOPE OF WORK INCLUDES THE FOLLOWING:

**1<sup>ST</sup> FLOOR:**

- NEW MECHANICAL, LIGHTING, FIRE ALARM AND FIRE PROTETION DEIGN
- NEW CEILING FINISHES
- NEW ACCESSIBLE DRINKING FOUNTAIN
- RENOVATION OF RESTROOMS
- REPLACEMENT OF ALL EXTERIOR WINDOWS

**2<sup>ND</sup> FLOOR:**

- NEW OFFICE LAYOUT
- NEW MECHANICAL ELECTRICAL, LIGHTING, PLUMBING, FIRE ALARM, FIRE PROTECTION, SECURITY, AUDIO AND VISUAL SYSTEMS
- TWO SINGLE-STALL UNISEX RESTROOMS
- SMALL KITCHENETTE/WORKROOM
- REPLACEMENT OF ALL EXTERIOR WINDOWS
- ADDITION OF NEW WINDOW OPENINGS
- INTERIOR STOREFRONT FOR OFFICES AND MEETING ROOM
- NEW BATT WALL INSULATION AND INTERIOR WALL FINISHES AT EXISTING EXTERIOR WALLS
- NEW SKYLIGHT OPENING
- REPLACE EXISTING ROOF MEMBRANE AND INSULATION ABOVE EXISTING ROOF DECK

**SITE:**

- NEW EXTERIOR TRELIS SLATS
- NEW SIDEWALK REPAIR AND REPLACEMENT
- NEW VRF SYSTEM, PAD AND UTILITY HOOK-UP TO SERVE BLDG. 11 AND SPACE FOR ADDITIONAL VRF FOR FUTURE CONNECTION TO ADMIN. CLUSTER BUILDINGS
- NEW SITEWORK FOR FIRE PROTECTION SYSTEM

**PROJECT DESCRIPTION**

- APN: 150-480-12
- PROPERTY OWNER: COLLEGE OF MARIN
- PROPERTY: 333.42 ACRES (INDIAN VALLEY CAMPUS) IN WILDFIRE URBAN INTERFACE ZONE
- ZONING DESIGNATION: CF (COMMUNITY FACILITIES)
- GENERAL PLAN DESIGNATION: CF (COMMUNITY FACILITIES)
- OCCUPANCY CLASSIFICATION: B (BUSINESS)
- CONSTRUCTION TYPE: VB
- FULLY SPRINKLERED: YES (REQUIRED PER CITY OF NOVATO FIRE PROTECTION ORDINANCE 2016-1 FOR SUBSTANTIAL REMODEL SECTION 202 AND SECTION 903.2)

**BUILDING HEIGHT, STORIES AND AREA SUMMARY**

ALLOWABLE BUILDING HEIGHT ABOVE GRADE PLANE (PER CBC TABLE 604.3): 60 FEET.  
ACTUAL BUILDING HEIGHT: 37'-1" T.O. PITCHED ROOF

ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE (PER CBC TABLE 604.4): 3  
ACTUAL NUMBER OF STORIES: 2

ALLOWABLE AREA FACTOR (PER CBC TABLE 908.2): 27,000  
ACTUAL BUILDING AREA:

FIRST FLOOR:	3,137 GSF
SECOND FLOOR:	3,036 GSF
TOTAL:	6,173 GSF

**FIRE RESISTIVE RATING REQUIREMENTS (PER CBC TABLE 601, TYPE VB)**

**PRIMARY STRUCTURAL FRAMING** 0

**BEARING WALLS** 0

**EXTERIOR** 0

**INTERIOR** 0

**NON-BEARING WALLS AND PARTITIONS (PER CBC TABLE 602)**

4'-6 FT	1
5'-0 FT x 10 FT	1
10'-0 FT x 30 FT	0
x>=30 FT	0

**NON-BEARING WALLS AND PARTITIONS** 0

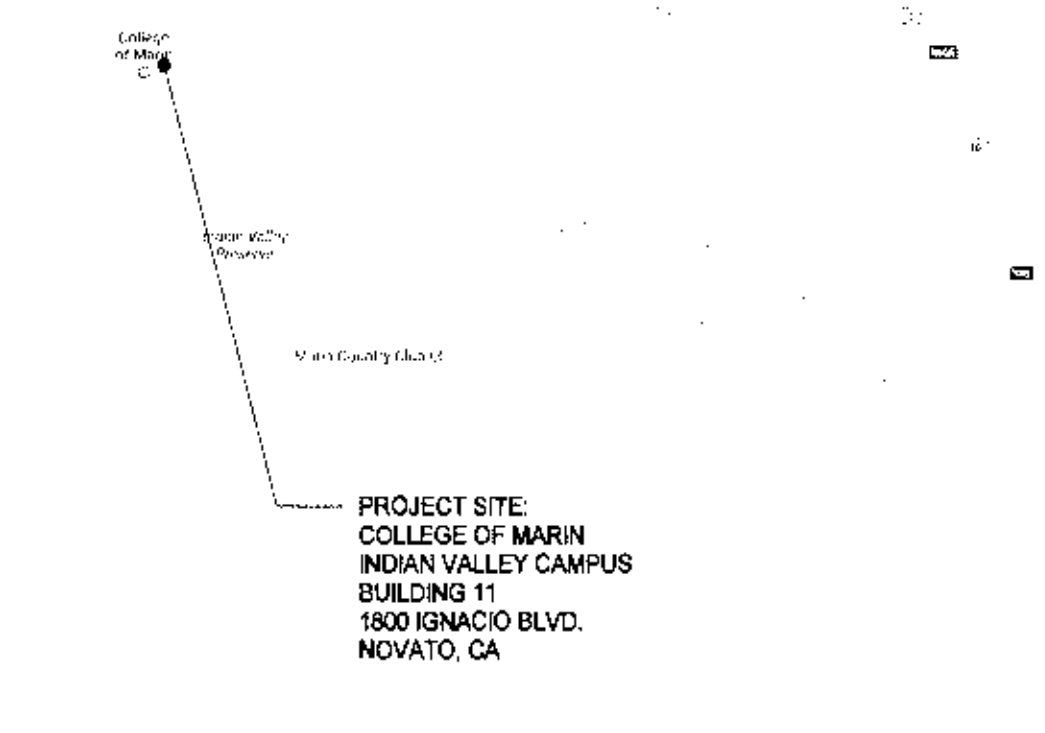
**INTERIOR** 0

**FLOOR CONSTRUCTION AND SECONDARY MEMBERS** 0

**ROOF CONSTRUCTION AND SECONDARY MEMBERS** 0

**SHAFT ENCLOSURE (PER CBC SEC. 713)** 1

**PROJECT INFORMATION**



**VICINITY MAP**

<b>GENERAL</b>	G0.0	TITLE SHEET	M101	MECHANICAL DEMO FIRST FLOOR PLANS
	G0.1	PROJECT INFORMATION, GENERAL NOTES	M102	MECHANICAL DEMO SECOND FLOOR PLAN
	G0.2	SYMBOLS, LEGEND, PLUMBING CALCS	M201	MECHANICAL DEMO ROOF PLAN
	G1.0	EGRESS ANALYSIS PLAN - FIRST FLOOR	M202	MECHANICAL FIRE FLOOR PLAN HVAC
	G1.1	EGRESS ANALYSIS PLAN - SECOND FLOOR	M203	MECHANICAL SECOND FLOOR PLAN HVAC
	G2.0	ACCESSIBLE PATH OF TRAVEL PLAN	M501	MECHANICAL ROOF PLAN
	G3.0	ACCESSIBILITY DETAILS	M502	MECHANICAL DETAILS
	G3.1	ACCESSIBILITY DETAILS	M601	MECHANICAL FLOW DIAGRAMS
	G3.2	ACCESSIBILITY DETAILS	M701	MECHANICAL CONTROL DIAGRAMS
	G4.0	CAL-GREEN CHECKLIST		
	G4.1	CAL-GREEN CHECKLIST		
	G5.0	TITLE 24 COMPLIANCE FORMS - ENVELOPE	ELECTRICAL	
	G6.1	TITLE 24 COMPLIANCE FORMS - FENESTRATION	E001	ELECTRICAL SYMBOLS, LEGENDS AND ABBREVIATION
			E002	ELECTRICAL LUMINAIRE SCHEDULE
			E003	ELECTRICAL M&E COORDINATION SCHEDULE
			E010	ELECTRICAL SITE PLAN
			E201	ELECTRICAL FIRST FLOOR PLAN LIGHTING
			E202	ELECTRICAL SECOND FLOOR PLAN LIGHTING
			E203	ELECTRICAL SECOND FLOOR TOP OF BEAM PLAN LIGHTING
<b>ARCHITECTURE</b>	A1.0	CAMPUS ACCESSIBILITY PLAN	E301	ELECTRICAL FIRST FLOOR POWER PLAN
	A1.1	PROPOSED SITE PLAN	E302	ELECTRICAL SECOND FLOOR POWER PLAN
	A1.2	DEMOLITION FLOOR PLANS	E301	ELECTRICAL DETAILS
	A1.3	DEMOLITION ROOF PLAN	E302	ELECTRICAL DETAILS
	A2.1	FIRST FLOOR PLAN	E303	ELECTRICAL DETAILS
	A2.2	SECOND FLOOR PLAN	E701	ELECTRICAL SINGLE LINE DIAGRAMS
	A2.3	ROOF PLAN	E901	ELECTRICAL PANEL SCHEDULE
	A2.4	FINISH & SIGNAGE PLANS	E902	ELECTRICAL PANEL SCHEDULES
	A3.1	BUILDING ELEVATIONS - SOUTH	E901	ELECTRICAL TITLE 24 COMPLIANCE FORMS
	A3.2	BUILDING ELEVATIONS - EAST	E902	ELECTRICAL TITLE 24 COMPLIANCE FORMS
	A3.3	BUILDING ELEVATIONS - NORTH	E903	ELECTRICAL TITLE 24 COMPLIANCE FORMS
	A3.4	BUILDING ELEVATIONS - WEST	E904	ELECTRICAL TITLE 24 COMPLIANCE FORMS
	A3.11	BUILDING SECTIONS	E905	ELECTRICAL TITLE 24 COMPLIANCE FORMS
	A3.12	BUILDING SECTIONS		
	A5.1	INTERIOR ELEVATIONS	PLUMBING	
	A5.2	INTERIOR ELEVATIONS	P001	PLUMBING SYMBOLS, LEGENDS AND ABBREVIATIONS
	A6.1	REFLECTED CEILING PLAN - FIRST FLOOR	P002	PLUMBING EQUIPMENT SCHEDULE
	A6.2	REFLECTED CEILING PLAN - SECOND FLOOR CEILING LEVEL	P003	PLUMBING TITLE 24 DOCUMENTATION
	A6.3	REFLECTED CEILING PLAN - SECOND FLOOR BEAM LEVEL	P100	PLUMBING DEMO UNDERGROUND PLAN
	A7.1	DOOR, WINDOW AND STOREFRONT SCHEDULE	P101	PLUMBING DEMO FIRST FLOOR PLAN
	A8.1	EXTERIOR DETAILS	P102	PLUMBING DEMO SECOND FLOOR PLAN
	A8.2	EXTERIOR DETAILS - MECH. ENCLOSURE	P200	PLUMBING UNDERGROUND PLAN
	A8.3	TRELIS DETAILS	P201	PLUMBING FIRST FLOOR PLAN
	A9.0	INTERIOR DETAILS	P202	PLUMBING SECOND FLOOR PLAN
	A9.1	INTERIOR DETAILS	P501	PLUMBING DETAILS
	A9.2	INTERIOR DETAILS		
	A9.3	INTERIOR DETAILS - CEILING	TELECOM	
	A9.4	INTERIOR DETAILS - CEILING	T0.00	TEL-COM PLAN COVER PAGE
	A9.5	INTERIOR DETAILS - CEILING	T3.01	TEL-COM FIRST FLOOR PLAN
	A9.6	INTERIOR DETAILS - CEILING	T3.02	TEL-COM SECOND FLOOR PLAN
	A9.6	INTERIOR DETAILS - CEILING	T4.00	TEL-COM ANV FUNCTIONAL DIAGRAMS & DETAILS
	A9.7	INTERIOR DETAILS		
	A9.8	INTERIOR DETAILS - ACOUSTIC		
	A			



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## GRAPHIC SYMBOLS

- GRAPHIC SYMBOLS REPRESENT OBJECTS, ELEMENTS, EQUIPMENT, INSTRUCTIONS, LOCATION, CONVENTIONS, ETC. THEY DO NOT REPRESENT THE SHAPE, SIZE, DIMENSION OF THE ACTUAL OBJECT.
- EACH DRAWING GROUP (I.E. MECHANICAL, ELECTRICAL) HAS ITS OWN SYMBOLS, ABBREVIATIONS, LEGEND AND NOTES. THE INFORMATION AND SYMBOLS ON THIS DRAWING ARE GENERAL AND APPLY TO ALL DRAWINGS.

### GENERAL SYMBOLS

	DOOR SYMBOL (LETTER DESIGNATES NUMBER OF DOOR IN ROOM) SEE A7.0-7.3 & FOR DOOR SCHEDULE
	WINDOW TYPE SEE A7.5 FOR WINDOW SCHEDULE
	STOREFRONT SEE A7.6 FOR STOREFRONT SCHEDULE
	EQUIPMENT SYMBOL
	REVISION - USED ON ADDENDUM ONLY
	MATCH LINE SHADED PORTION IS THE SIDE CONSIDERED.
	WORK POINT, CONTROL POINT OR DATUM POINT
	SECTIONS SECTION IDENTIFICATION SHEET WHERE SECTION IS DRAWN
	ELEVATIONS (UNFOLD ELEVATIONS CLOCKWISE.) DETAIL NUMBER INDICATES ELEVATION DRAWN SHEET WHERE ELEVATION IS DRAWN.
	DETAILS DETAIL NUMBER SHEET WHERE DETAIL IS DRAWN
	OFFICE ROOM NAME ROOM NUMBER
	EQUIPMENT TAG
	DIMENSION LINES
	ALIGN FIN. FACE TO FIN. FACE
	LIMIT OF WORK
	PARTITIONS PARTITION TAG SEE A9.1 - A9.2
	NEW PARTITIONS
	NEW DOORS FLOOR FINISH TRANSITION WHERE INDICATED AT CENTER LINE OF DOOR, TYPICAL.
	NEW WINDOW REFER TO SCHEDULE IN SPECIFICATIONS SECTION 08005.
	CHASE WALL PIPE OR PLUMBING

### EQUIPMENT

	ROBE HOOK
	CLOCK
	FIRE EXTINGUISHER CABINET
	HANDRAIL / WALL PROTECTION
	VISUAL DISPLAY BOARDS
	CORNER GUARD
	EDGE GUARD

### PLUMBING

	WALL MOUNTED TOILET
	FLOOR MOUNTED TOILET
	FLOOR CLEAN OUT (FCO) SEE PLUMBING PLANS FOR LOCATIONS (N) INDICATES NEW FCO (E) INDICATES EXISTING FCO
	FLOOR SINK PROVIDE COVER WHERE EXPOSED TO FOOT TRAFFIC
	FLOOR DRAIN

### MECHANICAL

	SUPPLY DIFFUSER
	RETURN AIR GRILLE
	EXHAUST GRILLE

### ELECTRICAL

	2 X 4' LIGHT FIXTURE
	2 X 2' LIGHT FIXTURE
	RECESSED DOWNLIGHT
	STRIP LIGHTING FIXTURE
	SURFACE MOUNTED DOWNLIGHT
	RECESSED WALL WASHER
	ROUND PENDANT
	WALL MOUNTED LIGHT
	TRACK LIGHT
	EXIT SIGN
	SMOKE DETECTOR
	TELEVISION AND BRACKET
	SPEAKER

### CASEWORK

	WALL HUNG CABINETS OR SHELVES
	BASE CABINET COUNTER TOP
	OWNER FURNISHED ITEMS (NOT IN CONTRACT)
	CASEWORK TAG

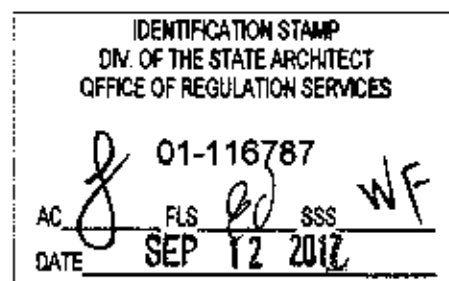
### MINIMUM PLUMBING FIXTURE CALCULATION

AREA 1 - OFFICE		
OCCUPANCY:	B (OFFICE OR PUBLIC)	NOTES:
BUILDING OCCUPANT LOAD RATIO PER TABLE A CBC:	1/200	M/WC PER PERSON: 1: 1-50, 2: 51-100, 3: 101-200, 4: 201-400, 1/500 FOR REMAINDER OVER 400
FLOOR AREA:	2821 SF	M/LR PER PERSON: 1: 1-100, 2: 101-200, 3: 201-400, 4: 401-800, 1/500 FOR REMAINDER OVER 800
CALCULATED OCCUPANT LOAD:	14	F/WC PER PERSON: 1: 1-15, 2: 16-30, 3: 31-50, 5: 101-200, 8: 201-400, 1/150 FOR REMAINDER OVER 400
MALE (50%):	7	M/LAV PER PERSON: 1: 1-75, 2: 76-150, 3: 151-200, 4: 201-300, 5: 301-400, 1/250 FOR REMAINDER OVER 400
FEMALE (50%):	7	F/LAV PER PERSON: 1: 1-50, 2: 51-100, 3: 101-150, 4: 151-200, 5: 201-300, 6: 301-400, 1/200 FOR REMAINDER OVER 400
		DRINKING FOUNTAIN IS NOT REQUIRED FOR OL NOT MORE THAN 20 (CPC 415.2)
		PER CPC 422.2 EXCEPTION 2, IF TOTAL OCCUPANT LOAD DOES NOT EXCEED 80, UNISEX FACILITIES OK
AREA 2 - STORAGE		
OCCUPANCY:	S (STORAGE)	NOTES:
BUILDING OCCUPANT LOAD RATIO PER TABLE A CBC:	1/500	M/WC PER PERSON: 1: 1-100, 2: 101-200, 3: 201-400, 1/500 FOR REMAINDER OVER 400
FLOOR AREA:	813 SF	F/WC PER PERSON: 1: 1-100, 2: 101-200, 3: 201-400, 1/150 FOR REMAINDER OVER 400
CALCULATED OCCUPANT LOAD:	1	M/LAV PER PERSON: 1: 1-200, 2: 201-400, 3: 401-750, 1/500 FOR REMAINDER OVER 750
MALE (50%):	1	F/LAV PER PERSON: 1: 1-50, 2: 51-100, 3: 101-150, 4: 151-200, 5: 201-300, 6: 301-400, 1/200 FOR REMAINDER OVER 400
FEMALE (50%):	1	DRINKING FOUNTAIN IS NOT REQUIRED FOR OL NOT MORE THAN 20 (CPC 415.2)
		PER CPC 422.2 EXCEPTION 2, IF TOTAL OCCUPANT LOAD DOES NOT EXCEED 10, UNISEX FACILITIES OK
TOTAL (WHEN ALL OCCUPANTS HAVE UNRESTRICTED ACCESS TO ALL AREAS OF BUILDING)		4 UNISEX RESTROOMS PROVIDED
MALE	8	1 HIGH/LOW DRINKING FOUNTAIN PROVIDED
FEMALE	8	

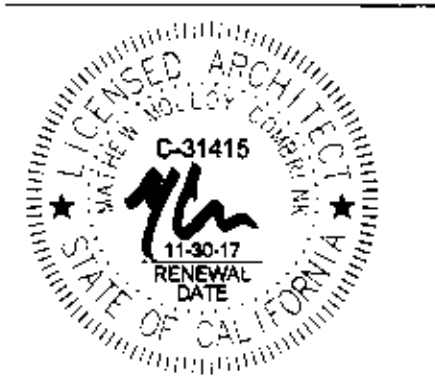
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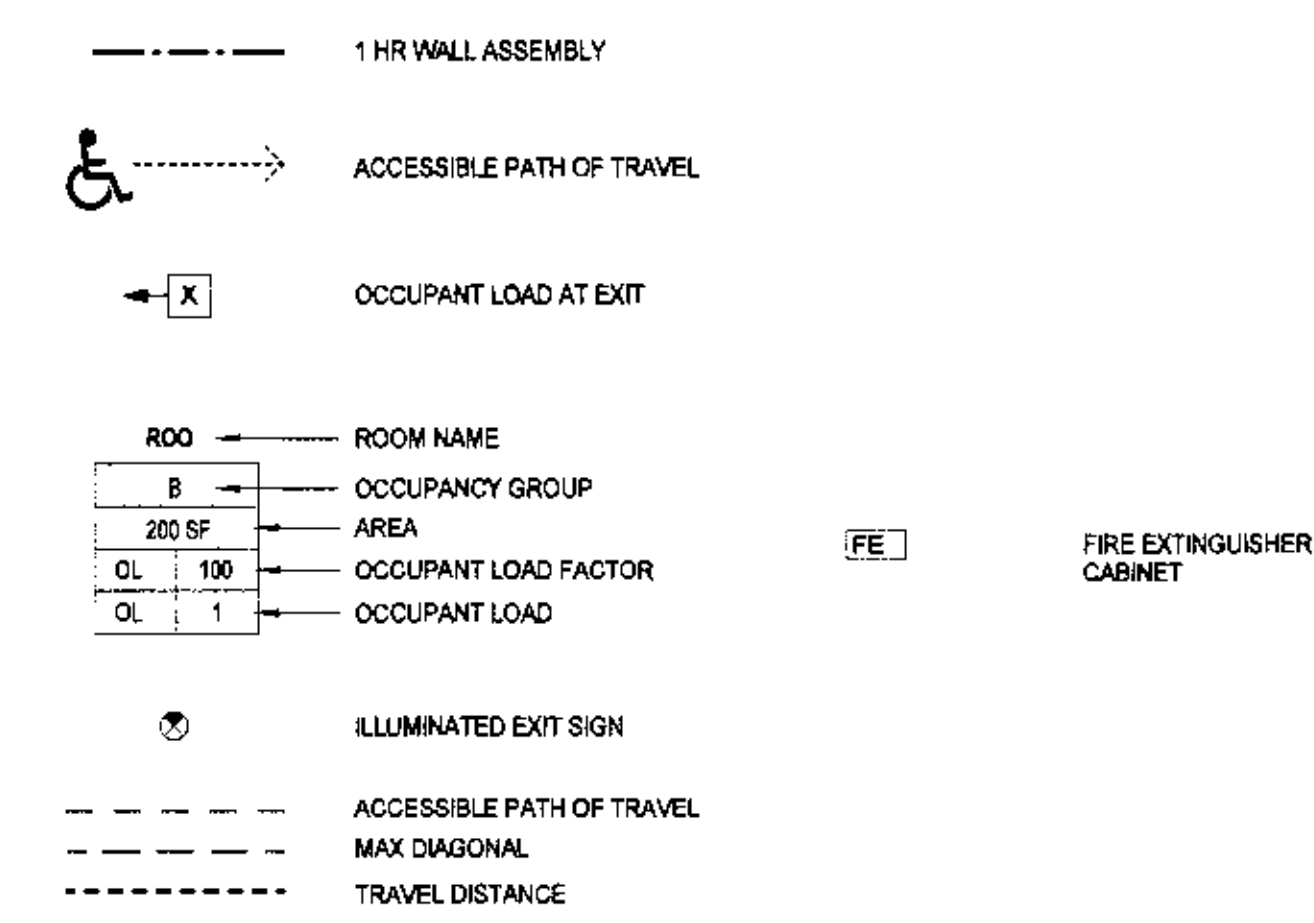
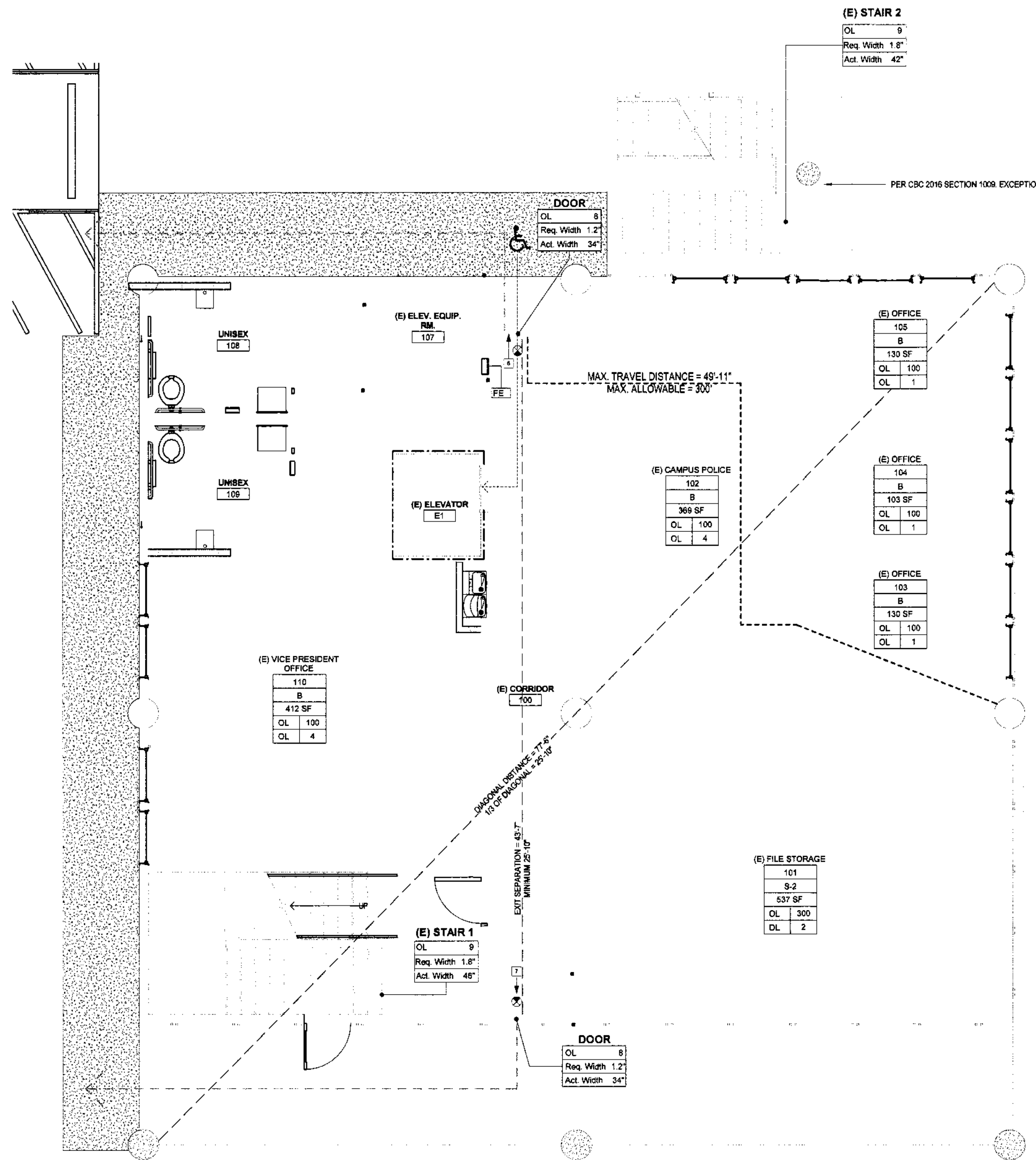
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renovation

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project number: 16-148.01

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**CONSTRUCTION DOCUMENTS**  
SYMBOLS, LEGEND,  
PLUMBING  
CALCS

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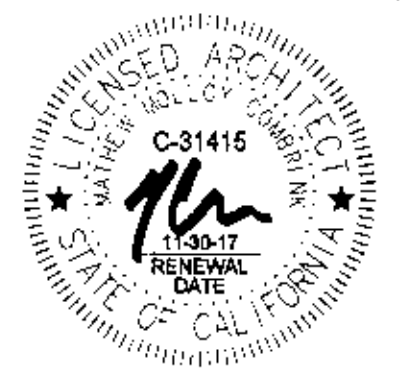
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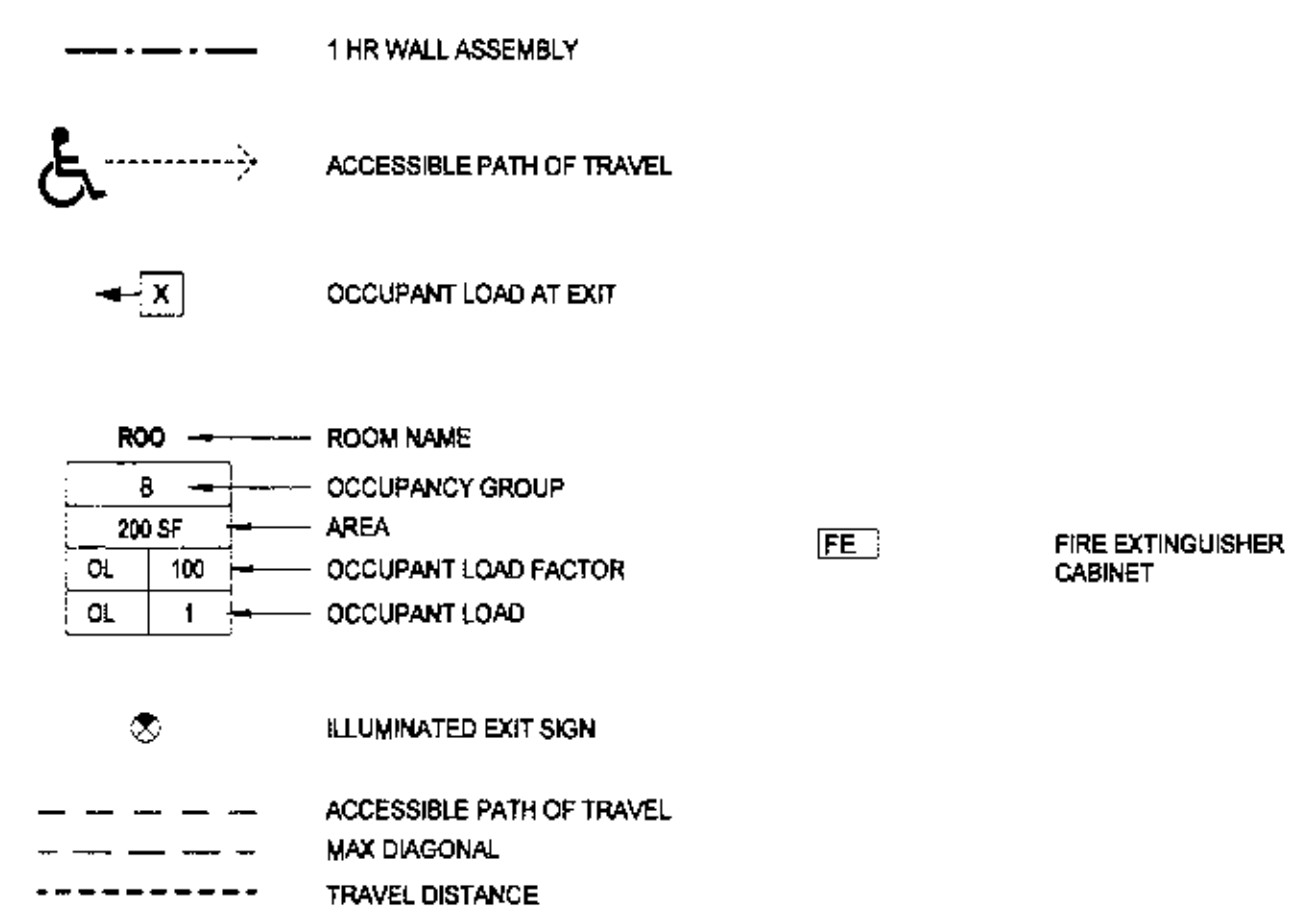
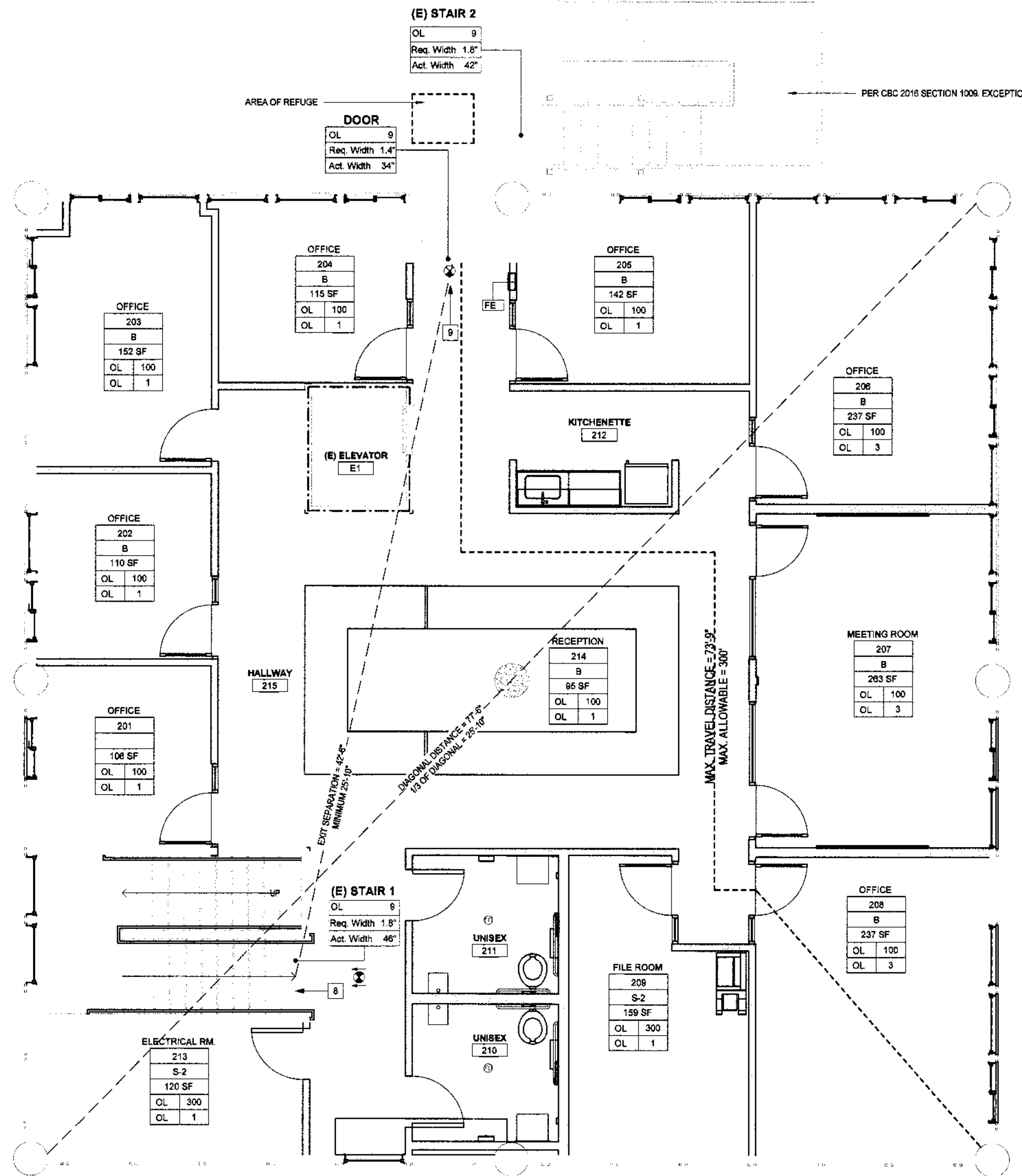
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project number: 16-148-01

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CONSTRUCTION  
DOCUMENTS

EGRESS  
ANALYSIS PLAN -  
FIRST FLOOR

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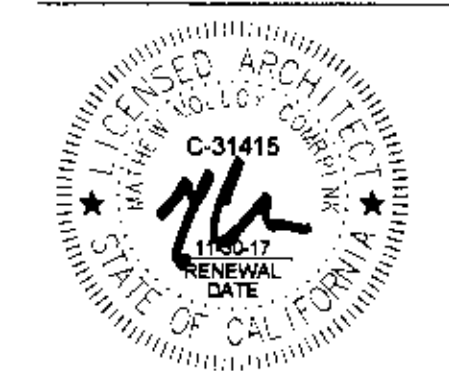
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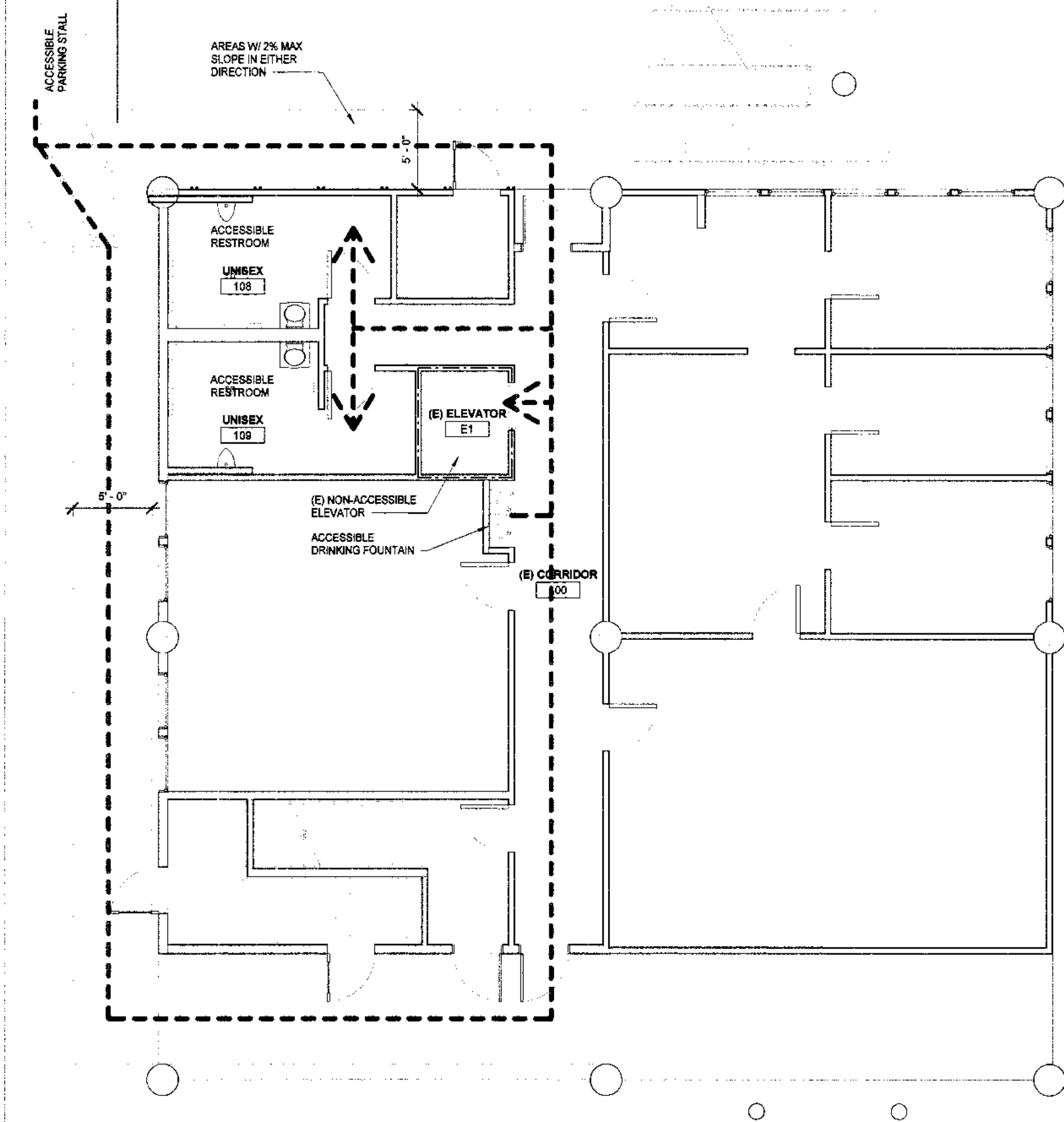
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CONSTRUCTION DOCUMENTS  
 EGRESS ANALYSIS PLAN - SECOND FLOOR

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1 ACCESSIBLE PATH OF TRAVEL PLAN - FIRST FLOOR

3/16" = 1'-0"

2 ACCESSIBLE PATH OF TRAVEL PLAN - LEVEL 2

3/16" = 1'-0"

PER DSA PROCEDURE 15-01  
 DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE STATEMENT:  
 THE PATH OF TRAVEL (POT) IDENTIFIED IN THESE CONSTRUCTION DOCUMENTS MEETS THE REQUIREMENTS OF THE CURRENT APPLICABLE CALIFORNIA BUILDING CODE (CBC) ACCESSIBILITY PROVISIONS FOR PATH OF TRAVEL REQUIREMENTS FOR ALTERATIONS, ADDITIONS, AND STRUCTURAL REPAIRS AS PART OF THE DESIGN OF THIS PROJECT. THE POT WAS EXAMINED AND ANY ELEMENTS, COMPONENTS, OR PORTIONS OF THE POT THAT WERE DETERMINED TO BE NONCOMPLIANT WITH THE CBC HAVE BEEN IDENTIFIED AND THE CORRECTIVE WORK NECESSARY TO BRING THEM INTO COMPLIANCE HAS BEEN INCLUDED WITHIN THE SCOPE OF THIS PROJECT'S WORK THROUGH DETAILS, DRAWINGS AND SPECIFICATIONS INCORPORATED INTO THESE CONSTRUCTION DOCUMENTS. ANY NONCOMPLIANT ELEMENTS, COMPONENTS, OR PORTIONS OF THE POT THAT WILL NOT BE CORRECTED BY THIS PROJECT BASED ON VALUATION THRESHOLD LIMITATIONS OR A FINDING OF UNREASONABLE HARDSHIP ARE INDICATED IN THESE CONSTRUCTION DOCUMENTS.

DURING CONSTRUCTION, IF POT ITEMS WITHIN THE SCOPE OF THE PROJECT REPRESENTED AS CBC COMPLIANT ARE FOUND TO BE NONCONFORMING BEYOND REASONABLE CONSTRUCTION TOLERANCES, THE ITEMS SHALL BE BROUGHT INTO COMPLIANCE WITH THE CBC AS A PART OF THIS PROJECT BY MEANS OF A CONSTRUCTION CHANGE DOCUMENT.

ACCESSIBLE PATH OF TRAVEL

DSA PR 15-01

1/4" = 1'-0"

ACCESSIBILITY LEGEND

1/4" = 1'-0"

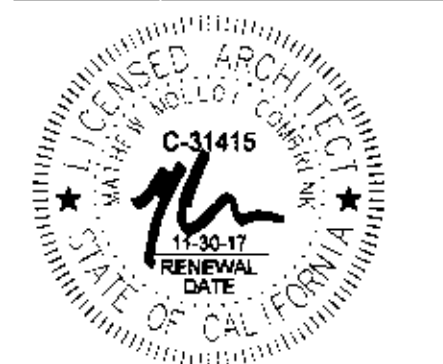
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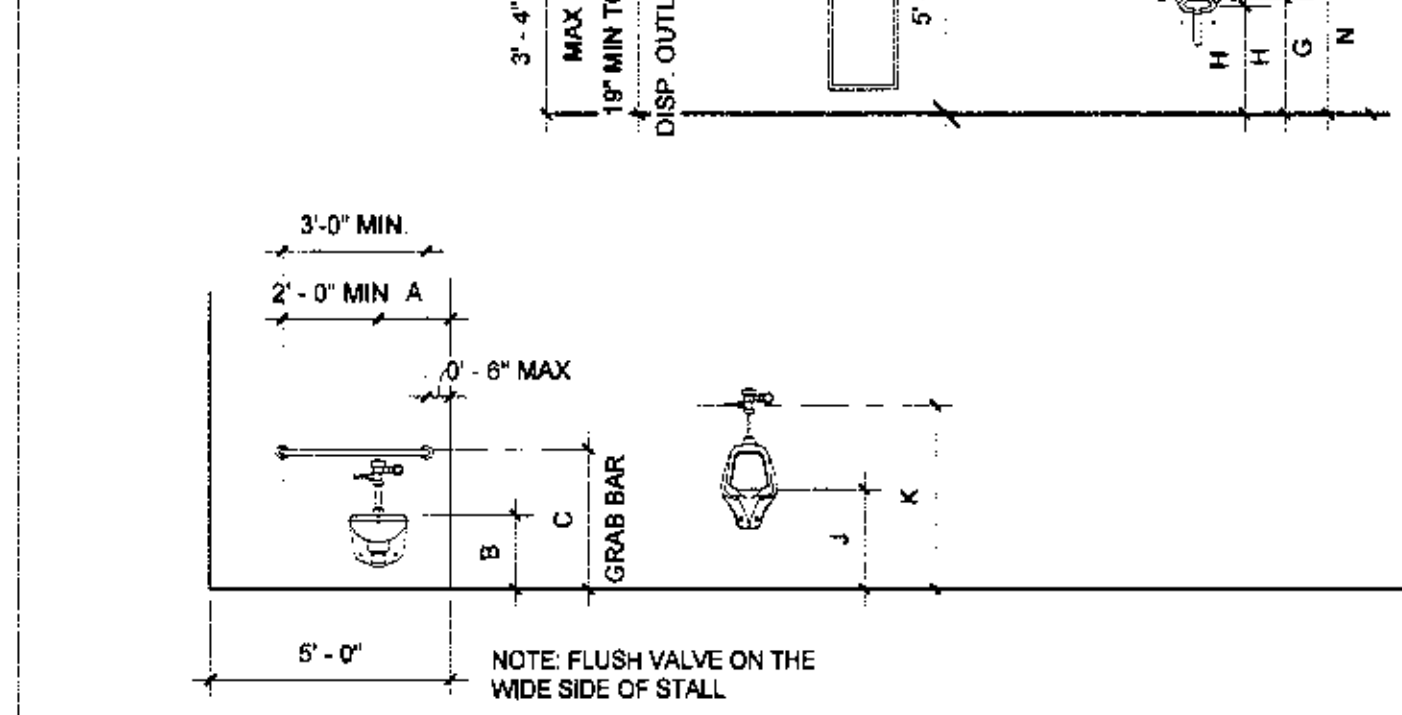
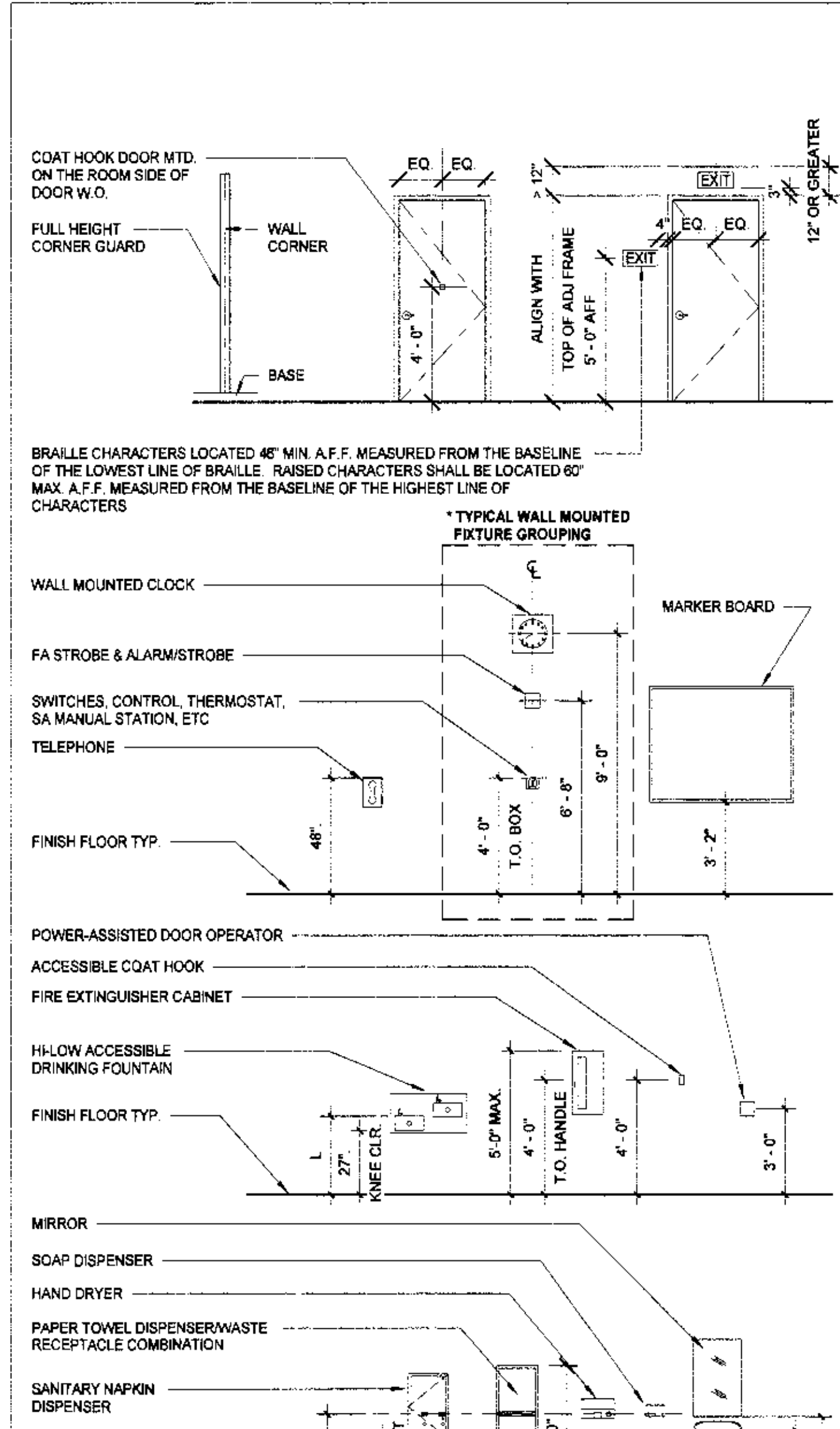
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CONSTRUCTION  
 DOCUMENTS  
 ACCESSIBLE  
 PATH OF TRAVEL  
 PLAN

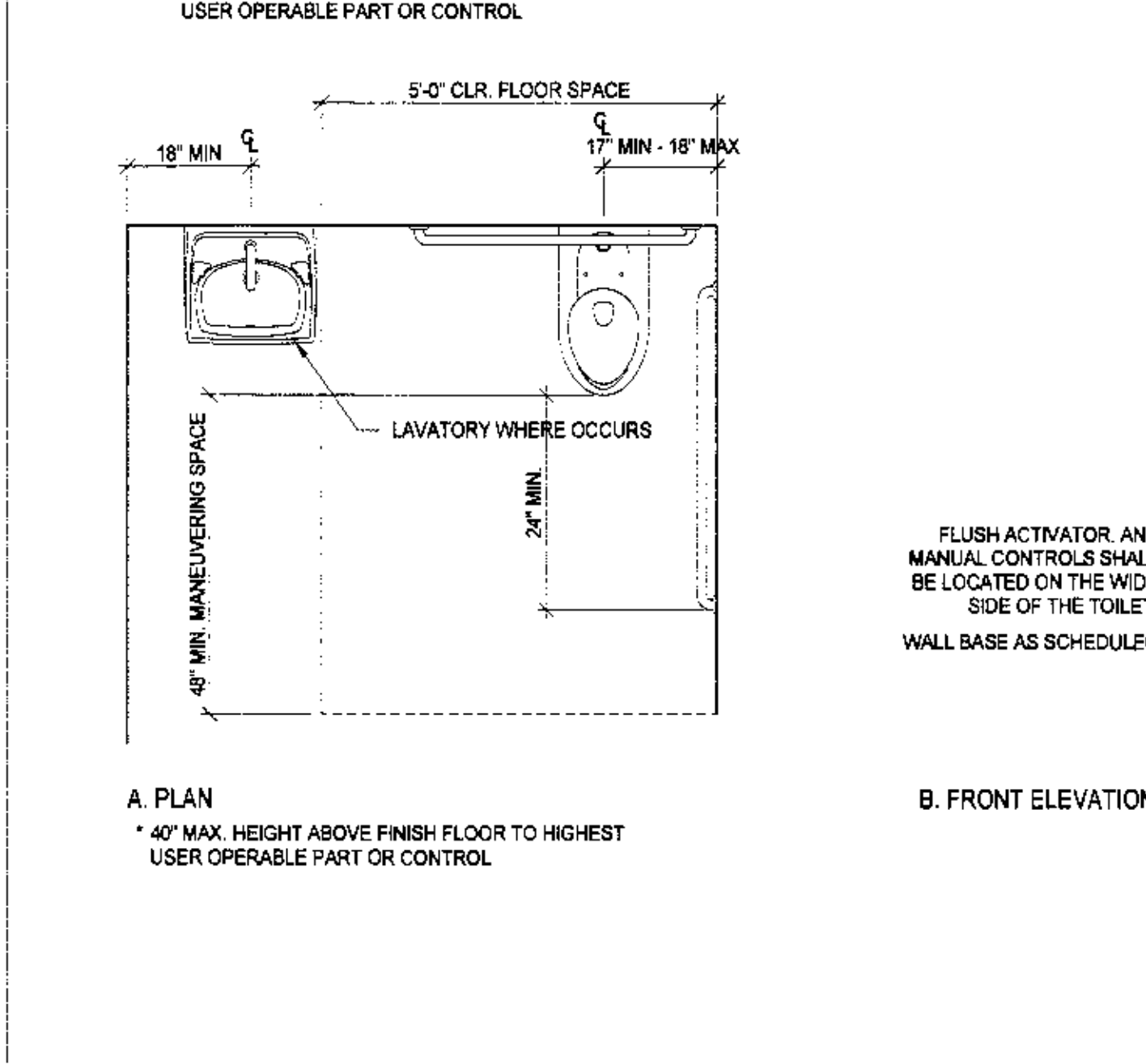
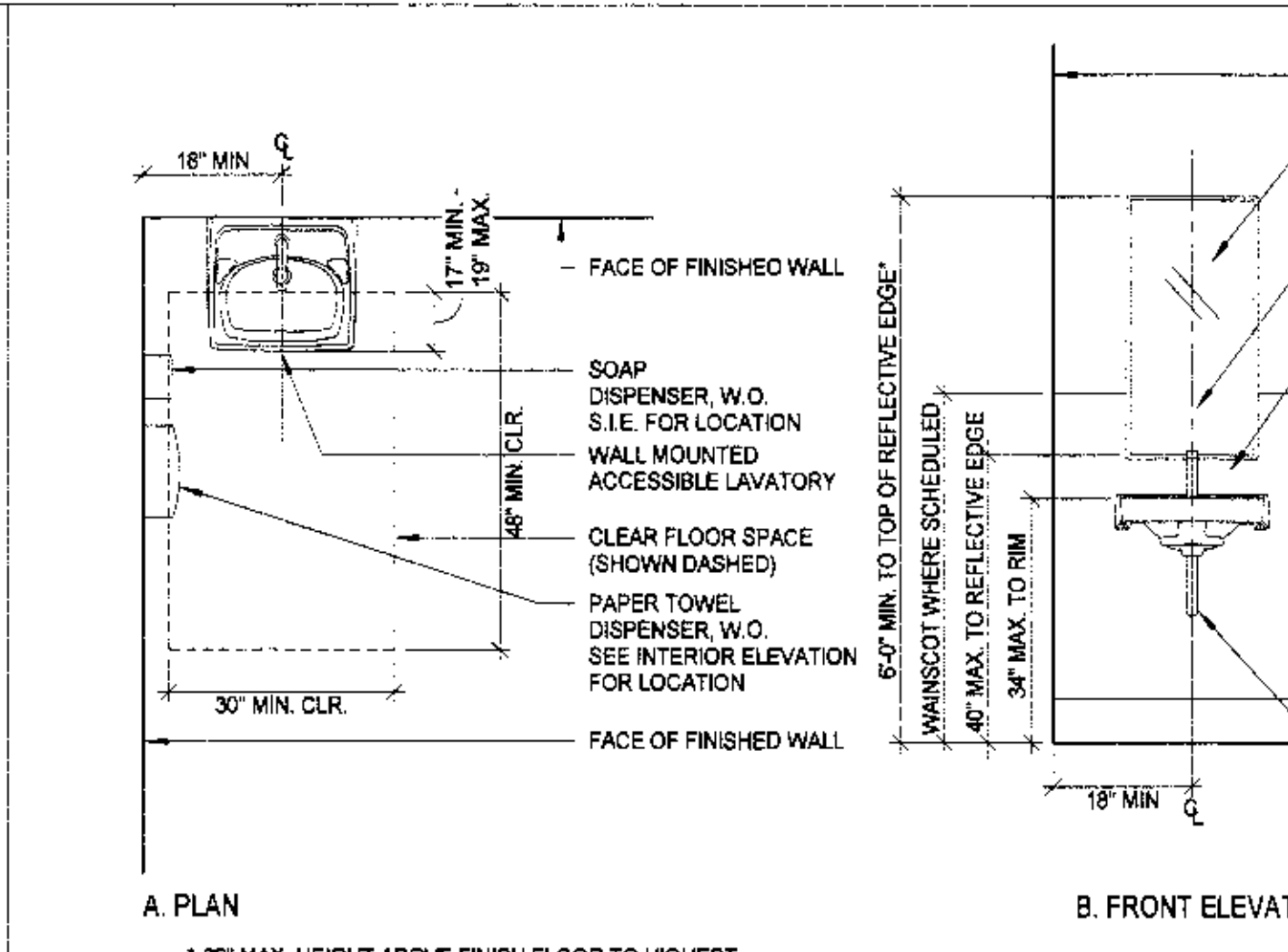
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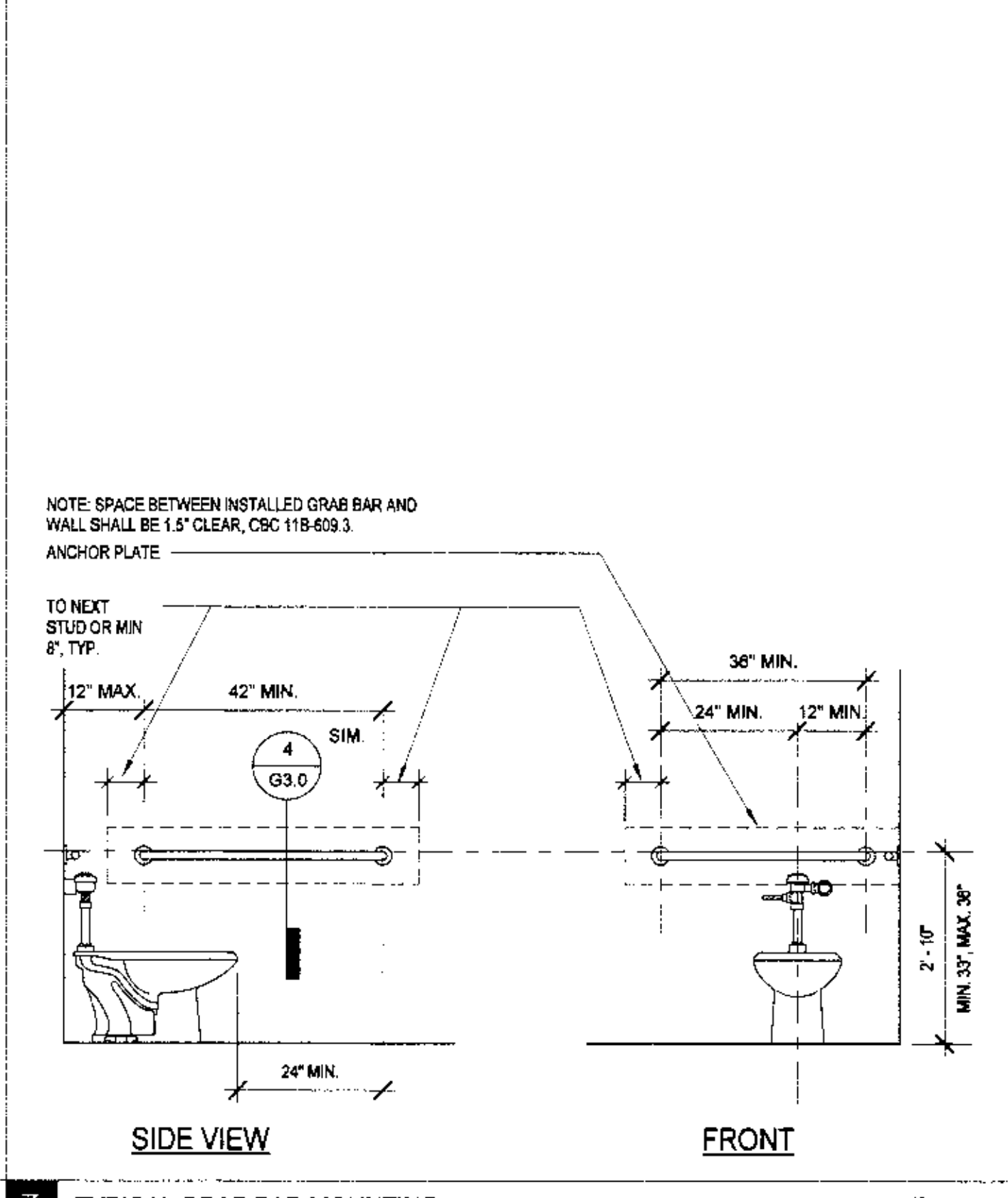


DIMENSIONS FOR ACCESSIBILITY	
DESCRIPTIONS	DIMENSIONS
A TOILET CENTER LINE FROM WALL	17" MIN. 18" MAX.
B TOILET SEAT HEIGHT	17"-19"
C GRAB BAR HEIGHT	33"-36"
D TOILET PAPER IN FRONT OF TOILET	7"-9"
E NAPKIN DISPOSAL IN FRONT OF TOILET	12"
F DISPENSER HEIGHT	40" MAX. A.F.F. TO OPERABLE PART
G LAVATORY AND SINK TOP HEIGHT	34" MAX. A.F.F.
H LAVATORY AND SINK KNEE CLEARANCE	29" MAX. AT APRON; 27" MAX. AT BOWL
J URINAL LIP HEIGHT	17" MAX.
K URINAL FLUSH HANDLE HEIGHT	44" MAX.
L DRINKING FOUNTAIN BUBBLER HEIGHT	36" MAX.
M DRINKING FOUNTAIN KNEE CLEARANCE	27" MAX.
N BOTTOM OF REFLECTIVE SURFACE (MIRROR)	40" MAX.

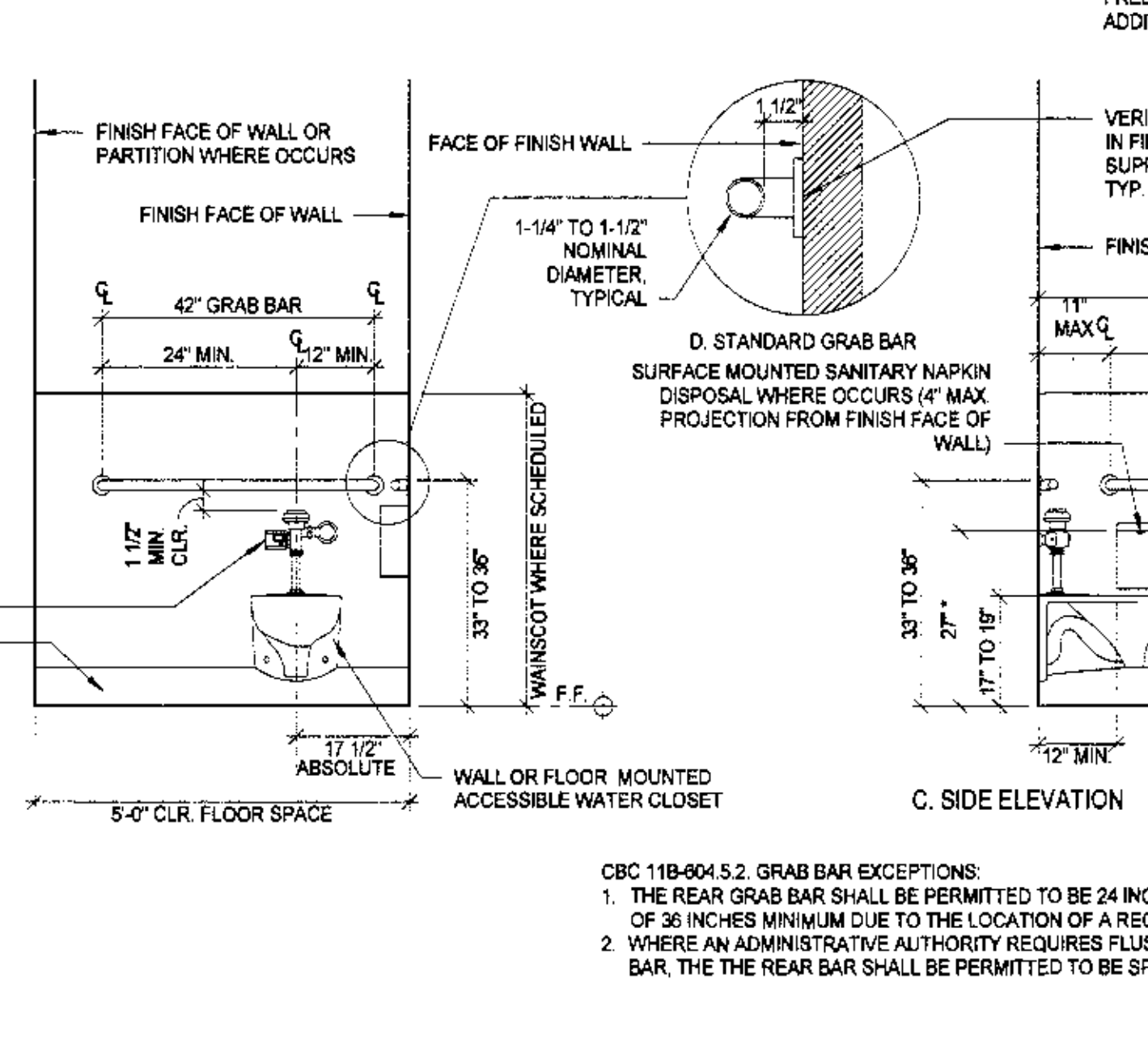
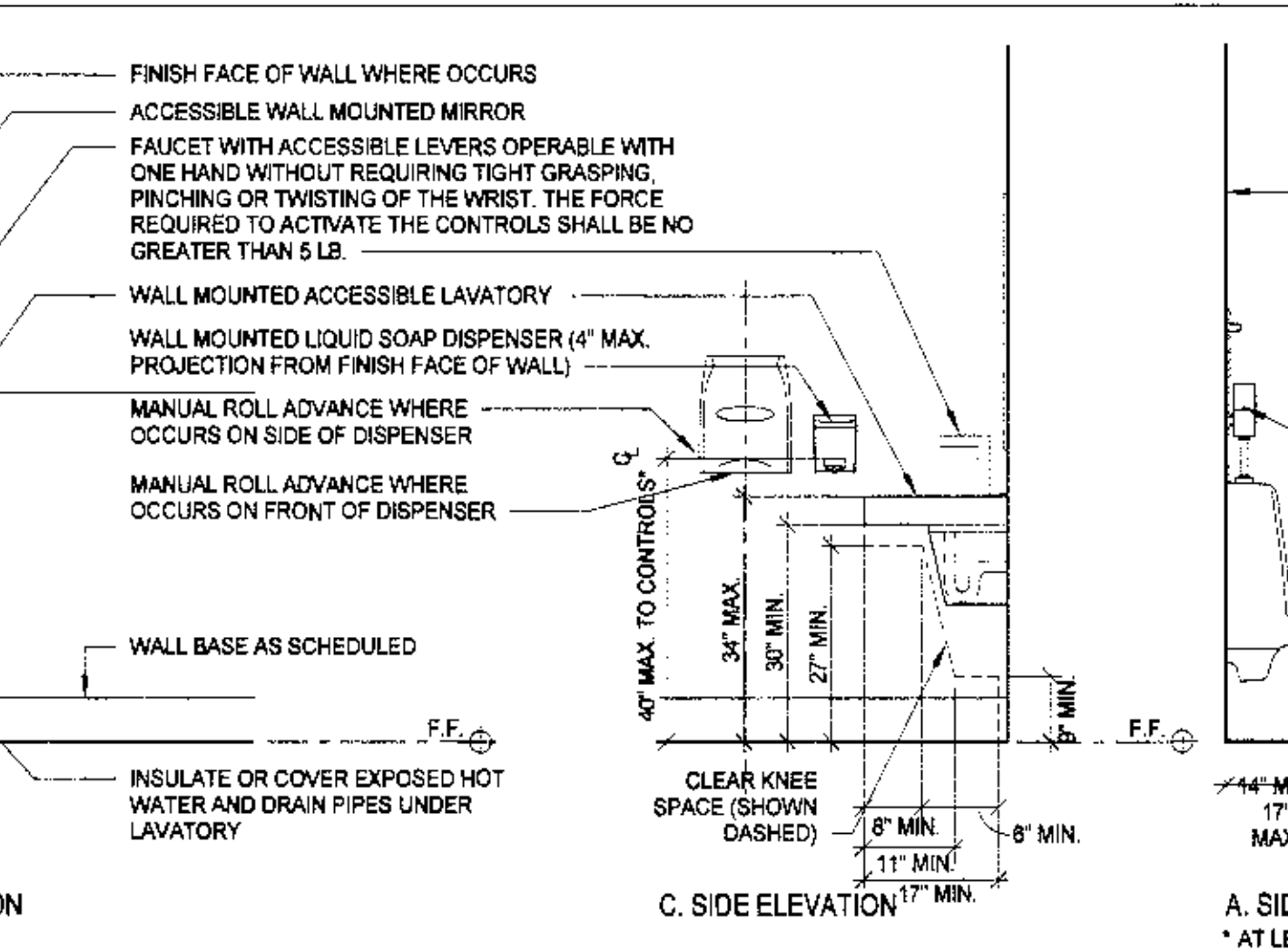
9 TYPICAL ACCESSIBLE MOUNTING HEIGHT 1/4" = 1'-0"



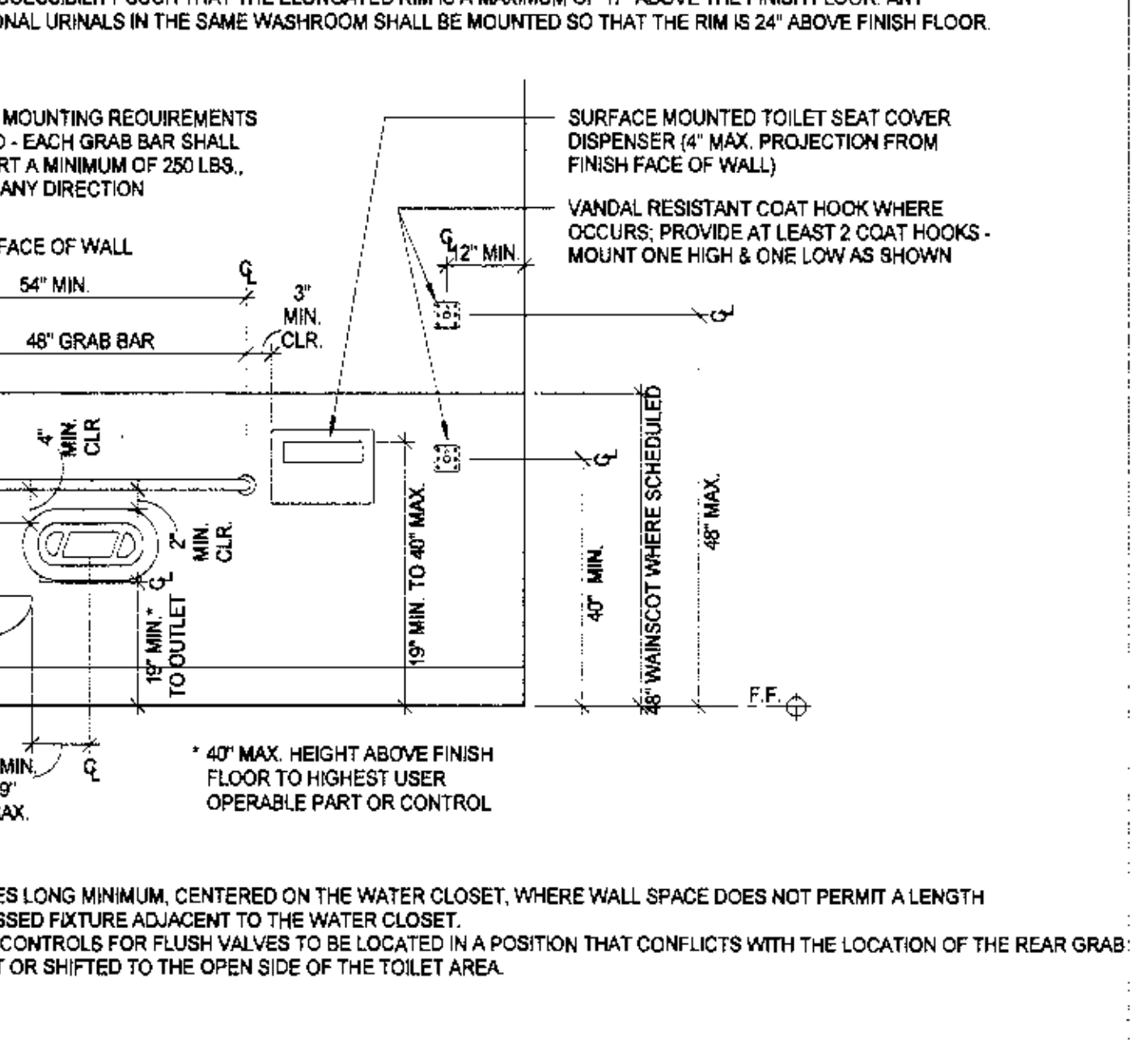
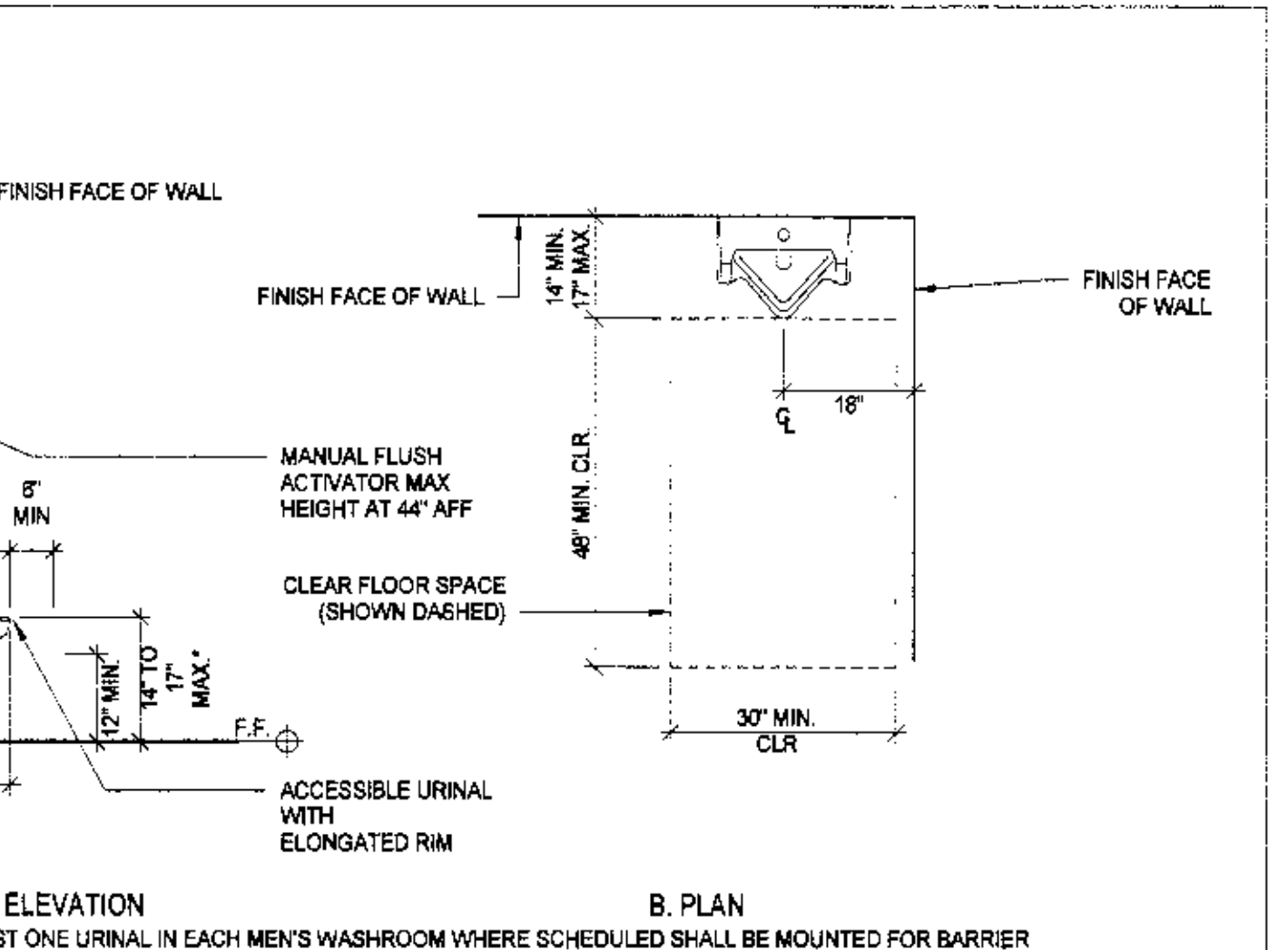
8 STANDARD ACCESSIBLE LAVATORY/TOILET/URINAL 1/2" = 1'-0"



7 TYPICAL GRAB BAR MOUNTING 1/2" = 1'-0"



4 GRAB BAR ANCHORAGE 1/2" = 1'-0"



3" = 1'-0" 1 GENERAL TOILET ROOM ACCESSIBILITY NOTES 1/2" = 1'-0"

- NOTE: SPACE BETWEEN INSTALLED GRAB BAR AND WALL SHALL BE 1.5" CLEAR, CBC 119-609.3.
- THE MINIMUM, MAXIMUM, AND ABSOLUTE DIMENSIONS SHOWN IN THESE STANDARD DETAILS VARY FROM THOSE IN TITLE 24 ADMINISTRATIVE CODE AND/OR AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG). DIMENSIONS THAT ARE NOT STATED AS "MAXIMUM" OR "MIN" OR "MINIMUM" OR "MIN" ARE ABSOLUTE (11018.4). ALL DIMENSIONS ARE SUBJECT TO CONVENTIONAL INDUSTRY TOLERANCES EXCEPT WHERE THE REQUIREMENT IS STATED AS A RANGE WITH SPECIFIC MINIMUM AND MAXIMUM END POINTS.
  - TOILET ROOMS ARE TO CONTAIN A 60" DIAMETER TURNING SPACE OF EQUIVALENT T-SHAPED SPACE COMPLYING WITH TITLE 24 11B-304. THE MANEUVERING SPACES ARE PERMITTED TO UNDERLAP SOME OBJECTS. 11B-104.1 PERMITS 18" TOE AND KNEE SPACE OF A CIRCULAR MANEUVERING SPACE OR, TOE AND KNEE SPACE AT ONLY ONE END OF EITHER THE BASE OR ONE ARE OF T-SHAPED SPACE. A DOOR IS PERMITTED TO OVERLAP A TOILET ROOM'S REQUIRED TURNING SPACE BY 12" MAX.
  - TOILET ROOMS ARE TO CONTAIN A CLEAR 45" PATH TO WHEELCHAIR AND ACCESSIBLE TOILET COMPARTMENTS, EXCEPT FOR INTERVENING DOOR WIDTHS. APPROACH FROM THE FRONT OF AN OUT-SWINGING WHEELCHAIR ACCESSIBLE TOILET COMPARTMENT DOOR SHALL COMPLY WITH TITLE 24 11B-604.2.4.1.
  - TRASH CAN IS NOT PERMITTED TO OCCUPY THE CLEAR FLOOR SPACE OF ANY FIXTURE OR DOOR.
  - DOORS ARE NOT PERMITTED TO ENCRUCH ON THE REQUIRED CLEAR FLOOR SPACE AT ANY ACCESSIBLE FIXTURE EXCEPT: WHERE THE TOILET OR BATHING ROOM IS FOR INDIVIDUAL USE AND A 30" BY 48" CLEAR FLOOR SPACE COMPLYING WITH TITLE 24 11B-306.4 IS PROVIDED WITHIN THE ROOM BEYOND THE ARC OF THE DOOR SWING, DOORS SHALL BE PERMITTED TO SWING INTO THE CLEAR FLOOR SPACE OR CLEARANCE REQUIRED FOR ANY FIXTURE.
  - THE CLEAR FLOOR AREAS OF ANY FIXTURE, ACCESSIBLE ROUTE AND MANEUVERING SPACE ARE PERMITTED TO OVERLAP.
  - AMBULATORY ACCESSIBLE STALL DOOR SHALL OPEN OUTWARD.
  - WHEELCHAIR ACCESSIBLE TOILET COMPARTMENT DOOR SHALL OPEN OUTWARD AND BE PROVIDED WITH 19" BY 51" CLEAR FLOOR AREA IN FRONT OF TOILET. IN FRONT OPENING TOILETS, TOILET STALL DOOR SHALL BE ORIENTED DIAGONALLY OPPOSITE FROM TOILET FIXTURE. TOILET COMPARTMENT DOOR SHALL PROVIDE 32" MINIMUM CLEAR, UNLESS THE DOOR IS APPROACHED PARALLEL TO THE SURFACE FROM LATCH SIDE - THEN DOOR IS REQUIRED TO BE 34" CLEAR WHEN OPENED IN THE 90 DEGREE POSITION.
  - MOUNTING HEIGHT OF FIXTURES SHALL TAKE INTO ACCOUNT FLOOR SLOPE TO DRAIN.
  - FLOOR SLOPE TO DRAIN SHALL NOT EXCEED 1.5% IN ANY DIRECTION.
  - TOILET ROOM THRESHOLD SHALL NOT EXCEED 1/2" HEIGHT AND SHALL BE BEVELED 1:2 AT NOSINGS, ON EACH SIDE, OR BE 1/4" TALL EASED WITH EDGES.
  - NO ACCESSORIES ARE TO BE MOUNTED BEHIND GRAB BARS UNLESS THEY ARE COMPLETELY FLUSH TO ADJACENT SURFACE.
  - ACCESSIBLE ACCESSORIES SHALL BE LOCATED ON AN ACCESSIBLE ROUTE AND WITHIN ACCESSIBLE REACH RANGE PROVIDE CLEAR FLOOR SPACE THAT ALLOWS A FORWARD OR PARALLEL APPROACH BY A PERSON USING A WHEELCHAIR. ALL USER OPERABLE PARTS & CONTROLS SHALL BE LOCATED WITHIN 40" FROM THE FINISH FLOOR. CONTROLS AND OPERATING MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 POUNDS (22.2 N) OF FORCE.
  - DOOR TO SINGLE USER ACCESSIBLE RESTROOM MUST BE PROVIDED WITH AN ACCESSIBLE PRIVACY LOCK.

1 GENERAL TOILET ROOM ACCESSIBILITY NOTES 1/2" = 1'-0"

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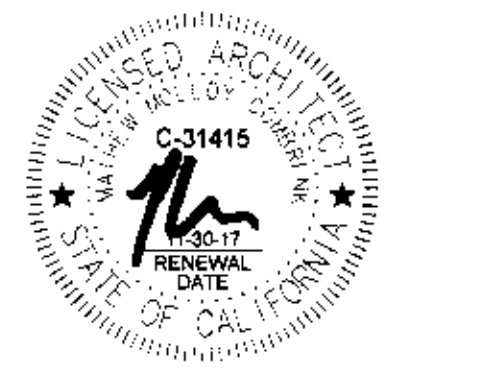
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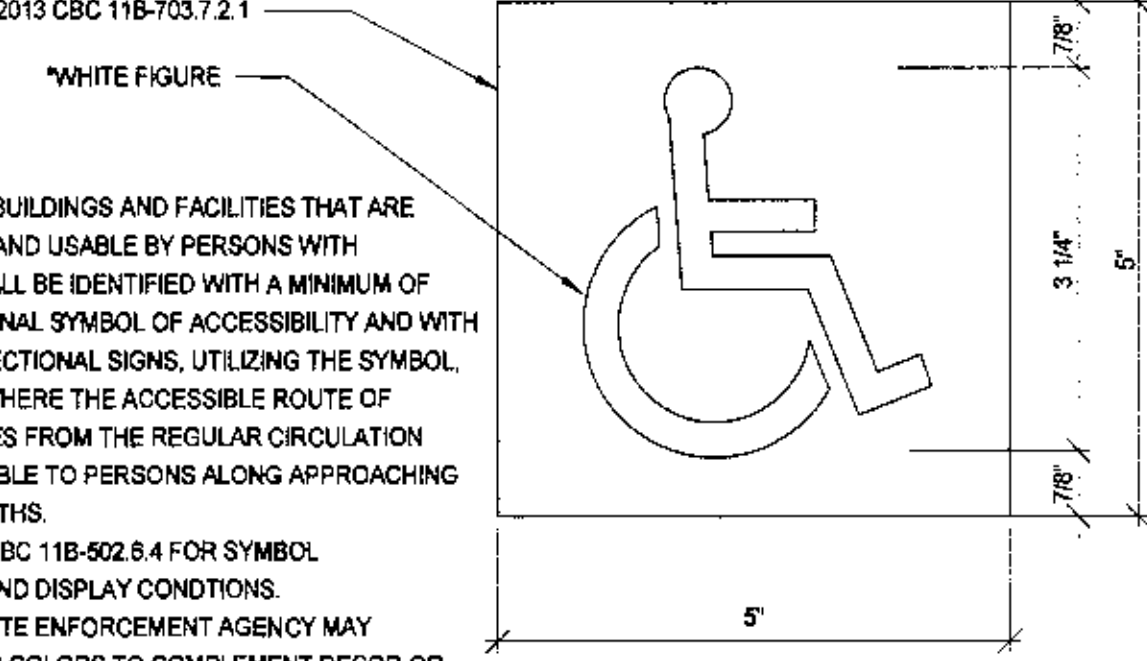
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 ACCESSIBILITY  
 DETAILS

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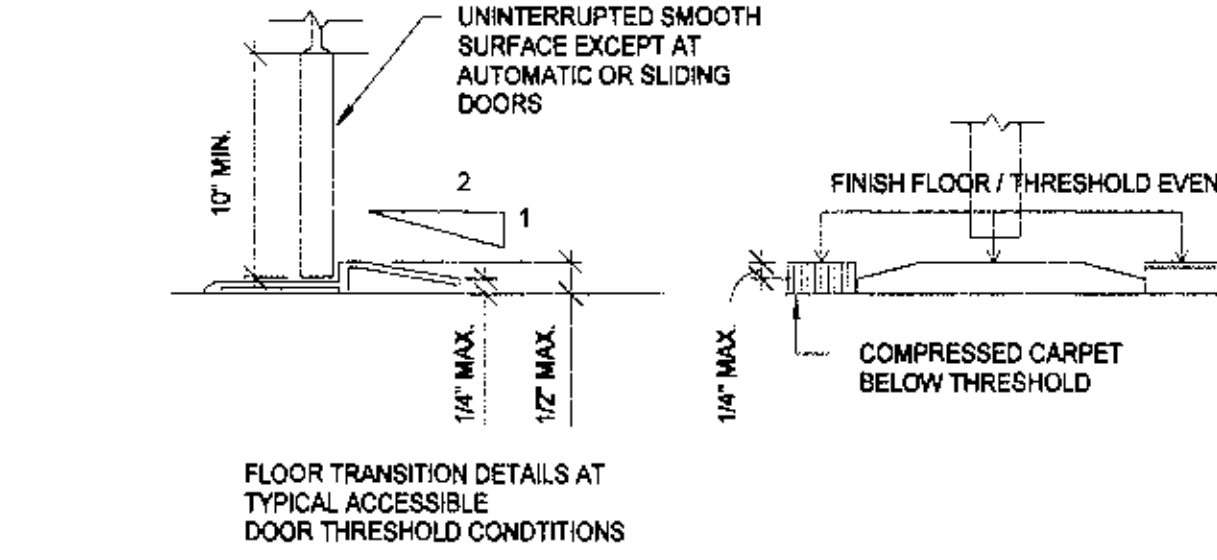
\*BLUE BACKGROUND, BLUE SHALL BE COLOR NO. 19090 IN FEDERAL STANDARD 595B, PER 2013 CBC 11B-703.2.1



- NOTES:
- ENTRANCES TO BUILDINGS AND FACILITIES THAT ARE ACCESSIBLE TO AND USABLE BY PERSONS WITH DISABILITIES SHALL BE IDENTIFIED WITH A MINIMUM OF ONE INTERNATIONAL SYMBOL OF ACCESSIBILITY AND WITH ADDITIONAL DIRECTIONAL SIGNS, UTILIZING THE SYMBOL, AT JUNCTIONS WHERE THE ACCESSIBLE ROUTE OF TRAVEL DIVERGES FROM THE REGULAR CIRCULATION PATH, TO BE VISIBLE TO PERSONS ALONG APPROACHING CIRCULATION PATHS.
  - REFER TO 2013 CBC 11B-502.8.4 FOR SYMBOL PROPORTIONS AND DISPLAY CONDITIONS.
  - THE APPROPRIATE ENFORCEMENT AGENCY MAY APPROVE OTHER COLORS TO COMPLEMENT DECOR OR UNIQUE DESIGN. THE SYMBOL CONTRAST SHALL BE LIGHT ON DARK OR DARK ON LIGHT.

12 ACCESSIBILITY DECAL AT ENTRY

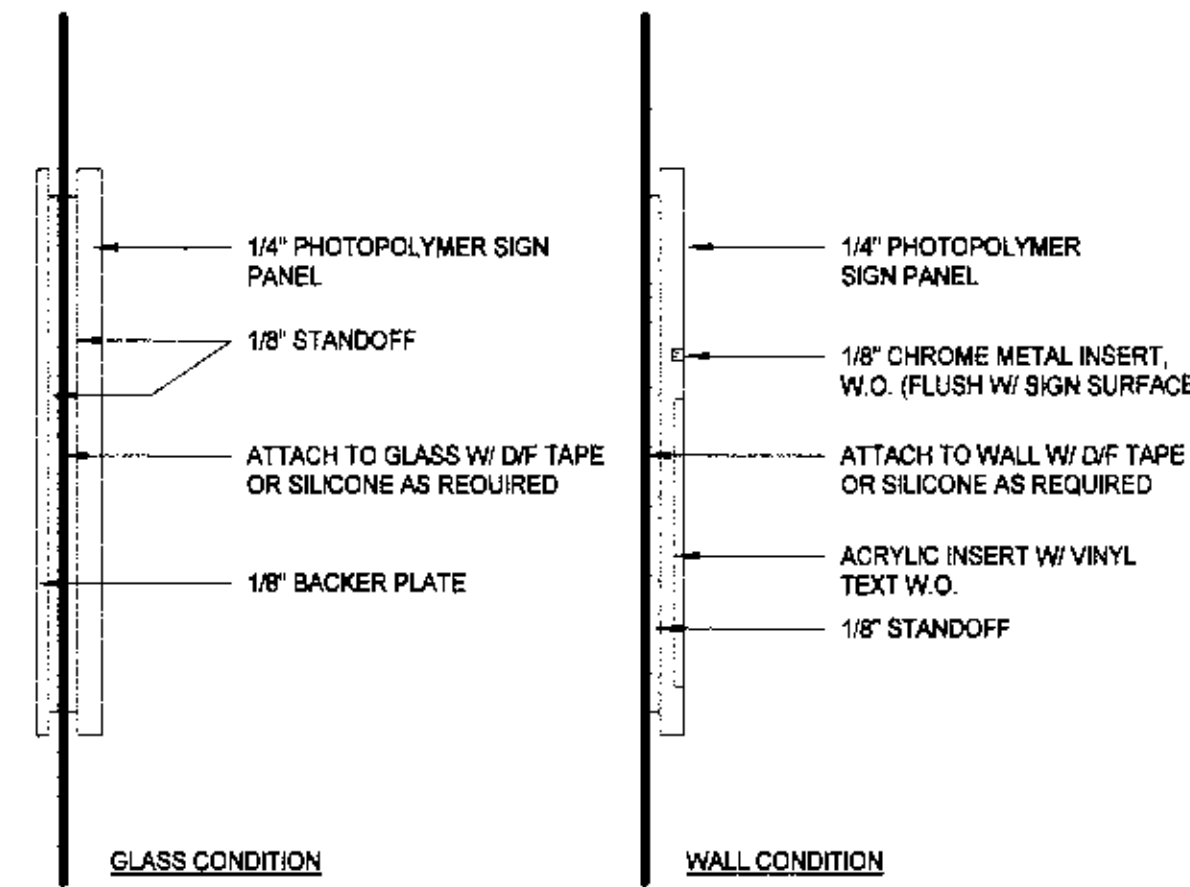
6" = 1'-0"



FLOOR TRANSITION DETAILS AT TYPICAL ACCESSIBLE DOOR THRESHOLD CONDITIONS

9 TYPICAL DOOR THRESHOLD DETAIL

3" = 1'-0"

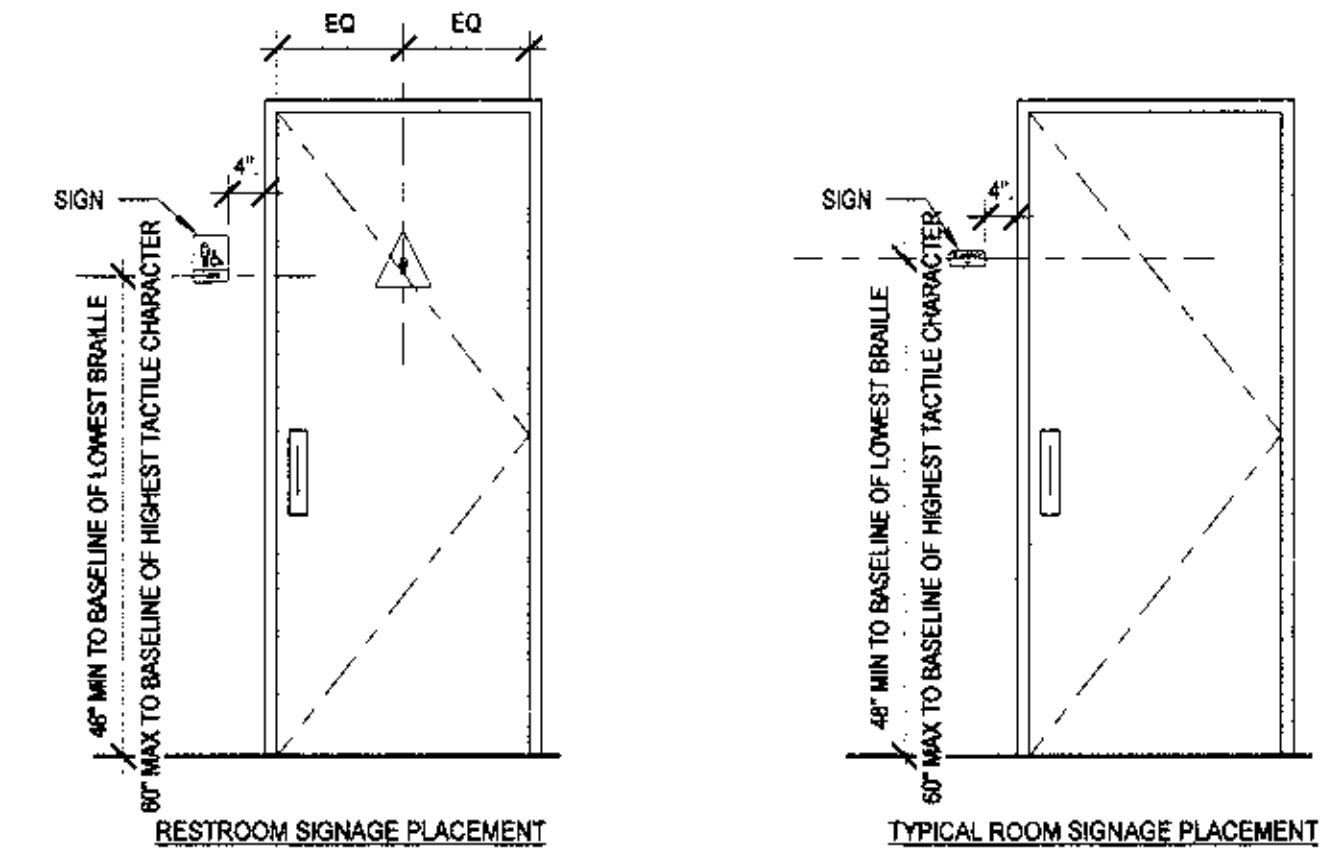


GLASS CONDITION WALL CONDITION

NOT TO SCALE

6 SIGNAGE ATTACHMENT

3" = 1'-0"

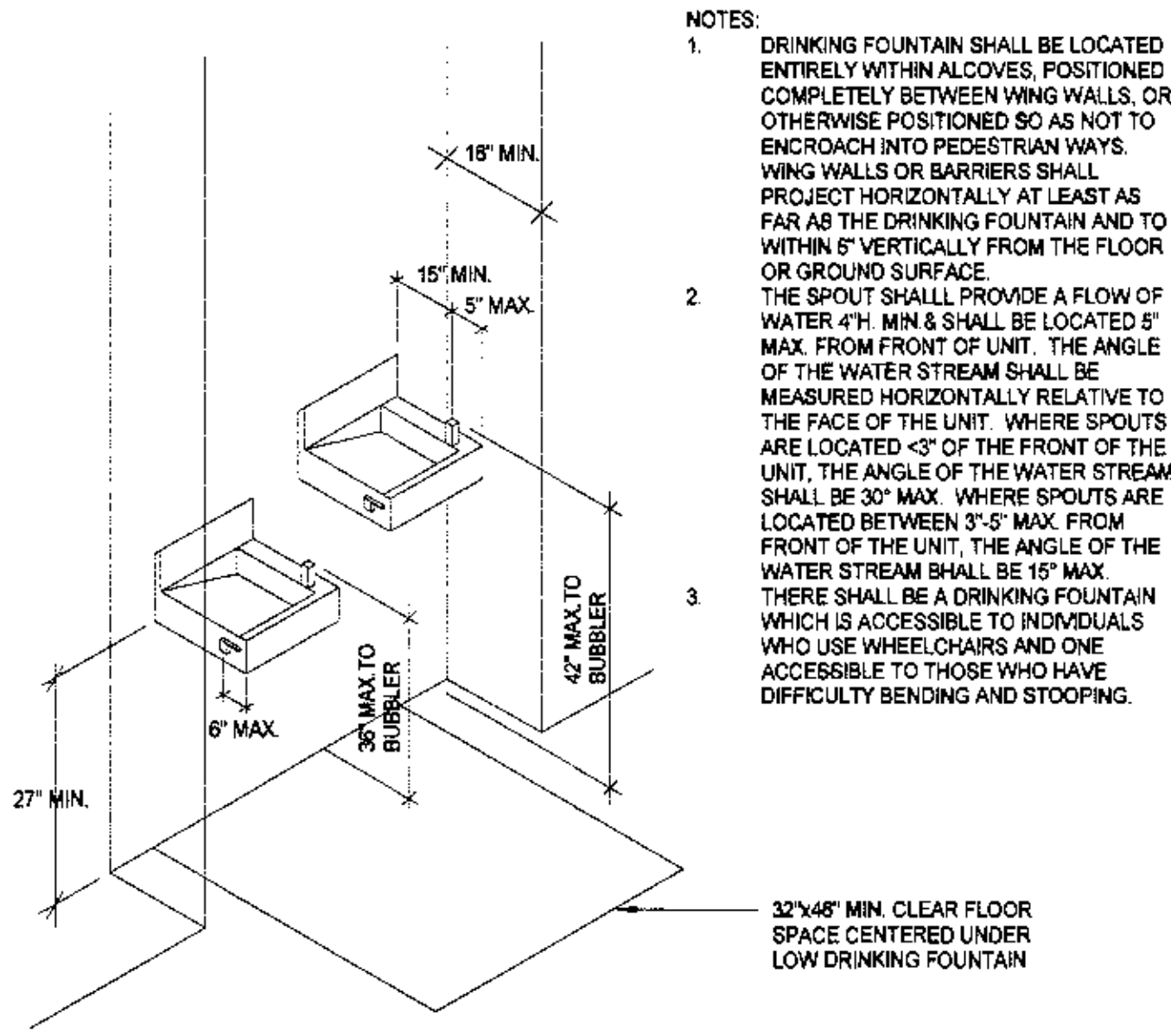


RESTROOM SIGNAGE PLACEMENT TYPICAL ROOM SIGNAGE PLACEMENT

NOTE: SIGNAGE SHALL BE LOCATED SO THAT A CLEAR FLOOR AREA OF 18"X18" MIN. CENTERED ON TACTILE CHARACTER IS PROVIDED BEYOND ARC OF SWING DOOR. ROOM ID OR EXIT SIGNAGE - MOUNT ON LATCH SIDE OF DOOR WHERE THERE IS NO WALL SPACE ON THE LATCH SIDE, INCLUDING DOUBLE LEAF DOORS, SIGNS SHALL BE PLACED ON THE NEAREST ADJOINING WALL, PREFERABLY ON THE RIGHT OR, WHEN OCCURS, GLASS SURFACE.

3 TYPICAL ROOM SIGNAGE

3" = 1'-0"



32"X48" MIN. CLEAR FLOOR SPACE CENTERED UNDER LOW DRINKING FOUNTAIN

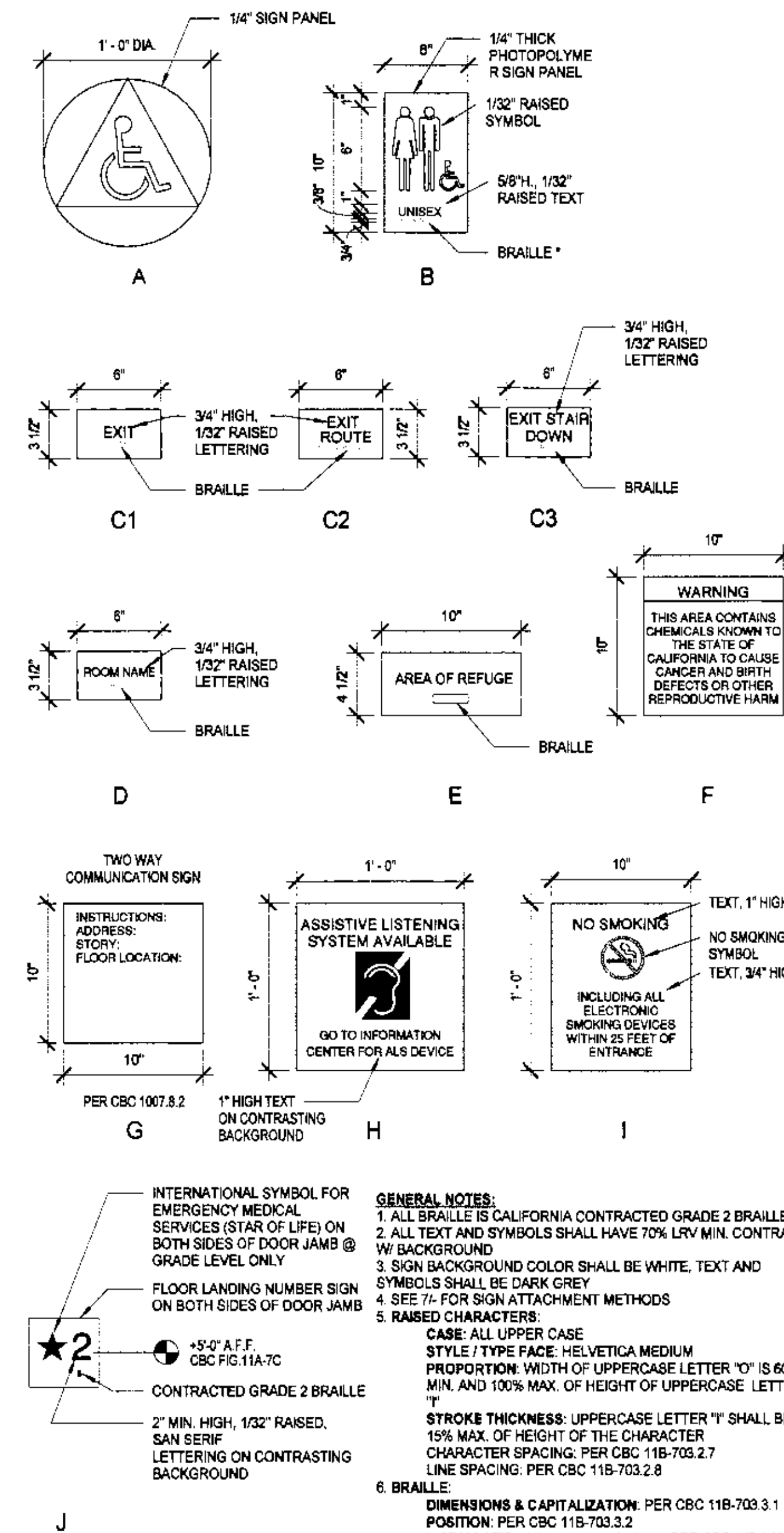
8 DRINKING FOUNTAIN REQUIREMENTS

1 1/2" = 1'-0"

- GENERAL BRAILLE NOTES:
- BEADED BRAILLE CONTRACTED GRADE 2 'BEADED BRAILLE', DOTS, ROUNDED OR OVAL.
  - THE INDICATION OF UPPERCASE LETTERS SHALL ONLY BE USED FOR FIRST WORDS, SENTENCES, PROPER NOUNS, INDIVIDUAL LETTER OF ALPHABET, INITIALS AND ACRONYMS.
  - DOT DIAMETER: 0.059 (1.5MM) TO 0.03 (0.8MM).
  - DISTANCE BETWEEN TWO DOTS IN SAME CELL, MEASURED CENTER TO CENTER: 0.100 (2.5MM).
  - DISTANCE BETWEEN CORRESPONDING DOTS IN ADJACENT CELLS MEASURED CENTER TO CENTER: 0.300 (7.6MM).
  - DISTANCE BETWEEN CORRESPONDING DOTS FROM ONE CELL DIRECTLY BELOW MEASURED CENTER TO CENTER: 0.336 (10.0 MM) TO 0.400 (10.2 MM).
  - BRAILLE SHALL BE POSITIONED BELOW THE CORRESPONDING TEXT IN A HORIZONTAL FORMAT, FLUSH LEFT OR CENTERED. IF TEXT IS MULTI-LINED, BRAILLE SHALL BE PLACED BELOW THE ENTIRE TEXT. BRAILLE SHALL BE SEPARATED 3/8" (9.5 MM) MIN. AND 1/2" (12.7 MM) MAX. FROM OTHER TACTILE CHARACTERS AND 3/8" (9.5 MM) MIN. FROM RAISED BORDERS AND DECORATIVE ELEMENTS.
  - BRAILLE SHALL BE PAINTED TO MATCH THE FIELD COLOR IN WHICH IT IS PLACED AND THE SIGN SHALL RECEIVE A CLEAR COAT TO PROTECT BRAILLE PLACEMENT.
  - RAISED TEXT AND BRAILLE SHALL NOT BE PLACED WITHIN A PICTOGRAM'S REQUIRED 6" (152 MM) MIN. FIELD HEIGHT.

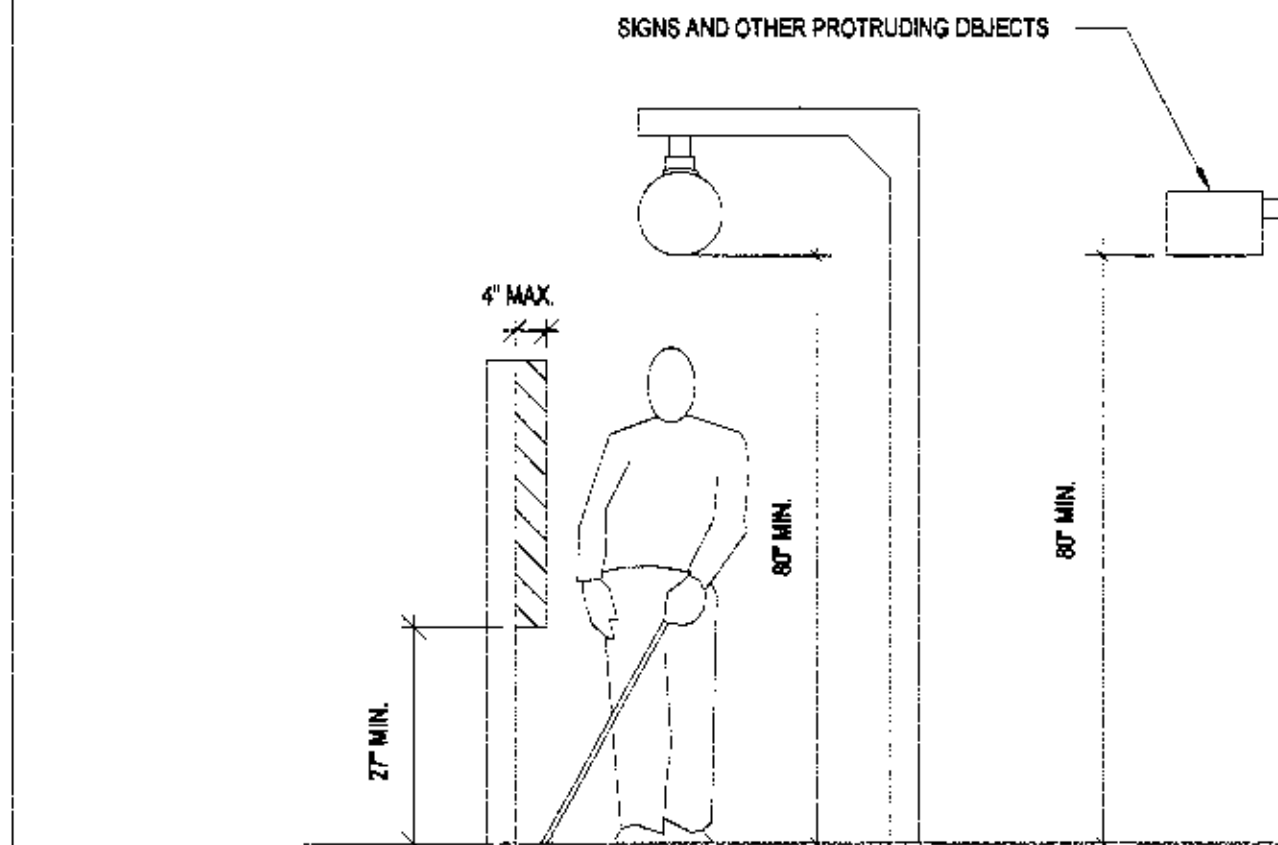
5 GENERAL BRAILLE NOTES

1/2" = 1'-0"



1 SIGNAGE TYPES

1 1/2" = 1'-0"

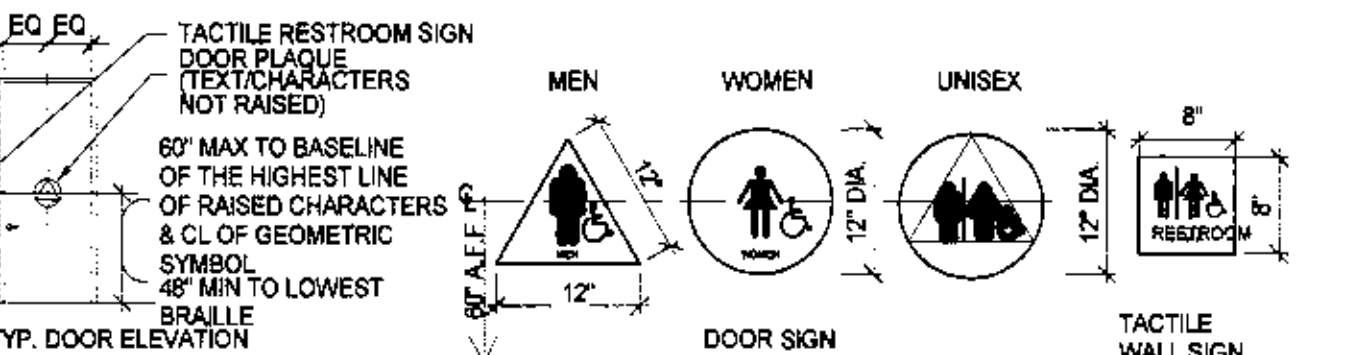


SIGNS AND OTHER PROTRUDING OBJECTS

- ABRUPT CHANGES IN LEVEL, EXCEPT BETWEEN A WALK OR SIDEWALK AND AN ADJACENT STREET OR DRIVEWAY, EXCEEDING 4" IN A VERTICAL DIMENSION, SUCH AS AT PLANTERS OR FOUNTAINS LOCATED IN OR ADJACENT TO WALKS, SIDEWALKS, OR OTHER PEDESTRIAN WAYS, SHALL BE IDENTIFIED BY WARNING CURBS PROJECTING AT LEAST 6" IN HEIGHT ABOVE THE WALK OR SIDEWALK SURFACE TO WARN THE BLIND OF A POTENTIAL DROP OFF.
- WHEN A GUARDRAIL OR HANDRAIL IS PROVIDED, NO WARNING CURB IS REQUIRED WHEN A GUARDRAIL IS PROVIDED CENTERED 3" ± 1" ABOVE THE SURFACE OF THE WALK OR SIDEWALK, THE WALK IS 5 PERCENT OR LESS GRADIENT, OR NO ADJACENT HAZARD EXISTS.
- OBJECTS PROJECTING FROM WALLS WITH THEIR LEADING EDGES BETWEEN 27" AND 80" ABOVE THE FINISHED FLOOR SHALL PROTRUDE NO MORE THAN 4" INTO WALKS, HALLS, CORRIDORS, PASSAGEWAYS, OR AISLES.
- FREE-STANDING OBJECTS MOUNTED ON POSTS OR PYLONS MAY OVERHANG 12" MAXIMUM FROM 27" TO 80" ABOVE THE GROUND OR FINISHED FLOOR.
- PROTRUDING OBJECTS SHALL NOT REDUCE THE CLEAR WIDTH OF AN ACCESSIBLE ROUTE OR MANEUVERING SPACE.
- WALKS, HALLS, CORRIDORS, PASSAGEWAYS, AISLES OR OTHER CIRCULATION SPACES SHALL HAVE 80" MIN. CLR. HEADROOM.
- ANY OBSTRUCTION, SUCH AS A POST-MOUNTED SIGN, THAT OVERHANGS A PEDESTRIAN WAY SHALL BE A MINIMUM OF 80" ABOVE THE WALKING SURFACE AS MEASURED FROM THE BOTTOM OF THE OBSTRUCTION.

10 PROTRUDING OBJECTS CLEARANCES

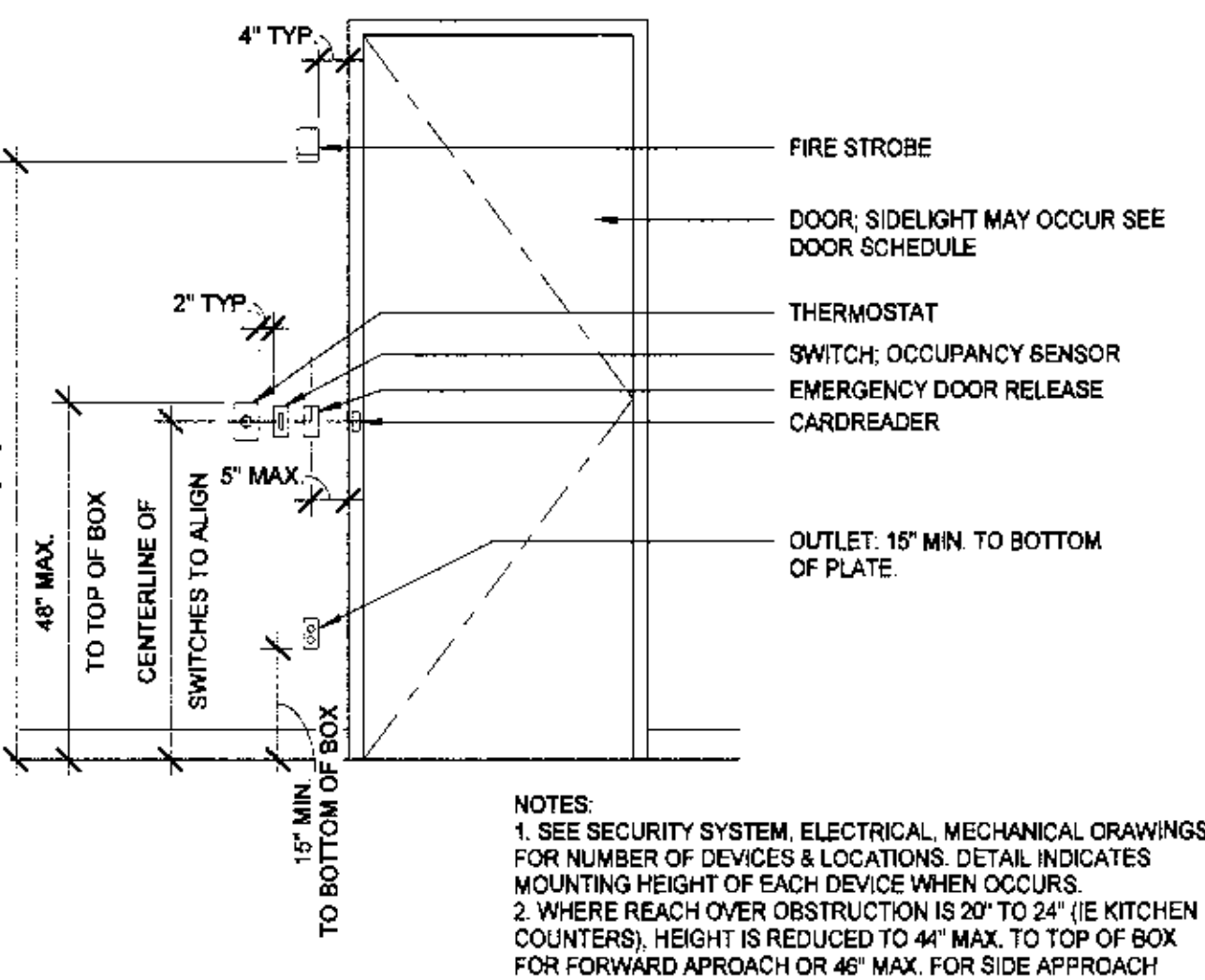
1/2" = 1'-0"



- NOTES:
- SIGNS PER CALIFORNIA BUILDING CODE.
  - ALL ACCESSIBLE TOILET AND BATHING FACILITIES SHALL BE IDENTIFIED BY THE 'INTERNATIONAL SYMBOL OF ACCESSIBILITY'.
  - DOORWAYS LEADING TO SANITARY FACILITIES SHALL BE IDENTIFIED BY A GEOMETRIC SYMBOL IN COMPLIANCE WITH THIS SECTION. GEOMETRIC SYMBOLS SHALL BE CENTERED HORIZONTALLY ON THE DOOR AT A HEIGHT OF 80" ABOVE THE FINISH FLOOR OR GROUND SURFACE MEASURED TO THE CENTER OF THE SYMBOL. EDGES OF ACCESSIBILITY SIGNAGE SHALL BE ROUNDED, CHAMFERED OR EASED. CORNERS SHALL HAVE A MINIMUM RADIUS OF 1/8". SEE 2013 CBC SECTION 11B-703.4.2 FOR SIGNAGE REQUIREMENTS APPLICABLE TO TACTILE SIGNAGE.
  - MEN'S SANITARY FACILITIES SHALL BE IDENTIFIED BY AN EQUILATERAL TRIANGLE, 1/4" THICK WITH EDGES 12" LONG AND A VERTEX POINTING UPWARD. THE TRIANGLE SYMBOL SHALL CONTRAST WITH THE DOOR, EITHER LIGHT ON A DARK BACKGROUND OR DARK ON A LIGHT BACKGROUND.
  - WOMEN'S SANITARY FACILITIES SHALL BE IDENTIFIED BY A CIRCLE, 1/4" THICK AND 12" IN DIAMETER. THE CIRCLE SYMBOL SHALL CONTRAST WITH THE DOOR, EITHER LIGHT ON A DARK BACKGROUND OR DARK ON A LIGHT BACKGROUND.
  - UNISEX SANITARY FACILITIES SHALL BE IDENTIFIED BY A TRIANGLE, 1/4" THICK WITH EDGES 12" LONG AND A VERTEX POINTING UPWARD. THE TRIANGLE SYMBOL SHALL CONTRAST WITH THE DOOR, EITHER LIGHT ON A DARK BACKGROUND OR DARK ON A LIGHT BACKGROUND.
  - CHARACTERS, SYMBOLS AND THEIR BACKGROUND SHALL HAVE A NONGLARE FINISH. CHARACTERS AND SYMBOLS SHALL CONTRAST WITH THEIR BACKGROUND, EITHER LIGHT ON A DARK BACKGROUND OR DARK ON A LIGHT BACKGROUND. CHARACTERS ON SIGNS SHALL HAVE A WIDTH-TO-HEIGHT RATIO OF BETWEEN 1.5 AND 1.1 AND A STROKE WIDTH-TO-HEIGHT RATIO OF BETWEEN 1.5 AND 1.1. CHARACTERS TO BE SANI SERIF UPPERCASE LETTERS AND NUMERALS ON TACTILE SIGNS ARE RAISED 1/32".
  - CHARACTERS TO BE ACCOMPANIED BY GRADE 2 BRAILLE. BRAILLE DOTS ARE 1/10" ON CENTER IN EACH CELL WITH 2/10" SPACE BETWEEN CELLS. BRAILLE DOTS ARE RAISED A MINIMUM OF 1/40" ABOVE THE BACKGROUND. MOUNTING HEIGHT IS 60" FROM THE FINISH FLOOR TO THE CENTERLINE OF THE SIGN.
  - FOR TACTILE WALL SIGN AT RESTROOMS SEE ALSO 11B703.1. ICON AS SHOWN ABOVE IS FOR USE AT UNISEX RESTROOMS. FOR WOMEN'S AND MEN'S ROOMS, USE APPROPRIATE ICONS AS ILLUSTRATED ON DOOR SIGNS ABOVE.

7 RESTROOM IDENTIFICATION SIGNAGE

3/4" = 1'-0"



- NOTES:
- SEE SECURITY SYSTEM, ELECTRICAL, MECHANICAL DRAWINGS FOR NUMBER OF DEVICES & LOCATIONS. DETAIL INDICATES MOUNTING HEIGHT OF EACH DEVICE WHEN OCCURS.
  - WHERE REACH OVER OBSTRUCTION IS 20" TO 24" (IE KITCHEN COUNTERS), HEIGHT IS REDUCED TO 44" MAX. TO TOP OF BOX FOR FORWARD APPROACH OR 46" MAX. FOR SIDE APPROACH.

4 TYP. DEVICE LOCATIONS

1/2" = 1'-0"

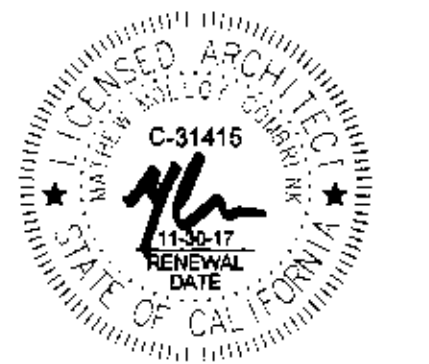
ARCHITECT  
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AC: [Signature] SEP 12 2017

5/07/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
renovation

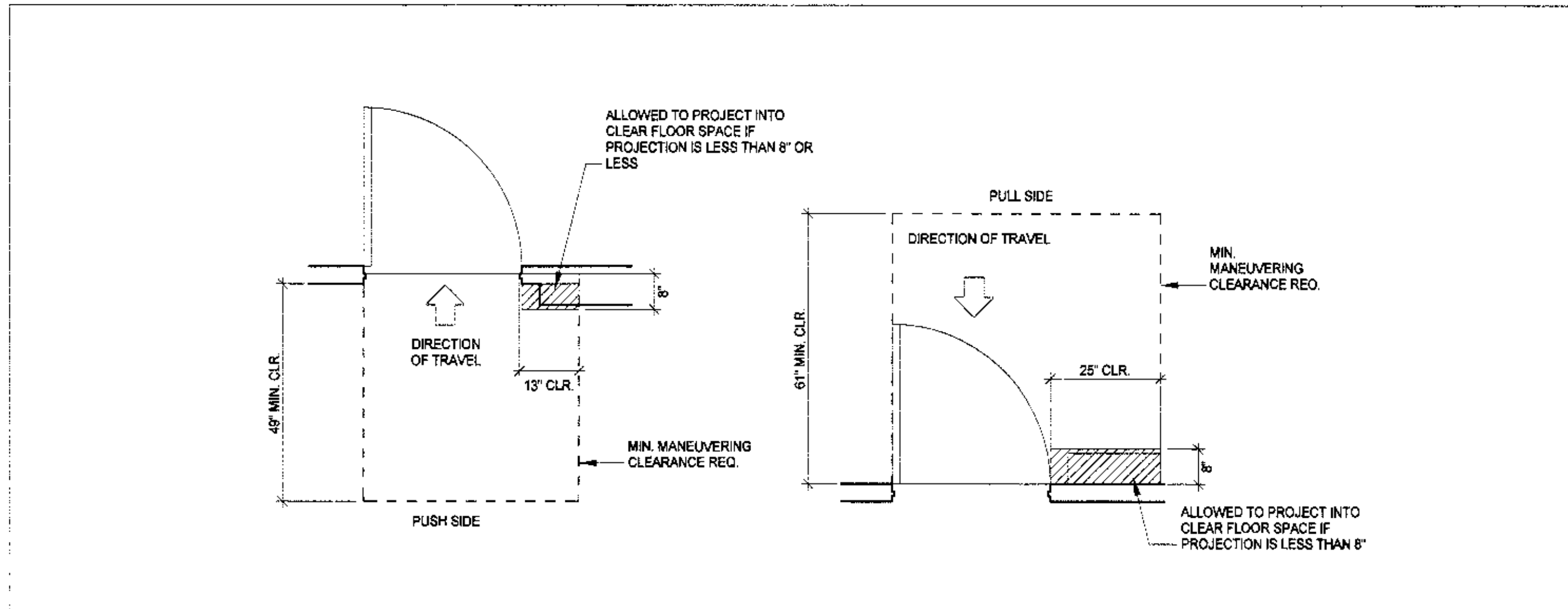
novato, california  
project number: 16-148-01

scale: as noted  
date: 03/10/2017

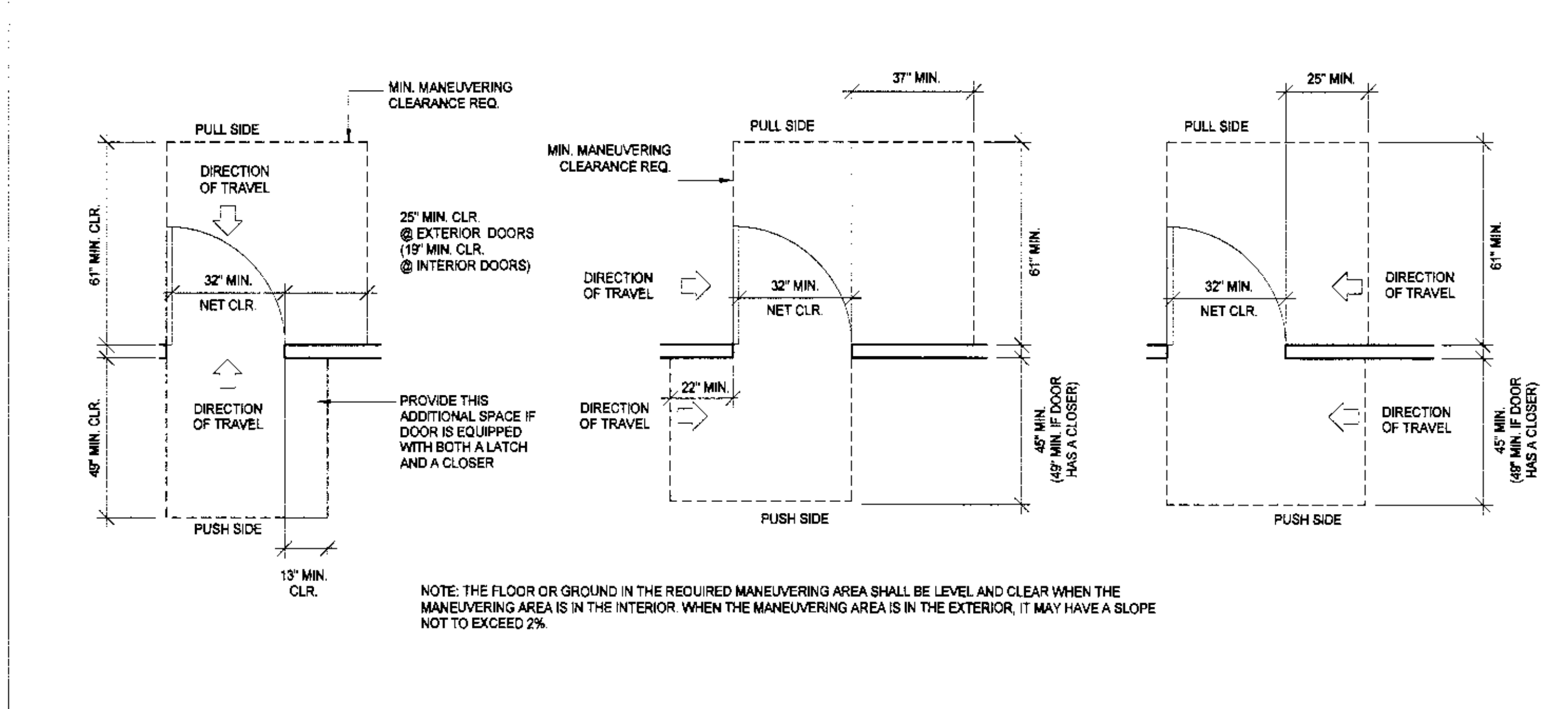
CONSTRUCTION DOCUMENTS  
ACCESSIBILITY DETAILS

G3.1

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**9 CLEAR SPACES AT DOORS** 1/2" = 1'-0"



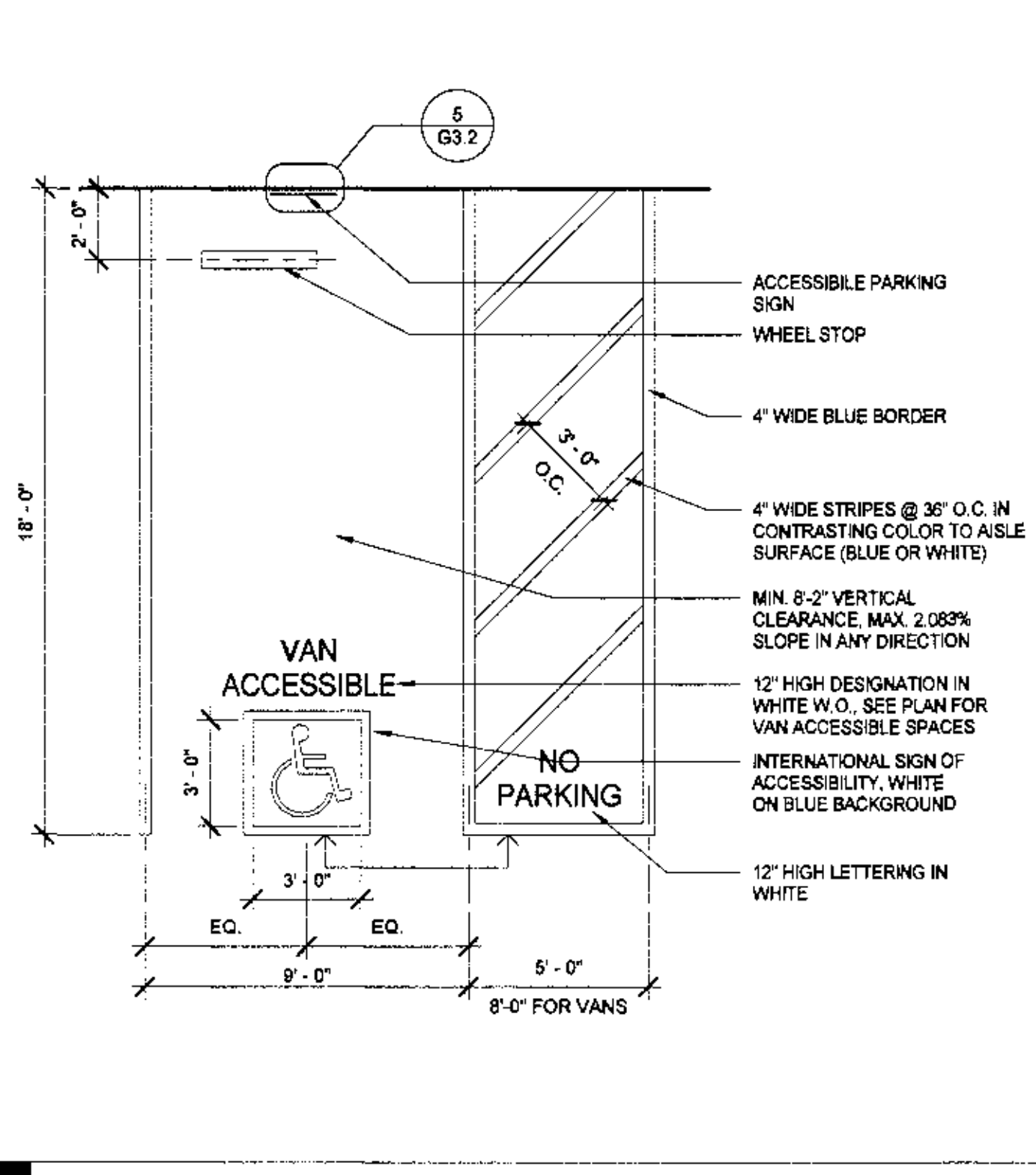
**8 TYPICAL DOOR CLEARANCES** 3/8" = 1'-0"

- ALL STOREFRONT DOORS, ENTRANCE DOORS, EXIT DOORS, AND DOORS ON AN ACCESSIBLE ROUTE SHALL BE MADE ACCESSIBLE AND FULLY COMPLY WITH ADA & CBC TITLE 24 REQUIREMENTS FOR ACCESSIBILITY UNLESS THEY ARE EXISTING OR OTHERWISE NOTED.
- THE FOLLOWING APPLIES TO ALL ADA & CBC TITLE 24 COMPLIANT ACCESSIBLE DOORS UNLESS OTHERWISE NOTED:
  - THE THRESHOLD SHALL NOT BE MORE 1/2" ABOVE THE FINISH FLOOR OR CONCRETE FLOORWORK. THE FINISH FLOOR LEVEL IS DEFINED AS THE TOP SURFACE OF THE FINISH FLOORING MATERIAL. SEE "TYPICAL DOOR CLEARANCES & HARDWARE MOUNTING GUIDE" ON THIS SHEET FOR OTHER TYPICAL REQUIREMENTS.
  - THE BOTTOM 10 INCHES OF ALL DOORS EXCEPT AUTOMATIC AND SLIDING DOORS WILL HAVE A SMOOTH UNINTERRUPTED SURFACE TO ALLOW THE DOOR TO BE OPENED BY A WHEELCHAIR FOOTREST WITHOUT CREATING A TRIP OR HAZARDOUS CONDITION. WHERE NARROW FRAME DOORS ARE USED, A 10 INCH HIGH SMOOTH PANEL SHALL BE INSTALLED ON THE PUSH SIDE OF THE DOOR WHICH WILL ALLOW THE DOOR TO BE OPENED BY A WHEELCHAIR FOOTREST WITHOUT CREATING A TRIP OR HAZARDOUS CONDITION, TYP.
  - THE DOORWAY SHALL BE OF A SIZE AS TO PERMIT THE INSTALLATION OF A DOOR NOT LESS THAN 3 FEET IN WIDTH AND NOT LESS THAN 6 FEET 8 INCHES IN HEIGHT. DOORS SHALL BE CAPABLE OF OPENING AT LEAST 90 DEGREES AND SHALL BE MOUNTED SO THAT THE CLEAR WIDTH OF THE DOORWAY IS NOT LESS THAN 32 INCHES.
  - THE MAXIMUM OPENING FORCE OF A DOOR WITH A CLOSER SHALL NOT EXCEED 5 LBS FOR EXTERIOR AND INTERIOR DOORS WHILE FIRE DOORS SHALL NOT EXCEED 15 LBS. THE SWEEP PERIOD OF THE CLOSER SHALL BE ADJUSTED SO THAT FROM AN OPEN POSITION OF 90 DEGREES, THE DOOR WILL TAKE AT LEAST 5 SECONDS TO MOVE TO A POINT 12 DEGREES FROM THE LATCH. AUTOMATIC-CLOSING FIRE OR SMOKE DOORS BY SMOKE DETECTORS SHALL NOT HAVE A CLOSING OR RE-CLOSING DELAY OF MORE THAN 10 SECONDS.
  - LATCHING AND LOCKING DOORS THAT ARE HAND ACTIVATED AND WHICH ARE IN A PATH OF TRAVEL SHALL BE OPERABLE WITH A SINGLE EFFORT BY LEVER TYPE HARDWARE, PANIC BARS, PUSH-PULL ACTIVATING BARS, OR OTHER HARDWARE DESIGNED TO PROVIDE PASSAGE WITHOUT THE ABILITY TO GRASP THE OPENING HARDWARE AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST.
- EXIT DOORS: REGARDLESS OF OCCUPANT LOAD SERVED, EXIT DOORS SHALL BE OPERABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR ANY SPECIAL KNOWLEDGE OR EFFORT. REVOLVING, SLIDING, AND OVERHEAD DOORS ARE NOT PERMITTED AS REQUIRED EXIT DOORS WHEN SERVING HAZARDOUS AREAS OR AN OCCUPANT LOAD OF 10 OR MORE.
- RATED DOORS: ALL RATED DOORS SHALL BE POSITIVE LATCHING AND INCLUDE A CLOSER. RATED ASSEMBLIES SHALL BE PROVIDED WITH APPROVED GASKETING MATERIAL INSTALLED TO PROVIDE A SEAL WHERE THE DOOR MEETS THE STOP ON BOTH SIDES & THE TOP. THE MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE AVAILABLE ON THE JOB SITE FOR ALL RATED DOOR ASSEMBLIES.
- SAFETY GLAZING: IN THE FOLLOWING LOCATIONS SHOULD BE OF SAFETY GLAZING MATERIAL IN ACCORDANCE WITH SECTION 2408.4 OF CBC TITLE 24:
  - INGRESS AND EGRESS DOORS EXCEPT JALOUSIES.
  - FIXED AND SLIDING PANELS OF SLIDING DOOR ASSEMBLIES AND PANELS IN SWINGING DOORS OTHER THAN WARDROBE DOORS.
  - UNFRAMED SWINGING DOORS.
- POWERED DOORS: POWERED DOOR OR GATE OPERATORS MAY SUBSTITUTE FOR AN INTERIOR OR EXTERIOR DOOR OR GATE OPERATING FORCE OF 5 POUND PRESSURE (22.2 N) (11B-404.2.9). WHEN PROVIDED, POWERED DOOR OPERATORS SHALL COMPLY WITH BHMA A156.10, OR LOW ENERGY OPERATED DOORS BHMA156.19.
  - NUMBER OF ACTUATORS: AT A PAIR OF DOORS, A MINIMUM OF ONE DOOR LEAF SHALL BE AN POWERED DOOR. WHEN AT A SINGLE LOCATION ONE OF EVERY EIGHT EXTERIOR DOOR LEAFS, OR FRACTION THEREOF, A MINIMUM OF ONE PAIR OF DOORS SHALL BE A POWERED DOOR. OTHER DOORS LEAFS IN THE CLUSTER MAY HAVE A MAXIMUM DOOR OPENING FORCE OF 8 1/2 POUNDS (37.8 N).
  - DOOR ACTUATORS, SENSING DEVICES, PUSH PLATES, VERTICAL ACTUATION BARS OR OTHER SIMILAR DEVICES: ACTUATORS SHALL BE PROVIDED WITH LEVEL CLEAR FLOOR AREAS COMPLYING WITH 11B-304 AND 11B-305, AND WITHOUT PROTRUDING OBSTRUCTIONS NOT OTHERWISE IN COMPLIANCE WITH 11B-307. OPERABLE PARTS COMPLYING WITH 11B-308.
  - POWER DISCONNECT: KEYED OR TOGGLE SWITCH FOR DISCONNECTING POWER TO THE DEVICE SHALL BE PROVIDED IN THE NEAR VICINITY OF THE POWERED DOOR. AN ACTUATOR IS PERMITTED TO CONTAIN INTEGRAL OR BE INTERCONNECTED WITH TIMER, SECURITY SYSTEMS OR OTHER OPERATIONAL CONTROLS.
  - BACK-UP OR EMERGENCY POWER OPERATION: POWERED DOORS SERVING A BUILDING OR FACILITY WITH 150 OR MORE SHALL BE PROVIDED WITH BACKUP POWER OR BACKUP GENERATOR POWER. THE BACKUP POWER SOURCE SHALL BE ABLE TO CYCLE THE DOOR A MINIMUM OF 100 CYCLES, WHEN THE DEVICE IS IN OPERATIONAL MODE.
  - ADDITIONAL SIGNAGE REQUIREMENTS:
    - IN ADDITION TO THE ACCESSIBILITY SYMBOL REQUIRED ON THE DOOR ACTUATORS, 6" BY 6" ACCESSIBILITY SYMBOL SIGN COMPLYING WITH 11B-216.5 SHALL BE PLACED ON, OR IMMEDIATELY ADJACENT TO, EACH POWERED DOOR (LOCATION ON A DOOR SURFACE IS NOT SPECIFIED). THE SIGN SHALL BOTH SIDES OF DOOR.
    - WHERE A POWERED DOOR IS PROVIDED IN A BUILDING OR FACILITY CONTAINING ASSEMBLY OCCUPANCIES OF 300 OR MORE, AN ACCESSIBILITY SYMBOL SIGN MEASURING 5' BY 6' AND COMPLYING WITH 11B-103.7 SHALL BE PROVIDED ABOVE THE ON BOTH THE INTERIOR AND EXTERIOR SIDES OF EACH POWERED DOOR OR PAIR OF DOORS.
    - ADDITIONAL SIGNAGE COMPLYING WITH BHMA A156.10 OR BHMA A156.19 SHALL BE PROVIDED.

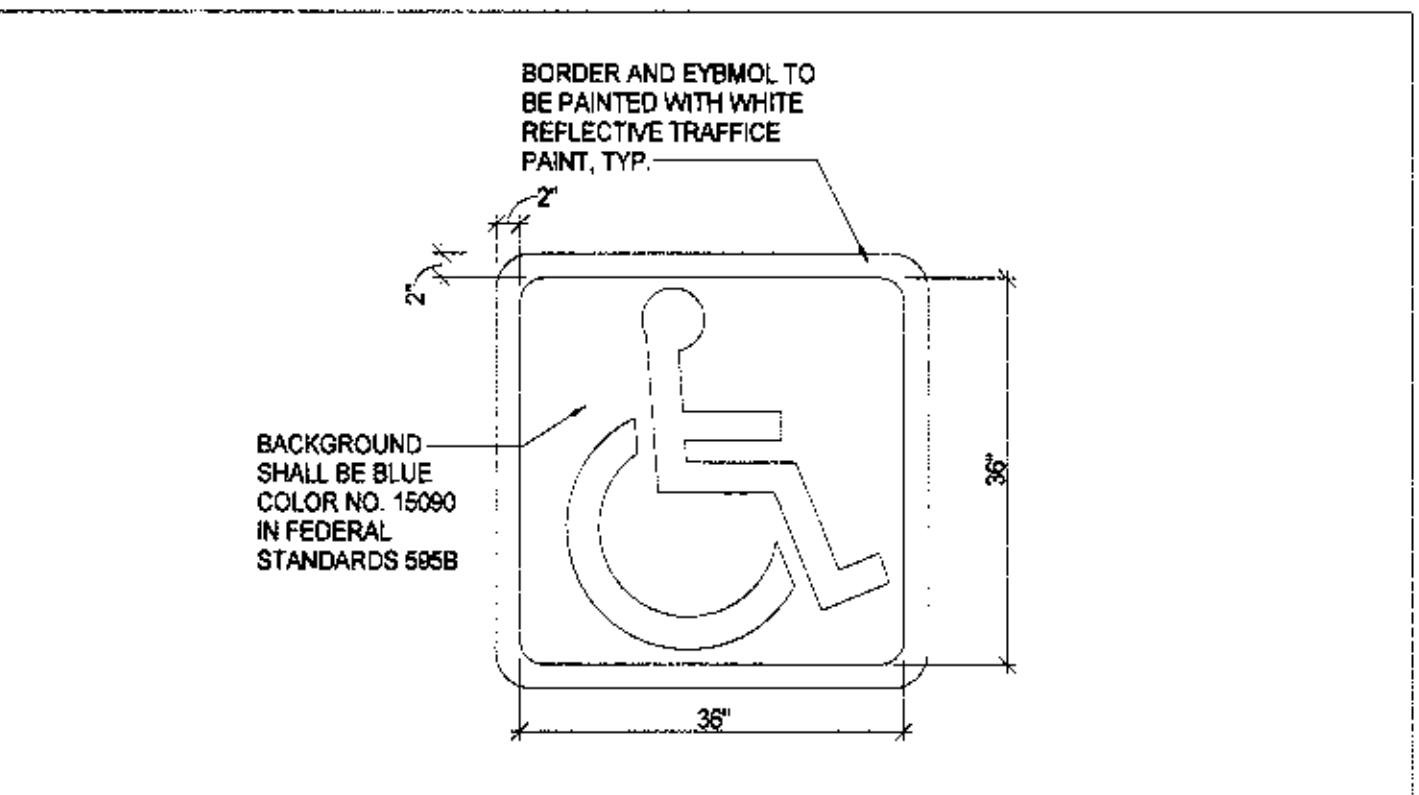
**7 TYPICAL DOOR CODE REQUIREMENTS** 1 1/2" = 1'-0"



**5 ACCESSIBLE STALL SIGN** 3" = 1'-0"



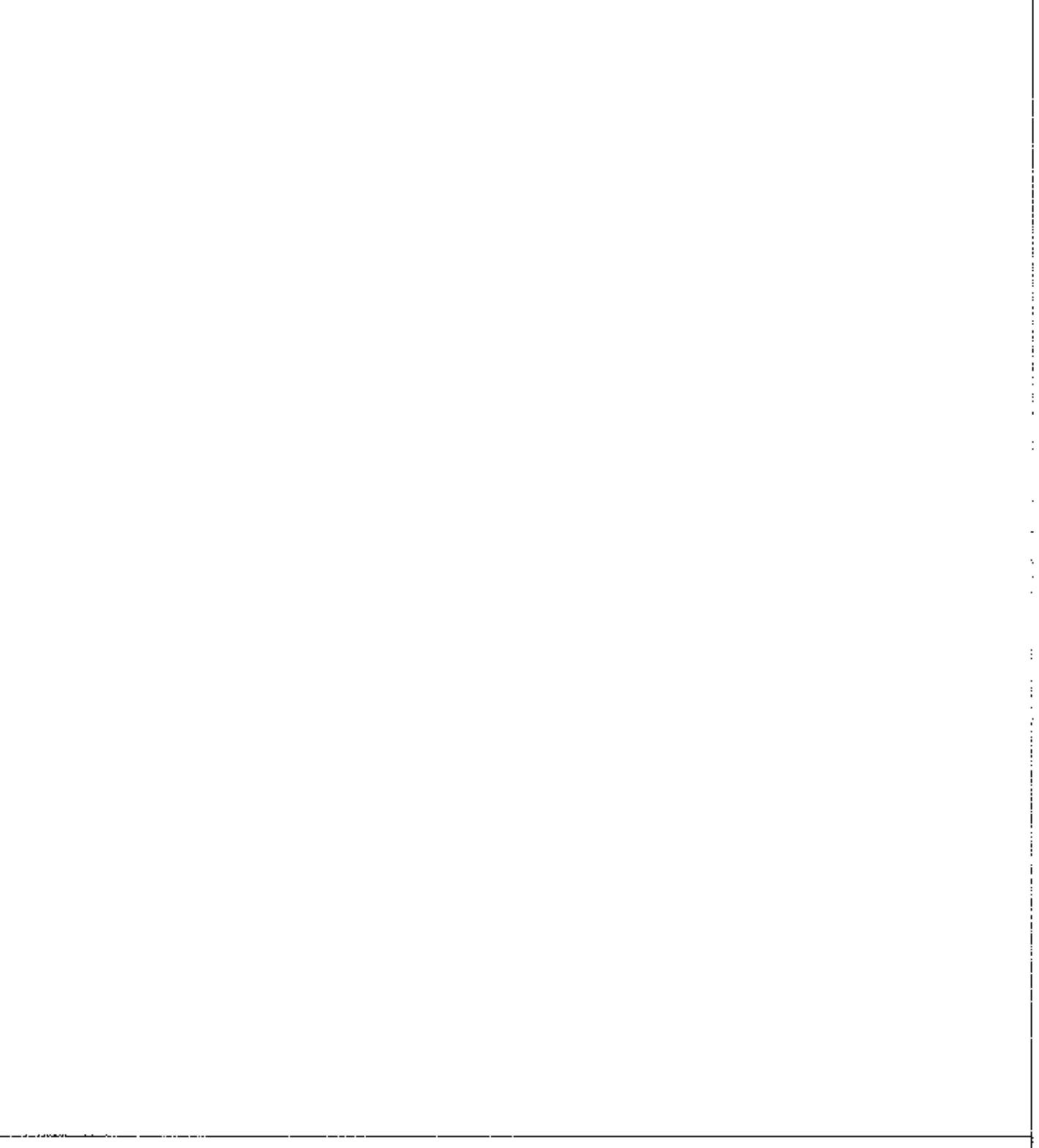
**1 ACCESSIBLE PARKING SPACE** 1/4" = 1'-0"



**3 ACCESSIBLE FLOOR SYMBOL** 3/4" = 1'-0"



**2 UNAUTHORIZED VEHICLE TOWING SIGN** 3" = 1'-0"



**1 ACCESSIBLE PARKING SPACE** 1/4" = 1'-0"

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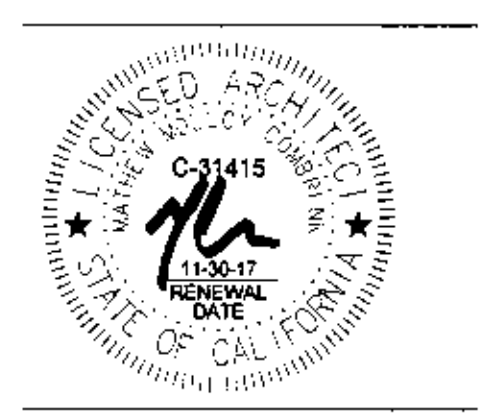
**CLIENT**  
 marin community college district  
 835 college avenue  
 kenfield, ca 94904

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 DIV. OF THE STATE ARCHITECT  
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 DATE: SEP 12 2014

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 5/31/17 OSA PLAN REVIEW  
 3/10/17 100% CO

rev date issue



**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 16-148 01

scale: as noted  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**ACCESSIBILITY DETAILS**

**G3.2**

Attachment 1

2016 CALIFORNIA GREEN BUILDING STANDARDS CODE  
Division of the State Architect – Structural Safety (DSA-SS)  
(CCR, Title 24, Part 11)

APPLICATION MATRIX	Mandatory Chapter 5
<b>DIVISION 5.1 - PLANNING AND DESIGN</b>	
<b>SITE DEVELOPMENT</b>	
<b>5.106.4.2 Bicycle parking.</b> For public schools and community colleges comply with Sections 5.106.4.2.1 and 5.106.4.2.2	
<b>5.106.4.2.1 Student bicycle parking.</b> Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.	<input type="checkbox"/>
<b>5.106.4.2.2 Staff bicycle parking.</b> Provide permanent secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:	<input type="checkbox"/>
<ol style="list-style-type: none"> <li>Covered, lockable enclosures with permanently anchored racks for bicycles;</li> <li>Lockable bicycle rooms with permanently anchored racks; or</li> <li>Lockable, permanently anchored bicycle lockers.</li> </ol>	
<b>5.106.8 Light pollution reduction.</b> Outdoor lighting systems shall be designed and installed to comply with the following:	<input type="checkbox"/>
<ol style="list-style-type: none"> <li>The minimum requirements in the <i>California Energy Code</i> for Lighting Zones 1-4 as defined in Chapter 10 of the <i>California Administrative Code</i>; and</li> <li>Backlight, Uplight and Glare (BUG) ratings as defined in IESNA TM-11-11; and</li> <li>Allowable BUG ratings not exceeding those shown in Table 5.106.8, or Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.</li> </ol> <p><b>Exceptions:</b></p> <ol style="list-style-type: none"> <li>Luminaires that qualify as exceptions in Section 140.7 of the <i>California Energy Code</i>.</li> <li>Emergency lighting.</li> <li>Building facade meeting the requirements in Table 140.7-B of the <i>California Energy Code</i>, Part 6.</li> <li>Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.</li> </ol>	

APPLICATION MATRIX	Mandatory Chapter 5
<b>GENERAL</b>	
<b>5.201.1 California Energy Code.</b> For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards. New construction, additions, and alterations must comply with the <i>California Energy Code</i> . Refer to <i>California Energy Code</i> Table 100.0-A	<input type="checkbox"/>
<b>DIVISION 5.3 - WATER EFFICIENCY AND CONSERVATION</b>	
<b>INDOOR WATER USE</b>	
<b>5.303.3 Water conserving plumbing fixtures and fittings.</b> Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:	
<b>5.303.3.1 Water closets.</b> The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specifications for Tank-Type Toilets.	<input type="checkbox"/>
<b>Note:</b> The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.	
<b>5.303.3.2 Urinals.</b>	
<b>5.303.3.2.1 Wall mounted Urinals.</b> The effective flush volume of wall mounted urinals shall not exceed 0.125 gallons per flush.	<input type="checkbox"/>
<b>5.303.3.2.2 Floor mounted urinals.</b> The effective flush volume of floor mounted or other urinals shall not exceed 0.5 gallons per flush.	<input type="checkbox"/>

APPLICATION MATRIX	Mandatory Chapter 5
<b>5.303.3.3 Showerheads</b>	
<b>5.303.3.3.1 Single showerhead.</b> Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specifications for showerheads.	<input type="checkbox"/>
<b>5.303.3.3.2 Multiple showerheads serving one shower.</b> When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the showerhead shall be designed to allow only one shower outlet to be in operation at one time.	<input type="checkbox"/>
<b>Note:</b> A hand-held shower shall be considered a showerhead.	
<b>5.303.3.4 Faucets and fountains.</b>	
<b>5.303.3.4.1 Non-residential lavatory faucets.</b> Non-residential lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.	<input type="checkbox"/>
<b>5.303.3.4.2 Kitchen faucets.</b> Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.	<input type="checkbox"/>
<b>5.303.3.4.3 Wash fountains.</b> Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute/20 [rim space (inches) at 60 psi].	<input type="checkbox"/>
<b>5.303.3.4.4 Metering faucets.</b> Metering faucets shall not deliver more than 0.20 gallons per cycle.	<input type="checkbox"/>
<b>5.303.3.4.5 Metering faucets for wash fountains.</b> Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per cycle/20 [rim space (inches) at 60 psi].	<input type="checkbox"/>
<b>Note:</b> Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.	
<b>5.303.6 Standards for plumbing fixtures and fittings.</b> Plumbing fixtures and fittings shall be installed in accordance with the California Plumbing Code, and shall meet the applicable standards referenced in Table 1701.1 of the <i>California Plumbing Code</i> and in Chapter 6 of this code.	<input type="checkbox"/>

APPLICATION MATRIX	Mandatory Chapter 5
<b>OUTDOOR WATER USE</b>	
<b>5.304.8 Outdoor potable water use in landscape areas.</b> For public schools and community colleges, landscape projects as described in Sections 5.304.8.1 and 5.304.8.2 shall comply with the California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, California Code of Regulations, except that the evapotranspiration adjustment factor (ETAF) shall be 0.65 with an additional water allowance for special landscape areas (SLA) of 0.35.	
<b>Exception:</b> Any project with an aggregate landscape area of 2,500 square feet or less may comply with the prescriptive measures contained in Appendix D of the MWELO.	
<b>5.304.6.1 Newly constructed landscapes.</b> New construction projects with an aggregate landscape area equal to or greater than 500 square feet.	<input type="checkbox"/>
<b>5.304.6.2 Rehabilitated landscapes.</b> Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 1,200 square feet.	<input type="checkbox"/>
<b>DIVISION 5.4 - MATERIAL CONSERVATION AND RESOURCE EFFICIENCY</b>	
<b>WATER RESISTANCE AND MOISTURE MANAGEMENT</b>	
<b>5.407.1 Weather protection.</b> Provide a weather-resistant exterior wall end foundation envelope as required by <i>California Building Code</i> , Section 1403.2 (Weather Protection) and <i>California Energy Code</i> Section 150. (Mandatory Features and Devices), manufacturer's installation instructions, or local ordinance, whichever is more stringent.	<input type="checkbox"/>
<b>5.407.2 Moisture control.</b> Employ moisture control measures by the following methods:	
<b>5.407.2.1 Sprinklers.</b> Design and maintain landscape irrigation systems to prevent spray on structures.	<input type="checkbox"/>
<b>5.407.2.2 Entries and openings.</b> Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:	
<b>5.407.2.2.1 Exterior door protection.</b> Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:	<input type="checkbox"/>
<ol style="list-style-type: none"> <li>An installed awning at least four feet in depth.</li> <li>The door is protected by a roof overhang at least four feet in depth.</li> <li>The door is recessed at least four feet.</li> <li>Other methods which provide equivalent protection.</li> </ol>	
<b>5.407.2.2.2 Flashing.</b> Installed flashing integrated with a drainage plane.	<input type="checkbox"/>

APPLICATION MATRIX	Mandatory Chapter 5
<b>DIVISION 5.4 - MATERIAL CONSERVATION AND RESOURCE EFFICIENCY</b>	
<b>CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING</b>	
<b>5.408.1 Construction waste management.</b> Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3, or meet a local construction and demolition waste management ordinance, whichever is more stringent.	
<b>5.408.1.1 Construction waste management plan.</b> Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:	<input type="checkbox"/>
<ol style="list-style-type: none"> <li>Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.</li> <li>Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).</li> <li>Identifies diversion facilities where construction and demolition waste material collected will be taken.</li> <li>Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.</li> </ol>	
<b>5.408.1.2 Waste management company.</b> Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.	<input type="checkbox"/>
<b>Note:</b> The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.	
<b>Exceptions to Sections 5.408.1.1 and 5.408.1.2:</b>	
<ol style="list-style-type: none"> <li>Excavated soil and land-clearing debris.</li> <li>Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.</li> <li>Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.</li> </ol>	
<b>5.408.1.3 Waste stream reduction alternative.</b> The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.	<input type="checkbox"/>

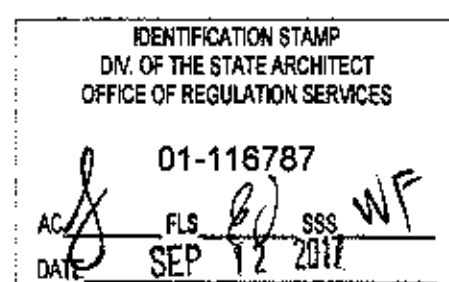
APPLICATION MATRIX	Mandatory Chapter 5
<b>BUILDING MAINTENANCE AND OPERATION</b>	
<b>5.410.1 Recycling by occupants.</b> Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.	<input type="checkbox"/>
<b>Exception:</b> Rural jurisdictions that meet and apply for the exemption of Public Resources Code 42649.82 (a)(2)(A) et seq. will also be exempt from the organics waste portion of this section.	
<b>5.410.1.2 Sample ordinance.</b> Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the <i>Public Resources Code</i> , Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).	<input type="checkbox"/>
<b>Note:</b> A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's website.	
<b>DIVISION 5.5 ENVIRONMENTAL QUALITY</b>	
<b>POLLUTANT CONTROL</b>	
<b>5.504.3 Covering of duct openings and protection of mechanical equipment during construction.</b> At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.	<input type="checkbox"/>
<b>5.504.4 Finish material pollutant control.</b> Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.	
<b>5.504.4.1 Adhesives, sealants, and caulks.</b> Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:	
<ol style="list-style-type: none"> <li>Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified in Subsection 2, below.</li> <li>Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of <i>California Code of Regulations</i>, Title 17, commencing with Section 94507.</li> </ol>	<input type="checkbox"/>
<b>TABLE 5.504.4.1 - ADHESIVE VOC LIMIT; TABLE 5.504.4.2 - SEALANT VOC LIMIT</b>	<input type="checkbox"/>

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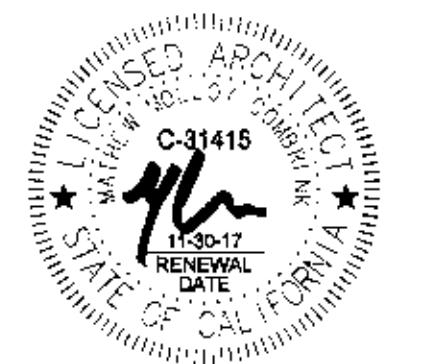
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3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
renovation

novato, california  
project number: 16-148.01  
scale: as noted  
date: 03/10/2017

CONSTRUCTION  
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APPLICATION MATRIX	Mandatory Chapter 5
<p><b>5.504.4.3 Paints and coatings.</b> Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3, shall be determined by classifying the coating as a Flat, Nonflat, or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36, and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat, or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.</p> <p><b>TABLE 5.504.4.3 - VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS</b></p> <p><b>5.504.4.3.1 Aerosol paints and coatings.</b> Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.</p> <p><b>5.504.4.4 Carpet systems.</b> All carpet installed in the building interior shall meet at least one of the following testing and product requirements:</p> <ol style="list-style-type: none"> <li>1. Carpet and Rug Institute's Green Label Plus Program.</li> <li>2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1.1, or <i>Specification 01350</i>)</li> <li>3. NSF/ANSI 140 at the Gold level or higher.</li> <li>4. Scientific Certifications Systems Sustainable Choice; or</li> <li>5. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database.</li> </ol> <p><b>5.504.4.4.1 Carpet cushion.</b> All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.</p> <p><b>5.504.4.4.2 Carpet adhesive.</b> All carpet adhesive shall meet the requirements of Table 5.504.4.1.</p> <p><b>5.504.4.5 Composite wood products.</b> Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted by the ATCM must meet the specified emission limits as shown in Table 5.504.4.5.</p> <p><b>TABLE 5.504.4.5 - FORMALDEHYDE LIMITS</b></p>	<input type="checkbox"/>

APPLICATION MATRIX	Mandatory Chapter 5
<p><b>5.504.4.6 Resilient flooring systems.</b> For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:</p> <ol style="list-style-type: none"> <li>1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;</li> <li>2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;</li> <li>3. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database; or</li> <li>4. Products certified under the UL GREENGUARD Gold (formerly the Greenguard Children &amp; Schools program).</li> </ol> <p><b>5.504.5.3 Filters.</b> In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed prior to occupancy and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.</p> <p><b>Exceptions:</b></p> <ol style="list-style-type: none"> <li>1. An ASHRAE 10-percent to 15-percent efficiency filter shall be permitted for an HVAC unit meeting the 2016 California Energy Code having 60,000 Btu/h or less capacity per fan coil, if the energy use of the air delivery system is 0.4 W/cfm or less at the design air flow.</li> <li>2. Existing mechanical equipment.</li> </ol> <p><b>5.504.5.3.1 Labeling.</b> Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.</p>	<input type="checkbox"/>
<p><b>INDOOR MOISTURE CONTROL</b></p> <p><b>5.505.1 Indoor moisture control.</b> Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of this code.</p>	<input type="checkbox"/>
<p><b>INDOOR AIR QUALITY</b></p> <p><b>5.506.1 Outside air delivery.</b> For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the 2018 California Energy Code, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.</p>	<input type="checkbox"/>

APPLICATION MATRIX	Mandatory Chapter 5
<p><b>ENVIRONMENTAL COMFORT</b></p> <p><b>5.507.4 Acoustical control.</b> Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E 413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.</p> <p><b>Exception:</b> Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.</p> <p><b>Exception: [DSA-SS]</b> For public schools and community colleges, the requirement of this section and all subsections apply only to new construction.</p> <p><b>5.507.4.1 Exterior noise transmission prescriptive method.</b> Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:</p> <ol style="list-style-type: none"> <li>1. Within the 65 CNEL noise contour of an airport.</li> </ol> <p><b>Exceptions:</b></p> <ol style="list-style-type: none"> <li>1. <math>L_{eq}</math> or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.</li> <li>2. <math>L_{eq}</math> or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.</li> </ol> <p><b>5.507.4.1.1 Noise exposure where noise contours are not readily available.</b> Buildings exposed to a noise level of 65 dBL<sub>eq</sub>-1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).</p> <p><b>5.507.4.2 Performance method.</b> For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (<math>L_{eq}</math>-1hr) of 50 dBA in occupied areas during any hour of operation.</p> <p><b>5.507.4.2.1 Site features.</b> Exterior features such as sound wall or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.</p>	<input type="checkbox"/>

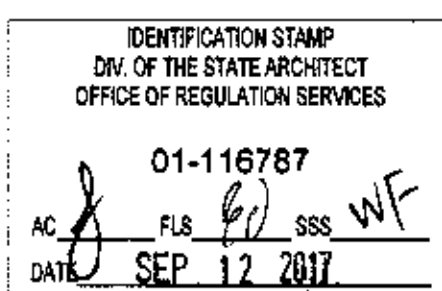
APPLICATION MATRIX	Mandatory Chapter 5
<p><b>5.507.4.3 Interior sound transmission.</b> Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.</p> <p><b>Note:</b> Examples of assemblies and their various STC rating may be found at the California Office of Noise Control website.</p>	<input type="checkbox"/>
<p><b>OUTDOOR AIR QUALITY</b></p> <p><b>5.508.1 Ozone depletion and greenhouse gas reductions.</b> Install HVAC and refrigeration and fire suppression equipment shall comply with 5.506.1.1 and 5.508.1.2.</p> <p><b>5.508.1.1 Chlorofluorocarbons (CFCs)</b> Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.</p> <p><b>5.508.1.2 Halons</b> Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.</p>	<input type="checkbox"/> <input type="checkbox"/>

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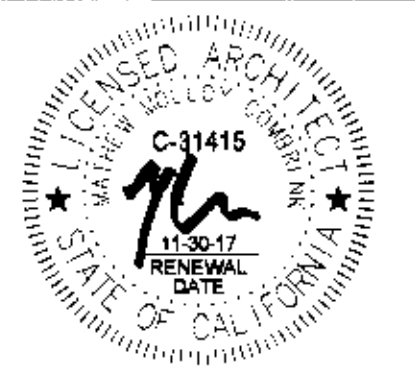
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5/31/17 DSA PLAN REVIEW  
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rev date issue



COM IVC Bldg. 11  
renovation

novato, california  
project number: 16-148-01

scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS

CAL-GREEN  
CHECKLIST

G4.1

STATE OF CALIFORNIA  
**ENVELOPE COMPONENT APPROACH**  
 CERTIFICATE OF COMPLIANCE  
 Envelope Component Approach  
 Project Name: College of Marin Indian Valley Campus Building 11 Renovation Date Prepared: 6/1/2017 Page of

**A. GENERAL INFORMATION**

01	Project Location:	1800 Ignacio Boulevard	06	Compliance Method:	<input checked="" type="checkbox"/> Component <input type="checkbox"/> Unconditioned (file Affidavit)
02	CA City and Zip Code:	Novato CA 94949	07	Building Front Orientation:	North
03	Climate Zone:	3	08	Phase of Construction:	<input type="checkbox"/> New Construction <input type="checkbox"/> Additions <input checked="" type="checkbox"/> Alteration <input type="checkbox"/> Nonresidential
04	Total Conditioned Floor Area:	6400 sf	09	Building Occupancy:	<input type="checkbox"/> High Rise Residential <input type="checkbox"/> Hotel/Motel Guest Room
05	Building Type:	<input checked="" type="checkbox"/> Schools (Public Schools) <input type="checkbox"/> Relocatable Public School Building <input checked="" type="checkbox"/> Conditioned Spaces <input type="checkbox"/> Unconditioned Spaces <input type="checkbox"/> Skylight Area for Large Enclosed Space > 5000 ft. (If checked, include the NRCC-ENV-04-E with submittal)			

**B. ENVELOPE DETAILS - FRAMED**

Tag/ID	Assembly Type	Frame Material	Frame Depth	Frame Spacing	Cavity R-value	Continuous Insulation R-value	Appendix JA4 Reference Table	Proposed U-Factor	Required U-Factor from Tables 140.3-B, C, or D	Field Inspection Comments
Roof	Wood	[E]	[E]		33.48	30	4.2.3	0.024	0.03	0.034
Wall	Wood	[E]	[E]		17.66	15	4.3.2	0.044	0.06	0.110

**C. ENVELOPE DETAILS - NON-FRAMED**

Tag/ID	Assembly Type	Assembly Materials	Thickness (inches)	Interior or Core Insulation R-Value	Continuous Insulation R-value	Appendix JA4 Reference Table	Proposed U-Factor	Required U-Factor from Tables 140.3-B, C, or D	Field Inspection Comments
N/A									

**D. ENVELOPE DETAILS - MASS**

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
**ENVELOPE COMPONENT APPROACH**  
 CERTIFICATE OF COMPLIANCE  
 Envelope Component Approach  
 Project Name: College of Marin Indian Valley Campus Building 11 Renovation Date Prepared: 6/1/2017 Page of

**F. AIR BARRIER**

01	02	03	04	05
Name	Air Barrier Material Type	Air Barrier Assembly Type	Whole Building Air Leakage Testing	Comments
N/A				

**G. FENESTRATION PROPOSED AREAS AND EFFICIENCIES**

Tag/ID	Fenestration Type	Surface Area	Orientation	# of Panes	Max U-Factor	Max [R]SHGC	Min VT	Label	Overhang	Condition Status	Comments
	SKYLIGHT	64 SF	Roof	4	0.58	0.25	0.49	NFRC 100	N/A	NEW	
W1	WINDOW	19.25SF	East	2	0.46	0.22	0.32	NFRC 100	N/A	UPGRADE	
W2	WINDOW	19.25SF	North	1	0.36	0.25	0.42	NFRC 100	N/A	UPGRADE	
W3	WINDOW	31.55F	South	1	0.36	0.25	0.42	NFRC 100	N/A	UPGRADE	
W4	WINDOW	6 SF	West	2	0.46	0.22	0.32	NFRC 100	N/A	UPGRADE	
W5	WINDOW	4.4 SF	North	1	0.36	0.25	0.42	NFRC 100	N/A	NEW	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
**ENVELOPE COMPONENT APPROACH**  
 CERTIFICATE OF COMPLIANCE  
 Envelope Component Approach  
 Project Name: College of Marin Indian Valley Campus Building 11 Renovation Date Prepared: 6/1/2017 Page of

01	02	03	04	05	06	07	08	09	10	11
Tag/ID	Mass Type	Density (lb/ft)	Mass Thickness (inches)	Furring Strip Thickness (inches)	Interior Insulation R-Value	Exterior Insulation R-Value	Appendix JA4 Reference Table	Proposed U-Factor	Required U-Factor from Tables 140.3-B, C, or D	Field Inspection Comments
N/A										

**E. ROOFING PRODUCTS (COOL ROOF)**

01	02	03	04	05	06	07	08	09	10	11
Mass Roof 25 lb/ft or Greater	Roof Pitch	CRR Product ID Number	Product Type	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)	Comments

**NOTES:**  
 1. Check the box if the aged Solar Reflectance was not available in the Cool Roof Council's Rated Product Directory, then use the equation in Section 110.8(i)(2):  $a_{s,r} = 0.2 + 6/a_{s,r}$   
 2. Calculate the SRI Value by using the SRI Worksheet and enter the resulting value in the SRI column above and attach a copy of the SRI Worksheet (NRCC-ENV-03-E) to this compliance document.

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
**ENVELOPE COMPONENT APPROACH**  
 CERTIFICATE OF COMPLIANCE  
 Envelope Component Approach  
 Project Name: College of Marin Indian Valley Campus Building 11 Renovation Date Prepared: 6/1/2017 Page of

**H. ENVELOPE MANDATORY MEASURES**

Indicate location on building plans of Mandatory Envelope Measures Note Block: G5.0, G5.1

**INSTRUCTIONS TO APPLICANT ENVELOPE COMPLIANCE & WORKSHEETS (check box if worksheet are included)**

For detailed instructions on the use of this and all Energy Efficiency Standards compliance documents, please refer to the Energy Commission website.

NRCC-ENV-01-E Certificate of Compliance. Required on plans for all submittals.  
 NRCC-ENV-04-E Use when minimum skylight requirements for large enclosed spaces are required in climate zones 2 through 15. Optional on plans.

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: MATT COMBRINK  
 Company: BRICK  
 Address: 1206 66TH STREET SUITE 1  
 City/State/Zip: EMERYVILLE, CA 94608  
 Phone: 510.488.6726

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

I certify the following under penalty of perjury, under the laws of the State of California:

- The information provided on this Certificate of Compliance is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
- The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
- I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: MATT COMBRINK  
 Company: BRICK  
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COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 16-148.01

scale: as noted  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 COMPLIANCE FORMS - ENVELOPE

**G5.0**

STATE OF CALIFORNIA  
**FENESTRATION WORKSHEET**  
 CEC-NRCC-ENV-02-E (Revised 09/16)  
 CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-ENV-02-E  
 Fenestration Worksheet Page of  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Prepared: 2017-06-01

**A. WINDOWS DETAILS WORKSHEET - §140.3(a)(6), C and D**  
 NOTE: Newly installed fenestration shall have a certified NRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Size-built fenestration less than 1,000 ft<sup>2</sup>, see Reference Nonresidential Appendix NA6.  
 Prescriptively, skylights shall have a glazing material or diffuser that has a measured haze value greater than 90%, determined according to ASTM D1003, or other test method approved by the Energy Commission.

01	02	03	04	Fenestration				Overhang					
				U-Factor	SHGC	VT	Dimensions	Calculated	Max (R)SHGC	Max (R)SHGC	Max (R)SHGC		
Tag/ID	Window Type (e.g. Window-1)	Surface Area	Proposed	Allowed	Proposed	Allowed	Proposed	Allowed	H	V	H/V	(R)SHGC Proposed	(R)SHGC Allowed
EXISTING												NaN	

**B. WEST WINDOW AREA CALCULATION - See §140.3(a)(5A)**

01. Gross West Exterior Wall Area	$R^2 \times 0.40 =$	0	R <sup>2</sup>	40% of Gross West Facing Exterior Wall Area; or
02. West Display Linear Perimeter	$FT \times 6 ft =$	0	R <sup>2</sup>	West Display Perimeter Area
03. Enter the Larger of 01 or 02		0	R <sup>2</sup>	Maximum Standard West Area
04. Enter Proposed West Window Area			R <sup>2</sup>	Proposed West Window Area

Note: If the PROPOSED WEST WINDOW AREA is greater than the MAXIMUM STANDARD WEST AREA then the envelope component approach may not be used.

**C. WINDOW AREA CALCULATION (for all other orientations other than West) - See §140.3(a)(5A)**

01. Gross Exterior Wall Area	$R^2 \times 6.40 =$	0	R <sup>2</sup>	40% of Gross Exterior Wall Area or
02. Linear Display Perimeter	$FT \times 6 ft =$	0	R <sup>2</sup>	Display Perimeter Area
03. Enter the Larger of 01 or 02		0	R <sup>2</sup>	Maximum Standard Area
04. Enter Proposed Window Area			R <sup>2</sup>	Proposed Window Area

Note: If the PROPOSED WINDOW AREA is greater than the MAXIMUM STANDARD AREA then the envelope component approach may not be used.

**D. SKYLIGHT AREA CALCULATION - See §140.3(a)(6A)**

	ACTUAL GROSS ROOF AREA	STANDARD ALLOWED SKYLIGHT AREA
01. If Atrium/Skylight Height is ≤ 55 ft, or	3364	$ft^2 \times 0.05 = 168.20000000000000$
02. If Atrium/Skylight Height is > 55 ft		$ft^2 \times 0.10 = 0$
03. Proposed Skylight Area (from plans)	64	ft <sup>2</sup>
04. SkylightSSR% = Proposed Skylight Area Divided by Actual Gross Roof Area =	1.90249399%	
05. Haze material value greater than 90% according to ASTM D1003, or other approved method by the Energy Commission		Yes No

1. If the SKYLIGHT SSR % is less than or equal to 5% then choose the appropriate column in Table 140.3-B and C and row in Table 140.3-D.  
 2. If the SKYLIGHT SSR % is greater than 5% then the Envelope Component Approach may not be used.

STATE OF CALIFORNIA  
**FENESTRATION WORKSHEET**  
 CEC-NRCC-ENV-02-E (Revised 09/16)  
 CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-ENV-02-E  
 Fenestration Worksheet Page of  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Prepared: 2017-06-01

**E. RELOCATABLE PUBLIC SCHOOL BUILDINGS - See §140.3(a)(8)**

Option 1

For Specific Climate Zone, use Table 140.3-B - Prescriptive Envelope Criteria.

Specific Climate Zone Metal Identification Label - Place two labels on each relocatable school building and indicate on the building plans.  
 Indicate location from the building plans:

Option 2

For Any (All) Climate Zone, use Table 140.3-D - Prescriptive Envelope Criteria.

Any (All) Climate Zone Metal Identification Label - Place two labels on each relocatable school building and indicate on the building plans.  
 Indicate location from the building plans:

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 CEC-NRCC-ENV-02-E (Revised 09/16)  
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**CERTIFICATE OF COMPLIANCE** NRCC-ENV-02-E  
 Fenestration Worksheet Page of  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Prepared: 2017-06-01

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: MATT COMBRINK  
 Signature Date: 2017-06-01  
 Company: BRICK  
 Address: 1266 66TH STREET SUITE 1  
 City/State/Zip: EMERYVILLE CA 94608  
 Phone: 510-488-6726

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- The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
- I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

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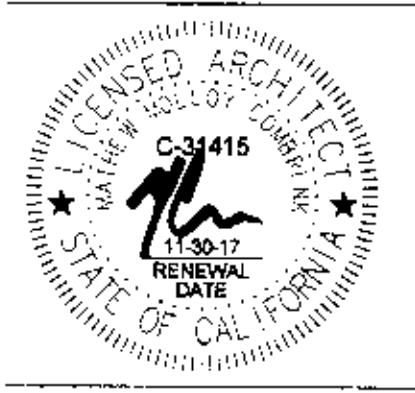
**CLIENT**  
 Marin Community College District  
 835 College Avenue  
 Kenfield, CA 94604

IDENTIFICATION STAMP  
 DIV. OF THE STATE ARCHITECT  
 OFFICE OF REGULATION SERVICES

01-116787  
 AC, FL, SS, WF  
 DATE: SEP 12 2017

9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
 renovation

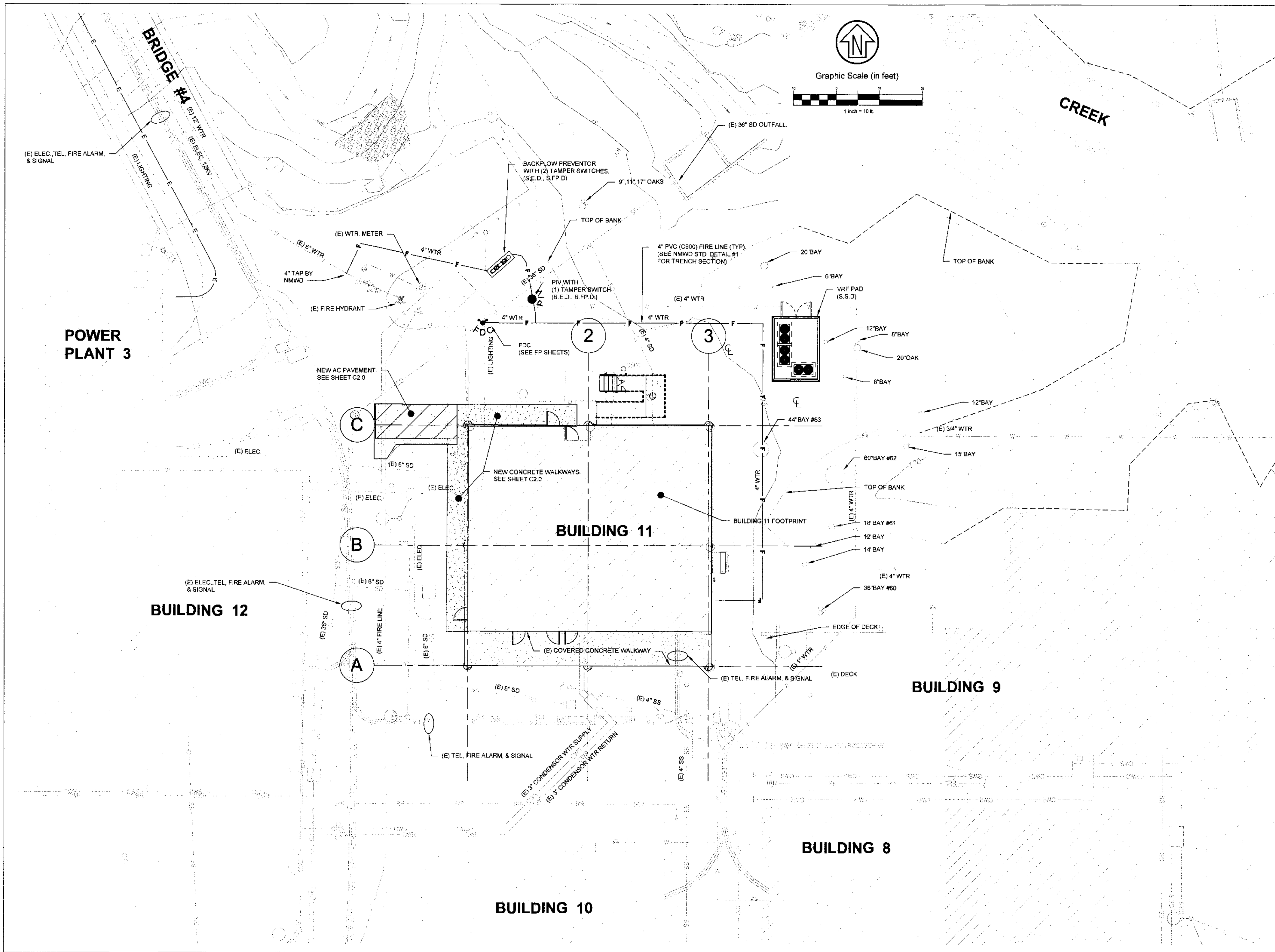
novato, california  
 project number: 16-148.01

scale: as noted  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 COMPLIANCE FORMS - FENESTRATION

G5.1

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kentfield, ca 94904

DIVISION OF THE STATE ARCHITECT  
IDENTIFICATION STAMP  
PROJECT: 01-116787  
APPL: [Signature]  
AC: [Signature] FLS [Signature] SSS [Signature] WF  
DATE: SEP 12 2017

CSW ST

CSW/Stubbs-Strooh  
Engineering Group, Inc.

45 Leveroni Court tel: 415.863.9850  
Novato, CA 94949 fax: 415.863.9833

Civil & Structural Engineers  
Surveying & Mapping  
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college of marin -  
indian valley  
campus bldg. 11  
renovation

novato, california  
project number: 16-148.01

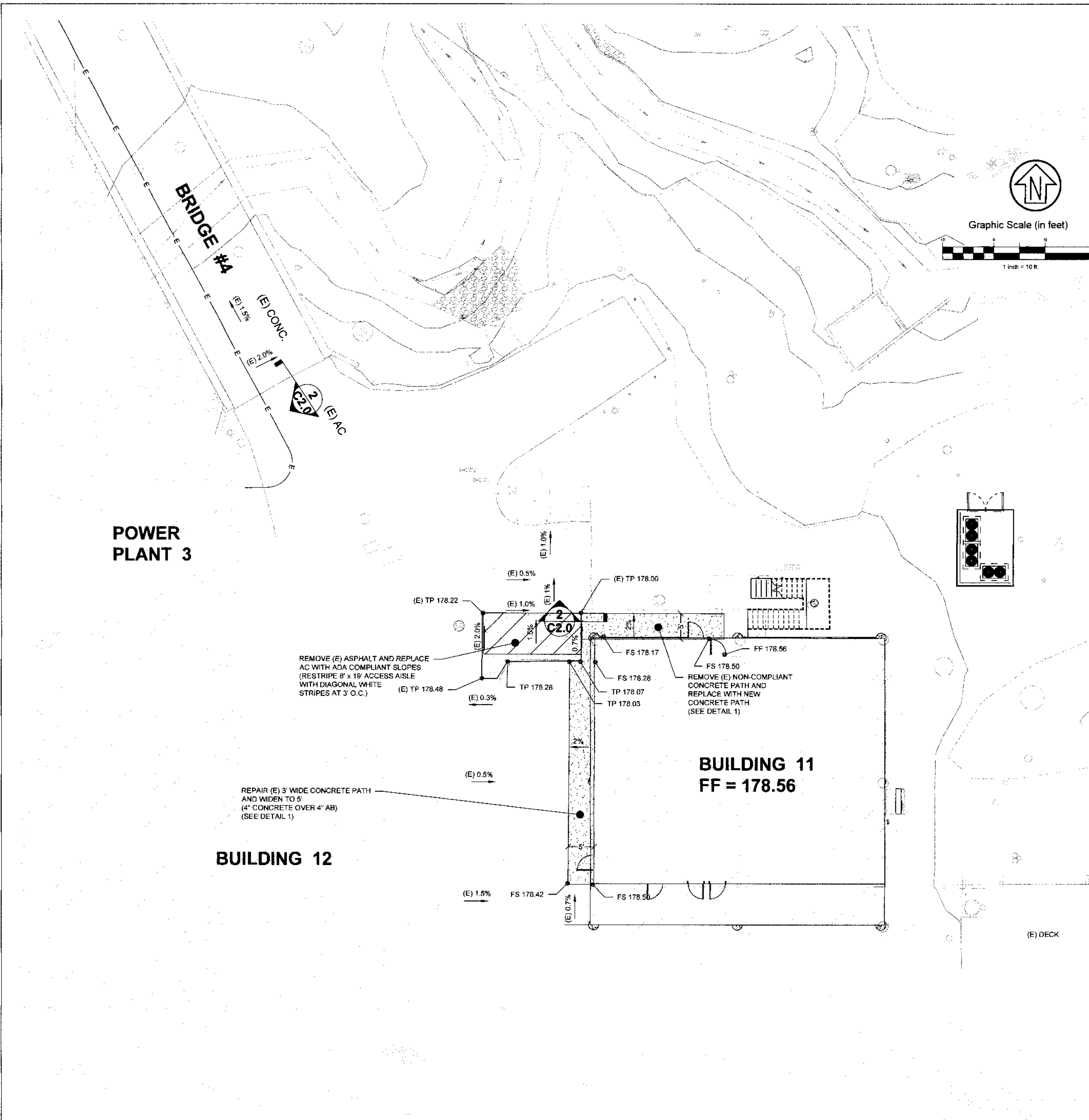
scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
SITE UTILITY PLAN

C1.0

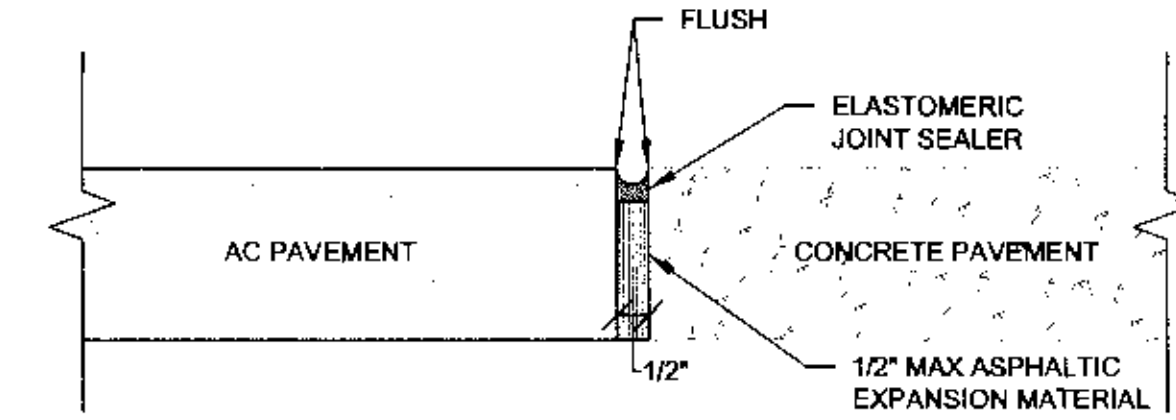
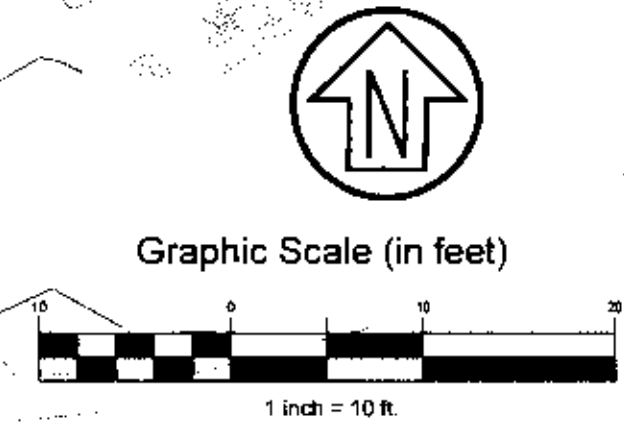
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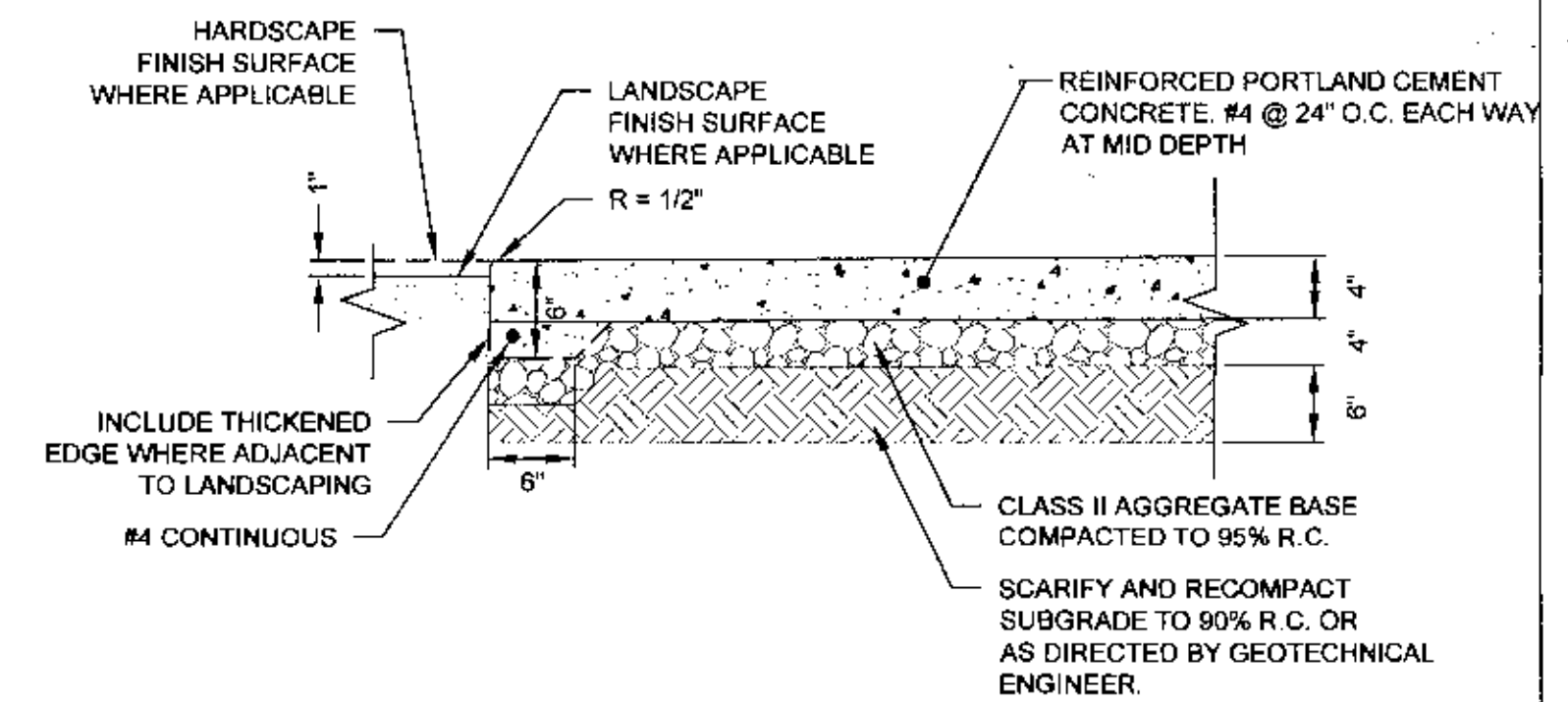


**ABBREVIATIONS**

AC	ASPHALT CONCRETE
AB	AGGREGATE BASE
(E)	EXISTING
FF	FINISHED FLOOR
FS	FINISHED SURFACE
TP	TOP OF PAVEMENT



**2 AC PAVEMENT TO CONCRETE PAVEMENT CONNECTION DETAIL**  
SCALE: NTS



**1 PEDESTRIAN CONCRETE SIDEWALK DETAIL**  
SCALE: 1" = 1'

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**DIVISION OF THE STATE ARCHITECT IDENTIFICATION STAMP**

APPL 01-116787  
AC & FLS @ SSS WF  
DATE SEP 12 2017

**CSW ST**

**CSW/Stuber-Streeb Engineering Group, Inc.**

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Novato, CA 94949 fax: 415.883.8635

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issue	issue



college of marin - indian valley campus bldg. 11 renovation

novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

**CONSTRUCTION DOCUMENTS**

**SITE ACCESSIBILITY IMPROVEMENTS**

**C2.0**

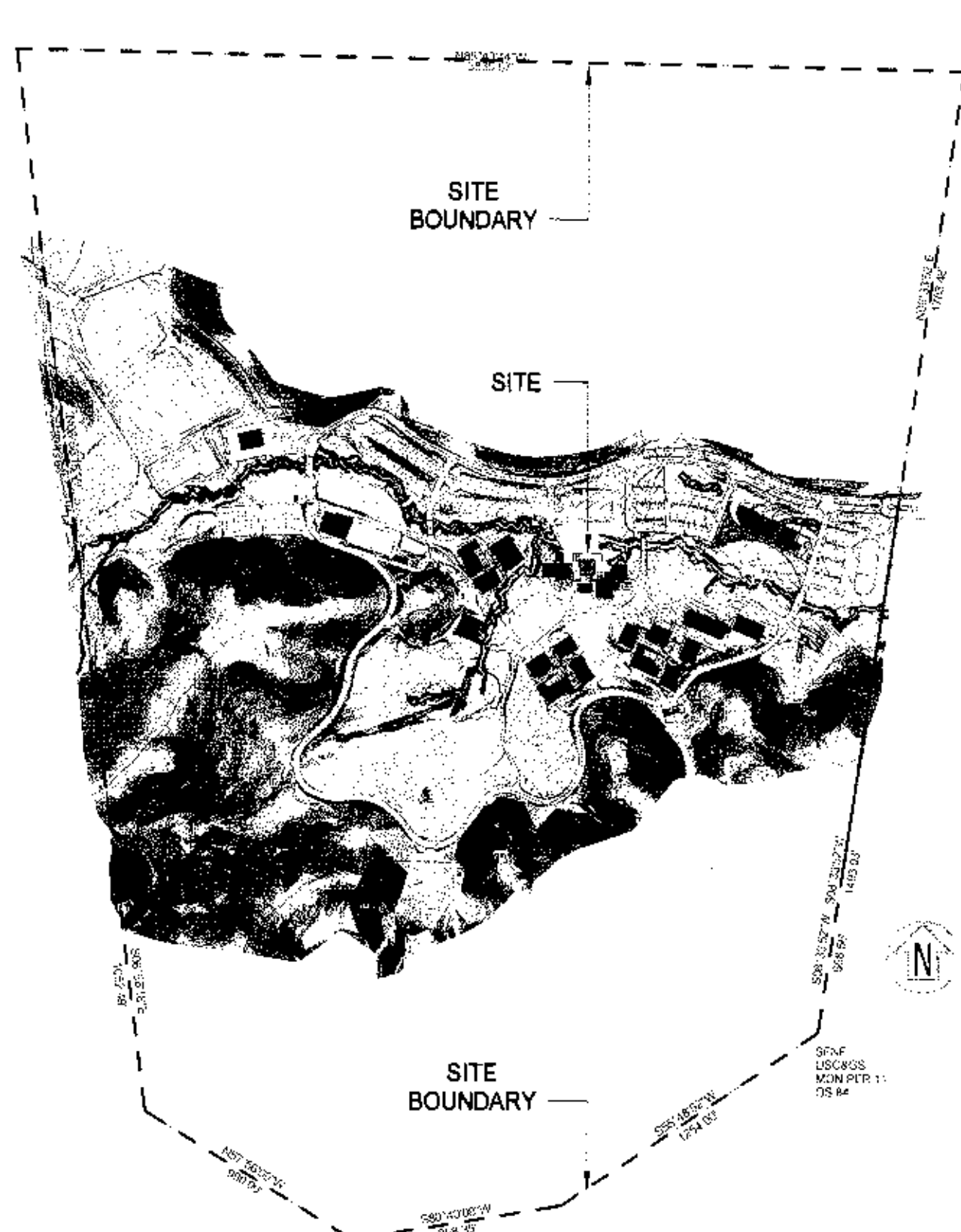
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BUILDING NUMBER	DESCRIPTION	DSA/O&A NUMBER
1	POMO 1-AUTO BODY	36398
2	POMO 2-AUTO TECHNOLOGY LAB	37169
3	CLASSROOMS/LABORATORY/OFFICES	37169
4	MACHINE & METAL TECHNOLOGY	37169
5	MATHEMATICS LABORATORY/VENDING	37169
6	CLASSROOMS/OFFICES	37169
7	CLASSROOMS/OFFICES	36398
8	COLLEGE OPERATIONS, FISCAL SERVICES	35993
9	ADMINISTRATIVE SERVICES	35993
10	ASSOCIATED STUDENTS (EMERITUS STUDENTS COLLEGE OF MARIN (ESCOM))	35993
11	INFORMATION SYSTEMS	36398
12	CHILD DEVELOPMENT	35993
13	ART LABORATORY/GALLERY/CLASSRM	35993
14	CLASSROOMS/OFFICES	35993
15	CLASSROOM (OLD THEATER/LOUNGE)	35993
16	DIGITAL VILLAGE	35993
17	CAREER STUDY CENTER (OLD LIBRARY)	37169
18	COMPUTER LABORATORY/CLASSRMS	35993
19	CLASSROOMS/LABORATORY/OFFICES	35993
20	FOOD SERVICES/CLASSROOMS/MULTIMEDIA	35993
21	POOL/LOCKER ROOM	
22	CORPORATION YARD	35993
27	CLASSROOM/STUDENT SERVICES AND LIBRARY	01-109797

DATES	DESCRIPTION / OTHER	DSA/O&A NUMBER
05/01/73	SITE 69 71013	35884
05/01/73	PERIMETER ROAD	35884
05/01/73	BRIDGE #6	35884
06/29/73	ADMINISTRATION BUILDING (AS)	35993
09/29/73	BASKETBALL & VOLLEYBALL COURTS	35993
09/29/73	COLLEGE A (OL)	35993
05/01/73	COLLEGE B (MW)	35993
06/29/73	POWERPLANT #1 PP1	35993
06/29/73	POWERPLANT #2 PP2	35993, 36398
06/29/73	POWERPLANT #3 PP3	35993
06/29/73	TENNIS COURTS (T1)	35993
07/03/73	PHASE I 71014	35993
04/08/74	SITE 73 72101	36841
11/08/74	PHASE II 72102	37169
08/23/76	PHASE III 75101-72103	39526
09/24/76	IVC PHASE IV 74081 PM7, PM BLDG. 1, 1S	36398
12/05/77	MAIN ENTRANCE GATES	75077
04/25/86	STRUCTURAL RENOVATION/REPAIR PH 1	47256
01/22/87	STRUCTURAL RENOVATION/REPAIR PH 2	48011
08/24/87	STRUCTURAL RENOVATION/REPAIR PH 3	48987
11/24/87	COGEN PLANTS	49432
06/24/89	EROSION CONTROL PH 1	51009
09/22/94	AUTO LIFT INSTALLATION	61309
07/02/95	IVC ATHLETIC FIELDS CITY OF NOVATO	64855
07/01/96	AUTO SHOP HEATING SYSTEM	65312
03/24/99	AUTO BODY SHOP HEATING SYSTEM	101371
10/01/99	INFANT TODDLER CENTER	101253
10/12/99	POOL SYSTEM MODERNIZATION	102000
02/14/02	ASPHALT UPGRADES	104299

PLAN 10-10-2011  
P.L.C. & N.A. NO. 81  
SHEET NO. 27 OF 27



PARKING TABULATION

THE NUMBER OF ACCESSIBLE SPACES REQUIRED BASED ON LOT SIZE IS AS FOLLOWS:

1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2% OF TOTAL

PARKING LOTS	TOTAL SPACES	CAR ACCESSIBLE SPACES	VAN ACCESSIBLE SPACES
1	76	3	1
2	121	4	2
3	71	1	1
4	111	7	1
5	91	1	1
6	35	0	2
ADDITIONAL CAMPUS PARKING			
P-9	1	0	1
P-10	2	1	1
P-11	1	1	0
P-12	2	2	0
P-13	4	1	0
TOTALS	515	21	10

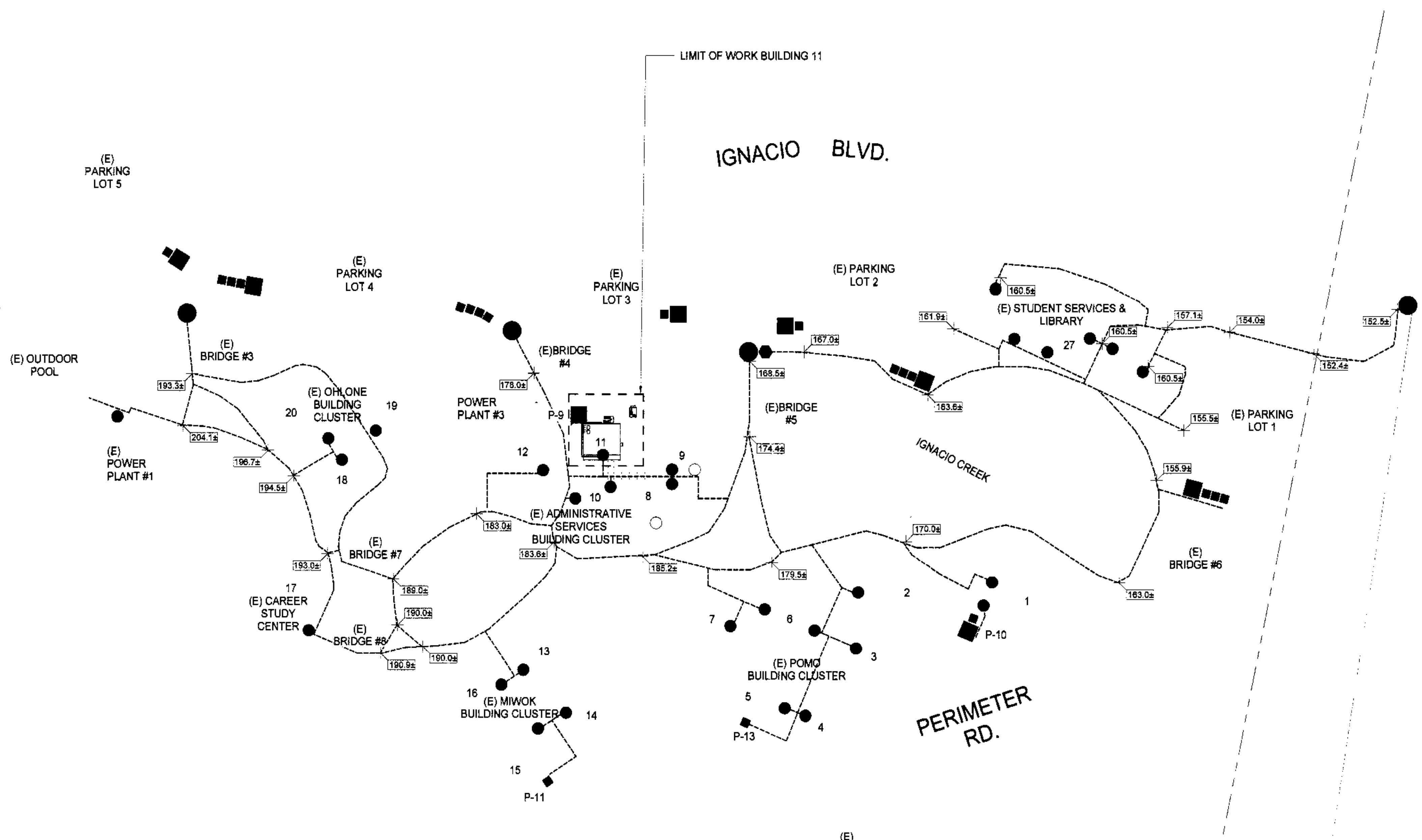
NOTES:  
1. PROPOSED ACCESSIBLE PATH OF TRAVEL AS INDICATED ON PLAN IS A BARRIER FREE ACCESS P.O.T. WITHOUT ANY ABRUPT LEVEL CHANGES EXCEEDING 1/2" BEVELED AT 1:2 MAX. SLOPE, OR VERTICAL LEVEL CHANGES NOT EXCEEDING 1/4" MAX. AND AT LEAST 48" WIDE. SURFACE IS SLIP RESISTANT, STABLE, FIRM, AND SMOOTH. CROSS SLOPE DOES NOT EXCEED 2% AND SLOPE IN THE DIRECTION OF TRAVEL IS LESS THAN 5% UNLESS OTHERWISE INDICATED. P.O.T. SHALL MAINTAIN FREE OF OVERHANGING OBSTRUCTIONS TO MINIMUM 80" (11B-307.4) AND PROTRUDING OBJECTS GREATER THAN 4" PROJECTION FROM WALL AND ABOVE 27" AND LESS THAN 80" (11B-307.2)  
2. ALL BUILDING ENTRANCES / EXITS ALONG THE INDICATED PROPOSED PATH OF TRAVEL ARE ACCESSIBLE UNLESS OTHERWISE NOTED.  
3. EXISTING ACCESSIBLE PARKING, ENTRANCES, AND PATHS OF TRAVEL ARE SHOWN ACCORDING TO INFORMATION PROVIDED BY THE COLLEGE OF MARIN.

LEGEND:

- CAMPUS ENTRANCE
- PROPERTY LINE
- EXISTING DESIGNATED ACCESSIBLE PATH OF TRAVEL
- PROPOSED ACCESSIBLE PATH OF TRAVEL 48" WIDE MIN. SLOPE < 5%
- ACCESSIBLE BUILDING ENTRANCE (2% MAX SLOPE TO DOOR)
- ENTRANCE
- EXISTING ACCESSIBLE PARKING SPACE
- EXISTING ACCESSIBLE VAN PARKING SPACE
- BUS STOP
- PASSENGER DROP OFF
- 174.48 SPOT ELEVATION

DSA/O&A TABULATION

1/8" = 1'-0"



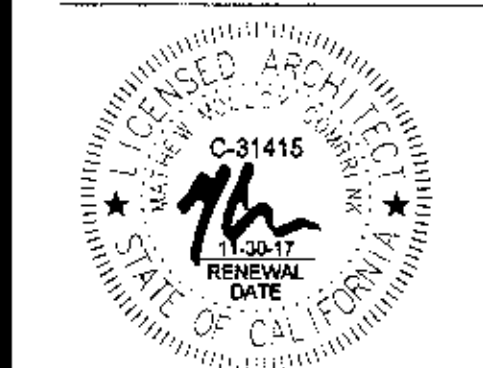
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01-116787  
AC 8 P.L. 90 SSS WF  
DATE SEP 12 2011

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3/10/17 100% CD

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COM IVC Bldg. 11  
renovation

novato, california  
project number: 16-148.01

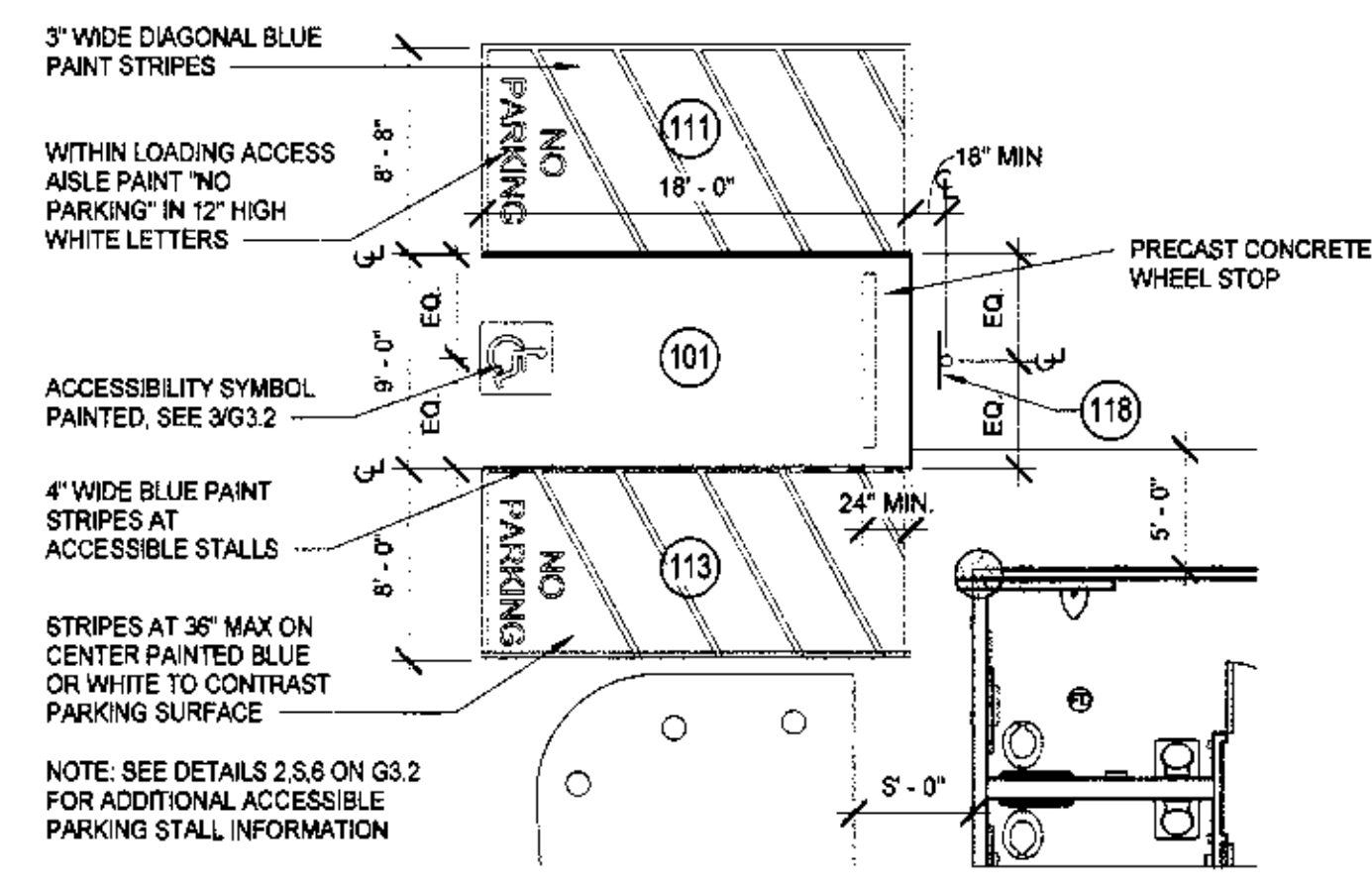
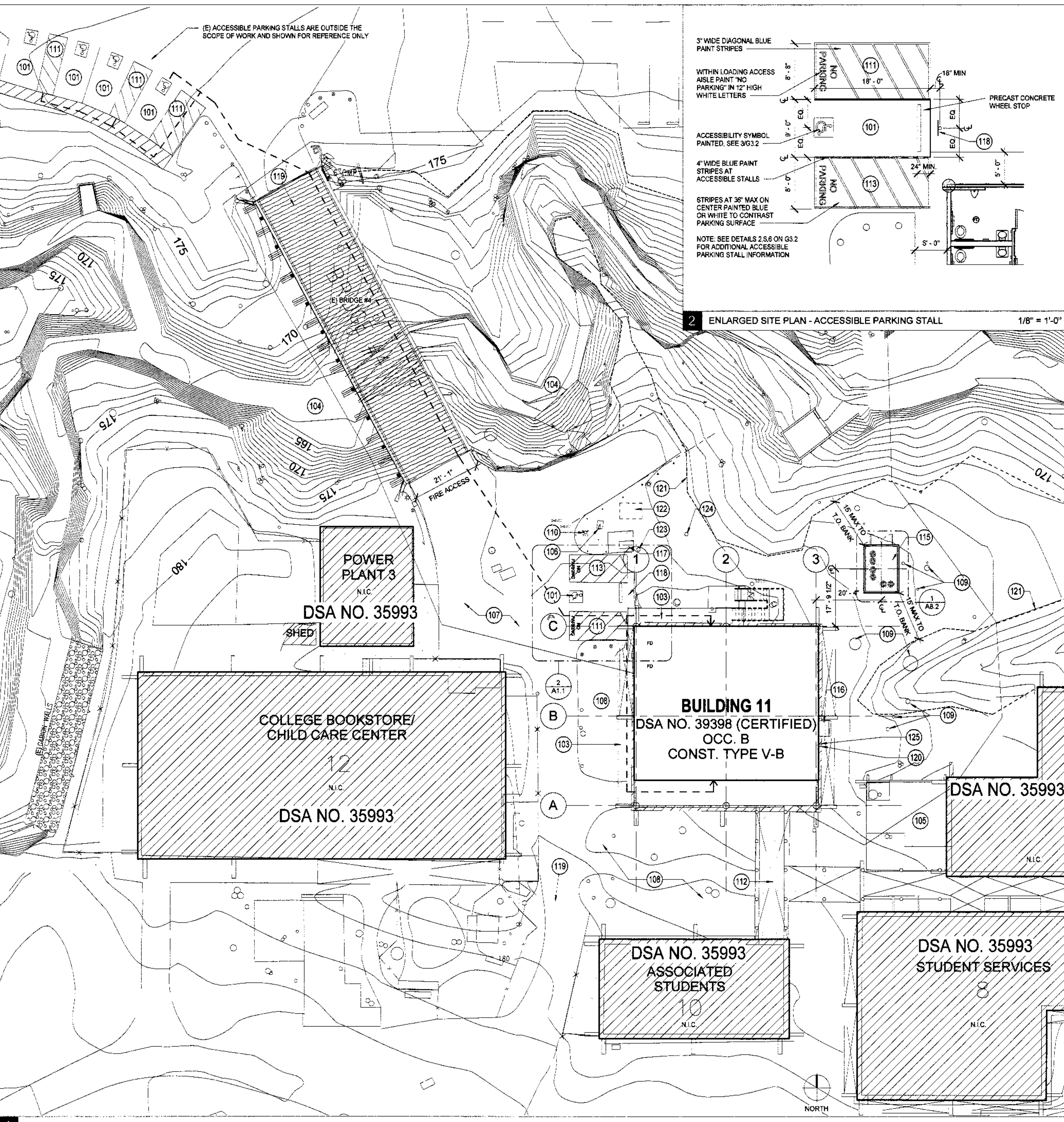
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CONSTRUCTION DOCUMENTS

CAMPUS ACCESSIBILITY PLAN

A1.0

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**2 ENLARGED SITE PLAN - ACCESSIBLE PARKING STALL** 1/8" = 1'-0"

**1 SITE PLAN** 1/16" = 1'-0"

**LOCAL FIRE AUTHORITY REVIEW**

To facilitate the Division of the State Architect's (DSA) approval of the Fire/Life Safety portion of a project, DSA requires Local Fire Authority (LFA) review of certain elements as identified in this form. Use of this form is mandatory for projects that add square footage to a campus or if any item on this form is relevant to the project. For additional information, see DSA 810 Instructions and DSA Policy 06-01.

**PROJECT INFORMATION**  
 School District/Owner: Marin Community College District  
 Project Name/School: College of Marin Indian Valley Campus Maintenance & Operations Facility  
 Project Address: 1800 Ignacio Blvd, Novato, CA 94949

**LOCAL FIRE AUTHORITY (LFA)**  
 LFA Agency Name: Novato Fire Protection District  
 LFA Reviewer Name: Lori Jessell Title: Deputy Fire Marshal  
 Email: jessell@novatofire.org Telephone Number: 415.879.12622

I have reviewed and responded to the applicable items for this project as listed below.  
 Note: Only sign this form when it is imaged onto the site plan. A loose form is not acceptable to DSA.  
 LFA Reviewer's Signature: *Lori Jessell* Date: 9/5/17  
 Review Key: "Y" = Complies with LFA requirements "N" = Not approved (complete Section 8)  
 "NA" = Not applicable to the project "NR" = LFA elects not to review

Description	Y	N	NA	NR
1 Where an elevator does not meet medical emergency service cab size, per the California Building Code (CBC), use of stairways for emergency rescue and patient transport is acceptable.	X			
2 Access roads, fire lane markings, pavers and gate entrances are in accordance with Title 19, California Code of Regulations and the California Fire Code, Chapter 5.	X			
3 Fire hydrant location and distribution complies with the California Fire Code (or see # 4).	X			
4 Fire hydrant location and distribution complies with NFPA 1142, "Alternate Means." If "NR" is checked, DSA can only approve on-site water storage as an alternate. The signature of the school district official is required to acknowledge the use of alternate means.				X
Signature of School District Official: <i>Gregory W. Nelson</i> Date: 9/5/17				
Print the School District Official's Name: Gregory W. Nelson				
5 The location(s) of the proposed post indicator valve and fire department connection meet the requirements of this jurisdiction.	X			
6 The location(s) of the detector check valve assembly meet the requirements of this jurisdiction.	X			
7 Is the project located in a hazard severity zone area? (CBC, Chapter 7A, Section 701A.) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Check type if "Yes": <input type="checkbox"/> Moderate <input checked="" type="checkbox"/> High <input type="checkbox"/> Very High <input type="checkbox"/> WIFA (If one of these boxes is checked, the project design must meet the requirements of Chapter 7A.)				
8 COMMENTS (note deficiencies): Fire sprinklers required, see fire protection drawings for details.				

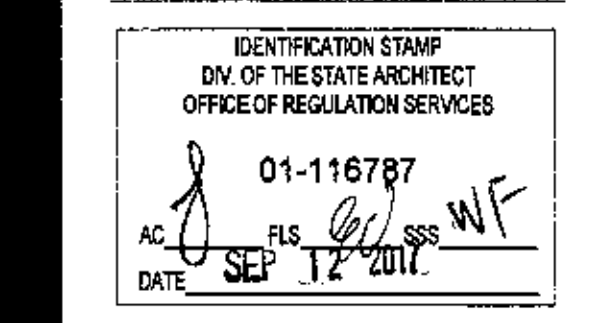
**DSA SUBMITTAL FORM 810** 12" = 1'-0"

- CONCRETE PATH
- WOODEN BRIDGE
- ASPHALT
- ACCESSIBLE PATH OF TRAVEL
- 101 (E) ACCESSIBLE PARKING STALL
- 102 NOT USED
- 103 REMOVE & REPAIR (E) CONC. WALKWAY, S.C.D.
- 104 (E) CREEK, S.C.D.
- 105 (E) WD. DECK, S.C.D.
- 106 (E) WATER METER, S.C.D.
- 107 (E) ASPHALT DRIVE AISLE AND WALKWAY, S.C.D.
- 108 (E) LANDSCAPE AREA, S.C.D.
- 109 (E) TREE, S.C.D.
- 110 (E) FIRE HYDRANT
- 111 (E) ACCESSIBLE WALK AISLE
- 112 (E) WOOD FRAMED COVERED WALKWAY
- 113 REPAIR (E) WALK AISLE, S.C.D.
- 114 NOT USED
- 115 NEW MECH. UNITS ON CONC. PAD W/ SCREENED ENCLOSURE + GATE, S.M.D., S.C.D., S.S.D.
- 116 (E) MECH. UNIT
- 117 (E) MAILBOXES, S.C.D.
- 118 NEW ACCESSIBLE PARKING STALL SIGNAGE, SEE DETAIL 28/5/G3.2
- 119 FIRE ROUTE ACCESS, SEE OVERALL CAMPUS PLAN A1.0
- 120 FIRE RISER, S.F.P.D.
- 121 T.O. BANK, S.C.D.
- 122 BACKFLOW PREVENTER W/ 2 TAMPER SWITCHES, S.F.P.D., S.C.D., S.E.D.
- 123 F.D.C., S.C.D., S.F.P.D.
- 124 P.I.V. W/ 1 TAMPER SWITCH, S.C.D., S.F.P.D., S.E.D.
- 125 FIRE SPRINKLER BELL, S.F.P.D., S.E.D.

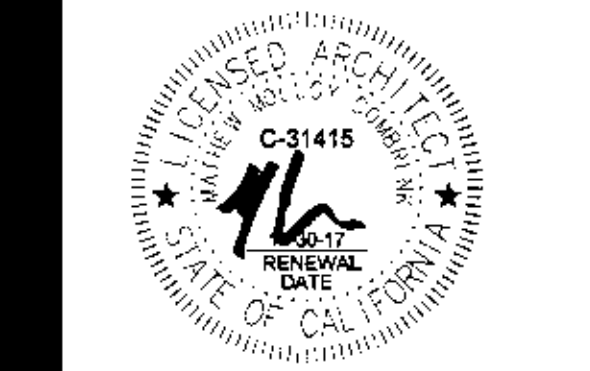
**SITE PLAN KEYNOTES** 1/4" = 1'-0"

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5/31/17	DSA PLAN REVIEW
3/10/17	100% CD
rev date	issue



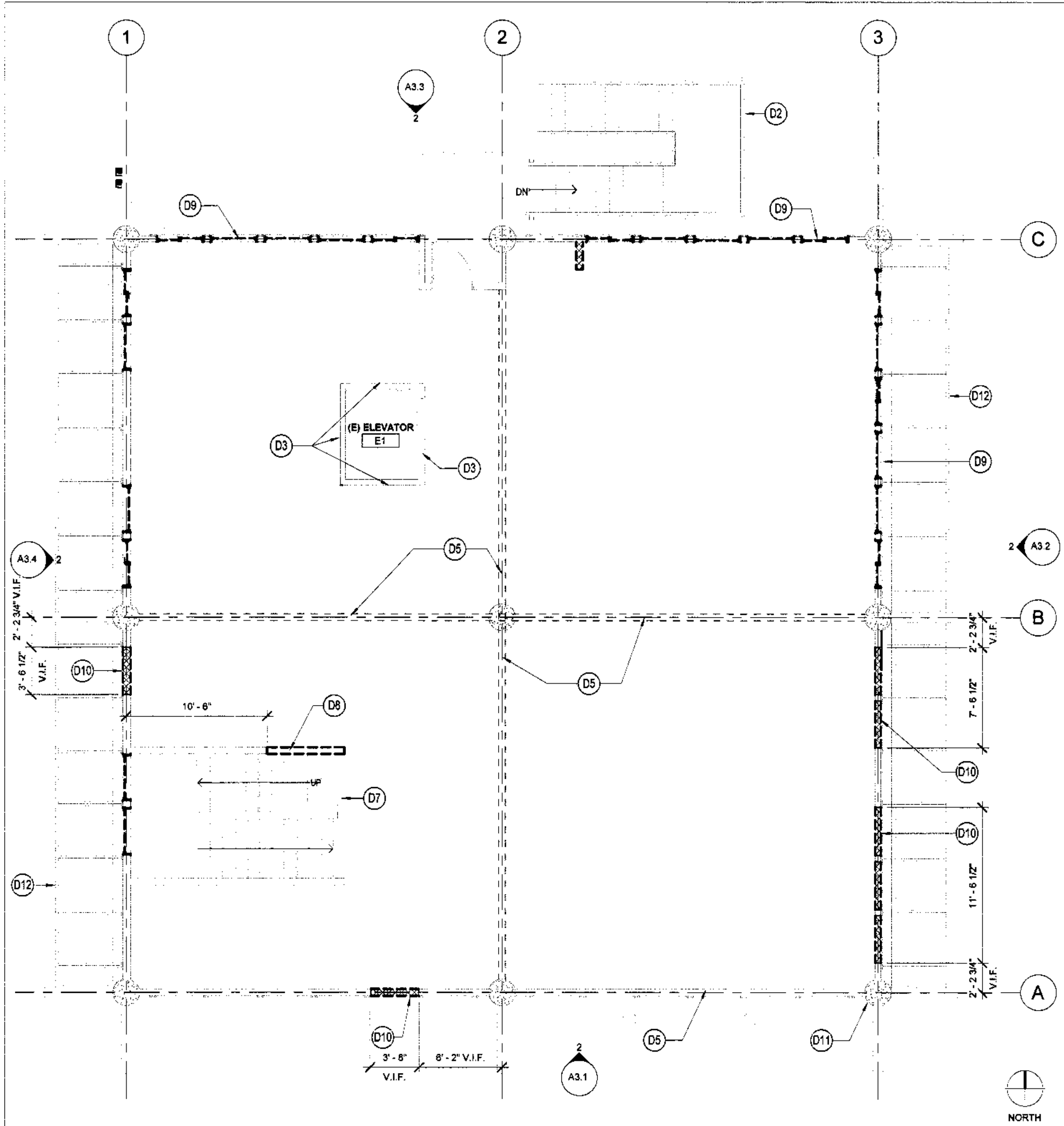
**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 16-148.01

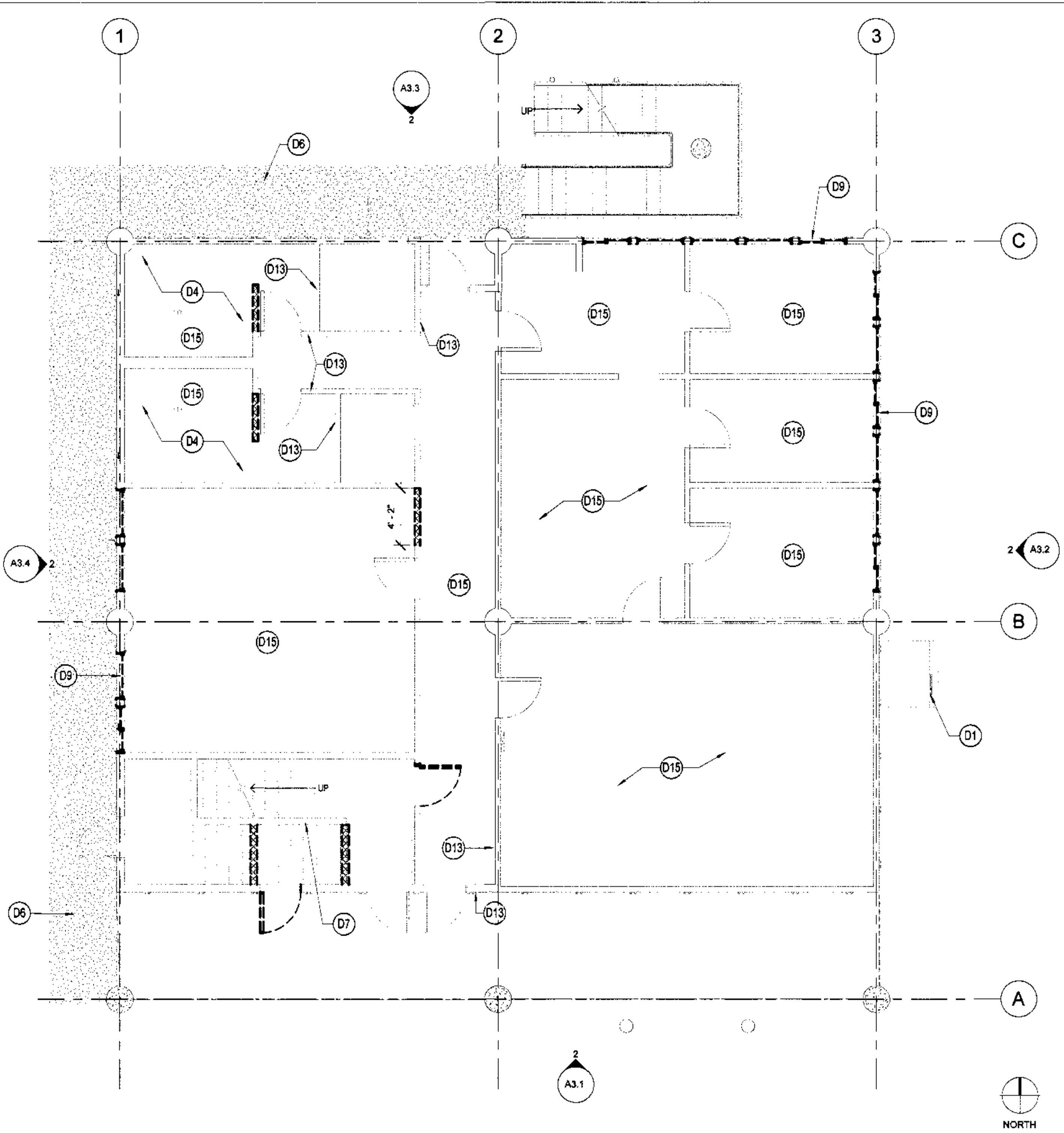
scale: as noted  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**PROPOSED SITE PLAN**

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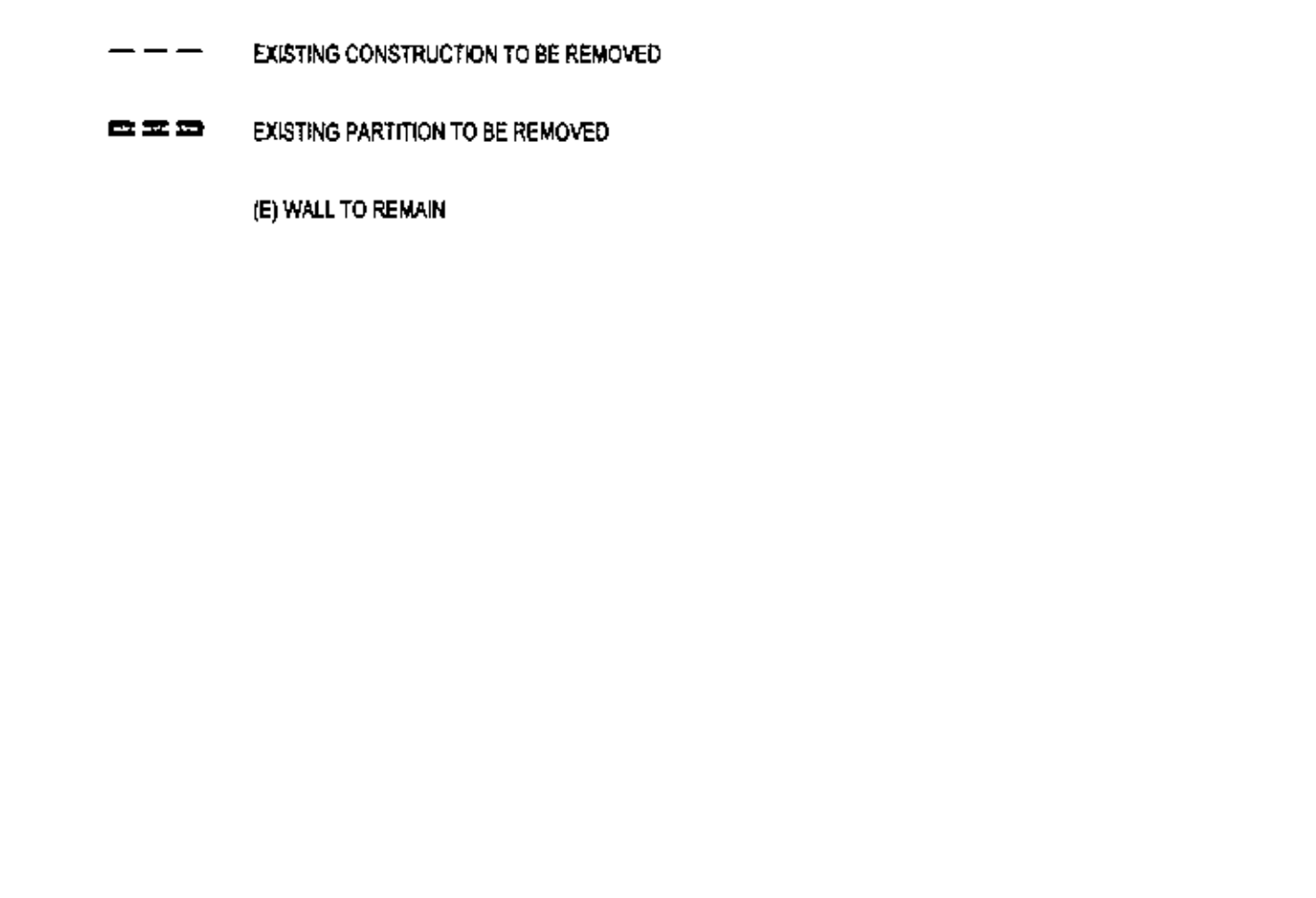
**2 DEMOLITION PLAN - SECOND LEVEL** 3/16" = 1'-0"



**1 DEMOLITION PLAN - FIRST FLOOR** 3/16" = 1'-0"

- DEMOLITION NOTES**
- ALL DEMOLITION WORK BY OTHERS U.O.N. IN DEMOLITION KEYNOTES. NOT EVERY ITEM OF (E) WORK TO BE DEMOLISHED IS INDICATED ON THE DRAWINGS. DEMOLITION WORK INCLUDES THE REMOVAL OF (E) CONSTRUCTION TO THE EXTENT REQUIRED TO ACCOMMODATE THE NEW CONSTRUCTION WHETHER PARTICULARLY INDICATED OR NOT. VISIT THE PROJECT SITE AND REVIEW DRAWINGS SHOWING NEW CONSTRUCTION TO DETERMINE THE EXTENT OF DEMOLITION WORK REQUIRED BEFORE PRICING.
  - IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; IMMEDIATELY NOTIFY ARCHITECT & OWNER.
  - CONDUCT A PRE-DEMOLITION MEETING AT THE PROJECT SITE BEFORE COMMENCING WITH DEMOLITION WORK. INSPECT AND DISCUSS CONDITION OF CONSTRUCTION TO BE SELECTIVELY DEMOLISHED. REVIEW DEMOLITION DOCUMENTS AND REPORT UNRESOLVED ISSUES OR CONFLICTS TO THE ARCHITECT.
  - PROTECT WALLS, CEILINGS, FLOORS AND OTHER EXISTING FINISH WORK TO REMAIN. COVER AND PROTECT FURNITURE, FURNISHINGS AND EQUIPMENT NOT TO BE REMOVED.
  - DO NOT CLOSE OR OBSTRUCT WALKWAYS, CORRIDORS, OR OTHER OCCUPIED OR USED FACILITIES WITHOUT WRITTEN PERMISSION FROM AUTHORITIES HAVING JURISDICTION. MAINTAIN FIRE-PROTECTION, LIFE SAFETY, AND BUILDING SECURITY SYSTEM IN SERVICE DURING DEMOLITION OPERATIONS.
  - MAINTAIN (E) UTILITIES INDICATED TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE. DO NOT REMOVE UTILITY LINES SERVING OTHER PARTS OF THE BUILDING UNTIL NEW REPLACEMENT LINES ARE INSTALLED. REMOVE & CAP UTILITIES CONCEALED BY NEW FINISHED SURFACES WHERE FIXTURES ARE DEMOLISHED.
  - REPAIR DAMAGE CAUSED BY SELECTIVE DEMOLITION TO ADJACENT CONSTRUCTION AND (E) COLUMNS AND RESTORE SURFACES INTENDED TO REMAIN. U.O.N. USE REPAIR MATERIALS IDENTICAL TO (E) MATERIALS. PATCH WITH DURABLE SEAMS THAT ARE AS INVISIBLE AS POSSIBLE. WHERE PATCHING OCCURS IN A PAINTED SURFACE, APPLY PRIMER & INTERMEDIATE PAINT COATS OVER PATCH AND APPLY FINAL PAINT COAT OVER ENTIRE UNBROKEN SURFACE CONTAINING PATCH. PROVIDE ADDITIONAL COATS UNTIL PATCH BLENDS WITH ADJACENT SURFACES.
  - DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE. STORAGE OR SALE OF REMOVED ITEMS ON-SITE IS NOT PERMITTED. DO NOT SOIL ADJACENT SURFACES OR OTHER BUILDING AREAS. LEGALLY DISPOSE OF REMOVED MATERIALS.
  - (E) POWER AND SIGNAL OUTLETS, T-STATS, ALARMS, SPEAKERS, NOT AFFECTED BY CONSTRUCTION TO REMAIN, U.O.N. COMPLY WITH EPA REGULATIONS AND APPLICABLE DISPOSAL REGULATIONS OF AUTHORITIES HAVING JURISDICTION.
  - PROMPTLY PATCH AND REPAIR HOLES AND DAMAGED SURFACES OF BUILDING CAUSED BY DEMOLITION OUTSIDE OF THE DEMISE TENANT'S AREA. RESTORE EXPOSED FINISHES OF PATCHED AREAS AND EXTEND FINISH RESTORATION INTO REMAINING ADJOINING CONSTRUCTION.
  - MAINTAIN BUILDING SECURITY, FIRE ALARM, AND FIRE PROTECTION SYSTEM OPERATIONAL AT ALL TIMES.
  - PROVIDE AND MAINTAIN SHORING, BRACING OR STRUCTURAL SUPPORT TO PRESERVE STABILITY AND SETTLEMENT, OR COLLAPSE OF CONSTRUCTION TO REMAIN, AND TO PREVENT UNEXPECTED OR UNCONTROLLED MOVEMENT OR COLLAPSE OF CONSTRUCTION BEING DEMOLISHED. STRENGTHEN OR ADD NEW SUPPORTS WHEN REQUIRED DURING PROGRESS OF DEMOLITION.
  - SEE REFLECTED CEILING DEMOLITION PLAN FOR ADDITIONAL INFORMATION.

- DEMOLITION KEYNOTES**
- D1 (E) PAD & CONDENSER UNIT, S.M.D.
  - D2 (E) EXTERIOR WD. STAIR
  - D3 TRIM (E) WD. STUDS TO NEW ELEVATION HEIGHT. SEE 9/A8.1 FOR ELEVATOR HOISTWAY DETAIL
  - D4 PREP SURFACE FOR INSTALLATION OF NEW FINISHES
  - D5 REMOVE (E) PAINT AT (E) GLULAM BEAMS. SANDBLAST FINISH. PREPARE AREA FOR NEW CLEAR COAT SEALER, TYPICAL AT ALL EXPOSED ROOF STRUCTURE. V.I.F. FIELD FOR LOCATIONS.
  - D6 REMOVE AND REPAIR (E) CONC. WALKWAY, S.C.D.
  - D7 (E) WOOD BALUSTER CAP TO REMAIN
  - D8 DEMOLISH (E) WALL TO 41" A.F.F.
  - D9 REMOVE ALL (E) WINDOW, TYP.
  - D10 DEMOLISH PORTION OF WALL FOR OPENING FOR NEW WINDOW
  - D11 (E) CONC. COLUMN, TYP.
  - D12 (E) EXTERIOR MTL. TRELLIS FRAME
  - D13 DEMO AREA FOR INSTALLATION OF DOOR ACTUATOR PLATE
  - D14 DEMO (E) DOOR, KEEP (E) HM. DOOR FRAME
  - D15 DEMO (E) CEILING
  - D16 DEMO (E) PIPE, MECHANICAL VENT. PATCH IN-KIND T&G CEILING DECK, SEE DETAIL 1/A8.1
  - D17 DEMO (E) ROOF MEMBRANE FOR NEW SKYLIGHT, S.S.D., SEE DETAIL 7/A8.1
  - D18 DEMO (E) ROOF MEMBRANE DOWN TO (E) T&G ROOF DECK, SEE 2/A8.1 SIM.
  - D19 (E) METAL FRAME



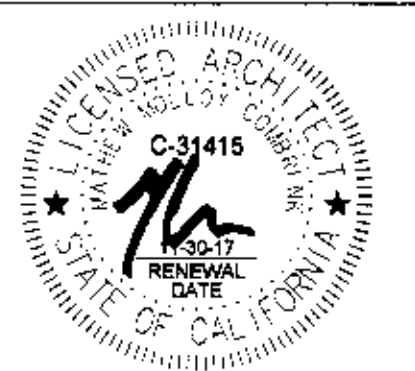
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5/31/17	DSA PLAN REVIEW
3/10/17	100% CD
rev date	issue



COM IVC Bldg. 11  
renovation

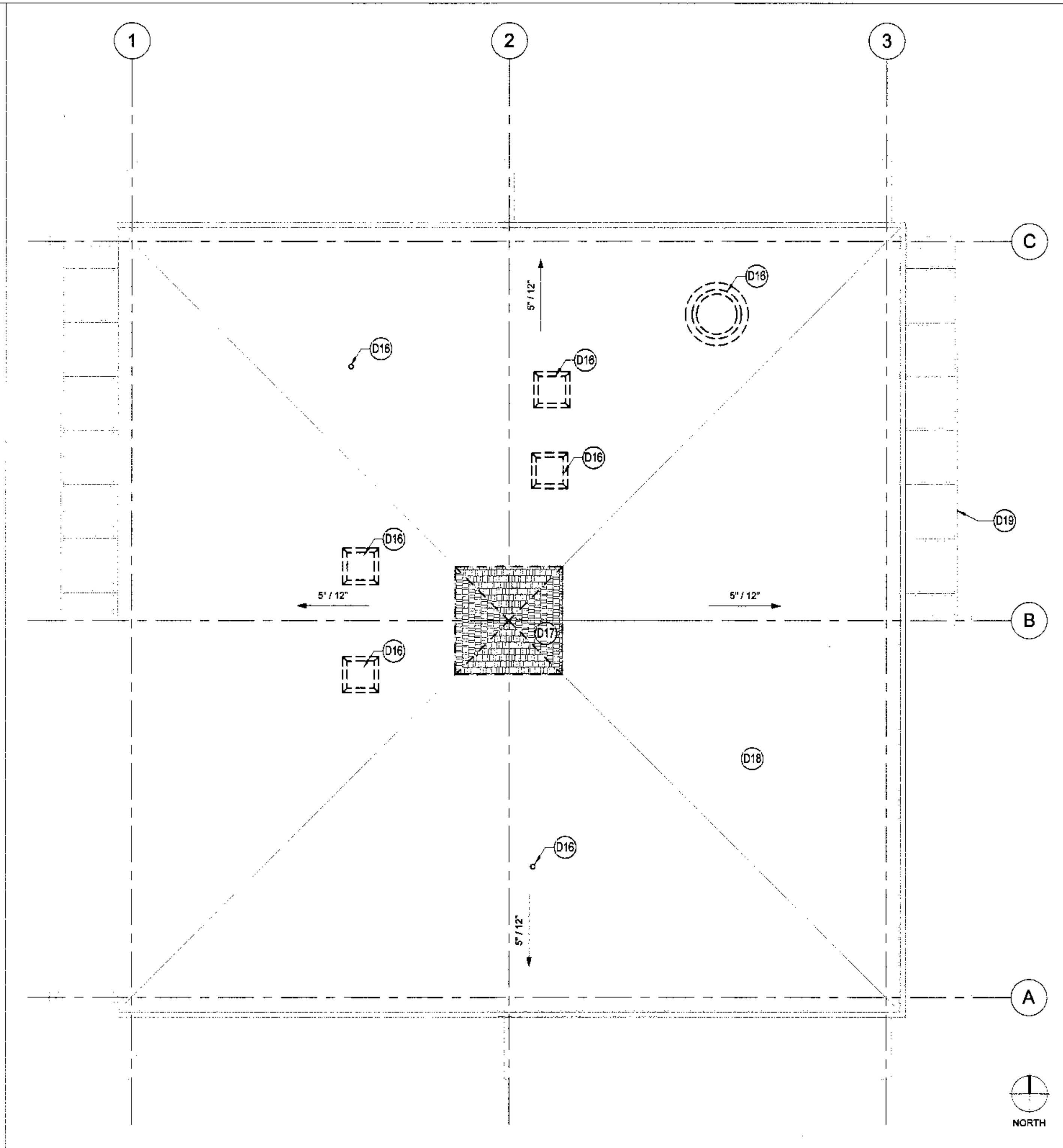
novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
DEMOLITION  
FLOOR PLANS



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**1 ROOF PLAN - DEMO** 3/16" = 1'-0"

1. ALL DEMOLITION WORK BY OTHERS U.O.N. IN DEMOLITION KEYNOTES. NOT EVERY ITEM OF (E) WORK TO BE DEMOLISHED IS INDICATED ON THE DRAWINGS. DEMOLITION WORK INCLUDES THE REMOVAL OF (E) CONSTRUCTION TO THE EXTENT REQUIRED TO ACCOMMODATE THE NEW CONSTRUCTION WHETHER PARTICULARLY INDICATED OR NOT. VISIT THE PROJECT SITE AND REVIEW DRAWINGS SHOWING NEW CONSTRUCTION TO DETERMINE THE EXTENT OF DEMOLITION WORK REQUIRED BEFORE PRICING.
2. IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; IMMEDIATELY NOTIFY ARCHITECT & OWNER.
3. CONDUCT A PRE-DEMOLITION MEETING AT THE PROJECT SITE BEFORE COMMENCING WITH DEMOLITION WORK. INSPECT AND DISCUSS CONDITION OF CONSTRUCTION TO BE SELECTIVELY DEMOLISHED. REVIEW DEMOLITION DOCUMENTS AND REPORT UNRESOLVED ISSUES OR CONFLICTS TO THE ARCHITECT.
4. PROTECT WALLS, CEILINGS, FLOORS AND OTHER EXISTING FINISH WORK TO REMAIN. COVER AND PROTECT FURNITURE, FURNISHINGS AND EQUIPMENT NOT TO BE REMOVED.
5. DO NOT CLOSE OR OBSTRUCT WALKWAYS, CORRIDORS, OR OTHER OCCUPIED OR USED FACILITIES WITHOUT WRITTEN PERMISSION FROM AUTHORITIES HAVING JURISDICTION. MAINTAIN FIRE-PROTECTION, LIFE SAFETY, AND BUILDING SECURITY SYSTEM IN SERVICE DURING DEMOLITION OPERATIONS.
6. MAINTAIN (E) UTILITIES INDICATED TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE. DO NOT REMOVE UTILITY LINES SERVING OTHER PARTS OF THE BUILDING UNTIL NEW REPLACEMENT LINES ARE INSTALLED. REMOVE & CAP UTILITIES CONCEALED BY NEW FINISHED SURFACES WHERE FITURES ARE DEMOLISHED.
7. REPAIR DAMAGE CAUSED BY SELECTIVE DEMOLITION TO ADJACENT CONSTRUCTION AND (E) COLUMNS AND RESTORE SURFACES INTENDED TO REMAIN. USE REPAIR MATERIALS IDENTICAL TO (E) MATERIALS. PATCH WITH DURABLE SEAMS THAT ARE AS INVISIBLE AS POSSIBLE. WHERE PATCHING OCCURS IN A PAINTED SURFACE, APPLY PRIMER & INTERMEDIATE PAINT COATS OVER PATCH AND APPLY FINAL PAINT COAT OVER ENTIRE UNBROKEN SURFACE CONTAINING PATCH. PROVIDE ADDITIONAL COATS UNTIL PATCH BLENDS WITH ADJACENT SURFACES.
8. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE. STORAGE OR SALE OF REMOVED ITEMS ON-SITE IS NOT PERMITTED. DO NOT SOIL ADJACENT SURFACES OR OTHER BUILDING AREAS. LEGALLY DISPOSE OF REMOVED MATERIALS.
9. (E) POWER AND SIGNAL OUTLETS, T-STATS, ALARMS, SPEAKERS, NOT AFFECTED BY CONSTRUCTION TO REMAIN. U.O.N. COMPLY WITH EPA REGULATIONS AND APPLICABLE DISPOSAL REGULATIONS OF AUTHORITIES HAVING JURISDICTION.
10. PROMPTLY PATCH AND REPAIR HOLES AND DAMAGED SURFACES OF BUILDING CAUSED BY DEMOLITION OUTSIDE OF THE DEMISE TENANT'S AREA. RESTORE EXPOSED FINISHES OF PATCHED AREAS AND EXTEND FINISH RESTORATION INTO REMAINING ADJOINING CONSTRUCTION.
11. MAINTAIN BUILDING SECURITY, FIRE ALARM, AND FIRE PROTECTION SYSTEM OPERATIONAL AT ALL TIMES.
12. PROVIDE AND MAINTAIN SHORING, BRACING OR STRUCTURAL SUPPORT TO PRESERVE STABILITY AND SETTLEMENT, OR COLLAPSE OF CONSTRUCTION TO REMAIN, AND TO PREVENT UNEXPECTED OR UNCONTROLLED MOVEMENT OR COLLAPSE OF CONSTRUCTION BEING DEMOLISHED. STRENGTHEN OR ADD NEW SUPPORTS WHEN REQUIRED DURING PROGRESS OF DEMOLITION.
13. SEE REFLECTED CEILING DEMOLITION PLAN FOR ADDITIONAL INFORMATION.
14. SEE REFLECTED CEILING DEMOLITION PLAN FOR ADDITIONAL INFORMATION.

- |      |                                                                                                                                                                    |       |                                                                                   |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|
| (D1) | (E) PAD & CONDENSER UNIT, S.M.D.                                                                                                                                   | (D10) | DEMOLISH PORTION OF WALL FOR OPENING FOR NEW WINDOW                               |
| (D2) | (E) EXTERIOR W.D. STAIR                                                                                                                                            | (D11) | (E) CONC. COLUMN, TYP.                                                            |
| (D3) | TRIM (E) W.D. STUDS TO NEW ELEVATION HEIGHT. SEE 2/A8.1 FOR ELEVATOR HOISTWAY DETAIL                                                                               | (D12) | (E) EXTERIOR MTL. TRELLIS FRAME                                                   |
| (D4) | PREP SURFACE FOR INSTALLATION OF NEW FINISHES                                                                                                                      | (D13) | DEMO AREA FOR INSTALLATION OF DOOR ACTUATOR PLATE                                 |
| (D5) | REMOVE (E) PAINT AT (E) GLULAM BEAMS. SANDBLAST FINISH. PREPARE AREA FOR NEW CLEAR COAT SEALER. TYPICAL AT ALL EXPOSED ROOF STRUCTURE. V.I.F. FIELD FOR LOCATIONS. | (D14) | DEMO (E) DOOR, KEEP (E) HM. DOOR FRAME                                            |
| (D6) | REMOVE AND REPAIR (E) CONC. WALKWAY, S.C.D.                                                                                                                        | (D15) | DEMO (E) CEILING                                                                  |
| (D7) | (E) WOOD BALUSTER CAP TO REMAIN                                                                                                                                    | (D16) | DEMO (E) PIPE, MECHANICAL VENT. PATCH IN-KIND T&G CEILING DECK, SEE DETAIL 1/A8.1 |
| (D8) | DEMOLISH (E) WALL TO 41" A.F.F.                                                                                                                                    | (D17) | DEMO (E) ROOF MEMBRANE FOR NEW SKYLIGHT, S.S.D. SEE DETAIL 7/A8.1                 |
| (D9) | REMOVE ALL (E) WINDOW, TYP.                                                                                                                                        | (D18) | DEMO (E) ROOF MEMBRANE DOWN TO (E) T&G ROOF DECK, SEE 2/A8.1 SIM.                 |
|      |                                                                                                                                                                    | (D19) | (E) METAL FRAME                                                                   |

--- EXISTING CONSTRUCTION TO BE REMOVED  
 [Hatched Box] EXISTING PARTITION TO BE REMOVED  
 (E) WALL TO REMAIN

**DEMOLITION NOTES**

**DEMOLITION KEYNOTES**

**DEMOLITION LEGEND**

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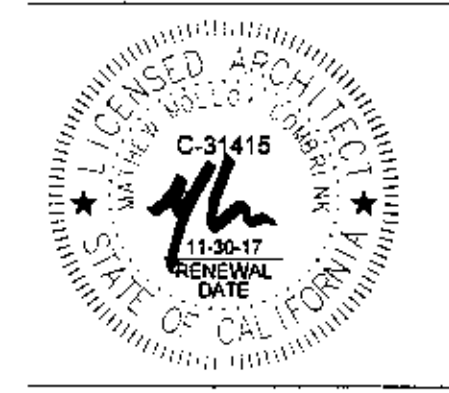
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5/31/17	DSA PLAN REVIEW
3/10/17	100% CD

rev. date issue



**COM IVC Bldg. 11 renovation**

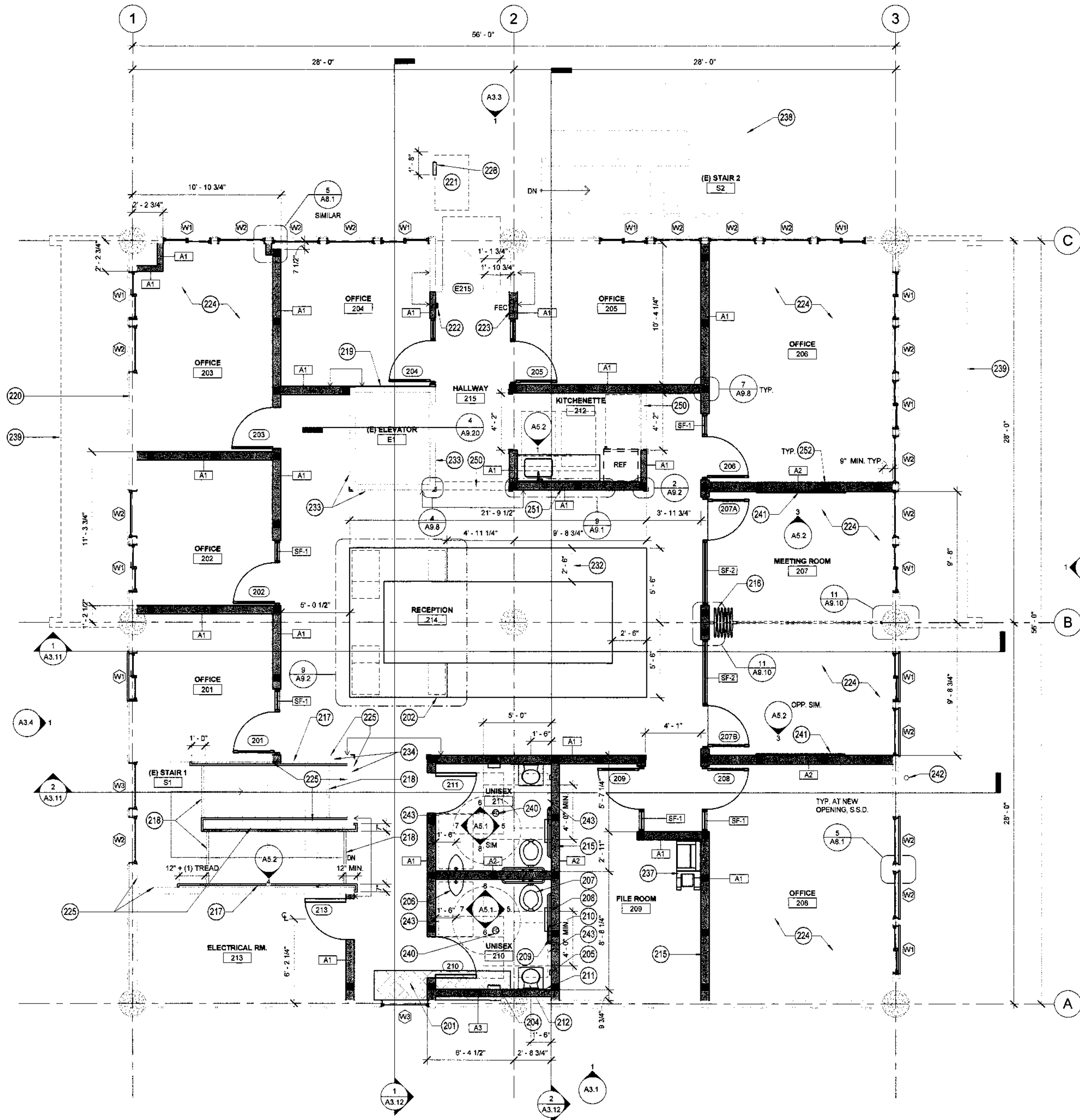
novato, california  
 project number: 16-148-01

scale: as noted  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**DEMOLITION ROOF PLAN**



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1. CUT AND FIT COMPONENTS AS REQUIRED TO ALTER (E) WORK FOR INSTALLATION OF NEW WORK. PATCH DAMAGED AREAS TO MATCH ADJACENT MATERIALS AND FINISHES.
2. PATCH AND REPAIR (E) PARTITION, FLOOR, AND CEILING SURFACES AS REQUIRED FOR A SMOOTH FINISHED WORK.
3. PATCH AND REPAIR (E) DAMAGED FIREPROOFING WORK AS REQUIRED PRIOR TO CONCEALING.
4. NO WORK IS TO BE DONE IN AREAS MARKED "N.I.C.", U.O.N.
5. PROVIDE A CLEAR HORIZONTAL DIMENSION OF 1'-8" MINIMUM FROM STRIKE FACE OF DOOR JAMB AT INTERIOR DOORS AND 2'-0" AT EXTERIOR DOORS TO THE NEAREST RETURNING PARTITION OR OBSTACLE AT THE FULL SIDE OF THE DOOR. LOCATE THE DOOR STOP TO ALLOW FOR A MINIMUM 90 DEGREE SWING. DOOR STOP SHALL NOT PROTRUDE INTO THE PATH OF TRAVEL BY MORE THAN 4". SEE A8.11 FOR FLOOR TRANSITION DETAILS.
6. PROVIDE THE REQUIRED BACKING, BRACING, AND BLOCKING FOR ATTACHMENT OF CASEWORK, EQUIPMENT, AND OTHER WORK.
7. CONTRACTOR SHALL COORDINATE KEYING REQUIREMENTS WITH BUILDING OWNER.
8. ALL OPEN JOINTS, PENETRATIONS AND OTHER OPENINGS IN THE BUILDING ENVELOPE SHALL BE SEALED, CAULKED, GASKETED AND WEATHER-STRIPPED TO LIMIT AIR LEAKAGE. PENETRATIONS AT RATED PARTITIONS SHALL BE FIRE SAFE TO MAINTAIN RATING.
9. CONCEALED WOOD BLOCKING SHALL BE FIRE RETARDANT TREATED, TYP.
10. VERIFY DIMENSIONS SHOWN WITH FIELD MEASUREMENTS. CHECK LEVELS AND LINES INDICATED PRIOR TO COMMENCING WORK. NOTIFY ARCHITECT OF ANY DISCREPANCIES FOR ADJUSTMENT OR CORRECTION. WORK SHALL PROCEED ONLY AFTER THE DISCREPANCY HAS BEEN RESOLVED.
11. WHERE CONFLICTS OCCUR, CONTRACTOR SHALL COORDINATE THE LAYOUT AND EXACT LOCATION OF PARTITIONS, DOORS, TELEPHONE, ELECTRICAL & COMMUNICATIONS OUTLETS AND SWITCHES WITH THE ARCHITECT PRIOR TO PROCEEDING WITH CONSTRUCTION.
12. REFER TO SHEET A8 FOR FLOOR TRANSITION DETAILS.
13. ALL TRASH CANS SHALL BE O.F.C.I.
14. ALL APPLIANCES & FURNITURE SHALL BE O.F.C.I.
15. SEE A9.1 FOR PARTITION SCHEDULE
16. SEE A9.7 FOR TYPICAL FRAMING DETAILS

**FLOOR PLAN NOTES** 1/4" = 1'-0"

- 1 HR. FIRE RATED PARTITION
- (E)
- NEW PARTITION AS SCHEDULED
- SURFACE MOUNTED FIRE EXTINGUISHER CABINET, PORTABLE FIRE EXTINGUISHER 2-A RATED, O.F.C.I.
- FLOOR DRAIN
- INTERIOR PARTITION TAG  
LETTER DENOTES PARTITION TYPE, NUMBER DENOTES STUD SIZE AND SHEATHING DETAILS, SEE A9.1-A9.2 FOR ADD'L DETAILS
- 3'-0" CORNER GUARD

**FLOOR PLAN LEGEND** 1/4" = 1'-0"

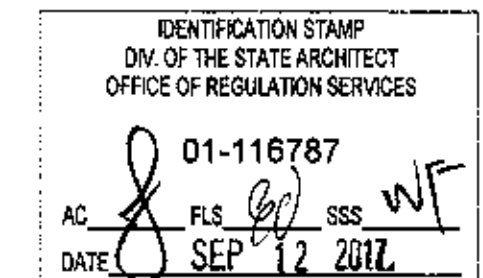
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| <ul style="list-style-type: none"> <li>(201) NEW IN-FILL FLOOR FRAMING, S.S.D.</li> <li>(202) BUILT-IN DESK</li> <li>(203) AUTOMATIC DOOR OPERATOR PUSH BUTTON, PATCH AREA IN-KIND</li> <li>(204) PAPER TOWEL DISPENSER</li> <li>(205) WALL MOUNTED SOAP DISPENSER</li> <li>(206) WALL MOUNTED URINAL</li> <li>(207) FLOOR MOUNTED TOILET</li> <li>(208) TOILET PAPER DISPENSER</li> <li>(209) SANITARY NAPKIN RECEPTACLE</li> <li>(210) TOILET SEAT COVER DISPENSER</li> <li>(211) MIRROR</li> <li>(212) WALL MOUNTED SINK</li> <li>(213) MTL. STUD FURRED PLUMBING WALL</li> <li>(214) BOTTLED RINKING FOUNTAIN, PROVIDE BACKING PLATE FOR MOUNTING. SEE 8/A8.8</li> <li>(215) PROVIDE BACKING PLATE IN WALLS @ 4'-6" &amp; 7'-6" A.F.F. ON ALL WALLS IN FILE ROOM (#209). SEE 10/A9.7</li> <li>(216) FOLDING PARTITION WALL</li> <li>(217) NEW 1-1/2" WOOD HANDRAIL, CLEAR SEALED</li> <li>(218) 2" WIDE CONTRASTING NOSING CARPET STRIP</li> <li>(219) 1 LAYER 1/2" SOUND DAMPING GYPSUM PANEL - QUIETROCK 510, SEE 2/A5.1</li> <li>(220) INSTALL R-15 BATT INSULATION AND (1) INTERIOR LAYER TYPE X GYP. BOARD ON ALL (E) EXTERIOR AND INTERIOR WALL CAVITIES ON SECOND FLOOR. AT ROOM 108 AND 109 INSTALL INSULATION AND TILE BOARD AT WET LOCATIONS, TYP.</li> <li>(221) AREA OF REFUGE: PROVIDE TWO WAY COMMUNICATION SYSTEM PER CBC 1009.8.1</li> <li>(222) (E) FIRE PULL STATION &amp; ALARM STROBE TO REMAIN</li> <li>(223) (E) SEMI-RECESSED FIRE EXTINGUISHER CABINET (2A109C, S.L.B.), +48" MAX. AT HANDLE A.F.F., O.F.C.I.</li> <li>(224) INSTALL ASSISTIVE LISTENING SYSTEM, MIN. 2 RECEIVERS, PER CBC 11B-219.3, S.T.D.</li> <li>(225) PROVIDE NEW 5/8" GYP. BD. FACING AT WALL SURFACES AT STAIR #1</li> <li>(226) TWO WAY COMMUNICATION DEVICE PER CBC 11B 709, S.T.D., S.E.D.</li> </ul> | <ul style="list-style-type: none"> <li>(227) (E) SEMI RECESSED ELECTRICAL PANEL, LESS THAN 4" PROJECTION FROM F.O. WALL, S.E.D.</li> <li>(228) REMOVE (E) ANNUNCIATOR PANEL, REPLACE W/ NEW ANNUNCIATOR PANEL, SEE FA-101</li> <li>(229) REPAIR &amp; ENLARGE SIDEWALK, S.C.D.</li> <li>(230) (N) SIDEWALK, S.C.D.</li> <li>(231) (E) COVERED WALKWAY</li> <li>(232) FLOOR FINISH TRANSITION</li> <li>(233) PREP (E) WALL FOR NEW PAINT</li> <li>(234) WD. WALL CAP @ LOW WALL</li> <li>(235) (E) AIR CONDITIONING MECH. UNIT</li> <li>(236) (E) IDF RACK, S.T.D.</li> <li>(237) (E) COPIER, N.I.C.</li> <li>(238) (E) WD. STAIR</li> <li>(239) (E) TRELIS ABOVE</li> <li>(240) FLOOR DRAIN, S.P.D.</li> <li>(241) WALL MOUNTED FLAT SCREEN MONITOR, O.F.C.I., S.T.D., SEE 14/S4.1</li> <li>(242) FIRE SPRINKLER RISER ATTACHED TO WALL, S.P.D. PROVIDE BLOCKING FOR ATTACHMENT AS REQUIRED.</li> <li>(243) 30" X 48" CLEAR FLOOR SPACE</li> <li>(244) PAINTED STRIPING</li> <li>(245) FIRE ALARM CONTROL PANEL, 4" MAX. PROJECTION FROM WALL, S.F.A.D.</li> <li>(246) DOCUMENTATION CABINET, 4" MAX. PROJECTION FROM WALL, S.F.A.D.</li> <li>(247) FIRE SPRINKLER BELL, S.E.D.</li> <li>(248) (E) FLOOR DRAIN, S.P.D.</li> <li>(249) GRAB BAR, SEE DETAIL 4A/G3.0 FOR MOUNTING DTL @ (E) WOOD FRAME WALL, 4B/G3.0 FOR MOUNTING DTL @ (N) MTL. STUD WALL.</li> <li>(250) BUILT UP MTL STUD BEAM W. (2) 806S162-43 WELDED TOGETHER</li> <li>(251) BUILT UP MTL STUD BEAM W. (2) 362S162-43 WELDED W/ 1/8" GROOVE WELD, 1" LONG AT 12" O.C. ON TOP OF STUD WALL, ATTACH BEAM TO COLUMNS W/ 2L30 CLIPS @ EACH END</li> <li>(252) BUILT UP COLUMN W/ (2) 806S250-87 WELDED, SPACED AT 9'-0" O.C. MAX., SEE 7/A8.8</li> </ul> |
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**FLOOR PLAN KEYNOTES** 1/4" = 1'-0"

**1 FLOOR PLAN - SECOND FLOOR**

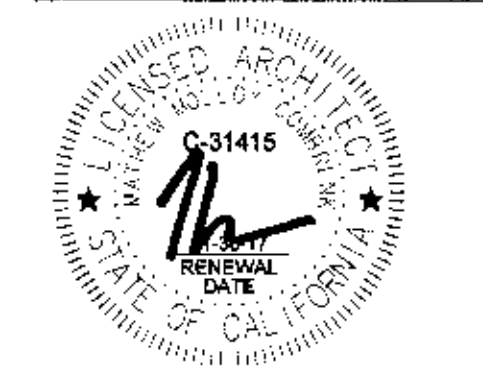
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rev	date	issue
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02.14.17 issue for coordination



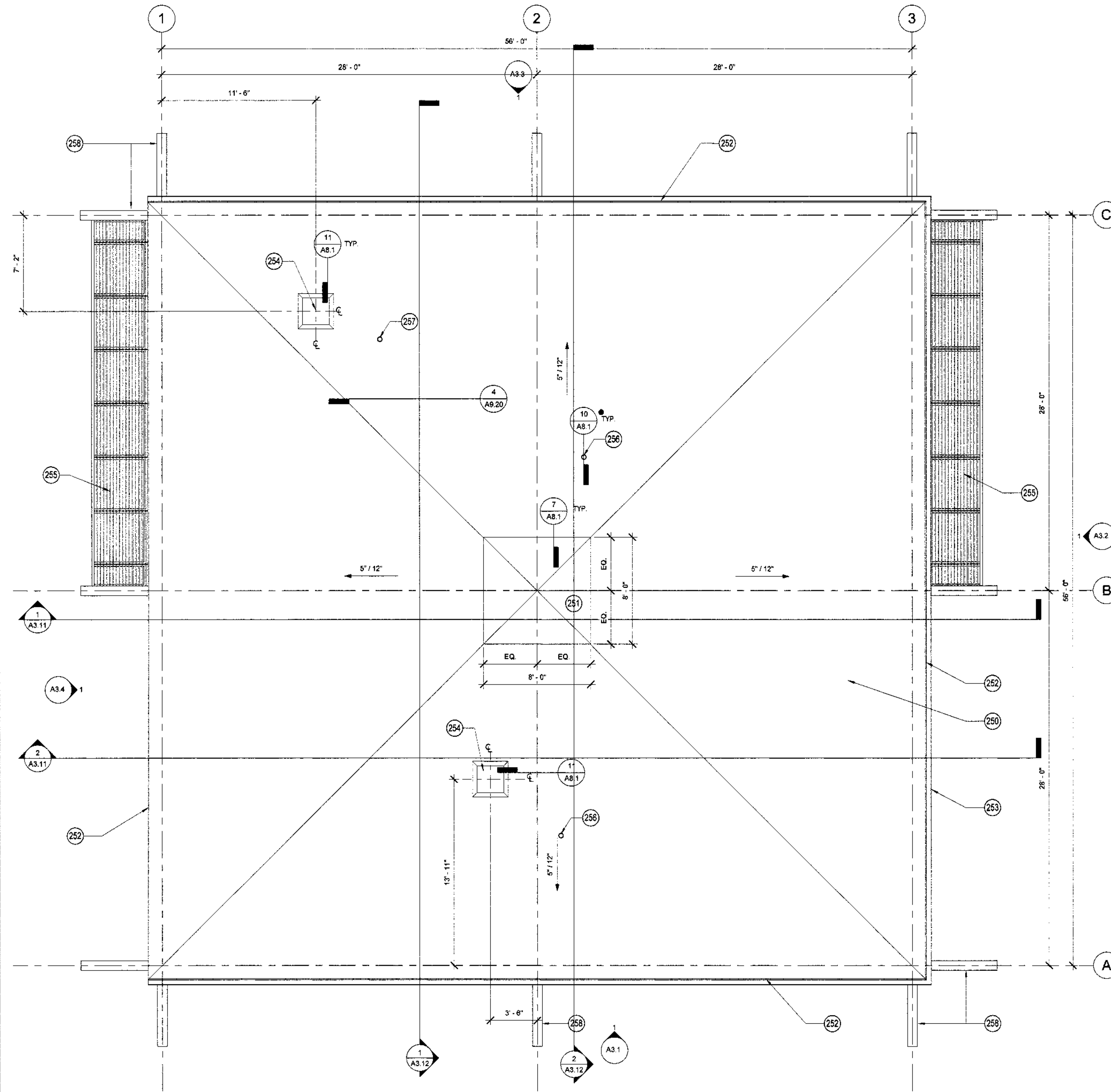
**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 16-148.D1

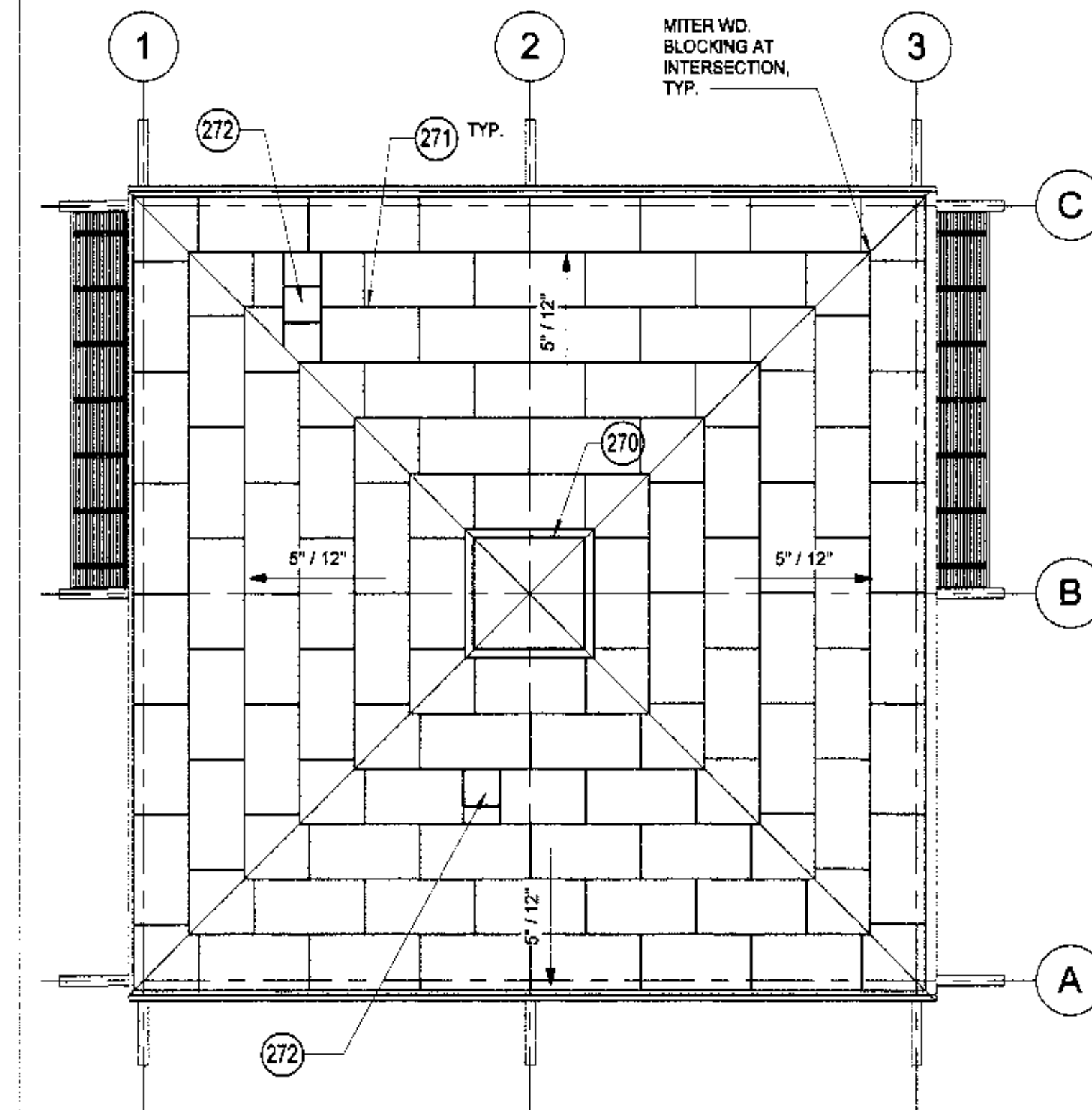
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**CONSTRUCTION DOCUMENTS**  
**SECOND FLOOR PLAN**

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1 ROOF PLAN 1/4" = 1'-0"



2 ROOF PLAN - BLOCKING LAYOUT 1" = 10'-0"

- CUT AND FIT COMPONENTS AS REQUIRED TO ALTER (E) WORK FOR INSTALLATION OF NEW WORK, PATCH DAMAGED AREAS TO MATCH ADJACENT MATERIALS AND FINISHES.
- PATCH AND REPAIR (E) PARTITION, FLOOR, AND CEILING SURFACES AS REQUIRED FOR A SMOOTH FINISHED WORK.
- PATCH AND REPAIR (E) DAMAGED FIREPROOFING WORK AS REQUIRED PRIOR TO CONCEALING.
- NO WORK IS TO BE DONE IN AREAS MARKED "N.I.C.", "U.O.M."
- PROVIDE A CLEAR HORIZONTAL DIMENSION OF 1'-6" MINIMUM FROM STRIKE FACE OF DOOR JAMB AT INTERIOR DOORS AND 2'-0" AT EXTERIOR DOORS TO THE NEAREST RETURNING PARTITION OR OBSTACLE AT THE FULL SIDE OF THE DOOR. LOCATE THE DOOR STOP TO ALLOW FOR A MINIMUM 90 DEGREE SWING. DOOR STOP SHALL NOT PROTRUDE INTO THE PATH OF TRAVEL BY MORE THAN 4". SEE A8.11 FOR FLOOR TRANSITION DETAILS.
- PROVIDE THE REQUIRED BACKING, BRACING, AND BLOCKING FOR ATTACHMENT OF CASEWORK, EQUIPMENT, AND OTHER WORK.
- CONTRACTOR SHALL COORDINATE KEYING REQUIREMENTS WITH BUILDING OWNER.
- ALL OPEN JOINTS, PENETRATIONS AND OTHER OPENINGS IN THE BUILDING ENVELOPE SHALL BE SEALED, CAULKED, GASKETED AND WEATHER-STRIPPED TO LIMIT AIR LEAKAGE. PENETRATIONS AT RATED PARTITIONS SHALL BE FIRE SAFE TO MAINTAIN RATING.
- CONCEALED WOOD BLOCKING SHALL BE FIRE RETARDANT TREATED, TYP.
- VERIFY DIMENSIONS SHOWN WITH FIELD MEASUREMENTS. CHECK LEVELS AND LINES INDICATED PRIOR TO COMMENCING WORK. NOTIFY ARCHITECT OF ANY DISCREPANCIES FOR ADJUSTMENT OR CORRECTION. WORK SHALL PROCEED ONLY AFTER THE DISCREPANCY HAS BEEN RESOLVED.
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- REFER TO SHEET A8.0 FOR FLOOR TRANSITION DETAILS.
- ALL TRASH CANS SHALL BE O.F.C.I.
- ALL APPLIANCES & FURNITURE SHALL BE O.F.C.I.
- SEE A8.1 FOR PARTITION SCHEDULE.
- SEE A9.7 FOR TYPICAL FRAMING DETAILS.

FLOOR PLAN NOTES 1/4" = 1'-0"

- 1 HR. FIRE RATED PARTITION CONSTRUCTION
- NEW PARTITION AS
- SURFACE MOUNTED FIRE EXTINGUISHING CABINET, PORTABLE FIRE EXTINGUISHER 2-A RATED
- FLOOR

ROOF PLAN LEGEND 1/4" = 1'-0"

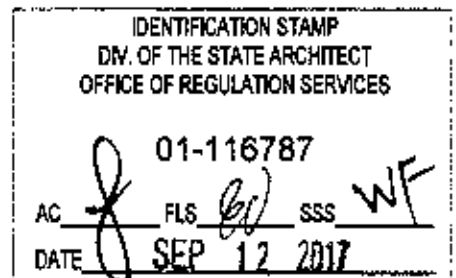
- (250) NEW ASPHALT SHINGLE ROOFING, CLASS A ROOF
- (251) NEW SKYLIGHT, O.F.C.I.
- (252) NEW FASCIA BD.
- (253) EXISTING GUTTER RELOCATED AT NEW ROOF ELEVATION. CLEAN OUT BEFORE REINSTALLATION. PROVIDE GUTTER SCREEN COVER
- (254) NEW EXHAUST VENT, S.M.D.
- (255) NEW FIBER REINFORCED HOLLOW PLANK TRELLIS INFILL
- (256) PLUMBING VENT, S.P.D.
- (257) REUSE (E) ROOF PLUMBING VENT, S.M.D.
- (258) (E) GLULAM BEAM, TYP.
- (270) SKYLIGHT OPENING, SEE 1/A2.3
- (271) 2X6 SHAPED WD BLOCKING @ 48" O.C. OVER (E) PLYWOOD. FASTEN NEW PLYWOOD W/ 10D NAILS @ 12" O.C. SEE 2/A6.1 FOR TYPICAL BLOCKING ATTACHMENT DETAIL
- (272) MECH. VENT OPENING, S.M.D., SEE 1/A2.3

ROOF PLAN KEYNOTES 1/4" = 1'-0"

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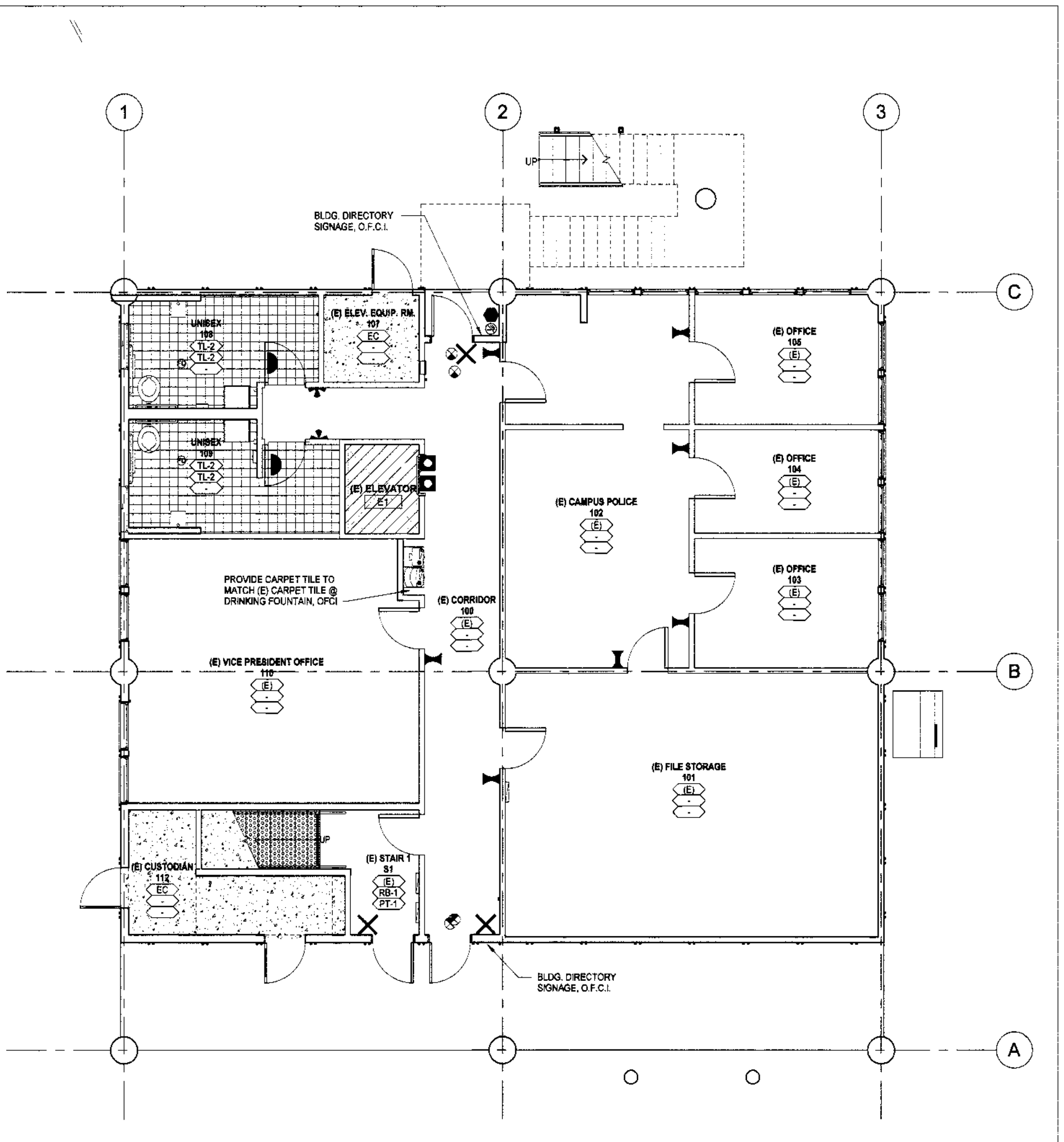
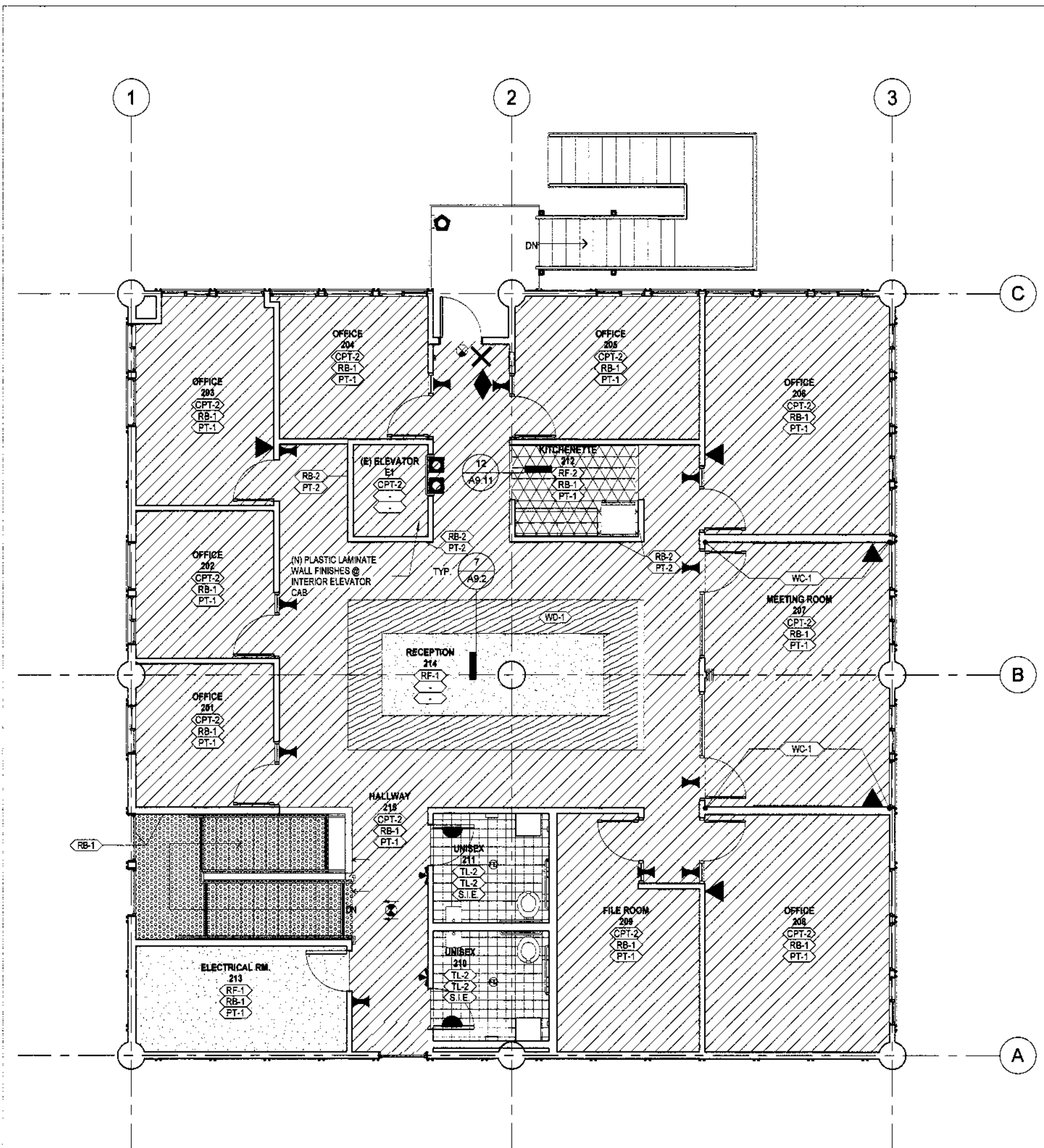
COM IVC Bldg. 11  
renovation

novato, california  
project number: 16-148-01

scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
ROOF PLAN

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2 FINISH/SIGNAGE PLAN - LEVEL 2

1 FINISH/SIGNAGE PLAN - LEVEL 1

3/16" = 1'-0"

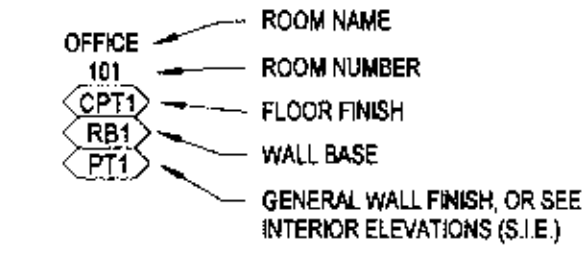
3/16" = 1'-0"

SYMBOL	FINISH	MANUFACTURER / NUMBER / COLOR
	RESTROOM TACTILE DOOR SIGN, SIGN TYPE A	
	ROOM IDENTIFICATION SIGN, SIGN TYPE B	
	TACTILE EXIT SIGN, SIGN TYPE C	
	ROOM IDENTIFICATION SIGN, SIGN TYPE D	
	AREA OF REFUGE SIGN, SIGN TYPE E	
	PROPOSITION 65 SIGN, SIGN TYPE F	
	TWO WAY COMMUNICATION INSTRUCTION SIGN, SIGN TYPE G	
	ASSISTANCE LISTENING SIGN, SIGN TYPE H	
	CEILING MOUNTED ILLUMINATED EXIT SIGN, S.E.D.	

SYMBOL	FINISH	MANUFACTURER / NUMBER / COLOR
	RESILIENT FLOORING - RF2	LINOLEUM FLOORING - ARMSTRONG MARMORETTE
	PLYWOOD - WD-1	PLYWOOD - 1/4" PRE-FINISHED VENEER PLYWOOD WOOD
	EXISTING CONCRETE - EC	
	DRY ERASE WALLCOVERING - WC-1	MAGNETIC DRY ERASE WALL COVERING MFR. KOROSEAL PRODUCT WALLTALKERS NOTE: PROVIDE LEVEL 5 DRYWALL FINISH TO RECEIVE WALLCOVERING
	BASE - RB-1	4" RUBBER BASE, SEE 3A9.2
	BASE - RB-2	4" RUBBER BASE ACCENT COLOR
	PAINT - PT-1	PAINT, COLOR TBD
	PAINT - PT-2	PAINT, ACCENT COLOR TBD

SYMBOL	FINISH	MANUFACTURER / NUMBER / COLOR
	(E)	(E) CARPET TILE, RUBBER BASE, & WALL FINISHES
	CARPET - CPT-2	CARPET TILE
	CARPET - CPT-3	BROADLOOM CARPET
	CARPET - CPT-4	BROADLOOM CARPET STRIP AT STAIR NOSING
	TILE - TL-1	PORCELAIN TILE - WALL TILE
	TILE - TL-2	PORCELAIN TILE - FLOOR TILE AND COVE BASE
	RESILIENT FLOORING - RF1	LINOLEUM FLOORING

**GENERAL NOTES:**  
 1. ALL FLOOR TILE TO BE THIN SET PER TCNA F13-11 FOR INTERIOR FLOORS OVER CONCRETE.  
 2. ALL WALL TILE TO BE THIN SET PER TCNA W244C-11 FOR INTERIOR WALLS OVER METAL STUDS.



SIGNAGE LEGEND

FINISH LEGEND

FINISH LEGEND / GENERAL NOTES

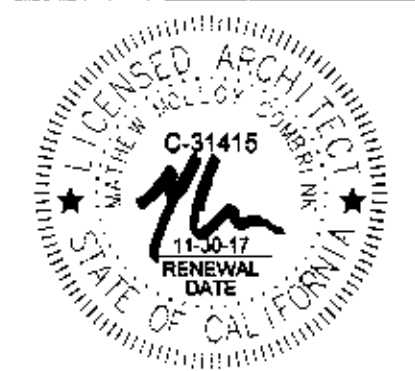
1/8" = 1'-0"

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 DATE: SEP 12 2017

rev	date	issue
9/07/17		DSA BACK CHECK
5/31/17		DSA PLAN REVIEW
3/10/17		100% CD



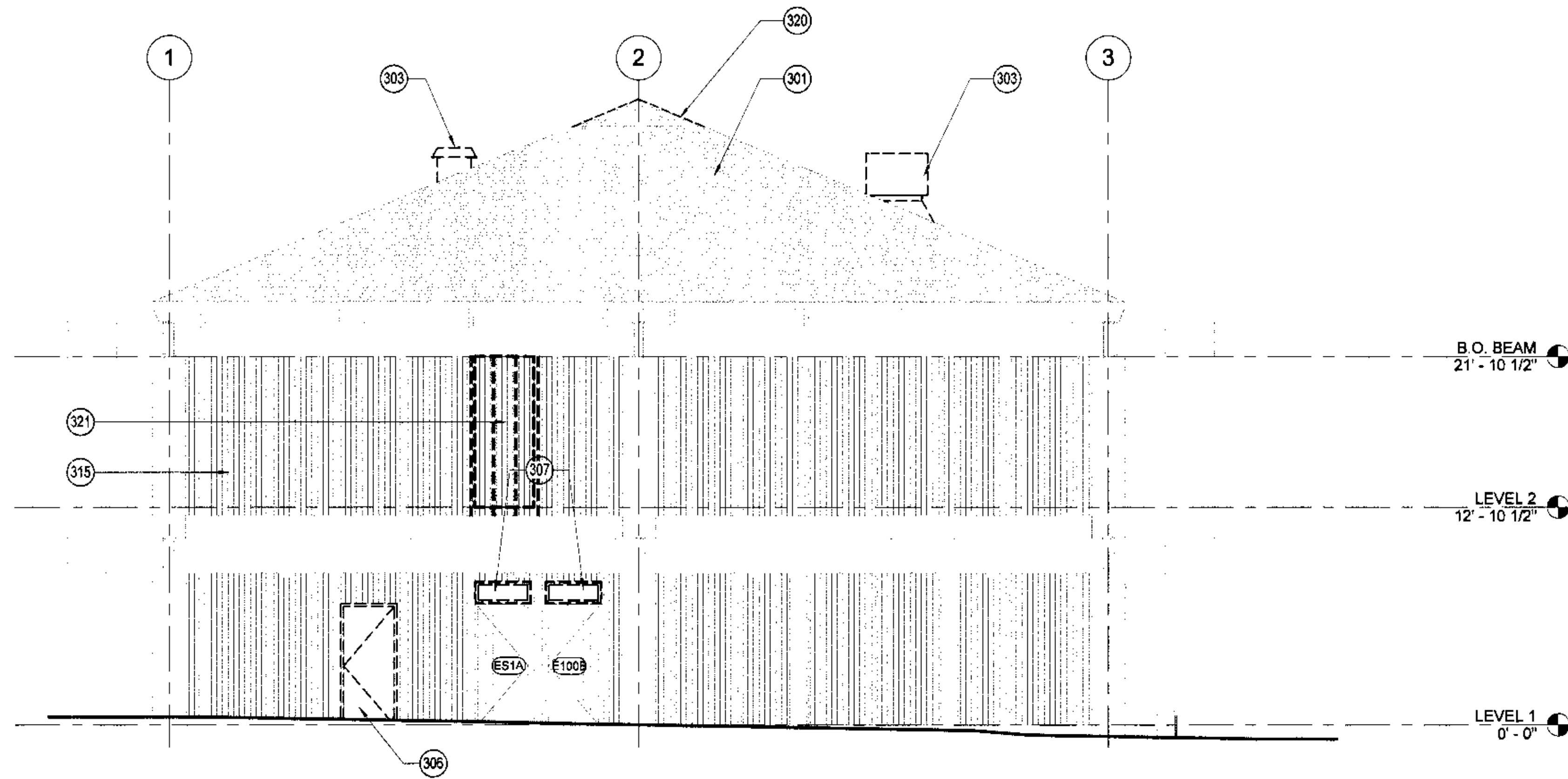
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novato, california  
 project number: 18-148.01

scale: as noted  
 date: 03/10/2017

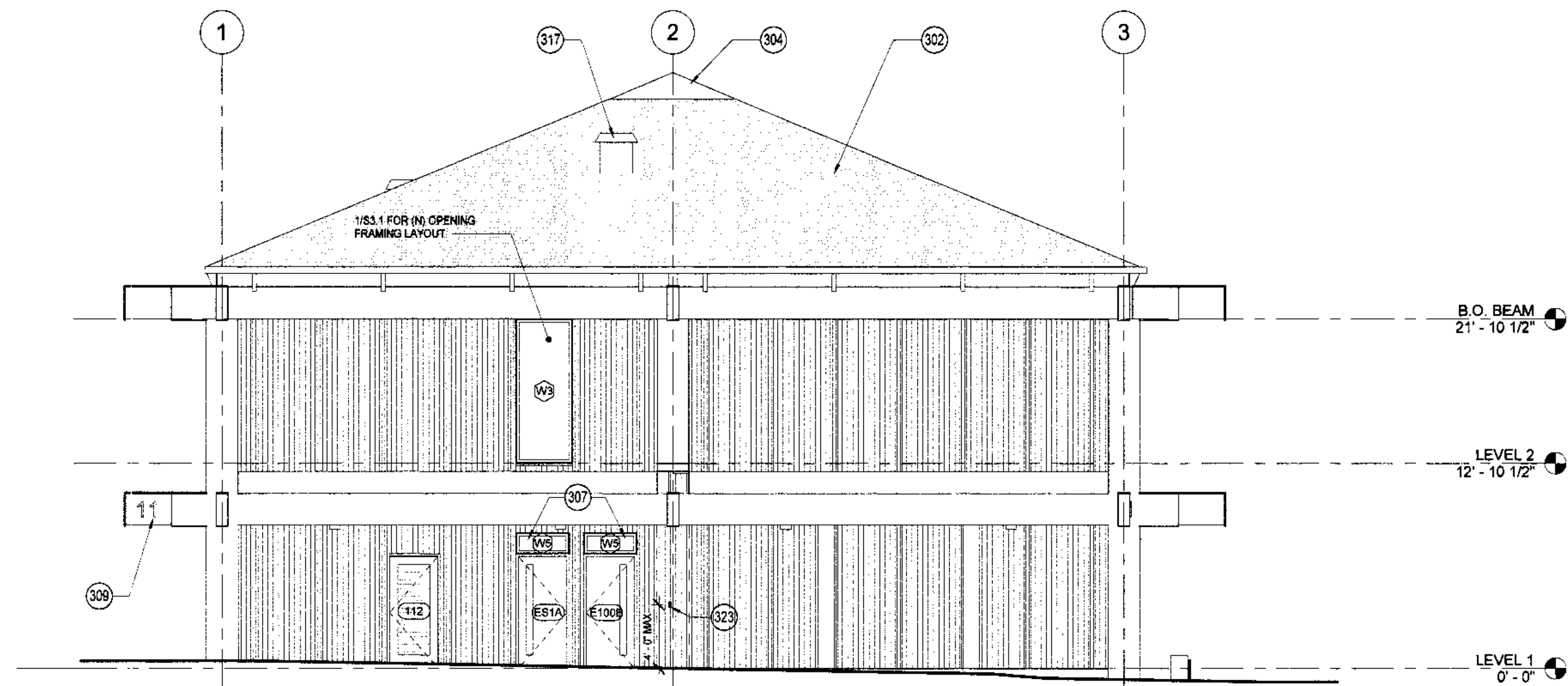
CONSTRUCTION DOCUMENTS  
 FINISH & SIGNAGE PLANS

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2 DEMOLITION - SOUTH ELEVATION

3/16" = 1'-0"



1 SOUTH ELEVATION

3/16" = 1'-0"

- GENERAL NOTES
- SEE G3.0 FOR TYPICAL ACCESSIBILITY REQUIREMENTS
  - SEE A8.10 FOR TYPICAL MILLWORK DETAILS
  - SEE A2.4 FOR FINISHES SCHEDULE
  - SEE A7.1 FOR HEAD, SILL, AND JAMB DETAIL REFERENCES FOR WINDOWS

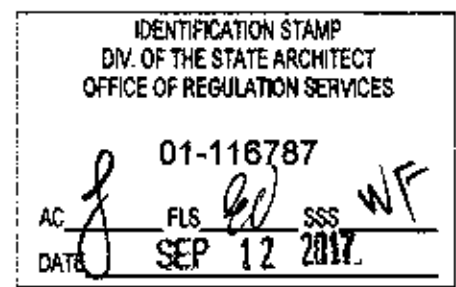
INTERIOR ELEVATION GENERAL NOTES			
301	REMOVE EXISTING SHINGLE ROOFING, PREP SUBSTRATE FOR NEW ROOFING	317	MECH VENT, S.M.D., S.S.D. FOR (N) FRAMING LAYOUT
302	NEW ASPHALT SHINGLE ROOFING, CLASS A ROOF	318	NOT USED
303	DEMOLISH EXISTING ROOF VENT, SEE 1/A8.1 FOR INFILL DETAIL	319	(E) MECH. UNIT
304	NEW SKYLIGHT, OFCI, S.S.D.	320	DEMO EXISTING ROOF MEMBRANE FOR SKYLIGHT OPENING. (E) ROOF FRAMING TO REMAIN
305	EXISTING WINDOW TO BE DEMOLISHED, TYP.	321	REMOVE WALL AREA & WD STUDS FOR NEW WINDOW OPENING BETWEEN EXISTING WOOD BATTENS, V.I.F., S.S.D.
306	EXISTING DOOR TO BE DEMOLISHED, TYP. (E) FRAME TO REMAIN	322	(E) WALL LOUVER, TYP. S.M.D. FOR REUSE
307	REMOVE (E) SOLID TRANSOM PANEL. REPLACE W/ 1/2" GLASS PANEL	323	SURFACE MTD. AUTOMATIC DOOR OPERATOR PANEL COLUMN. PATCH AREA IN-KIND
308	REMOVE (E) BUILDING NUMBER SIGNAGE	324	FIRE SPRINKLER RISER, S.F.P.D.
309	NEW BUILDING NUMBER SIGNAGE, O.F.C.I.	324	FIRE SPRINKLER BELL, S.F.P.D., S.E.D.
310	(E) LIGHT FIXTURE	325	(N) OPENING FOR WINDOW, S.S.D. FOR SILL & KING STUD INFORMATION
311	LIGHT FIXTURE, S.E.D.		
312	MECH UNIT, S.M.C.		
313	(E) GUARDRAIL		
314	(E) LOUVER		
315	(E) BOARD & BATT SIDING, TYP.		
316	(E) GLULAM BEAM, TYP.		

ELEVATION KEYNOTES

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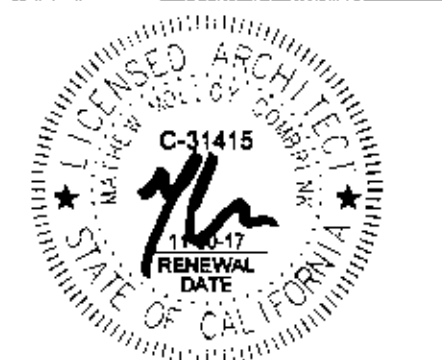
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3/10/17 100% CD

rev date issue



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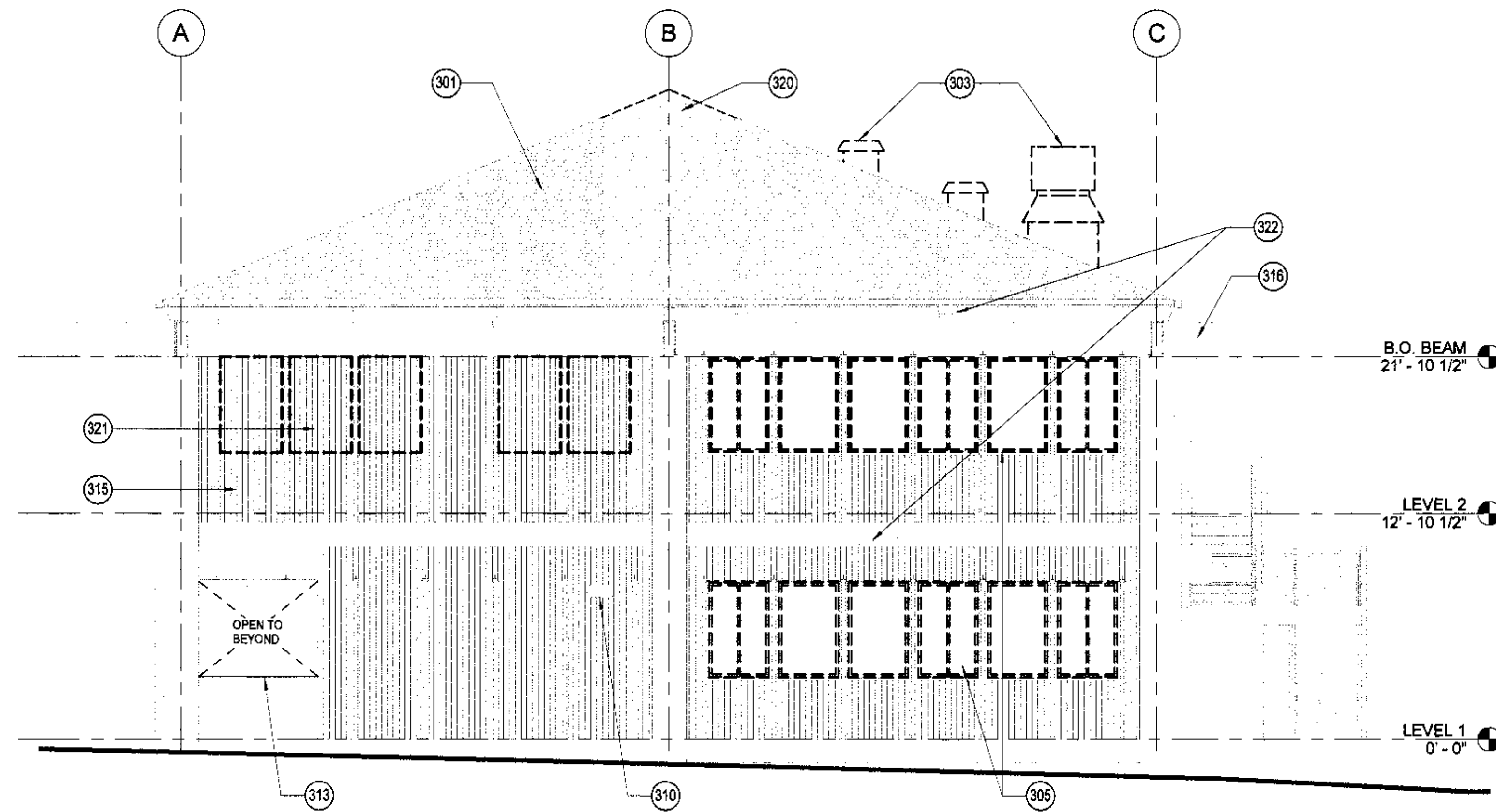
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date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
BUILDING  
ELEVATIONS -  
SOUTH

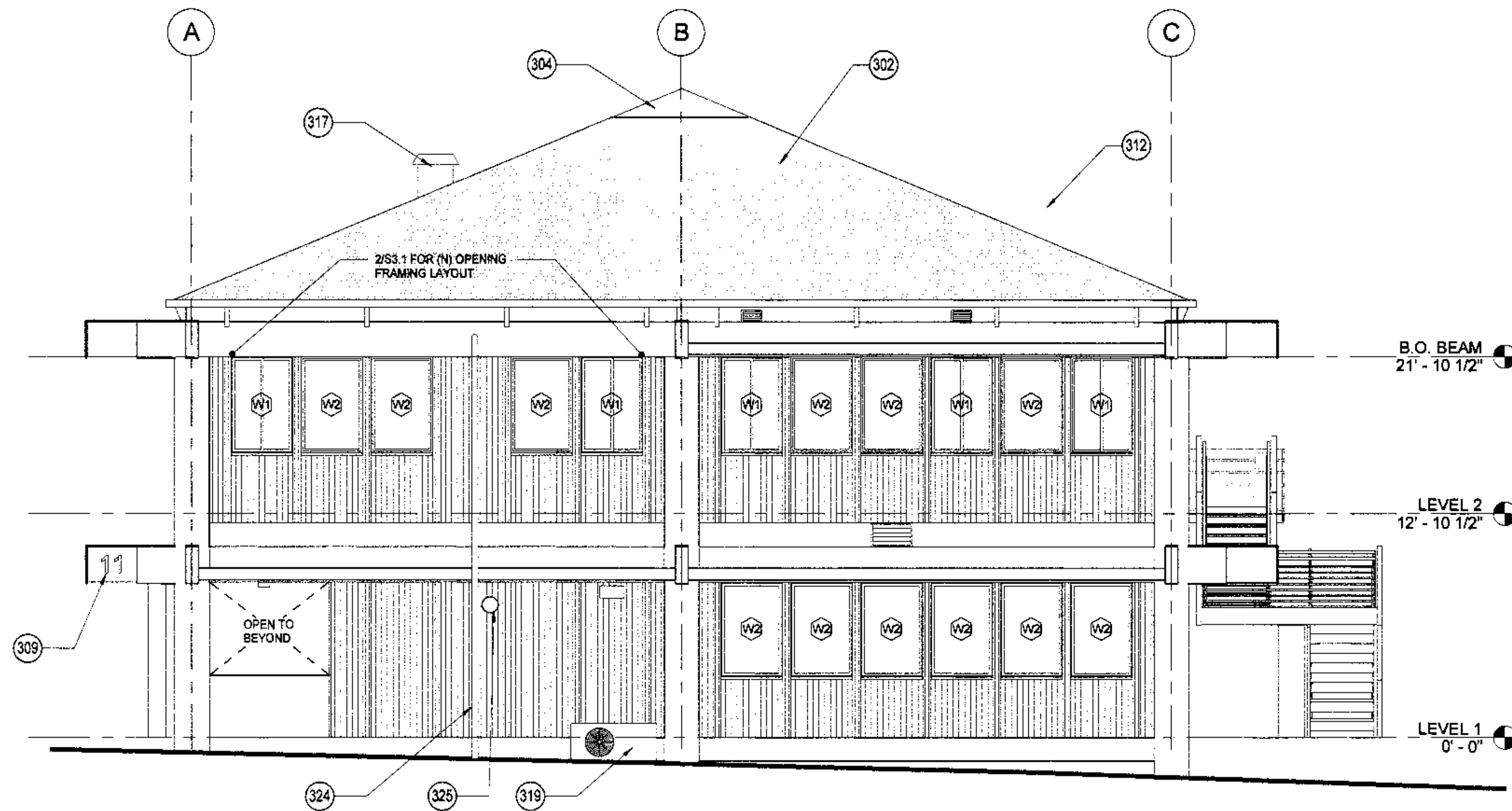
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2 DEMOLITION - EAST ELEVATION

3/16" = 1'-0"



1 EAST ELEVATION

3/16" = 1'-0"

GENERAL NOTES:

1. SEE G3.0 FOR TYPICAL ACCESSIBILITY REQUIREMENTS
2. SEE A8.10 FOR TYPICAL MILLWORK DETAILS
3. SEE A2.4 FOR FINISHES SCHEDULE
4. SEE A7.1 FOR HEAD, BILL, AND JAMB DETAIL REFERENCES FOR WINDOWS

INTERIOR ELEVATION GENERAL NOTES

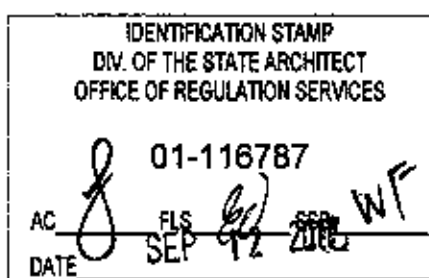
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| 301 REMOVE EXISTING SHINGLE ROOFING. PREP SUBSTRATE FOR NEW ROOFING | 317 MECH VENT, S.M.D., S.S.D. FOR (N) FRAMING LAYOUT                                                 |
| 302 NEW ASPHALT SHINGLE ROOFING, CLASS A ROOF                       | 318 NOT USED                                                                                         |
| 303 DEMOLISH EXISTING ROOF VENT, SEE 1/A8.1 FOR INFILL DETAIL       | 319 (E) MECH UNIT                                                                                    |
| 304 NEW SKYLIGHT, OFCI, S.S.D.                                      | 320 DEMO EXISTING ROOF MEMBRANE FOR SKYLIGHT OPENING. (E) ROOF FRAMING TO REMAIN                     |
| 305 EXISTING WINDOW TO BE DEMOLISHED, TYP.                          | 321 REMOVE WALL AREA & WD STUDS FOR NEW WINDOW OPENING BETWEEN EXISTING WOOD BATTENS, V.I.F., S.S.D. |
| 306 EXISTING DOOR TO BE DEMOLISHED, TYP. (E) FRAME TO REMAIN        | 322 (E) WALL LOUVER, TYP. S.M.D. FOR REUSE                                                           |
| 307 REMOVE (E) SOLID TRANSOM PANEL. REPLACE W/ 1/2" GLASS PANEL     | 323 SURFACE MTD. AUTOMATIC DOOR OPERATOR PANEL COLUMN, PATCH AREA IN-KIND                            |
| 308 REMOVE (E) BUILDING NUMBER SIGNAGE                              | 324 FIRE SPRINKLER RISER, S.F.P.D.                                                                   |
| 309 NEW BUILDING NUMBER SIGNAGE, O.F.C.I.                           | 324 FIRE SPRINKLER BELL, S.F.P.D., S.E.D.                                                            |
| 310 (E) LIGHT FIXTURE                                               | 325 (N) OPENING FOR WINDOW, S.S.D. FOR SILL & KING STUD INFORMATION                                  |
| 311 LIGHT FIXTURE, S.E.D.                                           |                                                                                                      |
| 312 MECH UNIT, S.M.D.                                               |                                                                                                      |
| 313 (E) GUARDRAIL                                                   |                                                                                                      |
| 314 (E) LOUVER                                                      |                                                                                                      |
| 315 (E) BOARD & BATT SIDING, TYP.                                   |                                                                                                      |
| 316 (E) GLULAM BEAM, TYP.                                           |                                                                                                      |

ELEVATION KEYNOTES

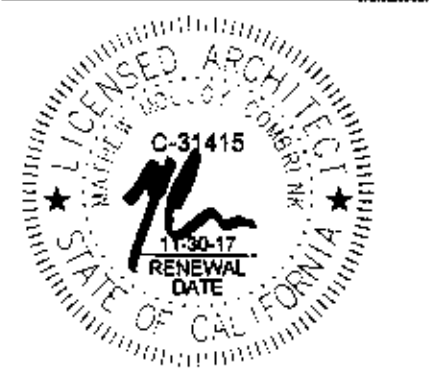
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9/07/17		DSA BACK CHECK
5/31/17		DSA PLAN REVIEW
3/10/17		100% CD



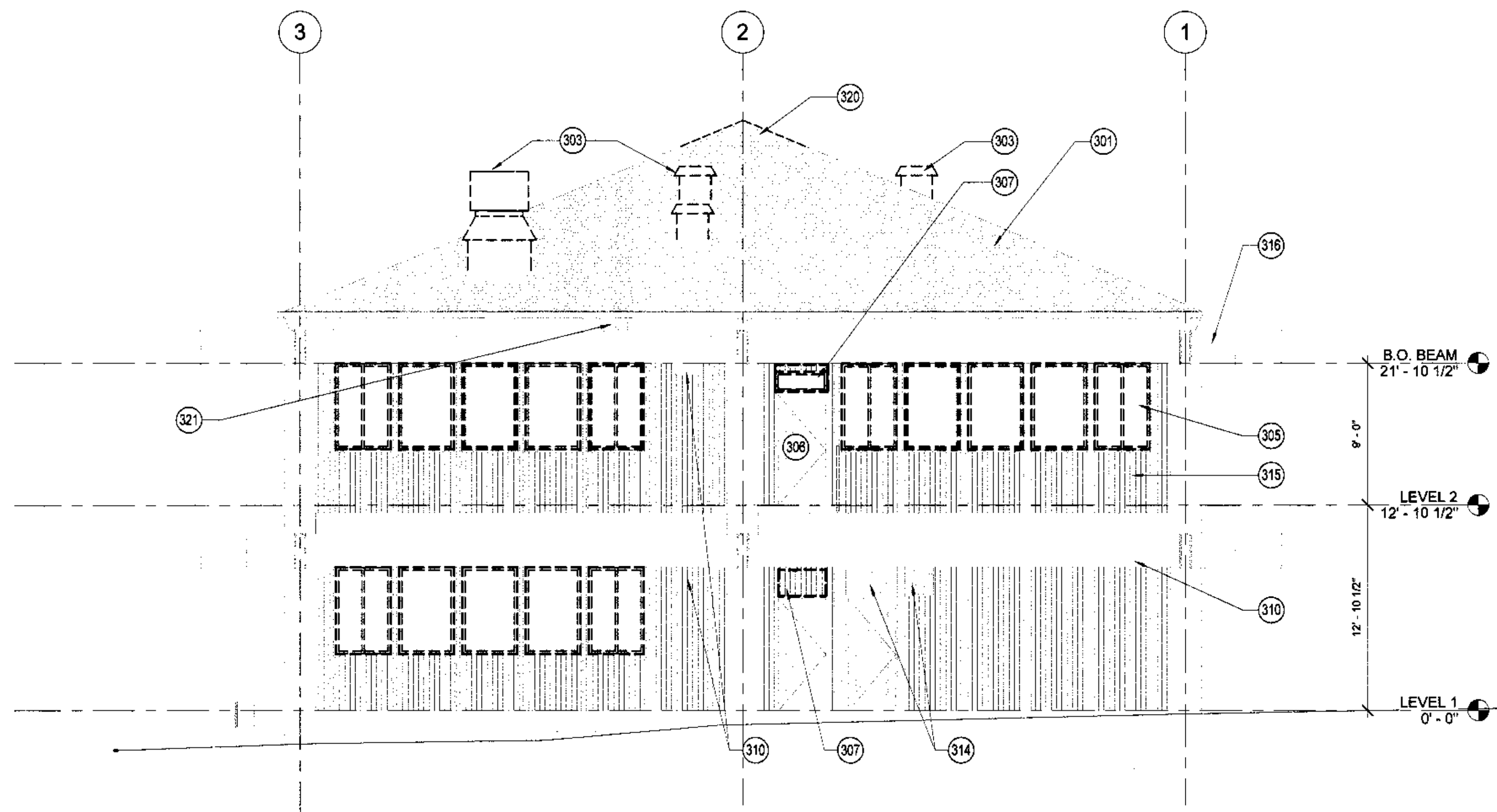
COM IVC Bldg. 11  
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project number: 16-148.01

scale: as noted  
date: 03/10/2017

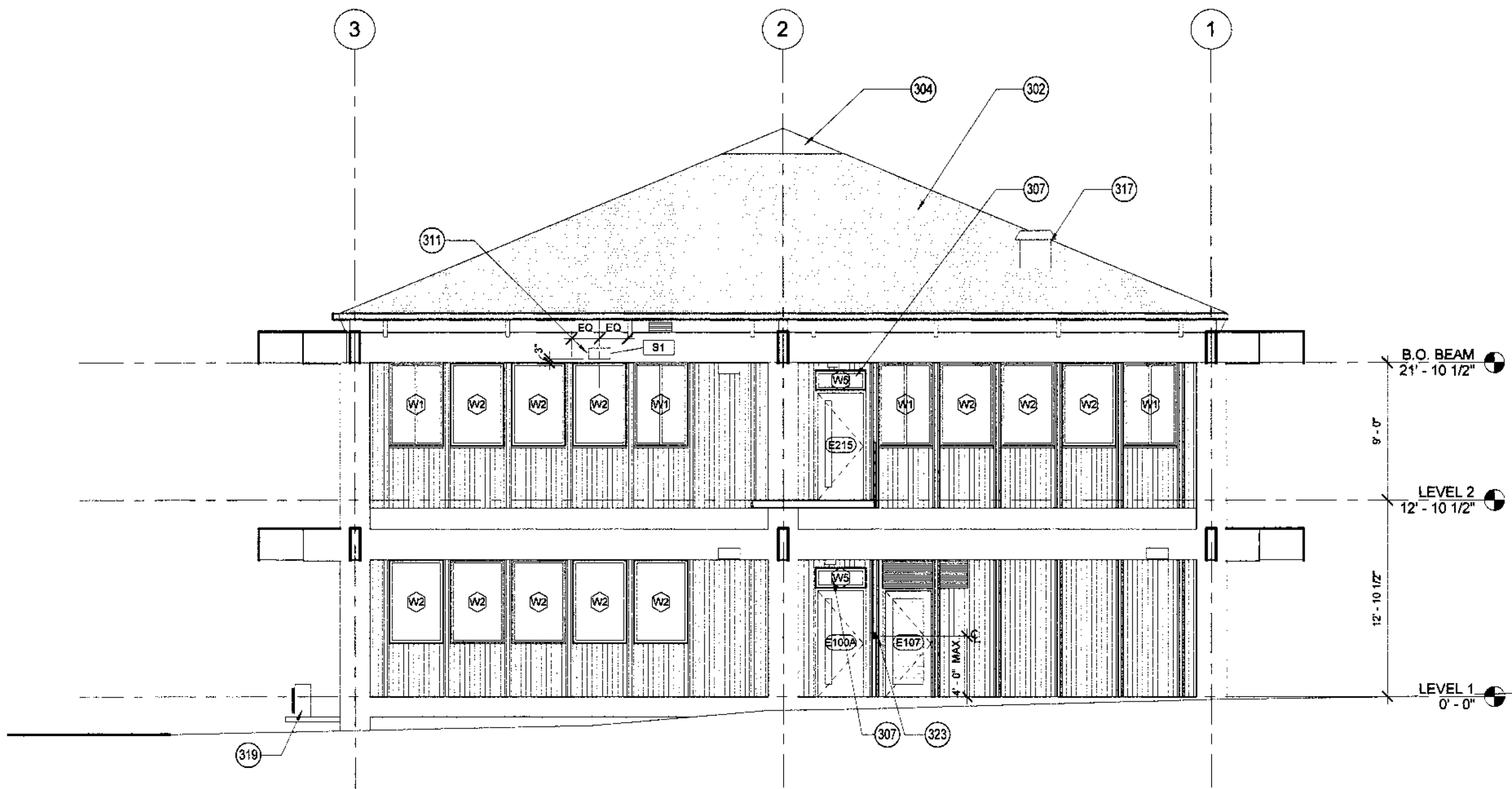
CONSTRUCTION  
DOCUMENTS  
BUILDING  
ELEVATIONS -  
EAST

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2 DEMOLITION - NORTH ELEVATION

3/16" = 1'-0"



1 NORTH ELEVATION

3/16" = 1'-0"

GENERAL NOTES:

1. SEE G3.0 FOR TYPICAL ACCESSIBILITY REQUIREMENTS
2. SEE A2.10 FOR TYPICAL MILLWORK DETAILS
3. SEE A2.4 FOR FINISHES SCHEDULE
4. SEE A7.1 FOR HEAD, SILL, AND JAMB DETAIL REFERENCES FOR WINDOWS

INTERIOR ELEVATION GENERAL NOTES

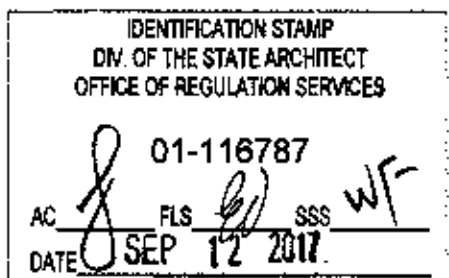
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|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| (301) REMOVE EXISTING SHINGLE ROOFING, PREP SUBSTRATE FOR NEW ROOFING | (317) MECH VENT, S.M.D., S.S.D. FOR (N) FRAMING LAYOUT                                                 |
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| (311) LIGHT FIXTURE, S.E.D.                                           |                                                                                                        |
| (312) MECH UNIT, S.M.D.                                               |                                                                                                        |
| (313) (E) GUARDRAIL                                                   |                                                                                                        |
| (314) (E) LOUVER                                                      |                                                                                                        |
| (315) (E) BOARD & BATT SIDING, TYP.                                   |                                                                                                        |
| (316) (E) GLULAM BEAM, TYP.                                           |                                                                                                        |

ELEVATION KEYNOTES

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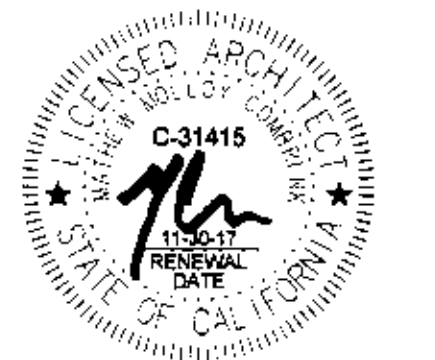
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3/10/17 100% CD

rev date issue



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project number: 16-148-01

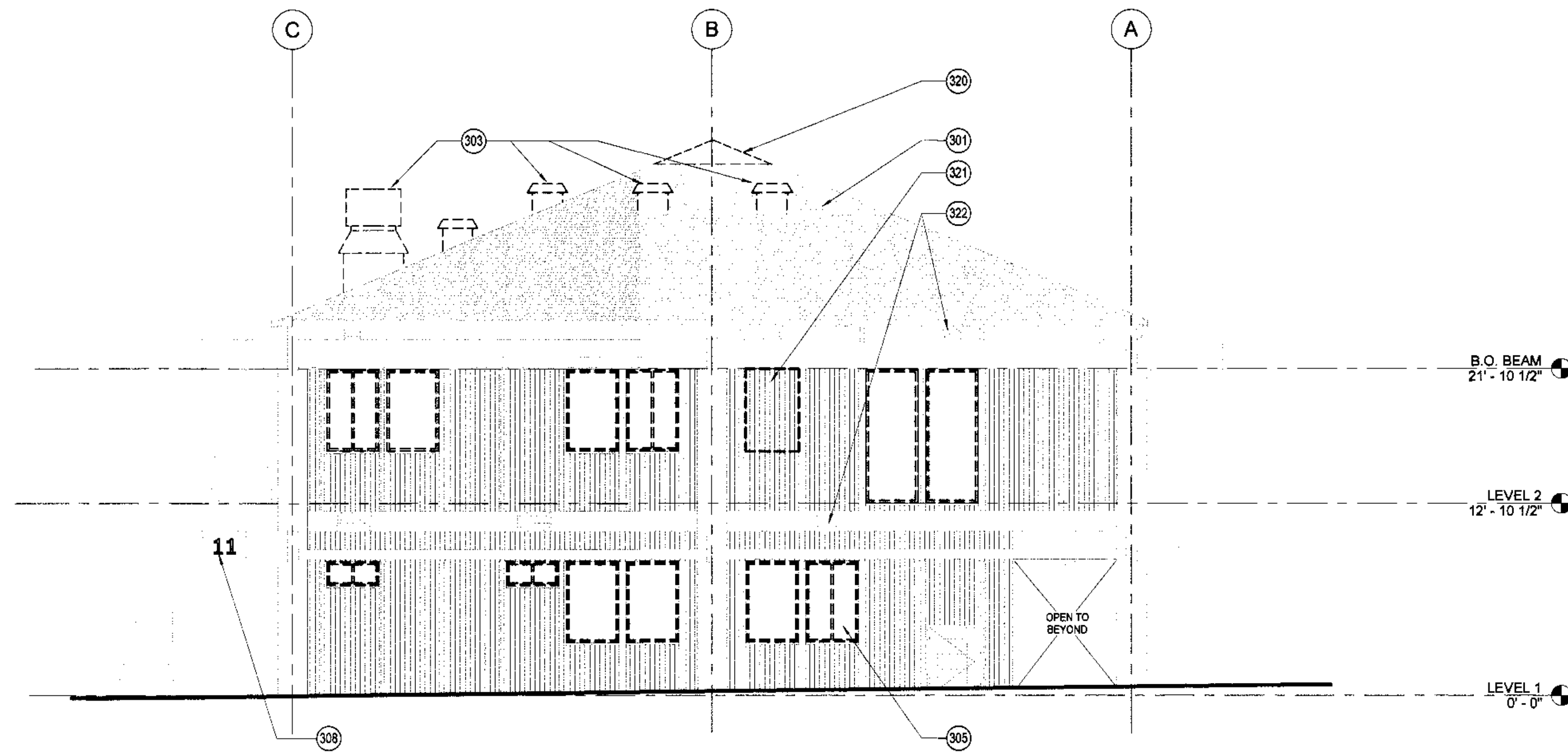
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CONSTRUCTION  
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BUILDING  
ELEVATIONS -  
NORTH

A3.3

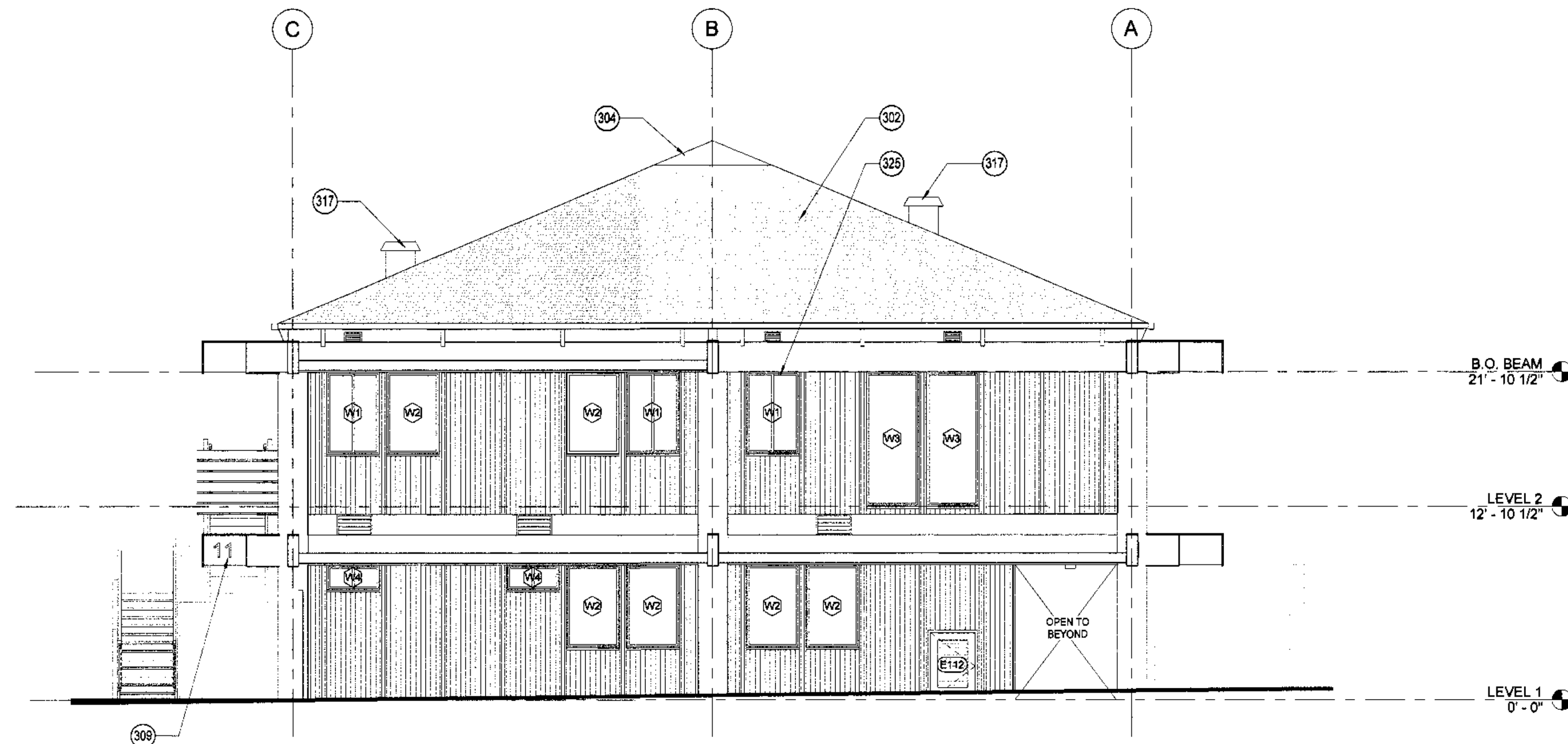


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2 DEMOLITION - WEST ELEVATION

3/16" = 1'-0"



1 WEST ELEVATION

3/16" = 1'-0"

- GENERAL NOTES:
- SEE G3.0 FOR TYPICAL ACCESSIBILITY REQUIREMENTS
  - SEE A9.10 FOR TYPICAL MILLWORK DETAILS
  - SEE A2.4 FOR FINISHES SCHEDULE
  - SEE A7.1 FOR HEAD, SILL, AND JAMB DETAIL REFERENCES FOR WINDOWS

INTERIOR ELEVATION GENERAL NOTES

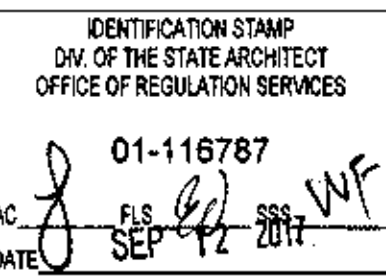
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| 313 (E) GUARDRAIL                                                   |                                                                                                      |
| 314 (E) LOUVER                                                      |                                                                                                      |
| 315 (E) BOARD & BATT SIDING, TYP.                                   |                                                                                                      |
| 316 (E) GLULAM BEAM, TYP.                                           |                                                                                                      |

ELEVATION KEYNOTES

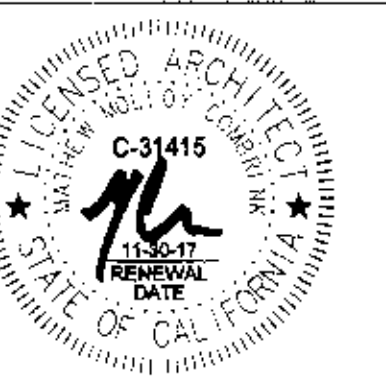
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project number: 16-148.01

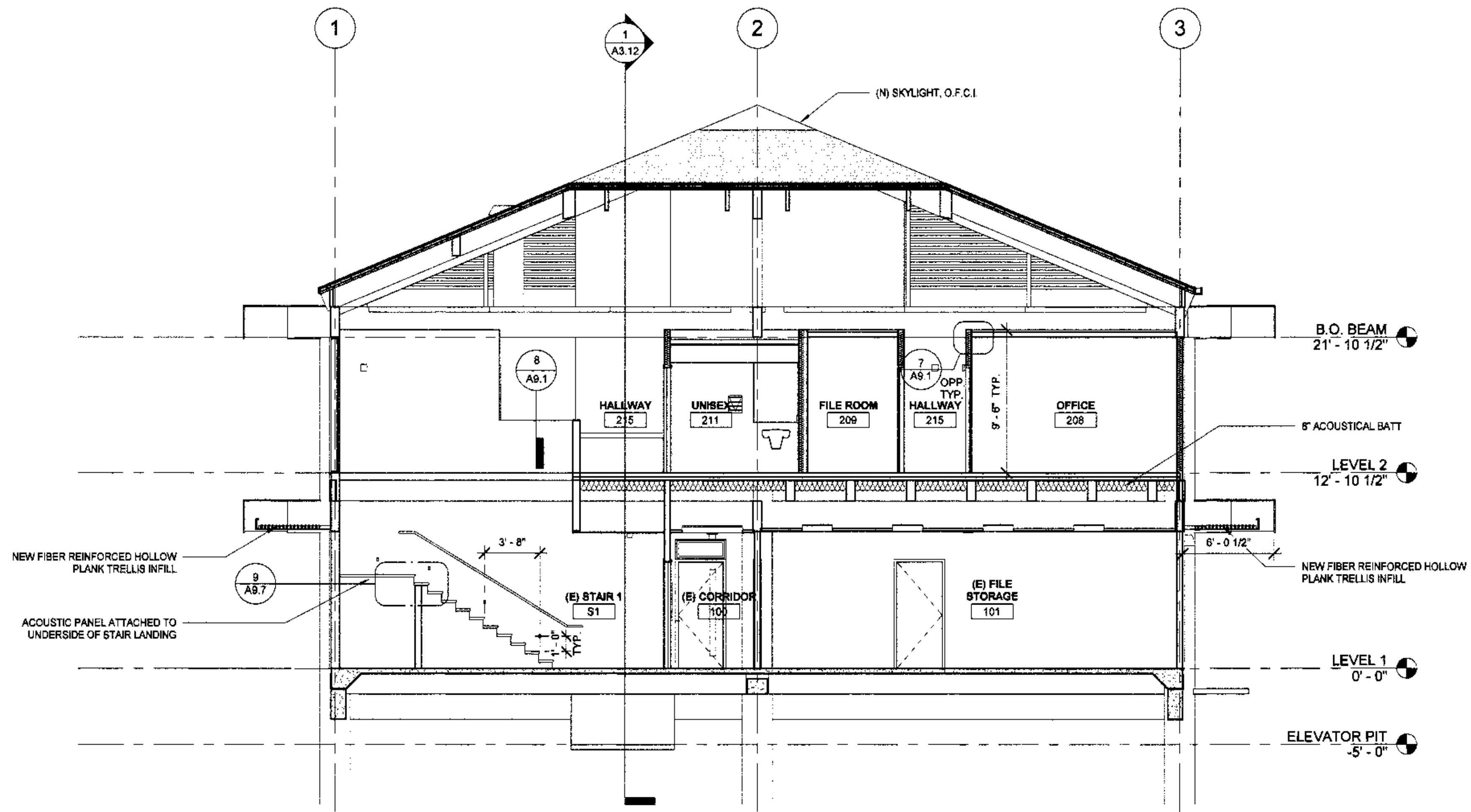
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CONSTRUCTION  
DOCUMENTS

BUILDING  
ELEVATION -  
WEST

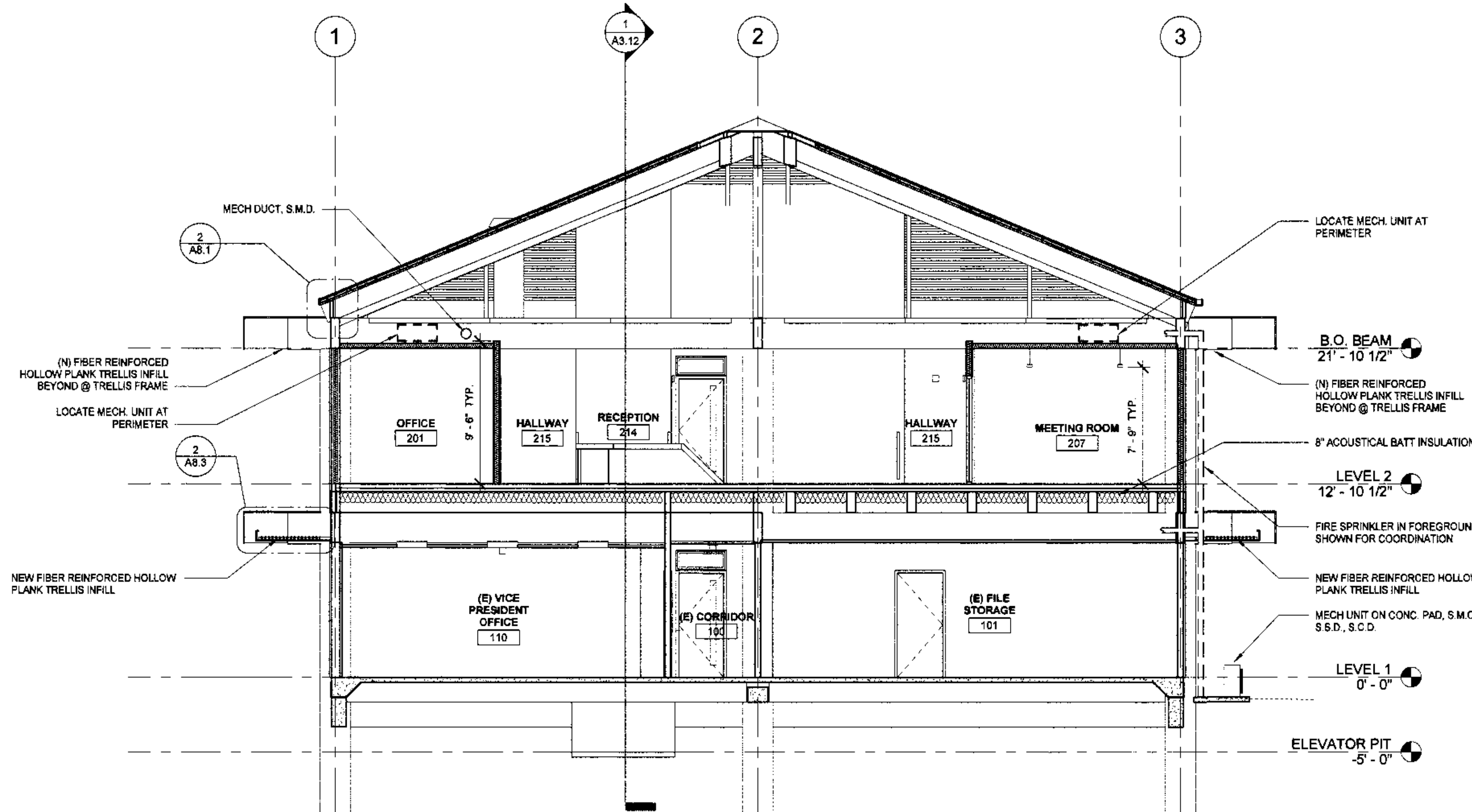
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2 BLDG. SECTION THRU STAIRS

3/16" = 1'-0"



1 BLDG. SECTION THRU CENTRAL SPACE

3/16" = 1'-0"

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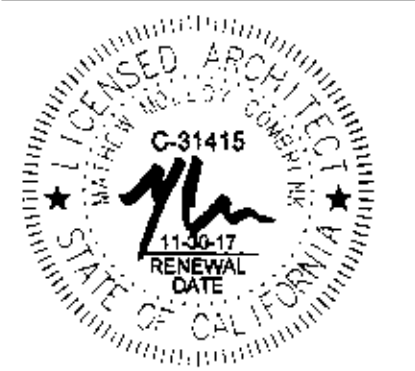
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OFFICE OF REGULATION SERVICES

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DATE SEP 12 2017

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3/10/17	100% CD
rev date	issue



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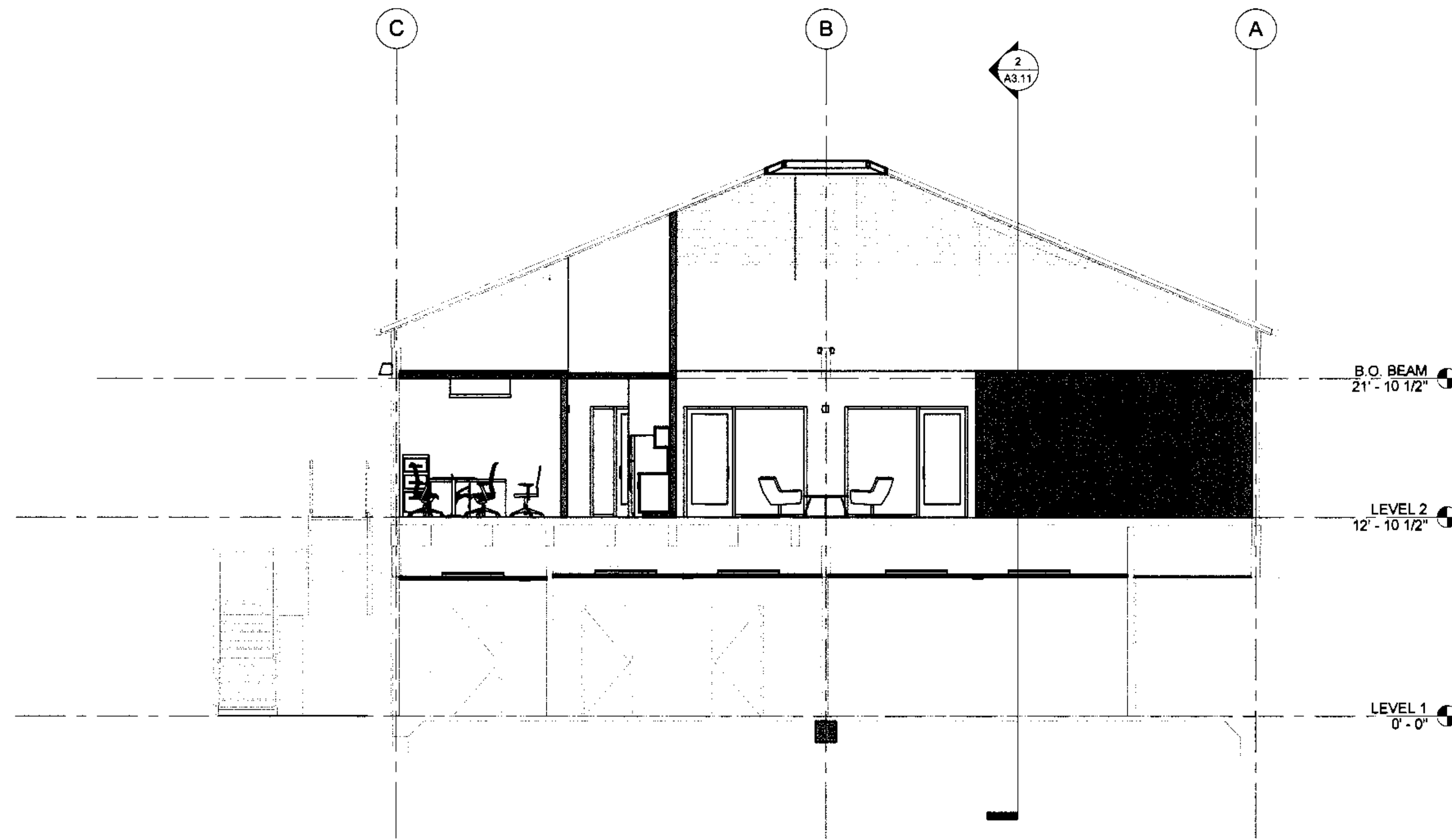
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project number: 16-148-01

scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
BUILDING  
SECTIONS

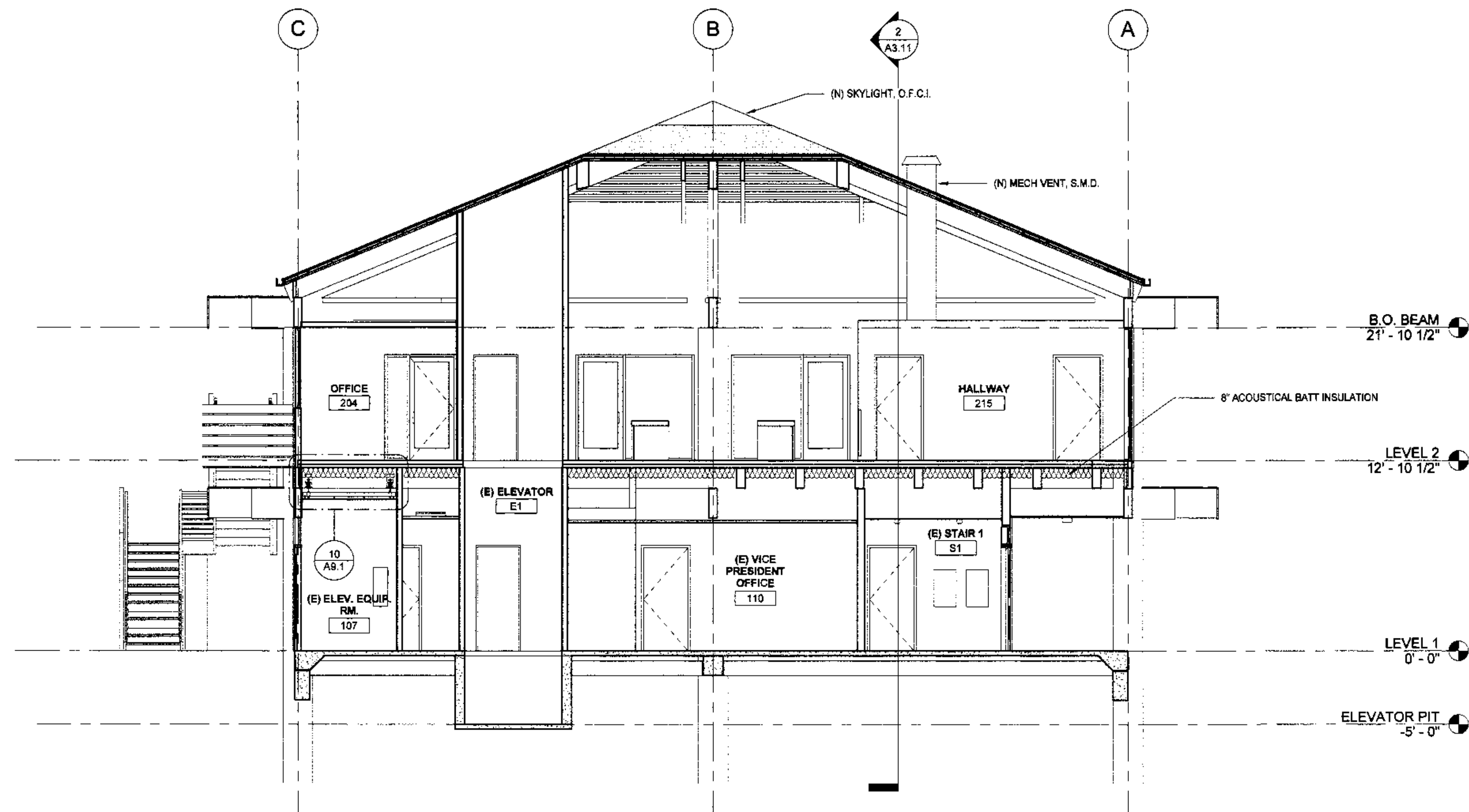
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2 BUILDING SECTION

3/16" = 1'-0"



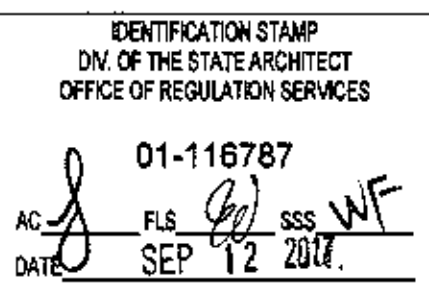
1 BLDG. SECTION THRU ELEV. HOISTWAY

3/16" = 1'-0"

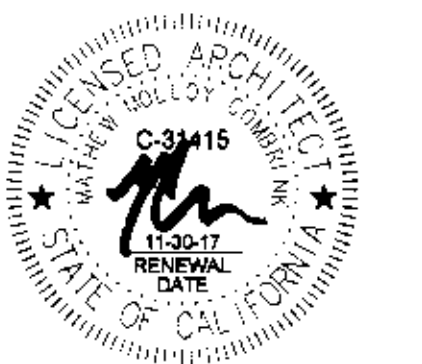
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novato, california  
project number: 16-148.01

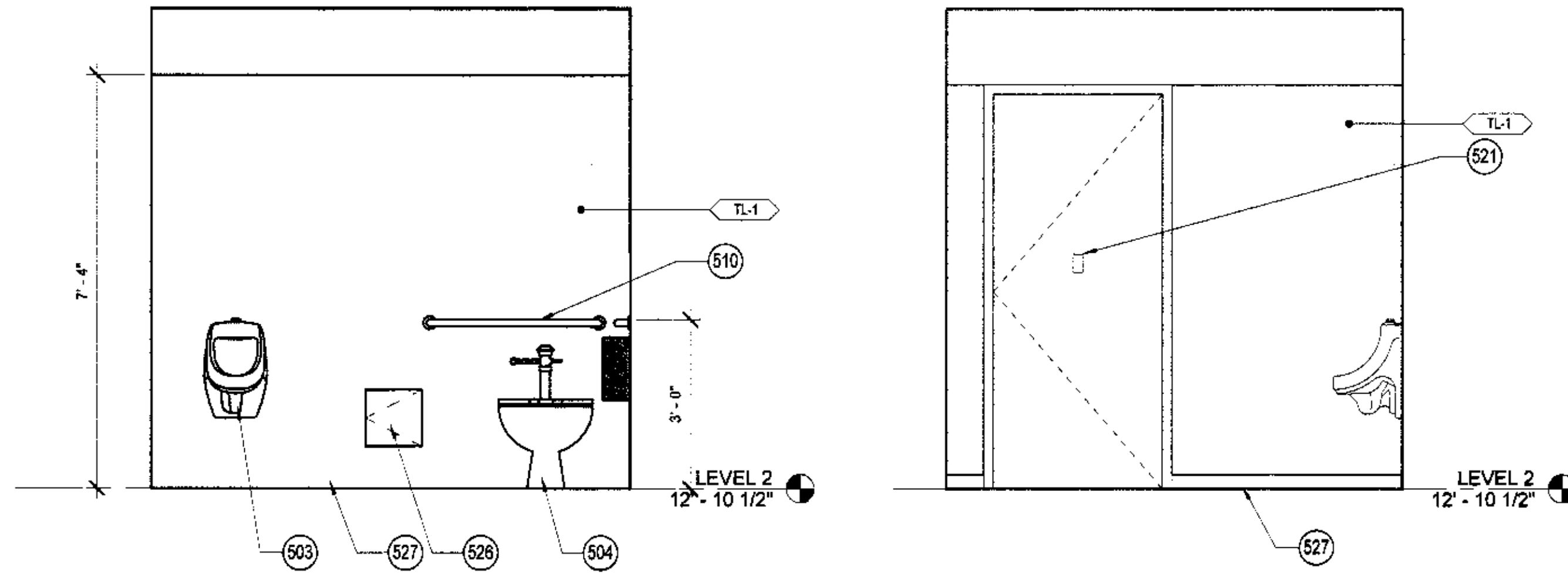
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CONSTRUCTION  
DOCUMENTS

BUILDING  
SECTIONS

A3.12

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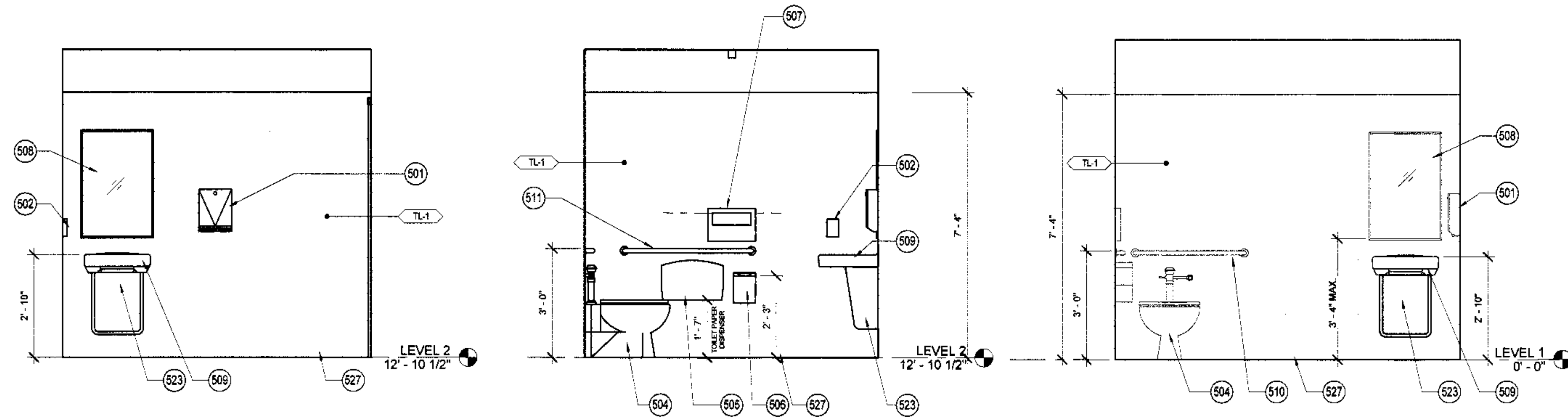
8 UNISEX RESTROOM #210 - NORTH 1/2" = 1'-0"

7 UNISEX RESTROOM #210 - WEST 1/2" = 1'-0"

- GENERAL NOTES:
1. SEE G3.0 FOR TYPICAL ACCESSIBILITY REQUIREMENTS
  2. SEE A9.10 FOR TYPICAL MILLWORK DETAILS
  3. SEE A2.4 FOR FINISHES SCHEDULE
  4. SEE A7.1 FOR HEAD, SILL, AND JAMB DETAIL REFERENCES FOR WINDOWS

INTERIOR ELEVATION GENERAL NOTES 1/16" = 1'-0"

1/16" = 1'-0"



6 UNISEX RESTROOM #210 - SOUTH 1/2" = 1'-0"

5 UNISEX RESTROOM #210 - EAST 1/2" = 1'-0"

4 UNISEX RESTROOM #109 - NORTH 1/2" = 1'-0"

- 501 PAPER TOWEL DISPENSER, O.F.C.I.
- 502 WALL MOUNTED SOAP DISPENSER, O.F.C.I. SEE 7/A6.3
- 503 WALL MOUNTED URINAL
- 504 FLOOR MOUNTED TOILET
- 505 TOILET PAPER DISPENSER, O.F.C.I.
- 508 SANITARY NAPKIN RECEPTACLE
- 507 TOILET SEAT COVER DISPENSER, O.F.C.I.
- 508 MIRROR
- 509 WALL MOUNTED SINK
- 510 36" GRAB BAR, SEE 8/A6.3
- 511 48" GRAB BAR, SEE 8/A6.3
- 512 QUARTZ SURFACING
- 513 REFRIGERATOR
- 514 NOT USED
- 515 4" RUBBER BASE
- 516 LIGHT FIXTURE AS SCHED., S.E.D.
- 517 NOT USED
- 518 WALL MOUNTED FLAT SCREEN MONITOR, O.F.C.I., S.T.D., SEE 14/S4.1
- 519 WALL MOUNTED MARKER & ERASER CADDY, O.F.C.I.
- 520 WOOD HANDRAIL
- 521 COAT HOOK, TYP. BEHIND DOOR
- 522 MAGNETIC DRY ERASE WALL COVERING, SEE FINISH PLAN
- 523 LAVATORY COVER GUARD AT WATER HEATER AND PIPING, S.M.D.
- 524 PROVIDE BACKING PLATE FOR FUTURE SHELF INSTALLATION
- 525 FUTURE SHELF INSTALLATION
- 526 ACCESS PANEL, S.P.D.
- 527 TILE COVE BASE, SEE A2.8 FOR FINISH SCHEDULE
- 528 REMOVABLE BASE CABINET WITH INTEGRAL TOE-KICK
- 529 WALL EXTENSION TO ROOF

3 UNISEX RESTROOM #109 - WEST 1/2" = 1'-0"

2 UNISEX RESTROOM #109 - SOUTH 1/2" = 1'-0"

1 UNISEX RESTROOM #109 - EAST 1/2" = 1'-0"

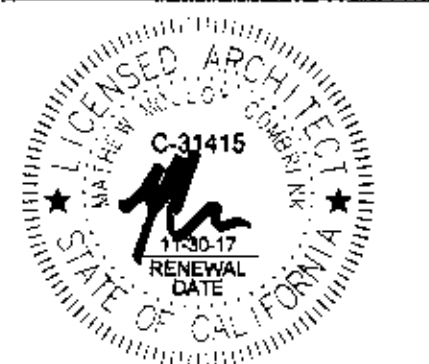
INTERIOR ELEVATION KEYNOTES

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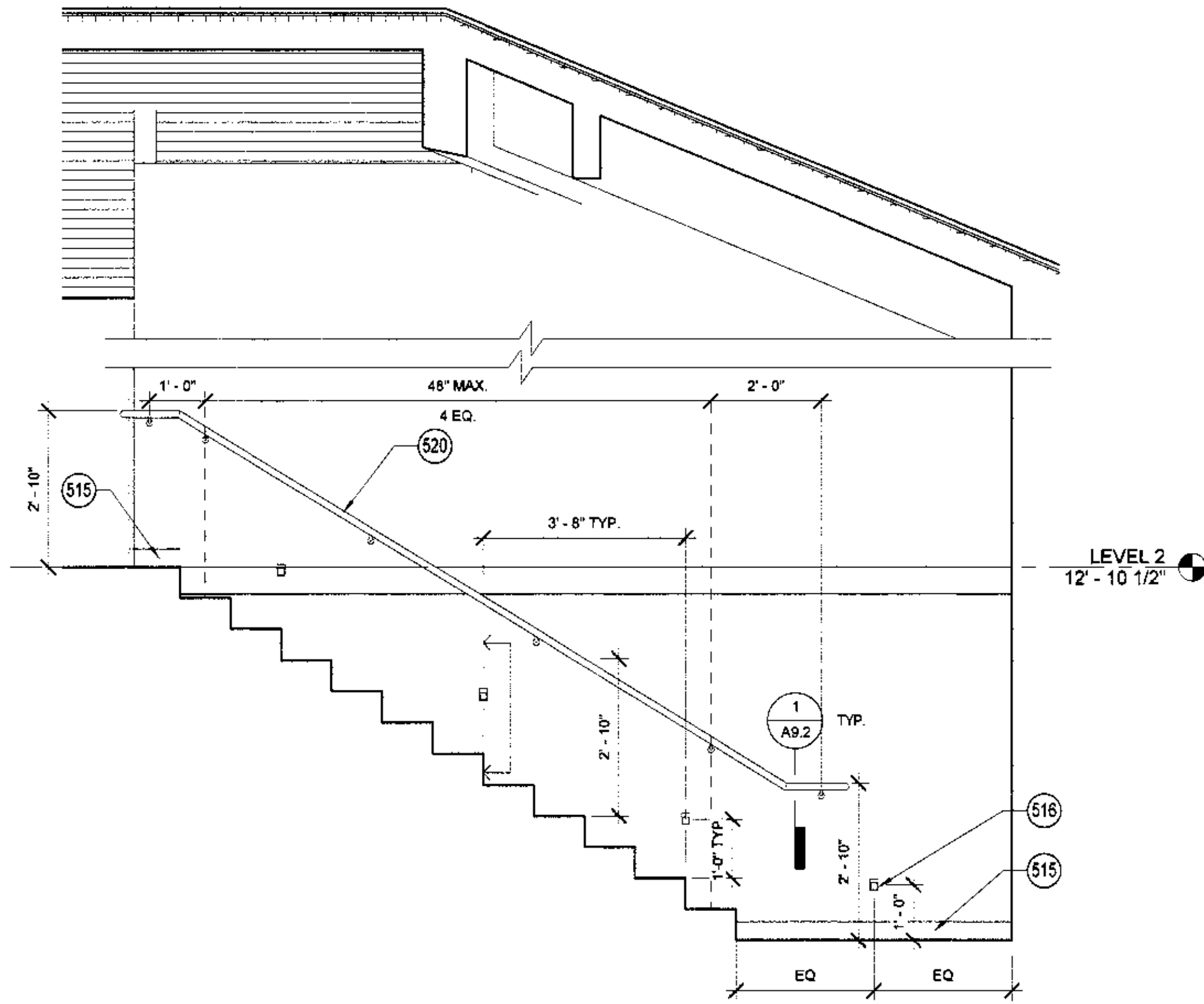
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novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

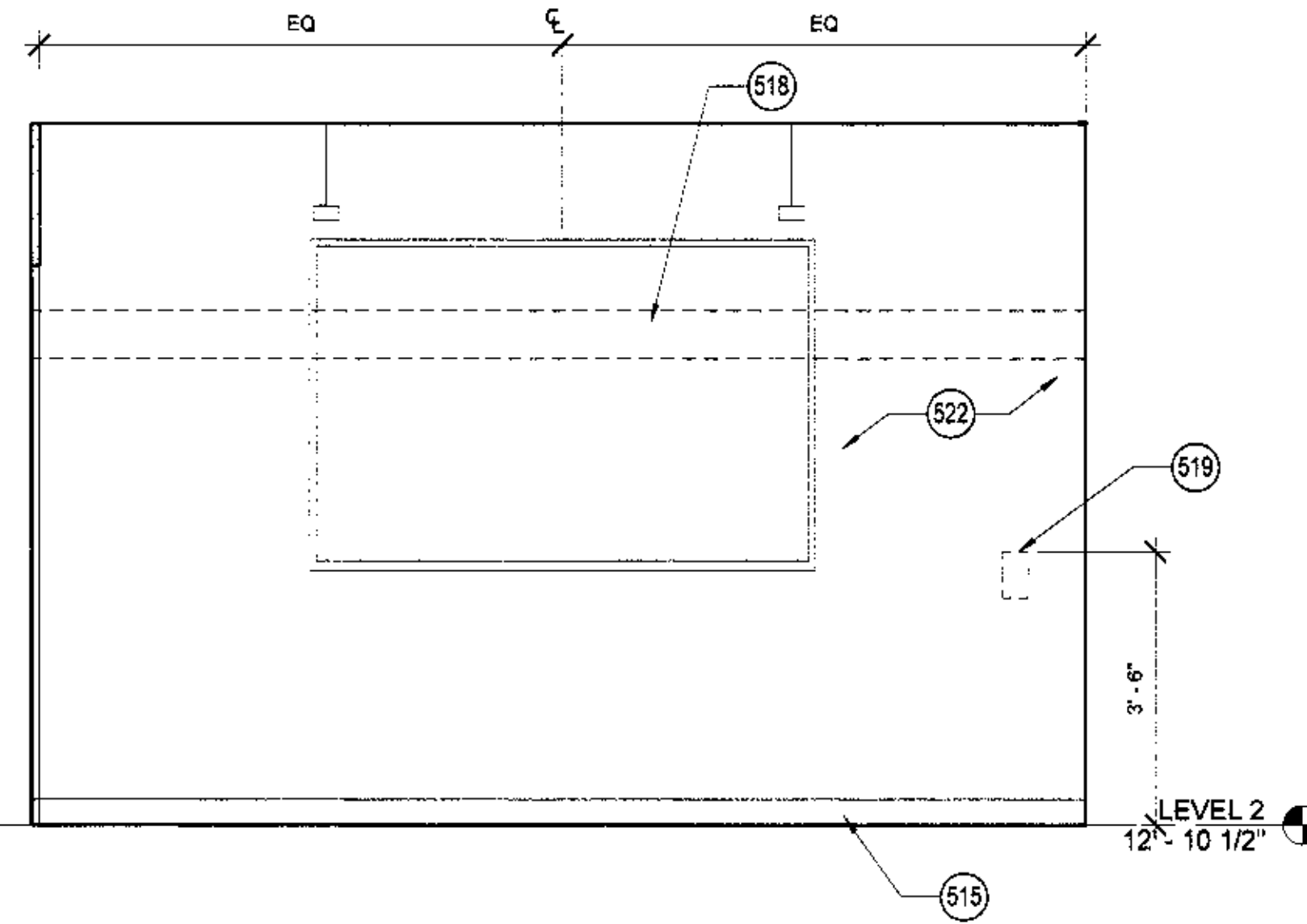
CONSTRUCTION  
DOCUMENTS  
INTERIOR  
ELEVATIONS

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4 STAIR #1 - SOUTH

1/2" = 1'-0" 3 MEETING #207 - NORTH



1/2" = 1'-0"

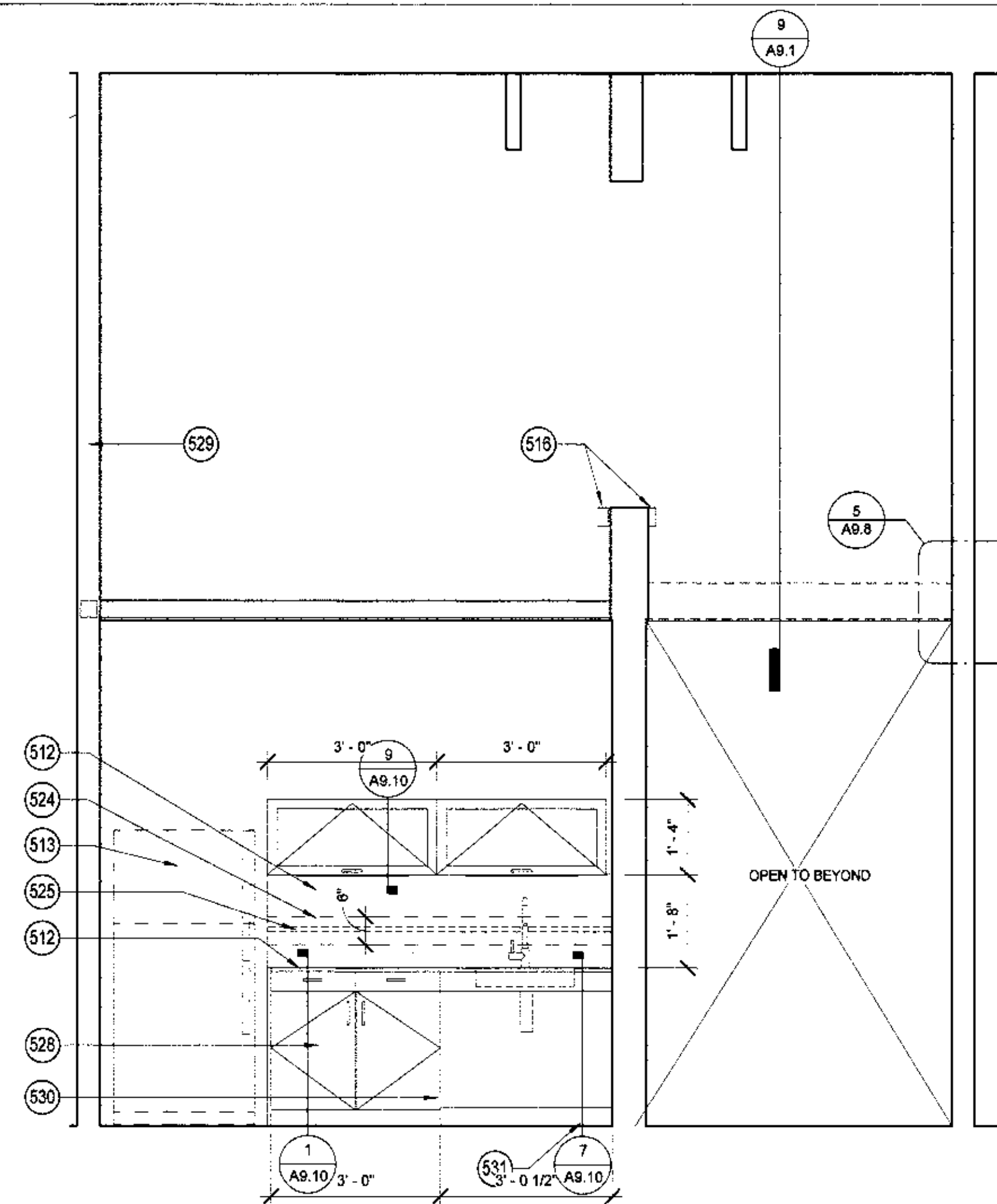
GENERAL NOTES

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2. SEE A8.10 FOR TYPICAL MILLWORK DETAILS
3. SEE A2.4 FOR FINISHES SCHEDULE
4. SEE A7.1 FOR HEAD, SILL, AND JAMB DETAIL REFERENCES FOR WINDOWS

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- 504 FLOOR MOUNTED TOILET
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- 508 MIRROR
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- 510 38" GRAB BAR, SEE 8/A9.3
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- 515 4" RUBBER BASE
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- 519 WALL MOUNTED MARKER & ERASER CADDY, O.F.C.I.
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- 521 COAT HOOK, TYP. BEHIND DOOR
- 522 MAGNETIC DRY ERASE WALL COVERING, SEE FINISH PLAN
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- 525 FUTURE SHELF INSTALLATION
- 526 ACCESS PANEL, S.P.D.
- 527 TILE COVE BASE, SEE A2.6 FOR FINISH SCHEDULE
- 528 REMOVABLE BASE CABINET WITH INTEGRAL TOE-KICK
- 529 WALL EXTENSION TO ROOF
- 530 END PANEL
- 531 WOOD BASE TO MATCH CABINETRY



1 KITCHENETTE - SOUTH

1/2" = 1'-0"

INTERIOR ELEVATION KEYNOTES

1/8" = 1'-0"

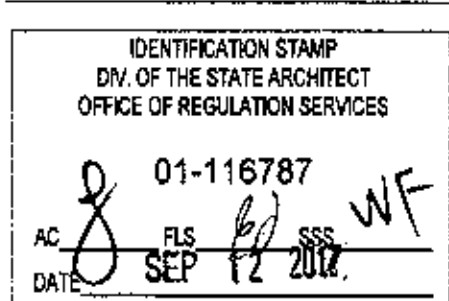
STORAGE CALCULATION PER CBC 11B-04.5  
AT LEAST 50% OF SHELF SPACE IN STORAGE  
FACILITIES SHALL COMPLY WITH SECTION 11B-011.  
TOTAL SHELF SPACE (IN LINEAR FEET)  
12'-0"  
TOTAL SHELF SPACE WITHIN REACH RANGE PER  
11B-008.3.2  
6'-0"  
SHELF SPACE WITHIN REACH RANGE: 50%

INTERIOR ELEVATION KEYNOTES

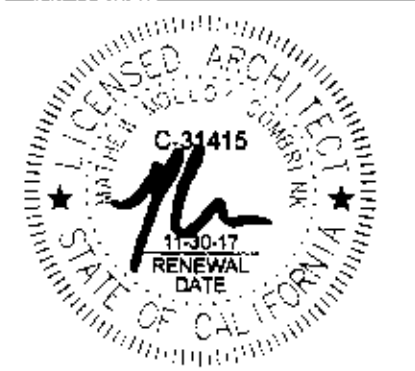
1/8" = 1'-0"

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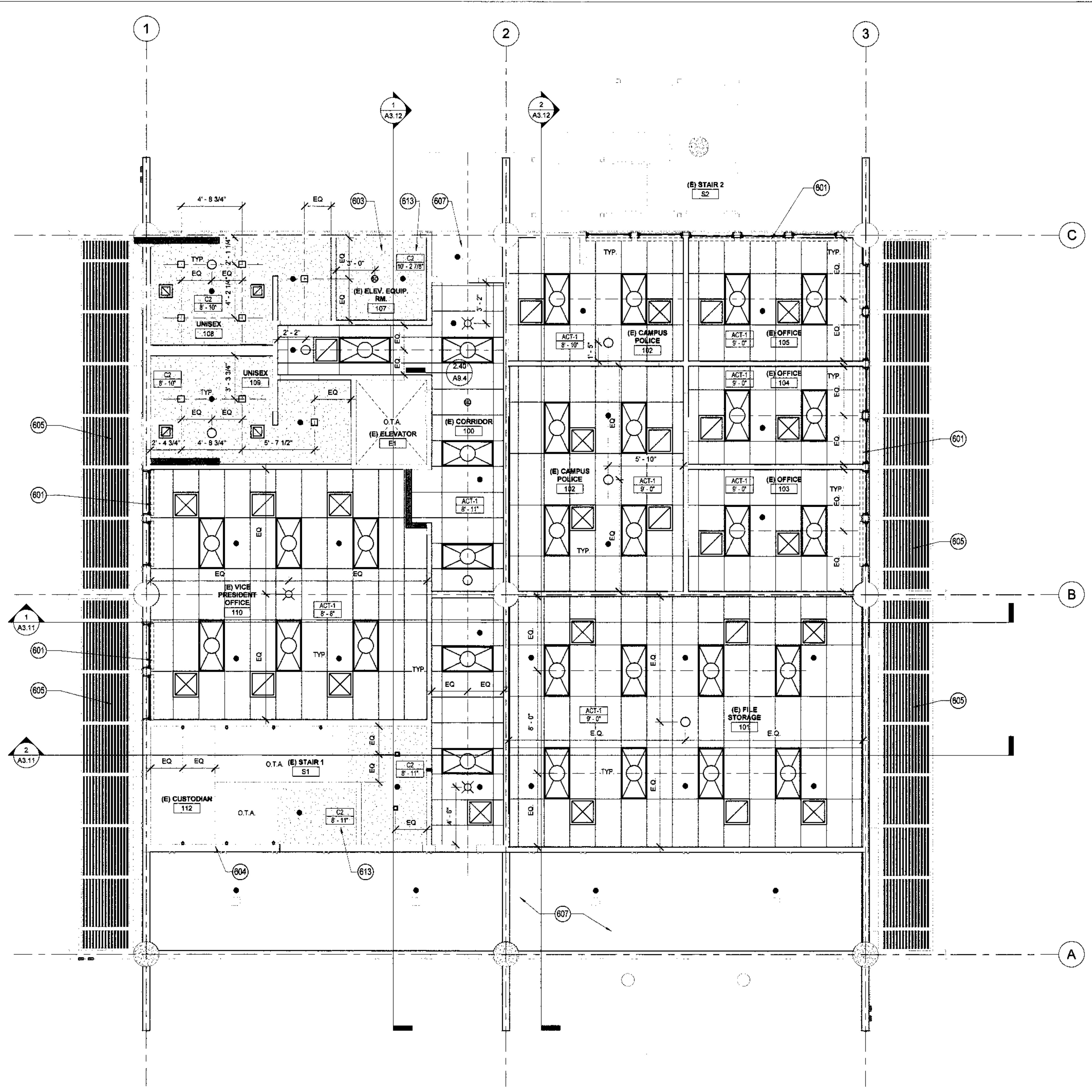
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INTERIOR  
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- MECH. VENT. S.M.D.
- 18" x 18" ACCESS PANEL, @ GYB. BD. CEILING
- AIR RETURN REGISTER, S.M.D.
- AIR SUPPLY REGISTER, S.M.D.
- RECESSED 2x4 LIGHT FIXTURE, S.E.D.
- RECESSED SPEAKER
- RECESSED DOWNLIGHT
- ILLUMINATED EXIT SIGN
- SMOKE SENSOR, S.F.A.D.
- CEILING MOUNTED FIRE ALARM HORN/STROBE, S.F.A.D.
- FIRE ALARM STROBE, S.F.A.D.
- WALL MOUNTED FIRE ALARM HORN/STROBE, S.F.A.D.
- WALL MOUNTED FIRE ALARM STROBE, S.F.A.D.
- FIRE SPRINKLER HEADS, S.F.P.D., TYP.
- UNDERCABINET LIGHT FIXTURE, S.E.D.
- LINEAR DIFFUSER, S.E.D.
- PENDANT LIGHT FIXTURE, LOWEST EDGE 8'-0" A.F.F., S.E.D.
- SUSPENDED INDIRECT/DIRECT LIGHT FIXTURE, LOWEST EDGE 8'-0" A.F.F., S.E.D.
- OPEN TO ABOVE
- GW8 CEILING
- C1 (METAL FRAME CEILING) SEE DETAIL # 7A8.1
- C2 (EXISTING WOOD FRAME CEILING)
- ACOUSTIC TILE CEILING - SUSPENDED CEILING

**RCP LEGEND** 1/8" = 1'-0"

1. WHERE POSSIBLE, ROUTE MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION CONDUITS, DUCTS, CONNECTION LINES TIGHT TO UNDERSIDE OF CEILING AND ALONG EXISTING ROOF STRUCTURE. COORDINATE WITH ARCHITECT PRIOR TO INSTALLATION FOR APPROVAL.
2. LIGHT FIXTURE TYPE F7 SHALL BE MOUNTED WITH BOTTOM @ 7'-0" ABOVE SECOND FLOOR.
3. FOR ACOUSTIC CEILING TILE DETAILS, SEE A8.4
4. SEE A8.5 AND ACOUSTIC REPORT FOR ACOUSTIC DETAILS

**RCP GENERAL NOTES** 1/4" = 1'-0"

- (601) ROLLER SHADE, TYP., SEE DETAIL #3A8.1, TYP.
- (602) DUCT SHAFT ABOVE, S.M.D FOR DUCTWORK, S.S.D FOR PENETRATION DETAIL
- (603) GYP. BD. CLNG. ON ACOUSTICAL HANGER, SEE DETAIL #10A8.1
- (604) STEP LIGHT, SEE BLDG SECTION FOR PLACEMENT REQ., S.E.D.
- (605) NEW FIBER REINFORCED HOLLOW PLANK TRELLIS INFILL
- (606) BUILT-IN DESK
- (607) (E) SOFFIT
- (608) (E) GLULAM BEAM, REMOVE (E) PAINT, SAND BLAST WOOD FINISH, PREP. FOR NEW CLEAR COAT SEALER
- (609) DUAL ROLLER SHADE AT MEETING ROOM, TYP., SEE DETAIL #4A8.1
- (610) MECH. VENT. PENETRATION, ROUTE MECH. DUCT TIGHT TO UNDERSIDE OF CEILING TO ROOF PENETRATION, ARCHITECT TO VERIFY ROUTING LOCATION PRIOR TO INSTALLATION
- (611) SKYLIGHT ABOVE
- (612) PROVIDE BLOCKING/SUPPORT FOR LIGHT FIXTURE
- (613) RELAMP (E) LIGHT FIXTURE, S.E.D.
- (614) REMOVE (E) PAINT AT (E) GLULAM BEAMS, SANDBLAST FINISH, PREPARE AREA FOR NEW CLEAR COAT SEALER, TYPICAL AT ALL EXPOSED ROOF STRUCTURE, V.I.F. FIELD FOR LOCATIONS.

**RCP KEYNOTES** 1/4" = 1'-0"

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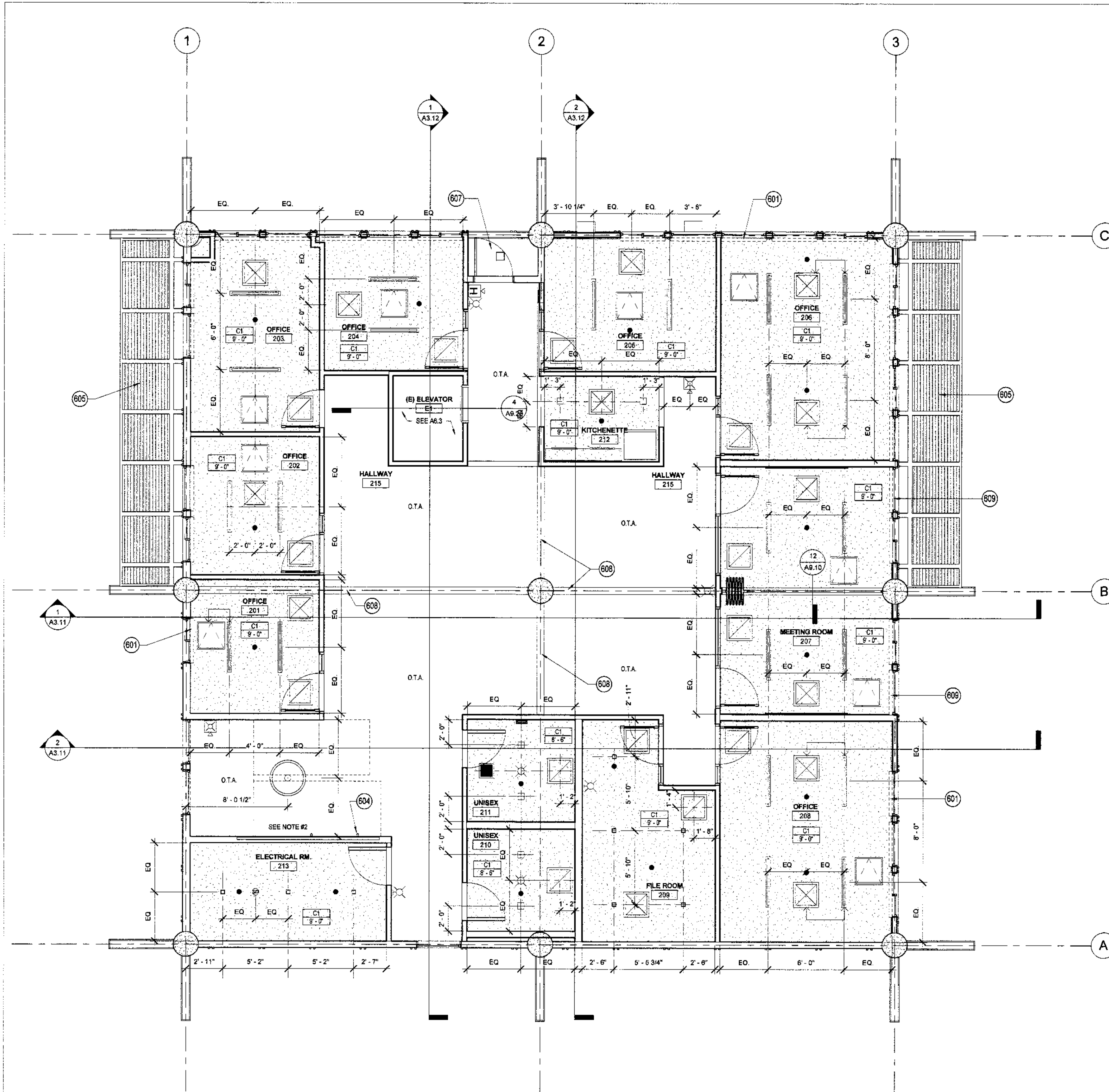
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scale: as noted  
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CONSTRUCTION DOCUMENTS  
 REFLECTED CEILING PLAN - FIRST FLOOR

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**RCP LEGEND** 1/8" = 1'-0"

1. WHERE POSSIBLE, ROUTE MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION CONDUITS, DUCTS, CONNECTION LINES TIGHT TO UNDERSIDE OF CEILING AND ALONG EXISTING ROOF STRUCTURE. COORDINATE WITH ARCHITECT PRIOR TO INSTALLATION FOR APPROVAL.
2. LIGHT FIXTURE TYPE F7 SHALL BE MOUNTED WITH BOTTOM @ 7'-4" ABOVE SECOND FLOOR.
3. FOR ACOUSTIC CEILING TILE DETAILS, SEE A9.4.
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**RCP GENERAL NOTES** 1/4" = 1'-0"

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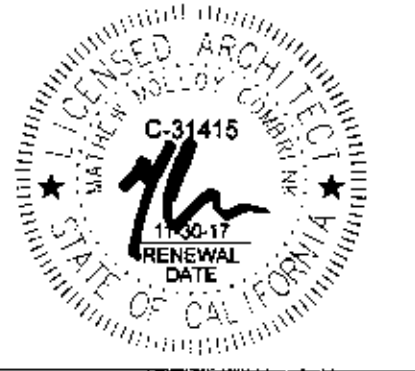
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**COM IVC Bldg. 11 renovation**

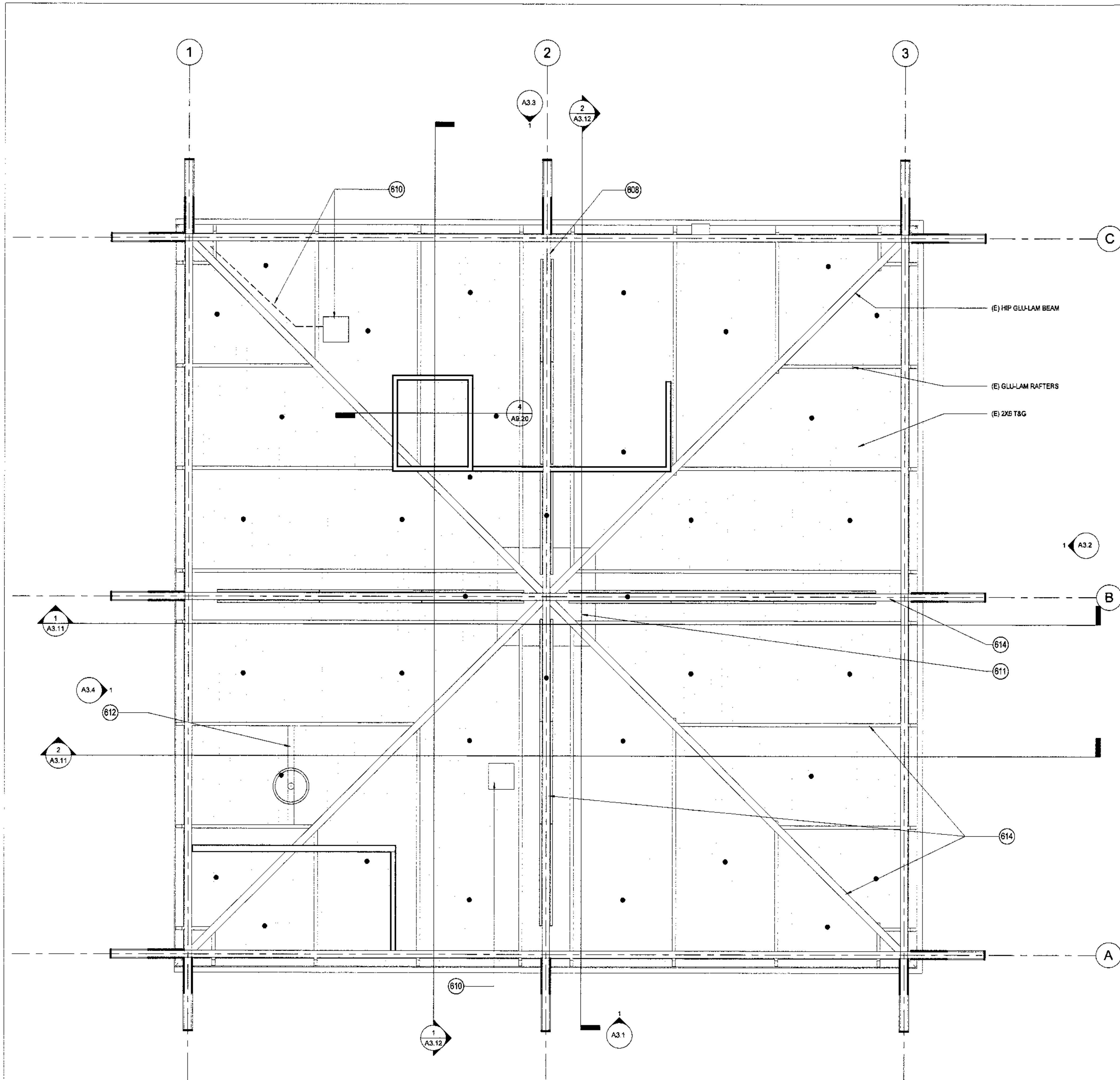
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 project number: 16-148.01

scale: as noted  
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**CONSTRUCTION DOCUMENTS**

**REFLECTED CEILING PLAN - SECOND FLOOR CEILING LEVEL**

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**COM IVC Bldg. 11**  
renovation

novato, california  
project number: 16-148.D1

scale: as noted  
date: 03/10/2017

**CONSTRUCTION DOCUMENTS**

**REFLECTED CEILING PLAN - SECOND FLOOR BEAM LEVEL**



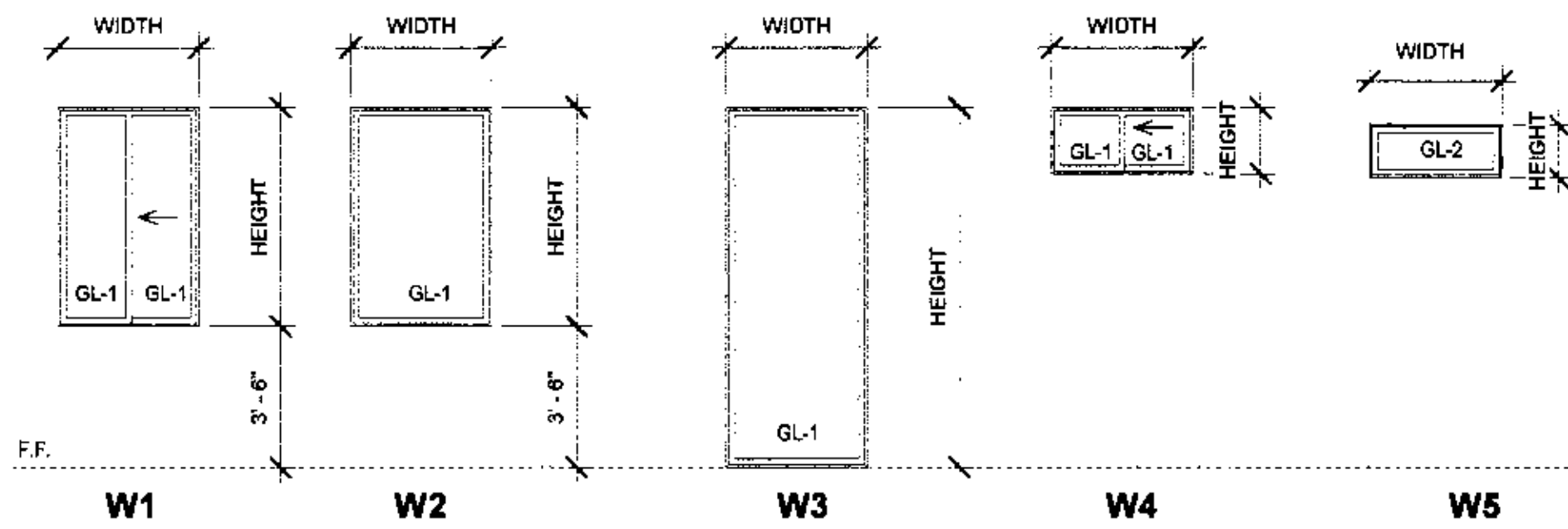
# WINDOW SCHEDULE

# DOOR SCHEDULE

WINDOW SCHEDULE						
Type Mark	Width	Height	Sill Height	HEAD	JAMB	SILL
W1	3' - 6 1/2"	5' - 6"	3' - 6"	3/A8.1	6/A8.1	3/A8.1
W2	3' - 6 1/2"	5' - 6"	3' - 6"	3/A8.1	6/A8.1	3/A8.1
W3	3' - 6 1/2"	9' - 0"	0' - 0"	3/A8.1	6/A8.1	3/A8.1
W4	3' - 6 1/2"	1' - 8"	7' - 4"	3/A8.1	6/A8.1	3/A8.1
W5	3' - 4"	1' - 4"	7' - 2"	9/A8.1	9/A8.1 SIM.	9/A8.1

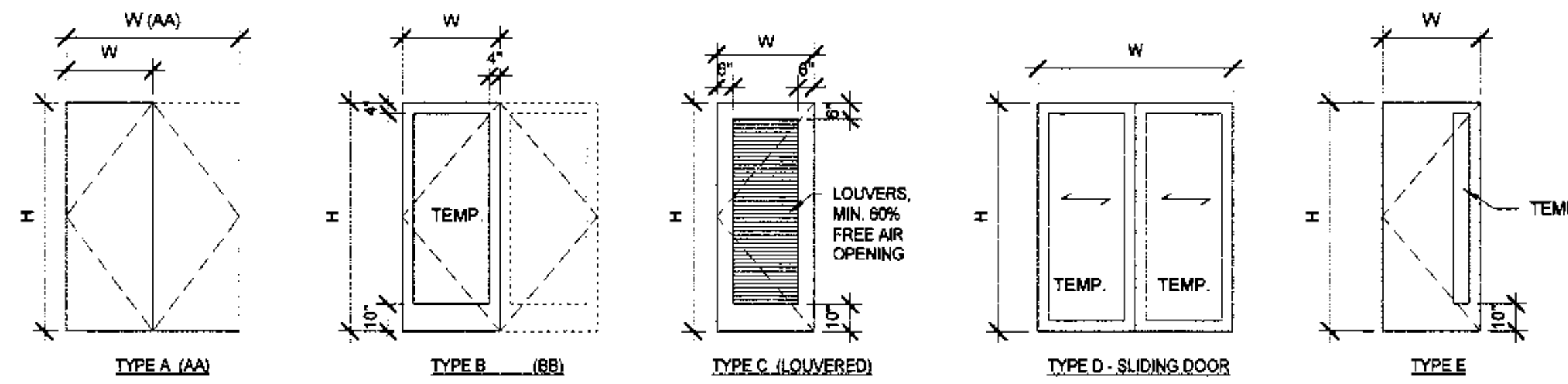
### GLAZING SCHEDULE:

GL-1: 1" INSULATED GLAZING WITH TEMPERED GLAZING ON OUTSIDE PANE  
 GL-2: REMOVE (E) SOLID TRANSOM PANEL AND REPLACE WITH 1/2" TEMP. GLASS.



### WINDOW LEGEND

DOOR NO.	ROOM #	ROOM NAME	TYPE	WIDTH	HEIGHT	THICKNESS	DOOR		FRAME		DETAILS			HARDWARE SET	FIRE RATING	HARDWARE COMMENT/ADDITIONAL NOTES
							MATERIAL	FINISH	MATERIAL	FINISH	HEAD	JAMB	THRESHOLD			
E1	M2	MECHANICAL ENCLOSURE	AA	7'-0"	9'-7"	3"	HM	PTD	HM	PTD	7/A8.2 SIM.	6/A8.2	2/A8.2	7	N/A	PROVIDE TOTAL OF 8 HINGES
E100A	100	(E) CORRIDOR	E	3'-0"	7'-0"	1 3/4"	(E) HM	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	4	N/A	2,3,4,5 REPLACE EXISTING TRANSOM GLAZING. SEE WDW. SCHED.
E100B	100	(E) CORRIDOR	E	3'-0"	7'-0"	1 3/4"	(E) HM	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	4	N/A	1,2,3,4,5 REPLACE EXISTING TRANSOM GLAZING. SEE WDW. SCHED.
E102A	102	(E) CAMPUS POLICE	A	3'-0"	7'-0"	3"	(E) WD	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	5	N/A	1,2,5
E101	101	(E) FILE STORAGE	A	3'-0"	7'-0"	3"	(E) WD	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	5	N/A	4,5
E108	108	UNISEX	A	3'-0"	7'-0"	3"	(E) WD	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	5.1	N/A	1,2,3,5 PROVIDE KICKPLATES ON BOTH SIDES
E109	109	UNISEX	A	3'-0"	7'-0"	3"	(E) WD	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	5.2	N/A	1,2,3,5 PROVIDE KICKPLATES ON BOTH SIDES
E110	110	(E) VICE PRESIDENT OFFICE	A	3'-0"	7'-0"	3"	(E) WD	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	5	N/A	1,2,5
ES1A	S1	(E) STAIR 1	E	3'-0"	7'-0"	1 3/4"	(E) WD	(E) PTD	(E) HM	(E) PTD	(E)	(E)	(E)	5	N/A	2,4,5 REPLACE EXISTING TRANSOM PANEL. SEE WDW. SCHED.
S1	S1	(E) STAIR 1	A	3'-0"	7'-0"	3"	WD	PTD	HM	PTD	(E)	(E)	(E)	6	N/A	5
112	112	(E) CUSTODIAN	C	3'-0"	7'-0"	1 3/4"	HM	PTD	HM	PTD	3/A9.1	2/A9.1	1/A9.1	8.1	N/A	2,4
201	201	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
202	202	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
203	203	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
204	204	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
205	205	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
206	206	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
207A	207	MEETING ROOM	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
207B	207	MEETING ROOM	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
208	208	OFFICE	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	1	N/A	
209	209	FILE ROOM	B	3'-0"	7'-0"	1 3/4"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	2	N/A	
210	210	UNISEX	A	3'-0"	7'-0"	3"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	3	N/A	
211	211	UNISEX	A	3'-0"	7'-0"	3"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	3	N/A	
213	213	ELECTRICAL RM.	A	3'-0"	7'-0"	3"	WD	FAC	SF	AL	6/A9.11	5/A9.11	9/A9.11	2	N/A	
E215	215	HALLWAY	E	3'-0"	7'-0"	1 3/4"	(E) HM	PTD	(E) HM	(E) PTD	(E)	(E)	(E)	4.1	N/A	2,4,5 REPLACE EXISTING TRANSOM GLAZING. SEE WDW. SCHED.



### DOOR LEGEND

#### ABBREVIATION

AL CLEAR ANNOXIDIZED ALUMINUM  
 CD COIL DOOR  
 CW CURTAINWALL  
 FAC FACTORY FINISH  
 GALV GALVANIZED  
 GL GLASS  
 HI HIGH IMPACT DOORS (TRAFFIC DOORS)  
 HM HOLLOW METAL  
 MFR MANUFACTURER  
 PGW PAINT GRADE WOOD  
 PTD PAINTED  
 SF STOREFRONT  
 SS STAINLESS STEEL  
 ST STEEL  
 STN STAINED  
 WD SOLID CORE WOOD  
 WV WOOD VENEER, WD1

#### GENERAL NOTES

- SEE FLOOR PLANS FOR DOOR SYMBOL REFERENCES.
- ALL EXTERIOR DOORS TO HAVE METAL THRESHOLDS.
- ALL HOLLOW METAL DOOR FRAMES TO BE PAINTED TO MATCH ADJACENT SURFACE.
- A PERMANENT LABEL SHALL IDENTIFY REQUIRED SAFETY GLAZING (I.E. TEMPERED) INSTALLED IN THE FOLLOWING LOCATIONS: A) WITHIN 24" OF EITHER SIDE OF ANY DOOR; B) GREATER THAN 6 SQ.FT. IN AREA WITH BOTTOM EDGES LESS THAN 18" ABOVE (AND HORIZONTALLY WITHIN 36") OF A WALKING SURFACE; C) LITES IN DOOR PANELS, CBC 2406.3 AND 2406.4.
- ALL WOOD DOORS SHALL BE SOLID CORE PER CBC 108A.3, PAINT GRADE.
- SEE SPECIFICATION APPENDIX FOR DOOR HARDWARE CUTSHEETS AND LOCKSET CUTOUT TEMPLATE.

#### HARDWARE

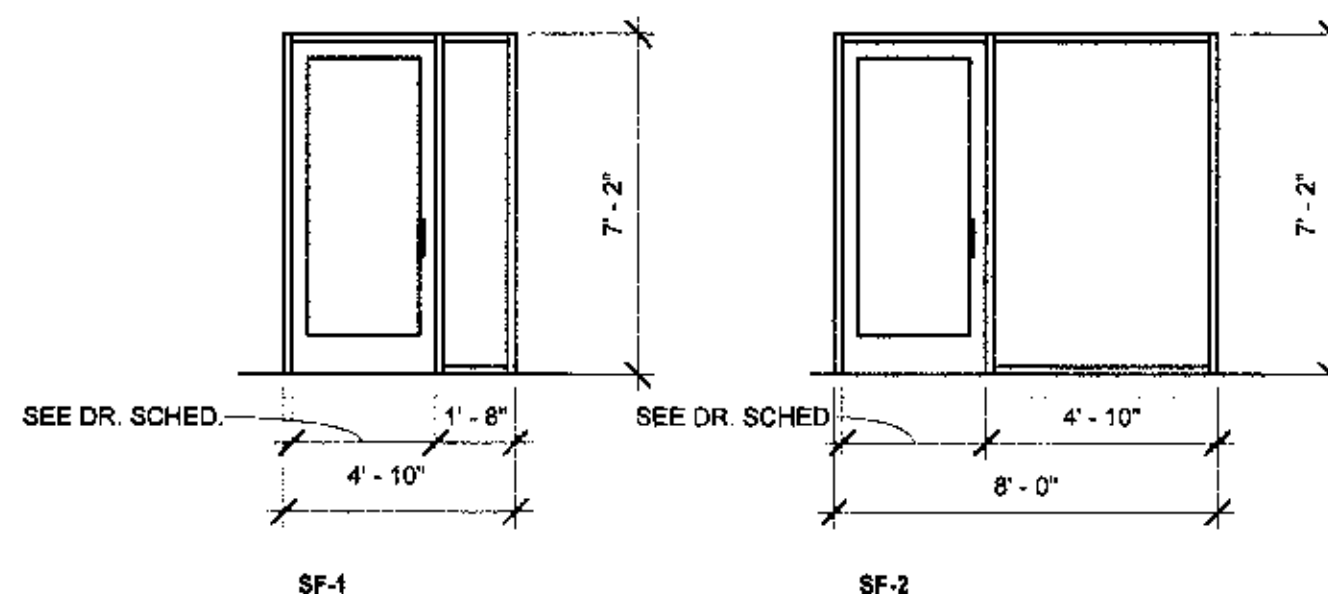
- REMOVE (E) DOOR STOP.
- REMOVE (E) KICKPLATE.
- REMOVE (E) DOOR CLOSER.
- FILL GAP BETWEEN NEW KICKPLATE AND GLAZING GAP WITH CLEAR FILLER STRIP.
- (E) DOOR THRESHOLD MEET ACCESSIBILITY STANDARDS. SEE DETAIL BG3.1 FOR CONFORMANCE.

### DOOR GENERAL NOTES

#### STOREFRONT SCHEDULE

TYPE	ROOM	HEAD DETAIL	JAMB DETAIL	SILL DETAIL
SF-1	201	8/A9.11	8/A9.11	789/A9.11
SF-1	202	8/A9.11	8/A9.11	789/A9.11
SF-1	204	8/A9.11	8/A9.11	789/A9.11
SF-1	205	8/A9.11	8/A9.11	789/A9.11
SF-1	206	8/A9.11	8/A9.11	789/A9.11
SF-2	207	8/A9.11	8/A9.11	789/A9.11
SF-2	207	8/A9.11	8/A9.11	789/A9.11
SF-1	208	8/A9.11	8/A9.11	789/A9.11
SF-1	209	8/A9.11	8/A9.11	789/A9.11

STOREFRONT NOTES:  
 SEE DOOR SCHEDULE FOR ALL DOORS WITH STOREFRONT FRAMES.



### STOREFRONT LEGEND

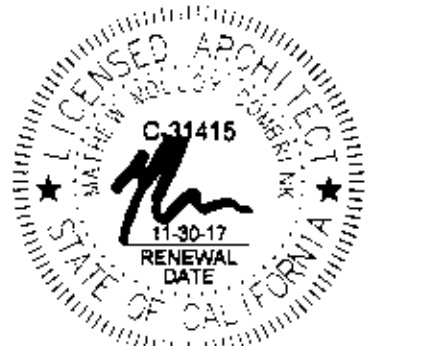
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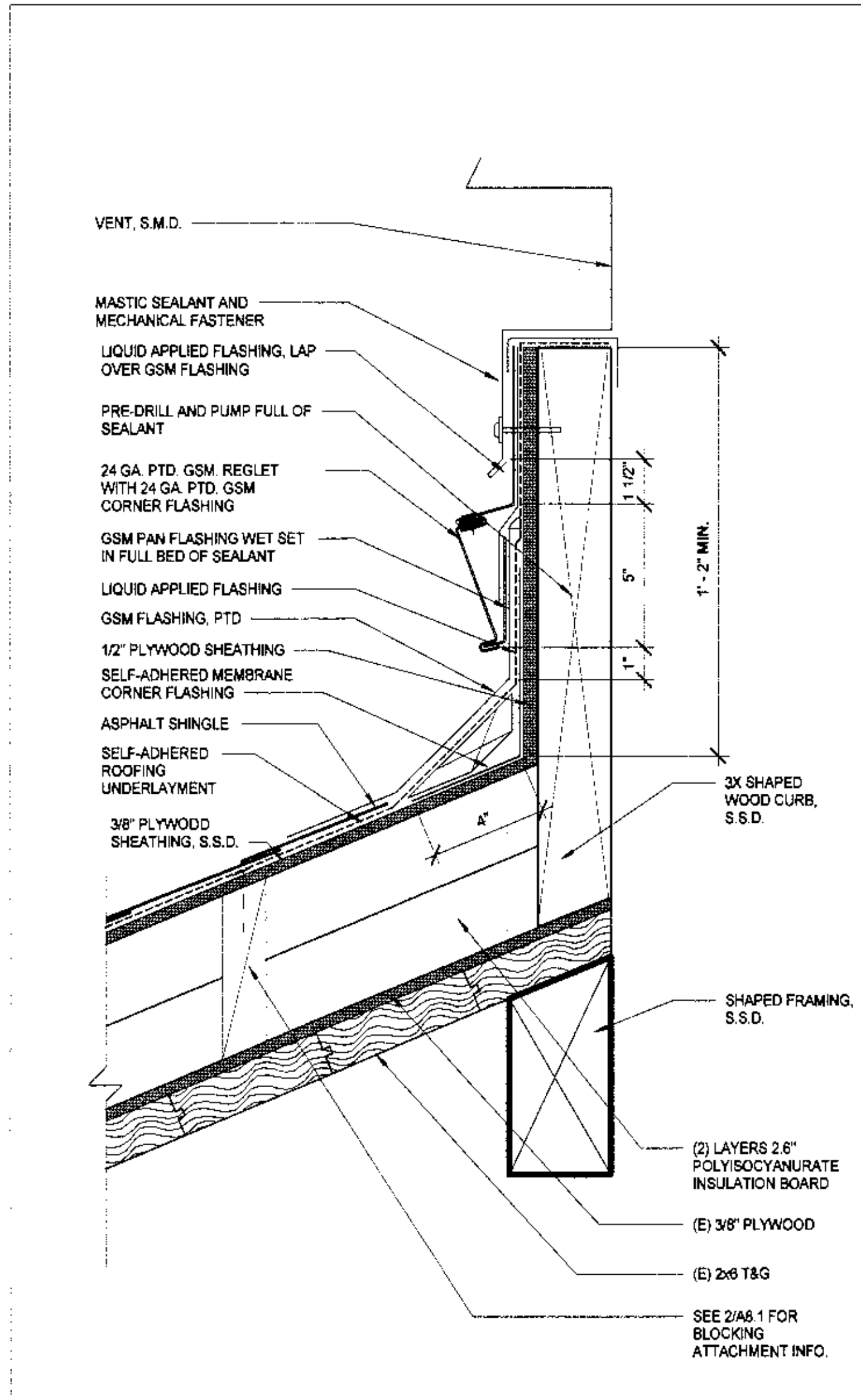
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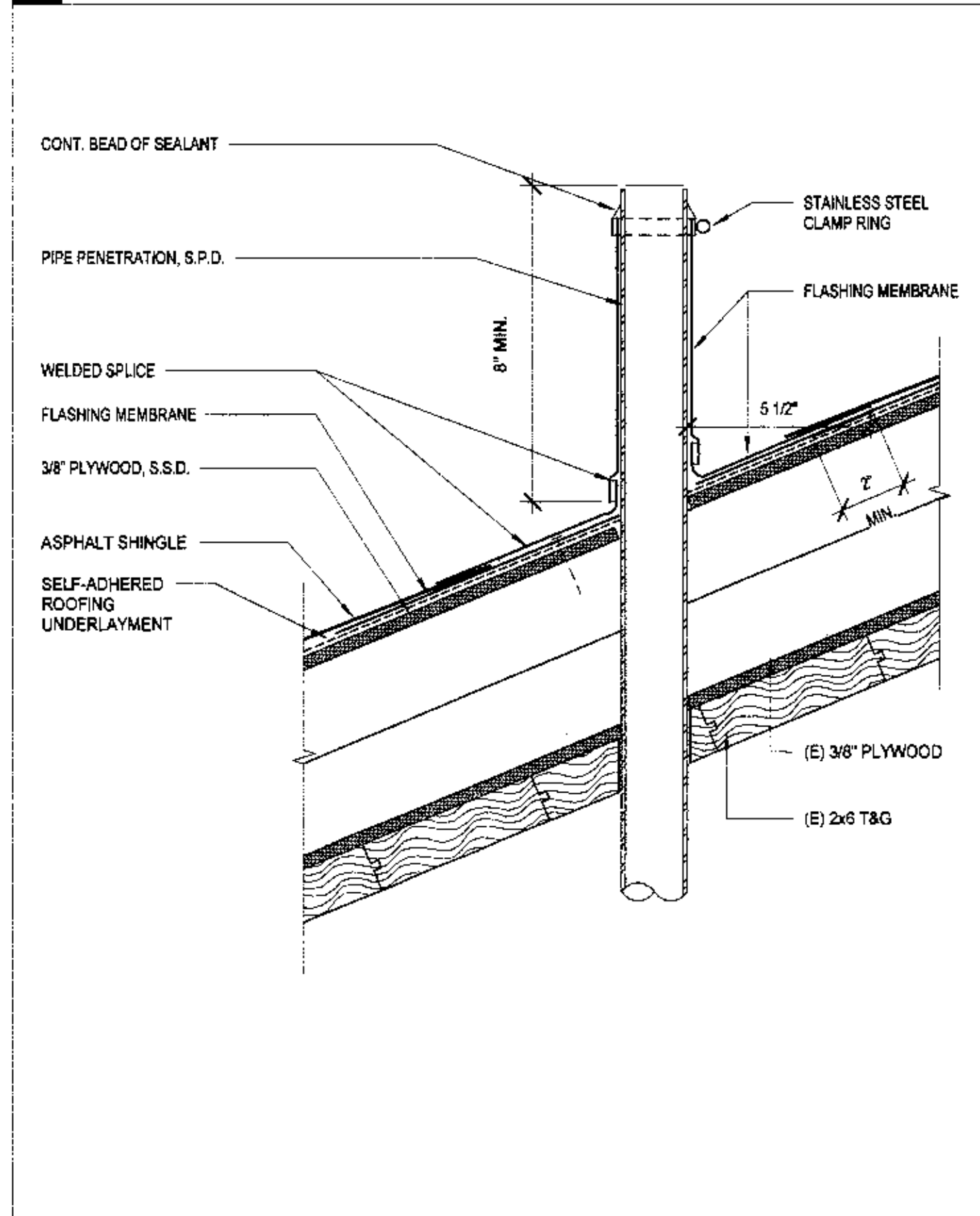
CONSTRUCTION DOCUMENTS  
 DOOR, WINDOW AND STOREFRONT SCHEDULE

A7.1

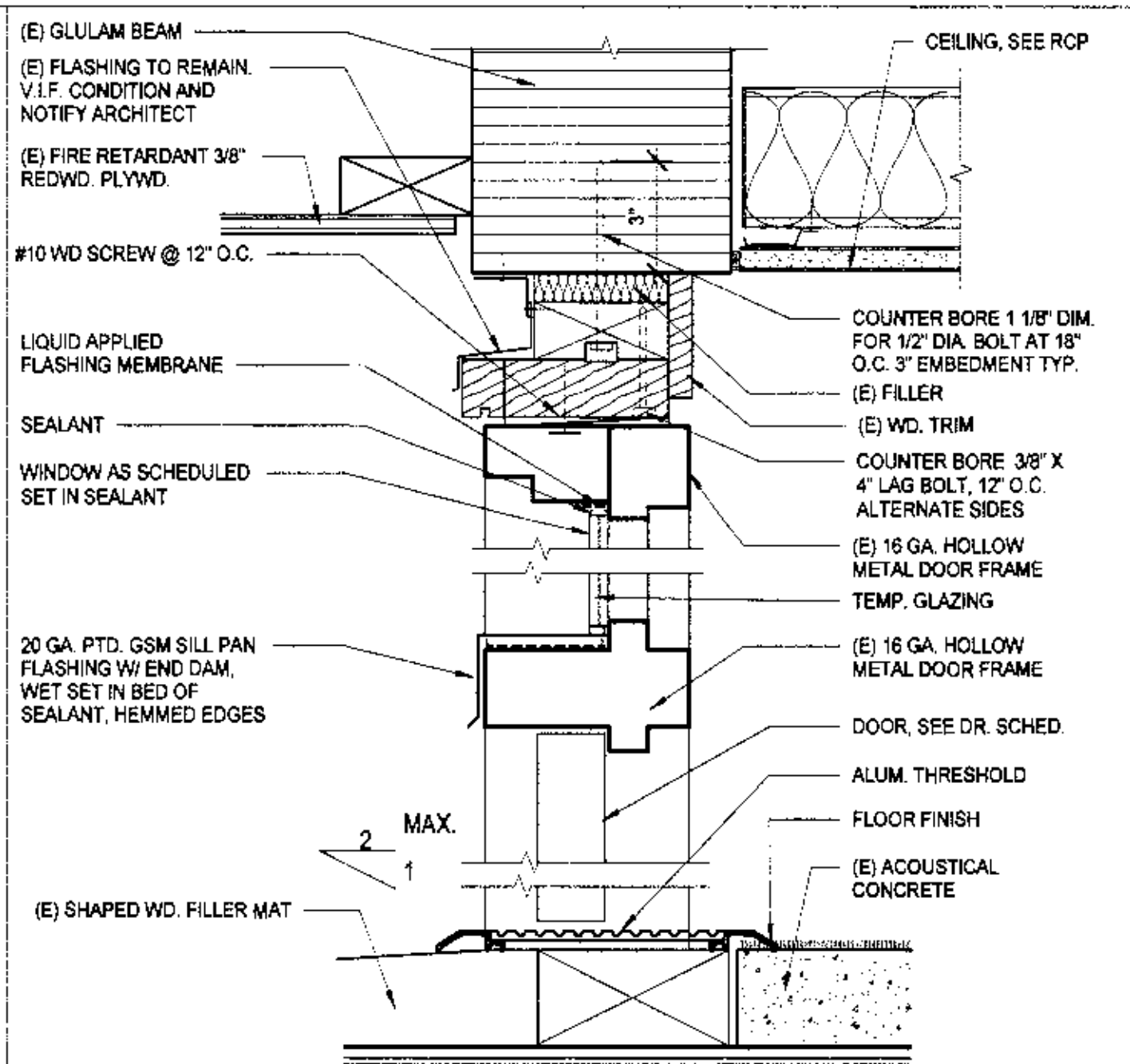
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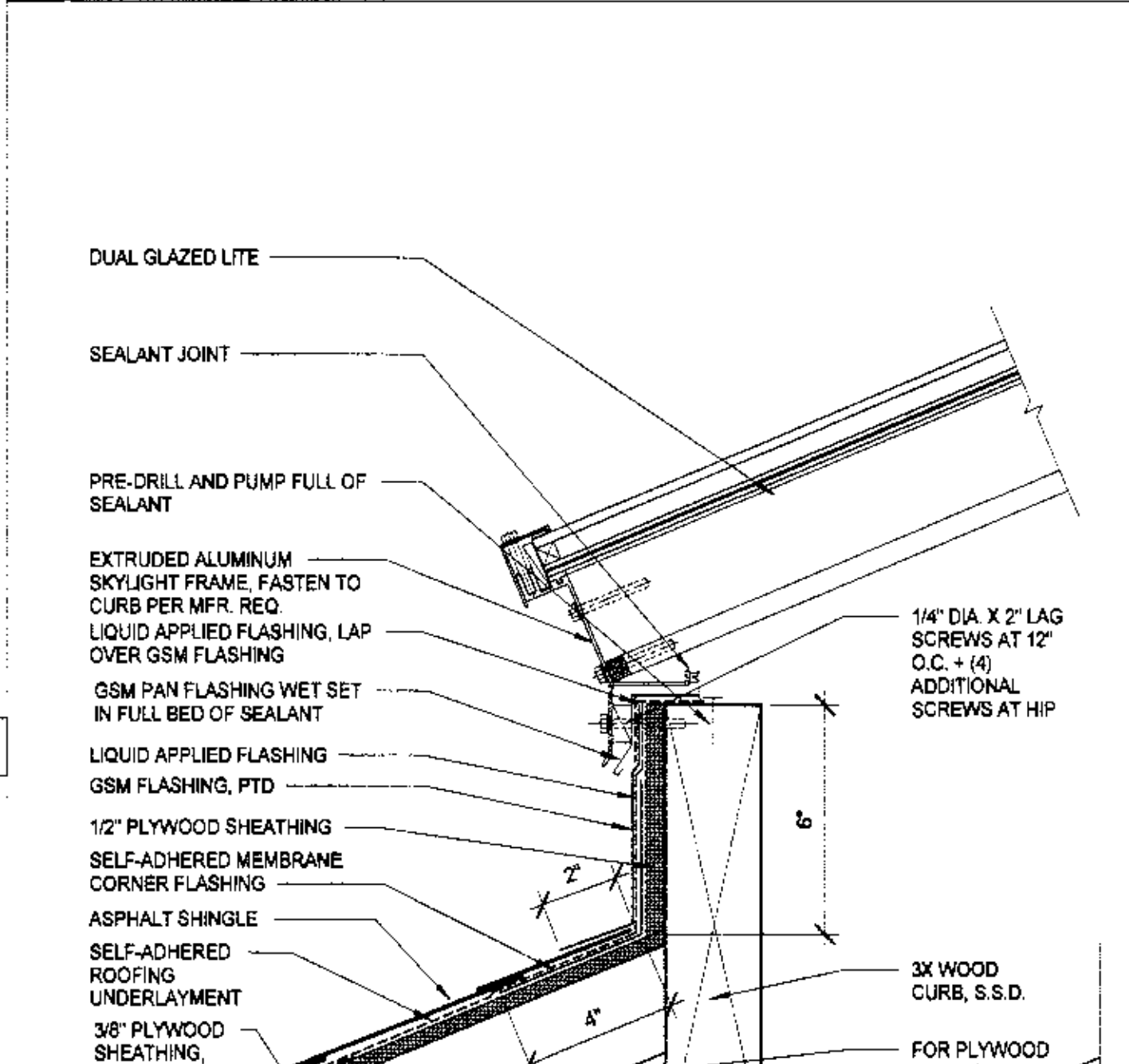
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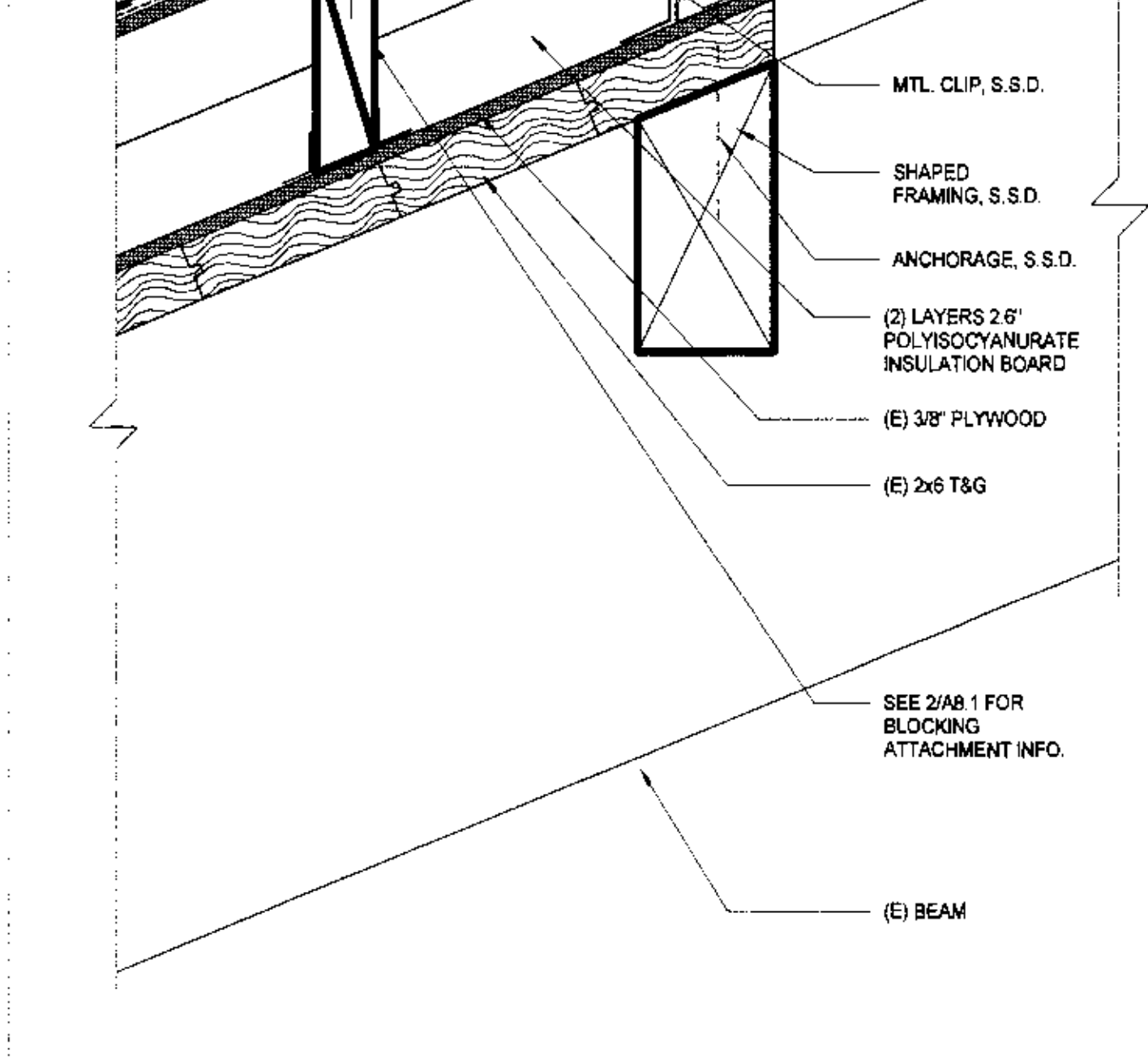
10 TYP. PIPE PENETRATION 3" = 1'-0"



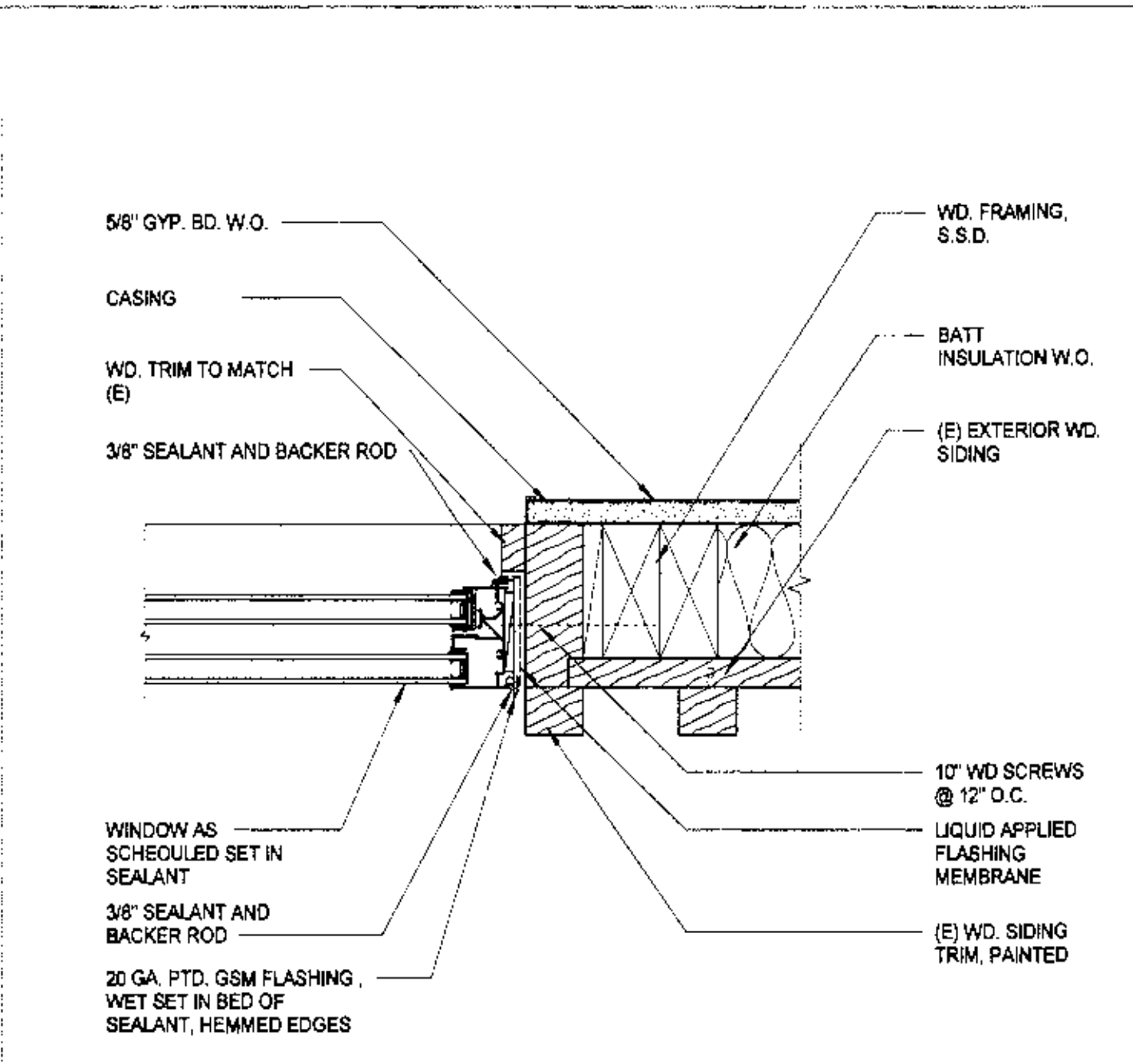
9 TYP. WINDOW HEAD & SILL AT TRANSOM 3" = 1'-0"



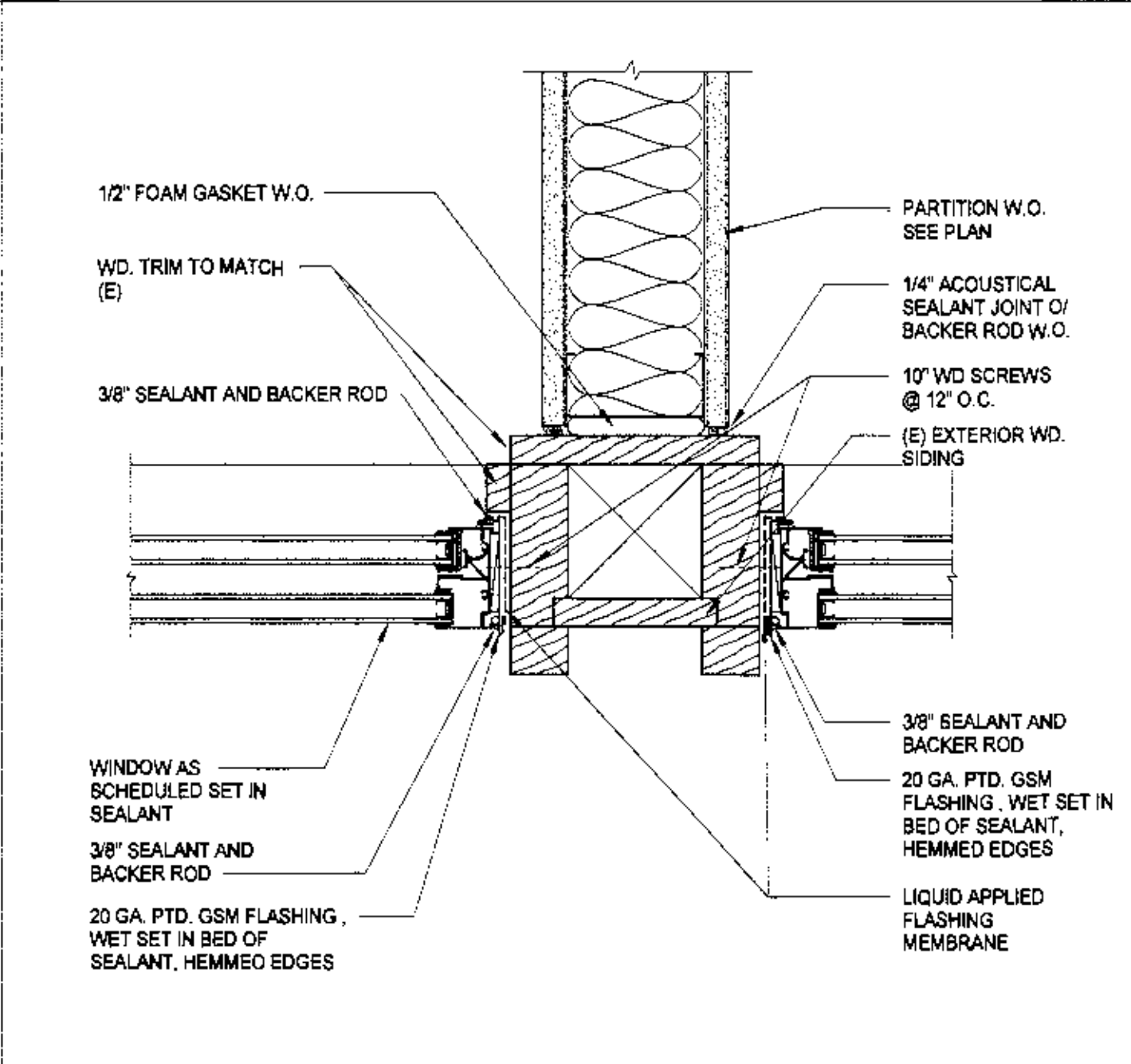
7 SKYLIGHT CURB 3" = 1'-0"



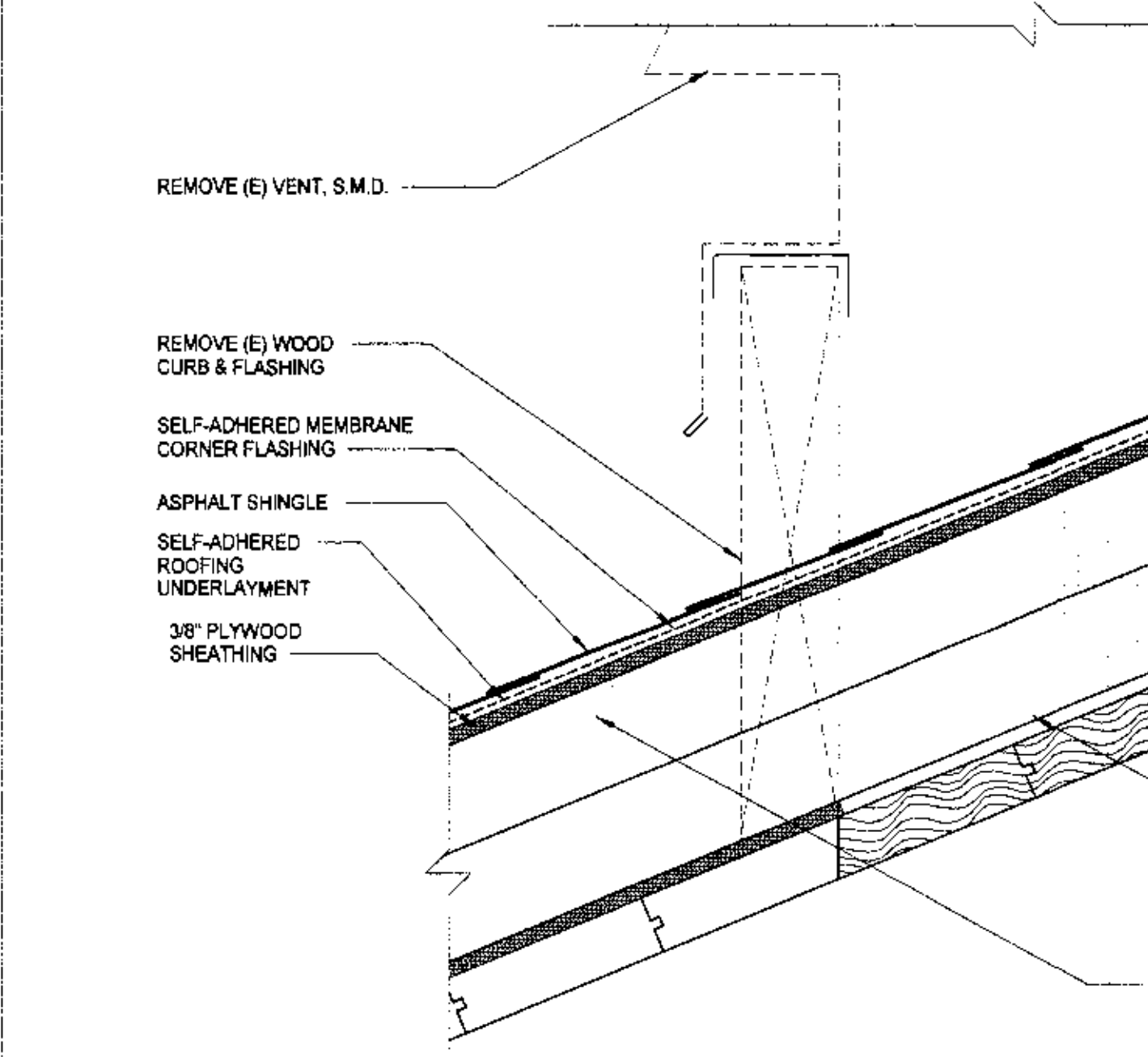
5 TYP. WINDOW JAMB @ POST 3" = 1'-0"



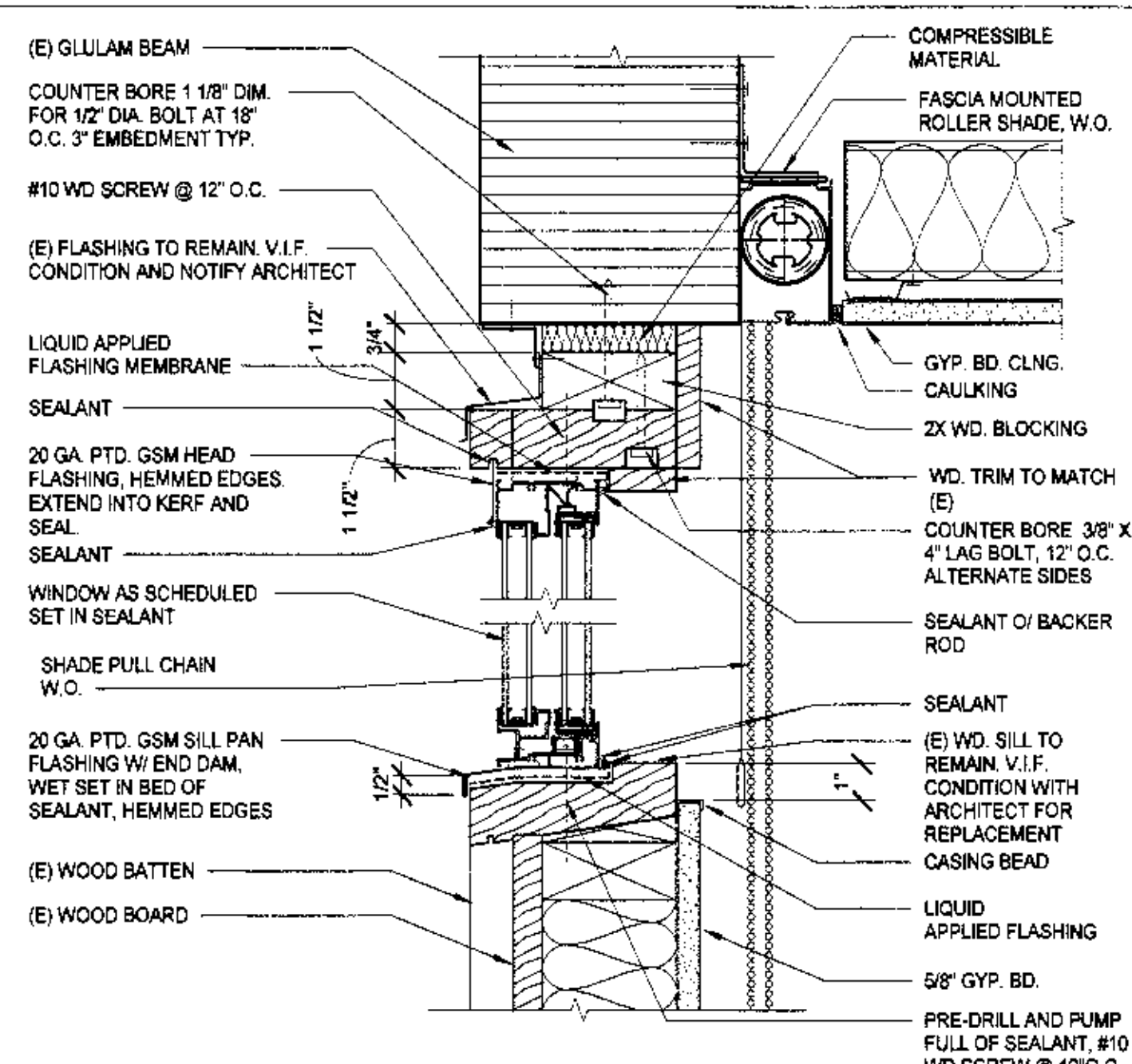
6 TYP. WINDOW JAMB 3" = 1'-0"



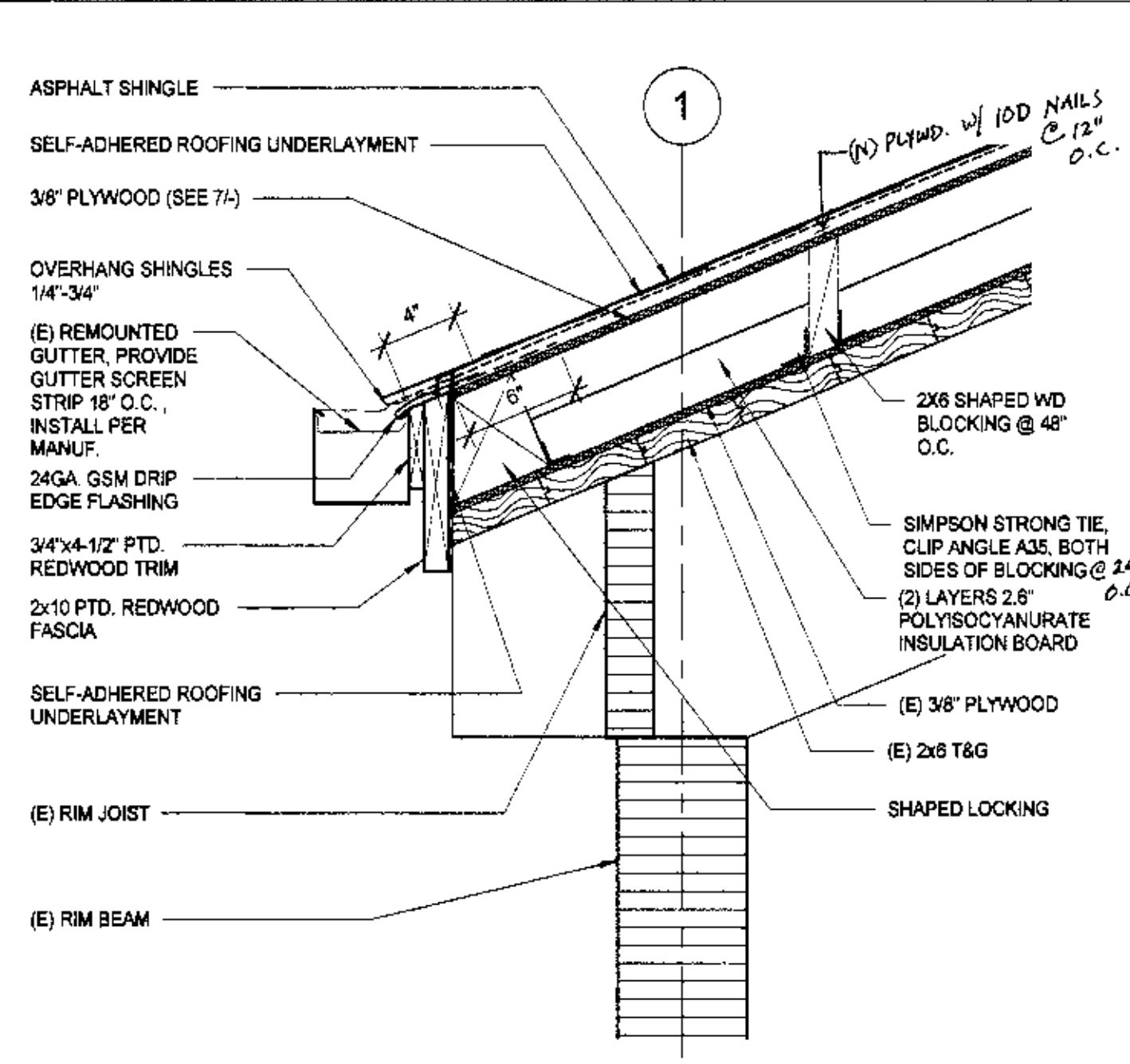
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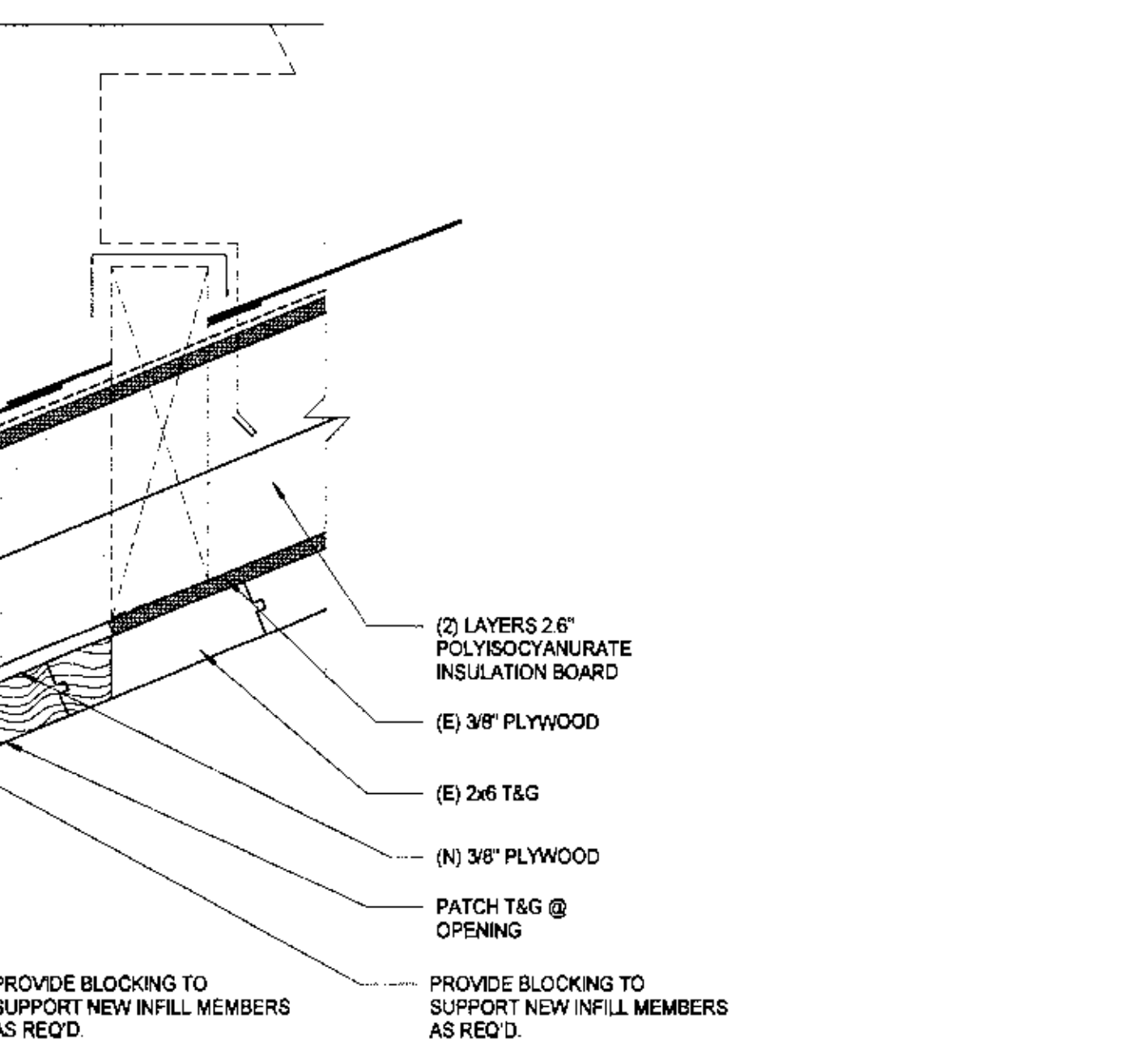
1 TYP. EXHAUST VENT INFILL 3" = 1'-0"



3 TYP. WINDOW HEAD & SILL 3" = 1'-0"



2 TYP. ROOF EAVE / ROOF ASSEMBLY 1 1/2" = 1'-0"



1 TYP. EXHAUST VENT INFILL 3" = 1'-0"

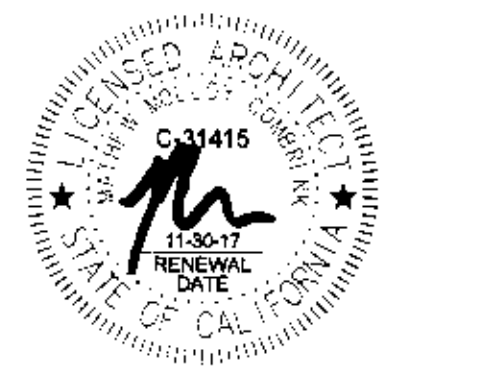
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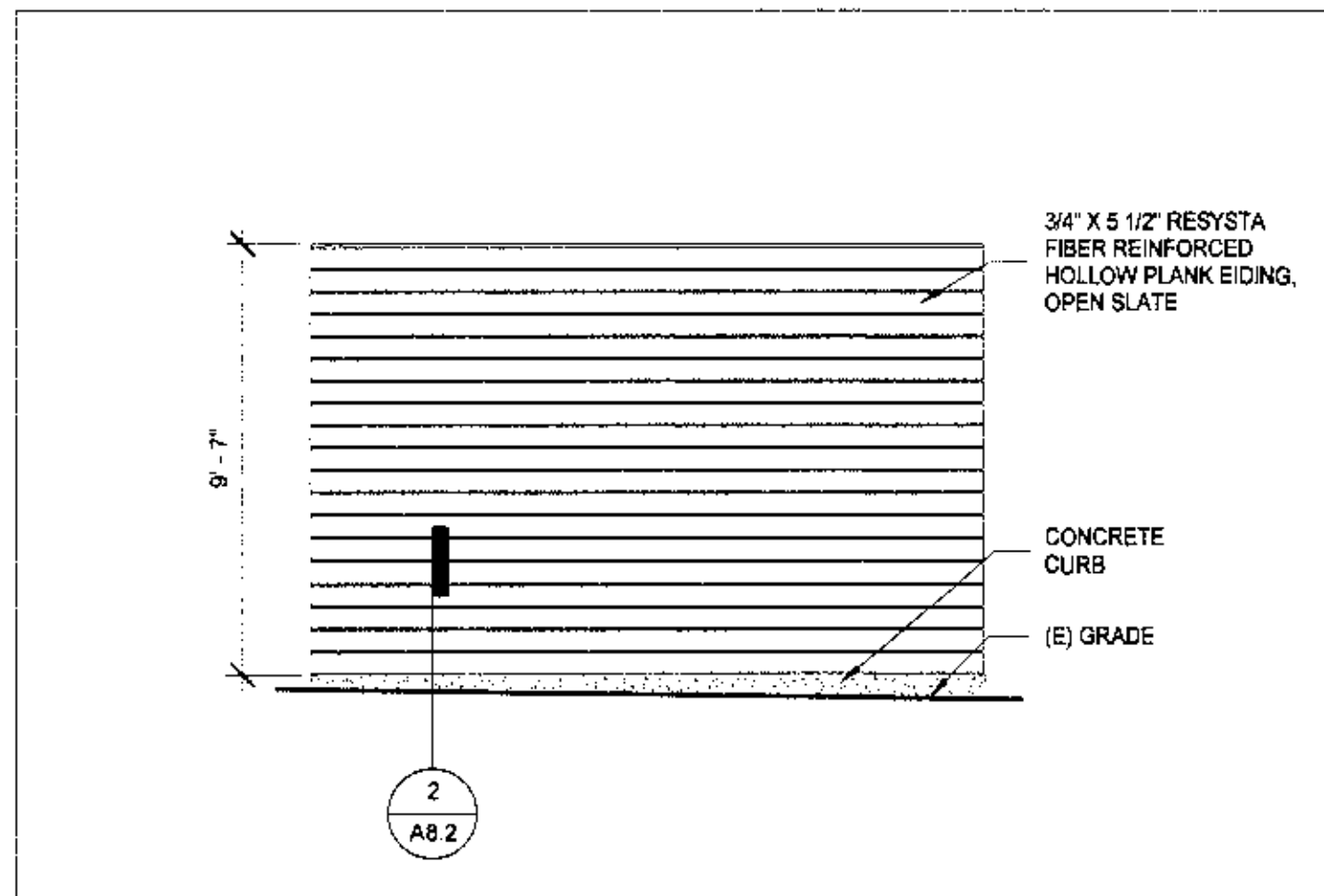
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project number: 16-148.01

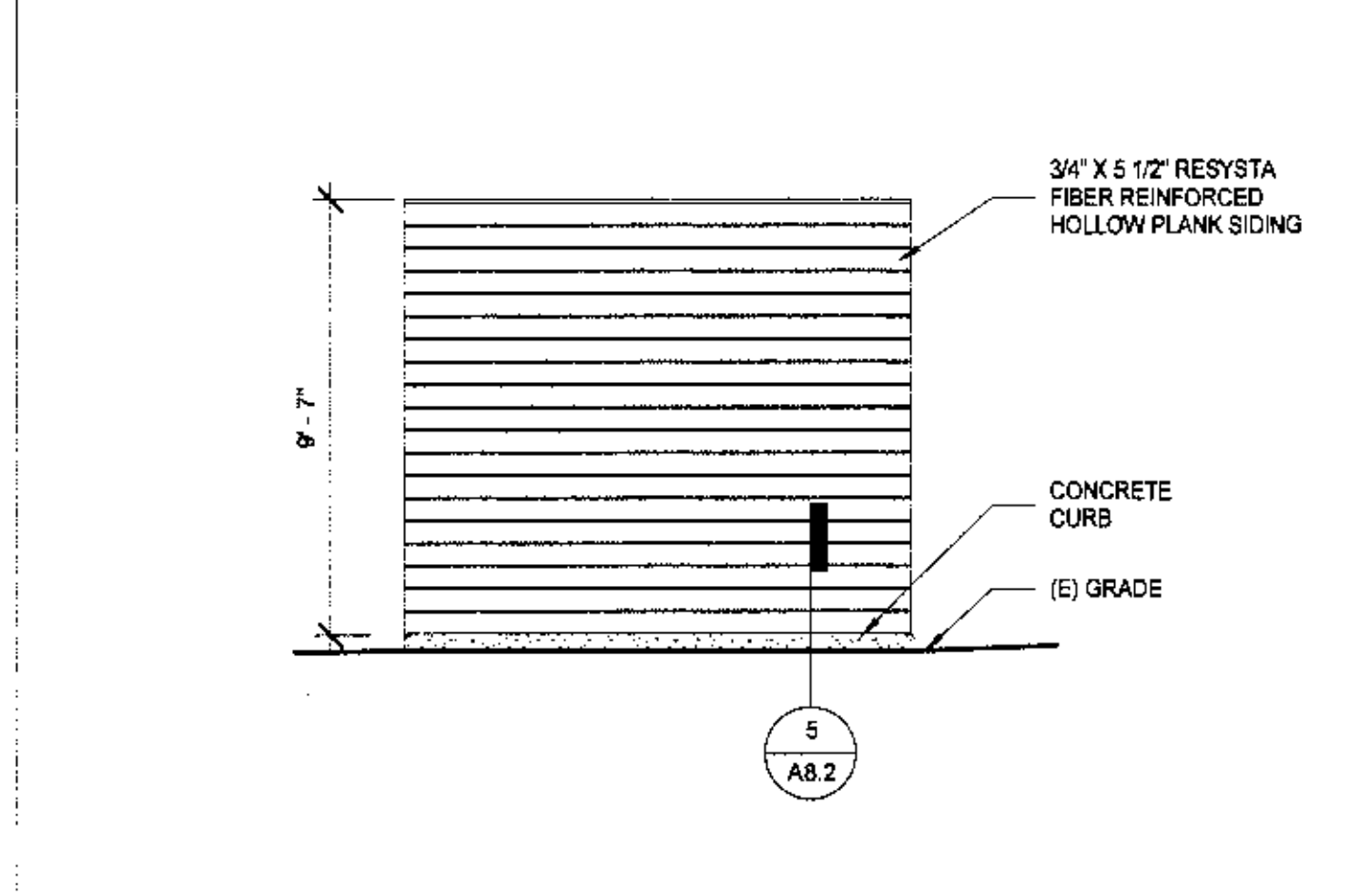
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CONSTRUCTION DOCUMENTS  
EXTERIOR DETAILS

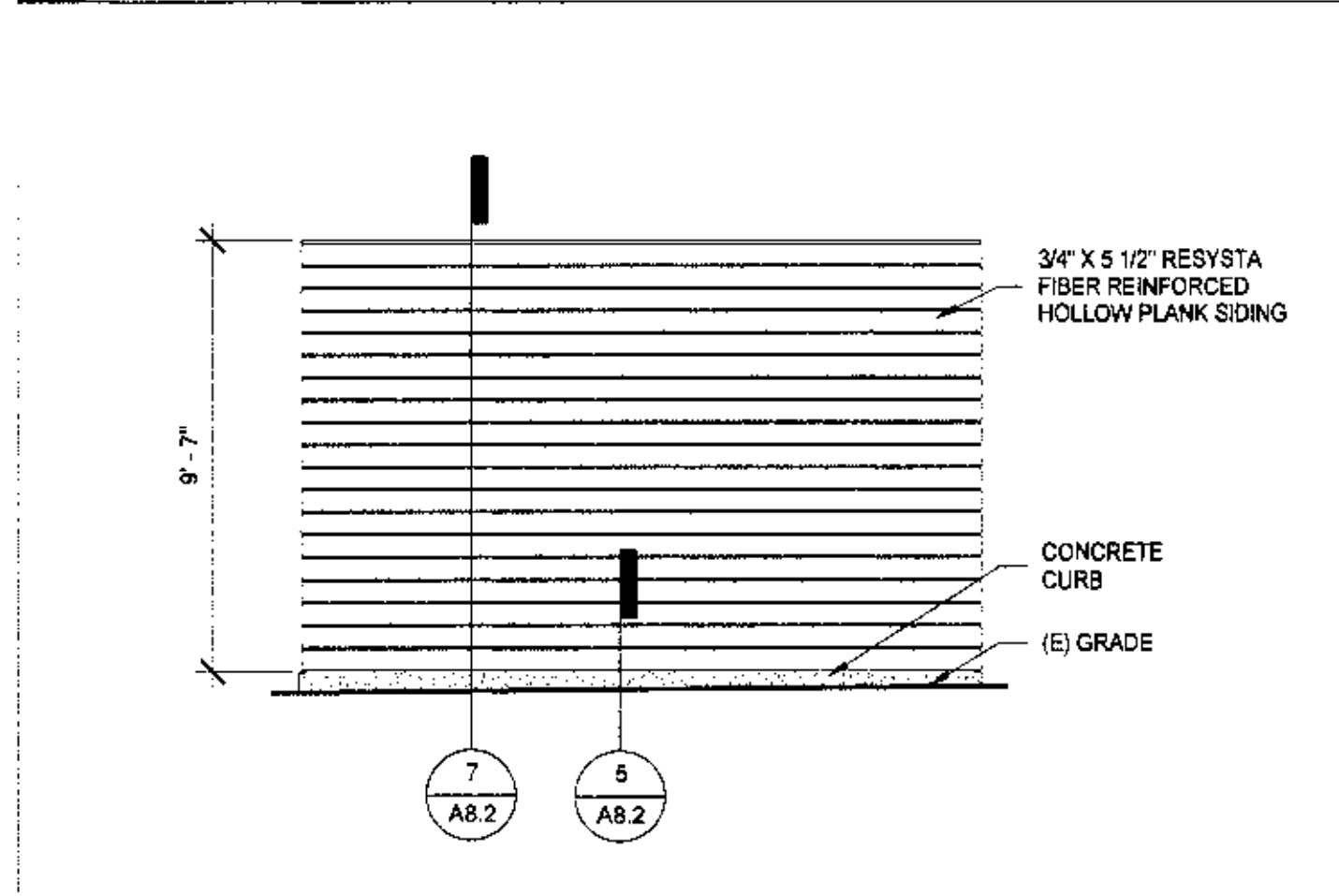
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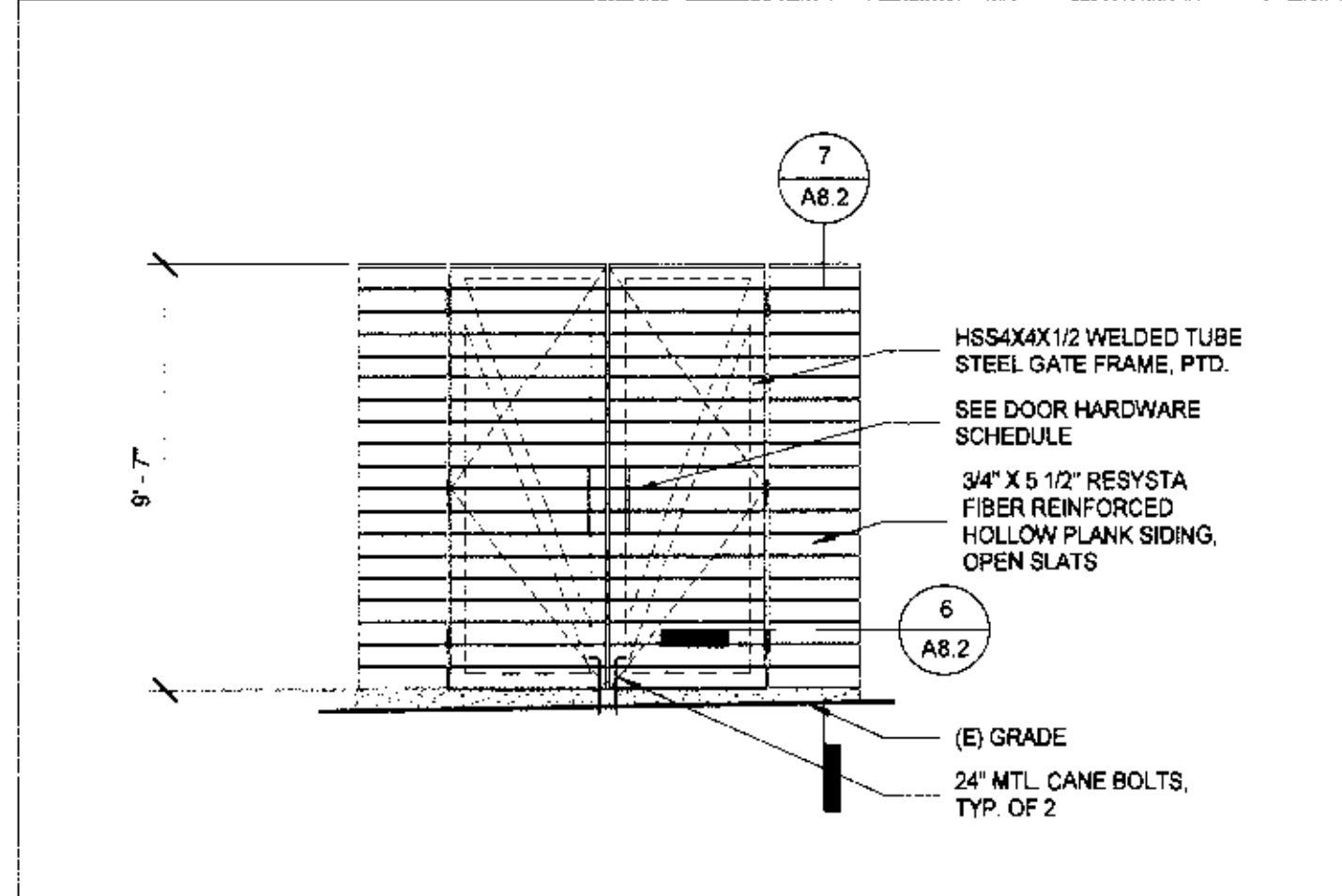
13 MECHANICAL PAD/ENCLOSURE EAST ELEVATION 1/4" = 1'-0"



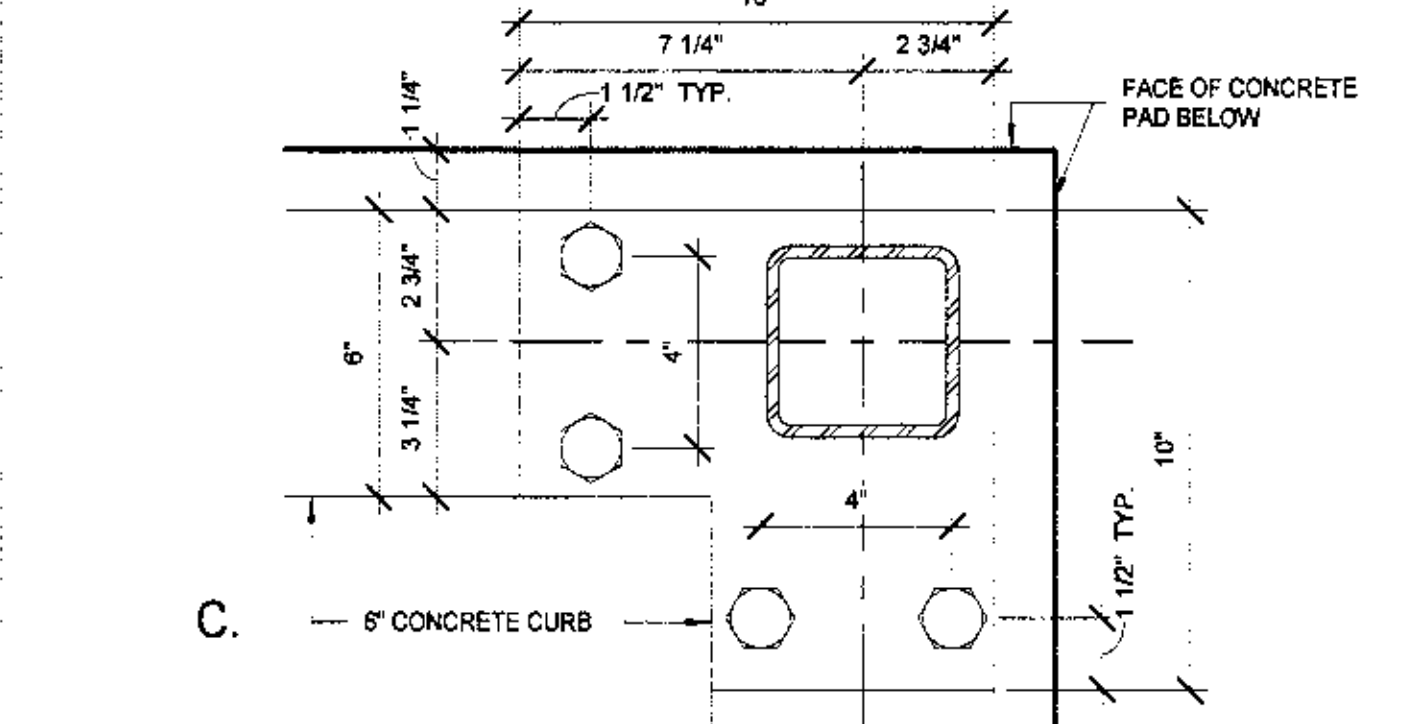
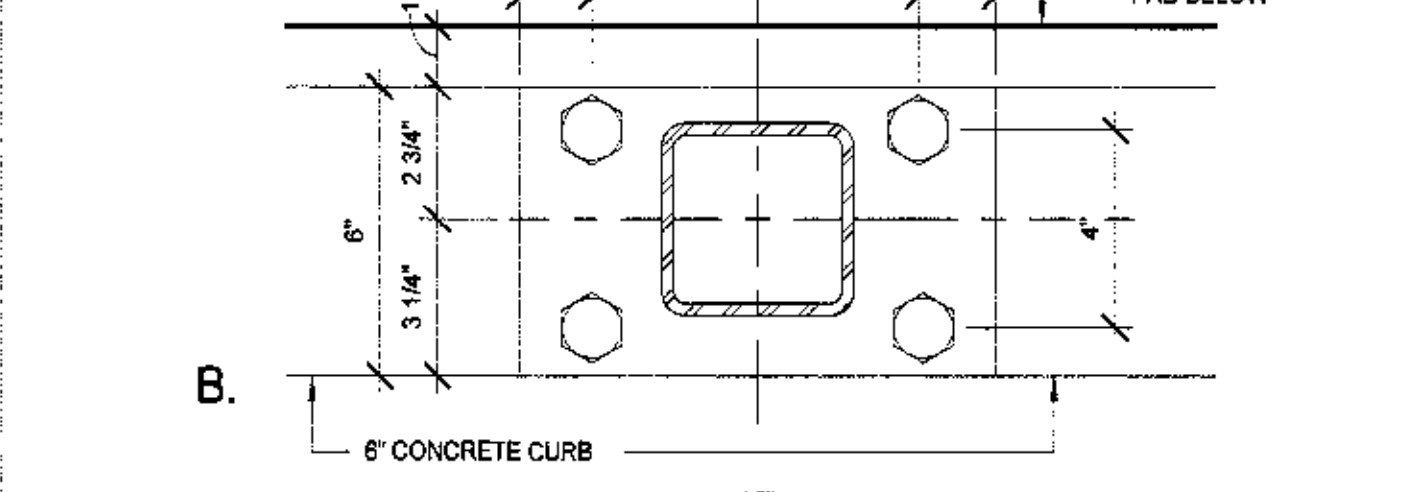
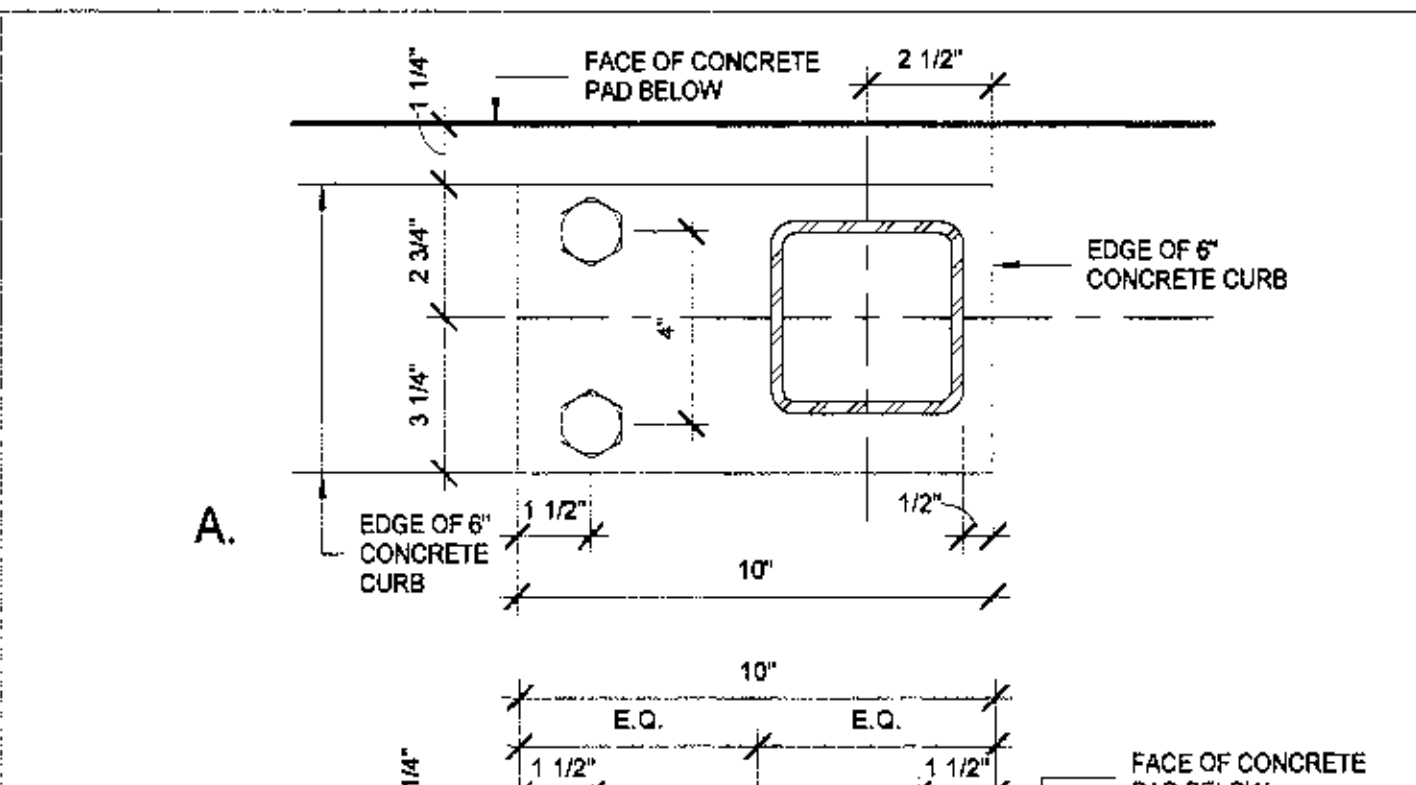
12 MECHANICAL PAD/ENCLOSURE SOUTH ELEVATION 1/4" = 1'-0"



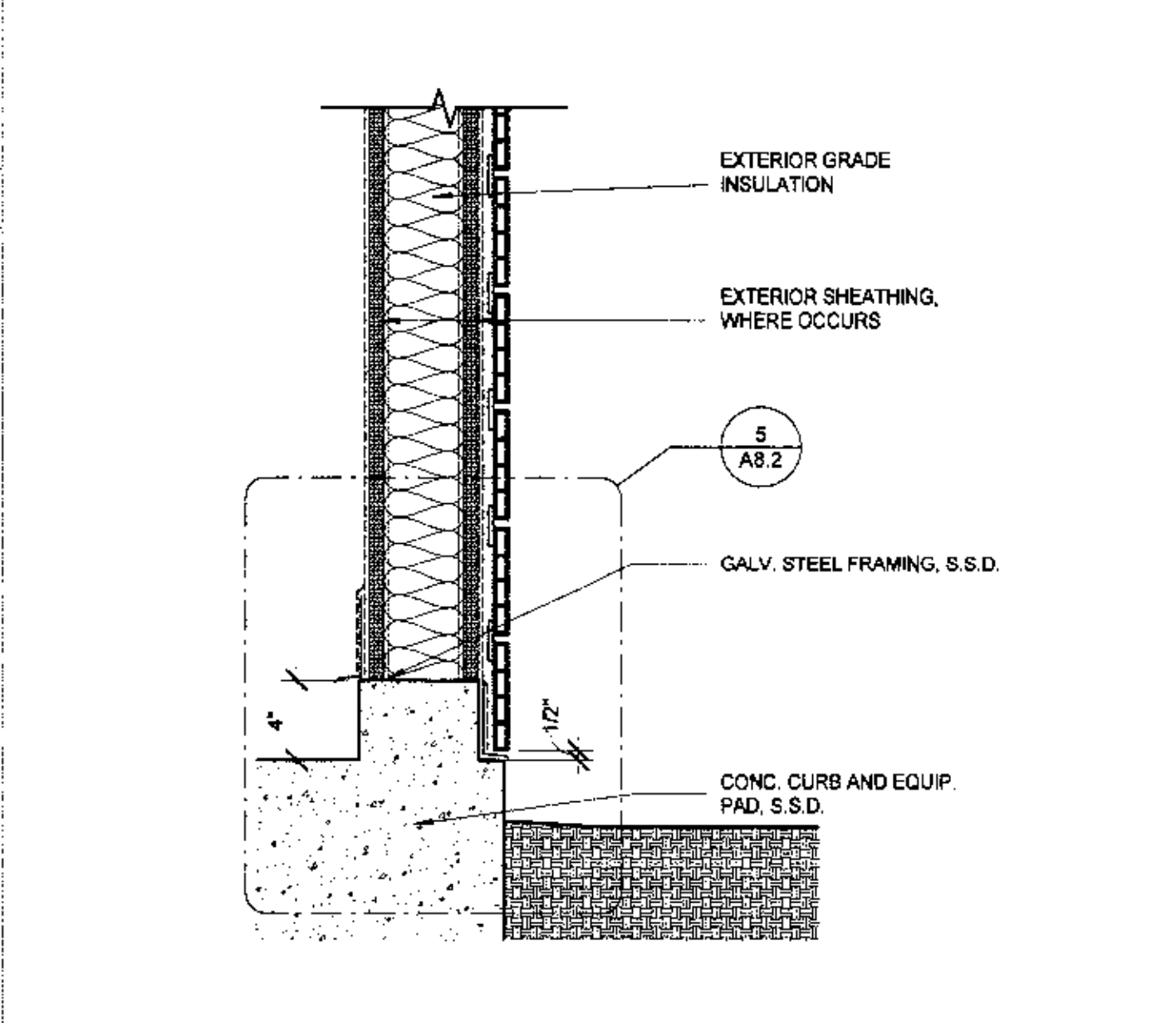
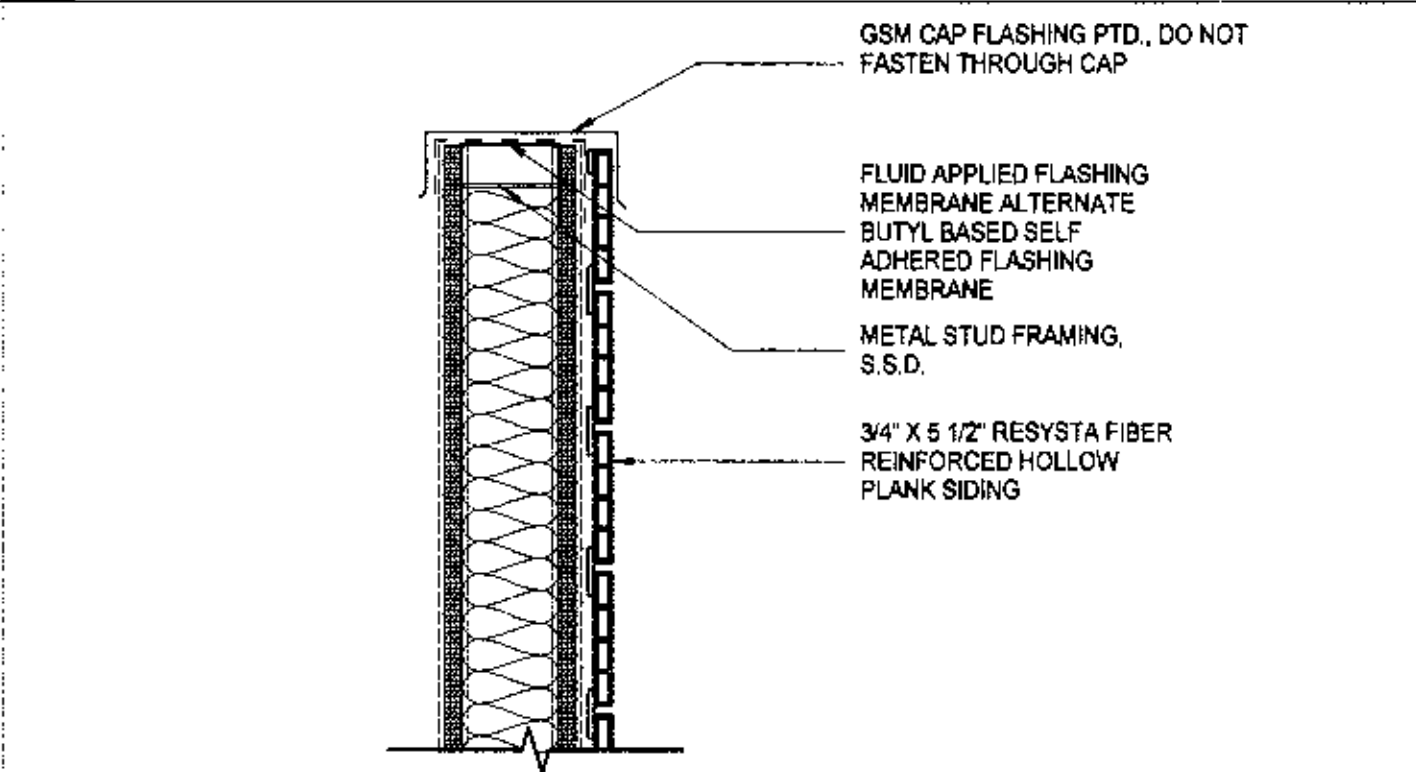
11 MECHANICAL PAD/ENCLOSURE WEST ELEVATION 1/4" = 1'-0"



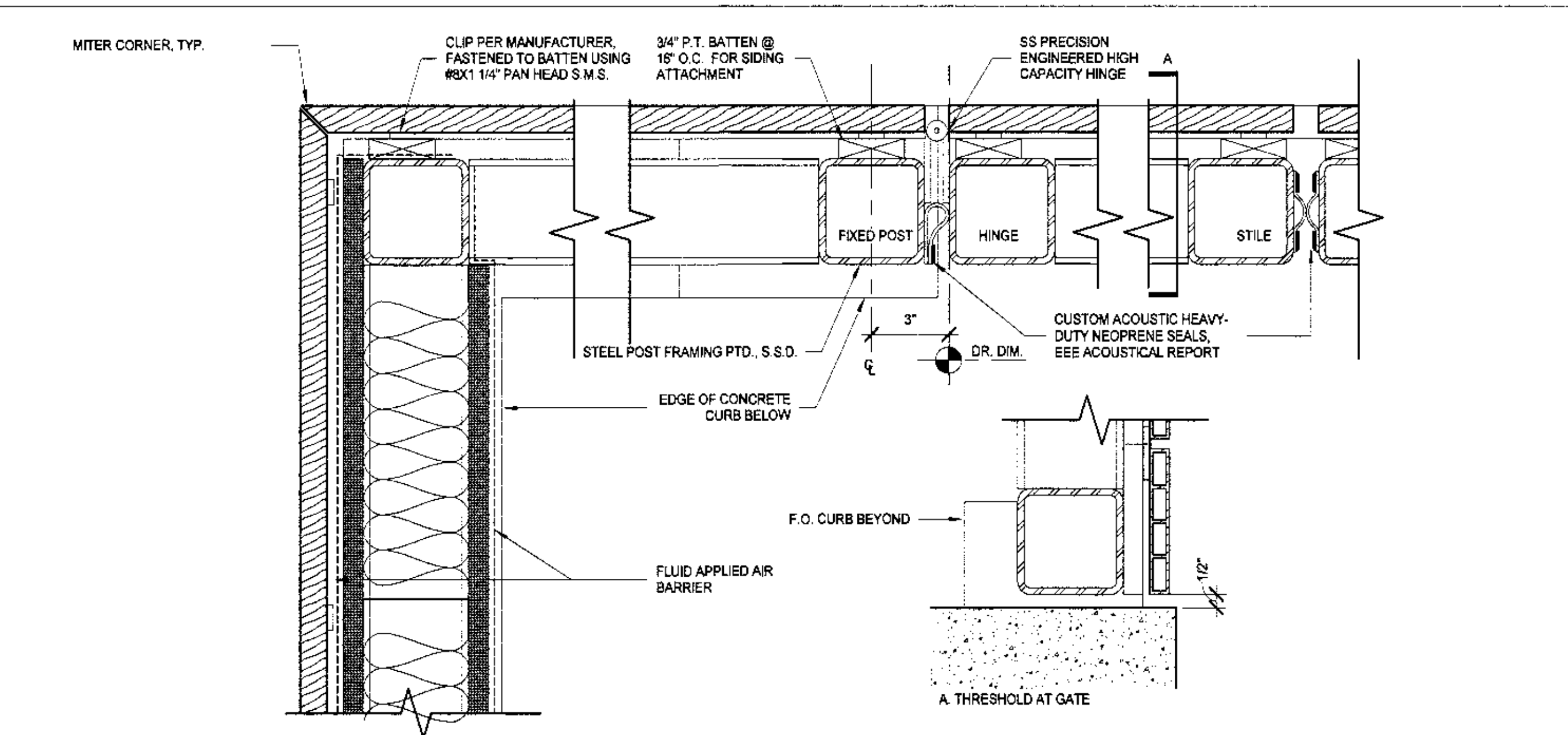
10 MECHANICAL PAD/ENCLOSURE NORTH ELEVATION 1/4" = 1'-0"



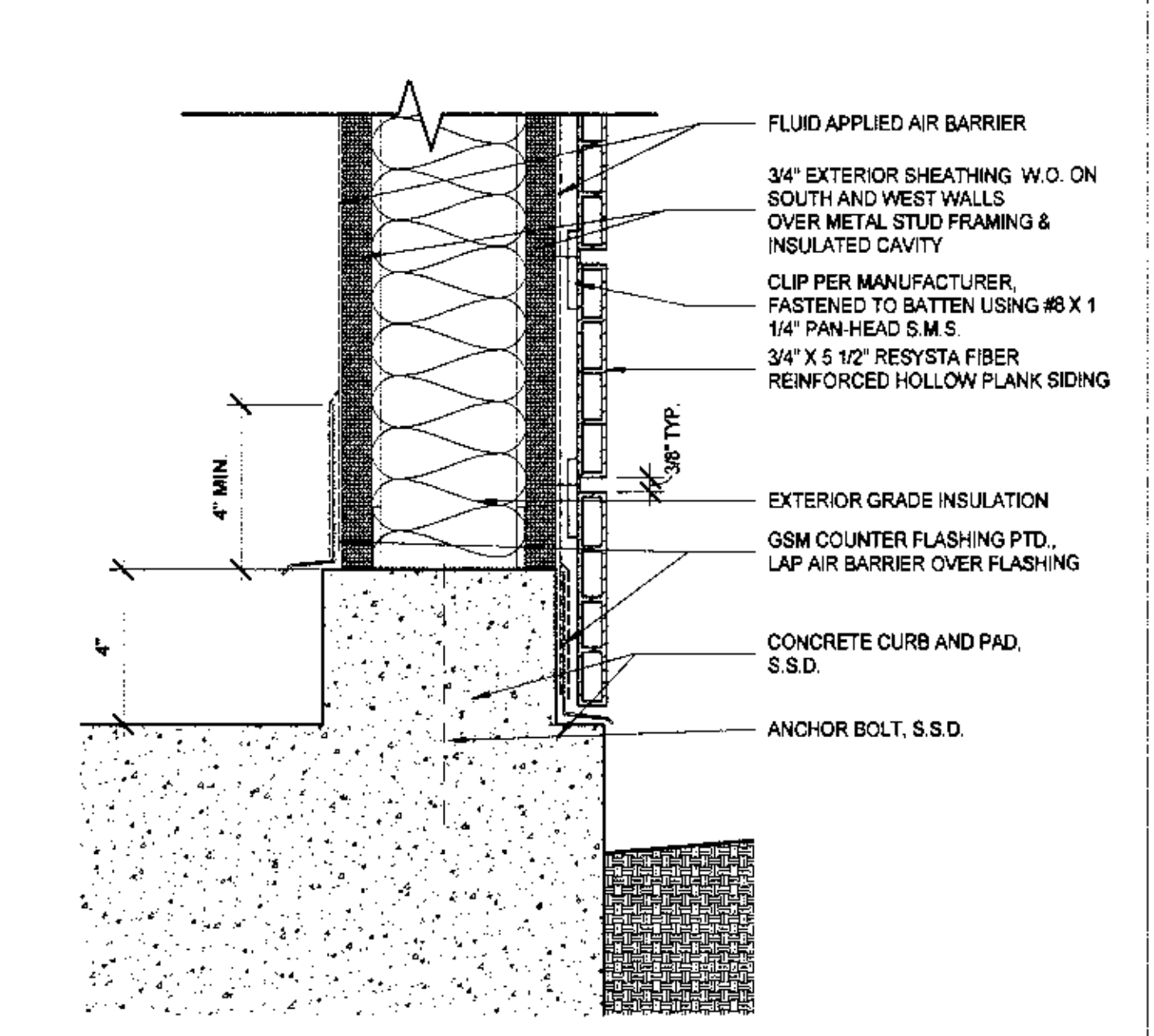
9 MECH. ENCLOSURE BASE PLATES 3" = 1'-0"



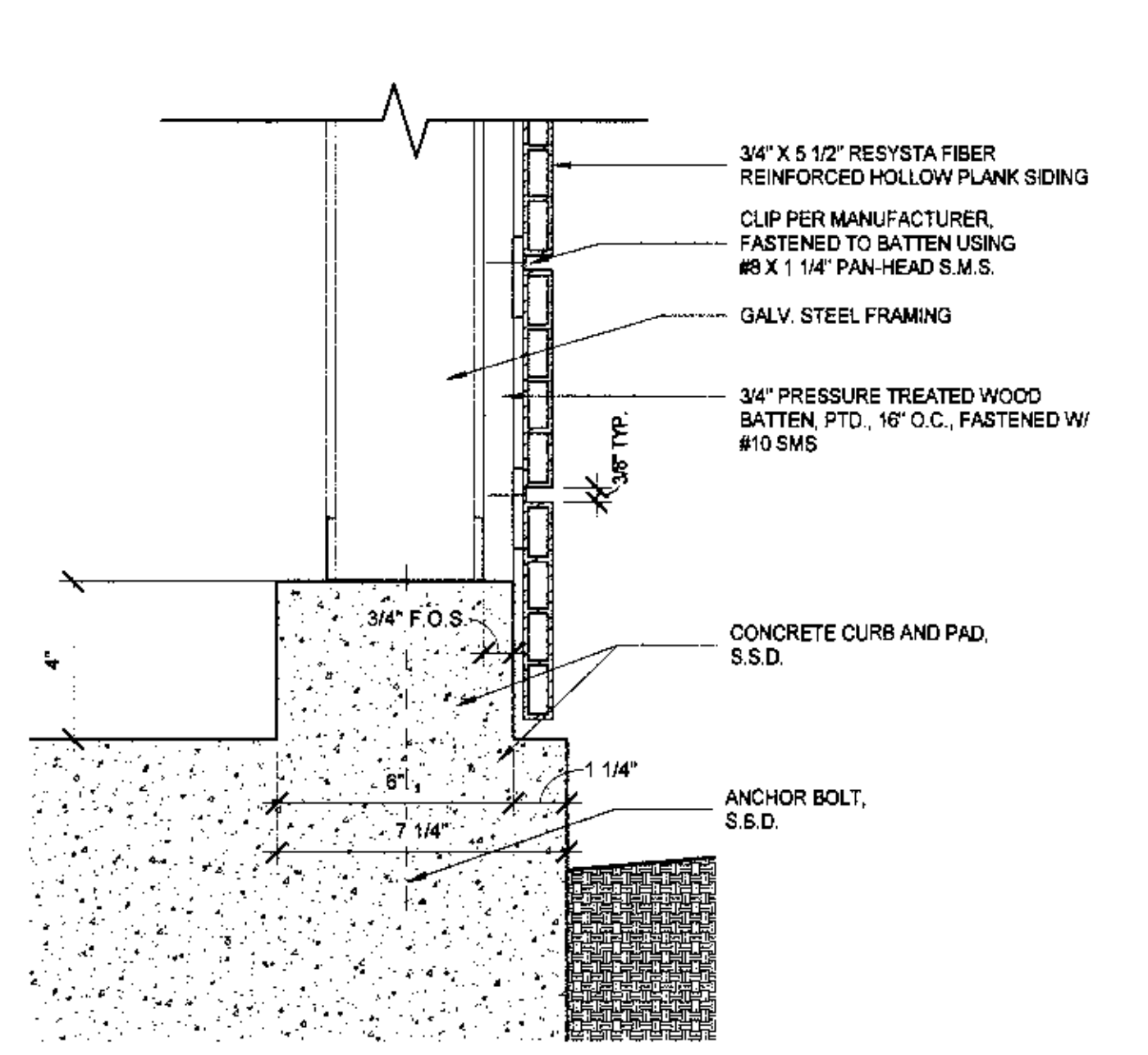
7 MECHANICAL ENCLOSURE SECTION 1 1/2" = 1'-0"



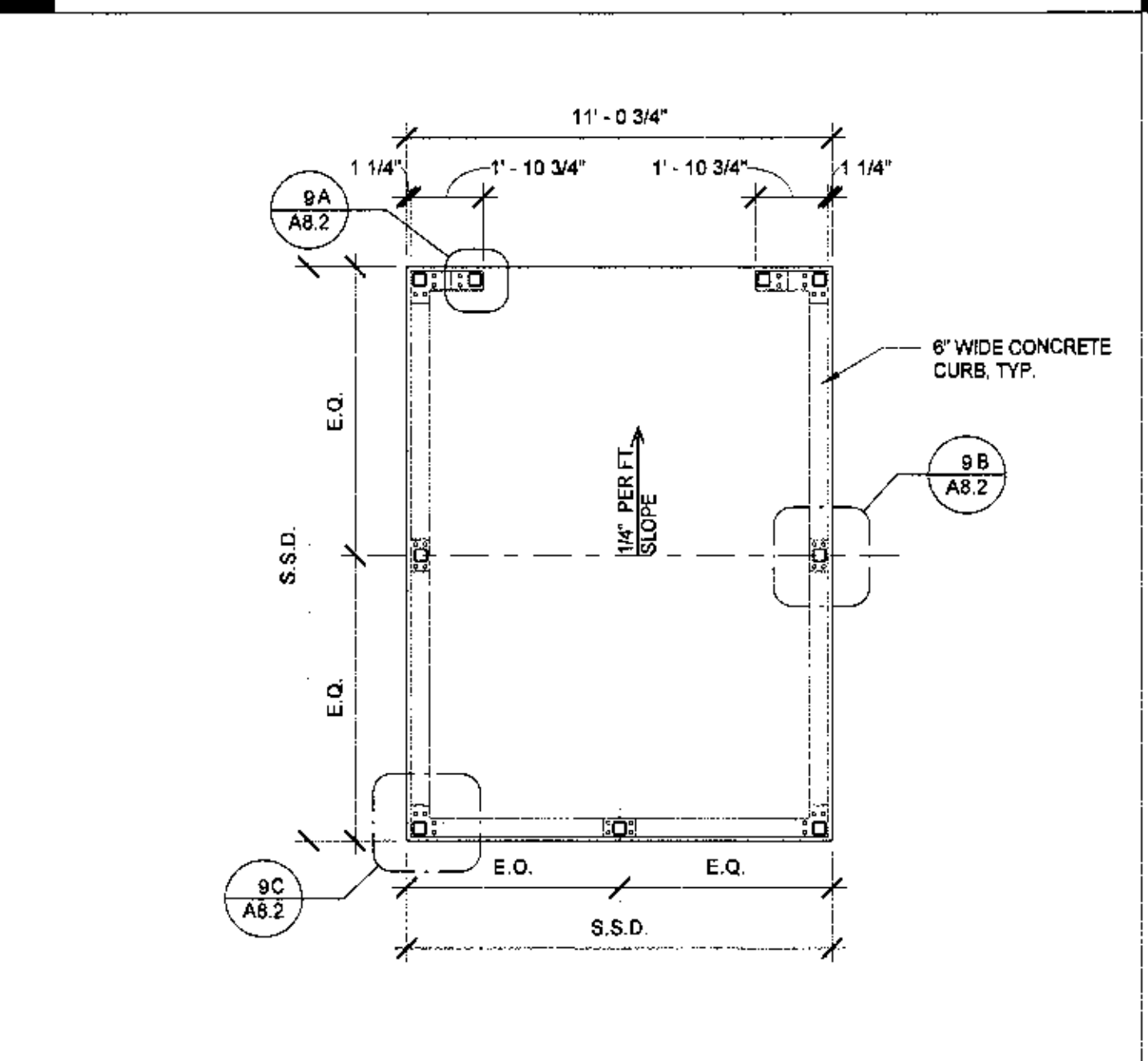
6 MECH. ENCLOSURE GATE HINGE AND CORNER 3" = 1'-0"



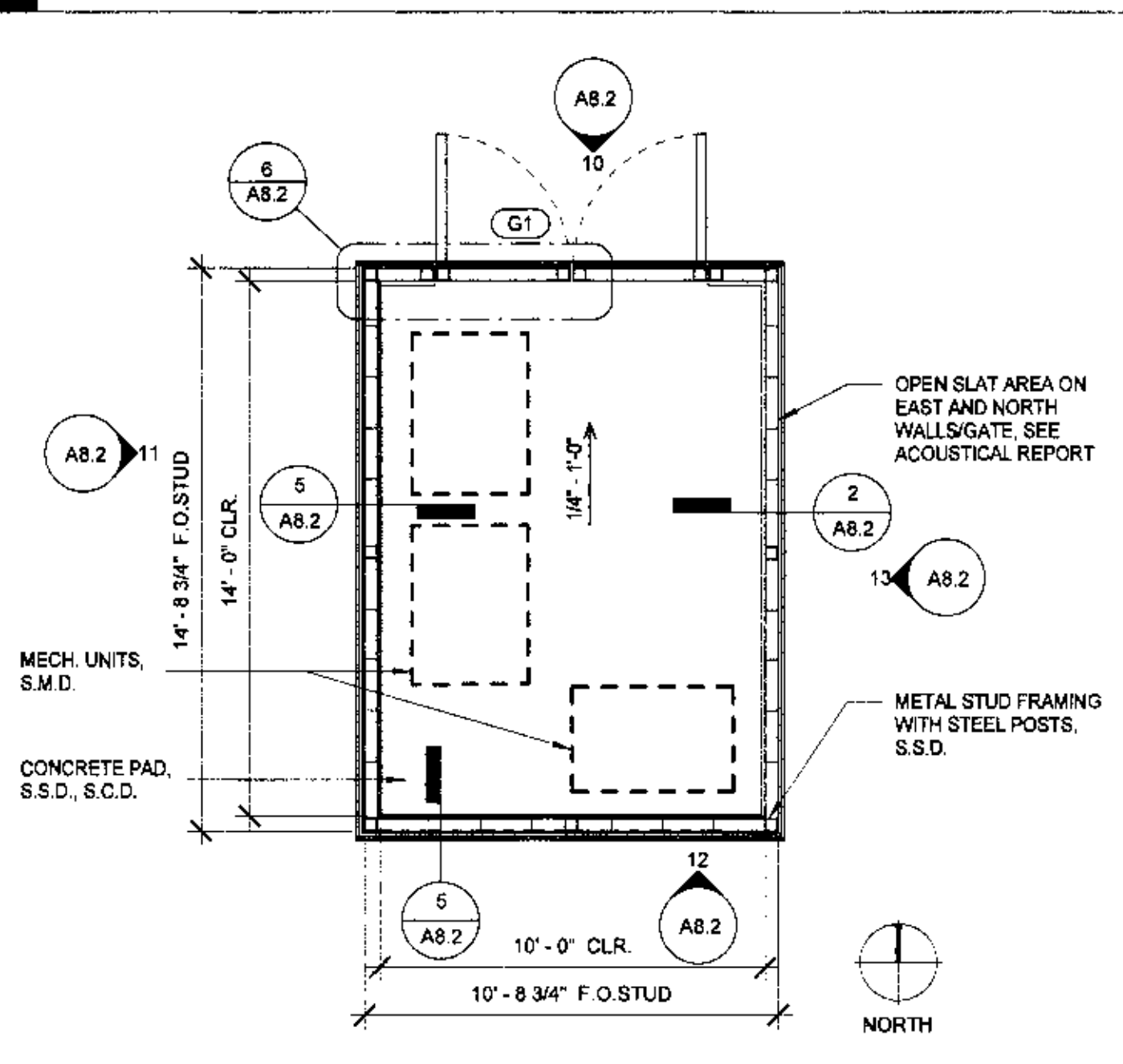
5 MECH. ENCLOSURE DETAIL 3" = 1'-0"



2 MECH. ENCLOSURE DETAIL @ OPEN SLATS 3" = 1'-0"



4 MECHANICAL PAD/ENCLOSURE SLAB PLAN 1 1/2" = 1'-0"



1 MECHANICAL PAD/ENCLOSURE ENLARGED PLAN 1/4" = 1'-0"

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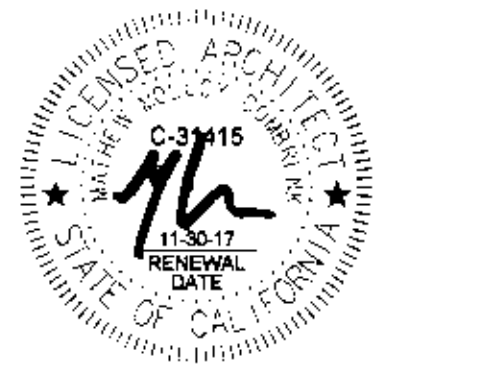
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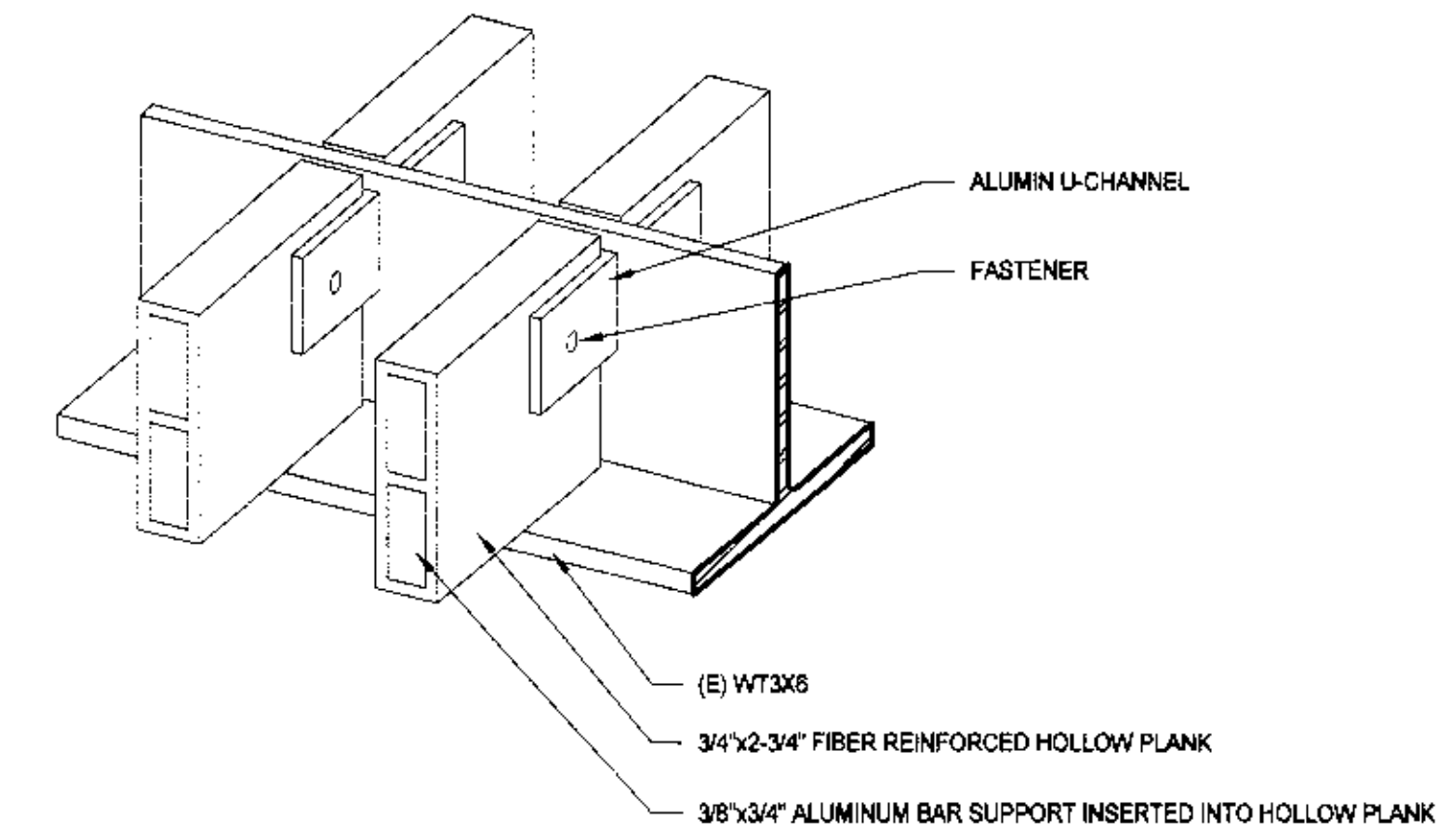
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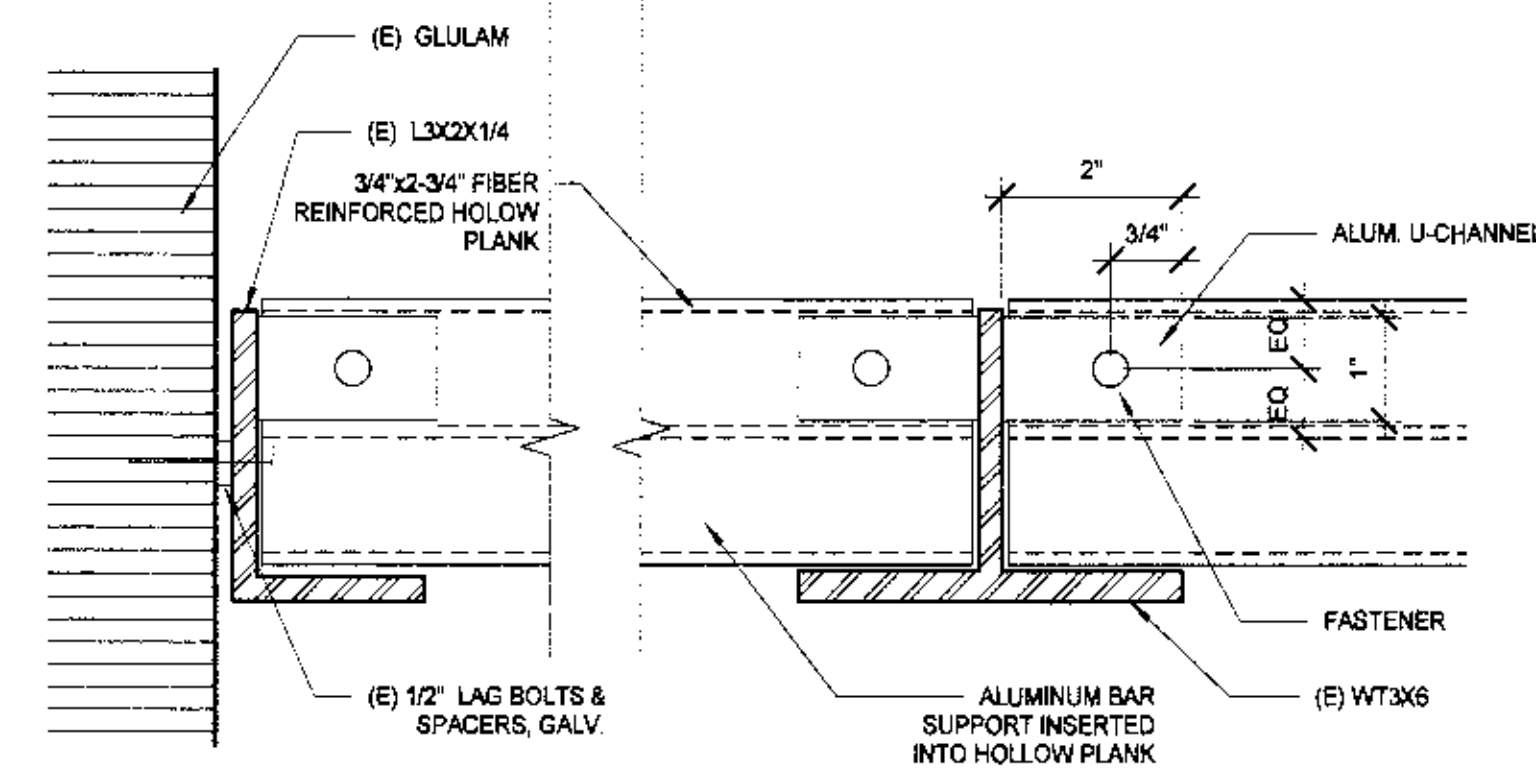
CONSTRUCTION  
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 EXTERIOR  
 DETAILS - MECH.  
 ENCLOSURE

A8.2

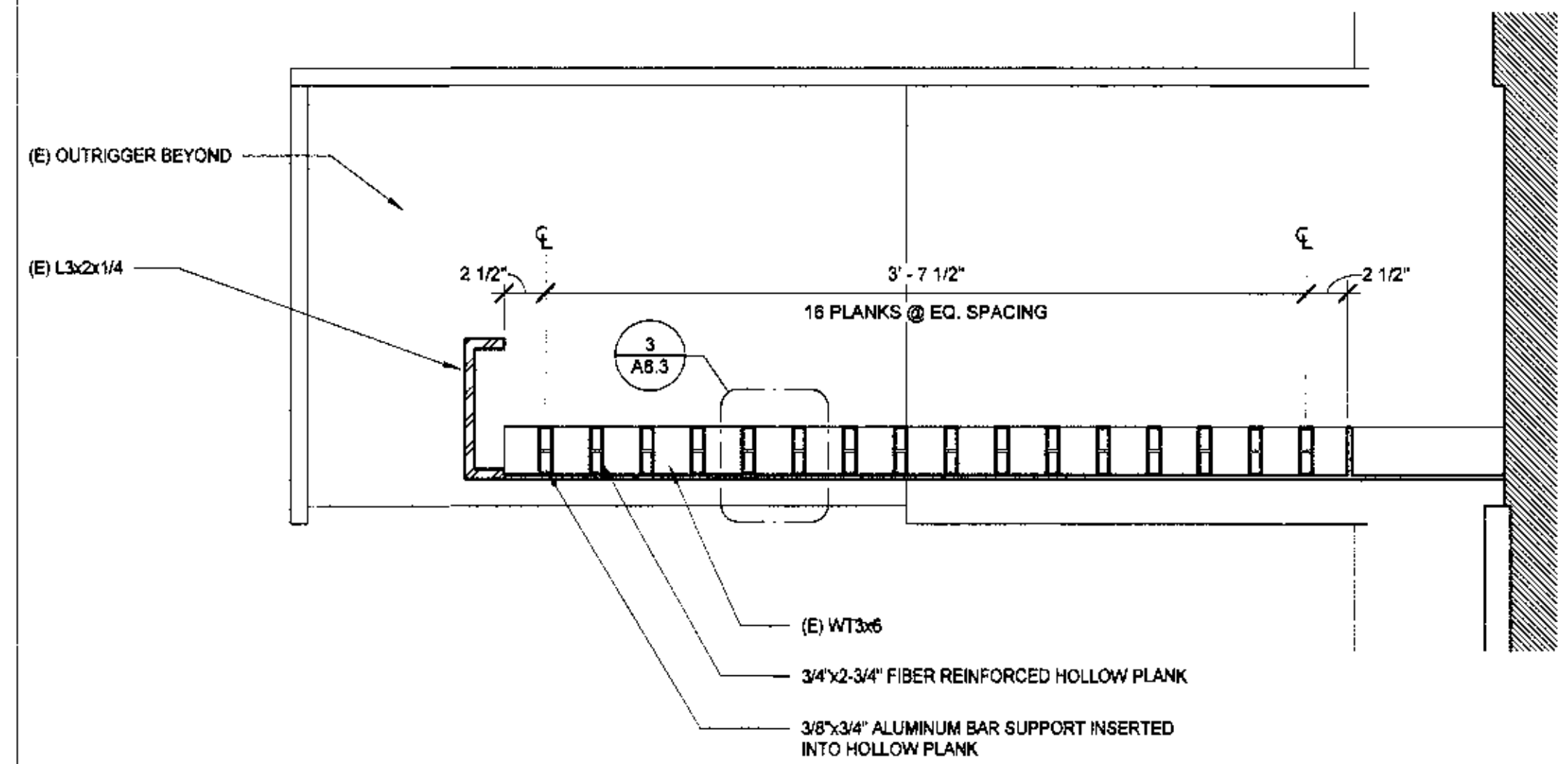
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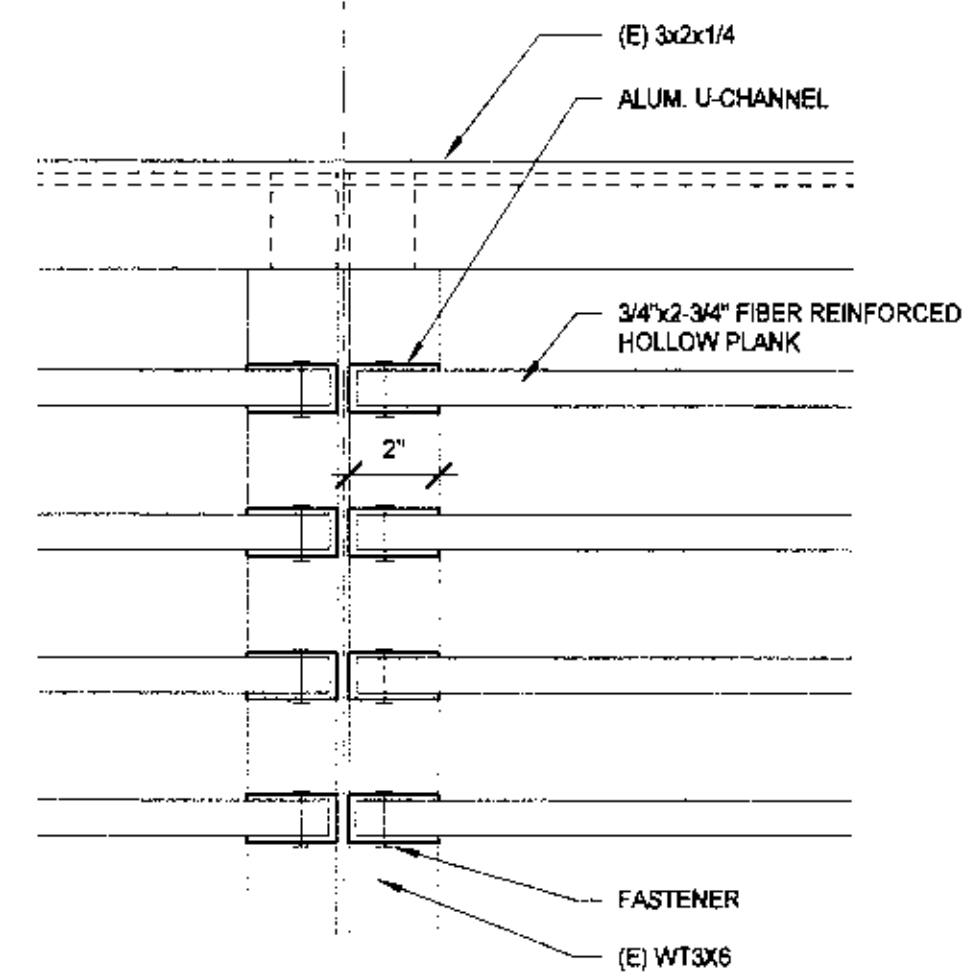
3 TRELLIS AXON 1" = 1'-0"



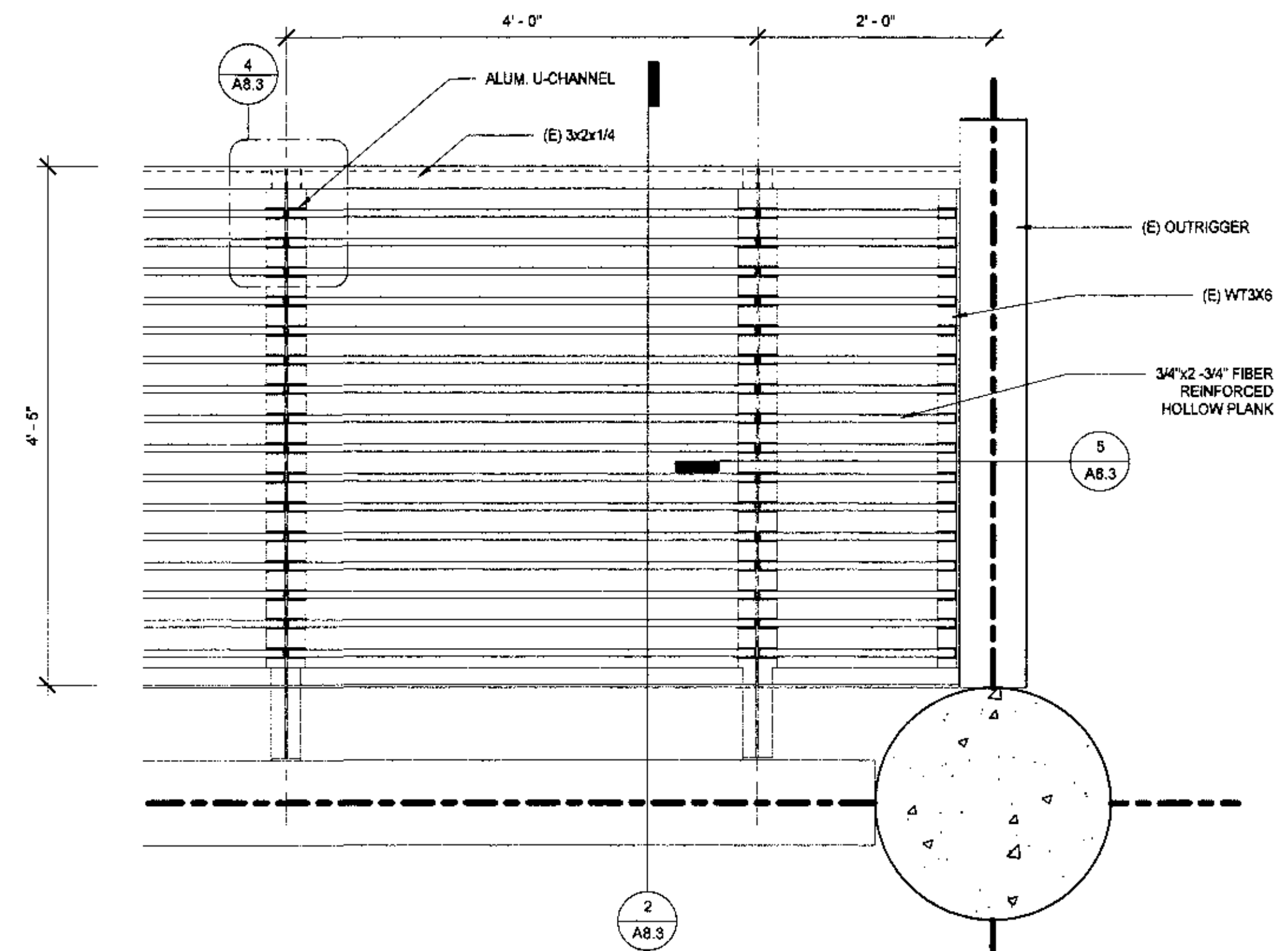
5 TRELLIS DETAIL AT INTERMEDIATE SUPPORT 8" = 1'-0"



2 NEW TRELLIS FIBER REINFORCED HOLLOW PLANK INFILL 1 1/2" = 1'-0"



4 TRELLIS DETAIL ENLARGED 3" = 1'-0"



1 TRELLIS DETAIL 1" = 1'-0"

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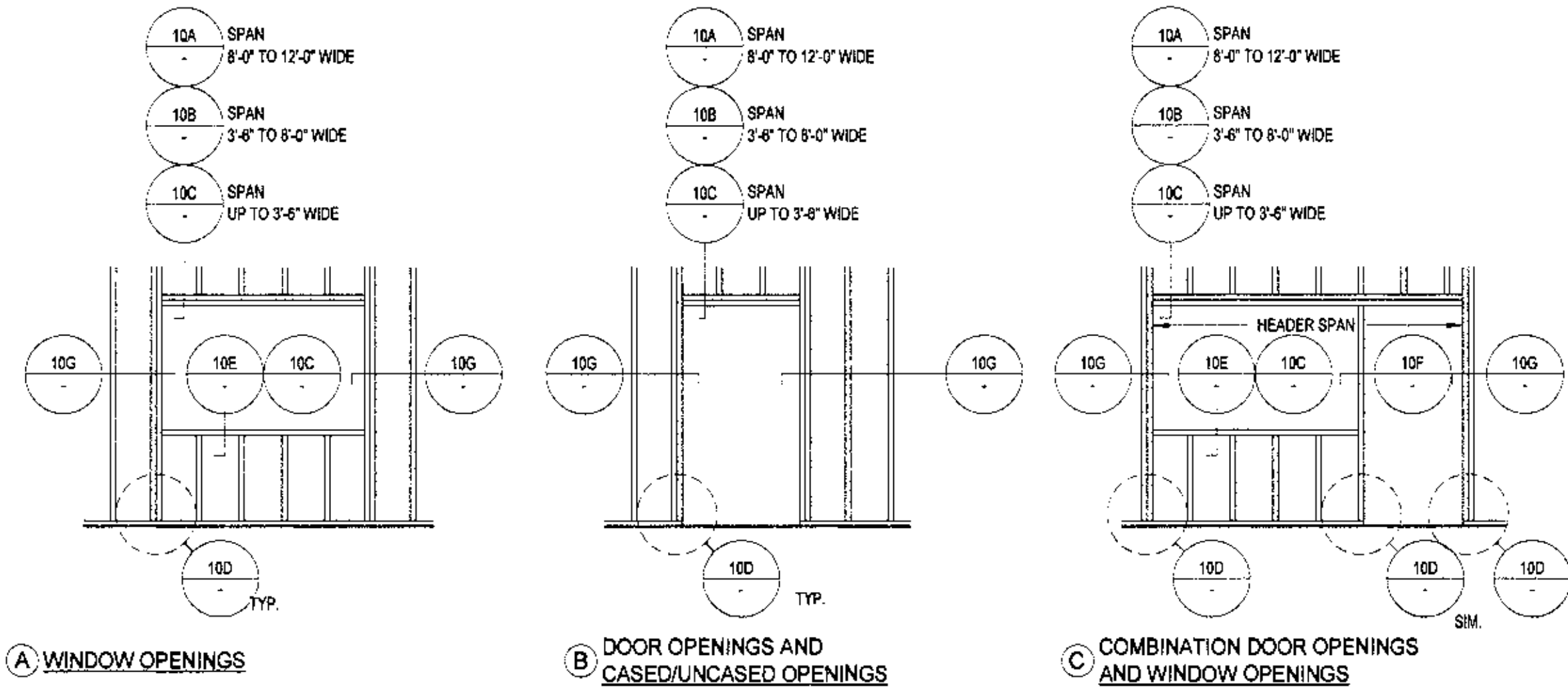


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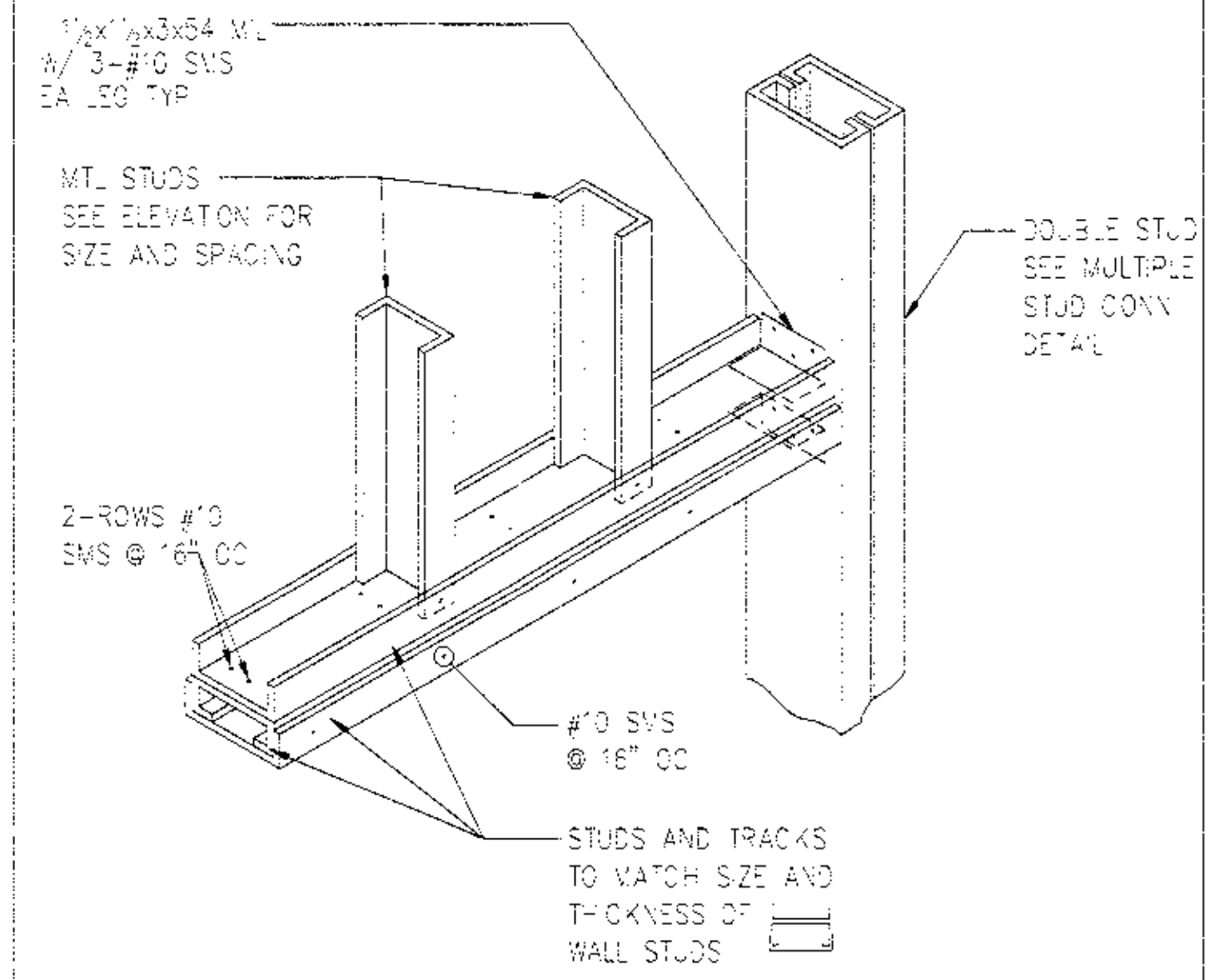
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DOCUMENTS  
TRELLIS DETAILS

A8.3



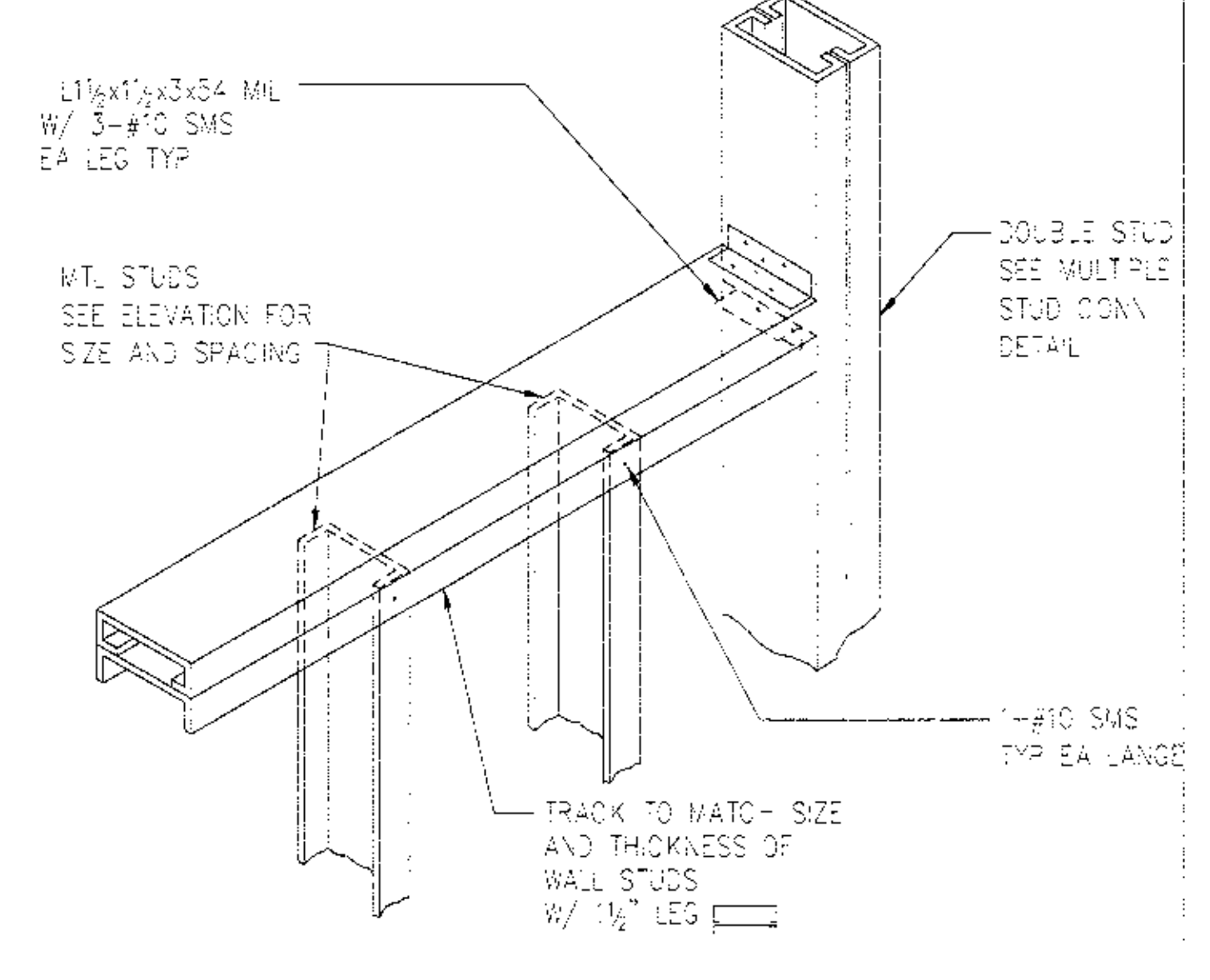
9 TYPICAL PARTITION WALL OPENINGS

1/4" = 1'-0"



6 ALT. HEADER DETAIL

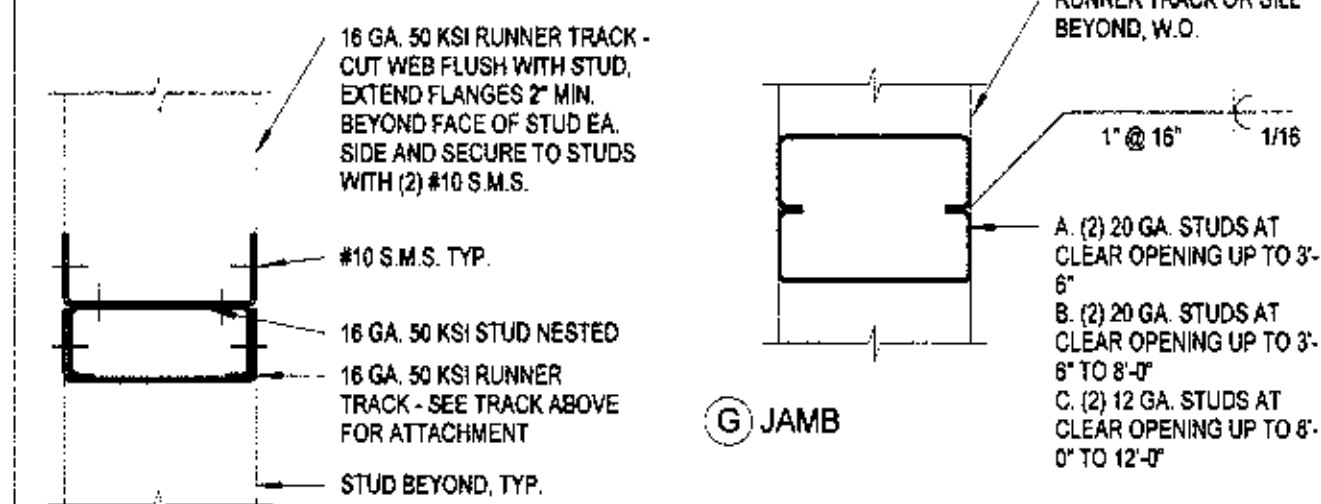
1" = 1'-0"



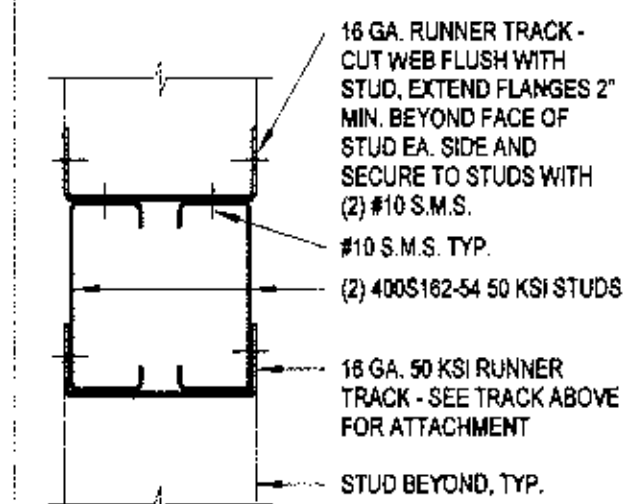
3 ALT. SILL DETAIL

1" = 1'-0"

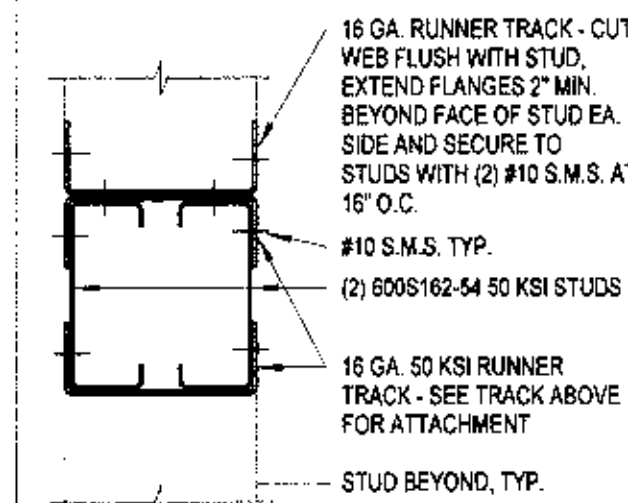
NOTE: SEE DETAILS 1/A9.7, 4/A9.7 AND 10/A9.7 FOR ADDITIONAL FRAMING DETAILS.



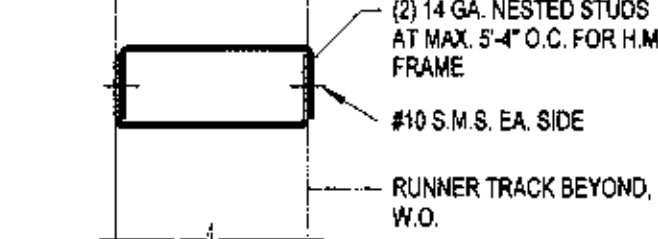
C HEAD AT OPENING UP TO 3'-6" CLR WIDTH AND SILL AT 8'-0" TO 12'-0" CLEAR



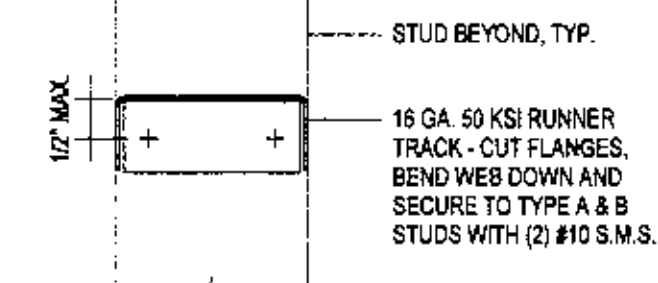
B HEAD AT OPENING 3'-6" TO 8'-0" CLR WIDTH



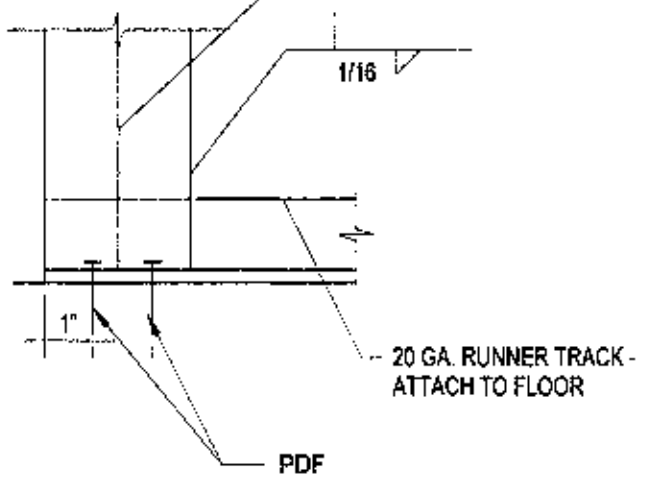
A HEAD AT OPENING 8'-0" TO 12'-0" CLR



F MULLION REINFORCING AT MULTIPLE OPENINGS



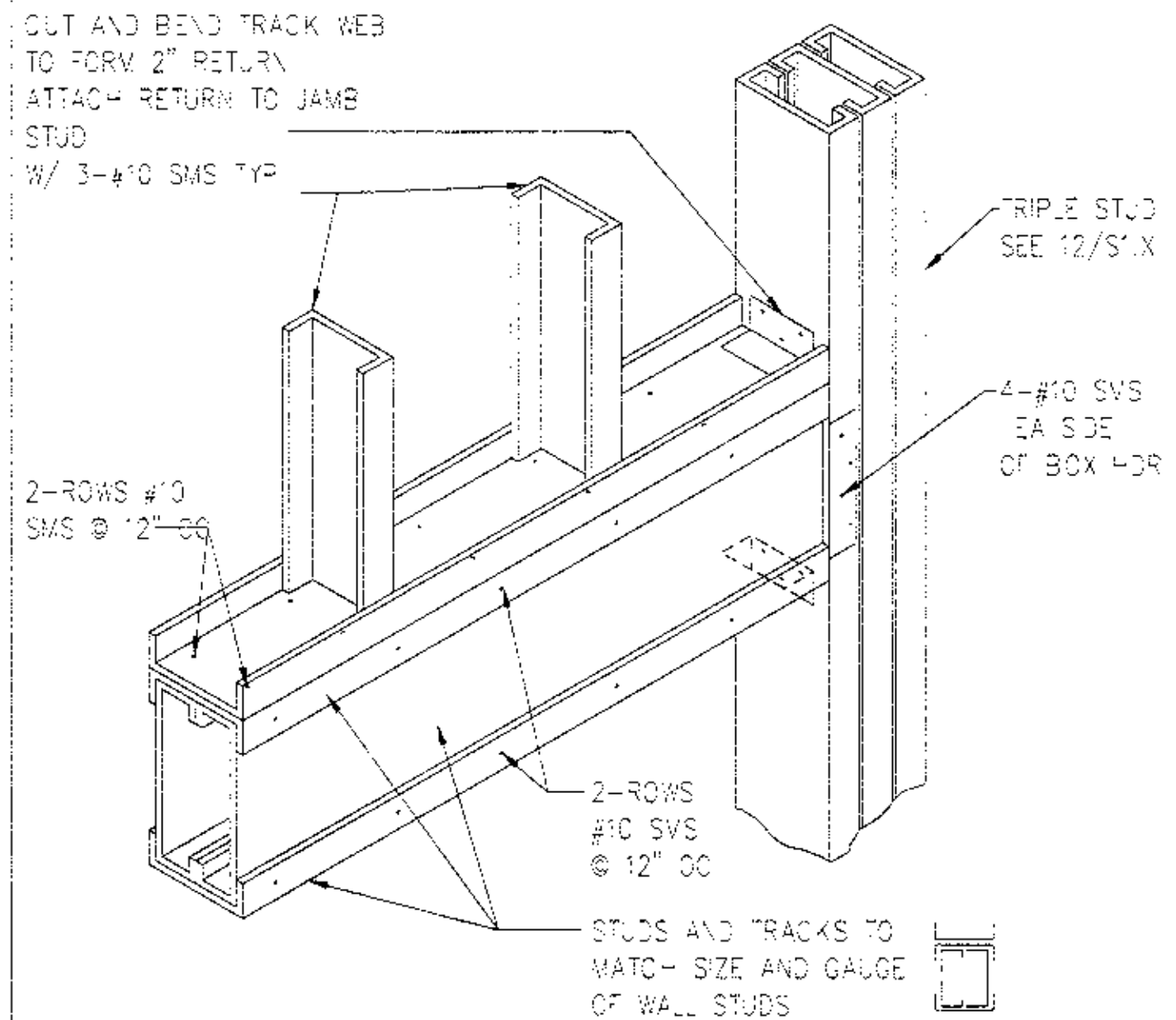
E SILL AT WINDOW AND UTILITY OPENINGS UP TO 8'-0" CLR WIDTH



D BASE AT DOUBLE NESTED STUDS, AS SHOWN BASE AT NESTED STUDS, SIMILAR

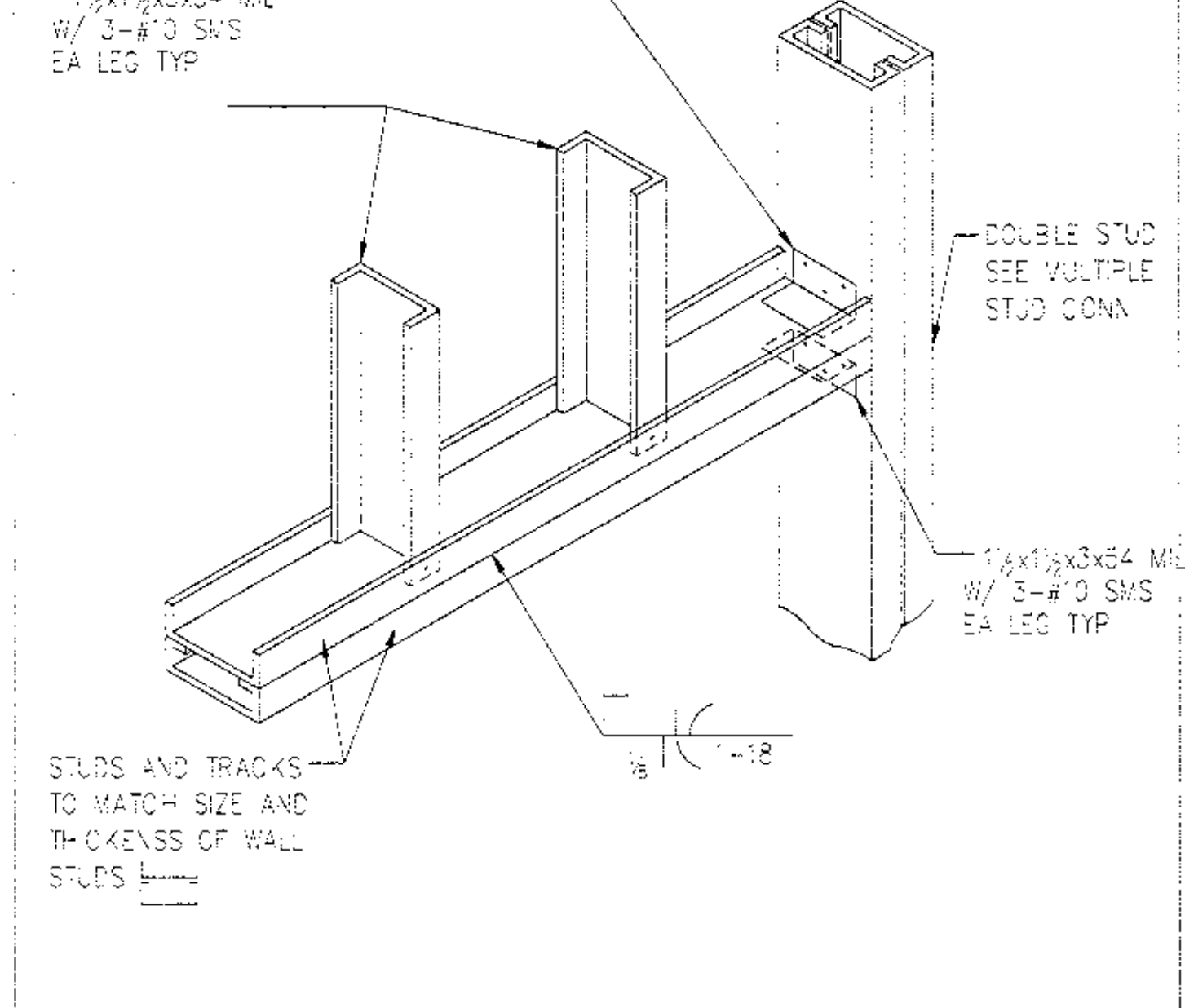
10 TYPICAL PARTITION FRAMING DETAILS

3" = 1'-0"



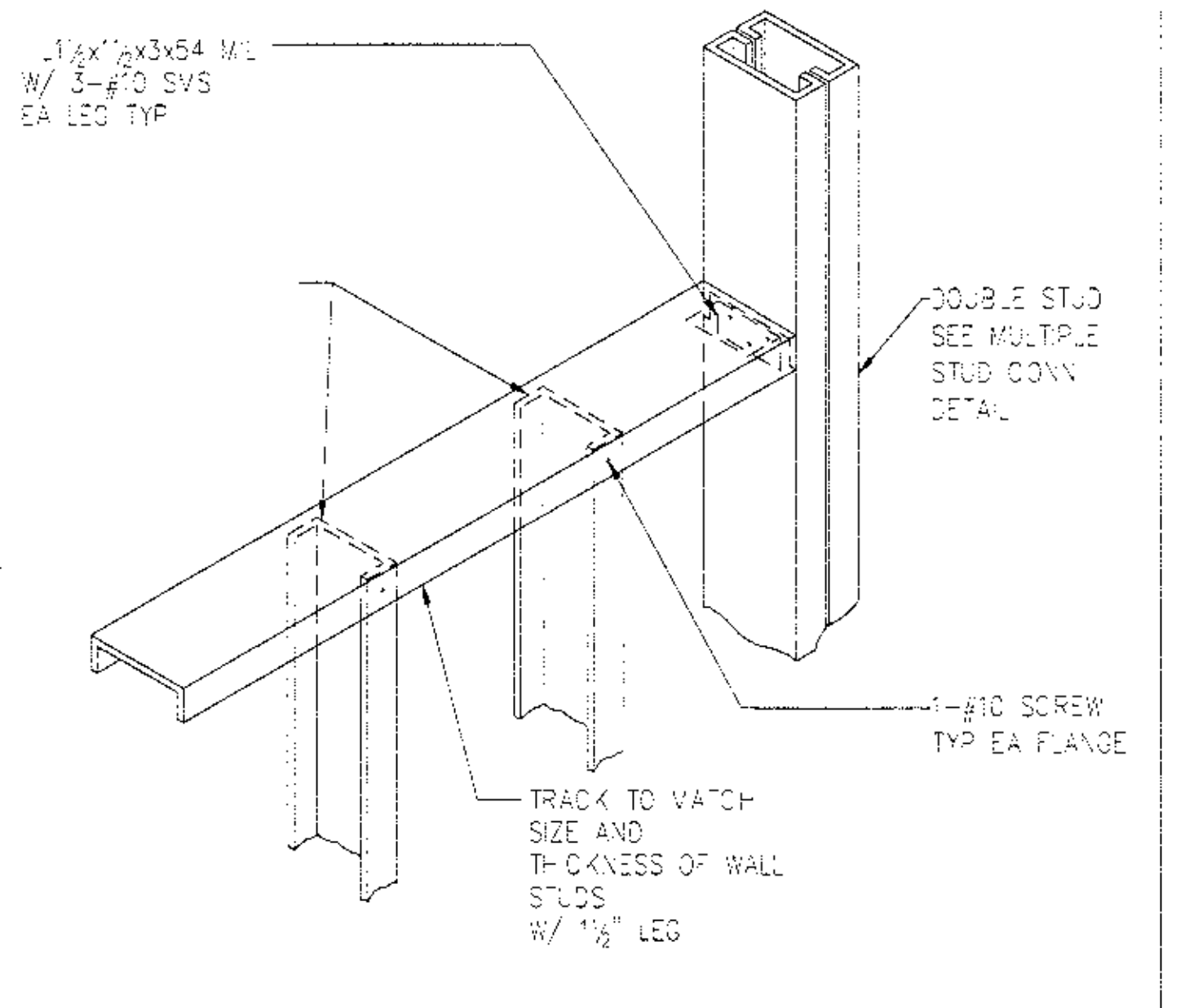
8 ALT. HEADER DETAIL 3

1" = 1'-0"



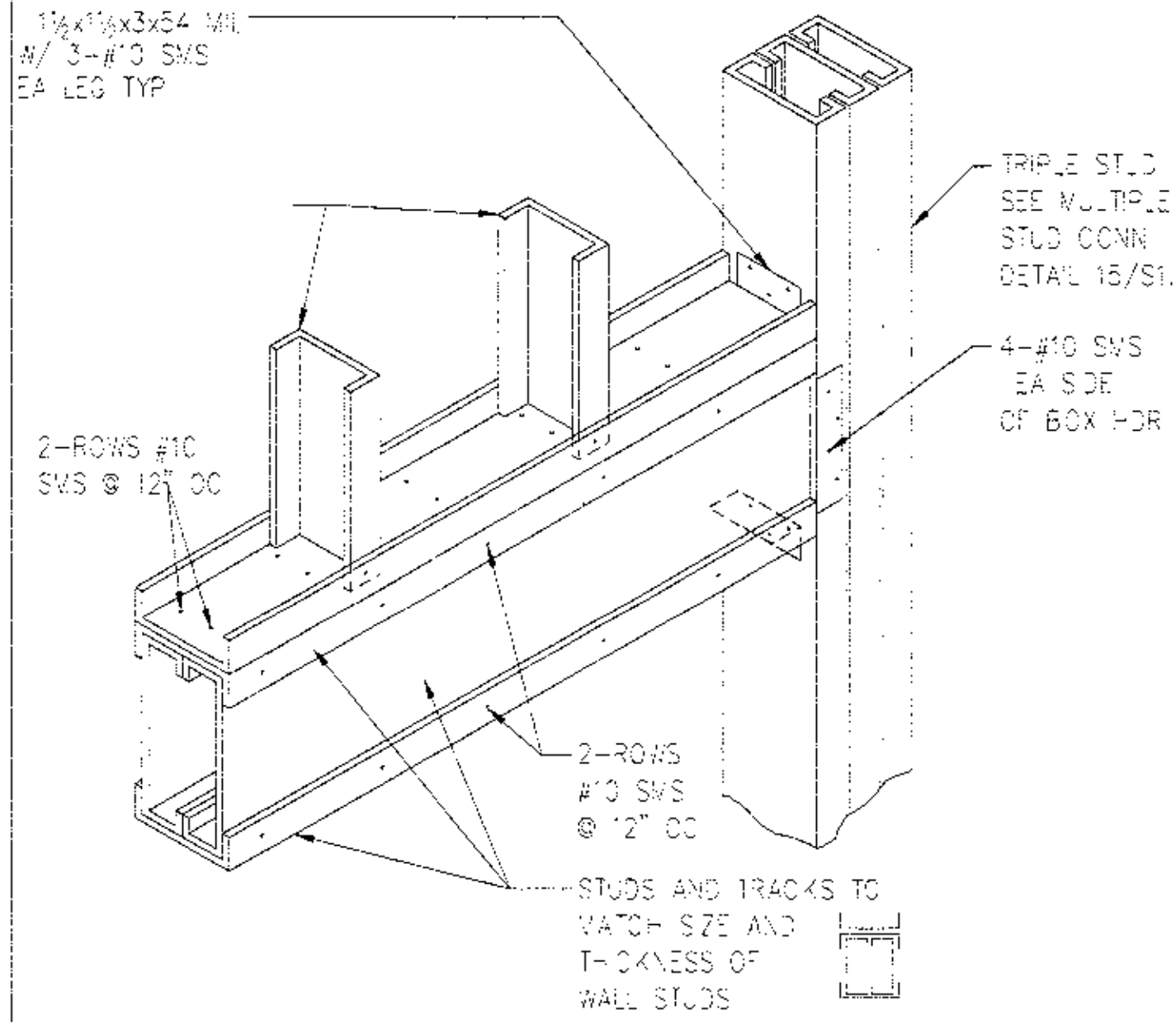
5 HEADER DETAIL

1" = 1'-0"



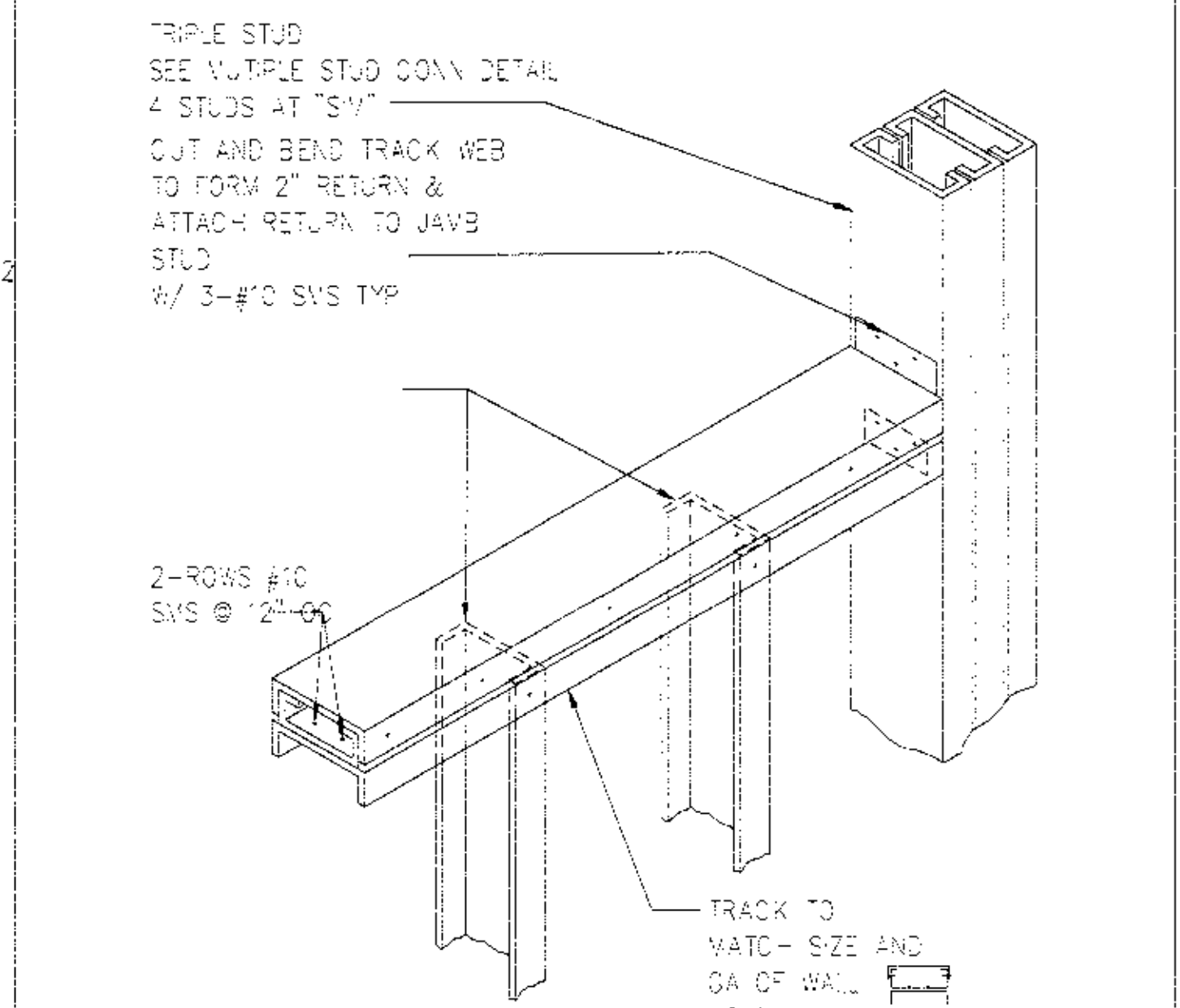
2 SILL DETAIL

1" = 1'-0"



7 ALT. HEADER DETAIL 2

1" = 1'-0"



4 ALT. SILL DETAIL 2

1" = 1'-0"

HEADER AND SILL GAUGE: 20GA.

W/ WIDTH MAX	JAMBS	HEADER	SILL
4'-0"	2 STUDS	TRACK & STUD (5 A9.0)	TRACK (2 A9.0)
8'-0"	2 STUDS	2 TRACKS & STUD (6 A9.0)	TRACK & STUD (3 A9.0)
10'-0" 12'-0"	3 STUDS	3 TRACKS & 2 STUDS (7 A9.0)	2 TRACKS & STUD (4 A9.0)

1 METAL STUD WALL OPENING FRAMING SCHEDULE

1" = 1'-0"

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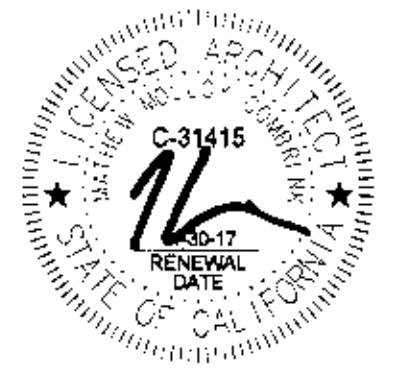
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 3/10/17 100% CD  
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 renovation

novato, california  
 project number: 16-148-01

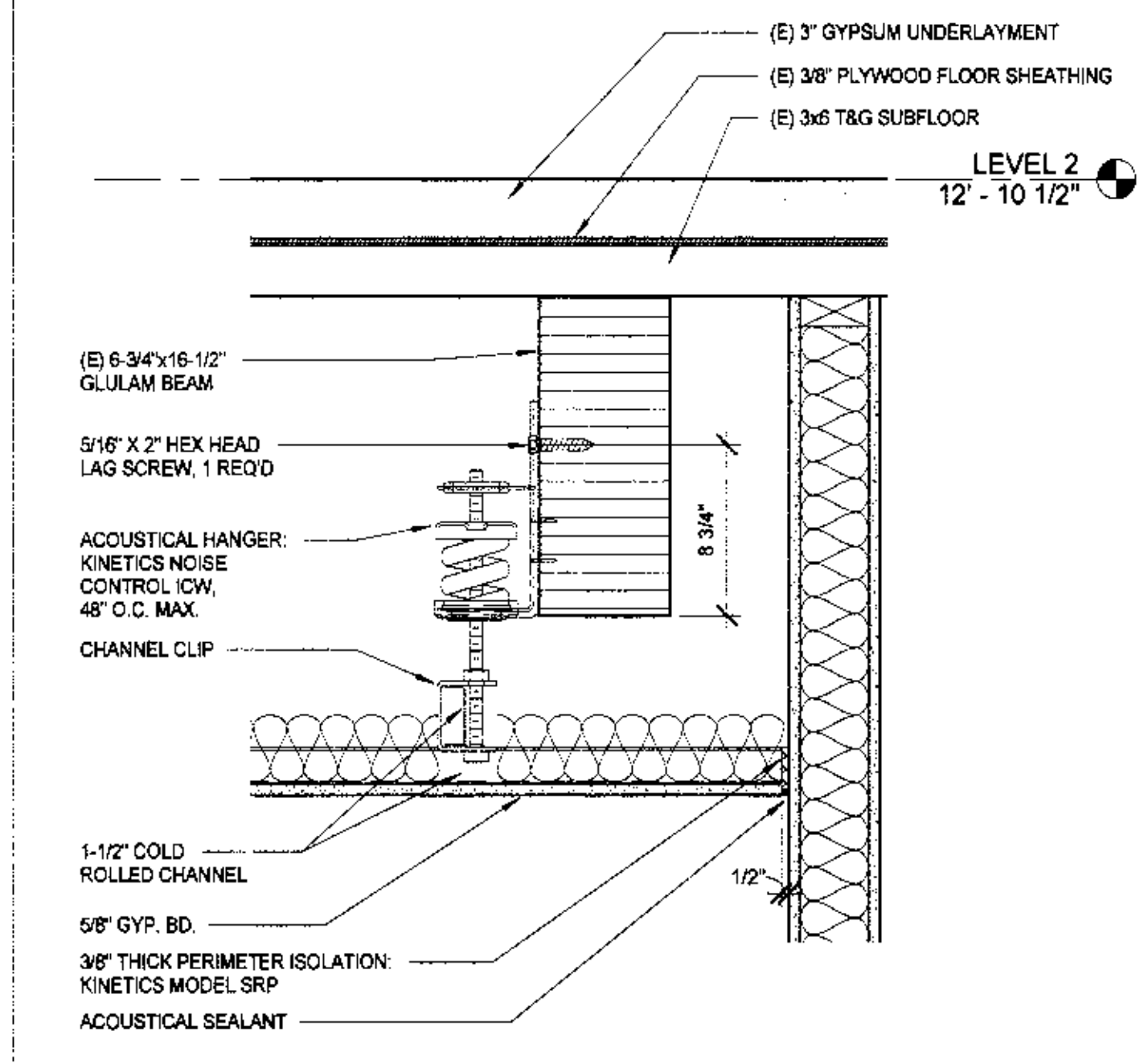
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CONSTRUCTION  
 DOCUMENTS

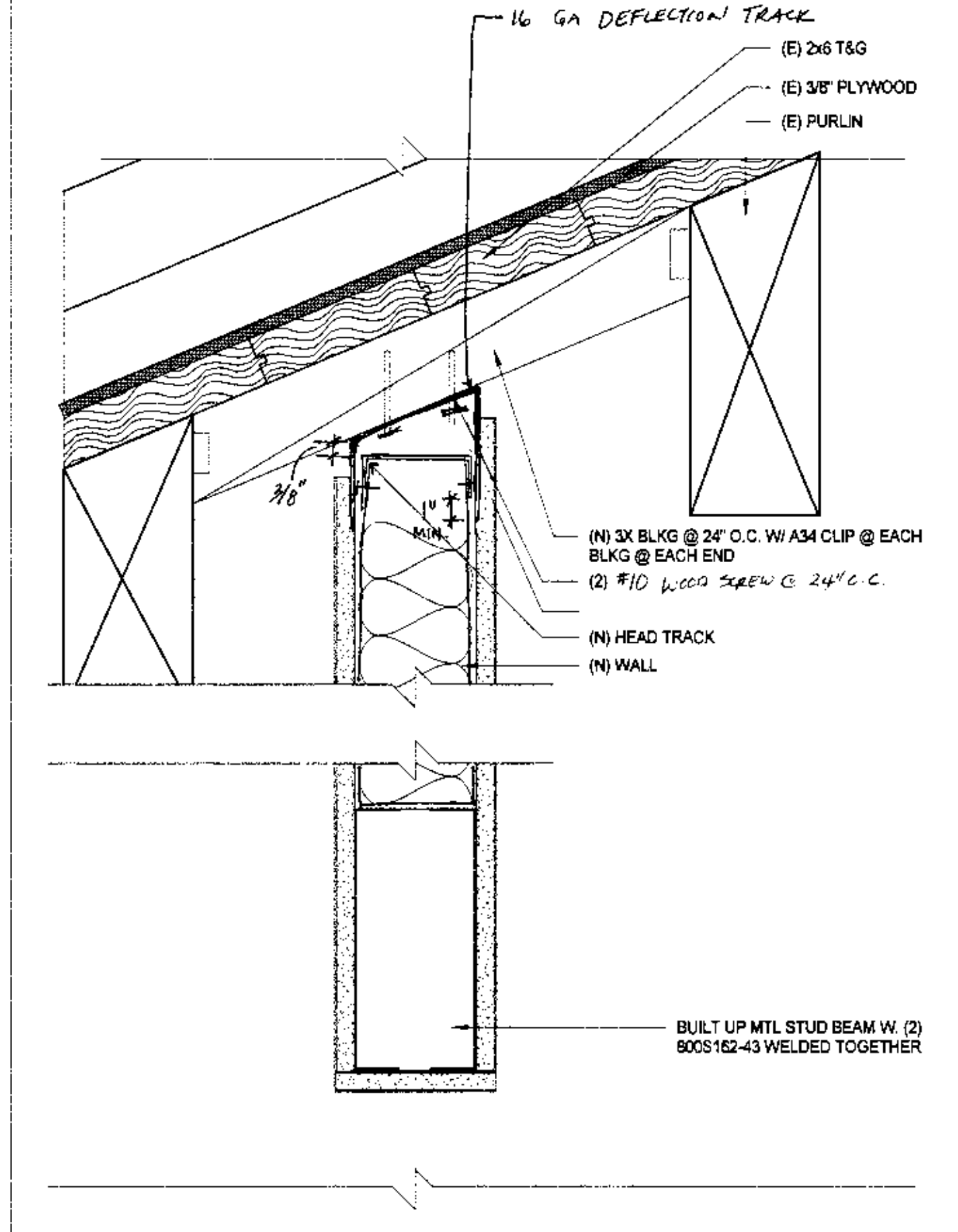
INTERIOR  
 DETAILS

A9.0

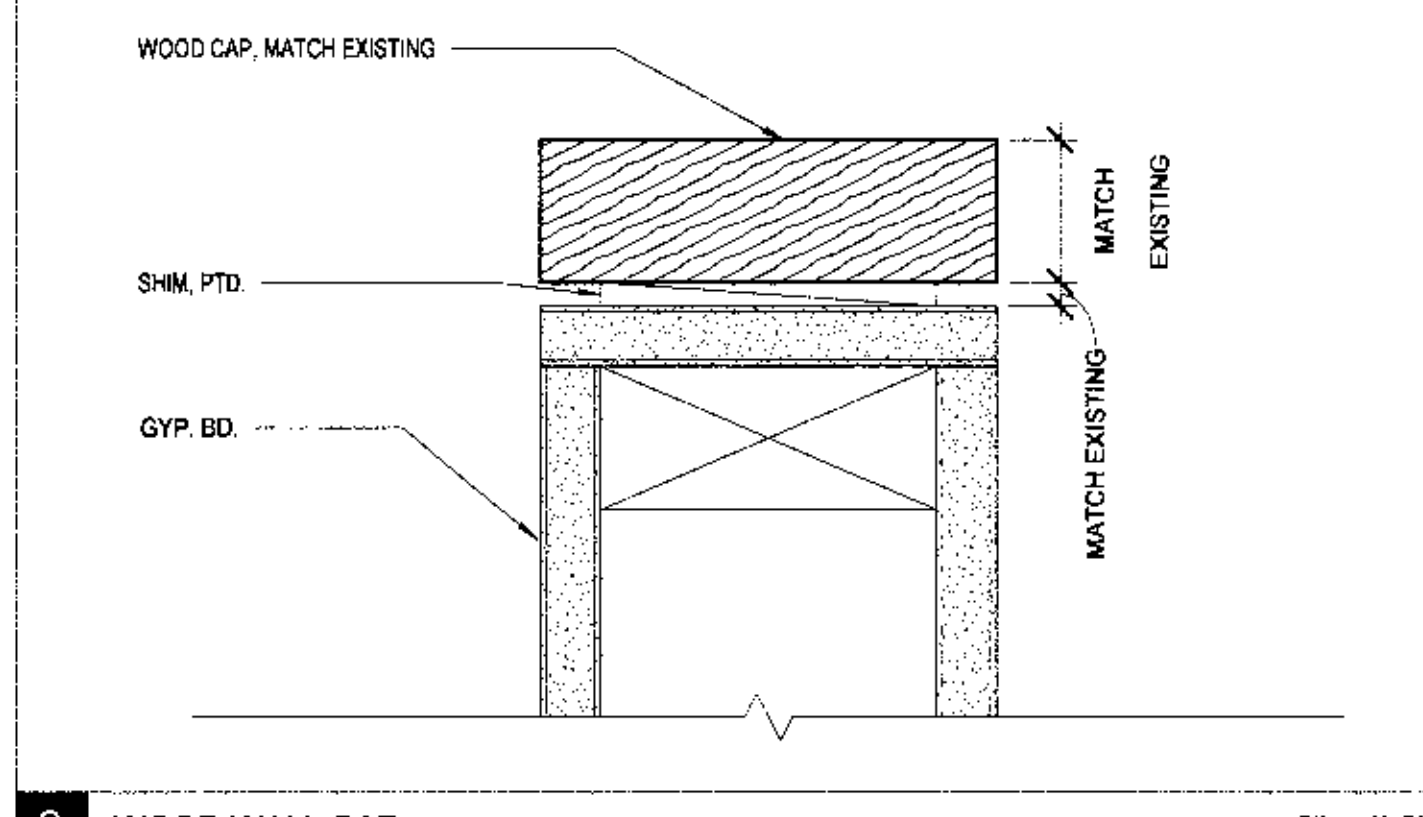
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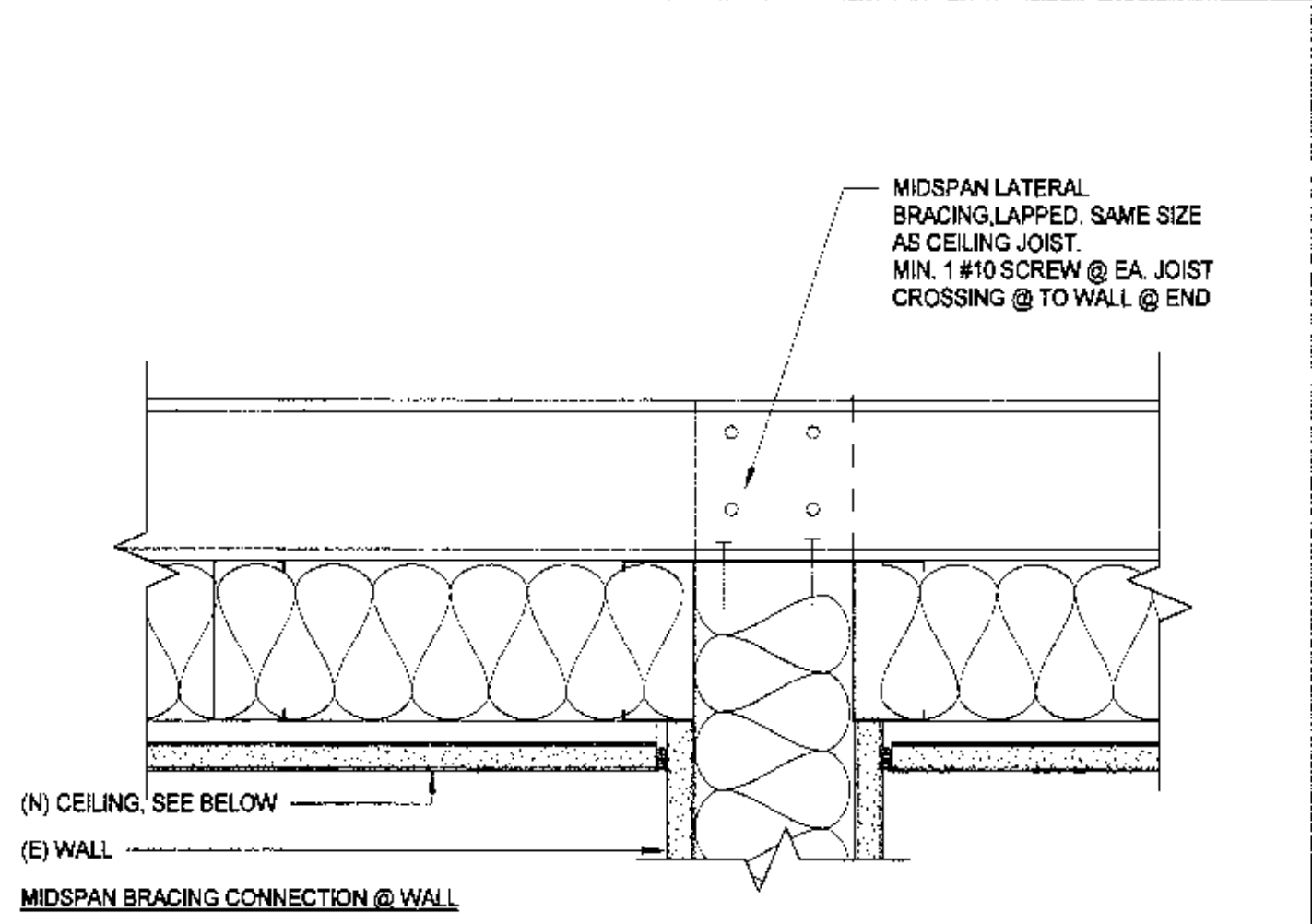
10 FLR.-CLNG. ASSM. W/ ACOUSTICAL HANGER 1 1/2" = 1'-0"



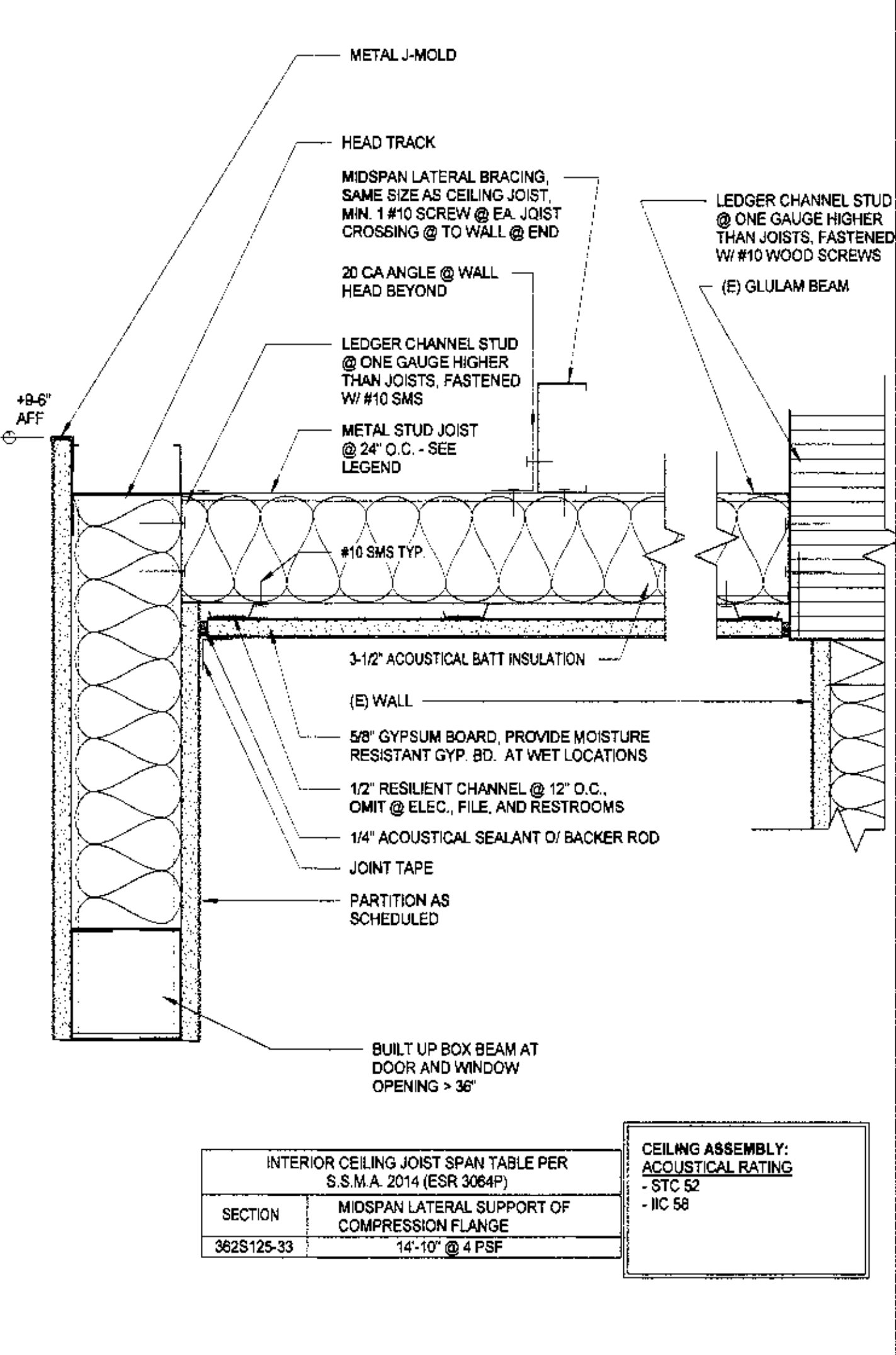
9 CEILING FRAMING @ (N) WALL 3" = 1'-0"



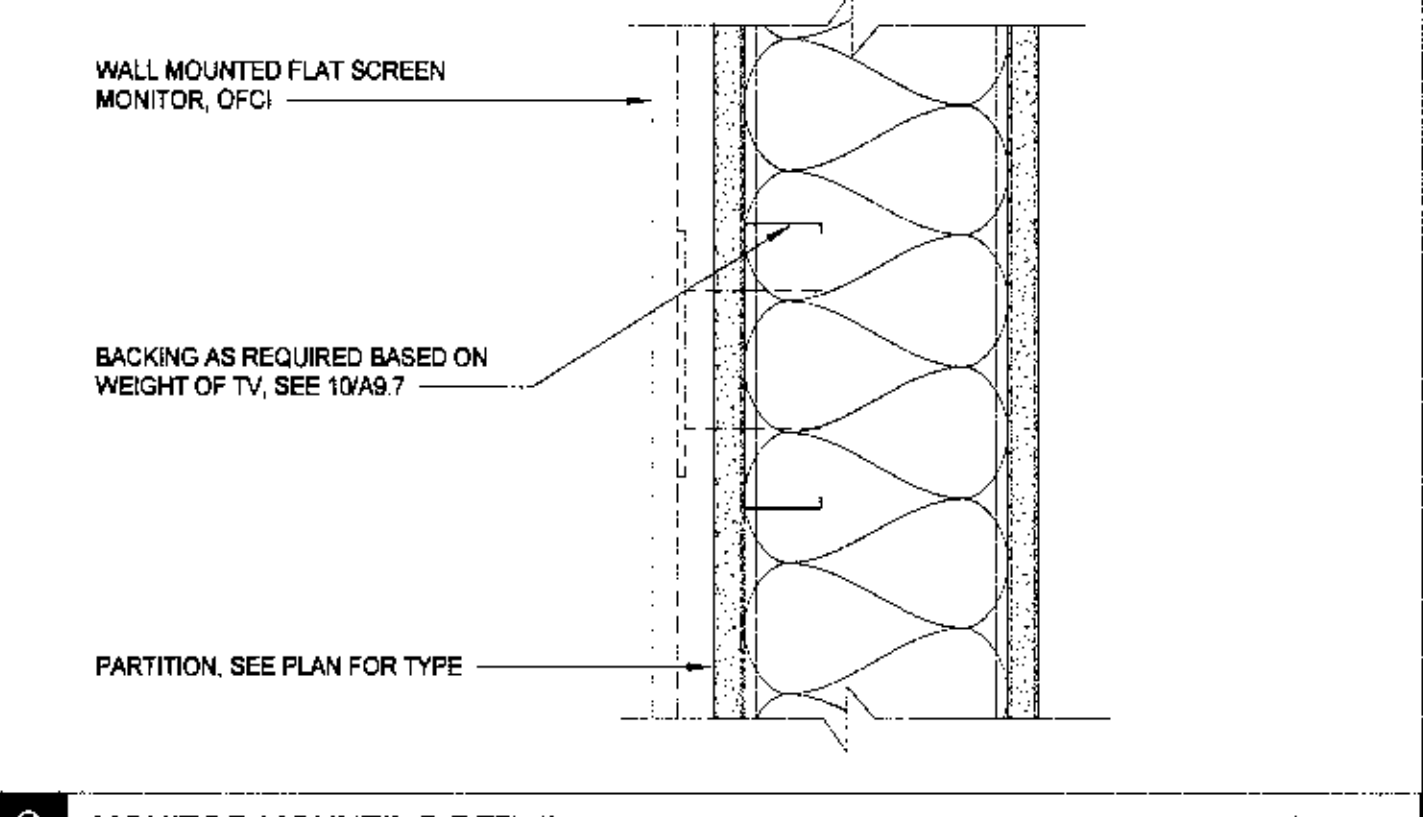
8 WOOD WALL CAP 6" = 1'-0"



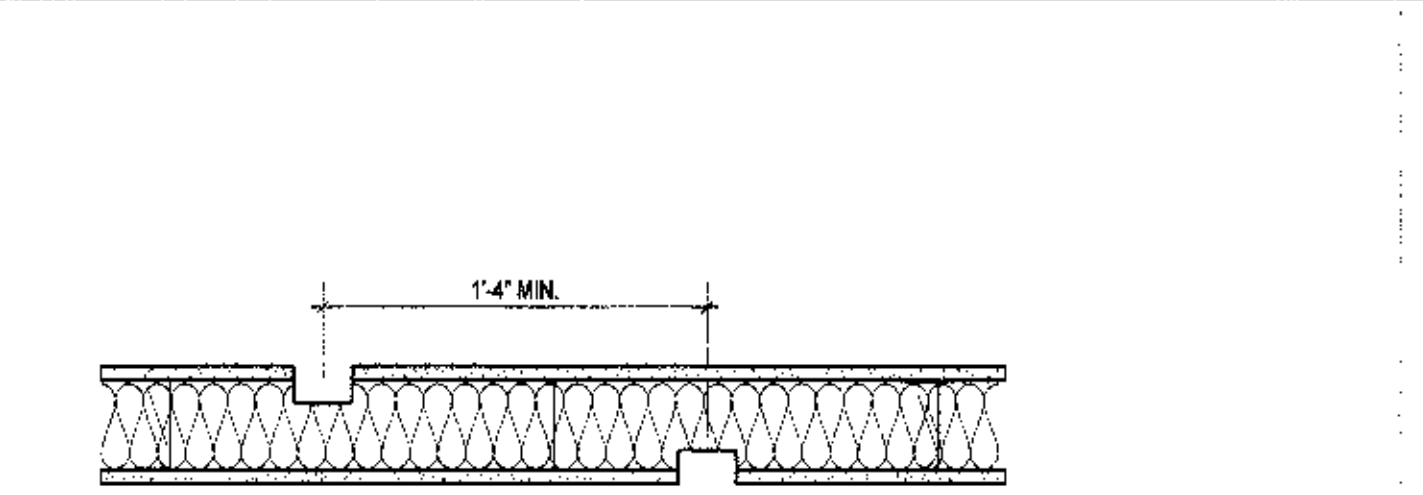
4 TYP. SEPARATION AT WALL OUTLETS 1 1/2" = 1'-0"



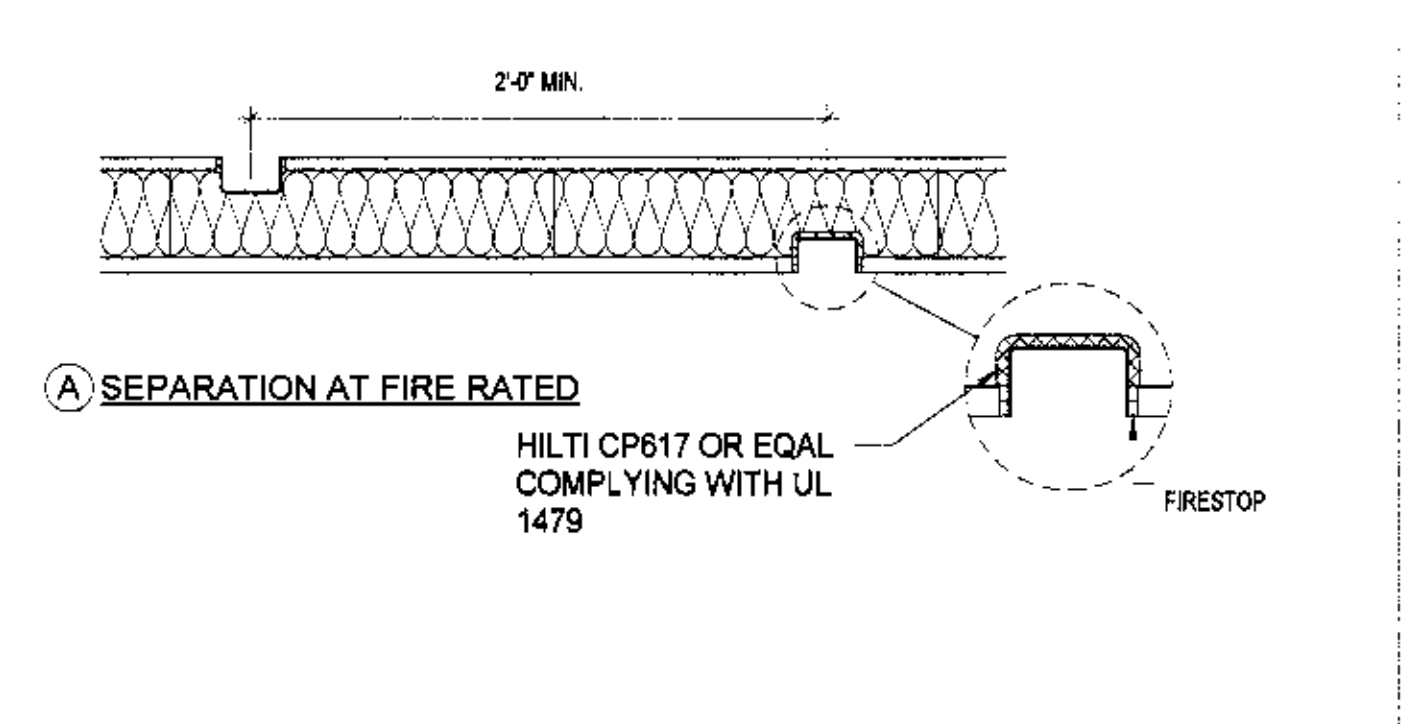
7 CEILING FRAMING @ NON RATED WALL 3" = 1'-0"



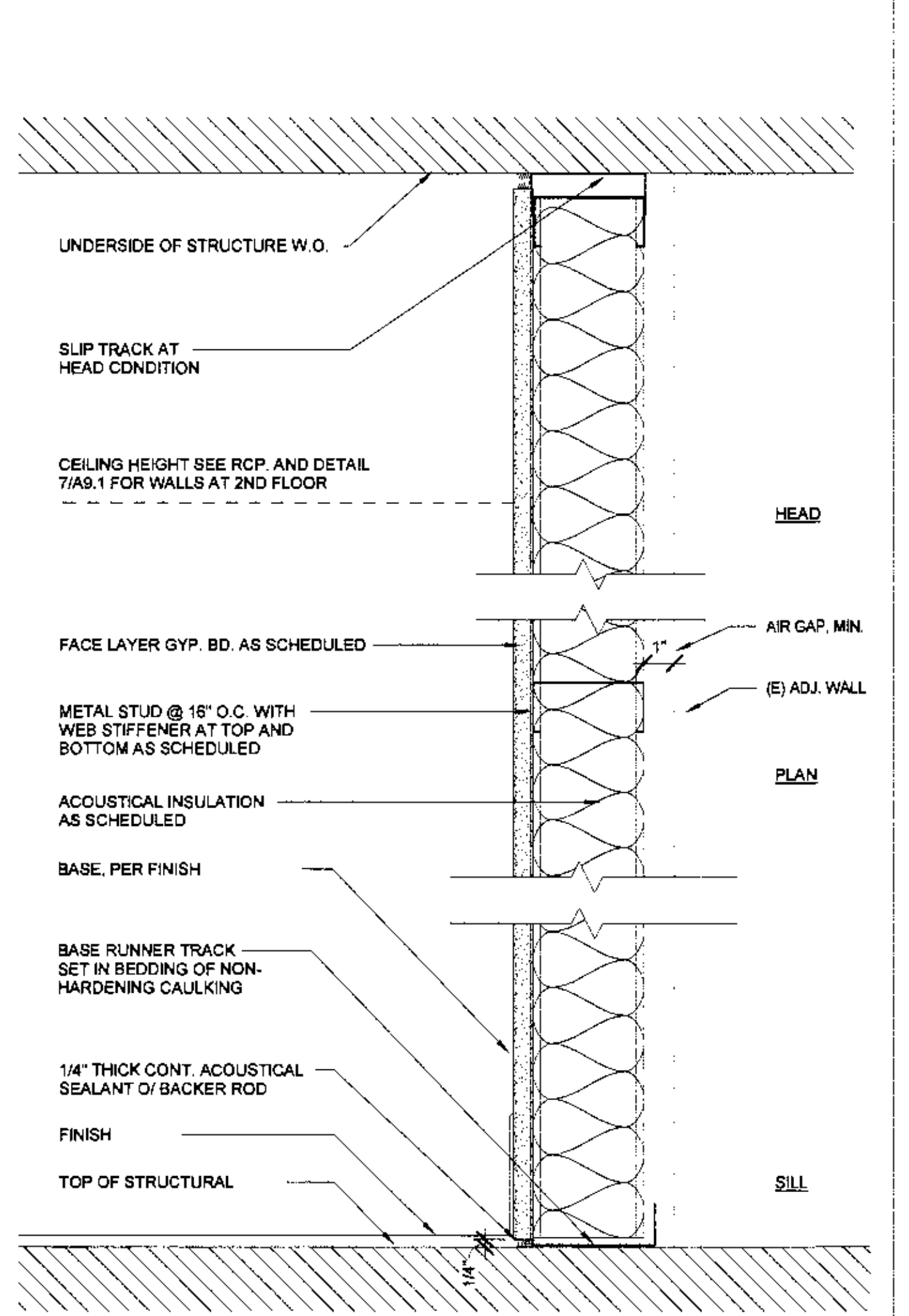
6 MONITOR MOUNTING DETAIL 3" = 1'-0"



B SEPARATION AT ACOUSTICAL INSULATED PARTITIONS



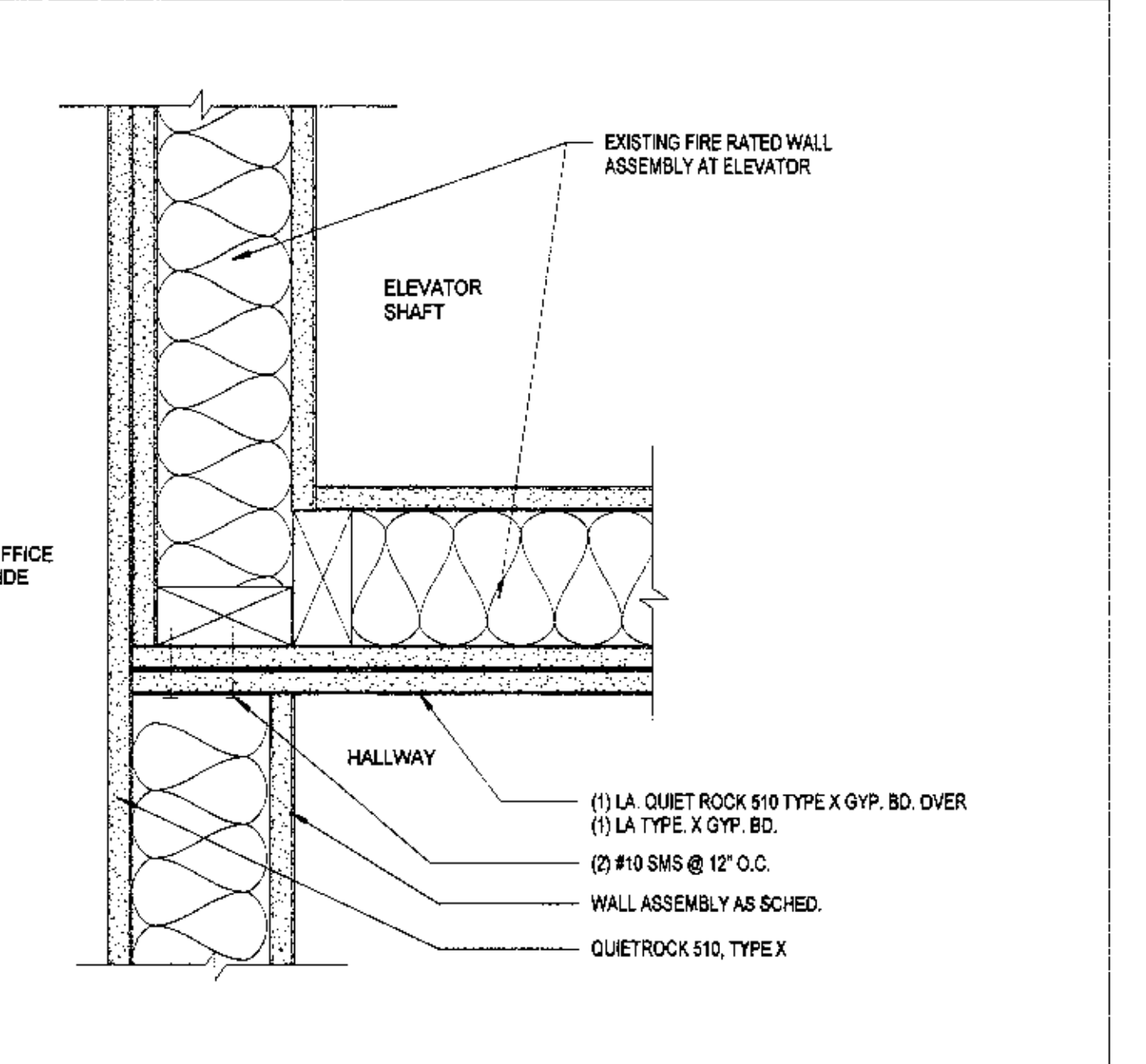
A SEPARATION AT FIRE RATED



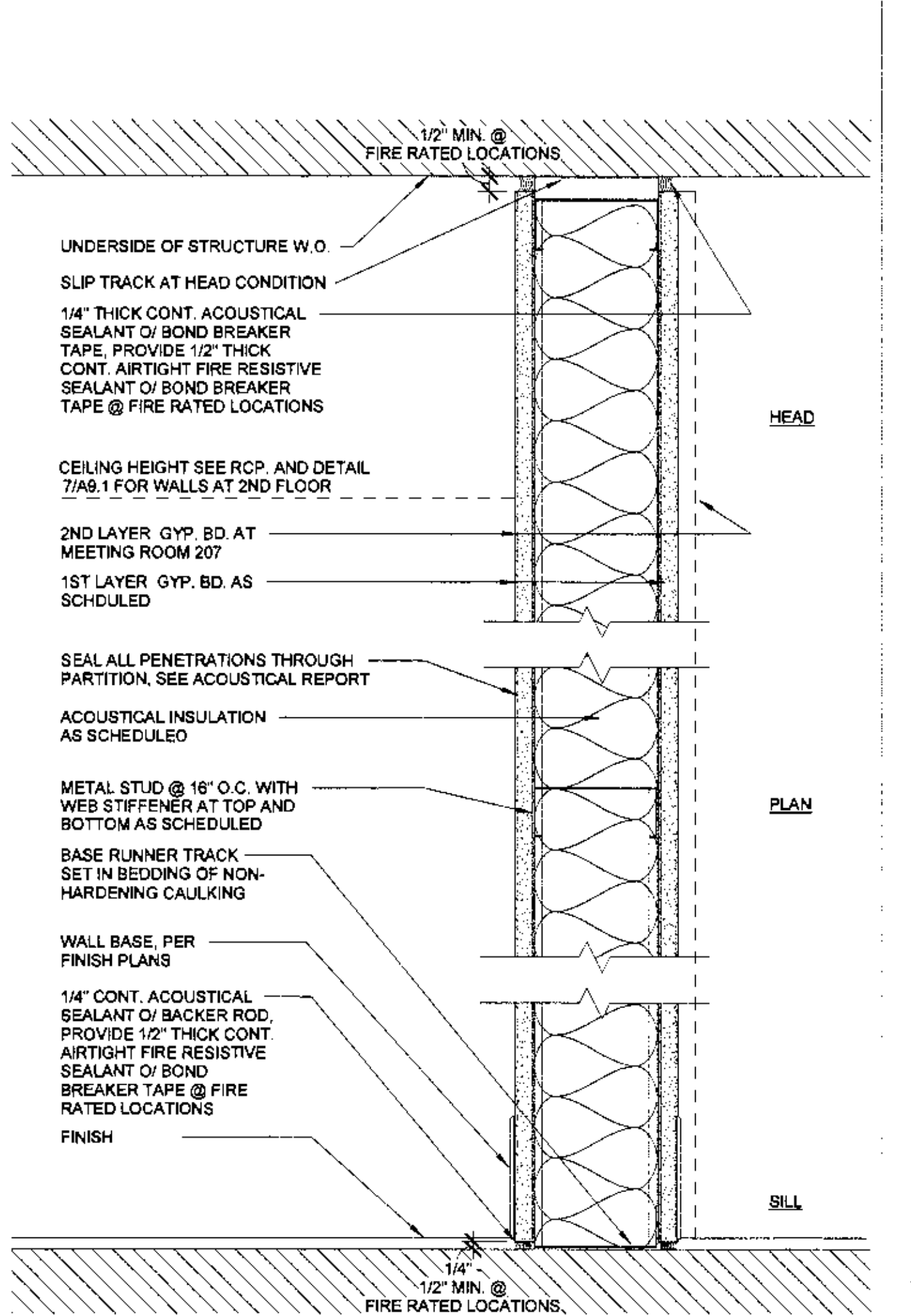
TYPE	STUD	FACE LAYER GYP. BD. HEIGHT	ACOUSTICAL INSULATION	NOTES
A3	6\"/>			

NOTES:  
 1. PROVIDE TILE BACKING PANEL @ JANITOR CLOSET. PROVIDE MOISTURE RESISTANT GYPSUM BOARD AT ALL OTHER TILE LOCATIONS.  
 2. SEE ACOUSTIC REPORT AND ACOUSTIC DETAILS IN SPECIFICATION APPENDIX FOR MORE INFO.  
 3. SEE A9.7 FOR TYPICAL FRAMING DETAILS.

4 PARTITION TYPE A3 - METAL STUD, PARTIAL HEIGHT FURRING 3" = 1'-0"



2 RATED - NON-RATED WALL INTERSECTION 1 - PLAN VIEW 3" = 1'-0"



TYPE	STUD SIZE	1ST LAYER SHEETING HT.	2ND LAYER SHEETING / FINISHES HT.	ACOUSTICAL INSULATION	NOTES
A1	6\"/>				
A2	6\"/>				

NOTES:  
 1. PROVIDE TILE BACKING PANEL @ JANITOR CLOSET. PROVIDE MOISTURE RESISTANT GYPSUM BOARD AT ALL OTHER TILE LOCATIONS.  
 2. SEE ACOUSTIC REPORT AND ACOUSTIC DETAILS IN SPECIFICATION APPENDIX FOR MORE INFO.  
 3. SEE A9.7 FOR TYPICAL FRAMING DETAILS.

1 PARTITION TYPE A1, A2 - METAL STUD, NON BEARING 3" = 1'-0"

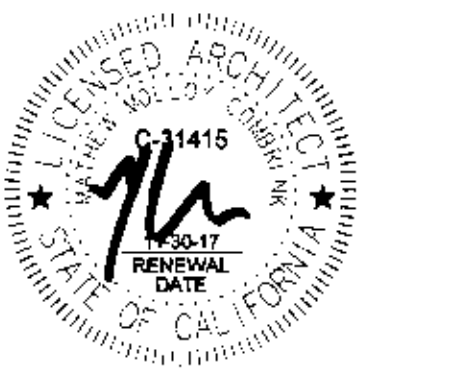
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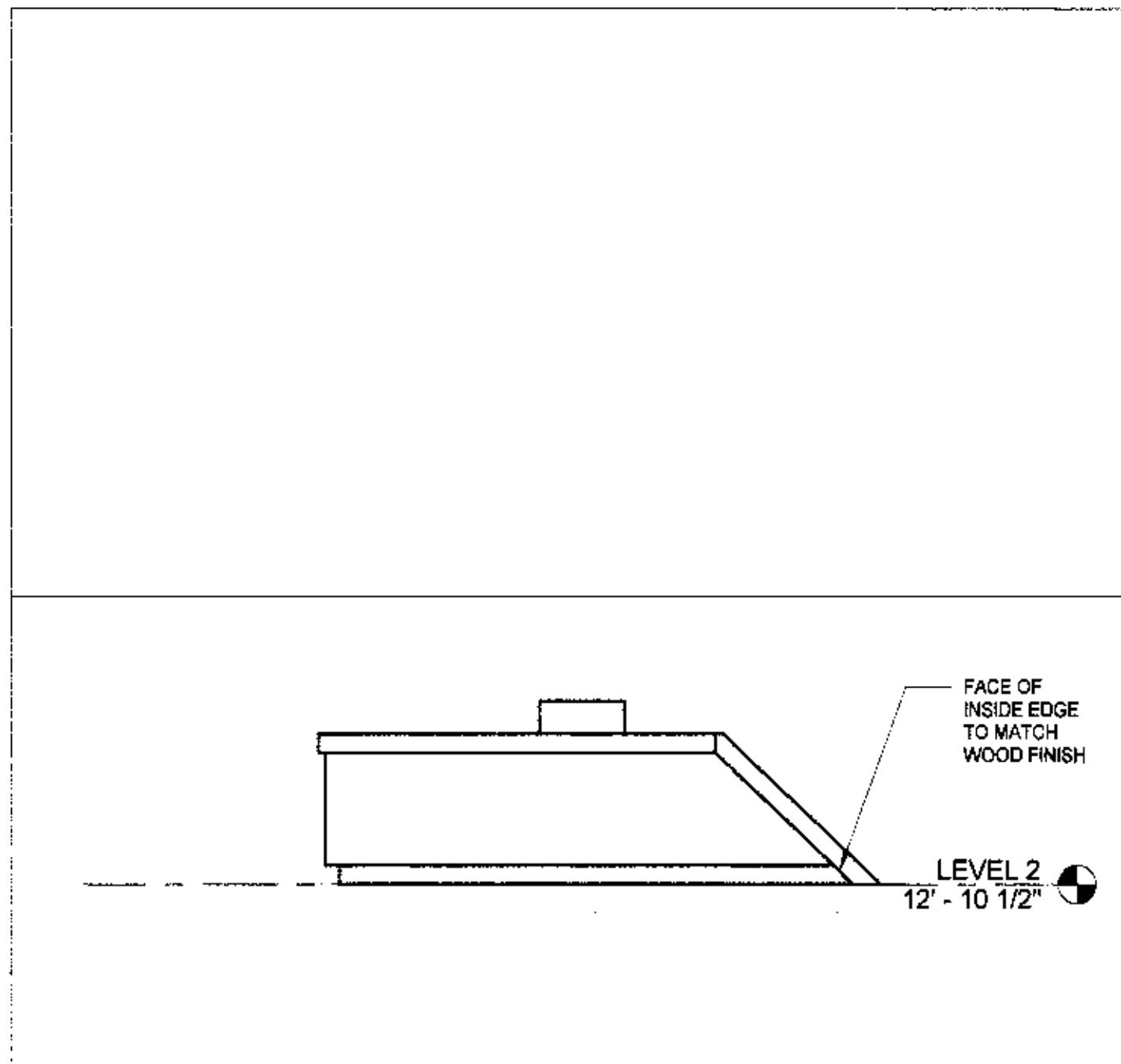
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scale: as noted  
 date: 03/10/2017

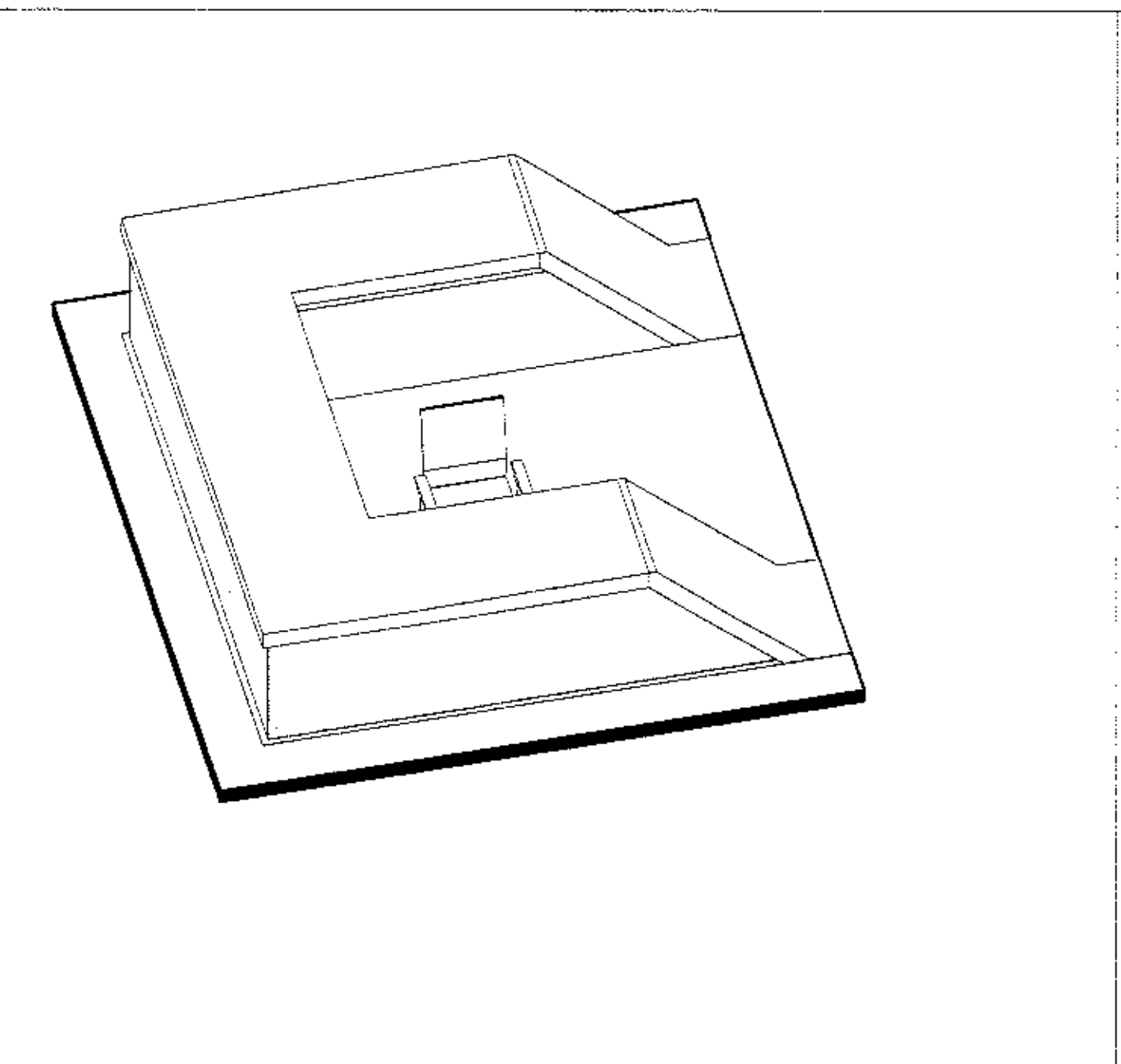
CONSTRUCTION DOCUMENTS  
 INTERIOR DETAILS

A9.1

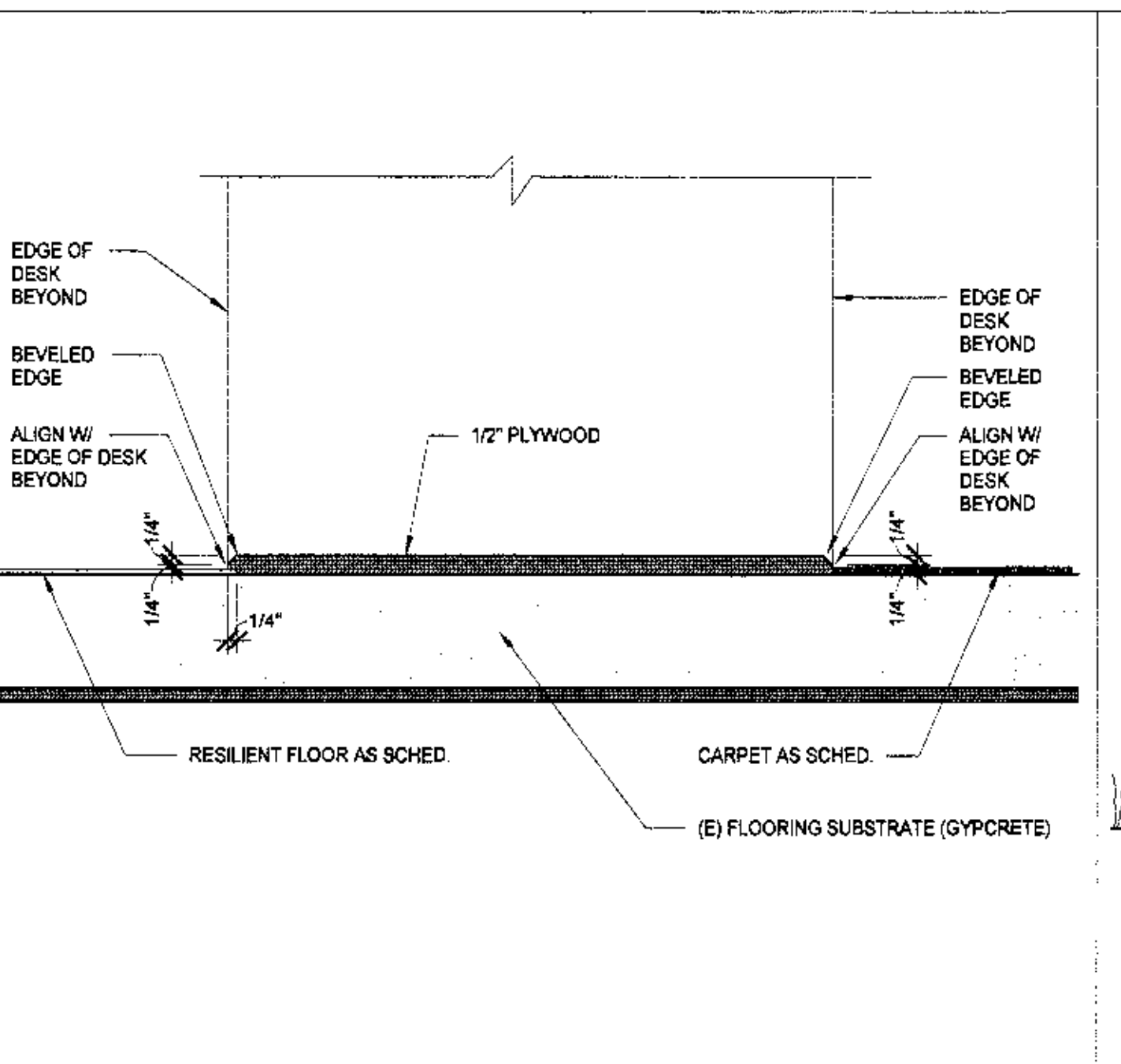
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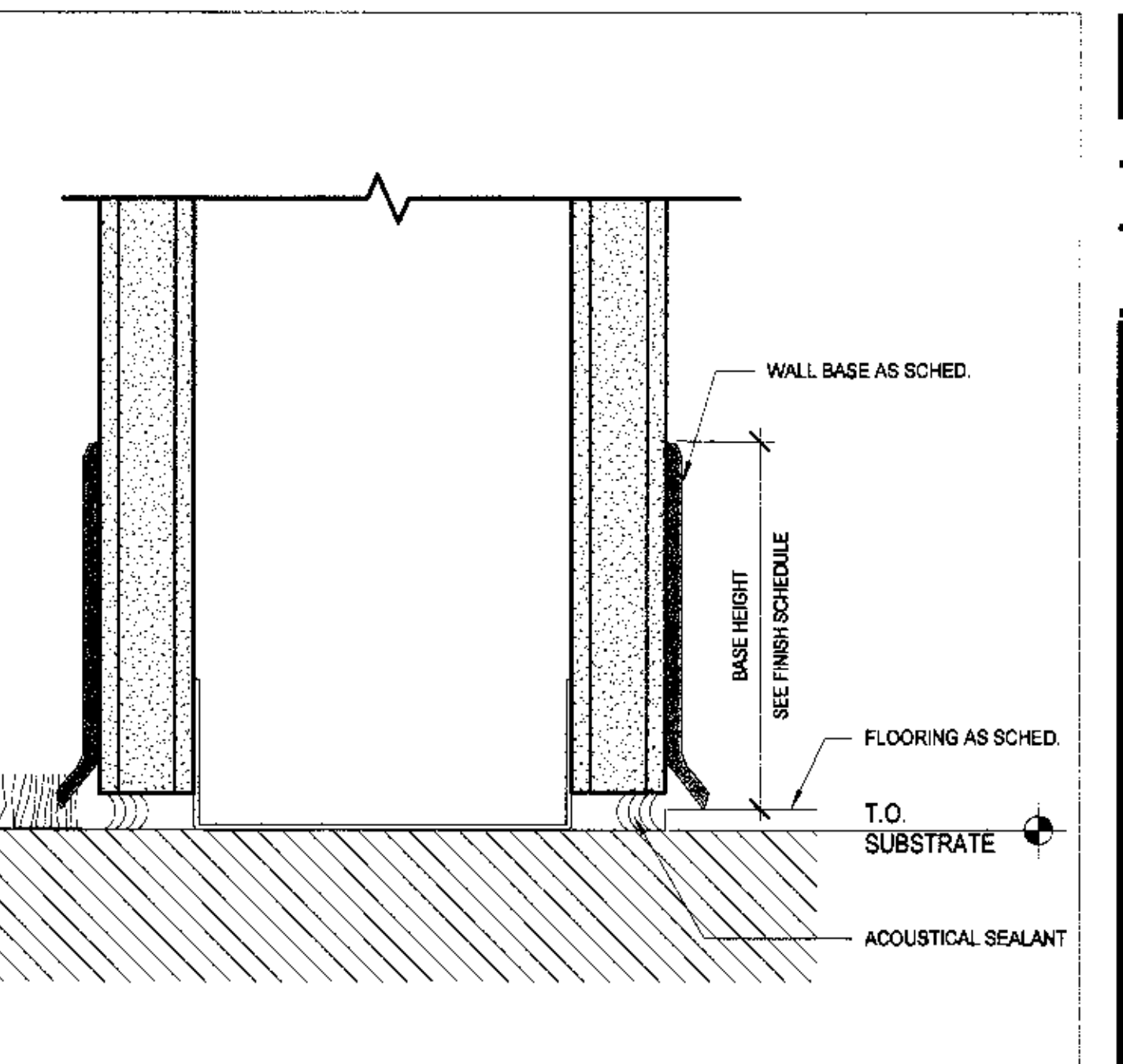
12 RECEPTION DESK SOUTH 3/8" = 1'-0"



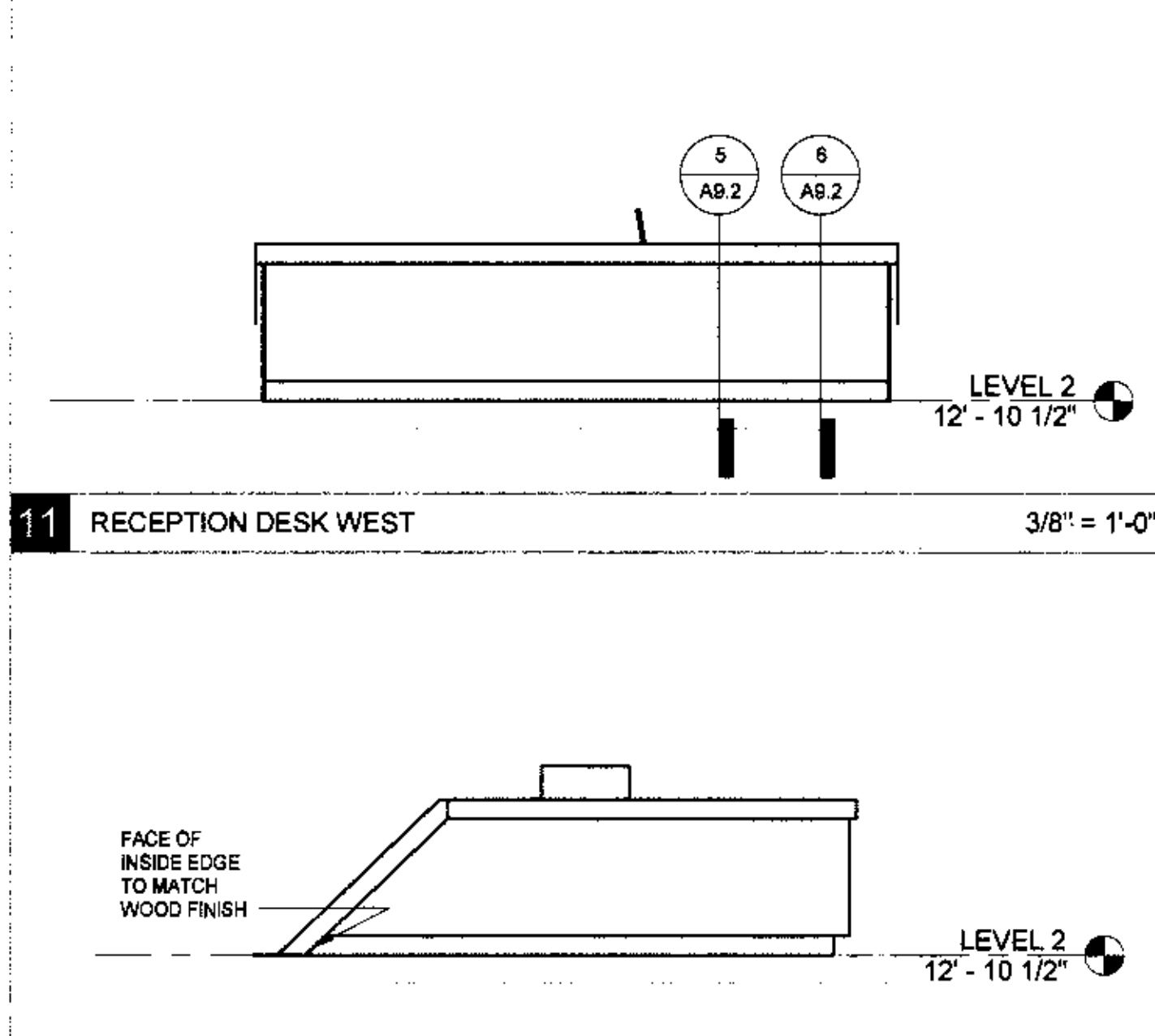
8 RECEPTION DESK AXON



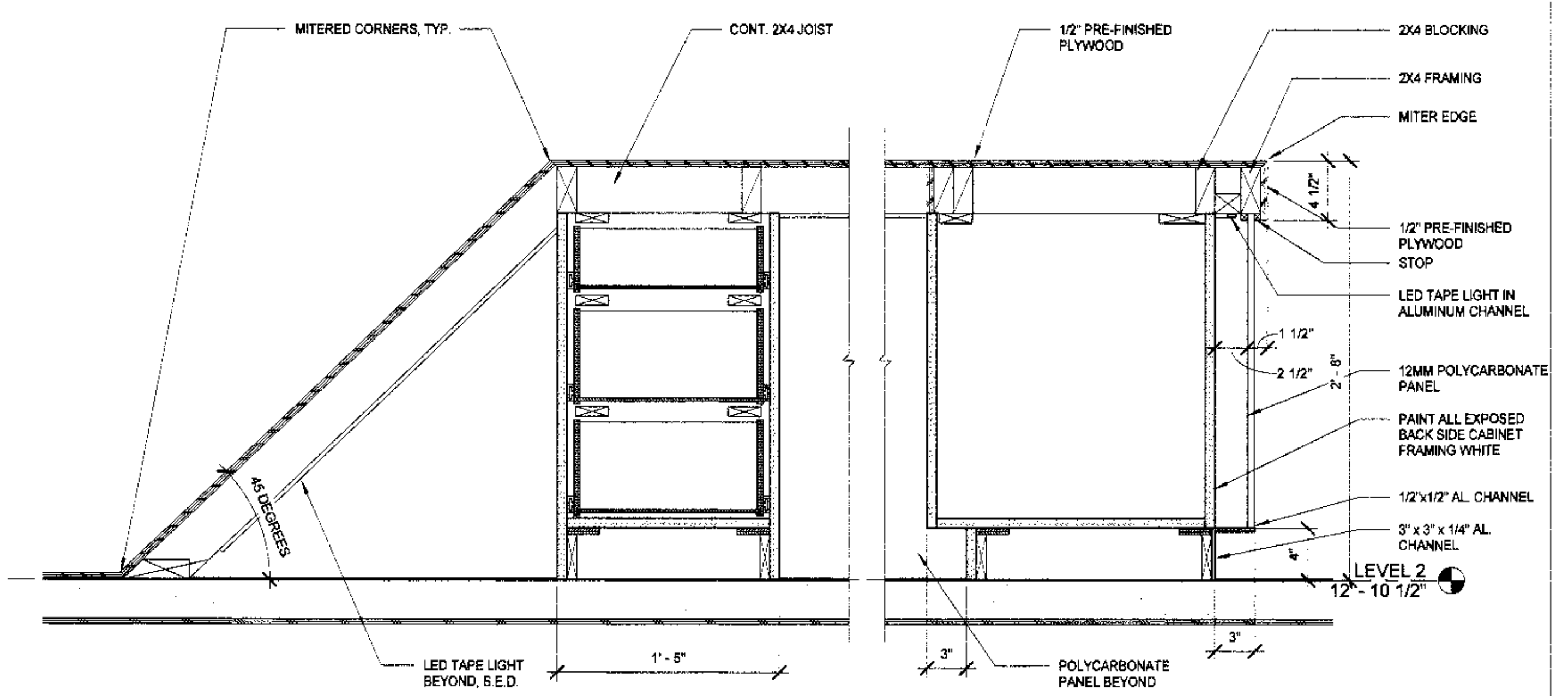
7 PLYWD. FLOORING TRANSITION 3" = 1'-0"



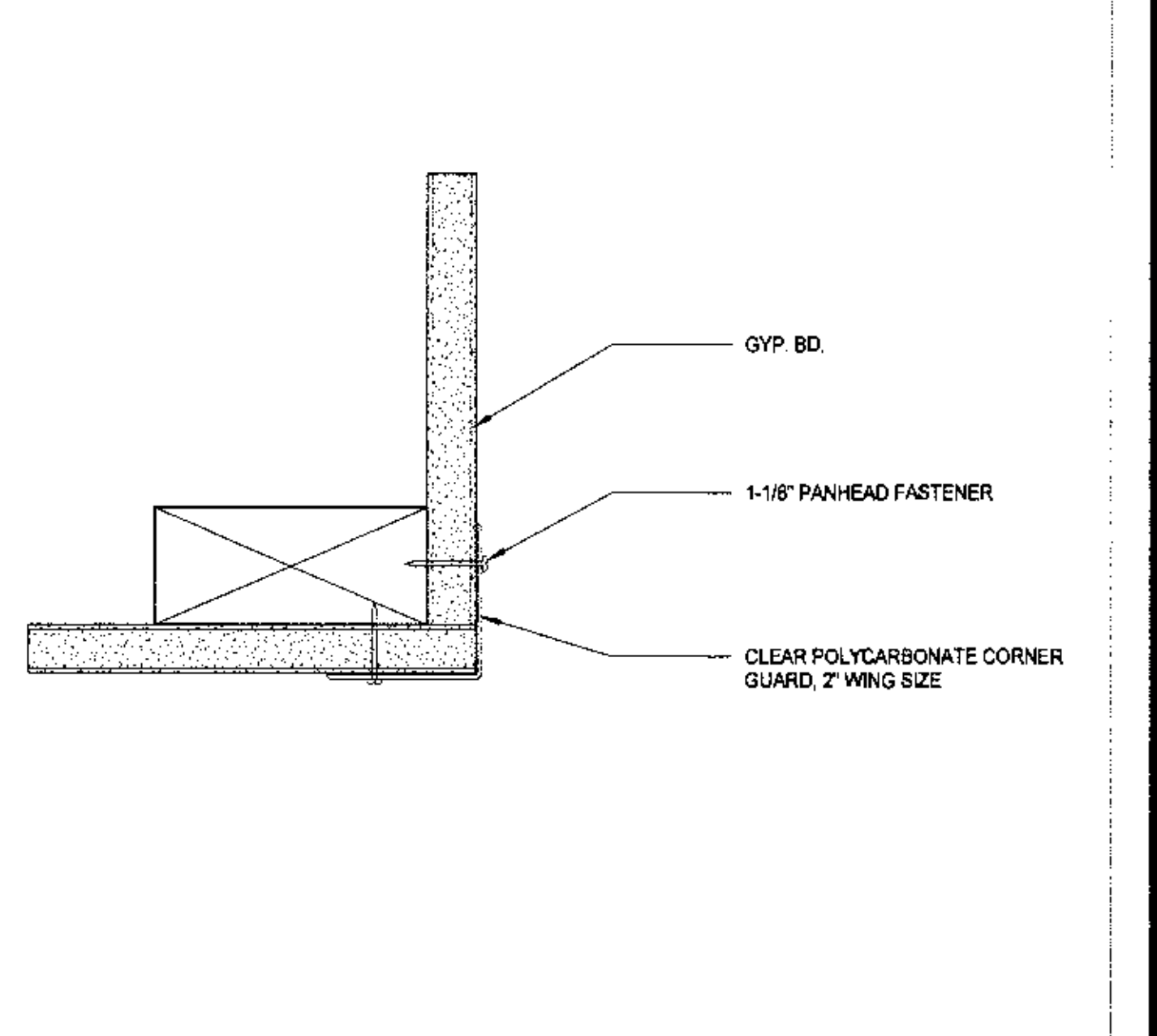
3 RESILIENT FLOOR BASE 12" = 1'-0"



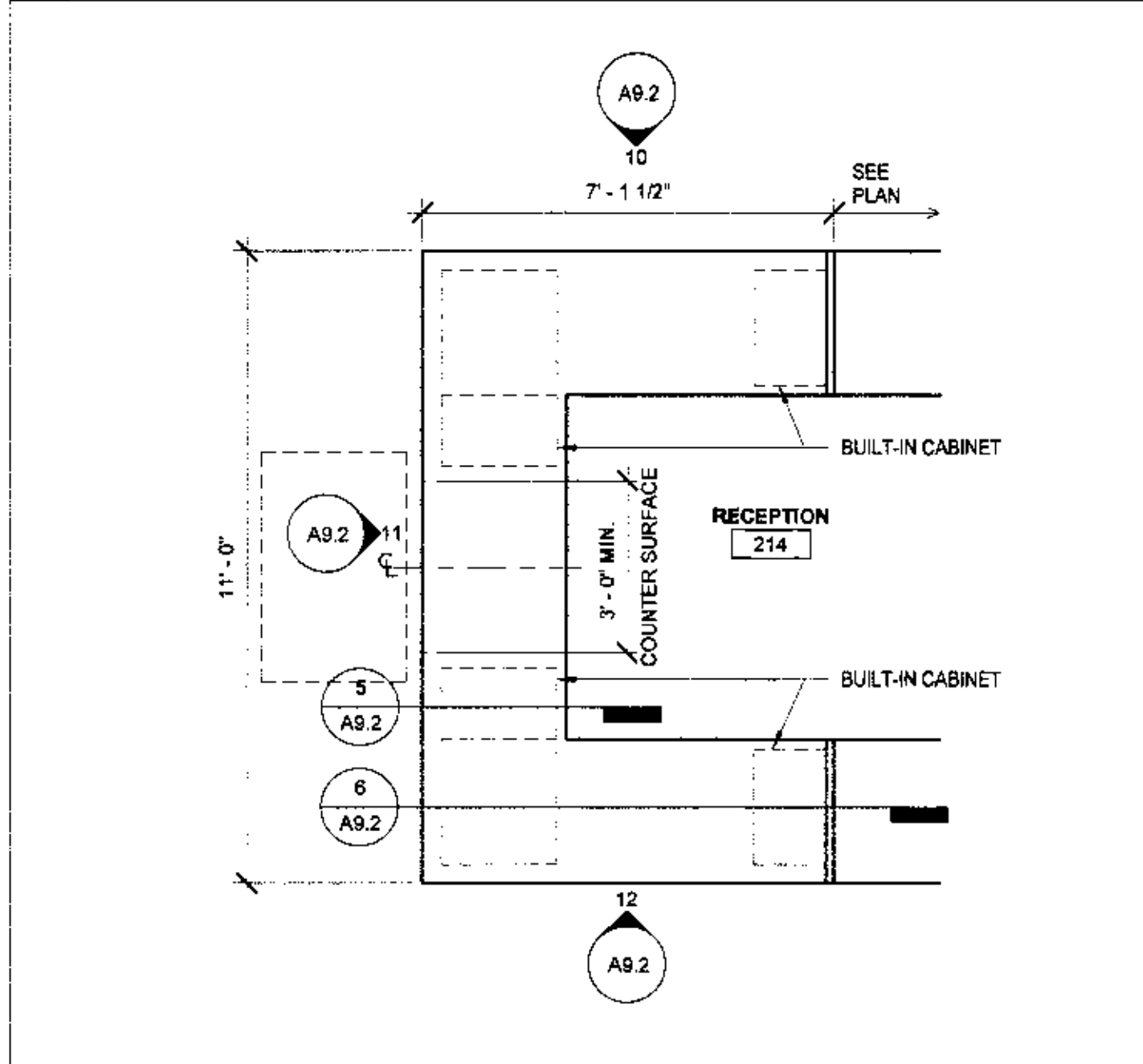
11 RECEPTION DESK WEST 3/8" = 1'-0"



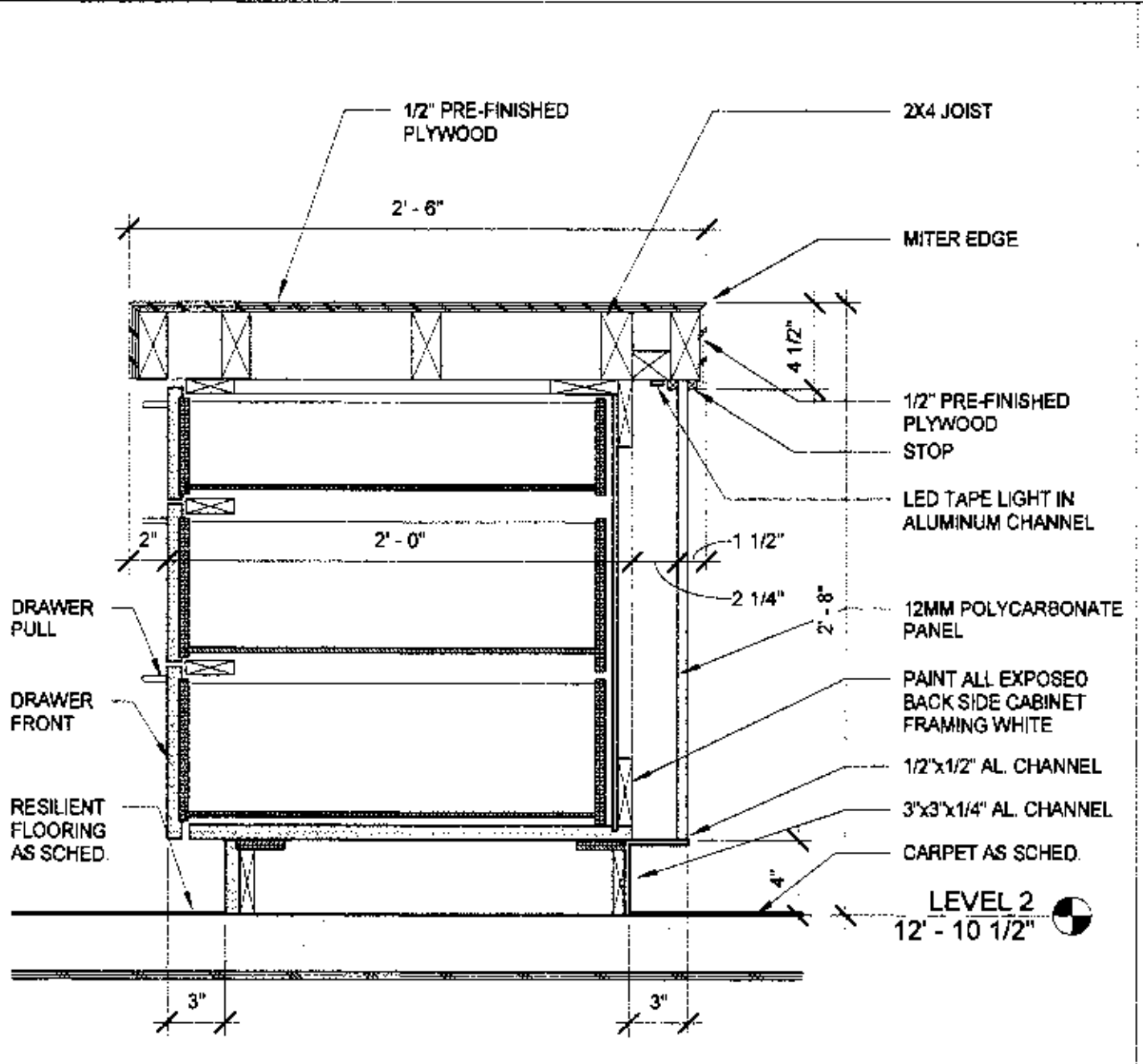
6 BUILT-IN DESK LONG SECTION 1 1/2" = 1'-0"



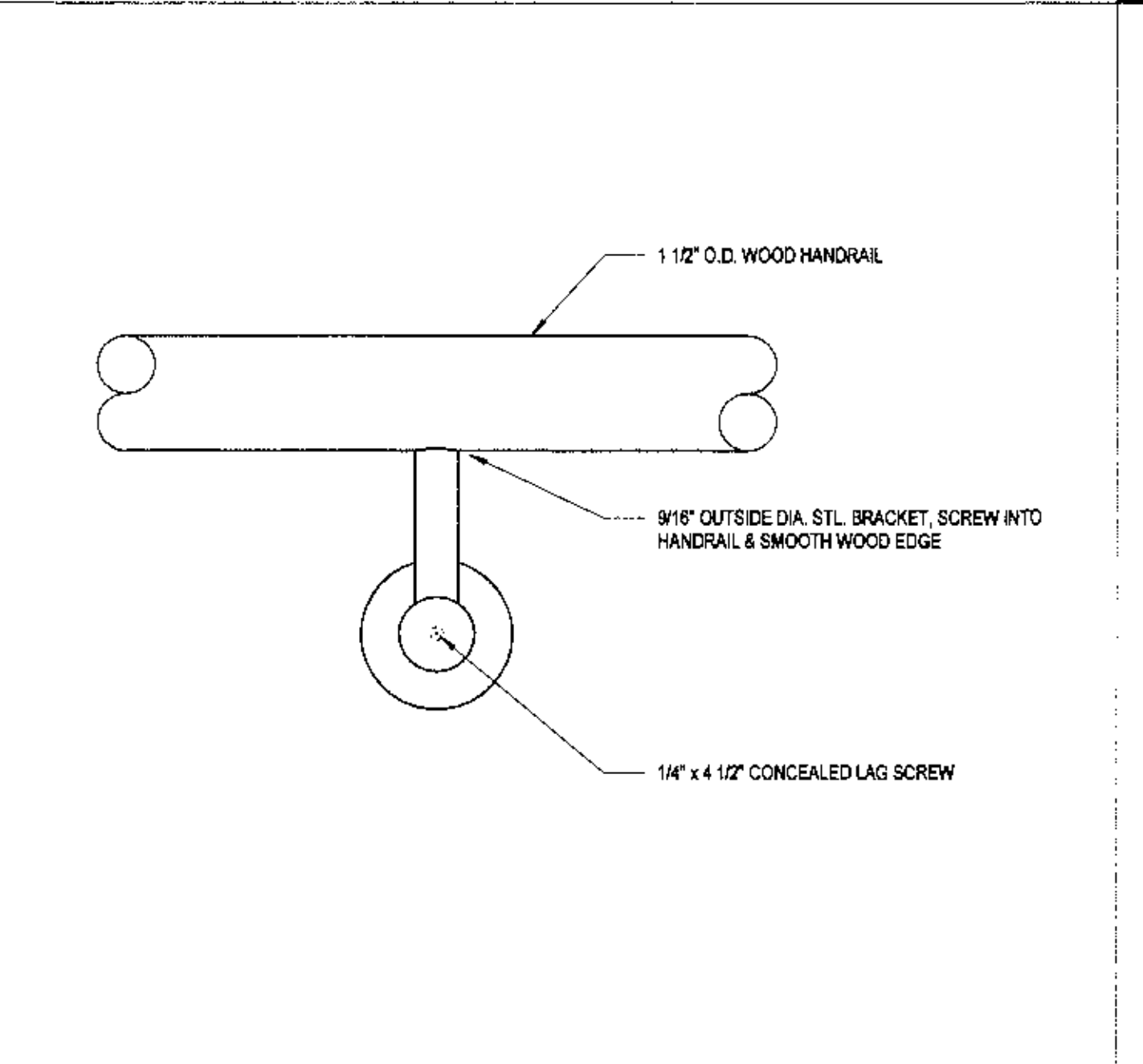
2 TYP. CORNER GUARD - PLAN VIEW 6" = 1'-0"



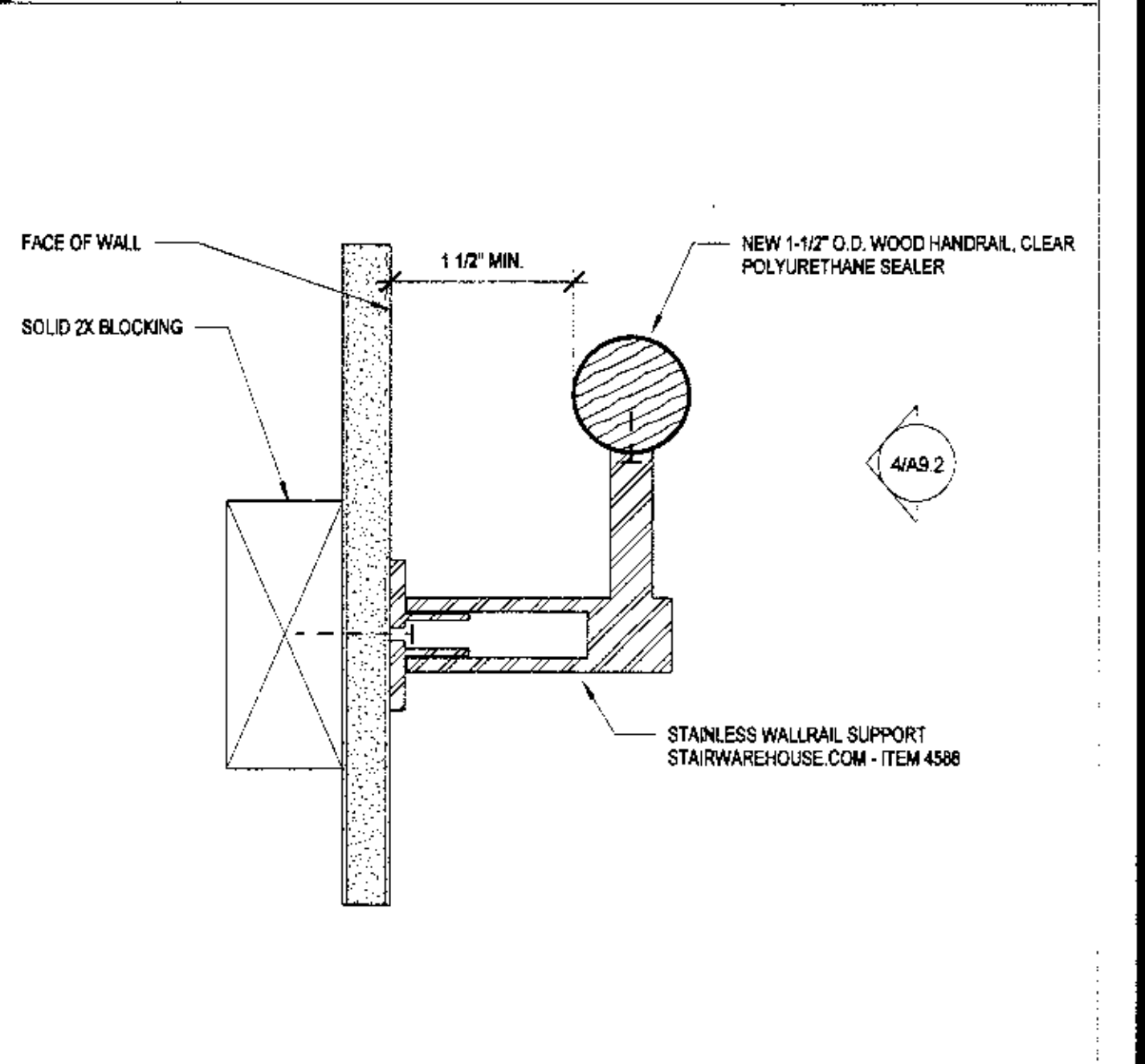
9 RECEPTION DESK ENLARGED PLAN 3/8" = 1'-0"



5 BUILT-IN DESK SECTION 1 1/2" = 1'-0"



4 HANDRAIL MOUNTING 6" = 1'-0"



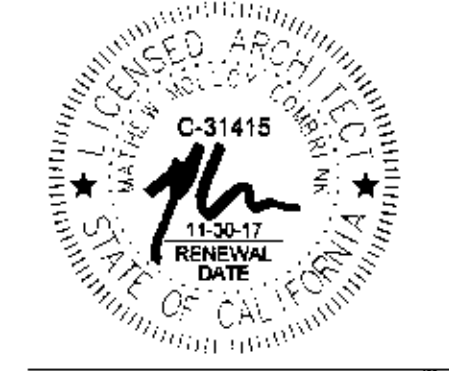
1 HAND RAIL SECTION 6" = 1'-0"

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CONSTRUCTION  
 DOCUMENTS  
 INTERIOR  
 DETAILS

A9.2

Design Spectral Acceleration Parameter, $S_{DS}$	Brace Assembly Spacing (ft.)	
	$z/h \leq 0.5^a$	$z/h > 0.5^a$
$S_{DS} \leq 1.15$	12 x 12	12 x 12
$1.15 < S_{DS} \leq 1.73$	12 x 12	8 x 12
$S_{DS} > 1.73$	8 x 12	8 x 8

- Footnotes:
- Where, as defined in ASCE 7, Section 13.3.1.
  - $z$  = height in structure of point of attachment of ceiling with respect to the base.
  - $h$  = average roof height of the structure with respect to the base.
  - It shall be permitted to use the brace assembly spacing for " $z/h > 0.5$ " for the full building height.
- 2.4 Attachment of Hanger and Bracing Wires:
- Fasten hanger wires with not less than three (3) tight turns in three (3) inches. Hanger wire loops shall be tightly wrapped and sharply bent to prevent any vertical movement or rotation of the member within the loops (see ASTM E580, Section 5.2.7.2).
  - Fasten bracing wires with not less than four (4) tight turns in one and one-half (1-1/2) inches.
  - Hanger and bracing wire anchorage to the structure shall be installed in such a manner that the direction of the anchorage aligns closely with the direction of the wire. (e.g. bracing wire ceiling clips must be bent as shown in the details and rotated as required to align closely with the direction of the wire, screw eyes in wood must be installed so they align closely with the direction of the wire, etc.)
  - Separate all ceiling hanger and bracing wires at least six (6) inches from all unbraced ducts, pipes, conduit, etc.
  - Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment. Provide trapeze or other supplementary support members at obstructions to allow typical hanger spacing. Brace assemblies must be configured and/or located in order to avoid obstructions in addition to maintaining the required brace assembly spacing.
  - Provide additional hangers, struts and brace assemblies as required at all ceiling breaks, soffits, or discontinuous areas.
  - Hanger wires that are more than one (horizontal) in six (vertical) out of plumb shall have counter-sloping wires.  
**Note:** See ASTM C636, Figure 1, for counter-sloping methods.
  - Attachment of the bracing wires to the structure above and to the main runners shall be adequate for the load imposed. The weight ( $W_L$ ) shall be taken as not less than four (4) psf for calculating seismic forces ( $F_p$ ).
  - Post-installed anchors (e.g. expansion anchors, screw anchors and power actuated fasteners) shall have a current Evaluation Report acceptable to DSA in accordance with IR A-5.

- Power-actuated fasteners in concrete are not permitted for bracing wires.
  - DSA approval of a construction plan is required prior to installing post-installed anchors in prestressed concrete. The construction plan shall demonstrate how the location of existing prestressing tendons and strands will be located and denoted as necessary to avoid interference.
5. Expansion Joints, Seismic Separation Joints:
- Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors and lobbies or other similar areas.
  - For ceiling areas exceeding 2,500 square feet, a seismic separation joint shall be provided to divide the ceiling into areas not exceeding 2,500 square feet in accordance with ASTM E580, Section 5.2.9.
6. Ceiling Fixtures, Terminals, and Devices:
- All fixtures, terminals, and other devices shall be mounted in a manner that will not compromise ceiling performance in accordance with Section 13.5.6.2.2 Item 5 of ASCE 7 as amended by CBC Section 1616A.1.20 (1616.10.16") and ASTM E580 Sections 5.3 and 5.4.
  - Ceiling panels shall not support any light fixtures, air terminals or devices.
  - Penetrations through the ceiling for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a two (2) inch oversized ring, sleeve or adapter through the ceiling tile to allow free movement of one (1) inch in all horizontal directions. Alternatively, per ASTM E580, Section 5.2.8.5, a flexible sprinkler hose fitting that can accommodate one (1) inch of ceiling movement shall be permitted to be used in lieu of the oversized ring, sleeve, or adapter.
  - Slack safety wires shall be considered hanger wires for installation and testing requirements.
- 6.1 Light Fixtures:
- All light fixtures shall be positively attached to the ceiling suspension systems by mechanical means per CEC Article 410.36 to resist a horizontal force equal to the weight of the fixture. A minimum of two screws or approved fasteners are required at each light fixture, per ASTM E580, Section 5.3.1.
  - Surface-mounted light fixtures shall be attached to the main runner with at least two positive clamping devices on each fixture. The clamping device shall completely surround the supporting ceiling runner and be made of steel with a minimum thickness of #14 gage. Rotational spring catches do not comply. A #12 gage slack safety wire shall be connected from each clamping device to the structure above. Provide additional supports when light fixtures are eight (8) feet or longer or exceed 56 lb. Maximum spacing between supports shall not exceed eight (8) feet.
  - Light fixtures weighing less than or equal to 10 lb. shall have a minimum of one (1) #12 gage slack safety wire connected from the fixture housing to the structure above.
  - Light fixtures weighing greater than 10 lb. but less than or equal to 56 lbs. may be supported directly on the ceiling runners, but they shall have a minimum of two (2) #12 gage slack safety wires connected from the fixture housing at diagonal corners to the structure above.

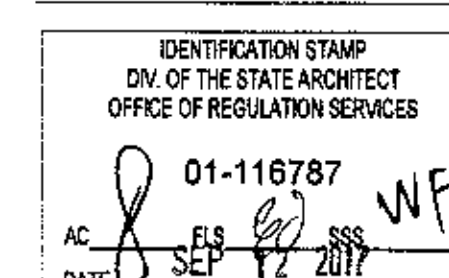
- Exception: All light fixtures greater than two by four feet weighing less than 56 lbs. shall have a #12 gage slack safety wire at each corner.
- All light fixtures weighing greater than 56 lb. shall be independently supported by not less than four (4) taut #12 gage hanger wires (one at each corner) attached from the fixture housing to the structure above or other approved hangers. The four (4) taut #12 gage wires or other approved hangers, including their attachment to the structure above, shall be capable of supporting four (4) times the weight of the fixture.
- 2.6.2 Services within the Ceiling:
- All flexible sprinkler hose fitting mounting brackets, ceiling-mounted air terminals or other services shall be positively attached to the ceiling suspension systems by mechanical means to resist a horizontal force equal to the weight of the component. Screws or approved fasteners are required. A minimum of two attachments are required at each component.
  - Ceiling-mounted air terminals or other services weighing less than or equal to 20 lb. shall have one (1) #12 gage slack safety wire attached from the terminal or service to the structure above.
  - Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 20 lb. but less than or equal to 56 lb. shall have two (2) #12 gage slack safety wires (at diagonal corners) connected from the terminal or service to the structure above.
  - Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 56 lb. shall be supported directly from the structure above by not less than four (4) taut #12 gage hanger wires attached from the terminal or service to the structure above or other approved hangers. The four (4) taut #12 gage wires or other approved hangers, including their attachment to the structure above, must be capable of supporting four (4) times the weight of the unit.
- 2.6.3 Other Devices within the Ceiling:
- All lightweight miscellaneous devices, such as strobe lights, occupancy sensors, speakers, exit signs, etc., shall be attached to the ceiling grid per Section 2.6.2 a) of this IR. In addition, devices weighing more than 10 lbs. shall have a #12 gage slack safety wire anchored to the structure above per Section 2.6.1 b) of this IR. Devices weighing more than 20 lbs. shall be supported from the structure above using details provided by the registered design professional (RDP).
3. ADDITIONAL REQUIREMENTS:
- 3.1 Pendant Mounted Light Fixtures:
- Where pendant mounted light fixtures are to be installed in areas with a suspended ceiling, the construction documents shall include complete support details complying with this IR and DSA IR 16-9.
  - Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two (2) times the weight of the fixture.
  - If a pendant mounted light fixture is directly and independently braced below the ceiling (i.e., aircraft cables to walls), then a brace assembly is not required above the ceiling.
  - If a pendant mounted light fixture is free to swing 45 degrees from vertical in all

- directions, and is not directly and independently braced below the ceiling, then a bracing assembly is only required where the pendant hanger penetrates the ceiling. Special details are required to attach the pendant hanger to the bracing assembly to transmit the horizontal and vertical forces. Exception: Where the weight of the fixture is less than 20 pounds, the vertical component of the brace force need not be considered so no compression strut/post is required.
- Rigid conduit shall not be used for attachment of the fixtures.
- Fire Rated Ceilings:
- Provide a detail and listing number for rated ceiling assemblies from an authorized testing agency. The components and installation details must conform in every respect with the listed detail and number. Details shall clearly depict all components, including insulation materials, framing and attachment of the design so that the assembly can be constructed and inspected accordingly.
  - Pop rivets, screws, or other attachments are not acceptable unless specifically detailed in the drawings and an approved listing by a State Fire Marshal (SFM) recognized laboratory.
- Acoustical Ceiling Tile Panel Installation
- For ceiling installations utilizing acoustical tile panels of mineral or glass fiber, it is not mandatory to provide 3/4" clearance between the acoustical tile panels and the wall on the sides of the ceiling which are free to slip.
- Other Panel Types:
- Panels weighing more than one-half (1/2) psf, other than mineral fiber and glass fiber acoustical tile, and all metal and wood panels shall be positively attached to the ceiling suspension runners by mechanical means, such as bolts, screws, or rivets, and each attachment shall have the allowable design strength to support 100 percent of the weight of the panel acting in any direction. A minimum of two attachments are required for each panel. For ceiling installations utilizing panels other than mineral or glass fiber, 3/4" clearance shall be provided between the ceiling panel and the wall on the sides of the ceiling area which are free to slip, unless otherwise justified by seismic qualification indicated below.
- The use of other types of attachment, such as clips, snap-in devices, perforated lips, clamping devices, or spring loaded devices or hooks, shall be listed per DSA IR A-5 and identified for use with the type of ceiling framing members and panels. The listing shall be seismically qualified in accordance with ASCE 7 Section 13.2.5 or 13.2.6.
- An alternate means of compliance per CAC 4-304 may be proposed and reviewed on a project by project basis when using unlisted means of attachment. The alternate means of attachment shall have the allowable design strength to support 100 percent of the weight of the panel acting in any direction and shall be capable of maintaining that strength if the ceiling grid is distorted or out of level.
- It is also alternately permitted to provide a secondary means of connecting the panel to the grid or structure to retain the panel in case of panel dropout, ceiling grid distortion, and ceiling grid becoming out-of-level. The secondary attachment shall have the allowable design strength to support two (2) times the weight of the panel acting in any direction, such as a slack wire or cable.
- Special attachment details complying with one of the methods outlined above, such as screws or cables, shall be provided at the perimeter of the ceiling, where panels are cut or altered, or where non-standard panel sizes or edge conditions occur.

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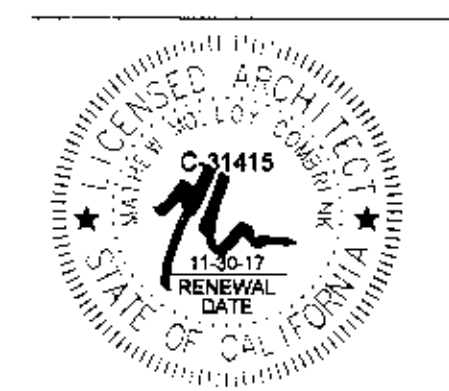
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CONSTRUCTION DOCUMENTS

INTERIOR DETAILS - CEILING

A9.3

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1. CEILING SYSTEM GENERAL NOTES:

- Ceiling system components shall comply with ASTM C635-07 and Section 5.1 of ASTM E580-10a.
- The ceiling grid system must be rated heavy duty as defined by ASTM C635-08.
- Ceiling systems. The following ceiling system(s) is/are part of the scope of this project: **[For each system used, the RDP shall indicate in the construction documents, the information that follows]**  
 Manufacturer's Name \_\_\_\_\_  
 Product Evaluation Report Type and Number \_\_\_\_\_  
 Manufacturer's Model - main runner \_\_\_\_\_  
 Manufacturer's catalog number - cross runner \_\_\_\_\_
- Seismic Wall Clip: **[RDP to specify if used]**  
 Manufacturer's Model \_\_\_\_\_
- Ceiling panels shall not support any light fixtures, air terminals or devices.
- For ceiling installations utilizing acoustical tile panels of mineral or glass fiber, it is not mandatory to provide 3/4" clearance between the acoustical tile panels and the wall on the sides of the ceiling which are free to slip. For all other ceiling panel types, provide 3/4" clearance between the ceiling panel and the wall on the sides of the ceiling free to slip.

2. MATERIALS:

- Ceiling wire shall be Class 1 zinc coated (galvanized) carbon steel conforming to ASTM A641-09a. Wire shall be #12 gage (0.106" diameter) with soft temper and minimum tensile strength = 70 ksi.
- Galvanized sheet steel (including that used for metal stud and track compression struts/posts) shall conform to ASTM A653-11, or other equivalent sheet steel listed in Section A2.1 of the North American Specification for the Design of Cold-Formed Steel Structural Members 2007, including supplement 2 dated 2010 (AISI S100-07/S2-10). Material 43 mil (18 gage) and lighter shall have minimum yield strength of 33 ksi. Material 54 mil (16 gage) and heavier shall have a minimum yield strength of 50 ksi.
- Electrical metallic tube (EMT) shall be ANSI C80.3/UL 797 carbon steel with G90 galvanizing. EMT shall have minimum yield strength ( $F_y$ ) of 30 ksi and minimum ultimate strength ( $F_u$ ) of 48 ksi.

Basis Document: DSA IR 25-2.13	Sheet No.: 1.00
Sheet Title: Ceiling Notes	rev. 09-21-15

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 3 of 51

3. ATTACHMENT OF HANGER AND BRACING WIRES:

- Separate all ceiling hanger and bracing wires at least six (6) inches from all unbraced ducts, pipes, conduit, etc.
- Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment.
- Hanger wires that are more than one (horizontal) in six (vertical) out of plumb shall have counter-sloping wires.
- Slack safety wires shall be considered hanger wires for installation and testing requirements.
- Hanger and bracing wire anchorage to the structure shall be installed in such a manner that the direction of the anchorage aligns closely with the direction of the wire. (e.g. bracing wire ceiling clips must be bent as shown in the details and rotated as required to align closely with the direction of the wire, screw eyes in wood must be installed so they align closely with the direction of the wire, etc.)

4. FASTENERS AND WELDING:

- Sheet metal screws shall comply with ASTM C1513-10, ASME B18.6.4-89 (R2005). Penetration of screws through joined material shall not be less than three exposed threads.
- Expansion anchors shall be: **[RDP to indicate manufacturer, product, evaluation report number and load for each size specified per CBC 1913A.7.2.]**
- Power-Actuated Fasteners shall be: **[RDP to indicate manufacturer, product, evaluation report number.]**
- If not otherwise specified in the evaluation report, power-actuated fasteners installed in steel shall be installed so the entire pointed end of the fastener is driven through the steel member.
- Power-actuated fasteners in concrete are not permitted for bracing wires.
- Concrete reinforcement and prestressing tendons shall be located by non-destructive means prior to installing post - installed anchor.
- Welding shall be in accordance with AWS D1.3 using E60XX series electrodes.

5. TESTING: All field testing must be performed in the presence of the project inspector.

- Post-installed anchors in concrete used to support hanger wires shall be tested at a frequency of 10 percent. Power actuated fasteners in concrete shall be field tested for 200 lbs. in tension. All other post-installed anchors in concrete shall be tested in accordance with CBC Section 1913A.7.
- Post-installed anchors in concrete used to attach bracing wires shall be tested at a frequency of 50 percent in accordance with CBC Section 1913A.7.

Basis Document: DSA IR 25-2.13	Sheet No.: 1.01
Sheet Title: Ceiling Notes	rev. 09-21-15

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 4 of 51

6. LIGHT FIXTURES:

- All light fixtures shall be positively attached to the ceiling suspension systems by mechanical means to resist a horizontal force equal to the weight of the fixture. A minimum of two screws or approved fasteners are required at each light fixture, per ASTM E580, Section 5.3.1.
- Surface-mounted light fixtures shall be attached to the main runner with at least two positive clamping devices. The clamping device shall completely surround the supporting ceiling runner and be made of steel with a minimum thickness of #14 gage. Rotational spring catches do not comply. A #12 gage slack safety wire shall be connected from each clamping device to the structure above. Provide additional supports when light fixtures are eight (8) feet or longer or exceed 56 lb. Maximum spacing between supports shall not exceed eight (8) feet.
- Light fixtures weighing less than or equal to 10 lb. shall have a minimum of one (1) #12 gage slack safety wire connected from the fixture housing to the structure above.
- Light fixtures weighing less than or equal to 10 lb. shall have a minimum of one (1) #12 gage slack safety wire connected from the fixture housing to the structure above.
- Light fixtures weighing greater than 10 lb. but less than or equal to 56 lbs. may be supported directly on the ceiling runners, but they shall have a minimum of two (2) #12 gage slack safety wires connected from the fixture housing at diagonal corners to the structure above.  
 Exception: All light fixtures greater than two by four feet weighing less than 56 lbs. shall have a #12 gage slack safety wire at each corner.
- All light fixtures weighing greater than 56 lb. shall be independently supported by not less than four (4) taut #12 gage hanger wires (one at each corner) attached from the fixture housing to the structure above or other approved hangers. The four (4) taut #12 gage wires or other approved hangers, including their attachment to the structure above, shall be capable of supporting four (4) times the weight of the fixture.

7. SERVICES WITHIN THE CEILING:

- All flexible sprinkler hose fitting mounting brackets, ceiling-mounted air terminals or other services shall be positively attached to the ceiling suspension systems by mechanical means. Screws or approved fasteners are required. A minimum of two attachments are required at each component.
- Ceiling-mounted air terminals or other services weighing less than or equal to 20 lb. shall have one (1) #12 gage slack safety wire attached from the terminal or service to the structure above.
- Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 20 lb. but less than or equal to 56 lb. shall have two (2) #12 gage slack safety wires (at diagonal corners) connected from the terminal or service to the structure above.
- Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 56 lb. shall be supported directly from the structure above by not less than four (4) taut #12 gage hanger wires attached from the terminal or service to the structure above or other approved hangers.

Basis Document: DSA IR 25-2.13	Sheet No.: 1.02
Sheet Title: Ceiling Notes	rev. 09-21-15

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 5 of 51

8. OTHER DEVICES WITHIN THE CEILING:

- All lightweight miscellaneous devices, such as strobe lights, occupancy sensors, speakers, exit signs, etc., shall be attached to the ceiling grid. In addition, devices weighing more than 10 lbs. shall have a #12 gage slack safety wire anchored to the structure above. Devices weighing more than 20 lb. shall be supported independently from the structure above.

Basis Document: DSA IR 25-2.13	Sheet No.: 1.03
Sheet Title: Ceiling Notes	rev. 09-21-15

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 6 of 51





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**HANGER WIRE**  
FOR CONNECTION TO STRUCTURE SEE CONNECTION MATRIX ON 4.11  
3 TURNS @ HANGER WIRE TYPICAL @ EACH END  
#12 GAGE WIRE

**BRACING WIRE**  
FOR CONNECTION TO STRUCTURE SEE CONNECTION MATRIX ON 4.11  
4 TURNS @ BRACE WIRES TYP. @ EACH END  
10' TO 45'  
#12 GAGE WIRE

Basis Document	DSA IR 25-2.13	Sheet No.	
Sheet Title	HANGER AND BRACING WIRE CONNECTION - TYPICAL WIRE TURNS	rev	09-21-15
			4.10

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 22 of 51

9/14/2015 2:16:05 PM

STRUCTURAL CONDITION OF FLOOR/ ROOF ABOVE SUSPENDED CEILING	APPLICABLE HANGER WIRE DETAIL	APPLICABLE BRACING WIRE DETAIL
METAL DECK	4.20	4.30
CONCRETE OVER METAL DECK	4.21	4.31
CONCRETE SLAB, BEAM, OR JOIST	4.22	4.32
STRUCTURAL STEEL	4.23	4.33
METAL STUD WALL	4.24	4.34
SAWN TIMBER	4.25, 4.29	4.35
WOOD JOIST	4.26	4.36, 4.37
WOOD CHORD TRUSS	4.27, 4.28	4.38, 4.29
OPEN WEB STEEL JOIST	4.28, 4.29	4.39, 4.29

Basis Document	DSA IR 25-2.13	Sheet No.	
Sheet Title	HANGER AND BRACING WIRE CONNECTION MATRIX	rev	09-21-15
			4.11

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 23 of 51

9/14/2015 2:16:05 PM

2x MIN. PENETRATION  
1/4" DIA. CLOSED EYE SCREW  
4.10 TYP.

THREE 1-1/2" X 9 GA. STAPLES OR 3-STRONGHOLD "J" NAILS AT EACH WIRE LOOP

1/4" DIA. DRILLED HOLE  
2" MIN.  
1" MIN.  
JOIST OR RAFTER  
4.29  
HANGER WIRE

NOTE:  
(1) WHEN FIRE RATED GYP. BOARD IS INSTALLED ON THE BOTTOM FLANGES, USE SCREW EYES W/ SUFFICIENT LENGTH TO AVOID DAMAGING THE FIRE RATED GYP. BOARD AND MEET MIN. PENETRATION.

Basis Document	DSA IR 25-2.13	Sheet No.	
Sheet Title	HANGER WIRE CONNECTION TO SAWN TIMBER	rev	09-21-15
			4.25

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 29 of 51

9/14/2015 2:16:06 PM

#12 GAGE HANGER WIRES (3) TIGHT TURNS WITHIN 3" AT BRACE WIRE PROVIDE (4) TIGHT TURNS WITHIN 1-1/2"

SADDLE TIE REQUIRED FOR ALL WIDTHS GREATER THAN 1/4"

MAIN CHANNEL SHOWN (WOOD FRAMING SIMILAR)

SADDLE TIE HAS DOUBLE LOOP AT SUPPORT

WHEN MULTIPLE SADDLE TIES ARE REQUIRED THEY SHALL ALTERNATE BACK AND FORTH TO PREVENT TWISTING

**TYPICAL SADDLE TIE DETAIL**  
HANGER WIRE CONDITION SHOWN. BRACE WIRE CONDITION SIMILAR

Basis Document	DSA IR 25-2.13	Sheet No.	
Sheet Title	TYPICAL SADDLE TIE DETAIL	rev	09-21-15
			4.29

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 33 of 51

9/14/2015 2:16:06 PM

BLOCKING FASTEN TO JOIST w/ 1-1/2" X 1-1/2" X 18 GA. CLIP AND (4) 8d X 1-1/2" NAILS EACH SIDE AND EACH END

1-1/2" MIN. PENETRATION

1/4" DIA. SCREW EYE w/ FULL THREAD EMBEDMENT (1-1/2" MIN.) INSTALL IN DIRECTION OF WIRE

1/4" DIA. CLOSED SCREW EYE. INSTALL IN THE DIRECTION OF THE BRACE WIRE

3" MAX.

JOIST OR RAFTER  
BRACING WIRE

4.10

THREE 1-1/2" X 9 GA. STAPLES OR 3-STRONGHOLD "J" NAILS AT EACH WIRE LOOP

THREE 1-1/2" X 9 GA. STAPLES OR 3-STRONGHOLD "J" NAILS AT EACH WIRE LOOP

2X BLKG w/ 2-16d COMMON NAILS AT EACH END

BRACING WIRE

1" MIN.  
JOIST OR RAFTER

BRACING WIRE

Basis Document	DSA IR 25-2.13	Sheet No.	
Sheet Title	BRACING WIRE CONNECTION TO SAWN TIMBER	rev	09-21-15
			4.35

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 39 of 51

9/14/2015 2:16:08 PM

1 3/8" EQ. EQ.  
FASTEN STRUT TO 2x4 IN LIEU OF RAFTER/ JOIST

(4) 1/4" DIA. LAG SCREWS

1-1/2" MIN. PENETRATION

1/4" DIA. LAG SCREW IN CENTER OF JOIST, TYP.

CUT FLANGES AND BEND

CONNECT USING OPTION 2 ON THIS SHEET

2x4 FLAT STRUT

1-1/2" MIN. PENETRATION

1/4" DIA. LAG SCREW

1/4" DIA. LAG SCREW IN CENTER OF JOIST, TYP.

1-1/2" MIN. PENETRATION

(2) #10 S.M.S.

1-1/2" X 1-1/2" X 1-1/2" 12GA. BEARING PLATE MIN.

1-1/2" X 1-1/2" 10GA X 2" CLIP (SEE NOTE 2)

1-1/2" X 1-1/2" 10GA X 2" CLIP (SEE NOTE 2)

1/4" DIA. CLOSED EYE SCREW WIRE WITHIN

**OPTION 1 OPTION 2 OPTION 3**  
**CHANNEL STRUT**

**OPTION 1 OPTION 2 OPTION 3**  
**TUBE STRUT**

NOTES:  
1. WEB OF CHANNEL TO BEAR WITHIN WIDTH OF WOOD MEMBER.  
2. VERTICAL LEG OF MEMBER TO FALL WITHIN THE WIDTH OF THE WOOD MEMBER.  
3. SEE PAGE 5.50 FOR ADDITIONAL INFORMATION.

Basis Document	DSA IR 25-2.13	Sheet No.	
Sheet Title	STRUT CONNECTION TO SAWN TIMBER WITHOUT GYPSUM BOARD	rev	09-21-15
			5.60

DSA IR 25-2.13 - Appendix A (rev 04/20/17) 50 of 51

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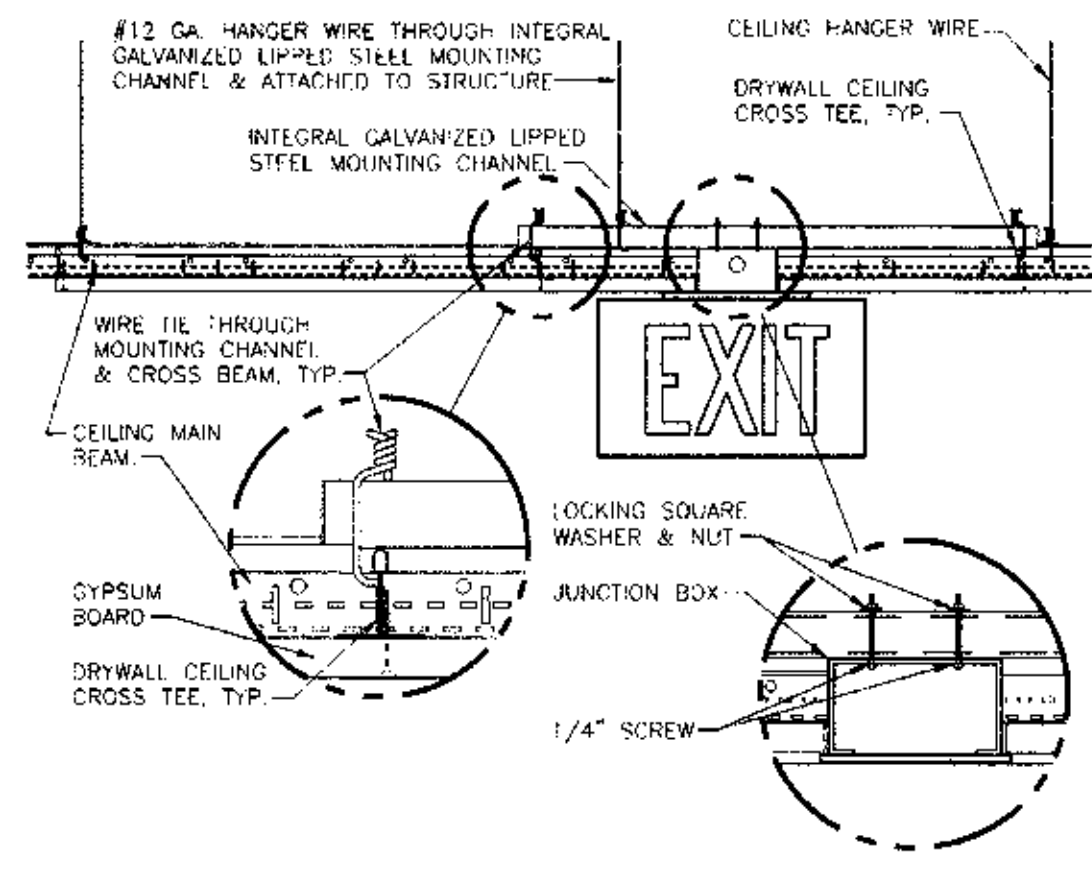
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CONSTRUCTION DOCUMENTS

INTERIOR DETAILS - CEILING

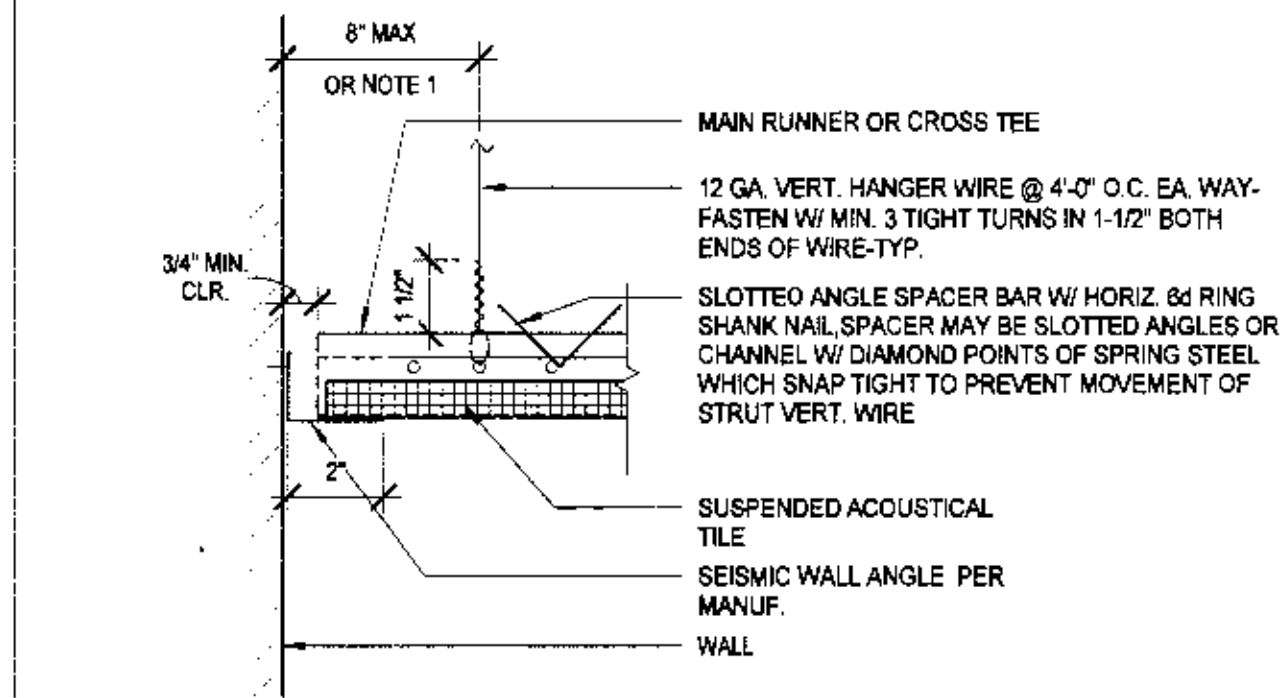
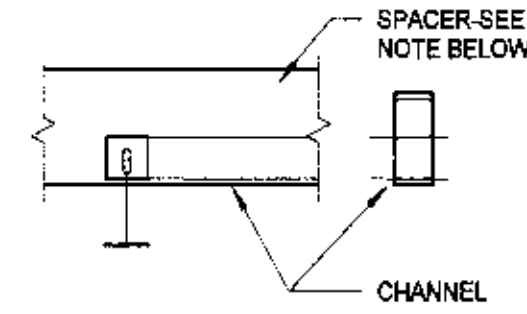
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8 TYP. EXIT SIGN MOUNTING ON SUSP. CLNG.

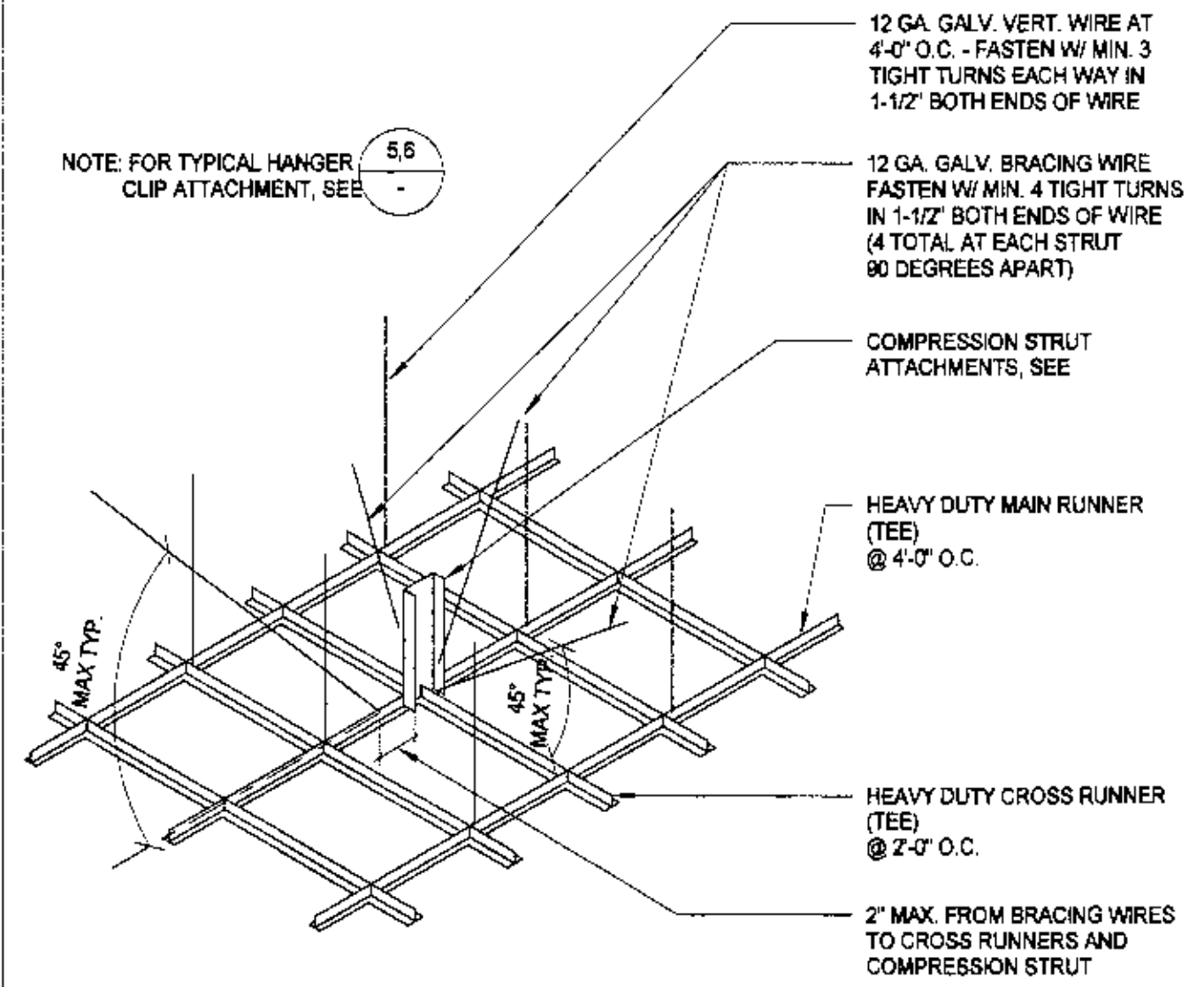
1 1/2" = 1'-0"

NOTES:  
1. 1/4 OF THE LENGTH OF THE END RUNNER WHICHEVER IS LESS.  
2. NAILS AT END OF HORIZONTAL STRUTS ARE TO BE PLACED WITH NAILHEAD TOWARD CENTERLINE OF SPAN OF STRUTS.  
3. CEILING GRID MEMBERS MAY BE ATTACHED TO NOT MORE THAN TWO ADJACENT WALLS.



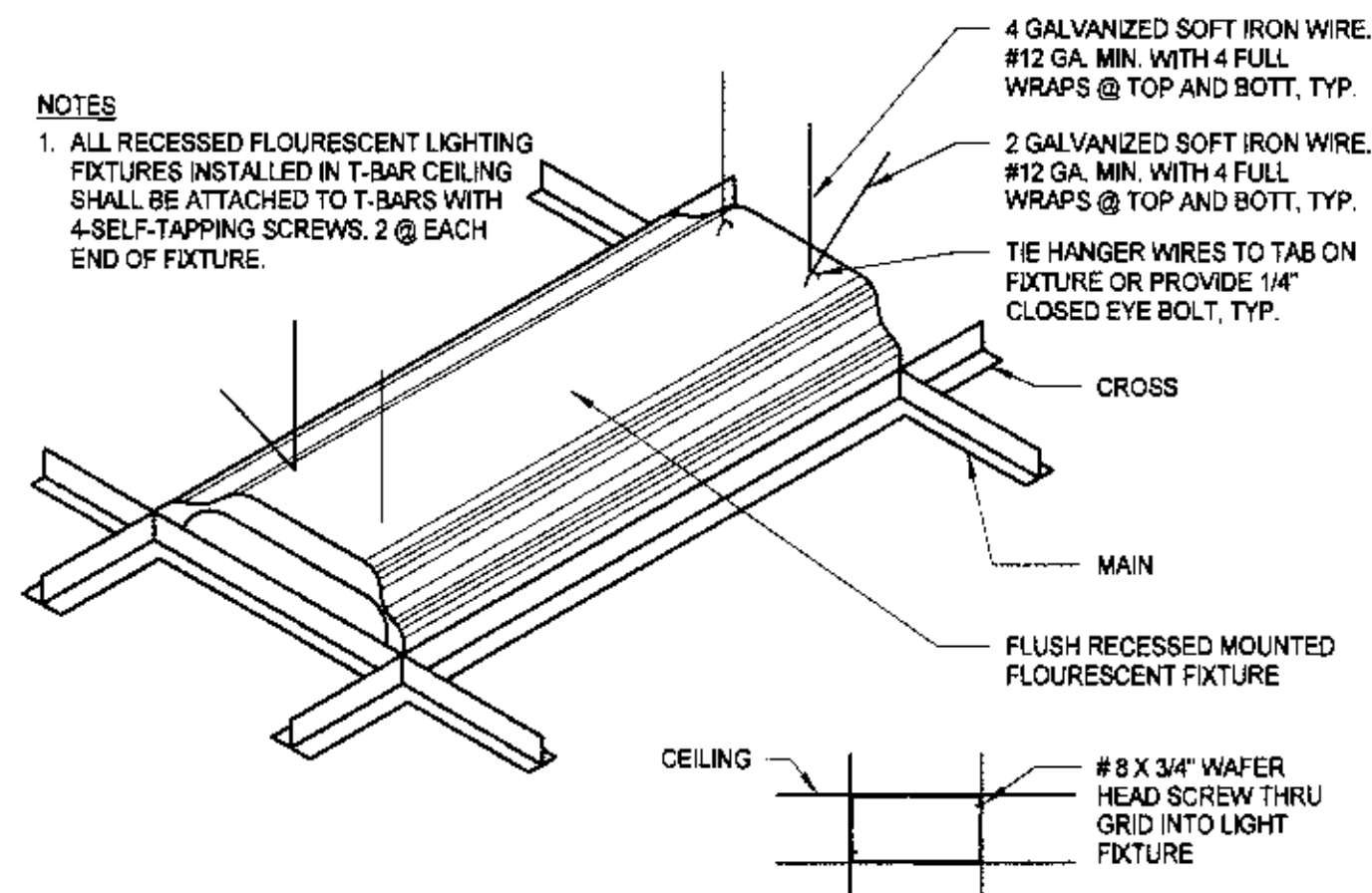
5 TYP. SUSP. ACOUS. CLG. WALL ATTACHMENT 1

3" = 1'-0"



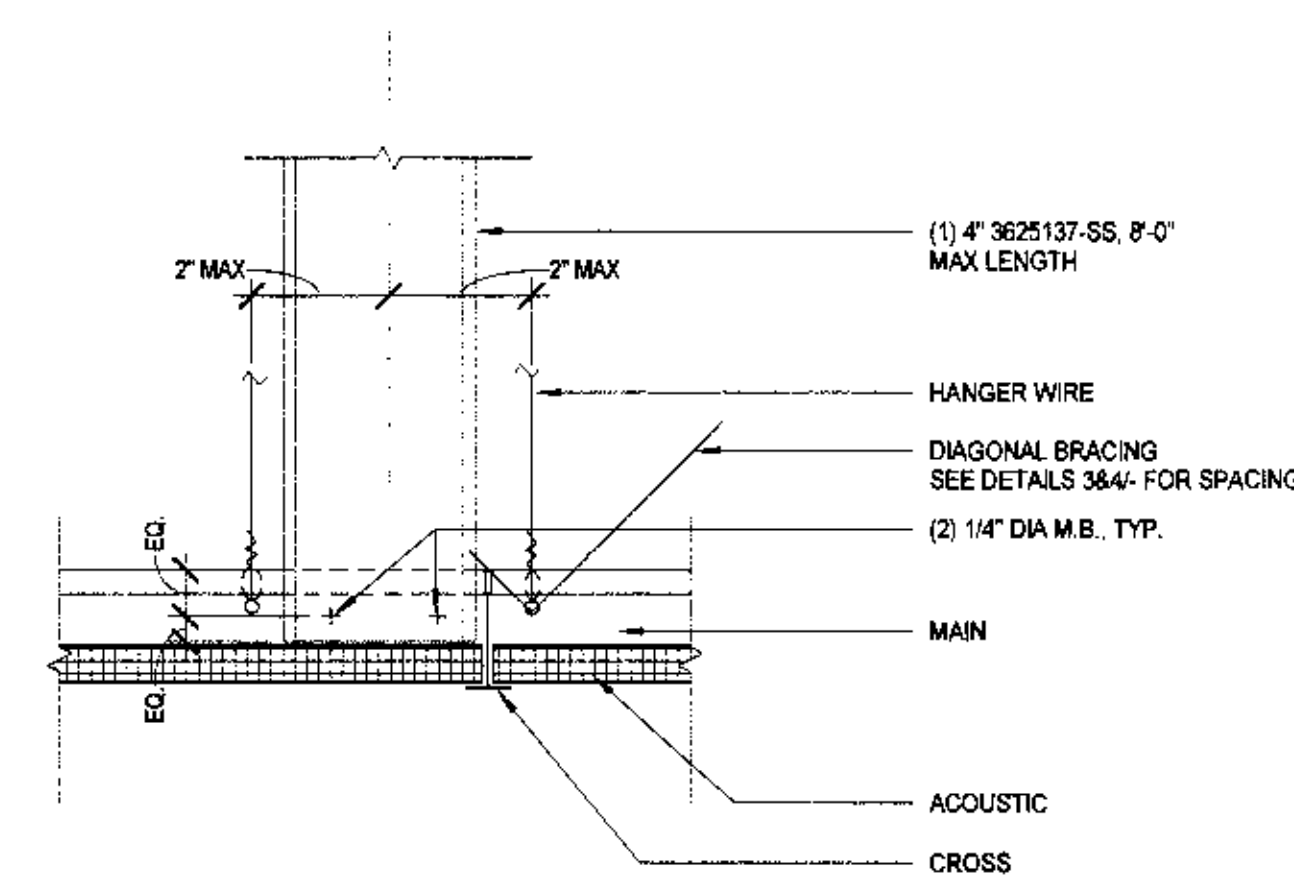
2 TYP. SUSP. ACOUS. CLG. DIAGONAL BRACING 3D1

1:3



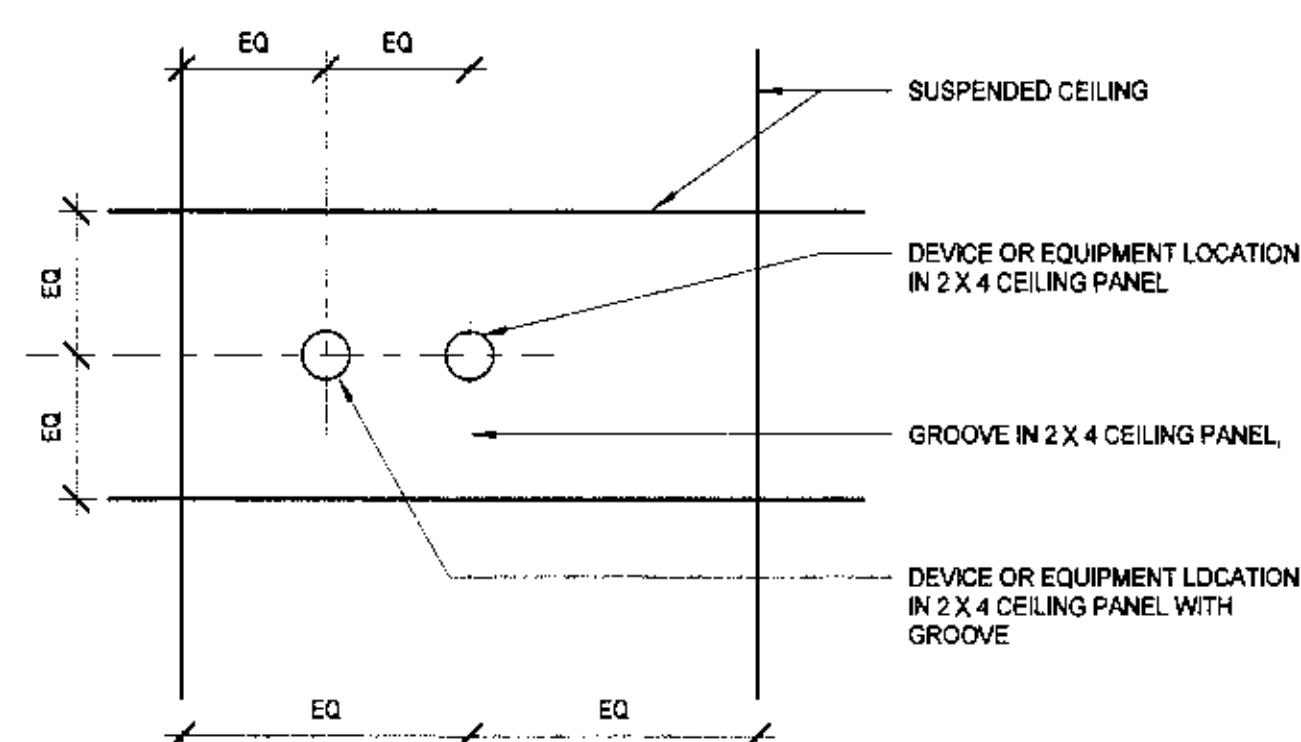
7 TYP. SUSPENDED LIGHT FIXTURE 1

3/4" = 1'-0"



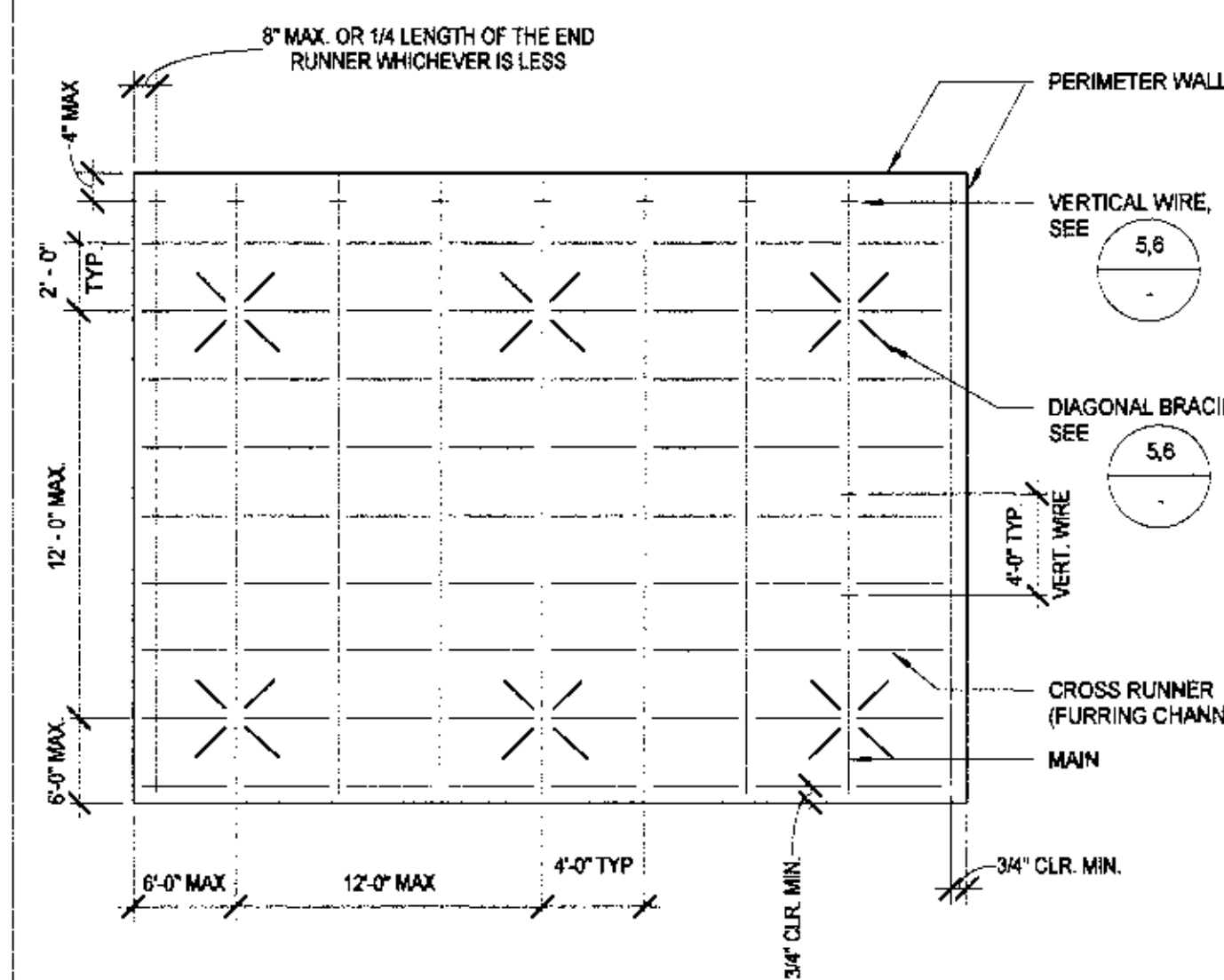
4 TYP. COMPRESSION STRUT @ SUSP. CLG. 1

3" = 1'-0"



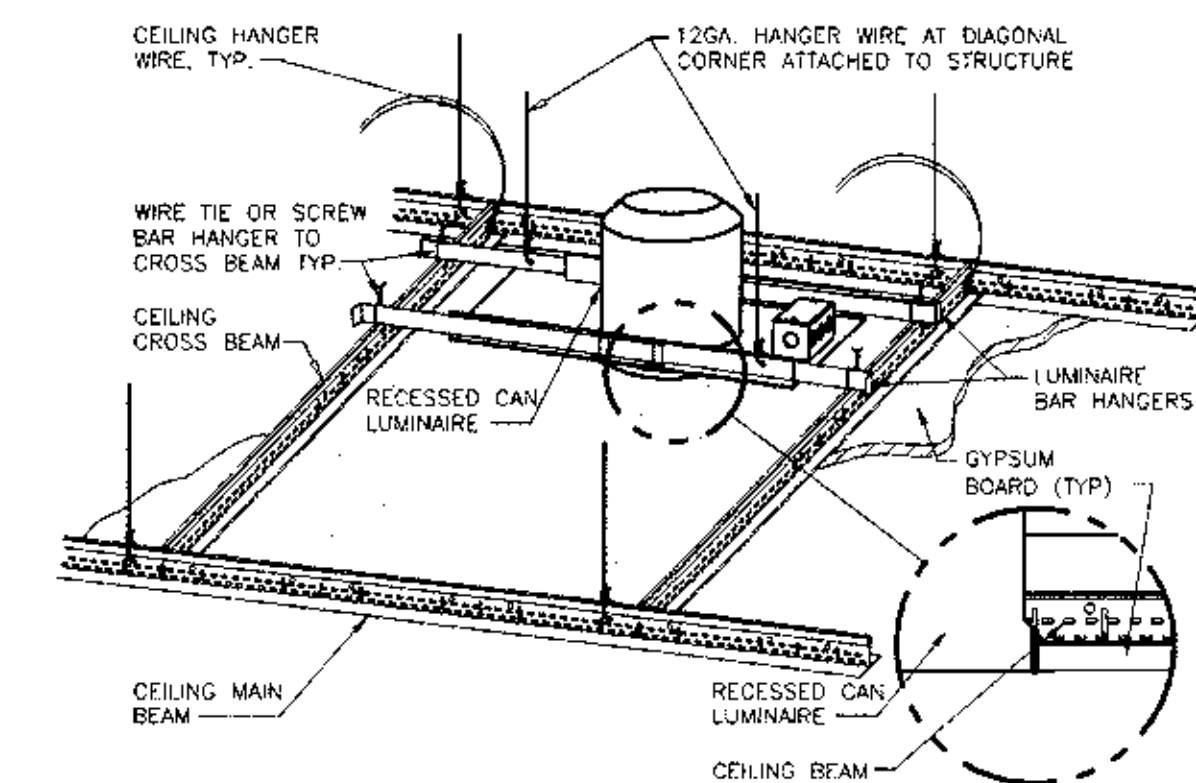
6 TYP. DEVICE LOCATION @ ACOUS. CLG. 1

3/4" = 1'-0"



3 TYP. SUSP. ACOUS. CLG. DIAG. BRACING PLAN 1

1:60



1 TYP. DOWNLIGHT MOUNTING @ SUSP. CLNG.

1 1/2" = 1'-0"

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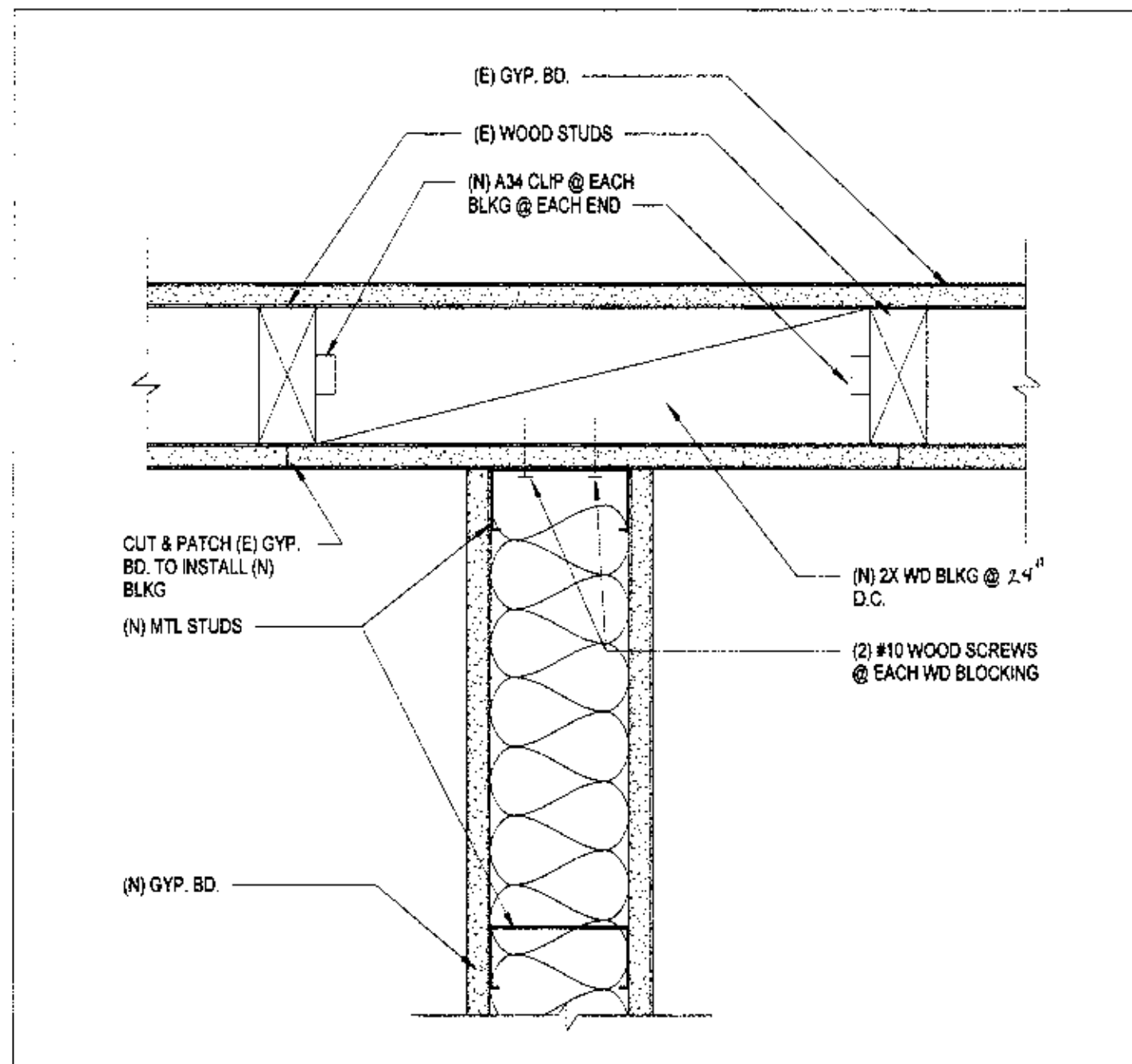
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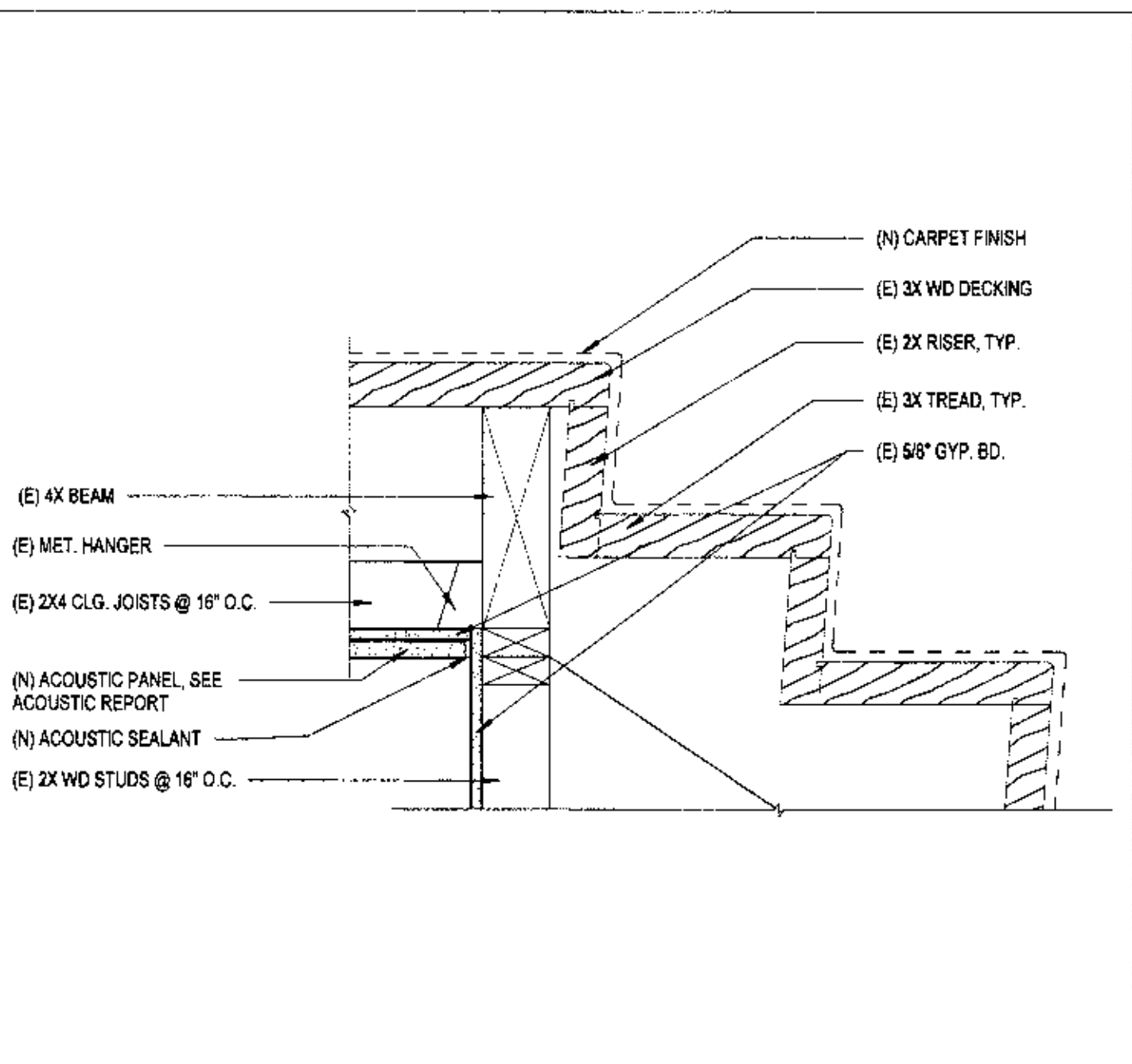
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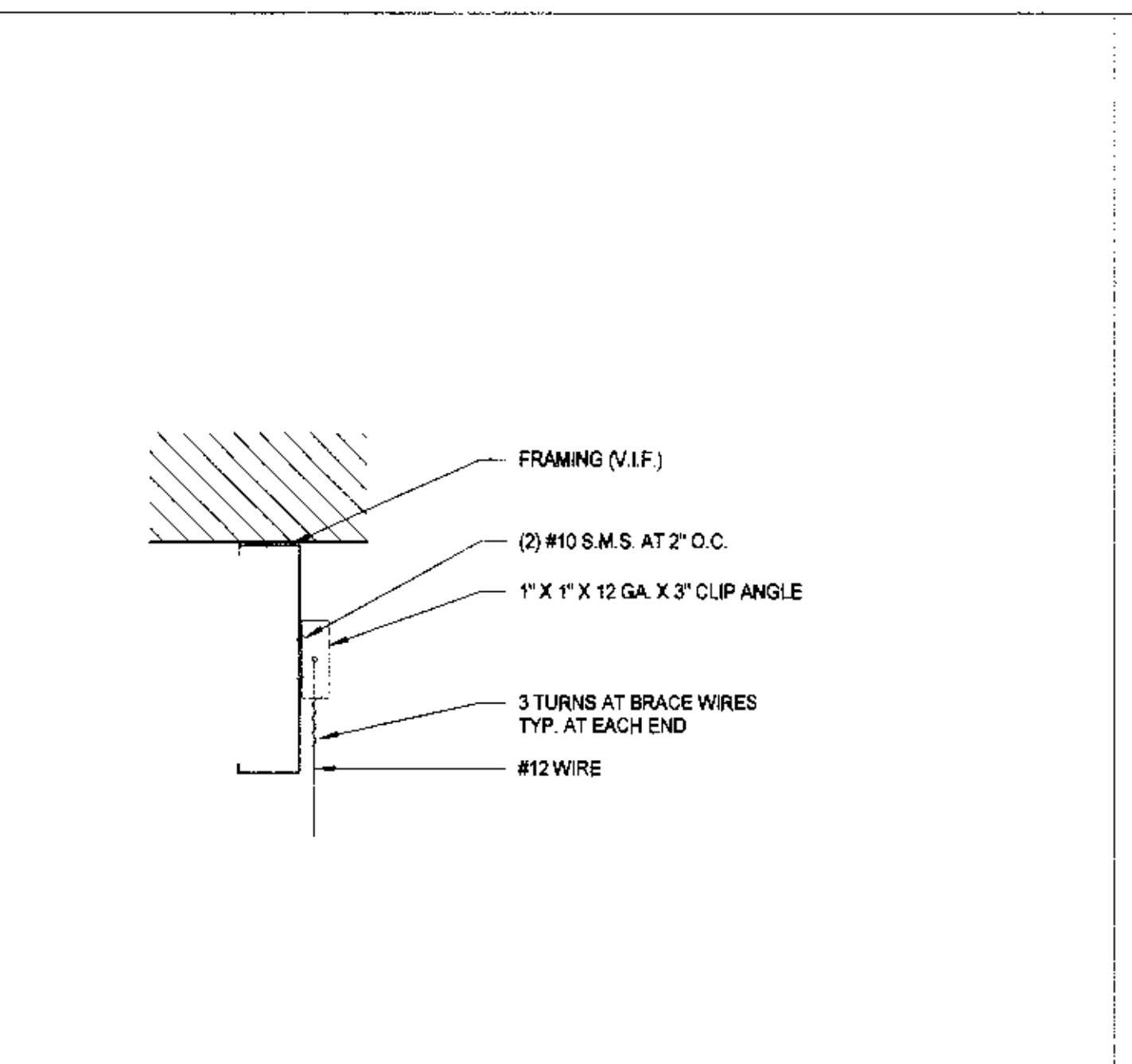
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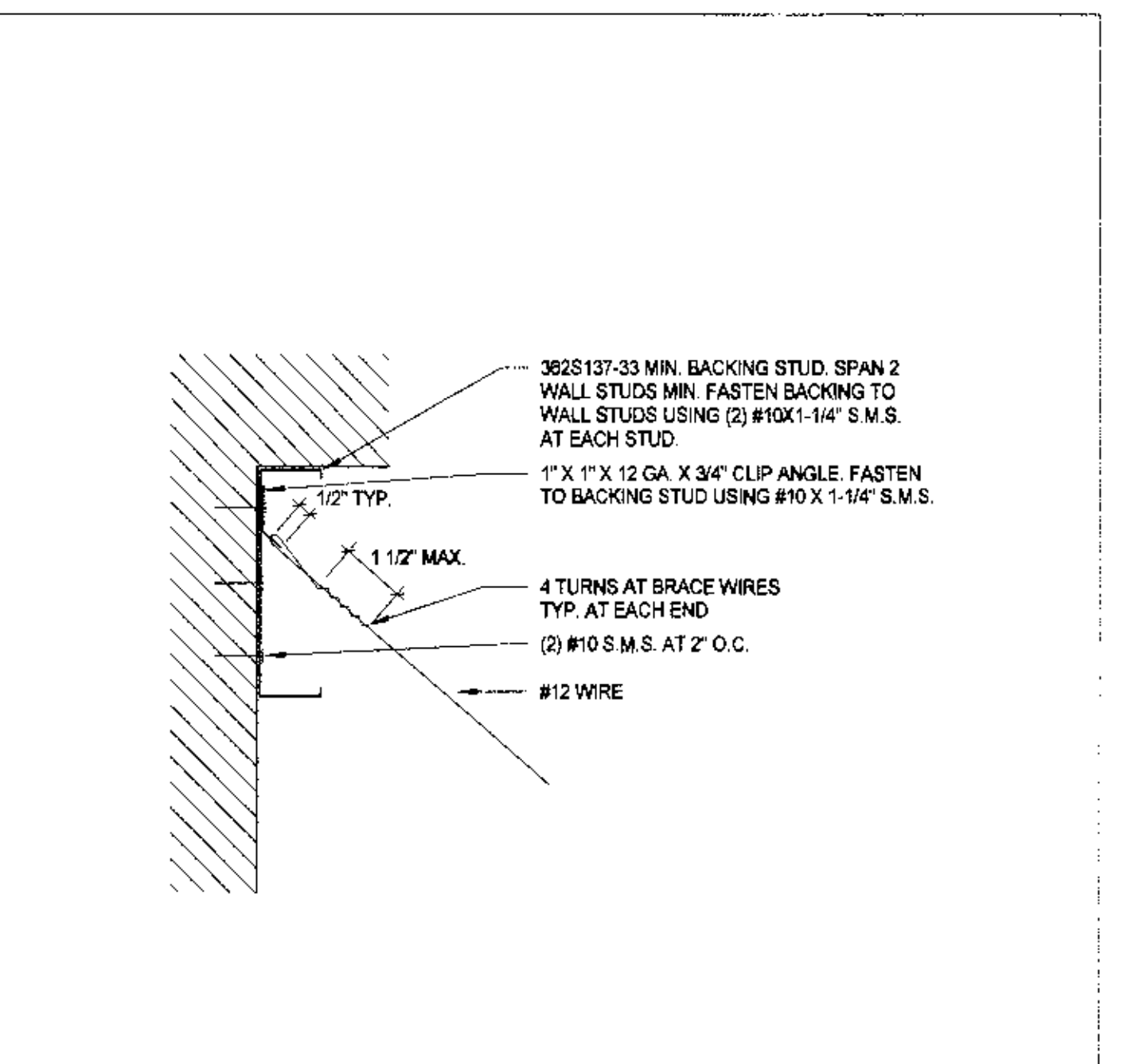
12 WALL INTERSECTION @ (E) ELEVATOR WALL 3" = 1'-0"



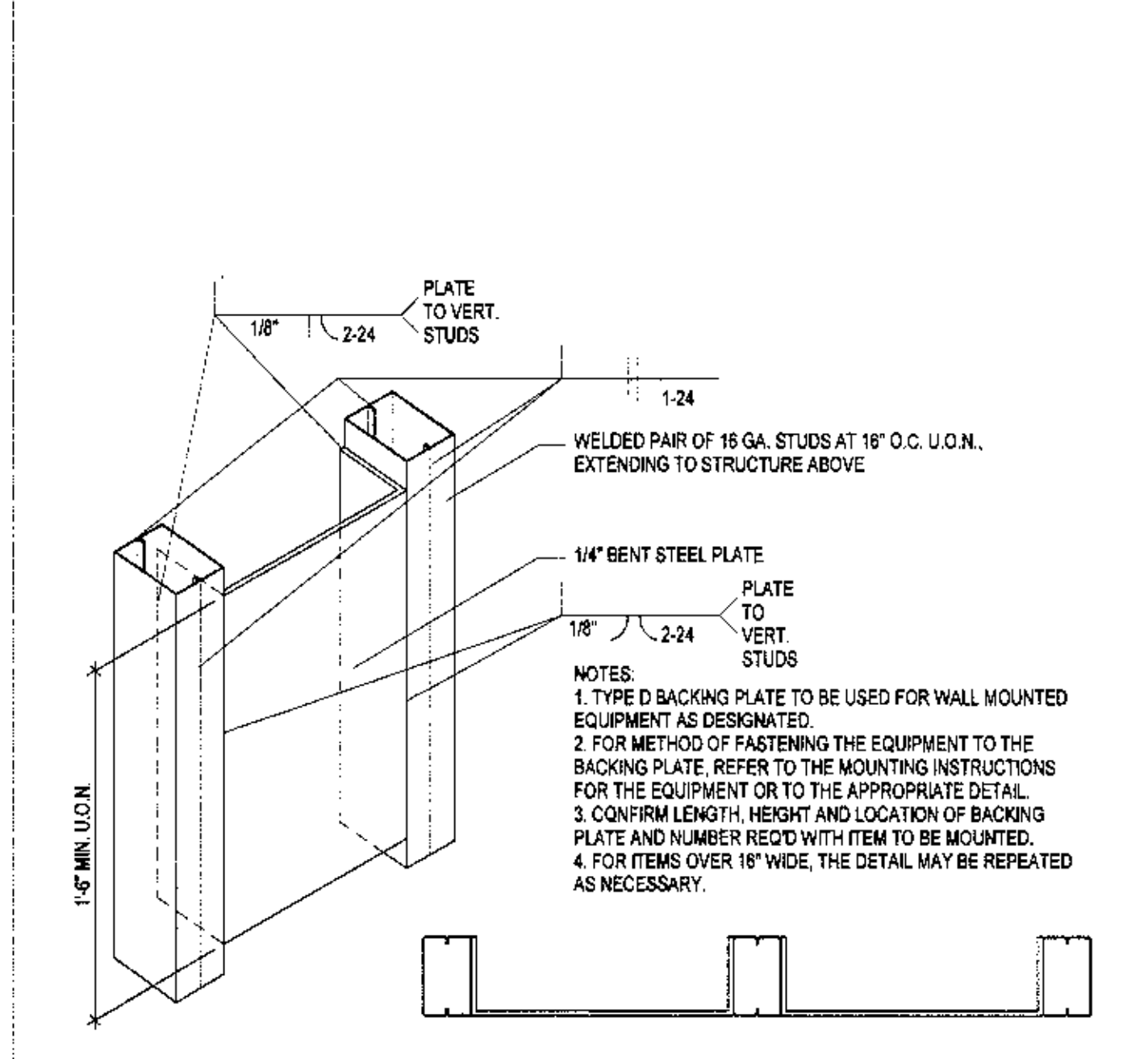
9 STAIR LANDING ACOUSTICAL DTL 1 1/2" = 1'-0"



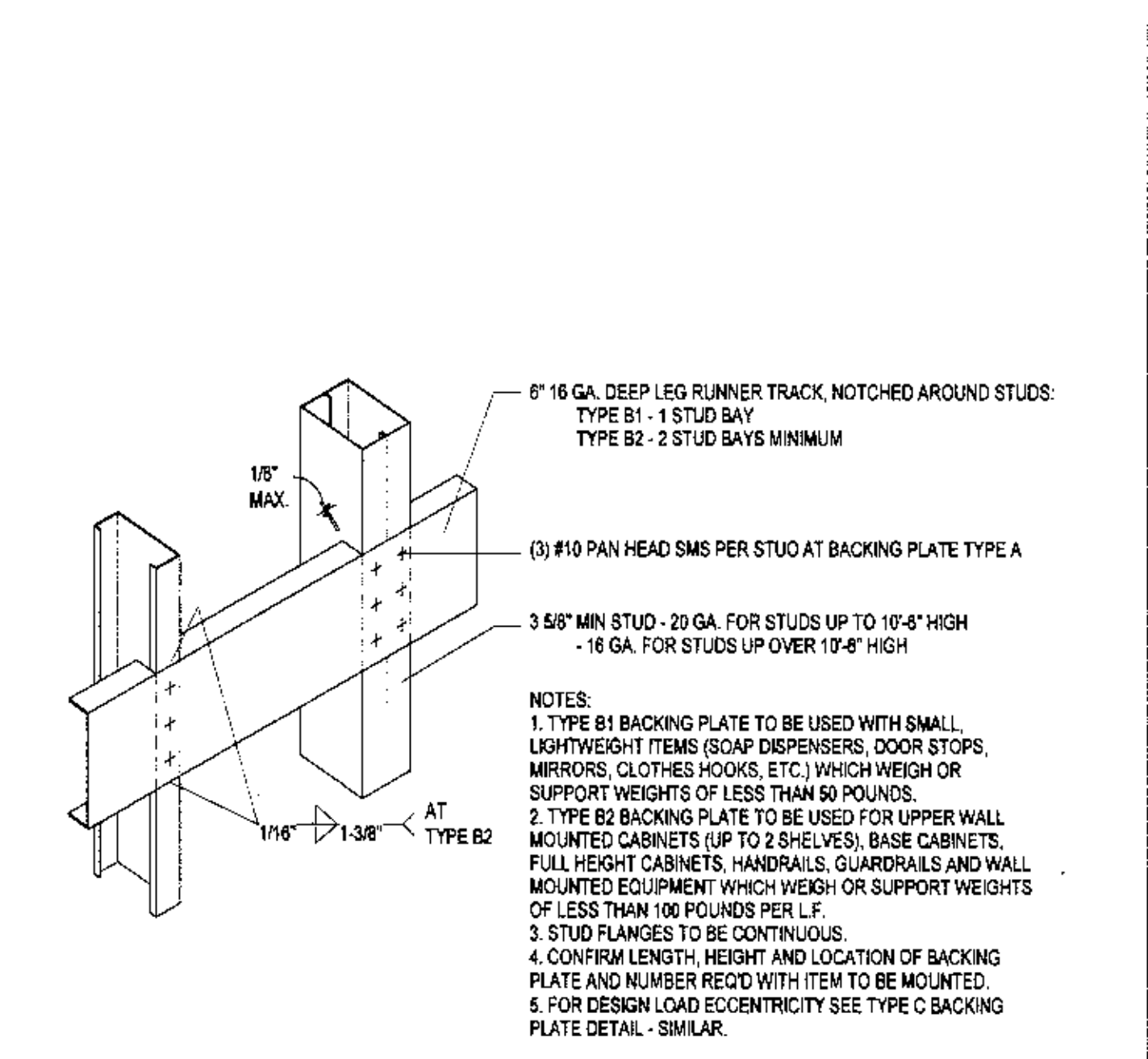
6 SECTION DETAIL - CEILING HANGER WIRE 3" = 1'-0"



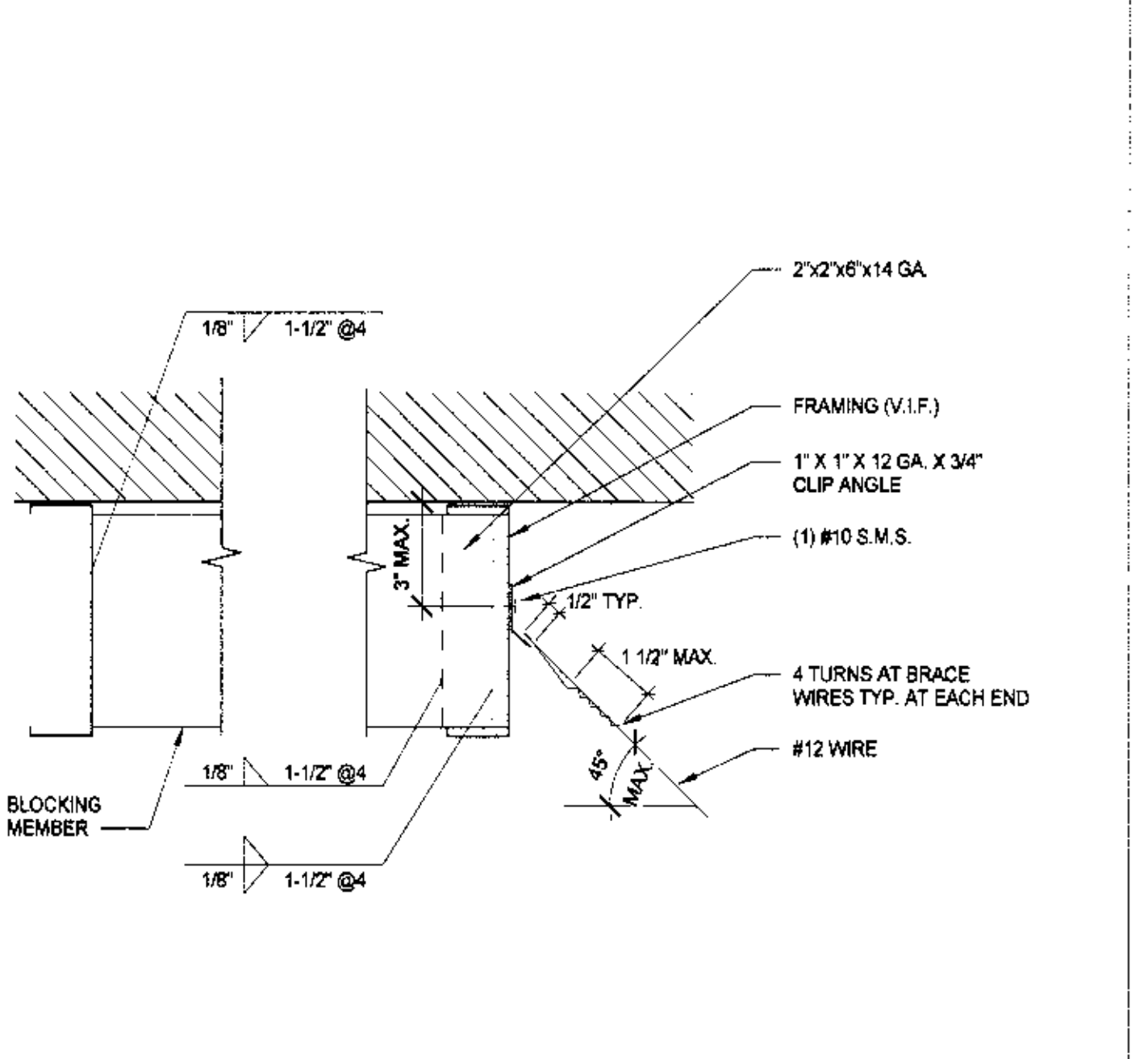
3 SECTION DETAIL - CEILING BRACING WIRE CONNECTION 1 3" = 1'-0"



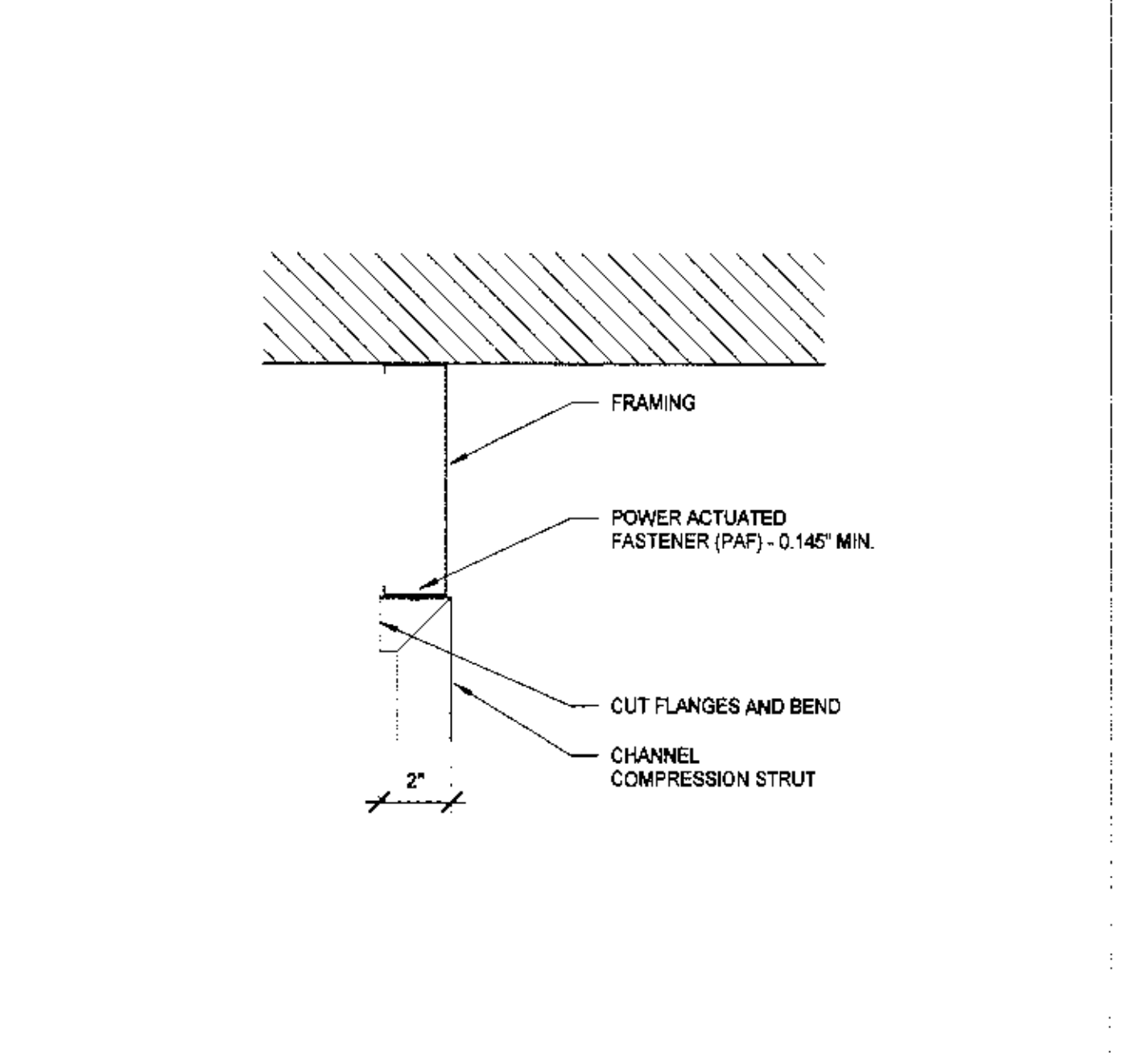
D BACKING PLATE TYPE D 1 1/2" = 1'-0"



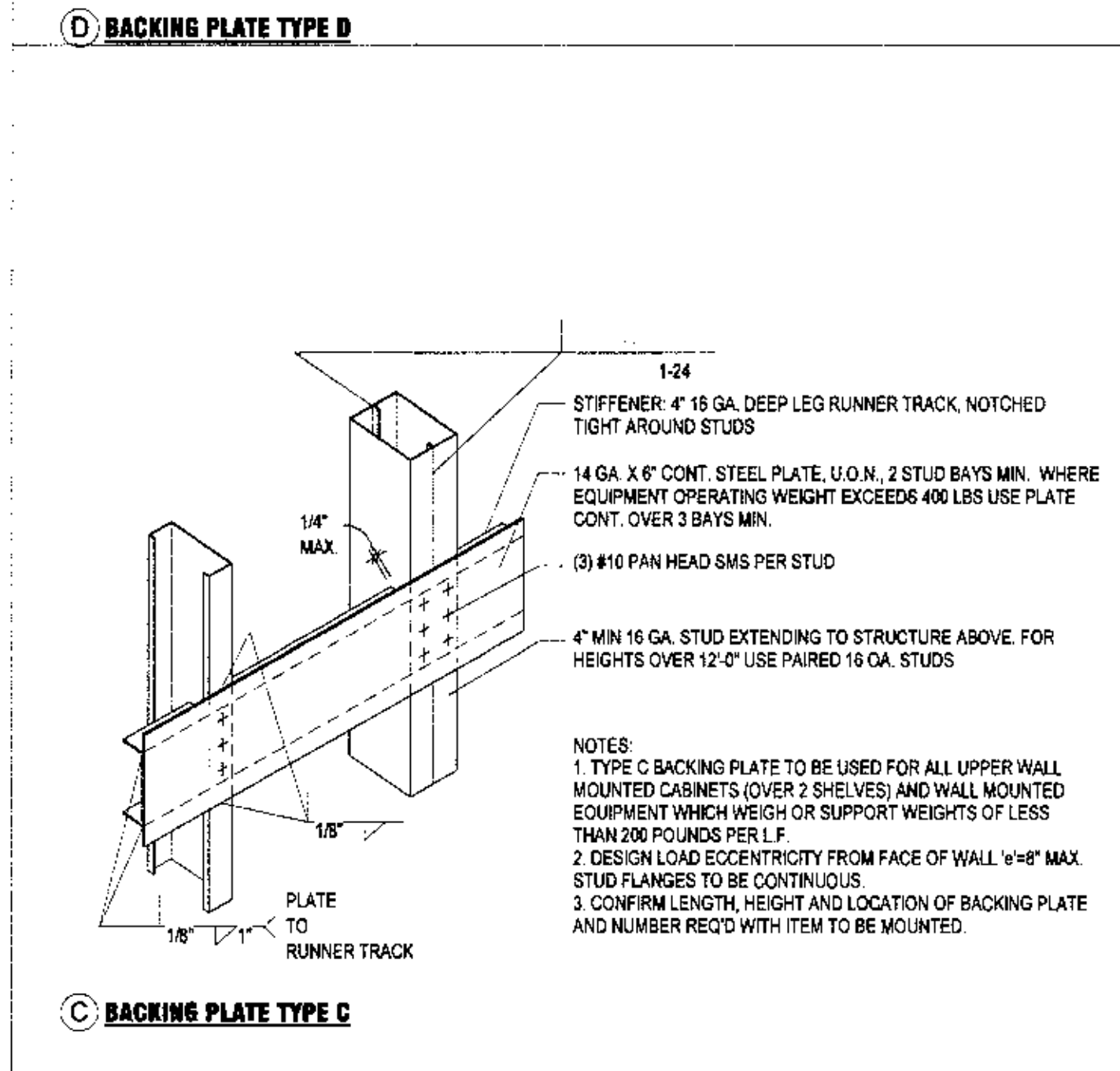
B BACKING PLATE TYPE B 1 1/2" = 1'-0"



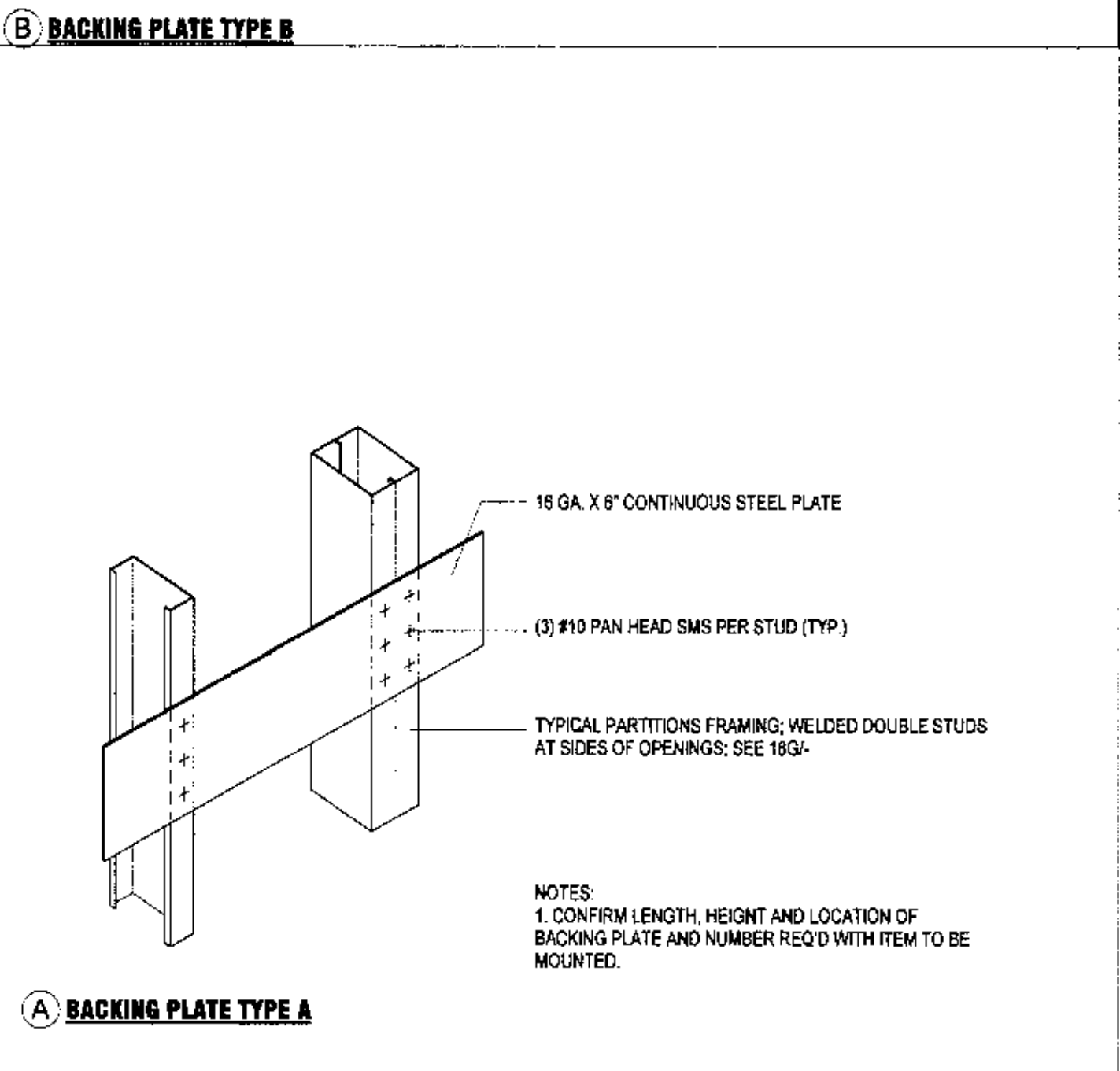
5 SECTION DETAIL - CEILING BRACING WIRE CONNECTION 2 3" = 1'-0"



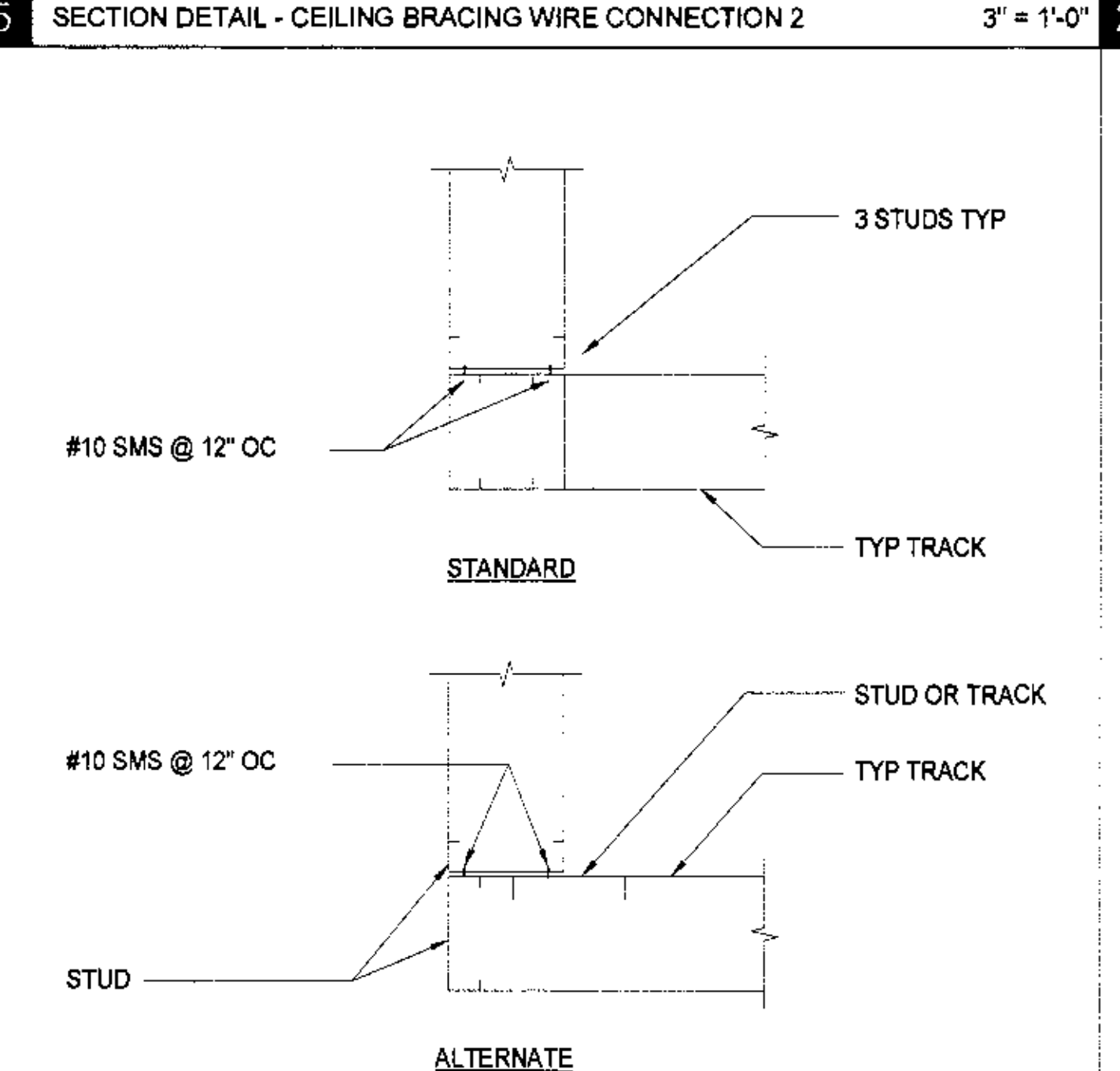
2 SECTION DETAIL - CEILING BRACING STRUT 2 3" = 1'-0"



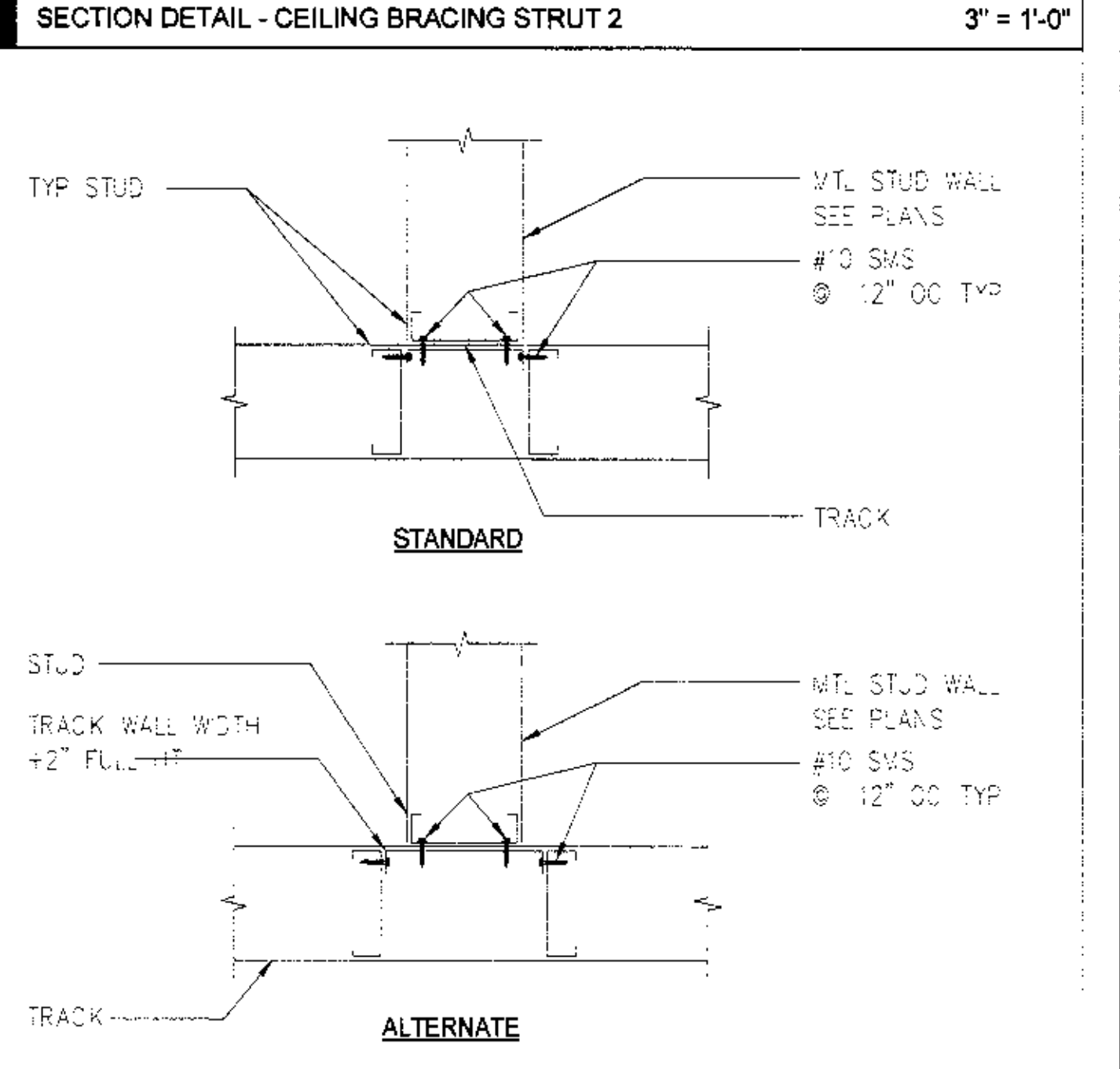
C BACKING PLATE TYPE C 1 1/2" = 1'-0"



A BACKING PLATE TYPE A 1 1/2" = 1'-0"



4 CORNER METAL FRAMING DETAIL 1" = 1'-0"



1 METAL FRAMING DETAILS 1" = 1'-0"

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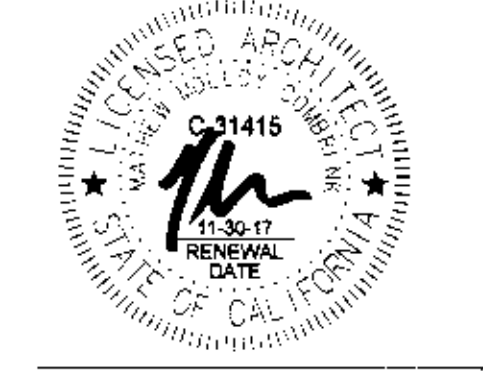
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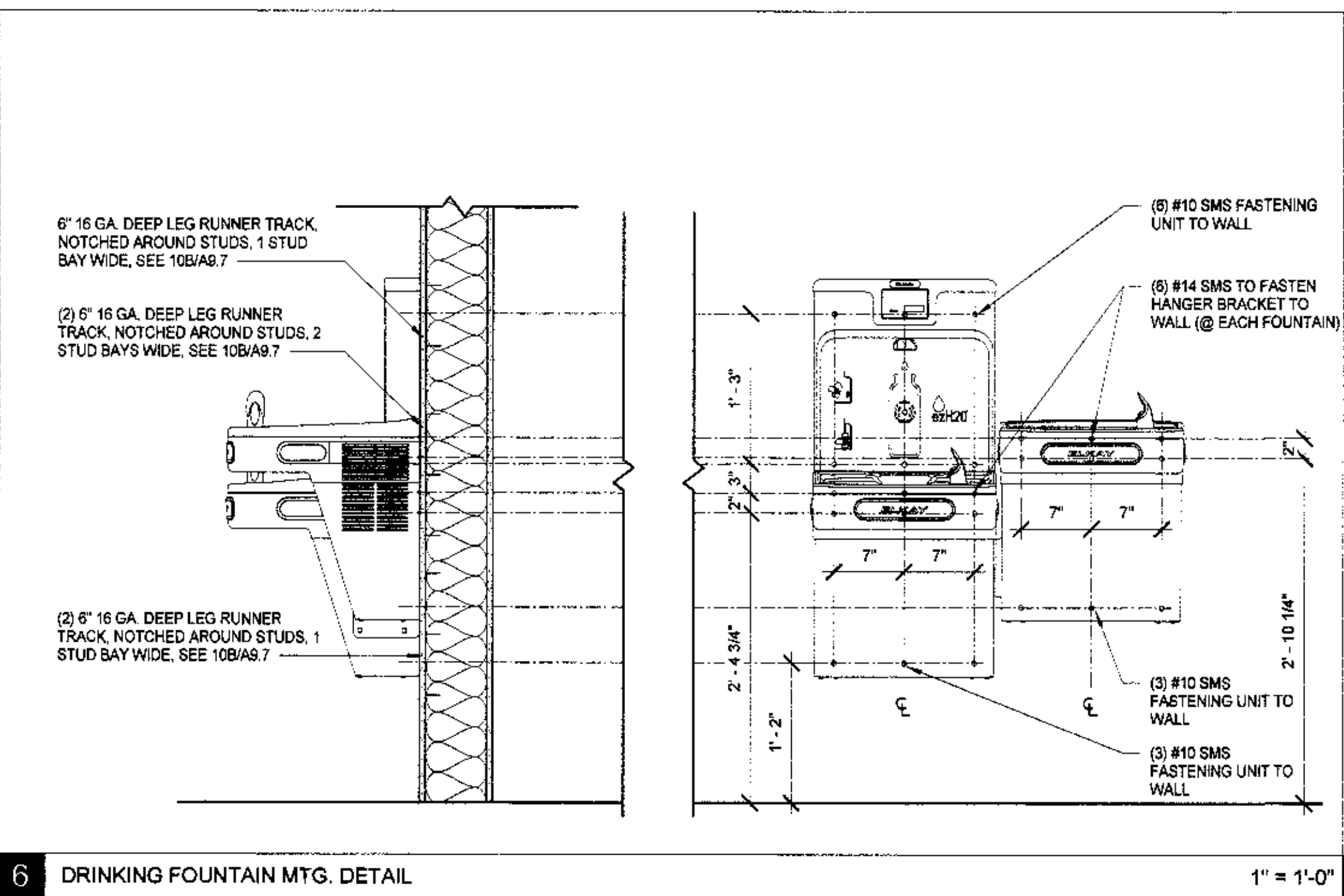
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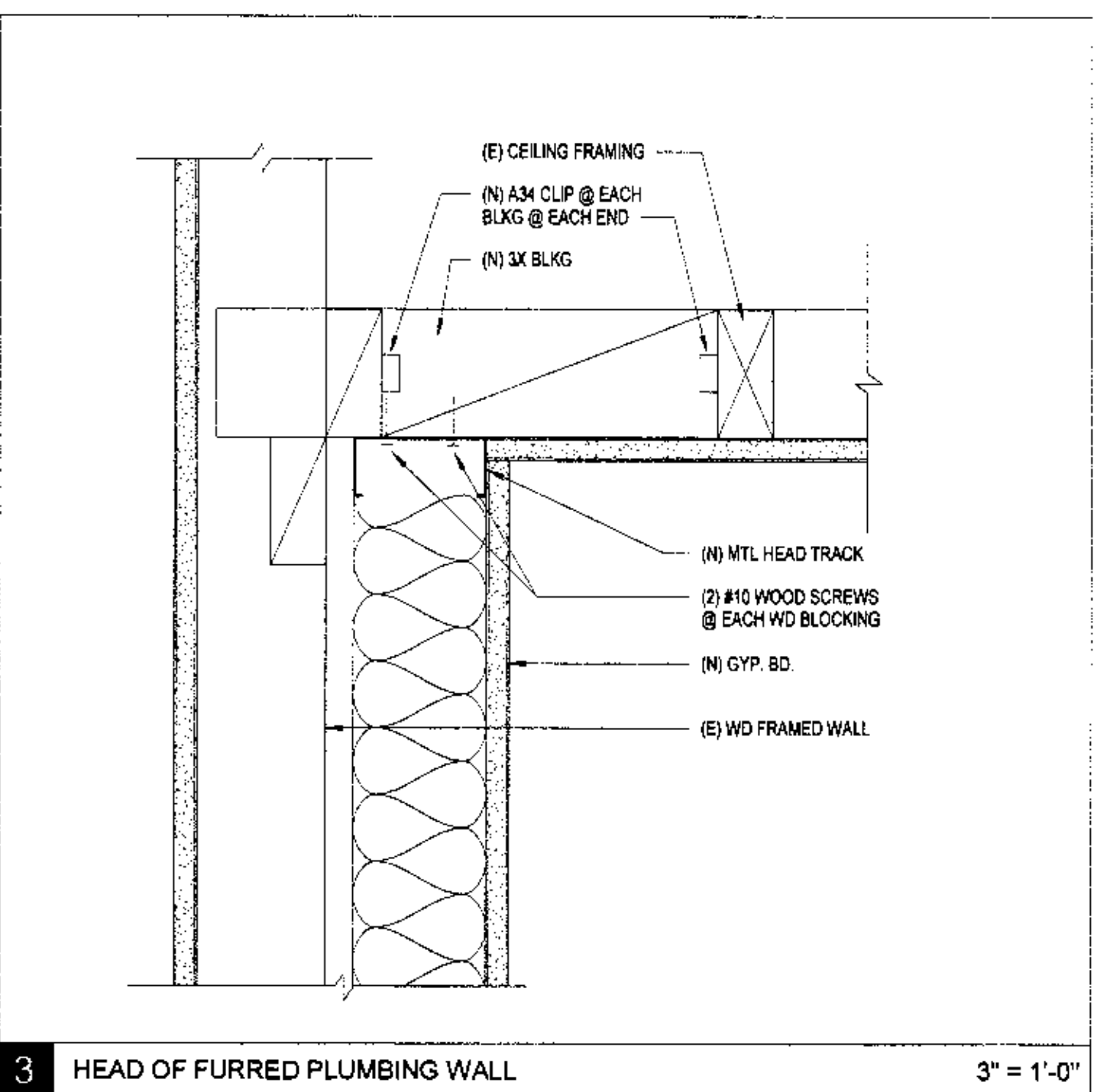
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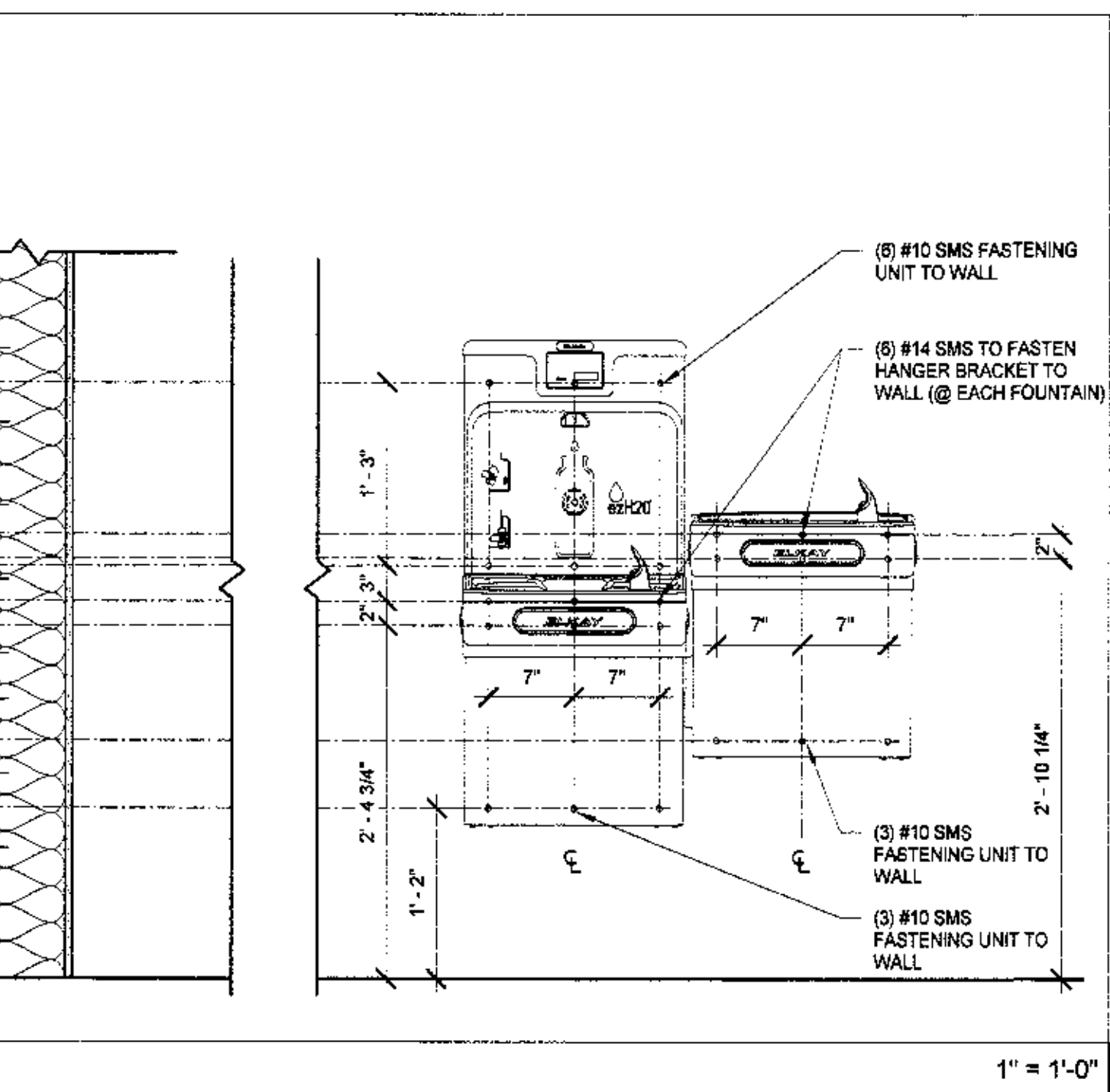
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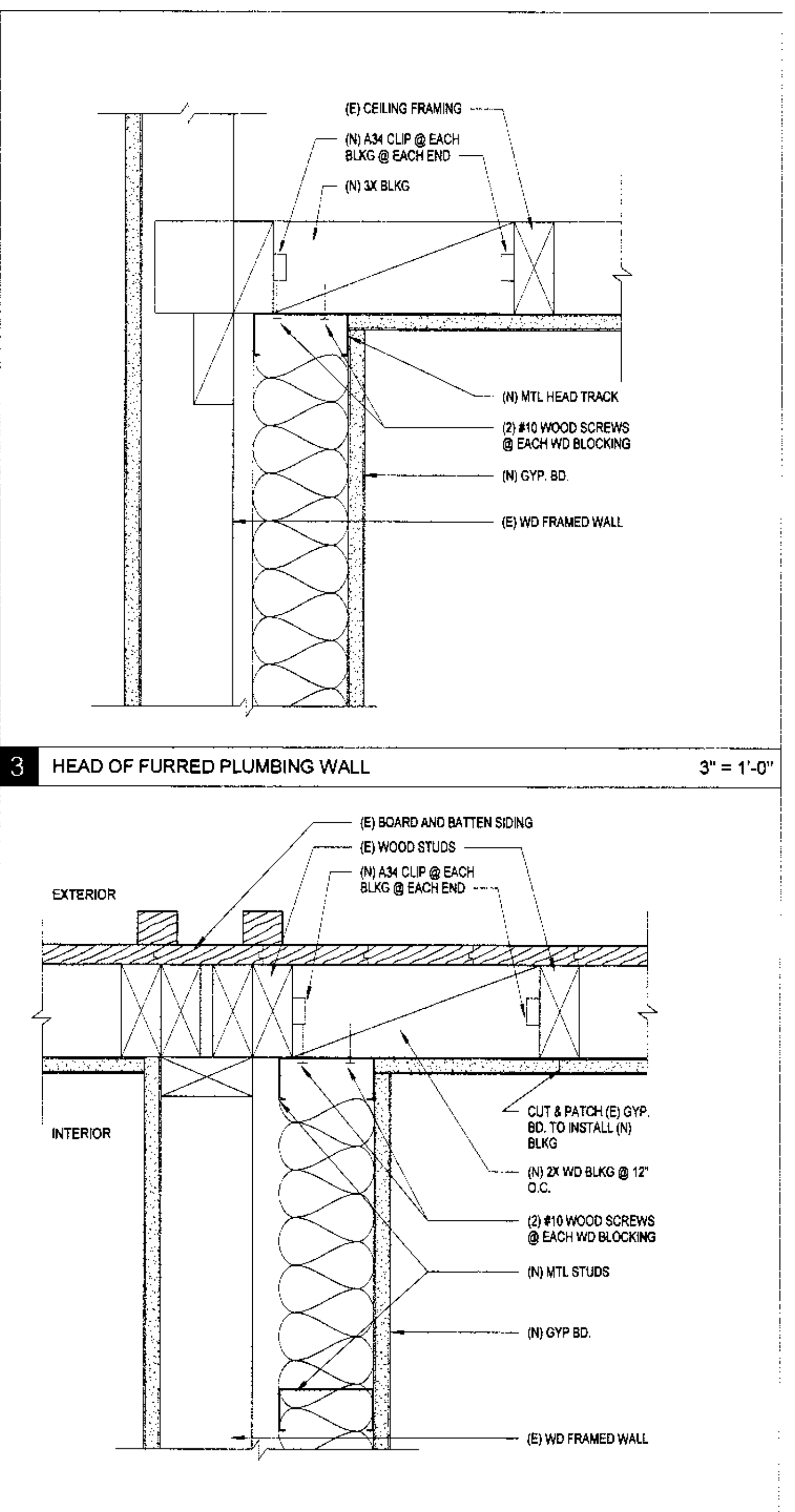
6 DRINKING FOUNTAIN MTG. DETAIL 1" = 1'-0"



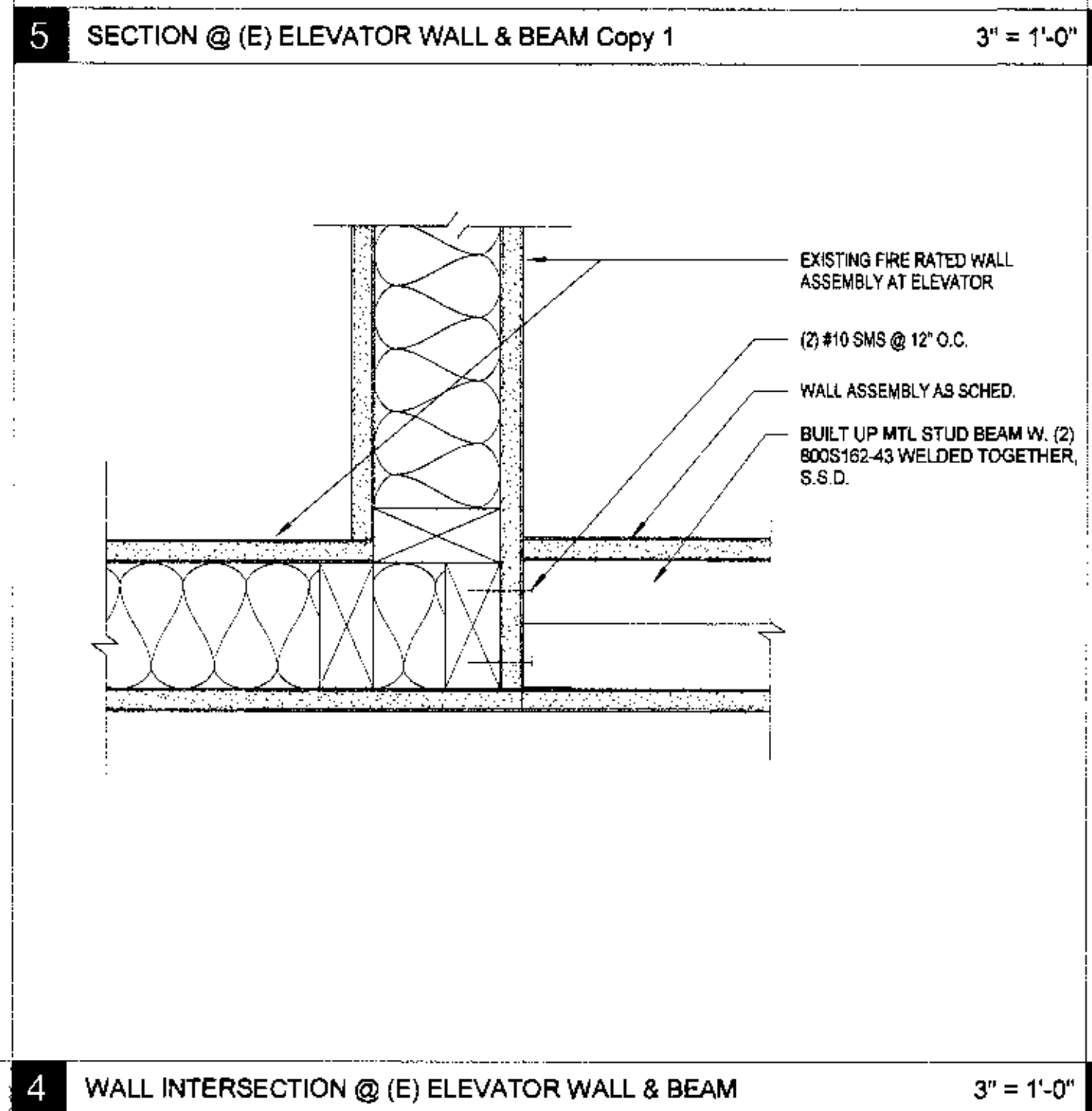
3 HEAD OF FURRED PLUMBING WALL 3" = 1'-0"



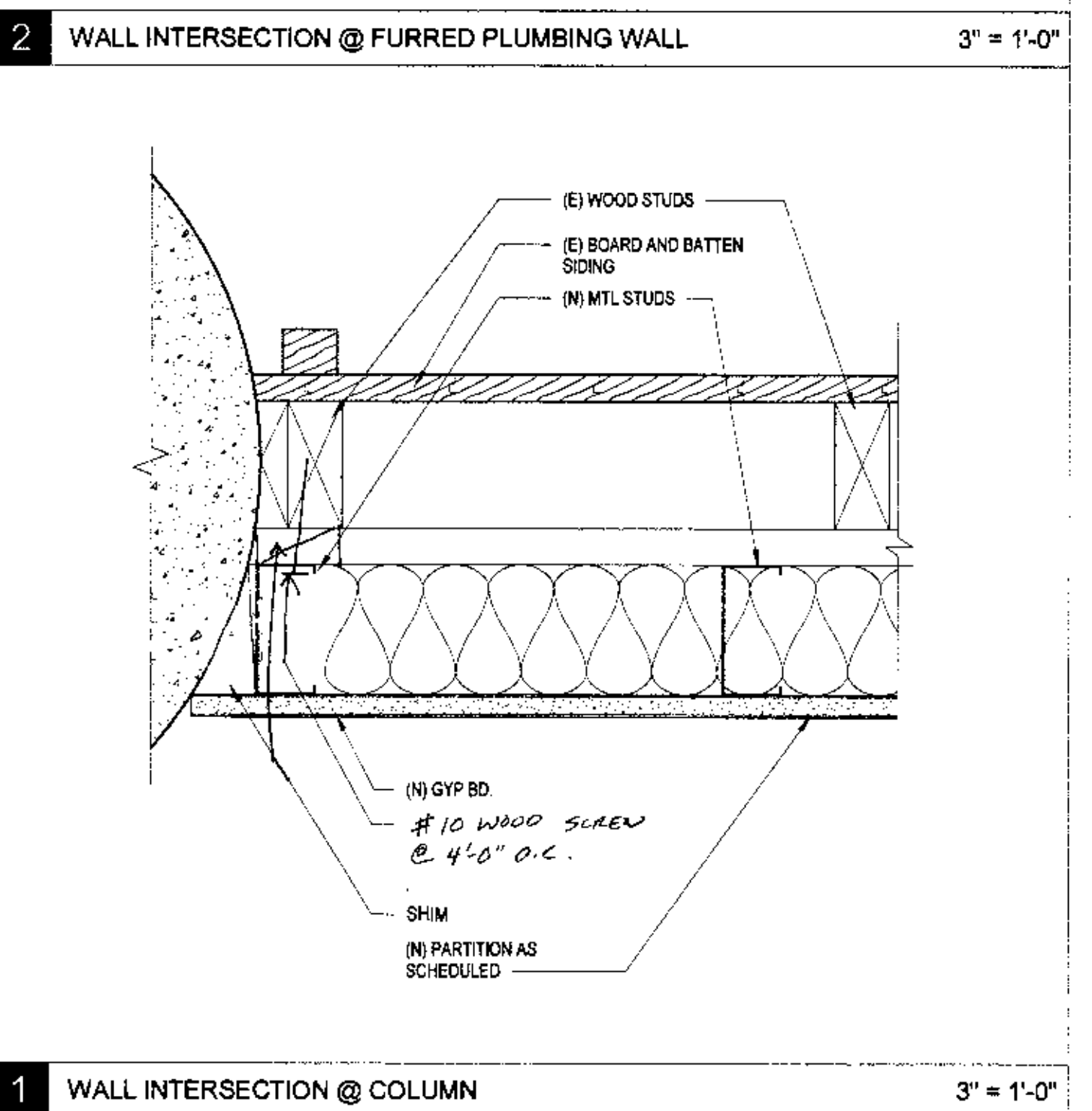
5 SECTION @ (E) ELEVATOR WALL & BEAM Copy 1 3" = 1'-0"



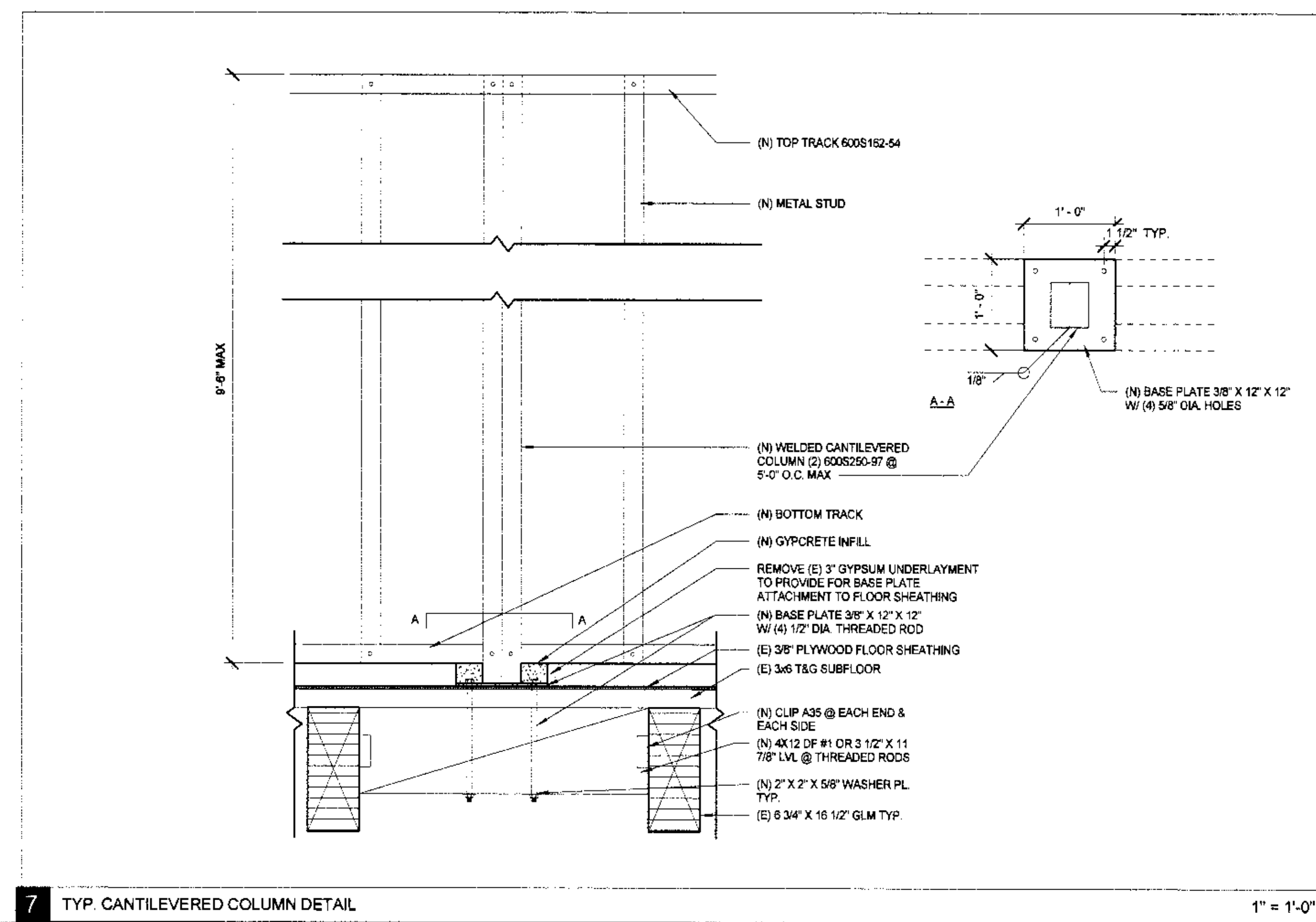
2 WALL INTERSECTION @ FURRED PLUMBING WALL 3" = 1'-0"



4 WALL INTERSECTION @ (E) ELEVATOR WALL & BEAM 3" = 1'-0"



1 WALL INTERSECTION @ COLUMN 3" = 1'-0"



7 TYP. CANTILEVERED COLUMN DETAIL 1" = 1'-0"

**brick.**

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 1290 68th street, suite 1  
 emeryville, ca 94608  
 510.516.0167  
 www.brick-llo.com

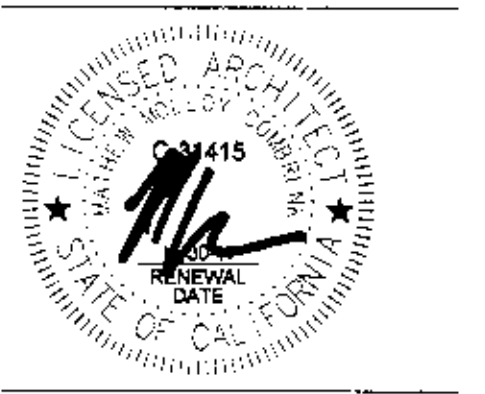
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 kentfield, ca 94504

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 DATE: SEP 12 2017

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5/31/17	DSA PLAN REVIEW
3/10/17	100% CD
rev date	issue



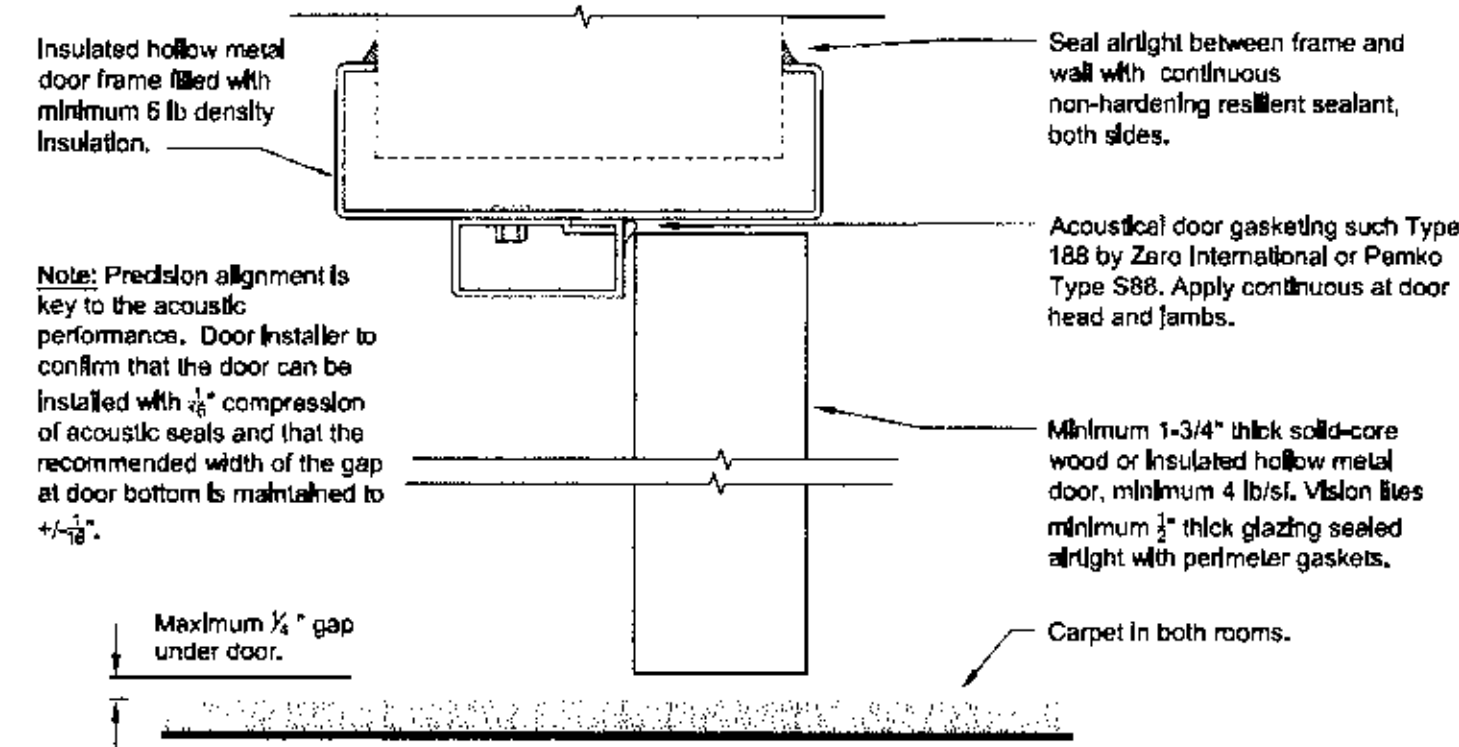
**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 16-148 01

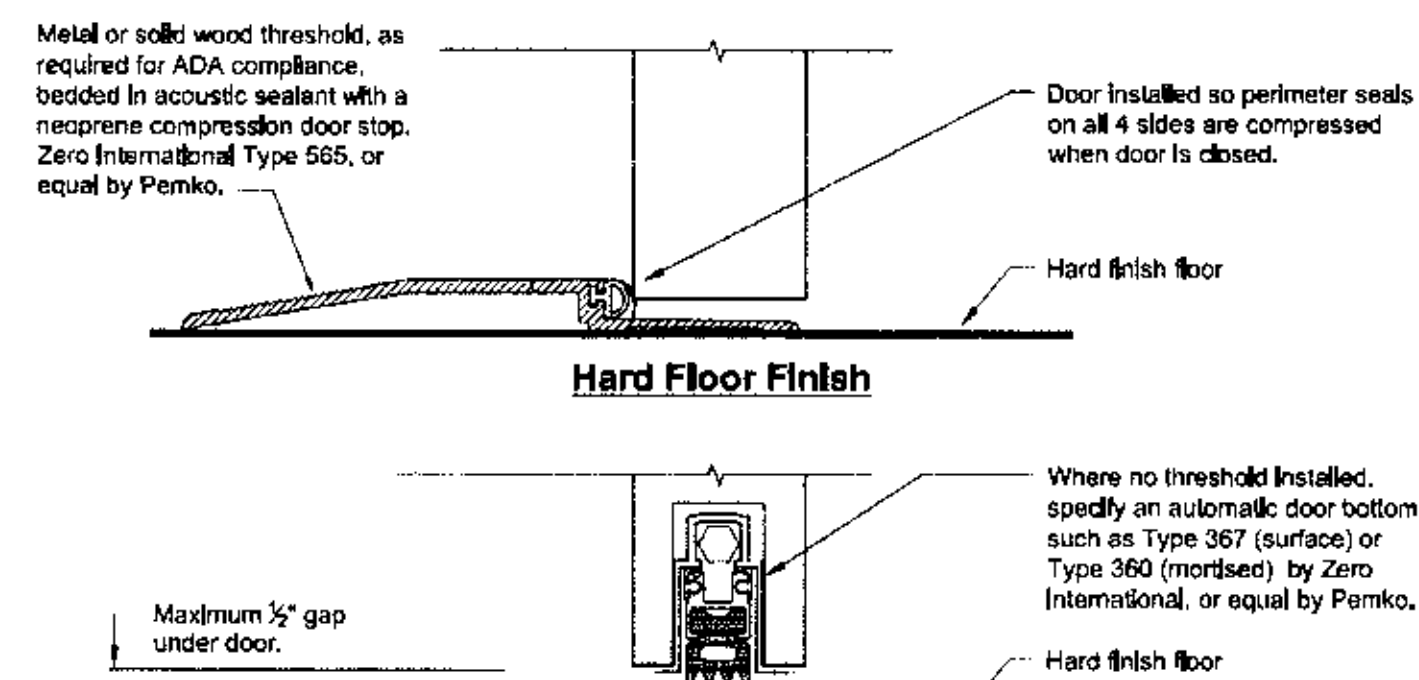
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**CONSTRUCTION DOCUMENTS**  
**INTERIOR DETAILS**

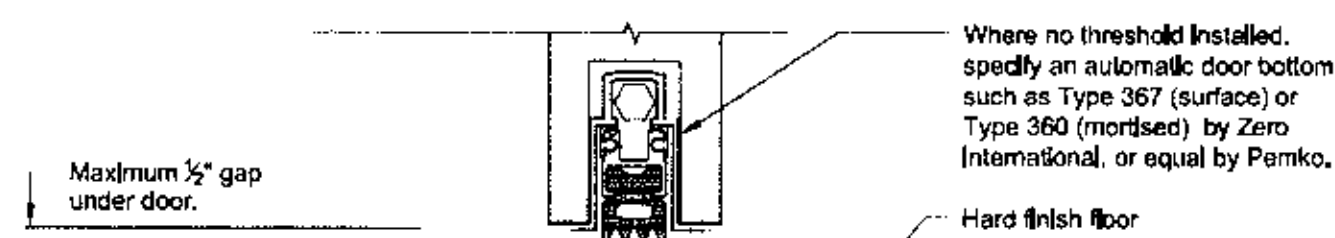
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**Carpeted Floor**

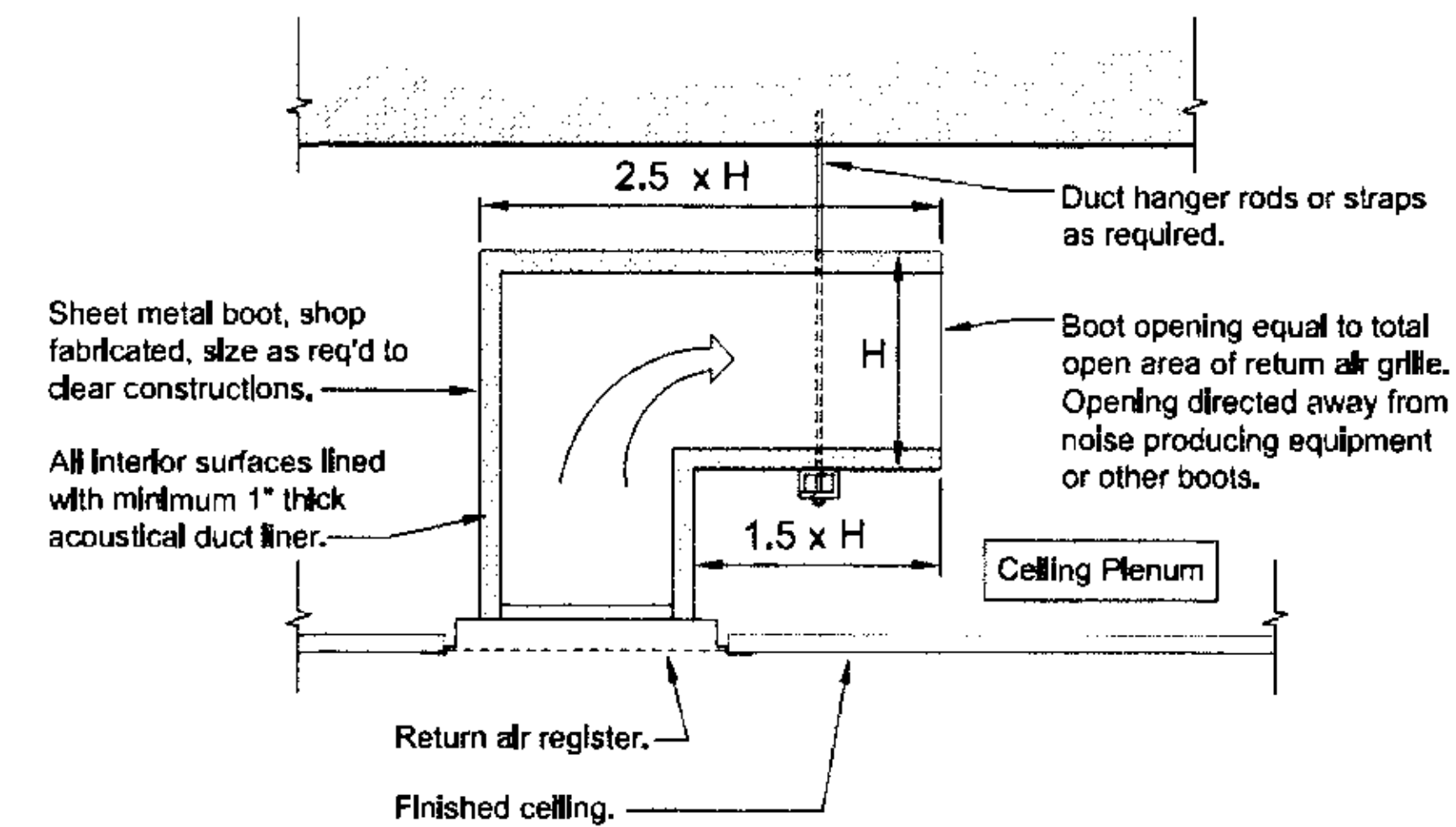


**Hard Floor Finish**

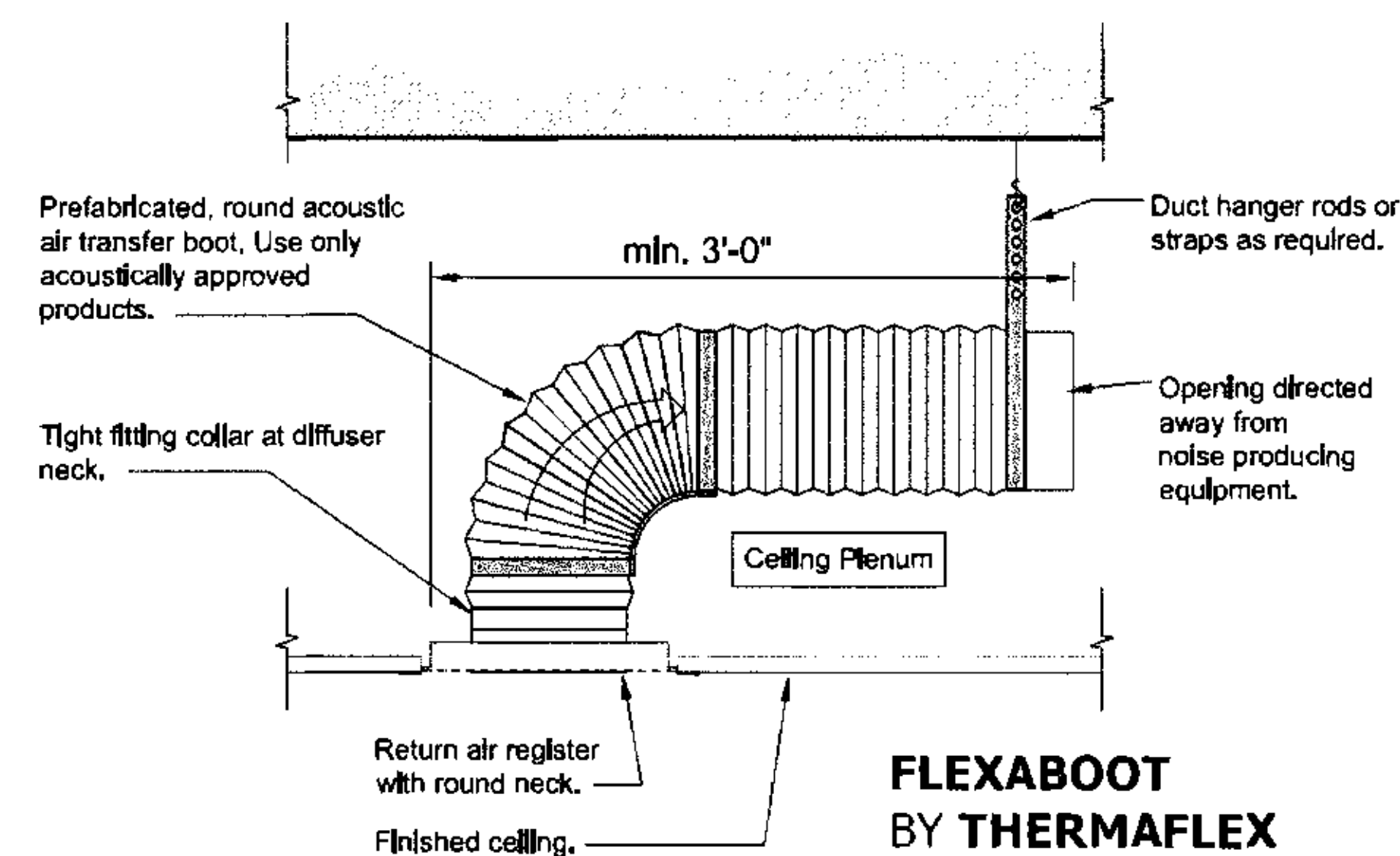


**Hard Floor Finish Floor (Alternate)**  
**DOOR TYPE DR1**

NOTE:  
1. SEE DOOR SCHEDULE FOR ADDITIONAL INFORMATION



**Section View Section View**  
not to scale



**Section View**  
not to scale

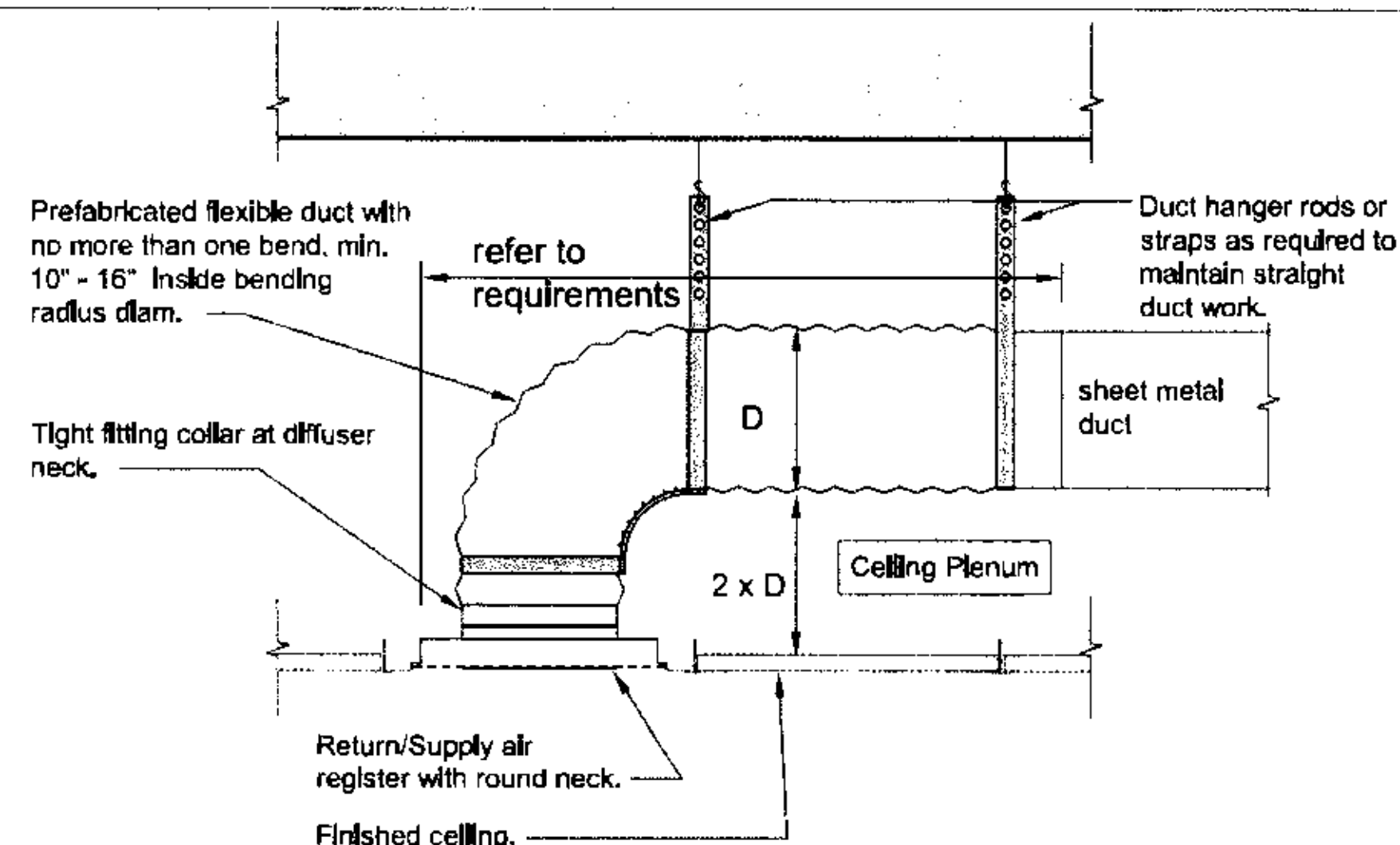
**FLEXABOOT**  
**BY THERMAFLEX**  
1-800-459-4822  
www.wereflexible.com

**5 DOOR ACOUSTIC REQUIREMENTS**

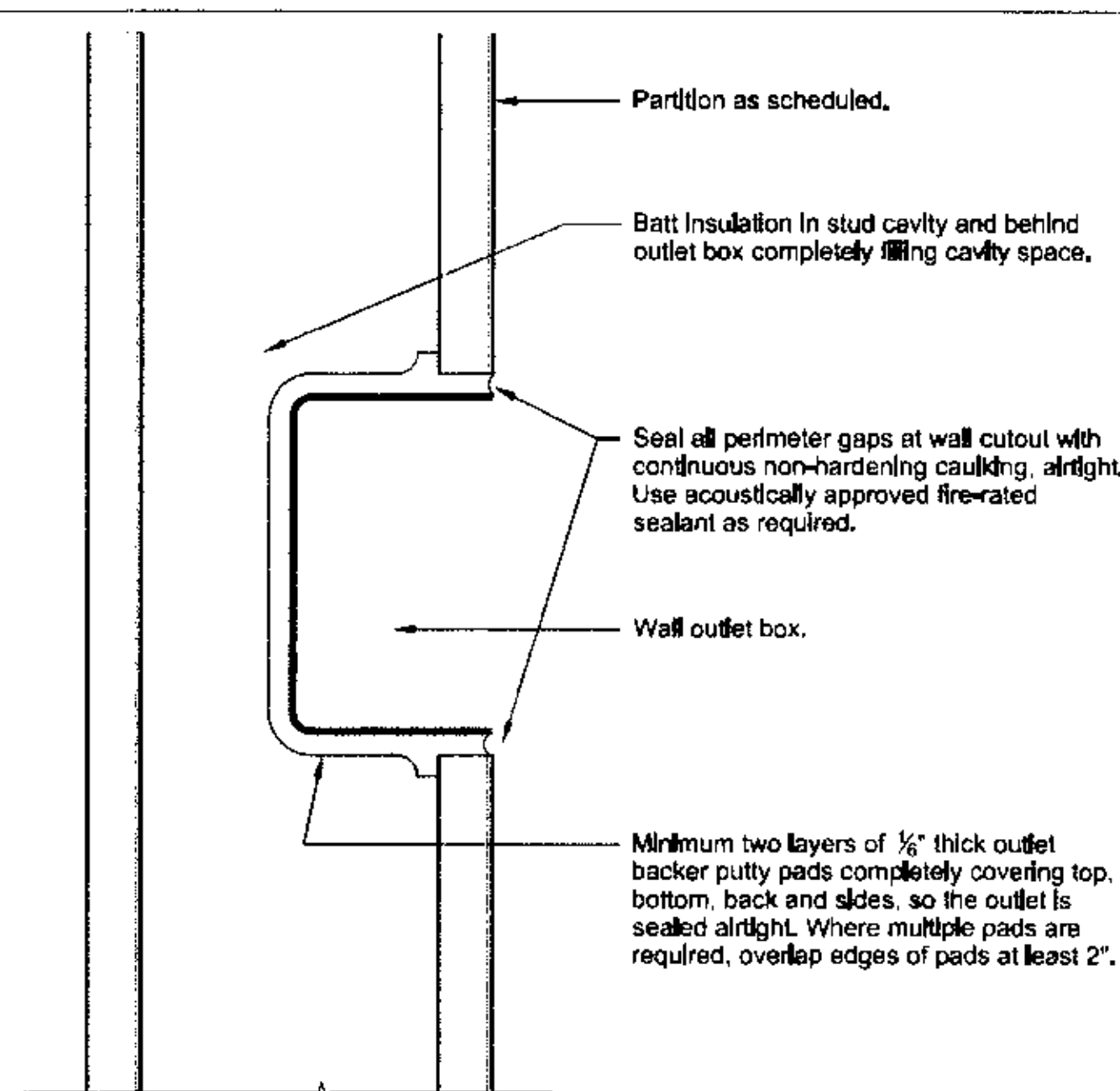
6" = 1'-0"

**2 RETURN AIR BOOT DETAIL @ MEETING ROOMS**

6" = 1'-0"



**Typical Flex Duct Connection**  
not to scale



**1 OUTLET BOX SOUND ISOLATION DETAIL**

6" = 1'-0"

6" = 1'-0"

**4 TYPICAL FLEX DUCT CONNECTION**

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renovation

novato, california  
project number: 16-148.01

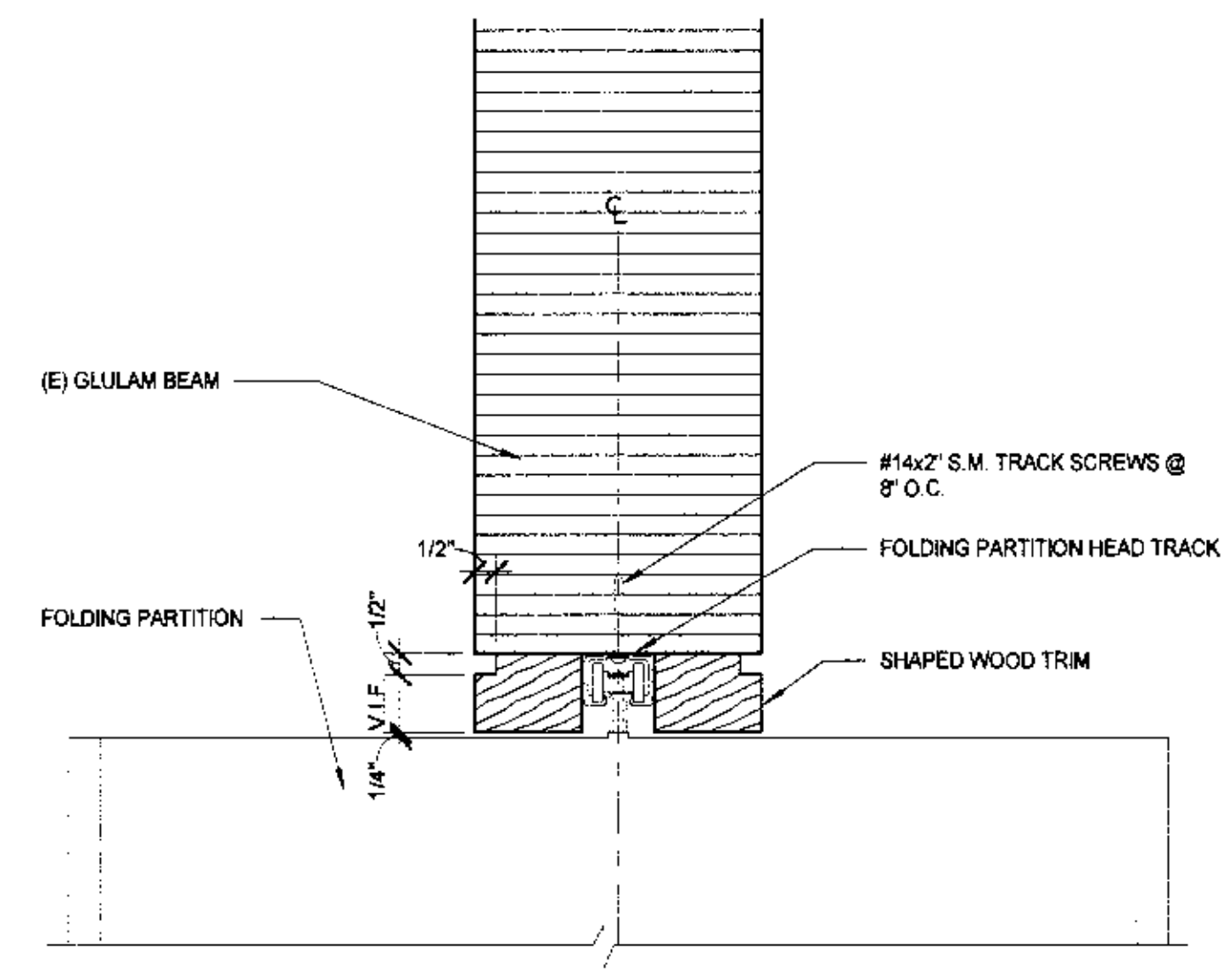
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**CONSTRUCTION**  
**DOCUMENTS**

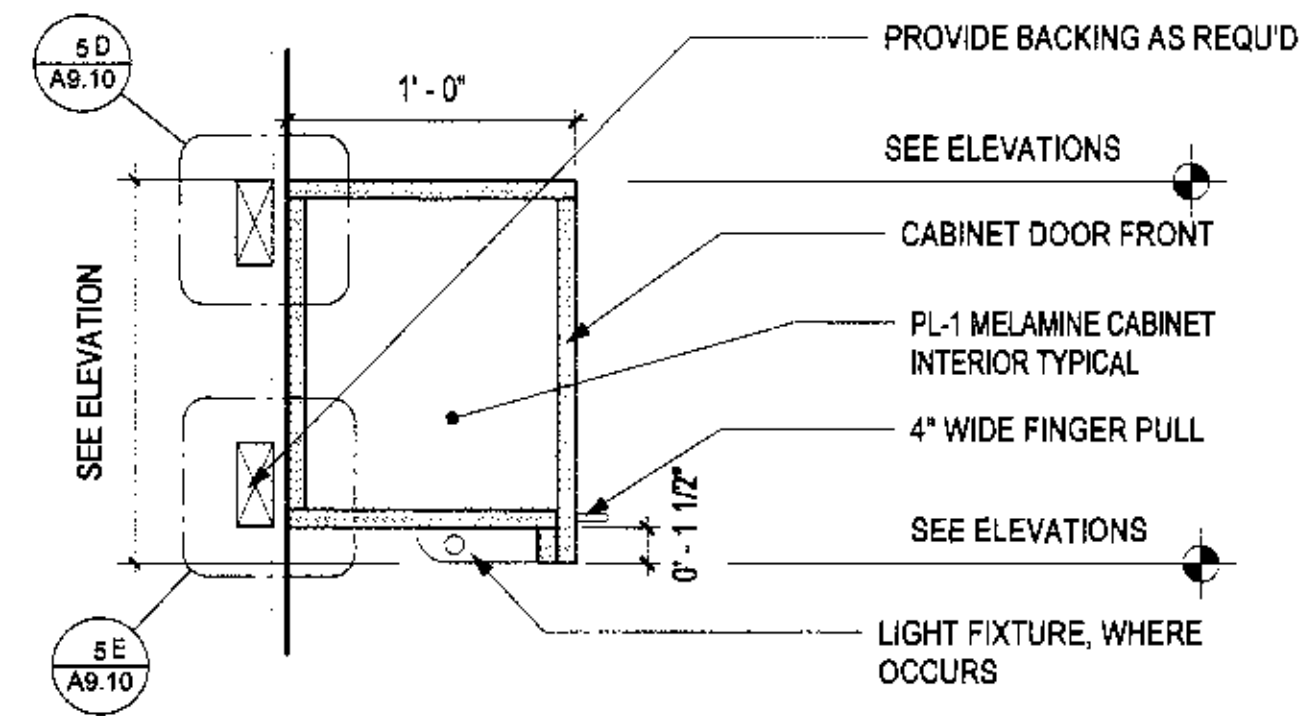
**INTERIOR**  
**DETAILS -**  
**ACOUSTIC**

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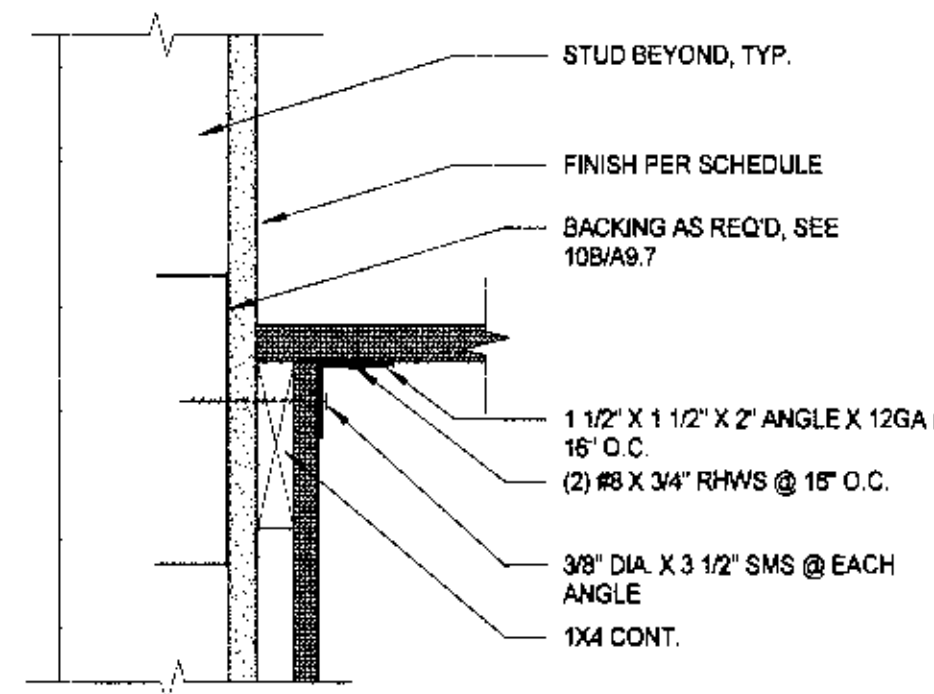
NOTE: COORDINATE W/ ARCHITECT AND REFER TO ACOUSTIC REPORT FOR FOLDING DOOR ACOUSTIC ISOLATION



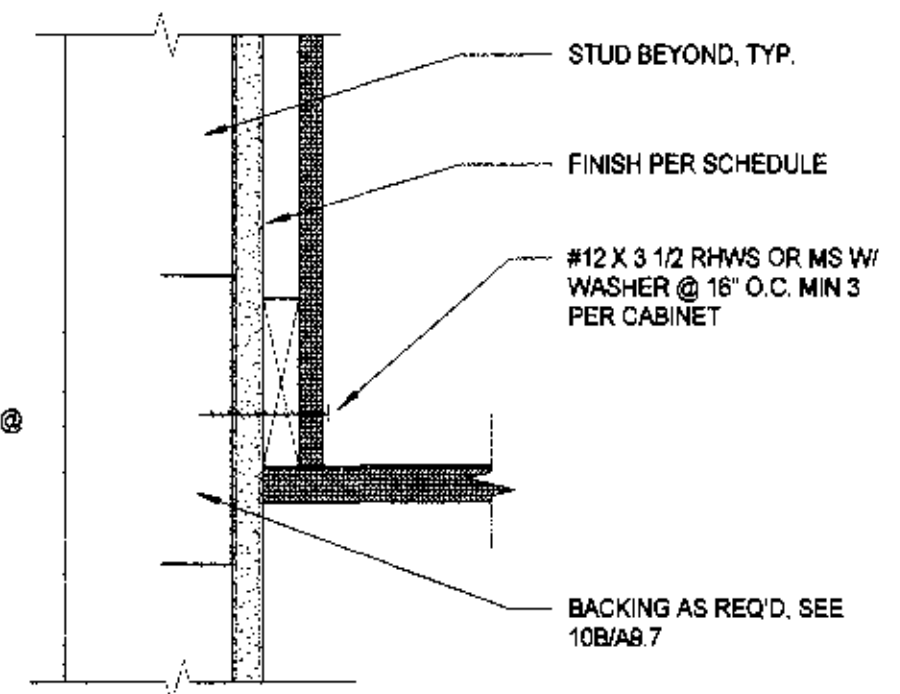
12 FOLDING PARTITION HEAD 3" = 1'-0"



9 UPPER CABINET WITH DOOR 1 1/2" = 1'-0"

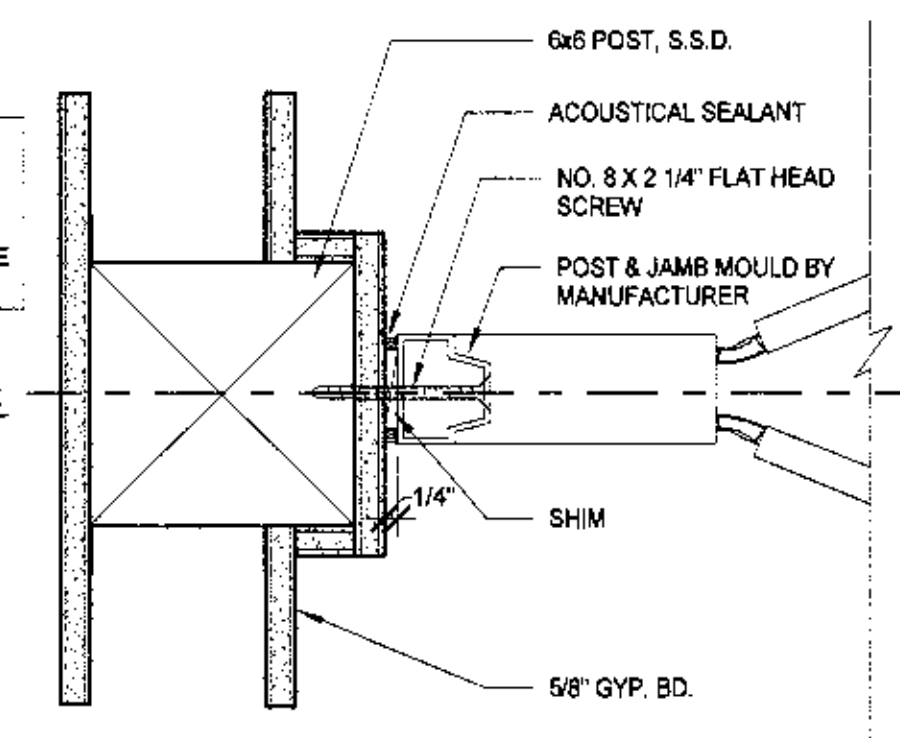


D

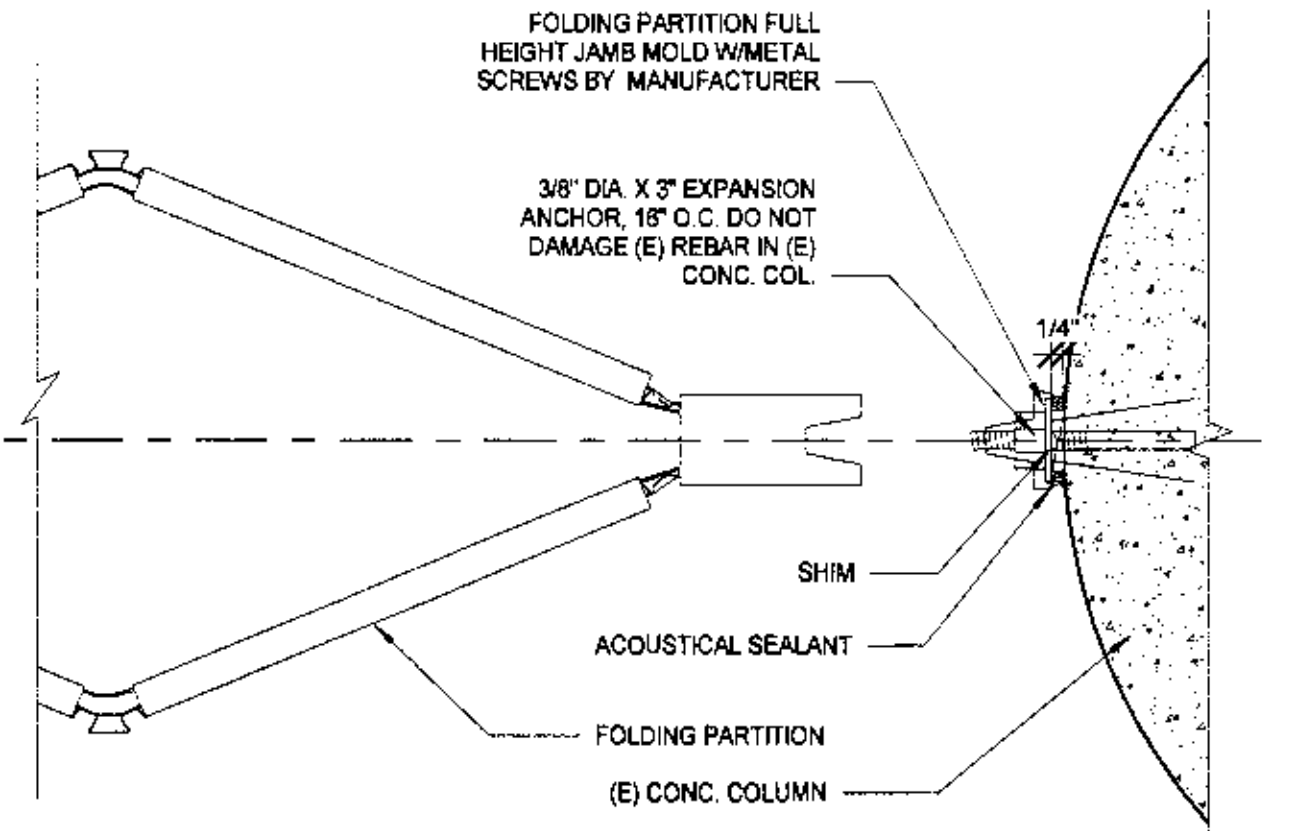


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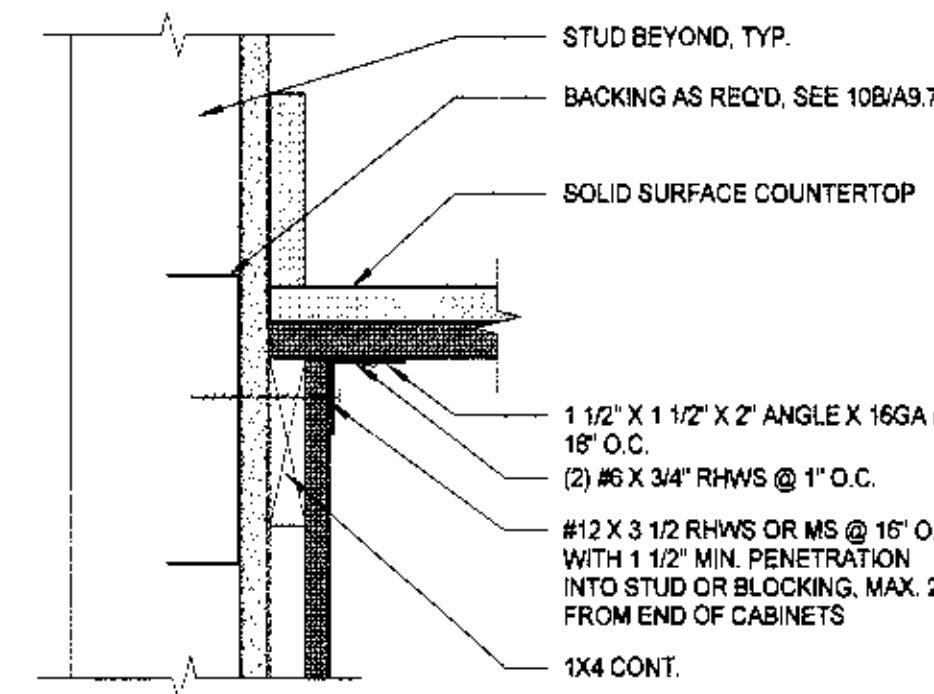
NOTE:  
1. COORDINATE W/ ARCHITECT AND REFER TO ACOUSTIC REPORT FOR FOLDING DOOR ACOUSTIC ISOLATION  
2. FOR FOLDING PARTITION HEAD DETAIL SEE 12/A9.10



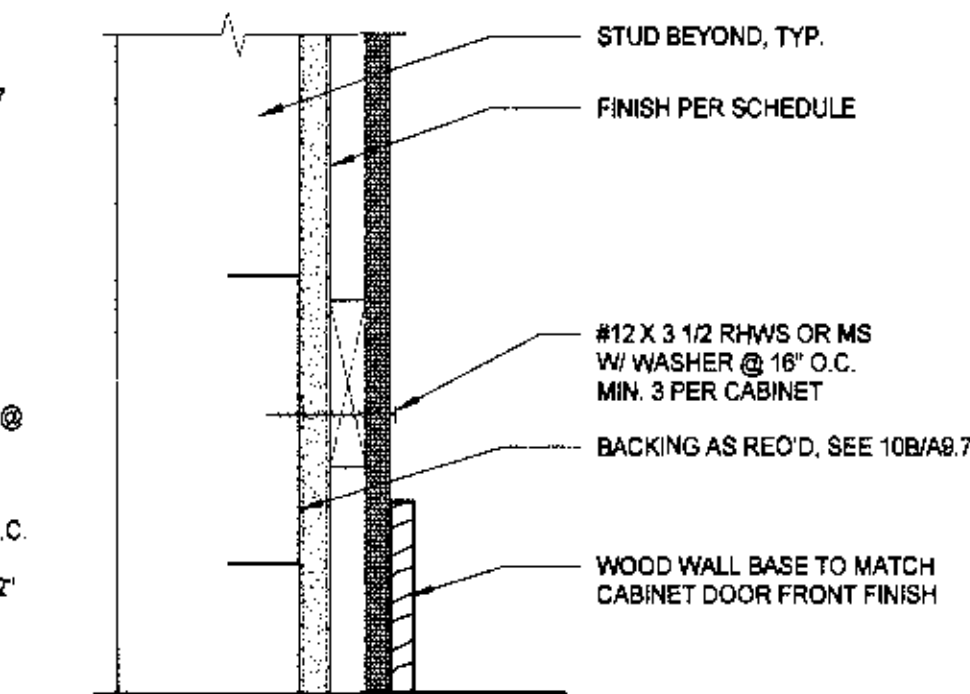
11 FOLDING PARTITION JAMB 3" = 1'-0"



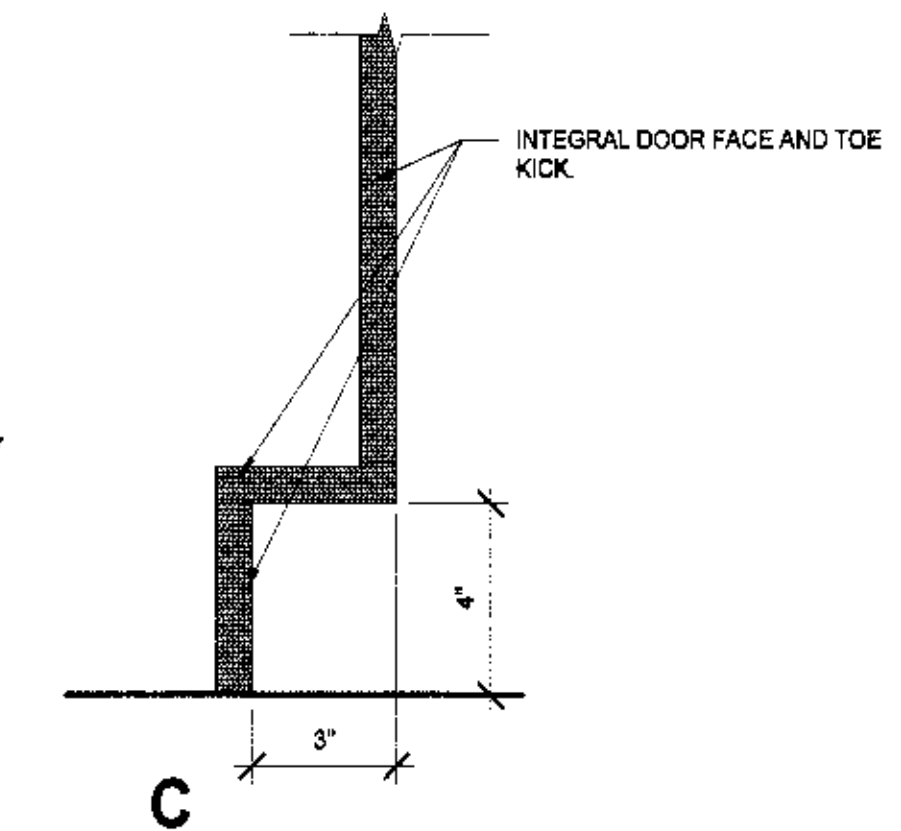
5 CABINET ANCHORAGE DETAILS 3" = 1'-0"



A



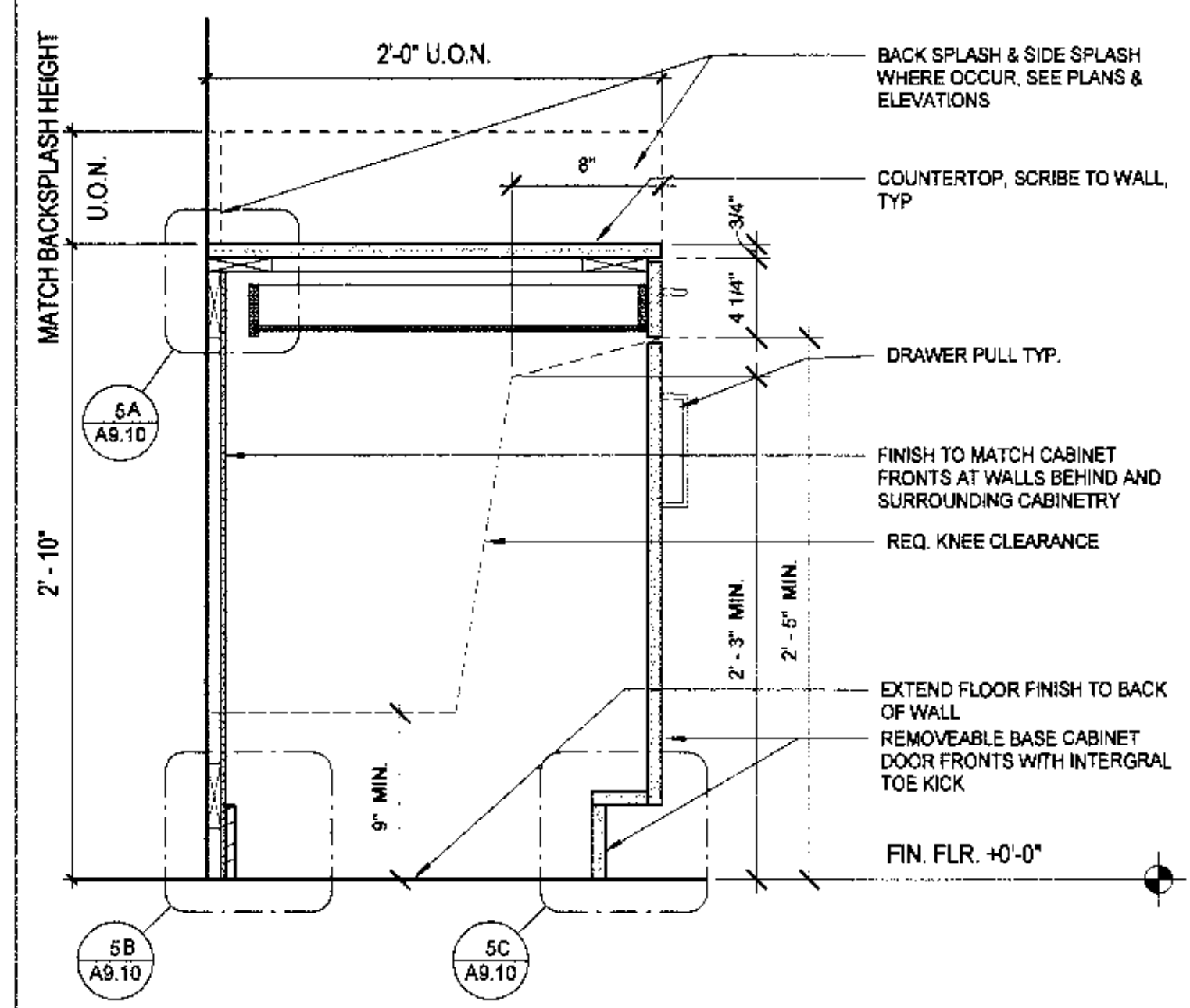
B



C



7 KITCHEN SINK BASE CABINET 1 1/2" = 1'-0"



1 TYPICAL BASE CABINET (KITCHEN) 1 1/2" = 1'-0"

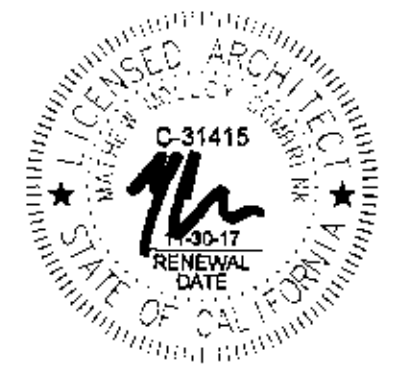
brick.

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renovation

novato, california  
project number: 16-148.01

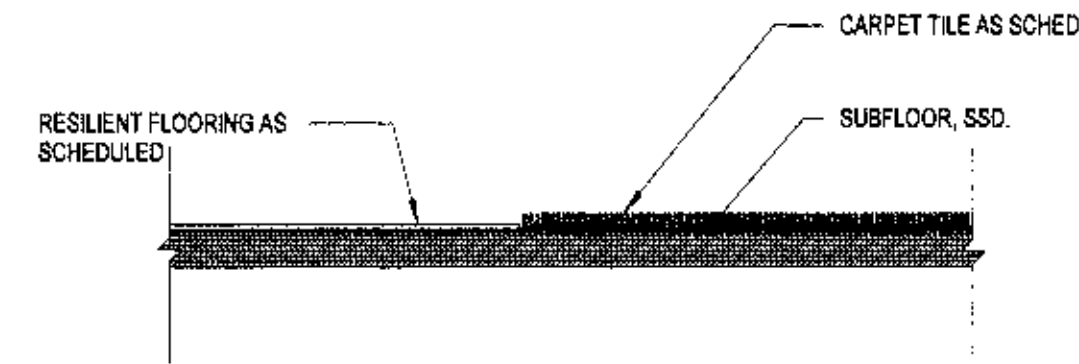
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CONSTRUCTION  
DOCUMENTS

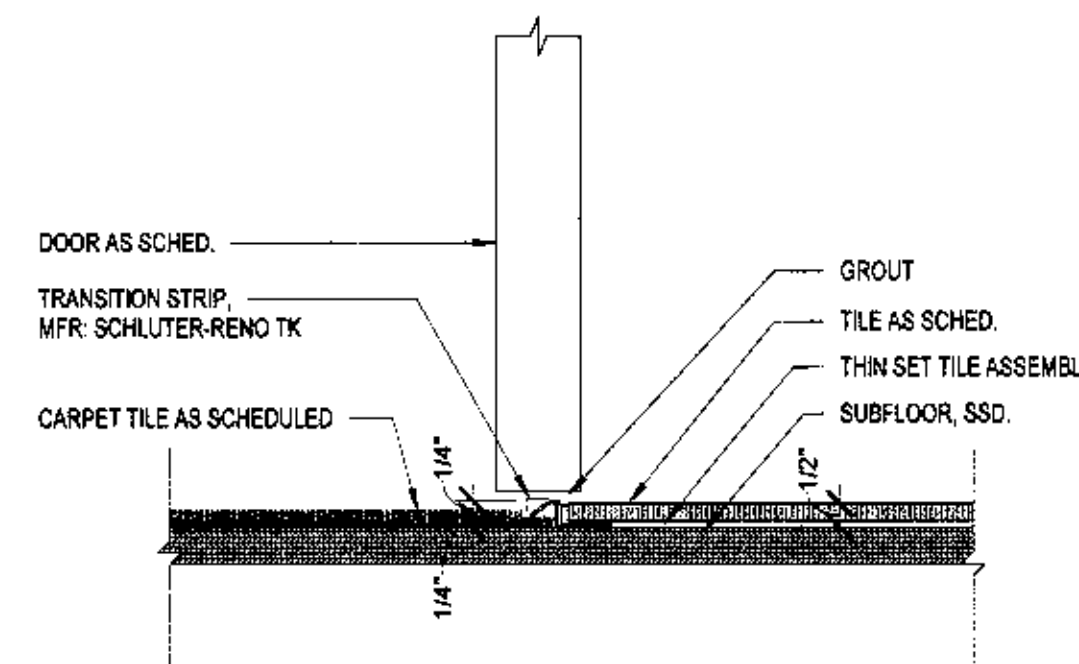
INTERIOR  
DETAILS -  
MILLWORK

A9.10

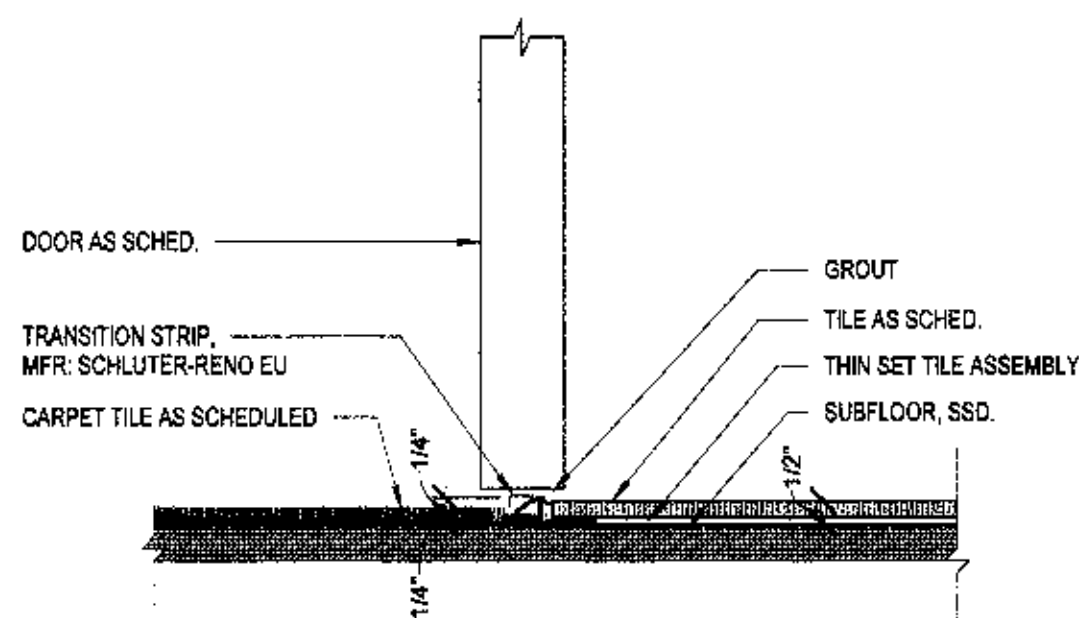
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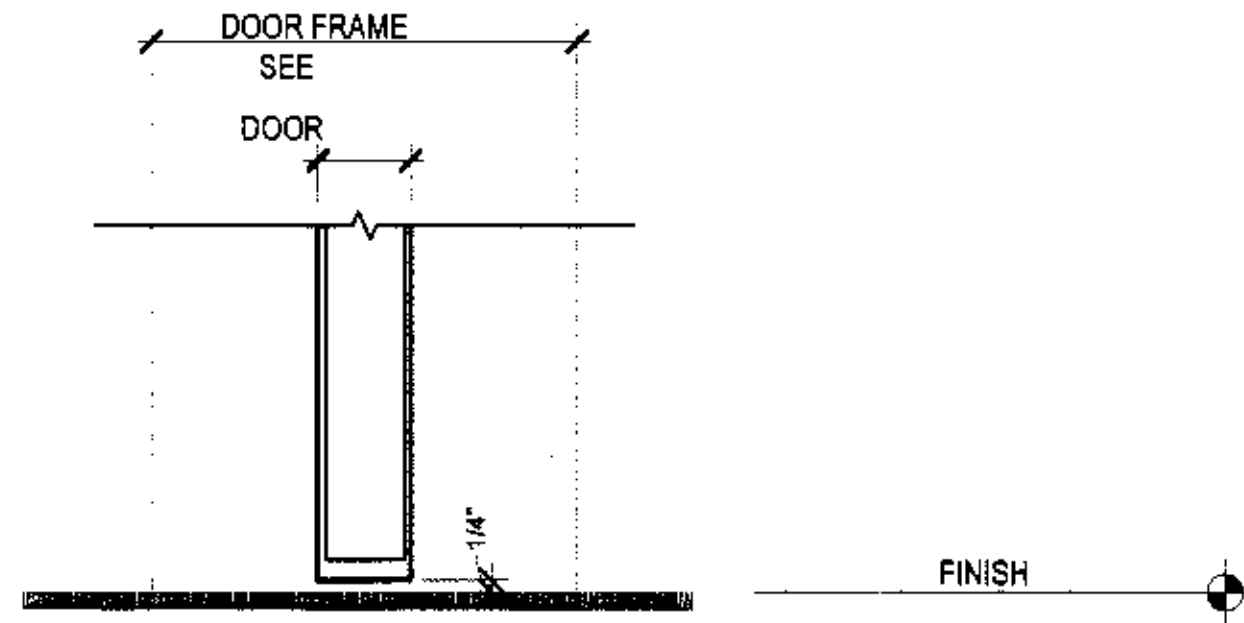
12 RESILIENT FLOORING TO CARPET TRANSITION 3" = 1'-0"



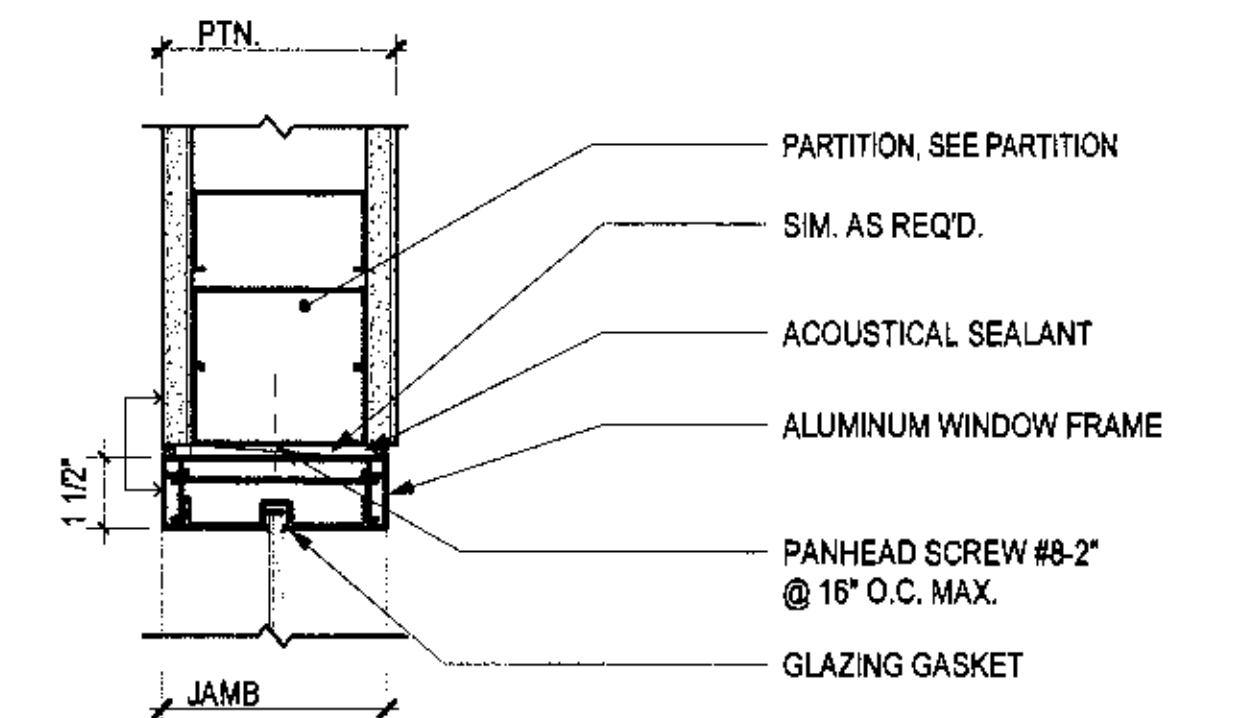
13 (E) CARPET TO TILE TRANSITION 3" = 1'-0"



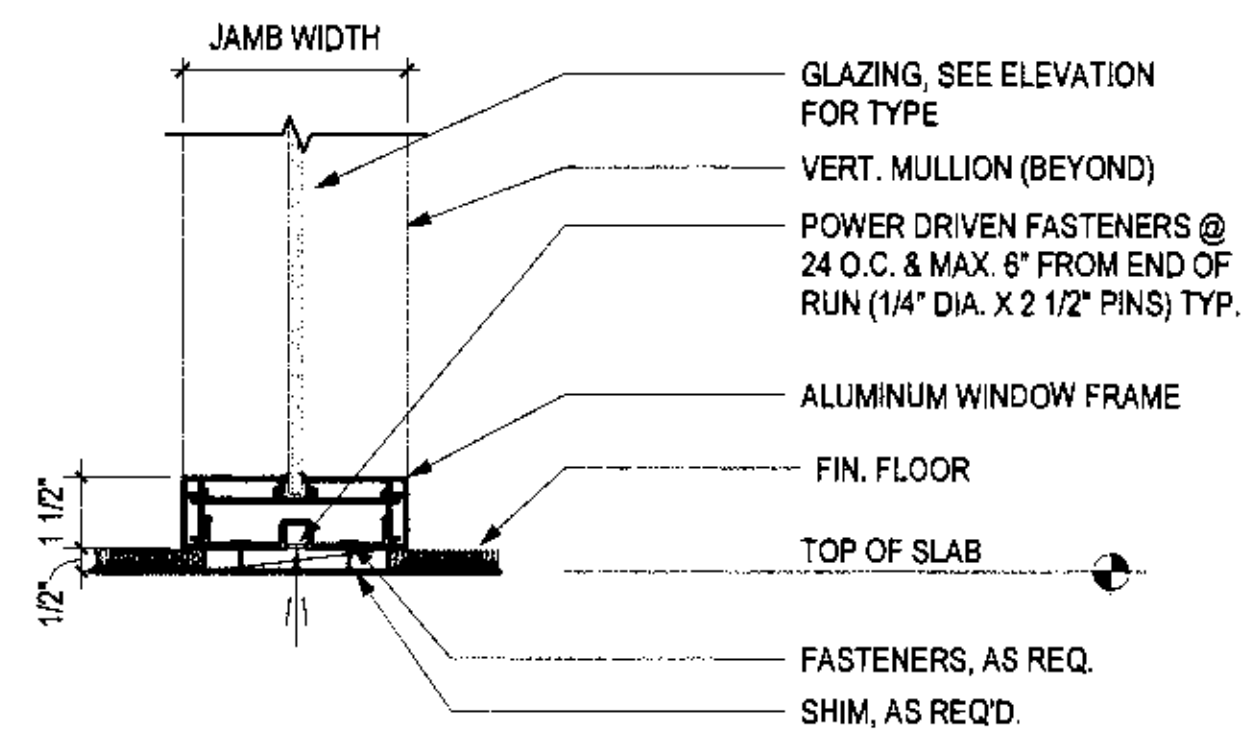
11 CARPET TO TILE TRANSITION 3" = 1'-0"



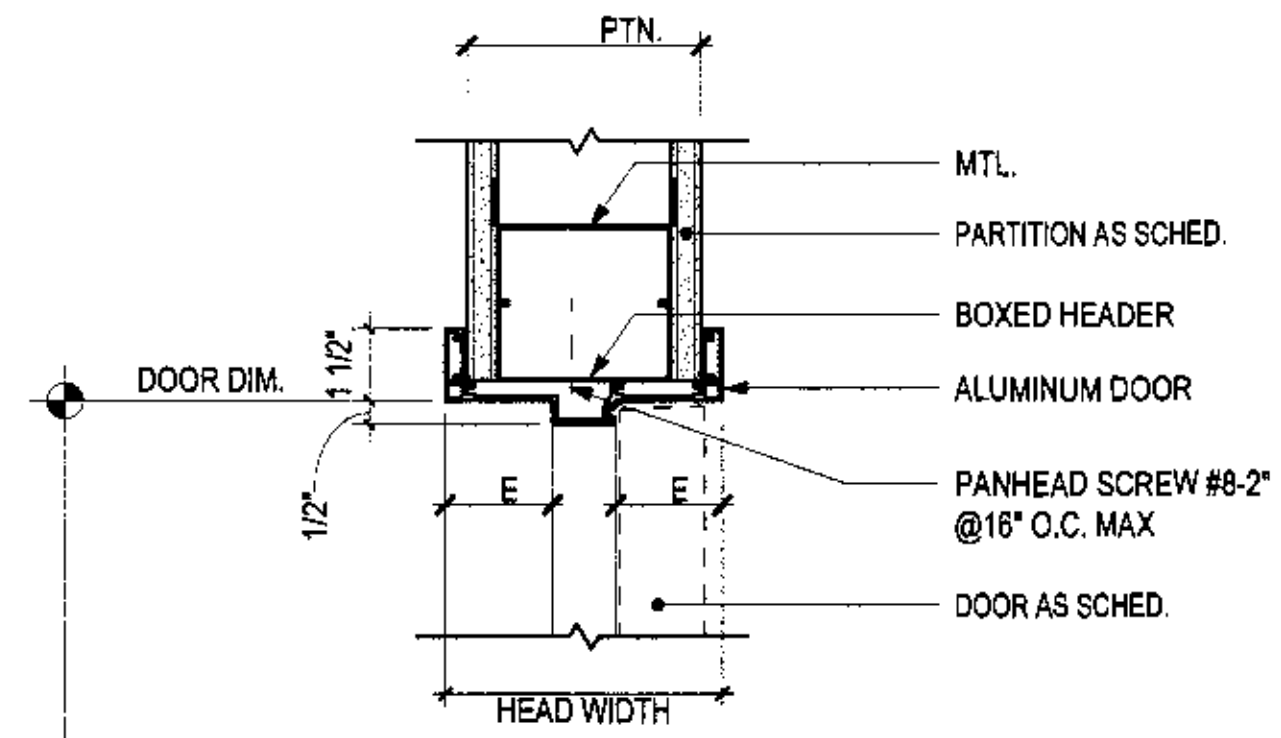
9 ALUM. DOOR SILL 3" = 1'-0"



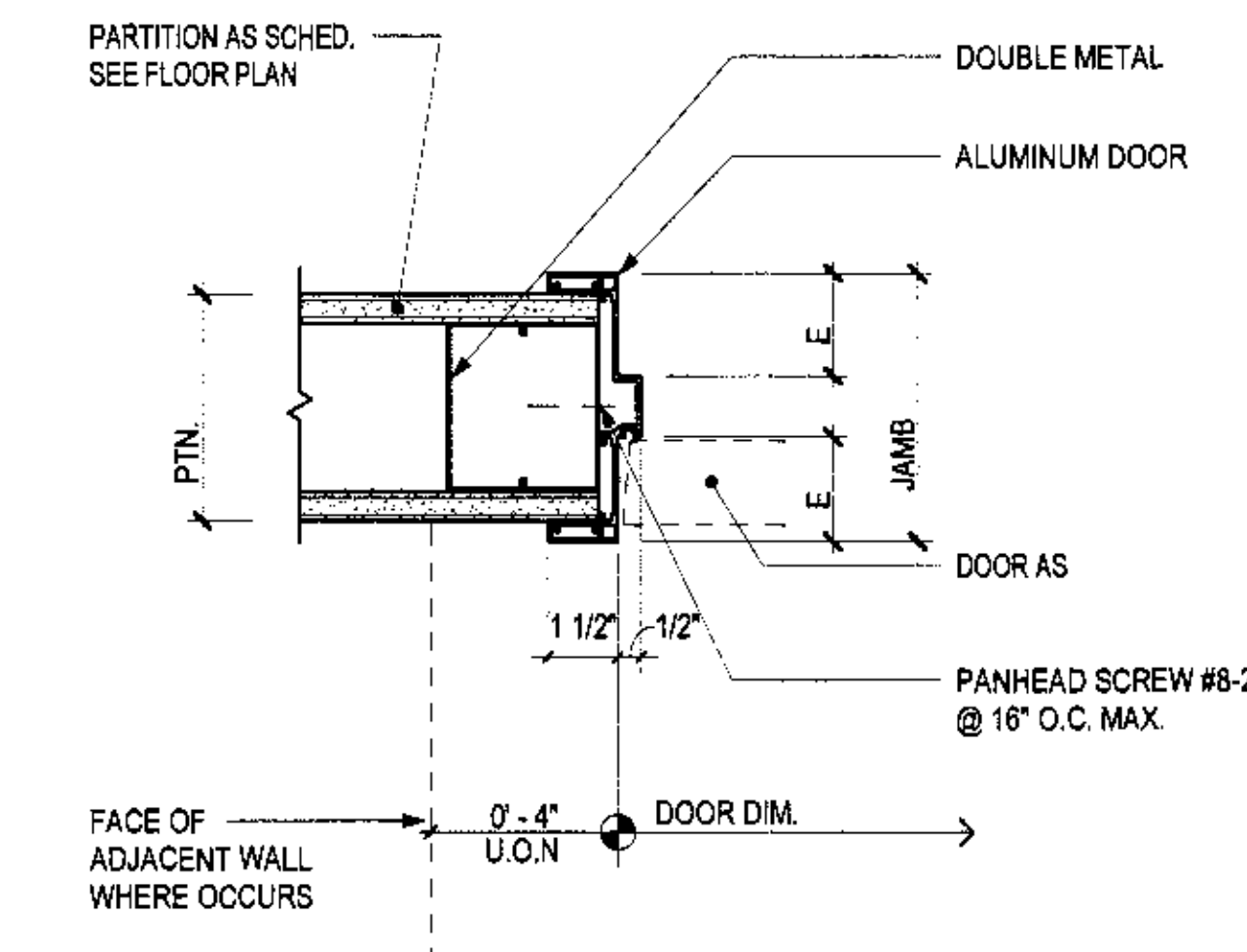
8 ALUMINUM JAMB @ PARTITION (HEAD SIM.) 3" = 1'-0"



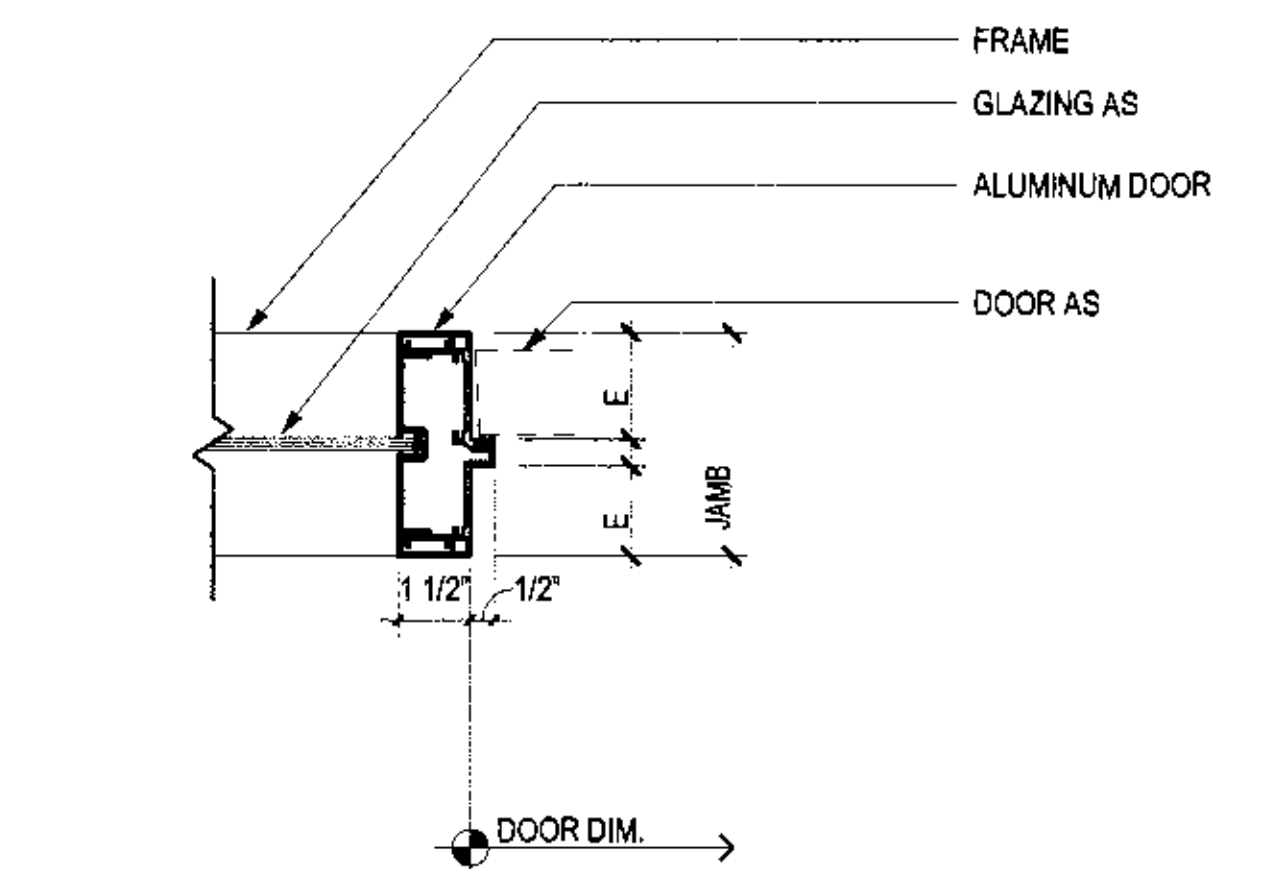
7 ALUMINUM SILL 3" = 1'-0"



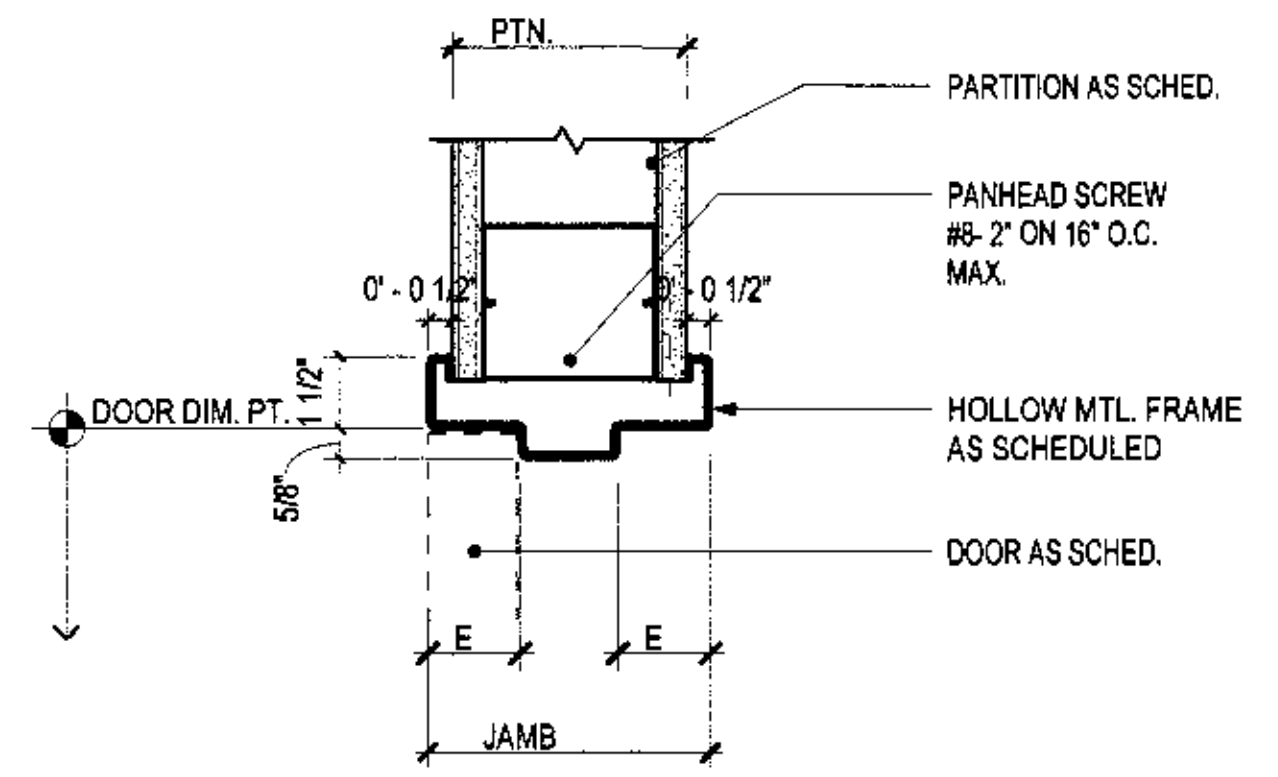
6 TYP. ALUMINUM DOOR HEAD 3" = 1'-0"



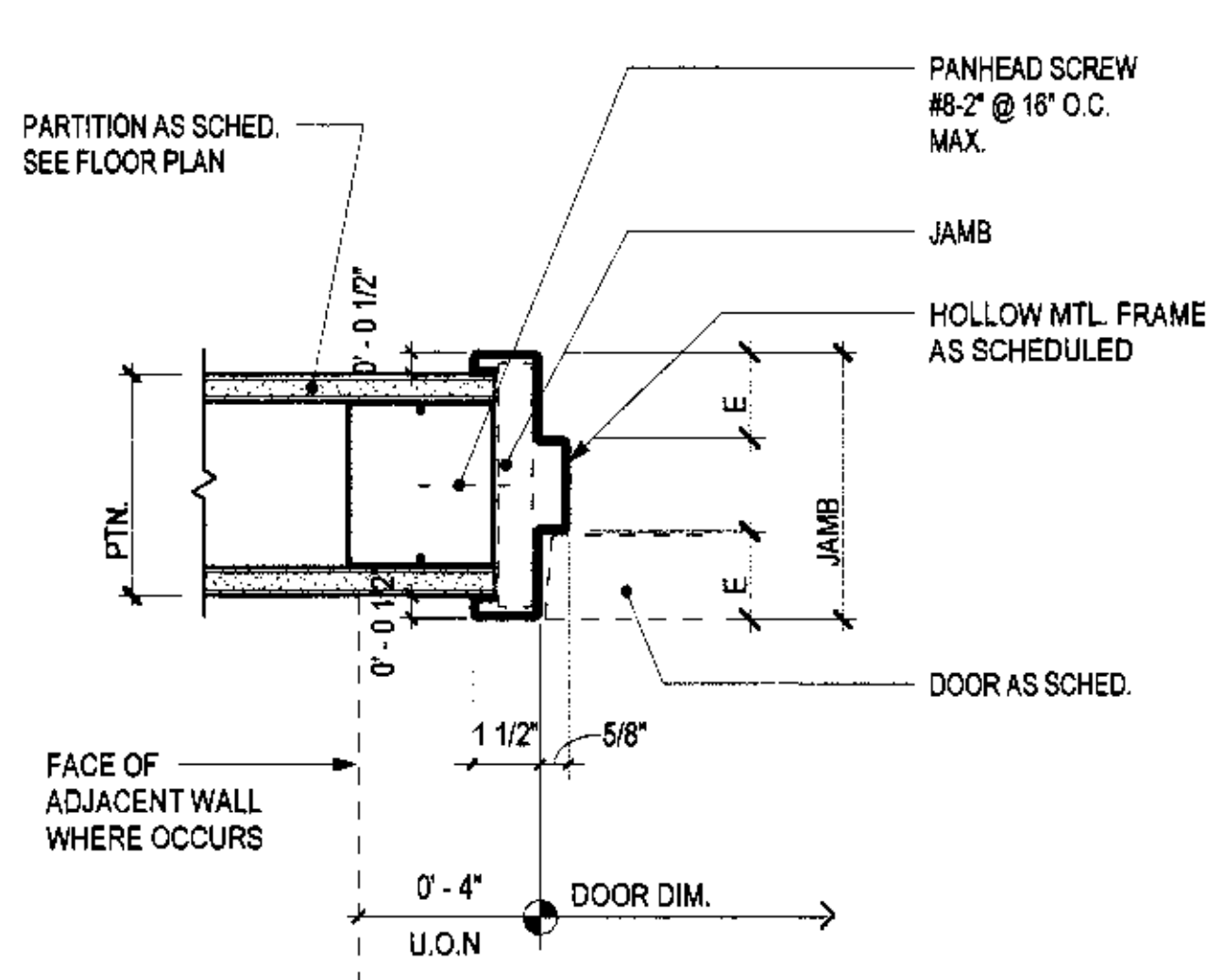
5 TYP. ALUMINUM DOOR JAMB 3" = 1'-0"



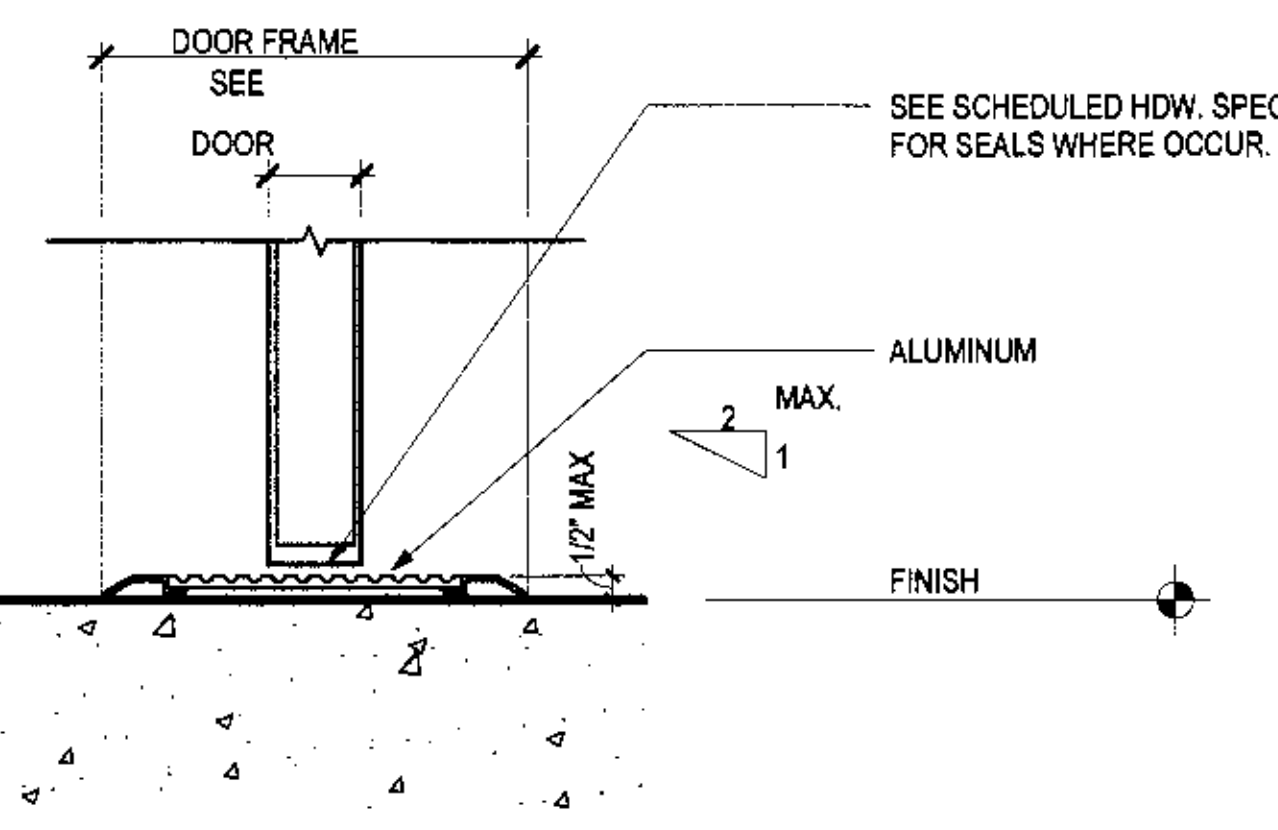
4 TYP. ALUMINUM DOOR JAMB @ INT. GLAZING 3" = 1'-0"



3 TYP. HOLLOW METAL DOOR HEAD 3" = 1'-0"



2 TYP. HOLLOW METAL DOOR JAMB 3" = 1'-0"



1 ALUMINUM THRESHOLD 3" = 1'-0"

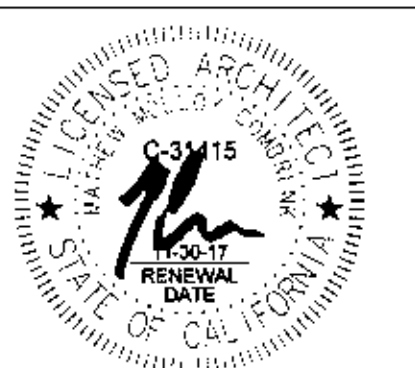
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emeryville, ca 94608  
510.515.0167  
www.brick-fp.com

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kandfield, ca 94904

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3/10/17 100% CD

rev date issue



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renovation

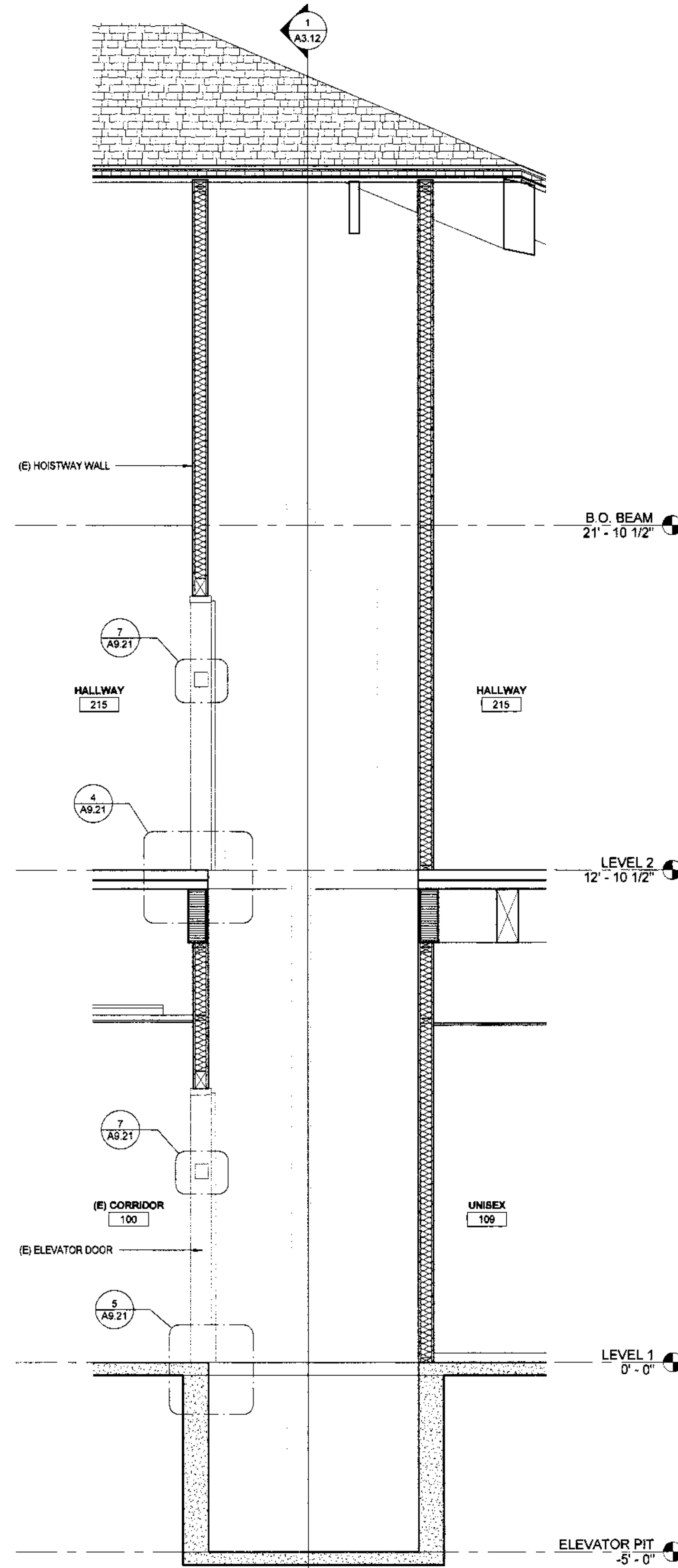
novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

CONSTRUCTION DOCUMENTS  
DETAILS - INTERIOR DOORS & STOREFRONT

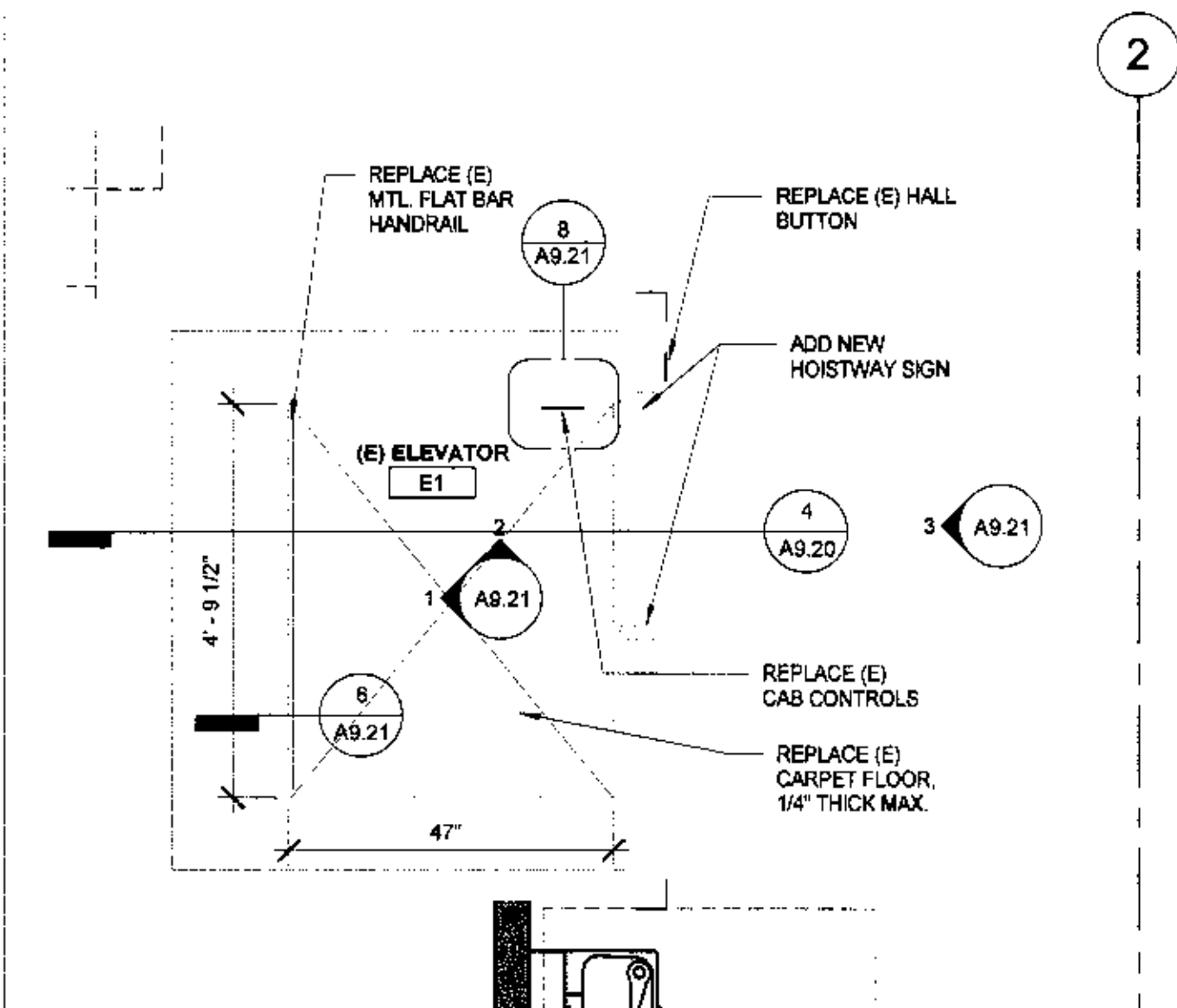


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4 WALL SECTION AT ELEVATOR

1/2" = 1'-0"



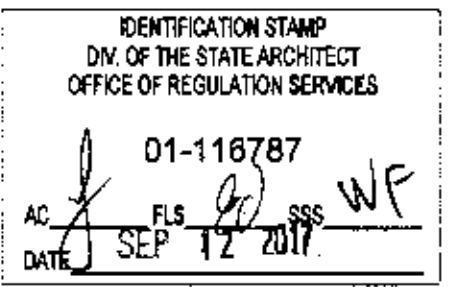
1 FLOOR PLAN - (E) FIRST FLOOR - ELEVATOR (2ND FLR.SIM.)

1/2" = 1'-0"

brick.

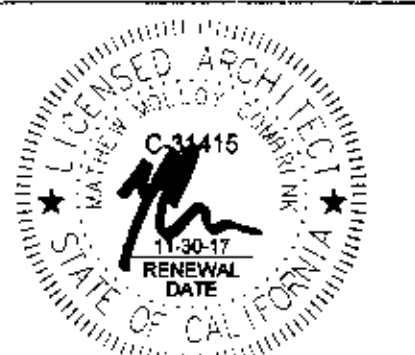
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project number: 16-148.01

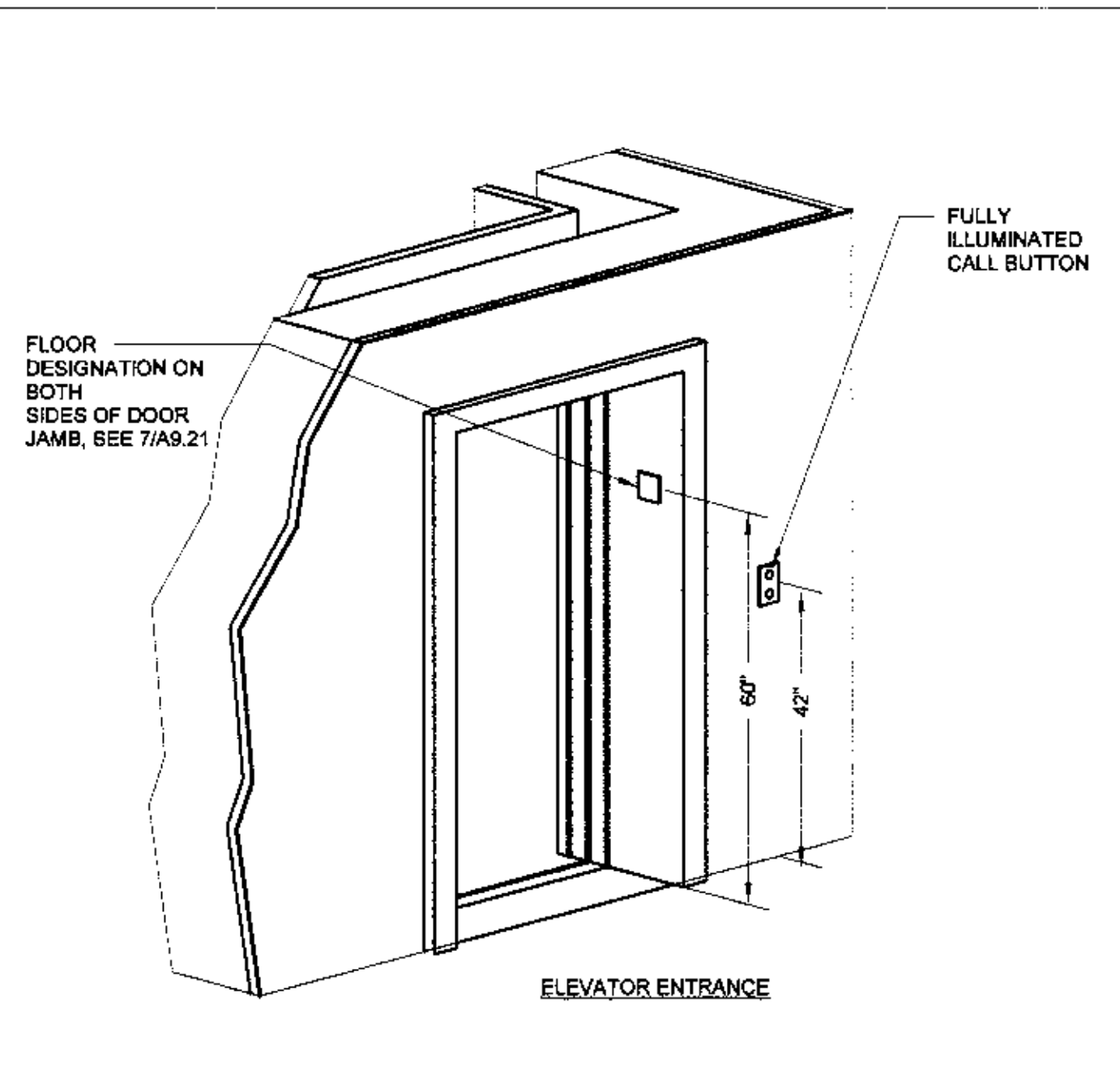
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CONSTRUCTION  
DOCUMENTS

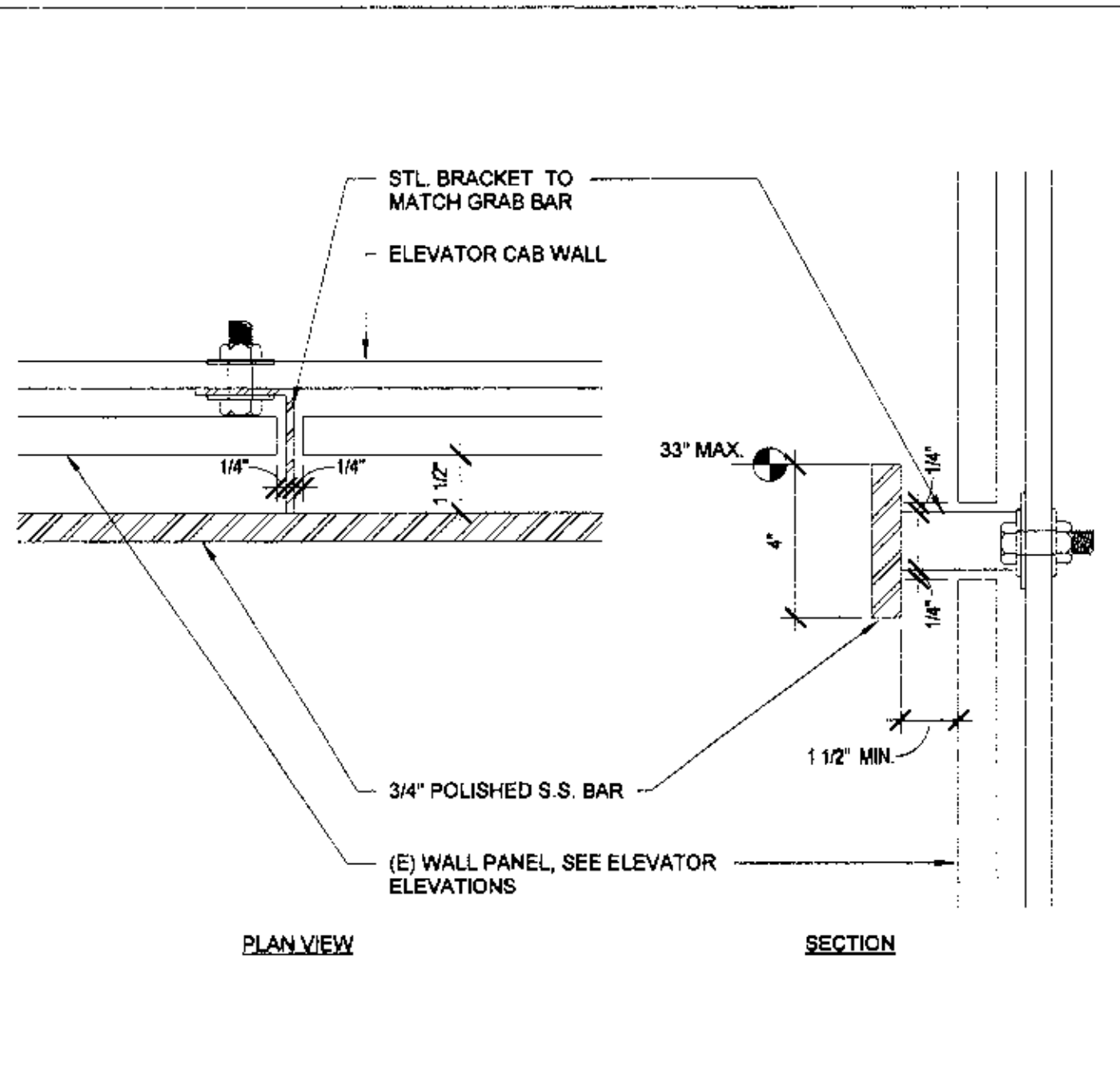
ELEVATOR  
PLANS AND  
SECTION

A9.20

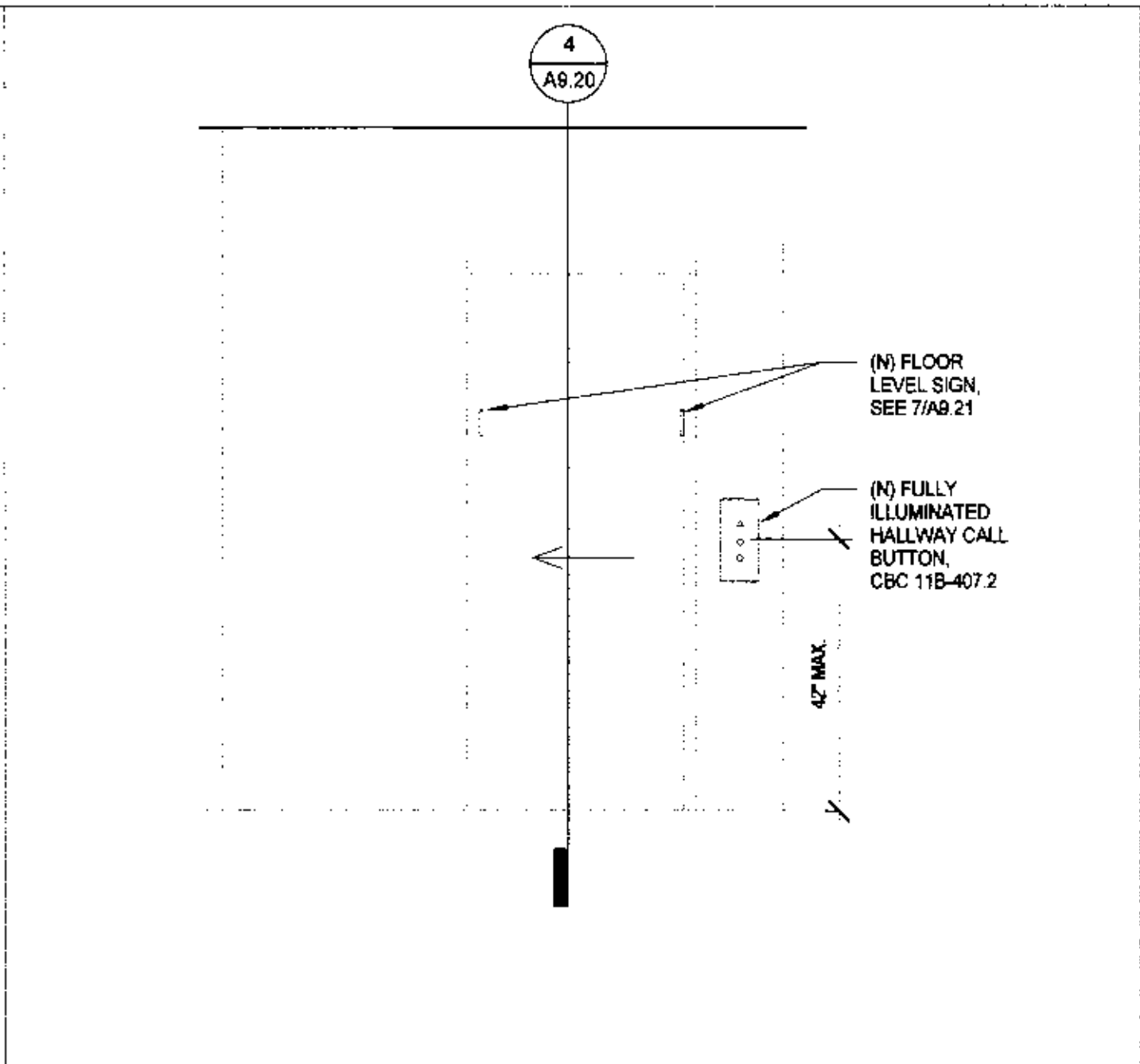
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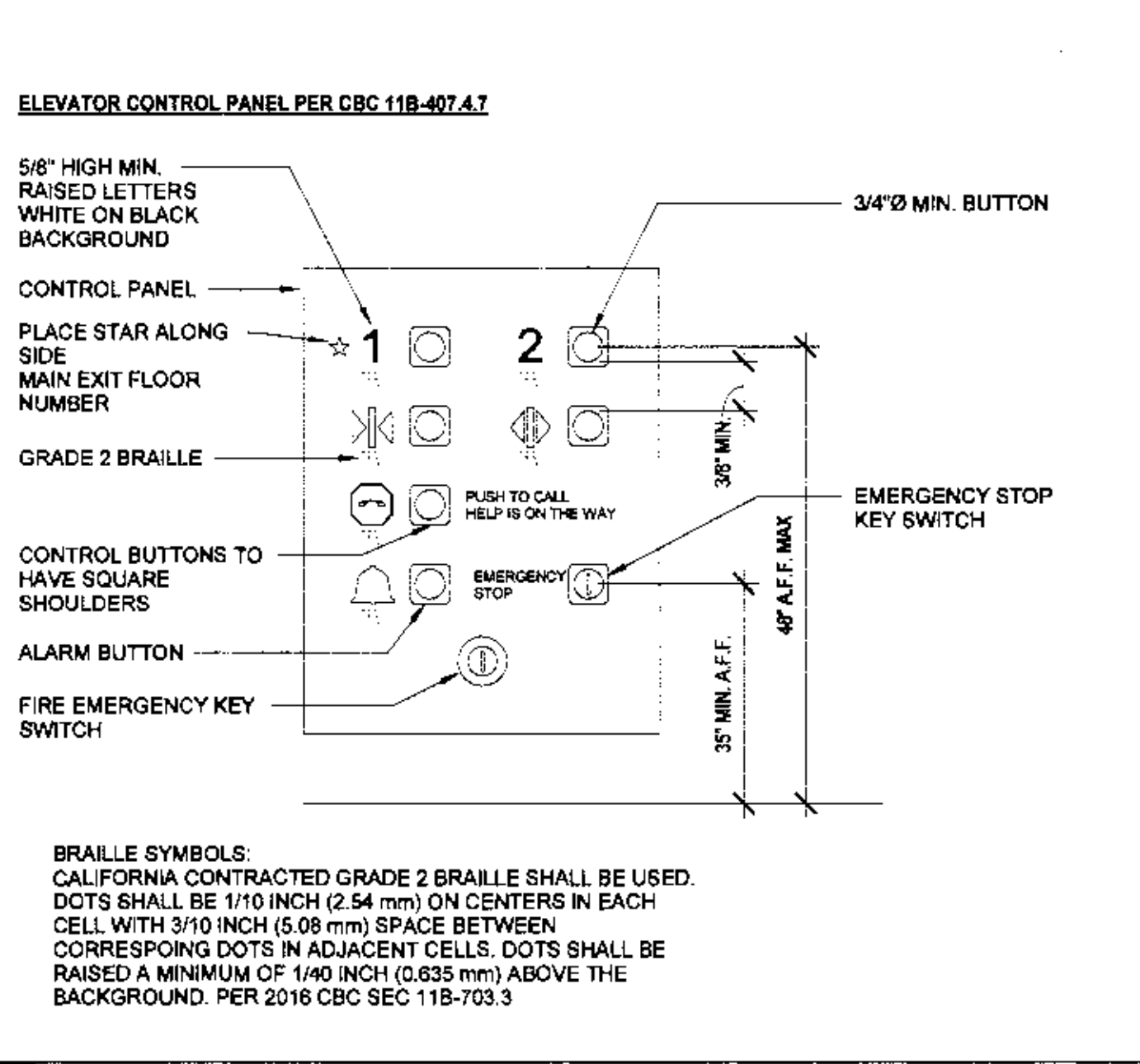
9 ELEVATOR ENTRY\_BLDG. 11 1/2" = 1'-0"



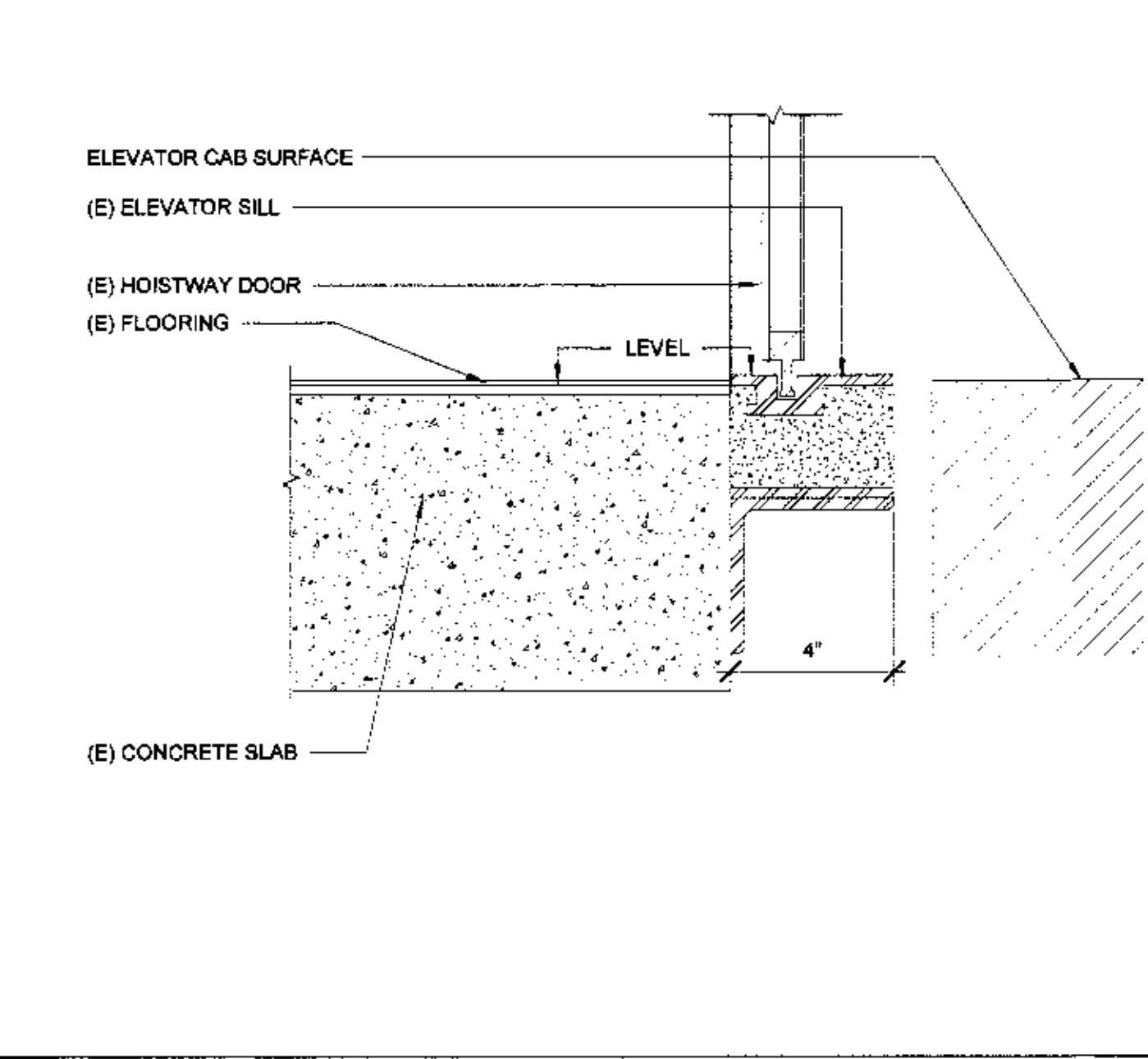
6 ELEVATOR SUPPORT RAIL 3" = 1'-0"



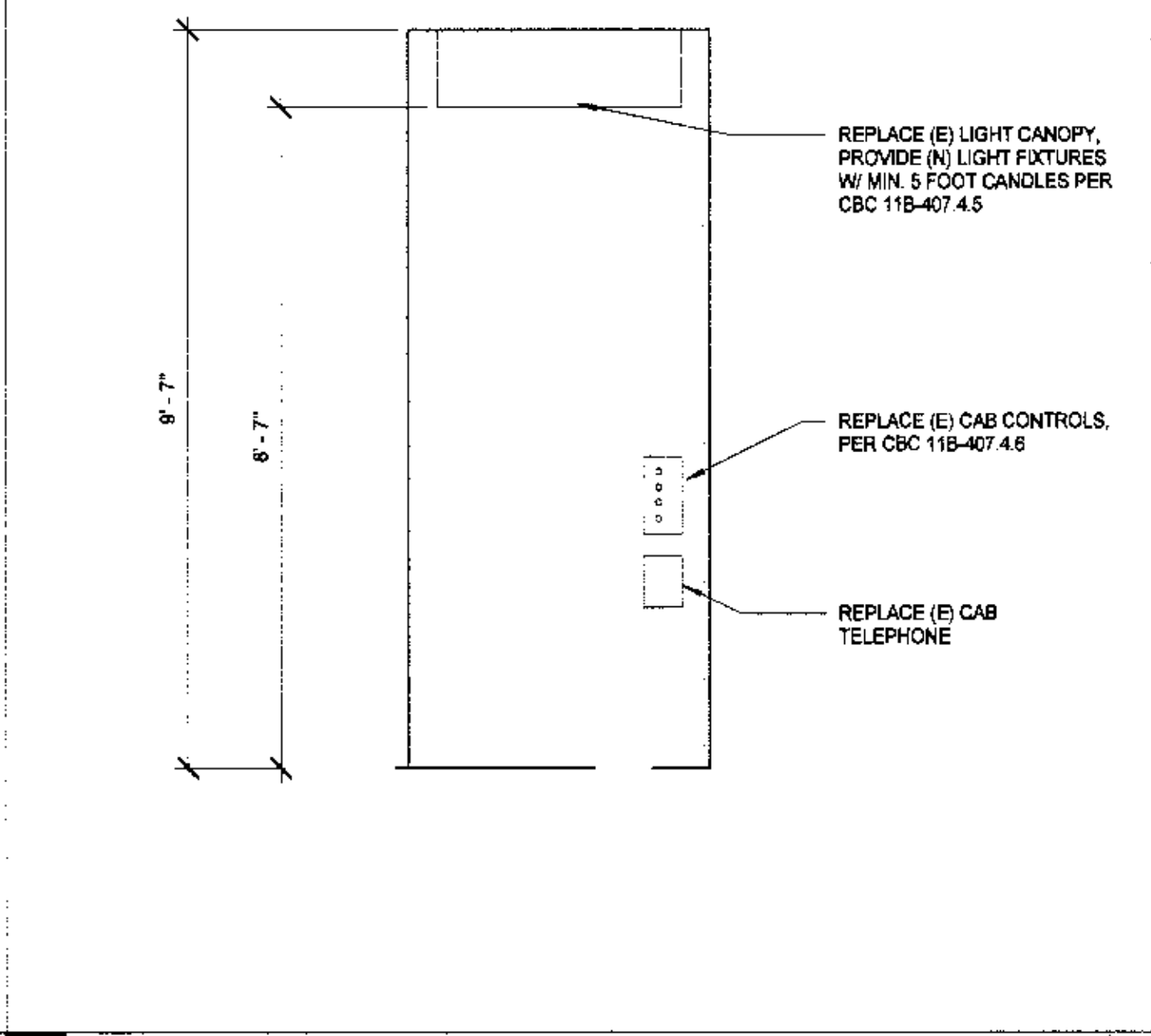
3 ELEVATOR HALLWAY ELEVATION 1/2" = 1'-0"



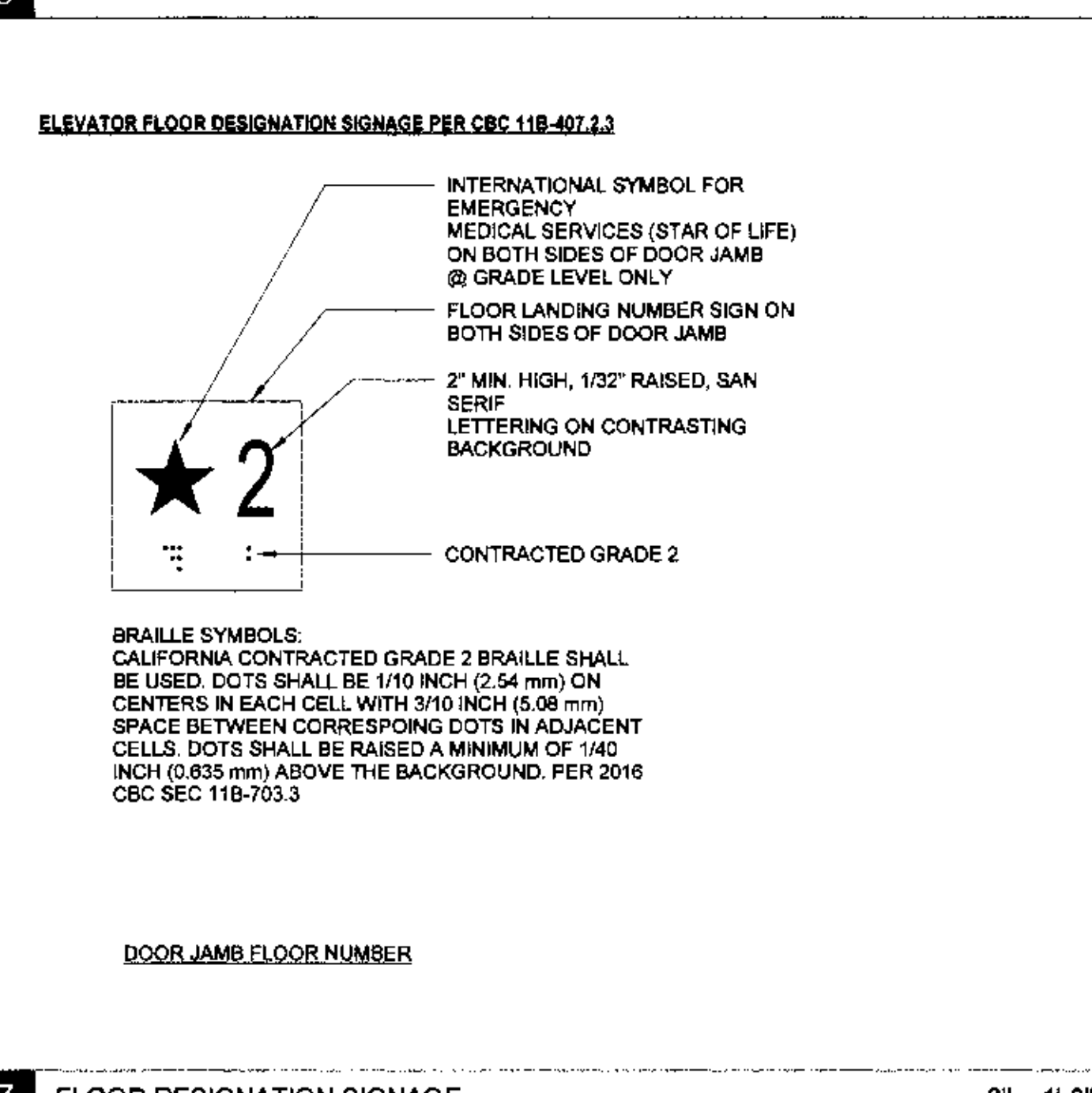
8 ELEVATOR CONTROL PANEL 3" = 1'-0"



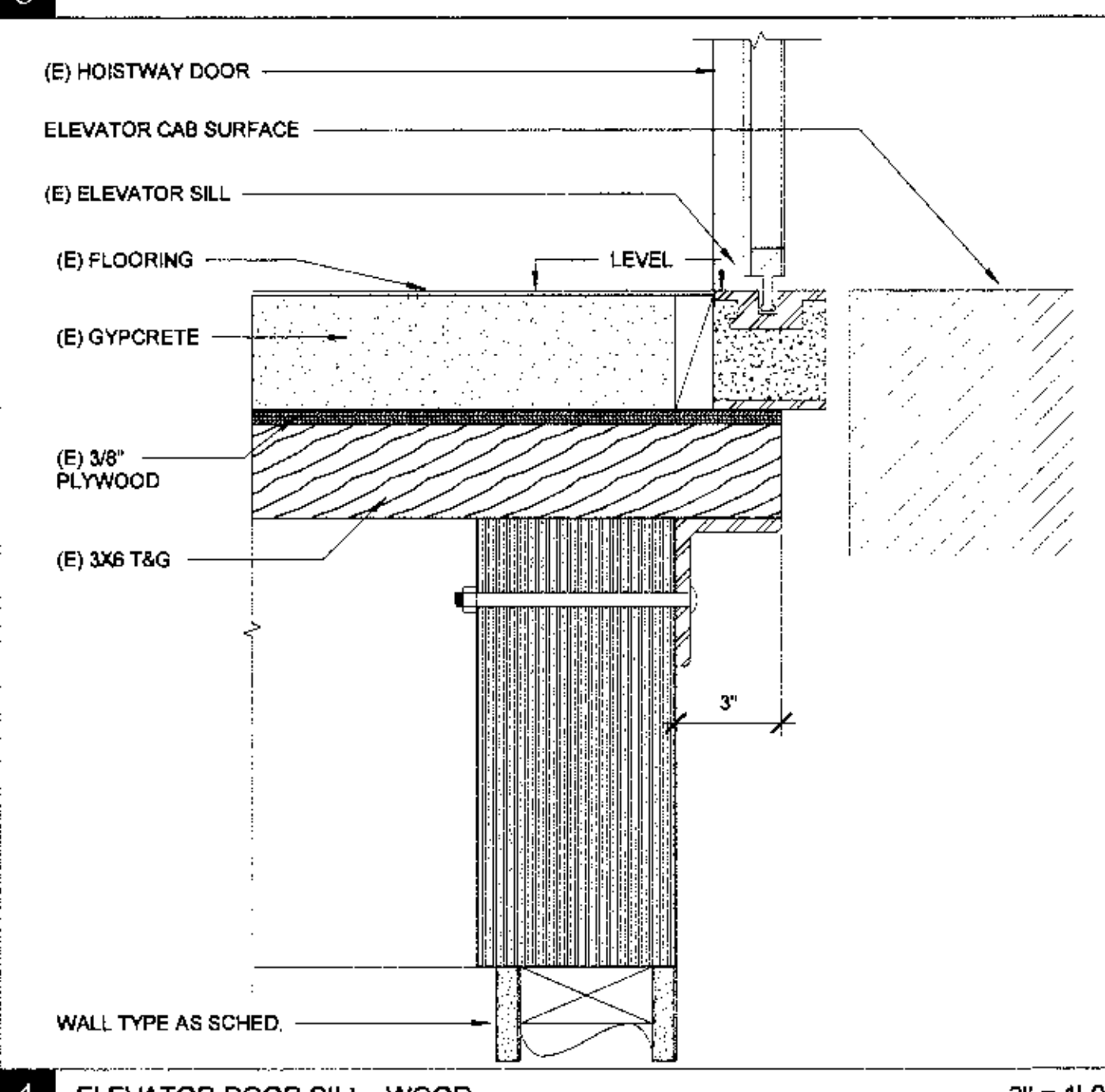
5 ELEVATOR DOOR SILL - CONCRETE 3" = 1'-0"



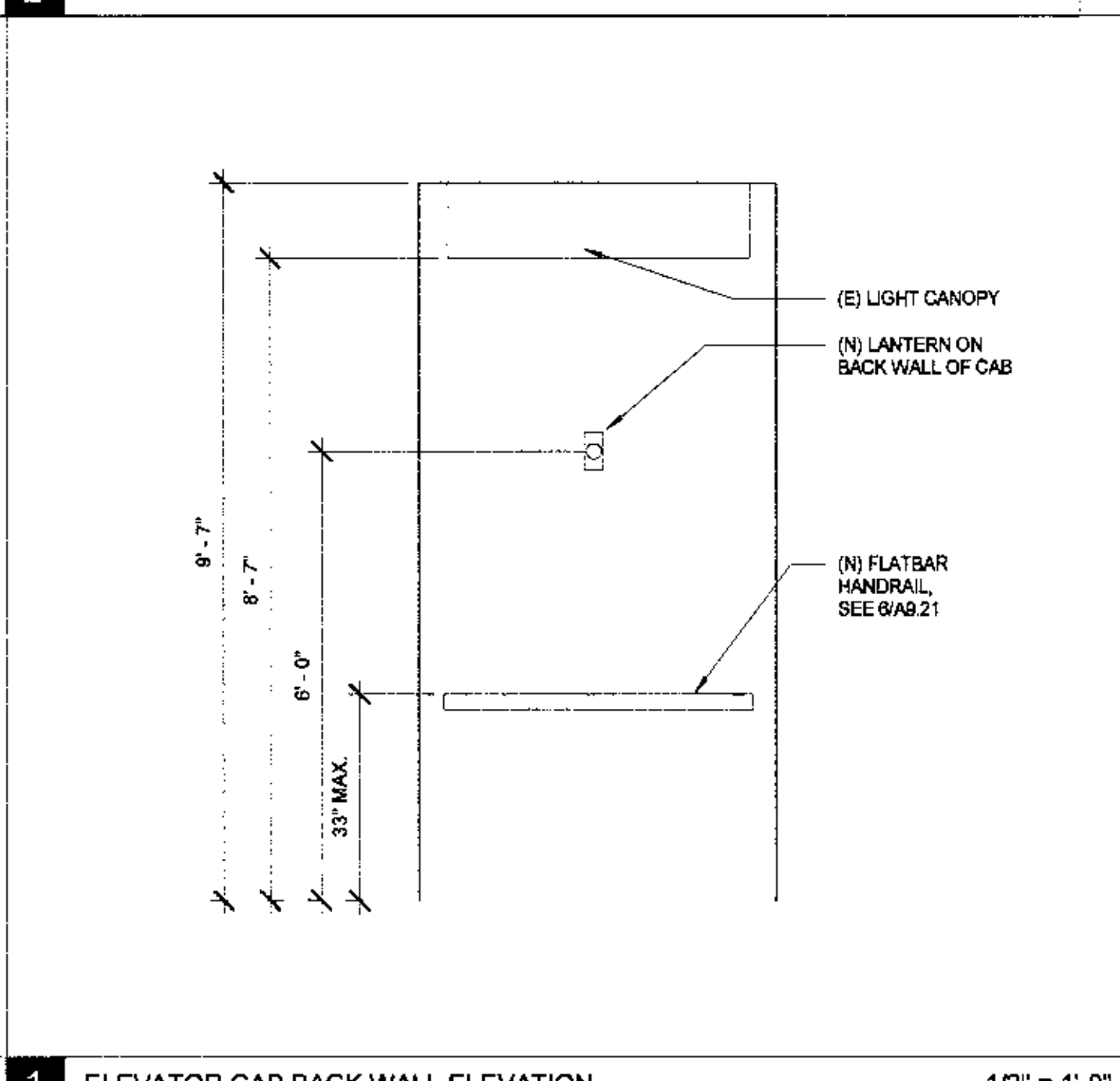
2 ELEVATOR CAB SIDE ELEVATION 1/2" = 1'-0"



7 FLOOR DESIGNATION SIGNAGE 3" = 1'-0"



4 ELEVATOR DOOR SILL - WOOD 3" = 1'-0"



1 ELEVATOR CAB BACK WALL ELEVATION 1/2" = 1'-0"

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kenfield, ca 94904

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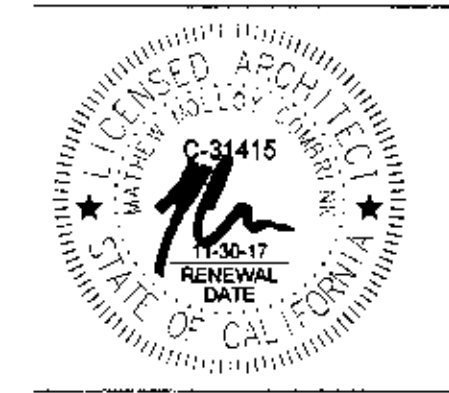
01-116787

AC: [Signature] FL: [Signature] SS: WF

DATE: JSEP 12 2017

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3/10/17 100% CD

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renovation

novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
ELEVATOR  
DETAILS

GENERAL NOTES

- 1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE 2016 CALIFORNIA BUILDING CODE, TITLE 24, PART 2 AND THE SPECIFICATIONS. THESE NOTES SHALL APPLY TO ALL STRUCTURAL DRAWINGS UNLESS OTHERWISE NOTED OR SHOWN.

DESIGN CRITERIA

- 1. VERTICAL LOADS: A. DEAD LOADS: i. ROOF DEAD LOAD: 24 PSF ii. FLOOR DEAD LOAD: 34 PSF B. LIVE LOADS: i. ROOF LIVE LOAD: 20 PSF ii. TYPICAL OFFICE FLOORS: 50 PSF iii. CORRIDORS AND LOBBIES ON SECOND FLOOR: 80 PSF

FOUNDATION NOTES

- 1. FOOTINGS SHALL BEAR ON UNDISTURBED NATURAL SOIL. FOR BIDDING PURPOSES, THE ELEVATION OF THE BOTTOM OF FOOTINGS SHALL BE AS INDICATED ON THE FOUNDATION PLANS AND ON DETAILS.

CONCRETE NOTES

- 1. ALL CONCRETE SHALL BE REINFORCED UNLESS NOTED "NOT REINFORCED". 2. SEE THE CALIFORNIA BUILDING CODE CHAPTER 19A AND THE SPECIFICATIONS FOR THE REQUIREMENTS FOR THE PRODUCTION, TESTING AND PLACEMENT OF CONCRETE.

Table with 6 columns: CONCRETE CLASS, USE, 28 DAY STRENGTH (PSI), MAX AGGREGATE SIZE (IN), CONCRETE WEIGHT (PCF), MAN W/C RATIO %, FLYASH %. Row A: PAD/FTG ON GRADE, 3000, 1, 145, 0.45, 25.

CARPENTRY NOTES

- 1. FRAMING LUMBER: DOUGLAS FIR-LARCH, MANUFACTURED AND GRADED IN ACCORDANCE WITH THE WEST COAST LUMBER INSPECTION BUREAU "STANDARD GRADING RULES NO. 17", EFFECTIVE SEPTEMBER 1, 1991.

Table with 2 columns: BOLT DIAMETER, PLATE SIZES. Rows: 1/2", 5/8", 3/4", 7/8", 1".

PLYWOOD SHEATHING NOTES

- 1. ROOF, FLOORS, ALL EXTERIOR WALLS AND INTERIOR SHEAR WALLS (WHERE SHEATHING IS TO BE REPLACED) SHALL BE SHEATHED WITH DOUGLAS FIR PLYWOOD WITH EXTERIOR GLUE AS FOLLOWS:

NAILING NOTES

- 1. ALL NAILS SHALL BE COMMON WIRE NAILS. WHERE NAILS TEND TO SPLIT THE WOOD, NAIL HOLES SHALL BE SUB-DRILLED. NAILS AT PRESSURE-PRESERVATIVE TREATED AND FIRE-RETARDANT TREATED WOOD SHALL BE HOT DIPPED ZINC COATED GALVANIZED, OR STAINLESS STEEL.

STRUCTURAL STEEL NOTES

- 1. STRUCTURAL STEEL SHALL BE ASTM A36 UNLESS OTHERWISE NOTED. ALL HOLLOW STEEL SECTIONS SHALL BE ASTM A500, GRADE B.

COLD FORMED METAL FRAMING NOTES

- 1. METAL STUD FABRICATION SHALL CONFORM TO AISI SPECIFICATIONS FOR THE DESIGN OF LIGHT GAGE COLD FORMED SECTIONS.

EXPANSION ANCHORS IN HARDENED CONCRETE NOTES

- 1. INSTALLATION: THE ANCHORS MUST BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS GIVEN IN ICC RESEARCH COMMITTEE RECOMMENDATIONS FOR THE SPECIFIC ANCHOR.

Table with 6 columns: ANCHOR DIAMETER, MINIMUM HOLE DEPTH, MINIMUM EFFECTIVE EMBEDMENT, ALLOWABLE STATIC LOAD (LBS), TEST LOAD (LBS), MINIMUM INSTALLATION TORQUE (FT-LBS). Rows for 3/8", 1/2", 5/8", 3/4" diameters.

TESTS, INSPECTIONS AND OBSERVATIONS NOTES

- 1. TESTS AND INSPECTIONS SHALL BE PROVIDED FOR ALL ITEMS AS REQUIRED BY THE CALIFORNIA BUILDING CODE. SEE STATEMENT OF SPECIAL INSPECTIONS FOR REQUIREMENTS.

SYMBOLS AND ABBREVIATIONS

Table with 4 columns: SYMBOL, SECTION A ON DRAWING S2.1, DIMENSION, DESCRIPTION. Lists symbols for HD, HDG, HGR, HCR, HOS, HSS, etc.

STRUCTURAL DRAWING LIST

Table with 2 columns: SHEET NO., SHEET NAME. Lists sheets S1.1 through S4.1.

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CLIENT marin community college district, 835 college avenue, kentfield, ca 94904



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9/12/17 DSA BACK CHECK 2, 9/07/17 DSA BACK CHECK, 5/31/17 DSA PLAN REVIEW, 3/10/17 100% CD

IDA STRUCTURAL ENGINEERS, 1620 Telegraph Ave. Ste. 202, Oakland, CA 94612, 747.503.9429, ida.com



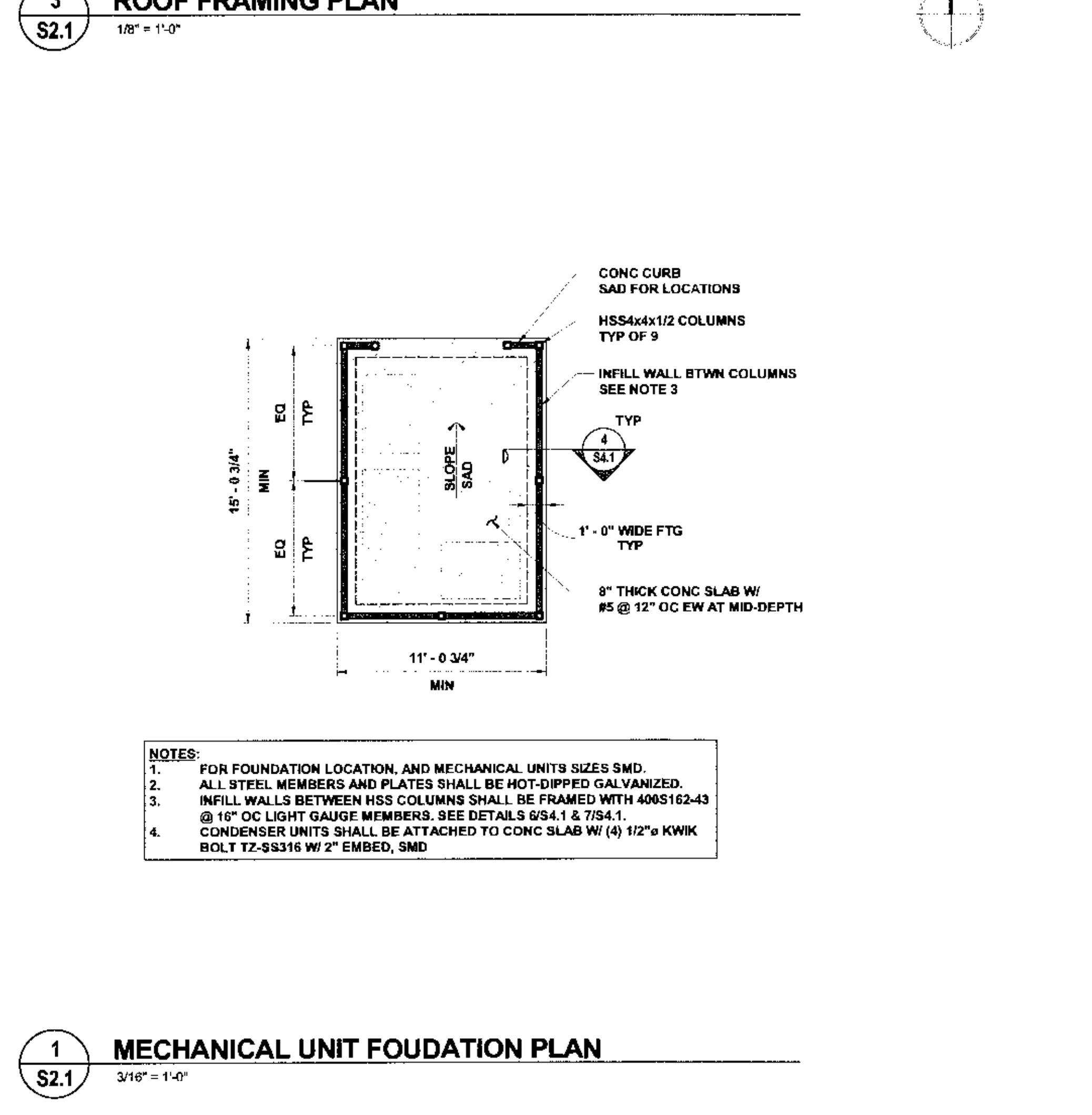
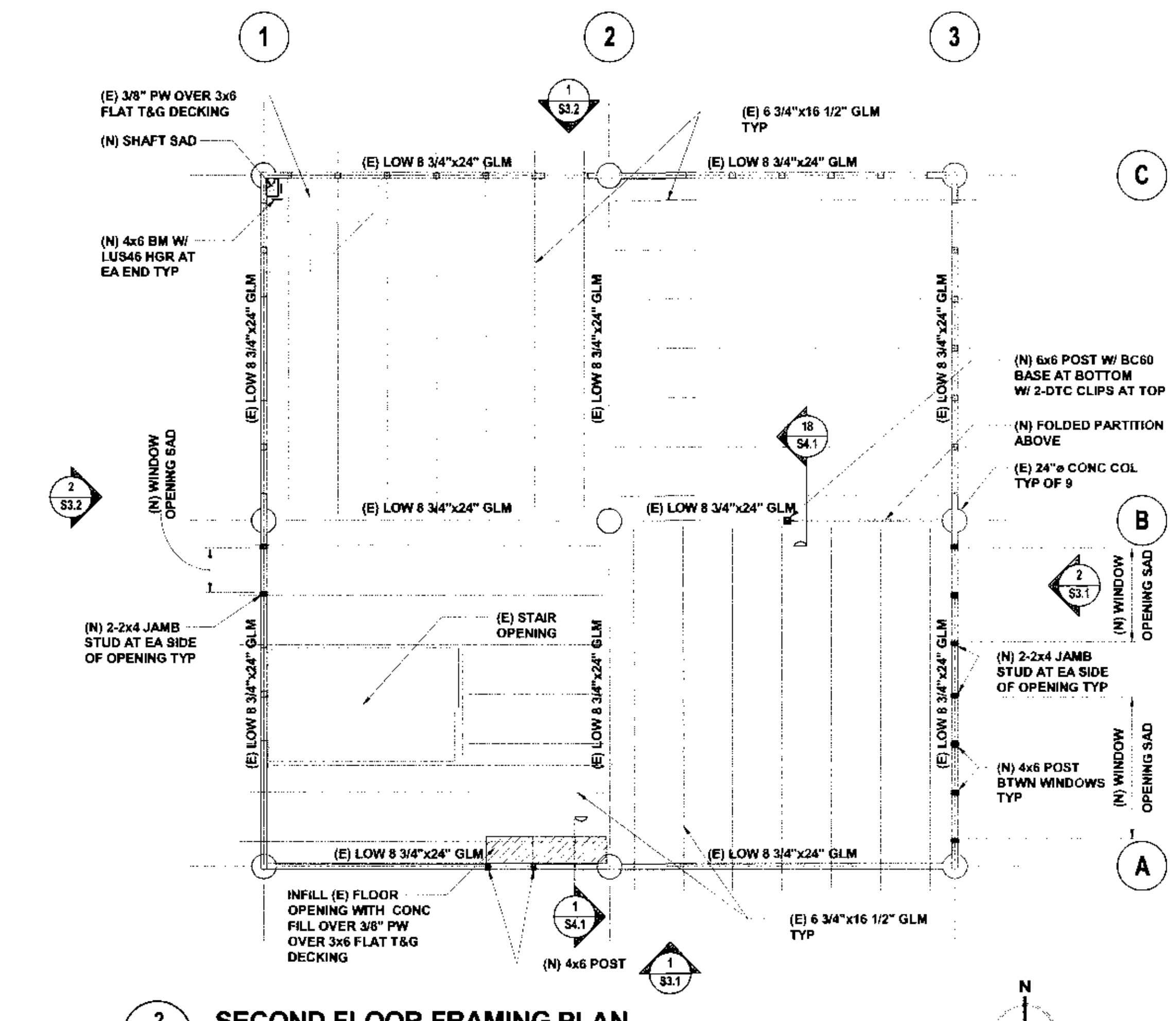
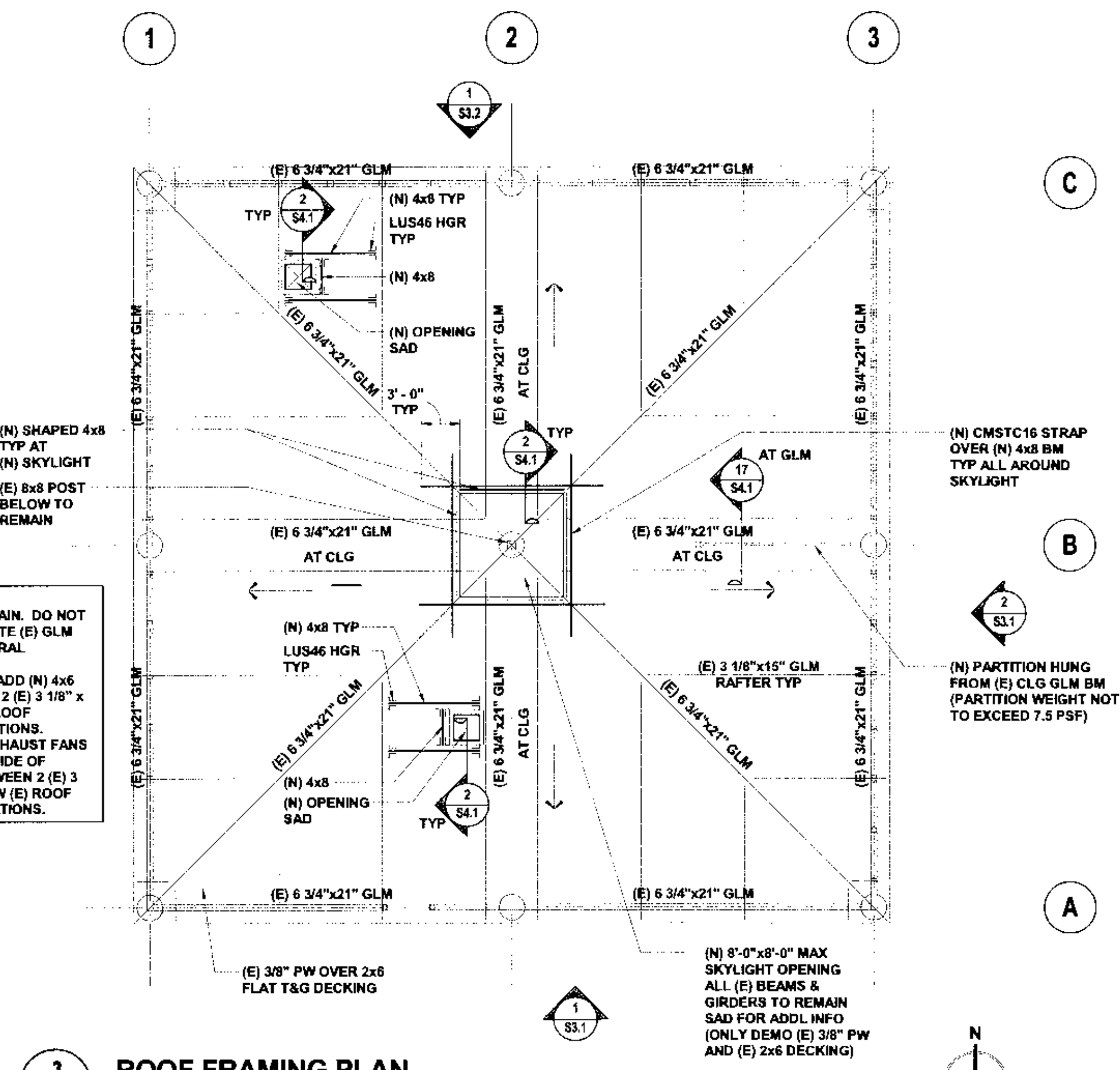
college of marin - indian valley campus bldg. 11 renovation

novato, california, project number: 17019.1

scale: as noted, date: 3/3/2017

CONSTRUCTION DOCUMENTS, GENERAL NOTES, SYMBOLS AND ABBREVIATIONS

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**NOTES:**

- ALL NEW FRAMING IN THE EXTERIOR WALLS SHALL BE FIRE-RETARDANT TREATED. ALL NAILS PENETRATING TREATED WOOD SHALL BE HOT-DIPPED GALVANIZED.

**ARCHITECT**  
brick  
1286 66th street  
emeryville, ca 94608  
510.516.0167  
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8/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

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**IDA**  
STRUCTURAL ENGINEERS  
1429 Telegraph Ave. Ste. 300  
Oakland, CA 94612  
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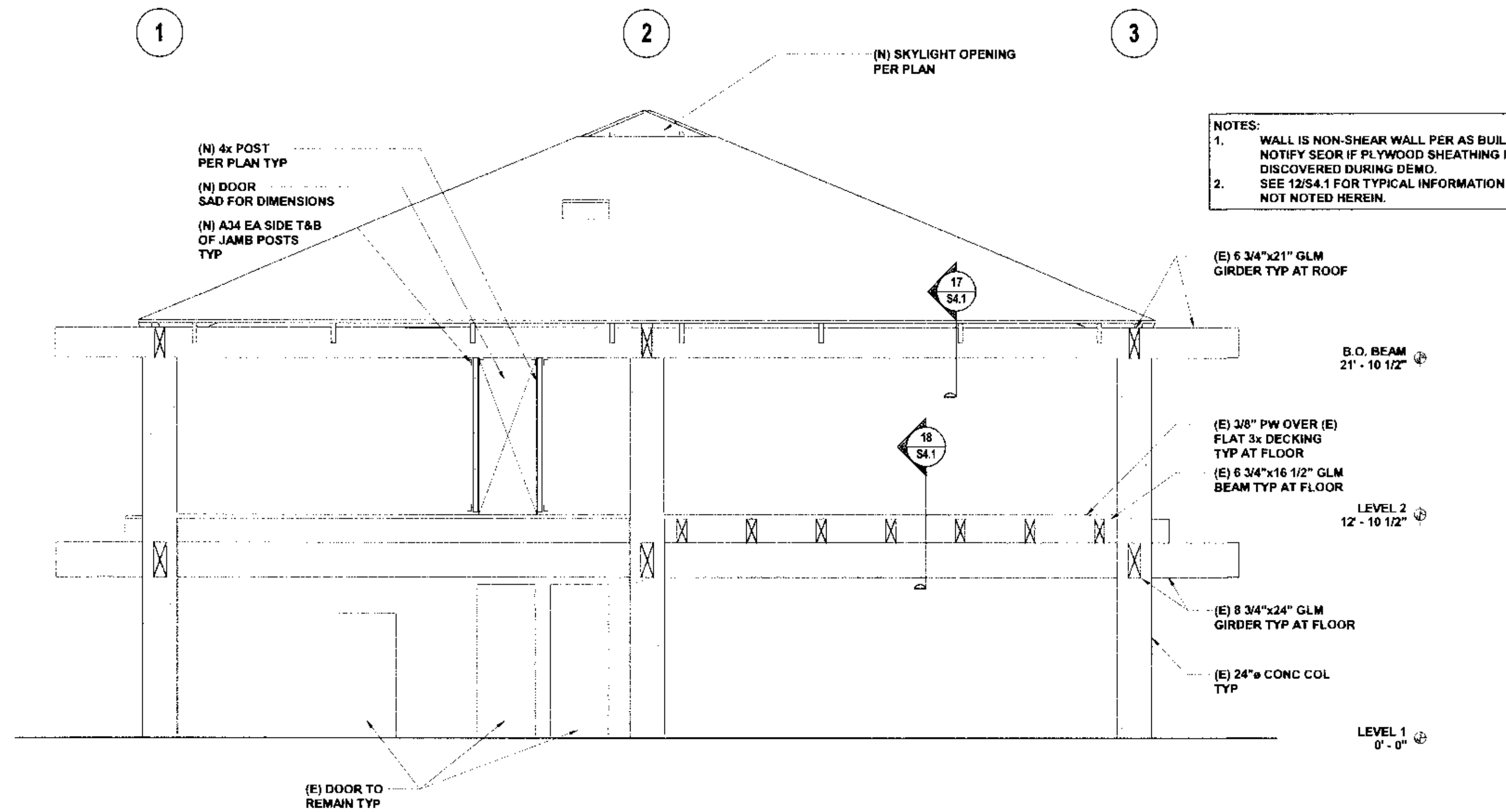
college of marin - indian valley campus bldg. 11 renovation

novato, california  
project number: 17019.1

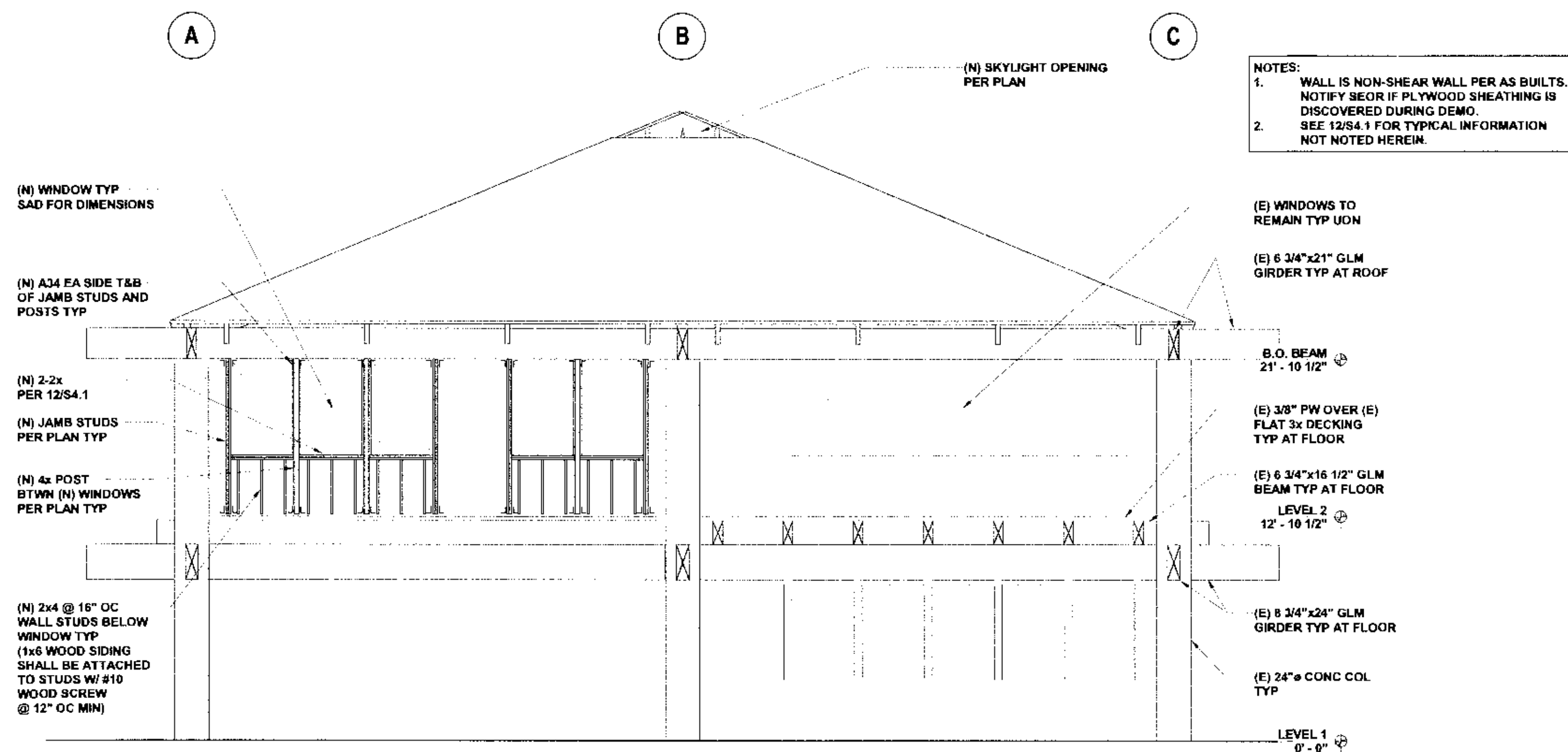
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date: 3/3/2017

**CONSTRUCTION DOCUMENTS**  
**FRAMING PLANS**

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**1 SOUTH FRAMING ELEVATION**  
S3.1 3/16" = 1'-0"



**2 EAST FRAMING ELEVATION**  
S3.1 3/16" = 1'-0"

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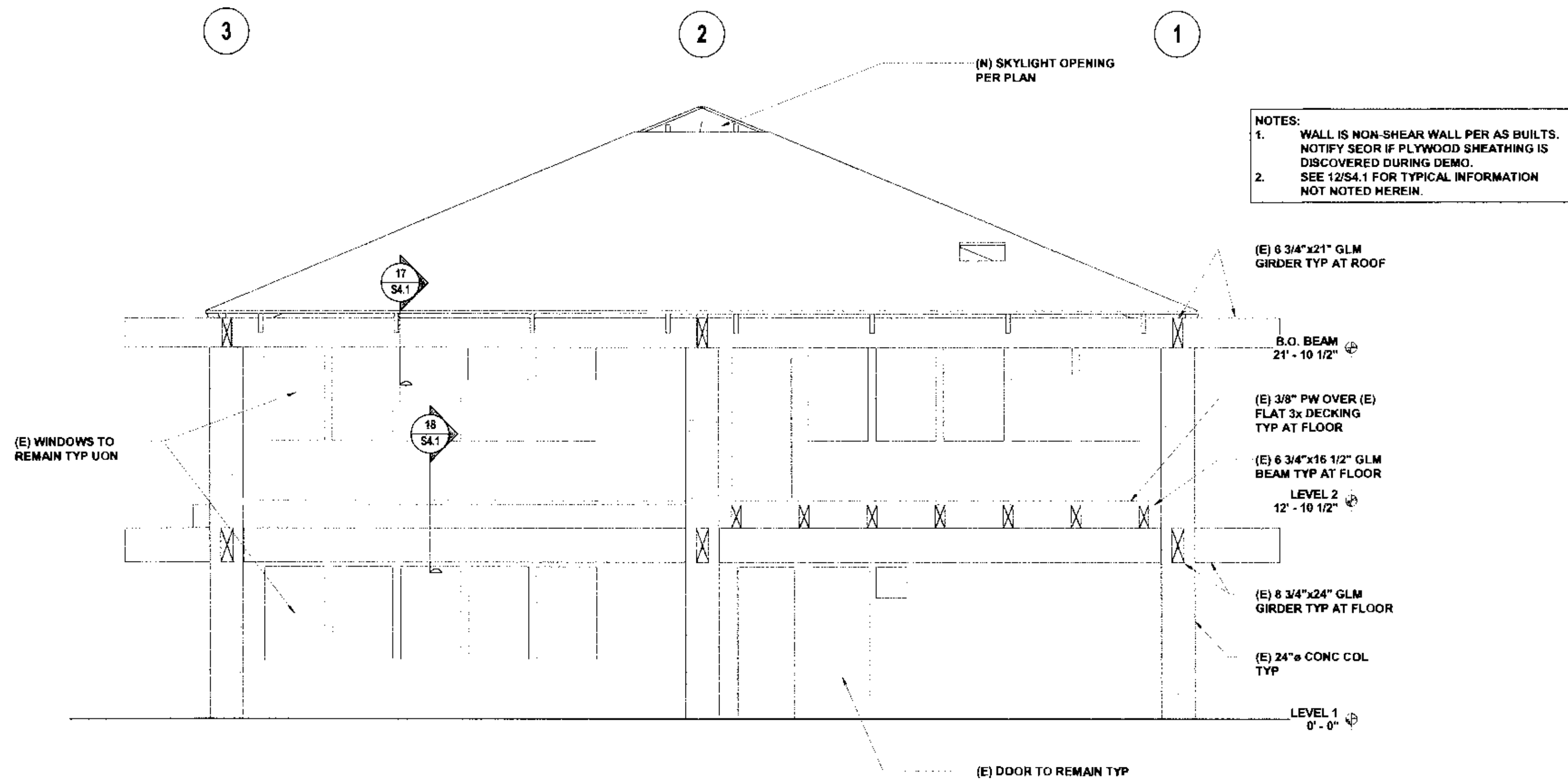
college of marin -  
indian valley  
campus bldg. 11  
renovation

novato, california  
project number: 17019.1

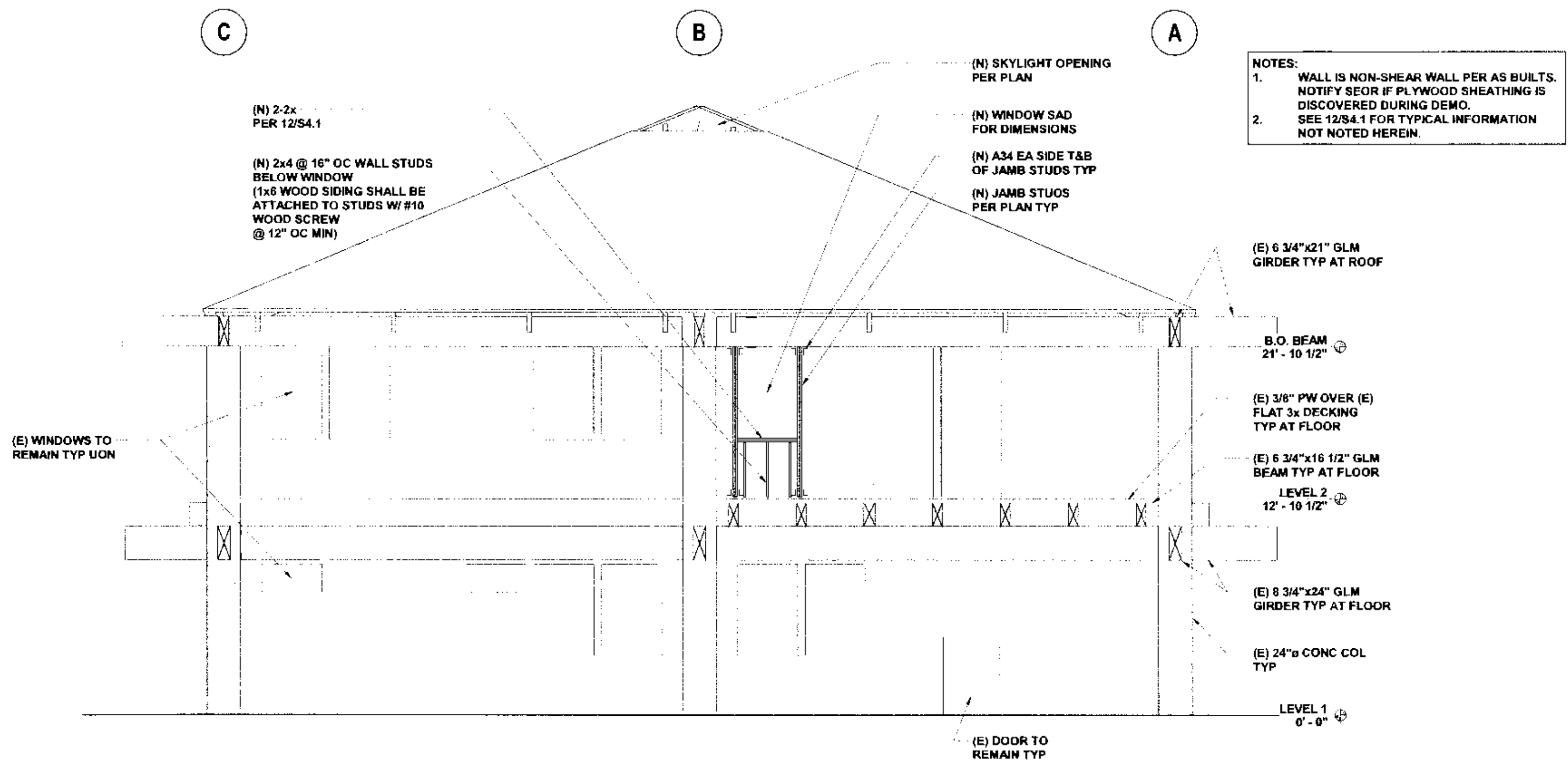
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CONSTRUCTION DOCUMENTS  
FRAMING ELEVATIONS

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**1 NORTH FRAMING ELEVATION**  
S3.2 3/16" = 1'-0"



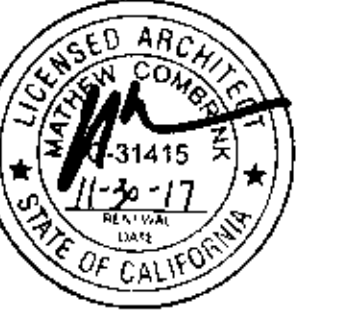
**2 WEST FRAMING ELEVATION**  
S3.2 3/16" = 1'-0"

**NOTES:**  
1. WALL IS NON-SHEAR WALL PER AS BUILTS. NOTIFY SEOR IF PLYWOOD SHEATHING IS DISCOVERED DURING DEMO. SEE 12/54.1 FOR TYPICAL INFORMATION NOT NOTED HEREIN.  
2. SEE 12/54.1 FOR TYPICAL INFORMATION NOT NOTED HEREIN.

**NOTES:**  
1. WALL IS NON-SHEAR WALL PER AS BUILTS. NOTIFY SEOR IF PLYWOOD SHEATHING IS DISCOVERED DURING DEMO. SEE 12/54.1 FOR TYPICAL INFORMATION NOT NOTED HEREIN.  
2. SEE 12/54.1 FOR TYPICAL INFORMATION NOT NOTED HEREIN.

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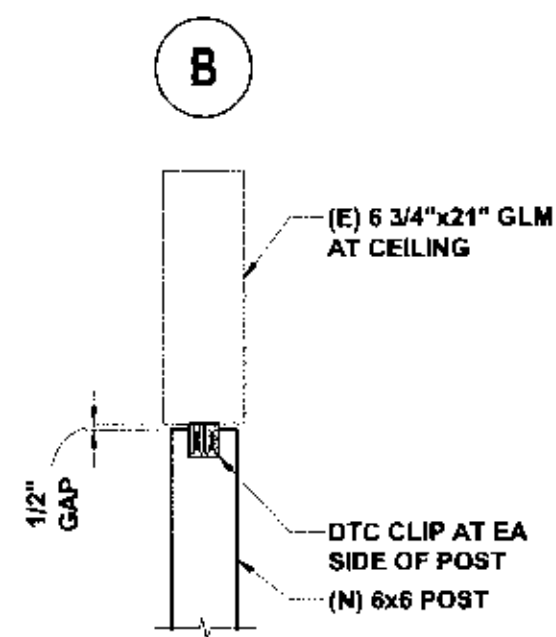


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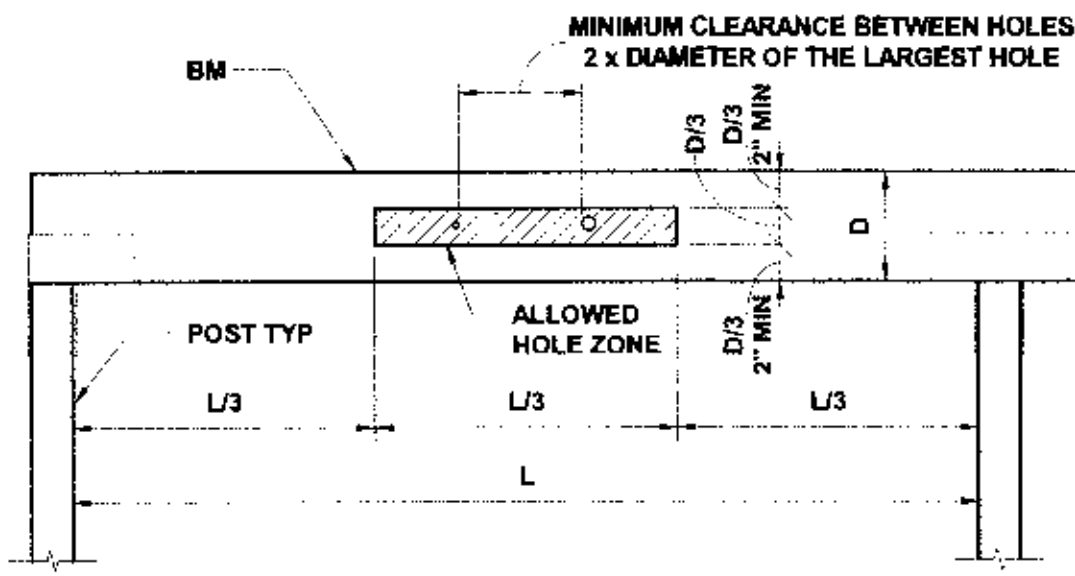
novato, california  
project number: 17019.1

scale: as noted  
date: 3/3/2017

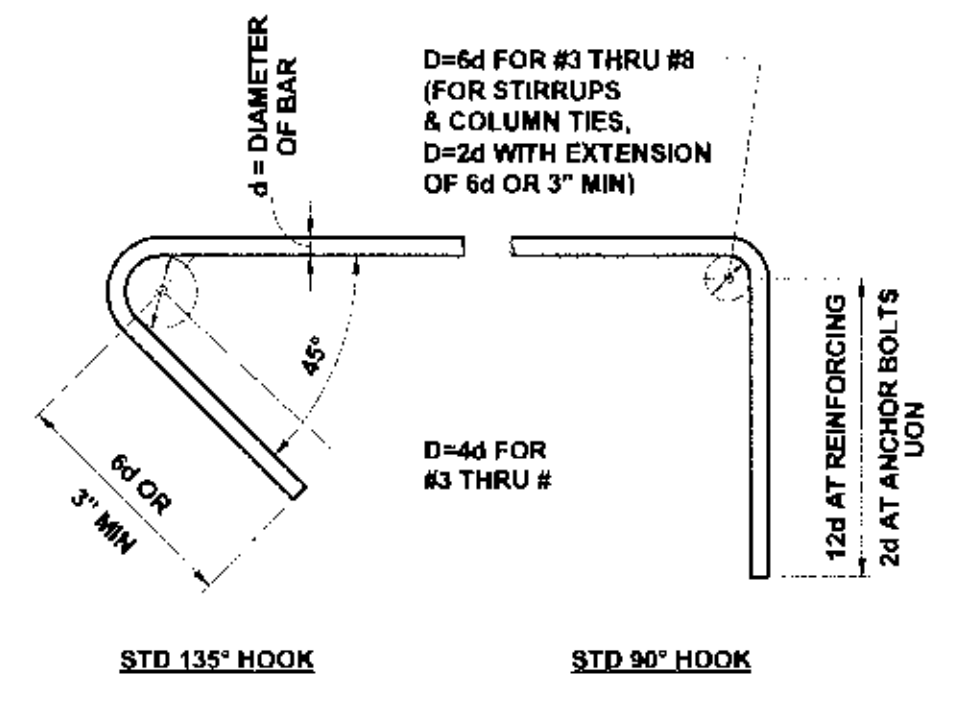
**CONSTRUCTION DOCUMENTS**  
FRAMING ELEVATIONS



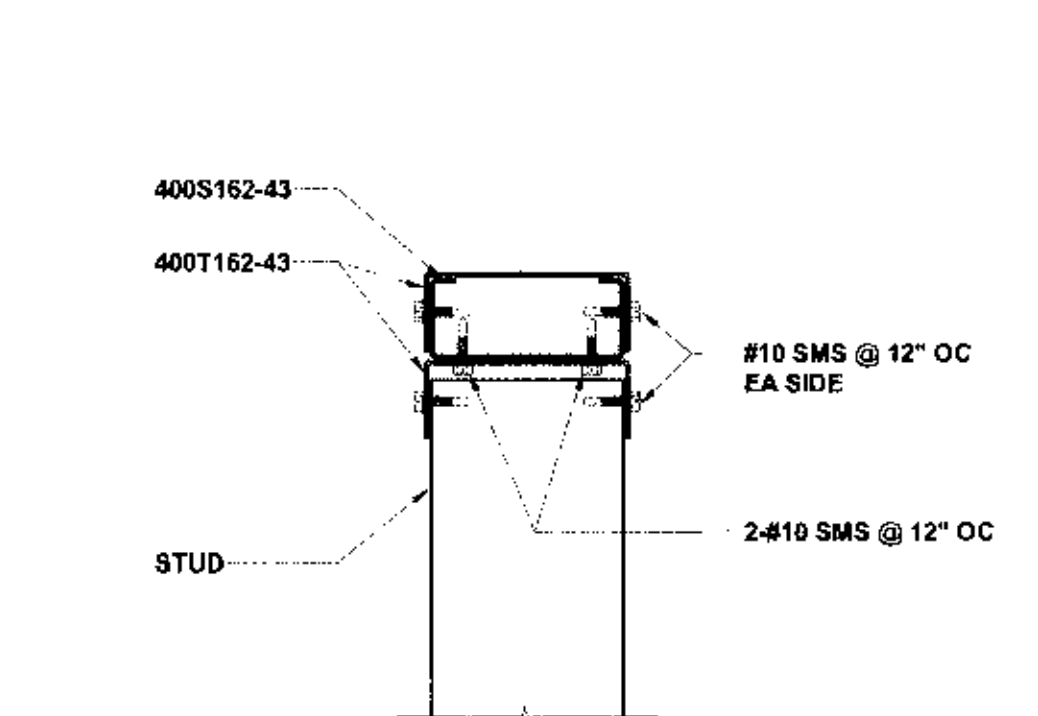
**17**  
**S4.1** DETAIL  
3/4" = 1'-0"



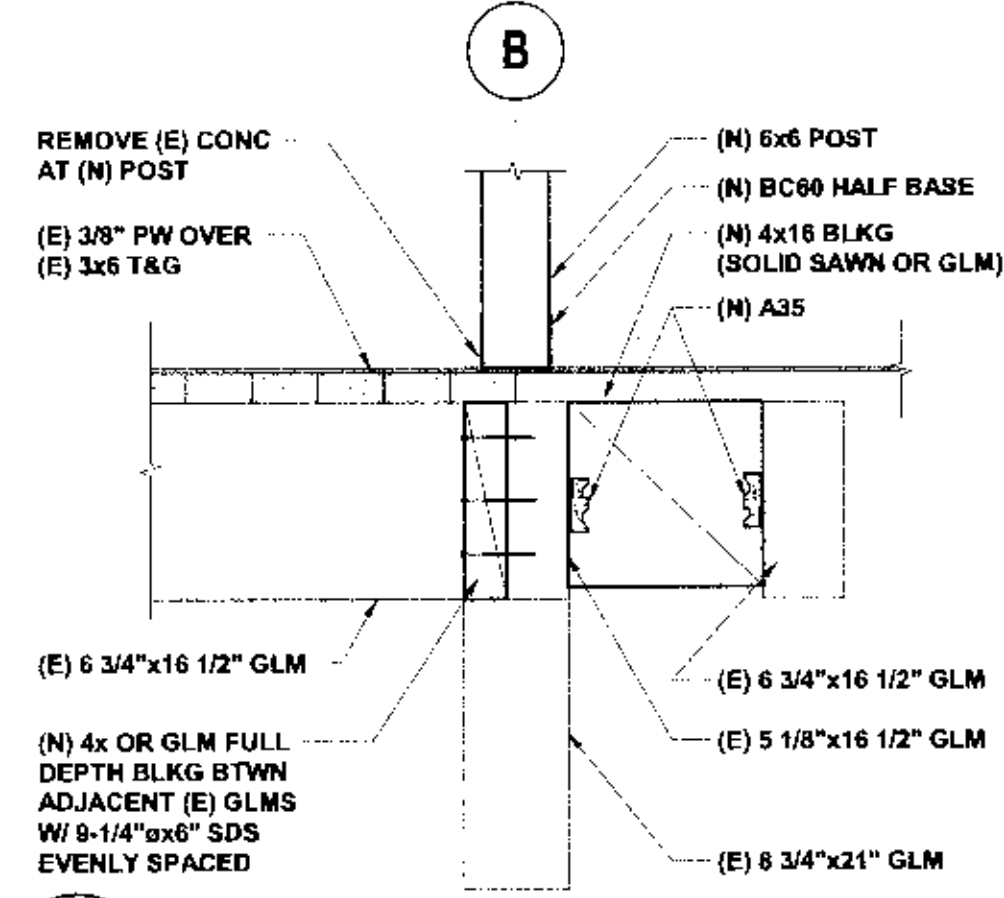
**13**  
**S4.1** HOLES IN GLM BEAMS  
NTS



**9**  
**S4.1** TYPICAL REINFORCING BAR & ANCHOR BOLT HOOK  
NTS



**1**  
**S4.1** FLOOR INFILL DETAIL  
3/4" = 1'-0"

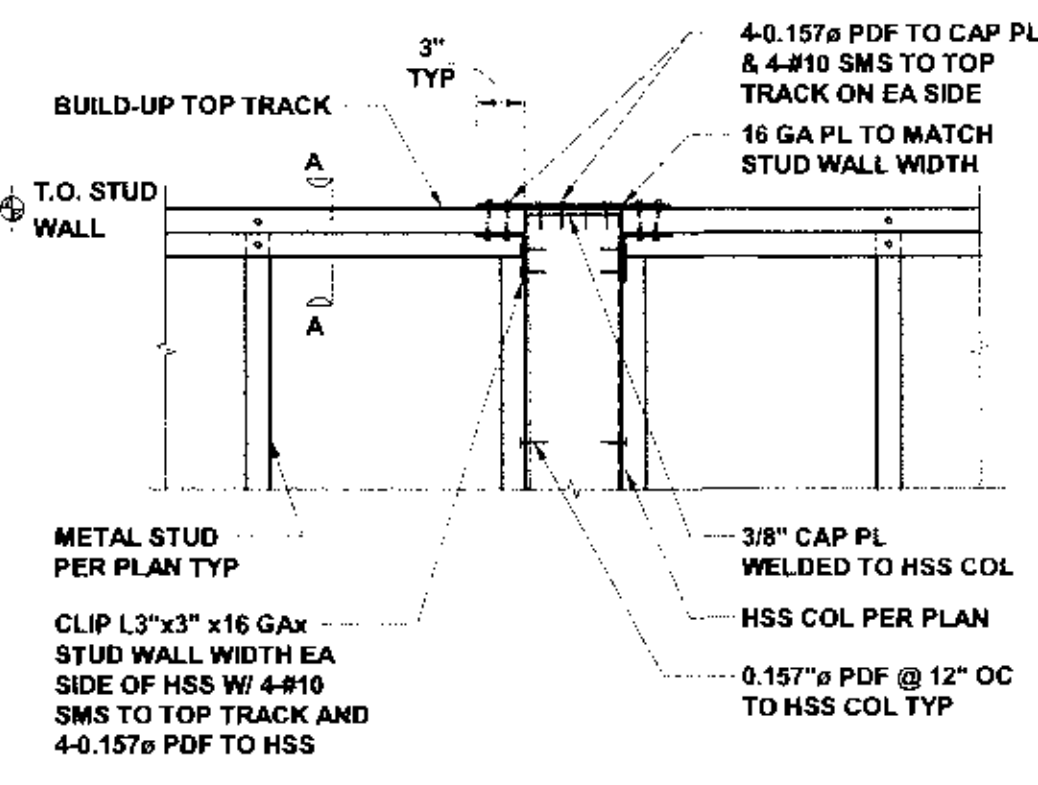


**18**  
**S4.1** DETAIL  
3/4" = 1'-0"

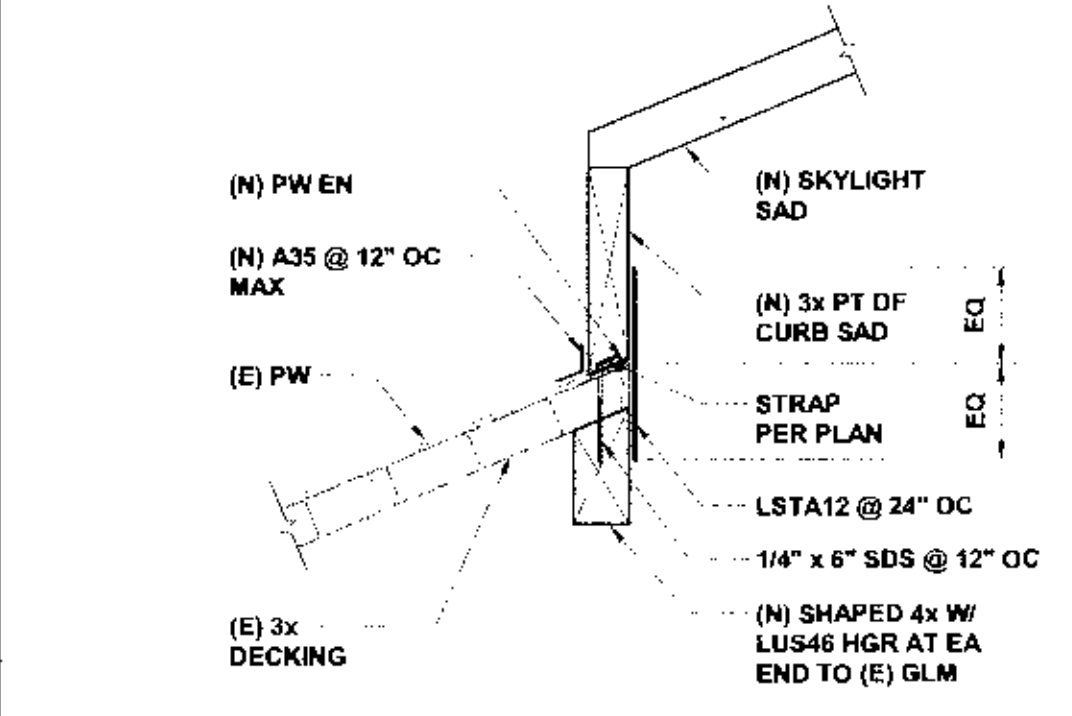
CONCRETE STRENGTH PSI	BAR TYPE	BAR SIZE									
		#3		#4		#5		#6		#7	
		A	B	A	B	A	B	A	B	A	B
3000	TOP BAR	22	28	29	37	36	47	43	56	63	81
	ALL OTHER BARS	17	22	22	29	28	36	33	43	46	63

- NOTES:**
1. SPLICE LENGTH IN INCHES.
  2. USE CLASS B FOR ALL LAP SPLICES EXCEPT CLASS A MAY BE USED FOR NON-STRUCTURAL SLABS ON GRADE.
  3. TOP BARS = HORIZONTAL BARS (OTHER THAN IN WALLS) PLACED WITH MORE THAN 12" OF FRESH CONCRETE CAST BELOW BARS. TABLE IS BASED UPON MINIMUM CLEAR SPACING GREATER THAN ONE BAR DIAMETER AND MINIMUM CLEAR SPACING GREATER THAN TWO BAR DIAMETERS, WHERE EITHER OF THESE REQUIREMENTS IS NOT MET, INCREASE LAP LENGTH BY 50%.
  - 4.

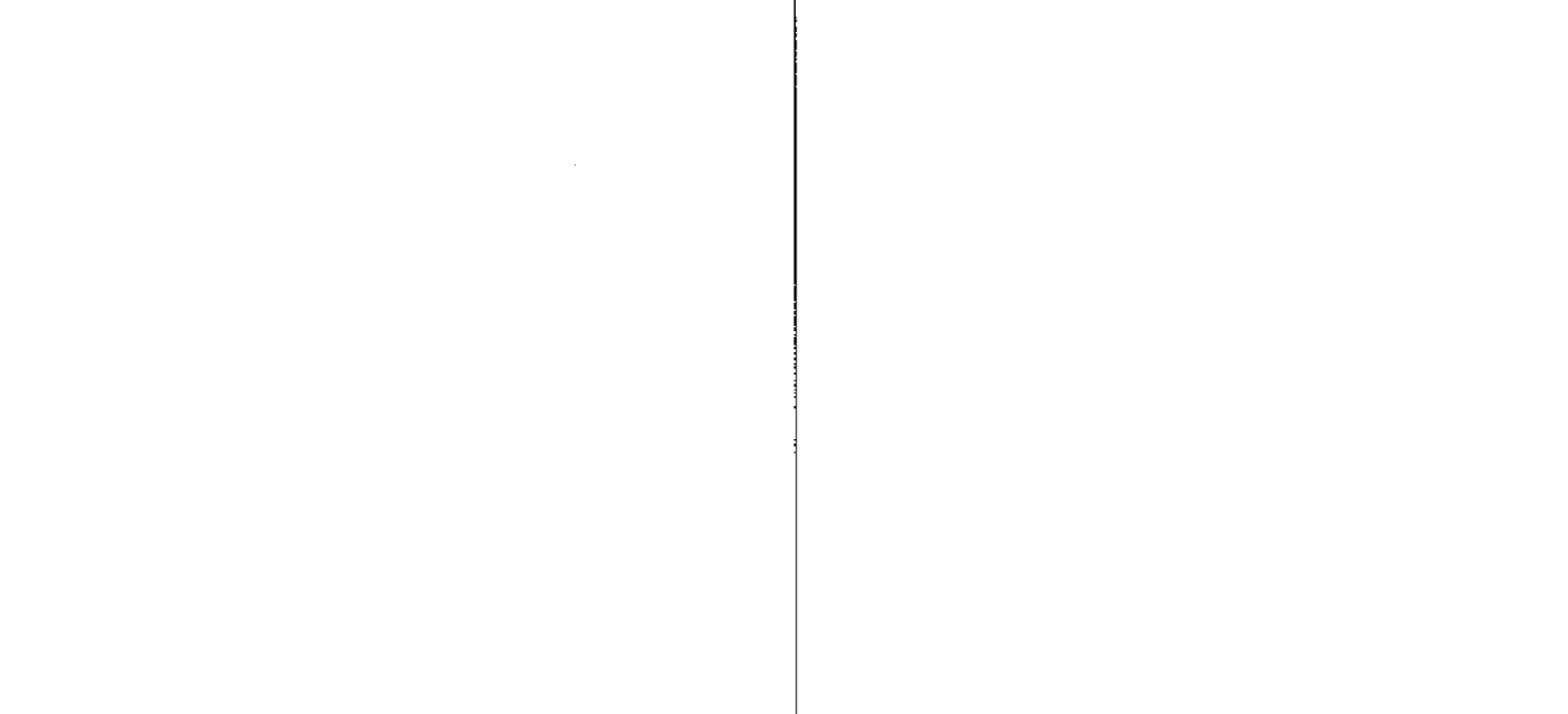
**10**  
**S4.1** REINFORCING BAR LAP SPLICE SCHEDULE IN CONCRETE  
NTS



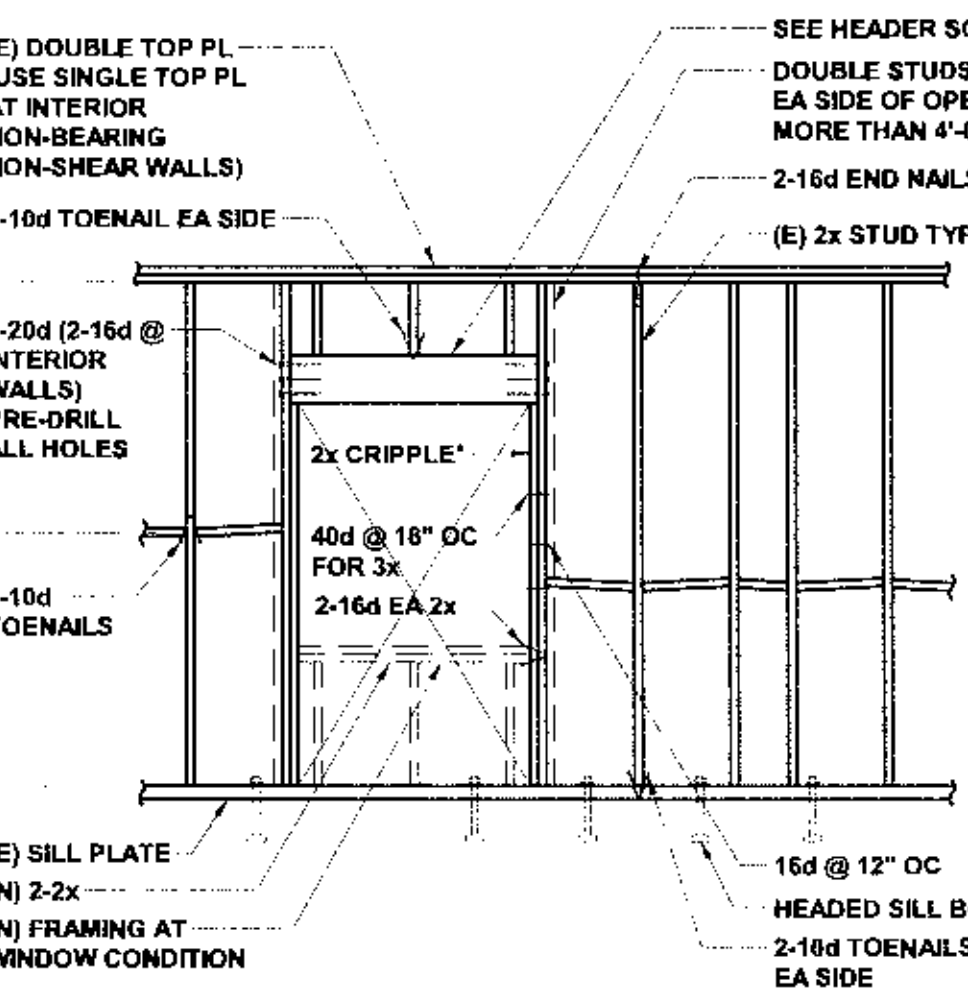
**6**  
**S4.1** TOP OF HSS COL TO STUD WALL DETAIL  
1" = 1'-0"



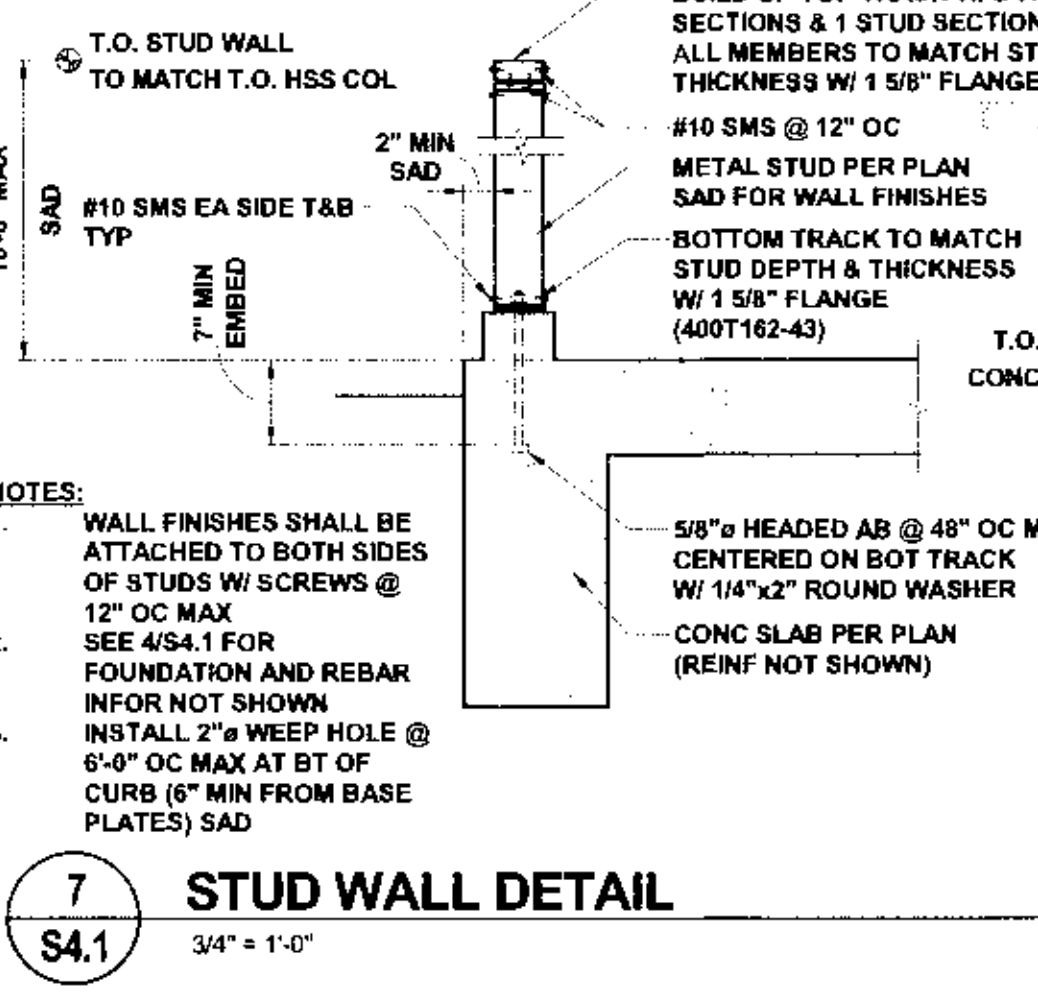
**2**  
**S4.1** (N) SKYLIGHT DETAIL  
1" = 1'-0"



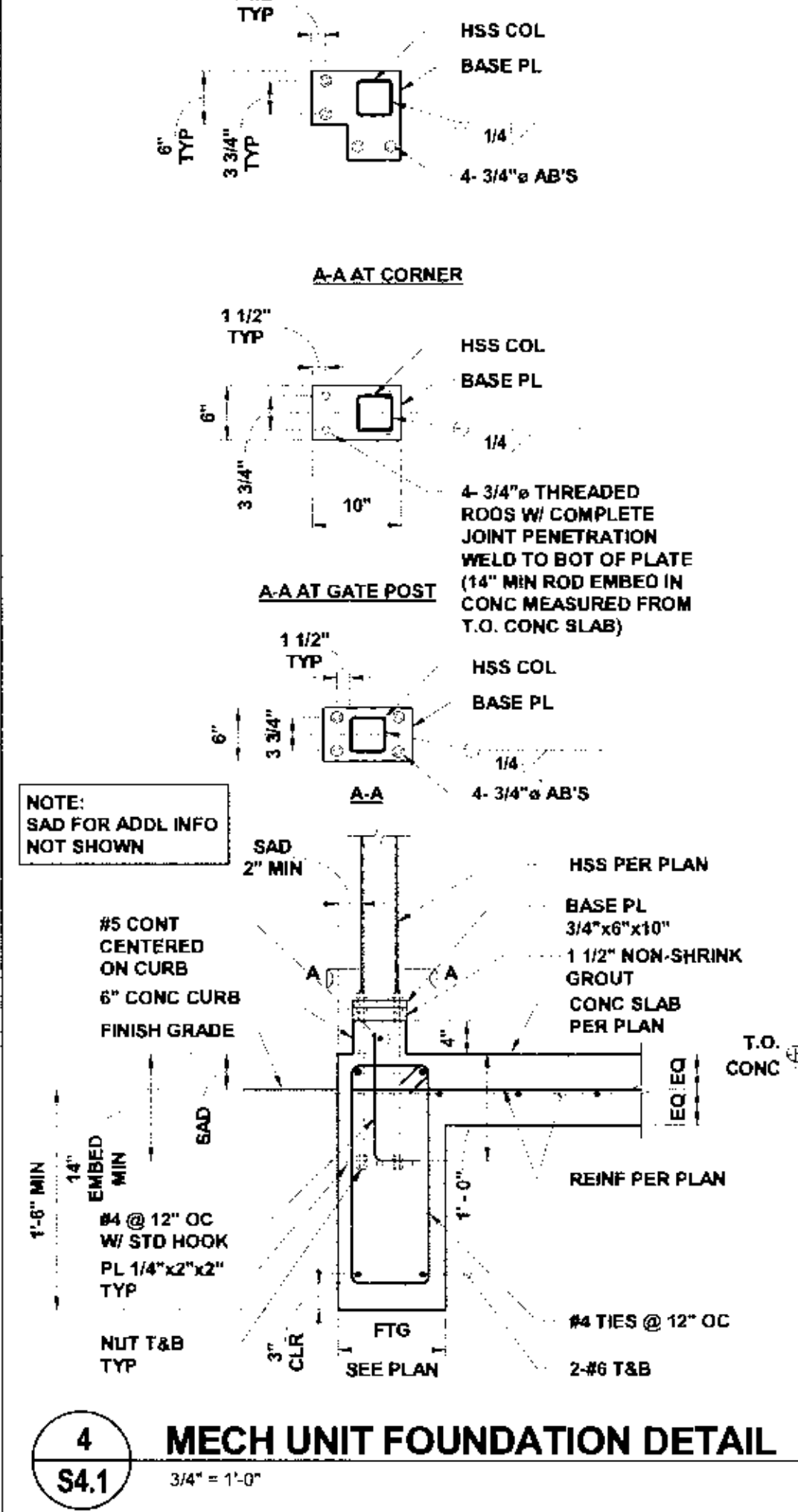
**12**  
**S4.1** TYPICAL FRAMING AT WINDOW / DOOR OPENING  
NTS



**7**  
**S4.1** STUD WALL DETAIL  
3/4" = 1'-0"



**4**  
**S4.1** MECH UNIT FOUNDATION DETAIL  
3/4" = 1'-0"



**1**  
**S4.1** FLOOR INFILL DETAIL  
3/4" = 1'-0"

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**LICENSED ARCHITECT**  
STATE OF CALIFORNIA  
C-31415  
11-30-17

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**REGISTERED PROFESSIONAL ENGINEER**  
STATE OF CALIFORNIA  
NO. S03527

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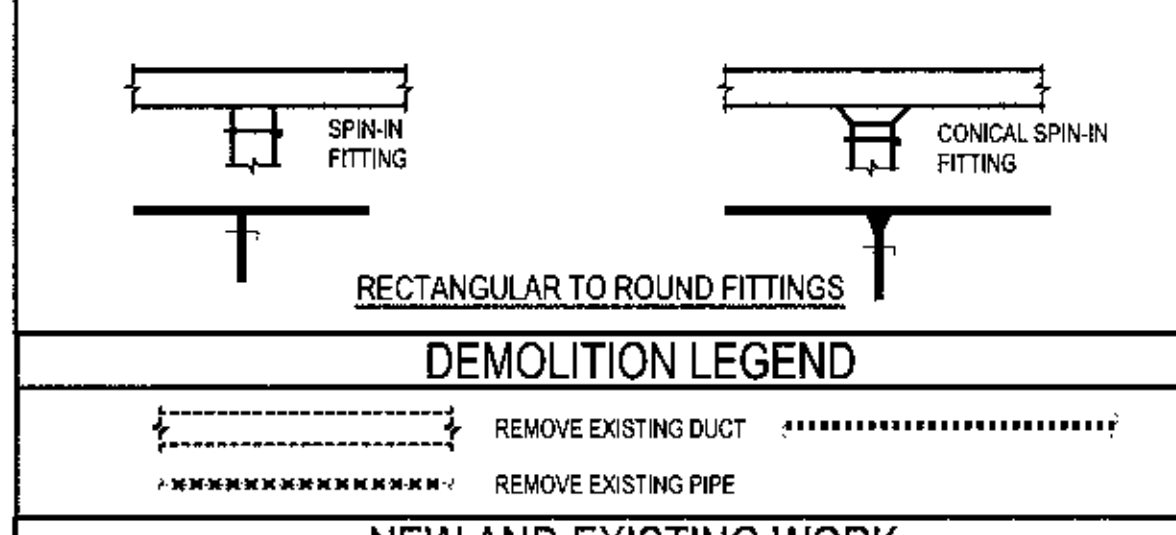
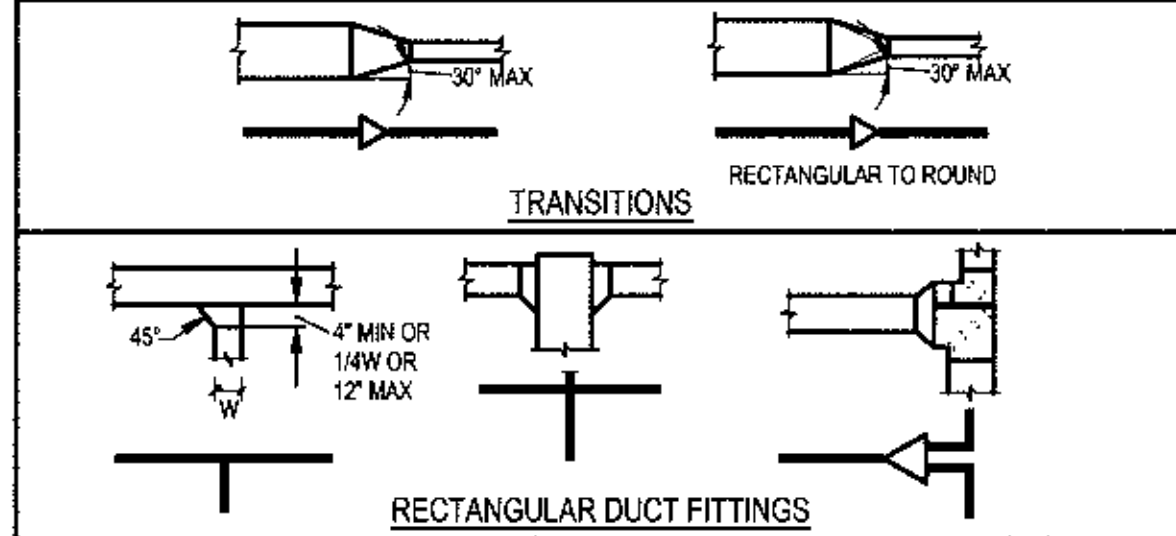
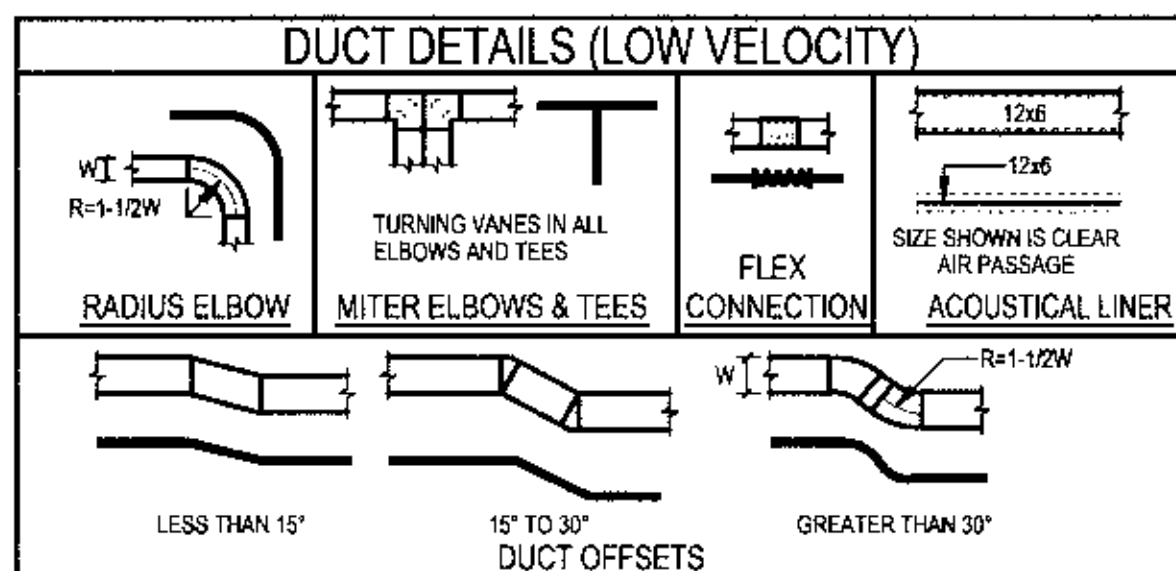
novato, california  
project number: 17019.1

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date: 3/3/2017

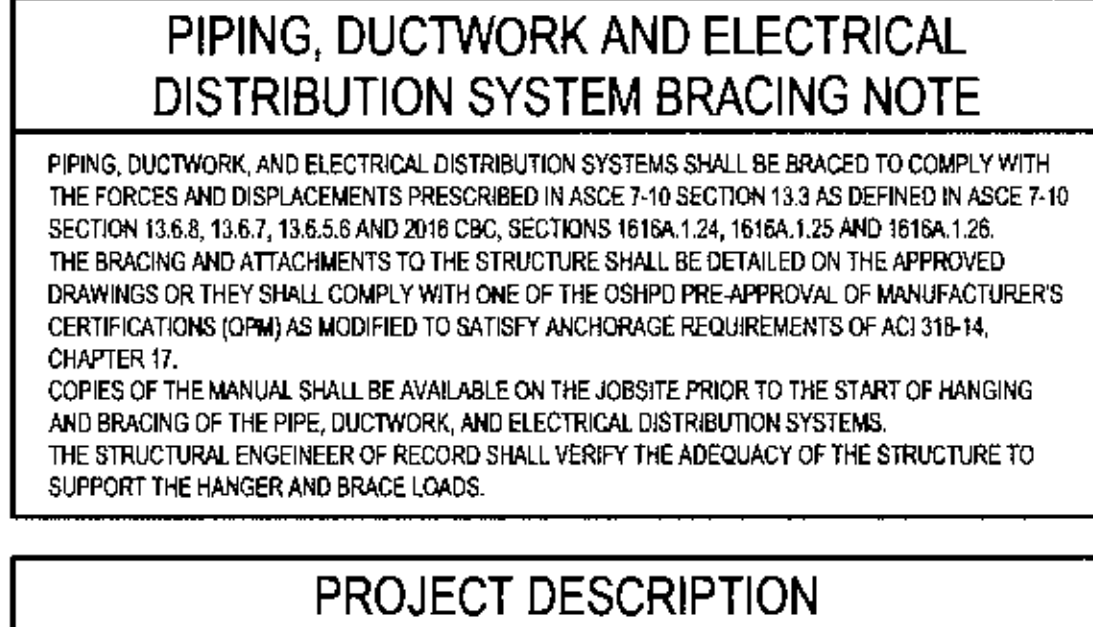
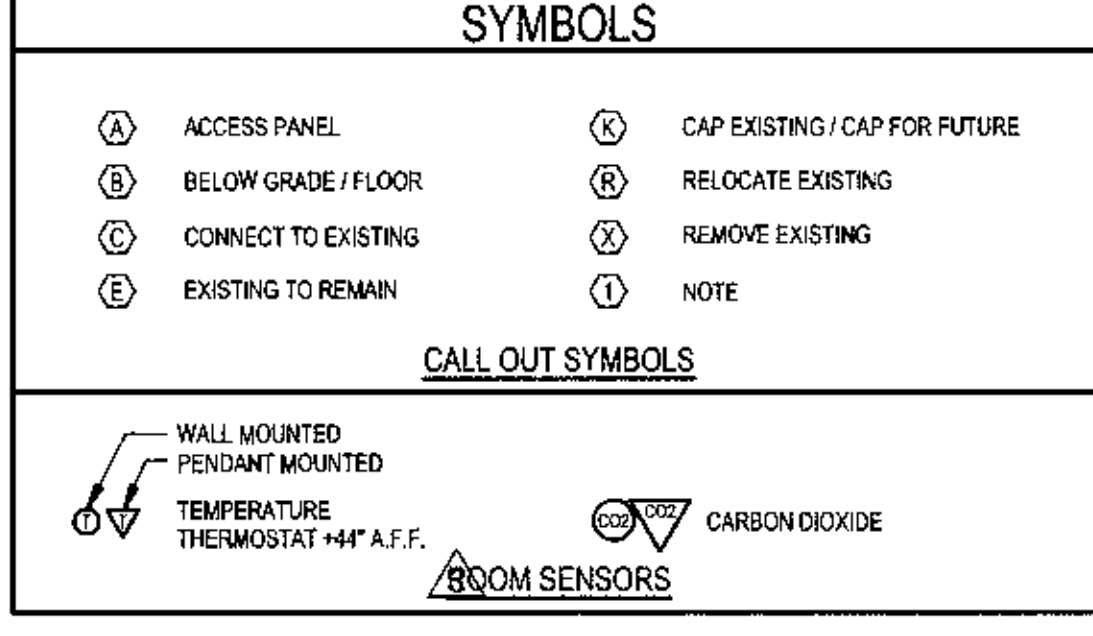
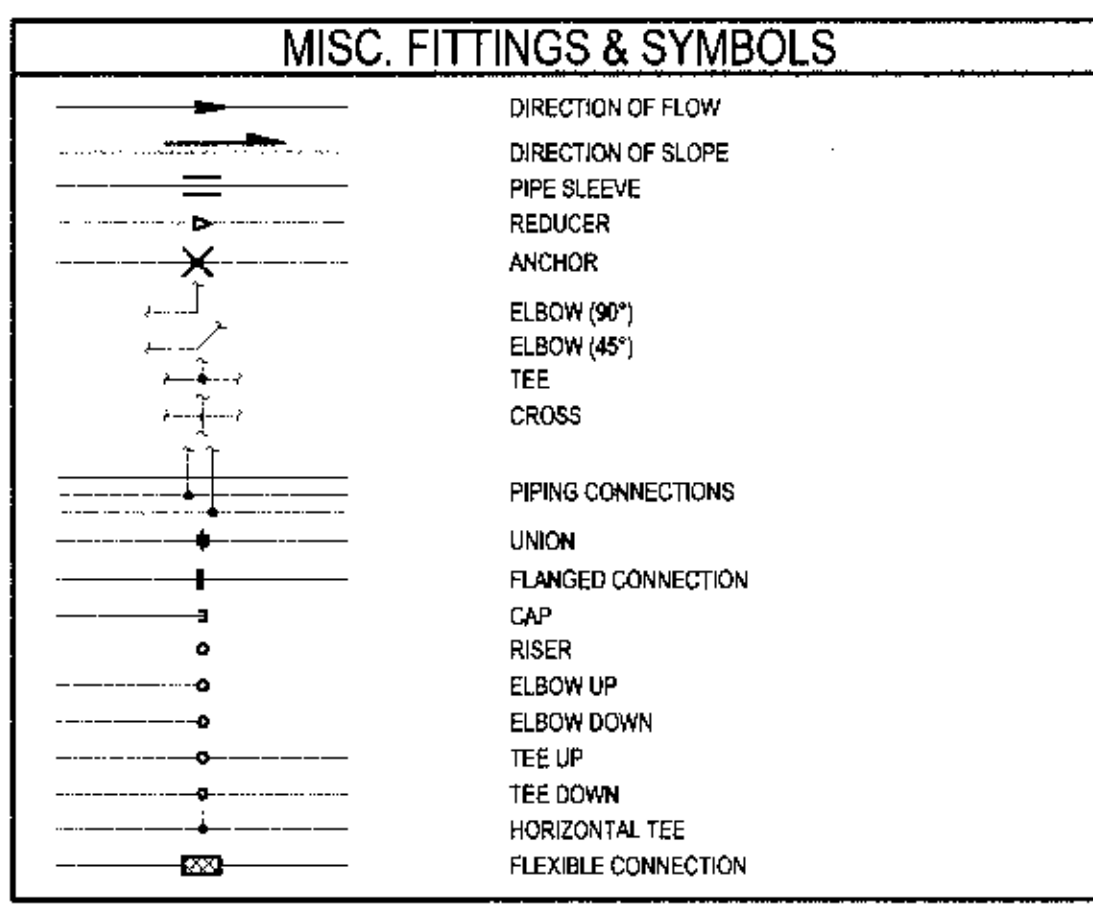
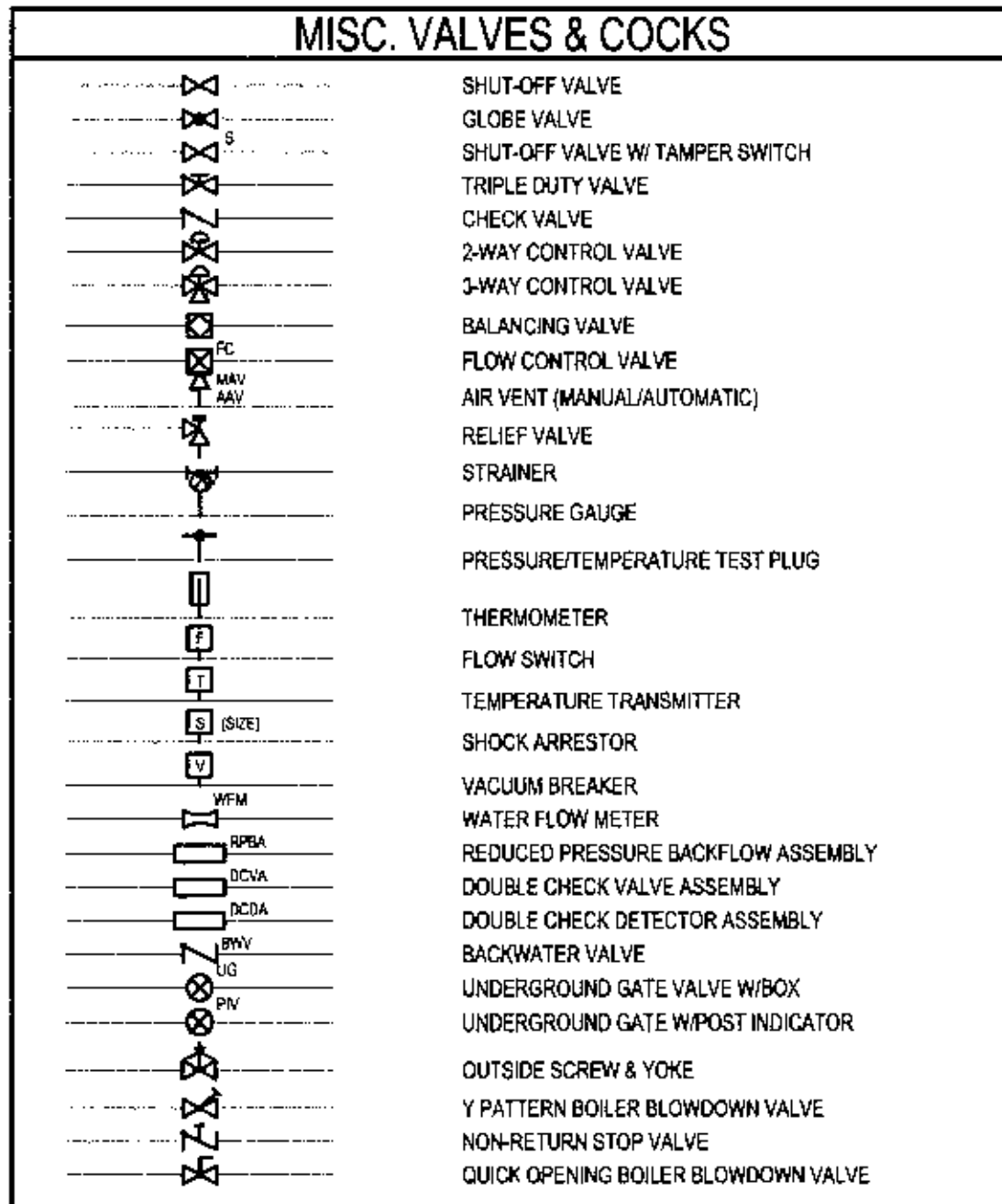
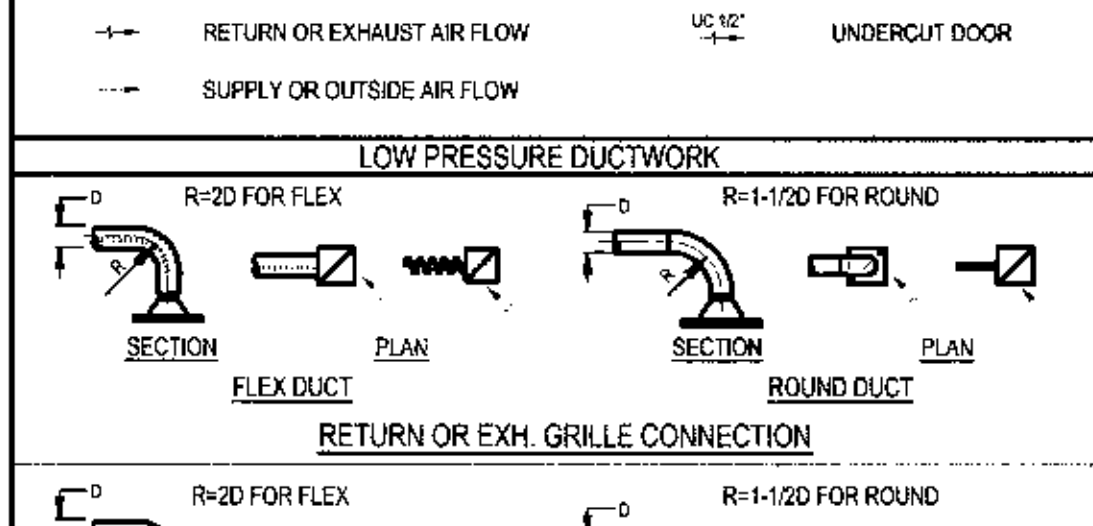
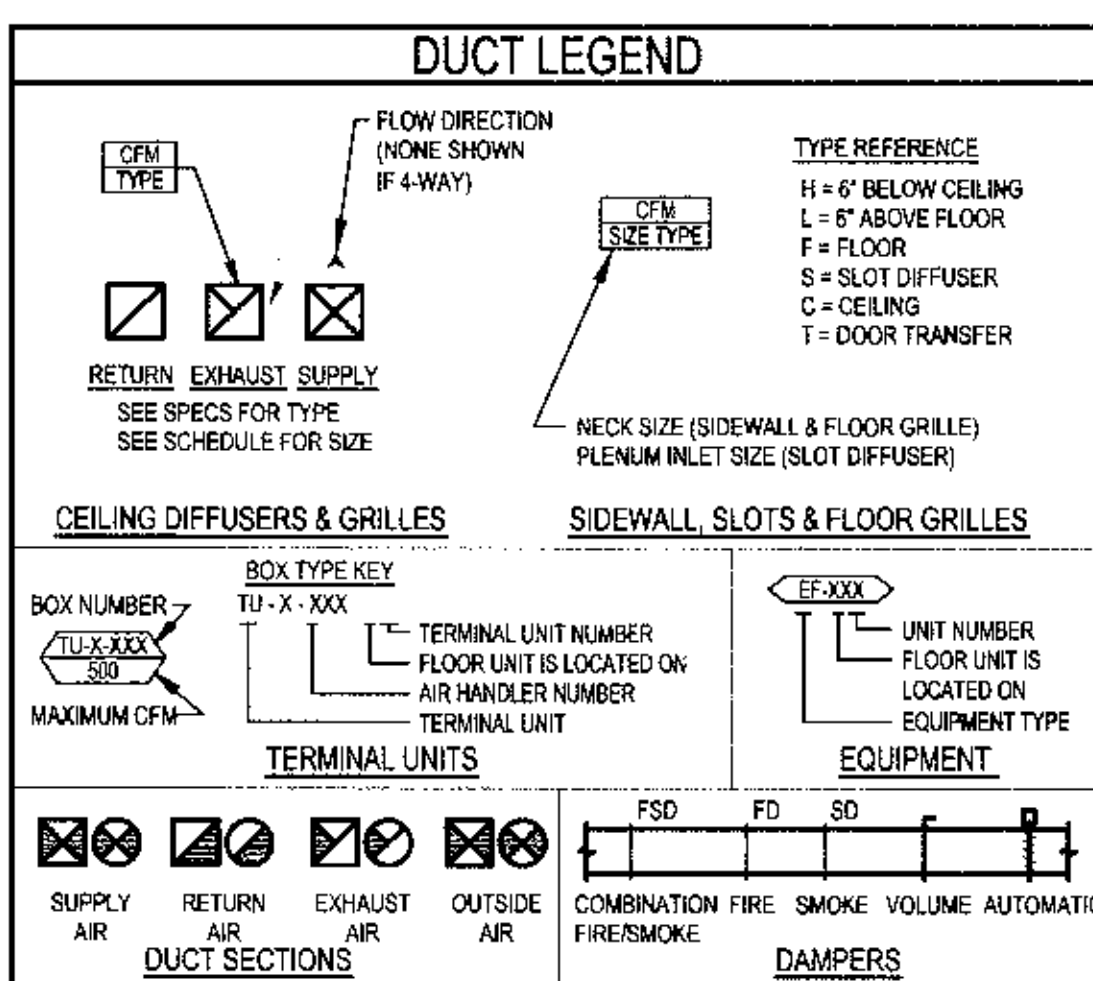
**CONSTRUCTION DOCUMENTS**  
**DETAILS**

**S4.1**

STANDARD MECHANICAL ABBREVIATIONS			
AFF	ABOVE FINISHED FLOOR	L	LENGTH
ALT	ALTERNATIVE	LAT	LEAVING AIR TEMP
AL	ALUMINUM	LB	POUND
APD	AIR PRESSURE DROP	LDB	LEAVING DRY BULB
APPROX	APPROXIMATELY	LF	LINEAR FEET
ARCH	ARCHITECTURAL	LFT	LEAVING FLUID TEMPERATURE
AUTO	AUTOMATIC	LVG	LEAVING
BDD	BACKDRAFT DAMPER	LWB	LEAVING WET BULB
BLDG	BUILDING	LWT	LEAVING WATER TEMPERATURE
BTU	BRITISH THERMAL UNIT	MAX	MAXIMUM
BTUH	BRITISH THERMAL UNITS PER HOUR	MBH	THOUSAND BTU PER HOUR
CFM	CUBIC FEET PER MINUTE	MECH	MECHANICAL
CLG	CEILING OR COOLING	MFR	MANUFACTURER
CONC	CONCRETE	MIN	MINIMUM
CONN	CONNECTION	MISC	MISCELLANEOUS
CONT	CONTINUED(JUNCTION)	MTD	MOUNTED
CL	CENTERLINE	NC	NORMALLY CLOSED
DDC	DIRECT DIGITAL CONTROL	NIC	NOT IN CONTRACT
DEFL	DEFLECTION	NO	NORMALLY OPEN
DN	DOWN	OAD	OUTSIDE AIR DAMPER
DWG	DRAWING	OC	ON CENTER DISTANCE
EA	EXHAUST AIR	OSA	OUTSIDE AIR
EAD	EXHAUST AIR DAMPER	PH	PHASE
EAT	ENTERING AIR TEMPERATURE	PSI	POUNDS PER SQUARE INCH
EDB	ENTERING DRY BULB	PVC	POLYVINYL CHLORIDE
EFF	EFFICIENCY	R (RAD)	RADIUS
EFT	ENTERING FLUID TEMPERATURE	RA	RETURN AIR
ELEC	ELECTRICAL	RAD	RETURN AIR DAMPER
ELEV	ELEVATION	REV	REVISION
ENGR	ENGINEER	RH	RELATIVE HUMIDITY
EO	EQUAL	RP	REVOLUTIONS PER MINUTE
EQUIP	EQUIPMENT	SA	SUPPLY AIR
ESP	EXTERNAL STATIC PRESSURE	SCFM	STANDARD CUBIC FEET PER MINUTE
EWB	ENTERING WET BULB	SD	SMOKE DAMPER
EWT	ENTERING WATER TEMPERATURE	SECT	SECTION
EXH	EXHAUST	SENS	SENSIBLE
EXIST	EXISTING	SP	STATIC PRESSURE
EXP	EXPANSION	SPEC	SPECIFICATION
F	DEGREES FAHRENHEIT	SQ	SQUARE
FILT	FILTER	SF	SQUARE FOOT(FEET)
FLEX	FLEXIBLE	SQ IN	SQUARE INCH(ES)
FPO	FLUID PRESSURE DROP	STL	STEEL
FM	FEET PER MINUTE	STRUCT	STRUCTURE(S)
FPS	FEET PER SECOND	SWP	SINGLE WALL PLENUM
FT	FEET/FOOT	SWSI	SINGLE WIDTH SINGLE INLET
FUT	FUTURE	TEMP	TEMPERATURE
FV	FACE VELOCITY	TSP	TOTAL STATIC PRESSURE
GA	GAGE/GAUGE	Typ	TYPICAL
GAL	GALLON	VOLTS	VOLTS
GALV	GALVANIZED	VD	VOLUME DAMPER
GPM	GALLONS PER MINUTE	VEL	VELOCITY
H	HEIGHT	VERT	VERTICAL
HORIZ	HORIZONTAL	VFD	VARIABLE FREQUENCY DRIVE
HP	HORSEPOWER	W	WIDTH
HTG	HEATING	WPD	WATER PRESSURE DROP
ID	INSIDE(DIAMETER/DIMENSION)	WTD	WATER TEMPERATURE DROP
IN	INCH(ES)	WTR	WATER TEMPERATURE RISE
INSUL	INSULATION	W	WITH
KW	KILOWATT	W/O	WITHOUT



HVAC PIPING		
— D —	D	DRAIN (CONDENSATE/INDIRECT)
— PC —	PC	PUMPED CONDENSATE
— RS —	RS	REFRIGERANT SUCTION
— RL —	RL	REFRIGERANT LIQUID
— RHG —	RHG	REFRIGERANT HOT GAS
— RRV —	RRV	REFRIGERANT RELIEF VENT



**GENERAL NOTE**

THIS IS A STANDARD LEGEND SHEET. THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

MECHANICAL DRAWING INDEX	
SHEET NO	DESCRIPTION
M001	SYMBOLS, LEGENDS, AND ABBREVIATIONS - MECHANICAL
M002	EQUIPMENT SCHEDULES - MECHANICAL
M003	EQUIPMENT SCHEDULES - MECHANICAL
M004	TITLE 24 DOCUMENTATION - MECHANICAL
M005	TITLE 24 DOCUMENTATION - MECHANICAL
M006	TITLE 24 DOCUMENTATION - MECHANICAL
M007	CALGREEN DOCUMENTATION - MECHANICAL
M101	DEMO FIRST FLOOR PLAN - MECHANICAL
M102	DEMO SECOND FLOOR PLAN - MECHANICAL
M103	DEMO ROOF PLAN - MECHANICAL
M201	FIRST FLOOR PLAN - MECHANICAL
M202	SECOND FLOOR PLAN - MECHANICAL
M203	ROOF PLAN - MECHANICAL
M301	DETAILS - MECHANICAL
M302	DETAILS - MECHANICAL
M303	FLOW DIAGRAMS - MECHANICAL
M304	CONTROLS - MECHANICAL

- GENERAL NOTES**
- REFER TO PROJECT BOOK SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS FOR THIS PROJECT. IN CASE OF CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS THE MOST STRINGENT SHALL GOVERN.
  - ALL WORK TO BE IN ACCORDANCE WITH REQUIREMENTS OF LATEST GOVERNING STATE AND LOCAL LOCAL FIRE CODES AND BUILDING CODES.
  - CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR SAFETY OF ALL PERSONS ON OR ABOUT THE CONSTRUCTION SITE IN ACCORDANCE WITH APPLICABLE LAWS AND CODES. GUARD ALL HAZARDS IN ACCORDANCE WITH THE SAFETY PROVISIONS OF THE LATEST MANUAL OF ACCIDENT PREVENTION PUBLISHED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL TRADE PERMITS AND INSPECTIONS. THE SUBMISSION OF BID PROPOSAL SHALL BE CONSIDERED AS CONCLUSIVE EVIDENCE THAT THE CONTRACTOR IS THOROUGHLY FAMILIAR WITH THE INTENT OF THE CONTRACT DOCUMENTS AND SCOPE OF THE PROJECT. PRIOR TO BIDDING CONTRACTOR SHALL VISIT THE JOB SITE TO CHECK EXISTING INSTALLATIONS AND SYSTEMS RELATED TO HIS WORK AND SHALL, IN THE BID PROPOSAL, INCLUDE ALL LABOR AND MATERIAL REQUIRED TO PROVIDE COMPLETE SYSTEMS.
  - CONTRACTOR SHALL COMPLETE THE WORK WITH MINIMUM INTERFERENCE WITH EXISTING SYSTEMS. ANY SHUTDOWN OF THE EXISTING SITE SYSTEMS SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR AND THE OWNER'S REPRESENTATIVE TWO WEEKS IN ADVANCE.
  - CONTRACTOR SHALL PRESERVE AND LEAK TEST ALL EXISTING HVAC AND PLUMBING INFRASTRUCTURE (DUCTWORK AND PIPING) TO BE RE-USED IN SCOPE OF PROJECT. IF ANY DUCTWORK OR PIPING IS FOUND TO BE DEFECTIVE CONTRACTOR SHALL PROVIDE ARCHITECT WITH COST ESTIMATE FOR REPAIR WORK REQUIRED (REPAIR OF REPLACEMENT AS NEEDED). EXISTING DUCTWORK AND PIPING FOUND TO BE DAMAGED OR MISSING SHALL BE REPAIRED OR REPLACED WITH NEW INSULATION MEETING 2013 CODE REQUIREMENTS.
  - IN THE AREA OF NEW CONSTRUCTION A NUMBER OF EXISTING SERVICES EXIST. PROTECT ALL ACTIVE INFRASTRUCTURE AND EQUIPMENT AND MAINTAIN THEM IN GOOD OPERATING CONDITION BEFORE, DURING, AND AFTER DEMOLITION AND CONSTRUCTION PHASES. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH ARCHITECTURAL AND ALL OTHER TRADES AND THEIR DRAWINGS RELATED TO THIS PROJECT. PROVIDE ALL WORK REQUIRED FOR COMPLETE SYSTEM INSTALLATION.
  - DRAWINGS ARE DIAGRAMMATIC IN NATURE AND EXISTING CONDITIONS SHALL BE FIELD VERIFIED FOR EXACT LOCATION AND SIZES OF EXISTING UTILITIES. THE PROPOSED POINT OF CONNECTIONS TO EXISTING SYSTEMS AND NEW ROUTINGS, INSTALL ALL EQUIPMENT, DUCTWORK, AND PIPING TO BEST SUIT FIELD CONDITIONS AND COORDINATE WITH THE WORK OF OTHER TRADES. THE DRAWINGS SHALL NOT BE SCALED TO DETERMINE EXACT LOCATIONS EQUIPMENT, DUCTWORK, OR PIPING.
  - ALL PIPING AND DUCTWORK TRANSITIONS AND/OFFSETS ARE SHOWN. PROVIDE TRANSITIONS AND/OFFSETS REQUIRED AT NO ADDITIONAL COST TO OWNER.
  - SEAL ALL FIRE RATED PIPE AND DUCTWORK PENETRATIONS WITH UL LISTED AND STATE FIRE MARSHAL APPROVED FIRE RETARDANT MATERIALS AND METHODS.
  - CONTRACTOR SHALL PROVIDE DUCTWORK AND TRANSITION EQUAL TO DUCT FREE AREA AS SHOWN ON DRAWING. TO PREVENT A CONFLICT WITH EXISTING CONDITIONS OR TO RESOLVE DUCTWORK CONFLICTS, DUCTWORK DIMENSIONS CAN BE REVISED AS LONG AS DUCT CROSS SECTION AREA IS MAINTAINED. BRANCH OUTLET RADIUS SHALL BE 1/2 OF MAIN RADIUS. BRANCH OUTLET RADIUS SHALL BE THE SAME SIZE AS DIFFUSERS/GRILLES NECK SIZE UNLESS OTHERWISE NOTED.
  - THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS OF DIFFUSERS AND GRILLES WITH OTHER CEILING AND/OR WALL DEVICES BEFORE COMMENCEMENT OF THE WORK.
  - PROVIDE OFFSETS AND/OR TRANSITIONS TO NEW OR EXISTING DUCT OR PIPING REQUIRED AS RESULT OF JOB CONDITIONS OR LACK OF COORDINATION WITH OTHER TRADES AT NO ADDITIONAL COST TO OWNER AND SUBJECT TO ARCHITECT'S REVIEW.
  - CONTRACTOR SHALL PROVIDE ALL NECESSARY STEEL AND COMPONENTS REQUIRED TO SUPPORT DUCT, PIPE, MECHANICAL EQUIPMENT, AND ELECTRICAL CONTROL PANELS RELATED TO MECHANICAL EQUIPMENT. PROVIDE FLOOR SUPPORT COMPONENTS, HANGERS AND SEISMIC RESTRAINTS AS REQUIRED. MECHANICAL CONTRACTOR SHALL PROVIDE SHIM TO LEVEL ALL EQUIPMENT AS REQUIRED.
  - SEISMIC BRACING OF MECHANICAL EQUIPMENT, PIPING, AND DUCTWORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2016 CALIFORNIA BUILDING CODE. ALL ANCHORING AND SEISMIC RESTRAINT OF DUCT, PIPE, AND EQUIPMENT SHALL BE REVIEWED AND APPROVED (STAMPED AND SIGNED CALCULATIONS SHALL BE PROVIDED FOR REVIEW WITH EVERY EQUIPMENT SUBMITTAL) BY A CALIFORNIA LICENSED STRUCTURAL ENGINEER.
  - CONSTRUCT AND INSTALL DUCTWORK ACCORDING TO SMACNA AND ALL APPLICABLE CODES INCLUDING ALL DIVISION OF STATE ARCHITECT CODE REQUIREMENTS INCLUDING ALL AMENDMENTS.
  - PROVIDE MANUAL FIRE DAMPERS UPSTREAM OF EACH AIR OUTLET.
  - ALL DUCTWORK CONNECTIONS TO EQUIPMENT WITH MOTORS SHALL BE MADE WITH FLEXIBLE CONNECTIONS.
  - ALL DUCTWORK LOCATED INSIDE WALL CAVITIES OR INACCESSIBLE SPACES SHALL BE LEAK TESTED AND INSULATED WITH VAPOR BARRIER SEAL BEFORE CLOSING WALL.
  - PROVIDE FIRE-SMOKE DAMPERS FOR ANY DUCTWORK CROSSING A FIRE RATED ASSEMBLY. FIRE-SMOKE DAMPER FIRE RATING SHALL MATCH OR EXCEED WALL FIRE RATING.
  - COORDINATION ITEMS:
    - MECHANICAL CONTRACTOR SHALL:
      - PROVIDE ALL COMBINATION FIRE-SMOKE DAMPERS (FSD). FIRE-SMOKE DAMPERS SHALL BE CONTROLLED BY DUCT SMOKE DETECTORS. PROVIDE ALL FSDS WITH 120V ELECTRICAL ACTUATORS.
      - INSTALL ALL FIRE-SMOKE DAMPERS AND DUCT SMOKE DETECTORS. COORDINATE WITH FIRE ALARM AND ELECTRICAL CONTRACTORS.
      - COORDINATE WITH CEILING CONTRACTOR FOR ACCESS TO FIRE-SMOKE DAMPERS (FSD).
    - FIRE ALARM CONTRACTOR SHALL:
      - PROVIDE ALL DUCT SMOKE DETECTORS. COORDINATE INSTALLATION WITH MECHANICAL AND ELECTRICAL CONTRACTORS.
      - CONNECT ALL FIRE-SMOKE DAMPERS TO FIRE ALARM (LIFE SAFETY) SYSTEM.
    - ELECTRICAL CONTRACTOR SHALL:
      - PROVIDE 120V POWER TO FSD DAMPERS AND TO DC CONTROL PANELS/TRANSFORMERS. COORDINATE FSD INSTALLATION WITH MECHANICAL AND FIRE ALARM CONTRACTORS.
      - SEAL ALL PENETRATIONS WITH MECHANICAL AND FIRE ALARM CONTRACTORS.
      - ALL PIPING LOCATED INSIDE WALL CAVITIES OR INACCESSIBLE SPACES SHALL BE LEAK TESTED AND INSULATED WITH VAPOR BARRIER SEAL BEFORE CLOSING WALL.
      - COORDINATE CORE DRILLING OF STRUCTURAL CONCRETE WALLS FOR PIPE PENETRATIONS. DIAMETER OF WALL OPENING SHALL BE 2 INCHES LARGER THAN THE DIAMETER OF PIPE WITH INSULATION SEAL ALL PENETRATIONS WITH UL APPROVED SEALANT.
      - ALL VALVES AND OTHER PIPING SPECIALTIES SHALL BE OF SAME SIZE AS PIPE SIZE.
      - INSTALL SHUT-OFF VALVES AT EACH BRANCH PIPE LINE.
      - PROVIDE MINIMUM 1" AIR GAP AT ALL DRINK CONNECTIONS.
      - COORDINATE LOCATIONS OF ACCESS DOORS WITH VALVE LOCATIONS. THE OPENING SHALL BE LARGE ENOUGH TO PERMIT MAINTENANCE. SHALL NOT EXCEED 6" ABOVE FINISHED FLOOR.
      - ALL MATERIALS AND WORKMANSHIP ARE SUBJECT TO APPROVAL BY OWNER, ARCHITECT, AND ENGINEER OF RECORD. ANY PORTION OF THE WORK OR EQUIPMENT FOUND TO BE DEFICIENT SHALL BE REPLACED BY THE CONTRACTOR AS PART OF THIS CONTRACT AT NO ADDITIONAL COST TO THE OWNER.
      - PROTECT EXISTING BUILDING STRUCTURES DURING CONSTRUCTION. PATCH, REPAIR AND REFRESH EXISTING WORK DAMAGED AS NEEDED. PATCHING AND REFINISHING IS TO BE PERFORMED BY WORKMEN SKILLED IN THE TRADES INVOLVED. DO NOT CUT ANY STRUCTURAL MEMBERS WITHOUT THE REVIEW AND APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
      - CONTRACTOR SHALL PROVIDE DUST COVERS AS REQUIRED TO CONTAIN DUST AND DEBRIS WITHIN CONSTRUCTION AREA AND KEEP DIRT AND DUST TO A MINIMUM.
      - CLEAN ALL EXPOSED SURFACES AND NEW EQUIPMENT AFTER COMPLETION.
      - GENERAL CONTRACTOR SHALL RETAIN INDEPENDENT TESTING AGENCY FOR TESTING AND BALANCING OF AIR AND WATER SYSTEMS. TESTING AGENCY SHALL BE MEMBER OF AABC AND SHALL SUBMIT THE FINAL BALANCE REPORT WITHIN 10 DAYS OF THE COMPLETION OF WORK. TESTING AGENCY SHALL ALLOW A 90-DAY PERIOD AFTER COMPLETION OF TESTING DURING WHICH TIME ADJUSTMENTS TO THE SYSTEM MAY BE REQUESTED BY THE ENGINEER WITHOUT ADDITIONAL COST TO THE CLIENT.
      - CONTRACTOR SHALL COORDINATE ALL EQUIPMENT AND INFRASTRUCTURE (PIPE, DUCT, CONDUIT) TO INSTALL THIS TRADE'S EQUIPMENT AT AS HIGH AN ELEVATION AS POSSIBLE TO ACHIEVE CEILING HEIGHTS SHOWN ON ARCHITECTURAL PLANS.
      - GENERAL CONTRACTOR SHALL COORDINATE WITH SUBCONTRACTORS AND PROVIDE FOR ALL EXPOSED EQUIPMENT, PIPE, DUCT, CONDUIT, AND OTHER MECH ELEMENTS WHICH ARE VISIBLE FROM THE OCCUPIED SPACE TO BE PAINTED OR PROVIDED WITH FINISH AS REQUIRED BY ARCHITECT. COORDINATE WITH ARCHITECT COLOR SWATCH FINISH TO BE USED IN PAINTING SUCH ELEMENTS.

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DIV. OF THE STATE ARCHITECT  
OFFICE OF REGULATION SERVICES  
01-116787  
AC: SEP 12 2017  
DATE: SEP 12 2017  
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9/07/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date

LICENSED ARCHITECT  
COMBINED  
11-30-17  
STATE OF CALIFORNIA

COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1095

scale: NONE  
date: 03/10/2017

CONSTRUCTION DOCUMENTS  
SYMBOLS, LEGENDS AND ABBREVIATIONS - MECHANICAL

**M001**

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Date: 9/5/17 Time: 11:47am File: P:\2017\17-1095 - College of Marin IVC Bldg 11 Renovation.dwg User: cndrew.rmcginn



### HEAT RECOVERY VRV SYSTEM SCHEDULE - OUTDOOR CONDENSER UNITS

TAG NUMBER	LOCATION	SERVICE	TYPE	QUANTITY	CAPACITY (MBH)			FAN AIRFLOW (CFM)	PIPING CONNECTIONS (IN.)		POWER				ELECTRICAL			APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
					TOTAL COOLING CAPACITY	TOTAL HEATING CAPACITY	TOTAL		LIQUID	GAS	VOLTS	PHASE	HZ	RLA	MCA	MOP	E-POWER (Y/N)			
CU-1	OUTDOOR EQUIPMENT PAD	1ST FLOOR	AIR COOLED CONDENSING UNIT	1	134.0	150.0		8228	1/2	1-1/8	208	3	60	16.2+22.6	55.0	70	Y	800	DAIKIN REYQ144TTJU	1, 2, 3

**GENERAL NOTES:**

- A. SIZE REFRIGERANT PIPING PER MANUFACTURER'S INSTRUCTIONS.
- B. PROVIDE COMPRESSOR WITH BRUSHLESS MOTOR, INVERTER, AND HIGH EFFICIENCY 6-POLE MOTOR.
- C. PROVIDE CONDENSER WITH DC FAN MOTOR.
- D. PROVIDE VRV IV HEAT RECOVERY MODEL.
- E. INCLUDE CONFIGURATOR SOFTWARE FOR OPTIMIZED SEASONAL ENERGY EFFICIENCY AND SIMPLIFIED COMMISSIONING.

**NOTES:**

1. REFRIGERANT = 410a
2. PROVIDE ANCHORAGE AND SEISMIC SUPPORT FOR OUTDOOR UNIT ON CONCRETE EQUIPMENT PAD.
3. PROVIDE FOR ALL REFRIGERANT, POWER, CONTROLS CONNECTIONS BETWEEN OUTDOOR AND INDOOR UNITS, BRANCH SELECTORS, AS WELL AS INDOOR AND CENTRAL DAIKIN CONTROL PANEL.

### HEAT RECOVERY VRV SYSTEM SCHEDULE - BRANCH SELECTOR BOXES

TAG NUMBER	FLOOR	LOCATION	TYPE	QUANTITY	POWER				ELECTRICAL			APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
					VOLTS	PHASE	HZ	MCA	E-POWER (Y/N)	MOP				
BS-1-1	1ST	CORRIDOR	BRANCH SELECTOR BOX	1	208	1	60HZ	0.6	Y	90	BS06054TVJ	1,2,4,5		
BS-2-1	2ND	CORRIDOR	BRANCH SELECTOR BOX	1	208	1	60HZ	1	Y	110	BS10054TVJ	1,3,4,5		

**GENERAL NOTES:**

- A. SIZE REFRIGERANT PIPING PER MANUFACTURER'S INSTRUCTIONS.
  - B. CONNECT UNITS TO NEW CENTRAL BMS.
- NOTES:**
1. REFRIGERANT = R410A
  2. 4 PORT BRANCH SELECTOR BOX, SERVING 4 AC UNITS, SEE FLOOR PLANS.
  3. 10 PORT BRANCH SELECTOR BOX, SERVING 10 AC UNITS, SEE FLOOR PLANS.
  4. PROVIDE INSULATION BALL VALVES ON PIPING BETWEEN BRANCH SELECTOR BOX AND EACH AC UNIT THAT IT SERVES.
  5. PROVIDE ANCHORAGE AND SEISMIC SUPPORT FOR BRANCH SELECTORS

### HEAT PUMP VRF SYSTEM SCHEDULE - INDOOR UNITS

TAG NUMBER	FLOOR	ROOM	TYPE	QUANTITY	OUTSIDE AIR CFM	CAPACITY (MBH)			FAN AIRFLOW (L/M/H CFM)	PIPING CONNECTIONS (IN.)		POWER				ELECTRICAL			APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
						TOTAL COOLING CAPACITY	SENSIBLE COOLING	TOTAL HEATING CAPACITY		LIQUID	GAS	VOLTS	PHASE	HZ	MCA	MOP	E-POWER (Y/N)				
FCU-1-1	1ST FLOOR	102A,105	CEILING CONCEALED	1	60	7	6.9	6.1	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ09PBCJU	1,2,3	
FCU-1-2	1ST FLOOR	102B	CEILING CONCEALED	1	40	3.6	3.4	2.2	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-1-3	1ST FLOOR	103,104	CEILING CONCEALED	1	60	7.8	7.7	4.9	388/410/450	1/4	1/2	208	1	60HZ	1.40	15	Y	60	FXMQ12PBCJU	1,2,3	
FCU-1-4	1ST FLOOR	100,101	CEILING CONCEALED	1	125	9.3	9.3	10.1	388/410/450	1/4	1/2	208	1	60HZ	1.40	15	Y	80	FXMQ12PBCJU	1,2,3	
FCU-1-5	1ST FLOOR	110	CEILING CONCEALED	1	65	11.8	11.2	6.0	500/530/560	1/4	1/2	208	1	60HZ	1.50	15	Y	80	FXMQ15PBCJU	1,2,3	
FCU-2-1	2ND FLOOR	206	CEILING CONCEALED	1	40	9	8.4	5.3	388/410/450	1/4	1/2	208	1	60HZ	1.40	15	Y	80	FXMQ12PBCJU	1,2,3	
FCU-2-2	2ND FLOOR	207A	CEILING CONCEALED	1	90	5.6	5.3	5.2	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-2-3	2ND FLOOR	207B	CEILING CONCEALED	1	90	5.5	5.3	5.3	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-2-4	2ND FLOOR	208,209	CEILING CONCEALED	1	65	10.5	10.5	6.9	500/530/560	1/4	1/2	208	1	60HZ	1.50	15	Y	80	FXMQ15PBCJU	1,2,3	
FCU-2-5	2ND FLOOR	201	CEILING CONCEALED	1	30	4.2	3.9	2.6	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-2-6	2ND FLOOR	202	CEILING CONCEALED	1	30	5.2	4.9	2.6	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-2-7	2ND FLOOR	203	CEILING CONCEALED	1	30	6.7	6.5	3.9	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ09PBCJU	1,2,3	
FCU-2-8	2ND FLOOR	204	CEILING CONCEALED	1	30	3.5	3.3	2.7	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-2-9	2ND FLOOR	205	CEILING CONCEALED	1	30	3.8	3.6	3.0	229/264/317	1/4	1/2	208	1	60HZ	0.60	15	Y	60	FXMQ07PBCJU	1,2,3	
FCU-2-10	2ND FLOOR	214	CEILING CONCEALED	1	145	14.4	14.3	10.6	529/582/635	1/4	1/2	208	1	60HZ	1.60	15	Y	80	FXMQ18PBVJU	1,2,3	

**GENERAL NOTES:**

- A. SIZE REFRIGERANT PIPING PER MANUFACTURER'S INSTRUCTIONS.
  - B. CONNECT UNITS TO NEW CENTRAL BMS.
- NOTES:**
1. REFRIGERANT = R410A
  2. PROVIDE ANCHORAGE AND SEISMIC SUPPORT FOR INDOOR UNITS.
  3. PROVIDE INDOOR UNITS WITH INTEGRAL CONDENSATE PUMP AND SINGLE POWER CONNECTION FOR UNIT AND CONDENSATE PUMP.

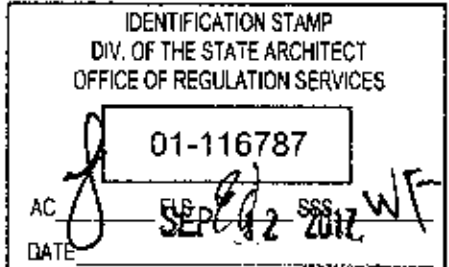
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9/07/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1065

scale: NTS  
date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**EQUIPMENT SCHEDULE MECHANICAL**

**M002**

### DIFFUSER AND GRILLE SCHEDULE

TAG NUMBER	MODULE SIZE	NECK SIZE	FINISH	SERVICE	BORDER	MATERIAL	MAX. NC	BASED ON	NOTES
SAG-1	24"x24	SEE NOTE 4	COORDINATE WITH ARCHITECTURAL PLANS	SUPPLY	COORD. W/RCP	STEEL	30	TITUS PAS	1,2,4
RAG-1	24"x24	SEE NOTE 4	COORDINATE WITH ARCHITECTURAL PLANS	RETURN	COORD. W/RCP	STEEL	30	TITUS PAR	1,2,4
SAG-2	SEE PLANS	SEE PLANS	COORDINATE WITH ARCHITECTURAL PLANS	SUPPLY	COORD. W/RCP	STEEL	30	TITUS S300FL	1,2
RAG-2	SEE PLANS	SEE PLANS	COORDINATE WITH ARCHITECTURAL PLANS	RETURN	COORD. W/RCP	STEEL	30	TITUS 350RL	1,2

**GENERAL NOTES:**

A. NONE

**NOTES:**

- COORDINATE EXACT DIFFUSER LOCATION WITH LIGHTS AND OTHER CEILING DEVICES. REFER TO ARCH. PLANS, DIFFUSER FRAME SHALL MATCH CEILING TYPE, BORDER AND FINISH/COLOR SHALL BE APPROVED BY ARCHITECT. PROVIDE ALL ACCESSORIES REQUIRED FOR COMPLETE INSTALLATION.
- WHERE DUCT CONNECTING TO THE DIFFUSER (OR PLENUM) IS SMALLER THAN THE SPECIFIED DIFFUSER NECK SIZE, PROVIDE AND INSTALL CONICAL INCREASER.
- FOR ALL LINEAR SUPPLY DIFFUSERS PROVIDE DIFFUSER MANUFACTURER'S LINED RECTANGULAR PLENUM WITH NECK SIZE AS INDICATED ON SCHEDULE.
- NECK SIZES SHALL BE AS FOLLOWS:  

24x24 SUPPLY	12x12 SUPPLY	24x24 RETURN/EXHAUST	12x12 RETURN/EXHAUST
6" < 150 CFM	12" < 390 CFM	6" < 120 CFM	ALL 15"
8" < 230 CFM	14" < 500 CFM	8" < 160 CFM	ALL 10"x10"
10" < 300 CFM			

### FAN SCHEDULE

TAG NUMBER	LOCATION	SERVICE	QUANTITY	TYPE	AIRFLOW			MOTOR				APPROX. WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
					CFM	TSP (IN WG)	FAN RPM	HP	VOLTAGE / PHASE	E-POWER	VFD			
EF-RF-1	ROOF	L1 TOILET EXHAUST	1	ROOF MOUNTED	340	0.250	1140	1/10	115/1	YES	NO	30	GREENHECK G-090-VG	2,3,4,5
EF-RF-2	ROOF	L2 TOILET AND RELIEF AIR	1	ROOF MOUNTED	580	0.250	1260	1/10	115/1	YES	NO	30	GREENHECK G-090-VG	2,3,4,5
SF-1-1	1ST FLOOR	L1 FCU VENTILATION AIR	1	INLINE CABINET	350	0.250	1248	1/10	115/1	YES	NO	60	GREENHECK SQ-80-VG	1,3,4,5
SF-2-1	2ND FLOOR	L2 FCU VENTILATION AIR	1	INLINE CABINET	315	0.250	1725	1/10	115/1	YES	NO	60	GREENHECK SQ-80-VG	1,3,4,5
SF-2-2	2ND FLOOR	L2 FCU VENTILATION AIR	1	INLINE CABINET	260	0.250	1725	1/10	115/1	YES	NO	60	GREENHECK SQ-80-VG	1,3,4,5

**GENERAL NOTES:**

A. NONE

**NOTES:**

- SEE 1ST FLOOR PLAN FOR FAN LOCATION.
- PROVIDE ROOF CURB WITH FAN ATTACHED PER MANUFACTURERS RECOMMENDATIONS.
- PROVIDE ANCHORAGE AND SEISMIC SUPPORT FOR ALL FANS.
- PROVIDE CONTROLS RELAY FOR ALL FANS AND CONNECT TO CENTRAL DAIKIN CONTROL PANEL. FANS SHALL BE ACCESSIBLE FOR VIEWING AND CONTROLLING (SCHEDULIN, START/STOP, ALARM).
- PROVIDE VARIABLE SPEED SWITCHES (RHECSTAT) FOR ALL FANS TO ALLOW FOR AIR BALANCING.

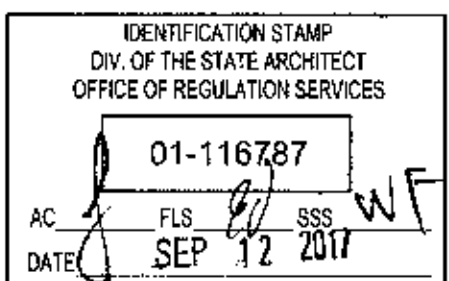
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9/07/17 DSA BACK CHECK  
 5/21/17 DSA PLAN REVIEW  
 3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**EQUIPMENT SCHEDULE**  
**MECHANICAL**

**M003**



STATE OF CALIFORNIA  
**REQUIRED ACCEPTANCE TESTS**  
 (REG-NRCC-MCH-04-E (Revised 01/16)) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-MCH-04-E  
 Required Acceptance Tests Page of  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Issued: 09/05/2017

**Designer:**  
 This compliance document is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for mechanical systems. The designer is required to check the applicable boxes by all acceptance tests that apply and list all equipment that requires an acceptance test. If all equipment of a certain type requires a test, list the equipment description and the number of systems. The NA number designates the Section in the Appendix of the Nonresidential Reference Appendices Manual that describes the test. Since this compliance document will be part of the plans, completion of this section will allow the responsible party to budget for the scope of work appropriately.

**Enforcement Agency:**  
**Systems Acceptance:** Before occupancy permit is granted for a newly constructed building or space, or a new space-conditioning system serving a building or space is operated for normal use, all control devices serving the building or space shall be certified as meeting the Acceptance Requirements for Code Compliance.

**Systems Acceptance:** Before occupancy permit is granted all newly installed HVAC equipment must be tested using the Acceptance Requirements. The NRCC-MCH-04-E compliance document is not considered a completed document and is not to be accepted by the building department unless the correct boxes are checked. The equipment requiring testing, person performing the test (Example: HVAC installer, TAB contractor, controls contractor, PE in charge of project) and what Acceptance test must be conducted. The following checked-off forms are required for ALL newly installed and replaced equipment. In addition a Certificate of Acceptance compliance documents shall be submitted to the building department that certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of Section 10-103(b) and Title 24 Part 6. The building inspector must receive the properly filled out and signed compliance documents before the building can receive final occupancy.

Test Description	MCH-02-A	MCH-03-A	MCH-04-A	MCH-05-A	MCH-06-A	MCH-07-A	MCH-11-A	MCH-12-A	MCH-14-A	MCH-18-A		
Equipment Requiring Testing or Verification	# of Units	Outdoor Air	Single Zone Unitary	Air Distribution Ducts	Economizer Controls	Demand Control Ventilation (DCV)	Supply Fan VAV	Automatic Demand Shed Control	FD0 for Packaged DX Units	Distributed Energy Storage DX AC Systems	Energy Management Control System	Test Performed By:
FCU:*	15	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Add Row Remove Label

STATE OF CALIFORNIA  
**REQUIRED ACCEPTANCE TESTS**  
 (REG-NRCC-MCH-04-E (Revised 01/16)) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-MCH-04-E  
 Required Acceptance Tests Page of  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Issued: 09/05/2017

**A. MECHANICAL COMPLIANCE FORMS & WORKSHEETS**  
 (Indicate if worksheet is included)

For detailed instructions on the use of this and all energy standards compliance documents, refer to the 2016 Nonresidential Manual. Note: The Enforcement Agency may require all compliance documents to be incorporated into the building plans. The NRCC-MCH-04-E and NRCC-MCH-05-E are alternative compliance documents to NRCC-MCH-01-E, NRCC-MCH-02-E and NRCC-MCH-03-E for projects using only single zone packaged HVAC systems.

YES	NO	Form	Title
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-MCH-04-E (1 of 2)	Certificate of Compliance. Required on plans when used.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-MCH-04-E (2 of 2)	Mechanical Acceptance Tests. Required on plans when used.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-MCH-05-E (1 of 2)	HVAC Prescriptive Requirements. It is required on plans when used.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-MCH-05-E (2 of 2)	Mechanical SWH Equipment Summary is required for all submittals with service water heating, pools or spas. It is required on plans where applicable.

STATE OF CALIFORNIA  
**REQUIRED ACCEPTANCE TESTS**  
 (REG-NRCC-MCH-04-E (Revised 01/16)) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-MCH-04-E  
 Required Acceptance Tests Page of  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Issued: 09/05/2017

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**  
 I certify that this Certificate of Compliance documentation is accurate and complete.  
 Documentation Author Name: MARCO ALVES  
 Company: PAE CONSULTING ENGINEERS  
 Address: 48 GOLDEN GATE AVE  
 City/State/Zip: SAN FRANCISCO/CA/94102  
 Phone: (415) 544-7500  
 Signature Date: 09/05/2017  
 (I, the undersigned, declare under penalty of perjury that the information provided is true and correct.)

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**  
 I certify the following under penalty of perjury, under the laws of the State of California:  
 1. The information provided on this Certificate of Compliance is true and correct.  
 2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).  
 3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 5 of the California Code of Regulations.  
 4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.  
 5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building division at occupancy.

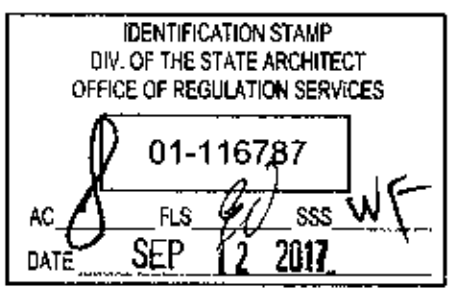
Responsible Designer Name: MARCO ALVES  
 Company: PAE CONSULTING ENGINEERS  
 Address: 48 GOLDEN GATE AVE  
 City/State/Zip: SAN FRANCISCO/CA/94102  
 Phone: (415) 544-7500  
 Date Issued: 09/05/2017  
 License No: M33075

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9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 DOCUMENTATION - MECHANICAL

M005

STATE OF CALIFORNIA  
**FAN POWER CONSUMPTION**  
 REG. NRCC-MCH-07-E (Revised 2/14) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-MCH-07-E  
 Power Consumption of Fans Requirements Page of

Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Issued: 9/05/2017

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**  
 I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: MARCO ALVES  
 Signature: [Signature] Date: 9/5/2017  
 Company: PAE CONSULTING ENGINEERS  
 Address: 48 GOLDEN GATE AVENUE City/State/Zip: SAN FRANCISCO/CA/94102 Phone: (415) 544-7500

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**  
 I certify the following under penalty of perjury, under the laws of the State of California:  
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 4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.  
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Responsible Person Name: MARCO ALVES Responsible Person Signature: [Signature]  
 Company: PAE CONSULTING ENGINEERS Date Signed: 9/5/2017  
 Address: 48 GOLDEN GATE AVENUE License: M39075  
 City/State/Zip: SAN FRANCISCO/CA/94102 Phone: (415) 544-7500

STATE OF CALIFORNIA  
**FAN POWER CONSUMPTION**  
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**CERTIFICATE OF COMPLIANCE** NRCC-MCH-07-E  
 Power Consumption of Fans Requirements Page of

Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Issued: 9/05/2017

**A. Constant Volume Fans Systems**  
 NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Constant Volume Fan Systems when using the Prescriptive Approach. See Power Consumption of Fans §140.4(c). If the total horsepower of all fans in the system is less than 25 hp, then this should be noted in the FAN DESCRIPTION column and the rest of this section left blank. If the total system horsepower is not obvious, such as when a VAV system has many fan-powered boxes, then this section must be completed.  
 Note: VAV fans and Constant Volume fans should be summarized on separate compliance documents.

FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS (A02 * B04 * 746) / (B03e * 603b)
		MOTOR	DRIVE		
01	02	03	04	05	
TOTAL FAN HP IS LESS THAN 25 HP- SEE M002/3.					NaN

Add Row: [Blank/Last]

**B. Variable Air Volume Fans Systems**  
 NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Variable Air Volume (VAV) Systems when using the Prescriptive Approach. See Power Consumption of Fans §140.4(c).

FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS (B02 * B04 * 746) / (B03e * 603b)
		MOTOR	DRIVE		
01	02	03	04	05	
TOTAL FAN HP IS LESS THAN 25 HP- SEE M002/3.					NaN

Add Row: [Blank/Last]

**C. Totals and Adjustments**

01	TOTAL FAN SYSTEM POWER (WATTS, SUM COLUMN 05)	W
02	SUPPLY DESIGN AIRFLOW	CFM
03	TOTAL FAN SYSTEM POWER INDEX (Row 1 / Row 2)	NaN W/CFM
04	SP <sub>1</sub>	in W.C. or Pa.
05	SP <sub>2</sub>	in W.C. or Pa.
06	Fan Adjustment = 1 / (SP <sub>1</sub> - 1) / SP <sub>2</sub>	Infinity
07	ADJUSTED FAN POWER INDEX (Line 3 x Line 6)	NaN W/CFM

I. TOTAL FAN SYSTEM POWER INDEX or ADJUSTED FAN POWER INDEX must not exceed 0.8 wj/cfm for Constant Volume systems or 1.25 wj/cfm for VAV systems.

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LICENSED ARCHITECT  
 MARK W. SOMBRINK  
 C.S. 1415  
 1-30-17  
 MECHANICAL  
 STATE OF CALIFORNIA

COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
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CONSTRUCTION DOCUMENTS  
 TITLE 24 DOCUMENTATION - MECHANICAL

M006

**5.410.2 Commissioning.** [N] For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. Commissioning requirements shall include:

1. Owner's or owner representative's project requirements.
2. Basis of design.
3. Commissioning measures shown in the construction documents.
4. Commissioning plan.
5. Functional performance testing.
6. Documentation and training.
7. Commissioning report.

**Exceptions:**

1. Dry storage warehouses of any size.
2. Areas under 10,000 square feet used for offices or other conditioned accessory spaces within dry storage warehouses.
3. Tenant improvements under 10,000 square feet as described in Section 5.03.1.1.
4. Commissioning requirements for energy systems covered by the 2013 California Energy Code.

All building operating systems covered by Title 24, Part 6, as well as process equipment and controls, and renewable energy systems shall be included in the scope of the commissioning requirements.

**5.410.2.1 Owner's or Owner Representative's Project Requirements (OPR).** [N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:

1. Environmental and sustainability goals.
2. Energy efficiency goals [Refer to 2013 California Energy Code, Section 120.8(a)].
3. Indoor environmental quality requirements.
4. Project program, including facility functions and hours of operation, and need for after hours operation.
5. Equipment and systems expectations.
6. Building occupant and operation and maintenance (O&M) personal expectations.

**5.410.2.2 Basis of Design (BOD).** [N] A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project. The Basis of Design document shall cover the following systems:

1. Heating, ventilation, air conditioning (HVAC) systems and controls. [Refer to 2013 California Energy Code, Section 120.8(c)].
2. Indoor lighting system and controls. [Refer to 2013 California Energy Code, Section 120.8(d)].
3. Water heating system. [Refer to 2013 California Energy Code, Section 120.8(e)].
4. Renewable energy systems.
5. Landscape irrigation systems.
6. Water reuse systems.

**5.410.2.3 Commissioning plan.** [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:

1. General project information.
2. Commissioning goals.
3. Systems to be commissioned. Plans to test systems and equipment shall include:
  - a. An explanation of the original design intent.
  - b. Equipment and systems to be tested, including the extent of tests.
  - c. Functions to be tested.
  - d. Conditions under which the test shall be performed.
  - e. Measurable criteria for acceptable performance.
4. Commissioning team information.
5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.

**5.410.2.4 Functional performance testing.** [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

**5.410.2.5 Documentation and training.** [N] A systems manual and systems operations training are required, including Occupational Safety and Health Act (OSHA) requirements in California Code of Regulations (CCR), Title 8, Section 5142, and other related regulations.

**5.410.2.5.1 Systems manual.** [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:

1. Site information, including facility description, history and current requirements.
2. Site contact information.
3. Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
4. Major systems.
5. Site equipment inventory and maintenance notes.
6. A copy of verifications required by the enforcing agency of this code.
7. Other resources and documentation, if applicable.

**5.410.2.5.2 Systems operations training.** [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following:

1. System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces).
2. Review and demonstration of servicing/preventive maintenance.
3. Review of the information in the systems manual.
4. Review of the record drawings of the system/equipment.

**SECTION 5.504 POLLUTANT CONTROL**

**5.504.1.3 Temporary ventilation.** The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30 percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or if the building is occupied during alteration, at the conclusion of construction.

**5.504.3 Covering of duct openings and protection of mechanical equipment during construction.** At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

**5.504.5.3 Filters.** In mechanically ventilated buildings, provide regularly occupied areas of the building with an filtration media for ambient and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

**Exceptions:**

1. An ASHRAE 10 percent to 15 percent efficiency filter shall be permitted for an HVAC unit meeting the 2013 California Energy Code having 60,000 Btu/h or less capacity per fan and if the energy use of the air delivery system is 0.4 Wcfm or less at design air flow.
2. Existing mechanical equipment.

**SECTION 5.505 INDOOR MOISTURE CONTROL**

**5.505.1 Indoor moisture control.** Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24 Part 2, Sections 1203 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of this code.

**SECTION 5.506 INDOOR AIR QUALITY**

**5.506.1 Outside air delivery.** For mechanically or naturally ventilated spaces in buildings meet the minimum requirements of Section 1201 (Requirements For Ventilation) of the 2013 California Energy Code, or the applicable local code, whichever is more stringent, and Division 4, Chapter 4 of CCR, Title 8.

**5.506.2 Carbon dioxide (CO<sub>2</sub>) monitoring.** In buildings or additions equipped with demand controlled ventilation, CO<sub>2</sub> sensors and ventilation controls shall be specified and installed in accordance with the requirements of the 2013 California Energy Code, Section 1206.2-4.

**5.410.4 Testing and adjusting.** Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 5.03.1.

**5.410.4.2 Systems.** Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include, as applicable to the project:

1. HVAC systems and controls.
2. Indoor and outdoor lighting and controls.
3. Water heating systems.
4. Renewable energy systems.
5. Landscape irrigation systems.
6. Water reuse systems.

**5.410.4.3 Procedures.** Perform testing and adjusting procedures in accordance with manufacturers' specifications and applicable standards on each system.

**5.410.4.3.1 HVAC balancing.** In addition to testing and adjusting, before a new space conditioning system serving a building or space is operated for normal use, balance the system in accordance with the procedures defined by the Testing, Adjusting and Balancing Bureau National Standards, the National Environmental Balancing Bureau Procedural Standards, Associated Air Balance Council National Standards or as approved by the enforcing agency.

**5.410.4.4 Reporting.** After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

**5.410.4.5 Operation and maintenance (O & M) manual.** Provide the building owner or representative with detailed operating and maintenance instructions and copies of warranties/warranties for each system. O & M instructions shall be consistent with ASHRAE requirements in CCR, Title 8, Section 5142, and other related regulations.

**5.410.4.5.1 Inspections and reports.** Include a copy of all inspection verifications and reports required by the enforcing agency.

**5.303.2 Water reduction.** Plumbing fixtures shall meet the maximum flow rate values shown in Table 5.303.2.3.

**Exception:** Buildings that demonstrate 20-percent overall water use reduction. In this case, a calculation demonstrating a 20-percent reduction in the building "water use baseline," as established in Table 5.303.2.2, shall be provided.

**5.303.2.1 Areas of addition or alteration.** For those occupancies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Section 5.303.2 and Section 5.303.3 shall apply to new fixtures in additions or areas of alteration to the building.

**5.303.3 Water conserving plumbing fixtures and fittings.** Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

**5.303.3.1 Water closets.** The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.

**Note:** The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

**5.303.3.2 Urinals.** The effective flush volume of urinals shall not exceed 0.5 gallons per flush.

**5.303.3.3 Showerheads.**

**5.303.3.3.1 Single showerhead.** Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

**5.303.3.3.2 Multiple showerheads serving one shower.** When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

**Note:** A hand-held shower shall be considered a showerhead.

**TABLE 5.303.2.3 WATER REDUCTION FIXTURE FLOW RATES**

FIXTURE TYPE	MAXIMUM FLOW RATE
Kitchen faucets	1.8 gpm @ 60 psi
Wash fountains	1.8 (rim space (in.)/20 gpm @ 60 psi)
Metering faucets	0.20 gallons/cycle
Metering faucets for wash fountains	20 (rim space (in.)/20 gpm @ 60 psi)

**TABLE 5.303.2.2 WATER USE BASELINE<sup>1</sup>**

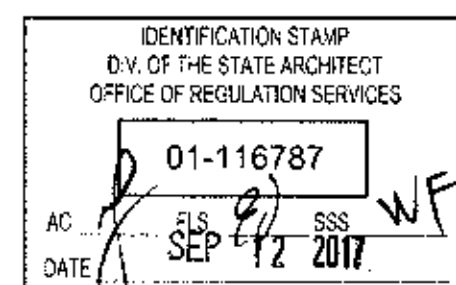
FIXTURE TYPE	BASELINE FLOW RATE	DURATION	DAILY USES	OCCUPANTS <sup>2</sup>
Showerheads	2.0 gpm @ 80 psi	5 min.	1	X <sup>3</sup>
Lavatory faucets, nonresidential	0.5 gpm @ 60 psi	25 min.	1	X <sup>3</sup>
Kitchen faucets	2.2 gpm @ 60 psi	4 min.	1	X <sup>3</sup>
Replacement aerators	2.2 gpm @ 60 psi			X
Wash fountains	2.2 (rim space (in.)/20 gpm @ 60 psi)			X
Metering faucets	0.25 gallons/cycle	25 min.	1	X
Metering faucets for wash fountains	25 (rim space (in.)/20 gpm @ 60 psi)	25 min.	1	X
Gravity tank-type water closets	1.28 gallons/flush	1 flush	1 male <sup>4</sup> 3 female <sup>4</sup>	X
Flushometer tank water closets	1.28 gallons/flush	1 flush	1 male <sup>4</sup> 3 female <sup>4</sup>	X
Flushometer valve water closets	1.28 gallons/flush	1 flush	1 male <sup>4</sup> 3 female <sup>4</sup>	X
Electromechanical hydraulic water closets	1.28 gallons/flush	1 flush	1 male <sup>4</sup> 3 female <sup>4</sup>	X
Urinals	0.5 gallons/flush	1 flush	2 male	X

Footnote: "Water Use" = Flow rate x Duration x Occupants x Daily uses.  
 1. The daily use number shall be increased to three if urinals are not installed in the room.  
 2. Refer to Table A, Chapter 4, California Plumbing Code, for occupant load factors.  
 a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the unobstructed number of users.  
 b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.  
 3. Use Worksheet WS-1 to calculate baseline water use.

**5.303.6 Standards for plumbing fixtures and fittings.** Plumbing fixtures and fittings shall be installed in accordance with the California Plumbing Code, and shall meet the applicable standards referenced in Table 1401.1 of the California Plumbing Code and in Chapter 6 of this code.

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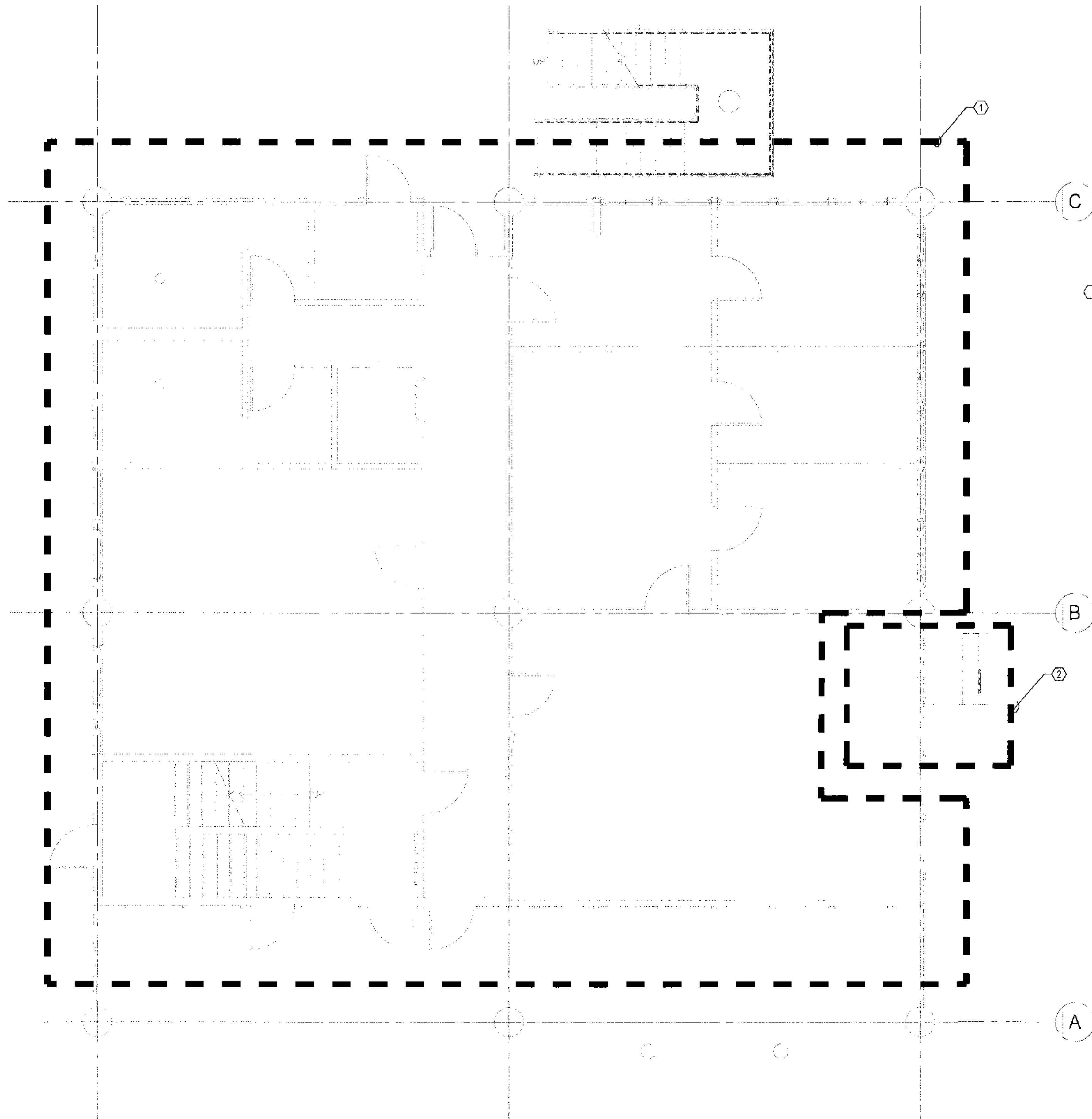


COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

CONSTRUCTION  
 DOCUMENTS  
 CALGREEN  
 DOCUMENTATION -  
 MECHANICAL



**GENERAL NOTES:**

- A. SEE M001 FOR PROJECT DESCRIPTION, GENERAL NOTES, AND PROJECT SPECIFICATIONS.
- B. PRIOR TO SUBMITTING PROPOSAL, CONTRACTOR SHALL VISIT PROJECT SITE AND THOROUGHLY INSPECT ALL EXISTING CONDITIONS.
- C. ALL EQUIPMENT, DUCT, AND PIPE SUPPORTS WITHIN THE PROJECT AREA THAT ARE EXISTING TO BE REUSED SHALL BE TESTED AS REQUIRED TO MEET CURRENT CALIFORNIA BUILDING CODE REQUIREMENTS FOR ANCHORING, SUPPORT, AND SEISMIC BRACING.
- D. CONTRACTOR SHALL FIRE STOP ALL WALL OPENINGS NEW AND EXISTING WITH A UL LISTED, FIRE MARSHALL APPROVED METHOD AND MATERIALS.
- E. REPAIR ALL OPENINGS MADE BY DEMOLITION OF EXISTING EQUIPMENT, DUCT, PIPE, ETC.
- F. DEMOLITION WORK SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING: REMOVAL OF EQUIPMENT, SUPPORTS, ANCHORS, PIPING, DUCTWORK, CONTROLS AND ALL APPURTENANCES WHERE INDICATED ON THE PLANS.

**NOTES:**

- 1. DEMOLISH ALL HVAC EQUIPMENT AND INFRASTRUCTURE WITHIN THE BUILDING WITH THE EXCEPTION OF EXISTING LIEBERT AC UNIT INCLUDING OUTDOOR CONDENSING UNIT AND INDOOR AC UNIT SERVING FORMER SERVER ROOM (NEW ROOM 101 - STORAGE).
- 2. KEEP EXISTING LIEBERT OUTDOOR CONDENSING UNIT, ASSOCIATED INDOOR AC UNIT AND ASSOCIATED PIPING.

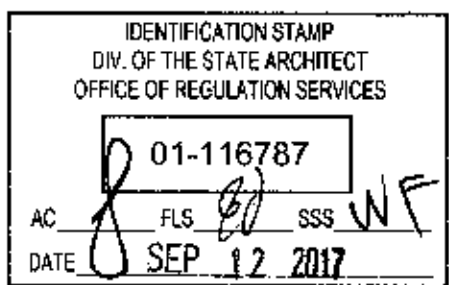
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M101 DEMO FIRST FLOOR PLAN - MECHANICAL  
SCALE: 1/4" = 1'-0"

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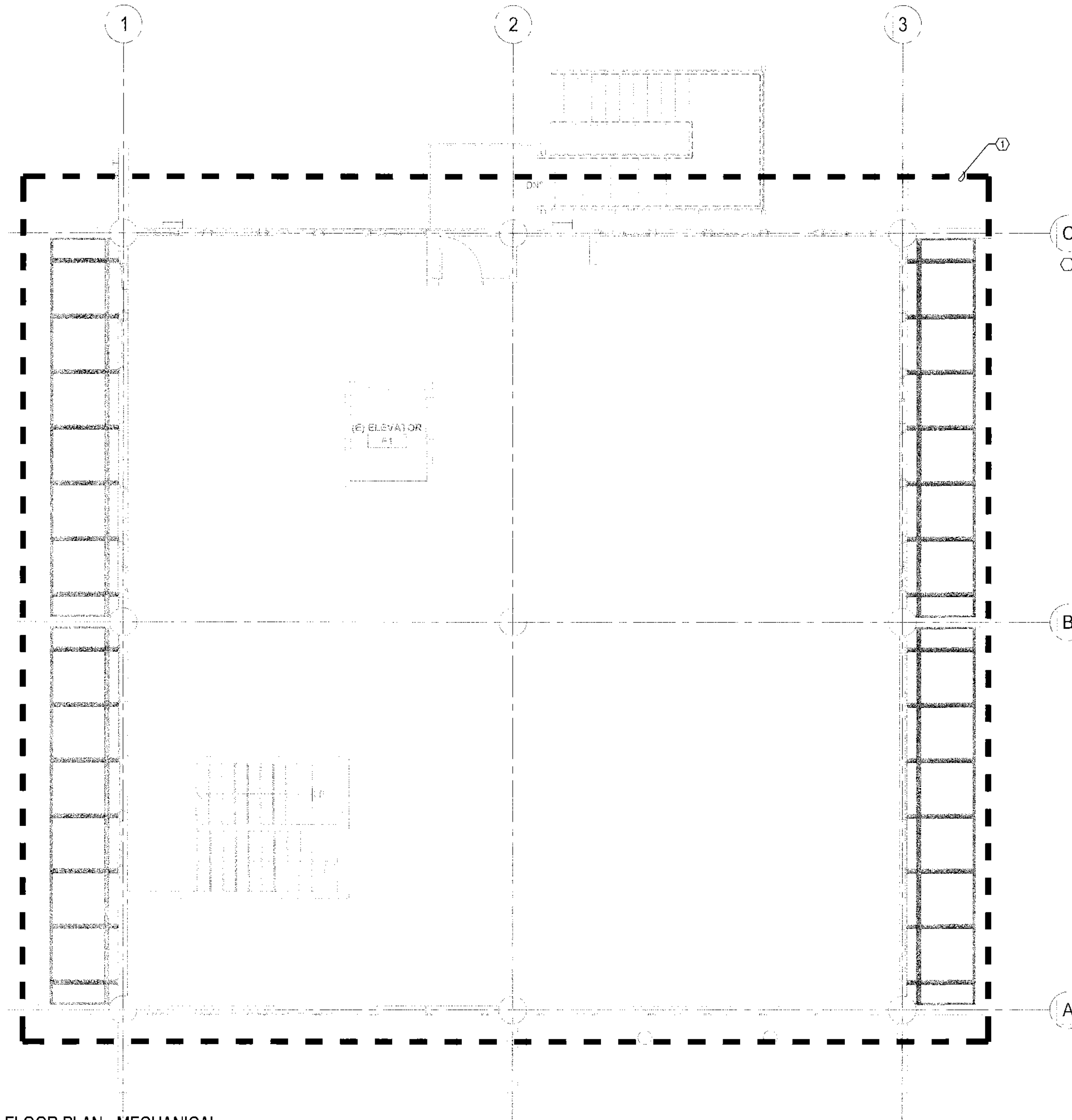
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DOCUMENTS

DEMO FIRST FLOOR  
PLAN - MECHANICAL

M101

11: 9/1/17 Time: 5:43pm File: P:\2017\17-1095 - College of Marin IVC Bldg 11 Renovation\01 Drawings\17-1095\_M102.dwg User: onofrem.mcginn

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**GENERAL NOTES:**

- A. SEE M001 FOR PROJECT DESCRIPTION, GENERAL NOTES, AND PROJECT SPECIFICATIONS.
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- E. REPAIR ALL OPENINGS MADE BY DEMOLITION OF EXISTING EQUIPMENT, DUCT, PIPE, ETC.
- F. DEMOLITION WORK SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING: REMOVAL OF EQUIPMENT, SUPPORTS, ANCHORS, PIPING, DUCTWORK, CONTROLS AND ALL APPURTENANCES WHERE INDICATED ON THE PLANS.

**NOTES:**

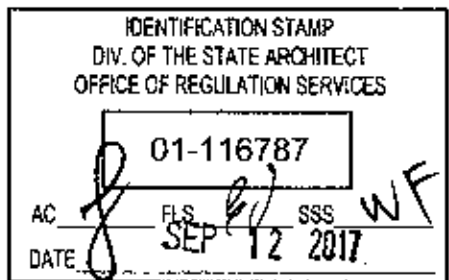
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scale: 1/4" = 1'-0"  
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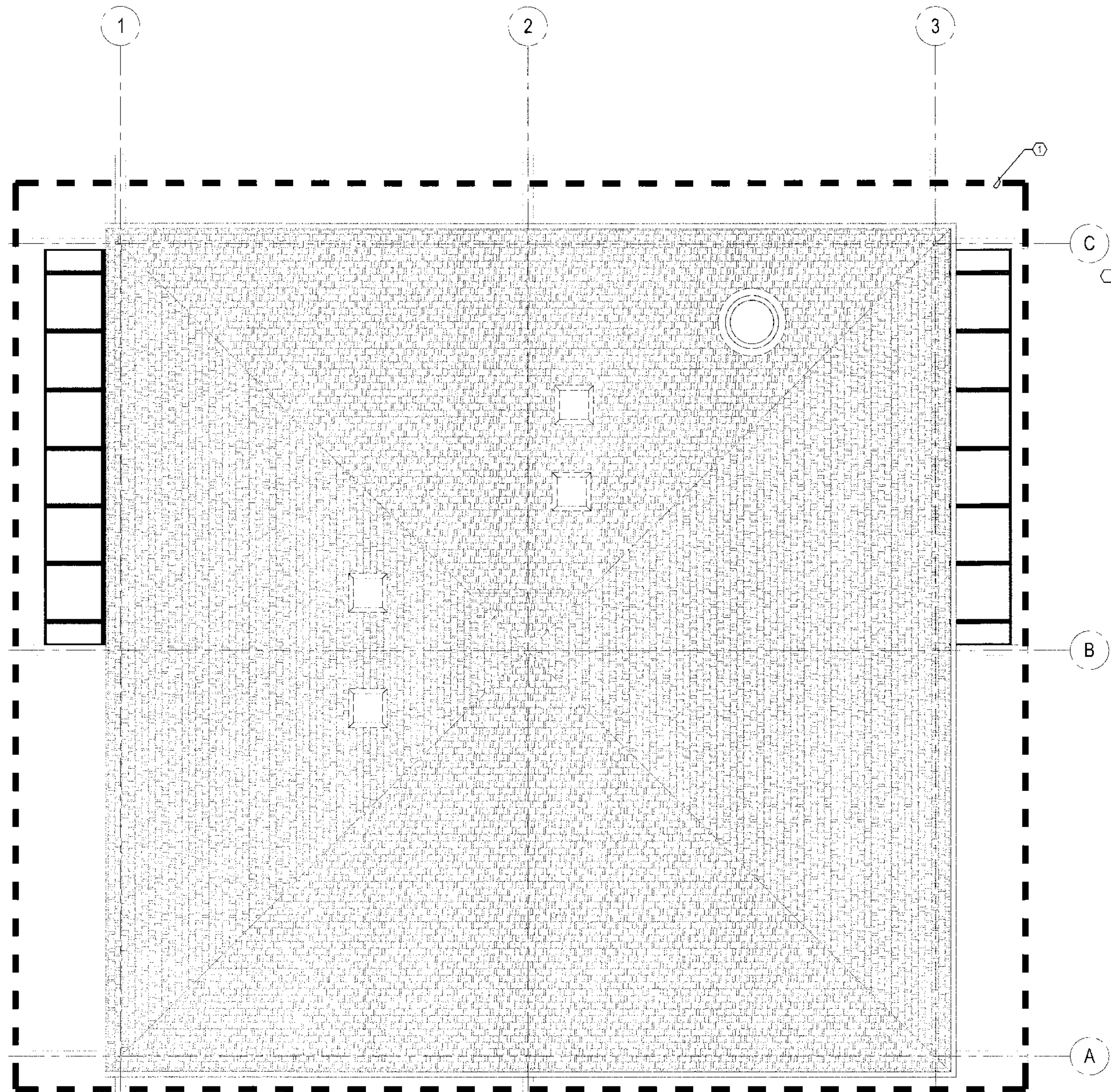
**CONSTRUCTION DOCUMENTS**

**DEMO SECOND FLOOR PLAN - MECHANICAL**

**1 DEMO SECOND FLOOR PLAN - MECHANICAL**  
 M202 SCALE: 1/4" = 1'-0"



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**GENERAL NOTES:**

- A. SEE M001 FOR PROJECT DESCRIPTION, GENERAL NOTES, AND PROJECT SPECIFICATIONS.
- B. PRIOR TO SUBMITTING PROPOSAL, CONTRACTOR SHALL VISIT PROJECT SITE AND THOROUGHLY INSPECT ALL EXISTING CONDITIONS.
- C. ALL EQUIPMENT, DUCT, AND PIPE SUPPORTS WITHIN THE PROJECT AREA THAT ARE EXISTING TO BE REUSED SHALL BE TESTED AS REQUIRED TO MEET CURRENT CALIFORNIA BUILDING CODE REQUIREMENTS FOR ANCHORING, SUPPORT, AND SEISMIC BRACING.
- D. CONTRACTOR SHALL FIRE STOP ALL WALL OPENINGS NEW AND EXISTING WITH A UL LISTED, FIRE MARSHALL APPROVED METHOD AND MATERIALS.
- E. REPAIR ALL OPENINGS MADE BY DEMOLITION OF EXISTING EQUIPMENT, DUCT, PIPE, ETC.
- F. DEMOLITION WORK SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING: REMOVAL OF EQUIPMENT, SUPPORTS, ANCHORS, PIPING, DUCTWORK, CONTROLS AND ALL APPURTENANCES WHERE INDICATED ON THE PLANS.

**NOTES:**

- 1. ALL EXISTING HVAC ROOF EQUIPMENT TO BE REMOVED.

1 DEMO ROOF FLOOR PLAN - MECHANICAL  
M103 SCALE: 1/4" = 1'-0"

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9/07/17 DSA BACK CHECK

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COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1095

scale: 1/4" = 1'-0"  
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CONSTRUCTION  
DOCUMENTS

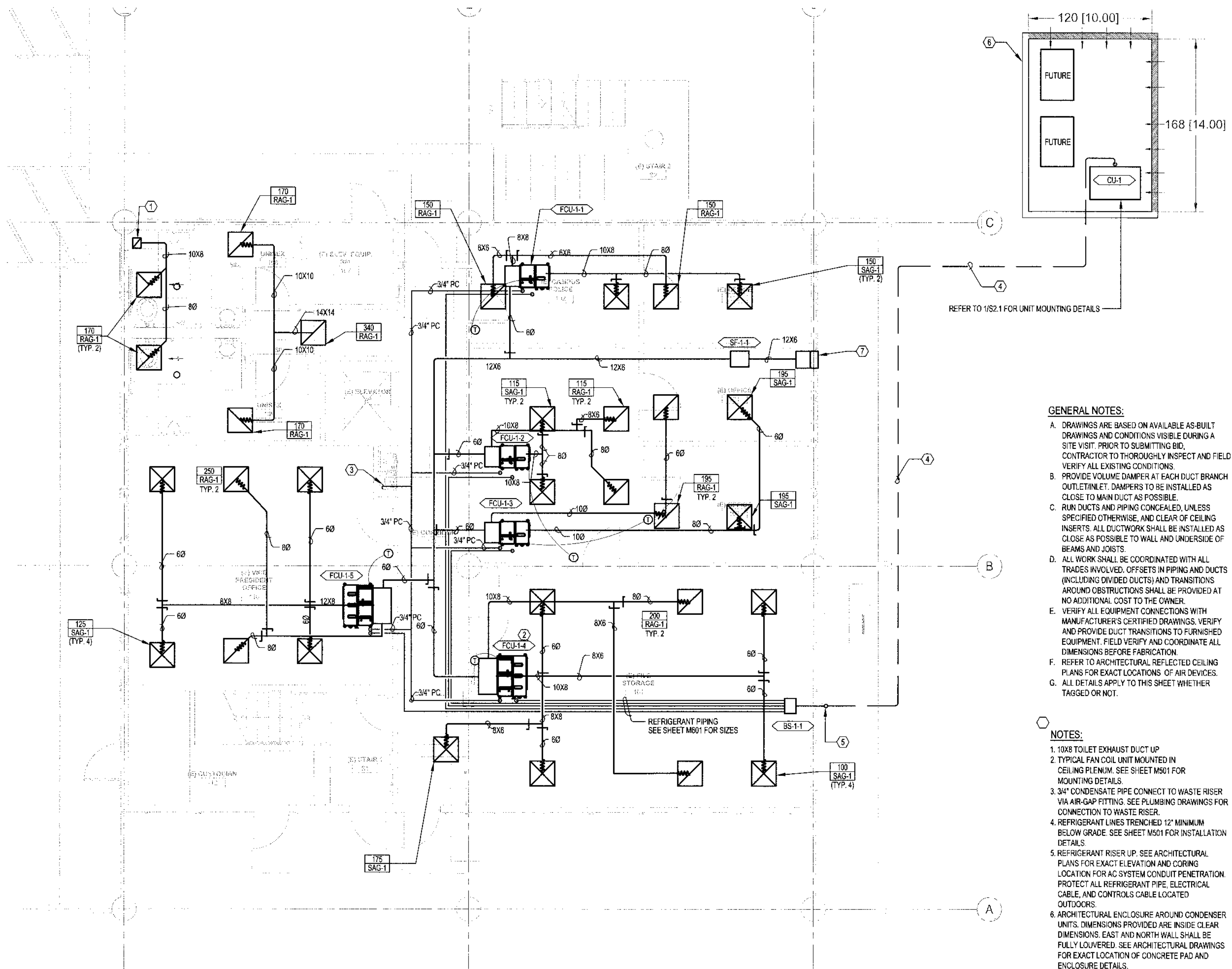
DEMO ROOF PLAN -  
MECHANICAL

M103

Date: 9/1/17 Time: 5:23pm File: P:\2017\17-1095 - College of Marin IVC Bldg 11 Renovation\01 Drawings\17-1095\_M201.dwg User: arc-crew.ncgogn

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**1** FIRST FLOOR PLAN - MECHANICAL  
M201 SCALE: 1/4" = 1'-0"



**GENERAL NOTES:**

- A. DRAWINGS ARE BASED ON AVAILABLE AS-BUILT DRAWINGS AND CONDITIONS VISIBLE DURING A SITE VISIT. PRIOR TO SUBMITTING BID, CONTRACTOR TO THOROUGHLY INSPECT AND FIELD VERIFY ALL EXISTING CONDITIONS.
- B. PROVIDE VOLUME DAMPER AT EACH DUCT BRANCH OUTLET/INLET. DAMPERS TO BE INSTALLED AS CLOSE TO MAIN DUCT AS POSSIBLE.
- C. RUN DUCTS AND PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE, AND CLEAR OF CEILING INSERTS. ALL DUCTWORK SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO WALL AND UNDERSIDE OF BEAMS AND JOISTS.
- D. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- E. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. FURNISH AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
- F. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES.
- G. ALL DETAILS APPLY TO THIS SHEET WHETHER TAGGED OR NOT.

**NOTES:**

1. 10X8 TOILET EXHAUST DUCT UP
2. TYPICAL FAN COIL UNIT MOUNTED IN CEILING PLENUM. SEE SHEET M601 FOR MOUNTING DETAILS.
3. 3/4" CONDENSATE PIPE CONNECT TO WASTE RISER VIA AIR-GAP FITTING. SEE PLUMBING DRAWINGS FOR CONNECTION TO WASTE RISER.
4. REFRIGERANT LINES TRENCHED 12" MINIMUM BELOW GRADE. SEE SHEET M501 FOR INSTALLATION DETAILS.
5. REFRIGERANT RISER UP. SEE ARCHITECTURAL PLANS FOR EXACT ELEVATION AND CORING LOCATION FOR AC SYSTEM CONDUIT PENETRATION. PROTECT ALL REFRIGERANT PIPE, ELECTRICAL CABLE, AND CONTROLS CABLE LOCATED OUTDOORS.
6. ARCHITECTURAL ENCLOSURE AROUND CONDENSER UNITS. DIMENSIONS PROVIDED ARE INSIDE CLEAR DIMENSIONS. EAST AND NORTH WALL SHALL BE FULLY LOUVERED. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF CONCRETE PAD AND ENCLOSURE DETAILS.
7. EXISTING OUTSIDE AIR LOUVER. 0.58 SF NET FREE AREA REQUIRED.

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3/10/17	100% CD
rev date	issue



**COM IVC Bldg. 11 renovation**

novato, california  
project number: 17-1095

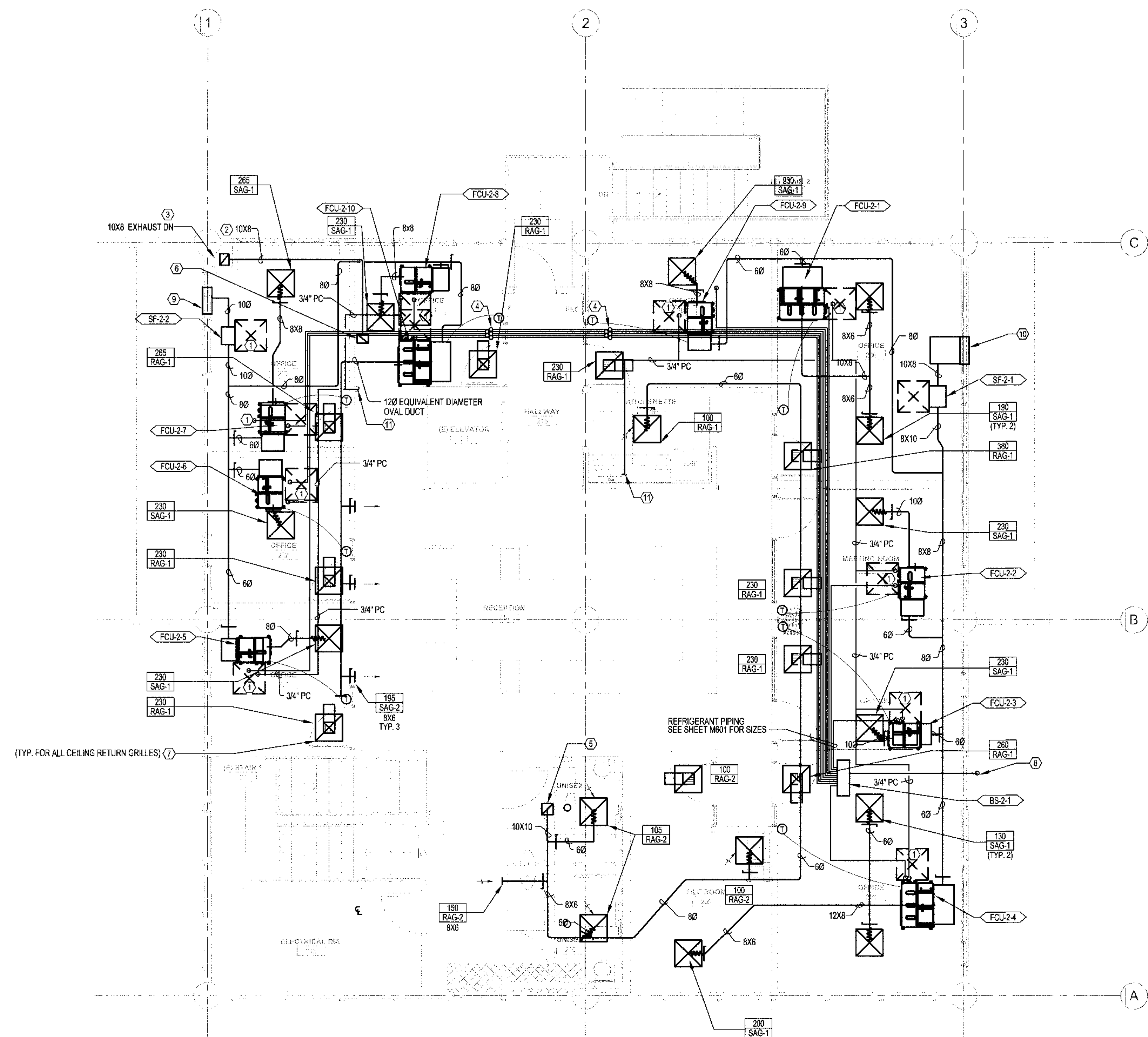
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**CONSTRUCTION DOCUMENTS**  
**FIRST FLOOR PLAN - MECHANICAL**

**M201**

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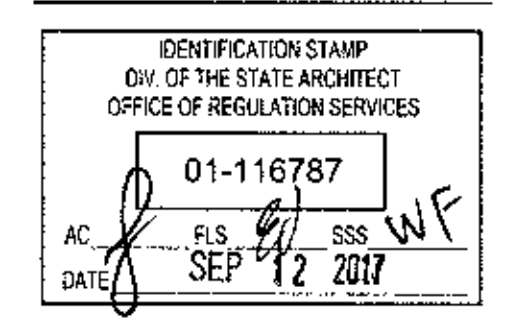
**1** SECOND FLOOR PLAN - MECHANICAL  
M202 SCALE: 1/4" = 1'-0"

- GENERAL NOTES:**
- DRAWINGS ARE BASED ON AVAILABLE AS-BUILT DRAWINGS AND CONDITIONS VISIBLE DURING A SITE VISIT. PRIOR TO SUBMITTING BID, CONTRACTOR TO THOROUGHLY INSPECT AND FIELD VERIFY ALL EXISTING CONDITIONS.
  - PROVIDE VOLUME DAMPER AT EACH DUCT BRANCH OUTLET/INLET. DAMPERS TO BE INSTALLED AS CLOSE TO MAIN DUCT AS POSSIBLE.
  - RUN DUCTS AND PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE, AND CLEAR OF CEILING INSERTS. ALL DUCTWORK SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO WALL AND UNDERSIDE OF BEAMS AND JOISTS.
  - ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
  - VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
  - REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES.
  - ALL DETAILS APPLY TO THIS SHEET WHETHER TAGGED OR NOT.

- NOTES:**
- PROVIDE 28"X28" ACCESS PANEL IN CEILING FOR EQUIPMENT MAINTENANCE
  - RUN DUCTWORK SLOPING UPWARD, TIGHT TO BOTTOM OF ROOF STRUCTURE
  - ARCHITECTURAL SHAFT, 16"X18" INSIDE CLEAR DIMENSIONS
  - REFRIGERANT LINES JOG UP TO 13" AFF.
  - 10X10 BUILDING EXHAUST UP TO FAN ON ROOF. ROOF OPENING=12.5' X 12.5'
  - 10X8 BUILDING EXHAUST UP TO FAN ON ROOF. ROOF OPENING=10.5'X10.5'
  - ALL CEILING RETURN GRILLES WILL BE PROVIDED WITH A BOOT AS SHOWN ON SHEET M501 MECHANICAL DETAILS.
  - REFRIGERANT RISER UP. SEE ARCHITECTURAL PLANS FOR EXACT ELEVATION AND CORING LOCATION FOR AC SYSTEM CONDUIT PENETRATION. PROTECT ALL REFRIGERANT PIPE, ELECTRICAL CABLE, AND CONTROLS CABLE LOCATED OUTDOORS.
  - EXISTING INTAKE LOUVER. 0.45 SF NET FREE AREA REQUIRED. PROVIDE DUCT PLENUM BOX 10"X10" FOR CONNECTING TO LOUVER.
  - EXISTING INTAKE LOUVER. 0.53 SF NET FREE AREA REQUIRED. PROVIDE DUCT PLENUM BOX 10"X10" FOR CONNECTING TO LOUVER.
  - 3/4" CONDENSATE PIPE CONNECT TO WASTE RISER VIA AIR-GAP FITTING. SEE PLUMBING DRAWINGS FOR CONNECTION TO WASTE RISER.

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project number: 17-1095

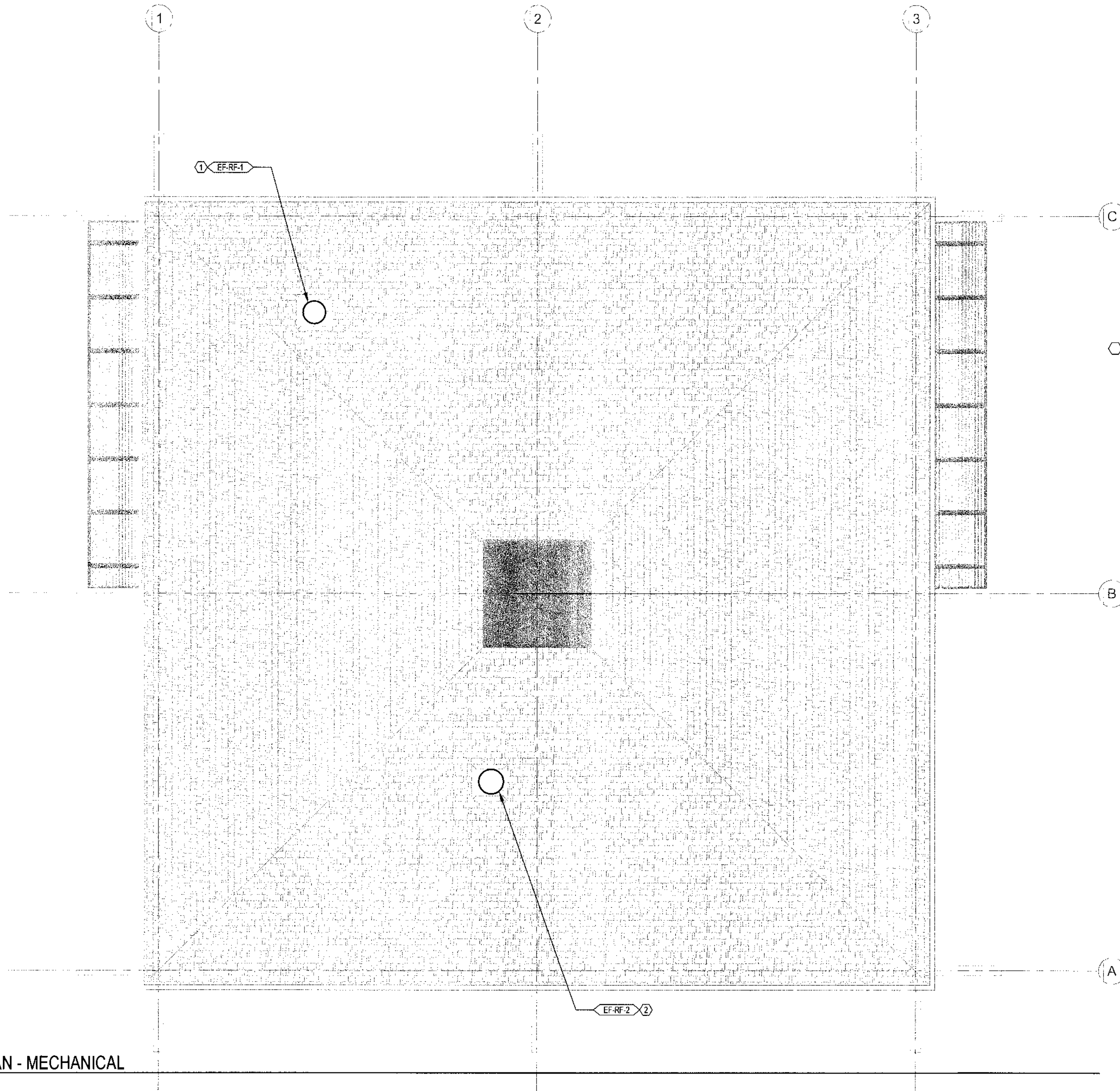
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**CONSTRUCTION DOCUMENTS**  
SECOND FLOOR PLAN - MECHANICAL

**M202**

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**1** ROOF PLAN - MECHANICAL  
 M202 SCALE: 1/4" = 1'-0"

**GENERAL NOTES:**

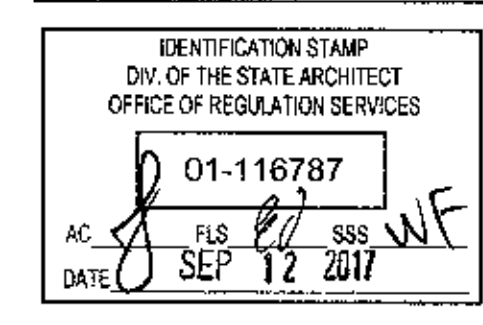
- A. DRAWINGS ARE BASED ON AVAILABLE AS-BUILT DRAWINGS AND CONDITIONS VISIBLE DURING A SITE VISIT. PRIOR TO SUBMITTING BID, CONTRACTOR TO THOROUGHLY INSPECT AND FIELD VERIFY ALL EXISTING CONDITIONS.
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- D. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- E. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
- F. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES.
- G. ALL DETAILS APPLY TO THIS SHEET WHETHER TAGGED OR NOT.

**NOTES:**

- 1. ROOF OPENING = 10.5' X 10.5'. SEE DETAIL 2/M501 FOR MOUNTING DETAIL.
- 2. ROOF OPENING = 12.5' X 12.5'. SEE DETAIL 2/M501 FOR MOUNTING DETAIL.

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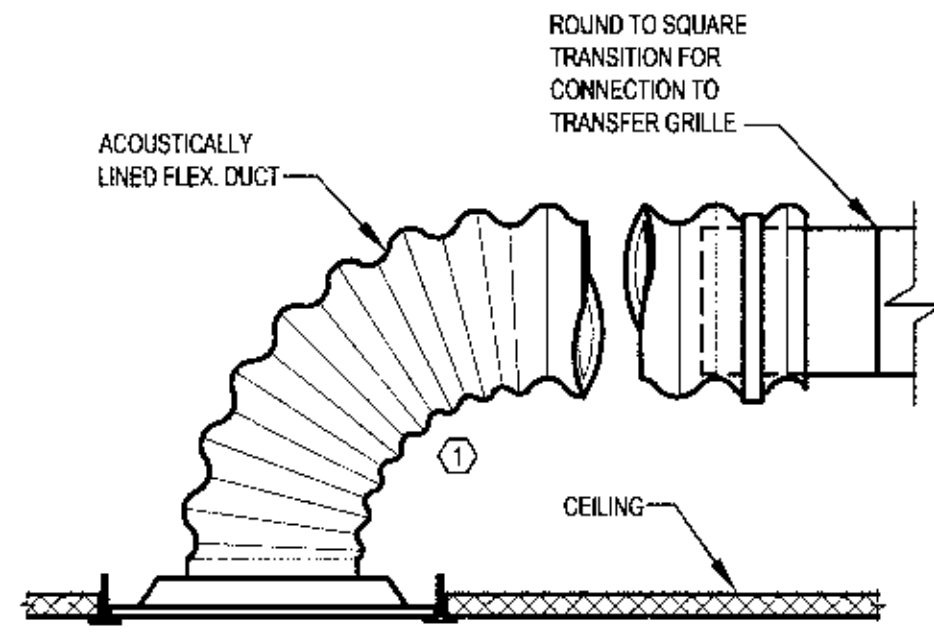


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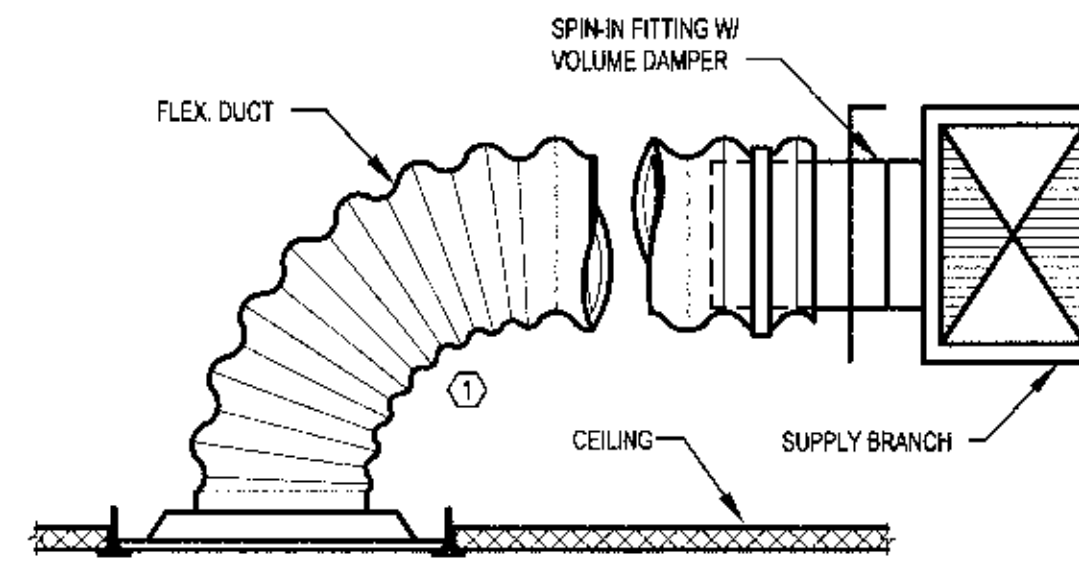
**CONSTRUCTION DOCUMENTS**  
**ROOF PLAN - MECHANICAL**



NOTES:  
 ① 1.5 DIA. MINIMUM FLEX DUCT RADIUS (4' MAX LENGTH)

7 TYPICAL ROUND RETURN AIR BOOT

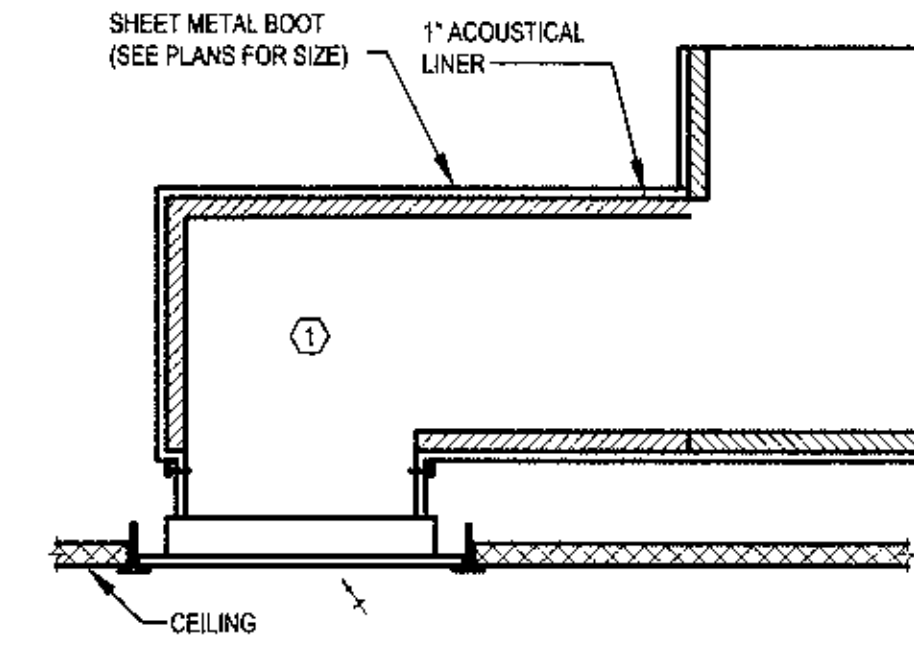
M501 SCALE: NONE



NOTES:  
 ① 1.5 DIA. MINIMUM FLEX DUCT RADIUS (4' MAX LENGTH) WHERE 1.5 DIA. TURN CAN NOT BE MET USE DETAIL 6/M5.01

4 TYPICAL ROUND NECK T-BAR DIFFUSER

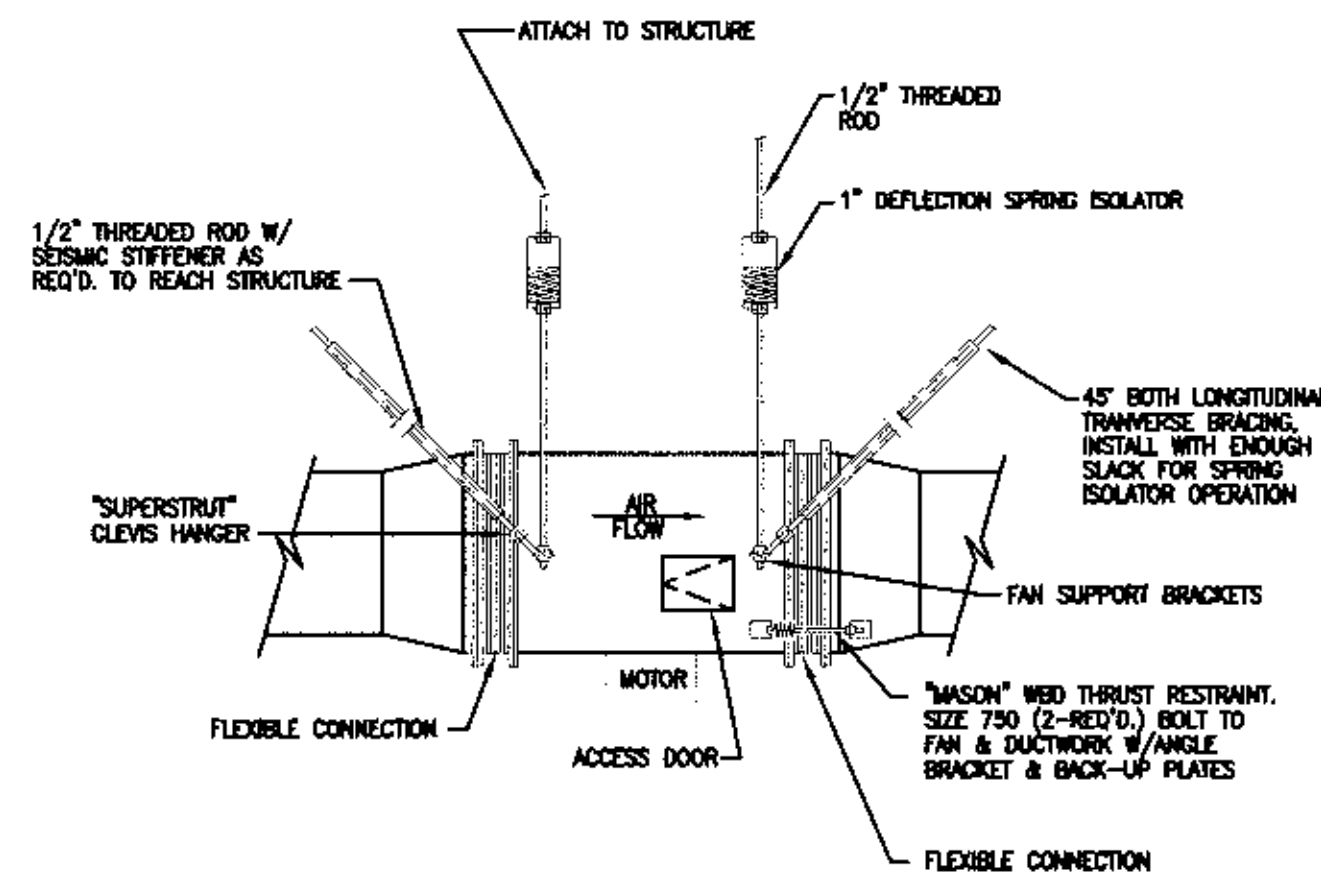
M501 SCALE: NONE



NOTES:  
 ① MINIMUM 2 90 DEGREE TURN PER RETURN BOOT. REFER TO ACOUSTICIAN REPORT FOR ADDITIONAL INFORMATION

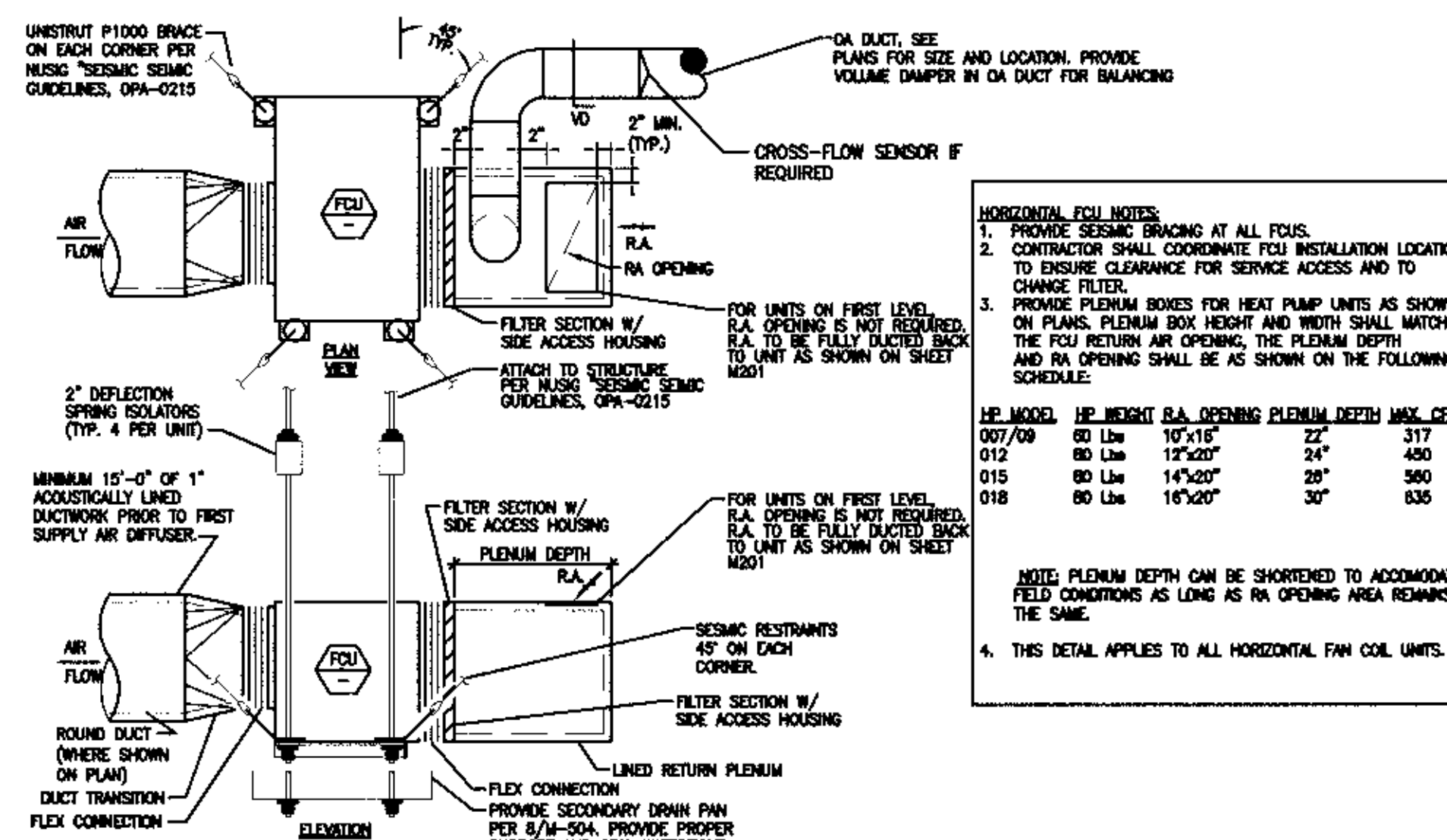
1 RETURN AIR BOOT

M501 SCALE: NONE



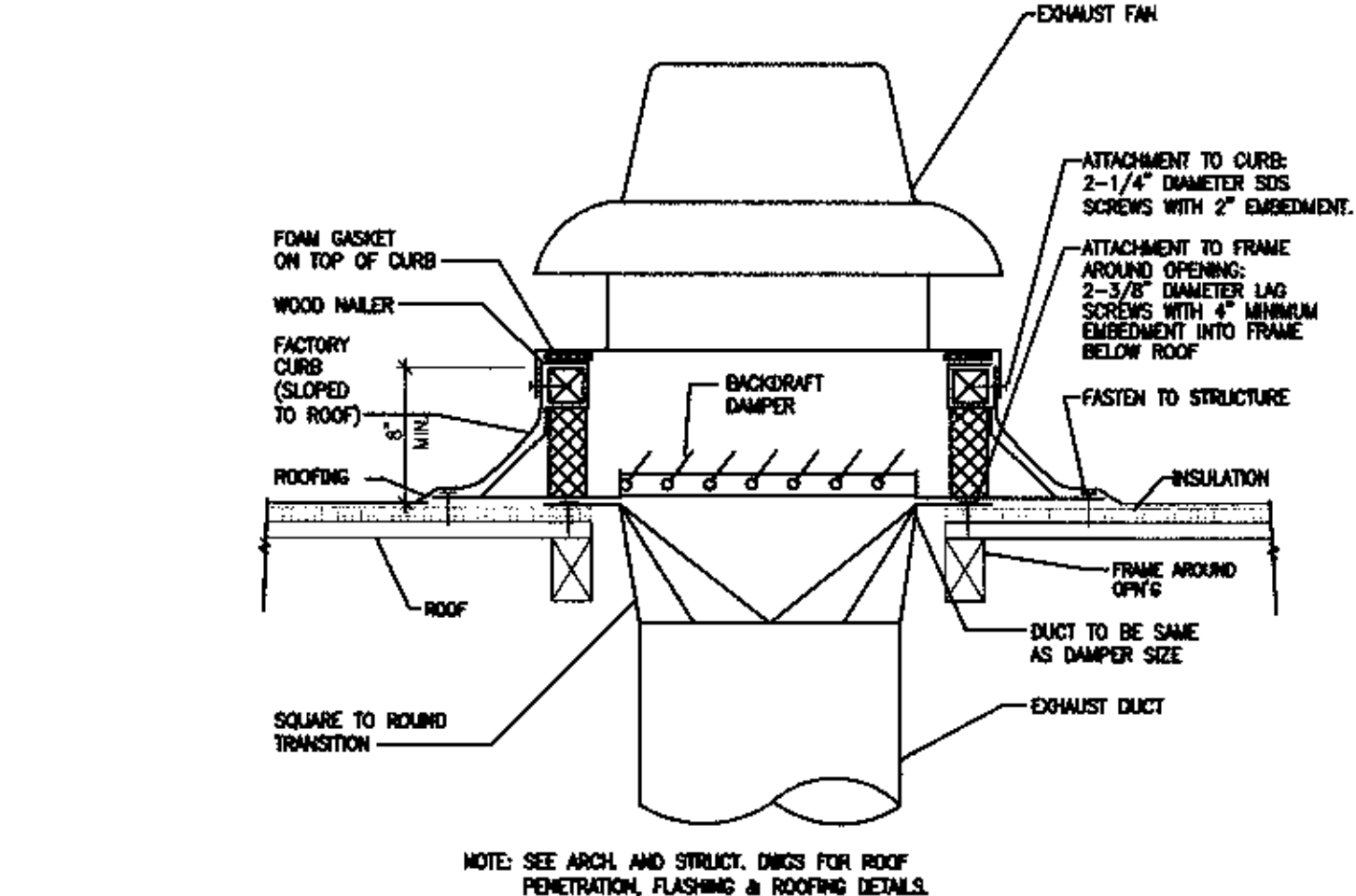
8 INLINE FAN MOUNTING DETAIL

M501 SCALE: NONE



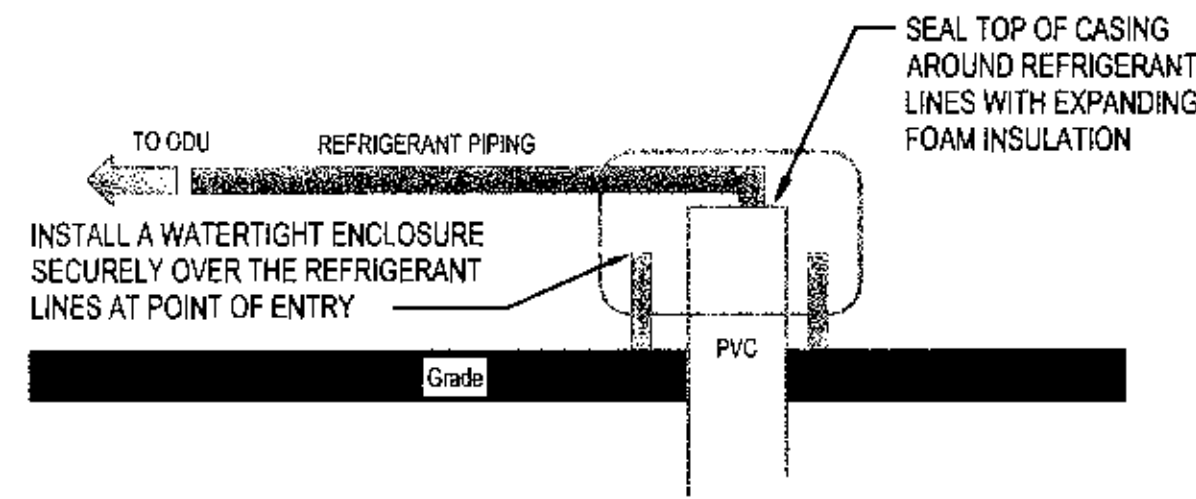
5 HORIZONTAL FAN COIL UNIT HANGING DETAIL

M501 SCALE: NONE



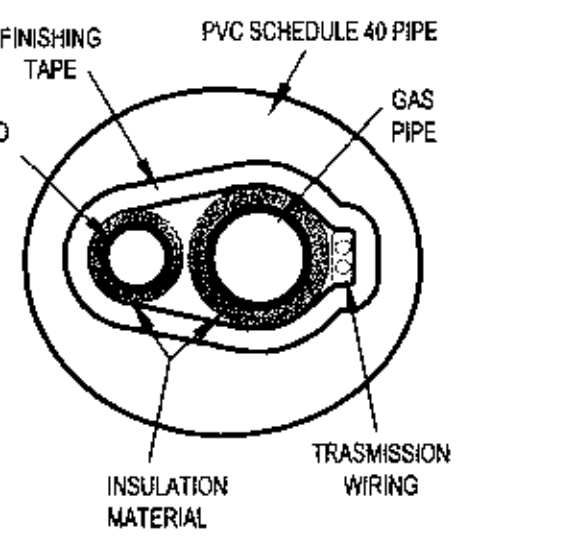
2 ROOF MOUNTED EXHAUST FAN

M501 SCALE: NONE



9 UNDERGROUND REFRIGERANT PIPING INSTALLATION

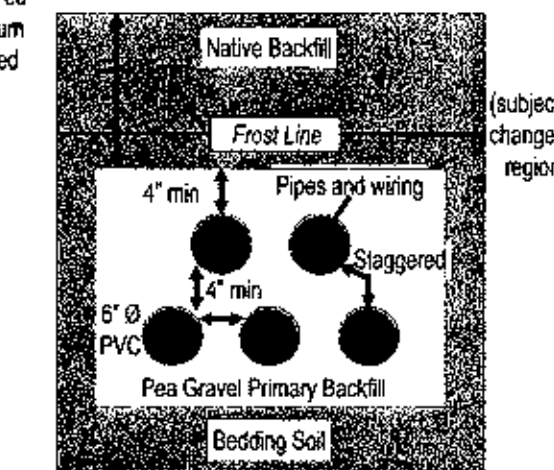
M501 SCALE: NONE



6 UNDERGROUND REFRIGERANT PIPING INSTALLATION

M501 SCALE: NONE

- Trench should be partially back filled with Pea Gravel and PVC pipes shall have 4" minimum clearance all around arranged in a staggered pattern.
- Refrigerant piping must pass the leak test and be vacuumed cleaned prior to being backfilled with selected earth or sand, hand placed and hand tamped to a minimum of 12" below grade and 4" above the top most PVC pipe.
- The final back fill should be equal or deeper than the frost line (Note: Frost line varies by region).
- No boulders, rocks over 6" in diameter should be in the backfill.
- No wheeled or tracked vehicles for tamping should be used.



3 UNDERGROUND REFRIGERANT PIPING INSTALLATION

M501 SCALE: NONE

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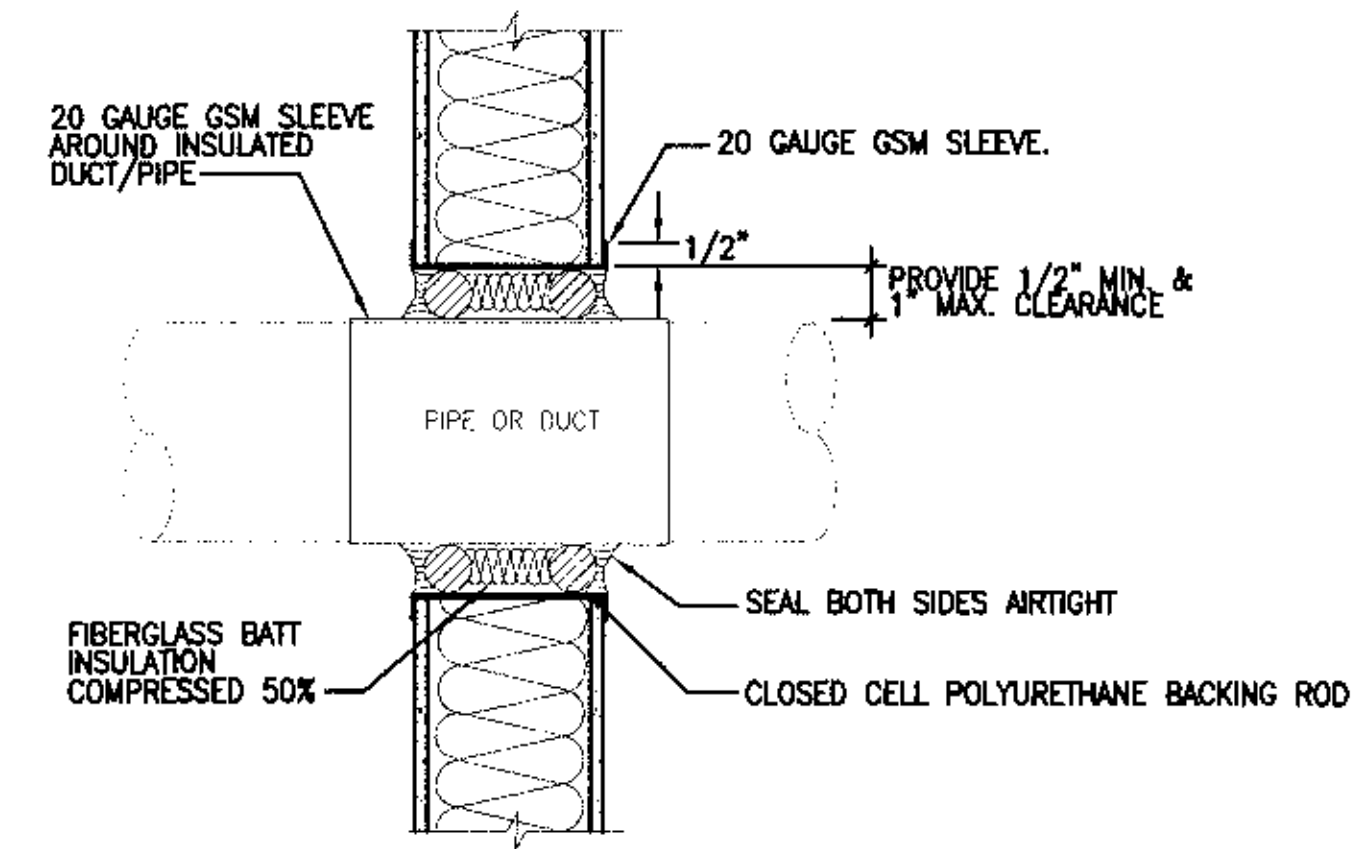
DETAILS - MECHANICAL

M501

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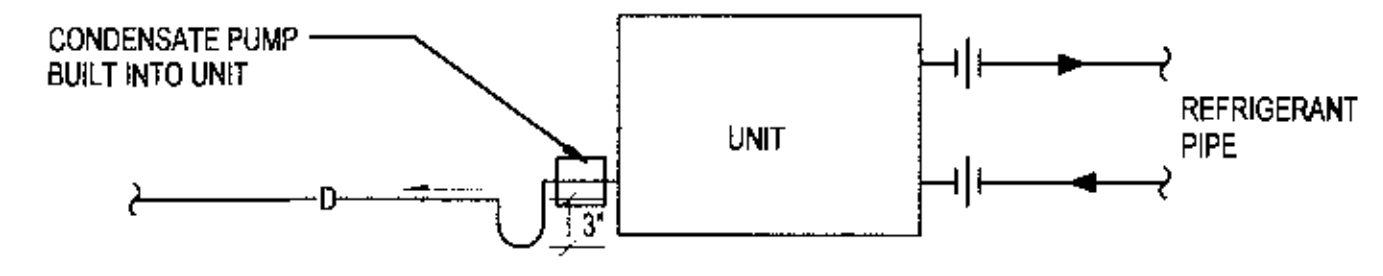
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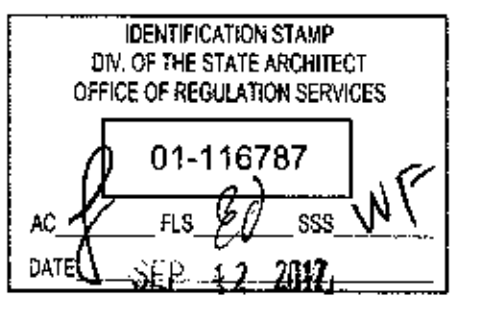
NOTE:  
DUCT/PIPE MUST "FLOAT" IN OPENING AND NOT HAVE CONTACT WITH PARTITION.

**1 DUCT/PIPE PENETRATION THROUGH WALL**  
M502 SCALE: NONE



NOTES:  
1. CONTRACTOR SHALL PROVIDE ALL REQUIRED SEISMIC CALCULATIONS STAMPED AND SIGNED BY STRUCTURAL ENGINEER.

**2 VRF FAN COIL UNIT PIPING**  
M502 SCALE: NONE



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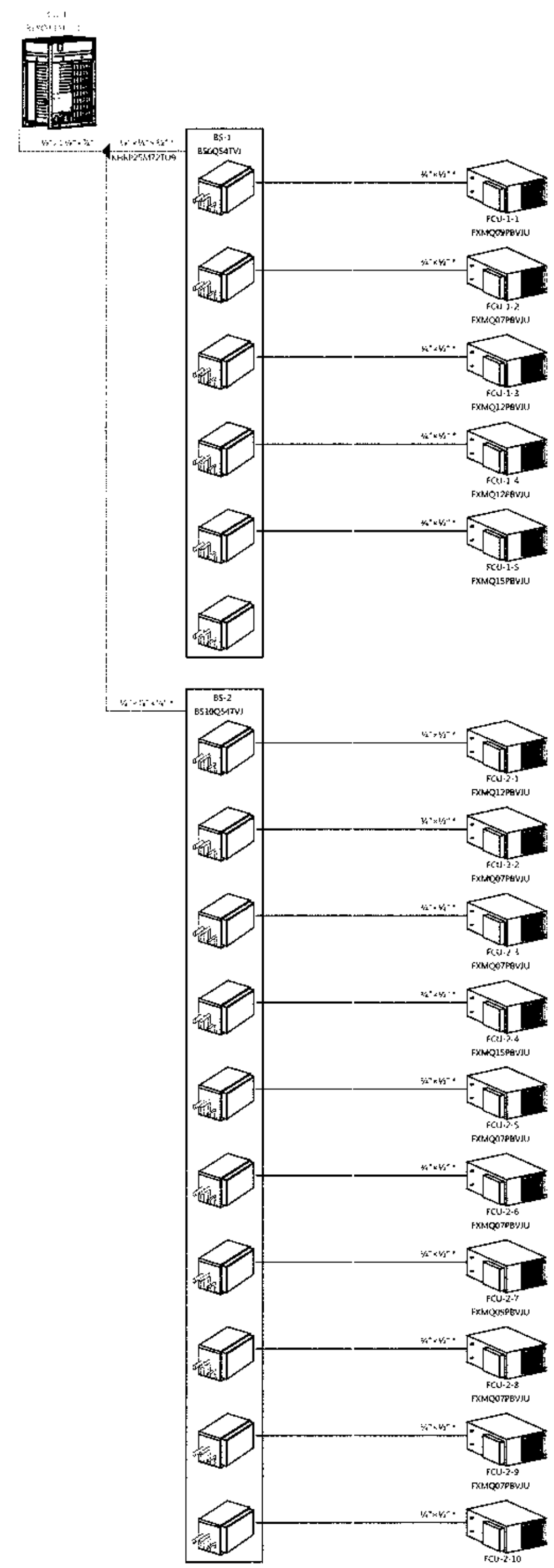
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date: 03/10/2017

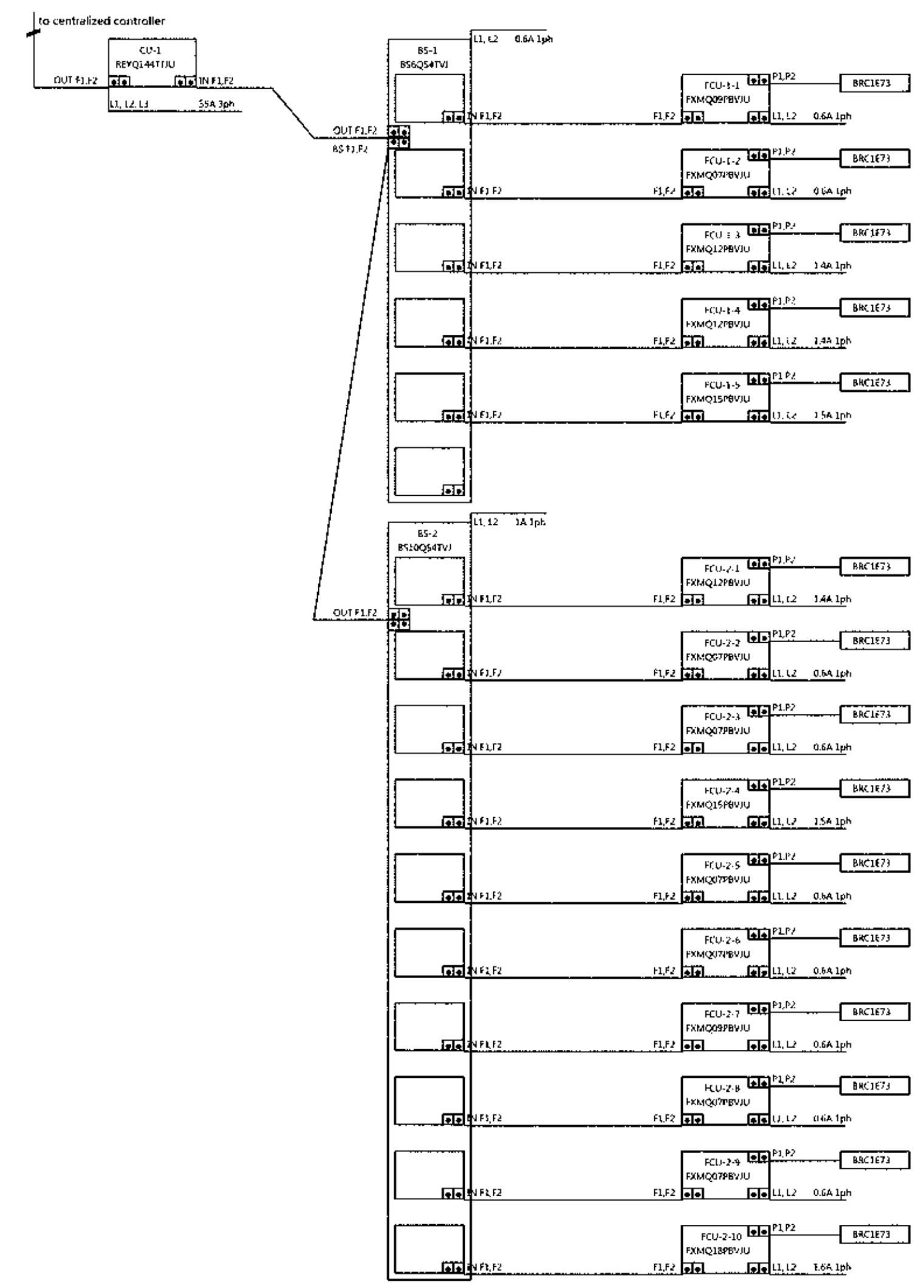
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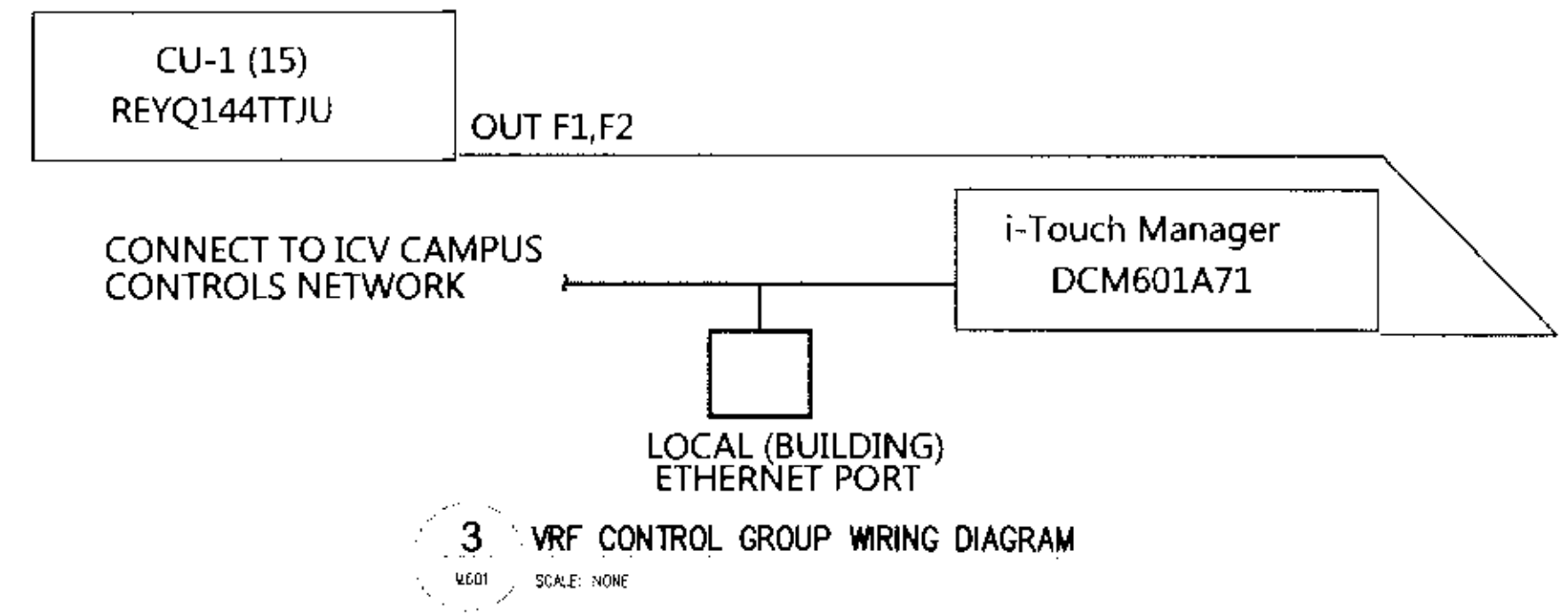
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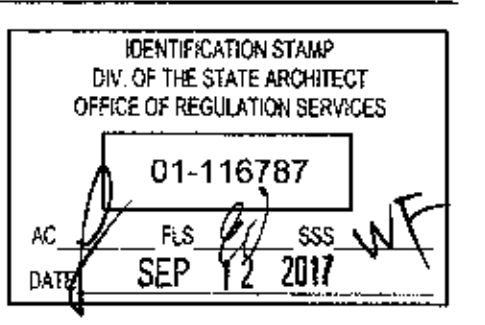
1 VRF PIPING DIAGRAM  
MSD SCALE: VRF



2 VRF WIRING DIAGRAM  
MSD SCALE: NONE

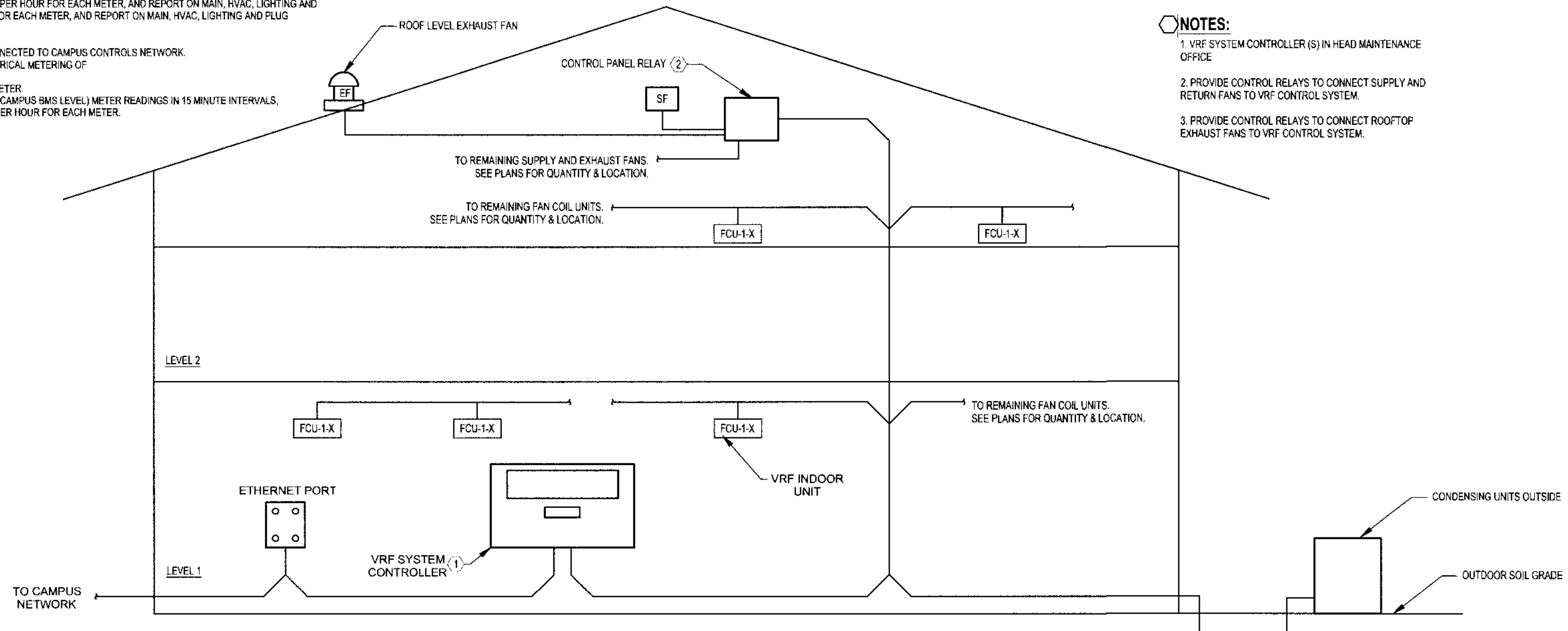


3 VRF CONTROL GROUP WIRING DIAGRAM  
MSD SCALE: NONE



**SEQUENCE OF OPERATIONS:**

- A. CONTROL SYSTEM**
- CENTRAL CONTROLS SYSTEM SHALL BE CONNECTED TO CAMPUS NETWORK AND TO THE INTERNET.
  - CENTRAL CONTROLS SYSTEM SHALL BE REMOTELY AVAILABLE TO BUILDING MANAGEMENT VIA PASSWORD PROTECTED WEB INTERFACE.
  - CENTRAL CONTROLS SYSTEM DATA AND VARIABLES SHALL BE ADJUSTABLE REMOTELY (INPUT AND OUTPUT POINTS SHALL BE ADJUSTABLE VIA WEB INTERFACE).
  - ALL EQUIPMENT SETPOINT TEMPERATURES AND SCHEDULES SHALL BE ADJUSTABLE.
  - THE PRIMARY CONTROL SYSTEM FOR THE VARIABLE REFRIGERANT HEAT PUMP SYSTEM AND BUILDING FANS SHALL BE THE INTEGRAL CONTROL SYSTEM OF THE VRF/VRV HEAT PUMP SYSTEM, DAIKIN INTELLIGENT TOUCH MANAGER (DCM601A51).
- B. FIRST, SECOND FLOORS AND ROOF**
- FCU UNITS**
    - GENERAL:**
      - THE INDOOR FAN COIL UNIT SHALL OPERATE ON A TIME-BASED SCHEDULE SET BY THE CENTRAL CONTROL SYSTEM. SCHEDULE SHALL BE SET BY BUILDING MANAGEMENT.
      - SET INDOOR OCCUPIED AND UNOCCUPIED SCHEDULES AS DIRECTED BY COLLEGE OF MARIN FACILITIES MANAGER.
      - OCCUPIED SPACE TEMPERATURE SETPOINT SHALL BE SET TO 72°F (ADJUSTABLE).
      - UN-OCCUPIED SPACE TEMPERATURE SETPOINT SHALL BE ALLOWED TO DRIFT BETWEEN 66°F AND 78°F (+/-6°F ADJUSTABLE).
      - USERS SHALL BE ABLE TO OVERRIDE SYSTEM CONTROLS VIA LOCAL THERMOSTAT.
    - ALARMS:**
      - WHEN VRF/VRV SYSTEM CONTROLS GENERATES AN ALARM IT SHALL BE BROADCAST TO BUILDING MANAGEMENT VIA EMAIL AND TXT MESSAGE.
  - SUPPLY AIR FANS:**
    - GENERAL:**
      - SUPPLY AIR FANS SHALL BE ON WHEN EXHAUST FANS ARE ON.
      - SUPPLY AIR FANS SHALL BE CONNECTED TO CENTRAL CONTROLS SYSTEM VIA RELAYS. PROVIDE ALARM FUNCTION WHEN FANS ARE COMMANDED TO START AND FAN DOES NOT START VIA CT RELAY.
  - EXHAUST AIR FANS (EF-RF-1.2):**
    - GENERAL:**
      - EXHAUST AIR FANS SHALL BE ON AS SET BY CENTRAL CONTROLS SYSTEM SCHEDULING.
      - CENTRAL CONTROLS SYSTEM SHALL HAVE THE ABILITY TO PROVIDE FOR OCCUPIED AND UNOCCUPIED SCHEDULING OF EXHAUST FANS.
    - ALARMS:**
      - IF FAN FAILS TO START WHEN COMMANDED SYSTEM CONTROLS SHALL GENERATE AN ALARM AND IT SHALL BE BROADCAST TO CAMPUS CONTROLS MANAGEMENT VIA EMAIL AND TXT MESSAGE TO FACILITIES MANAGEMENT TEAM.
      - DAIKIN VRV ALARMS AVAILABLE THROUGH I-TOUCH CONTROLLER SHALL ALL BE BROADCAST TO CAMPUS CONTROLS MANAGEMENT SYSTEM VIA EMAIL AND TXT MESSAGE TO FACILITIES MANAGEMENT TEAM.
  - METERING:**
    - ELECTRICAL**
      - PROVIDE ELECTRICAL DDC SUBMETERS CONNECTED TO CAMPUS CONTROLS NETWORK.
      - PROVIDE FOR THE SEGREGATED ELECTRICAL METERING OF:
        - HVAC LOADS
        - LIGHTING LOADS
        - PLUG LOADS
      - PROVIDE ONE BUILDING ELECTRICAL MAIN METER, ONE METER FOR THE LIGHTING CONTROL PANEL, AND ANOTHER METER(S) FOR HVAC LOADS. PLUG LOADS SHALL BE CALCULATED AS FOLLOWS, PLUG LOADS = MAIN METER LOADS - HVAC LOADS - LIGHTING LOADS.
      - TREND AND LOG (LOCALLY AND AT THE CAMPUS BMS LEVEL) METER READINGS IN 15 MINUTE INTERVALS, CALCULATE AND REPORT ENERGY USE PER HOUR FOR EACH METER, AND REPORT ON MAIN, HVAC, LIGHTING AND PLUG LOADS ENERGY USE PER HOUR FOR EACH METER, AND REPORT ON MAIN, HVAC, LIGHTING AND PLUG LOADS ENERGY USE FOR EVERY HOUR.
    - WATER**
      - PROVIDE WATER DDC SUBMETERS CONNECTED TO CAMPUS CONTROLS NETWORK.
      - PROVIDE FOR THE SEGREGATED ELECTRICAL METERING OF:
        - MAIN COLD WATER
      - PROVIDE ONE BUILDING WATER MAIN METER.
      - TREND AND LOG (LOCALLY AND AT THE CAMPUS BMS LEVEL) METER READINGS IN 15 MINUTE INTERVALS, CALCULATE AND REPORT WATER USE PER HOUR FOR EACH METER.



**GENERAL NOTES:**

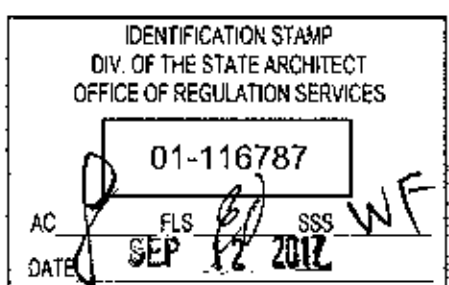
- FOR GENERAL SYSTEM REQUIREMENTS SEE PROJECT SPECS AND GENERAL NOTES ON M01.
- ALL CONTROL WIRING SHALL BE FURNISHED AND INSTALLED BY THE CONTROLS CONTRACTOR IN ACCORDANCE WITH DIVISION 26 SPECIFICATIONS. SEE SPECIFICATIONS FOR LOCATIONS REQUIRING WIRING TO BE IN CONDUIT.
- ALL CONTROLS INFORMATION IS DIAGRAMMATIC (CORRECT COUNTS FOR ALL CONTROL DEVICES REQUIRED FOR A COMPLETE SYSTEM SHALL BE PROVIDED BY CONTRACTOR).
- PROVIDE NECESSARY INTERFACE TO CONNECT TO OTHER MANUFACTURER MICROPROCESSOR BASED EQUIPMENT. COORDINATE WITH MANUFACTURERS AS REQUIRED TO MAKE THIS CONNECTION POSSIBLE.
- ALL DIGITAL INPUTS (DI) AND OUTPUTS (DO) SHALL HAVE RUNTIME ACCUMULATION FOR MAINTENANCE MONITORING.
- PROVIDE A MINIMUM OF 20% ADDITIONAL POINTS BEYOND THOSE SHOWN ON DRAWINGS.
- CONTROL SYSTEM SHALL BE INTEGRATED WITH WWW (PASSWORD PROTECTED) NETWORK TO ALLOW USE OF THE CONTROL SYSTEM AT ANY WORKSTATION IN BUILDING AND ANY OTHER BUILDING CLIENT BUILDING. MULTI-LEVEL PASSWORDS SHALL BE INCORPORATED.
- BASIS OF DESIGN IS VRF EQUIPMENT MANUFACTURER CONTROLS.
- THE CONTROL SYSTEM SHALL CONTINUE TO OPERATE DURING A POWER OUTAGE (PROVIDE A MINIMUM OF 8 HOUR BATTERY TIME) AND SHALL BE ENTIRELY CONNECTED TO GENERATOR, ON BACKUP POWER.
- THE OUTSIDE REFERENCES FOR TEMPERATURE, HUMIDITY, SHALL BE CONNECTED TO A MINIMUM OF TWO SEPARATE POINTS OF OUTSIDE AIR AT TWO OPPOSITE SIDES OF THE BUILDING. SHIELD OUTSIDE AIR TEMPERATURE, AND HUMIDITY SENSORS FROM DIRECT SUNLIGHT.
- PROVIDE QTY AND DETERMINE LOCATION OF ALL 120V POWER CONNECTIONS REQUIRED FOR ALL PANELS, TRANSFORMERS, CONTROLLERS, ETC. TO ACCOMPLISH INSTALLATION AND A FULLY FUNCTIONING SYSTEM.

**NOTES:**

- VRF SYSTEM CONTROLLER (S) IN HEAD MAINTENANCE OFFICE
- PROVIDE CONTROL RELAYS TO CONNECT SUPPLY AND RETURN FANS TO VRF CONTROL SYSTEM.
- PROVIDE CONTROL RELAYS TO CONNECT ROOFTOP EXHAUST FANS TO VRF CONTROL SYSTEM.

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9/07/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date issue



**COM IVC Bldg. 11  
renovation**

novato, california  
project number: 17-1095

scale: NONE  
date: 03/10/2017

**CONSTRUCTION  
DOCUMENTS**

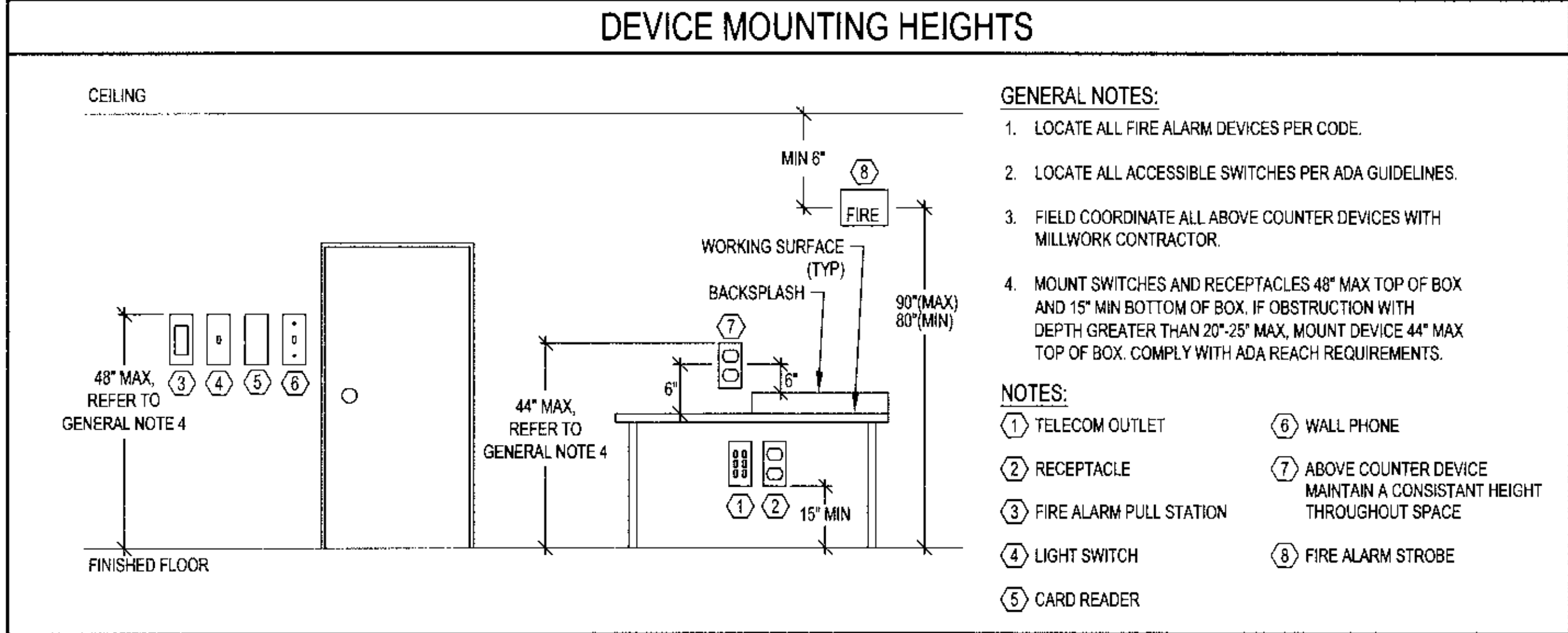
CONTROL DIAGRAMS  
MECHANICAL



ABBREVIATIONS			
AFF	ABOVE FINISHED FLOOR	KVA	KILOVOLT AMP
A	AMPERE (AMP)	KVAR	KILOVOLT AMPS REACTIVE
AL	ALUMINUM	LA	LIGHTNING ARRESTOR
ARCH	ARCHITECT / ARCHITECTURAL	LTG	LIGHTING
ATS	AUTOMATIC TRANSFER SWITCH	LV	LOW VOLTAGE
CB	CIRCUIT BREAKER	MATV	MASTER ANTENNA TELEVISION
C	CONDUIT	MCA	MINIMUM CIRCUIT AMPS
CCTV	CLOSED CIRCUIT TELEVISION	MCB	MAIN CIRCUIT BREAKER
CKT	CIRCUIT	MCC	MOTOR CONTROL CENTER
CLG	CEILING	MDP	MAIN DISTRIBUTION PANEL
CT	CURRENT TRANSFORMER	MECH	MECHANICAL
CU	COPPER	MH	METAL HALIDE
DN	DOWN	MLO	MAIN LUGS ONLY
EMERG	EMERGENCY	MTS	MANUAL TRANSFER SWITCH
EMT	ELECTRIC METALLIC TUBING	MW	MICROWAVE
EP	EXPLOSION PROOF	NIC	NOT IN CONTRACT
EPO	EMERGENCY POWER OFF	NL	NIGHT LIGHT CIRCUIT
EWG	ELECTRIC WATER COOLER	PA	PUBLIC ADDRESS
FA	FIRE ALARM	PE	PHOTO ELECTRIC CELL
FLA	FULL LOAD AMPS	PF	POWER FACTOR
FLUOR	FLUORESCENT	PNL	PANELBOARD
FCIC	FURNISHED BY CONTRACTOR	PVC	POLYVINYL CHLORIDE CONDUIT
	INSTALLED BY CONTRACTOR	PWR	POWER
FOIC	FURNISHED BY OWNER	REF	REFRIGERATOR
	INSTALLED BY CONTRACTOR	SDP	SUB-DISTRIBUTION PANEL
FOIO	FURNISHED BY OWNER	STR	STARTER
	INSTALLED BY OWNER	SW	SWITCH
GFP	GROUND FAULT PROTECTION	TD	TIME DELAY
GFI	GROUND FAULT INTERRUPTER	TP	TAMPERPROOF
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TTB	TELEPHONE TERMINAL BOARD
GRC	GALVANIZED RIGID CONDUIT	TTC	TELEPHONE TERMINAL CABINET
GRD	GROUND	TV	TELEVISION
HP	HORSEPOWER	TYP	TYPICAL
HPS	HIGH PRESSURE SODIUM	UG	UNDERGROUND
HV	HIGH VOLTAGE	UON	UNLESS OTHERWISE NOTED
HZ	HERTZ	UPS	UNINTERRUPTIBLE POWER SUPPLY
IG	ISOLATED GROUND	V	VOLTAGE
INC	INCANDESCENT	VA	VOLT AMPERES
JB	JUNCTION BOX	VP	VAPOR PROOF
KW	KILOWATT	W	WATTS
KWH	KILOWATT HOUR	WP	WEATHER PROOF
KV	KILOVOLT	XFMR	TRANSFORMER
		XFSW	TRANSFER SWITCH

**ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE**

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE DESIGNED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-10 SECTION 13.3 AS DEFINED IN ASCE 7-10 SECTION 13.6.8, 13.6.7, 13.6.5.6, AND 2016 CBC, SECTIONS 1616A.1.24, 1616A.1.25 AND 1616A.1.26. THE BRACING AND ATTACHEMENTS TO THE STRUCTURE SHALL BE DETAILED ON THE APPROVED DRAWINGS OR THEY SHALL COMPLY WITH ONE OF THE OSHPD PRE-APPROVAL OF MANUFACTURER'S CERTIFICATIONS (OPM) AS MODIFIED TO SATISFY ANCHORAGE REQUIREMENTS OF ACI 318-14, CHAPTER 17. COPIES OF THE MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF HANGING AND BRACING OF THE PIPE, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.



**FIRE ALARM**

Ⓜ	SPRINKLER SYSTEM SWITCH: FLOW, TAMPER
Ⓜ	MANUAL FIRE ALARM STATION
Ⓜ	DETECTOR: IONIZATION, HEAT, PHOTOELECTRIC
Ⓜ	DETECTOR: BEAM
Ⓜ	DUCT DETECTOR, TYPE AS NOTED
Ⓜ	FIRE ALARM: VISUAL
Ⓜ	FIRE ALARM: BELL; BELL W/VISUAL
Ⓜ	FIRE ALARM: CHIME; CHIME W/VISUAL
Ⓜ	FIRE ALARM: HORN; HORN W/VISUAL
Ⓜ	FIREMANS PHONE JACK
Ⓜ	SPEAKER: WALL, CEILING
Ⓜ	MAGNETIC DOOR HOLDER, CLOSER
Ⓜ	FIRE ALARM SPEAKER: WALL, CEILING

**EQUIPMENT**

Ⓜ	ELECTRICAL EQUIPMENT
Ⓜ	PANELBOARD
Ⓜ	CABINET
Ⓜ	TRANSFORMER
Ⓜ	GROUND ROD, IN TEST WELL
Ⓜ	GROUND PAD
Ⓜ	EQUIPMENT WITH DERIVED GROUND
Ⓜ	VOLTMETER, AMMETER
Ⓜ	SELECTOR SWITCH: VOLTMETER, AMMETER
Ⓜ	METER: KILOWATT HOUR, POWER FACTOR
Ⓜ	POTENTIAL TRANSFORMER
Ⓜ	CURRENT TRANSFORMER
Ⓜ	CABLE TRAY: CENTER SUPPORT, OUTER SUPPORTS

**DESIGNATION SYMBOLS**

Ⓜ	123	EQUIPMENT DESIGNATOR SEE SCHEDULE.
(E)		EXISTING
(F)		FUTURE
(N)		NEW
(R)		RELOCATED

— BOLD LINEWEIGHT DENOTES NEW EQUIPMENT, LIGHT FIXTURES, AND DEVICES.  
 — LIGHT LINEWEIGHT DENOTES EXISTING EQUIPMENT, LIGHT FIXTURES, AND DEVICES.  
 - - - - - DASHED LINEWEIGHT DENOTES DEMOLISHED EQUIPMENT, LIGHT FIXTURES, AND DEVICES.

**LIGHTING**

Ⓜ	CEILING LUMINAIRE: SURFACE, RECESSED
Ⓜ	CEILING LUMINAIRE: PENDANT MOUNTED
Ⓜ	CEILING LUMINAIRE: PENDANT LINEAR
Ⓜ	WALL LUMINAIRE: SURFACE, RECESSED
Ⓜ	WALL WASHER: SURFACE, RECESSED
Ⓜ	TRACK WITH HEADS LOCATED
Ⓜ	FLUORESCENT LUMINAIRE: SURFACE, RECESSED
Ⓜ	FLUORESCENT LUMINAIRE: WALL MOUNTED
Ⓜ	FLUORESCENT LUMINAIRE: BARE LAMP
Ⓜ	POLE LIGHT: LUMINAIRES AS SHOWN
Ⓜ	DESIGNATES LIGHT ON EMERGENCY CIRCUIT
Ⓜ	EXIT LIGHT: CEILING, WALL (ARROWS AS SHOWN)
Ⓜ	BOLLARD
Ⓜ	EMERGENCY BATTERY LIGHT: HEADS AS SHOWN
Ⓜ	WALL SWITCH: 1 POLE, 2 POLE
Ⓜ	WALL SWITCH: 3 WAY, 4 WAY
Ⓜ	WALL SWITCH: KEY LOCK, MOMENTARY
Ⓜ	WALL SWITCH: LOW VOLTAGE, PILOT
Ⓜ	WALL SWITCH: TIMER, MANUAL DIMMER
Ⓜ	DESIGNATES LUMINAIRE TYPE (SEE LUMINAIRE SCHEDULE)
Ⓜ	DESIGNATES NIGHT LIGHT CIRCUIT
Ⓜ	LUTRON MAESTRO SWITCH WITH INTEGRAL OCCUPANCY/VACANCY SENSOR: MODEL NO.: MS-OPS6M2
Ⓜ	LUTRON 3-BUTTON PICO KEYPAD WITH RAISE/LOWER MODEL NO.: PU2-3BR-L-GWH-L01
Ⓜ	LUTRON WIRELESS CEILING-MOUNT OCCUPANCY/VACANCY SENSOR: MODEL NO.: LRF2-OCR2B-P-WH
Ⓜ	LUTRON WIRELESS CEILING-MOUNT DAYLIGHT SENSOR MODEL NO.: LRF2-DCRB-WH
Ⓜ	LUTRON CENTRALIZED LIGHTING CONTROL HUB MODEL NO.: HJS-2-FM

**POWER**

Ⓜ	WALL RECEPTACLE: DUPLEX, QUADPLEX
Ⓜ	SPLIT CONTROLLED WALL RECEPTACLE: DUPLEX, QUADPLEX
Ⓜ	CONTROLLED WALL RECEPTACLE: DUPLEX, QUADPLEX
Ⓜ	WALL RECEPTACLE: ISOLATED GROUND
Ⓜ	CEILING RECEPTACLE: DUPLEX
Ⓜ	FIRE RATED FLOOR POKE-THRU, DUPLEX
Ⓜ	FIRE RATED FLOOR POKE-THRU, QUADPLEX
Ⓜ	CONNECTION TO EQUIPMENT PROVIDED BY OTHERS
Ⓜ	DENOTES RECEPTACLE ABOVE COUNTER
Ⓜ	SPECIAL PURPOSE OUTLET AS NOTED, EMERGENCY
Ⓜ	CLOCK HANGER RECEPTACLE
Ⓜ	FLUSH IN-FLOOR OUTLET: DUPLEX, COMBINATION, SIGNAL
Ⓜ	PEDESTAL OUTLET: POWER, SIGNAL, COMBINATION
Ⓜ	SURFACE OUTLET STRIP: DIMENSION AS SHOWN
Ⓜ	TELEPOWER POLE, POWER, COMBINATION
Ⓜ	JUNCTION BOX
Ⓜ	DISCONNECT SWITCH: FUSED, NON-FUSED
Ⓜ	MOTOR STARTER: MANUAL, MAGNETIC, COMBINATION
Ⓜ	MOTOR CONNECTION
Ⓜ	CONTACTOR, RELAY, SOLENOID
Ⓜ	PUSH BUTTON STATION
Ⓜ	WIRING CONCEALED IN CEILING OR WALL
Ⓜ	WIRING CONCEALED IN FLOOR OR UNDERGROUND
Ⓜ	INDICATES INSULATED GREEN GROUND WIRE
Ⓜ	HOME RUN DESTINATION SHOWN
Ⓜ	CONDUIT ELL: UP, DN.

**NOTE**

THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

**ELECTRICAL DRAWING LIST**

E001	SYMBOLS, LEGENDS AND ABBREVIATIONS - ELECTRICAL
E002	LUMINAIRE SCHEDULE - ELECTRICAL
E003	M&E COORDINATION SCHEDULE - ELECTRICAL
E010	SITE PLAN - ELECTRICAL
E201	FIRST FLOOR PLAN - LIGHTING
E202	SECOND FLOOR PLAN - LIGHTING
E203	SECOND FLOOR TOP OF BEAM PLAN - LIGHTING
E301	FIRST FLOOR PLAN - POWER
E302	SECOND FLOOR PLAN - POWER
E601	DETAILS - ELECTRICAL
E602	DETAILS - ELECTRICAL
E603	DETAILS - ELECTRICAL
E701	SINGLE-LINE DIAGRAM - ELECTRICAL
E801	PANEL SCHEDULES - ELECTRICAL
E802	PANEL SCHEDULES - ELECTRICAL
E901	TITLE 24 COMPLIANCE FORMS - ELECTRICAL
E902	TITLE 24 COMPLIANCE FORMS - ELECTRICAL
E903	TITLE 24 COMPLIANCE FORMS - ELECTRICAL
E904	TITLE 24 COMPLIANCE FORMS - ELECTRICAL
E905	TITLE 24 COMPLIANCE FORMS - ELECTRICAL

**ONE-LINE**

Ⓜ	CIRCUIT BREAKER
Ⓜ	SWITCH, FUSED SWITCH
Ⓜ	BUSS
Ⓜ	AUTOMATIC SWITCH
Ⓜ	METER
Ⓜ	PANEL
Ⓜ	FEEDER CALLOUT
Ⓜ	FAULT CURRENT CALLOUT
Ⓜ	GENERATOR

**COMPONENT ANCHORAGE NOTE**

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2016 CBC, SECTIONS 1616A.1.24 THROUGH 1616A.1.26 AND ASCE 7-10 CHAPTER 26 AND 13.

- ALL PERMANENT EQUIPMENT AND COMPONENTS.
- TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER.
- MOVABLE EQUIPMENT WHICH IS STATIONED IN ONE PLACE FOR MORE THAN 8 HOURS AND HEAVIER THAN 400 POUNDS ARE REQUIRED TO BE ANCHORED WITH TEMPORARY ATTACHEMENTS.

THE ATTACHMENT OF THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.

- COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
- COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

FOR THOSE ELEMENTS THAT DO NOT REQUIRE DETAILS ON THE APPROVED DRAWINGS, THE INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD AND THE DSA DISTRICT STRUCTURAL ENGINEER. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH ABOVE REQUIREMENTS.

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LICENSED ARCHITECT  
 NATALIE SWOPE  
 17-0935  
 11-50-17  
 REG. NO. 17  
 STATE OF CALIFORNIA

COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: NONE  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**SYMBOLS, LEGENDS AND ABBREVIATIONS**  
**ELECTRICAL**

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LUMINAIRE SCHEDULE											
FIXTURE TYPE	IMAGE	PRODUCT DESCRIPTION	BASIS OF DESIGN MANUFACTURER	SIZE	INPUT WATTS	LAMP SOURCE (Type, CCT, Delivered Lumens)	DRIVER / BALLAST (Integral/Remote) (Electronic/Magn.) (Dimming Type)	INPUT VOLTAGE	FINISH	MOUNTING	NOTES
F1		2x4 RECESSED LED VOLUMETRIC IN OFFICES ON LEVEL 1	FINELITE HPR-LED-ANR-2x4-DCO-S-935-277V-SC-XX	2 Ft W x 4 Ft L x 4" D	27 W	LED 3500K 3680 LM >90 CRI	INTEGRAL ELECTRONIC 0-10V DIM TO 5%	277	AS PER ARCHITECT	RECESSED ACT CLG.	
F2		8-FT DIRECT / INDIRECT LINEAR PENDANT ON WOOD BEAMS	FINELITE HP-2-WM-ID-8-B-B-9-35-F-277V-MB-DC	4" H x 3" D x LENGTH AS SHOWN	12W / LF	LED 3500K 1360 LM / LF >90CRI	INTEGRAL ELECTRONIC 0-10V DIM TO 5%	277	AS PER ARCHITECT	BRACKET MOUNTED	DUAL CIRCUIT RUNS OF (6) 8 FT PER BEAM (24T PER OVERALL RUN) OUTER 8" INDIRECT PORTION ON BOTH SIDES OF BEAMS TO BE ON 'C' LEG.
F3		4" SQ. RECESSED LED DOWNLIGHT IN BATHROOMS	CALCULITE C4X4L10-DL-35K-CL-XX-XX C4X4L10-N-2-LD-XX	4.5" SQ. x 4.5" H	20 W	LED 3500K 880 LM >90 CRI	INTEGRAL ELECTRONIC 0-10V DIM TO 10%	277	AS PER ARCHITECT	RECESSED GYP. CLG.	CONFIRM QUANTITY OF F3s ON MICROINVERTER BEFORE ORDERING
F4		4-FT DIRECT / INDIRECT LINEAR PENDANT IN OFFICES	FINELITE S16 LED ID-DCO-4-3E-B-B-935-OPEN-277V-SC-FA-FE-C4	8" W x 2" D x 4 FT L	12 W / LF	LED 3500K 1260 LM / FT >90 CRI	INTEGRAL ELECTRONIC 0-10V DIM TO 5%	277	AS PER ARCHITECT	AIRCRAFT CABLE PENDANT IN GYP. CLG.	PROVIDE 3/32" DIAMETER CABLE @ EACH END. SEE DETAIL 2/1603 FOR MOUNTING.
F5		4" SQ. LOW PROFILE LED DOWNLIGHT IN STORAGE / BOH	PHILIPS SLIMLINE S4S-8-35K-7-XX-Z10U	4" SQ. x	10W	LED 3500K 650 LM	INTEGRAL ELECTRONIC 0-10V	277	AS PER ARCHITECT	SURFACE MOUNT GYP. CEILING	
F6		RECESSED LED STEPLIGHT IN CIRCULATION	WAC LIGHTING WL-LED200F-C-WT	3"W x 5"H x 1.5" D	4W	LED 3000K 120 LM	INTEGRAL ELECTRONIC 0-10V	277	WHITE	WALL RECESSED	MOUNT MIN. 12" ABOVE TREAD SEE ARCH DWGS FOR SPACING.
F7		SUSPENDED LED DRUM PENDANT IN STAIRWELL	LUMETTA P2034 P2034-XX-XX-XX-LED3-277-CF6-LTC4-BDX	14" D x 34" DIA. X SUSP. HT.	57W	LED 3500K 6300 LM >90CRI	INTEGRAL ELECTRONIC 0-10V DIM TO 5%	277	SHADE AS PER ARCHITECT	ROUND CANOPY / CABLE	PROVIDE 6" DIA. 'CF6' CANOPY. SEE DETAIL 3/E602 FOR RADIUS OF ROTATION TO COMPLY WITH IR 16-9. PROVIDE 3/32" DIA. CABLE. SEE DETAIL 2/1603 FOR MOUNTING.
F8		WALL MOUNT LINEAR INDIRECT LED IN KITCHENETTE	FINELITE HP2 WM-I	2.25" W x 4" D x 4'-0" L	18.5 W	LED 3500K 880 LM >90 CRI	INTEGRAL ELECTRONIC 0-10V	277	AS PER ARCHITECT	WALL MOUNT	
F9		UNDERCABINET LED STRIP IN KITCHENETTE	CSL LIGHTING ECO-LIGHTBAR LED	1FT & 2FT VERSIONS	6W / LF	LED 3000K 500 LM / LF >90 CRI	REMOTE ELECTRONIC 0-10V	24DC / 277AC	SATIN ALUMINUM	SURFACE MOUNT CASEWORK	COORDINATE LOCATION OF REMOTE POWER SUPPLY AND LINK TOGETHER
F10		NOT USED									
F11		LED TAPE IN CHANNEL AT DESK BEHIND ACRYLIC PANEL	LUMINII TAPE: LL18-35L-XX-XX-XX CHANNEL: SL7-XX-M-SA SUPPLY: PSV-XX-24V-U2DIM-D	LEGNTN AS SHOWN	1.5 W/LF	LED 3500K 125 LM/LF >90 CRI	INTEGRAL ELECTRONIC 0-10V DIM TO 10%	24DC / 277AC	SILVER ANODIZED	UNDER DESKTOP BEHIND ACRYLIC PANEL	COORDINATE LOCATION OF REMOTE POWER SUPPLY WITH ARCHITECT PRIOR TO INSTALLATION.
S2	NO PHOTO	EXISTING SURFACE MOUNTED ENTRY LIGHT AT EXTERIOR SOFFITS	N/A	N/A	18W	VERIFY IN FIELD	VERIFY IN FIELD	277	EXISTING	EXTERIOR SOFFIT	CONTRACTOR TO CONFIRM EXISTING LIGHTING FOR EM EGRESS - REFURBISH MAY BE DESIRED BY ARCHITECT
S3	NO PHOTO	EXISTING WALL PACK AT TOP LANDINGS OF EXTERIOR STAIR	N/A	N/A	18W	VERIFY IN FIELD	VERIFY IN FIELD	277	EXISTING	WALL SURFACE	CONTRACTOR TO CONFIRM EXISTING LIGHTING FOR EM EGRESS - REFURBISH MAY BE DESIRED BY ARCHITECT
X		EXIT SIGN AS PER LIFE SAFETY DIAGRAM	LITHONIA EDG-EDGR	11" H x 5.5" D x 13.5" L	5W	LED 3500K	INTEGRAL ELECTRONIC 0-10V	277	AS PER ARCHITECT	RECESSED OR SURFACE WALL / CEILING	CONTRACTOR TO COORDINATE NUMBER OF FACES, MOUNTING, AND ARROW DIRECTIONS PRIOR TO INSTALLATION

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No. E18943  
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9/7/17 DSA BACK CHECK  
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LICENSED ARCHITECT  
3415  
11-30-17  
STATE OF CALIFORNIA

COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1095

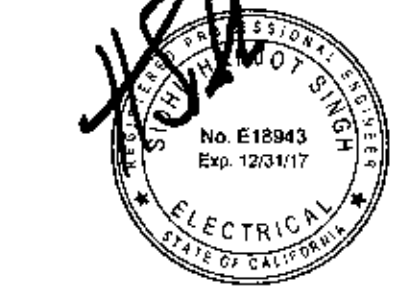
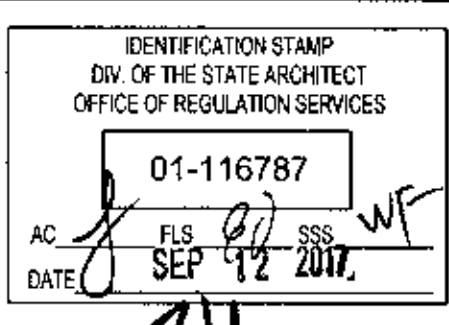
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CONSTRUCTION DOCUMENTS  
LUMINAIRE SCHEDULE - ELECTRICAL

E002

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COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1095

scale: NONE  
date: 03/10/2017

CONSTRUCTION DOCUMENTS  
M&E COORDINATION SCHEDULE - ELECTRICAL

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

EQUIPMENT DESCRIPTIONS			ELECTRICAL CHARACTERISTICS											CONNECTION CHARACTERISTICS			FEEDER CHARACTERISTICS			PANEL INFORMATION	NOTES
TAG	DESCRIPTION	LOCATION	KW	HP	FLA	MCA	MCOCP	VOLTS/PHASE	VFD	1-POINT CONNECT	STARTER DIVISION	DISCONNECT DIVISION	DISCONNECT SIZE	DISCONNECT TYPE	EMERGENCY POWER	CONDUIT DIA (INCH)	PHASE CONDUCTORS	GROUND CONDUCTOR	PANEL NAME		
FCU-1-1	FAN COIL UNIT	L1				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-1-2	FAN COIL UNIT	L1				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-1-3	FAN COIL UNIT	L1				1.40		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-1-4	FAN COIL UNIT	L1				1.40		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-1-5	FAN COIL UNIT	L1				1.50		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-1	FAN COIL UNIT	L2				1.40		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-2	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-3	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-4	FAN COIL UNIT	L2				1.50		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-5	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-6	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-7	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-8	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-9	FAN COIL UNIT	L2				0.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
FCU-2-10	FAN COIL UNIT	L2				1.60		208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1	HAS CONDENSATE PUMP	
EF-RF-1	EXHAUST FAN	ROOF	0.10	2.6				115/1	NO	YES	23	26	30	NEMA 3R	YES	1/2	(2) #12	(1) #12	AL1		
EF-RF-2	EXHAUST FAN	ROOF	0.10	2.6				115/1	NO	YES	23	26	30	NEMA 3R	YES	1/2	(2) #12	(1) #12	AL1		
SF-1-1	OUTSIDE AIR FAN	L1	0.10					115/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1		
SF-2-1	OUTSIDE AIR FAN	L2	0.10					115/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1		
SF-2-2	OUTSIDE AIR FAN	L2	0.10					115/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1		
CU-1	OUTDOOR CONDENSING UNIT	OUTDOOR EQUIPMENT PAD				55.0		208/3	NO	YES	23	26	100	NEMA 3R	YES	1	(3) #4	(1) #10	AL1		
BS-1	BRANCH SELECTOR	L1				0.6	15	208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1		
BS-2	BRANCH SELECTOR	L2				1.0	15	208/1	NO	YES	23	26	TOGGLE	NEMA 1	YES	1/2	(2) #12	(1) #12	AL1		
EW-1-1	ELECTRIC WATER HEATER	L1 RESTROOM MENS	5.54					277/1	N/A	YES	23	26	30	NEMA 1	YES	1/2	(2) #10	(1) #10	AL	CONFIRM BREAKER SIZE WITH MANUFACTURER	
EW-1-2	ELECTRIC WATER HEATER	L1 RESTROOM WOMEN'S	5.54					277/1	N/A	YES	23	26	30	NEMA 1	YES	1/2	(2) #10	(1) #10	AL	CONFIRM BREAKER SIZE WITH MANUFACTURER	
EW-2-1	ELECTRIC WATER HEATER	L2 KITCHENETTE	16.05					277/1	N/A	YES	23	26	90	NEMA 1	YES	1 1/4	(2) #2	(1) #8	AL	CONFIRM BREAKER SIZE WITH MANUFACTURER	
EW-2-2	ELECTRIC WATER HEATER	L2 RESTROOM	5.54					277/1	N/A	YES	23	26	30	NEMA 1	YES	1/2	(2) #10	(1) #10	AL	CONFIRM BREAKER SIZE WITH MANUFACTURER	
EW-2-3	ELECTRIC WATER HEATER	L2 RESTROOM	5.54					277/1	N/A	YES	23	26	30	NEMA 1	YES	1/2	(2) #10	(1) #10	AL	CONFIRM BREAKER SIZE WITH MANUFACTURER	

GENERAL NOTES:

- REFER TO ONE-LINE DIAGRAM OR PANEL SCHEDULES FOR OVERCURRENT PROTECTION CHARACTERISTICS AND CIRCUIT NUMBERS.
- COORDINATE ALL EQUIPMENT CONNECTION REQUIREMENTS WITH INSTALLING CONTRACTOR PRIOR TO THE INSTALLATION OF ANY ELECTRICAL WORK.
- VFD'S ARE FURNISHED BY DIVISION 23. INSTALL VFD AND PROVIDE PROVIDE LINE AND LOAD SIDE FEEDERS IN ELECTRICAL WORK.
- COMBINATION STARTER/DISCONNECTS AND DISCONNECT SWITCHES SHALL BE LOCATED WITHIN SIGHT OF AND ADJACENT TO EQUIPMENT SERVED. COORDINATE INSTALLATION WITH EQUIPMENT INSTALLER.
- NOT ALL EQUIPMENT IDENTIFIED HERE IS SHOWN ON FLOOR PLANS. REFER TO DRAWINGS IN OTHER DISCIPLINES FOR EQUIPMENT LOCATIONS.
- SEE MECHANICAL AND PLUMBING DRAWINGS FOR EXACT EQUIPMENT LOCATIONS.

NOTES:

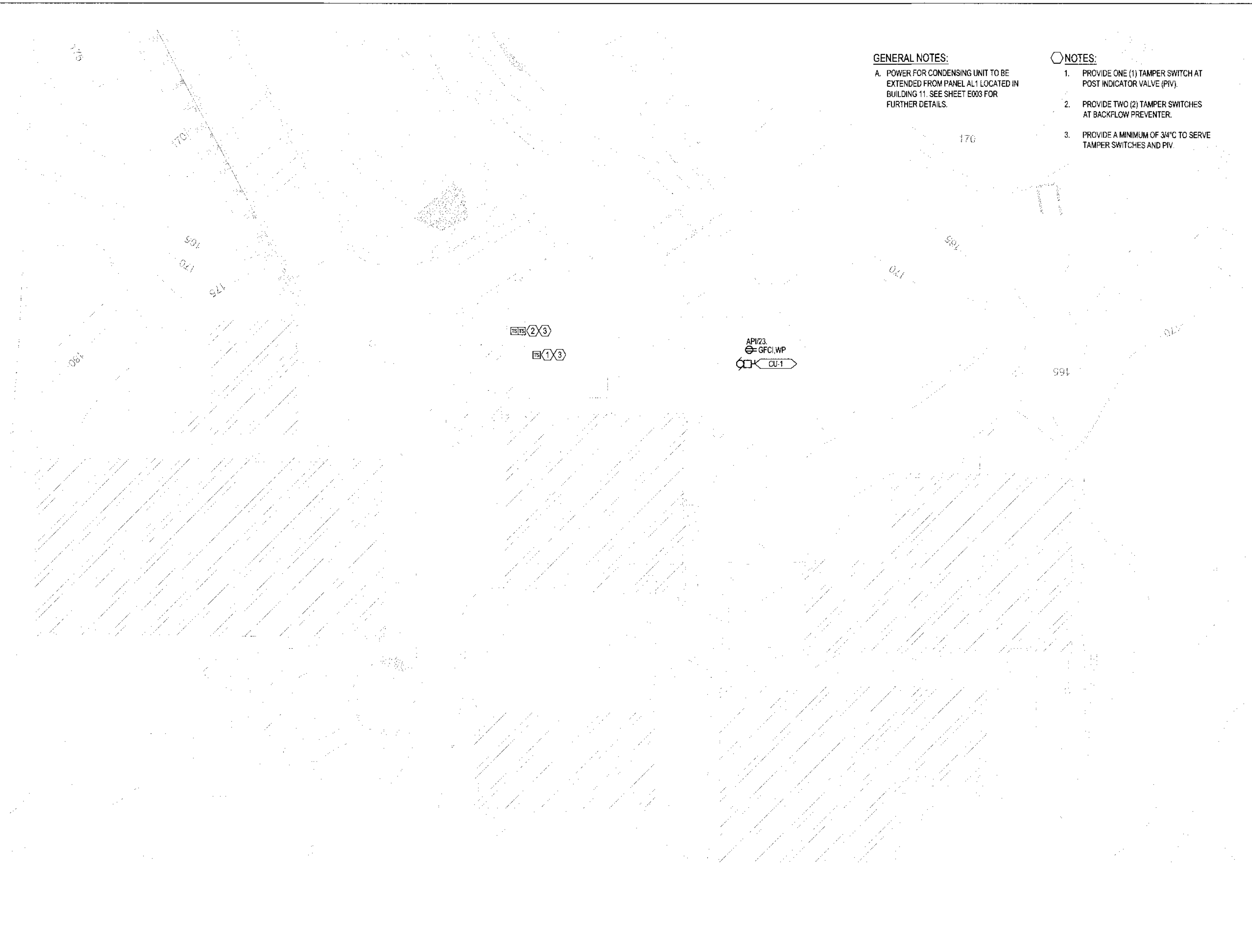
- PROVIDE STANDBY POWER SOURCE.
- FURTHER COORDINATION IS REQUIRED WITH DELEGATED FIRE PROTECTION DESIGN.

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11: 9/1/17 Time: 4:35pm File: P:\2017\17-095 - College of Marin IVC Bldg 11 Renovation\01 Dwg\CAD\17-1095-E010.dwg User: notalie.swope

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1 SITE PLAN - ELECTRICAL  
E010 SCALE: 1/16" = 1'-0"



**GENERAL NOTES:**  
A. POWER FOR CONDENSING UNIT TO BE EXTENDED FROM PANEL AL1 LOCATED IN BUILDING 11. SEE SHEET E003 FOR FURTHER DETAILS.

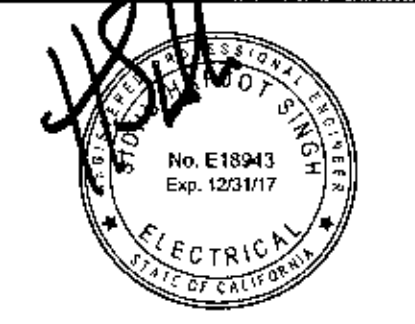
- NOTES:**
1. PROVIDE ONE (1) TAMPER SWITCH AT POST INDICATOR VALVE (PIV).
  2. PROVIDE TWO (2) TAMPER SWITCHES AT BACKFLOW PREVENTER.
  3. PROVIDE A MINIMUM OF 3/4" TO SERVE TAMPER SWITCHES AND PIV.

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renovation

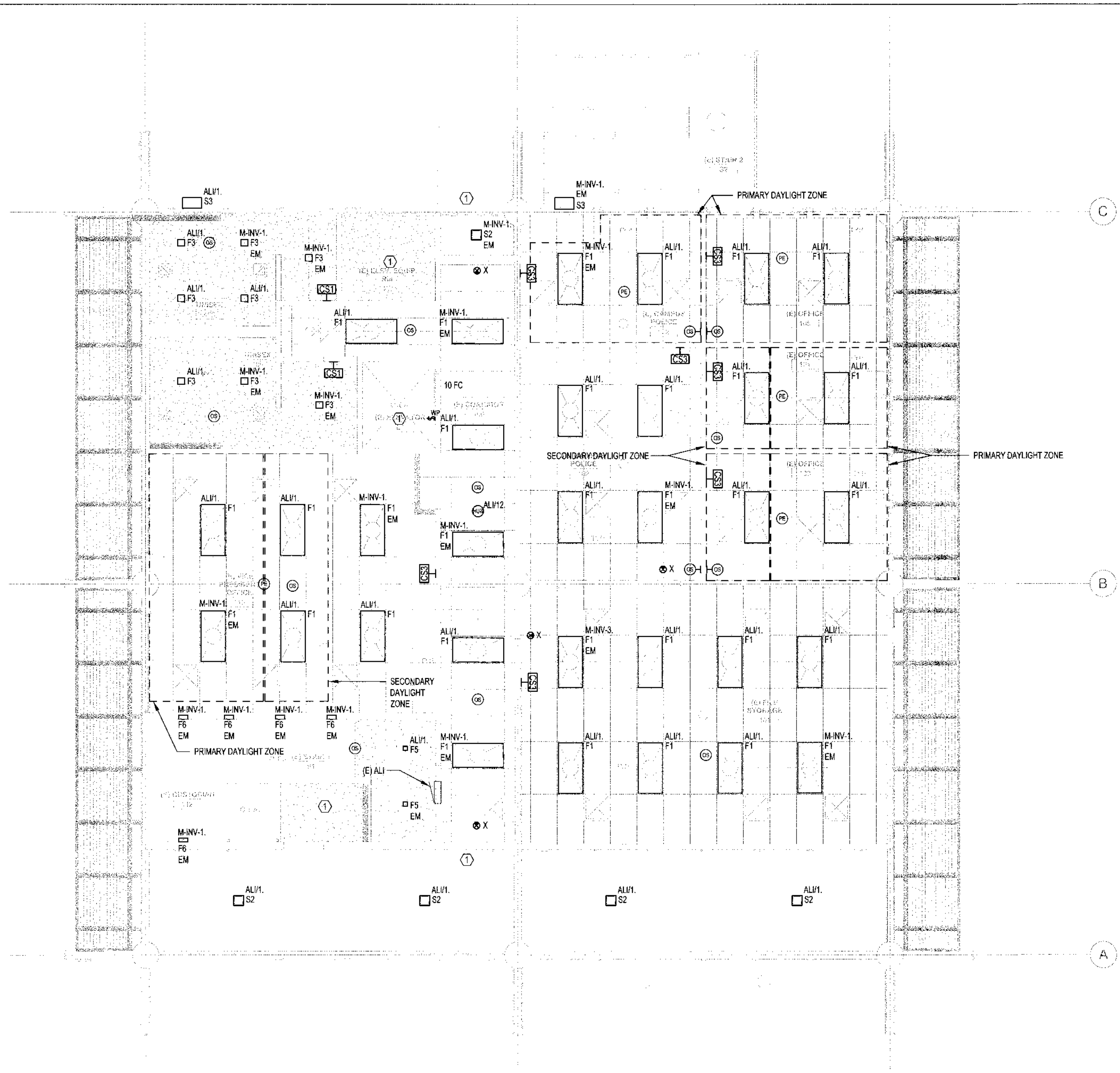
novato, california  
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scale: 1/16" = 1'-0"  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
SITE PLAN -  
ELECTRICAL

E010

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**1** FIRST FLOOR PLAN - LIGHTING  
 E201 SCALE: 1/4" = 1'-0"

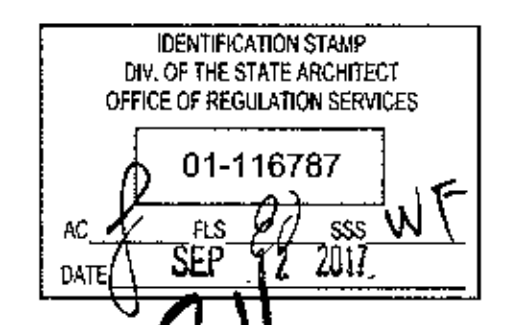
**GENERAL NOTES:**

- A. ALL LUMINAIRES AND DEVICES ARE NEW, UON.
- B. ALL COMPONENTS SHOWN ARE DIAGRAMMATIC AND SHALL BE COORDINATED BY THE CONTRACTOR WITH EXISTING CONDITIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE WORK WITH THAT OF ALL OTHER TRADES.
- C. CONNECT ALL EXIT SIGNS TO NEAREST UNSWITCHED EMERGENCY MICRO-INVERTER CIRCUIT.
- D. EMERGENCY EGRESS LIGHTING IS DESIGNATED AS 'EM' AND SHALL BE CIRCUITED VIA MICRO-INVERTER. PROVIDE UL924 BYPASS SHUNT RELAY FOR THESE LUMINAIRES SO THAT DURING LOSS OF NORMAL POWER, LUMINAIRE GOES TO FULL BRIGHTNESS. CONNECT 'HOT' TO MICRO-INVERTER AND 'SENSING' TO CLOSEST AVAILABLE NORMAL CIRCUIT.
- D. LIGHTING SHALL BE PROVIDED VIA DISTRIBUTED RELAY SYSTEM WITH WIRELESS CONTROL DEVICES FOR MANUAL DIMMING AND SWITCHING, AUTOMATIC DAYLIGHT HARVESTING, AND OCCUPANCY SENSOR CONTROL.
- E. LIGHTING CONTROL INTENT:  
 CENTRAL AREA:  
 -AUTOMATIC ON/OFF VIA TIMECLOCK  
 -OCCUPANCY SENSORS TO REDUCE LIGHT OUTPUT TO 50% WHEN UNOCCUPIED  
 -MANUAL OVERRIDE AND DIMMER SWITCH  
 -PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES  
 OFFICES/MEETING ROOMS:  
 -OCCUPANCY SENSORS TO TURN OFF LIGHTING WHEN UNOCCUPIED  
 -MANUAL OVERRIDE AND DIMMER SWITCH  
 -PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES  
 ALL OTHER INDOOR AREAS:  
 -MANUAL ON/AUTOMATIC OFF VIA OCCUPANCY SENSORS  
 -MANUAL OVERRIDE AND DIMMER SWITCH  
 -PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES
- E. BASIS-OF-DESIGN NETWORK LIGHTING CONTROL SYSTEM IS LUTRON VIVE.
- F. REFER TO SHEET E802 FOR SEISMIC DETAILS.

- NOTES:**
- 1. CONTRACTOR TO CONFIRM EXISTING LIGHTING AT DOOR TO EXTERIOR. RELAMP AND REFURBISH, IF FIXTURE NEEDS REPLACEMENT, PROVIDE ALTERNATE FIXTURE FOR APPROVAL BY ARCHITECT.

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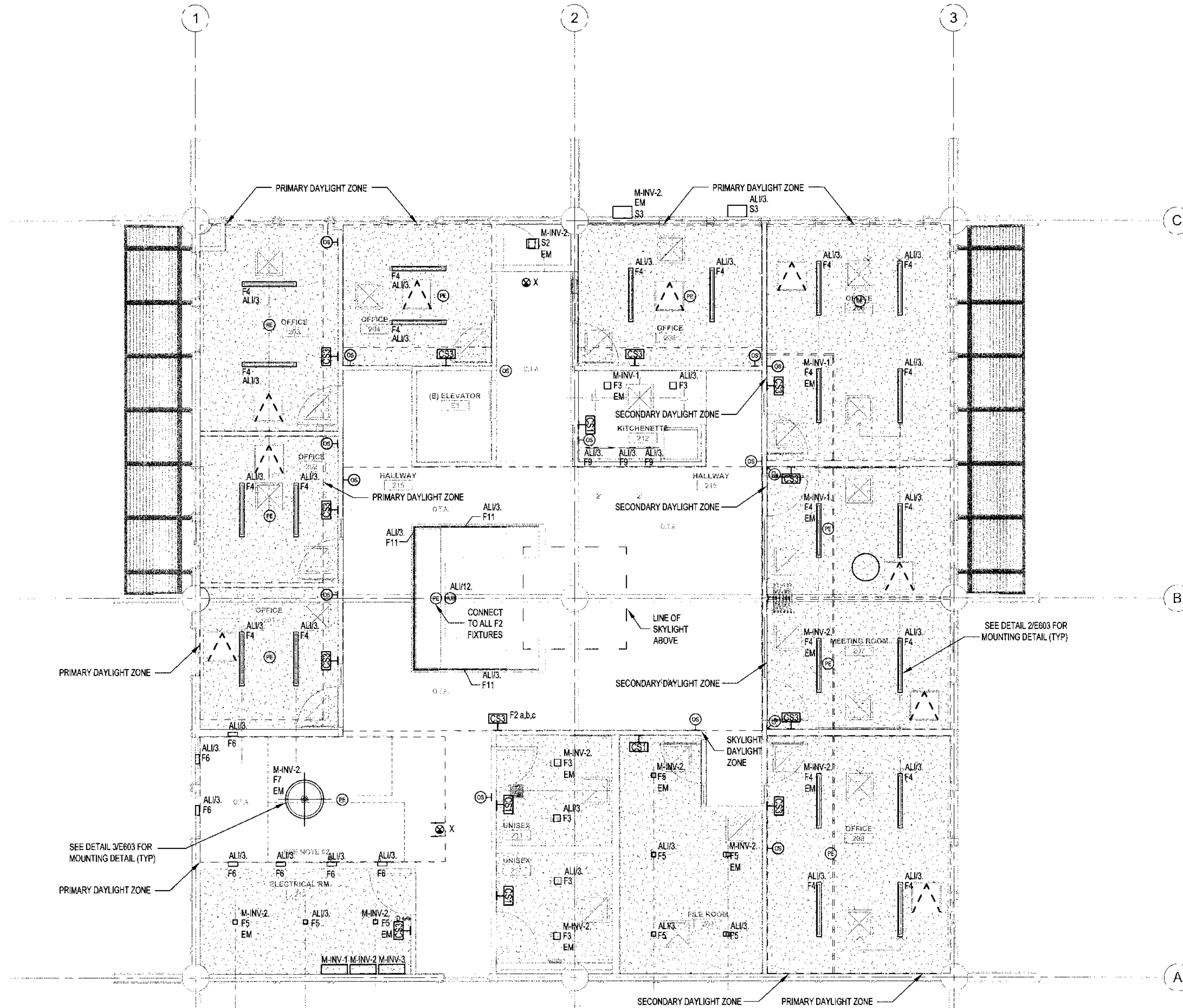
**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**FIRST FLOOR PLAN LIGHTING**

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1 SECOND FLOOR PLAN - LIGHTING  
E202 SCALE: 1/4" = 1'-0"

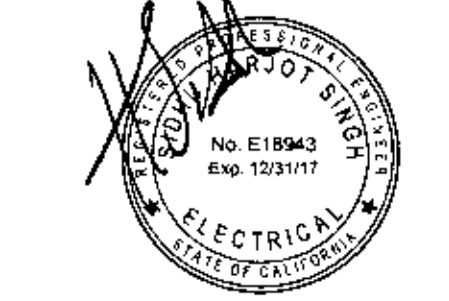
- GENERAL NOTES:**
- A. ALL LUMINAIRES AND DEVICES ARE NEW, UON.
  - B. ALL COMPONENTS SHOWN ARE DIAGRAMMATIC AND SHALL BE COORDINATED BY THE CONTRACTOR WITH EXISTING CONDITIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE WORK WITH THAT OF ALL OTHER TRADES.
  - C. CONNECT ALL EXIT SIGNS TO NEAREST UNSWITCHED EMERGENCY MICRO-INVERTER CIRCUIT.
  - D. EMERGENCY EGRESS LIGHTING IS DESIGNATED AS 'EM' AND SHALL BE CIRCUITED VIA MICRO-INVERTER. PROVIDE IUL924 BYPASS SHUNT RELAY FOR THESE LUMINAIRES SO THAT DURING LOSS OF NORMAL POWER, LUMINAIRE GOES TO FULL BRIGHTNESS. CONNECT 'HOT' TO MICRO-INVERTER AND 'SENSING' TO CLOSEST AVAILABLE NORMAL CIRCUIT.
  - D. LIGHTING SHALL BE PROVIDED VIA DISTRIBUTED RELAY SYSTEM WITH WIRELESS CONTROL DEVICES FOR MANUAL DIMMING AND SWITCHING, AUTOMATIC DAYLIGHT HARVESTING, AND OCCUPANCY SENSOR CONTROL.
  - E. LIGHTING CONTROL INTENT:  
CENTRAL AREA:  
-AUTOMATIC ON/OFF VIA TIMECLOCK  
-OCCUPANCY SENSORS TO REDUCE LIGHT OUTPUT TO 50% WHEN UNOCCUPIED  
-MANUAL OVERRIDE AND DIMMER SWITCH  
-PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES  
OFFICES/MEETING ROOMS:  
-OCCUPANCY SENSORS TO TURN OFF LIGHTING WHEN UNOCCUPIED  
-MANUAL OVERRIDE AND DIMMER SWITCH  
-PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES  
ALL OTHER INDOOR AREAS:  
-MANUAL ON/AUTOMATIC OFF VIA OCCUPANCY SENSORS  
-MANUAL OVERRIDE AND DIMMER SWITCH  
-PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES
  - E. BASIS-OF-DESIGN NETWORK LIGHTING CONTROL SYSTEM IS LUTRON VIVE.
  - F. REFER TO SHEET E602 FOR SEISMIC DETAILS.

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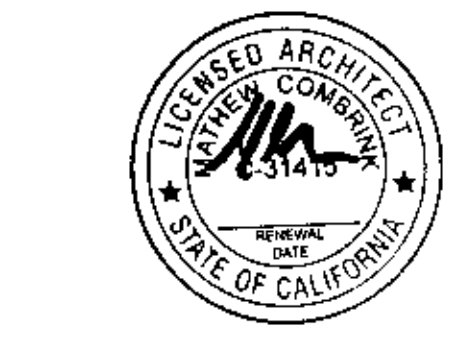
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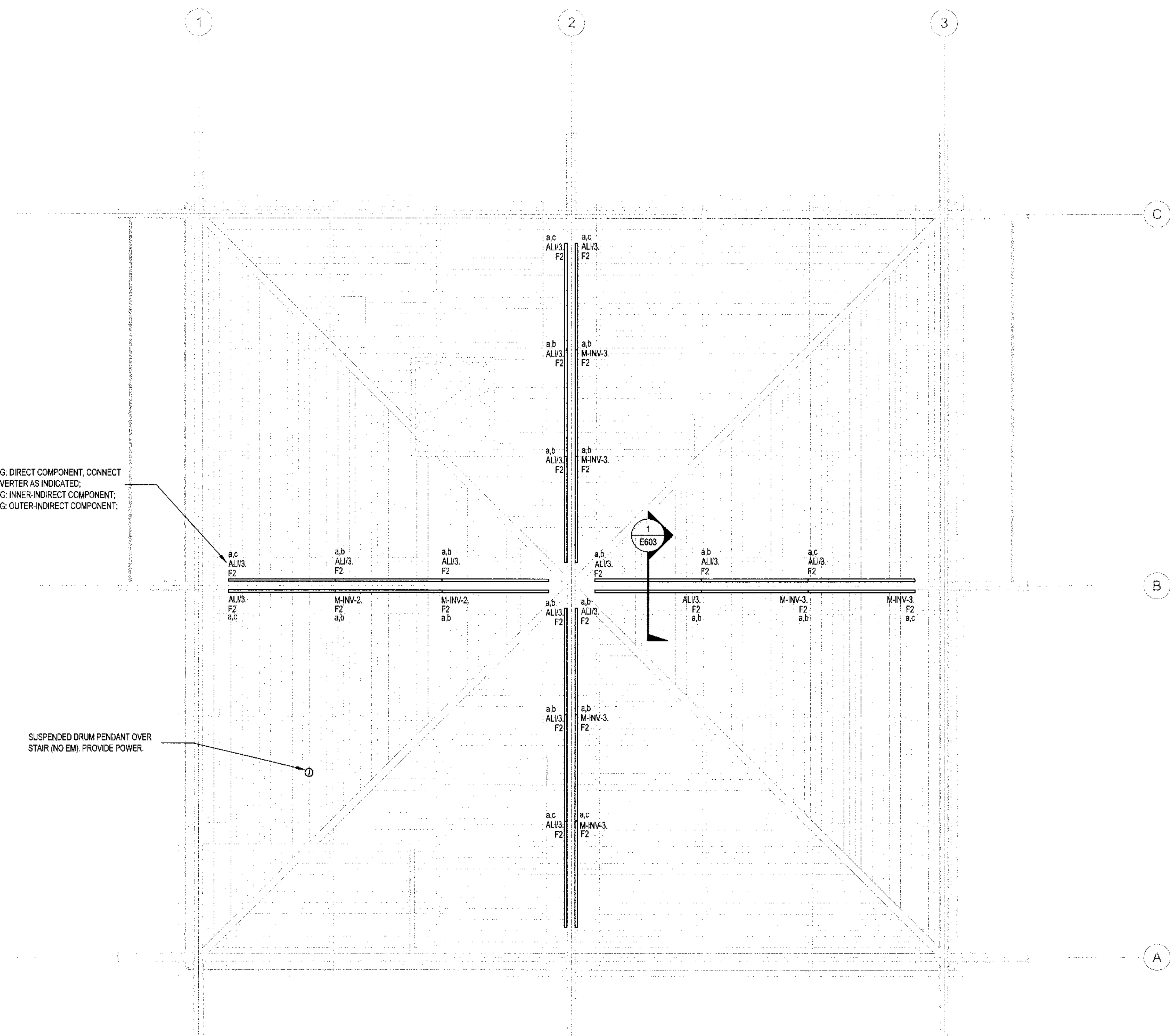
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project number: 17-1095

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CONSTRUCTION DOCUMENTS  
SECOND FLOOR PLAN LIGHTING

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1 SECOND FLOOR TOP OF BEAM PLAN - LIGHTING  
E203 SCALE: 1/4" = 1'-0"

**GENERAL NOTES:**

- A. ALL LUMINAIRES AND DEVICES ARE NEW, UON.
- B. ALL COMPONENTS SHOWN ARE DIAGRAMMATIC AND SHALL BE COORDINATED BY THE CONTRACTOR WITH EXISTING CONDITIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE WORK WITH THAT OF ALL OTHER TRADES.
- C. CONNECT ALL EXIT SIGNS TO NEAREST UNSWITCHED EMERGENCY MICRO-INVERTER CIRCUIT.

D. EMERGENCY EGRESS LIGHTING IS DESIGNATED AS 'EM' AND SHALL BE CIRCUITED VIA MICRO-INVERTER. PROVIDE UL924 BYPASS SHUNT RELAY FOR THESE LUMINAIRES SO THAT DURING LOSS OF NORMAL POWER, LUMINAIRE GOES TO FULL BRIGHTNESS. CONNECT "HOT" TO MICRO-INVERTER AND "SENSING" TO CLOSEST AVAILABLE NORMAL CIRCUIT.

D. LIGHTING SHALL BE PROVIDED VIA DISTRIBUTED RELAY SYSTEM WITH WIRELESS CONTROL DEVICES FOR MANUAL DIMMING AND SWITCHING, AUTOMATIC DAYLIGHT HARVESTING, AND OCCUPANCY SENSOR CONTROL.

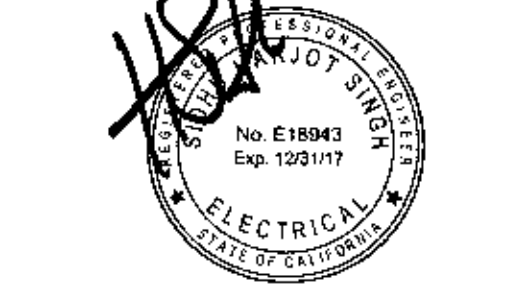
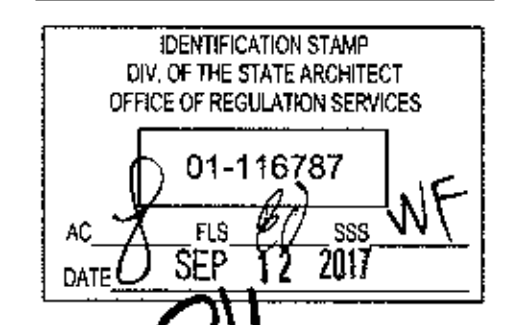
- E. LIGHTING CONTROL INTENT:
  - CENTRAL AREA:
    - AUTOMATIC ON/OFF VIA TIMECLOCK
    - OCCUPANCY SENSORS TO REDUCE LIGHT OUTPUT TO 50% WHEN UNOCCUPIED
    - MANUAL OVERRIDE AND DIMMER SWITCH
    - PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES
  - OFFICES/MEETING ROOMS:
    - OCCUPANCY SENSORS TO TURN OFF LIGHTING WHEN UNOCCUPIED
    - MANUAL OVERRIDE AND DIMMER SWITCH
    - PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES
  - ALL OTHER INDOOR AREAS:
    - MANUAL ON/AUTOMATIC OFF VIA OCCUPANCY SENSORS
    - MANUAL OVERRIDE AND DIMMER SWITCH
    - PHOTOCELL FOR AUTOMATIC DIMMING IN DAYLIGHT ZONES

E. BASIS-OF-DESIGN NETWORK LIGHTING CONTROL SYSTEM IS LUTRON VIVE.

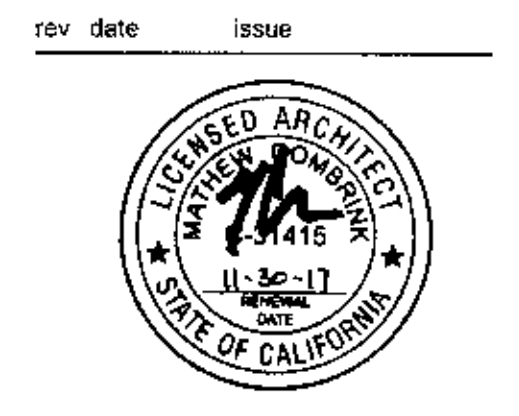
F. REFER TO SHEET E602 FOR SEISMIC DETAILS

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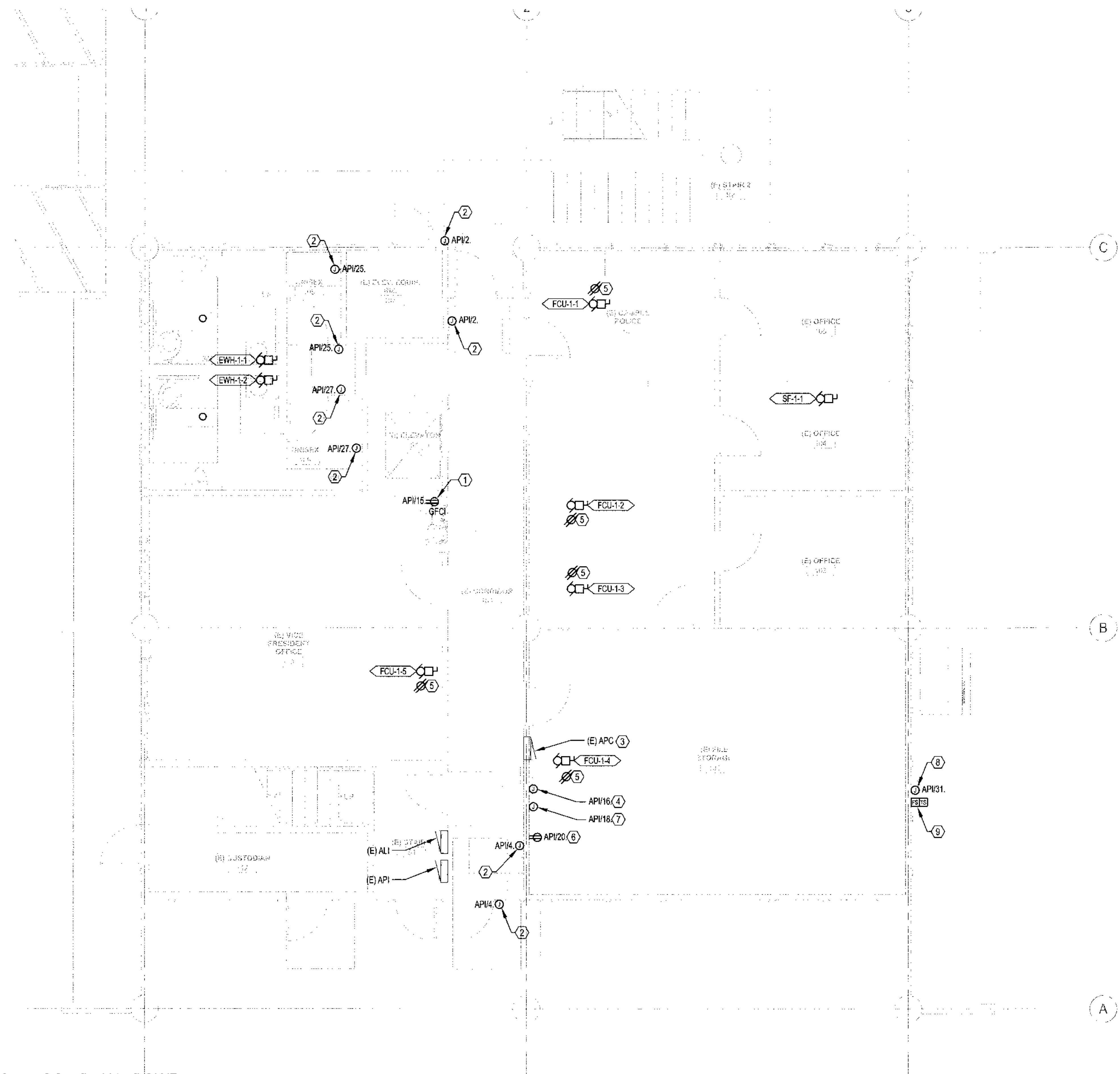
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**CONSTRUCTION DOCUMENTS**  
SECOND FLOOR TOP OF BEAM PLAN LIGHTING

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**1** FIRST FLOOR PLAN - POWER  
E301 SCALE: 1/4" = 1'-0"

- GENERAL NOTES:**
- A. SCOPE OF WORK AT THIS LEVEL INCLUDES REPLACEMENT OF PLUMBING FIXTURES AND MECHANICAL EQUIPMENT ONLY.
  - B. ALL EQUIPMENT AND DEVICES ARE NEW, UN.
  - C. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EQUIPMENT LOCATIONS.
  - D. ELECTRICAL CONTRACTOR TO MAINTAIN CONNECTIONS TO ALL DEVICES ON THE FIRST FLOOR THRU CONSTRUCTION.
  - E. ELECTRICAL CONTRACTOR TO REFERENCE TELECOM DRAWINGS FOR ADDITIONAL TELECOM, AV, AND SECURITY COORDINATION.

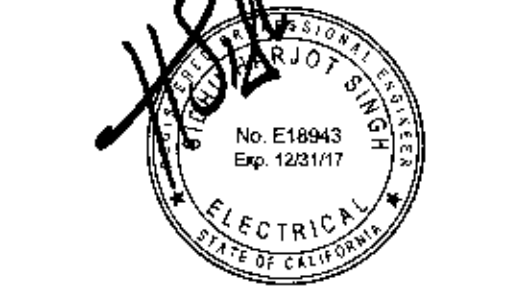
- NOTES:**
1. PROVIDE 120V DUPLEX RECEPTACLE CONNECTION TO DRINKING FOUNTAIN. BRANCH CIRCUIT WIRING TO REMAIN IN PLACE.
  2. PROVIDE 120V CONNECTION TO DOOR HARDWARE.
  3. MAINTAIN CONNECTION TO PANEL THROUGHOUT CONSTRUCTION.
  4. PROVIDE CONNECTION TO NEW FIRE ALARM CONTROL PANEL. LOCKABLE CIRCUIT BREAKER TO BE PROVIDED.
  5. PROVIDE RECEPTACLE ADJACENT TO FCU FOR CONNECTION TO CONDENSATE PUMP.
  6. PROVIDE RECEPTACLE FOR CONNECTION TO DDC PANEL. REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION.
  7. PROVIDE CONNECTION TO NEW FIRE PROTECTION PREACTION PANEL. LOCKABLE CIRCUIT BREAKER TO BE PROVIDED.
  8. PROVIDE 120V CONNECTION TO FIRE ALARM BELL.
  9. PROVIDE ONE (1) FLOW SWITCH AND ONE (1) TAMPER SWITCH.

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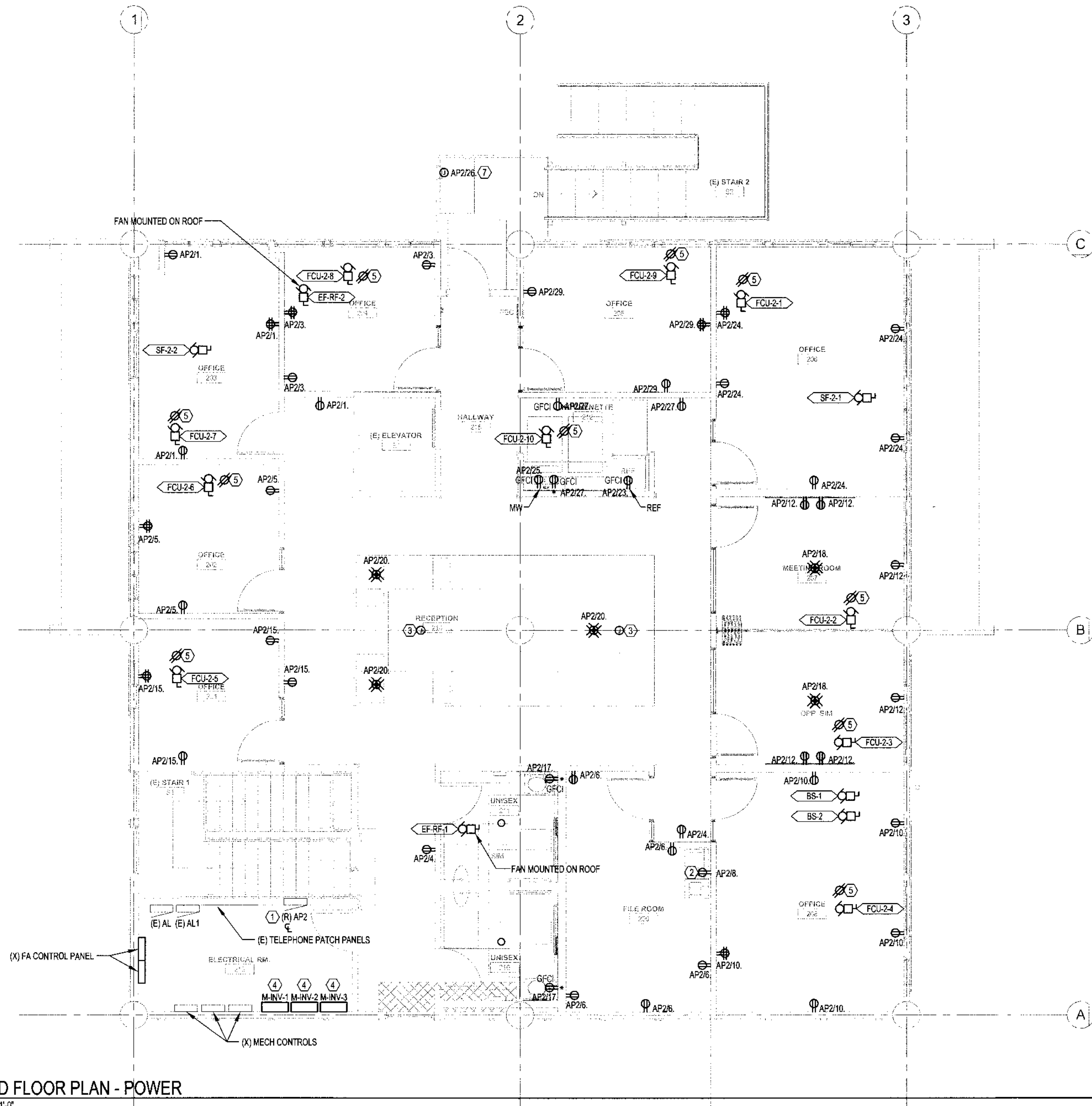
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date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
FIRST FLOOR PLAN  
POWER



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**GENERAL NOTES:**

A. ALL EQUIPMENT AND DEVICES ARE NEW, UON.

B. ALL COMPONENTS SHOWN ARE DIAGRAMMATIC AND SHALL BE COORDINATED BY THE CONTRACTOR WITH EXISTING CONDITIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE WORK WITH THAT OF ALL OTHER TRADES.

C. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EQUIPMENT LOCATIONS.

D. ELECTRICAL CONTRACTOR TO REFERENCE TELECOM DRAWINGS FOR ADDITIONAL TELECOM, AV, AND SECURITY COORDINATION.

E. CABLING FOR TELECOM SHALL BE ROUTED IN 3/4" CONDUIT BELOW LEVEL 2 SLAB. 4" BACK BOXES TO BE PROVIDED AT LOCATIONS INDICATED ON TELECOM DRAWINGS. EC TO PROVIDE AND INSTALL CONDUIT AND BOXES.

**NOTES:**

- ELECTRICAL CONTRACTOR TO COORDINATE FINAL ROUGH-IN LOCATION OF POWER PANEL WITH EXISTING PATCH PANELS. IF IT'S DISCOVERED DURING SHOP DRAWING PHASE THAT THE PANEL DOES NOT HAVE SUFFICIENT CLEARANCE AND/OR SPACE, CONTRACTOR SHALL INFORM THE ENGINEER AND ARCHITECT PRIOR TO ROUGH-IN.
- PROVIDE DUPLEX RECEPTACLE CONNECTION TO COPIER.
- PROVIDE JUNCTION BOX FOR FUTURE CONNECTION TO CEILING FAN. EXACT LOCATION TO BE CONFIRMED IN FIELD.
- SURE-LITES INV550SI EMERGENCY INVERTER. CONNECT TO PANEL ALI. LOAD NOT TO EXCEED 550W PER MICRO-INVERTER.
- PROVIDE RECEPTACLE ADJACENT TO FCU FOR CONNECTION TO CONDENSATE PUMP.
- PROVIDE CONNECTION TO TWO-WAY COMMUNICATION DEVICE.

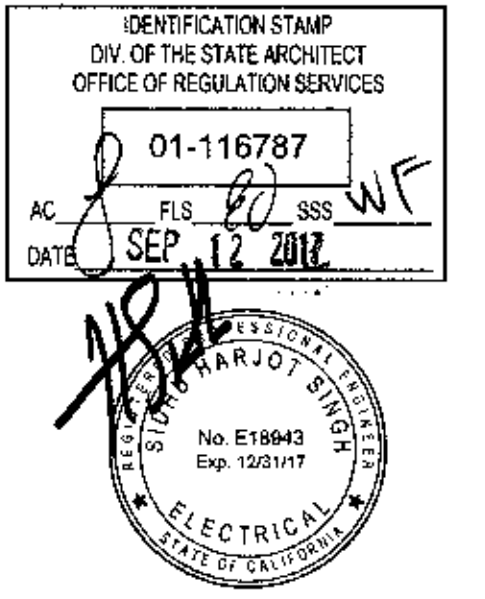
**1 SECOND FLOOR PLAN - POWER**  
E302 SCALE: 1/4" = 1'-0"

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3/10/17	100% CD
rev date	issue

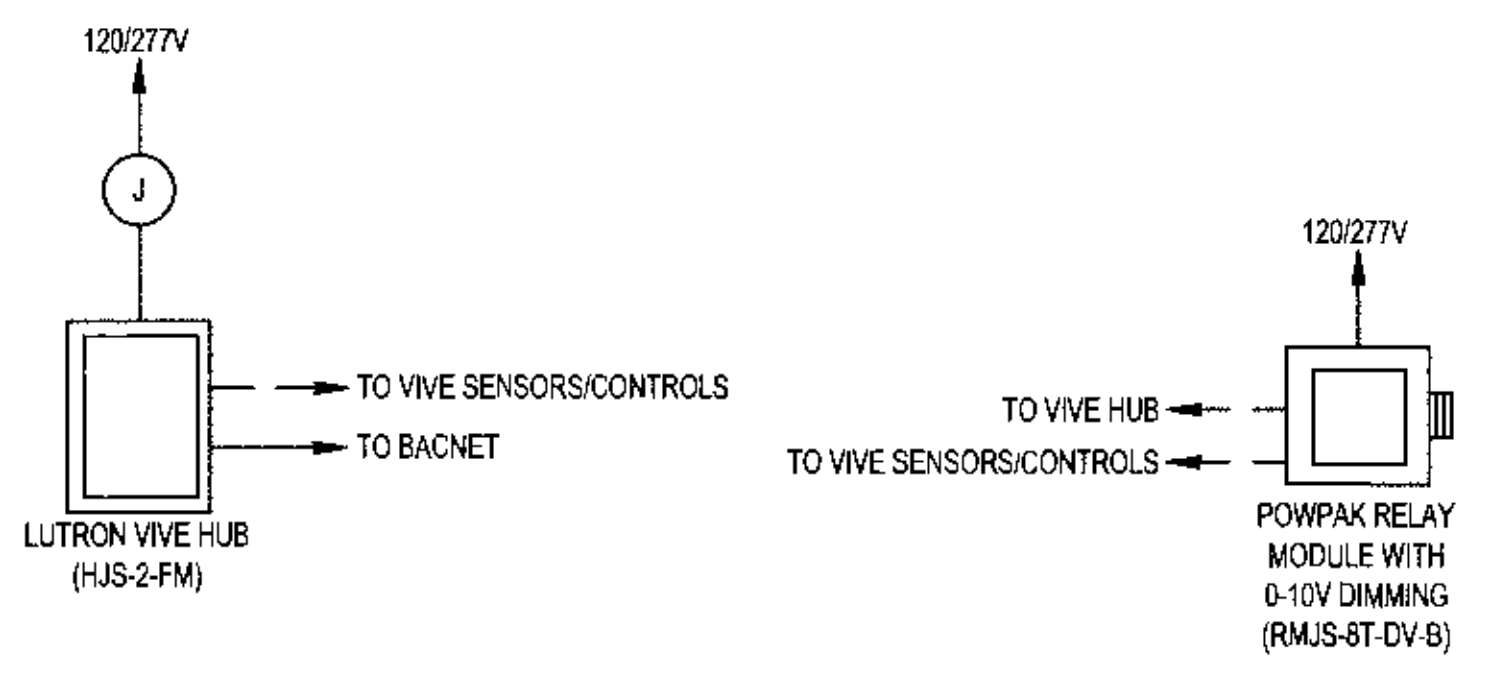
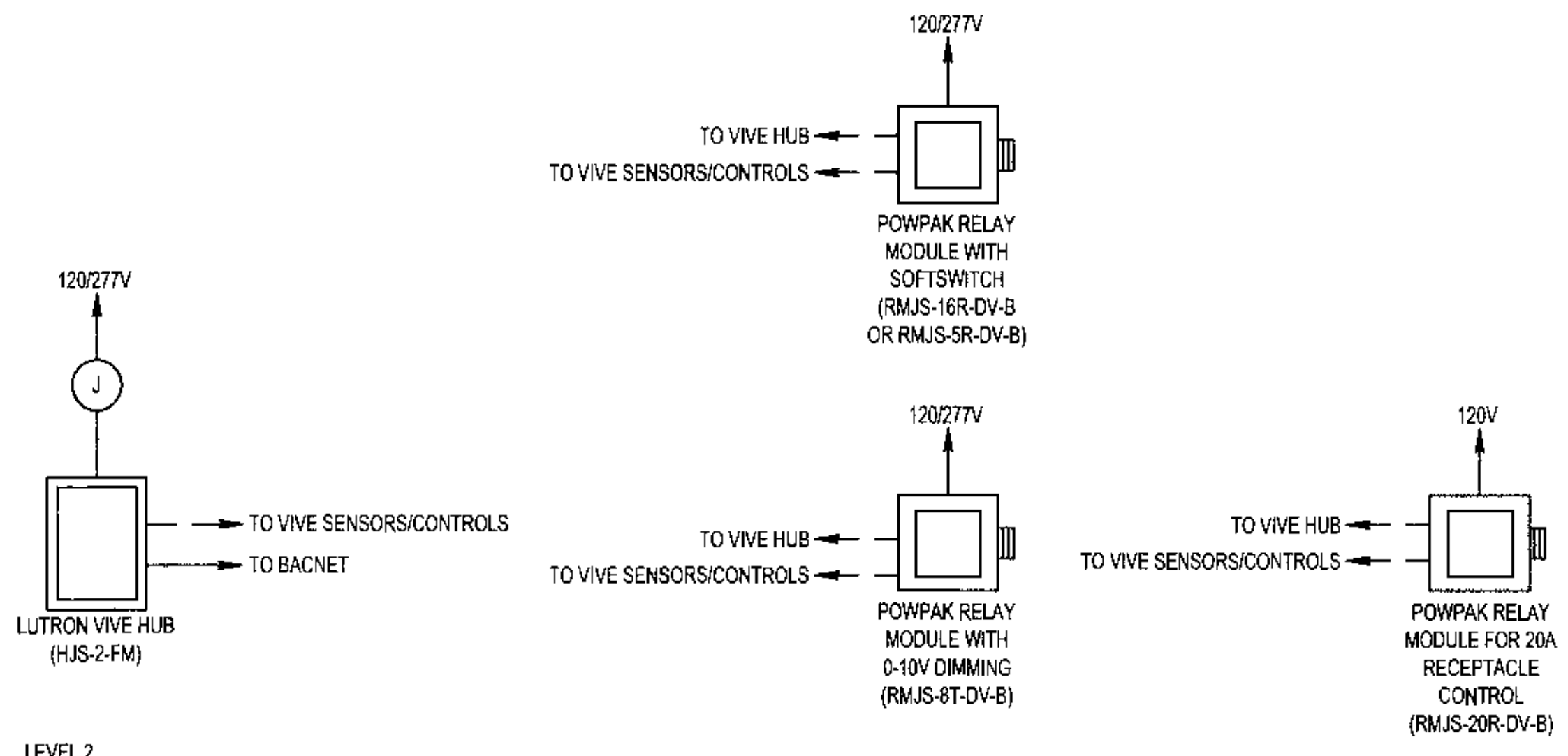


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renovation

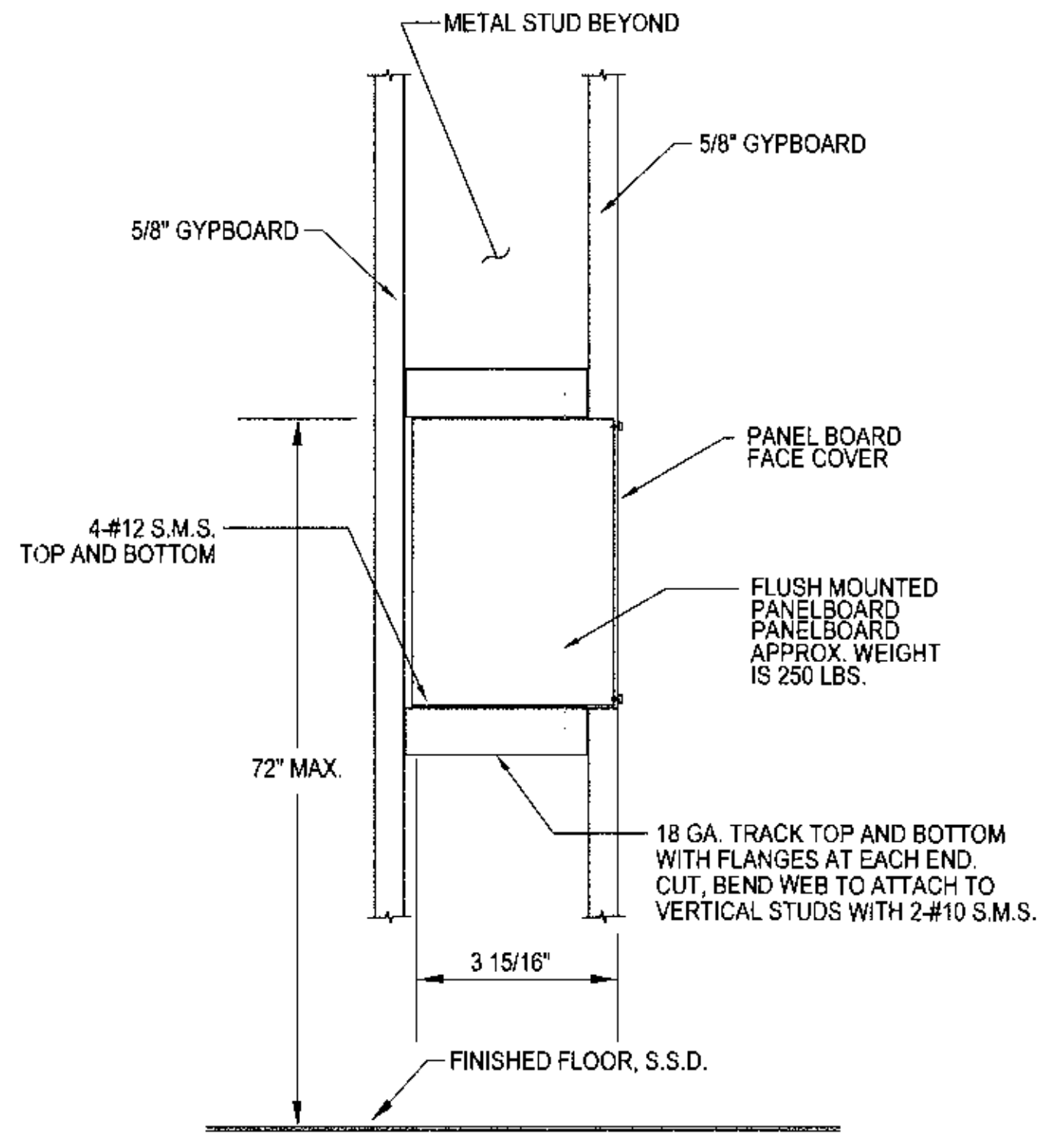
novato, california  
project number: 17-1095

scale: 1/4" = 1'-0"  
date: 03/10/2017

CONSTRUCTION DOCUMENTS  
SECOND FLOOR PLAN POWER

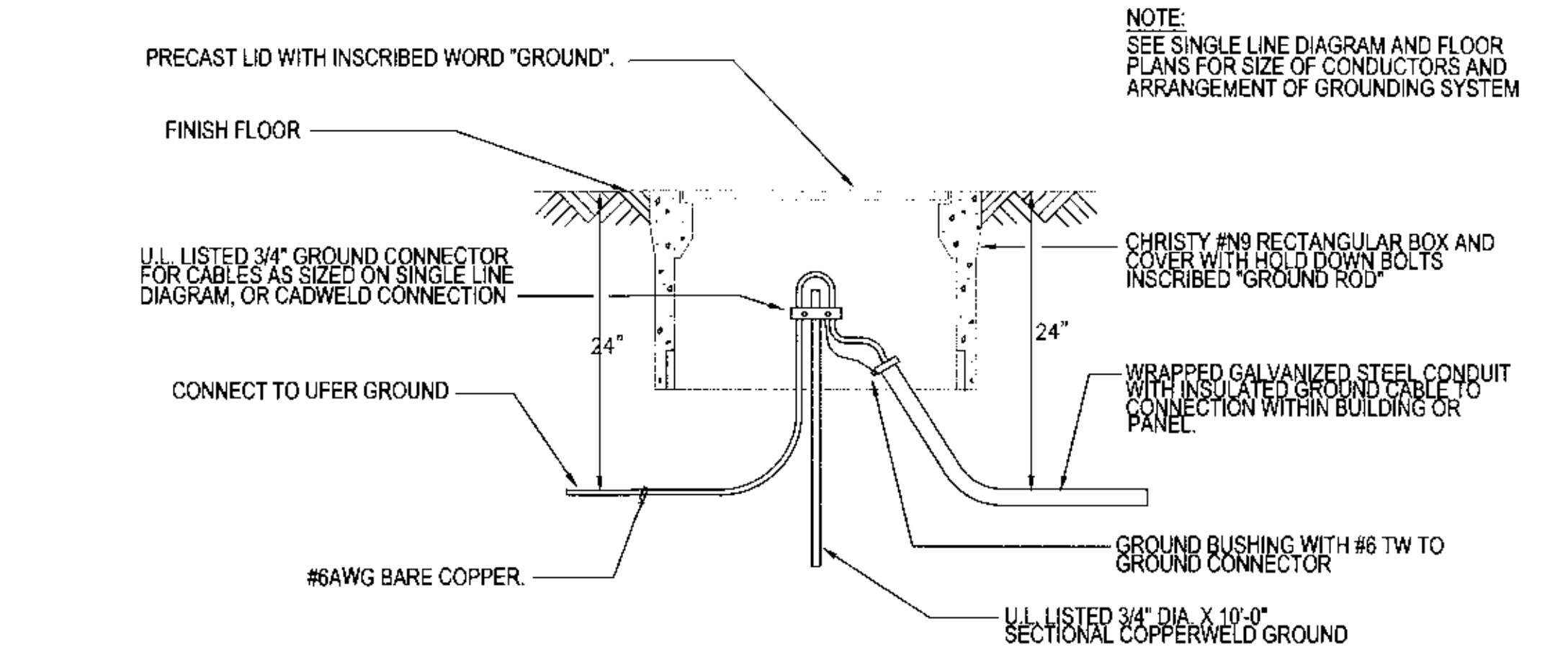
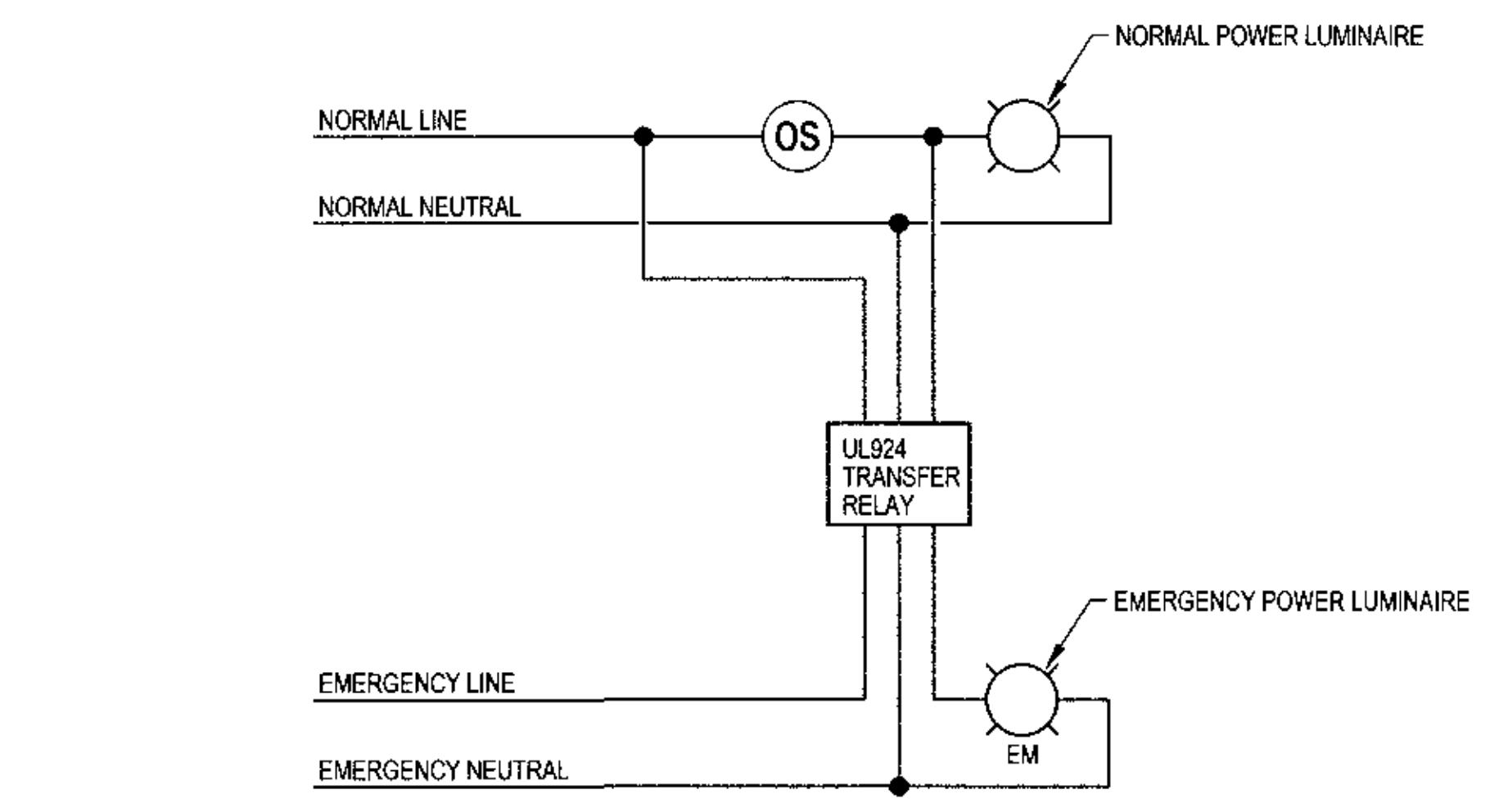


**4 LUTRON VIVE NETWORK LIGHTING CONTROL SCHEMATIC**  
SCALE: NONE

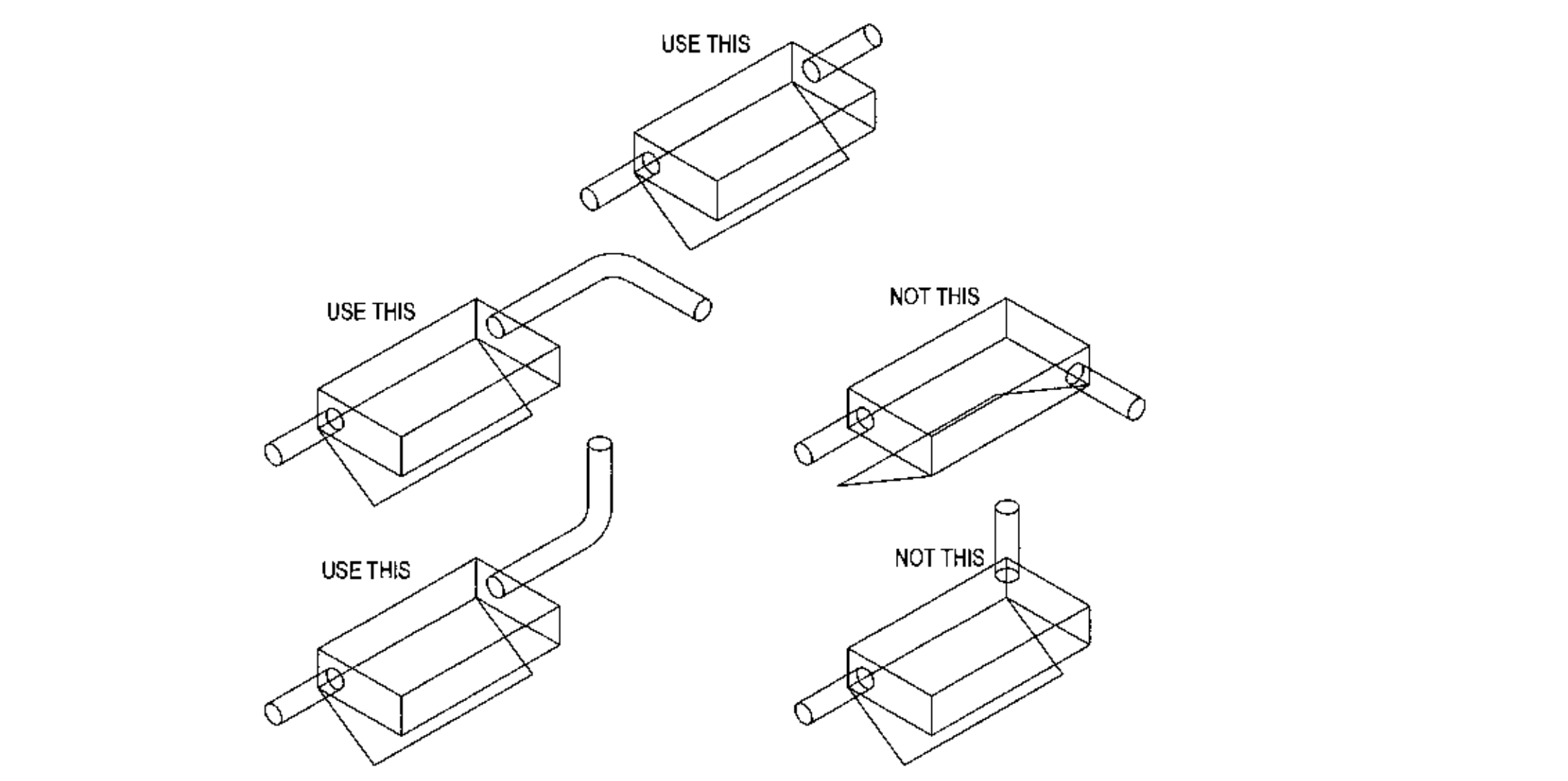


**5 FLUSH MOUNTED PANELBOARD DETAIL**  
SCALE: NONE

**1 EMERGENCY LIGHTING TRANSFER RELAY WIRING DETAIL**  
SCALE: NONE



**2 GROUND ROD AND INSPECTION WELL DETAIL**  
SCALE: NONE



**3 PULLBOX INSTALLATION DETAIL**  
SCALE: NONE

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DATE: SEP 10 2017

REGISTERED PROFESSIONAL ENGINEER  
No. E16943  
Exp. 12/31/17  
ELECTRICAL  
STATE OF CALIFORNIA

9/6/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date issue  
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WALTER J. BROWNE  
C 91415  
DATE 11-30-17  
STATE OF CALIFORNIA

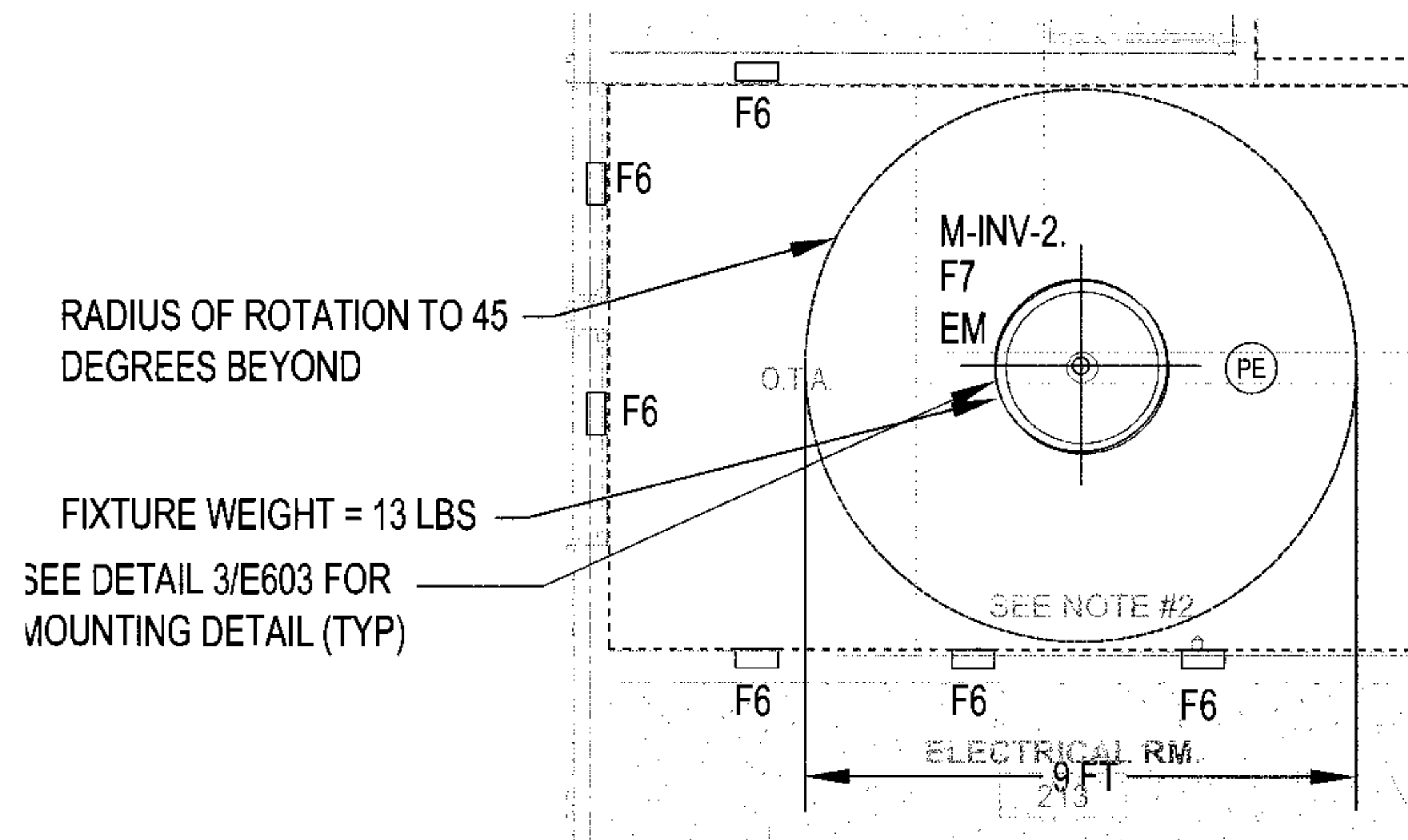
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renovation

novato, california  
project number: 17-1095

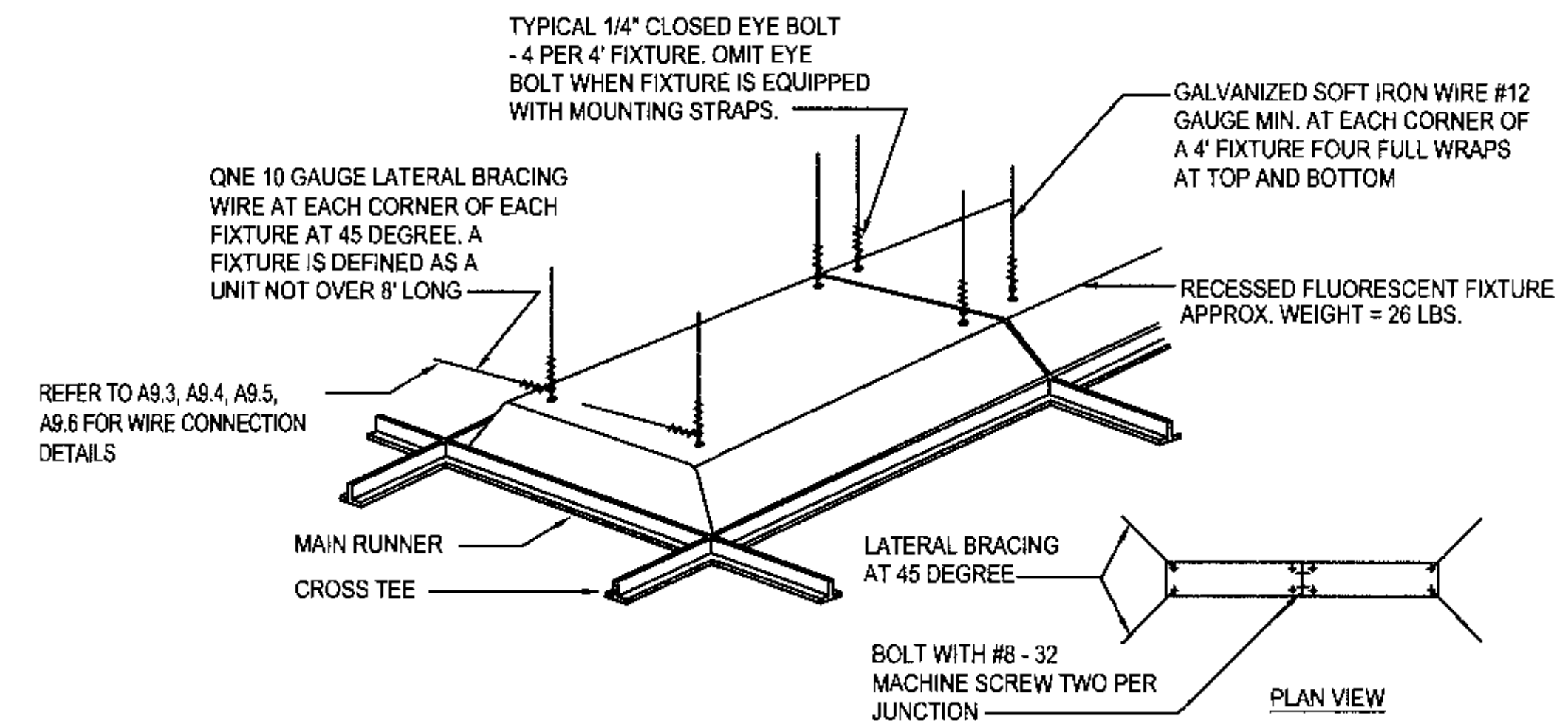
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CONSTRUCTION  
DOCUMENTS  
DETAILS - ELECTRICAL

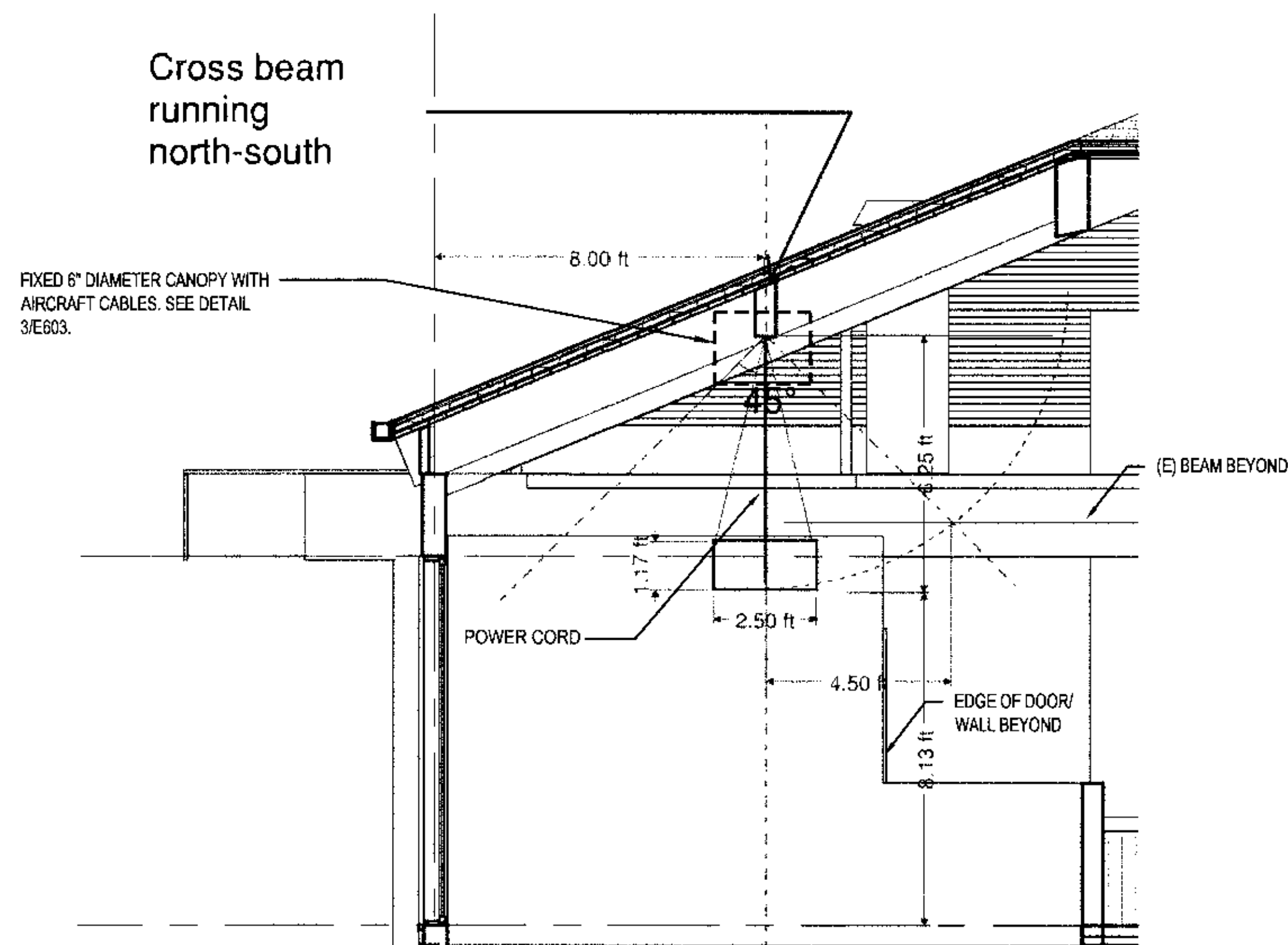
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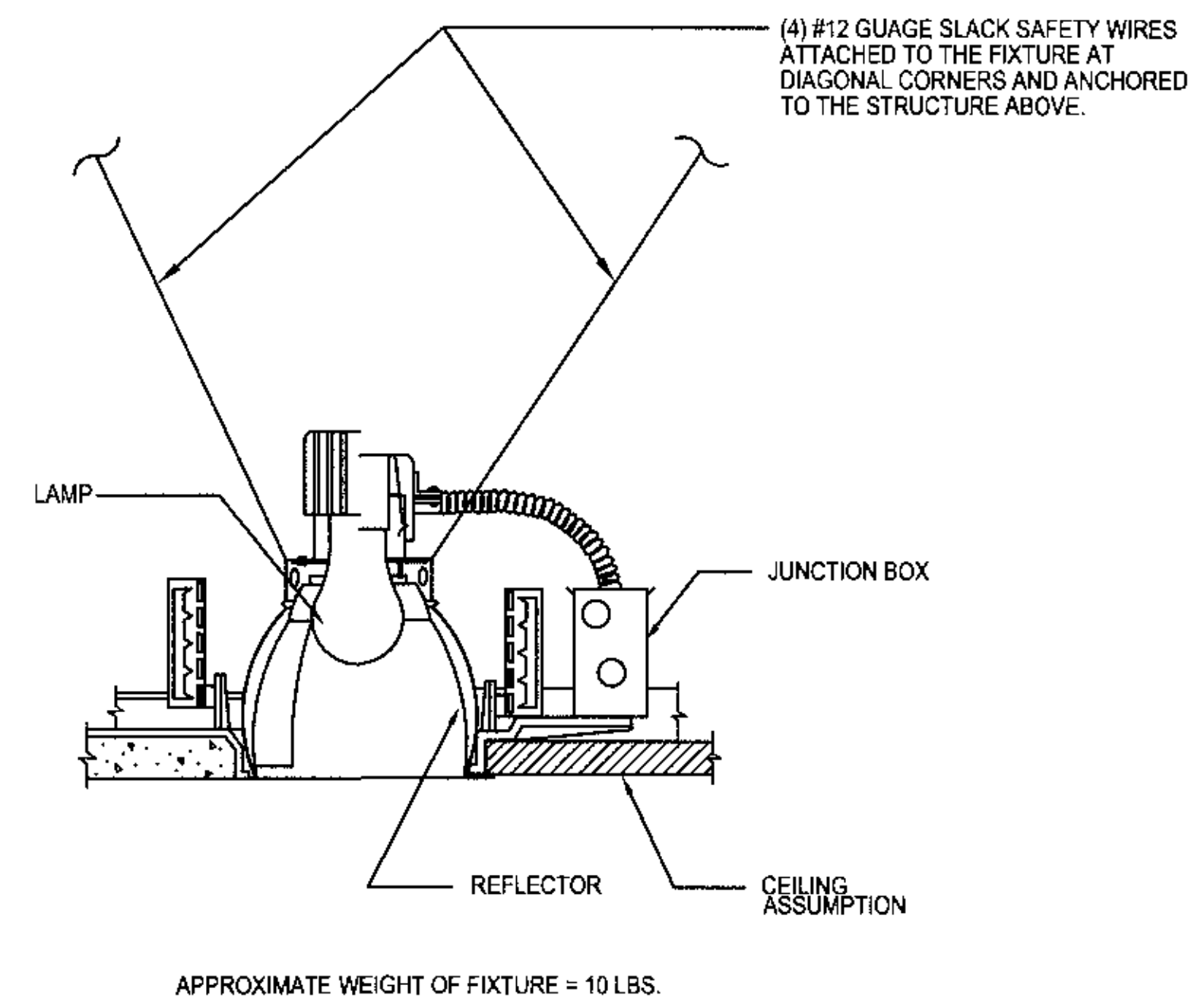
**3** PENDANT FIXTURE - PLAN VIEW - SEISMIC CONTROL DETAIL  
E602 SCALE: NONE



**1** RECESSED FIXTURE - SEISMIC CONTROL DETAIL  
E602 SCALE: NONE



**4** PENDANT FIXTURE F7 - SECTION VIEW - SEISMIC CONTROL DETAIL  
E602 SCALE: NONE



**2** RECESSED DOWNLIGHT FIXTURE - SEISMIC CONTROL DETAIL  
E602 SCALE: NONE

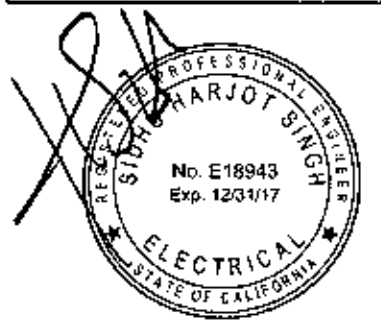
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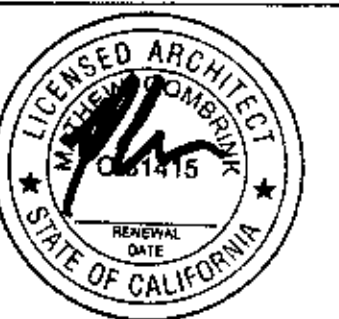
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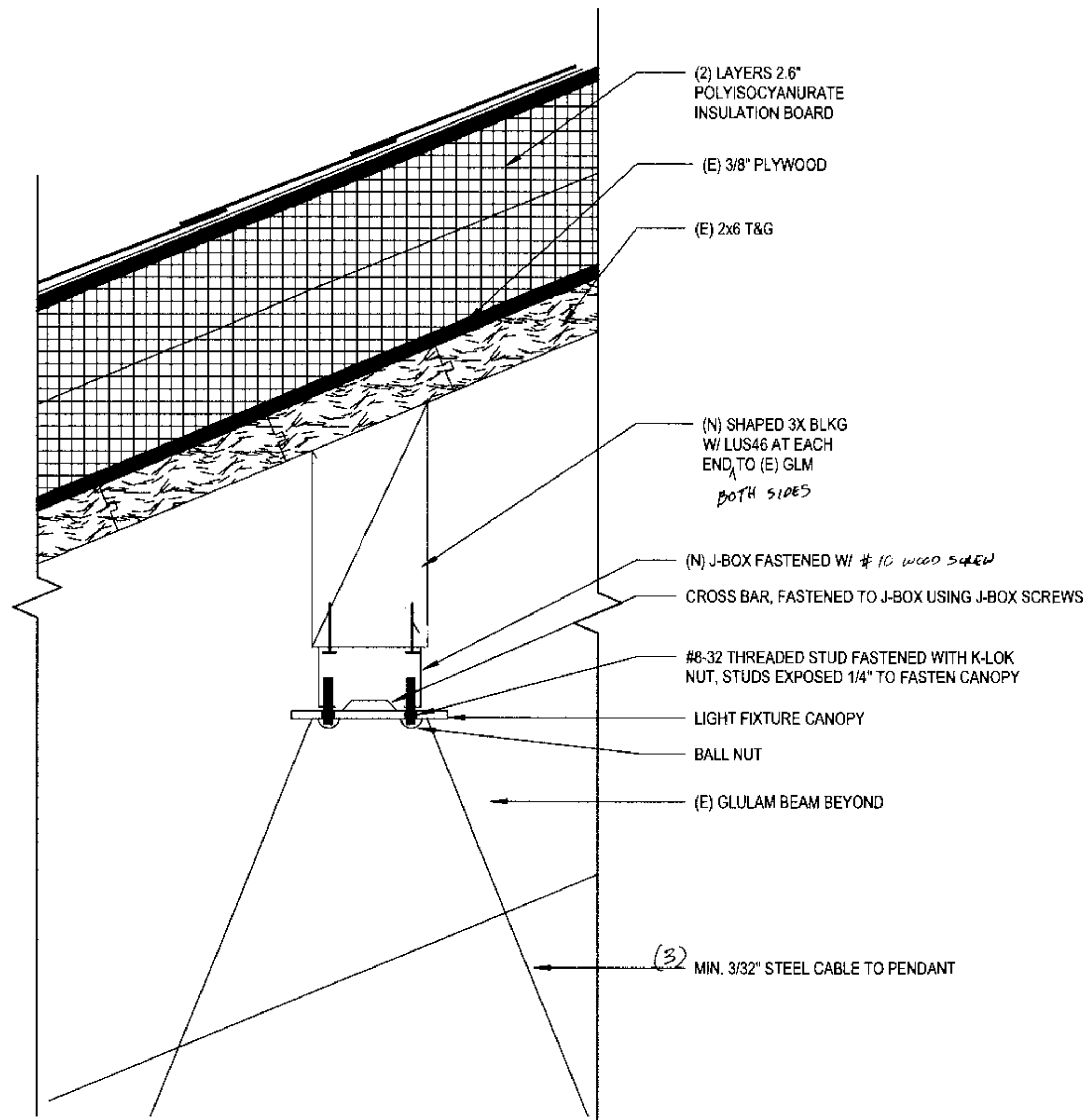
novato, california  
project number: 17-1095

scale: NONE  
date: 03/10/2017

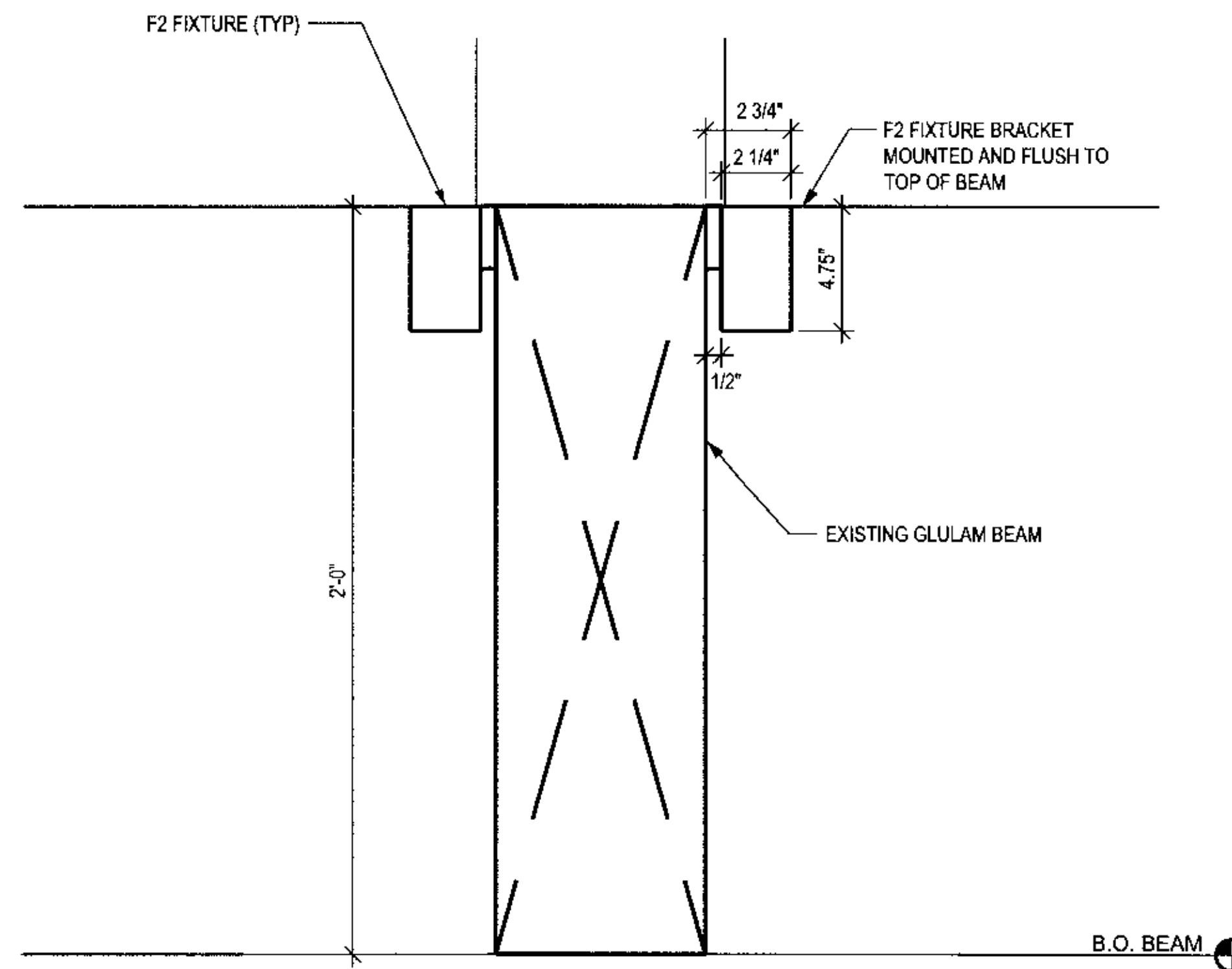
CONSTRUCTION  
DOCUMENTS  
DETAILS - ELECTRICAL

E602

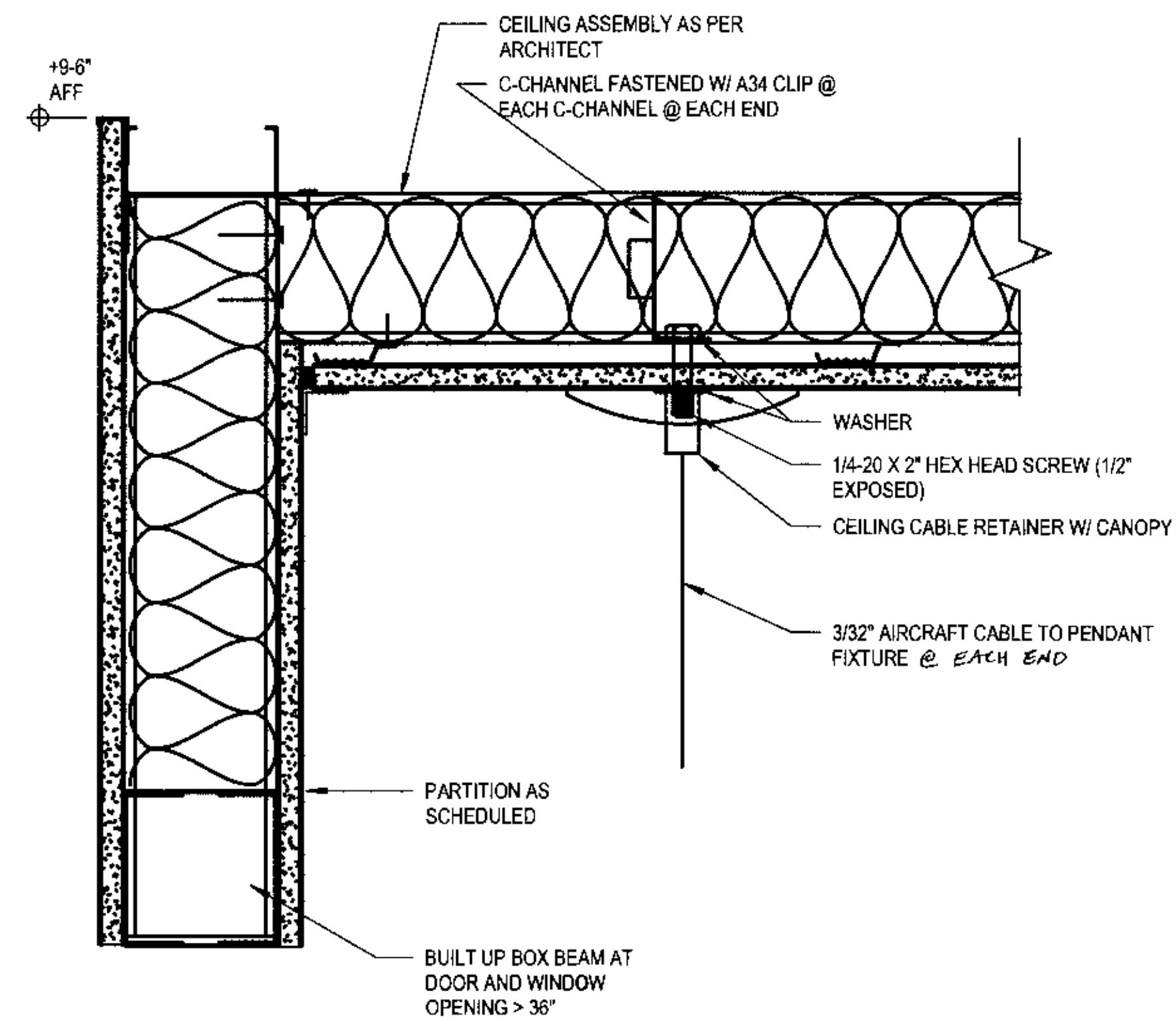
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**3 STAIR PENDANT MOUNTING DETAIL**  
1" = 1'-0"



**1 FIXTURE F2 - SECTION VIEW**  
SCALE: NONE



**2 PENDANT MOUNTING DETAIL**  
1" = 1'-0"

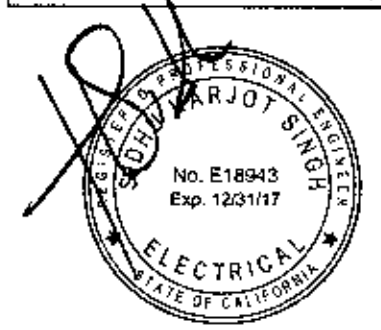
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 date: 03/10/2017

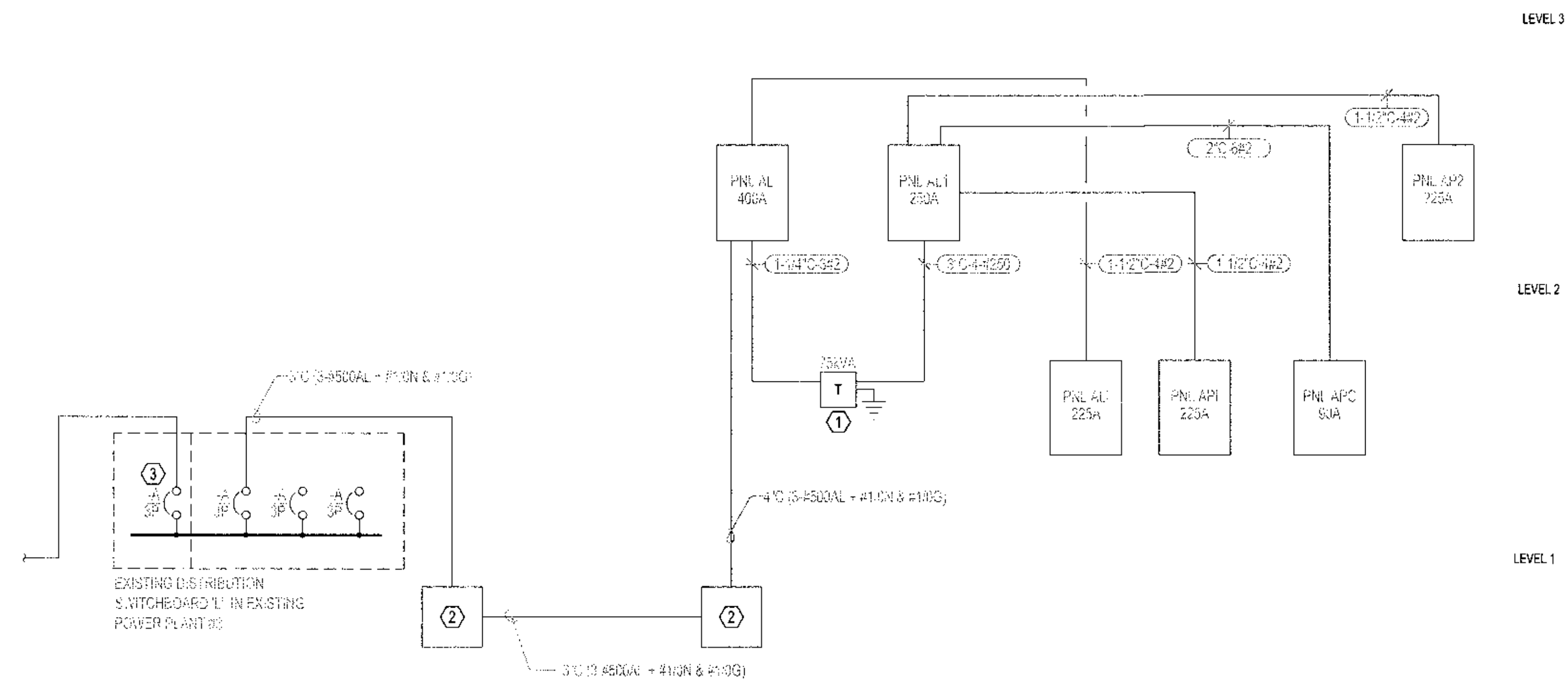
CONSTRUCTION  
 DOCUMENTS  
 DETAILS - ELECTRICAL

**E603**

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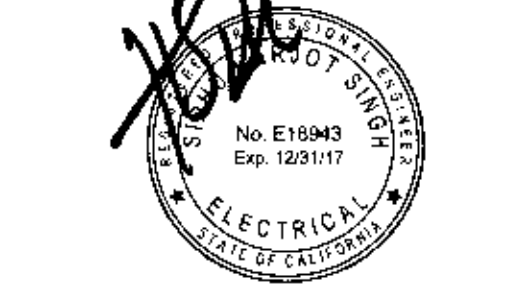
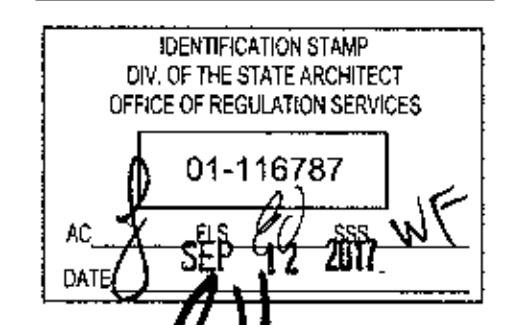
**GENERAL NOTES:**  
 A. ALL EQUIPMENT AND CONNECTIONS SHOWN ARE EXISTING TO REMAIN, UON.  
 B. SEE PLANS AND SCHEDULES FOR FURTHER CIRCUITING INFORMATION AND REQUIREMENTS.

- NOTES:**
- STEP-DOWN TRANSFORMER LOCATED WITHIN TRANSFORMER ROOM #116 BELOW STAIR LANDING PER AS-BUILT DRAWINGS. MAINTAIN POWER TO TRANSFORMER THROUGHOUT CONSTRUCTION.
  - EXISTING CONCRETE PULL-BOX.
  - MAIN BREAKER SIZE TO BE CONFIRMED IN FIELD.



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**CONSTRUCTION DOCUMENTS**  
**SINGLE - LINE DIAGRAM ELECTRICAL**

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(E) PANEL AL1 (FORMERLY PANEL AL1)																								
PANEL: (E) AL1					LOCATION: LEVEL 1					VOLTS: 480 Y1 277 P 3 W: 4					AC RATING: 14K									
AMP: 225 MLO <input checked="" type="checkbox"/> MCB <input type="checkbox"/>					NEUTRAL: 100%					MOUNT: <input type="checkbox"/> SURFACE <input checked="" type="checkbox"/> FLUSH					FED FROM: (E) AL									
TYPE: EXISTING <input checked="" type="checkbox"/> NEW <input type="checkbox"/>					STYLE: PANELBOARD																			
CIRCUIT DESCRIPTION	LOAD			P	OR #	P	OR #	P	OR #	LOAD	CIRCUIT DESCRIPTION	LOAD			P	OR #	P	OR #	LOAD	CIRCUIT DESCRIPTION				
	TYPE	KVA	BKR									TYPE	KVA	TYPE										
(N) LGT - LEVEL 1	LGT	0.00	(E) 20	1	1	A	2	1	(E) 20	1.00	MISC	(N) DOOR HARDWARE - NORTH ENTRANCE								(E) AC SRV. RM INDOOR				
(N) LGT - LEVEL 2	LGT	2.61	(E) 20	1	3	B	4	1	(E) 20	1.00	MISC	(N) DOOR HARDWARE - SOUTH ENTRANCE								(E) LGT. RM. 208 & 209				
(E) SPARE			(E) 20	1	5	C	6	1	(E) 20	1.00	MISC	(E) REC. RM. 103, 104, SURF RACEWAY								(N) EMER-2				
(N) MICROWVERTER 1	LGT	0.68	(E) 20	1	7	A	8	1	(E) 20	0.05	LGT	(N) GENERATOR ENCLOSURE LIGHTING								(E) SPARE				
(N) MICROWVERTER 2	LGT	0.68	(E) 20	1	9	B	10	1	(E) 20	0.40	LGT	(N) LUTRON VIVE HUBS								(N) EMER-1				
(N) MICROWVERTER 3	LGT	0.68	(E) 20	1	11	C	12	1	(E) 20	0.40	LGT	(E) AC SRV. RM OUTDOOR COND UNIT								(N) EMER-4				
(E) SPARE			(E) 15	3	13	A	14	3	(E) 15											(N) EMER-5				
			(E) 15	3	15	B	16													(E) SPARE				
			(E) 15	3	17	C	18													(E) AC-6				
(E) SPARE			(E) 15	3	19	A	20	3	(E) 15											(E) AC-7				
			(E) 15	3	21	B	22													(E) AC-5				
			(E) 15	3	23	C	24													(E) SPARE				
(N) MICROWVERTER 7	LGT	0.15		31	A	32														(E) AC-8 RM 201				
(E) SPARE				33	B	34														(E) AC-8				
(E) SPARE				35	C	36														(E) 15KW. ELEC WATER HEATER				

(E) PANEL AL																								
PANEL: (E) AL					LOCATION: LEVEL 2					VOLTS: 480 Y1 277 P 3 W: 4					AC RATING: 14K									
AMP: 400 MLO <input type="checkbox"/> MCB <input checked="" type="checkbox"/> 400A					NEUTRAL: 100%					MOUNT: <input checked="" type="checkbox"/> SURFACE <input type="checkbox"/> FLUSH					FED FROM: (E) SW60 L									
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	TYPE	KVA	BKR									TYPE	KVA	TYPE										
(E) LGT RM. 200, 206, 207, 215, 218 & 219	LGT	16.56	(E) 20	1	1	A	2	1	(E) 20	1.63	COMB	(E) LGT. RM. 208 & 209									(E) LGT. RM. 208 & 209			
(E) LGT RM. 201 THRU 205	LGT	16.56	(E) 20	1	3	B	4	1	(E) 20	1.63	COMB	(N) EMER-1									(N) EMER-2			
(E) SPARE			(E) 20	1	5	C	6	1	(E) 20	1.63	COMB	(E) COMPUTER PANEL									(E) COMPUTER PANEL			
(N) EMER-3	MTR	5.54	(N) 30	1	7	A	8	2	(E) 40															
(N) EMER-4	MTR	5.54	(N) 30	1	9	B	10	2	(E) 40															
(N) EMER-5	MTR	5.54	(N) 30	1	11	C	12	2	(E) 40															
(E) AC-6			(E) 15	3	13	A	14	3	(E) 15												(E) SPARE			
			(E) 15	3	15	B	16														(E) AC-8			
			(E) 15	3	17	C	18																	
(E) AC-7			(E) 15	3	19	A	20	3	(E) 20															
			(E) 15	3	21	B	22																	
			(E) 15	3	23	C	24																	
(E) AC-8			(E) 20	3	25	A	26	3	(E) 20															
			(E) 20	3	27	B	28																	
			(E) 20	3	29	C	30																	
(E) PANEL AL1	COMB	23.82	(E) 100	3	37	A	38	3	(E) 100	1.63	COMB	(E) PANEL AL1												
	COMB	14.91	(E) 100	3	39	B	40			3.33	COMB													
	COMB	41.37	(E) 100	3	41	C	42			1.60	COMB													

(E) PANEL AP1 (FORMERLY PANEL AP2)																								
PANEL: (E) AP1					LOCATION: LEVEL 1					VOLTS: 208 Y1 120 P 3 W: 4					AC RATING: 10K									
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	TYPE	KVA	BKR									TYPE	KVA	TYPE										
(E) LGT RM. 103, 104, 106 & ELEV PIT	LGT	0.08	(E) 20	1	1	A	2	1	(E) 20	1.00	MISC	(N) DOOR HARDWARE - NORTH ENTRANCE												
(E) LGT RM. 104, 102	LGT	0.08	(E) 20	1	3	B	4	1	(E) 20	1.00	MISC	(N) DOOR HARDWARE - SOUTH ENTRANCE												
(E) REC. RM. 103, 104, SURF RACEWAY			(E) 20	1	5	C	6	1	(E) 20	1.00	MISC	(E) REC. RM. 103, SURF RACEWAY												
(E) REC. RM. 103, 104, SURF RACEWAY			(E) 20	1	7	A	8	1	(E) 20	1.00	MISC	(E) REC. RM. 103, SURF RACEWAY												
(E) REC. EXT. ELECT. CART CHARGER			(E) 20	1	9	B	10	1	(E) 20	1.00	MISC	(E) REC. RM. 102, SOLIDER BENCH												
(E) REC. RM. 102, 102, 105 & IN-WALL AMP.			(E) 20	1	11	C	12	1	(E) 20	1.00	MISC	(E) REC. RM. 102, SURF RACEWAY												
(E) REC. RM. 102, 102, 103 & 114			(E) 20	1	13	A	14	1	(E) 20	1.00	MISC	(E) REC. RM. 102, SURF RACEWAY												
(N) DRINKING FOUNTAIN	MISC	0.37	(N) 20	1	15	B	16	1	(E) 20	1.00	MISC	(N) FIRE ALARM CONTROL PANEL (NOTE 6)												
(E) SPARE			(E) 20	1	17	C	18	1	(E) 20	1.00	MISC	(N) FIRE PROTECTION PNEUMATIC PANEL (NOTE 6)												
(E) LGT RM. 103, 103, 104, 106, 110	REC	0.18	(E) 20	1	19	A	20	1	(E) 20	0.20	MISC	(E) REC. EXTERIOR NORTH												
(N) GENERATOR RECEPTACLE (NOTE 5)	REC	0.18	(E) 20	1	21	B	22	2	(E) 20	0.20	MISC	(E) REC. EXTERIOR NORTH												
(N) OUTDOOR MCH RECEPTACLE (NOTE 5)	REC	0.18	(E) 20	1	23	C	24	2	(E) 20	0.20	MISC	(E) REC. EXTERIOR NORTH												
(N) DOOR HARDWARE - UNISEX 110	MISC	1.00	(E) 20	1	25	A	26	1	(E) 20			(E) SPARE												
(N) DOOR HARDWARE - UNISEX 110	MISC	1.00	(E) 20	1	27	B	28	1	(E) 20			(E) SPARE												
(E) SPARE			(E) 20	1	29	C	30	2	(E) 20			(E) SPARE												
(N) FIRE ALARM BELL	MISC	0.20	(E) 20	1	31	A	32					(E) SPARE												
(E) SPARE			(E) 20	1	33	B	34					(E) SPARE												
(E) SPARE			(E) 20	1	35	C	36					(E) SPARE												

(E) PANEL AL1 (FORMERLY PANEL AP)																								
PANEL: (E) AL1					LOCATION: LEVEL 2					VOLTS: 208 Y1 120 P 3 W: 4					AC RATING: 10K									
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TYPE: EXISTING <input checked="" type="checkbox"/> NEW <input type="checkbox"/>					STYLE: PANELBOARD																			
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	TYPE	KVA	BKR									TYPE	KVA	TYPE										
(E) SPARE			(E) 20	1	1	A	2	3	(N) 60	5.30	MTR	(N) CU-4												
			(E) 20	1	3	B	4			5.30	MTR													
			(E) 20	1	5	C	6			5.30	MTR													
(E) REC RM. 200, 215, 216, 217 & 219			(E) 20	1	7	A	8	1	(E) 20	0.31	MTR	(N) EF-AP-1												
(E) ELEVATOR CAR LIGHTS			(E) 20	1	9	B	10	1	(E) 20	0.50	MTR	(N) CONDENSATE PUMPS FOR FCUS												
(N) EF-AP-2	MTR	0.31	(E) 20	1	11	C	12	1	(E) 20	0.50	MTR	(N) CONDENSATE PUMPS FOR FCUS												
(N) SF-1-1	MTR	0.53	(E) 20	1	13	A	14	2	(N) 20	0.48	MTR	(N) FCU-1, 1, 2, 1, 3, 1, 4, 1, 5												
(N) SF-2-1	MTR	0.53	(E) 20	1	15	B	16	2	(N) 20	0.48	MTR	(N) FCU-1, 1, 2, 1, 3, 1, 4, 1, 5												
(N) SF-2-2	MTR	0.53	(E) 20	1	17	C	18	2	(N) 20	0.41	MTR	(N) FCU-2, 1, 2, 1, 3, 1, 4, 1, 5												
(N) BS-1 BS-2	MTR	0.14	(N) 20	2	19	A	20			0.41	MTR													
			(E) 20	2	21	B	22	2	(N) 20	0.34	MTR	(N) FCU-2, 1, 2, 1, 3, 1, 4, 1, 5												
(N) CONDENSATE PUMPS FOR FCUS	MTR																							

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(E) PANEL AP2 (FORMERLY PANEL AP1)																	
PANEL: (E) AP2		M.L.O. <input checked="" type="checkbox"/>		M.C.B. <input type="checkbox"/>		LOCATION: LEVEL 2		VOLTS: 208 Y1 120 P 3		W: 4		AIC RATING: 10k		MOUNT: <input type="checkbox"/> SURFACE		<input checked="" type="checkbox"/> FLUSH	
TYPE: EXISTING <input checked="" type="checkbox"/> NEW <input type="checkbox"/>		STYLE: PANELBOARD		NEUTRAL: 100%		FED FROM: (E) A1											
CIRCUIT DESCRIPTION	LOAD		CIR #	P	CIR #	P	CIR #	P	CIR #	LOAD		CIRCUIT DESCRIPTION					
	TYPE	KVA								KVA	TYPE						
(N) REC. RM: OFFICE 201 HALL (NOTE 5)	REC	0.90	(E) 20	1	1	A	2	1	(E) 20	0.36	REC	(E) LTO: RM 209					
(N) REC. RM: OFFICE 204 (NOTE 5)	REC	0.72	(E) 20	1	3	B	4	1	(E) 20	0.72	REC	(N) REC. RM: SOUTH CORRIDOR (NOTE 5)					
(N) REC. RM: OFFICE 202 (NOTE 5)	REC	0.72	(E) 20	1	5	A	6	1	(E) 20	1.44	MISC	(N) REC. RM: FILE ROOM 209 (NOTE 5)					
(E) SHAW SAW	REC	0.72	(E) 20	1	7	A	8	1	(E) 20	1.10	REC	(N) COPPER - FILE ROOM 209 (NOTE 5)					
(E) JIG SAW	REC	0.72	(E) 20	1	9	B	10	1	(E) 20	1.10	REC	(N) REC. RM: OFFICE 208 (NOTE 5)					
(E) SPRAY BOOTH	REC	0.72	(E) 20	1	11	C	12	1	(E) 20	1.10	REC	(N) REC. RM: MEETING ROOM 207 (NOTE 5)					
(E) GRINDER	REC	0.72	(E) 20	1	13	A	14	1	(E) 20	0.72	REC	(E) FILM DRYER					
(N) REC. RM: OFFICE 201 HALL (NOTE 5)	REC	0.90	(E) 20	1	15	B	16	1	(E) 20	1.10	REC	(E) FRONT WASHER					
(N) REC. RM: UNISEX 210, UNISEX 211 (NOTE 5)	REC	0.36	(E) 20	1	17	C	18	1	(E) 20	0.72	REC	(N) FLOOR REC. RM: MTO 207 (NOTE 5)					
(E) REC. ROOM 206	REC	0.36	(E) 20	1	19	A	20	1	(E) 20	1.10	REC	(N) FLOOR REC. RM: LOBBY (NOTE 5)					
(E) REC. ROOM 203, 204 & 205	REC	0.36	(E) 20	1	21	B	22	1	(E) 20	1.10	REC	(E) COPY MACHINE					
(N) REF - KITCHENETTE (NOTE 5)	KITCH	0.80	(E) 20	1	23	C	24	1	(E) 20	1.10	REC	(N) REC. RM: OFFICE 206 (NOTE 5)					
(N) MW - KITCHENETTE (NOTE 5)	KITCH	1.00	(E) 20	1	25	A	26	1	(E) 20	0.90	REC	(N) TWO-WAY COMMUNICATION DEVICE					
(N) REC. RM: KITCHENETTE (NOTE 5)	KITCH	0.54	(E) 20	1	27	B	28	1	(E) 20			(E) SPARE					
(N) REC. RM: OFFICE 205 (NOTE 5)	REC	0.72	(E) 20	1	29	C	30	1	(E) 20			(E) SPACE					
(E) SPACE					31	A	32					(E) SPACE					
(E) SPACE					33	B	34					(E) SPACE					
(E) SPACE					35	A	36					(E) SPACE					
(E) SPACE					37	A	38					(E) SPACE					
(E) SPACE					39	B	40					(E) SPACE					
(E) SPACE					41	C	42					(E) SPACE					

ESTIMATED MAXIMUM DEMAND (EMD) CALCULATIONS			
LOAD SUMMARY:	LOAD TYPE:	CONNECTED	NEC DEMAND
LIGHTING	LTO	0.00 KVA	0.00 KVA (125%)
RESIDENT LTO/RECP	RES	0.00 KVA	0.00 KVA (100%/25%)
SMALL APPLIANCE	RES	0.00 KVA	0.00 KVA (100%/25%)
LARGEST MOTOR		KVA	KVA (125%)
REMAINING MOTORS	MTR	0.00 KVA	0.00 KVA (100%)
GEN PURPOSE RECP	REC	11.02 KVA	10.51 KVA (90% > 10KVA)
COMPUTER RECP	MISC	0.00 KVA	0.00 KVA (100%)
EQUIP/OTHER	MISC	1.44 KVA	1.44 KVA (100%)
HEATING	MISC	0.00 KVA	0.00 KVA (100%)
ELEVATOR	ELEV	0.00 KVA	0.00 KVA @ 100%
KITCHEN EQPT	KITCH	2.34 KVA	1.52 KVA @ 65%
TOTALS:		14.80 KVA	13.47 KVA
		41.08 AMPS	37.25 AMPS

CONNECTED PHASE LOADING			
PHASE:	KVA		
PHASE A:	4.94 KVA		
PHASE B:	3.62 KVA		
PHASE C:	6.24 KVA		

NOTES:  
 1. LIGHT LINEWEIGHT AND (E) DENOTES EXISTING  
 2. BOLD LINEWEIGHT AND (N) DENOTES NEW  
 3. CONTRACTOR SHALL CONFIRM ALL EXISTING CONDITIONS PRIOR  
 CONSTRUCTION. CONTRACTOR TO VERIFY THAT CIRCUITS IDENTIFIED ARE  
 AVAILABLE FOR USE AS INDICATED ON PLANS  
 4. CONTRACTOR SHALL MARK CIRCUIT DESCRIPTIONS AS 'SPARE' IF LOAD IS FOUND  
 TO BE REMOVED.  
 5. PROVIDE CT METER FOR TIE-IN TO CAMPUS BACNET SYSTEM ON CIRCUITS NOTED.  
 6. PROVIDE LOCKABLE CIRCUIT BREAKER.

(E) PANEL APC (FORMERLY PANEL AP3)																	
PANEL: (E) APC		M.L.O. <input type="checkbox"/>		M.C.B. <input checked="" type="checkbox"/>		LOCATION: LEVEL 1		VOLTS: 208 Y1 120 P 2		W: 3		AIC RATING: 10k		MOUNT: <input type="checkbox"/> SURFACE		<input checked="" type="checkbox"/> FLUSH	
TYPE: EXISTING <input checked="" type="checkbox"/> NEW <input type="checkbox"/>		STYLE: PANELBOARD		NEUTRAL: 100%		FED FROM: (E) A1											
CIRCUIT DESCRIPTION	LOAD		CIR #	P	CIR #	P	CIR #	P	CIR #	LOAD		CIRCUIT DESCRIPTION					
	TYPE	KVA								KVA	TYPE						
(E) EXISTING LOAD			(E) 30	1	1	A	2	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	3	B	4	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	5	A	6	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	7	B	8	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 15	1	9	A	10	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 15	1	11	B	12	1	(E) 15			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 15	1	13	A	14	1	(E) 15			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 30	1	15	B	16	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	17	A	18	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	19	B	20	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	21	A	22	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	23	B	24	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	25	A	26	1	(E) 20			(E) EXISTING LOAD					
(E) EXISTING LOAD			(E) 20	1	27	B	28	1	(E) 20			(E) EXISTING LOAD					
(E) SPACE					29	A	30					(E) SPACE					
(E) SPACE					31	B	32					(E) SPACE					
(E) SPACE					33	A	34					(E) SPACE					
(E) SPACE					35	B	36					(E) SPACE					
(E) SPACE					37	A	38	3	(E) 80			(E) EXISTING LOAD					
(E) SPACE					39	B	40					(E) EXISTING LOAD					
(E) SPACE					41	A	42					(E) EXISTING LOAD					

ESTIMATED MAXIMUM DEMAND (EMD) CALCULATIONS			
LOAD SUMMARY:	LOAD TYPE:	CONNECTED	NEC DEMAND
LIGHTING	LTO	0.00 KVA	0.00 KVA (125%)
RESIDENT LTO/RECP	RES	0.00 KVA	0.00 KVA (100%/25%)
SMALL APPLIANCE	RES	0.00 KVA	0.00 KVA (100%/25%)
LARGEST MOTOR		KVA	KVA (125%)
REMAINING MOTORS	MTR	0.00 KVA	0.00 KVA (100%)
GEN PURPOSE RECP	REC	0.00 KVA	0.00 KVA (90% > 10KVA)
COMPUTER RECP	MISC	0.00 KVA	0.00 KVA (100%)
EQUIP/OTHER	MISC	0.00 KVA	0.00 KVA (100%)
HEATING	MISC	0.00 KVA	0.00 KVA (100%)
ELEVATOR	ELEV	0.00 KVA	0.00 KVA @ 100%
KITCHEN EQPT	KITCH	0.00 KVA	0.00 KVA @ 65%
TOTALS:		0.00 KVA	0.00 KVA
		0.00 AMPS	0.00 AMPS

CONNECTED PHASE LOADING			
PHASE:	KVA		
PHASE A:	0.00 KVA		
PHASE B:	0.00 KVA		
PHASE C:	0.00 KVA		

NOTES:  
 1. LIGHT LINEWEIGHT AND (E) DENOTES EXISTING  
 2. BOLD LINEWEIGHT AND (N) DENOTES NEW  
 3. CONTRACTOR SHALL CONFIRM ALL EXISTING CONDITIONS PRIOR  
 CONSTRUCTION. CONTRACTOR TO VERIFY THAT CIRCUITS IDENTIFIED ARE  
 AVAILABLE FOR USE AS INDICATED ON PLANS  
 4. CONTRACTOR SHALL MARK CIRCUIT DESCRIPTIONS AS 'SPARE' IF LOAD IS FOUND  
 TO BE REMOVED.  
 5. PROVIDE CT METER FOR TIE-IN TO CAMPUS BACNET SYSTEM ON CIRCUITS NOTED.  
 6. PROVIDE LOCKABLE CIRCUIT BREAKER.

(E) PANEL AP2
(E) PANEL APC

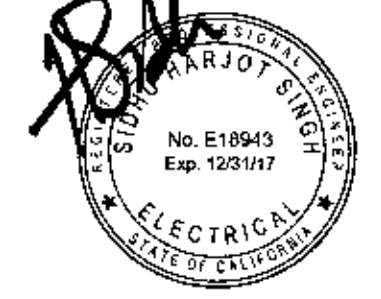
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 AC 8 FLS 127 SSS WF  
 DATE 8 SEP 12 2017



9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD  
 rev date issue



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: NONE  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**PANEL SCHEDULES - ELECTRICAL**

STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
 (REG. NRCC-LTI-01-E, Revised 04/16)

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11  
 Date Prepared: 4/8/2017  
 NRCC-LTI-01-E  
 (Page 1 of 6)

**A. General Information**

Climate Zone: 2	Conditioned Floor Area: 5,539		
	Unconditioned Floor Area: 0		
Building Type: <input checked="" type="checkbox"/> Nonresidential	<input type="checkbox"/> Relocatable Public Schools	<input checked="" type="checkbox"/> High-Rise Residential	<input type="checkbox"/> Hotel/Motel
<input type="checkbox"/> Schools	<input type="checkbox"/> Addition	<input checked="" type="checkbox"/> Conditioned Spaces	<input type="checkbox"/> Unconditioned Spaces
Phase of Construction: <input type="checkbox"/> New Construction	<input type="checkbox"/> Addition	<input checked="" type="checkbox"/> Alteration	
Method of Compliance: <input checked="" type="checkbox"/> Complete Building	<input checked="" type="checkbox"/> Area Category	<input type="checkbox"/> Tailored	

Project Address: 835 College Avenue

**B. Lighting Compliance Documents** (select yes for each document included)

For detailed instructions on the use of this and all Energy Efficiency Standards compliance documents, refer to the Nonresidential Manual published by the California Energy Commission.

YES	NO	COMP. DOC.	TITLE
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LTI-01-E	Certificate of Compliance - All Pages required on plans for all submittals.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LTI-02-E	Lighting Controls, Certificate of Compliance, and PAF Calculation - All Pages required on plans for all submittals.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LTI-03-E	Indoor Lighting Power Allowance
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-04-E	Tailored Method Worksheets
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-05-E	Low Voltage Track Lighting Worksheets
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-06-E	Indoor Lighting Existing Conditions

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
 (REG. NRCC-LTI-01-E, Revised 04/16)

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11  
 Date Prepared: 4/8/2017  
 NRCC-LTI-01-E  
 (Page 2 of 6)

**C. Summary of Allowed Lighting Power**  
 Conditioned and Unconditioned space lighting must not be combined for compliance.

Indoor Lighting Power for Conditioned Spaces			Indoor Lighting Power for Unconditioned Spaces		
Row	Watts	Watts	Row	Watts	Watts
01	Installed Lighting NRCC-LTI-01-E, Table H, page 5 + 4,259		01	Installed Lighting NRCC-LTI-01-E, Table H, page 5 + 0	
02	Portable Only for Offices NRCC-LTI-01-E, Table G, page 4 +		02	Minus Lighting Control Credits NRCC-LTI-02-E, page 2 -	
03	Minus Lighting Control Credits NRCC-LTI-02-E, page 2 -		03	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3) = 4,259	
04	Adjusted Installed Lighting Power (row 1 plus row 2 minus row 3) = 4,259		04	Adjusted Installed Lighting Power (row 1 minus row 3) = 0	
Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)			Complies ONLY if Installed ≤ Allowed (Box 04 < Box 05)		
Allowed Lighting Power Conditioned NRCC-LTI-03-E, page 1 4,340			Allowed Lighting Power Unconditioned NRCC-LTI-03-E, page 1 0		
Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires, may instead use the allowed wattage from NRCC-LTI-06, page 2.			Alterations with replacement luminaires that have at least 50/35% lower power compared to the original existing luminaires, may instead use the allowed wattage from NRCC-LTI-06, page 2.		

**D. Declaration of Required Certificates of Installation**  
 Declare by selecting yes for all of the Certificates that will be submitted. (Retain copies and verify forms are completed and signed.)

YES	NO	Compliance Document/Title	Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LTI-01-E - Must be submitted for all buildings	<input type="checkbox"/> Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LTI-02-E - Must be submitted for a lighting control system, or for an Energy Management Control System (EMCS), to be recognized for compliance	<input type="checkbox"/> Field Inspector
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-03-E - Must be submitted for a line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection device used to energize only line-voltage track lighting, to be recognized for compliance	<input type="checkbox"/> Field Inspector
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-04-E - Must be submitted for two interlocked systems serving an auditorium, a convention center, a conference room, a multipurpose room, or a theater to be recognized for compliance	<input type="checkbox"/> Field Inspector
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-05-E - Must be submitted for a Power Adjustment Factor (PAF) to be recognized for compliance	<input type="checkbox"/> Field Inspector
<input type="checkbox"/>	<input checked="" type="checkbox"/>	NRCC-LTI-06-E - Must be submitted for additional wattage installed in a video conferencing studio to be recognized for compliance	<input type="checkbox"/> Field Inspector

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
 (REG. NRCC-LTI-01-E, Revised 04/16)

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11  
 Date Prepared: 4/8/2017  
 NRCC-LTI-01-E  
 (Page 3 of 6)

**E. Declaration of Required Certificates of Acceptance**  
 Declare by selecting yes for all of the Certificates that will be submitted. (Retain copies and verify forms are completed and signed.)

YES	NO	Compliance Document/Title	Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	<input type="checkbox"/> Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCA-LTI-03-A - Must be submitted for automatic daylight controls	<input type="checkbox"/> Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCA-LTI-04-A - Must be submitted for demand responsive lighting controls.	<input type="checkbox"/> Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCA-LTI-05-A - Must be submitted for institutional tuning power adjustment factor (PAF).	<input type="checkbox"/> Field Inspector

A Separate Lighting Schedule Must Be Filled Out for Conditioned and Unconditioned Spaces. Installed Lighting Power Listed on this Lighting Schedule is only for:  
 CONDITIONED SPACE  UNCONDITIONED SPACE

**F. Indoor Lighting Schedule and Field Inspection Energy Checklist**

The actual indoor lighting power listed on the next 2 pages includes all installed permanent and planned portable lighting systems.

When Complete Building Method is used for compliance, list each different type of luminaire on separate lines.

When Area Category Method or Tailored Method is used for compliance, list each different type of luminaire by each different function area on separate lines.

Also include track lighting in schedule, and submit the track lighting compliance document (NRCC-LTI-05-E) when line-voltage track lighting is installed.

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
 (REG. NRCC-LTI-01-E, Revised 04/16)

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11  
 Date Prepared: 4/8/2017  
 NRCC-LTI-01-E  
 (Page 4 of 6)

**G. Installed Portable Luminaires in Offices - Exception to Section 140.6(a)**

This section shall be filled out ONLY for portable luminaires in offices (As defined in §100.1). All other planned portable luminaires shall be documented on next page of this compliance document.

This section is used to determine if greater than 0.3 watts of portable lighting is planned for any office.

Fill out a separate line for each different office. Small offices that are typical (having the same general and portable lighting) may be grouped together. This allowance shall not be traded between offices having different lighting systems.

Office Portable Luminaire Schedule	Office Installed Portable Luminaire W/ft <sup>2</sup>						Office Location	Field Inspector		
1	2	3	4	5	6	7	8	9	10	
Complete Luminaire Description (i.e., LED, under cabinet, furniture mounted direct/indirect)	Watts per Luminaire	Number of Luminaires	Installed portable luminaire watts in this office (G04 x G03)	Square feet of this office	Watts per square foot (G04 / G05)	If G06 ≤ 0.3, enter 2000 If G06 > 0.3, (G06 x 0.3)	(G06 x G07)	Identify Office area in which these portable luminaires are installed	Pass	Fail
									<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>
Total installed portable luminaire watts that are greater than 0.3 W/ft <sup>2</sup> per office:								Enter sum total of all pages into NRCC-LTI-01-E, Page 1		

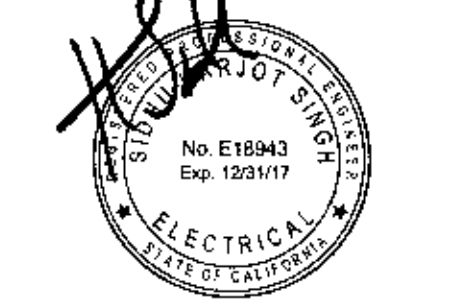
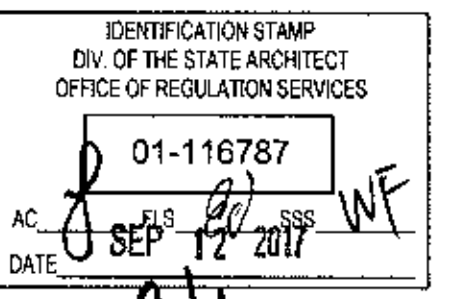
CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

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9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: NONE  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 COMPLIANCE FORMS - ELECTRICAL

E901



STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
(CALIFORNIA ENERGY COMMISSION)  
 CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11 Date Prepared: 4/6/2017  
 NRCC-LTI-01-E (Page 5 of 6)

A Separate Lighting Schedule Must Be Filled Out for Conditioned and Unconditioned Spaces. Installed Lighting Power listed on this Lighting Schedule is only for:  
 **CONDITIONED SPACE**     UNCONDITIONED SPACE

01 Name or Item Tag	02 Luminaire Schedule Complete Luminaire Description (i.e. 3 lamp fluorescent troffer, 13218, one dimmable electronic ballast)	03 Watts per Luminaire	04 How wattage was determined		05 Number of Luminaires	06 Total Installed Watts in this Area (Watts x HPS)	07 Location Primary Function area in which these luminaires are installed	08 Field Inspector	
			CEC Default from MAG	As Calculated (S/20 HPS)				Pass	Fail
F1	F1 - 2x4 RECESSED LED	27.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	162	Office > 250 sqft	<input type="checkbox"/>	<input type="checkbox"/>
F1	F1 - 2x4 RECESSED LED	27.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	162	Office <= 250 sqft	<input type="checkbox"/>	<input type="checkbox"/>
F1	F1 - 2x4 RECESSED LED	27.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	162	Corridors	<input type="checkbox"/>	<input type="checkbox"/>
F1	F1 - 2x4 RECESSED LED	27.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14	378	Corridor/Restroom/Support	<input type="checkbox"/>	<input type="checkbox"/>
F2	F2 - 8FT D/I LINEAR PENDANT	12.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	192	2,304	Lobby, Main Entry	<input type="checkbox"/>	<input type="checkbox"/>
F3	F3 - 4' SO. RECESSED LED	20.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	16	320	Corridor/Restroom/Support	<input type="checkbox"/>	<input type="checkbox"/>
F4	F4 - 4FT D/I LINEAR PENDANT	12.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	32	384	Office > 250 sqft	<input type="checkbox"/>	<input type="checkbox"/>
F4	F4 - 4FT D/I LINEAR PENDANT	12.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	8	96	Office <= 250 sqft	<input type="checkbox"/>	<input type="checkbox"/>
F4	F4 - 4FT D/I LINEAR PENDANT	12.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	16	192	Corridors	<input type="checkbox"/>	<input type="checkbox"/>
INSTALLED WATTS PAGE TOTAL:						4,160	Enter sum total of all pages into NRCC-LTI-01-E, Page 2	4,259	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
(CALIFORNIA ENERGY COMMISSION)  
 CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11 Date Prepared: 4/6/2017  
 NRCC-LTI-01-E (Page 6 of 6)

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**  
 I certify that the Certificate of Compliance documentation is accurate and complete.  
 Documentation Author Name: Harjot Sidhu  
 Signature Date: 4/6/2017  
 Company: PAE CONSULTING ENGINEERS, INC.  
 Address: 425 CALIFORNIA STREET #1200  
 City/State/Zip: SAN FRANCISCO, CA 94104  
 Phone: (415) 544-7707

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**  
 I certify the following under penalty of perjury, under the laws of the State of California:  
 1. The information provided on this Certificate of Compliance is true and correct.  
 2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).  
 3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.  
 4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable consultation documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.  
 5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.  
 Responsible Designer Name: Harjot Sidhu  
 Signature Date: 4/6/2017  
 Company: PAE CONSULTING ENGINEERS, INC.  
 Address: 425 CALIFORNIA STREET #1200  
 City/State/Zip: SAN FRANCISCO, CA 94104  
 Phone: (415) 544-7707

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING**  
(CALIFORNIA ENERGY COMMISSION)  
 CERTIFICATE OF COMPLIANCE  
 Indoor Lighting  
 Project Name: College of Marin - Building 11 Date Prepared: 4/6/2017  
 NRCC-LTI-01-E (Page 5 of 6)

A Separate Lighting Schedule Must Be Filled Out for Conditioned and Unconditioned Spaces. Installed Lighting Power listed on this Lighting Schedule is only for:  
 **CONDITIONED SPACE**     UNCONDITIONED SPACE

01 Name or Item Tag	02 Luminaire Schedule Complete Luminaire Description (i.e. 3 lamp fluorescent troffer, 13218, one dimmable electronic ballast)	03 Watts per Luminaire	04 How wattage was determined		05 Number of Luminaires	06 Total Installed Watts in this Area (Watts x HPS)	07 Location Primary Function area in which these luminaires are installed	08 Field Inspector	
			CEC Default from MAG	As Calculated (S/20 HPS)				Pass	Fail
F5	F5 - 4' SQ. LOW PROFILE LED	10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	60	Office <= 250 sqft	<input type="checkbox"/>	<input type="checkbox"/>
F5	F5 - 4' SQ. LOW PROFILE LED	10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3	30	Electrical, Mechanical Room	<input type="checkbox"/>	<input type="checkbox"/>
F8	F8 - WALL MOUNT LINEAR LED	18.5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	19	Kitchenette	<input type="checkbox"/>	<input type="checkbox"/>
INSTALLED WATTS PAGE TOTAL:						99	Enter sum total of all pages into NRCC-LTI-01-E, Page 2	4,259	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING - LIGHTING CONTROLS**  
(CALIFORNIA ENERGY COMMISSION)  
 CERTIFICATE OF COMPLIANCE  
 Indoor Lighting - Lighting Controls  
 Project Name: College of Marin - Building 11 Date Prepared: 4/6/2017  
 NRCC-LTI-02-E (Page 1 of 3)

**A. Mandatory Lighting Control Declaration Statements (Indicate if the measure applies by checking yes or no below.)**

YES	NO	Control Requirements
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting shall be controlled by self-contained lighting control devices which are certified to the Energy Commission according to the Title 20 Appliance Efficiency Regulations in accordance with Section 110.9.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting shall be controlled by a lighting control system or energy management control system in accordance with Section 110.9. An Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	One or more Track Lighting Integral Current Limiters shall be installed which have been certified to the Energy Commission in accordance with Section 110.9 and Section 130.4. Additionally, an Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	A Track Lighting Supplementary Overcurrent Protection Panel shall be installed in accordance with Section 110.9 and Section 130.4. Additionally, an Installation Certificate shall be installed in accordance with Section 130.4(b).
<input type="checkbox"/>	<input type="checkbox"/>	All lighting controls and equipment shall comply with the applicable requirements in Section 110.9 and shall be installed in accordance with the manufacturer's instructions in accordance with Section 130.1.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All luminaires shall be functionally controlled with manually switched ON and OFF lighting controls in accordance with Section 130.1(a).
<input type="checkbox"/>	<input type="checkbox"/>	General lighting shall be separately controlled from all other lighting systems in an area. Floor and wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less. When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled, in accordance with Section 130.1(a)(4).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The general lighting of any enclosed area 100 square feet or larger, with a connected lighting load that exceeds 0.5 watts per square foot shall meet the multi-level lighting control requirements in accordance with Section 130.1(b).
<input type="checkbox"/>	<input type="checkbox"/>	All installed indoor lighting shall be equipped with controls that meet the applicable Shut-OFF control requirements in Section 130.1(c).
<input type="checkbox"/>	<input type="checkbox"/>	Lighting in all Daylit Zones shall be controlled in accordance with the requirements in Section 130.1(d) and daylit zones are shown on the plans.
<input type="checkbox"/>	<input type="checkbox"/>	Lighting power in buildings larger than 10,000 square feet shall be capable of being automatically reduced in response to a Demand Responsive Signal in accordance with Section 130.1(e).
<input type="checkbox"/>	<input type="checkbox"/>	Before an occupancy permit is granted for a newly constructed building or area, or a new lighting system serving a building, area, or site is operated for normal use, indoor lighting controls serving the building, area, or site shall be certified as meeting the Acceptance Requirements for Code Compliance in accordance with Section 130.4 (a). The controls required to meet the Acceptance Requirements include automatic daylight controls, automatic shut-off controls, and demand responsive controls.

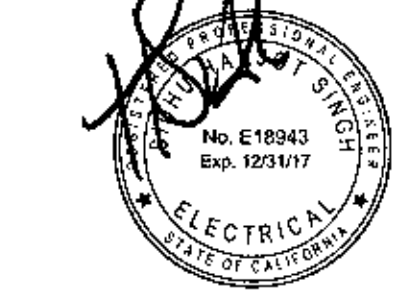
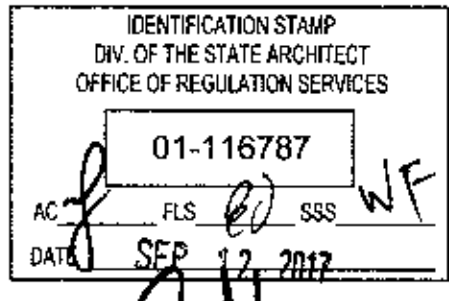
CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

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9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD  
 rev date issue



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: NONE  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 COMPLIANCE FORMS - ELECTRICAL

E902

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STATE OF CALIFORNIA  
**INDOOR LIGHTING - LIGHTING CONTROLS**  
REG NRCC-LTI-02-E (Revised 07/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting - Lighting Controls  
 Project: College of Marin - Building 11 Date Prepared: 4/6/2017

NRCC-LTI-02-E (Page 2 of 3)

A separate document must be filled out for Conditioned and Unconditioned Spaces. This page is used only for the following:  
 CONDITIONED SPACES  UNCONDITIONED SPACES

**B. Mandatory and Prescriptive Indoor Lighting Control Schedule, PAF Calculation, and Field Inspection Checklist**

Lighting Control Schedule	Standards Complying With <sup>1</sup> (✓ all that apply, or enter "E" if Exempted)										Values of Controlled Lighting	PAF	Control Credit (A, B, C)	✓ if Acceptance Test Required	Field Inspector	
	01	02	03	04	05	06	07	08	09	10						
Location in Building	Type/Description of Lighting Control (i.e., occupancy sensor, automatic time switch, dimmer, automatic daylight, etc.)	# of Units	\$130.1(a)	\$130.0(b)	\$130.1(c)	\$130.1(d)	\$130.1(e)	\$140.6(a)	\$140.6(b)	\$140.6(f)					Pass	Fail
SEE SHEETS E201, E202, E203			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>
Control Credit PAGE TOTAL (Sum of Column 13):												C				
IF MULTIPLE PAGES ARE USED, ENTER SUM TOTAL OF Control Credit for all pages HERE (Sum of all Column 13):												C				
Enter Control Credit total into NRCC-LTI-01-E, Page 1																

1. \$130.1(a) = Manual area controls; \$130.0(b) = Multi-Level; \$130.1(c) = Auto Shut-Off; \$130.1(d) = Mandatory Daylight; \$130.1(e) = Demand Responsive; \$140.6(a) = Additional lighting controls installed to earn a PAF; \$140.6(b) = Prescriptive Secondary Stable Daylight Controls.  
 2. Check Table 140.6-A for correct Factor. PAFs shall not be traded between conditioned and unconditioned spaces. As a condition to earn a PAF, an Installation Certificate is also required to be filled out, signed, and submitted.

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING POWER ALLOWANCE**  
REG NRCC-LTI-03-E (Revised 07/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting Power Allowance  
 Project: College of Marin - Building 11 Date Prepared: 4/6/2017

NRCC-LTI-03-E (Page 1 of 4)

A separate page must be filled out for Conditioned and Unconditioned Spaces. This page is only for:  
 CONDITIONED spaces  UNCONDITIONED spaces

**A. SUMMARY TOTALS OF LIGHTING POWER ALLOWANCES**

If using Complete Building Method for compliance, use only the total in column (a) as total allowed building watts.  
 If using Area Category Method, Tailored Method, or a combination of Area Category and Tailored Method for compliance, use only the total in column (b) as the total allowed building watts.

	(a)	(b)
01 Complete Building Method Allowed Watts. Documented in section B of NRCC-LTI-03-E (below on this page)		
02 Area Category Method Allowed Watts. Documented in section C-1 of NRCC-LTI-03-E (below on this page)		4,340
03 Tailored Method Allowed Watts. Documented in section A of NRCC-LTI-03-E		0
<b>TOTAL ALLOWED BUILDING WATTS. Enter number into correct cell on NRCC-LTI-01, Page 2, Row 1</b>		4,340

Check here if building contains both conditioned and unconditioned areas.

**B. COMPLETE BUILDING METHOD LIGHTING POWER ALLOWANCE**

01	02	03	04
TYPE OF BUILDING (From §140.6 Table 140.6-B)	WATTS PER ft <sup>2</sup>	COMPLETE BLDG. AREA	ALLOWED WATTS
Total Area:			
Total Watts: Enter Total Watts into section A, row 1 (Above on this page)			

**C-1 AREA CATEGORY METHOD TOTAL LIGHTING POWER ALLOWANCES**

	Watts
Total from section C-2	4,340
Total from section C-3	0
Total Watts: Enter Total Watts into section A, row 2 (Above on this page)	4,340
For Alterations Only - Reduced lighting power option (Total Allowed Watts x 0.85). Enter this value into section A, row 2 if using this option.	

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING - LIGHTING CONTROLS**  
REG NRCC-LTI-02-E (Revised 07/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting - Lighting Controls  
 Project: College of Marin - Building 11 Date Prepared: 4/6/2017

NRCC-LTI-02-E (Page 3 of 3)

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Harjot Sidhu  
 Company: PAE CONSULTING ENGINEERS, INC.  
 Address: 425 CALIFORNIA STREET #1200  
 City/State/Zip: SAN FRANCISCO, CA 94104  
 Phone: (415) 544-7707

Documentation Author Signature: [Signature]  
 Signature Date: 4/6/2017  
 License Number: E16943

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

I certify the following under penalty of perjury, under the laws of the State of California:

- The information provided on this Certificate of Compliance is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
- The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
- I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permits issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Harjot Sidhu  
 Responsible Designer Signature: [Signature]  
 License Number: E16943  
 Address: 425 CALIFORNIA STREET #1200  
 City/State/Zip: SAN FRANCISCO, CA 94104  
 Phone: (415) 544-7707

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
**INDOOR LIGHTING POWER ALLOWANCE**  
REG NRCC-LTI-03-E (Revised 07/16) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE  
 Indoor Lighting Power Allowance  
 Project: College of Marin - Building 11 Date Prepared: 4/6/2017

NRCC-LTI-03-E (Page 2 of 4)

A separate page must be filled out for Conditioned and Unconditioned Spaces. This page is only for:  
 CONDITIONED spaces  UNCONDITIONED spaces

**C-2 AREA CATEGORY METHOD GENERAL LIGHTING POWER ALLOWANCE**

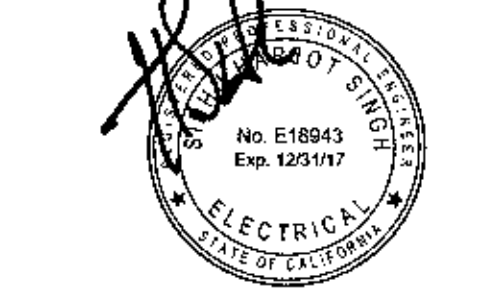
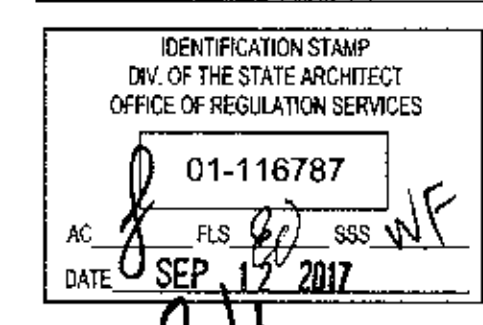
Do not include portable lighting for offices. Portable lighting for offices shall be documented only in Section G of NRCC-LTI-01-E.  
 Separately list lighting for each primary function area as defined in §100.1 of the Standards

01	02	03	04
AREA CATEGORY (From §140.6 Table 140.6-C)	WATTS PER ft <sup>2</sup>	AREA (ft <sup>2</sup> )	ALLOWED WATTS
Location in Building	Primary Function Area per Table 140.6-C		
Office > 250 sqft	Office > 250 sqft	976	732
Office <= 250 sqft	Office <= 250 sqft	1,303	1,303
Conference Rooms	Corridors	290	174
Kitchenette	Kitchenette	100	120
Corridor	Corridors	289	173
L1 Electrical Room	Electrical, Mechanical Room	200	110
L1 Corridor/Restroom/Support	Corridor/Restroom/Support	1,528	817
L1 Main Entry Lobby	Lobby, Main Entry	853	810
TOTALS		6,539	
Enter sum total Area Category allowed watts into section C-1 of NRCC-LTI-03-E (this compliance document)			4,340

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance April 2016

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9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: NONE  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 COMPLIANCE FORMS - ELECTRICAL

E903



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STATE OF CALIFORNIA  
**Electrical Power Distribution**  
 CEC-NRCC-ELC-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-ELC-01-E  
 Page 1 of 4

Project Name: College of Marin Date Prepared: 4/6/2017

**General Information**

Project Address: 835 College Ave., Kentfield, CA 94904 Climate Zone: 3 Conditioned Floor Area: 5,539  
 Unconditioned Floor Area:

Building Type:  Nonresidential  High-Rise Residential  Hotel/Motel  
 Schools  Relocatable Public Schools  Conditioned Spaces  Unconditioned Spaces

Phase of Construction:  New Construction  Addition  Alteration

In the table below identify all applicable construction documents that specify the requirements for the scope of responsibility reported by this certificate. Use additional pages as needed to list all construction documents related to compliance of Section 130.5.

Document Number	Document Title/Descriptions (Include description information for Table or Schedule if it contains compliance information)	Document Sheet # or Page #	Indicate which subsection of Section 130.5 is related to the document (e.g. 130.5(a) for service electrical metering)
Add Row			

**A. Service Electrical Metering**

Check one of the three boxes below if the electrical power distribution system is in compliance with Section 130.5(a).

For newly installed electrical service in newly constructed buildings, Service Electrical Metering is required according to Section 130.5(a). Fill out Column 1 through 6 of table below.

For new or replacement electrical service equipment in existing buildings, Service Electrical Metering is required according to Section 141.0(b)(2). Fill out Column 1 through 6 of table below.

EXCEPTION to Electrical Service Metering: Service or feeder for which the utility company provides a metering system that indicates instantaneous kW demand and kWh for a utility-defined period. Fill out Column 1, 2 and 6 of table below with the compliance information. Fill out a separate line for each electrical service that is connected to the building.

Electrical Service Designation/Location/Description	Electrical Service Rating (kVA)	Metering Capabilities (check all that are present)				Exception to 130.5 (a)	Field Inspector
		03	04	05	06		
Add Row							

STATE OF CALIFORNIA  
**Electrical Power Distribution**  
 CEC-NRCC-ELC-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-ELC-01-E  
 Page 2 of 4

Project Name: College of Marin Date Prepared: 4/6/2017

**B. Separation of Electrical Circuits for Electrical Energy Monitoring**

Check all boxes below if the electrical power distribution system is in compliance with Section 130.5(b).

The electrical power distribution system meets the separation of electrical circuits for electrical energy monitoring requirement of Section 130.5(b). The electrical power distribution systems is designed so that measurement devices can monitor the electrical energy usage of load types according to TABLE 130.5-B.

Describe the electrical power distribution system installed and the compliance method chosen in meeting the requirement of Section 130.5(b). Use the space below to include the information. Examples of compliance methods are detailed in Nonresidential Compliance Manual Chapter 8.

Fill out Column 1 thru 3 with the compliance information.

General Information	Electrical Power Distribution System Information and Method of Compliance	Electrical Service Rating (kVA)	Enforcement Agency
01	02	03	04
Electrical Service Designation/Location/Description	Describe the electrical power distribution system installed and the compliance method used	kVA	Check that the system complies

Field Inspector Notes:

STATE OF CALIFORNIA  
**Electrical Power Distribution**  
 CEC-NRCC-ELC-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-ELC-01-E  
 Page 3 of 4

Project Name: College of Marin Date Prepared: 4/6/2017

**C. Voltage Drop**

Check all boxes below if the electrical power distribution system is in compliance with Section 130.5(c).

The electrical power distribution system meets the voltage drop requirement of Section 130.5(c). The maximum sustained voltage drop on feeder conductors and branch circuit conductors to the farthest connected load or outlet, do not exceed 5%.

Voltage drop calculation documents showing compliance to Section 130.5(c) are submitted as part of the compliance document submittal.

**D. Circuit Controls for 120-Volt Receptacles and Controlled Receptacles**

Check one or more boxes below for applicable requirements of Section 130.5(d) for the electrical power distribution system.

The control is capable of automatically shutting OFF the controlled receptacles when the space is typically unoccupied, either at the receptacle or circuit level. For the automatic time switch control, it incorporates an override control that allows the controlled receptacle to remain ON for no more than 2 hours when an override is initiated and an automatic holiday "shut-OFF" feature that turns OFF all loads for at least 24 hours and then resumes the normally scheduled operation. Countdown timer switches are not to be used to comply with the automatic time switch control requirements. The controls meet the requirement of Section 130.5(d)(1).

There is at least one controlled receptacle within 6 ft from each uncontrolled receptacle. Where receptacles are installed in modular furniture in open office area, at least one controlled receptacle is installed at each workstation. The receptacles meet the requirement of Section 130.5(d)(2).

There are installed split wired receptacles with at least one controlled and one uncontrolled receptacle. Where receptacles are installed in modular furniture in open office area, at least one controlled receptacle is installed at each workstation. The receptacles meet the requirement of Section 130.5(d)(2).

Permanent and durable marking for controlled receptacles or circuits to differentiate them from uncontrolled receptacles or circuits is provided. The markings meet the requirement of Section 130.5(d)(3).

For hotel and motel guest rooms, there are controlled receptacles for at least one-half of the 120-volt receptacles in each guest room. Electric circuits serving controlled receptacles in guestrooms are installed to have captive key controls, occupancy sensing controls, or automatic controls so the power is switched off no longer than 30 minutes after the guest room has been vacated. The receptacles meet the requirement of Section 130.5(d)(4).

Receptacles that are only for the following purposes are excepted from Section 130.5(d):

- Receptacles specifically for refrigerators and water dispensers in kitchen areas.
- Receptacles located a minimum of six feet above the floor that are specifically for clocks.
- Receptacles for network copiers, fax machines, A/V and data equipment other than personal computers in copy rooms.
- Receptacles on circuits rated more than 20 amperes.
- Receptacles connected to an uninterruptible power supply (UPS) that are intended to be in continuous use, 24 hours per day/365 days per year, and are marked to differentiate them from other uncontrolled receptacles or circuits.

STATE OF CALIFORNIA  
**Electrical Power Distribution**  
 CEC-NRCC-ELC-01-E (Revised 01/16) CALIFORNIA ENERGY COMMISSION

**CERTIFICATE OF COMPLIANCE** NRCC-ELC-01-E  
 Page 4 of 4

Project Name: College of Marin Date Prepared: 4/6/2017

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Harjot Sidhu  
 Signature: [Signature]  
 Date: [Date]

Company: PAE CONSULTING ENGINEERS, INC  
 Address: 48 Golden Gate Ave  
 City/State/Zip: San Francisco, CA, 94102  
 Phone: 415-544-7707

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

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- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
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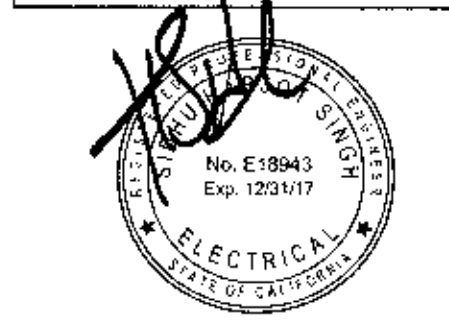
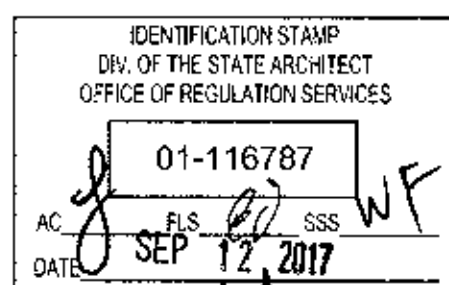
Responsible Designer Name: [Name]  
 Signature: [Signature]  
 Date: [Date]

Company: [Company]  
 Address: [Address]  
 City/State/Zip: [City/State/Zip]  
 Phone: [Phone]

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9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: NONE  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 TITLE 24 COMPLIANCE FORMS - ELECTRICAL

E905

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STANDARD PLUMBING ABBREVIATIONS table with columns for symbol and description. Includes terms like AIRFOIL, ABOVE FINISHED FLOOR, ALTERNATIVE, ALUMINUM, AIR PRESSURE DROP, etc.

SPECIALTY PIPING table with columns for symbol and description. Includes terms like ACID VENT, ACID WASTE, FLUORIDE WASTE, DEIONIZED WATER SUPPLY, etc.

PLUMBING PIPING table with columns for symbol and description. Includes terms like WASTE, PUMPED WASTE, STORM DRAIN, PLUMBED STORM DRAIN, etc.

GENERAL NOTE: THIS IS A STANDARD LEGEND SHEET. THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

PLUMBING DRAWING INDEX table with columns for SHEET NO and DESCRIPTION. Lists sheets P001 through P501 and their corresponding descriptions.

COMPONENT ANCHORAGE NOTE: ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2016 CBC, SECTIONS 1816A.1.24 THROUGH 1816A.1.26 AND ASCE 7-10 CHAPTER 26 AND 13.

FIRE PROTECTION SYMBOLS table with columns for symbol and description. Includes terms like FIRE PROTECTION, FIRE SPRINKLER, DRY PIPE SPRINKLER, etc.

MISC. VALVES & COCKS table with columns for symbol and description. Includes terms like SHUT-OFF VALVE, GLOBE VALVE, CHECK VALVE, 2-WAY CONTROL VALVE, etc.

DEMOLITION LEGEND table with columns for symbol and description. Includes terms like EXISTING WASTE (BELOW GRADE OR FLOOR), EXISTING COLD WATER, NEW WASTE (BELOW GRADE OR FLOOR), NEW COLD WATER.

PLUMBING SYMBOLS table with columns for symbol and description. Includes terms like THRUST BLOCK, CLEANOUT, WALL CLEANOUT, FLOOR CLEANOUT, etc.

MISC. FITTINGS & SYMBOLS table with columns for symbol and description. Includes terms like DIRECTION OF FLOW, DIRECTION OF SLOPE, PIPE SLEEVE, REDUCER, ANCHOR, etc.

SYMBOLS table with columns for symbol and description. Includes terms like ACCESS PANEL, BELOW GRADE / FLOOR, CONNECT TO EXISTING, EXISTING TO REMAIN, CAP EXISTING / CAP FOR FUTURE, RELOCATE EXISTING, REMOVE EXISTING, NOTE.

ARCHITECT: brick, 1266 66th street, emeryville, ca 94608, 510.516.0167, www.brick-llp.com

CLIENT: marin community college district, 835 college avenue, kentfield, ca 94904. Logo for PAE Portland | San Francisco | Seattle pae-engineers.com

IDENTIFICATION STAMP: DIV OF THE STATE ARCHITECT, OFFICE OF REGULATION SERVICES, 01-116787, SEP 12 2017.



9/07/17 DSA BACK CHECK, 5/31/17 DSA PLAN REVIEW, 3/10/17 100% CD.



COM IVC Bldg. 11 renovation

novato, california, project number: 17-1095

scale: NONE, date: 03/10/2017

CONSTRUCTION DOCUMENTS, SYMBOLS, LEGENDS AND ABBREVIATIONS PLUMBING

P001

### PLUMBING DESIGN CRITERIA

DOMESTIC WATER PIPING SYSTEM:  
 BASIS OF DESIGN: 2016 CALIFORNIA PLUMBING CODE, APPENDIX A 'RECOMMENDED RULES FOR SIZING THE WATER SUPPLY SYSTEM'. PIPING SIZED ON 3 PSI/100 FT. DROP, VELOCITIES NOT TO EXCEED 6 FT./SEC. (COLD WATER) AND NOT TO EXCEED 5 FT./SEC. (HOT WATER).  
 WASTE AND VENT PIPING SYSTEM:  
 BASIS OF DESIGN: 2016 CALIFORNIA PLUMBING CODE, CHAPTER 7, 'SANITARY DRAINAGE'.  
 ALL WASTE PIPING SIZED AT 1/4" FT. SLOPE UNLESS OTHERWISE NOTED.

### MISCELLANEOUS PLUMBING EQUIPMENT SCHEDULE

TAG NUMBER	LOCATION	DESCRIPTION	ELECTRICAL	NOTES
TP-1	LEVEL 2 RESTROOM	ELECTRONIC TRAP PRIMER 1-16 OPENING MANIFOLD CALIBRATED FOR EQUAL WATER DISTRIBUTION, 3/4" INLET CONNECTION BASED ON: PRECISION PLUMBING PRODUCTS PRIMETIME ELECTRONIC TRAP PRIMER, PT SERIES	120 V, 1 PH	

### PLUMBING FIXTURE SCHEDULE

TAG NUMBER	FIXTURE TYPE	ROUGH-IN SIZE (INCHES)					GPM/GPF	ELEC. CONNECTION	DESCRIPTION	NOTES
		W	V	CW	HW	TW				
WC-1	WATER CLOSET	3	2	1	-	-	1.6/1.1	N	MANUAL DUAL FLUSH VALVE. ADA COMPLIANT	
U-1	URINAL	2	1-1/2	3/4	-	-	0.125	N	BATTERY POWERED SENSOR ACTIVATED FLUSH-VALVE. ADA COMPLIANT	
L-1	LAVATORY	2	1-1/2	1/2	1/2	-	0.5	N	COUNTERTOP. AUTOMATIC FAUCET. ADA COMPLIANT.	
S-1	SINK	2	1-1/2	3/4	3/4	-	1.75	N	COUNTERTOP. MANUAL FAUCET. ADA COMPLIANT.	
DF-1	DRINKING FOUNTAIN	2	1-1/2	3/4	3/4	-	1.1	Y	WALL MOUNTED, WITH BOTTLE FILLING STATION. ADA COMPLIANT.	CHILLER UNIT

### CPC 2016 - PLUMBING WATER & WASTE CALCULATIONS

Quantity	Appliances, Appurtenances or Fixtures <sup>2</sup>	Table A-2		Table 7-3		Notes
		WSFU	Public	DFU	Public	
1	Drinking Fountain or Watercooler	0.5		0.5		
4	Lavatory	4.0		4.0		
4	Floor Drain - 2"	0.0		8.0		
	<i>Sinks</i>					
1	Kitchen, domestic	1.5		2.0		
4	Urinal, 1.0 GPF	16.0		8.0		
4	Water Closet, 1.6 GPF Flushometer Valve	20.0		16.0		
		42.0 WSFU		38.5 DFU		
	<i>Additional Water Uses</i>					
	HVAC Make-Up	GPM	0.0			
	Kitchen	GPM	0.0			
	Other	GPM	0.0			
	Total GPM	46.8		n/a		
	Enter Pipe Size	3"		4"		

### WATER HEATER SCHEDULE

TAG NUMBER	DESCRIPTION	LOCATION	SERVICE	TYPE	NO. OF ELEMENTS	ELECTRICAL				WEIGHT (LBS)	MANUFACTURER & MODEL	NOTES
						TOTAL kW	kW PER ELEMENT	FLA	VOLT/ PHASE			
EWH-1-1	ELECTRIC WATER HEATER	L1 RESTROOM	DOMESTIC HOT WATER	TANKLESS/INSTANTANEOUS	1	5.54	5.54	20	277/1	5	CHRONOMITE M-20L	ACTIVATION FLOW RATE: 0.35 GPM
EWH-1-2	ELECTRIC WATER HEATER	L1 RESTROOM	DOMESTIC HOT WATER	TANKLESS/INSTANTANEOUS	1	5.54	5.54	20	277/1	5	CHRONOMITE M-20L	ACTIVATION FLOW RATE: 0.35 GPM
EWH-2-1	ELECTRIC WATER HEATER	L2 KITCHENETTE	DOMESTIC HOT WATER	TANKLESS/INSTANTANEOUS	1	16.05	16.05	58	277/1	10	CHRONOMITE R-58L	ACTIVATION FLOW RATE: 0.35 GPM
EWH-2-2	ELECTRIC WATER HEATER	L2 RESTROOM	DOMESTIC HOT WATER	TANKLESS/INSTANTANEOUS	1	5.54	5.54	20	277/1	5	CHRONOMITE M-20L	ACTIVATION FLOW RATE: 0.35 GPM
EWH-2-3	ELECTRIC WATER HEATER	L2 RESTROOM	DOMESTIC HOT WATER	TANKLESS/INSTANTANEOUS	1	5.54	5.54	20	277/1	5	CHRONOMITE M-20L	ACTIVATION FLOW RATE: 0.35 GPM

GENERAL NOTES:  
 A. THE CHRONOMITE WATER HEATERS ARE PROVIDED WITH FOUR (4) MOUNTING FLANGES LOCATED ON EACH CORNER OF THE UNIT. PER THE INSTALLATION INSTRUCTIONS, THE UNIT IS MOUNTED TO THE WALL UNDER THE SINK WITH FOUR SCREWS THROUGH THE FLANGES LOCATED ON EACH CORNER USING MOLLY ANCHORS OR FASTENERS.

### PLUMBING GENERAL NOTES

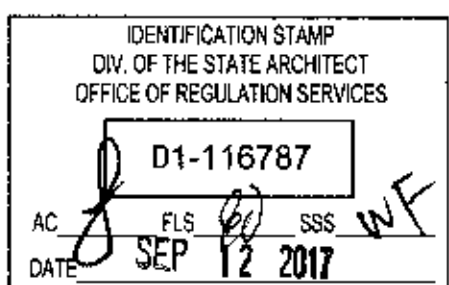
- REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS FOR THIS PROJECT. IN CASE OF CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS, THE MOST STRINGENT SHALL GOVERN.
- THE DESIGN ASSUMES ALL EXISTING PLUMBING EQUIPMENT AND SYSTEMS ARE FUNCTIONING CORRECTLY. CONTRACTOR SHALL PERFORM TESTING OF EXISTING SYSTEMS AND SUBMIT A DETAILED EQUIPMENT TESTING REPORT TO CLIENT AND ENGINEER OF RECORD.
- ALL MATERIALS AND WORKMANSHIP ARE SUBJECT TO APPROVAL BY THE OWNER, ARCHITECT, AND ENGINEER OF RECORD. ANY PORTION OF THE WORK OR EQUIPMENT FOUND TO BE DEFECTIVE SHALL BE REPLACED BY THE CONTRACTOR AS PART OF THIS CONTRACT AT NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE SAFETY OF ALL PERSONS ON OR ABOUT THE CONSTRUCTION SITE IN ACCORDANCE WITH APPLICABLE LAWS AND CODES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL TRADE PERMITS AND INSPECTION.
- THE CONTRACTOR, PRIOR TO BIDDING, SHALL VISIT THE JOB SITE, CHECK EXISTING INSTALLATIONS AND SYSTEMS RELATED TO HIS WORK AND SHALL, IN THE BID PROPOSAL, INCLUDE ALL LABOR AND MATERIAL REQUIRED TO PROVIDE A COMPLETE SYSTEM.
- ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER AND SUBJECT TO ARCHITECT'S REVIEW.
- CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS STEEL AND COMPONENTS REQUIRED TO SUPPORT PIPE, PLUMBING/FIRE PROTECTION EQUIPMENT, AND ELECTRONIC/CONTROL PANELS RELATED TO PLUMBING/FIRE PROTECTION EQUIPMENT. PROVIDE FLOOR SUPPORT COMPONENTS, HANGERS, AND SEISMIC RESTRAINTS AS REQUIRED.
- FABRICATE AND INSTALL ALL PIPING PER CURRENT CODE REQUIREMENTS.
- CLEAN ALL EXPOSED SURFACES AND NEW EQUIPMENT AFTER COMPLETION.
- EXISTING INFORMATION SHOWN ON FLOOR PLANS IS FROM PLUMBING RECORD DRAWINGS AND FIELD INVESTIGATION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS IN THE FIELD BEFORE COMMENCEMENT OF WORK. THE CONTRACTOR IS REQUIRED TO REPORT TO THE ARCHITECT DISCREPANCIES OR INCONSISTENCIES BETWEEN THE SPECIFIED DESIGN AND EXISTING CONDITIONS FOR CLARIFICATION PRIOR TO COMMENCEMENT OF THE WORK. ABSOLUTE ACCURACY OF THE DRAWINGS CAN NOT BE GUARANTEED. WHILE EVERY EFFORT HAS BEEN MADE TO COORDINATE THE LOCATION OF EXISTING EQUIPMENT, PIPING, ETC., IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE EXACT REQUIREMENTS GOVERNED BY ACTUAL JOB CONDITIONS. REPORT TO ARCHITECT AND ENGINEER OF RECORD, IN WRITING, CONDITIONS WHICH WILL PREVENT PROPER PROVISION OF THE WORK SHOWN ON THESE DOCUMENTS. DRAWINGS ARE DIAGRAMMATIC IN NATURE AND SHALL NOT BE SCALED TO DETERMINE EXACT LOCATIONS OF EXISTING UTILITIES, AND PROPOSED POINT OF CONNECTIONS TO EXISTING SYSTEMS. INSTALL ALL EQUIPMENT AND PIPING TO BEST SUIT FIELD CONDITIONS AFTER COORDINATION WITH THE WORK OF OTHER TRADES. CONTRACTOR SHALL COMPLETE THE WORK WITH MINIMUM INTERFERENCE WITH EXISTING SYSTEMS. ANY SHUTDOWN OF THE EXISTING SYSTEM SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR, THE SCHOOL REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE.
- PROTECT ALL ACTIVE UTILITIES, INFRASTRUCTURE, AND EQUIPMENT WITHIN PROJECT AREA DURING DEMOLITION AND CONSTRUCTION PHASES.
- REFER TO ARCHITECTURAL DRAWINGS AND MARSHALL & ASSOCIATES FOR EXACT LOCATIONS AND ELEVATIONS OF ALL PLUMBING FIXTURES.
- THE SANITARY DRAINAGE SYSTEM SHALL BE TESTED IN ACCORDANCE WITH 2016 CPC, SECTION 712.00 "TESTING". CLEANOUTS SHALL BE INSTALLED IN ACCORDANCE WITH 2016 CPC, SECTION 707.0 AND 719.0 "CLEANOUTS".
- ALL COLD AND HOT WATER SHALL BE INSULATED.
- ALL SLOPES AND INVERT ELEVATIONS SHALL BE CHECKED BEFORE ANY PIPING IS INSTALLED IN ORDER THAT PROPER SLOPES WILL BE MAINTAINED.
- MAKE PROPER WASTE, VENT, HOT AND COLD WATER CONNECTION TO ALL PLUMBING FIXTURES AND EQUIPMENT, EVEN THOUGH ALL MISCELLANEOUS CONNECTIONS, OFFSETS AND ELBOWS MAY NOT BE SHOWN.
- ALL PIPE PENETRATIONS THROUGH SLAB, FLOOR OR WALL SHALL BE SEALED.
- CONTRACTOR SHALL PROVIDE ADDITIONAL WATER DROPS IN WALL WHEN HORIZONTAL RUN IN WALL CONFLICTS WITH OTHER PIPES IN WALL.
- ALL PLUMBING DEVICES AT HARD LID CEILINGS MUST BE ACCESSIBLE FOR MAINTENANCE AND AS REQUIRED BY CODE.
- CONTRACTOR SHALL PROVIDE SCHOOL WITH A COMPLETE AND ACCURATE SET OF AS-BUILT DRAWINGS AT COMPLETION OF THE PROJECT.
- OFFSETS IN VERTICAL DRAINAGE SHALL BE MADE AT 45 WHEREVER POSSIBLE.
- SEISMIC BRACING OF MECHANICAL EQUIPMENT, PIPING, AND DUCTWORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2010 CALIFORNIA BUILDING CODE AND SHALL BE PROVIDED PER "MASON INDUSTRIES SEISMIC RESTRAINT GUIDELINES", OSHPD PRE-APPROVED OPA-0349. ALL ANCHORING AND SEISMIC RESTRAINT OF DUCT, PIPE, AND EQUIPMENT SHALL BE REVIEWED AND APPROVED (STAMPED AND SIGNED CALCULATIONS SHALL BE PROVIDED FOR REVIEW WITH EVERY EQUIPMENT SUBMITTAL) BY A CALIFORNIA LICENSED STRUCTURAL ENGINEER. CAMERA ALL SEWER MAINS AND REMOVE ALL OBSTRUCTIONS.

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COM IVC Bldg. 11  
 renovation

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

CONSTRUCTION DOCUMENTS  
 EQUIPMENT SCHEDULE  
 PLUMBING

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STATE OF CALIFORNIA  
**WATER HEATING SYSTEM GENERAL INFORMATION**  
 CEC-NRCC-PLB-01-E (Revised 01/16)  
 CERTIFICATE OF COMPLIANCE NRCC-PLB-01-E  
 Water Heating System General Information [Page 1 of 2]  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Prepared: 05/31/2017

**A. GENERAL INFORMATION/SYSTEM INFORMATION**

01	Water Heater System Name:	EWH-2-1
02	Water Heater System Configuration:	Single Dwelling Unit
03	Water Heater System Type:	Domestic Hot Water
04	Building Type:	Nonresidential
05	Total Number of Water Heaters in Systems:	1
06	Central DHW Distribution Type:	Other
07	Dwelling Unit DHW Distribution Type:	Standard Distribution System (STD)

**B. WATER HEATER INFORMATION**  
 Each water heater type requires a separate compliance document.

01	Water Heater Type:	Instantaneous Small - Electric
02	Fuel Type:	Electricity
03	Manufacture Name:	CHRONOMITE
04	Model Number:	M-20L
05	Number of Identical Water Heaters:	1
06	Installed Water Heater System Efficiency:	99%
07	Required Minimum Efficiency:	93%
08	Standby Loss Percent or Standby Loss Total:	n/a
09	Rated Input:	16,050W
10	Pilot Energy:	n/a
11	Water Heater Tank Storage Volume:	n/a
12	Exterior Insulation on Water Heater:	n/a
13	Volume of Supplemental Storage:	n/a
14	Internal Insulation on Supplemental Storage:	n/a
15	Exterior Insulation on Supplemental Storage:	n/a

**C. PLUMBING COMPLIANCE FORMS & WORKSHEETS**  
 Check box if worksheet is included.  
 For detailed instructions on the use of this and all Energy Standards compliance documents, refer to the 2016 Nonresidential Manual  
 Note: The Enforcement Agency may require all compliance documents to be incorporated into the building plans.

YES	NO	Doc/Worksheet #	Title
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-PLB-01-E	Certificate of Compliance, Declaration. Required on plans for all submittals.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-01-E	Certificate of Installation. Required on plans for all submittals.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-02-E	Certificate of Installation, required on central systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-03-E	Certificate of Installation, required on single dwelling unit systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-21-H	Certificate of Installation, required on HERS verified central systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-22-H	Certificate of Installation, required on HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCS-5TH-01-E	Certificate of Installation, required on any solar water heating.

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
**WATER HEATING SYSTEM GENERAL INFORMATION**  
 CEC-NRCC-PLB-01-E (Revised 01/16)  
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 Water Heating System General Information [Page 1 of 2]  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Prepared: 05/31/2017

**A. GENERAL INFORMATION/SYSTEM INFORMATION**

01	Water Heater System Name:	EWH-1-1, EWH-1-2, EWH-2-2, EWH-2-3
02	Water Heater System Configuration:	Single Dwelling Unit
03	Water Heater System Type:	Domestic Hot Water
04	Building Type:	Nonresidential
05	Total Number of Water Heaters in Systems:	4
06	Central DHW Distribution Type:	Other
07	Dwelling Unit DHW Distribution Type:	Standard Distribution System (STD)

**B. WATER HEATER INFORMATION**  
 Each water heater type requires a separate compliance document.

01	Water Heater Type:	Instantaneous Small - Electric
02	Fuel Type:	Electricity
03	Manufacture Name:	CHRONOMITE
04	Model Number:	R-5BL
05	Number of Identical Water Heaters:	4
06	Installed Water Heater System Efficiency:	99%
07	Required Minimum Efficiency:	93%
08	Standby Loss Percent or Standby Loss Total:	n/a
09	Rated Input:	5,540W
10	Pilot Energy:	n/a
11	Water Heater Tank Storage Volume:	n/a
12	Exterior Insulation on Water Heater:	n/a
13	Volume of Supplemental Storage:	n/a
14	Internal Insulation on Supplemental Storage:	n/a
15	Exterior Insulation on Supplemental Storage:	n/a

**C. PLUMBING COMPLIANCE FORMS & WORKSHEETS**  
 Check box if worksheet is included.  
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 Note: The Enforcement Agency may require all compliance documents to be incorporated into the building plans.

YES	NO	Doc/Worksheet #	Title
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-PLB-01-E	Certificate of Compliance, Declaration. Required on plans for all submittals.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-01-E	Certificate of Installation. Required on plans for all submittals.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-02-E	Certificate of Installation, required on central systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-03-E	Certificate of Installation, required on single dwelling unit systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-21-H	Certificate of Installation, required on HERS verified central systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCI-PLB-22-H	Certificate of Installation, required on HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.
<input type="checkbox"/>	<input type="checkbox"/>	NRCS-5TH-01-E	Certificate of Installation, required on any solar water heating.

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

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 Water Heating System General Information [Page 2 of 2]  
 Project Name: COLLEGE OF MARIN INDIAN VALLEY CAMPUS BUILDING 11 RENOVATION Date Prepared: 05/31/2017

**DOCUMENTATION AUTHORITY'S DECLARATION STATEMENT**

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Authority Name:	MARCO ALVES	Documentation Authority Signature:	<i>[Signature]</i>
Company:	PAE CONSULTING ENGINEERS	Signature Date:	05/31/2017
Address:	48 GOLDEN GATE AVENUE	CEA/HERS Certification Identification (if applicable):	
City/State/Zip:	SAN FRANCISCO/CA/94102	Phone:	(415) 544-7500

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

I certify the following under penalty of perjury, under the laws of the State of California:

- The information provided on this Certificate of Compliance is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
- The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
- I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the building provides to the building owner at occupancy.

Responsible Designer Name:	MARCO ALVES	Responsible Designer Signature:	<i>[Signature]</i>
Company:	PAE CONSULTING ENGINEERS	Date Signed:	05/31/2017
Address:	48 GOLDEN GATE AVENUE	License:	M33075
City/State/Zip:	SAN FRANCISCO/CA/94102	Phone:	(415) 544-7500

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA  
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**DOCUMENTATION AUTHORITY'S DECLARATION STATEMENT**

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Authority Name:	MARCO ALVES	Documentation Authority Signature:	<i>[Signature]</i>
Company:	PAE CONSULTING ENGINEERS	Signature Date:	05/31/2017
Address:	48 GOLDEN GATE AVENUE	CEA/HERS Certification Identification (if applicable):	
City/State/Zip:	SAN FRANCISCO/CA/94102	Phone:	(415) 544-7500

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Responsible Designer Name:	MARCO ALVES	Responsible Designer Signature:	<i>[Signature]</i>
Company:	PAE CONSULTING ENGINEERS	Date Signed:	05/31/2017
Address:	48 GOLDEN GATE AVENUE	License:	M33075
City/State/Zip:	SAN FRANCISCO/CA/94102	Phone:	(415) 544-7500

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

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IDENTIFICATION STAMP  
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 01-116787  
 DATE: SEP 12 2017



9/07/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD  
rev date issue



COM IVC Bldg. 11  
renovation

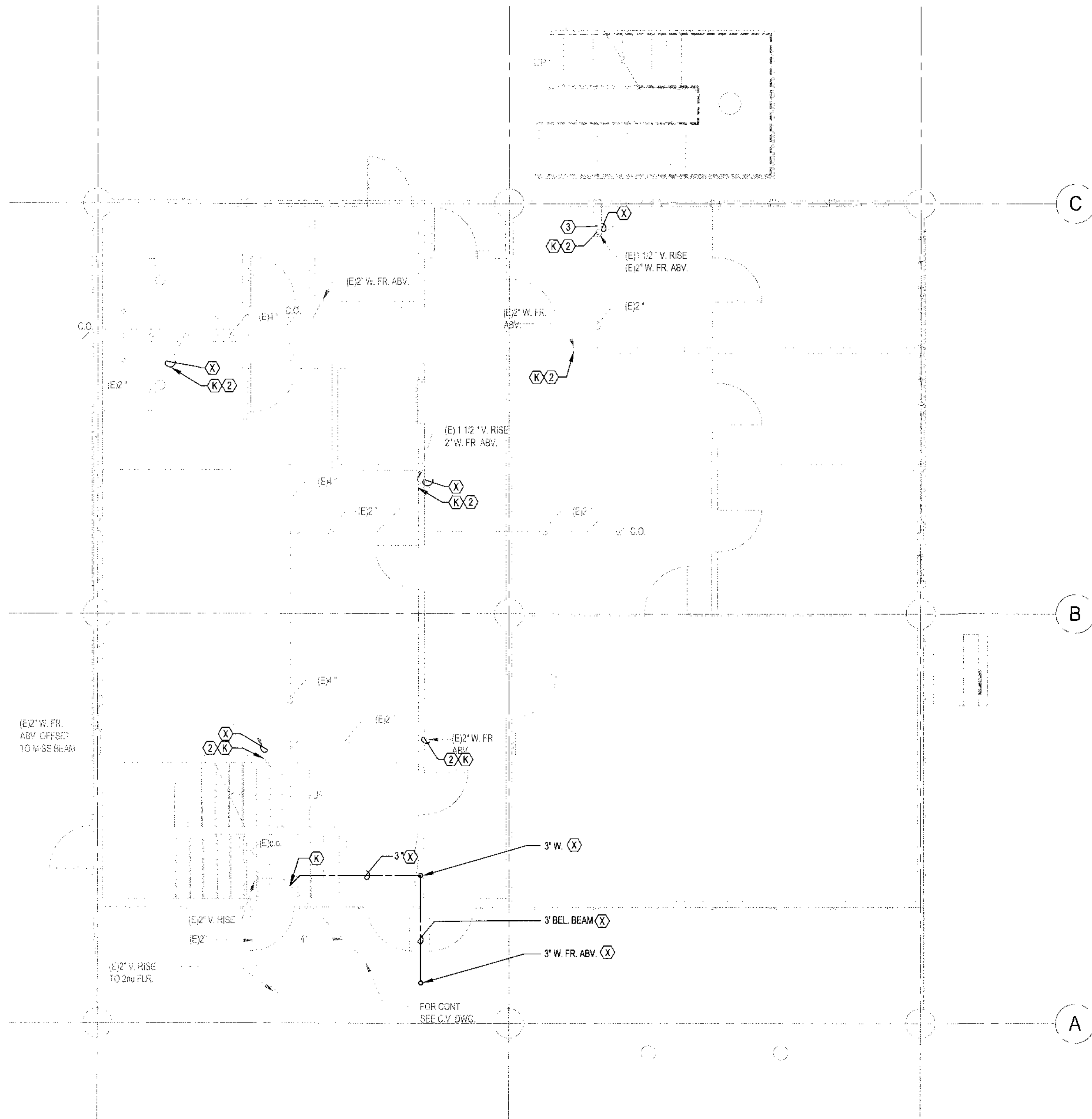
novato, california  
project number: 17-1095

scale: 1/4" = 1'-0"  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
TITLE 24  
DOCUMENTATION  
PLUMBING

P003

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**GENERAL NOTES:**

- A. THE CONTRACTOR SHALL THOROUGHLY EXAMINE THE SITE PRIOR TO SUBMITTING A BID. DUE TO THE NATURE OF THE PROJECT AND THE STATE OF THE EXISTING BUILDING, IT IS IMPOSSIBLE TO COMPLETELY RELATE THE SCOPE OF THE DEMOLITION REQUIRED TO THE CONTRACTOR THROUGH THE CONTRACT DOCUMENTS. FAILURE TO VISIT THE SITE WILL NOT RELIEVE THE CONTRACTOR OF DEMOLITION RESPONSIBILITIES UNDER THIS CONTRACT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE AND COORDINATE THE EXACT CONTENT OF DEMOLITION NECESSARY TO PROVIDE A RENOVATED AND UPGRADED SPACE AND TO FACILITATE NEW WORK.
- B. INFORMATION REGARDING THE EXISTING CONDITIONS WAS GATHERED FROM THE ALL AVAILABLE EXISTING DRAWINGS AND SURVEY. THERE ARE NO GUARANTEES AS TO THE ACCURACY OF THIS INFORMATION AND IT IS OFFERED FOR INFORMATION ONLY.
- C. VERIFY EXISTING LOCATIONS OF EQUIPMENT, PIPING AND SYSTEM COMPONENTS PRIOR TO DEMOLITION. IF EXISTING CONDITIONS ARE DIFFERENT THAN WHAT IS INDICATED ON THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT PRIOR TO PROCEEDING WITH WORK.
- D. MINIMIZE DISTURBANCE AND/OR DAMAGE TO EXISTING FINISHED SURFACES AND FINISHES. WHERE DEMOLITION OF PLUMBING SYSTEM COMPONENTS DAMAGES EXISTING SURFACE TO REMAIN, RESTORE THOSE SURFACES TO THE SAME CONDITION AS THE ADJACENT SURFACES. RESTORATION ALL BE PERFORMED BY WORKMEN SKILLED IN PERFORMING SUCH WORK. ALL FIRE AND SMOKE RATINGS SHALL BE RETAINED AS PART OF THE REPAIRS AND PATCHES. HOLES WEATHERTIGHT WHERE REQUIRED. ALL PATCHES AND REPAIRS SHALL BE SUBJECT TO REVIEW AND APPROVAL OF THE ARCHITECT.
- E. ALL AREAS OF EGRESS SHALL BE KEPT OPEN AND FREE FROM DEBRIS AT ALL TIMES.
- F. DO NOT REMOVE ITEMS SUPPORTING OTHER ITEMS WITHOUT PROVIDING TEMPORARY OR PERMANENT SUPPORT AS REQUIRED. SEE DRAWINGS FOR AREAS AND EXTENT OF DEMOLITION. PROPERLY SUPPORT ALL EXISTING ITEMS TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED SUPPORTS FOR AFFECTED ITEMS.
- G. VERIFY EXTENT OF PIPING, EQUIPMENT, COMPONENTS AND CONTROLS TO BE RETAINED OR REUSED PRIOR TO THE DEMOLITION OF SPECIFIC SYSTEM. PROTECT ITEMS WHICH ARE TO BE REUSED ON SITE TO MINIMIZE POST CONSTRUCTION REPAIRS. ANY ITEMS WHICH ARE DAMAGED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE CONTRACT.
- H. REMOVE EQUIPMENT. OWNER WISHES TO RETAIN AND DELIVER TO THE LOCATION DESIGNATED BY THE OWNER. REMOVE PROMPTLY FROM THE SITE. ALL MATERIALS AND EQUIPMENT INDICATED FOR REMOVAL WHICH ARE NOT SPECIFIED FOR REUSE, STORAGE, OR RETAINED BY THE OWNER.
- I. VERIFY ALL EXISTING STRUCTURAL CONDITIONS AND NOTIFY STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO PENETRATING EXISTING STRUCTURAL SYSTEMS.
- J. THE PLUMBING CONTRACTOR SHALL REFER TO DRAWINGS OF THE CONTRACT DOCUMENTS FOR DEMOLITION OF PLUMBING SYSTEM COMPONENTS INCLUDED IN THE PLUMBING CONTRACT. NOTIFY THE ARCHITECT OF ALL DISCREPANCIES OR QUESTIONS PERTAINING TO EXTENT OF WORK PRIOR TO BIDDING.
- K. PLUMBING CONTRACTOR SHALL COORDINATE ALL CUTTING AND PATCHING WORK WITH ALL OTHER CONTRACTORS DUE TO DEMOLITION WORK.

**NOTES:**

- 1. EXISTING FIXTURE TO BE REMOVED. CAP EXISTING CONNECTIONS AT THE WALL FOR CONNECTION TO NEW FIXTURES
- 2. DEMO EXISTING WASTE PIPING WITHIN THE WALL AND CAP AT FINISHED FLOOR
- 3. DEMO EXISTING PIPING WITHIN THE WALL.

**1 DEMO UNDERGROUND PLAN - PLUMBING**  
 P100 SCALE: 1/4" = 1'-0"

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 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD

rev date issue



**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

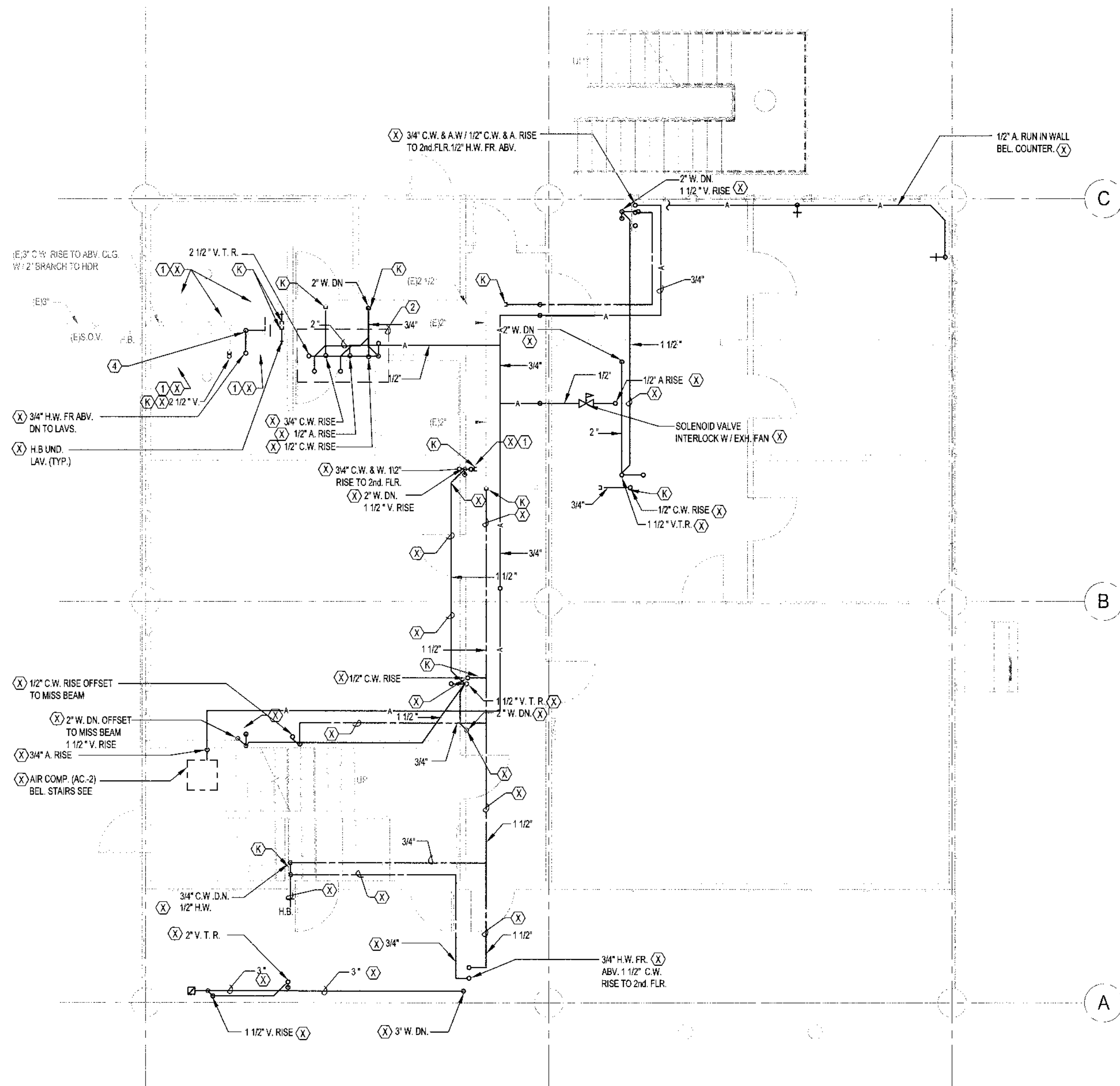
**CONSTRUCTION DOCUMENTS**

**DEMO UNDERGROUND PLAN - PLUMBING**

**P100**



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- GENERAL NOTES:**
- A. EXISTING PIPING & FIXTURES TO BE REUSED UNLESS OTHERWISE NOTED.
  - B. DEMOLISH ENTIRE AIR COMPRESSOR SYSTEM INCLUDING ASSOCIATED PIPING AND EQUIPMENT.
  - C. THE CONTRACTOR SHALL THOROUGHLY EXAMINE THE SITE PRIOR TO SUBMITTING A BID. DUE TO THE NATURE OF THE PROJECT AND THE STATE OF THE EXISTING BUILDING, IT IS IMPOSSIBLE TO COMPLETELY RELATE THE SCOPE OF THE DEMOLITION REQUIRED TO THE CONTRACTOR THROUGH THE CONTRACT DOCUMENTS. FAILURE TO VISIT THE SITE WILL NOT RELIEVE THE CONTRACTOR OF DEMOLITION RESPONSIBILITIES UNDER THIS CONTRACT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE AND COORDINATE THE EXACT CONTENT OF DEMOLITION NECESSARY TO PROVIDE A RENOVATED AND UPGRADED SPACE AND TO FACILITATE NEW WORK.
  - D. INFORMATION REGARDING THE EXISTING CONDITIONS WAS GATHERED FROM THE ALL AVAILABLE EXISTING DRAWINGS AND SURVEY. THERE ARE NO GUARANTEES TO THE ACCURACY OF THIS INFORMATION AND IT IS OFFERED FOR INFORMATION ONLY.
  - E. VERIFY EXISTING LOCATIONS OF EQUIPMENT, PIPING AND SYSTEM COMPONENTS PRIOR TO DEMOLITION. IF EXISTING CONDITIONS ARE DIFFERENT THAN WHAT IS INDICATED ON THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT PRIOR TO PROCEEDING WITH WORK.
  - F. MINIMIZE DISTURBANCE AND/OR DAMAGE TO EXISTING FINISHED SURFACES AND FINISHES. WHERE DEMOLITION OF PLUMBING SYSTEM COMPONENTS DAMAGES EXISTING SURFACE TO REMAIN, RESTORE THOSE SURFACES TO THE SAME CONDITION AS THE ADJACENT SURFACES. RESTORATION MUST BE PERFORMED BY WORKMEN SKILLED IN PERFORMING SUCH WORK. ALL FIRE AND SMOKE RATINGS SHALL BE RETAINED AS PART OF THE REPAIRS AND PATCHES/SEAL HOLES WEATHERTIGHT WHERE REQUIRED. ALL PATCHES AND REPAIRS SHALL BE SUBJECT TO REVIEW AND APPROVAL OF THE ARCHITECT.
  - G. ALL AREAS OF EGRESS SHALL BE KEPT OPEN AND FREE FROM DEBRIS AT ALL TIMES.
  - H. DO NOT REMOVE ITEMS SUPPORTING OTHER ITEMS WITHOUT PROVIDING TEMPORARY OR PERMANENT SUPPORT AS REQUIRED. SEE DRAWINGS FOR AREAS AND EXTENT OF DEMOLITION. PROPERLY SUPPORT ALL EXISTING ITEMS TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED SUPPORTS FOR AFFECTED ITEMS.
  - I. VERIFY EXTENT OF PIPING, EQUIPMENT, COMPONENTS AND CONTROLS TO BE RETAINED OR REUSED PRIOR TO THE DEMOLITION OF SPECIFIC SYSTEM. PROTECT ITEMS WHICH ARE TO BE REUSED ON SITE TO MINIMIZE POST-CONSTRUCTION REPAIRS. ANY ITEMS WHICH ARE DAMAGED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE CONTRACT.
  - J. REMOVE EQUIPMENT. OWNER WISHES TO RETAIN AND DELIVER TO THE LOCATION DESIGNATED BY THE OWNER. REMOVE PROMPTLY FROM THE SITE. ALL MATERIALS AND EQUIPMENT INDICATED FOR REMOVAL WHICH ARE NOT SPECIFIED FOR REUSE, STORAGE, OR RETAINED BY THE OWNER.
  - K. VERIFY ALL EXISTING STRUCTURAL CONDITIONS AND NOTIFY STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO PENETRATING EXISTING BUILDING STRUCTURAL SYSTEMS.
  - L. THE PLUMBING CONTRACTOR SHALL REFER TO DRAWINGS OF THE CONTRACT DOCUMENTS FOR DEMOLITION OF PLUMBING SYSTEM COMPONENTS INCLUDED IN THE PLUMBING CONTRACT. NOTIFY THE ARCHITECT OF ALL DISCREPANCIES OR QUESTIONS PERTAINING TO EXTENT OF WORK PRIOR TO BIDDING.
  - M. PLUMBING CONTRACTOR SHALL COORDINATE ALL CUTTING AND PATCHING WORK WITH ALL OTHER CONTRACTORS DUE TO DEMOLITION WORK.

- NOTES:**
- 1. EXISTING FIXTURE TO BE REMOVED. CAP EXISTING CONNECTIONS AT THE WALL FOR CONNECTION TO NEW FIXTURES.
  - 2. DEMO EXISTING DOMESTIC WATER AND WASTE PIPING WITHIN THE WALL AND CAP AT FINISHED FLOOR.
  - 3. DEMO EXISTING PIPING WITHIN THE WALL.
  - 4. DEMO ALL HW PIPING WITHIN THE WALL.

**1 DEMO FIRST FLOOR PLAN - PLUMBING**  
 SCALE: 1/4" = 1'-0"

9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD



**COM IVC Bldg. 11 renovation**

novato, california  
 project number: 17-1095

scale: 1/4" = 1'-0"  
 date: 03/10/2017

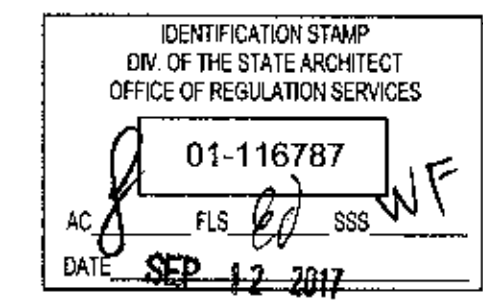
**CONSTRUCTION DOCUMENTS**

**DEMO FIRST FLOOR PLAN - PLUMBING**

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**COM IVC Bldg. 11 renovation**

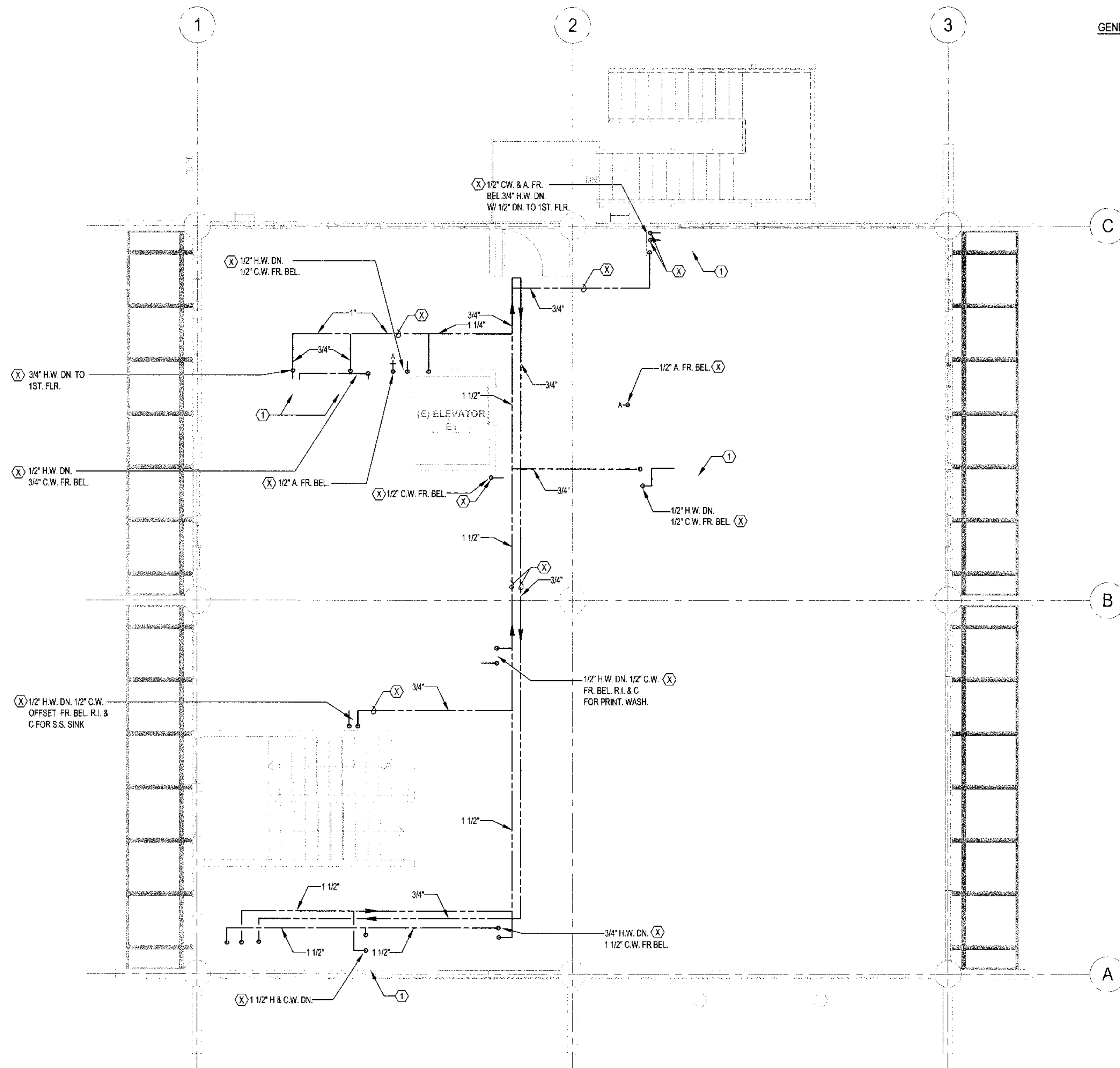
novato, california  
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**CONSTRUCTION DOCUMENTS**

**DEMO FIRST FLOOR PLAN - PLUMBING**

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- GENERAL NOTES:**
- A. ALL PIPING AND FIXTURES ON THIS FLOOR DEMOLISHED.
  - B. THE CONTRACTOR SHALL THOROUGHLY EXAMINE THE SITE PRIOR TO SUBMITTING A BID. DUE TO THE NATURE OF THE PROJECT AND THE STATE OF THE EXISTING BUILDING, IT IS IMPOSSIBLE TO COMPLETELY RELATE THE SCOPE OF THE DEMOLITION REQUIRED TO THE CONTRACTOR THROUGH THE CONTRACT DOCUMENTS. FAILURE TO VISIT THE SITE WILL NOT RELIEVE THE CONTRACTOR OF DEMOLITION RESPONSIBILITIES UNDER THIS CONTRACT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE AND COORDINATE THE EXACT CONTENT OF DEMOLITION NECESSARY TO PROVIDE A RENOVATED AND UPGRADED SPACE AND TO FACILITATE NEW WORK.
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  - F. ALL AREAS OF EGRESS SHALL BE KEPT OPEN AND FREE FROM DEBRIS AT ALL TIMES.
  - G. DO NOT REMOVE ITEMS SUPPORTING OTHER ITEMS WITHOUT PROVIDING TEMPORARY OR PERMANENT SUPPORT AS REQUIRED. SEE DRAWINGS FOR AREAS AND EXTENT OF DEMOLITION. PROPERLY SUPPORT ALL EXISTING ITEMS TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED SUPPORTS FOR AFFECTED ITEMS.
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  - L. PLUMBING CONTRACTOR SHALL COORDINATE ALL CUTTING AND PATCHING WORK WITH ALL OTHER CONTRACTORS DUE TO DEMOLITION WORK.

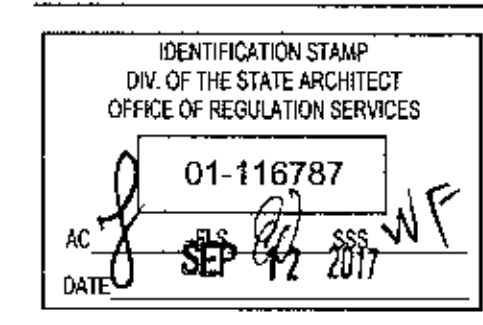
**NOTES:**  
1. EXISTING FIXTURES TO BE REMOVED

**1**  
**P102** DEMO SECOND FLOOR PLAN - PLUMBING  
SCALE: 1/4" = 1'-0"

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9/07/17	DSA BACK CHECK
5/31/17	DSA PLAN REVIEW
3/10/17	100% CD
rev date	issue



**COM IVC Bldg. 11 renovation**

novato, california  
project number: 17-1095

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**CONSTRUCTION DOCUMENTS**

**DEMO SECOND FLOOR PLAN - PLUMBING**

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**GENERAL NOTES:**

- A. PROVIDE TERMINAL CONNECTION FOR EACH NEW PIECE OF EQUIPMENT AS SPECIFIED BY EQUIPMENT MANUFACTURER.
- B. CONTRACTOR TO VERIFY EXISTING CONDITIONS PRIOR TO STARTING ANY WORK.
- C. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSET IN PIPING AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE PROJECT.
- D. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS.
- E. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE WORK. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATIONS OF EQUIPMENT AND FIXTURES.
- F. ANY PENETRATIONS THROUGH SOUND RATED PARTITIONS SHALL BE FILLED WITH BATT INSULATION AND/OR FIRE SAFING AND SEALED TIGHT WITH ACOUSTICAL SEALANT.
- G. ALL EQUIPMENT CONNECTION LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR AND BE PROVIDED PER MANUFACTURER'S INSTRUCTIONS.

**NOTES:**

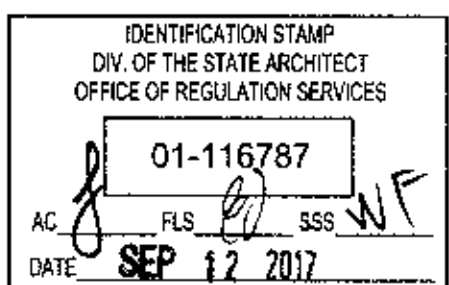
- 1. 2" W FROM URINAL

**1 UNDERGROUND PLAN - PLUMBING**  
 P201 SCALE: 1/4" = 1'-0"

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**COM IVC Bldg. 11 renovation**

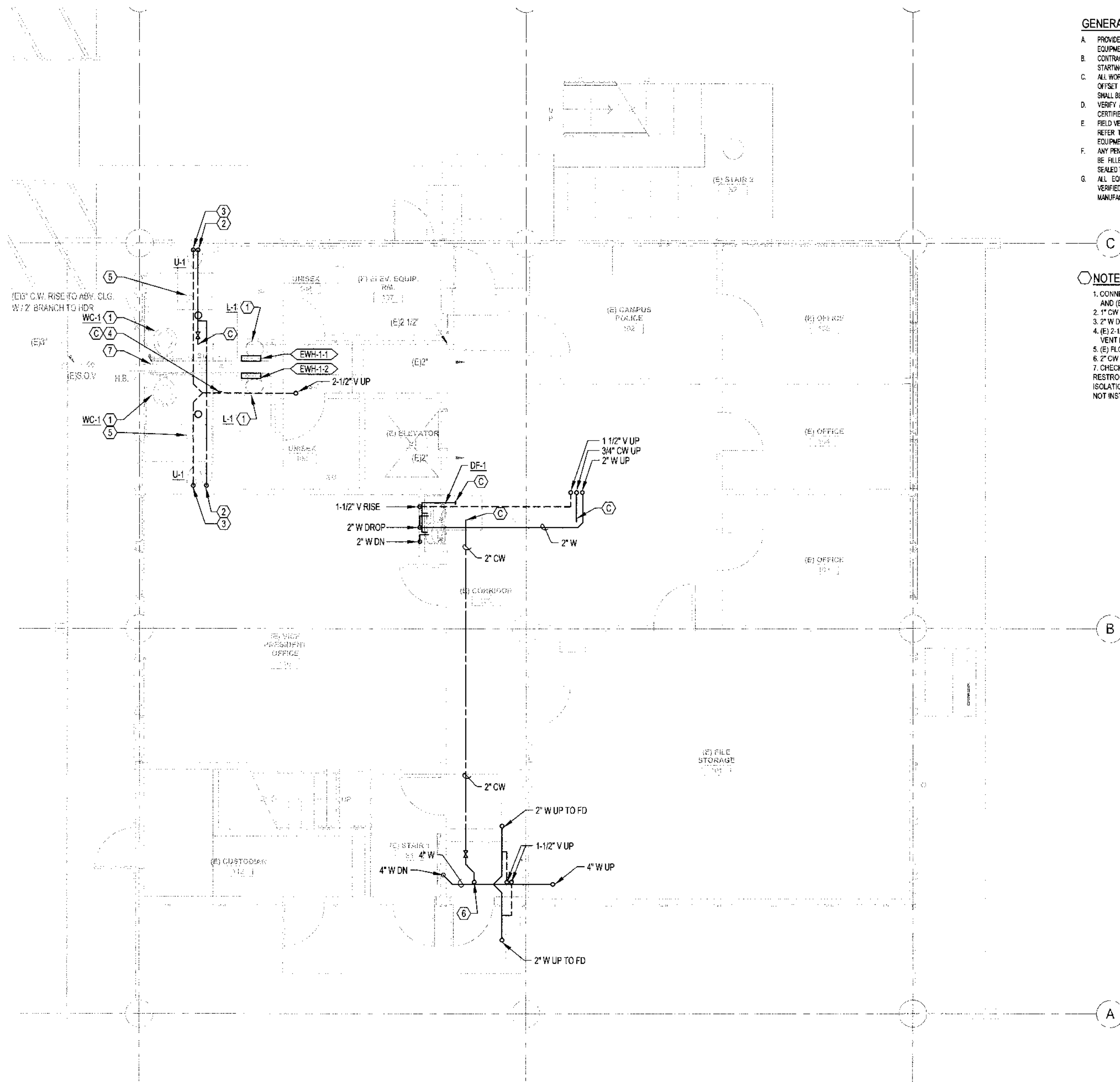
novato, california  
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**CONSTRUCTION DOCUMENTS**  
**UNDERGROUND PLANS**  
**PLUMBING**

**P200**

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**GENERAL NOTES:**

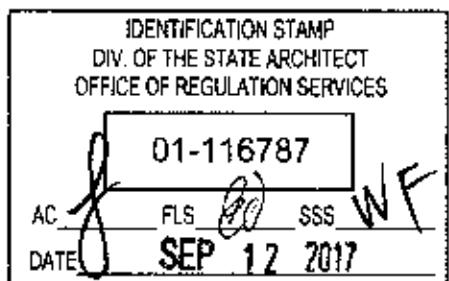
- A. PROVIDE TERMINAL CONNECTION FOR EACH NEW PIECE OF EQUIPMENT AS SPECIFIED BY EQUIPMENT MANUFACTURER.
- B. CONTRACTOR TO VERIFY EXISTING CONDITIONS PRIOR TO STARTING ANY WORK.
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- D. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS CERTIFIED DRAWINGS.
- E. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE WORK. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATIONS OF EQUIPMENT AND FIXTURES.
- F. ANY PENETRATIONS THROUGH SOUND RATED PARTITIONS SHALL BE FILLED WITH BATT INSULATION AND/OR FIRE SAFING AND SEALED TIGHT WITH ACOUSTICAL SEALANT.
- G. ALL EQUIPMENT CONNECTION LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR AND BE PROVIDED PER MANUFACTURERS INSTRUCTIONS.

**NOTES:**

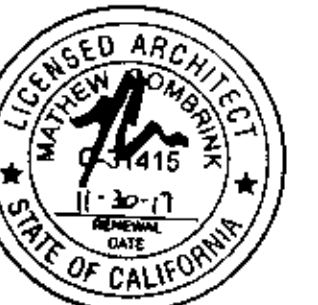
- 1. CONNECT NEW FIXTURES TO (E) SANITARY, (E) VENT AND (E) DOMESTIC WATER PIPING
- 2. 1\"/>

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COM IVC Bldg. 11  
 renovation

novato, california  
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**CONSTRUCTION DOCUMENTS**  
**FIRST FLOOR PLANS**  
**PLUMBING**

**1** FIRST FLOOR PLANS - PLUMBING  
 P201 SCALE: 1/4" = 1'-0"

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1 SECOND FLOOR PLAN - PLUMBING  
M202 SCALE: 1/4" = 1'-0"

GENERAL NOTES:

- A. PROVIDE TERMINAL CONNECTION FOR EACH NEW PIECE OF EQUIPMENT AS SPECIFIED BY EQUIPMENT MANUFACTURER.
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- C. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSET IN PIPING AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE PROJECT.
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- F. ANY PENETRATIONS THROUGH SOUND RATED PARTITIONS SHALL BE FILLED WITH BATT INSULATION AND/OR FIRE SAFING AND SEALED TIGHT WITH ADJUSTICAL SEALANT.
- G. ALL EQUIPMENT CONNECTION LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR AND BE PROVIDED PER MANUFACTURER'S INSTRUCTIONS.

NOTES:

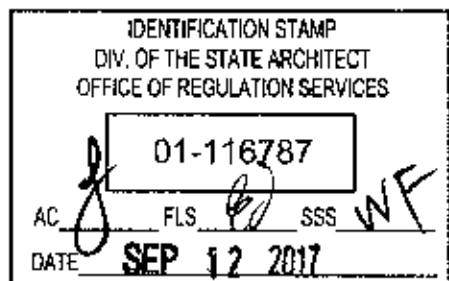
- 1. CONNECT NEW FIXTURE TO SANITARY AND DOMESTIC WATER PIPING
- 2. 3/4" CW DROP
- 3. 2" W DROP & 1-1/2" V RISE
- 4. CONNECT VENT RISER TO EXISTING ROOF VENT
- 5. 2" FD. SEE ARCHITECTURAL PLANS FOR EXACT LOCATION
- 6. TRAP PRIMER VALVE. PROVIDE ACCESS PANEL. COORDINATE LOCATION WITH ARCHITECT.
- 7. 2" CW DOWN
- 8. 1-1/2" V DN & CONNECT TO VENT PIPING IN CHASE.

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3/10/17 100% CD

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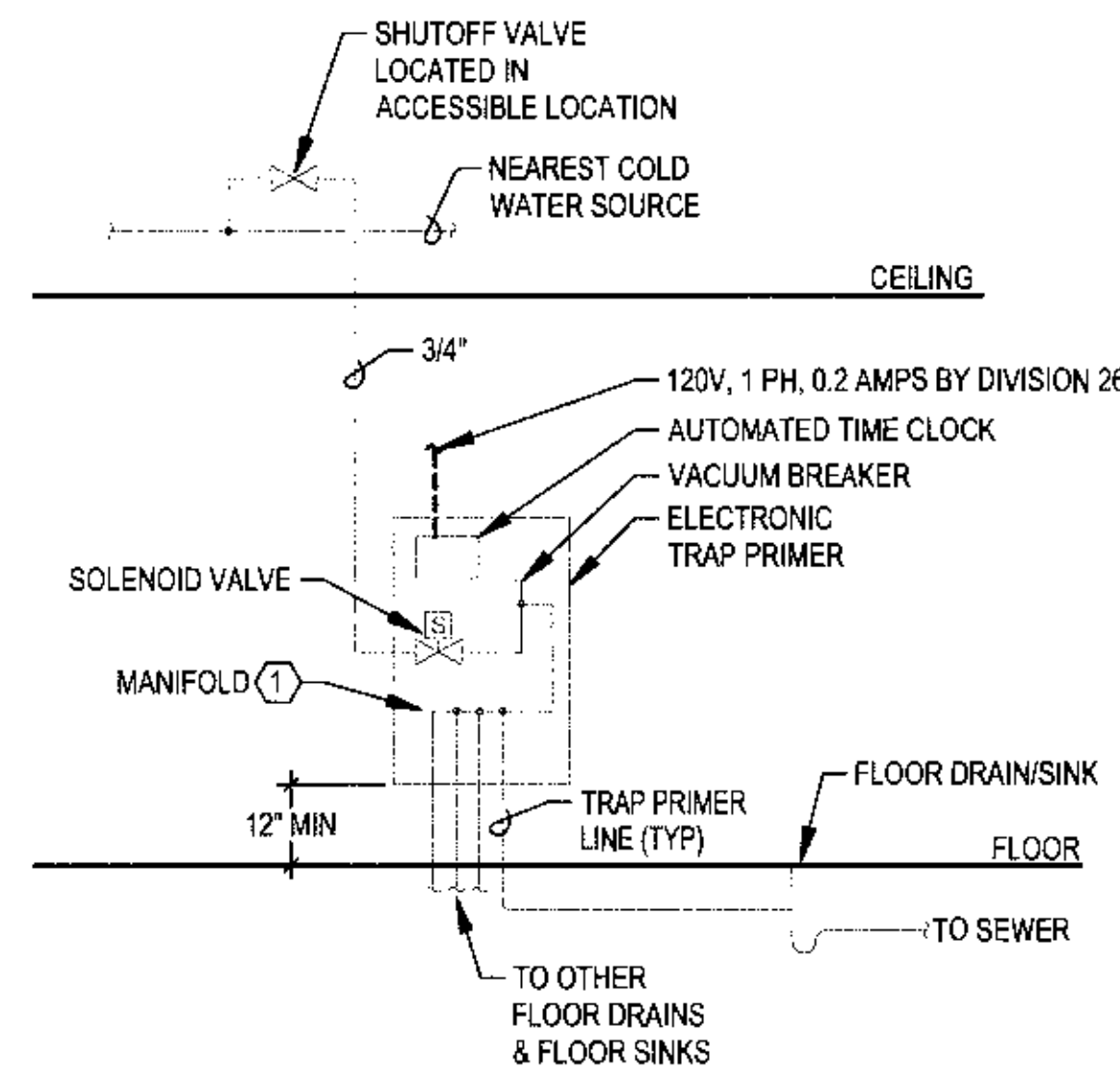
COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1095

scale: 1/4" = 1'-0"  
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CONSTRUCTION  
DOCUMENTS  
SECOND FLOOR PLAN  
PLUMBING

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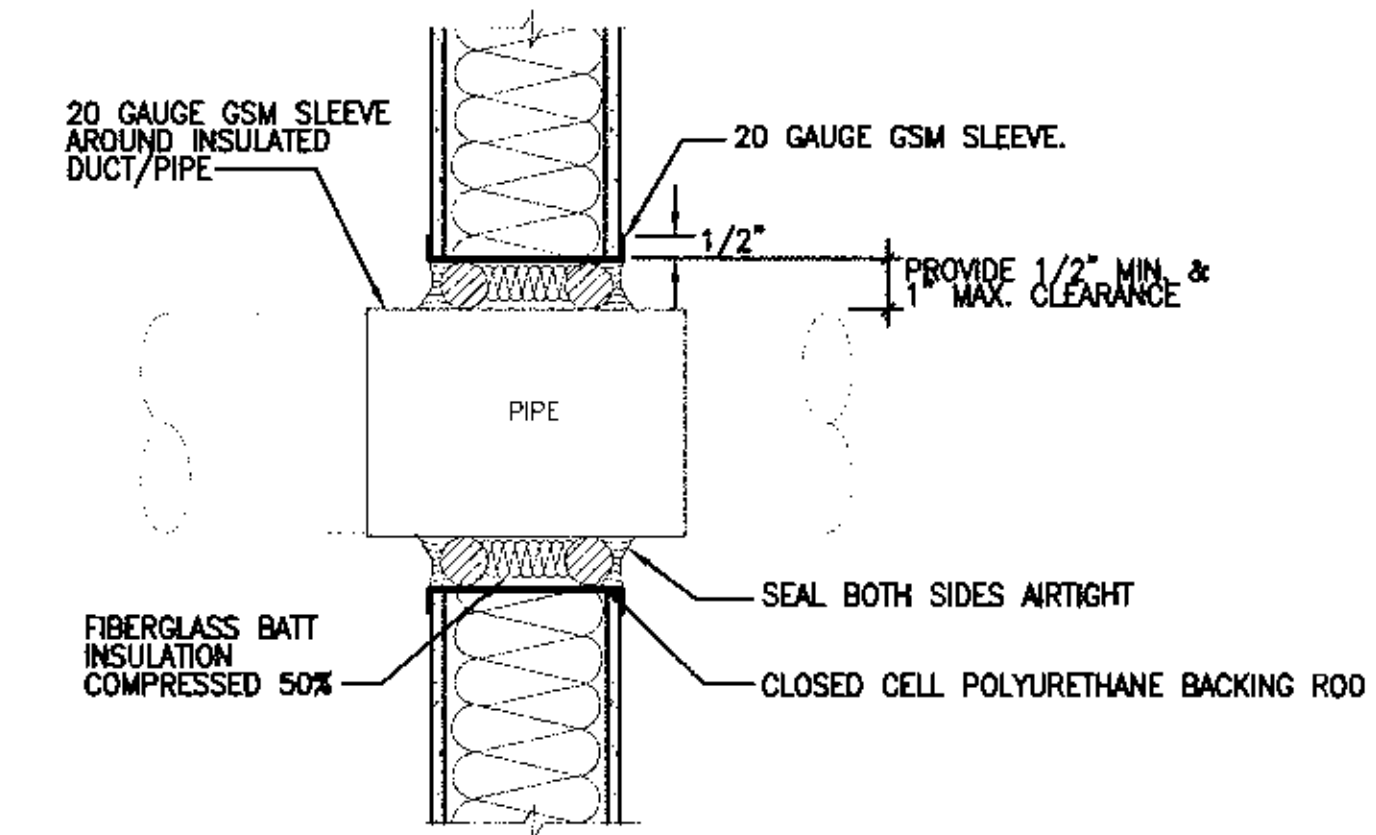
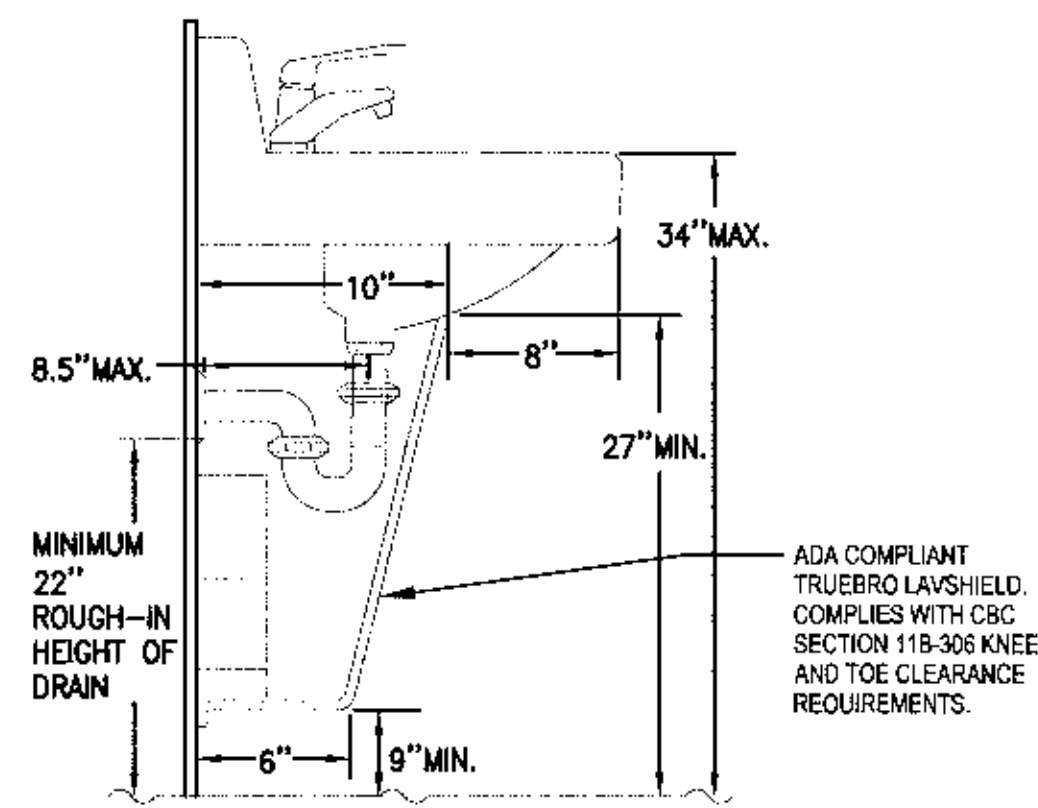
**2 ELECTRIC TRAP PRIMER DETAIL**  
P501 SCALE: NONE

**GENERAL NOTES:**

- A. ALL FLOOR DRAINS, FLOOR SINKS AND SIMILAR TRAPS SHALL BE PRIMED.
- B. WHERE PRIMING VALVES ARE INSTALLED IN FINISHED ROOMS, CONCEAL IN LOCKABLE CABINET. REFER TO SPECIFICATION 22 40 00 AND PLUMBING EQUIPMENT SCHEDULE FOR TRAP PRIMER TYPE (SURFACE OR RECESSED) AND QUANTITIES.
- C. COORDINATE LOCATION OF ELECTRONIC TRAP PRIMER STATIONS WITH ELECTRICAL CONTRACTOR FOR 120V SERVICE.
- D. REFER TO SPECIFICATION 22 21 13 FOR ALLOWABLE TRAP PRIMER LINE PIPE MATERIALS.

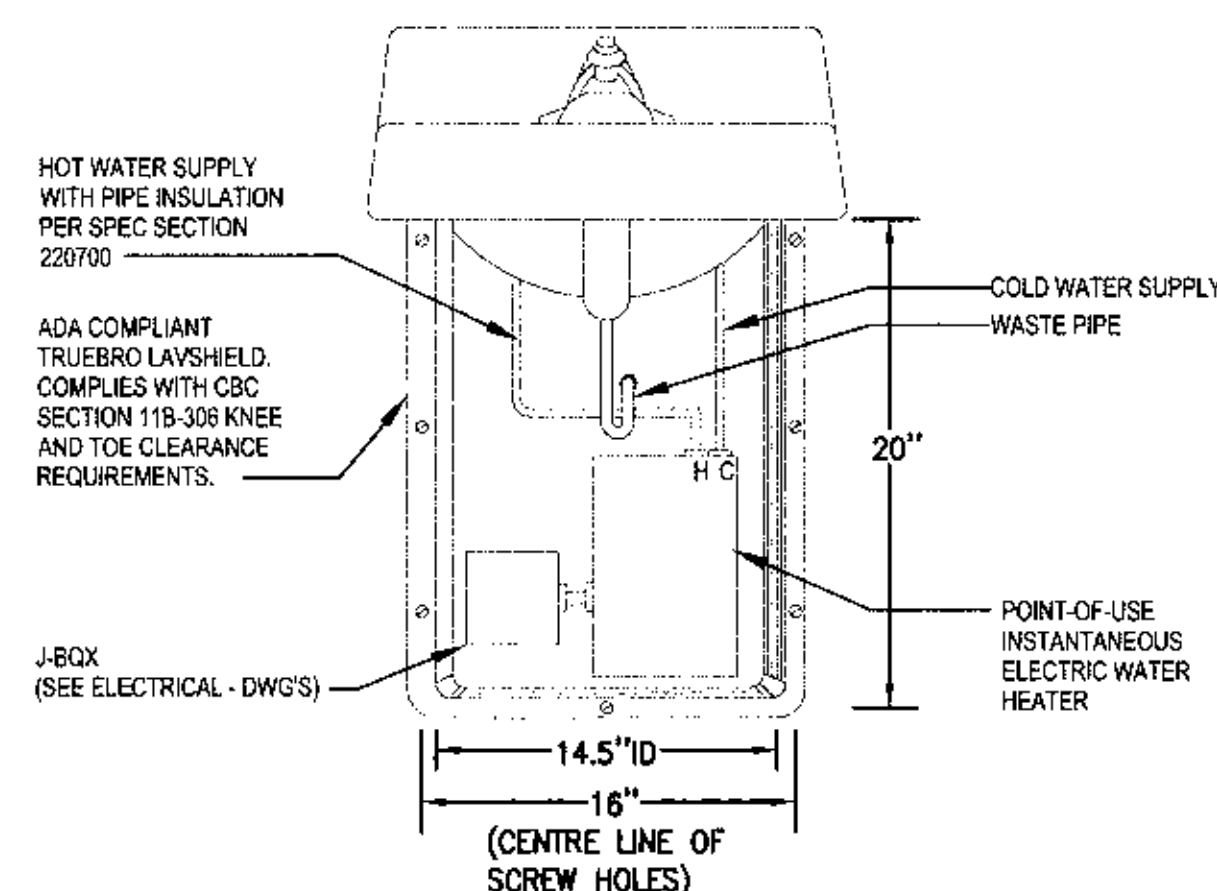
**NOTES:**

- 1. MANIFOLD SHOWN TO SERVE 4 TRAPS. CONTRACTOR TO VERIFY QUANTITY OF TRAPS TO BE SERVED FROM EACH TRAP PRIMER STATION AND PROVIDE APPROPRIATE NUMBER OF OUTLETS ON MANIFOLD.

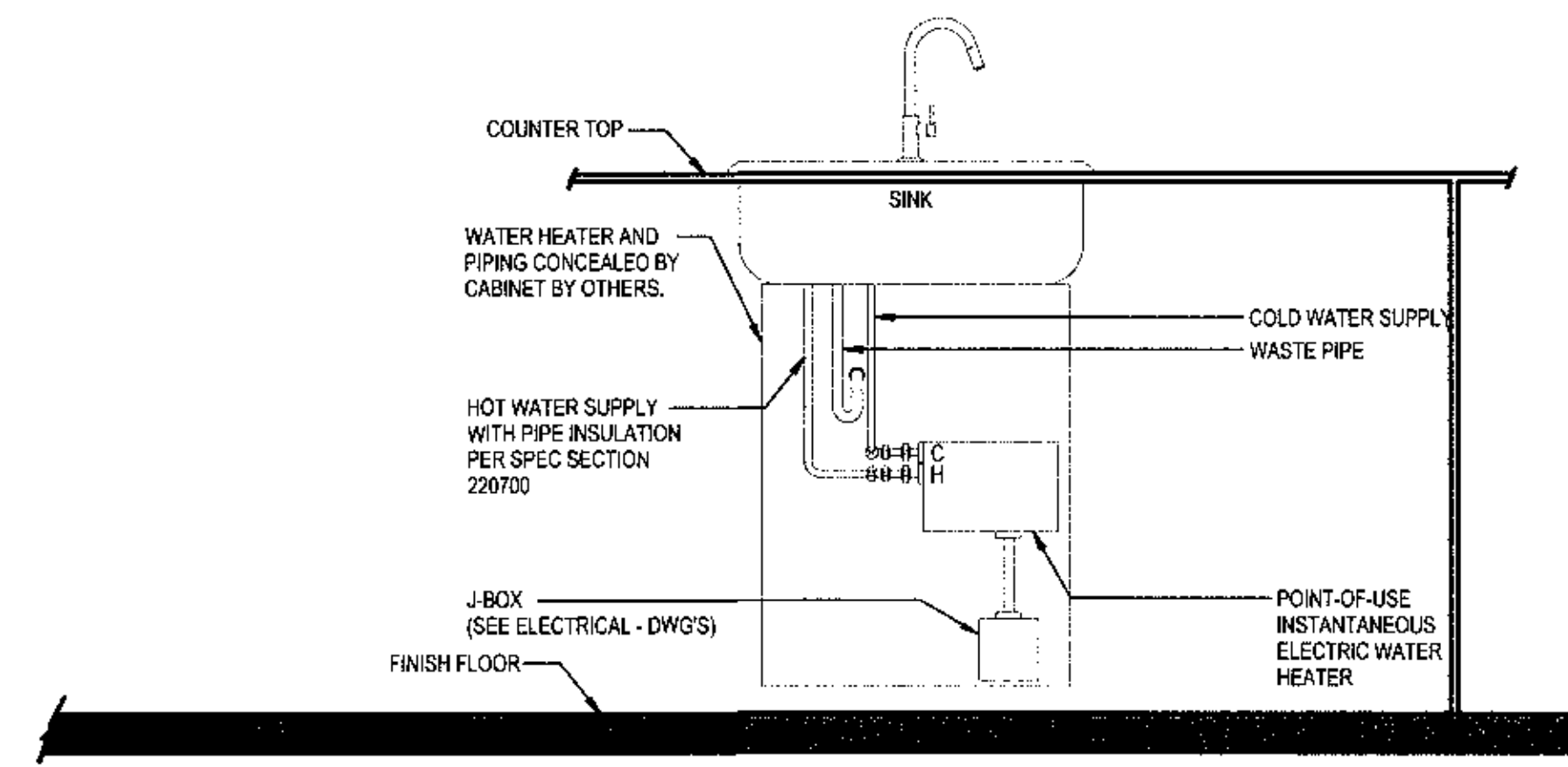


**NOTE:**  
DUCT/PIPE MUST "FLOAT" IN OPENING AND NOT HAVE CONTACT WITH PARTITION.

**3 PIPE PENETRATION THROUGH WALL**  
P501 SCALE: NONE



**4 INSTANTANEOUS ELECTRIC WATER HEATER - LAVATORY**  
P501 SCALE: NONE



**1 INSTANTANEOUS ELECTRIC WATER HEATER - SINK**  
P501 SCALE: NONE

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9/07/17 DSA BACK CHECK  
5/21/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date issue



COM IVC Bldg. 11  
renovation

novato, california  
project number: 17-1095

scale: NONE  
date: 03/10/2017

**CONSTRUCTION DOCUMENTS**

DETAILS - PLUMBING

brick.

### GENERAL NOTES

1. THESE DRAWINGS PROVIDE SUPPLEMENTAL INFORMATION TO THE SPECIFICATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COMPLETE SET OF CONTRACT DOCUMENTS, ADDENDA, DRAWINGS AND SPECIFICATIONS.
2. ALL SYSTEMS CABLING INCORPORATED IN THIS PROJECT WILL BE HOME RUN, WITH OUT BREAKS OR SPLICES, TO THE EXISTING IDF LOCATED IN FILE STORAGE, ROOM 101.
3. THE CONTRACTOR SHALL COORDINATE ITS WORK WITH OTHER TRADES AT THE SITE. ANY COSTS TO INSTALL WORK THAT IS DIFFERENT FROM THE WORK AS SHOWN ON THE DRAWINGS SHALL BE INCURRED BY THE CONTRACTOR. ANY DISCREPANCIES, AMBIGUITIES OR CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE.
4. THE CONTRACTOR SHALL PROVIDE AND KEEP A UP-TO-DATE AND COMPLETE RECORD SET OF SHOP DRAWINGS. THESE PRINTS SHALL BE CORRECTED DAILY AND SHOW EVERY CHANGE FROM THE APPROVED SHOP DRAWINGS. THIS SET OF DRAWINGS SHALL BE KEPT ON THE JOB SITE AND SHALL BE USED ONLY AS A RECORD SET. THIS SHALL NOT BE CONSTRUED AS AUTHORIZATION FOR THE CONTRACTOR TO MAKE CHANGES IN THE CONTRACT DOCUMENTS WITHOUT WRITTEN AUTHORIZATION.
5. THE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT SHALL BE COORDINATED WITH THE ELECTRICAL AND MECHANICAL DRAWING DETAILS, OR SECTIONS PRIOR TO INSTALLATION. MOUNTING HEIGHTS OF ALL DEVICES AND EQUIPMENT ARE FROM FINISHED FLOOR TO THE CENTER OF DEVICES AND EQUIPMENT UNLESS OTHERWISE NOTED. BOXES INSTALLED IN LOCATIONS THAT ARE NOT APPROVED BY THE OWNER SHALL BE RELOCATED AS DIRECTED BY THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
6. FULLY COORDINATE THE LAYOUT OF ALL CABINETS AND RACKS WITH OTHER EQUIPMENT AND FURNITURE WITHIN THE SAME ROOM PRIOR TO SUBMITTING SHOP DRAWINGS FOR APPROVAL.
7. ALL WORK SHALL BE INSPECTED AND APPROVED BEFORE COVER-UP.
8. ALL RECESSED FIXTURES, SPEAKERS, RECEPTACLES, SWITCHES, ETC., MOUNTED IN THE FIRE RATED CEILINGS OR WALLS SHALL BE ENCLOSED WITH AN APPROVED ENCLOSURE CARRYING THE SAME FIRE RATING AS THE CEILING OR WALL.
9. CONTRACTOR SHALL TEST AND IDENTIFY ALL EXISTING CONDITIONS OF SYSTEMS RELEVANT AND/OR AFFECTED BY THIS PROJECT. SUBMIT A LIST OF IDENTIFIED PROBLEMS AND SEQUENCES OF OPERATIONS TO THE DISTRICT SO APPROPRIATE ACTION CAN BE TAKEN TO ALIEAVATE THE PROPBLEM.
10. ONLY NEW, UN-USED MATERIALS ARE TO BE EMPLOYED IN THE COMPLEATION OF THE PROJECT. ANY USED MATERIAL FOUND INSTALLED WILL BE IMEADREATLY REPLACED TO THE SATISIFACTION OF THE DISTRICT AT THE CONTRACTOR'S SOLE EXPENCE.
11. TERMINATE ALL CABLES PER EIA/TIA-T568B WIRING SCHEME.

### ELECTRICAL FOR TELCOM NOTES

1. AC POWER CIRCUITS AND RECEPTACLES REQUIRED BY TELCOM SYSTEMS ARE CALLED OUT IN THESE TELCOM DRAWINGS. SEE ELECTRICAL DRAWINGS "E" SHEETS FOR SPECIFIC CIRCUIT REQUIREMENTS AND OTHER ITEMS IN CONTRACT. WHERE A CONFLICT EXISTS BETWEEN THE TEL-COM DRAWINGS AND "E" SHEETS, RECONCILE THROUGH RFI PROCESS.
2. CONDUITS, JUNCTION BOXES AND OTHER TEL-COM TERMINAL BOXES SHOWN ON THESE DRAWINGS ARE TO BE CONSIDERED A PART OF THE ELECTRICAL SCOPE. THESE PATHWAYS ARE TO BE RESERVED EXCLUSIVELY FOR TEL-COM SYSTEMS AND ARE NOT TO BE SHARED WITH POWER.
3. FLOORBOXES AND POKE THOUGH FOR POWER/TEL DATA/AUDIOVISUAL SHOWN ON THESE DRAWINGS ARE TO BE CONSIDERED A PART ELECTRICAL SCOPE. COORDINATE FLOORBOX AND POKE THOUGH REQUIRMENTS WITH OTHER SHEET SETS. VERIFY ALL LOCATIONS WITH ARCHITECT PRIOR TO INSTALLING.
4. ALL CONDUITS SHOWN ARE 1/2 INCH UNLESS OTHERWISE NOTED. NO CONDUIT PATHWAY SHALL EXCEED THREE NINETY DEGREE BENDS BETWEEN JUNCTION BOXES. ALL CONDUIT SHALL BE METALLIC. FLEXIBLE CONDUIT SHALL NOT BE USED UNLESS APPROVED BY THE TEL-COM CONSULTANT.
5. CONDUITS SHALL BE TERMINATED WITH JUNCTION BOXES, PULL-BOXES OR TERMINAL CABINETS AT BOTH ENDS, UNLESS OTHERWISE NOTED. CONDUITS TERMINATED AS "STUBS" SHOULD BE DE-BURRED AND FITTED WITH BUSHINGS.
6. MAINTAIN A MINIMUM 12 INCHES OF SEPARATION BETWEEN TEL-COM CONDUITS AND PARALLEL AC POWER CONDUITS. AC POWER CONDUITS CROSSING TEL-COM CONDUITS SHOULD DO SO AT PERPENDICULAR NINETY-DEGREE ANGLES. NOTIFY TEL-COM CONSULTANT IF PARALLEL AC POWER RUNS ARE UNAVOIDABLE.
7. TEL-COM EQUIPMENT AND ELECTRICAL OUTLETS ADJACENT TO JUNCTION BOXES SHALL BE SERVED BY 120-VOLT AC CIRCUITS, WHICH ARE DEDICATED SOLELY FOR TEL-COM USE. ALL CIRCUITS SHALL HAVE DEDICATED GROUNDED (I.E. NO COMMON "ROUND-HOUSE NEUTRAL" CONDUCTORS) CONDUCTORS AND INSULATED EQUIPMENT GROUNDS.
8. NO INDUCTIVE LOADS SUCH AS MOTORS AND BALLAST LIGHTING ARE TO BE SERVED BY AC POWER CIRCUITS INTENDED FOR TEL-COM USE. NOTIFY THE GENERAL CONTRACTOR IN THE EVENT OF A CONFLICT WITH THE PANELBOARD SCHEDULE.
9. PROVIDE PULL STRINGS IN TEL-COM CONDUITS LABELED AT TERMINATION BOXES INDICATING DESTINATION AT OPPOSITE END.
10. MARK AND COLOR-CODE JUNCTION BOXES AND TERMINAL CABINETS WITH THEIR ID NUMBER ON THE INSIDE OF THE BOX FACING THE ROOM, SUCH THAT THEY REMAIN IDENTIFIABLE AFTER CLOSURE OF WALLS.
11. MOUNT DEVICES ABOVE FINISH FLOOR 48" T.O. BOX MAX. IF OBSTRUCTION IS GREAT THAN 20"-25" THAN MOUNT DEVICE A.F.F. 40" T.O. BOX MAX.
12. MOUNT DEVICES ABOVE FINISH FLOOR 15" B.O. BOX MIN

### SYMBOL INDEX

Symbol	Description of location (outlet)	Location Type (outlet)	Cable Type	No. of Cables	Jack Color
	Outdoor Mini Dome Camera	CCTV	CAT6 Blue CMR	1	Yellow
	Indoor Mini Dome Camera	CCTV	CAT6 Blue CMR	1	Yellow
	Wi-Fi Access Point	DATA	CAT6 Blue CMR	2	Violet
	SecureAll Access Point	Access Control	CAT6 Blue CMR	1	Red
	Wall Workstation	DATA	CAT6 Blue CMR	3	Cable 1 Blue Cable 2 Orange Cable 3 Green
	Ceiling Workstation	DATA	CAT6 Blue CMR	3	Cable 1 Blue Cable 2 Orange Cable 3 Green
	Floor Workstation	DATA	CAT6 Blue CMR	3	Cable 1 Blue Cable 2 Orange Cable 3 Green
	Wall Mounted Display	AV	CAT6 Blue CMR	3	Cable 1 Blue Cable 2 Orange Cable 3 Green

### DETAIL - REFERENCE NOTE

SCALE: NONE

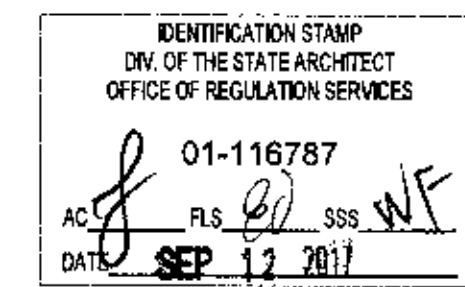
DETAIL NUMBER  
DRAWING NUMBER

### DRAWING INDEX

- T0.00 TELCOM SYMBOLS, LEGENDS AND NOTES
- T3.01 TELCOM FIRST FLOOR PLAN
- T3.02 TELCOM SECOND FLOOR PLAN
- T4.00 TELCOM AV FUNCTIONAL DIGRAMS & DETAILS
- T5.00 TELCOM DETAILS

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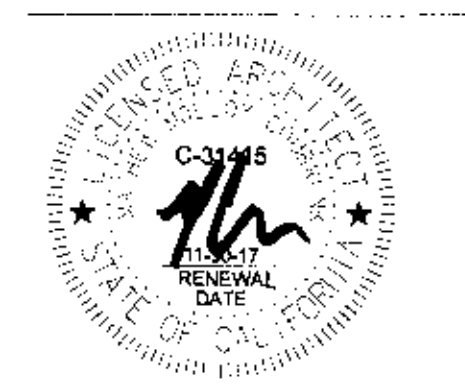
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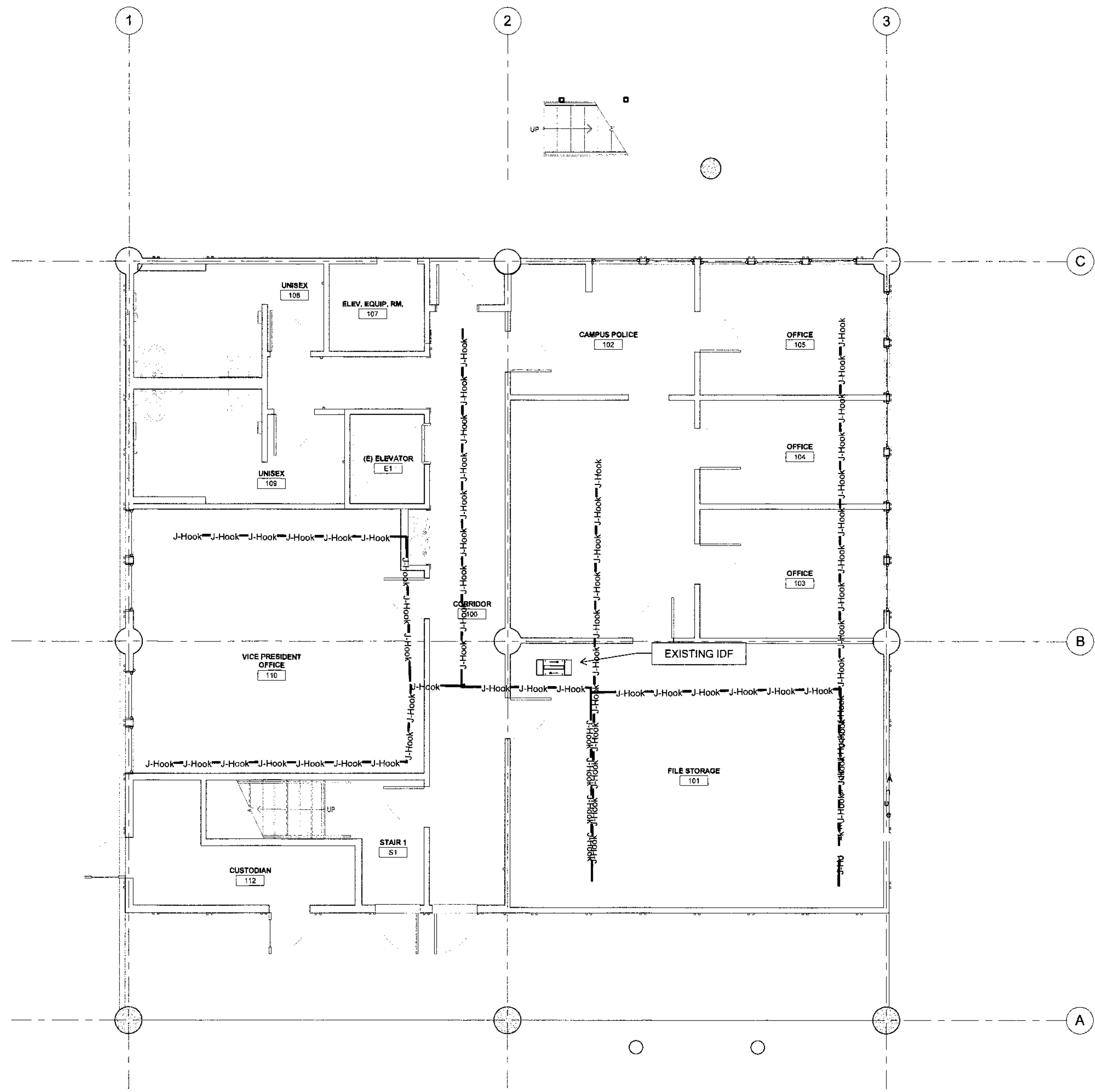
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CONSTRUCTION  
DOCUMENTS  
TELCOM PLAN  
COVER PAGE

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Outlet Symbol List						
Symbol	Type of Location (outlet)	Type of Location (outlet)	# of cables per Location	Type of Cable	CMR / CMR	Color of Jack
	Outdoor Mini Dome Camera	CCTV	1	CAT6 Blue	CMR	YELLOW
	Indoor Mini Dome Camera	CCTV	1	CAT6 Blue	CMR	YELLOW
	Wi-Fi Access Point	DATA	2	CAT6 Blue	CMR	PURPLE
	SecureALL Access Point	Access Control	1	CAT6 Blue	CMR	RED
	Wall Workstation	DATA	3	CAT6 Blue	CMR	CABLE 1-BLUE CABLE 2-ORANGE CABLE 3-GREEN
	Floor Workstation	DATA	3	CAT6 Blue	CMR	CABLE 1-BLUE CABLE 2-ORANGE CABLE 3-GREEN
	Wall Mounted Display/TV	AV	3	CAT6 Blue	CMR	CABLE 1-BLUE CABLE 2-ORANGE CABLE 3-GREEN

Symbol LIST and NOTES	
	Existing IDF location - Use the existing 19"x7" Equipment Rack for the new Panduit all metal Angled Modular Patch Panels for all location cabling.
	J-Hook pathway - Contractor to provide their own ceiling wires and J-Hooks. J-Hooks shall be installed every 48" for proper support. Cables resting on or touching the ceiling grid are not permitted. All pathways shall be installed in straight, uniform runs, employing right angles when turning. Cabling shall be neat and clean with gentle swells between J-Hooks and around turns. DO NOT share or use ceiling wires install by other trades.

- ALL LOW-VOLTAGE LOCATIONS ARE LOCATED ON THE 2ND FLOOR
- PROVIDE (1) 3/4" CONDUIT FROM THE OUTLET BACK BOX THROUGH TO THE FIRST-FLOOR ACCESSIBLE CEILING SPACE
- ROUTE ALL CABLING THROUGH THE FIRST-FLOOR CEILING SPACE TO THE IDF USING J-HOOKS

1 FLOOR PLAN - LOW VOLTAGE

1/4" = 1'-0"

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11/30/17  
RENEWAL  
DATE

COM IVC Bldg. 11  
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novato, california  
project number: 16-148.01

scale: as noted  
date: 03/10/2017

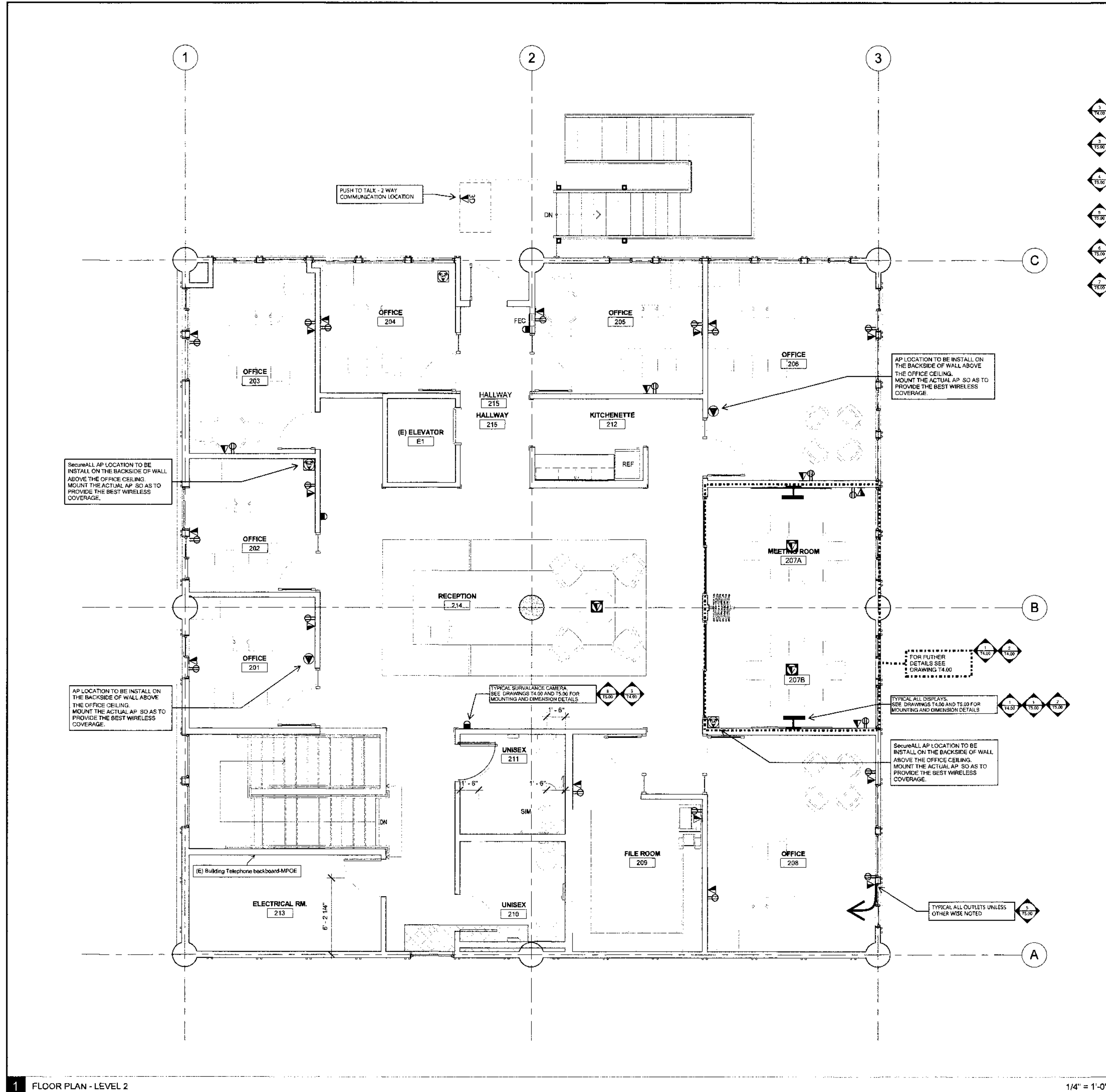
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FIRST FLOOR  
PLAN

T3.01



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Outlet Symbol List						
Symbol	Type of Location (outlet)	Type of Location (outlet)	# of cables per Location	Type of Cable	CMR / CMR	Color of Jack
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	Wall Workstation	DATA	3	CAT6 Blue	CMR	CABLE 1-BLUE CABLE 2-ORANGE CABLE 3-GREEN
	Floor Workstation	DATA	3	CAT6 Blue	CMR	CABLE 1-BLUE CABLE 2-ORANGE CABLE 3-GREEN
	Wall Mounted Display/TV	A/V	3	CAT6 Blue	CMR	CABLE 1-BLUE CABLE 2-ORANGE CABLE 3-GREEN
	All horizontal cabling, unless otherwise noted, will be home ran through the first floor accessible ceiling space. Provide a 3/4" conduit from the back box through the floor into accessible ceiling space.					
	J-Hook pathway - Contractor to provide their own ceiling wires and J-Hooks. J-Hooks shall be installed every 48" for proper support. Cables resting on or touching the ceiling grid are not permitted. All pathways shall be installed in straight, uniform runs, employing right angles when turning. Cabling shall be neat and clean with gentle swells between J-Hooks and around turns. DO NOT share or use ceiling wires install by other trades.					
<b>SHEET NOTES:</b>						
1. PROVIDE ASSISTIVE LISTENING SYSTEMS FOR OFFICE 203, 206 AND 208 AS OUTLINED IN SPECIFICATION SECTION 27 51 26.						
2. PROVIDE, INSTALL AND ADD THE NEW SURVALANCE CAMERAS TO THE EXISTING VIDEO MANAGEMENT SOFTWARE.						

1 FLOOR PLAN - LEVEL 2

1/4" = 1'-0"

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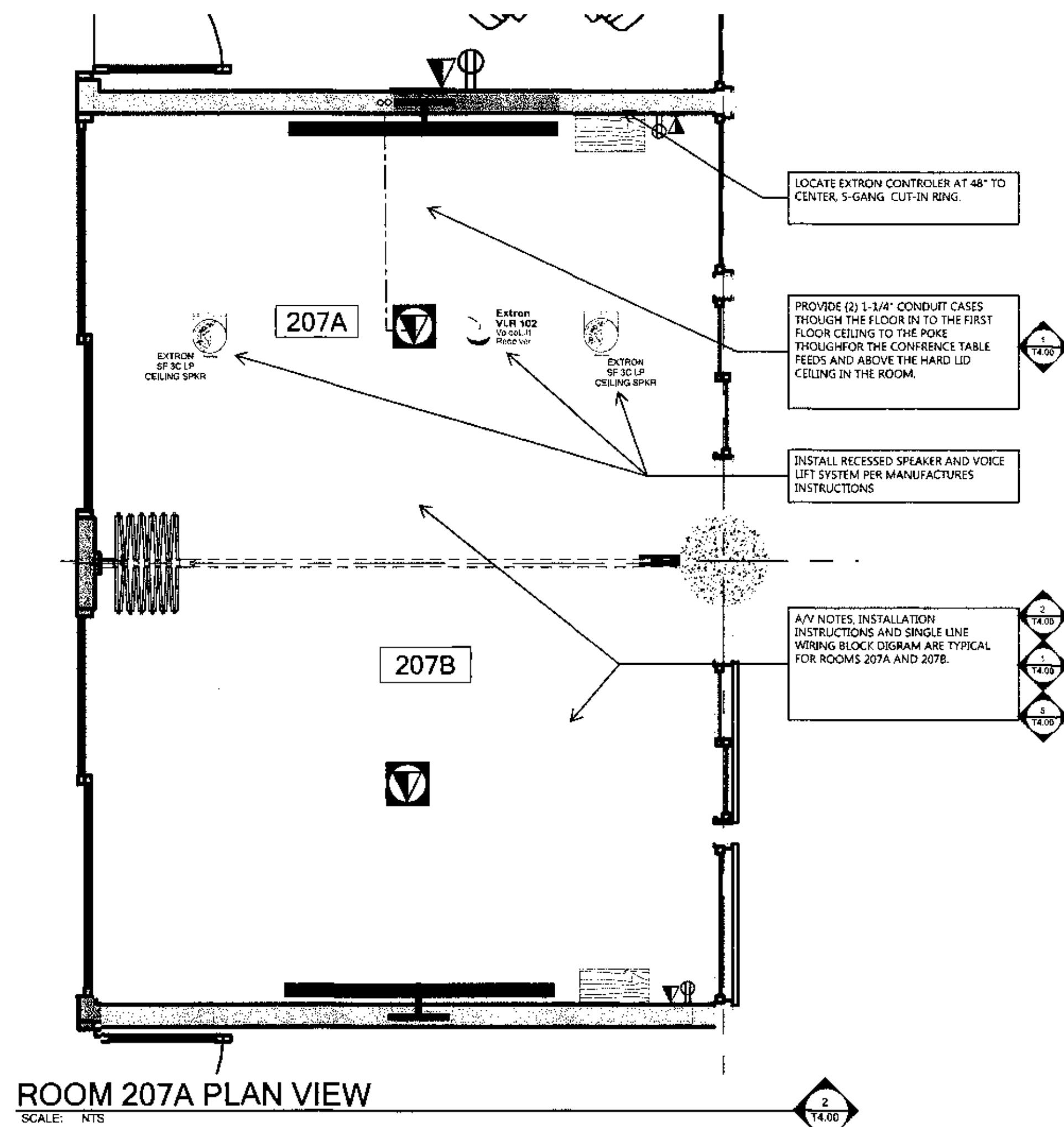
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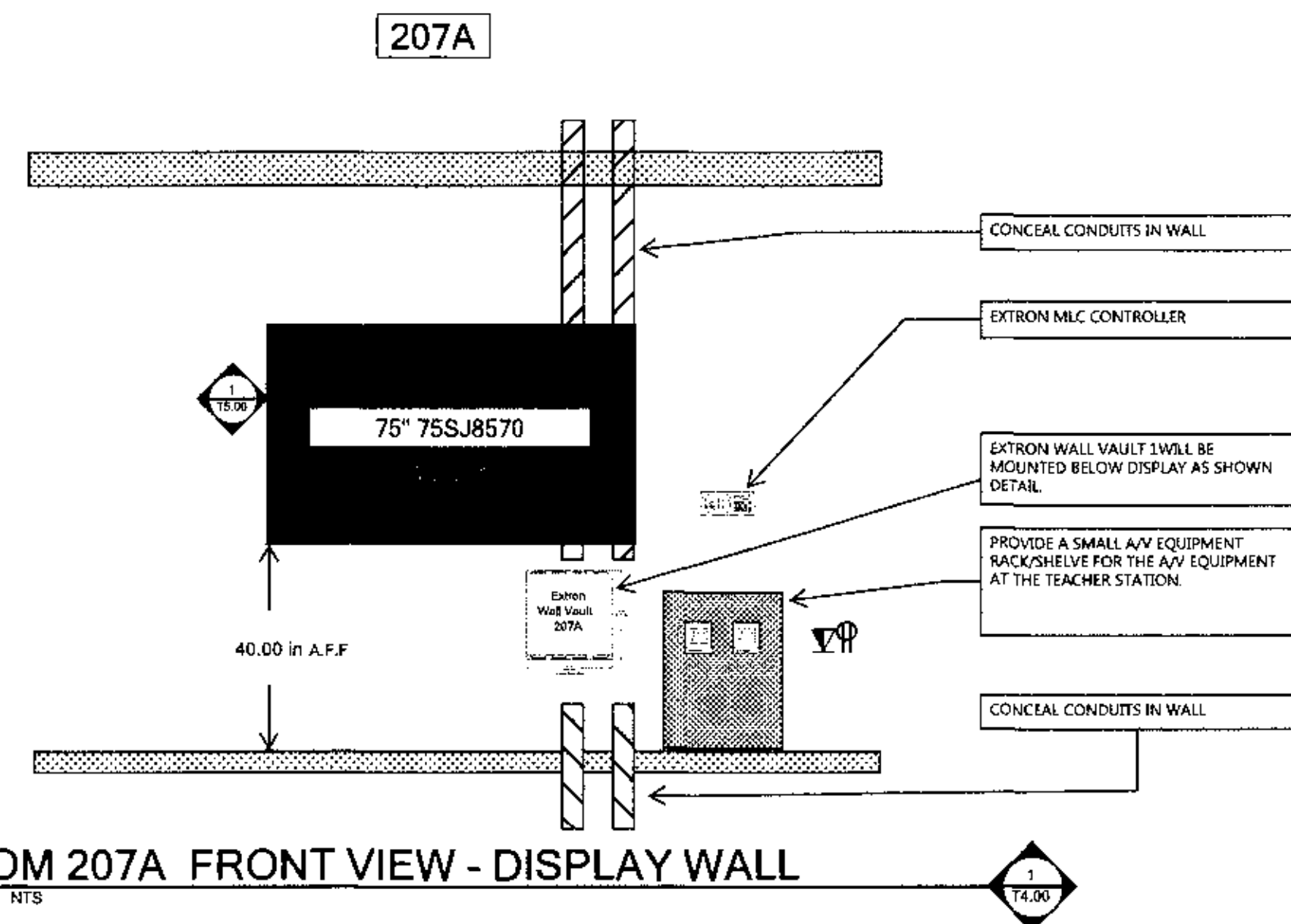
CONSTRUCTION DOCUMENTS  
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SECOND FLOOR PLAN

T3.02

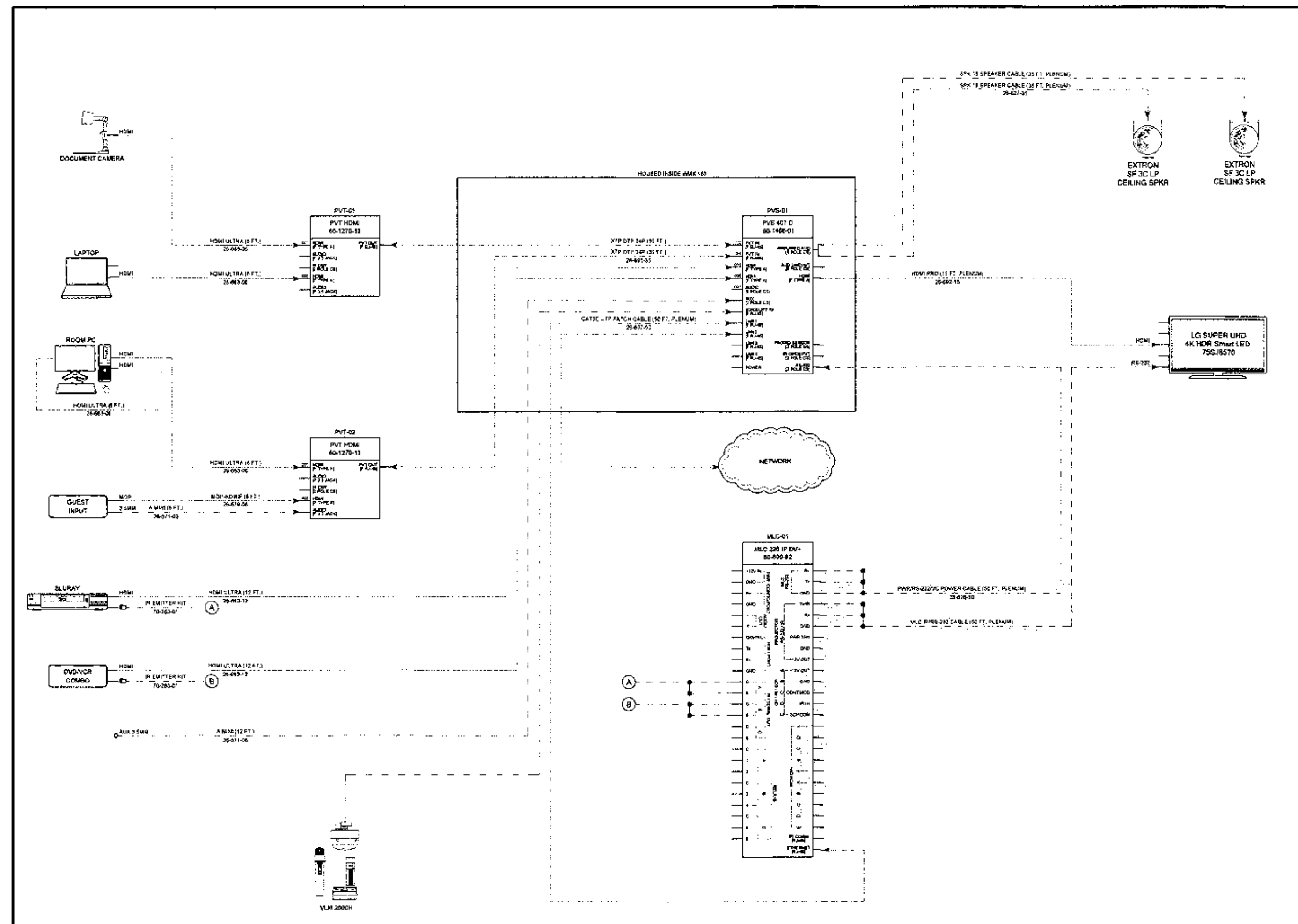
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ROOM 207A PLAN VIEW  
SCALE: NTS



ROOM 207A FRONT VIEW - DISPLAY WALL  
SCALE: NTS



AV SYSTEM SINGLE LINE WIRING BLOCK DIGRAM  
SCALE: NTS

ASSISTIVE LISTENING SYSTEMS NOTES:

PROVIDE (3) ASSISTIVE LISTENING SYSTEMS. ONE SYSTEM IN EACH OFFICE: 203, 206 AND 208 AS OUTLINED IN SPECIFICATION SECTION 27 51 26. EACH SYSTEM WILL CONTAIN:  
 (1) WIRELESS FM TRANSMITTER WITH DIGITAL TUNING, LISTEN #LT-700-216  
 (1) LAPEL MICROPHONE, LISTEN #LA-261.  
 (2) WIRELESS FM RECEIVERS, LISTEN #LR-300-072.  
 (2) EAR SPEAKERS #LA164.  
 (2) NECK LOOPS #LA-166.  
 (1) CASE, LISTEN #LA-306.  
 PROVIDE 2-AA DURACELL OR EQUAL BATTERIES FOR EACH TRANSMITTER AND RECEIVER.

ASSISTIVE LISTENING SYSTEM

SCALE: NTS

PROVIDE, INSTALL AND ADD THE NEW SURVILLANCE CAMERAS TO THE EXISTING VIDEO MANAGEMENT SOFTWARE.

- IQD62N1-B7 011-0467 ALLIANCE-MINI INDOOR VANDAL DOME DAY/NIGHT CAMERA; H:264; 1080p; 3-6 mm lens; black plastic trim ring
- Resolution up to 5 MP
- H.264 Main Profile + M-JPEG compression
- WDR on 1, 2, 3 MP modes (100 dB)
- On-camera storage (16GB SDHC)
- Two-way audio with built-in microphone
- True daylight with movable infrared (IR) cut filter
- 3-axis gimbal
- Power-over-Ethernet
- Cast aluminum
- ONVIF and PSIA compliant

VIDEO SURVILLANCE CAMERAS

SCALE: NTS

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 12/31/17  
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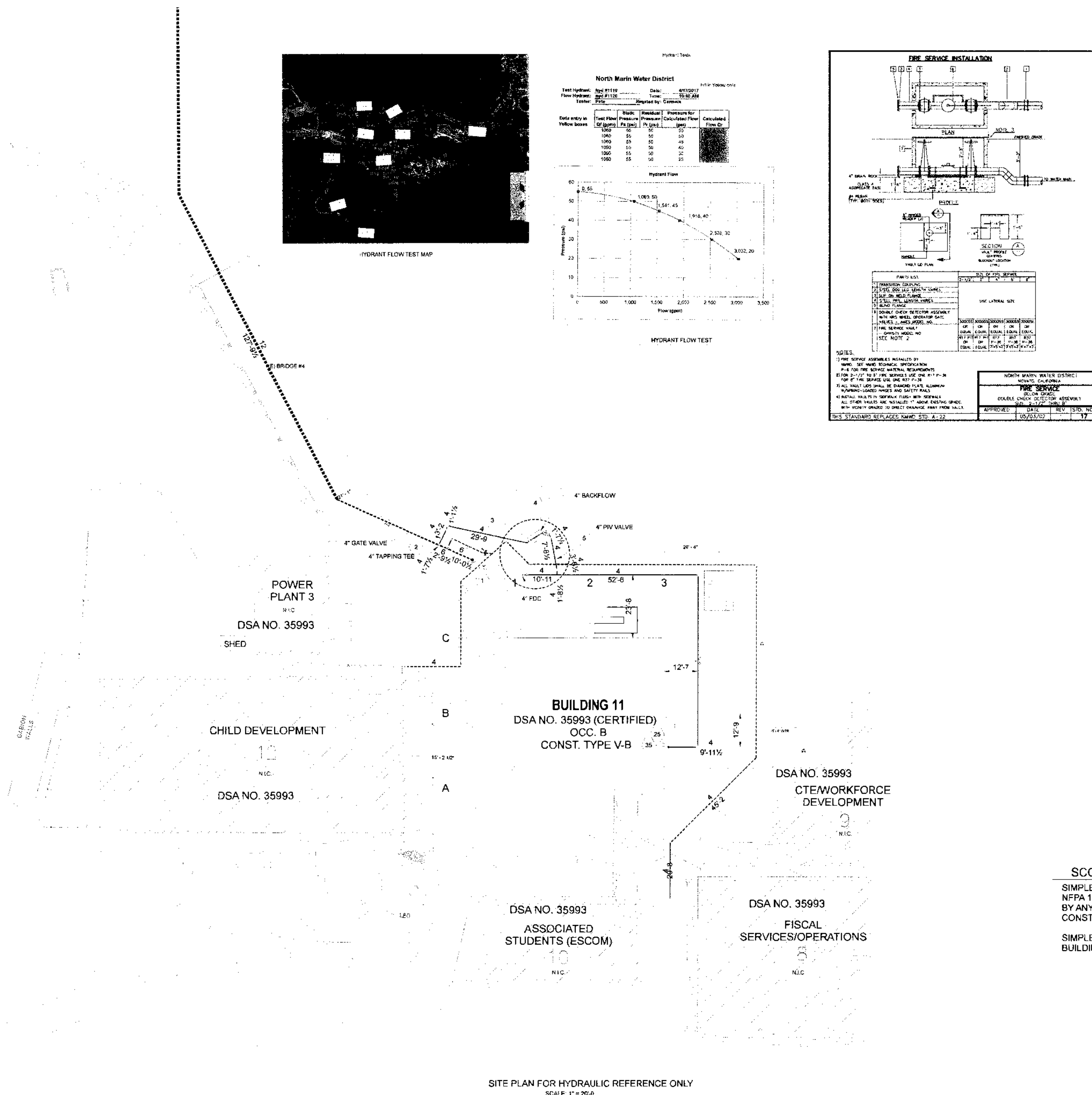
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CONSTRUCTION  
 DOCUMENTS  
 TEL-COM -  
 A/V FUNCTIONAL  
 DIGRAMS & DETAILS

T4.00





**FIRE SPRINKLER GENERAL NOTES FOR DSA REVIEW:**

- 1) A COPY OF THE ORIGINAL, PREVIOUSLY APPROVED DSA UNDERGROUND PIPING PLANS OR OTHER WATER SUPPLY COMPONENTS, SUCH AS WATER TANKS, FIRE PUMPS, ECT. FOR THE PROJECT SHALL BE INCLUDED IN ALL AUTOMATIC FIRE SPRINKLER DEFERRED SUBMITTAL PLAN PACKAGES. ALL DEVIATIONS FROM THE PREVIOUSLY APPROVED PLANS SHALL BE JUSTIFIED AND SUBMITTED TO ARCHITECT VIA CHANGE ORDER PROCESS AS APPLICABLE. UNDERGROUND PIPING SIZE IS NOT THE RESPONSIBILITY OF DSA AND THE ARCHITECT OF RECORD SHALL ASSUME FULL LIABILITY FOR UNDERSIZED PIPING SHOULD THE FINAL DESIGN OF THE FIRE SPRINKLER SYSTEM REQUIRE LARGER PIPING. ADDITIONAL WATER SUPPLY, FIRE PUMPS, OR OTHER EQUIPMENT OR ITEMS.
- 2) 2016 NFPA 13 8.16.4.1.1: THE DESIGNER SHALL INDICATE ON THE PLANS ALL PIPING SUBJECT TO FREEZING (WHERE WATER TEMPERATURE CANNOT BE MAINTAINED ABOVE 40 DEGREES FAHRENHEIT) AND PROVIDE APPROVED PROTECTION.
- 3) 2016 NFPA 13 SEC 10.10.2.1.1: UNDERGROUND MAINS AND LEAD-IN CONNECTIONS TO SYSTEM RISERS SHALL BE COMPLETELY FLUSHED BEFORE CONNECTION IS MADE TO OVERHEAD SPRINKLER PIPING. WHERE UNDERGROUND PIPING IS FLUSHED AND NOT IMMEDIATELY CONNECTED TO OVER HEAD PIPING, THE RISER SHALL BE CAPPED OR OTHERWISE PROTECTED TO PREVENT DEBRIS, DIRT, OR ANIMALS FROM ENTERING INTO THE UNDERGROUND PIPING) WITNESSED BY THE PROJECT INSPECTOR.
- 4) PROVIDE "WET SIGNED" WATER FLOW TEST DATA NO MORE THAN 3 MONTHS OLD AND INDICATE THE LOCATIONS AND HEIGHT ELEVATIONS OF THE TEST AND RESIDUAL FLOW HYDRANTS. WATER FLOW TEST DATA MUST BE PROVIDED BY OR WITNESSED BY THE LOCAL WATER PURVEYOR, UTILITIES COMPANY, OR LOCAL FIRE DEPARTMENT.
- 5) ARCHITECT OF RECORD, MECHANICAL ENGINEER & FIRE PROTECTION CONTRACTOR (C-16) SHALL AFFIX THEIR SEAL, STAMP AND SIGN ALL SUBMITTAL OR PROVIDE DOCUMENTATION PER DSA IR-18.
- 6) 2016 NFPA 13 FIGURE 10.10.1: A COPY OF COMPLETED AND SIGNED CONTRACTOR'S MATERIALS & TEST CERTIFICATE FOR UNDERGROUND PIPING SHALL BE INCLUDED IN SUBMITTAL (NOT IN SCOPE OF WORK TO BE PROVIDED BY CONTRACTOR).
- 7) 2016 NFPA 13 SECTION 10.10.2.2: ALL PIPING AND ATTACHED APPARATUS SUBJECT TO SYSTEM WORKING PRESSURE SHALL BE HYDROSTATIC TESTED AT 200 PSI OR 50 PSI IN EXCESS OF THE SYSTEM WORKING PRESSURE, WHICHEVER IS GREATER, AND SHALL MAINTAIN THAT PRESSURE WITHOUT LOSS FOR 2 HOURS. (WITNESSED BY PROJECT INSPECTOR).
- 8) 2016 NFPA 13 SECTION 8.2.9: PROVIDE SPARE SPRINKLER HEAD CABINET, SPRINKLER WRENCH AND NO FEWER THAN 6 SPARE SPRINKLER HEADS MATCHING THE TYPES AND TEMPERATURE RATING IN EACH PROTECTED AREA FOR SYSTEM LESS THAN 300 SPRINKLERS. (12 SPARE SPRINKLER HEADS FOR SYSTEMS 300 TO 1,000 SPRINKLERS).
- 9) 2016 NFPA 13 SECTION 9.3.3: THE END SPRINKLER ON EACH LINE SHALL BE RESTRAINED AGAINST EXCESSIVE VERTICAL AND LATERAL MOVEMENT.
- 10) 2016 CBC 903.4.2 AND NFPA 13 8.17.4.2.1 - 8.17.4.2.3: THE INSPECTOR'S TEST VALVE LOCATION SHALL BE INSTALLED WITHIN THE MOST HYDRAULICALLY REMOTE SYSTEM AREA. THE PIPE SIZE SHALL BE NO LESS THAN 1 INCH WITH A SMOOTH BORE, CORROSION-RESISTANT ORIFICE, PROVIDING THE EQUIVALENT FLOW OF THE SMALLEST ORIFICE IS THE SPRINKLER TYPES INSTALLED WITHIN THE SYSTEM. THE DISCHARGE SHALL BE TO THE EXTERIOR OF THE BUILDING.
- 11) 2016 NFPA 25 5.3.3.8: THE SPRINKLER FLOW SWITCH SHALL BE TESTED TO CONFIRM THAT WHEN THE INSPECTOR'S TEST VALVE IS ACTIVATED AN ALARM WILL SOUND NO MORE THAN 90 SECONDS AFTER INITIAL FLOW (WITNESSED BY THE PROJECT INSPECTOR).
- 12) 2016 CBC 904.4.3: CONNECTIONS TO PROTECTED PREMISES AND SUPERVISING STATION FIRE ALARM SYSTEMS SHALL BE TESTED TO VERIFY PROPER IDENTIFICATION AND TRANSMISSION OF ALARMS FROM AUTOMATIC FIRE EXTINGUISHING SYSTEMS. WITNESSED BY PROJECT INSPECTOR.
- 13) 2016 NFPA 13 SECTION 8.17.1: SIGN SHALL BE PROVIDED AS REQUIRED, INCLUDING "RISER ROOM IDENTIFICATION".
- 14) CBC 2016 SECTION 903.4.1: THE MAIN FIRE ALARM PANEL VALVE AND WATER-FLOW ALARM AND TROUBLE SIGNALS SHALL BE DISTINCTLY DIFFERENT AND SHALL BE AUTOMATICALLY TRANSMITTED TO AN APPROVED CENTRAL STATION MONITORING COMPANY.
- 15) 2016 NFPA 13 SECTION 24.5: A PERMANENT HYDRAULIC CALCULATIONS DESIGN PLACARD SHALL BE ATTACHED TO EACH RISER.
- 16) 2016 NFPA 13 SECTION 8.1 AND 2016 CBC 903.4.2: FLOW SWITCH SHALL BE CONNECTED TO A 10 INCH OUTSIDE ALARM BELL OR OTHER AUDIBLE ALARM DEVICE AT EACH RISER. APPROVED IDENTIFICATION SIGNS SHALL BE PROVIDED ON THE OUTSIDE ALARM BELL "SPRINKLER FIRE ALARM - WHEN ALARM SOUNDS CALL 911 FIRE DEPARTMENT".
- 17) TITLE 19 ARTICLE 906(A): A LABEL OF THE SELF-ADHESIVE TYPE SHALL BE PLACED ON THE FIRE DEPARTMENT CONNECTION OR ON THE RISER FOR THE FIRE SPRINKLER SYSTEM AND SHALL INCLUDE THE SITE OF INSTALLATION AND / OR DATE SERVICE WAS PERFORMED AND LICENSE NUMBER OF PERSON PERFORMING SERVICE WORK.
- 18) 2016 NFPA 13 FIGURE 24.1: SPRINKLER CONTRACTOR SHALL COMPLETE AND SIGN CONTRACTOR'S MATERIAL & TEST CERTIFICATE FOR THE ABOVEGROUND PIPING. THIS FORM SHALL BE GIVEN TO THE PROJECT INSPECTOR WHO WILL FORWARD TO DSA FOR FILING IN PROJECT RECORDS.

**USGS Design Maps Summary Report**

User-Specified Input  
 Report Title: Building 11 - College of Marin  
 Building Code Reference Document: ASCE 41-13 Retrofit Standard, BSE-2N  
 Site Coordinates: 38.068356N, 122.546218W  
 Site Soil Classification: Site Class D - "Soft Soil"

USGS-Provided Output  
 S<sub>max</sub> = 1.500 g S<sub>max</sub> = 1.500 g  
 S<sub>min</sub> = 0.600 g S<sub>min</sub> = 0.900 g

from open street map	latitude	longitude	altitude
decimal	38.0683568	-122.5462186	
deg-min-sec	38° 4' 6.0845"	-122° 32' 46.387"	

Ignacio Boulevard, Novato, Marin County, California, 94949, United States of America.

**SCOPE OF WORK:**  
 SIMPLEXGRINNELL TO DESIGN & INSTALL ONE WET AND ONE PRE-ACTION SPRINKLER SYSTEM PER NFPA 13, 2016 EDITION. THE DESIGN IS THE PROPERTY OF SIMPLEXGRINNELL AND SHALL NOT BE USED BY ANY ONE OTHER THAN SIMPLEXGRINNELL. THIS PLAN IS FOR PERMIT ONLY AND NOT FOR CONSTRUCTION WITHOUT APPROVAL OF SIMPLEXGRINNELL.

SIMPLEXGRINNELL POINT OF CONNECTION IS 6" ABOVE GRADE AT UNDERGROUND SUPPLY TO BUILDING.

novato, california  
 project number: 15-148-01  
 scale: as noted  
 date: 03/10/2017

**CONSTRUCTION DOCUMENTS**  
**SITE PLAN**

**brick.**  
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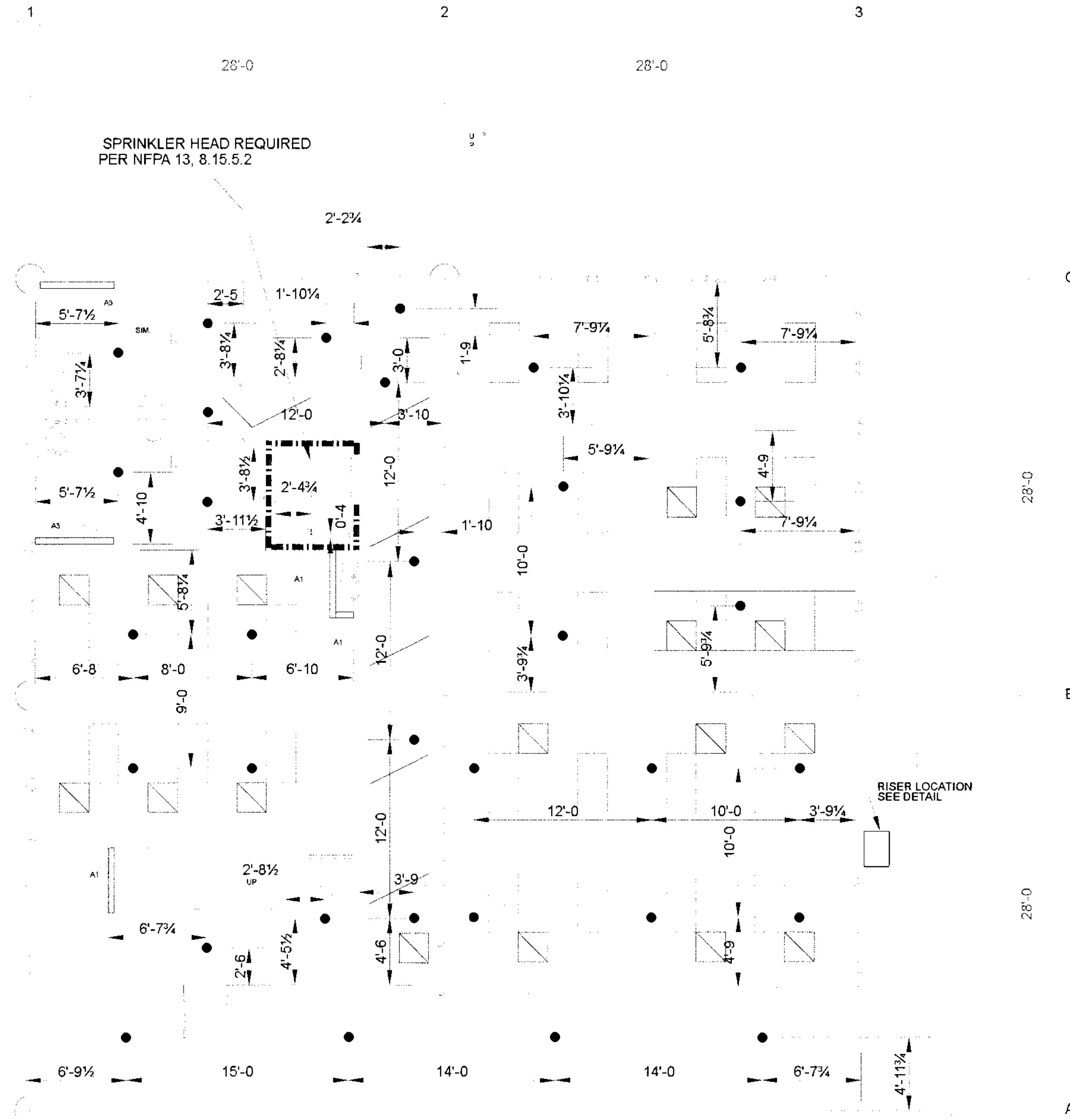
01-116787  
 AC: J. FLS. SSS WF  
 DATE: SEP 12 2017

9/07/17 DSA BACK CHECK  
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**COM IVC Bldg. 11**  
**renovation**

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SPRINKLER HEAD REQUIRED  
PER NFPA 13, 8.15.5.2

**1ST FLOOR REFLECTED CEILING PLAN**  
SCALE: 1/4" = 1'-0"

Sprinkler Legend										
Symbol	Manufacturer	SIN/Model	Quantity	K-Factor	Type	Size	Response	Orifice	Finish	Temperature/Note
●	Generic	T10332	33	5.6	Pendant	1/2"	Quick	1/2"	White	155°F
◐	Generic	T10331	1	5.6	Stem	1/2"	Quick	1/2"	Black	200°F
			Total = 34							

1/4" = 1'-0" FLOOR PLAN KEYNOTES

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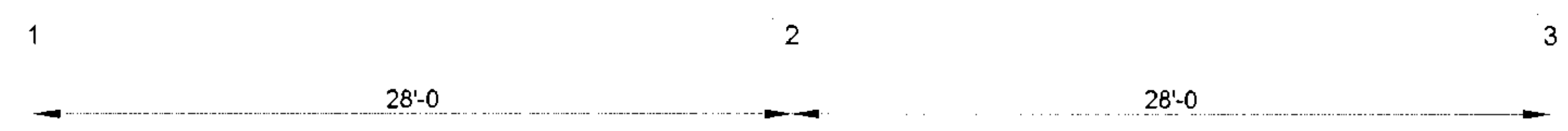
COM IVC Bldg. 11  
renovation

novato, california  
project number: 15-148.01  
scale: as noted  
date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
1ST FLOOR  
REFLECTED CEILING  
PLAN

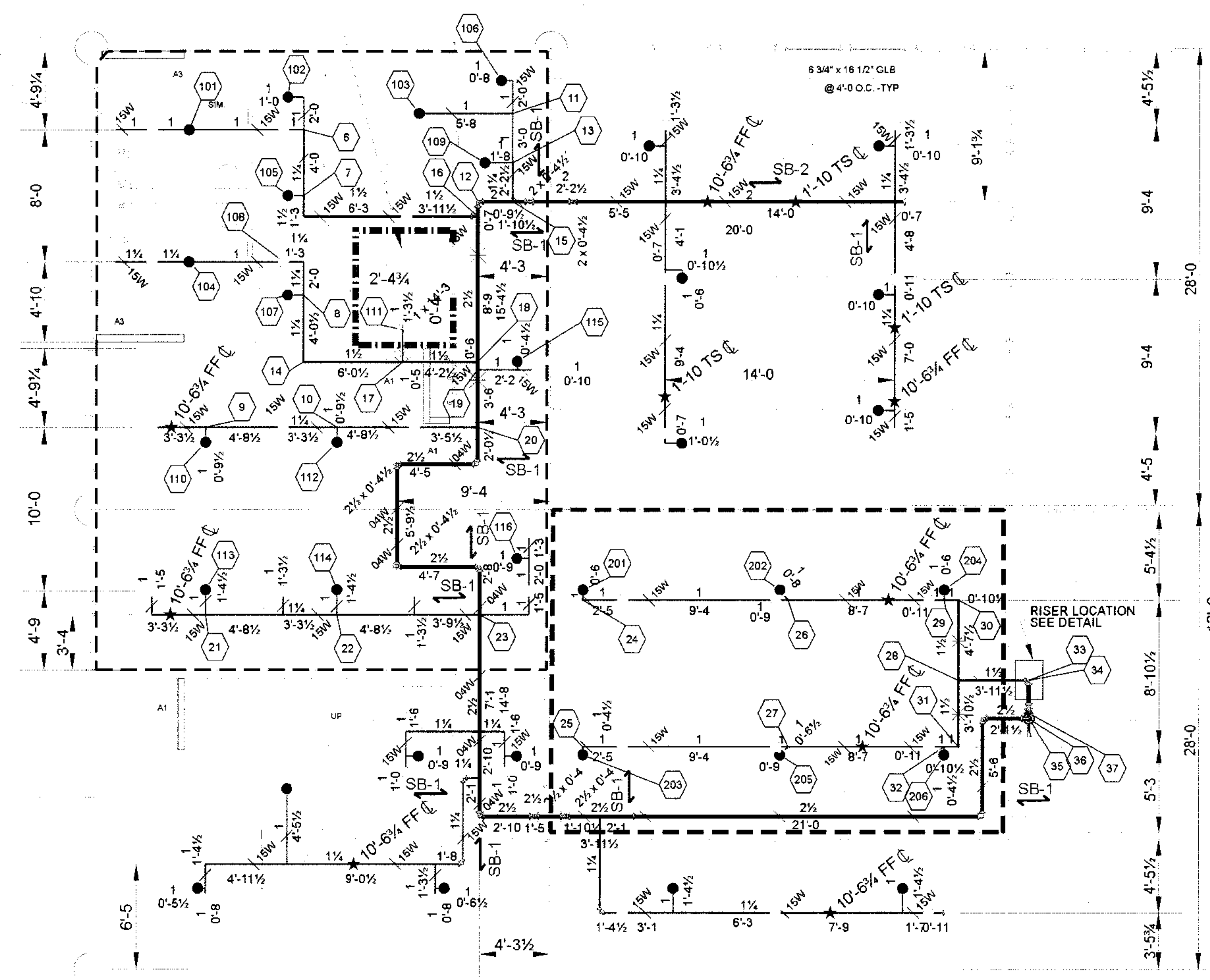
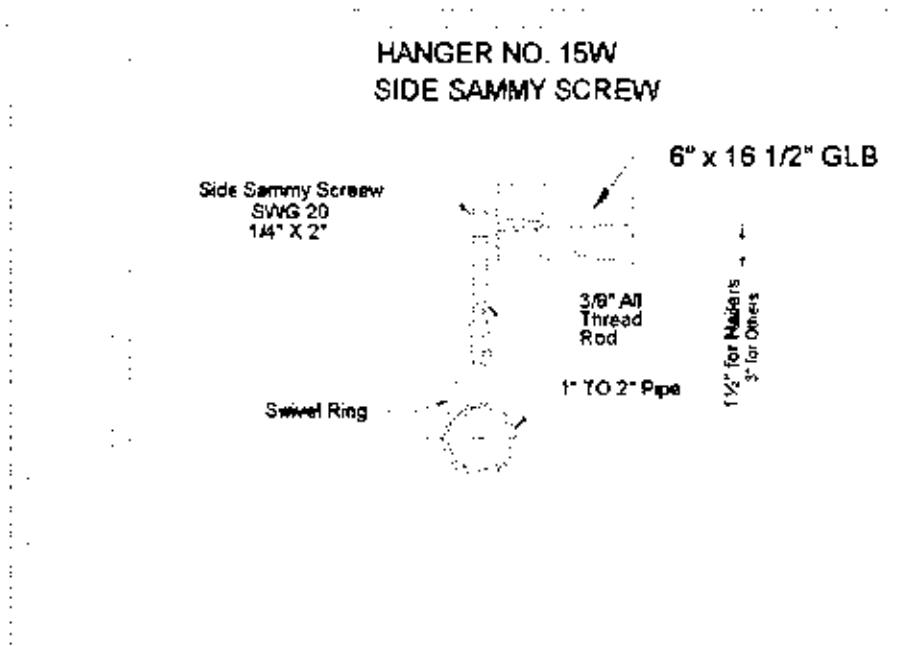
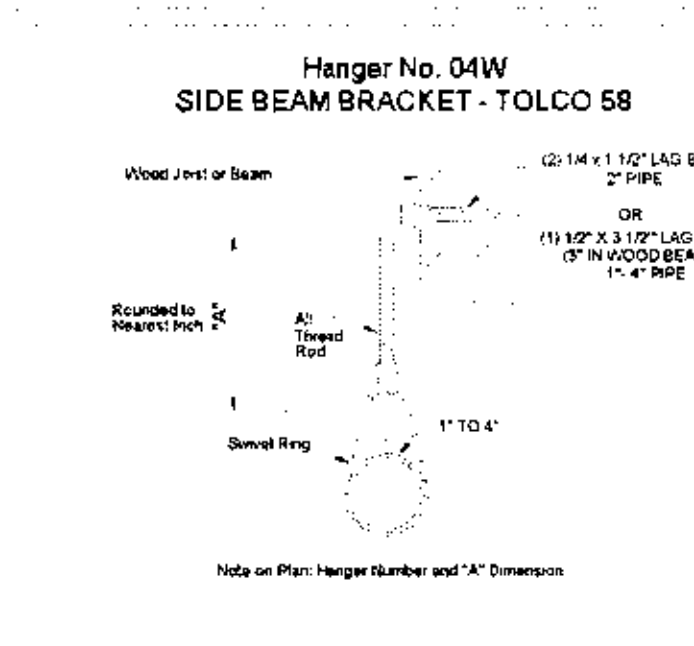
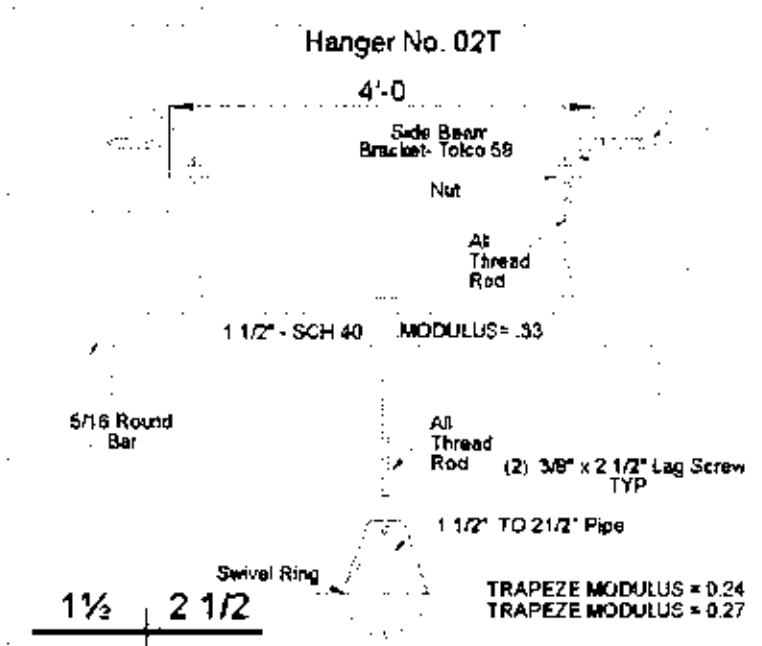
FP-2

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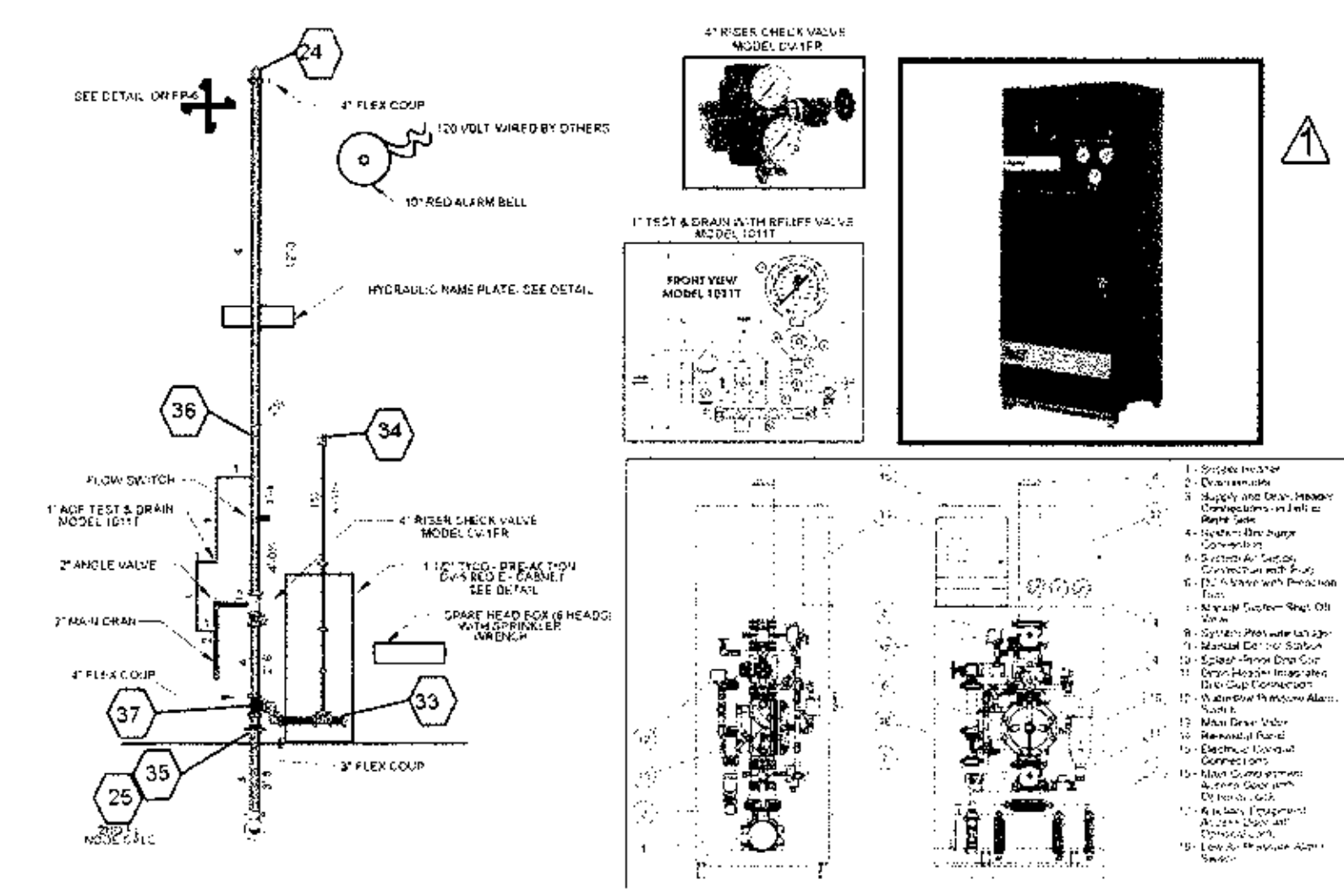
SPRINKLER HEAD REQUIRED PER NFPA 13, 8.15.5.2

SB-1 LATERAL BRACING SEE FP-6 FOR DETAIL  
SB-2 LONGITUDINAL BRACING SEE FP-6 FOR DETAIL



SYSTEM INSTALLED BY  
**SimplexGrinnell LP**

PHOTO NUMBER: **FP-3** DATED: **07/20/17**  
FOR: **COM IVC BLDG. RENOVATION**  
AT: **1255 COLLEGE AVENUE, SANTA ROSA, CA 95407**  
IS INSIGNED FOR: **8** SPRINKLERS TO THIS CHARGE AT A DENSITY OF: **15** GALLONS PER MINUTE PER SQUARE FOOT OVER A MAXIMUM FLOOR AREA OF: **53348** SQUARE FEET WHEN SUPPLIED WITH WATER AT THE RATE OF: **SCALE** GALLONS PER MINUTE AT A PRESSURE OF: **232.8** POUNDS PER SQUARE INCH AT THE BASE OF THE RISEY



- FIRE SPRINKLER NOTES:**
- ALL MATERIAL AND METHODS SHALL CONFORM TO THE REQUIREMENTS OF NFPA 13, 2016 CFC, PART 9, TITLE 24 C.C.R. (2015 UFC AND 2016 CA AMENDMENTS) AND DSA
  - ALL FIRE RATED PENETRATIONS SHALL BE FIRE STOPPED USING AN APPROVED AND EQUALLY RATED MATERIAL.
  - CONSTRUCTION = COMBUSTIBLE. UNOBSTRUCTED CONSTRUCTION
  - SYSTEM TYPE= WET & PRE-ACTION. SEE RISER DETAIL FOR SYSTEM RISER AND LOCATION.
  - HAZARD AREA: LIGHT HAZARD (10 / 15000 sqft); OFFICE / EDUCATION ORD GP 1 (15 / AREA); STORAGE ROOM
  - BRANCH LINES ARE WELDED 1" AND 1 1/2" SCH 40 PIPE WITH 1/2" OUTLETS FITTINGS.
  - MAINS THAT ARE 4" AND LARGER SHALL BE GROOVED SCH. 10 PIPE, WITH WELDED OUTLETS FOR BRANCH LINES. RISER NIPPLES AND SHALL UTILIZE THREADED FITTINGS OR GROOVED.
  - ALL GROOVED COUPLINGS SHALL BE RIGID TYPE UNLESS OTHERWISE INDICATED.
  - ALL DIMENSIONS LINES ARE FROM COLUMN LINES UNLESS OTHERWISE SHOWN OR INDICATED.
  - SWAY BRACING LOCATIONS ARE APPROXIMATE AND SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13, 2016 CHAPTER 9, SECTION 9.3. SEE LOCATION ON PLANS.
  - HYDRAULIC CALCULATION WERE BASED UPON THE FLOW CHARACTERISTICS OF WATER FLOW INFORMATION SITE FLOW TEST. SEE SITE PLAN FOR INFORMATION
  - EXACT SPRINKLER LOCATIONS SHALL BE FIELD VERIFIED
  - HANGERS LOCATIONS ARE APPROXIMATE AND SHALL BE INSTALLED AS PER NFPA 13, 2016 CHAPTER 9.
- BRACING NOTES:**
- ALL PIPING LARGER THAN 2.5" DIAMETER, AND FEED MAINS, CROSS MAIN, REGARDLESS OF DIAMETER SIZE REQUIRE SEISMIC BRACING IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS.
  - TRANSVERSE SWAY BRACING: MAX SPACING FOR LATERAL / TRANSVERSE BRACING IS 40 FT. DISTANCE BETWEEN LAST BRACE AND PIPE AND NOT EXCEED 6FT. WHERE THERE IS A CHANGE IN THE DIRECTION PIPING, THE CUMULATIVE DISTANCE BETWEEN CONSECUTIVE LATERAL BRACE SHALL NOT EXCEED 40 FT. TRANSVERSE BRACING SHALL BE ALLOWED TO ACT AS LONGITUDINAL BRACING IF THEY ARE WITHIN 2 FT. OF PIPE CENTERLINE BRACED LONGITUDINALLY.
  - LONGITUDINAL SWAY BRACING: LONGITUDINAL BRACING SPACE 80 FT MAX. LONGITUDINAL BRACING SHALL BE ALLOWED TO ACT AS TRANSVERSE BRACING IF THEY ARE WITHIN 2 FT. OF PIPE. DISTANCE BETWEEN LAST BRACE AND PIPE AND OR A CHANGE IN DIRECTION NOT EXCEED 40 FT.
  - SHOW TRANSVERSE AND LONGITUDINAL BRACING LOCATIONS / LAYOUT PER ABOVE REQUIREMENTS.
  - SHOW BRACING CONNECTION TO ROOF / FLOOR FRAMING DETAILS FOR ALL FRAMING MATERIALS ( SUCH AS STEEL BEAMS, SAWN LUMBER, STEEL DECK.
  - NO LAG BOLT OR SHOT PINS FOR BRACING CONNECTIONS.
  - BRACING PIPE L<sub>t</sub> < 300 (i.e. SLENDER PIPE NOT ALLOWED)
  - FLEXIBLE PIPE WHERE ACROSS BUILDINGS.

Hydraulic Information-AREA #2 PRE-ACTION		Hydraulic Information AREA 1- WET	
OCCUPANCY CLASSIFICATION	Ordinary Group I	OCCUPANCY CLASSIFICATION	Light Hazard
DENSITY	0.150gpm/ft <sup>2</sup> for 1500.00ft <sup>2</sup> (Actual 539.49ft <sup>2</sup> )	DENSITY	0.100gpm/ft <sup>2</sup> for 1500.00ft <sup>2</sup> (Actual 1029.98ft <sup>2</sup> )
TOTAL HOSE STREAMS	250.00	TOTAL HOSE STREAMS	100.00
TOTAL HEADS FLOWING	8	TOTAL HEADS FLOWING	15
K-FACTOR	5.8	K-FACTOR	5.8
TOTAL WATER REQUIRED	364.18	TOTAL WATER REQUIRED	353.38
TOTAL PRESSURE REQUIRED	42.815	TOTAL PRESSURE REQUIRED	46.831
SAFETY MARGIN (psi)	+11.482 (21.2%)	SAFETY MARGIN (psi)	+7.514 (13.8%)

**1ST FLOOR PIPING PLAN**  
SCALE: 1/4" = 1'-0"

Symbol	Manufacturer	SIN/Model	Quantity	K-Factor	Type	Size	Response	Critical	Finish	Temperature	Notes
●	Generic	T13132	34	5.8	Pendent	1/2"	Quick	37	White	155°F	
○	Generic	T13331	1	5.8	SideWall	1/2"	Quick	37	Brass	200°F	
○	Generic	T13131	31	5.8	Upright	1/2"	Quick	37	Brass	200°F	
Total = 66											

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DATE SEP 17 2017

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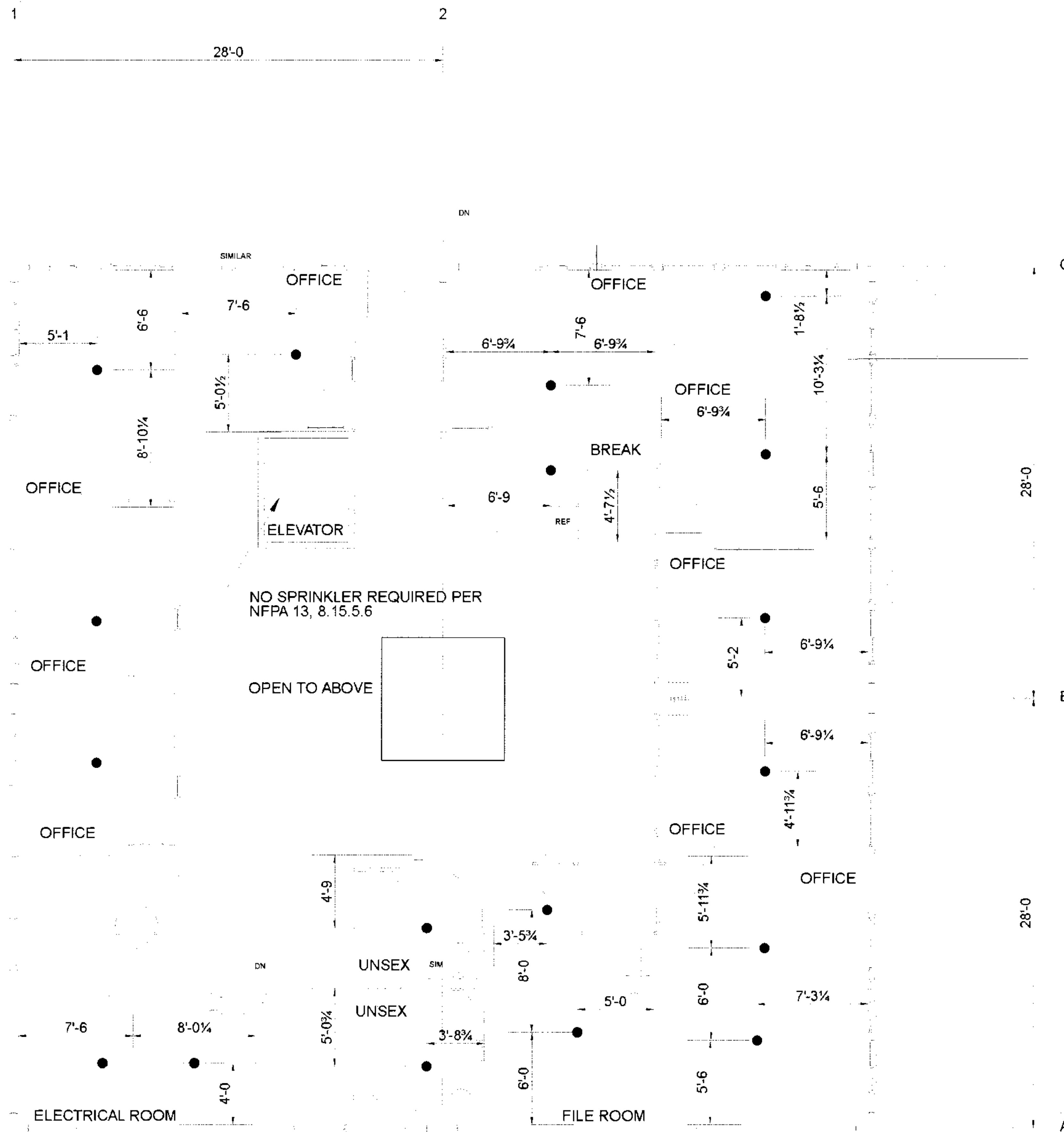
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renovation

novato, california  
project number: 16-148-01  
scale: as noted  
date: 03/10/2017

CONSTRUCTION DOCUMENTS  
1ST FLOOR PIPING PLAN

FP-3

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**2ND FLOOR REFLECTED CEILING PLAN**

SCALE: 1/4" = 1'-0"

Sprinkler Legend												
Symbol	Manufacturer	SIN/Model	Quantity	K-Factor	Type	Size	Response	Office	Finish	Temperature	Note	
●	Generic	TY3132	18	5.6	Pendent	1/2"	Standard		1/2" White	155° F		
			Total = 18									

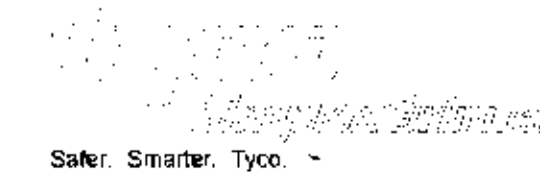
1/4" = 1'-0" FLOOR PLAN KEYNOTES

1/4" = 1'-0"

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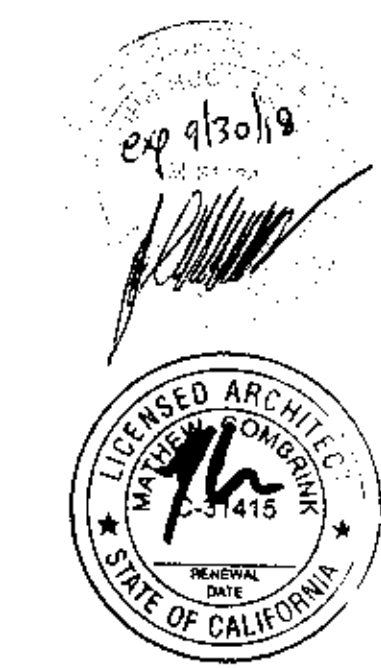


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novato, california  
project number: 15-148.01

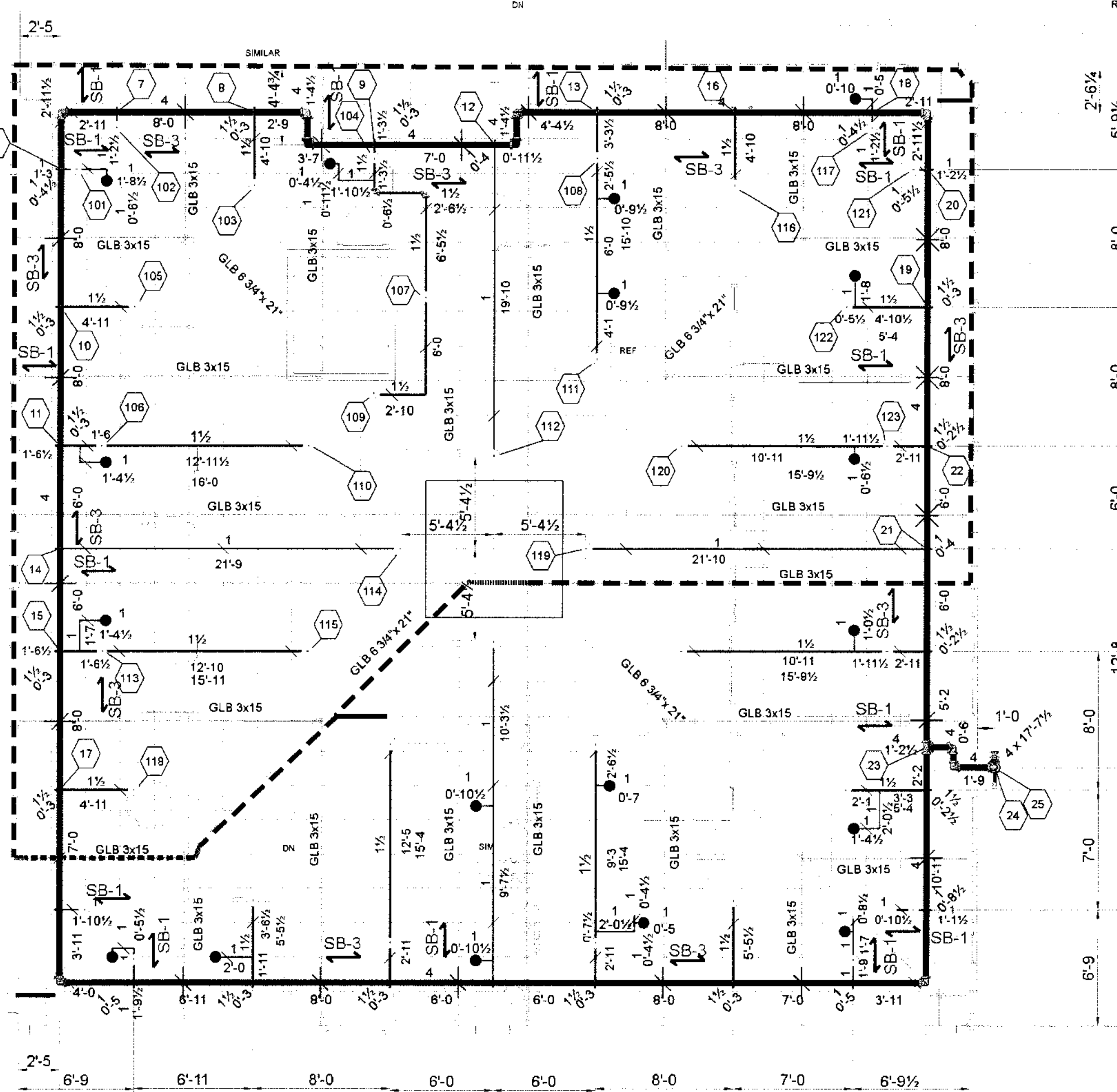
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date: 03/10/2017

CONSTRUCTION  
DOCUMENTS  
2ND FLOOR  
REFLECTED CEILING  
PLAN

FP-4

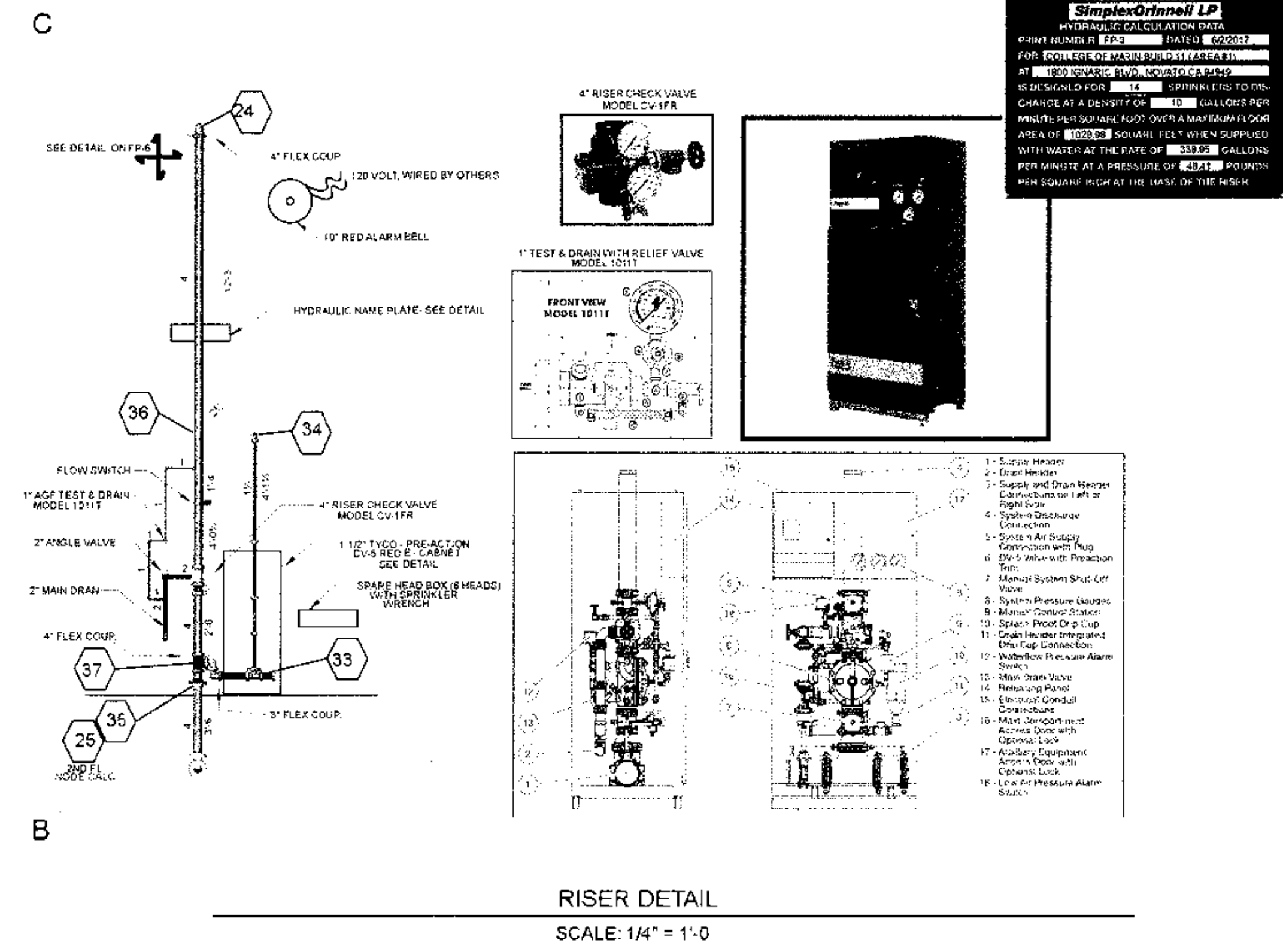
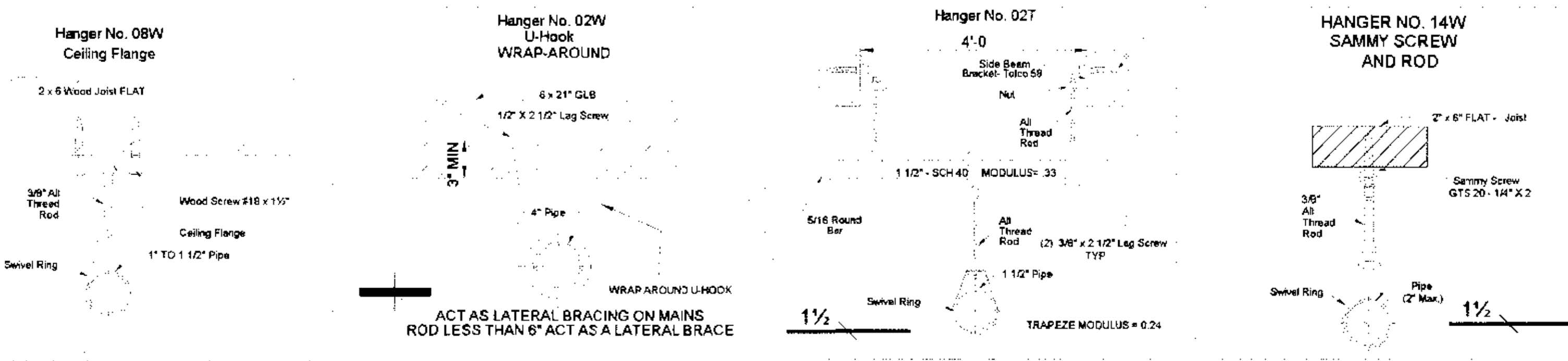
1 28'-0"

Hydraulic Information -2ND FLOOR	
OCCUPANCY CLASSIFICATION	Light Hazard
DENSITY	0.100gpm/ft <sup>2</sup> for 1500.00ft <sup>2</sup> (Actual 1980.48ft <sup>2</sup> )
TOTAL HOSE STREAMS	100.00
TOTAL HEADS FLOWING	23
K-FACTOR	5.6
TOTAL WATER REQUIRED	514.47
TOTAL PRESSURE REQUIRED	43.690
SAFETY MARGIN (psi)	+10.007 (18.6%)



PIPING PLAN  
SCALE: 1/4" = 1'-0"

Sprinkler Legend											
Symbol	Manufacturer	SIN/Model	Quantity	K-Factor	Type	Size	Response	Orifice	Finish	Temperature	Note
●	Generic	TY3132	18	5.6	Pendent	1/2"	Standard	1/2"	White	155°F	
○	Generic	TY3131	37	5.6	Upright	1/2"	Standard	1/2"	Brass	200°F	
			Total = 55								



- FIRE SPRINKLER NOTES:**
- 1) ALL MATERIAL AND METHODS SHALL CONFORM TO THE REQUIREMENTS OF NFPA 13, 2016. 2016 CFC, PART 9, TITLE 24 C.C.R. (2015 UFC AND 2016 CA AMENDMENTS) AND DSA
  - 2) ALL FIRE RATED PENETRATIONS SHALL BE FIRE STOPPED USING AN APPROVED AND EQUALLY RATED MATERIAL.
  - 3) CONSTRUCTION = COMBUSTIBLE, UNOBSTRUCTED CONSTRUCTION
  - 4) SYSTEM TYPE= WET & PRE-ACTION. SEE RISER DETAIL FOR SYSTEM RISER AND LOCATION.
  - 5) HAZARD AREAS:  
LIGHT HAZARD (10 / 15000 sqft). OFFICE / EDUCATION  
ORD GP 1 (15 / AREA); STORAGE ROOM
  - 6) BRANCH LINES ARE WELDED. 1" AND 1 1/2" SCH 40 PIPE WITH 1/2" OUTLETS FITTINGS.
  - 7) MAINS THAT ARE 4" AND LARGER SHALL BE GROOVED SCH. 10 PIPE, WITH WELDED OUTLETS FOR BRANCH LINES, RISER NIPPLES AND SHALL UTILIZE THREADED FITTINGS OR GROOVED.
  - 8) ALL GROOVED COUPLINGS SHALL BE RIGID TYPE UNLESS OTHERWISE INDICATED.
  - 9) ALL DIMENSIONS LINES ARE FROM COLUMN LINES UNLESS OTHERWISE SHOWN OR INDICATED.
  - 10) SWAY BRACING LOCATIONS ARE APPROXIMATE AND SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13, 2016 CHAPTER 9, SECTION 9.3. SEE LOCATION ON PLANS.
  - 11) HYDRAULIC CALCULATION WERE BASED UPON THE FLOW CHARACTERISTICS OF WATER FLOW INFORMATION SITE FLOWTEST. SEE SITE PLAN FOR INFORMATION.
  - 12) EXACT SPRINKLER LOCATIONS SHALL BE FIELD VERIFIED.
  - 13) HANGERS LOCATIONS ARE APPROXIMATE AND SHALL BE INSTALLED AS PER NFPA 13, 2016 CHAPTER 9.
- BRACING NOTES:**
- 1) ALL PIPING LARGER THAN 2.5" DIAMETER, AND FEED MAINS, CROSS MAIN, REGARDLESS OF DIAMETER SIZE REQUIRE SEISMIC BRACING IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS.
  - 2) TRANSVERSE SWAY BRACING:  
- MAX SPACING FOR LATERAL / TRANSVERSE BRACING IS 40 FT  
- DISTANCE BETWEEN LAST BRACE AND PIPE AND NOT EXCEED 8 FT.  
- WHERE THERE IS A CHANGE IN THE DIRECTION PIPING, THE CUMULATIVE DISTANCE BETWEEN CONSECUTIVE LATERAL BRACE SHALL NOT EXCEED 40 FT.  
- TRANSVERSE BRACING SHALL BE ALLOWED TO ACT AS LONGITUDINAL BRACING IF THEY ARE WITHIN 2 FT. OF PIPE CENTERLINE BRACED LONGITUDINALLY.
  - 3) LONGITUDINAL SWAY BRACING:  
- LONGITUDINAL BRACING SPACE 80 FT. MAX  
- LONGITUDINAL BRACING SHALL BE ALLOWED TO ACT AS TRANSVERSE BRACING IF THEY ARE WITHIN 2 FT. OF PIPE  
- DISTANCE BETWEEN LAST BRACE AND PIPE AND OR A CHANGE IN DIRECTION NOT EXCEED 40 FT.
  - 4) SHOW TRANSVERSE AND LONGITUDINAL BRACING LOCATIONS / LAYOUT PER ABOVE REQUIREMENTS.
  - 5) SHOW BRACING CONNECTION TO ROOF / FLOOR FRAMING DETAILS FOR ALL FRAMING MATERIALS ( SUCH AS STEEL BEAMS, SAWN LUMBER, STEEL DECK.
  - 6) NO LAG BOLT OR SHOT PINS FOR BRACING CONNECTIONS.
  - 7) BRACING PIPE Lr < 300 (i.e. SLENDER PIPE NOT ALLOWED)
  - 8) FLEXIBLE PIPE WHERE ACROSS BUILDINGS.

1/4" = 1'-0" FLOOR PLAN KEYNOTES 1/4" = 1'-0"

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novato, california  
project number: 15-148.01  
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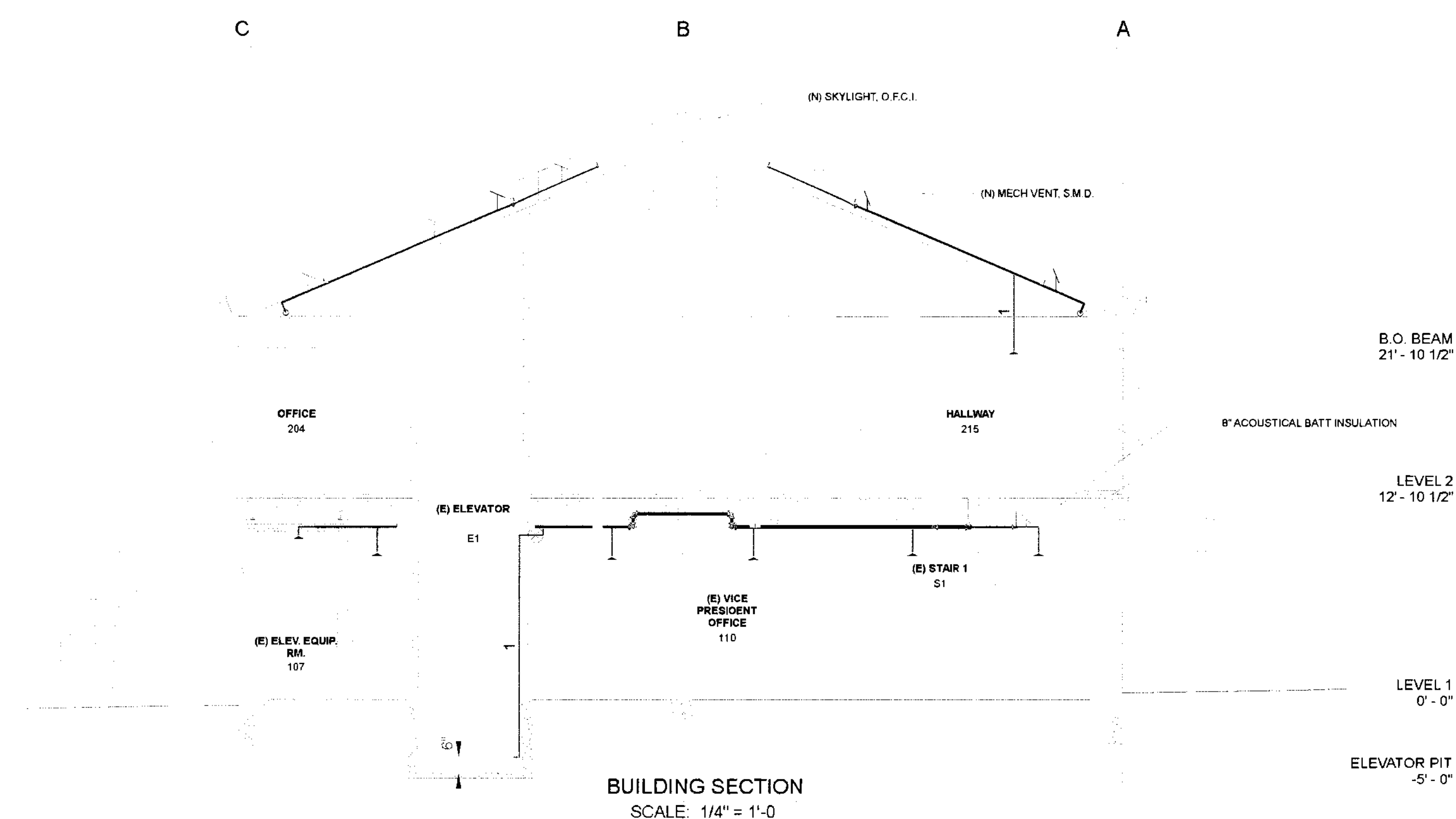
CONSTRUCTION  
DOCUMENTS  
2ND FLOOR  
PIPING PLAN

FP-5

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**BUILDING SECTION**  
SCALE: 1/4" = 1'-0"

**SEISMIC BRACING CALCULATIONS**  
NFPA 13 (2016)

Project: BUILDING 11 Contractor: SIMPLEXGRINNELL FIRE PROTECTION  
Address: 4650 BELCOT DRIVE SACRAMENTO, CA 95833  
Telephone: (916) 283-0300 Fax: (916) 920-2777

BRACE INFORMATION		SEISMIC BRACE ATTACHMENTS	
Length of brace:	7'-0"	Structure attachment fitting:	Make: TOLCO Model: 909
Diameter of brace:	1 in.	Listed load rating:	2017 Adj. load rating: 1007.5
Type of brace:	Schedule 40	Sway brace (pipe attachment) fitting:	Make: TOLCO Model: 1000
Angle of brace:	60 TO 90	Listed load rating:	1265 Adj. load rating: 632.5
Least radius of gyration:	0.42	Br value:	200
Ir value:	200	Maximum horizontal load:	1310

**FASTENER INFORMATION**

Orientation of connecting surface: F

Fastener:  
Type: THUR BOLT  
Diameter: 1/2" X 7"  
Length: 7" (6.25" Embedment)  
Maximum load: 500 lb

**SEISMIC BRACE ASSEMBLY DETAIL**

Labels: 6" X 16 1/2" GLB, 1 1/2" X 7" THRU BOLT, 1" PIPE, FIG 909, FIG 1000, TOP OF RISER BRACE, Lateral brace SB-1, Longitudinal brace SB-2

SPRINKLER SYSTEM ZONE OF INFLUENCE (ZOI) Load Calculation		BRACE IDENTIFICATION	
Pipe Size	Weight (Wt)	Length (L)	Total Wt
1"	11.73	17.97	209.95
Total Zone of Influence (ZOI) Weight (Wp)			280.95

**SEISMIC BRACING CALCULATIONS**  
NFPA 13 (2016)

Project: BUILDING 11 Contractor: SIMPLEXGRINNELL FIRE PROTECTION  
Address: 4650 BELCOT DRIVE SACRAMENTO, CA 95833  
Telephone: (916) 283-0300 Fax: (916) 920-2777

BRACE INFORMATION		SEISMIC BRACE ATTACHMENTS	
Length of brace:	7'-0"	Structure attachment fitting:	Make: TOLCO Model: 909
Diameter of brace:	1 in.	Listed load rating:	2017 Adj. load rating: 1007.5
Type of brace:	Schedule 40	Sway brace (pipe attachment) fitting:	Make: TOLCO Model: FIG 4
Angle of brace:	60 TO 90	Listed load rating:	1265 Adj. load rating: 632.5
Least radius of gyration:	0.42	Br value:	200
Ir value:	200	Maximum horizontal load:	1310

**FASTENER INFORMATION**

Orientation of connecting surface: F

Fastener:  
Type: THUR BOLT  
Diameter: 1/2" X 7"  
Length: 4.5" (6.25" Embedment)  
Maximum load: 480 LB

**SEISMIC BRACE ASSEMBLY DETAIL**

Labels: 3 1/8" X 15" GLB, 1 1/2" X 7" THRU BOLT, 1" PIPE, FIG 4, FIG 909, Lateral brace SB-1, Longitudinal brace SB-2

SPRINKLER SYSTEM ZONE OF INFLUENCE (ZOI) Load Calculation		BRACE IDENTIFICATION	
Pipe Size	Weight (Wt)	Length (L)	Total Wt
1"	11.78	17.97	210.80
Total Zone of Influence (ZOI) Weight (Wp)			270.80

**SEISMIC BRACING CALCULATIONS**  
NFPA 13 (2016)

Project: BUILDING 11 Contractor: SIMPLEXGRINNELL FIRE PROTECTION  
Address: 4650 BELCOT DRIVE SACRAMENTO, CA 95833  
Telephone: (916) 283-0300 Fax: (916) 920-2777

BRACE INFORMATION		SEISMIC BRACE ATTACHMENTS	
Length of brace:	7'-0"	Structure attachment fitting:	Make: TOLCO Model: 909
Diameter of brace:	1 in.	Listed load rating:	2017 Adj. load rating: 1007.5
Type of brace:	Schedule 40	Sway brace (pipe attachment) fitting:	Make: TOLCO Model: 1000
Angle of brace:	60 TO 90	Listed load rating:	1265 Adj. load rating: 632.5
Least radius of gyration:	0.42	Br value:	200
Ir value:	200	Maximum horizontal load:	1310

**FASTENER INFORMATION**

Orientation of connecting surface: F

Fastener:  
Type: THUR BOLT  
Diameter: 1/2" X 7"  
Length: 7" (6.25" Embedment)  
Maximum load: 500 lb

**SEISMIC BRACE ASSEMBLY DETAIL**

Labels: 6" X 16 1/2" GLB 1ST FLOOR, 1 1/2" X 7" THRU BOLT, 1" PIPE, FIG 1000, FIG 909, PIPE DEPTH MIN., Lateral brace SB-1, Longitudinal brace SB-2

SPRINKLER SYSTEM ZONE OF INFLUENCE (ZOI) Load Calculation		BRACE IDENTIFICATION	
Pipe Size	Weight (Wt)	Length (L)	Total Wt
1"	11.78	17.97	210.80
Total Zone of Influence (ZOI) Weight (Wp)			202.06

**SEISMIC BRACING CALCULATIONS**  
NFPA 13 (2016)

Project: BUILDING 11 Contractor: SIMPLEXGRINNELL FIRE PROTECTION  
Address: 4650 BELCOT DRIVE SACRAMENTO, CA 95833  
Telephone: (916) 283-0300 Fax: (916) 920-2777

BRACE INFORMATION		SEISMIC BRACE ATTACHMENTS	
Length of brace:	7'-0"	Structure attachment fitting:	Make: TOLCO Model: 909
Diameter of brace:	1 in.	Listed load rating:	2017 Adj. load rating: 1007.5
Type of brace:	Schedule 40	Sway brace (pipe attachment) fitting:	Make: TOLCO Model: FIG 4
Angle of brace:	60 TO 90	Listed load rating:	1265 Adj. load rating: 632.5
Least radius of gyration:	0.42	Br value:	200
Ir value:	200	Maximum horizontal load:	1310

**FASTENER INFORMATION**

Orientation of connecting surface: F

Fastener:  
Type: THUR BOLT  
Diameter: 1/2" X 7"  
Length: 7" (6.25" Embedment)  
Maximum load: 500 LB

**SEISMIC BRACE ASSEMBLY DETAIL**

Labels: 6" X 16 1/2" GLB, 1 1/2" X 7" THRU BOLT, 1" PIPE, FIG 4, FIG 909, PIPE DEPTH MIN., Lateral brace SB-1, Longitudinal brace SB-2

SPRINKLER SYSTEM ZONE OF INFLUENCE (ZOI) Load Calculation		BRACE IDENTIFICATION	
Pipe Size	Weight (Wt)	Length (L)	Total Wt
1"	11.78	17.97	210.80
Total Zone of Influence (ZOI) Weight (Wp)			97.06

**brick.**

ARCHITECT  
brick  
1265 66th street, suite 1  
emeryville, CA 94608  
510.516.0167  
www.brick-llp.com

CLIENT  
marin community college district  
835 college avenue  
kentfield, ca 94904

Saler: Smarter. Tyco.  
District - 413  
3077 Wiljan Court, Suite B  
Santa Rosa, CA 95407  
-1-707-578-3212

IDENTIFICATION STAMP  
DIV OF THE STATE ARCHITECT  
OFFICE OF REGULATION SERVICES  
01-116787  
AC FL SSS WF  
DATE SEP 12 2011

9/27/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD  
rev date ISSUE

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COM IVC Bldg. 11  
renovation

novato, california  
project number: 16-148-01  
scale: as noted  
date: 03/10/2017

CONSTRUCTION DOCUMENTS  
BUILDING SECTION &  
BRACING DETAILS

# COLLEGE OF MARIN-BUILDING 11 FIRE ALARM SYSTEM

## SITE

INDIAN VALLEY CAMPUS-BUILDING 11  
1800 IGNACIO BLVD  
NOVATO, CA 94949

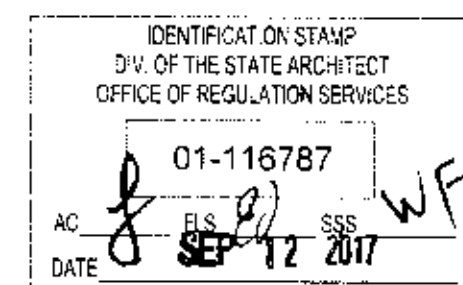
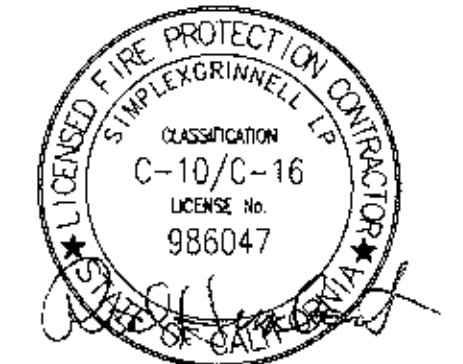
## OWNER

COLLEGE OF MARIN  
835 COLLEGE AVE.  
KENTFIELD, CA 94904

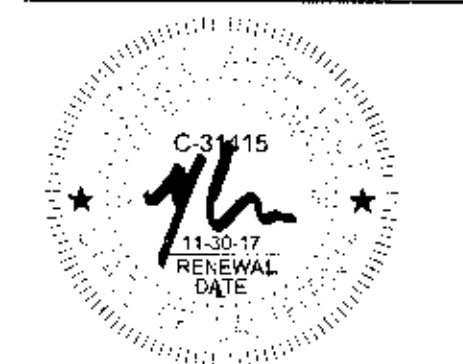
Sheet List Table	
Sheet Number	Sheet Title
FA-001	COVER SHEET
FA-002	GENERAL INFORMATION
FA-100	SITE PLAN
FA-101	DEVICE PLACEMENT PLAN-1ST FLOOR
FA-102	DEVICE PLACEMENT PLAN-2ND FLOOR
FA-201	RISER DIAGRAM
FA-501	PANEL DETAIL
FA-502	NAC PANEL DETAIL
FA-601	CALCULATIONS AND SCHEDULES
FA-701	WIRING TYPICALS
FA-702	WIRING TYPICALS
FA-703	WIRING TYPICALS
FA-704	WIRING TYPICALS

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marin community college district  
835 college avenue  
kentfield, ca 94904



rev	date	issue
9/07/17		DSA BACK CHECK
5/31/17		DSA PLAN REVIEW
3/10/17		100% CD



college of marin -  
indian valley  
campus bldg. 11  
renovation

project number: 999058101

scale: as noted  
date: 04/11/2017

COVER SHEET

FA-001

**tyco**  
**SimplexGrinnell**

Safer. Smarter. Tyco.™

SALES REPRESENTATIVE  
ANTON G. TRAUB  
707-578-3212

3077 WILJAN COURT, SUITE B  
SANTA ROSA, CA 95407

PHONE: 707-578-3212  
SERVICE: 707-578-3212  
FAX: 707-578-3902

DRAWING PREPARED BY  
RICH HUMBERT, SET  
NICET LEVEL IV, #89649

### GENERAL NOTES

- THESE DRAWINGS DEPICT GENERAL LOCATIONS OF LIFE SAFETY EQUIPMENT & FIELD DEVICES. EXACT ROUTING OF CONDUITS TO BE DETERMINED IN THE FIELD BY THE INSTALLING CONTRACTOR TO SUIT CONDITIONS. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD DRAWINGS.
- SHOULD ANY CONDITIONS EXIST THAT DIFFER FROM WHAT IS INDICATED ON THESE DRAWINGS WHICH CAUSE MAJOR DEVIATIONS IN THE WORK SHOWN, THE CONTRACTOR SHALL CONTACT SIMPLEXGRINNELL IN A TIMELY MANNER SO AS NOT TO IMPAIR THE CONSTRUCTION SCHEDULE.
- CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVAL FOR ALL NECESSARY ADJUSTMENTS IN CIRCUITING AS REQUIRED TO ACCOMMODATE THE RELOCATION OF EQUIPMENT AND/OR DEVICES WHICH ARE AFFECTED BY ANY AUTHORIZED CHANGE. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD DRAWINGS.
- A SHIPPED SET OF APPROVED FIRE ALARM DRAWINGS SHALL BE AT THE JOB SITE AND SHALL BE USED FOR INSTALLATION.
- THE POWER CIRCUIT TO THE FACP AND TO THE FIRE ALARM POWER SUPPLIES SHALL BE ON A DEDICATED 120V, 20A BRANCH CIRCUIT BREAKER AND SHALL HAVE A RED MARKING, LOCK-ON PROVISION AND SHALL BE IDENTIFIED AS FIRE ALARM CIRCUIT CONTROL. THE LOCATION OF THE CIRCUIT DISCONNECT MEANS (CIRCUIT BREAKER) SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT.
- UPDATE THE AS-BUILT DRAWING SET DAILY WITH JOB PROGRESS. RETURN THE AS-BUILT DRAWING SET TO SIMPLEXGRINNELL NO LATER THAN 7 DAYS AFTER FINAL TEST.
- THE CONTRACTOR WILL MAINTAIN ALL AREAS OF THE BUILDING IN A NEAT AND WORKMAN LIKE MANNER.
- DO NOT APPLY POWER EXCEPT IN THE PRESENCE OF A FACTORY TRAINED SIMPLEXGRINNELL TECHNICAL REPRESENTATIVE.
- ANY SMOKE DETECTOR HEAD INSTALLED BEFORE THE BUILDING IS CLEANED AND ACCEPTED SHALL BE COVERED TO PROTECT FROM DUST. ANY FALSE ALARMS DUE TO DIRT CONTAMINATED HEADS SHALL BE THE RESPONSIBILITY OF THE FIRE ALARM INSTALLER.
- THE FIRE ALARM INSTALLER WILL MAINTAIN THE FIRE RESISTANCE INTEGRITY OF ALL WALL, CEILING, AND ROOF ASSEMBLIES ANY TIME THAT WORK IS NOT ACTUALLY BEING PERFORMED.
- INSTALLATION OF DEVICES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. POWER LIMITED AND NON-POWER LIMITED FIELD WIRING MUST BE INSTALLED WITHIN THE FACP ENCLOSURE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NEC.
- ALL WIRING SHALL BE INSTALLED ACCORDING TO NFPA 70 (NEC).
- FIRE ALARM CIRCUITS SHALL BE IDENTIFIED IN ACCORDANCE WITH APPROPRIATE SECTION OF NEC 760. MARK ALL FIRE ALARM WIRES IN ACCORDANCE WITH NEC 760 SECTIONS FOR POWER LIMITED AND NON-POWER LIMITED WIRE.
- FIRE ALARM CABLE INSTALLED IN GROUTS, PLENUM, AND OTHER SPACES USED FOR ENVIRONMENTAL AIR SHALL BE TYPE FPLP.
- FIRE ALARM CABLE INSTALLED IN THE VERTICAL RING AND PENETRATING MORE THAN ONE FLOOR OR CABLES INSTALLED IN VERTICAL RINGS IN SHUTS SHALL BE TYPE FPLP.
- FIRE ALARM CABLE INSTALLED IN UNDERGROUND CONDUIT OR OTHER NET LOCATIONS SHALL BE UL LISTED FOR NET LOCATIONS.
- FIRE ALARM CIRCUITS EXTENDING BEYOND ONE BUILDING AND RUN OUTDOORS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 70 ARTICLES 770, 775 AND 800 WHERE APPLICABLE.
- ALL WIRING, INCLUDING SHIELDS MUST BE DRY AND FREE OF SHORTS AND GROUNDS.
- ALL SHIELDS MUST HAVE SHIELD CONTINUITY AT FULL LENGTH OF THE WIRE.
- ONLY SYSTEM WIRING CAN BE RUN IN THE SAME CONDUIT.
- 120VAC IS NOT PERMITTED IN THE SAME CONDUIT WITH LOW VOLTAGE WIRING.
- MAINTAIN 40 PERCENT MINIMUM CONDUIT FILL RATIO AS PER NEC REQUIREMENTS.
- EXISTING CONDUITS MAY BE USED BY THE INSTALLATION CONTRACTOR AS DEEMED NECESSARY, HOWEVER, ANY EXISTING CONDUIT WILL BE USED ONLY IF CONDUITS MEET CURRENT STANDARDS AND CODES. SIMPLEXGRINNELL MAKES NO STATEMENTS WRITTEN OR VERBAL, AS TO THE CONDITION OF EXISTING CONDUITS.

### SYSTEM DESCRIPTION / SCOPE OF WORK

OCCUPANCY TYPE: B BUSINESS GROUP

SPRINKLER PROTECTION: BUILDING WILL BE FULLY SPRINKLED

PROVIDE AND INSTALL A NEW AUTOMATIC AND MANUAL FIRE ALARM SYSTEM AS SHOWN ON DRAWINGS.

REMOVE ALL EXISTING PERIPHERAL EQUIPMENT AND REPLACE AS NEW. INSTALL NEW FIRE ALARM CONTROL PANEL NEXT TO EXISTING PANEL AND REMOVE EXISTING SYSTEM COMPLETELY.

ALL WIRING TO BE CLASS B. WIRING IS STYLE Y FOR NOTIFICATION APPLIANCE CIRCUITS, STYLE B FOR INITIATING DEVICE CIRCUITS, AND STYLE 4 FOR SIGNALING LINE CIRCUITS.

AUTOMATIC FIRE ALARM SYSTEM SHALL TRANSMIT THE ALARM, SUPERVISORY AND TROUBLE SIGNALS TO AN APPROVED SUPERVISING STATION. THE SUPERVISING STATION SHALL BE LISTED AS OTHER DUTY OR LAUS UNDERWRITERS LABORATORY OR SHALL MEET THE REQUIREMENTS OF FACTORY MUTUAL RESEARCH APPROVAL STANDARD 3011. SUPERVISION OF SYSTEM AND LEASED TELEPHONE LINES SHALL BE ARRANGED BY THE OWNER.

### FIRE ALARM APPLICABLE CODES & STANDARDS

CALIFORNIA BUILDING CODE, 2016 EDITION, TITLE 24, PART 2

CALIFORNIA FIRE CODE, 2016 EDITION, TITLE 24, PART 9

CALIFORNIA ELECTRIC CODE, 2016 EDITION, TITLE 24, PART 3

CALIFORNIA ELEVATOR SAFETY CONSTRUCTION CODE, 2016 EDITION

NFPA 72, 2016 EDITION WITH CALIFORNIA AMENDMENTS

### ABBREVIATIONS LEGEND

AC = ABOVE CEILING	HT = HEIGHT
CE = CEILING MOUNTED	HVAC = HEATING, VENTILATION, & AIR CONDITIONING
E = EXISTING TO REMAIN	IMS = INFORMATION MANAGEMENT SYSTEM
RC = EXISTING TO REMOVE AND COVER	MAX = MAXIMUM
RD = EXISTING DEVICE TO BE RELOCATED	MIN = MINIMUM
RL = RELOCATED DEVICE	N/A = NOT APPLICABLE
RR = REMOVE EXISTING AND REPLACE W/NEW	NAC = NOTIFICATION APPLIANCE CIRCUIT EXTERIOR
WP = WEATHERPROOF	NEC = NATIONAL ELECTRICAL CODE
XP = EXPLOSION PROOF	NFPA = NATIONAL FIRE PROTECTION ASSOCIATION
H = HIGH HUMIDITY	NIC = NOT IN CONTRACT
FF = FIBRE FINISHED FLOOR	NPU = NETWORK PROCESSING UNIT
AAU = AUTHORITY HAVING JURISDICTION	NIS = NOT TO SCALE
ALM = ALARM	PAP = PRE-ACTION PANEL
ANN = ANNUNCIATOR	SCC = STATUS COMMAND CENTER
BMS = BUILDING MANAGEMENT SYSTEM	SLC = SIGNALING LINE CIRCUIT
CBC = CALIFORNIA BUILDING CODE	SMK = SMOKE
CD = (CALIFORNIA) CANDELA	SRP = SUPERVISORY
CSFM = CALIFORNIA STATE FIRE MARSHAL	TAC = TRUALENT ADDRESSABLE CONTROLLER
DET = DETECTOR	TABL = TROUBLE
GGP = GATE GATHERING PANEL	TS = TAMPER SWITCH
EDL = END OF LINE	TYP = TYPICAL
EPO = EMERGENCY POWER OFF	UDN = UNLESS OTHERWISE NOTED
FACP = FIRE ALARM CONTROL PANEL	VOC = VOICE COMMAND CENTER
FATC = FIRE ALARM TERMINAL CABINET	VT = VALVE TAMPER
FBO = FURNISHED BY OTHERS	WF = WATER FLOW
FCC = FIRE COMMAND CENTER	W = (66 1/2") WATT
FAL = FIRE ALARM ANNUNCIATOR	W/ = WITH
FIR = FIRE ALARM TRANSDUCER	W/O = WITH OUT
FSD = FIRE SMOKE DAMPER	

### DEVICE ADDRESSING LEGEND

ADDRESSABLE CARD (ONSET OR MAPNET) | DEVICE ADDRESS

M2-1

ADDRESSABLE DEVICES NUMBERING

CHANNEL DESIGNATION | DEVICE ADDRESS

ADDRESSABLE POWER SUPPLY (EPS, TPS) | BRANCH/REPEATER DESIGNATOR (OPT.) (E/F) | BRANCH (E/F) | REPEATER/BRANCH

A1:2-1(1)

ADDRESSABLE NOTIFICATION DEVICE

### NFPA GENERAL NOTES

NFPA 72 (2016) SEC. 7.7.2.1 WITH EVERY NEW SYSTEM, A DOCUMENTATION CABINET SHALL BE INSTALLED AT THE SYSTEM CONTROL UNIT OR AT ANOTHER APPROVED LOCATION AT THE PROTECTED PREMISES.

NFPA 72 (2016) SEC. 7.7.2.2 THE DOCUMENTATION CABINET SHALL BE SIZED SO THAT IT CAN CONTAIN ALL NECESSARY DOCUMENTATION.

NFPA 72 (2016) SEC. 7.7.2.3 ALL RECORD DOCUMENTATION SHALL BE STORED IN THE DOCUMENTATION CABINET.

NFPA 72 (2016) SEC. 7.7.2.5 THE DOCUMENTATION CABINET SHALL BE PROMINENTLY LABELED "SYSTEM RECORD DOCUMENTS".

NFPA 72 (2016) SEC. 7.8.6.2 A RECORD OF COMPLETION DOCUMENTATION SHALL BE COMPLETED BY THE INSTALLING CONTRACTOR AND SUBMITTED TO THE ENFORCING AGENCY (ISA/PROJECT INSPECTOR) AND THE OWNER (SCHOOL DISTRICT) AT THE CONCLUSION OF THE JOB. WHEN MORE THAN ONE CONTRACTOR HAS BEEN RESPONSIBLE FOR THE INSTALLATION, EACH CONTRACTOR SHALL COMPLETE THE PORTIONS OF THE DOCUMENTATION FOR WHICH THAT CONTRACTOR HAS RESPONSIBILITY.

PROJECT INSPECTOR SHALL FIELD VERIFY CORRECT CANDELA SETTING ON STROBES DUE TO FIELD ADJUSTABILITY.

### SYMBOL KEY

#### FIRE ALARM SYMBOLS LEGEND

QTY.	SYMBOL	DESCRIPTION	MODEL#	COMMONLY USED BACKBOX, REFER TO DATA SHEET FOR OTHER OPTIONS	CSFM #
1	FACP	FIRE ALARM CONTROL PANEL W/ 10AH BATTERY SET	SIMPLEX 4007-9201 SIMPLEX 2081-9274	SUPPLIED BY SIMPLEXGRINNELL	7165-0026.0376
1	NAC	NAC EXTENDER PANEL # DESIGNATES THE NAC PANEL NUMBER W/ 6.2AH BATTERY SET	SIMPLEX 4008-9201 SIMPLEX 2081-9272	SUPPLIED BY SIMPLEXGRINNELL	7300-0026.0214
1	FAP	FIRE ALARM COLOR TOUCHSCREEN ANNUNCIATOR PANEL (RED)	SIMPLEX 4006-9202	5 GANG BOX 2 1/2" DEEP	7200-0028.0382
3	MF	NO GRP MANUAL PULL STATION, ADDRESSABLE	SIMPLEX 4099-9021	SINGLE GANG BOX 2 1/2" DEEP	7150-0028.0224
6	SD	SMOKE SENSOR / BASE	SIMPLEX 4058-9714 SIMPLEX 4058-9792 BASE	4" OCTAGONAL BOX 1 1/2" DEEP	7272-0028.0218 7500-0028.0217
3	RM	RELAY RIM	SIMPLEX 4090-9002	4" SQUARE BOX 2 1/8" DEEP W/700 GANG COVER	7900-0028.0223
8	IM	INDIVIDUAL ADDRESSABLE MODULE	SIMPLEX 4090-9001	SINGLE GANG BOX 2 1/2" DEEP WITH COVER	7300-0028.0223
8	MS	WALL MOUNT MULTI-CANDELA STROBE ONLY, RED # = CANDELA RATING	SIMPLEX 4940-WRF	4" SQUARE BOX 1 1/2" DEEP W/4905-9937 ADAPTER SKIRT WHEN SURFACE MOUNTED	7125-0028.0373
3	MS	WALL MOUNT MULTI-CANDELA HORN/STROBE, RED # = CANDELA RATING	SIMPLEX 494W-WRF	4" SQUARE BOX 1 1/2" DEEP W/4905-9937 ADAPTER SKIRT WHEN SURFACE MOUNTED	7125-0028.0373
5	MS	ADDRESSABLE CEILING MOUNT MULTI-CANDELA STROBE ONLY RED # = CANDELA RATING	SIMPLEX 4908-9202	HANDY BOX 1 1/2" DEEP	7125-0028.0235
7	MS	ADDRESSABLE CEILING MOUNT MULTI-CANDELA HORN/STROBE RED # = CANDELA RATING	SIMPLEX 4908-9228	4" SQUARE BOX 1 1/2" DEEP	7125-0028.0236
1	SRP	SUPPRESSION RELEASE PERIPH & ENCLOSURE	SIMPLEX 4090-9006	SUPPLIED BY SIMPLEXGRINNELL	7300-0028.0313
1	SM	COIL SUPERVISORY MODULE	SIMPLEX 2081-9046	SINGLE GANG BOX 2 1/8" DEEP WOODEN	7170-0028.0226
1	AS	ABORT SWITCH	SIMPLEX 2080-9057	SUPPLIED BY SIMPLEXGRINNELL	7300-0028.0313
1	PIV	POST INDICATOR VALVE	SUPPLIED BY OTHERS	INSTALLED BY MECHANICAL CONTRACTOR	
1	W	120V WATERFLOW BELL	SUPPLIED BY OTHERS		
1	HS	HEAT SENSOR / BASE	SIMPLEX 4098-9733 SIMPLEX 4098-9792 BASE	4" OCTAGONAL BOX 1 1/2" DEEP	7270-0028.0216 7300-0028.0217
1	DOC	DOCUMENTS STORAGE	SSU00625		
1	CALL	UNIVERSAL WIRELESS FIRE ALARM COMMUNICATOR	ISC X4010CF		7300-1273.0143

### SEQUENCE OF OPERATION

SYSTEM INPUTS	CONTROL UNIT ANNUNCIATOR	NOTIFICATION	FIRE SAFETY CONTROL	REMARKS
1. SMOKE SENSOR/DETECTOR	*	*	*	
2. MANUAL PULL STATION	*	*	*	
3. ELEVATOR HOISTWAY SMOKE DETECTOR	*	*	*	
4. ELEVATOR LOBBY SMOKE DETECTORS (ECL MAIN FLP)	*	*	*	
5. ELEVATOR MECH. ROOM HEAT DETECTOR	*	*	*	
6. ELEVATOR MECH. ROOM SMOKE DETECTOR	*	*	*	
7.				
8.				
9. ELEVATOR POWER MONITOR	*	*	*	
10. SMOKE DETECTOR IN STORAGE ROOM	*	*	*	
11. WATERFLOW SWITCH	*	*	*	
12. TAMPER SWITCH	*	*	*	
13. FIRE ALARM AC POWER FAILURE	*	*	*	
14. FIRE ALARM SYSTEM LOW BATTERY	*	*	*	
15. OPER. CIRCUIT OR GROUND FAULT	*	*	*	
16. CLASS B NOTIFICATION CIRCUIT (HORN) - SHORT	*	*	*	
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### FIRE ALARM WIRE LIST

CIRCUIT DESCRIPTION	RISER RATED: PPAR	SINGLE CONDUCTOR (THRU/RTN)	PLENUM RATED: FPLP
A ADDRESSABLE NOTIFICATION CIRCUIT 14 AWG STRANDED UNSHIELDED TWISTED PAIR	ANIXTER PART NUMBER FA-1402C-2-1N-03 AREA=0.0449 SQ. INCH	SS ANX/PAGE 454830ARE AREA=0.0559 SQ. INCH	SS ANX/PAGE 454830ARE AREA=0.0559 SQ. INCH
B PLAIN/NO COMMUNICATION 1. PAIR 18 AWG TWISTED OVERALL SHIELD	SS ANX/PAGE 740215 AREA=0.0768 SQ. INCH ANIXTER PART NUMBER FANC-1802C-1-25-0095 740215	SS ANX/PAGE 740215 AREA=0.0768 SQ. INCH	SS ANX/PAGE 740215 AREA=0.0768 SQ. INCH
M POWER CIRCUIT 1. PAIR 18 AWG UNSHIELDED TWISTED (SUBSCRIPT "U" IF MIXED W/SHIELDED)	SS ANX/PAGE 454730ARE AREA=0.0504 SQ. INCH ANIXTER PART NUMBER FA-1802C-1-1N-03-BX 740215	SS ANX/PAGE 454730ARE AREA=0.0504 SQ. INCH	SS ANX/PAGE 454730ARE AREA=0.0504 SQ. INCH
P POWER CIRCUIT 2 CONDUCTOR 16 AWG SOLID (SUBSCRIPT "S" IF RESETTABLE)	SS ANX/PAGE 454730ARE AREA=0.0272 SQ. INCH ANIXTER PART NUMBER FA-1602C-1-1N-03-BX	(1) #18 AWG AREA=0.0072 SQ. INCH (EACH)	SS ANX/PAGE 454730ARE AREA=0.0272 SQ. INCH ANIXTER PART NUMBER FA-1602C-1-2N-03
V VISUAL/SIGNAL CIRCUIT 12 CONDUCTOR 14 AWG STRANDED	ANIXTER PART NUMBER FA-1402C-2-1N-03 AREA=0.0349 SQ. INCH	(2) #14 AWG AREA=0.0087 SQ. INCH (EACH)	SS ANX/PAGE 454830ARE AREA=0.0349 SQ. INCH ANIXTER PART NUMBER FA-1402C-2-2N-03
F FIBER OPTIC CIRCUIT - 2 MULTIMODE FIBERS, 92.5/125 MICRON	INDOOR PLENUM RATED: SRNP ANIXTER PART # 37D-949-TD0-02 AREA=0.0314 SQ. INCH ST CONNECTOR ANIXTER 95-051-52-SP	INDOOR/OUTDOOR PLENUM RATED: SRNP ANIXTER PART # 37D-949-TD0-02 AREA=0.0314 SQ. INCH ST CONNECTOR ANIXTER 95-051-52-SP	SS ANX/PAGE 454730ARE AREA=0.0272 SQ. INCH ANIXTER PART NUMBER FA-1802C-1-2N-03
Z ZONE CIRCUIT 2 CONDUCTOR 16 AWG SOLID	SS ANX/PAGE 454730ARE AREA=0.0272 SQ. INCH ANIXTER PART NUMBER FA-1602C-1-1N-03-BX	(2) #16 AWG AREA=0.0172 SQ. INCH (EACH)	SS ANX/PAGE 454730ARE AREA=0.0272 SQ. INCH ANIXTER PART NUMBER FA-1602C-1-2N-03
CONDUIT SIZE	CONDUCTOR AREA	CONDUIT AREA	CONDUCTOR AREA
1/2"	0.12 SQ INCH *	1-1/4"	0.80 SQ INCH *
3/4"	0.21 SQ INCH *	1-1/2"	0.92 SQ INCH *
1"	0.34 SQ INCH *	2"	1.34 SQ INCH *

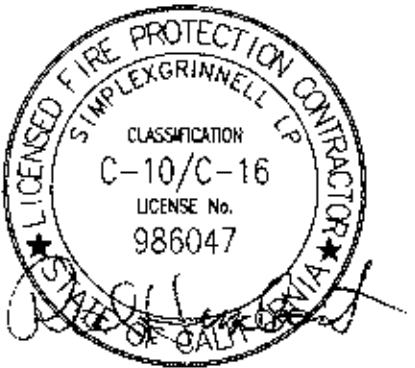
\* USE FPLP FOR NEC.

THE CABLES SPECIFIED HERE ARE FOR REFERENCE OF REQUIRED ELECTRICAL CHARACTERISTICS AS WELL AS CODE REQUIREMENTS. ALTERNATE SUPPLIERS MAY BE SUBSTITUTED PROVIDING EQUIVALENT CHARACTERISTICS ARE MAINTAINED. ITEMS SUCH AS CAPACITANCE BETWEEN CONDUCTORS AND WIRE GAUGE CAN BE CRUCIAL TO THE CIRCUIT DESIGN OF THIS SYSTEM INSTALLATION.

REFERENCE <https://www.onixter.com/customer/tycods> FOR SS ANIXTER CABLE DATA

**ARCHITECT**  
brick  
1266 66th street, suite 1  
emeryville, ca 94608  
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www.brick-llp.com

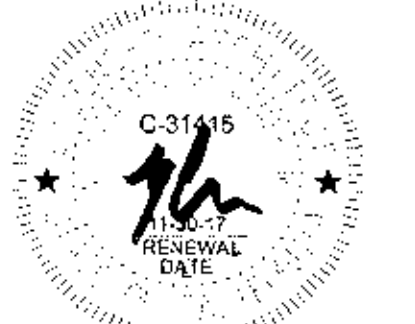
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3/10/17		100% CD



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indian valley  
campus bldg. 11  
renovation

project number: 699058101

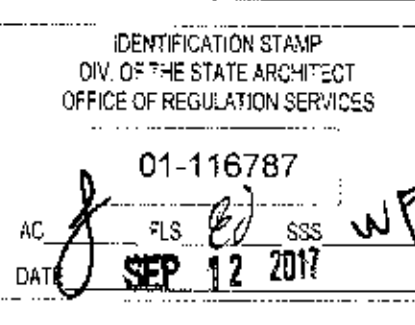
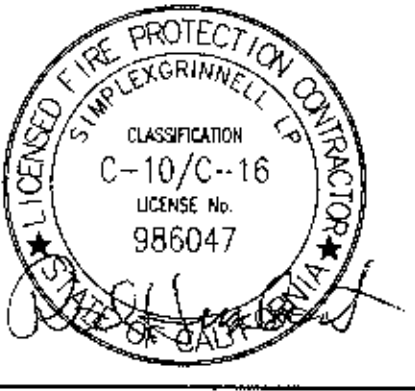
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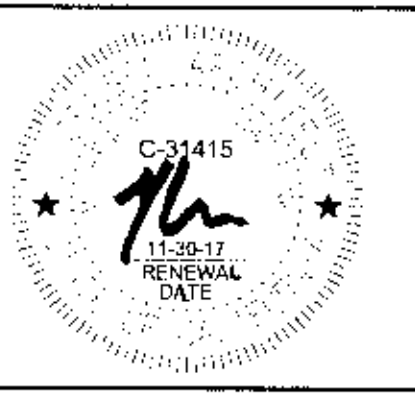
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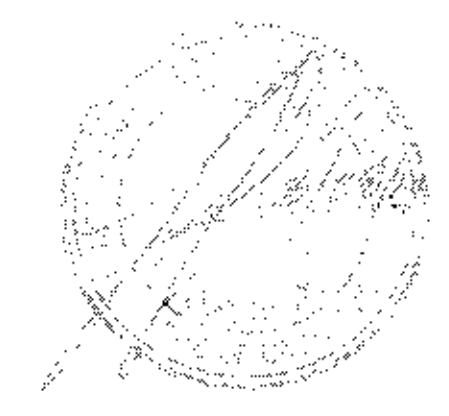
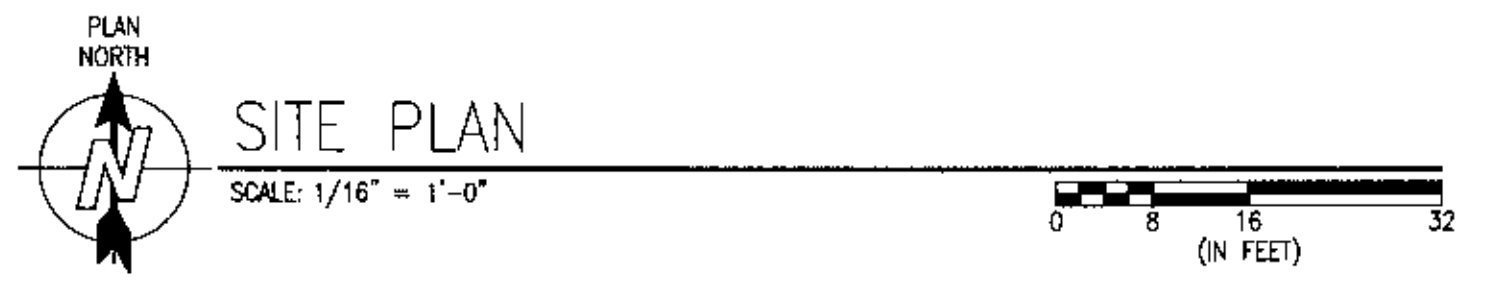
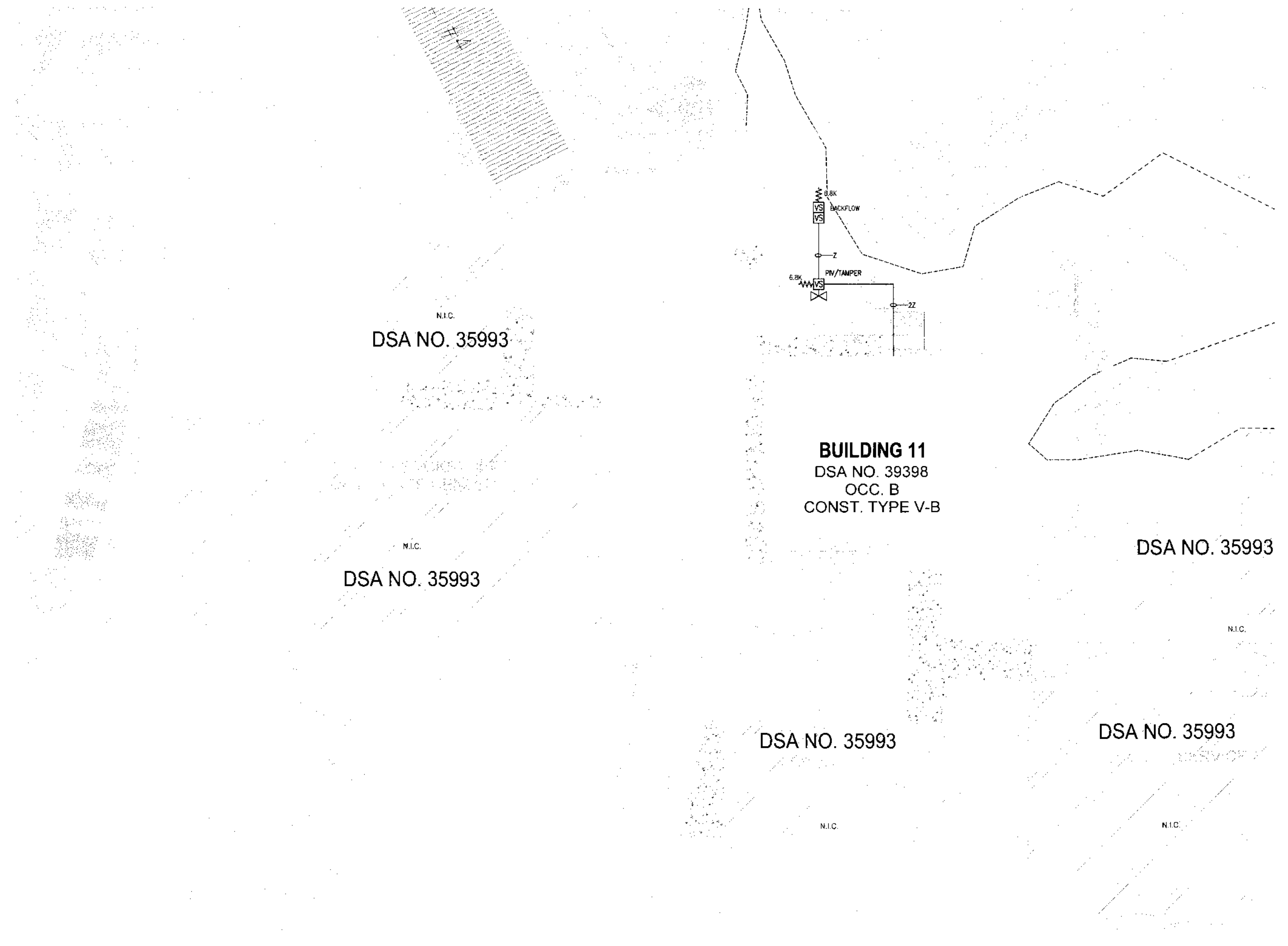
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campus bldg. 11  
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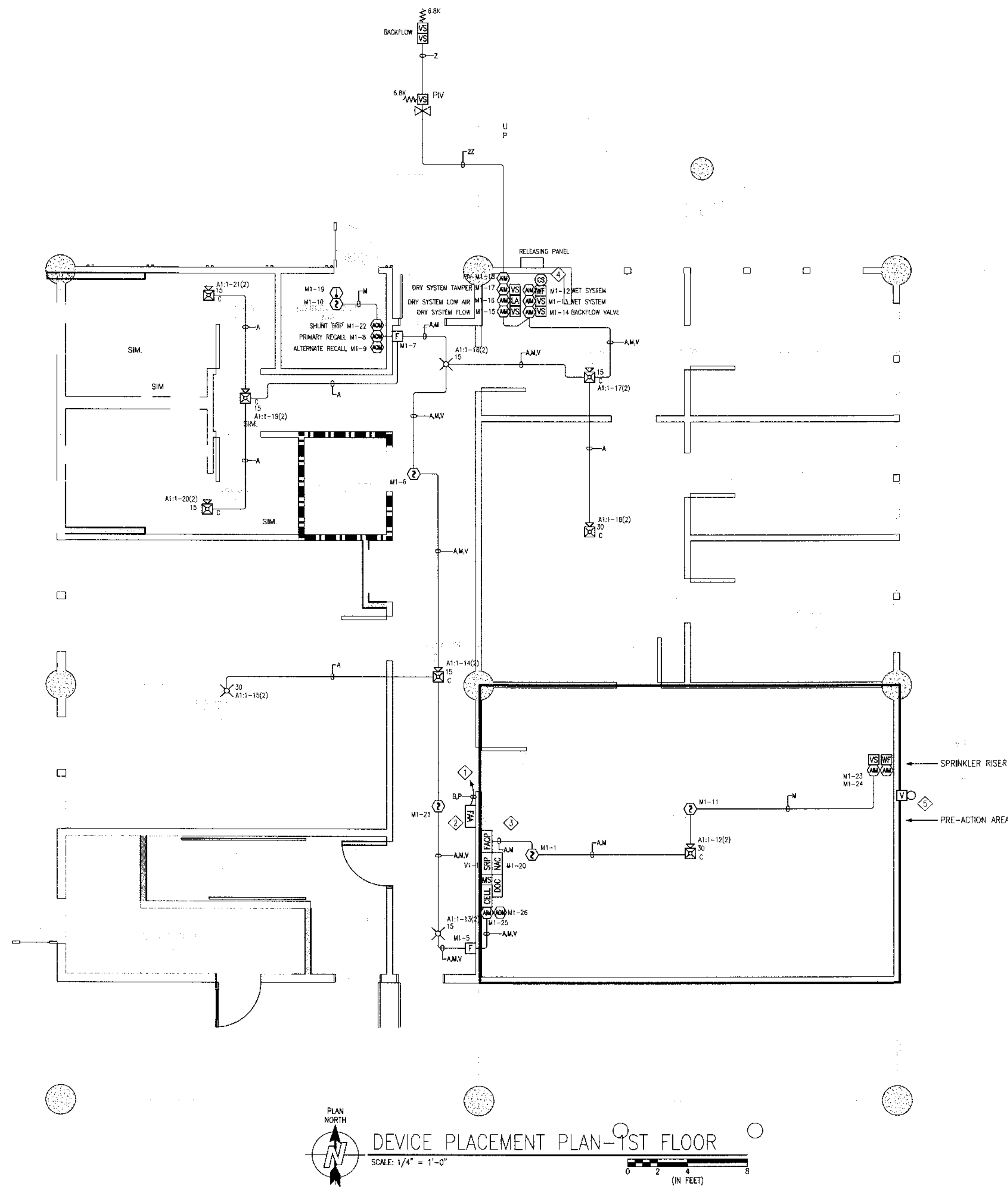
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SITE PLAN

FA-100



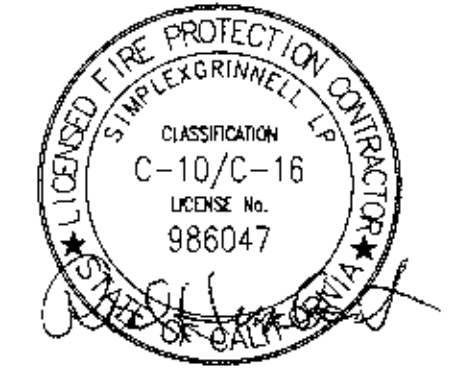
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- GENERAL NOTES:**
1. ALL CEILINGS ARE ASSUMED TO BE 10' A.F.F., SMOOTH CONSTRUCTION UNLESS NOTED OTHERWISE.
  2. ALL NOTIFICATION APPLIANCE CANDELA INTENSITY PLUGS SHALL RETAIN THEIR FACTORY SETTING OF "FACT" UNLESS OTHERWISE DIRECTED BY THE AUTHORITY HAVING JURISDICTION.
- KEYNOTES:**
- 1 TO FACT LOCATED IN FILE STORAGE ROOM 101.
  - 2 VERIFY IN FIELD FOR SEMI-RECESSED UNIT.
  - 3 INSTALLING NEW FACT AND REMOVE THE OLD SYSTEM COMPLETELY.
  - 4 ALL EQUIPMENT TO MONITOR OUTSIDE PRE-ACTION EQUIPMENT AND BACKFLOW VALVES. VERIFY LOCATION FOR ALL DEVICES ON-SITE.
  - 5 120V WATER FLOW BELL BY OTHERS.

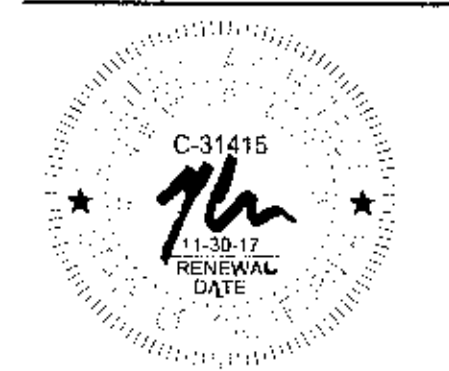
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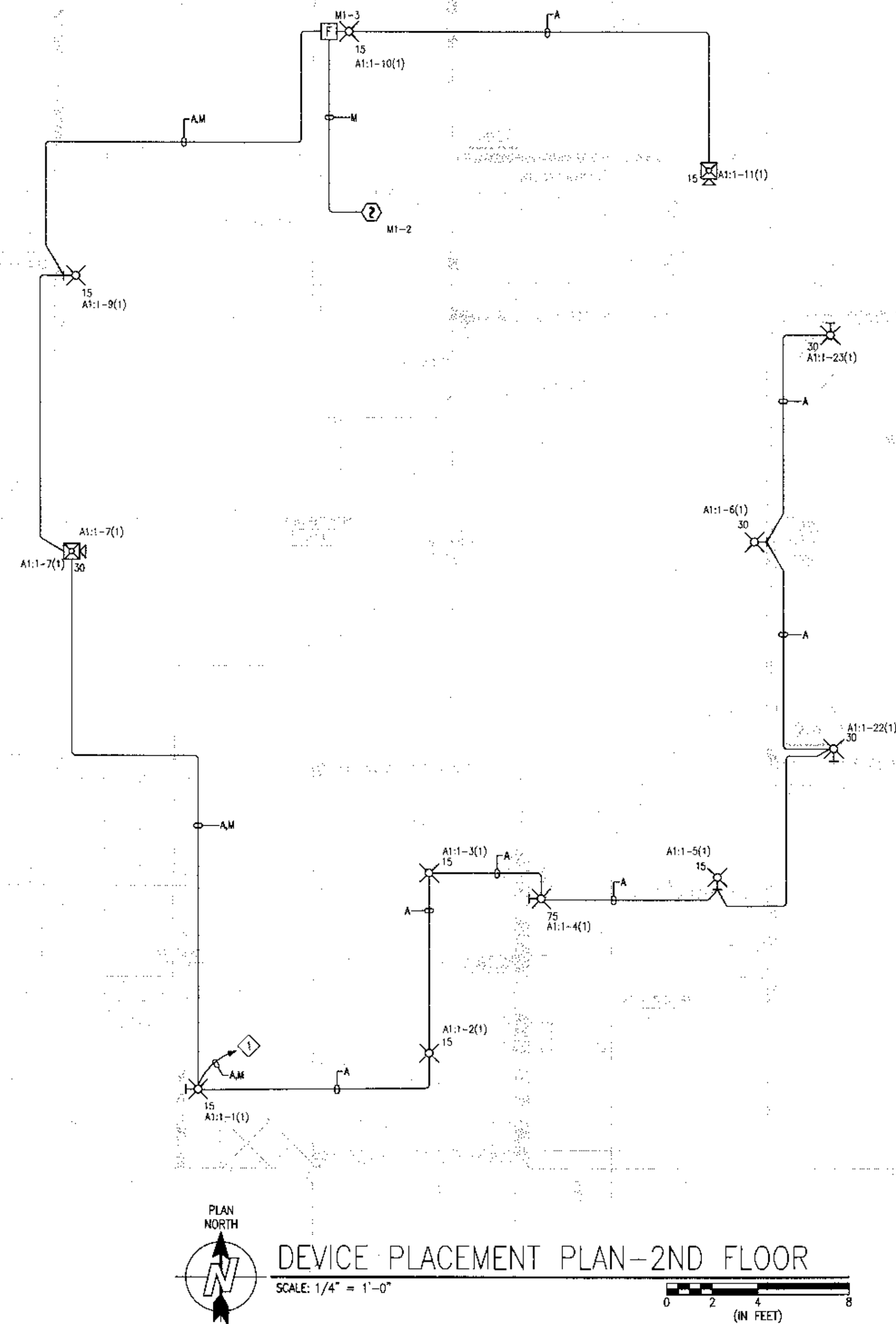
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**DEVICE  
PLACEMENT  
PLAN-1ST FLOOR**

**FA-101**

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**GENERAL NOTES:**

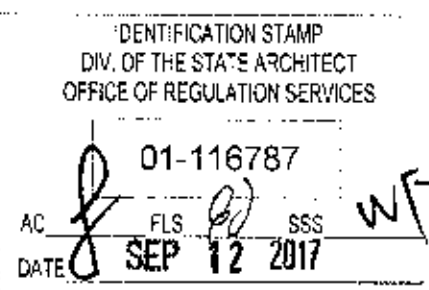
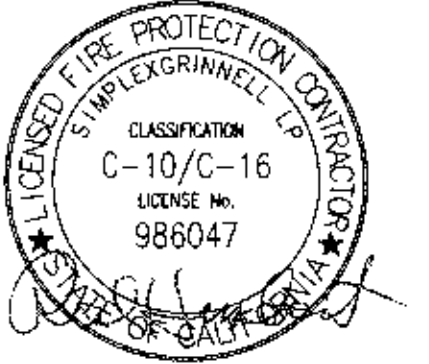
1. ALL CEILINGS ARE ASSUMED TO BE 10' A.F.F., SMOOTH CONSTRUCTION UNLESS NOTED OTHERWISE.
2. ALL NOTIFICATION APPLIANCE (CANDLA INTENSITY PLUGS SHALL RETAIN THEIR FACTORY SETTINGS OF "FACP" UNLESS OTHERWISE DIRECTED BY THE AUTHORITY HAVING JURISDICTION.
3. ROUTE ALL CONDUIT AND WIRE CONNECTIONS TIGHT TO THE CEILING FRAMING AND ALONG PARALLEL FRAMING MEMBERS WHERE POSSIBLE. COORDINATE WITH ARCHITECT PRIOR TO INSTALLATION.

**KEYNOTES:**

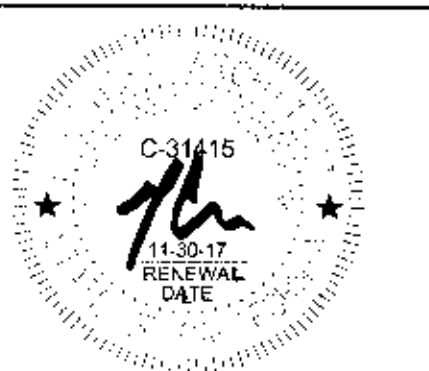
- ① TO FACP LOCATED ON 1ST FLOOR FILE STORAGE ROOM 101

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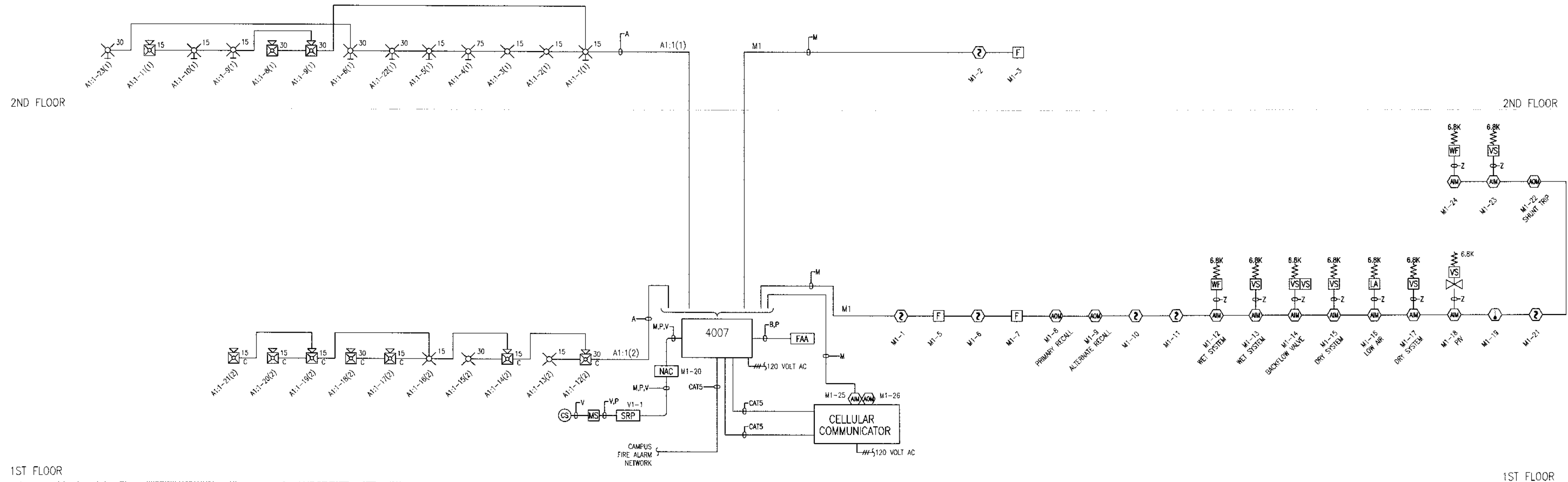
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**DEVICE  
 PLACEMENT  
 PLAN-2ND FLOOR**

**FA-102**

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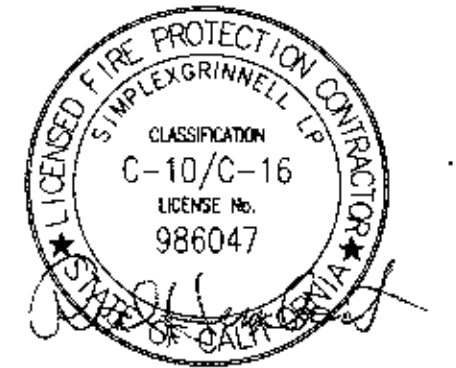


RISER DIAGRAM  
SCALE: NTS



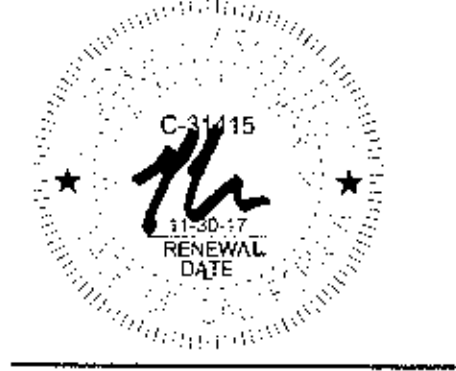
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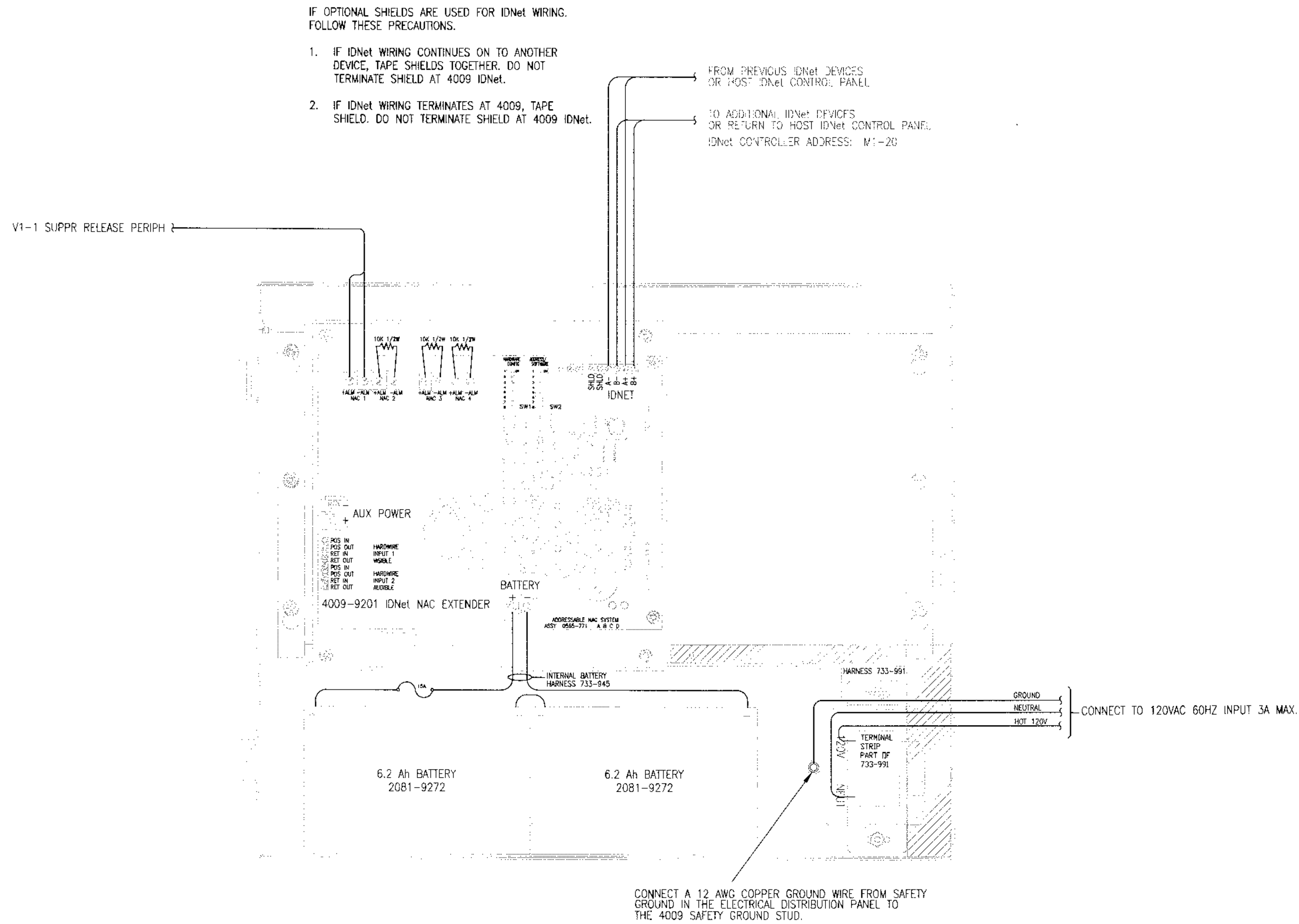
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RISER DIAGRAM



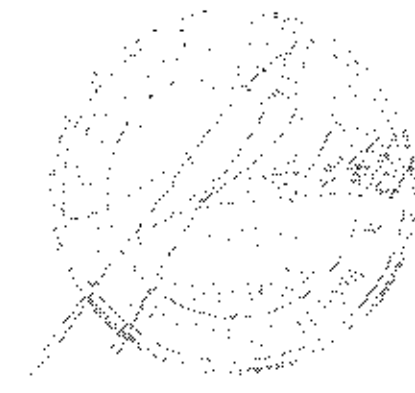


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NAC PANEL DETAIL

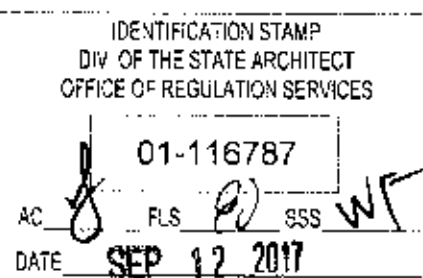
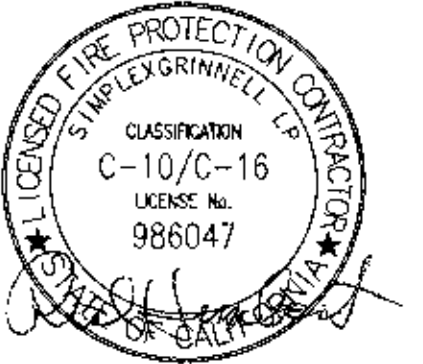
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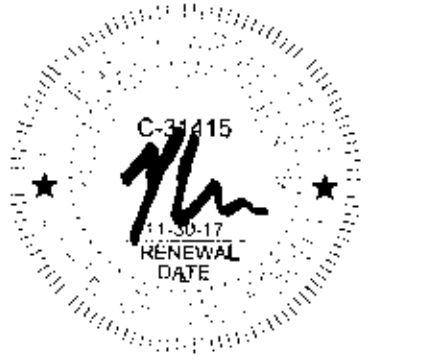
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NAC PANEL DETAIL

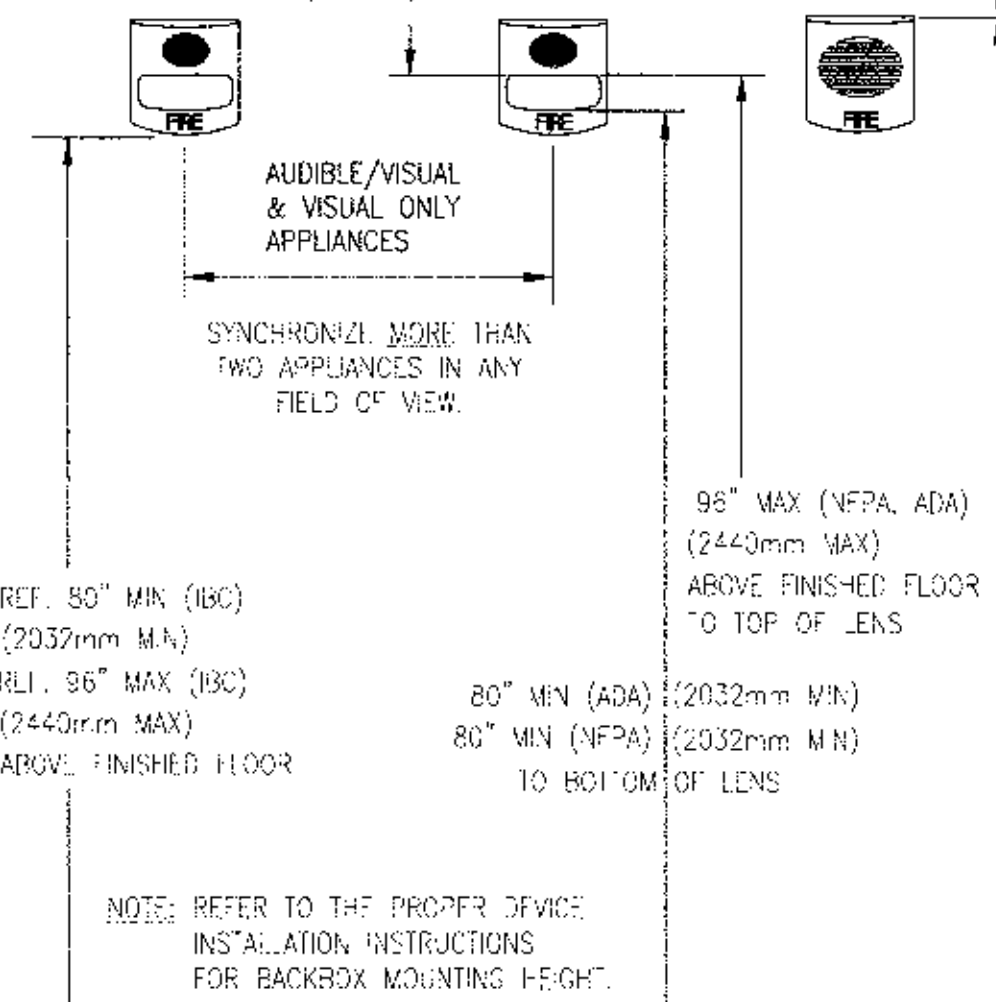
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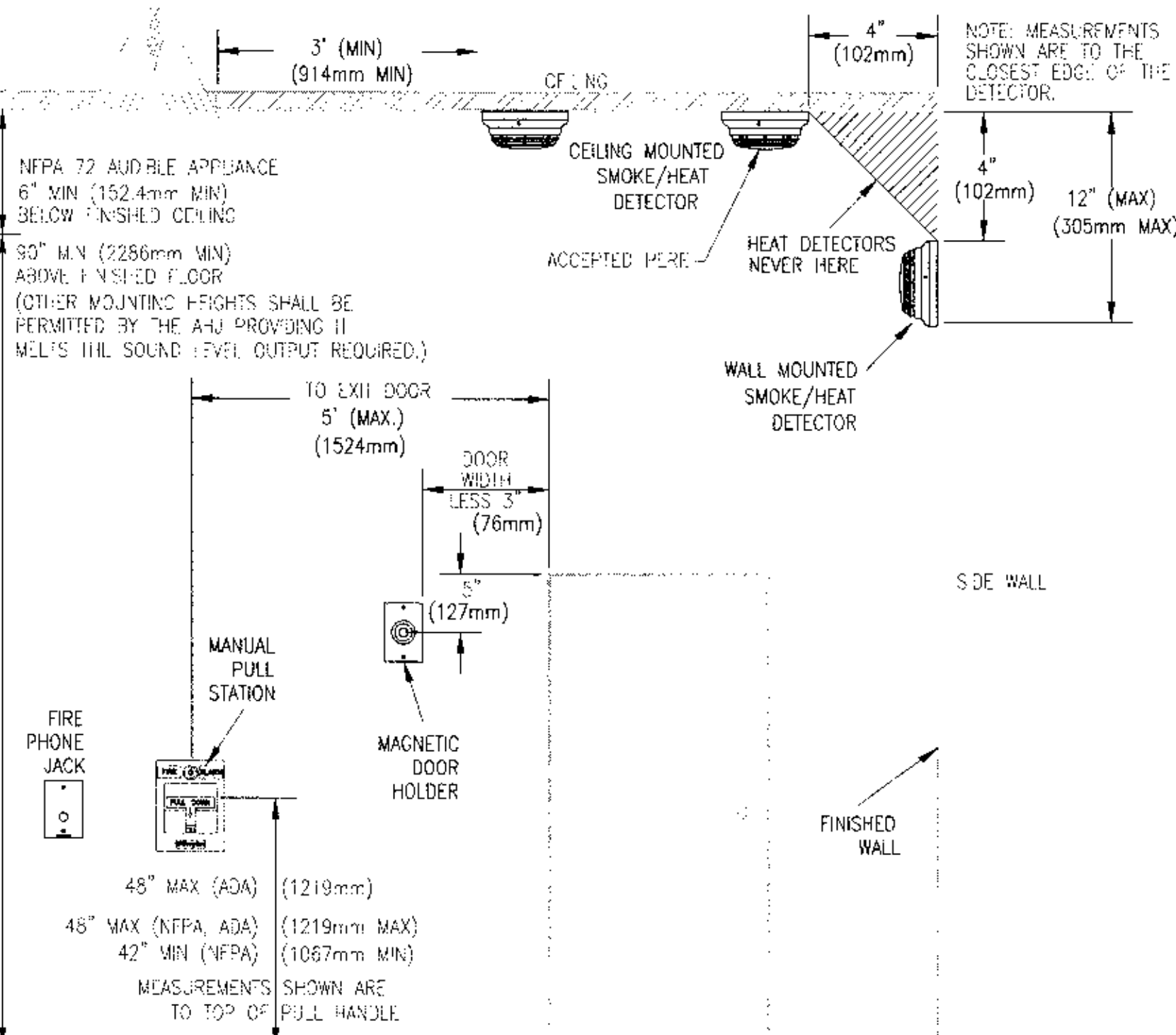
DEVICE MOUNTING HEIGHT REFERENCE (PER NFPA 72)

VISUAL APPLIANCE MOUNTING HEIGHT CONSIDERATIONS IN SLEEPING ROOMS  
 1. MIN DISTANCE IN SLEEPING ROOMS IS 24" (610mm) FROM CEILING TO TOP OF LENS FOR 110CD STROBES WITHIN 16" OF THE PILLOW  
 2. 177CD STROBES, USED IN SLEEPING ROOMS, CAN BE WITHIN THE 24" (610mm) MINIMUM DISTANCE FROM THE CEILING. THE HIGHER INTENSITY IS TO COMPENSATE FOR A POSSIBLE SMOKE LAYER.

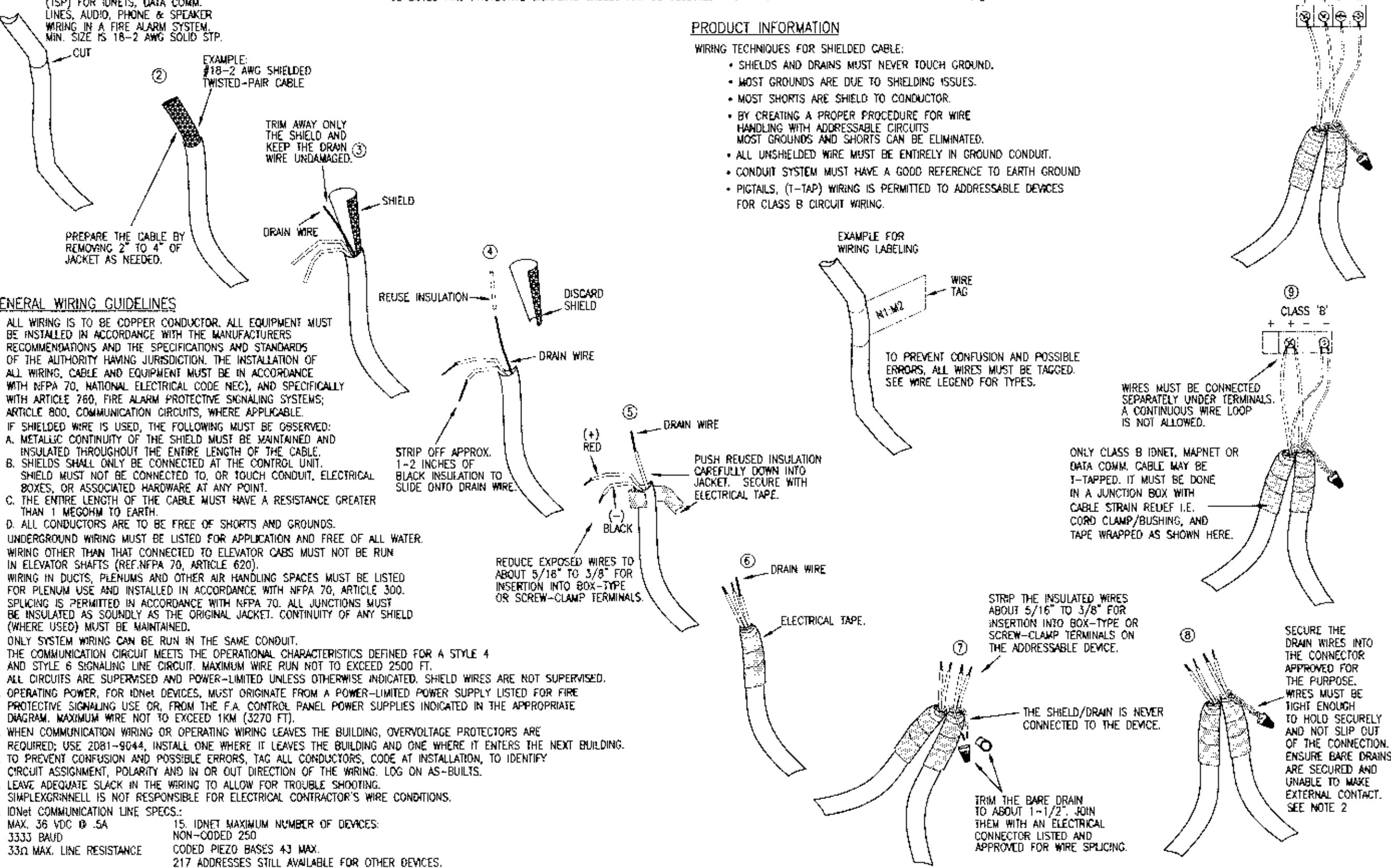
FOR CEILING HEIGHTS LESS THAN 86" (2180mm), THE VISUAL LENS MOUNTING HEIGHT SHALL BE WITHIN 6" (150mm) OF THE CEILING.



A/C SUPPLY OR RETURN DIFFUSER  
 THE 4" REQUIREMENT FOR SMOKE DETECTORS HAS BEEN REMOVED FROM THE 2010 EDITION OF NFPA 72



SIGNALING LINE (ADDRESSABLE) CIRCUITS SHIELDING EXAMPLE

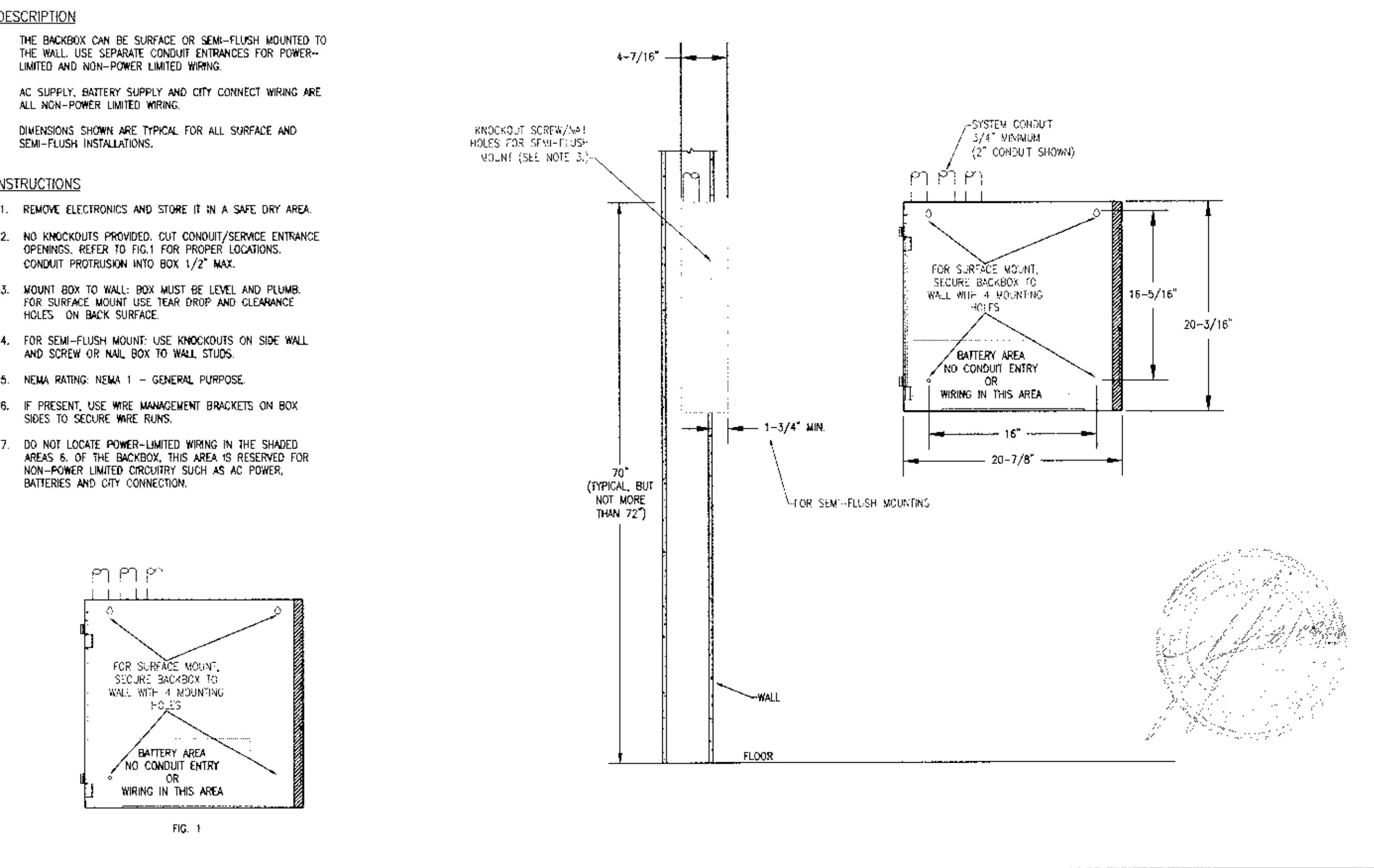


END-OF-LINE RESISTOR CODES

NOTE: REFER TO PANEL/MODULE AND DEVICE INSTALLATION INSTRUCTIONS FOR PROPER TERMINATIONS.  
 \* USE WITH RETROFIT OR HIGH CURRENT MODULE

MODEL	REFERENCE NUMBER	OHMS	1ST BAND	2ND BAND	3RD BAND	4TH BAND	5TH BAND	WATTS	CIRCUIT TYPE	FIRE ALARM PANEL/MODULE
4081-9001	733-892	2.2K	RED	RED	RED	GOLD	N/A	1/2	ANNUNCIATOR (4300)	4004, 4010 (TROUBLE)
4081-9002	733-893	3.3K	ORANGE	ORANGE	RED	GOLD	N/A	1	N.O. INITIATING PULL, SMOKE, HEAT, WATERFLOW, TAMPER, ETC. 24 PT. I/O SWITCH SUPV.	4004*, 4004R, 4005*, 4006, 4100, 4120, 4100U, ZAM'S
4081-9003	733-896	4.7K	YELLOW	VIOLET	RED	GOLD	N/A	1/2	CURRENT LIMITED N.O. INITIATING NOTIFICATION (DACT)	4605-7401, 4100 SERIES
4081-9004	733-886	6.8K	BLUE	GREY	RED	GOLD	N/A	1/2	N.O. INITIATING PULL, SMOKE, HEAT, WATERFLOW, TAMPER, ETC.	4004, 4005, 4090-9001 IDNET IAM 2190-9173 MAPNET 2 PT I/O 4-ZOMA ZAM (TROUBLE)
4081-9005	733-984	1.8K	BROWN	GREY	RED	GOLD	N/A	1/2	CURRENT LIMITED N.O. INITIATING (IN LINE)	4090-9001 IDNET IAM
4081-9006	733-890	560Ω	GREEN	BLUE	BROWN	GOLD	N/A	1	N.C. INITIATING (EOLR)	4005*, 4090-9001 IDNET IAM 4100, 4100U
4081-9007	733-891	1.2K	BROWN	RED	RED	GOLD	N/A	1	N.C. INITIATING (EOLR)	4005
4081-9008	733-894	10K	BROWN	BLACK	ORANGE	GOLD	N/A	1/2	NOTIFICATION	4004, 4005, 4006, 4008, 4009, 4010, 4100, 4100U
4081-9009	733-912	20Ω	RED	BLACK	BLACK	GOLD	N/A	1	TO MR-101 RELAY COIL	4005 & POINT I/O
4081-9010	733-973	1K	BROWN	BLACK	RED	GOLD	N/A	1	N.C. INITIATING (ACROSS CONTACTS) 24 PT. I/O (ACROSS CONTACTS) CURRENT LIMITED N.O. INITIATING (IN SERIES WITH CONTACT)	4005*, 4090-9001 IDNET IAM 4605-7401, 4100 SERIES 4090-9001 IDNET IAM
4081-9011	733-974	100Ω	BROWN	BLACK	BROWN	GOLD	N/A	1/2	ANNUNCIATOR (N2)	4006, 4008, 4010
4081-9012	733-985	22K	RED	RED	ORANGE	GOLD	N/A	1/2	SPEAKER CIRCUIT	4003
4081-9013	734-086	4.99K	YELLOW	WHITE	WHITE	BROWN	BROWN	1/2		
4081-9014	734-092	2.4K	RED	YELLOW	RED	GOLD	N/A	1/2	N.C. INITIATING (SECURITY MONITORING EOLR)	4090-9001 IDNET IAM
4081-9015	734-093	1.5K	BROWN	GREEN	RED	GOLD	N/A	1/2	CURRENT LIMITED N.O. INITIATING (SECURITY MONITORING EOLR)	4090-9001 IDNET IAM
4081-9016	734-149	150K	BROWN	GREEN	YELLOW	GOLD	N/A	1/2		
4081-9017	734-171	3.9K	ORANGE	WHITE	RED	GOLD	N/A	1		
4081-9018	734-168	10K	BROWN	BLACK	ORANGE	GOLD	N/A	1	70VRMS CONSTANT SUPV. NACS	4100-1260
	378-090	8.2K	GRAY	RED	RED	GOLD	N/A	1/2	SECURITY MONITORING (EOLR)	4100, 4100U
	378-046	5.6K	GREEN	BLUE	RED	GOLD	N/A	1/2	N.O. SECURITY MON. (SERIES)	4100, 4100U
	378-069	12K	BROWN	RED	ORANGE	GOLD	N/A	1/2	N.C. SECURITY MON. (SHUNT)	4100, 4100U

4007es BACKBOX INSTALLATION

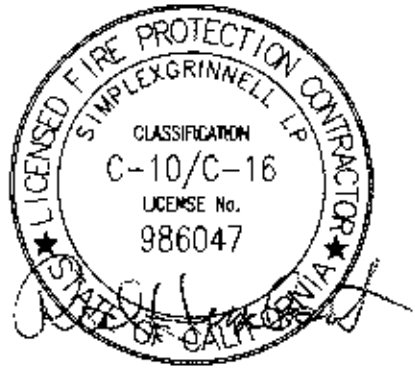


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project number 99058101

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WIRING TYPICALS

FA-701

**PRODUCT INFORMATION 4099-9021 SINGLE ACTION NO GRIP IDNet SLC ADDRESSABLE MANUAL STATION**

**FEATURES:**

- UL LISTED
- SINGLE ACTION, NO GRIP IDNet SLC ADDRESSABLE
- PULL LEVER PROVIDES VISUAL INDICATION
- LED INDICATOR FLASHES DURING COMMUNICATION
- TAMPER RESISTANT RESET KEY LOCK
- MOUNTING: SEMI-FLUSH SURFACE
- OPERATING TEMPERATURE RANGE: 32 - 120° F
- OPERATING HUMIDITY RANGE: 0 - 93% RH
- ADAPTER PLATES 2099-9813 OR 2099-9814 CAN BE USED FOR RETROFIT APPLICATIONS.
- 5" HIGH X 3 3/4" WIDE X 1" DEEP
- SCREW TERMINALS FOR 18 TO 14 AWG WIRE
- ADDRESS BY MEANS OF AN 8 POSITION DIP SWITCH
- COMPATIBLE WITH IDNet SLC/MANET

**INSTALLATION INSTRUCTIONS:**

**SURFACE MOUNTING:**

- COVER & BACKPLATE COME ASSEMBLED.
- UNLOCK STATION, DROP COVER FORWARD TO EXPOSE MOUNTING SCREWS.

**SEMI-FLUSH MOUNTING:**

- COVER & BACKPLATE COME ASSEMBLED.
- UNLOCK STATION, DROP COVER FORWARD TO EXPOSE MOUNTING SCREWS.

**FLUSH MOUNTING:**

- COVER & BACKPLATE COME ASSEMBLED.
- UNLOCK STATION, DROP COVER FORWARD TO EXPOSE MOUNTING SCREWS.

**CONSTRUCTION:**

STATION HOUSING AND PULL LEVER ARE CONSTRUCTED OF COPPERS RESISTANT AND DIRT RESISTANT, HIGH IMPACT LEXAN. HOUSING IS RED WITH RAISED WHITE LETTERING AND PULL LEVER IS WHITE WITH RED RAISED LETTERING.

**APPLICATION:**

PULL STATIONS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72 AND ADA GUIDE LINES.

**INTRODUCTION:**

THE 4099-9021 ADDRESSABLE PULL STATION PROVIDES TWO-STATE STATUS INFORMATION (NORMAL AND SHORT) TO THE IDNet SLC COMPATIBLE FIRE ALARM CONTROL PANEL (FACP) VIA THE IDNet SLC CHANNEL. THE IDNet SLC CHANNEL PROVIDES THE COMMUNICATION LINK BETWEEN THE PULL STATION AND THE FACP AND POWERS THE ENTIRE CIRCUITRY.

**WIRING:**

- ALL WIRING TO COMPLY WITH LOCAL CODE.
- CONDUCTORS MUST TEST FREE OF ALL GROUNDS.
- MAINTAIN CORRECT POLARITY.
- IDNet SLC LINES ARE TO BE 18 AWG TWISTED SHIELDED PAIR
- MAXIMUM LINE RUN FROM PANEL TO FARTHEST DEVICE NOT TO EXCEED 2500 FEET.
- MAXIMUM TOTAL WIRE (INCLUDING ALL T-TAPS) FROM PANEL NOT TO EXCEED 10,000 FEET.
- MAXIMUM QUANTITY OF DEVICES PER CIRCUIT: 250
- TERMINALS 1 AND 2 FOR FIELD WIRING, TERMINALS 3 AND 4 ARE FACTORY WIRING.
- WIRE NUT, SPLICE, OR SOLDER THE SHIELD WIRES
- IF SHIELD IS PRESENT, IT SHOULD BE CONNECTED TO THE OUTGOING IDNet SLC SHIELD TO PROVIDE A CONTINUOUS SHIELD OVER INSULATED FROM THE ELECTRICAL BOX.
- SEE INSTALLATION INSTRUCTIONS 574-332

**PRODUCT INFORMATION 4098-9792 STANDARD SENSOR BASE**

**FEATURES:**

- UL LISTED, FM APPROVED
- TRULIARM ANALOG SENSING PROVIDES DIGITAL TRANSMISSION OF ANALOG SENSOR VALUES VIA MANETNET OR IDNet SLC TWO WIRE COMMUNICATIONS
- FIRE ALARM CONTROL PANEL PROVIDES:
  - INDIVIDUAL SENSITIVITY SELECTION FOR EACH SENSOR
  - BASE VALUE LOGGING ALLOWING ACCURATE ANALYSIS FOR SENSITIVITY SELECTION
  - AUTOMATIC ENVIRONMENTAL COMPENSATION
  - DISPLAY OF SENSITIVITY IN PERCENT PER FOOT
  - MULTI-STATE ALARM OPERATOR
  - ABILITY TO DISPLAY AND PRINT DETAILED SENSOR INFORMATION IN PLAIN ENGLISH LANGUAGE
- PHOTOLECTRIC SMOKE SENSOR 4098-9714:
  - SEVEN LEVELS OF SENSITIVITY FROM 0.2% TO 3.7%
  - IONIZATION SMOKE SENSOR 4098-9717:
    - FOUR LEVELS OF SENSITIVITY FROM 0.5% TO 1.7%
  - HEAT SENSOR 4098-9733:
    - RATE-OF-RISE TEMPERATURE DETECTION IS SELECTABLE AT THE CONTROL PANEL FOR EITHER 120° OR 150° F PER MINUTE
    - FIXED TEMPERATURE SENSING IS INDEPENDENT OF RATE-OF-RISE AND PROGRAMMABLE TO OPERATE AT 135° OR 150° F
    - TRULIARM HEAT SENSORS CAN BE PROGRAMMED AS A UTILITY DEVICE TO MONITOR FOR TEMPERATURE EXTREMES IN THE RANGE FROM 32° F TO 120° F.
- UL STANDARD SPACING:
  - 40 FT SPACING FOR 135° F
  - 40 FT SPACING FOR 155° F
- BASE MOUNTED ADDRESS SELECTION:
  - ACCESSIBLE FROM FRONT (DIP SWITCH UNDER SENSOR)
  - ADDRESS REMAINS WITH ITS PROGRAMMED LOCATION
  - FOR USE WITH SHIMEX 4010, 4100, 4020, AND 4120 SERIES CONTROL PANELS.
  - MAXIMUM QUANTITY OF DEVICES:
    - 127 FOR 4020, 4100, 4120
    - 250 FOR 4010, 4100
  - MOUNTING: CEILING OR WALL
  - COLOR: FIRST WHITE
  - BASE DIMENSIONS: 15/16" X 4-7/8"

**DESCRIPTION:**

THE TRULIARM SENSOR BASES CONTAIN INTEGRAL ADDRESSABLE ELECTRONICS THAT CONSTANTLY MONITOR THE STATUS OF THE DETACHABLE PHOTOLECTRIC, IONIZATION, OR HEAT SENSORS. EACH SENSORS OUTPUT IS DIGITIZED AND TRANSMITTED TO THE SYSTEM FIRE ALARM CONTROL PANEL EVERY FOUR SECONDS. SINCE TRULIARM SENSORS USE THE SAME BASE, DIFFERENT SENSOR TYPES CAN BE EASILY INTERCHANGED TO MEET SPECIFIC LOCATION REQUIREMENTS. THIS FEATURE ALLOWS SENSOR SUBSTITUTION DURING BUILDING CONSTRUCTION. WHEN CONDITIONS ARE TEMPORARILY DUSTY, INSTEAD OF COVERING THE SMOKE SENSORS, HEAT SENSORS MAY BE INSTALLED WITHOUT REPROGRAMMING THE CONTROL PANEL. ALTHOUGH THE CONTROL PANEL WILL INDICATE AN INCORRECT SENSOR TYPE, THE HEAT SENSOR WILL OPERATE AS A DEFAULT SENSITIVITY PROVIDING HEAT DETECTION FOR BUILDING PROTECTION AT THAT LOCATION.

**WIRING:**

- ALL WIRING TO COMPLY WITH LOCAL CODE.
- CONDUCTORS MUST TEST FREE OF ALL GROUNDS.
- MAINTAIN CORRECT POLARITY.
- MANETNET/IDNet SLC WIRING TO BE #18 AWG TWISTED SHIELDED PAIR
- IF SHIELD IS PRESENT, CONNECT TO THE OUTGOING IDNet SLC SHIELD TO PROVIDE A CONTINUOUS SHIELD OVER THE LENGTH OF THE IDNet SLC CHANNEL. METHOD OF SPICE DETERMINED BY AHJ.
- REFER TO INSTALLATION INSTRUCTIONS 574-707
- REFER TO APPLICATION MANUAL (574-708)

**PRODUCT INFORMATION TrueAlert™ ES (STYLE 4 SLC) VISIBLE ONLY NOTIFICATION APPLIANCES 49V0 SERIES**

**FEATURES:**

- INDIVIDUALLY ADDRESSABLE WALL MOUNT VISIBLE NOTIFICATION APPLIANCE WITH EFFICIENT ELECTRONIC HIGH INTENSITY STROBE PROVIDED
- SUPERVISION OF EACH INDIVIDUAL APPLIANCE'S WIRING AND CONNECTIONS
- ABILITY TO CONNECT USING "T" TAPPING FOR CLASS B/STYLE 4 CIRCUITS TO SHUNT WIRING
- HORN'S CONTROLLED SEPARATELY FROM STROBES ON THE SAME 2-WIRE CIRCUIT ALLOWING "ON-UNTIL-SILENCED" AND "ON-UNTIL-RESET"
- XENON STROBE OUTPUT IS MANUALLY SELECTABLE FOR 15, 30, 75, 110, 135 AND 185 CANDELA OR "FACP". THE "FACP" SETTING ALLOWS THE 1100 TO PROGRAM THE CANDELA SETTING.
- IN/OUT WIRING ACCESSIBLE FROM FRONT OF HOUSING PROVIDES EASY ACCESS FOR INSTALLATION, INSPECTION, AND TESTING OF APPLIANCES AND WIRING
- MAGNETIC TEST DIAGNOSTICS TO ASSIST CHECKOUT AND TESTING OF APPLIANCES AND WIRING
- UL LISTED TO STANDARD 1971
- LED INDICATOR AND MAGNETIC TEST FEATURE:
  - LED INDICATOR CAN BE ELECTED TO DISPLAY EACH POLLING CYCLE TO INDICATE APPLIANCE SUPERVISION
  - WHEN THE TRULIARM CONTROLLER IS IN DIAGNOSTIC MODE, THE MAGNETIC TEST PULSES THE LED TO INDICATE APPLIANCE ADDRESS AND IS SELECTABLE TO ALSO BRIEFLY FLASH THE STROBE TO CONFIRM OPERATION
- TRULIARM 2-WIRE ADDRESSABLE CONTROL OF VISIBLE AND AUDIBLE NOTIFICATION ACTIVATES APPLIANCES WITH:
  - HORN'S SOUNDED AS TEMPORAL OR MARCH TIME PATTERN, OR ON CONTINUOUSLY, CONTROLLED SEPARATELY FROM VISIBLE APPLIANCES ON THE SAME TWO-WIRE CIRCUIT

**SPECIFICATIONS:**

STROBE:

RATED VOLTAGE RANGE: 17 TO 31 VDC  
 SUPERVISORY REQUIREMENTS: 1 UNIT LOAD  
 STROBE FLASH RATE: 1 Hz

MODEL NUMBER	COVER COLOR	LETTERING COLOR	LENS COLOR	CURRENT VALUES ARE UL 1971 MAX RATING FOR THE GIVEN VOLTAGE LEVEL
49V0-WRF-(BA)	RED	WHITE	CLEAR	23 VRMS 0.047 0.057 0.100 0.132 0.160 0.208
			AMBER	23 VRMS 0.062 0.075 0.133 0.178 **0.214 **0.281
			BLUE	23 VRMS 0.067 0.103 0.171 0.250 **0.282
			*10cld *20cld *45cld *75cld *95cld	
49V0-WWF-(BA)	WHITE	RED	GREEN	23 VRMS 0.054 0.078 0.128 0.184 0.211
			AMBER	23 VRMS 0.064 0.103 0.171 0.250 **0.282
			BLUE	23 VRMS 0.067 0.103 0.171 0.250 **0.282
			*10cld *20cld *45cld *75cld *95cld	

**WIRING NOTES:**

- REFER TO FIELD WIRING DIAGRAMS OF THE DRAWING TRULIARM COMPATIBLE CONTROLLER FOR ADDITIONAL SLC WIRING INFORMATION.
- NOTIFICATION APPLIANCES ARE RATED PER INDIVIDUAL NAMEPLATE LABEL.
- MAINTAIN CORRECT POLARITY ON TERMINAL CONNECTIONS. DO NOT LOOP WIRES UNDER TERMINALS.
- ALL TRULIARM SLC WIRING CONNECTIONS ARE SUPERVISED AND POWER-LIMITED.
- POWERING THE V/O FROM AN APPLIANCE POWER SOURCE LESS THAN 17 VDC OR GREATER THAN 32 VDC MAY CAUSE PERMANENT DAMAGE TO THE V/O UNIT.
- THE TRULIARM V/O CAN ONLY BE OPERATED THROUGH A 4099 TRULIARM ADDRESSABLE CONTROLLER OR TRULIARM COMPATIBLE FACP.

**PRODUCT INFORMATION TrueAlert™ (STYLE 4) VISIBLE NOTIFICATION APPLIANCES 4906 SERIES**

**FEATURES:**

- INDIVIDUALLY ADDRESSABLE HIGH INTENSITY VISIBLE NOTIFICATION APPLIANCE (STROBE) PROVIDES:
  - SUPERVISION OF EACH INDIVIDUAL APPLIANCE'S WIRING AND CONNECTIONS
  - ABILITY TO CONNECT USING "T" TAPPING FOR CLASS B/STYLE 4 CIRCUITS TO SIMPLIFY WIRING
  - COMPATIBILITY WITH ADA REQUIREMENTS
  - MAGNETIC TEST DIAGNOSTICS TO ASSIST CHECKOUT AND TESTING OF APPLIANCES AND WIRING
  - XENON STROBE OUTPUT IS MANUALLY SELECTABLE FOR 10, 30, 75, 110 CANDELA OR "FACP". THE "FACP" SETTING ALLOWS THE 4100 TO PROGRAM THE CANDELA SETTING.
  - UL LISTED TO STANDARD 1971
  - LED INDICATOR AND MAGNETIC TEST FEATURE:
    - LED INDICATOR CAN BE ELECTED TO DISPLAY EACH POLLING CYCLE TO INDICATE APPLIANCE SUPERVISION
    - WHEN THE TRULIARM CONTROLLER IS IN DIAGNOSTIC MODE, THE MAGNETIC TEST PULSES THE LED TO INDICATE APPLIANCE ADDRESS AND IS SELECTABLE TO ALSO BRIEFLY FLASH THE STROBE TO CONFIRM OPERATION
  - TRULIARM NOTIFICATION APPLIANCE DESIGN PROVIDES FLEXIBLE, EASY, AND CONVENIENT FLUSH OF SURFACE WALL BOX MOUNTING:
    - REAR OF HOUSING DOES NOT EXTEND INTO BOX AND EASILY MOUNTS TO SINGLE GANG ELECTRICAL BOX

**WIRING NOTES:**

- REFER TO FIELD WIRING DIAGRAMS OF THE DRAWING TRULIARM COMPATIBLE CONTROLLER FOR ADDITIONAL SLC WIRING INFORMATION.
- THIS RANGE MAY CAUSE PERMANENT DAMAGE TO THE APPLIANCE. PLEASE NOTE THAT 17 VRMS IS THE LOWEST OPERATING VOLTAGE THAT IS ALLOWED AT THE LAST APPLIANCE ON THE TRULIARM NOTIFICATION APPLIANCE CIRCUIT UNDER WORST CASE CONDITIONS. VOLTAGE DROP AND STANDBY BATTERY CALCULATIONS SHOULD BE MADE USING ANTICIPATED OPERATING CONDITIONS. LOW HORN SETTING DRAWS APPROXIMATELY 5 mA LESS CURRENT AT EACH VOLTAGE LISTED.
- VOLTAGE DROPS AND STANDBY BATTERY CALCULATIONS SHOULD BE MADE USING ANTICIPATED OPERATING CONDITIONS. OPERATION ABOVE 24VRMS DRAWS LESS CURRENT.

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**LICENSED FIRE PROTECTION CONSULTANT**  
 CLASSIFICATION  
 C-10/C-16  
 LICENSE NO.  
 986047

**IDENTIFICATION STAMP**  
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 OFFICE OF REGULATION SERVICES

01-116787  
 AC. J.S.L.S. SSS W.F.  
 DATE SEP 27 2011

9/07/17	DSA BACK CHECK
5/31/17	DSA PLAN REVIEW
3/10/17	100% CD
rev date	issue

**REVIEW**  
 03/15  
 4/30/17  
 REVIEWED  
 DATE

college of marin -  
 indian valley  
 campus bldg. 11  
 renovation

project number: 99808101

scale: as noted  
 date: 04/11/2017

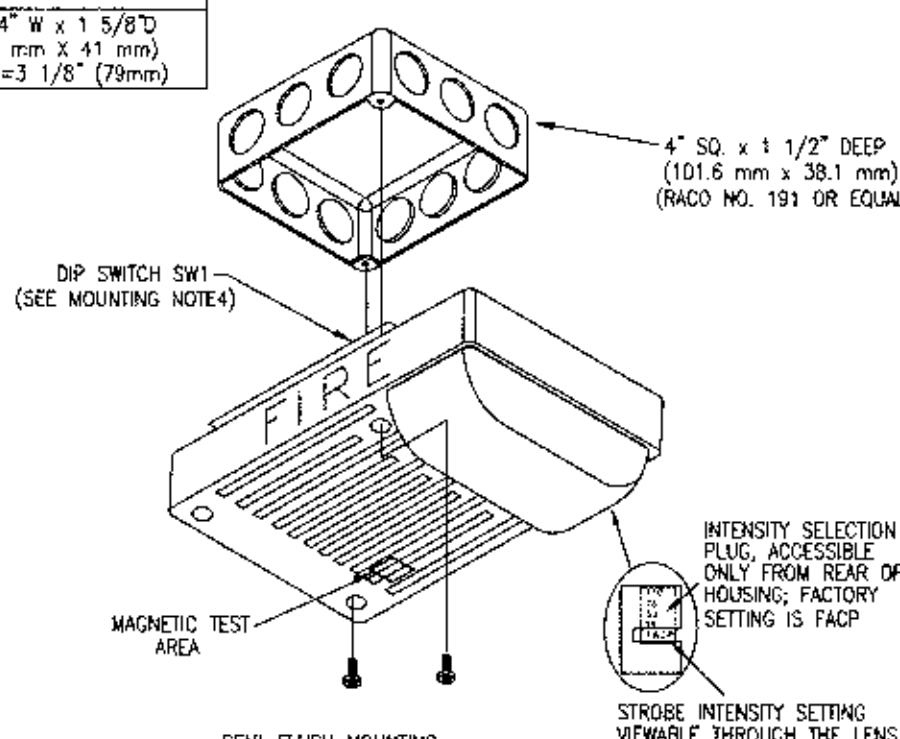
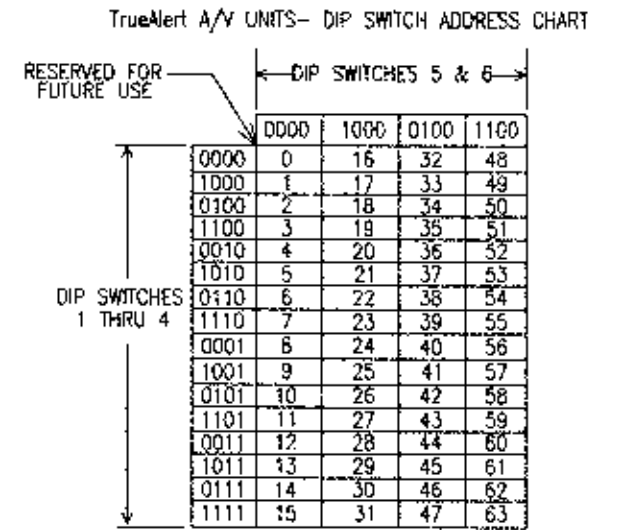
**WIRING TYPICALS**

**TrueAlert™ (STYLE 4) AUDIO/VISIBLE NOTIFICATION APPLIANCES 4906 SERIES**

**PRODUCT INFORMATION**  
**FEATURES:**  
 INDIVIDUALLY ADDRESSABLE AUDIBLE/VISIBLE NOTIFICATION APPLIANCES WITH EFFICIENT ELECTRONIC HORN AND HIGH INTENSITY KENON STROBE PROBES:  
 • SUPERVISION OF EACH INDIVIDUAL APPLIANCE'S WIRING AND CONNECTIONS  
 • ABILITY TO CONNECT USING "T" TAPPING FOR CLASS B/STYLE 4 CIRCUITS TO SIMPLIFY WIRING  
 • HORNS CONTROLLED SEPARATELY FROM STROBES ON THE SAME 2-WIRE CIRCUIT ALLOWING "ON-UNTIL-SILENCED" AND "ON-UNTIL-RESET" USING A SINGLE ADDRESS  
 • KENON STROBE OUTPUT IS MANUALLY SELECTABLE FOR 15, 30, 75, 110 CANDELA OR "FACP" THE "FACP" SETTING ALLOWS THE 4100 TO PROGRAM THE CANDELA SETTING  
 • MAGNETIC TEST DIAGNOSTICS TO ASSIST CHECKOUT AND TESTING OF APPLIANCES AND WIRING  
 LED INDICATOR AND MAGNETIC TEST FEATURE:  
 • LED INDICATOR CAN BE SELECTED TO DISPLAY EACH POLLING CYCLE TO INDICATE APPLIANCE SUPERVISION  
 • WHEN THE TrueAlert CONTROLLER IS IN DIAGNOSTIC MODE, THE MAGNETIC TEST PULSES THE LED TO INDICATE APPLIANCE ADDRESS AND IS SELECTABLE TO ALSO BRIEFLY FLASH THE STROBE TO CONFIRM OPERATION  
 TrueAlert 2-WIRE ADDRESSABLE CONTROL OF VISIBLE AND AUDIBLE NOTIFICATION ACTIVATES APPLIANCES WITH:  
 • HORNS SOUNDED AS TEMPORAL OR MARCH TIME PATTERN, OR ON CONTINUOUSLY CONTROLLED SEPARATELY FROM VISIBLE APPLIANCES ON THE SAME TWO-WIRE CIRCUIT  
 • UL LISTED TO STANDARD 1871  
 TrueAlert NOTIFICATION APPLIANCE DESIGN PROVIDES AUDIBLE NOTIFICATION APPLIANCE (HORN)  
 • CONTROLLER CAN BE SELECTED FOR "HIGH" OUTPUT OR A "LOW" OUTPUT SOUND LEVEL (-5 dbA DIFFERENCE)  
 • UL LISTED TO STANDARD 484

**MOUNTING ADAPTERS AND BOXES**

MODEL NUMBER	DESCRIPTION	DIMENSIONS
4905-9915	SURFACE MOUNT WHITE ADAPTER SKIRT, USE TO COVER 1 1/2" DEEP SURFACE MOUNTED BOXES	5 3/8" H x 6 1/4" W x 1 5/8" D (138 mm X 153 mm X 41 mm) DEPTH WITH HORN = 3 1/8" (79mm)



**SPECIFICATIONS:**

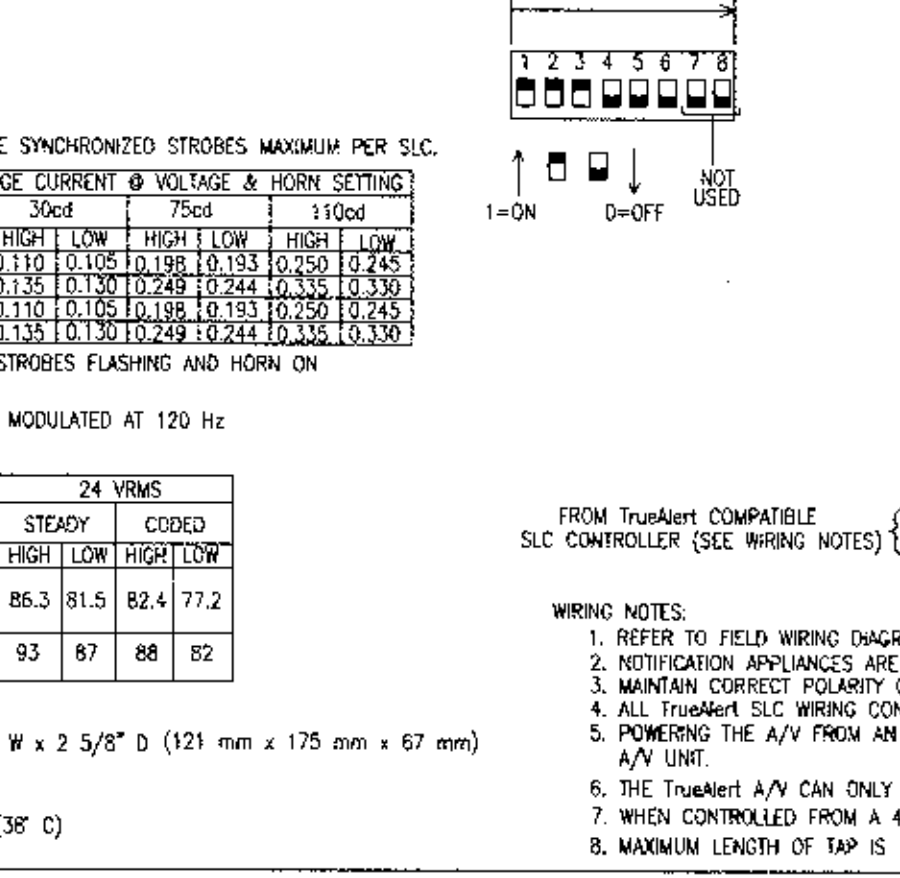
**RATED VOLTAGE RANGE:** 17 VRMS TO 31 VRMS  
**SUPERVISORY REQUIREMENTS:** 1 UNIT LOAD  
**STROBE FLASH RATE:** 1 Hz  
**OPERATING VOLTAGE RANGE:** UP TO 43 TrueAlert ADDRESSABLE SYNCHRONIZED STROBES MAXIMUM PER SLC

MODEL NUMBER	HOUSING COLOR	LETTERING COLOR	NOMINAL AVERAGE CURRENT @ VOLTAGE & HORN SETTING							
			15cod		30cod		75cod		110cod	
			HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
4906-9226	RED	WHITE	23.7	17.8	10.2	7.7	11.1	8.3	11.1	8.3
4906-9230	WHITE	RED	23.7	17.8	10.2	7.7	11.1	8.3	11.1	8.3

**PERFORMANCE REFERENCE, NOMINAL AVERAGE CURRENTS WITH STROBES FLASHING AND HORN ON**

VOLTAGE	17 VRMS				24 VRMS			
	STEADY	CODED	STEADY	CODED	STEADY	CODED	STEADY	CODED
SOUND TYPE	84.6	79.1	80.6	75.5	86.3	81.5	82.4	77.2

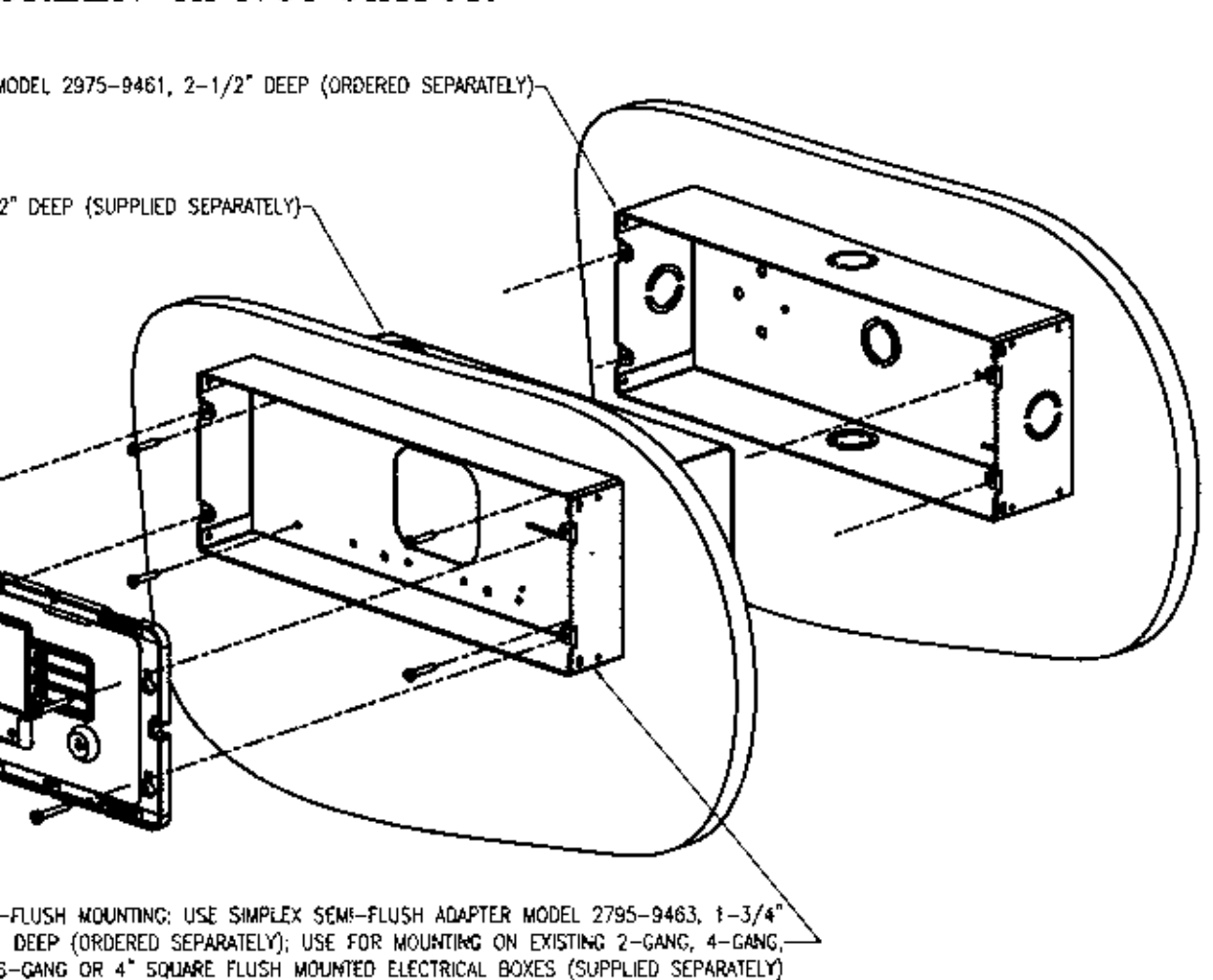
**GENERAL SPECIFICATIONS:**  
 HOUSING DIMENSIONS (INCLUDING LENS): 4 3/4" H x 6 7/8" W x 2 5/8" D (121 mm x 175 mm x 67 mm)  
 DEPTH INTO BOX: 1 1/16" (27 mm)  
 TEMPERATURE RANGE: 32° F TO 120° F (0° C TO 49° C)  
 HUMIDITY RANGE: 10% TO 93% RH NON-CONDENSING @ 100° F (38° C)  
 CONNECTIONS: TERMINAL BLOCKS FOR 18 TO 12 AWG



**4606-9202 COLOR TOUCHSCREEN ANNUNCIATOR**

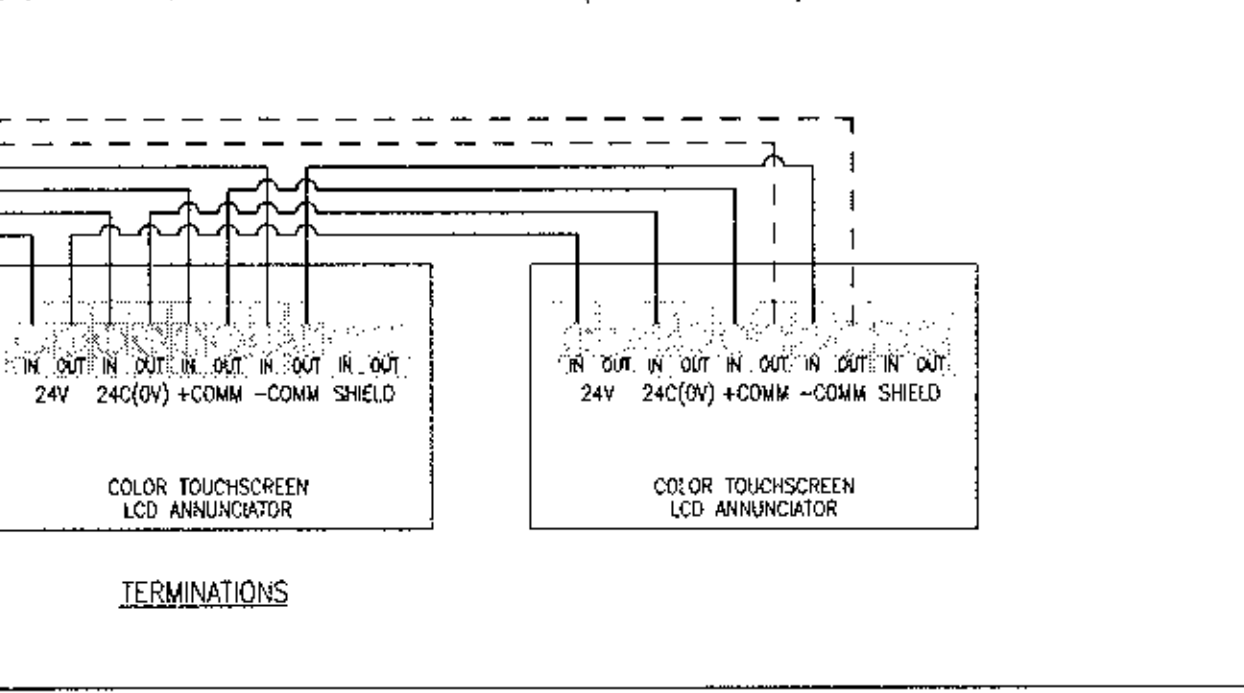
**PRODUCT INFORMATION**  
**FEATURES:**  
 • UL LISTED  
 • FM APPROVED  
 • FLUSH MOUNT ON STANDARD ELECTRICAL BOXES

**SPECIFICATIONS:**  
 • VOLTAGE: 24VDC NOMINAL  
 • CURRENT: ALARM 124mA DISPLAY ACTIVE 70mA STANDBY 45mA  
 • OPERATING TEMPERATURE: 32° F TO 120° F (0 TO 49° C)  
 • HUMIDITY RANGE: UP TO 93% RH NON-CONDENSING @ 100° F (38° C)  
 • STANDARD TRIM: RED (4606-9202), OR PLATINUM (4606-9205)



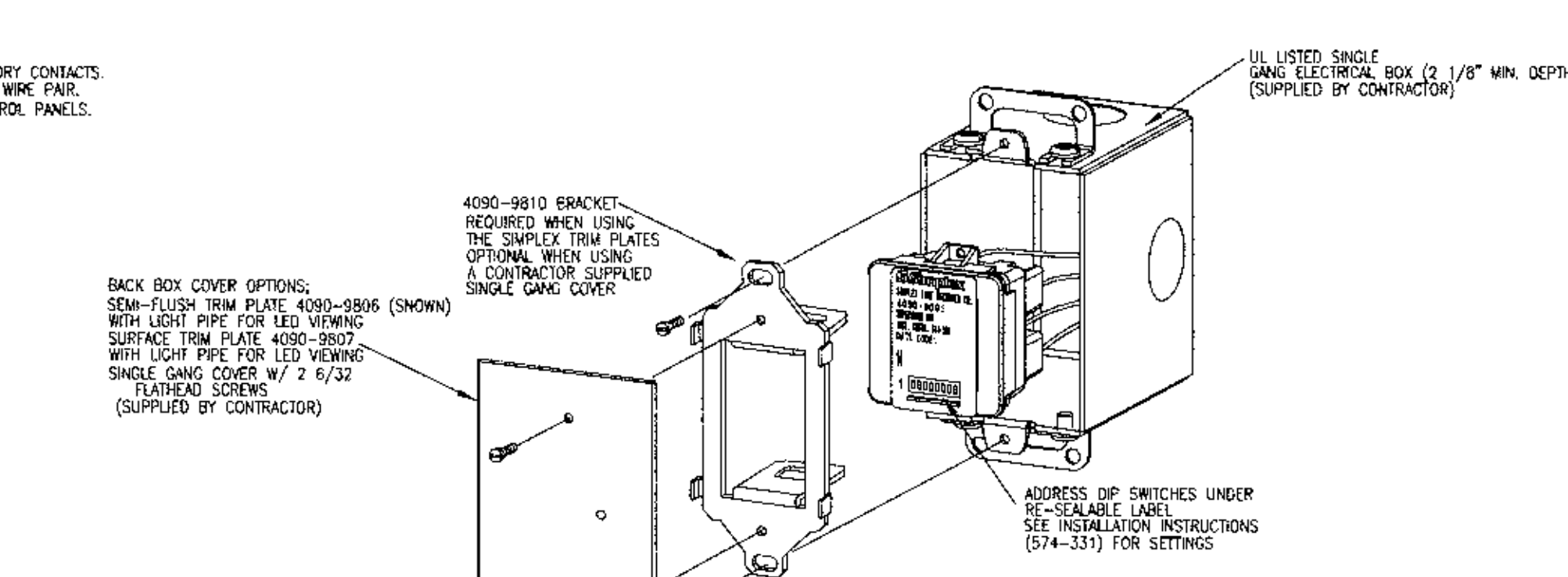
**NOTES:**

1. ALL WIRING TO BE NO. 18 AWG OR TO LOCAL CODE.
2. ALL WIRING SUPERVISED.
3. WIRE TO BE 18 AWG UNSHEATHED TWISTED PAIR CONSULT SALES ENGINEERING FOR EXCEPTIONS. 10,000 FT TOTAL WIRING, UP TO 2,500 FT TO FARTHEST DEVICE.
4. WHEN WIRING LEAVES THE BUILDING, OVER VOLTAGE PROTECTORS ARE REQUIRED (SEE 2081-9044). ONE IS INSTALLED WHERE IT LEAVES THE BUILDING AND ONE WHERE IT ENTERS THE NEXT BUILDING. TWO 2081-9044 (MAX).
5. REFER TO DATA SHEET 54606-0003 FOR FURTHER DETAILS.



**4090-9001 IDNET SLC, SUPERVISED ADDRESSABLE INPUT MODULE (AIM)**

**PRODUCT INFORMATION**  
**FEATURES:**  
 • UL LISTED  
 • ADDRESSABLE COMMUNICATIONS SUPPLY BOTH DATA AND POWER TO PROVIDE:  
 - SUPERVISED STYLE B MONITORING OF NORMALLY OPEN DRY CONTACTS  
 - COMMUNICATIONS WIRING USING ONE TWISTED, SHIELDED WIRE PAIR  
 • COMPATIBLE WITH SIMPLEX ADDRESSABLE FIRE ALARM CONTROL PANELS  
 • COMPACT, SEALED CONSTRUCTION  
 - ALLOWS MOUNTING IN A SINGLE GANG BOX  
 - REDUCES DUST INFILTRATION  
 • PROVIDES CURRENT LIMIT MONITORING  
 - TO MONITOR TAMPER SWITCH (SUPERVISORY) AND WATER FLOW SWITCH (ALARM) ON SAME CIRCUIT  
 - REQUIRES ONLY ONE ADDRESSABLE POINT  
 • SELECTABLE LATCHING OPERATION  
 - MONITORS MOMENTARY CONTACT CLOSURES SUCH AS RATE-OF-RISE HEAT DETECTORS

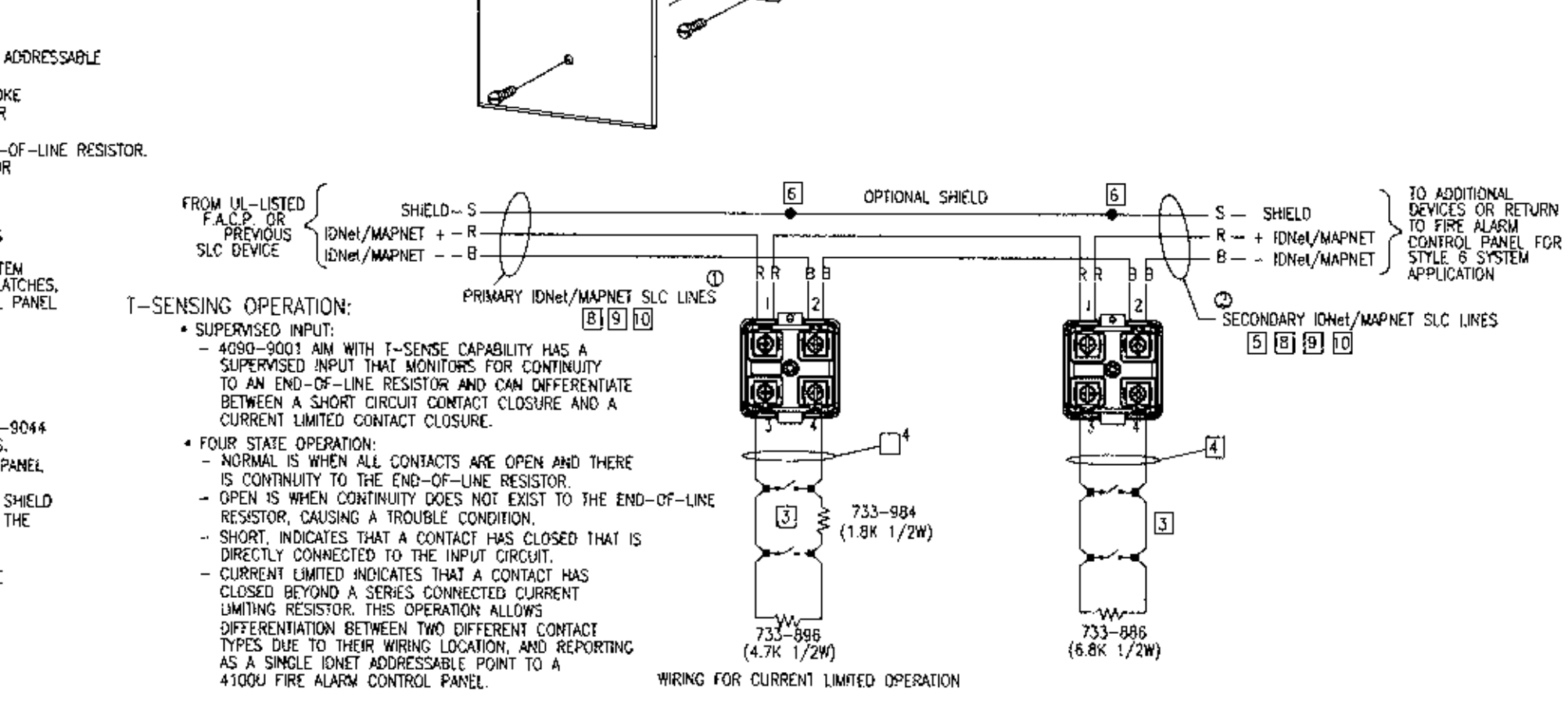


**SPECIFICATIONS:**  
 • WIRE CONNECTIONS: SCREW TERMINALS FOR IN/OUT WIRING FOR WIRE FROM #18 TO #14 AWG  
 • DIMENSIONS: 1 9/16" X 1 3/4" X 1 1/4"  
 • TEMPERATURE RANGE: 32° F TO 158° F (0° C TO 70° C)  
 • HUMIDITY: UP TO 93% RH AT 100° F  
 • SUPERVISION RESISTOR: 4.7kΩ, 1/2W (SUPPLIED) SIMPLEX PART NO. 733-886  
 • RESISTOR FOR CURRENT LIMITED OPERATION: 4.7kΩ, 1/2W WITH A 1.8kΩ, 1/2W  
 • INPUT REQUIREMENTS: NORMALLY OPEN, DRY CONTACTS  
 • HOUSING MATERIAL: BLACK THERMOPLASTIC

**DESCRIPTION:**  
 THE 4090-9001 IS AN ADDRESSABLE INPUT MODULE (AIM) WITH POWER AND COMMUNICATIONS SPECIFIED BY A TWO WIRE ADDRESSABLE CIRCUIT. IT PROVIDES LOCATION SPECIFIC ADDRESSABILITY TO A SINGLE INITIATING DEVICE (SUCH AS SINGLE STATION SMOKE DETECTOR ALARM CONTACTS OR HEAT DETECTOR CONTACTS) OR MULTIPLE DEVICES AT THE SAME LOCATION BY MONITORING NORMALLY OPEN, DRY CONTACTS AND THE WIRING TO AN END-OF-LINE RESISTOR. CLOSURE OF THE MONITORED CONTACTS INITIATES AN ALARM OR OTHER RESPONSE AS PROGRAMMED AT THE FIRE ALARM CONTROL PANEL. AN OPEN IN THE MONITORED CIRCUIT WIRING WILL CAUSE A TROUBLE TO BE REPORTED.  
 IF THE INITIATING DEVICE CONTACTS ARE MOMENTARY, SUCH AS FROM A RATE-OF-RISE HEAT DETECTOR, ENABLING THE LATCH FEATURE WILL MAINTAIN THE ALARM. WHEN THE SYSTEM IS RESET FOR APPLICATIONS WHERE THE CONTACT CLOSURES LATCHES, OR IF ITS CONDITION NEEDS TO BE TRACKED AT THE CONTROL PANEL, NON-LATCHING OPERATION MAY BE ENABLED.

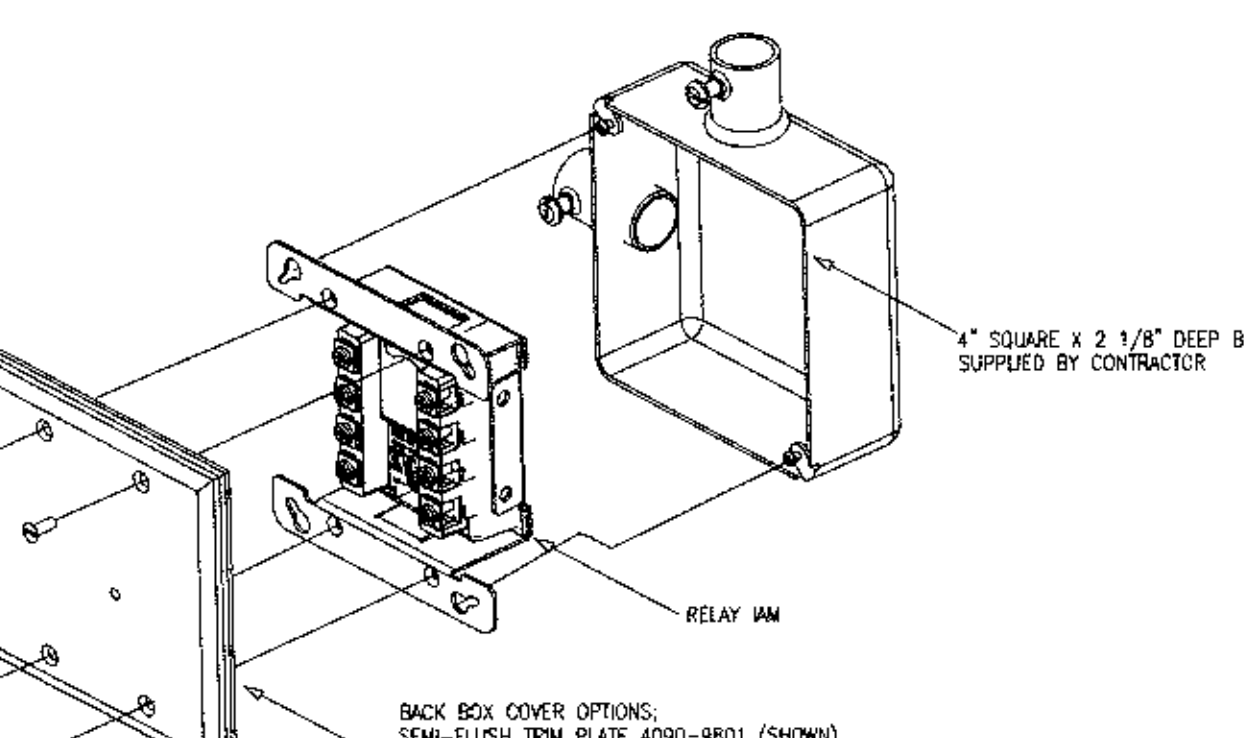
**WIRING NOTES:**

1. ALL WIRING TO COMPLY WITH LOCAL CODE.
2. CONDUCTORS MUST TEST FREE OF ALL GROUNDS.
3. ONLY A/D DRY CONTACTS ARE ALLOWED FROM THE F.A.C.P. TO THE FARTHEST DEVICE. NOT TO EXCEED 2500 FEET.
4. MAXIMUM QUANTITY OF DEVICES PER CIRCUIT: CONTROL PANEL MODULE DEPENDENT.
5. IF SHIELD IS PRESENT, CONNECT TO THE OUTGOING IDNET SHIELD TO PROVIDE A CONTINUOUS SHIELD OVER THE LENGTH OF THE IDNET CHANNEL. METHOD OF SPLICE DETERMINED BY ALL.
7. REFER TO INSTALLATION INSTRUCTIONS 574-331.
8. MAXIMUM ALLOWABLE LINE RUN FROM THE F.A.C.P. TO THE FARTHEST DEVICE, NOT TO EXCEED 2500 FEET.
9. MAXIMUM TOTAL WIRE (INCLUDING ALL T-TAPS) FROM THE FIRE ALARM CONTROL PANEL.
10. FOR STYLE B CIRCUIT WIRING IT IS RECOMMENDED THE PRIMARY Q AND THE BACK-UP Q LINES BE IN SEPARATE WIRE RUNS AND IN COMPLIANCE WITH LOCAL REQUIREMENTS.
11. REFER TO FIELD WIRING DIAGRAM 842-073.



**4090-9002 IDNET SLC, INDIVIDUAL ADDRESSABLE OUTPUT MODULE RELAY (AOM)**

**PRODUCT INFORMATION**  
**FEATURES:**  
 • UL LISTED  
 • A SINGLE ADDRESSABLE POINT BOTH CONTROLS A 2A FORM C RELAY AND TRACKS ITS STATUS  
 • COMPATIBLE WITH SIMPLEX MODEL 4010 AND 4100 ADDRESSABLE FIRE ALARM CONTROL PANELS  
 • LATCHING RELAY BEHAVIOR ALLOWS DATA AND POWER TO BE BOTH SUPPLIED BY IDNET COMMUNICATIONS  
 • COMPACT, SEALED CONSTRUCTION  
 - SCREW TERMINALS FOR WIRING CONNECTIONS  
 - REDUCES DUST INFILTRATION

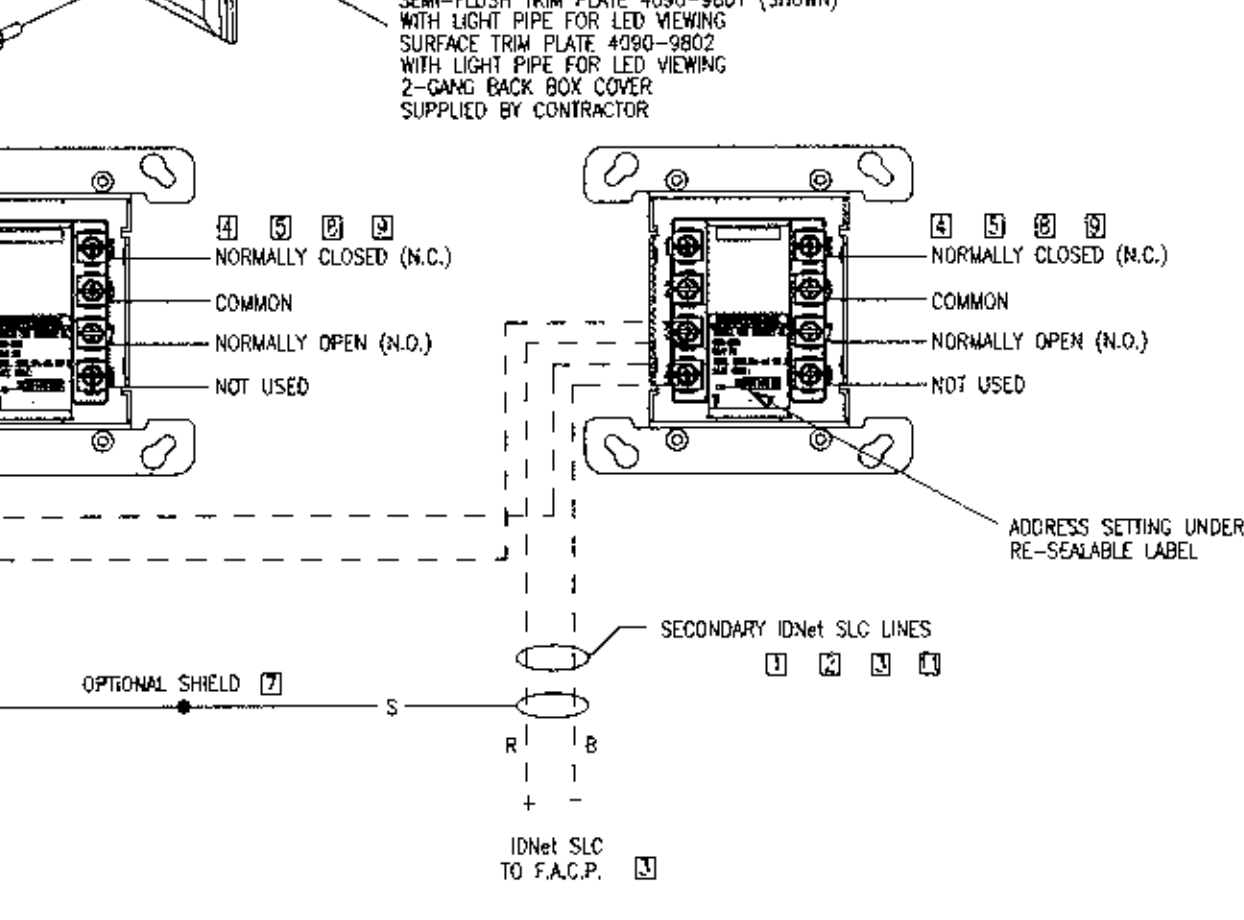


**SPECIFICATIONS:**  
 • RELAY IAW POWER: SUPPLIED BY IDNET COMMUNICATIONS  
 • RELAY IAW CONTACTS (FORM "C", SPDT)  
 • POWER LIMITED RATING: 2A @ 24VDC, TRANSIENT SUPPRESSED LOADS, 1A @ 24VDC FOR INDUCTIVE LOADS  
 • NON POWER LIMITED RATING: 1/2A @ 24VAC, TRANSIENT SUPPRESSED LOADS, 1A @ 24 VAC FOR INDUCTIVE LOADS  
 • WIRE CONNECTIONS: SCREW TERMINALS FOR IN/OUT WIRING, #18 TO #14 AWG WIRE  
 • COMPATIBLE WITH SIMPLEX 2081-9044 OVER VOLTAGE PROTECTORS  
 • DIMENSIONS: 4 1/8" H x 1 5/8" W x 1 3/8" D (105mm x 35mm)  
 • HOUSING MATERIAL: BLACK THERMOPLASTIC  
 • MOUNTING PLATE MATERIAL: SHEET METAL, GALVANIZED  
 • TEMPERATURE RANGE: 32° F TO 120° F (0° C TO 49° C)  
 • INTENDED FOR INDOOR OPERATION  
 • HUMIDITY RANGE UP TO 93% RH AT 100° F (38° C)

**DESCRIPTION:**  
 IDNET SLC RELAY MODULES ALLOW THE SIMPLEX FIRE ALARM CONTROL PANEL TO CONTROL A REMOTELY LOCATED FORM "C" CONTACT USING IDNET ADDRESSABLE COMMUNICATIONS FOR BOTH DATA AND POWER. TYPICAL APPLICATIONS WOULD BE FOR SWITCHING LOCAL POWER FOR CONTROL FUNCTIONS SUCH AS ELEVATOR CAPTURE, OR CONTROL OF HVAC COMPRESSORS, PRESSURIZATION FANS, DAMPERS, ETC. RELAY STATUS IS ALSO COMMUNICATED REQUIRING ONLY ONE DEVICE ADDRESS.

**WIRING NOTES:**

1. IDNET LINES ARE TO BE #18 AWG TWISTED PAIR (CONSULT SALES ENGINEERING FOR EXCEPTIONS).
2. MAXIMUM ALLOWABLE LINE RUN, FROM THE F.A.C.P. TO THE FARTHEST DEVICE, NOT TO EXCEED 2500 FEET.
3. MAXIMUM QUANTITY OF DEVICES PER CIRCUIT: CONTROL PANEL MODULE DEPENDENT.
4. CONTRACTOR WIRING TO RELAY CONTACTS IS UNSUPERVISED. USE #14 AWG WIRE TO LOCAL CODE.
5. RELAY CONTACTS RATED 2A, 24VDC (1A FOR INDUCTIVE LOAD) RELAY CONTACTS RATED 0.5A, 120VAC (NON POWER LIMITED) FOR POWER-LIMITED OPERATION, POWER MUST BE PROVIDED FROM FACP OR POWER-LIMITED POWER SUPPLY LISTED FOR FIRE PROTECTIVE SIGNALING USE.
6. SEE INSTALLATION INSTRUCTIONS 574-164.
7. IF SHIELD IS PRESENT, CONNECT TO THE OUTGOING IDNET SHIELD TO PROVIDE A CONTINUOUS SHIELD OVER THE LENGTH OF THE IDNET CHANNEL. METHOD OF SPLICE DETERMINED BY ALL.
8. WHEN CONNECTED TO A NON POWER-LIMITED SOURCE, THE WIRING MUST MAINTAIN A MINIMUM 1/4 INCH SEPARATION FROM IDNET WIRING.
9. WHEN USED WITH NON POWER-LIMITED SOURCE, THE "POWER LIMITED WIRING" INDICATION ON THE DEVICE LABEL MUST BE OBSERVED.
10. WHEN BOTH POWER-LIMITED AND NON POWER-LIMITED SOURCES ARE PRESENT, USE TYPE FPL, FPLR OR FPLP POWER LIMITED CABLE FOR POWER-LIMITED CIRCUITS.
11. MAXIMUM TOTAL WIRE (INCLUDING ALL T-TAPS) ON CIRCUIT, FROM THE F.A.C.P. NOT TO EXCEED 10,000 FEET OR 500W (CLASS B ONLY).
12. REFER TO FIELD WIRING DIAGRAM 842-073.



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 AC: JLS, SSS, WF  
 DATE: SEP 12 2017

9/07/17 DSA BACK CHECK  
 5/31/17 DSA PLAN REVIEW  
 3/10/17 100% CD

rev date issue

**PROFESSIONAL SEAL**  
 C-31415  
 11-30-17  
 RENEWAL  
 DATE

college of marin - indian valley campus bldg. 11 renovation

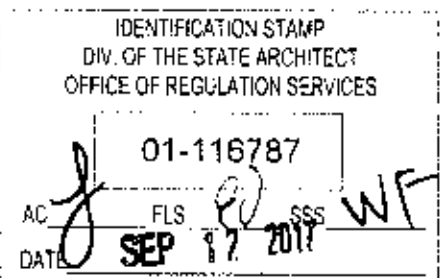
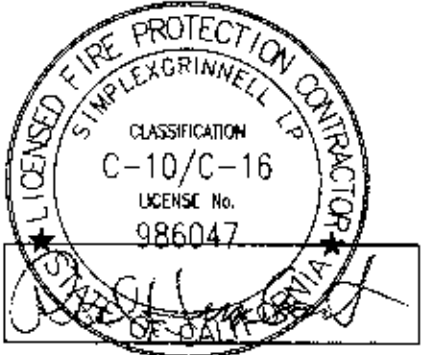
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 scale: as noted  
 date: 04/11/2017

**WIRING TYPICALS**

**FA-703**

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kentfield, ca 94904



9/07/17 DSA BACK CHECK  
5/31/17 DSA PLAN REVIEW  
3/10/17 100% CD

rev date issue



college of marin -  
indian valley  
campus bldg. 11  
renovation

project number: 999058101

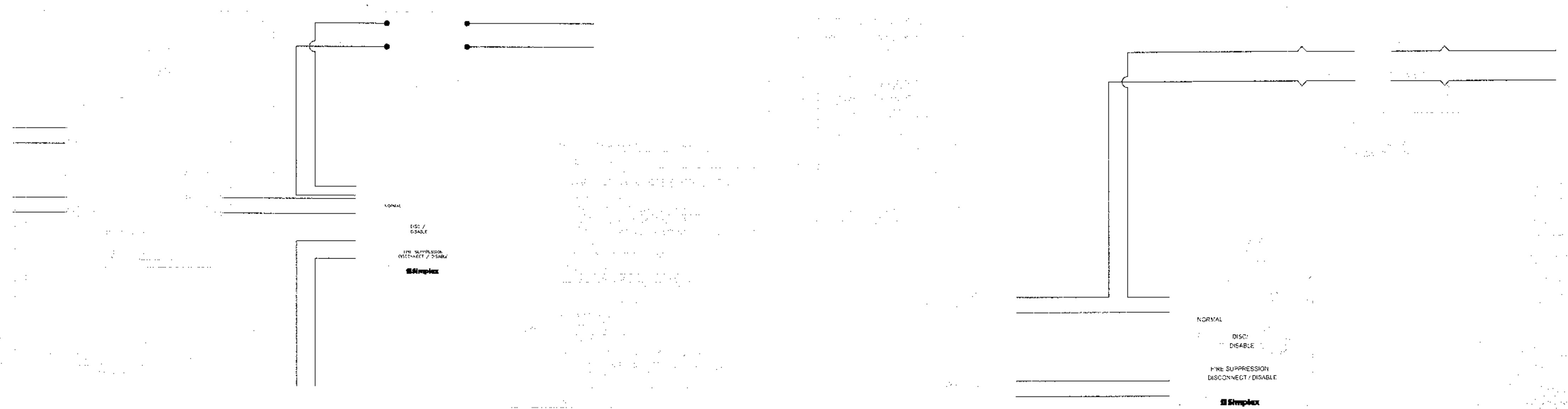
scale: as noted  
date: 04/11/2017

WIRING TYPICALS

FA-704

4090 9006 SUPPRESSION RELEASING DEVICE

PRODUCT INFORMATION  
FEATURES:  
• UL LISTED TO STANDARD 854  
• ULC LISTED  
• TV APPROVED



# END OF PROJECT MANUAL