

**DOCUMENT 00 01 10**

**TABLE OF CONTENTS**

---

| Initial Issue | Current Revision |  |
|---------------|------------------|--|
|---------------|------------------|--|

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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 |

PROCUREMENT AND CONTRACTING REQUIREMENTS

|    |    |             |   |
|----|----|-------------|---|
| -- | -- | 00 10 00    | Notice to Bidders   |
| -- | -- | 00 11 00    | Instructions to Bidders   |
| -- | -- | 00 21 13.1  | Bidder Information and Forms                                    |
| -- | -- | 00 31 19    | Existing Conditions   |
| -- | -- | 00 31 32    | Geotechnical Data   |
| -- | -- | 00 41 13    | Bid Form and Proposal   |
| -- | -- | 00 43 13    | Bid Bond  |
| -- | -- | 00 43 36    | Designated Subcontractors List                                  |
| -- | -- | 00 45 01    | Site Visit Certification  |
| -- | -- | 00 45 19    | Non-Collusion Declaration                                       |
| -- | -- | 00 45 26    | Worker's Compensation Certification                             |
| -- | -- | 00 45 46.02 | Disable Veteran Business Enterprise Participation Certification |
| -- | -- | 00 45 46.03 | Drug-Free Workplace Certification                               |
| -- | -- | 00 45 46.04 | Tobacco-Free Environment Certification                          |
| -- | -- | 00 45 46.05 | Hazardous Materials Certification                               |
| -- | -- | 00 45 46.06 | Lead-Based Materials Certification                              |
| -- | -- | 00 45 46.07 | Imported Materials Environment Certification                    |
| -- | -- | 00 45 46.08 | Sex Offender Registration Certification - OPTIONAL              |
| -- | -- | 00 45 46.09 | Buy American Certification                                      |
| -- | -- | 00 45 46.10 | Roofing Project Certification                                   |
| -- | -- | 00 45 46.11 | Iran Contracting Act Certification                              |
| -- | -- | 00 45 90    | Post Bid Interview  |
| -- | -- | 00 51 00    | Notice of Award   |
| -- | -- | 00 53 00    | Agreement   |
| -- | -- | 00 55 00    | Notice to Proceed   |
| -- | -- | 00 56 00    | Escrow Bid Documentation  |
| -- | -- | 00 57 00    | Escrow Agreement in Lieu of Retention                           |
| -- | -- | 00 61 13.13 | Performance Bond  |
| -- | -- | 00 61.13.16 | Payment Bond  |
| -- | -- | 00 63 63    | Change Order Form   |

| Initial Issue | Current Revision |             |  |
|---------------|------------------|-------------|--|
| --            | --               | 00 65 19.26 | Agreement and Release of Any and All Claims                  |
| --            | --               | 00 65 36    | Guarantee Form   |
| --            | --               | 00 72 13    | General Conditions   |
| --            | --               | 00 73 13    | Special Conditions   |
| --            | --               | 00 73 56    | Hazardous Materials Procedures and Requirements              |
| --            | --               | 00 91 00    | Prevailing Wage and Related Labor Requirements Certification |

**DIVISION 01 – GENERAL REQUIREMENTS**

|    |    |             |  |
|----|----|-------------|--|
| -- | -- | 01 11 00    | Summary of Work                            |
| -- | -- | 01 22 00    | Alternates and Unit Pricing                |
| -- | -- | 01 25 13    | Product Options and Substitutions          |
| -- | -- | 01 26 00    | Changes in the Work                        |
| -- | -- | 01 31 19    | Project Meetings                           |
| -- | -- | 01 33 00    | Submittals                                 |
| -- | -- | 01 35 13.23 | Site Standards                             |
| -- | -- | 01 41 00    | Regulatory Requirements                    |
| -- | -- | 01 42 13    | Abbreviations and Acronyms                 |
| -- | -- | 01 42 16    | Definitions                                |
| -- | -- | 01 42 19    | References                                 |
| -- | -- | 01 43 00    | Materials and Equipment                    |
| -- | -- | 01 45 00    | Quality Control                            |
| -- | -- | 01 50 00    | Temporary Facilities and Controls          |
| -- | -- | 01 50 13    | Construction Waste Management and Disposal |
| -- | -- | 01 52 13    | Field Offices                              |
| -- | -- | 01 64 00    | Owner-Furnished Products                   |
| -- | -- | 01 66 00    | Product Delivery Storage and Handling      |
| -- | -- | 01 71 23    | Field Engineering                          |
| -- | -- | 01 73 29    | Cutting and Patching                       |
| -- | -- | 01 76 00    | Alteration Project Procedures              |
| -- | -- | 01 77 00    | Contract Closeout and Final Cleaning       |
| -- | -- | 01 78 23    | Operations and Maintenance Data            |
| -- | -- | 01 78 36    | Warranties                                 |
| -- | -- | 01 78 39    | Record Documents                           |

**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)**

| Initial Issue  | Current Revision |                 |  |
|--|------------------|-----------------|--|
| <b>DIVISION 05 – METALS</b>                          |                  |                 |  |
| --   | --               | 05 50 00        | Metal Fabrications                     |
| <b>DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES</b>  |                  |                 |  |
| --   | --               | <b>06 10 00</b> | <b>Rough Carpentry</b>                 |
| --   | --               | 06 10 53        | Miscellaneous Rough Carpentry          |
| --   | --               | 06 40 23        | Architectural Woodwork                 |
| --   | --               | 06 40 05        | Exterior Finish Carpentry              |
| <b>DIVISION 07 – THERMAL AND MOISTURE PROTECTION</b> |                  |                 |  |
| --   | --               | 07 21 00        | Building Insulation                    |
| --   | --               | 07 25 00        | Weather Barriers                       |
| --   | --               | 07 31 13        | Asphalt Shingles                       |
| --   | --               | 07 62 00        | Sheet Metal Flashing                   |
| --   | --               | 07 81 90        | Repair of Existing Fireproofing        |
| --   | --               | 07 84 00        | Firestopping                           |
| --   | --               | 07 92 00        | Joint Sealants                         |
| <b>DIVISION 08 – OPENINGS</b>                        |                  |                 |  |
| --   | --               | 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                       |
| --   | <b>ADD. 1</b>    | <b>08 71 00</b> | <b>Door Hardware</b>                   |
| --   | --               | 08 80 00        | Glazing                                |
| --   | --               | 08 83 00        | Mirrors                                |
| <b>DIVISION 09 – FINISHES</b>                        |                  |                 |  |
| --   | --               | 09 22 16        | Non-Structural Metal Framing           |
| --   | <b>ADD. 1</b>    | <b>09 29 00</b> | <b>Gypsum Board</b>                    |
| --   | --               | 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                      |
| --   | --               | <b>09 91 00</b> | <b>Painting and Coating</b>            |
| <b>DIVISION 10 – SPECIALTIES</b>                     |                  |                 |  |
| --   | --               | 10 22 33        | Accordion Folding Partitions           |
| --   | --               | 10 26 00        | Wall and Door Protection               |
| --   | --               | 10 28 00        | Toilet Accessories                     |
| --   | <b>ADD. 1</b>    | <b>10 85 00</b> | <b>Exterior Acoustical Specialties</b> |

| Initial Issue  | Current Revision |                     |  |
|--|------------------|---------------------|--|
| <b>DIVISION 11 – EQUIPMENT</b>   |                  |                     |  |
| --   | --               | 11 52 00            | Audio-Visual Equipment   |
| <b>DIVISION 12 - FURNISHINGS</b>                                       |                  |                     |  |
| --   | --               | 12 24 13            | Roller window Shades   |
|  |                  | <del>12 36 61</del> | <del>Solid Surfacing Countertops</del>                           |
| <b>DIVISION 13 – SPECIAL CONSTRUCTION (NOT USED)</b>                   |                  |                     |  |
| <b>DIVISION 14 – CONVEYING EQUIPMENT (NOT USED)</b>                    |                  |                     |  |
| <b>DIVISION 21 – FIRE PROTECTION</b>                                   |                  |                     |  |
| --   | --               | 21 05 00            | Common Work Results for Fire Protection                          |
| --   | --               | 21 05 00            | Water Based Fire Suppression System                              |
| <b>DIVISION 22 – PLUMBING</b>  |                  |                     |  |
| --   | --               | 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 21 23            | Pumps for Plumbing   |
| --   | --               | 22 25 00            | Plumbing Water Treatment   |
| --   | --               | 22 30 00            | Plumbing Equipment   |
| --   | --               | 22 40 00            | Plumbing Fixtures  |
| <b>DIVISION 23 – HEATING, VENTILATING, and AIR CONDITIONING (HVAC)</b> |                  |                     |  |
| --   | --               | 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                               |

| Initial Issue | Current Revision |          |                                      |
|---------------|------------------|----------|--------------------------------------|
| --            | --               | 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                   |
| -- | <b>ADD.1</b> | <b>26 05 73</b> | <b>Overcurrent Protective Device Coordination Study</b> |
| -- | --           | 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                                       |
| -- | <b>ADD.1</b> | <b>26 32 13</b> | <b>Engine Generators</b>                                |
| -- | <b>ADD.1</b> | <b>26 36 23</b> | <b>Automatic Transfer Switches</b>                      |
| -- | --           | 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 |
| -- | -- | 28 30 00 | Fire Detection and Alarm  |

**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          |

Initial  
Issue

Current  
Revision

---

**APPENDIX**

|    |              |   |   |
|----|--------------|---|---|
| -- | --           |   | Owner Performance Requirements  |
| -- | --           |   | Report No. 2 Acoustics and Noise Control                                  |
| -- | --           |   | Acoustic Partition Details  |
| -- | <b>ADD.1</b> |   | <b>Report No. 3 VRF Units Exterior Noise Control (updated 17.03.17)</b>   |
| -- | <b>ADD.1</b> |   | <b>Report No. 4-Generator exterior noise control</b>                      |
| -- | --           | A | Fabric Wrapped Panel Information  |
| -- | --           | B | Low Pressure HVAC Systems Acoustic Requirements and Performance Criteria  |
| -- | --           | C | Plumbing System Noise and Vibration Control                               |
| -- | --           | D | Emergency Backup Generator Acoustic Requirements and Performance Criteria |
| -- | --           | E | Sound Masking Design Guidelines and Performance Criteria                  |
| -- | --           | F | Operable Partition Acoustic Requirements and Design Guidelines            |
| -- | --           |   | Acoustics Product Data Sheets   |
| -- | --           |   | Lighting Cut Sheets   |

| Initial<br>Issue | Current<br>Revision |
|------------------|---------------------|
|------------------|---------------------|

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**END OF DOCUMENT**

**SECTION 06 10 00**  
**ROUGH CARPENTRY**

**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. Wood blocking, cants, and nailers.
  2. Wood furring and grounds.
  3. Non-load-bearing wood studs.
  4. Plywood backing panels.
  - 4.5. Wood-Framed ceiling hanger.
- B. Related Requirements:
1. Section 06 16 00 "Sheathing."
  2. Section 09 91 00 "Painting" for field painting of plywood backerboards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
  3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
1. Fire-retardant-treated wood.

1.5 QUALITY ASSURANCE



- A. 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.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood flat with spacers beneath and between each bundle to provide air circulation. Protect wood from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Use materials complying 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 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. Use treatment that does not promote corrosion of metal fasteners.
- C. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Application: Treat all rough carpentry unless otherwise indicated.
  - 1. Plywood backing panels.

### 2.2 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
  - 4. Furring.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber:
  - 1. Spruce-pine-fir; NLGA.
  - 2. Western woods; WCLIB or WWPA.

### 2.3 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness. Panels shall not contain added urea-formaldehyde.

## 2.4 WOOD-FRAMED CEILING HANGER

- A. Product: Kinetics Noise Control "Model ICW", or equal, as approved by the District.
1. Product incorporates a 1 in. rated deflection spring in series with a neoprene cup to resiliently support one more layers of gypsum board.

### 2.42.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Power-Driven Fasteners: NES NER-272.
- C. Lag Bolts: ASME B18.2.1.
- D. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- B-C. Install wood-framed ceiling hanger in accordance with manufacturer's recommendations and as shown on Drawings.

### 3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

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.
5. 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, UL10B, 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 tap 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          | Trimco               |

### 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, 205, 206, 208

|                          |                      |       |    |
|--------------------------|----------------------|-------|----|
| 3 Hinges                 | FBB179 4 1/2 X 4 1/2 | US26D | ST |
| 1 Secure All Lock System | by Others            |       |    |
| 1 Wall Bumper            | by Owner             | 626   | BY |
| 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                  |       |    |
| 1 Door Closer            | CLD-4551 STD W/PA BRKT MC  | 689   | SD |
| 1 Kick Plate             | K0050 10" x 2" LDW B4E CSK | 630   | TR |
| 1 Wall Bumper            | by Owner                   | 626   | BY |
| 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 | by Others            |       |    |
| 1 Wall Bumper            | by Owner             | 626   | BY |
| 1 Gasketing              | S88D Head & Jambs    |       | PE |

**SET #4**

Doors: E100A, E100B

|                              |                            |     |     |
|------------------------------|----------------------------|-----|-----|
| 1 Low Energy Operator        | CLD-4990                   | 628 | SD  |
| 2 Full Length Actuator Plate | 10LPR36-HW                 | 630 | BEA |
| 1 Kick Plate                 | K0050 10" x 2" LDW B4E CSK | 630 | TR  |

NOTE: Balance of hardware to remain.

**SET #5**

Doors: E102A, E110, ES1A, E105

|              |                            |     |    |
|--------------|----------------------------|-----|----|
| 1 Kick Plate | K0050 10" x 2" LDW B4E CSK | 630 | TR |
|--------------|----------------------------|-----|----|

NOTE: Balance of hardware to remain.

**SET #5.1**

Doors: E108, E109

|                              |                            |     |     |
|------------------------------|----------------------------|-----|-----|
| 1 Low Energy Operator        | CLD-4990                   | 628 | SD  |
| 2 Full Length Actuator Plate | 10LPR36-HW                 | 630 | BEA |
| 1 Kick Plate                 | K0050 10" x 2" LDW B4E CSK | 630 | TR  |

NOTE: Balance of hardware to remain.

**SET #6**

Doors: 112

|                          |                            |       |    |
|--------------------------|----------------------------|-------|----|
| 3 Hinges                 | FBB179 4 1/2 X 4 1/2 NRP   | US26D | ST |
| 1 Secure All Lock System | by Others                  |       |    |
| 2 Kick Plate             | K0050 10" x 2" LDW B4E CSK | 630   | TR |
| 1 Floor Stop             | by Owner                   | 626   | BY |
| 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                  |       |    |
| 1 Door Closer            | CLD-4551 STD W/PA BRKT MC  | 689   | SD |
| 2 Kick Plate             | K0050 10" x 2" LDW B4E CSK | 630   | TR |
| 1 Wall Bumper            | by Owner                   | 626   | BY |
| 1 Gasketing              | S88D Head & Jambs          |       | PE |

**SET #6.2**

Doors: 200

|                          |                            |       |    |
|--------------------------|----------------------------|-------|----|
| 3 Hinges                 | FBB179 4 1/2 X 4 1/2 NRP   | US26D | ST |
| 1 Secure All Lock System | by Others                  |       |    |
| 1 Door Closer            | CLD-4551 STD W/PA BRKT MC  | 689   | SD |
| 1 Kick Plate             | K0050 10" x 2" LDW B4E CSK | 630   | TR |
| 1 Floor Stop             | by Owner                   | 626   | BY |
| 1 Door Shoe              | 215AV                      |       | PE |
| 1 Gasketing              | S88D Head & Jambs          |       | PE |

**SET #7**

Doors: G1, G2, **G3**

|                                   |  |              |           |
|-----------------------------------|--|--------------|-----------|
| <b>Hinges (10@G1, 8@G2, 5@G3)</b> | <b>FBB199 5 X 4 1/2 NRP</b>                                      | <b>US32D</b> | <b>ST</b> |
| <b>2 Door Pull</b>                | <b>1165 x 40" O/A</b>  | <b>US32D</b> | <b>TR</b> |
| 1 Padlock                         | A6460  |              | AM        |
| 1 Hasp                            | A825   |              | AM        |
| 1 Cane Bolt                       | SP 1009-18"  |              | ST        |
| <b>1 Gasketing</b>                | <b>See Acoustic Report for door compression seal information</b> |              |           |

**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 and Fire 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, or equal as approved by the District.
- ~~4. Acceptable Alternate Products: Subject to the requirements of this article 'CGC Secureck 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. ASTM C 1766. ½ in. thick with tapered edges. Class A per ASTM E 84.

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. Outlet Box Pads: Lowry's Inc. "Box Pads", or equal, as approved by the District.

D.E. 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. Acoustical Partitions:

1. Outlet Box Pads: Install outlet box pads in accordance with manufacturer's instructions. Properly clean substrate, removing dust or debris from the surface to be applied. After the outlet box installation is completed, place an outlet pad centered on the back of the box. Carefully mold and fold around conduit cable entering box. Remove paper backing.
2. Acoustical Sealants
  - a. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and

through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

- b. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

~~D.E. 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.

2. Fire Sealant:

- ~~E-a. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.~~
- b. Install sealants to meet fire rating for joint assembly or penetration assembly.

### 3.4 APPLYING TILE BACKING PANELS

- A. Tile Backing Panels: ANSI A108.11, at showers, tubs, and where indicated.
- B. Where tile backing panels abut 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**

**SECTION 09 91 00**

**PAINTING 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 or glu-lam 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.
  4. Glu-lam Mockup: Remove existing paint finish and sand surface, as specified. Apply two coats of specified coating.
- 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 AND COATING 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: -Devoe 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: Devoe 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, Opaque Finish:
  - 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.

5. Wood, Transparent Finish:

1 Clear Finish:

- 1) Prime Coat: Benwood Waterborne Stain 205; Old Masters Stain.
- 2) Body Coat: Benwood Stays Clear Acrylic Polyurethane; Old Masters Clear Polyurethane.
- 3) Finish Coat: Benwood Stays Clear Acrylic Polyurethane; Old Master Clear Polyurethane.

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. Locate 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~~Existing Work: Sand, wire brush, or scrape painted surfaces to remove loose, scaling paint and to reduce gloss. Wash soiled surfaces.
  1. Glu-lams: Completely remove existing paint, sanding, or light blasting as required. Sand surface for transparent coating.
- 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 85 00

### EXTERIOR ACOUSTICAL SPECIALTIES

#### 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.

##### ~~1.24~~ SUMMARY

- A. Work Included: Exterior Acoustical Specialties, complete, as shown and specified.

##### ~~1.32~~ 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. Qualifications of Installer.
- C. Closeout Submittals: Submit for College of Marin's documentation.
  - 1. Maintenance Data.

##### ~~4.3~~ 1.4 QUALITY ASSURANCE

- A. Qualified Installer: Installer to have successful 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.

##### ~~4.4~~ 1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Protect items from damage at factory, in transit, and after installation.

#### PART 2 - PRODUCTS

##### 2.1 MANUFACTURERS AND PRODUCTS

- A. Acoustical Panels for Generator Enclosure: Noise Barriers, LLC, "QuietPerf", or equal, as acceptable to the District. Provide 4 in. thick panels, unless otherwise shown. Size as shown on Drawings. 22 gauge perforated galvanized/galvannealed steel with polyester powder-coat finish. College of Marin Representative shall select color from manufacturer's standards.
- B. Acoustical Louvers: Noise Barriers, LLC, "QuietLouver", or equal, as acceptable to the District. Louver to be 12 in. deep. Provide galvanized steel louvers with manufacturer's standard powder-coat finish. College of Marin Representative shall select color from manufacturer's standards.

- C. Acoustical Absorptive Panel: Empire "M-90 Absorptive Panel", or equal as acceptable to the District. Provide 22 gauge backless assembly, 2 inches thick, attached with a J channel clip.

### **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 Conditions and Measurements: Verify in field for Work fabricated to fit Project conditions.

#### **3.2 INSTALLATION**

- A. General: Install per manufacturer's recommendations. Install Work plumb, level, and true; properly assembled, installed and anchored. Use mechanics skilled in Work involved.

#### **3.3 CLEANING**

- A. General: Leave installation clean and free from defects.

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 32 13**

**ENGINE GENERATORS**

**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. Diesel Engine
  - 2. Fuel System
  - 3. Fuel System (Bulk Storage Tank by Mechanical)
  - 4. Engine Starting System
  - 5. Generator and Exciter
  - 6. Instruments and Controls
  - 7. Remote Annunciator
  - 8. Automatic Operation
  - 9. Weatherproof Housing
  - 10. Provide an Emergency Power Generation System complete as indicated.
  - 11. Consist of a diesel engine driven electric generator set with control panel, cooling system, governor, starter motor, structural steel skid base and other accessories needed for proper operation, including exhaust system, fuel system, automatic battery charger, starting batteries, battery cables, and other accessories as required for operation as specified below. The complete system is intended to automatically provide continuous electric power for the duration of any failure of the normal utility electric supply.
  - 12. Minimum standby output rating of 500 KW with 0.8 power factor, 480Y/277V, 3-phase, 4-wire, 60 Hertz, AC.
- 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 73, Overcurrent Protective Device Coordination Study
5. Section 26 05 80, Electrical Testing

### 1.03 QUALITY ASSURANCE

- A. Engine Generator Set:
  1. Product of a firm regularly engaged in the assembly or manufacture of this equipment.
- B. Component Parts:
  1. Product of firms regularly engaged in the manufacture of these parts.
- C. It is the intention of these specifications to secure equipment that can be properly maintained and serviced without the necessity of carrying expensive parts, stocks or being subjected to the inconvenience of interrupted service due to the lack of available parts.
- D. An engine of the same model, bore, stroke, configuration and rpm as the engine submitted, shall have a minimum of 2,000 hours of satisfactory operation under average rated load conditions of 75 percent or greater over a 2 year period. Satisfactory operation is defined as an availability of at least 95 percent with no period of downtime for repair in excess of 75 hours. Certification of the above equipment experience, either from field installations or laboratory testing, shall be provided. Provide NEMA certification so the generator meets applicable NEMA standards. Include certifications be included with the shop drawing submittal.

### 1.04 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
  1. UL: Underwriters Laboratories
    - a. UL 508 Industrial Control Equipment
    - b. UL 1008 Automatic Transfer Switches
  2. NFPA: National Fire Protection Association
    - a. NFPA 30 Flammables and Combustible Liquids
    - b. NFPA 37 Stationary Combustion Engines and Gas Turbines
    - c. NFPA 70 National Electrical Code (NEC)
    - d. NFPA 110 Emergency and Standby Power Systems
  3. NEMA: National Electrical Manufacturer's Association
    - a. NEMA ICS Industrial Controls and Systems
    - b. NEMA MG-1 Motors and Generators

### 1.05 SUBMITTALS

- A. Shop Drawings
- B. Product Data

- C. Site Test Report
- D. Operating and Maintenance Data:
  - 1. Provide complete instructions covering the operation and testing of the engine generator and associated equipment for the plant, together with a manual covering engine operation and maintenance. Operation instructions include minor adjustments necessary to obtain optimum operation of the set.
  - 2. Maintenance instructions include complete trouble shooting and diagnostic information, disassembly instructions, assembly instructions and preventive maintenance schedule.
  - 3. Preventive maintenance schedule in outline form. Include recommended lubricants and specified all necessary service checks. Furnish spare parts books for the engine generator and associated equipment.
  - 4. Include data in Operating and Maintenance Manuals specified in Section 26 05 00, Common Work Results for Electrical.

## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Caterpillar
- B. Cummins
- C. Generac
- D. Equal as approved by the District.

### **2.02 DIESEL ENGINE**

- A. Diesel-fueled, liquid-cooled, four cycle, multi-cylinder, mechanical injection type.
- B. Operate engine satisfactorily on a commercial grade of 2 fuel oil and does not require a premium fuel.
- C. Naturally aspirated, supercharged, turbo-charged or turbo-charged-after-cooled. Fuel pump shall have at least a 5-foot suction lift at operating speed. The engine shall be provided with removable cylinder liners of the wet or dry type.
- D. The engine shall be equipped with the following accessories:
  - 1. Fuel filtering system with two filters:
    - a. Primary filter located between the bulk storage transfer pump and the day tank with the secondary filter on the engine located by the manufacturer.
    - b. Filter system shall be capable of removing dirt, metallic chips, carbon, water and other foreign matter which would be harmful to the engine.
    - c. Primary filter shall be capable of filtering 15 to 25 micron particles and secondary unit filtering 5 micron particles.

2. Pressurized lubricating system and a full flow filter system consisting of a strainer with openings not exceeding 0.035-inches, followed by a replaceable filter capable of removing 15 micron particles.
3. Air cleaner to effectively remove dirt and abrasives from the combustion air. Arrange filter for easy removal and replacement of filter element. A combination filter silencer or separate silencer shall be provided if required on the intake air system to reduce the intake air noise level below the audible mechanical noise level of the engine.
4. Isochronous type governor to produce the following characteristics: Steady state speed bank,  $\pm 1/3$  percent; frequency change with 25 percent and load change, 2 percent; recovery time for 25 percent load change, 3 seconds; speed change for 100 percent load rejection, 8 percent. Provide engine with an independent overspeed governing system actuated to stop the engine when speed exceeds 120 percent of synchronous speed. Overspeed shutoff device requires manual resetting after emergency tripping.
5. Size direct mounted radiator to maintain engine coolant at recommended temperature during engine operation at full load. Horizontal discharge radiator, with fan driven directly from the engine crankshaft or through V-belt drive. Fan to have sufficient pressure to circulate the required quantity of air for engine cooling through an outside air louver with 0.5-inch pressure drop. Enclose fan assembly with a suitable guard.
6. Provide cooling system with thermo-statically controlled radiator shutters and thermostats, as required to maintain proper engine operating temperature. Design filler caps for pressure relief prior to removal. Hoses and connections shall be suitable for temperatures up to 275 degrees F and a working pressure of 100 psig. An engine-driven pump shall be provided for circulating jacket coolant. Provide cooling system with a permanent type antifreeze solution containing a rust inhibitor. Use type of antifreeze solution as recommended by the engine manufacturer.
7. Thermostatically controlled electric water heater to supply heat to the engine water jacket. The heater shall have sufficient capacity to maintain the engine jacket coolant at a temperature of 90 degrees F. Install heater in such a manner that rapid thermal circulation is obtained with minimum temperature differential between the heater-water and cylinder head water.
8. Critical type exhaust muffler locates as close to the engine as practicable. Sound levels at 75-feet from the engine shall be no more than 45 DBA. Provide muffler with bolted flange connections and companion flanges. Pressure drop through the muffler not to exceed the recommendations of the engine manufacturer. Provide a bellows type flexible connection 24-inch length at the engine exhaust. Construct bellows of flexible connections of 321 stainless steel and provided with bolted flanged ends. Muffler and indoor exhaust piping insulated with lagging to maintain a surface temperature not to exceed 150 degrees F. Lagging not to interfere with operation of flexible connection. Black steel exhaust piping conforming to Federal Specification WW-P-406D, Weight A, Class 1. Pitch exhaust piping be pitched away from the engine.
9. Provide the following automatic engine protective systems with a single audible alarm and separate fault indicating lights mounted in the engine generator control panel:
  - a. High coolant temperature shutdown.
  - b. Low oil pressure shutdown.
  - c. Engine overspeed shutdown.
  - d. Engine overcrank shutdown.
  - e. Silencing switch with ringback feature for audible alarm. Fault indicating lights shall remain ON as long as the faults are uncorrected. Provide lamp test switch.

- E. Mount engine-generator set on a structural steel subbase and provide suitable spring-type vibration isolators. The isolator shall have an operating efficiency better than 90 percent. Provide welded floor plates on isolators and bolt to concrete floor to provide lateral restraint.

### **2.03 FUEL SYSTEM**

- A. Furnish and install a base tank complete with accessories. Tank shall be as recommended by the engine supplier, sized for 8 hour engine full load running time, and include the following:
  - 1. Fuel filter.
  - 2. Vent cap and flame arrester sized per NFPA-30.
  - 3. Rupture basin equal to the size of the fuel tank capacity.
  - 4. Drain valve.
  - 5. Rupture basin float switch.
  - 6. Low fuel level alarm and contacts.
  - 7. High fuel level alarm and contacts.
  - 8. Inlet and outlet connections.
- B. Fuel connections between the tank and engine made as directed by the equipment supplier under this division of the work.
- C. Upon certification from installers relative to the cleanliness of the fuel system, provide a full tank of fuel to conduct all tests. Fuel remaining after tests shall become the property of the Owner.

### **2.04 ENGINE STARTING SYSTEM**

- A. Provide a DC electric starting motor integral with the engine and solenoid of required voltage and amperage as recommended by the engine manufacturer. The drive mechanism for engaging the starting motor with the engine flywheel designed to engage and release without binding.
- B. Heavy duty, lead acid type storage batteries for engine starting and other requirements. Batteries have sufficient capacity to perform not less than four successive 10 second starting attempts without recharging. Voltage as required by the engine starting system. Provide battery rack, cable, cable rack, conduit, electrical wiring, and accessories as required to interconnect the batteries to the DC apparatus.
- C. Provide battery charger apparatus to maintain batteries at full charge at all times. This apparatus permits either high or low rate charge, depending on battery condition. Provide an ammeter to indicate charging rate and the charging circuit shall be protected by either fuses or circuit breakers. Protect charger apparatus against damage during engine cranking.
- D. Low battery voltage, high battery voltage and charger failure indication shall initiate alarms at the remote annunciator as a charger malfunction indication.

## 2.05 GENERATOR AND EXCITER

### A. Generator:

1. Dripproof construction, engine driven self excited type, directly connected to the engine with a flexible coupling.
2. Provided with a full amortisseur winding.
3. Insulation system Class F with temperature rises in accordance with NEMA Standard MG1.
4. Conform to applicable portions of NEMA Standards for Motors and Generators, MG1.
5. Include a static voltage regulator, factory tested with the generator to assure proper operation of the generator voltage regulator system.
6. Maintain output voltage within  $\pm 2$  percent of rated voltage under steady-state conditions of load between no load and full load.
7. Recover output voltage within  $\pm 2$  percent of the final voltage in 2 seconds or less following the sudden application or removal of 25 percent increments of rated load.

### B. Exciter:

1. Brushless direct connected AC exciter used with rotating rectifiers or static exciter regulator assembly.
2. Consist of an alternator and hermetically sealed rectifiers mounted on the same shaft with the generator.
3. Fed output of the alternator exciter through the rectifiers to the field of the generator without external electrical connections to the rotating assembly.
4. Static exciter installed in a suitable enclosure consists of a system of transformers, reactors, semiconductors and other static devices which feedback a part of the generator power output to the generator field for excitation.

### C. Automatic Voltage Regulator:

1. Include a manual voltage adjust control which will provide control of the terminal voltage with  $\pm 5$  percent of the rated value for any load within the generator rating.

## 2.06 INSTRUMENTS AND CONTROLS

### A. Furnish and install the following engine and generator instruments and controls in a control panel mounted on the engine generator set:

1. Lube Oil Pressure Gauge
2. Water Temperature Gauge
3. Engine Running Time Hour Meter
4. Manual Start/Stop Switch

5. Engine Protective Alarms
  6. AC Voltmeter
  7. AC Ammeter
  8. Phase selector switches for voltmeter and ammeter.
  9. Frequency Meter
  10. Voltage Adjust Control
- B. The governor manual speed adjusting control may be either mechanical or electrical. Isolate instrumentation to prevent damage from engine generator set vibration.
- C. Provide a panel at the Fireman's Command Center for status indication and control of the generator. Status indication includes a white pilot light indicating generator running, a green pilot indicating generator on-line, an amber light indicating low day tank fuel condition, and a common amber light indicating a generator alarm condition. Provide a guarded generator start switch.

## **2.07 REMOTE ANNUNCIATOR**

- A. Provide a remote annunciator. Coordinate location with Owner. Include the following indicating lights:
1. Generator On Line
  2. Battery Charger Malfunction
  3. Low Lube Oil Pressure
  4. Low Coolant Temperature
  5. High Coolant Temperature
  6. Low Main Tank Fuel
  7. Engine Overcrank Shutdown
  8. Engine Overspeed Shutdown
- B. Include an audible alarm to sound when any of the alarm conditions in this Section exist. Equip audible alarm with a silencing switch with ringback feature.
- C. Indicating lights shall remain ON as long as faults are uncorrected. Equip lights with lamp test device.
- D. Derive remote annunciator device power from the engine starting battery/charger system.



## **2.08 AUTOMATIC OPERATION**

- A. Equip engine generator set with an automatic control system to start and stop the unit. The automatic engine starting control operates from auxiliary contacts in the automatic transfer switch which close for engine run and open for engine stop. Arrange starting control circuits so that cranking will commence immediately after closing of the auxiliary contact. Provide four cranking cycles of 10 seconds ON and 10 seconds OFF. If the engine has not started and the completion of the four cranking cycles, or if any safety device should operate while the engine is in operation, the unit shall be stopped immediately and the starting controls locked out, requiring manual resetting. The starting control equipment capable of operating at 75 percent normal DC voltage. The overcrank indicating light indicates that the engine has not started at the completion of the four cranking cycles. After the engine successfully starts, the starting control shall automatically disconnect the cranking controls.
- B. Selector switch provides the following positions:
  - 1. Manual or Handcrank
  - 2. OFF or Stop
  - 3. Automatic
  - 4. Engine Test

## **2.09 WEATHERPROOF HOUSING**

- A. Provide a weatherproof housing which completely enclose the engine-generator set. Provide weatherproof housing with noise abatement insulation. Quiet type housing shall attenuate generator noise emission to -73 dBa at 7 meters. The housing shall contain all louvers and controls to automatically open upon engine start-up and close after shutdown. Engine silencer shall be installed inside of the enclosure.
- B. The side panels shall be lockable and removable for servicing of the engine-generator. Provide 2 sets of keys to the owner at completion of the project. Housing shall have baked enamel finish in color as selected by Architect.
- C. Provide two 12VDC luminaires with switch on control panel to light the engine-alternator for use in maintaining the generator set. Connect to engine starting system. Include overcurrent protection for the luminaire circuit.
- D. Provide one weatherproof GFCI 20A duplex receptacle mounted to skid base for connection to 120V field wiring.

## **PART 3 - EXECUTION**

### **3.01 ELECTRICAL WIRING**

- A. Conduit, wiring, and electrical connections required between the various items of the System shall be provided and installed complete.

### **3.02 SUPERVISION**

- A. Installation and start-up shall be supervised, checked and tested by a qualified representative of the engine generator manufacturer.

### 3.03 FIELD TEST

- A. After installation and initial start-up of the engine generator set is complete, a test shall be performed and logged in the presence of the Architect. Engine generator manufacturer to furnish an engineer to operate the engine during the tests, to check all details of the installation and to instruct the operators. This engineer will be required for a period of not less than 2 days for instruction and tests and all costs in connection therewith shall be included in the Contractor's bid. The Contractor shall furnish all fuel, lubricants, load banks and instruments necessary to conduct the tests and shall connect all devices required to obtain data required below. Connect resistor load bank to load side of the automatic transfer switch and make any necessary temporary connections to obtain full load for the test.
- B. Field Test Requirements:
1. Record data every 15 minutes and at the beginning and end of every separate test and include electrical and temperature information. Accomplish testing in the following sequence:
    - a. Check engine and generator mounting bolts. Check alignment of engine generator and realign if not within manufacturer's limits.
    - b. Test generator and exciter insulation resistance with a megger. Take generator readings at circuit breaker or at leads to switchboard. Record results in the test report.
    - c. Perform engine manufacturer's recommended prestarting checks. Include a check of water, fuel and lube oil levels within the engine.
    - d. Start engine and make engine manufacturer's after starting checks during a reasonable run-in or warmup period.
    - e. Operate engine generator set for one hour at 50 percent of rated load.
    - f. Operate engine generator set for one hour at 75 percent of rated load.
    - g. Operate engine generator set for two hours at 100 percent of rated load.
    - h. Measure sound level to assure that the sound spectrum does not exceed the criteria specified.
    - i. Increase engine speed by manually overriding the governor. Measure speed by a tachometer. Record speed at which overspeed trip operates.
    - j. Demonstrate functioning of high temperature coolant circuit by restricting airflow through the radiator.
    - k. Shutdown engine and observe operation of low oil pressure control. Record pressure at which trip operates. If safety conditions of the Safety System are not met during the preceding three steps, make the necessary readjustments and step repeated until satisfactory results are obtained.
    - l. Ensure proper operation of the automatic exercising system by setting system for automatic operation then manually initiating an exercise period of at least 30 minutes.
    - m. A battery starting test shall be performed with the charger disconnected, consisting of four cranking cycles of 10 seconds ON and 10 seconds OFF. Shutoff engine fuel supply to prevent starting.
- C. Checks to be made during on-site testing:
1. Proper operation of controls.
  2. Proper operation of gauges and instruments throughout operation.
  3. Proper operation of auxiliary and accessory equipment. Check valves, including pilot valves and injection pump, tests to assure proper operation.

- D. Inspection: Upon completion of the on-site tests, a general inspection shall be made for:
1. Leaks in the engine, piping systems, tanks, etc.
  2. Excessive blowby.
  3. Any other deficiency which may impair proper operation.

#### **3.04 ACCEPTANCE**

- A. Final acceptance made when the generator set has successfully completed the onsite tests and after defects in material or operation has been corrected.

**END OF SECTION**

**SECTION 26 36 23**

**AUTOMATIC TRANSFER SWITCHES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirement 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. Automatic Transfer Switches
- 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
  - 7. Section 26 32 13, Engine Generators

**1.03 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
  - 1. Underwriters Laboratories (UL).
    - a. UL 508 Industrial Control Equipment
    - b. UL 1008 Automatic Transfer Switches
  - 2. National Fire Protection Association (NFPA)
    - a. NFPA 70 National Electrical Code (NEC)
    - b. NFPA 110 Emergency and Standby Power Systems
  - 3. National Electrical Manufacturer's Association (NEMA)
    - a. ICS Industrial Controls and Systems

#### **1.04 SUBMITTALS**

- A. Shop Drawings
- B. Product Data
- C. Operating and Maintenance Data:
  - 1. Complete instructions covering the operation and testing of the automatic transfer switches.
  - 2. Maintenance instructions shall include complete trouble shooting and diagnostic information, disassembly instructions, assembly instructions and preventive maintenance schedule.
  - 3. Include data in Operating and Maintenance Manuals specified in Section 26 05 00, Common Work Results for Electrical.

### **PART 2 - PRODUCTS**

#### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Automatic transfer switches of the same manufacturer as the engine generator equipment specified in Section 26 32 13, Engine Generators.
- B. Equal as approved by the District.

#### **2.02 AUTOMATIC TRANSFER SWITCHING SYSTEM**

- A. Furnish each switch with full load current rating, voltage, phase, poles and AIC ratings as shown on the drawings. Transfer switches capable of switching classes of load and shall be rated for continuous duty when installed in non-ventilated enclosures.
- B. Transfer switches shall be 4-pole type provided with a switched neutral pole. The neutral pole shall be of the same construction and have the same ratings as the phase poles. All poles shall be switched simultaneously using a common crossbar.
- C. Provide relays and control circuits to obtain fixed preferential control with transfer switch connected to the normal source of power under normal conditions.
- D. Upon a sustained drop in voltage of 30 percent in any phase of the normal power source from rated voltage and after a delay of 2 seconds, switch closes circuit to automatically start the alternate power source and transfer the load to the alternate power source provided the voltage and frequency of that source are at least 90 percent of rated value.
- E. Electrically operated switch but mechanically held in both the normal and standby positions and shall include an electrically continuous neutral position. Operator momentarily energizes from the source to which the load is being transferred. Upon return of normal power to within 10 percent of rated voltage on all phases, and after a preset time delay adjustable from 2 to 25 minutes, the switch shall automatically transfer the load to the normal source. If the standby power source should fail during the delay period prior to return to normal source, the time delay bypassed and the switch shall return immediately to the normal source. Provide test switch to simulate failure of the normal power source and to test the operation of a transfer switch.

- F. Provide a manual operator for maintenance servicing of the transfer switch in accordance with UL-1008.
- G. Provide an override switch to bypass the automatic transfer controls so that the transferred switch will remain indefinitely connected to the standby power source, regardless of the condition of the normal power source.
- H. Each automatic transfer switch shall be furnished with voltage sensing relays for each phase. Connection of these sensing relays shall be made to the normal power input terminals of the transfer switch. Voltage range shall be field adjustable.
- I. Delayed Transition:
  - 1. Controls include a time delay, adjustable from 0-60 seconds, to control the switching time from source to source, to allow load generated voltages to decay before connecting to an energized source.
- J. High Intensity LED Lamps:
  - 1. Provide to indicate Source 1 and Source 2 Available, Source 1 and Source 2 Connected, exercise mode, and test mode.
  - 2. Source available LED indicators operates from the control microprocessor to indicate the true condition of the sources as sensed by the control.
  - 3. Transmit signals transmitted to the remote annunciator.
  - 4. Provide one set Form C auxiliary contacts indicating transfer switch position, rated 10A 250 VAC.
- K. Install automatic transfer switch in a NEMA Type I wall mounted enclosure conforming to NEMA ICS and comply with the requirements of UL-508.
- L. Provide a field-configurable exerciser clock, displaying real time in hours and minutes, with provisions for selection of testing interval at 7, 14, 21, or 28-day intervals in either with-load or without-load configuration. Exercise period duration shall be field configurable.
- M. If an elevator is being served by the transfer switch, the transfer switch provides a relay contact signal prior to transfer or retransfer. The time period before and after transfer adjustable in a range of 0 to 50 seconds.
- N. Transfer Switch: Provide with AL/CU mechanical lugs sized for the full output rating of the switch, and capable of accepting the number of cables indicated on the drawings.
- O. Automatic Transfer Switch:
  - 1. Suitable for satisfactory performance when installed for operation at 200-feet altitude, 104 degrees F high and 41 degrees F low ambient temperature, 90 percent relative humidity.
  - 2. Warranty:
    - a. Warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.
    - b. Comprehensive, including parts, labor, and travel to the site.

- P. Clean surfaces to be painted to ensure that they are free from all oil, grease, welding slag and spatter, mill scale, products of corrosion, dirt or other foreign products. Paint at least one coat of rust inhibiting primer and one coat of finish enamel.
- Q. Apply rust inhibiting primer to a clean, dry surface as soon as practicable after cleaning. Painting shall be with manufacturer's current materials according to manufacturer's current process except that the total dry film thickness shall be not less than 2.5 mils.
- R. Paint free from runs, sags, orange peel, or other defects.
- S. Finish Coat Color of Paint: Manufacturer's standard.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Mount transfer switches square and plumb, with top of switches 6 feet – 0 inches above finish floor.
- B. Provide and install complete conduit, wiring, and electrical connections required between the various items of the System.
- C. Engage a factory-authorized service representative to inspect the equipment, verify installation meets the manufacturer's requirements, and perform manufacturer recommended start-up testing.
- D. Engage a factory-authorized representative to provide training of the Owner's personnel to adjust, operate, and maintain the automatic transfer switch equipment.

**END OF SECTION**



ACOUSTIC ARTS AND ENGINEERING

## College of Marin Bldg 11 Renovation (Project No. 1) VRF Units Exterior Noise Control

March 17, 2017

Report No. 3, revision 1

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### Summary

This report outlines revised noise control recommendations for 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 side of Building 11. Without noise control measures the VRF units operating together, are expected to generate the following noise levels around the site:

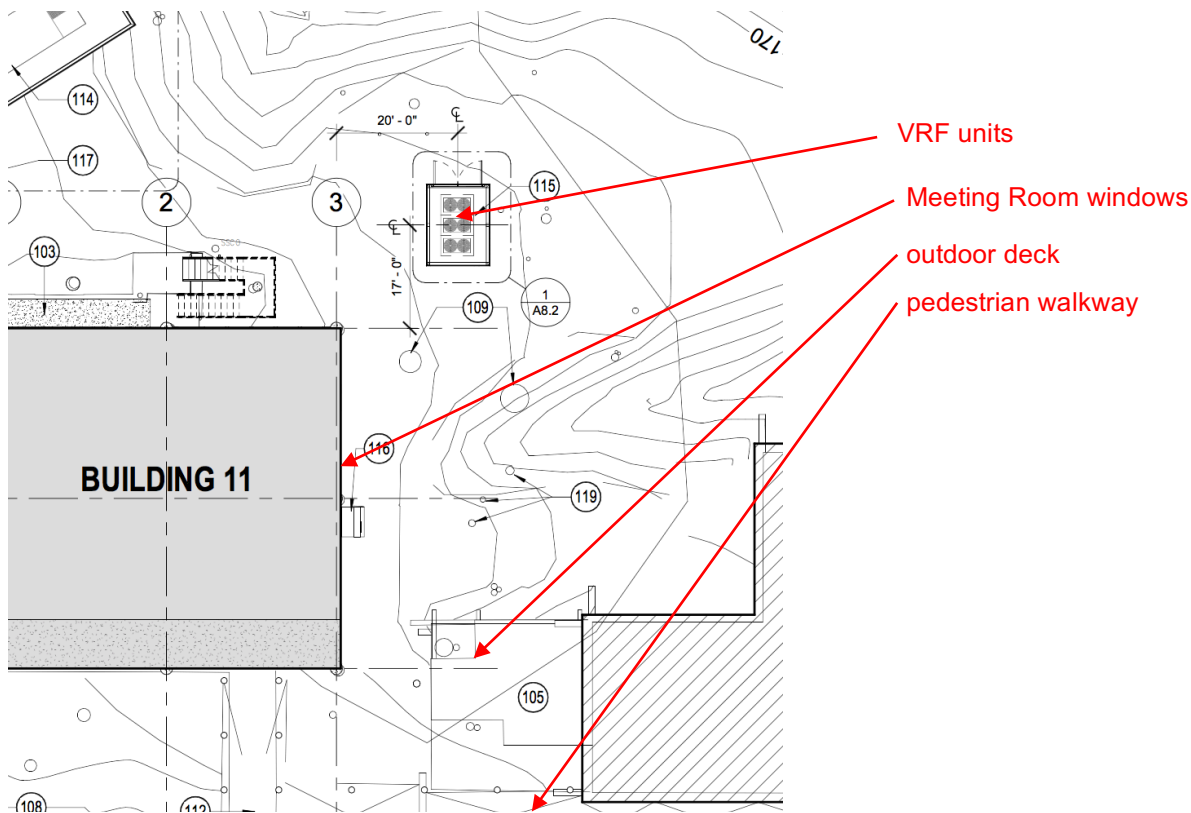
|                    |             |
|--------------------|-------------|
| Building 11        | 55 - 59 dBA |
| Building 9         | 48 - 52 dBA |
| Outdoor deck       | 48 dBA      |
| Pedestrian walkway | 47 dBA      |

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. It is expected that the windows will be opened frequently.

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 to a noise level between 35 and 40 dBA. Sensitive upper floor spaces such as the meeting rooms in Building 11 should also be protected from the VRF noise. Offices facing out to the VRF equipment may have slightly higher noise level exposure, up to 50 dBA (on the outside) due to operation of the VRF units.

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.

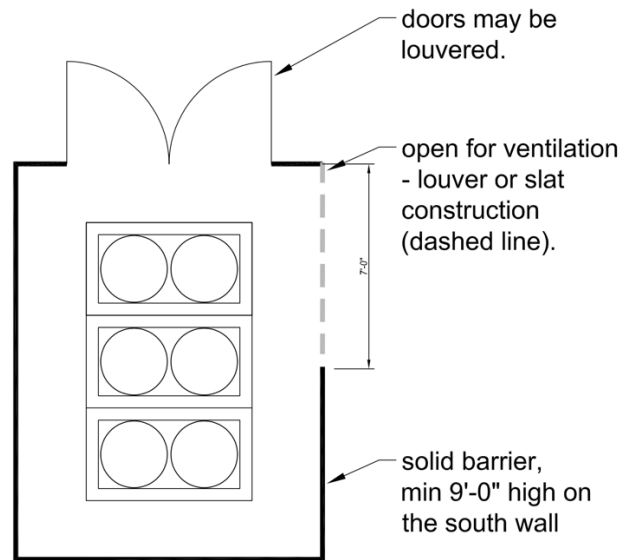
Due to the shorter distance to the equipment and direct line of sight into the enclosure, the north east corner office in Building 11 will be exposed to exterior noise levels greater than 50 dBA. This is the worst case condition. Note that the noise barrier would need to extend as high as 13 ft in order 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.

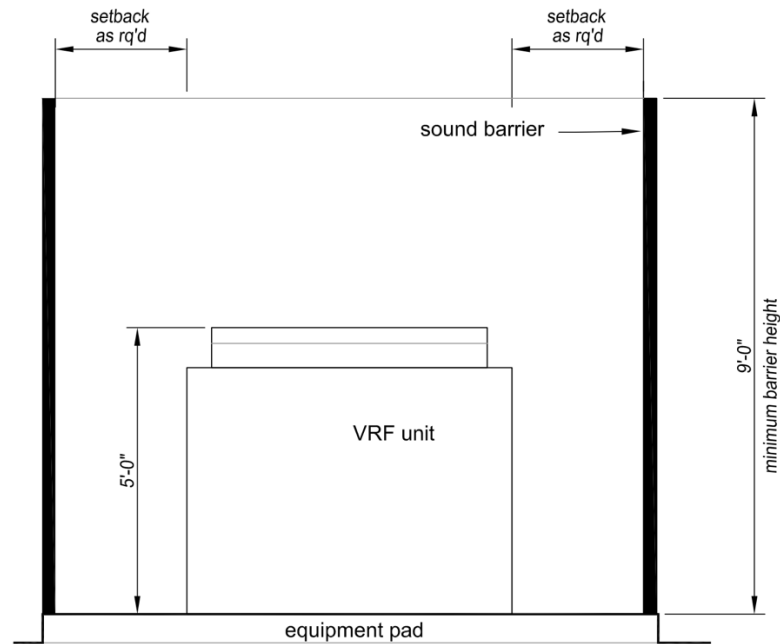
The required noise reduction can be achieved with an acoustic enclosure with the following characteristics:

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 on all sides.
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/gates may be louvered for most of the door panel area for ventilation.
6. The access doors/gates do not require acoustic seals.

∞ End of Document ∞



ACOUSTIC ARTS AND ENGINEERING

# College of Marin Bldg 11 Renovation (Project No. 1) Back Up Generator Exterior Noise Control

March 17, 2017

## Report No. 4

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### Summary

This report outlines final noise control recommendations for the backup generator unit to be located near the Building 11 at the College of Marin Indian Valley campus in Novato, California.

The unit will be mounted on a slab on grade just to the north east side of Building 11, approximately 34 ft from the nearest building. The generator will be specified with a Level 2 noise housing/enclosure provided by the manufacturer. The generator, together with the noise reducing housing/enclosure, will be maximum 9'4" tall.

Without additional noise control measures the generator noise would be uncomfortably loud for pedestrians walking along the roadway. Generator noise is impulsive and this is distracting and generally perceived as annoying at levels >50 dBA.

However, the generator is not intended for operation other than during a power outage. With the exception of occasional testing, the generator is expected to rarely generate noise. During a power outage the buildings will be occupied and it is assumed that higher noise levels are acceptable during these events. The generator noise should be controlled to reasonable levels to minimize the impact on operations. Refer to OPR for generator noise criteria around the project (exterior noise levels).

The generator should be enclosed with a solid barrier wall to reduce noise transmitted to the most sensitive receivers which include the outdoor pedestrian walkways, the deck, and the meeting rooms in Building 11. The barrier should be solid and sized/detailed to achieve as close as possible to the recommended outdoor noise criteria.

The meeting rooms have operable windows and these will be generally opened during meetings. With the proposed location of the generator the meeting room is shielded from the generator by the building itself. So this room will not be exposed to particularly high levels of generator noise if the windows are closed and with the recommended noise control measures.

The primary aim of these recommendations is to achieve a cost effective approach to keep generator noise to acceptable levels at public walkways and interior noise levels with the windows closed. The greatest generator noise exposure is expected at upper floors of Building 11 on the north facing offices, and the walkway passing directly by the generator. With a barrier as recommended the buildings around the generator, and particularly the 2<sup>nd</sup> floor offices will be mostly shielded from direct equipment noise emissions. Fig 1 below shows the proposed generator layout:

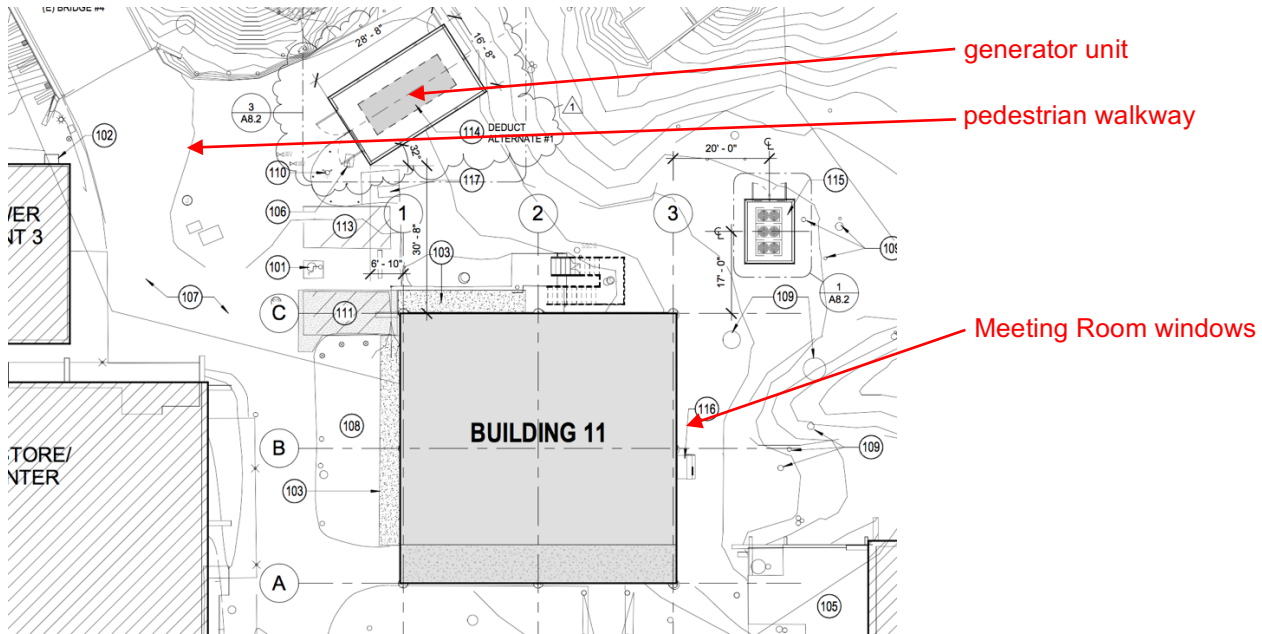


FIG 1: Proposed generator location and surrounding receivers

## Recommended Noise Control Measures

### Testing Schedule:

1. The testing should be scheduled during times when the surrounding buildings are not occupied such on a Sunday.

### Unit Location and Orientation:

2. The proposed location and orientation is acceptable as proposed. Since the exhaust will be at the top of the unit the noise will generally be directed straight up.

Sound Barrier Construction:

3. A solid, minimum 11 ft high acoustical enclosure, with no holes, or gaps is recommended around the entire unit. The basic wall construction should be constructed per architectural sheet A8.2.
4. Due to the sightlines from upper floors, the 2<sup>nd</sup> floor offices on the north side of Building 11 will have the highest generator noise exposure. The windows at these offices may have slightly higher exterior noise exposure levels than the criterion, with exterior noise levels as high as 65 dBA. The windows at these offices facing north should be insulated glazing units. With insulated glazing and with windows closed, the interior noise levels in all offices facing the equipment will be below 45 dBA.
5. The barrier should be no less than 11 ft high assuming that the top of the generator equipment is no higher than 9'-4" above the slab and the composite barrier construction, including framing, insulation, and exterior cladding should have a surface density no less than 5 lbs./ft<sup>2</sup>. The proposed construction meets this requirement.
6. The exterior of the enclosure may be finished per aesthetic preference.
7. Ventilation louvers are not required.
8. Drainage holes may be installed on the north side of the sound barrier wall, open toward the parking area. The acoustical preference is to provide drainage on 1 side only. The exact drainage design to be confirmed based on drainage requirements (by others). The acoustical preference is to install small diameter (>4 sq inch) weep holes in the barrier wall or in the concrete pad. The number of weep holes should be per drainage requirement.

Door Construction:

9. The access doors/gates should be constructed per architectural sheet A8.2. The main door panels should have compression seals at the jamb, between the steel framing around the door and the steel door jamb posts.
10. The meeting stile at the double doors should also be sealed with a solid rubber or neoprene compression seal.

Due to the large gap these seals should be custom engineered by Zero International or Pemko. The manufacturer should be contacted and asked to design and fabricate the seals according to the installation conditions and to achieve positive compression at both jambs and at the meeting stile with the door closed.

See the following web links for contacting the sales representatives.

<http://zerointernational.com/content.aspx?p=4>

<http://pemko.com>

11. The top and bottom of the door do not require gaskets.
12. The side access door does not require acoustic seals.

Sound Absorptive Panels:

13. The solid interior surfaces at the short walls (ends) of the barrier should be treated with exterior grade acoustic panels at least 2" thick, and with a minimum 0.95 NRC rating. Perforated metal panels with high density mineral fiber or fiber glass insulation, and with no back such as Type M90 by Empire or equal are recommended (see data sheet attached). Note that these are not the STC rated M90 panels.
14. Make provisions for minimum 40% of these two interior wall surfaces to be treated with these panels. The panels should be installed at the top of the wall or door.

∞ End of Document ∞

Encl.,

**Appendix A** Data sheets

# M90 ACOUSTICAL PANEL WALL MOUNTING DETAIL

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" - 1/4" 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 6 LBS.  
PER CUBIC FOOT DENSITY AND CONFORM WITH FEDERAL  
SPECIFICATION HH-1-5588 AND ASTM STANDARDS C612 AND  
E136.

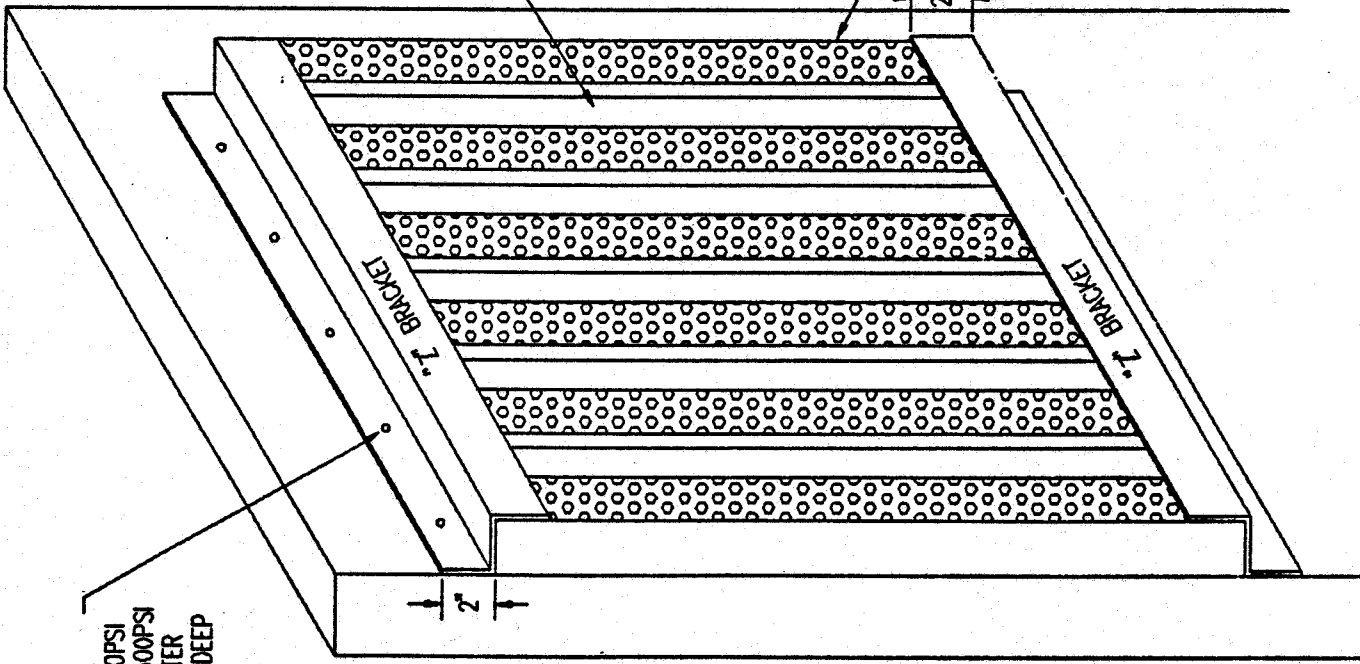
NOT DRAWN TO SCALE

M-90 ACOUSTICAL PANEL  
WALL MOUNTING DETAIL

dwg# m90113

G.L.R.

~~89-PANEL MOUNTING DETAIL~~  
~~WALL MOUNTING DETAIL~~  
~~WALL MOUNTING DETAIL~~  
~~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)

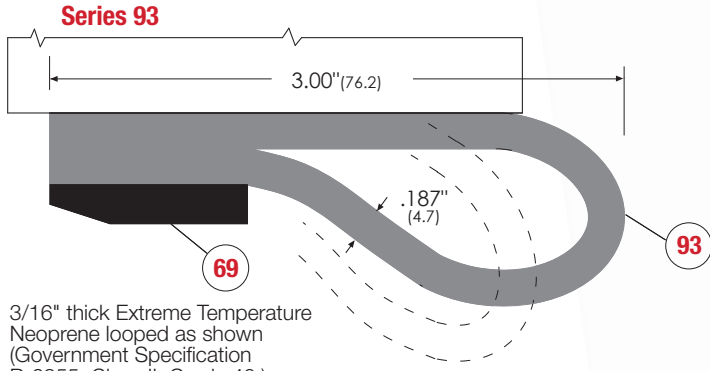
\*PANEL WIDTH=24-30 INCHES  
\*PANEL LENGTH=UP TO 12 FEET



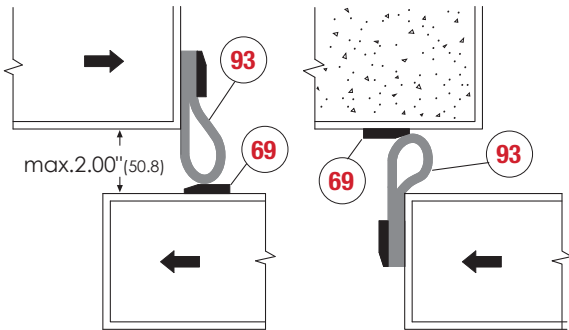
# Heavy-Duty Overhead Doors and Sliding Hangar Doors



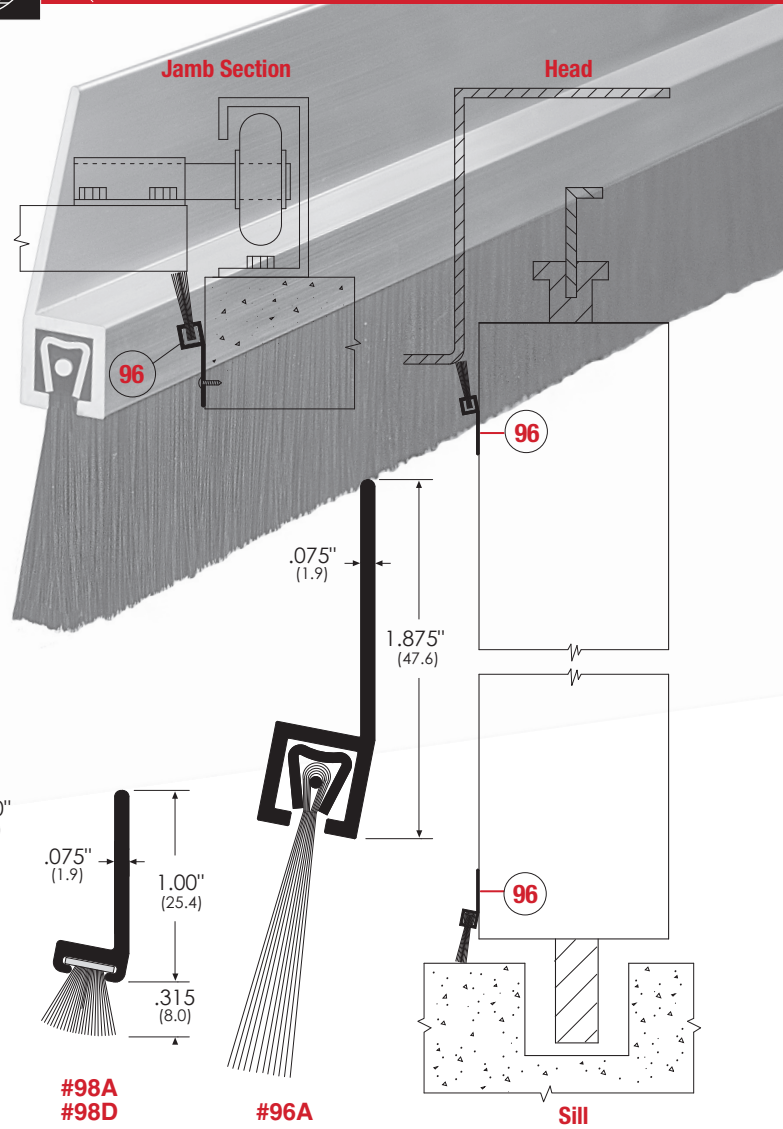
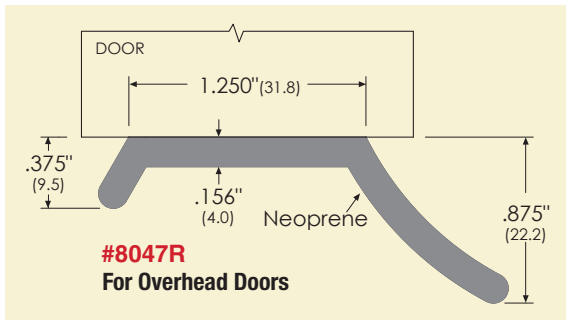
Note: A = Aluminum R = Rubber  
D = Dark Bronze Anodized



3/16" thick Extreme Temperature Neoprene looped as shown (Government Specification R-6855, Class II, Grade 40.)

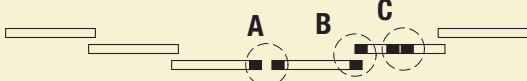


## Intermediate Stiles



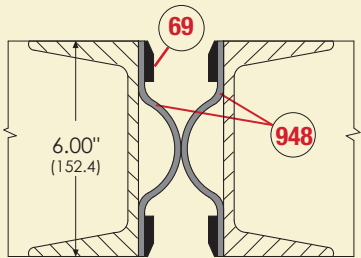
## SLIDING HANGAR DOORS (Available as Engineered Special order only)

### Series 94



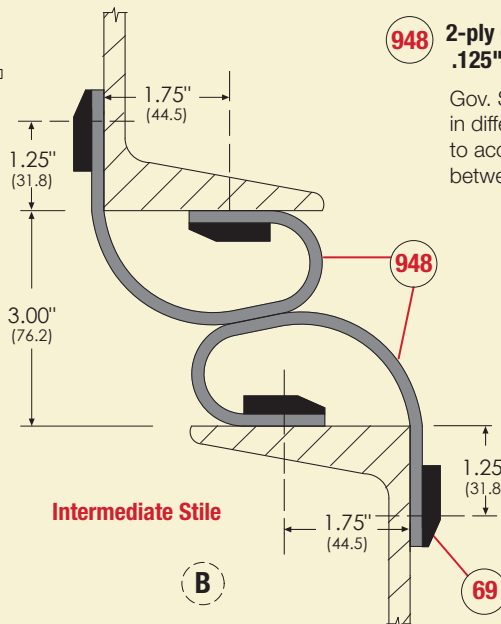
### Hangar Doors Schematic Arrangement

Illustrations not to scale



**Meeting Stile** 2-ply Cloth-Lined Rubber .125" x 8.00"

(A)

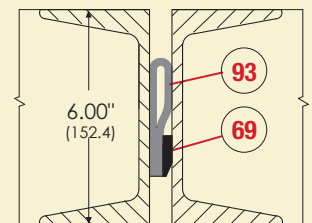


**Intermediate Stile**

(B)

**(948) 2-ply Cloth-Lined Rubber .125" x 8.00"**

Gov. Spec. HHP 151E Class II. Available in different widths, thicknesses and plies to accommodate varying spaces between doors.



10' Door Sections Permanently Fastened Together

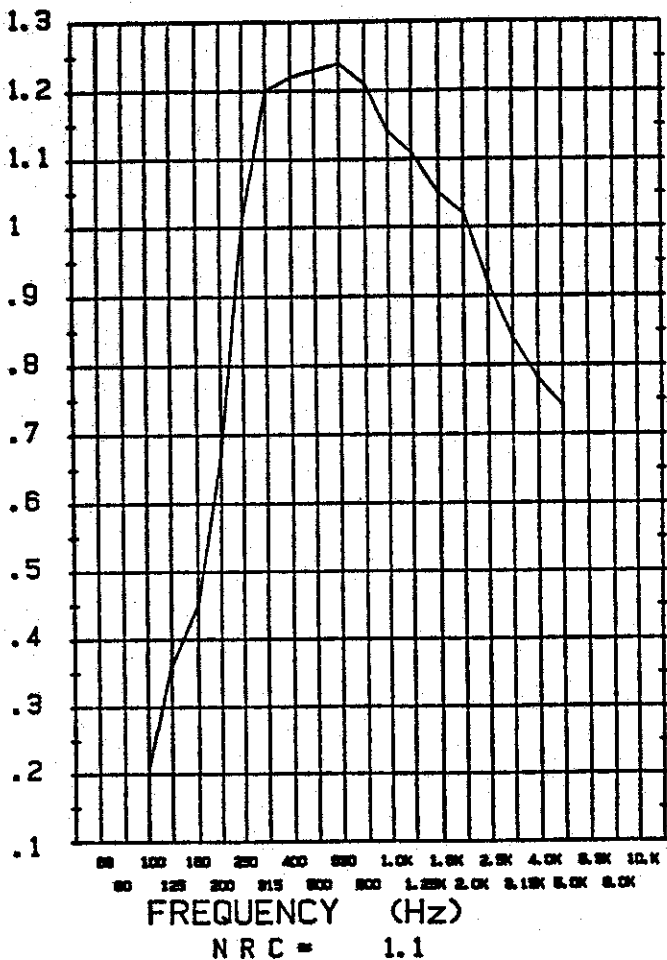
(C)

Overhead / Hangar Doors

# RIVERBANK ACOUSTICAL LABORATORIES EMPIRE ACOUSTICAL SYSTEMS

## SOUND ABSORPTION REPORT RAL-A90-1

SOUND ABSORPTION COEFFICIENT



### 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                                       |

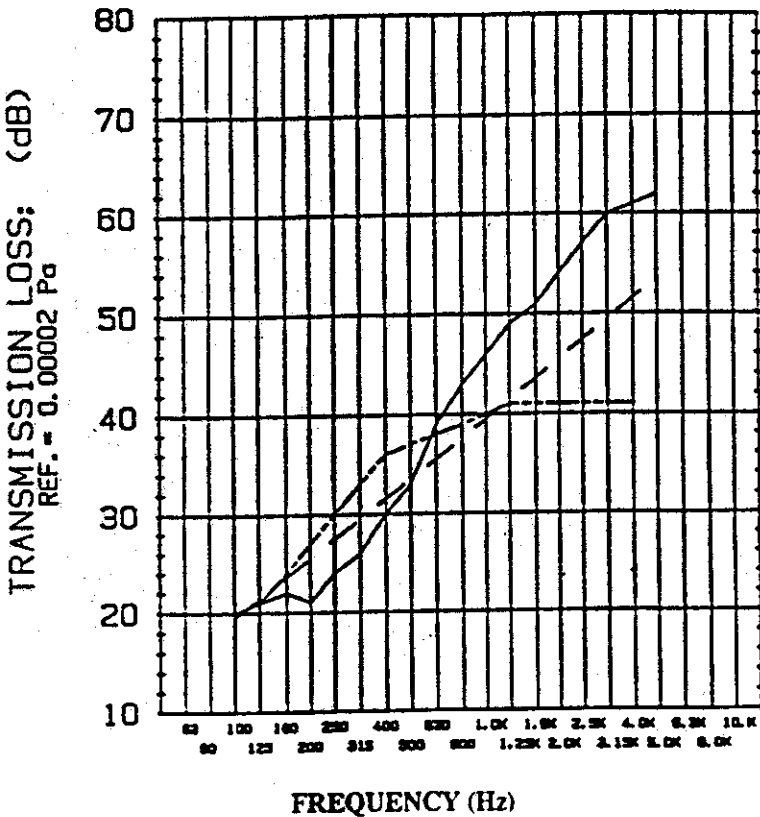
NRC = 1.10

### 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



| 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    |

——— Transmission Loss  
 - - - - - Sound Transmission Class Contour  
 - · - · - Mass Law Contour

### 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.