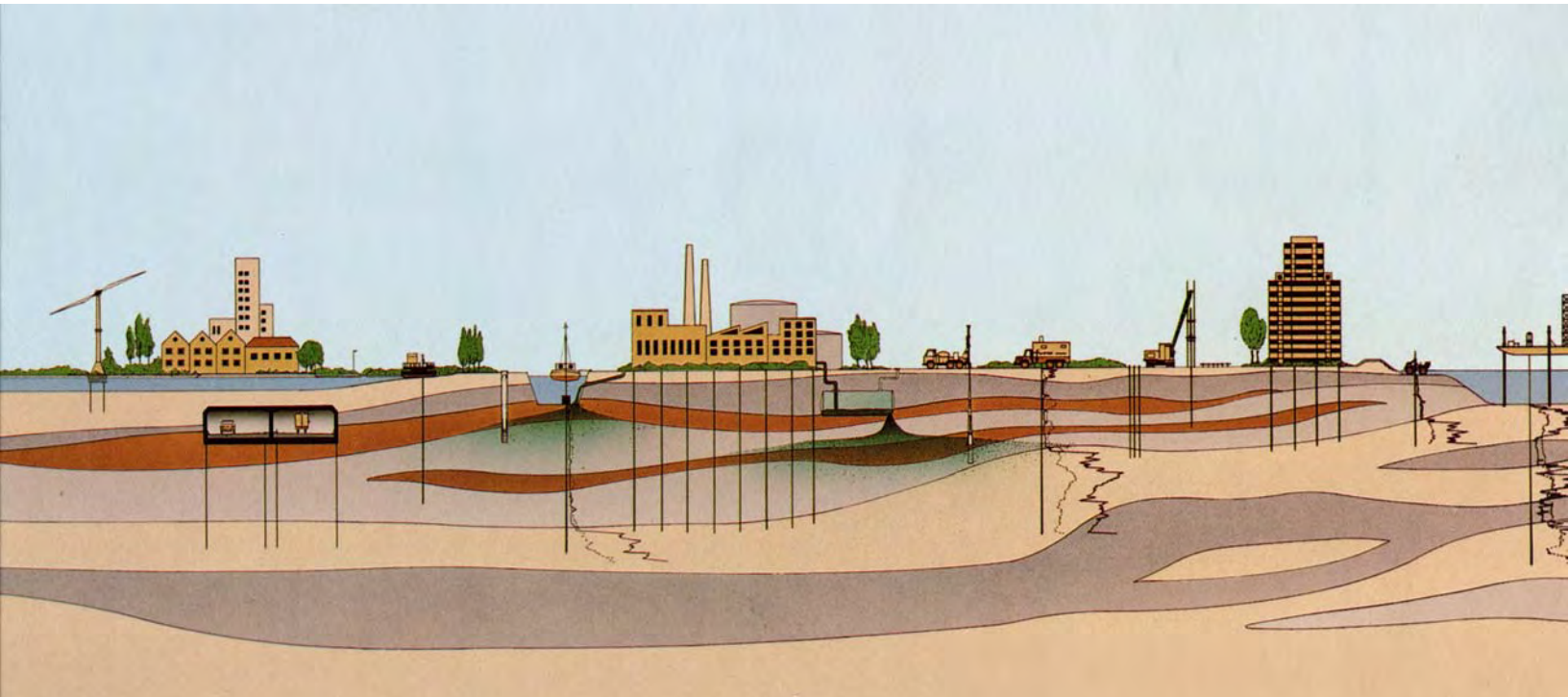
FUGRO WEST, INC.

BASELINE GEOLOGIC HAZARDS STUDY
COLLEGE OF MARIN
INDIAN VALLEY CAMPUS
NOVATO, MARIN COUNTY, CALIFORNIA

Prepared for:
COLLEGE OF MARIN

DECEMBER 2005

Project No. 1715.001



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December 15, 2005
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Attention: Ms. Suzanne Brown

Subject: Baseline Geologic Hazards Study
College of Marin Indian Valley Campus, Novato, California

Dear Ms. Brown:

As requested, Fugro West, Inc., has performed a baseline geologic hazards study for the Indian Valley Campus of the College of Marin in Novato, California. This report provides information regarding our limited geotechnical field exploration and laboratory testing program and our general assessment of geologic hazards for the Indian Valley Campus. This baseline geologic hazard assessment report will need to be updated for each specific area of focus prior to submittal to the Division of the State Architect (DSA).

We trust that this report provides the information that you require at this time. If you have questions or comments concerning the contents of this report, please do not hesitate to call.

Sincerely,

FUGRO WEST, INC.

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1.0 INTRODUCTION

This report presents the results of the limited geotechnical study and baseline geologic hazard study conducted by Fugro West, Inc., (Fugro) for the College of Marin, Indian Valley Campus, in Novato, California.

The baseline geologic hazard study was performed based on requirements contained in the document titled, *California Geological Survey – Note 48, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings.* This document is used by the California Geological Survey (CGS) in their evaluation of geologic hazard reports which are prepared to conform with the requirements of the California Department of General Services, Division of the State Architect (DSA), which are presented in their Interpretation of Regulations Document titled, *Geologic Hazard Report Requirements*, IR A-4, dated July 21, 2005. The latest version of CGS *Note 48* is dated January 1, 2004, with supporting documentation provided by the CGS dated July 1, 2005.

1.1 SITE AND PROJECT DESCRIPTION

The project site is the College of Marin's Indian Valley Campus, located at 1800 Ignacio Boulevard, southwest of the City of Novato in Marin County, California, as shown on the *Site Vicinity Map*, Plate 1. The College property consists of a 330-acre portion of the former Pacheco Ranch. The campus was constructed during the mid-1970s adjacent to the deeply incised and meandering Ignacio Creek, formerly called the North Branch of Arroyo San Jose Creek, which flows west to east through the alluvial filled valley that is centrally located within the property. An ephemeral channel, fed from the upslope watershed to the southwest, has deeply incised the lowland area within the campus, and merges with Ignacio Creek near the central portion of the campus.

Hill slopes rise generally toward the north and south from the campus as shown on the *Local Topographic Map*, Plate 2. The approximate geographic center of the campus is located at latitude 38.0749°N and longitude –122.5786°W, as shown on Plate 2. The campus area, as presented on the *Site Plan and Geologic Map*, Plate 3, encompasses a relatively small portion of the property, and ranges from between approximately Elevation 150 feet and 200 feet, with the hill slopes to the north and south within the property reaching a maximum of approximately Elevation 450 feet and Elevation 730 feet, respectively. Lowland areas adjacent to the creek that support the current campus development consisted of gently sloping grassland terrain prior to development, while the relatively dense riparian vegetation along the watercourses, and the dense vegetation along the adjacent slopes, remain relatively undisturbed by campus development. A residence, barn and associated improvements formerly located along the north side of the creek at the western edge of the property, were demolished as part of the campus development.

The Indian Valley Campus was generally constructed in groups of buildings, known as "clusters", as shown on the *Site Plan and Geologic Map*, Plate 3. These clusters have been named: Pomo, Administrative Services, Miwok and Ohlone. A perimeter roadway that traverses along the base of the slope to the south of the campus provides access to the Pomo and Miwok Clusters, and to the lower elevation portion of the property. Three power plants, a corporation yard and police facility are spread throughout the improved area. Athletic fields, tennis courts and a swim center are located at the western portion of the campus. Parking areas, Lots 1 through 8, as shown on Plate 3, are located along the south side of Ignacio Boulevard and to the immediate north of Ignacio Creek. Four vehicular access bridges and four pedestrian only bridges, provide access from the parking areas to the campus buildings, and access across the ephemeral channel passing through the campus from the southwest. A number of frequently utilized trailheads leading to open-space areas to the north, west and southwest of the campus property are accessible to the public from the western end of the campus development.

Numerous retaining walls line the base of the cut slope around the perimeter roadway, and are present to support cuts and fills required to develop level pads for various structures. These retaining walls are constructed from 12-inch-diameter, pressure-treated lumber columns that are slightly inclined into the slope to be parallel with the face of the cut, and pressure treated wood lagging spans between the near vertical columns. Gravel drainage is provided behind the lagging along some sections of wall, while native materials are present behind the lagging in other areas. Concrete drainage ditches are present above the retaining walls in some locations. Distress to these walls was observed in a number of areas, and some sections of wall have been replaced with new wall sections consisting of drilled, cast-in-place concrete piers supporting solder beams (steel H-beams) with pressure-treated wood lagging spanning between them.

The building clusters and other structures and facilities as shown on Plate 3, can be briefly summarized as the following:

1.1.1 Pomo Cluster

The Pomo Cluster is the largest and easternmost cluster on the campus and is located primarily on an alluvial apron at the base of a swale and hillside between Ignacio Creek to the north and the perimeter road to the south. The cluster consists of seven structures, Buildings 1 through 7, with various patios, walkways and retaining walls. Buildings in this cluster generally include a machine shop, metal shop, auto body shop and technology lab, a medical lab, general classrooms and offices. Power Plant 2, located south of the cluster, across the perimeter roadway, was constructed on a fill at the base of the swale.

1.1.2 Administrative Services Cluster

The Administrative Services Cluster, Buildings 8 through 12, is located near the center of the campus, immediately to the south of the main campus entrance at Parking Lot 4. Bridge 5, a pedestrian only bridge, provides access to the cluster from Parking Lot 4. Buildings in this cluster generally include student and administrative services, a bookstore and child care center. Power Plant 3 is located in the area of the cluster at the edge of the creek bank. The western

edge of Building 12, the Child Care Center, is located very close to the edge of the deeply incised, meandering creek that passes by the building with a local northerly trend. A 60-foot-long, 18-foot-high, and 15-foot-wide gabion basket erosion control/retaining wall structure has been constructed along the creek to mitigate further bank erosion that could eventually impact the perimeter area around Building 12, and the integrity of its foundation.

1.1.3 Miwok Cluster

The Miwok Cluster consists of four, closely spaced structures, Buildings 13 through 16, plus an additional structure, Building 17. The main cluster is located to the south of the Administrative Services Cluster and west of the Pomo Cluster at the base of a topographic nose within the uphill portion of the campus, next to the perimeter road. Building 17 is located approximately 250 feet to the northwest and across the ephemeral creek from the main cluster. Buildings within the main cluster generally include facilities for art labs and gallery, a student lounge and theatre, classrooms for foreign languages and general studies. Building 17 houses the library and foreign language studies and is as close as 10 feet to the adjacent creek bank. A landslide that occurred immediately southeast of Building 17, along the bank of the deeply incised ephemeral creek, has been repaired by installation of a 30-foot-long, 18-foot-high, and 15-foot-wide gabion basket erosion control/retaining wall structure, similar to what was constructed near Building 12.

1.1.4 Ohlone Cluster

The Ohlone Cluster consists of five main structures, Buildings 18 through 22, along with the swimming pool facility, considered as Building 23. Buildings 18, 19 and 20 comprise the main cluster within the interior of the campus, with the other buildings and facilities spread out within the western portion of the campus. The main cluster, Buildings 18 through 20, generally house the court reporting, computer laboratory, office occupations and general classrooms. These buildings are located immediately southwest of the confluence of the ephemeral channel with Ignacio Creek. Buildings 21 and 23, located a few hundred feet west of the main cluster, comprise the swimming pool and associated locker room facilities. Power Plant 1 is located at the east of the swim center facility. The Corporation Yard and Campus Police offices, located northwest of the pool facility, and along the north side of Ignacio Creek, are considered Building 22.

1.1.5 Parking Lots and Bridges

The campus contains eight main parking lots. With exception for Parking Lot 8, all of the parking lots are located to the south, and down slope of, Ignacio Boulevard and immediately north of Ignacio Creek. Parking Lot 8 is located on the west end of Ignacio Boulevard, in front of the campus police/corporation yard facilities. Wood retaining walls of various heights, constructed as discussed under Section 1.1, are present within some of the lots. Asphalt concrete pavements within these lots display various degrees of distress, with the pavement sections consisting of asphalt concrete over what some have reported to be treated subgrade soil. An assessment of the pavements within the campus was completed independently of this geologic hazard study.

Access from the parking lots across Ignacio Creek to the campus, and across the ephemeral channel within the campus, is provided by eight bridges and two paved culverts. Four of the bridges are for vehicular traffic between the parking lots and the main campus across Ignacio Creek. Two additional bridges and two culverts are limited to pedestrian traffic across Ignacio Creek. Two pedestrian bridges cross the northeast flowing ephemeral creek between Building 17 and the rest of the Miwok Cluster located to the southeast.

1.1.6 Athletic Fields and Trail Access

Athletic fields and associated improvements are present within the northwest trending valley that ascends from the area containing the Corporation Yard, Campus Police offices and Parking Lot 8. Grading took place within this alluvial valley to develop the relatively flat athletic field surfaces.

An extensive system of fire roads and trails can be accessed from the Athletic Field area. These well-utilized roads and trails trend north, west and southwest from this area.

1.2 PURPOSE AND SCOPE OF SERVICES

The purpose of our geologic hazard study, limited subsurface exploration and laboratory-testing program was to obtain information on surface and subsurface conditions to aid in the evaluation of the geologic hazard, geotechnical and seismology aspects of the project. The scope of our services performed included, but was not limited to, the following items:

- Review of existing geologic, geotechnical and construction reports provided by College of Marin, review of available published and unpublished geologic maps and reports, and review of stereo-paired aerial photographs of the site and vicinity;
- Performance of a geologic reconnaissance of the college property and preparation of a reconnaissance level geologic map for the developed portion of the campus;
- Conducting of a limited geotechnical subsurface exploration and laboratory testing program to confirm and supplement the available information on subsurface conditions along Ignacio Creek;
- Develop seismic design parameters based on the 2001 California Building Code;
- Perform a preliminary Probabilistic Seismic Hazard Assessment (PSHA) based on the 2002 USGS/CGS probabilistic seismic hazard assessment model for the design basis earthquake, 10 percent probability of exceedance in 50 years (475-year return period) event that can be used by the structural engineer for preliminary structural assessment purposes; and
- Preparing this baseline geologic hazards study and preliminary geotechnical assessment report presenting results from our geotechnical field exploration, laboratory testing program, geologic hazard study, seismic analysis, discussion of geotechnical issues and geotechnical recommendations.

2.0 DATA REVIEW, EXPLORATION AND LABORATORY TESTING

The limited geotechnical exploration and laboratory-testing program described herein was developed to provide general characterization of the subsurface materials.

2.1 REVIEW OF EXISTING DATA

Prior to conducting our geotechnical field exploration and laboratory testing program, Fugro reviewed relevant, available information relating to geotechnical, geologic, and seismic data, as well as results of previous explorations performed within the campus property, including the following reports:

- "Report, Initial Studies of Flood Control Geology and Soil Engineering, Proposed North Campus, College of Marin," dated August 22, 1967, (first geotechnical study of the College site) prepared by Cooper-Clark & Associates (CCA);
- "Report, Site and Foundation Investigation, Initial Facilities, Indian Valley Colleges, Novato, California," dated March 14, 1973, (geotechnical study for initial structures at the campus) prepared by CCA;
- "Report, Site and Foundation Investigation, Proposed Physical Education Facilities, Phase III of Indian Valley Colleges, Novato, California," dated May 20, 1975, prepared by CCA;
- Reports of earthwork inspection and testing for site construction, dated February 5, 1976, February 17, 1976, June 22, 1976, November 1, 1976, February 23, 1978, and May 25, 1978, prepared by CCA;
- "Foundation Investigation – Gabion Retaining Walls, Indian Valley Colleges, Novato, California," dated December 6, 1988, prepared by Harding Lawson Associates (HLA).

Exploration locations presented in previous reports within the campus property are plotted on the *Site Plan and Geologic Map*, Plate 3. Data from previous explorations were used in our general analysis of subsurface conditions and site geology.

2.2 FIELD EXPLORATION

2.2.1 General

One of the California Geological Survey's (CGS's) requirements for a geologic hazard study and associated geotechnical assessment, is that there be one subsurface exploration point (e.g., borehole, cone penetrometer sounding, etc.) for every 5,000 square feet of building footprint area, with a minimum of two exploration points per building. Previously completed exploration points can be used to partially satisfy this requirement if the exploration method utilized (drilling and sampling techniques) is acceptable by today's standards. The subsurface explorations completed by previous investigators during the 1960s and 1970s for the campus structures provide a wealth of information concerning properties of the subsurface materials, but

the borings were not performed using drilling and sampling methods that would be acceptable by today's standards.

Should detailed assessment of individual structures, or clusters of buildings, within the Indian Valley Campus be required, a subsurface exploration program that satisfies CGS's criteria for minimum number of exploration points would be developed.

2.2.1 Current and Previous Studies

Fugro conducted seventeen exploratory borings for a pavement condition study, and geotechnical assessment of materials adjacent to Ignacio Creek, as a part of the current geotechnical study for the project. The field exploration was conducted between October 17 and 20, 2005. The exploratory borings, designated B-1 through B-18, were drilled with a truck-mounted drill rig. Boring B-3 could not be completed as planned due to the presence of utilities. Geotechnical assessment along Ignacio Creek included Borings B-2, B-8, and B-13 that were drilled to depths of 45, 45, and 29 feet, respectively, using hollow stem augers. Borings B-2 and B-8 were completed as 2-inch-diameter open-standpipe piezometers for monitoring of the groundwater elevation. All other borings were performed for the pavement study, and extended to a depth of 5 feet below the existing ground surface using solid flight augers. Results of our pavement assessment are presented in a separate report. The locations of the exploratory borings are shown on the *Site Plan and Geologic Map*, Plate 3.

Ten previous borings were performed by CCA in 1967. These borings were located in the valley areas of the campus before any development had taken place, and extended to depths of between 10 and 38 feet. In 1972, CCA performed 65 borings extending to depths of between 5 and 40 feet. The 1972 borings were scattered across the site and were intended for design of all initial structures, roadways and parking lots at the campus. Seventeen additional borings were performed by CCA in 1975 near the existing swimming pool and locker room facility that extended to depths of between 15 and 41 feet. Since these borings were performed, moderate grading and construction has occurred at the site. A summary of subsurface conditions encountered in the current and previous borings, as applicable, is presented in Section 4.0. The approximate locations of previous borings are shown on the *Site Plan and Geologic Map*, Plate 3.

Logs of the recent exploratory borings and details regarding the field exploration are included in Appendix A. The subsurface conditions encountered in the exploratory borings are summarized in Section 4.2.

2.3 LABORATORY TESTING

Geotechnical laboratory testing was conducted on the soil samples collected from the recently completed borings at Fugro's soil mechanics laboratory in Oakland, California. The geotechnical laboratory test program included: classification tests (fines content, Atterberg limits, water content, unit weight) and R-Value testing for the pavement study. The results of the laboratory tests are presented on boring logs (Appendix A) at the appropriate sample depths, and in Appendix B, *Laboratory Test Results*.

2.4 CORROSION TESTING

Corrosion testing was also conducted on four selected samples at Cerco Analytical, Inc., in Pleasanton, California. Four samples were retrieved and tested from Borings B-2, B-5, B-9 and B-13. The depths at which the corrosion tests were conducted are shown on the boring logs provided in Appendix A. The corrosion test results are discussed below.

2.4.1 Tests for Buried Concrete

Soluble sulfate concentration, chloride ion concentration, and pH tests were performed on the four samples. These tests provide an indication of the corrosion potential of the soil environment on buried concrete structures. The table below presents the depth at which the samples were collected and the laboratory test results.

Test No.	Sample	Sulfate (mg/kg)	Chloride (mg/kg)	pH
1	B-2 @ 3-3.5 ft	ND	29	6.6
2	B-5 @ 2.5-3 ft	ND	100	5.6
3	B-9 @ 2.5-3 ft	ND	16	7.1
4	B-13 @ 3-3.5 ft	ND	ND	6.6

N.D. = None Detected

Based on guidelines presented by the Portland Cement Association (PCA) in their publication, *Design and Control of Concrete Mixtures* (13th Edition, 1990) and on the *1997 Uniform Building Code* (UBC), cement used to construct below grade concrete structures will be subjected to a moderate degree of sulfate exposure if the measured sulfate levels exceeds 150 mg/kg. Based on CERCO Analytical Inc.'s (CERCO) evaluation, the detected sulfate ion concentrations are non-detectable (ND). The sulfate concentration from all samples was determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

Based on CERCO's evaluation, chloride ion concentrations range from non-detectable to 100 mg/kg. Because these concentrations are below 300 mg/kg, they were determined to be insufficient to corrode the steel embedded in a concrete mortar coating.

Based on CERCO's evaluation, the pH of the soils tested ranges from 6.6 to 7.1, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

For specific long-term, location-specific corrosion control design recommendations, we recommend that a corrosion engineer evaluate the corrosion potential of the soil environment on buried concrete structures and steel pipe coated with cement-mortar.

2.4.2 Tests for Buried Ferrous Metals

In addition to the pH tests described above, the resistivity and redox tests were performed on the same soil samples as discussed above. These tests may be evaluated together to provide an indication of the corrosion potential of the soil environment on buried ferrous metals such as steel or cast-iron pipes. The results of these tests are presented in the table below.

Test No.	Sample	Resistivity (ohm-cm)	Redox potential (mV)
1	B-2 @ 3-3.5 ft	3,600	420
2	B-5 @ 2.5-3 ft	2,900	480
3	B-9 @ 2.5-3 ft	4,500	480
4	B-13 @ 3-3.5 ft	6,600	500

Based on the resistivity measurement, CERCO classified all samples as "moderately corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron pipeline should be protected against corrosion as well.

The measured soil reduction-oxidation (redox) potentials range from 420 to 500 mV. CERCO classified all samples as considered to be indicative of aerobic soil conditions. Appendix C presents the complete results of corrosion tests and recommendations provided by the corrosion engineer from CERCO.

3.0 GEOLOGIC SETTING

3.1 REGIONAL GEOLOGIC SETTING

The Indian Valley Campus is located within the Coast Ranges Geomorphic Province in Northern California. The general geology of the site vicinity is presented on the *Regional Geologic Map*, Plate 4. The Coast Ranges province is characterized by a series of tectonically driven events that includes development of generally northwest-trending faults and folds, erosion and deposition. The Bay Area experienced uplift and faulting in several episodes during late Tertiary time (about 25 to 2 million years ago) producing a series of northwest-trending valleys and mountain ranges, including the San Francisco Peninsula, the Diablo Range, and the intervening San Francisco Bay. During this time, the process of erosion was cutting down the relative high areas and the eroded materials were being deposited in the low-lying areas as sand, gravel and clay alluvium. The existing landscape we see today is the result of these processes taking place over millions of years. These same geological processes of bedrock erosion in the upland areas and deposition of alluvium within lowland areas are continuing today.

3.2 TECTONIC ENVIRONMENT AND REGIONAL GEOLOGY

During the period between approximately 140 million to about 28 million years ago, a subduction zone existed along western North America, and belts of oceanic rock were accreted to northern California along the active subduction-zone margin (Harden, 2001). The subduction zone was in the approximate position of the Coast Ranges about 100 million years ago, and fragments of the oceanic crust that collided with North America at that time are currently present in the Coast Ranges as the Franciscan Complex. The Franciscan Complex rocks form the heart of the Coast Ranges, and are found in two northwest-trending belts that are composed of a number of geologic terranes that were juxtaposed and mixed during subduction and accretion along the North American margin. These rocks originate from a variety of sources, including volcanic and sedimentary rocks formed on seamounts, deep oceanic crust, deep ocean floor sediments, and sediments deposited in trenches. Among these rocks are altered submarine basalts, radiolarian chert and minor limestone, with the most abundant rock types being mudstone and greywacke (sandstone) deposited as turbidite sequences. Metamorphic rocks found in the Franciscan include blueschist and eclogitic rocks, with serpentinite found along fault zones and within the matrix of mélange units. Contacts between these different types of rock are considered fault contacts.

The Franciscan rocks can be roughly divided into three units called the Coastal Belt, Central Belt and Eastern Belt. Marin County and the Indian Valley Campus property are located within the Central Belt of the Franciscan that is considered primarily a mélange that generally consists of blocks of submarine basalt, blueschist, chert and resistant greywacke (sandstone) present within a matrix of highly sheared weaker rock material. This rock matrix material can include shale, argillite, siltstone, serpentinite and sandstone, much of which may be sheared to the consistency of a soil (Medley 1994, 2001). The Central Belt in Marin County was estimated by Medley (1994) to be comprised of blocks of greywacke (60–70 percent), volcanic rocks (15–20 percent), serpentinite (15–20 percent), chert (5–10 percent), with the remaining blocks consisting of rare limestone and exotic metamorphic rock. The blocks may also be composed of intact siltstone and sandstone/siltstone sequences.

3.3 SEISMICITY

The Indian Valley Campus is located in the San Francisco Bay Area, which is considered one of the most seismically active regions in the United States. Significant earthquakes have occurred in the San Francisco Bay Area and are believed to be associated with crustal movements along a system of subparallel fault zones that generally trend in a northwesterly direction. The campus location is shown with respect to the locations of many of these faults on the *Regional Fault Location Map*, Plate 5, and *Regional Epicenter Map*, Plate 6. The project site is located in Seismic Zone 4, and is not located in a State Designated Fault-Rupture Hazard Zone established in accordance with the Alquist-Priolo Earthquake Fault Zoning Act.

Earthquake intensities will vary throughout the Bay Area depending upon the magnitude of earthquake, the distance of the site from the causative fault, and the type of materials

underlying the site. The site will be subjected to at least one moderate to severe earthquake that will cause strong ground shaking.

Since the early 1800s, major earthquakes have been recorded along the San Andreas fault system. Table 1 presents large magnitude (M_w>6.0) regional earthquakes that are suspected to have occurred within 100 miles of the site from 1800 to 2002, and Table 2 presents historic earthquakes (M_w>4.0) that occurred within 10 miles of the site.

Table 1. Large Magnitude (M_w>6.0) Regional Earthquakes Within 100 Miles of the Site

Epicenter Location	Date	Moment Magnitude	Distance (mi)	Distance (km)	Compass Direction to Epicenter
Mare Island	March 31, 1898	6.5	13.0	20.9	East
San Francisco	June 21, 1808	6.3	19.5	31.3	South
San Francisco	April 18, 1906	8.3	26.2	42.2	South
San Francisco Peninsula	June 1, 1838	7.0	34.2	55.0	South
Hayward	October 21, 1868	6.8	36.7	59.1	Southeast
Unavailable	May 19, 1889	6.0	37.3	60.0	East
Vacaville	April 19, 1892	6.4	38.6	62.1	Northeast
Dixon	April 21, 1892	6.2	47.0	75.7	Northeast
Fremont	November 26, 1858	6.1	54.3	87.3	Southeast
South Santa Cruz Mountains	October 8, 1865	6.5	65.1	104.7	Southeast
1984 Morgan Hill	April 24, 1984	6.1	70.9	114.1	Southeast
1911 Morgan Hill	July 1, 1911	6.5	72.8	117.1	Southeast
Loma Prieta	October 18, 1989	7.0	81.2	130.7	Southeast
Gilroy	June 20, 1897	6.2	94.8	152.6	Southeast

Table 2. Historic Earthquakes (M_w>4.0) Within 10 Miles of the Site

Epicenter Location	Date	Moment Magnitude	Distance (mi)	Distance (km)	Compass Direction to Epicenter
Novato	August 27, 1855	4.9	4.6	7.4	East

The computer program EQSEARCH, v3.00, was used to access the historical seismicity information presented in Tables 1 and 2. The site is shown with respect to the locations of historical earthquake epicenters on the *Regional Epicenter Map*, Plate 6.

Table 3 presents San Francisco Bay Area fault parameters published by the State of California Geological Survey (formerly the California Division of Mines and Geology, [CDMG]). These parameters are used to evaluate seismic hazards pertaining to San Francisco Bay Area faults. The site is not located within a Fault-Rupture Hazard Zone as established by the Alquist-Priolo Earthquake Fault Zoning Act.

Table 3. San Francisco Bay Area Fault Parameters

Fault System Generating Earthquake	Fault Length (km)[1]	Distance To Nearest Segment of Fault from Site (km)	Upper Bound Earthquake Mw_{max} [1]	Slip Rate (mm/yr)[1]
Rodgers Creek	62	11.6	7.0	9.0
Hayward (Northern)	35	12.7	6.4	9.0
San Andreas (North Coast South)	190	17.5	7.4	24.0
Point Reyes	47	26.6	7.0	0.3
West Napa	30	30.5	6.5	1.0
San Andreas (Peninsula)	85	31.9	7.1	17.0
San Gregorio (North)	110	34.0	7.2	7.0
Green Valley (South)	25	41.5	6.2	5.0
Hayward (Southern)	53	42.1	6.7	9.0
Green Valley (North)	14	42.8	6.2	5.0
Concord	17	44.0	6.2	4.0
Mount Diablo Thrust	25	52.0	6.6	2.0
Hunting Creek - Berryessa	60	53.3	7.1	6.0
Maacama - Garberville	182	56.2	7.5	9.0
Calaveras (Northern)	45	57.3	6.8	6.0
Great Valley 5	28	64.4	6.5	1.5
Great Valley 4	42	64.5	6.6	1.5
Greenville (North)	27	68.5	6.6	2.0
Monte Vista-Shannon	45	76.0	6.7	0.4
Collayomi	29	78.2	6.5	0.6
Great Valley 3	55	82.9	6.9	1.5
Greenville (South)	24	90.8	6.6	2.0
Bartlett Springs fault system	174	95.0	7.6	6.0
Calaveras (Central)	59	97.0	6.2	15.0
Great Valley 7	45	99.6	6.7	1.5

[1] CGS (2003) California fault parameters from www.consrv.ca.gov/CGS/rghm/psha/index.htm

3.4 SITE HISTORY

The Indian Valley Campus of the College of Marin is located on the former Pacheco Ranch, as described in Section 1.1. After selection of this site for the campus, geotechnical and geologic investigations were conducted in 1967, 1973, 1975, and 1988 to support campus construction. The site grading and construction of the majority of the campus structures had been completed by late 1976. The earthwork and foundation construction for additional structures were completed by 1978. Gabion retaining walls, as discussed in Section 1.1, were subsequently constructed along the creek bank to mitigate the erosion hazard to various

structures after 1988. Construction recommendations for early campus development included repair of a small landslide that would be traversed by roadways. No slides were encountered in the area of the structures at the time of construction, but one shallow slide was encountered near the perimeter road on the south side of the campus. Removal and recompaction of the loose surficial soil was also recommended.

4.0 SITE CONDITIONS

4.1 SURFACE CONDITIONS

A surface description of the campus was presented in detail under Section 1.1, *Site and Project Description*. The Indian Valley Campus is approximately 330 acres in area, with terrain that varies from steeply sloping, tree and brush covered hills to gently sloping, grass-covered valleys dissected by tree-lined ephemeral creeks. A majority of the campus facilities were constructed in the mid 1970's, and are located within the main west to east trending valley on the moderately sloping alluvial deposits along the base of the surrounding hills. As shown on the *Site Plan and Geologic Map*, Plate 3, Ignacio Creek ranges from about Elevation 146 feet at Bridge 6 near the east end of the campus, to about Elevation 195 feet to the west of Bridge 2. The top of bank in these locations is at approximately Elevation 160 feet and Elevation 195 feet, respectively. The campus structures range from between Elevation 170 feet and Elevation 208 feet.

The structures are generally grouped within clusters to the south side of Ignacio Creek, the main creek passing through the campus. On the north side of the creek are eight paved parking lots, Ignacio Boulevard (the only access road), athletic fields, a corporation yard and a police facility. The campus on the south side of the creek is surrounded by a two-lane perimeter roadway that trends along the base of the undeveloped slope that rises steeply toward the south. Vehicular and pedestrian bridges cross Ignacio Creek and the northeast trending, deeply dissected and meandering ephemeral drainage that drains into Ignacio Creek. Additional site improvements include numerous wood retaining walls, concrete patios and walkways and landscaped areas. Much of the portion of the College property that supports the campus development remains undisturbed.

4.2 SUBSURFACE CONDITIONS

The location of the features and subsurface exploration points discussed below, can be seen on the *Site Plan and Geologic Map*, Plate 3.

4.2.1 Pomo Cluster

Previous Borings C-16 through C-21 and P-19 to P-20, performed in 1972 by CCA, and Boring 6 performed in 1967 by CCA, are located in the area of the Pomo Cluster, as shown on Plate 3. The subsurface soils encountered in these previous borings consisted of interlayered stiff to hard sandy clay and dense to very dense clayey sand extending to the maximum depth explored of 25 feet. Weathered sandstone was encountered in two borings at depths of 1 and 9 feet below the ground surface in Previous Borings C-21 and PB-6, Elevations 182 feet and 180

feet, respectively. Atterberg limits tests on two samples from these borings indicate that the near surface soils have a low to moderate plasticity.

4.2.2 Administrative Services Cluster

Previous Borings C-1 through C-4, P-6, B-2 and B-4 (CCA, 1972) were performed in the area of the Administrative Services Cluster, as shown on Plate 3. Subsurface materials in the area of the structures consisted of stiff to very stiff sandy clay and dense to very dense clayey sand that extended at least to the maximum depth explored of 35 feet. The depth of these materials was found to be at least 36 to 39 feet adjacent to the creek. Based on one test of the near surface clayey material, the clay has a low plasticity. Small layers of dense to very dense clayey gravel were also encountered in Previous Borings B-2 and B-4 performed near the creek at depths of 28½ and 35½ feet below the ground surface. Sandstone was encountered in Previous Borings C-2 and B-2 at depths of 17½ feet and 38½ feet, Elevations 161 and 129½ feet, respectively, indicating that the rock surface beneath the alluvium is inclined downward toward the creek.

4.2.3 Miwok Cluster

Previous Borings C-9 through C-15, P-18, PB-10, and PB-11 (CCA, 1972) and PB-4 (CCA, 1967) were performed in the area of the Miwok Cluster. Subsurface materials consisted of stiff to hard sandy clay interlayered with dense to very dense silty and clayey sand and dense to very dense clayey gravel. These materials were encountered to depths of up to 37 feet below the ground surface. Based on three laboratory test results, the upper materials have a low plasticity. Sandstone was encountered in four of the borings below depths of 17½ to 37 feet. The sandstone was encountered at Elevations 163, 167½, and 168½ feet in three of these borings. However, in Boring PB-11, the sandstone was encountered at Elevation 146 feet.

4.2.4 Ohlone Cluster

4.2.4.1 Buildings 18 through 20

Previous Borings C-5 through C-8 (CCA, 1972) and PB-5 (CCA, 1967) were drilled near the three grouped buildings of the Ohlone Cluster. These borings mainly encountered very stiff sandy clay extending to the maximum depth explored of 25 feet. Sandstone was encountered in the southern and central portions of this site in Boring C-7 and C-6 at depths of 9½ and 18½ feet, Elevations 166½ feet and 181½ feet, respectively. Previous Boring PB-5, performed near the footprint of Building 19, encountered mainly dense clayey sand and clayey gravel that extended to a depth of 15 feet. A loose sand layer was encountered between depths of 2 and 5½ feet. Weathered sandstone was encountered in this boring below 15 feet at Elevation 164 feet.

4.2.4.2 Locker Rooms and Pool

Previous Borings located near the locker rooms and pool included Borings PB-1 through PB-17 (CCA, 1975) and PB-12 and PB-13 (CCA, 1972). CCA reported that subsurface materials in this area consisted mainly of sandy clay with a larger proportion of gravelly soil than

encountered elsewhere on campus. All clayey soils encountered were medium stiff to very stiff and gravels and sands were dense. Bedrock consisting of sandstone and chert was encountered in Previous Borings PB-2 and PB-17, in the area of the swimming pool, at depths of 25 and 21 feet, Elevations 188 and 177 feet, respectively.

4.2.4.3 Campus Police/Corporation Yard

Previous Borings C-23 and C-24 (CCA, 1972) were performed at the current police/corporation yard structure. These borings extended to depths of 20 feet, Elevations 185 feet and 186 feet, respectively, and encountered mainly very stiff sandy clay. Layers of dense clayey sand were encountered below a depth of 18½ feet in C-23 and between 11 and 15½ feet in C-24.

4.2.5 Bridges

4.2.5.1 Bridge 1

Previous Boring PB-9 (CCA, 1972) was performed for Bridge 1 on the south side of the creek. This boring encountered very dense clayey sand to a depth of 5 feet. The clayey sand was underlain by 5 feet of very dense clayey gravel. Weathered sandstone was encountered below a depth of 10 feet and extended to the maximum depth explored of 17 feet (Elevation 197 feet).

4.2.5.2 Bridge 2

Fugro's Boring B-8, at Bridge 2, encountered 11 feet of hard sandy silt. The silt layer was underlain by dense clayey sand to about 24½ feet. Below 24½ feet, we encountered a three-foot layer of firm to stiff sandy clay, which was in turn underlain by dense clayey gravel to about 32 feet and very stiff sandy clay to about 42 feet. Bedrock consisting of weathered shale was encountered below a depth of about 42 feet at Elevation 163 feet.

Previous Borings PB-7, PB-7A, and PB-8 (CCA, 1972) were also drilled at the Bridge 2 crossing. These borings encountered 3 to 4 feet of dense to very dense clayey sand at the surface underlain by medium stiff to very stiff sandy clay to about Elevation 171½ feet. Five-foot layers of very dense clayey gravel were encountered in Previous Borings PB-7A and PB-8 at depths of 12 and 19 feet, Elevations 187½ feet and 182½ feet, respectively. Below the clay layer, Previous Borings PB-7A and PB-8 encountered dense to very dense clayey gravel extending to the maximum depth explored of about 40 feet, Elevations 159½ feet and 161½ feet, respectively.

4.2.5.3 Bridge 3 and Paved Culvert A

Previous Borings PB-5 and PB-6 (CCA, 1972) were drilled on the north and south sides of Bridge 3, respectively. Paved Culvert A is approximately 100 feet upstream from Bridge 3. The subsurface materials on the north side consisted of stiff to very stiff sandy clay of medium plasticity to a depth of 20 feet underlain by dense clayey gravel to the maximum depth explored

of 25 feet, Elevation 160 feet. On the south side, the subsurface conditions consisted of interlayered very dense clayey sand and stiff to very stiff sandy clay to the maximum depth explored of 23 feet, Elevation 164 feet.

4.2.5.4 Bridge 4

Fugro's Boring B-13 was drilled on the north side of Bridge 4. We encountered very stiff sandy silt extending to a depth of about 8 feet underlain by stiff to hard sandy clay to a depth of about 23 feet. Below a depth of about 23 feet, we encountered weathered sandstone, which extended to the maximum depth explored of 29 feet. Refusal blow counts were achieved at 23½ and 28½ feet.

Previous Boring C-4 (CCA, 1972) was performed near the south side of Bridge 4. This boring encountered about 3 feet of very stiff sandy clay underlain by very dense clayey sand to a depth of about 10½ feet. Below the sand, another layer of sandy clay was encountered to about 21 feet. Underlying the sandy clay were alternating layers of clayey sand and sandy clay to the maximum depth explored of about 30 feet, Elevation 145 feet.

4.2.5.5 Bridge 5

Previous Borings PB-1 and PB-2 were performed on the north and south sides, respectively, of Bridge 5. The subsurface materials encountered in these borings consisted of alternating layers of stiff to very stiff sandy clay and medium dense to very dense clayey sand. The layers were generally 5 to 10 feet thick. These layers continued until sandstone bedrock was encountered at depths of 22 and 38½ feet, Elevations 143 feet and 129½ feet, in Previous Borings PB-1 and PB-2, respectively. A 2½-foot thick, very dense, clayey gravel layer was encountered in Previous Boring PB-2 at a depth of about 28½ feet.

4.2.5.6 Bridge 6 and Paved Culvert B

Fugro's Boring B-2 and Previous Boring PB-17 (CCA, 1972), completed on the north and south sides of side of Bridge 6, respectively, encountered stiff to hard clay and sandy clay and sandy silt interlayered with dense to very dense clayey and silty sand to a depth of about 20 feet. Below these materials, the two borings encountered stiff to very stiff sandy clay to a depth of 42 feet in Fugro's Boring B-2 and the maximum depth explored of 30 feet in Previous Boring PB-17. Weathered siltstone was encountered below a depth of 42 feet, Elevation 115 feet, in Fugro's Boring B-2. Approximately 2 feet of soft clay fill over 9 feet of debris fill was encountered in Previous Boring PB-16 (CCA, 1972) completed along the north bank of the creek. The debris fill contained refuse (i.e., wood, wire, garbage, and metal).

4.2.5.7 Bridges 7 and 8

Previous Boring C-9 (CCA, 1972) was drilled near the southwest end of Pedestrian Bridge 7. Materials encountered in that boring consisted of stiff to very stiff sandy clay and silty clay with gravel that extended to the maximum depth explored of 25 feet, Elevation161 feet. Previous Borings PB-10 and PB-11 (CCA, 1972) were drilled on the west and east sides of the creek at the Bridge 8 crossing, respectively. The west side of the creek was underlain by 2 feet

of very dense clayey sand and hard sandy clay that extended to a depth of 12 feet. The clay was underlain by 2- and 3-foot layers of very dense clayey gravel and very stiff sandy clay, respectively. Sandstone was encountered below a depth of 17 feet, Elevation 168 feet in PB-10. On the east side of the creek, the subsurface materials consisted of 37 feet of sandy clay with varying amounts of gravel. Sandstone was encountered at a depth of 37 feet and refusal was achieved at 37½ feet, Elevation 145½ feet, in PB-11.

4.2.6 General

The attached boring logs and related information depict location specific subsurface conditions encountered during Fugro's limited field investigation, and the previous studies. The approximate locations of Fugro's borings were determined by survey work completed by CSW / Stuber-Stroeh. The passage of time could result in changes in the subsurface conditions due to environmental changes. It is noted that most, if not all, of the campus improvements were constructed after completion of the previous borings and a portion of the subsurface materials encountered may have been removed or fill may have been placed above those locations. Site specific borings will need to be performed at each structure to verify the current conditions and to satisfy CGS requirements should site-specific assessments be required.

4.3 SITE GEOLOGY

The Indian Valley Campus is located within the Central Belt (mélange belt) of the Franciscan Complex of rocks that constitute the main portion of the Coast Ranges geomorphic province as discussed in Section 3.2, *Tectonic Environment and Regional Geology,* and as shown on the *Regional Geologic Map*, Plate 4. The campus site is generally underlain and surrounded by competent blocks of greywacke sandstone, interbedded with shale and siltstone, mapped as unit KJfs on Plate 4, and on the *Site Plan and Geologic Map*, Plate 3.

The prominent rock within the KJfs unit mapped at IVC consists of thin-bedded shales and siltstones with minor sandstone interbeds that strike west to northwest, and dip at about 25º to 60º to the northeast. The rock is generally soft to very soft, but local moderately hard zones are encountered. Generally weak and friable, the rock was observed to range from moderate to severely weathered. Along the upper elevation portion of the southern slope of the property, high above the campus development, a generally resistant, massive, arkosic sandstone containing minor shale interbeds is exposed within incised portions of the steep swales. This member of the unit, as observed, is strong to very strong, moderately hard to hard, and slightly to moderately weathered.

These competent blocks in the Central Belt are suspended in a mélange matrix composed of a tectonic mixture of variably resistant smaller blocks of rock that can include sandstone, radiolarian chert, metavolcanic rock, serpentinite and exotic metamorphic blocks, all suspended in a sheared shaley matrix. The mélange matrix is mapped as a separate unit when the blocks suspended in the matrix are too small to reasonably map. This mélange matrix unit is mapped as KJfm on Plate 4, and on the *Site Plan and Geologic Map*, Plate 3. The mapped competent blocks within the KJfs unit are underlain by mélange matrix at an unknown depth.

The nature of the contact between competent bocks of the Central Belt and the mélange matrix is a fault contact.

Mélange matrix terrane, as observed on the Indian Valley Campus and surrounding hill slopes, is characterized by hummocky topography that results from the variable resistance to weathering of the smaller suspended blocks and of the matrix materials composing the mélange. The hummocky nature of the topography is also the result of down slope creep of the near surface soils that are generally of moderate to high plasticity, and the small to large-scale slope instabilities that are a distinguishing characteristic of the mélange. The more resistant blocks of rock suspended in the matrix, radiolarian chert as observed at IVC, generally provide the most prominent, and often the only, outcrops observed within the mélange matrix.

As indicated on the *Site Plan and Geologic Map*, Plate 3, the mélange matrix (KJfm) was exposed at the surface on the slopes at the southwest portion of the mapped area, along with a much smaller exposure at the northwest corner of the mapped area. A prominent exposure of chert noted to the north of the western portion of the mapped area, is interpreted to be a resistant block within the mélange matrix (KJfm) that surrounds a competent block of the Central Belt that is mapped as KJfs.

The mélange matrix (KJfm), as discussed above, is prone to landsliding, and a large, older, landslide complex within the mélange matrix is mapped as descending toward the valley from the southwest slope. Steep slopes underlain by sandstone and siltstone (KJfs) ascending south from the campus are also susceptible to landsliding, and an older landslide is mapped as descending into the valley south of the campus development. Both of these landslides can be seen on the *Site Plan and Geologic Map*, Plate 3. Deposits resulting from these landslides within the valley area have been at least partially reworked as alluvium, and their current mapped extent into the valley is variable.

The processes of landsliding and rock weathering have contributed to the alluvial materials (Qal) that are now present beneath the campus development and along Ignacio Creek. Alluvium is also present within drainages along the slopes, but these deposits are not presented on Plate 3 as mapped units. Within the channel descending from the southwest slope (KJfm), the alluvium consists exclusively of metamorphic materials derived from the mélange matrix and older associated landslide debris. Sandstone alluvium derived from the southern slope (KJfs) and associated landslide debris is present within the channel draining from the base of the landslide mapped to the east of the mélange matrix. These two incised and meandering channels converge in the area south of Building 17, where the alluvial materials begin to coalesce, while the channel continues its descent toward its eventual convergence with Ignacio Creek. Alluvium entering the campus area from the west, within Ignacio Creek, consists of a combination of metamorphic materials derived from the mélange matrix (KJfm) and sandstone derived from the competent Central Belt blocks (KJfs).

Colluvial soils (Qc) are mapped where significant accumulation is likely present. The colluvium generally consists of relatively loose, heterogeneous and incoherent masses of soil material or rock fragments that are deposited primarily by mass wasting usually at the base of a slope or within topographic swales.

Fill materials (Qf) resulting from grading work associated with campus development are present at numerous locations within the campus. The largest area of fill appears to have been placed for development of the athletic fields at the northwest portion of the campus. This alluvial valley area was cut and filled to prepare the current relatively level playing fields. Numerous small fills and sliver fills (not mapped) are present throughout the campus to develop roadways, culverts below roadways, bridge abutment areas, and building pads. Debris fill associated with the residence, barn, garage and bridge formerly located along Ignacio Creek at the west end of the campus property was observed within the creek channel banks at the west edge of the campus property.

4.4 SURFACE GEOLOGIC RECONNAISSANCE

A reconnaissance of the IVC campus was performed by our Certified Engineering Geologist to map the site geology, and to observe conditions within the creeks. The reconnaissance included the slopes to the north and south of the campus development, to the limits of the College of Marin property. The discussion presented under Section 4.3, *Site Geology*, and the geologic mapping presented on the *Site Plan and Geologic Map*, Plate 3, are a presentation of the pertinent portion of the information gathered during that reconnaissance.

4.5 GROUNDWATER

Groundwater was not encountered in previous borings performed near the Pomo and Miwok Clusters, or the main body of the Ohlone Cluster. At the Administration Services Cluster, groundwater was encountered in Previous Borings C-1, PB-2, and PB-4 at depths of 26, 28, and 39 feet, a range of between Elevation 132 feet and 143 feet. Groundwater was encountered in the current Fugro borings and previous borings at Bridge 2 between Elevations 160 and 182 feet, Bridge 3 at Elevation 165 feet, Bridge 5 at Elevation 141 feet, and Bridge 6 between Elevation 142 feet and Elevation 145 feet. No groundwater was encountered at other bridges. The current borings performed by Fugro, B-2 and B-8, were completed as open-standpipe piezometers. During drilling, groundwater was measured in Borings B-2 and B-8 at depths of about 12 and 24 feet, Elevation 145 feet and Elevation 177½ feet, respectively. Stabilized groundwater measurements were recorded in these piezometers November 30, 2005. At that time, groundwater was measured in Borings B-2 and B-8, at depths of about 13½ feet and 17½ feet, corresponding to Elevation 143½ feet and Elevation 188 feet, respectively.

We note that fluctuations in the groundwater level could occur due to change in seasons, variations in rainfall, and other factors.

5.0 GEOLOGIC HAZARDS EVALUATION

Geologic hazards can be grouped into seismic and non-seismic categories. Seismic hazards can be further subdivided into surface fault offset, strong ground motion, and ground deformation hazard due to seismic shaking. Seismic ground deformation includes liquefaction, seismically induced waves, inundation due to dam or embankment failure, flooding hazard and landsliding. Certain types of ground deformation and water movement, however, can also occur under non-seismic conditions, so there is some overlap between seismic and non-seismic

hazards. In general, the list of potential geologic hazards can also include such rare occurrences as mine collapse, hydro-compaction, and peat oxidation, but these rare hazards do not warrant discussion in connection with the Indian Valley Campus.

5.1 STABILITY OF CREEK BANKS

Ignacio Creek trends in a west to east direction as it passes through the campus, and an unnamed tributary creek descending from the slope to the southwest have a confluence near the Ohlone Cluster at the center of the campus. These creeks, which are both deeply incised within alluvial materials and locally landslide debris, are attempting to reduce their down slope velocity by meandering. Meandering of these channels has resulted in bank erosion, and mitigation measures were employed in the past to protect structures located very near the bank of the unnamed tributary creek. The mitigation measures consisted in construction of a 60-foot-long and 30-foot-long, gabion retaining walls adjacent to the location of Buildings 12 and 17, respectively, as discussed in Sections 1.1.2 and 1.1.3.

Meandering of these channels has lead to local undermining of the banks. This process, along with scour within the channel, and uncontrolled surface drainage entering the channel near the abutments, have resulted in local removal of soil that was intended to provide coverage for the abutments and bents for the various bridges that span these creeks. Typically, pile foundations for bridges such as these are designed assuming vertical and lateral capacity is derived from materials encountered beginning from below the bottom of the channel; and therefore, local exposure of the piles below bent caps and abutments should not impact the integrity of the bridge foundations.

Future creek meandering, bank erosion and local undermining of creek banks could result in loss of ground surface area between certain campus structures and the top of the creek banks. This future erosion and loss of creek bank area should be a relatively slow process that can be observed and monitored over time. Based on our observations, sudden foundation failure to a campus structure should not be an issue, as these buildings are founded on drilled, cast-in-place, concrete piers. Should undesirable erosion processes appear to be encroaching on the area between the creek bank and a campus structure, mitigation measures could be implemented that may include, gabion retaining walls, concrete stitch pier walls, or rip rap.

Detailed study to develop a topographic map for the creek, characterize the creek morphology, and quantify water flow rates and flow fluctuation within the creek system is currently being performed by others. A detailed assessment of the creek bank erosion issue is to be addressed as part of that study. Information resulting from that assessment would be referenced in an updated version of this report when specific building assessments are completed.

5.2 SURFACE FAULT OFFSET

5.2.1 Aerial Photograph Review

A Fugro State of California Certified Engineering Geologist (CEG) reviewed historic, black and white, stereo-paired aerial photographs of the project site and vicinity to discern geomorphic evidence of geologic hazards and snapshots into the history of development at the site. Aerial photographs were reviewed at Pacific Aerial Surveys in Oakland. The stereo-paired aerial photographs reviewed for the project are listed in the reference section at the end of this report.

The earliest photos reviewed were from 1950, 1958, 1970 and 1972, prior to college development. Older landsliding along the southwest slope and southern slope was evident, as well as the accumulation of landslide debris at the base of the slope. Evidence of the west to east trending fault mapped by previous investigators as roughly coinciding with the location of Ignacio Creek, and trending away from the creek at the west end of the property was not strong. A subtle tonal lineation possibly suggestive of faulting was observed to extend along the alluvium and up the slope at the west end of the property. This evidence was not strong enough to support the presence of a fault in the area. A house, barn, garage, bridge and associated other improvements formerly present along the creek at the west end of the campus property were observed in the photographs.

Campus construction was in progress as observed in the 1975 air photos. The Miwok and Ohlone Clusters, Power Plant #2, and the Corporation Yard Building #22, were present at that time. Other portions of the site had been graded in preparation for additional construction. No evidence suggestive of faulting was observed. Further observation of the topography and older landsliding on the southern slope was useful.

Study of photographs from 1982, 1986, 1990, 1995, 1996, and 2000, offered little additional insight to confirm the presence or absence of the fault trending through the valley as inferred by previous investigators. Again, evidence was not strong enough to support the presence of a fault in the area.

5.2.2 Fault Rupture Hazard Zoning by the State

The Alquist-Priolo Earthquake Fault Zoning Act (Act) was signed into law December 22, 1972, and went into effect March 7, 1973. The purpose of the Act is to prohibit the location of most structures for human occupancy across traces of active faults and to thereby mitigate the hazard of surface fault rupture. Under the Act, the State Geologist is required to delineate *Earthquake Fault Zones*, previously known as *Special Studies Zones*, along known active faults in California. All of the Earthquake Fault Zone maps issued prior to January 1, 1977, were based almost solely on the mapping and interpretations of others. Later maps were based extensively on interpretations of the Fault Evaluation and Zoning Program staff that presented their findings in Fault Evaluation Reports (FERs). The campus is not located within an area considered to have the potential for fault rupture hazard and is therefore not included in the Earthquake Fault Zones mapping.

In 1973, CCA (1973) performed a study aimed at determining if there was actually a fault crossing the site. CCA claimed the existence of the fault was developed based on “reviewing and field checking regional and site geologic mapping”, although no discussion of evidence of faulting gained by field mapping was provided. Additional evidence for the presence of a fault was based on performance of 8,200 feet of resistivity surveys and 3,000 feet of magnetometer surveys, with over 1,350 individual readings taken. The data gathered during this exercise was retained in CCA’s files, and is currently unavailable for review. It should be noted that these geophysical methods, and the results obtained by such studies, are not currently an accepted approach to conclusively determine the presence or absence of faulting.

Based on a culmination of their work, CCA concluded that an inactive fault passes through the site, as presented on their geologic map. The fault was mapped as crossing the south end of athletic field on the west end of the campus and as generally following the path of Ignacio Creek. At the west end of the site, the fault was mapped as passing through the location subsequently established as the corporation yard. They reported that the chance of movements along this fault to be exceedingly remote, however, these conclusions could not be considered absolute.

The most recent regional geologic map of the Novato Quadrangle prepared by Rice, et al. (2002), released by the California Geological Survey, and presented on Plate 4, does not include a concealed trace of a fault as passing through the valley as indicated by previous investigators. In addition, many of the other previously mapped faults in the area have not been presented on this recent publication.

Evidence to suggest that a fault passes through the Indian Valley Campus, roughly coinciding with the Ignacio Creek drainage, has not been supported by the current study. Based on this, the fault feature presented by the previous investigators is not included on our *Site Plan and Geologic Map*, Plate 3.

5.3 STRONG GROUND MOTION

A preliminary Probabilistic Seismic Hazard Assessment (PSHA) was performed based on the 2002 USGS/CGS probabilistic seismic hazard assessment model (revised 2003) found at http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamain.html. This model is for the design basis earthquake (DBE), 10 percent probability of exceedance in 50 years (475-year return period) event. The model provides three values of ground motion, the peak ground acceleration (PGA) and spectral acceleration (Sa) at 0.2 second and 1.0 second periods. Plate 7, *Probabilistic Seismic Hazard Map*, presents the college site on the CGS probabilistic seismic hazard map. Results of our analysis are presented below. If individual buildings are to be assessed, a site-specific PSHA should be performed for each building taking into account local soil conditions. The site specific analysis should include determination of both design basis earthquake (DBE) ground motions and upper bound earthquake (UBE, 10 percent probability of exceedance in 100 years) ground motions.

Table 4. Seismic Design Parameters per 2002 USGS/CGS for Structures on Alluvium and Soft Rock

Ground Motion	Alluvium (S_D)	Soft Rock (S_C)
PGA	0.484	0.47
Sa (0.2 s)	1.176	1.117
Sa (1.0 s)	0.661	0.578

5.4 SEISMIC DESIGN BY CALIFORNIA BUILDING CODE (CBC)

Structures should be designed to resist the lateral forces generated by earthquake shaking in accordance with local design practice. This section presents seismic design criteria from the 2001 California Building Code (CBC).

Table 5. Seismic Design Parameters per 2001 CBC for Structures on Very Dense Soil (S_D) and Soft Rock (S_C)

Description	Parameter	1998 CBC Reference
Seismic zone	4	Plate 16A-2
Seismic zone factor (Z)	0.4	Plate 16A-I
Soil profile type	S_C or S_D	Plate 16A-J
Seismic Coefficients		
C_a (for S_c sites)	$0.40N_a$	Table 16A-Q
C_v (for S_c sites)	$0.56N_v$	Table 16A-R
C_a (for S_D sites)	$0.44N_a$	Table 16A-Q
C_v (for S_D sites)	$0.64N_v$	Table 16A-R
Near source factors		
N_a	1.0	Table 16A-S
N_v	1.14	Table 16A-T

The near source factor N_v is greater than unity as a result of the site's proximity to a Type A fault, the Rodgers Creek fault. The near source factors N_a and N_v are equal to unity at distances greater than or equal to 10 km and 15 km, respectively, from a Type A Near-source Zone.

5.5 SHAKING HAZARD

During a moderate to severe earthquake occurring on any of the previously listed active faults, strong ground shaking at the college will likely occur. Strong ground shaking not only can cause the structures to shake, but it also has the potential capability of inducing other phenomena that can indirectly cause damage to structures. These phenomena include soil liquefaction, seismically induced waves such as tsunamis and seiches, inundation due to dam

or embankment failure, flooding, landsliding, and other shaking hazards such as lateral spreading, ground cracking, lurching and water movement. Detailed discussions of these phenomena with respect to the site are presented in the subsequent paragraphs.

5.5.1 Liquefaction

Soil liquefaction is a phenomenon primarily associated with saturated cohesionless soil layers located close to the ground surface. These soils lose strength during cyclic loading, such as imposed by earthquakes. During the loss of strength, the soil acquires "mobility" sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, uniformly graded, saturated, fine-grained sands that lie close to the ground surface; a depth usually considered less than 50 feet.

According to the Association of Bay Area Governments (ABAG) liquefaction susceptibility interactive map, Plate 8, found at http://gis.abag.ca.gov/website/liq/viewer.htm (ABAG 2003), the college is predominantly located in an area where the subsurface materials are considered to have a moderate susceptibility for liquefaction. The Novato quadrangle has not yet been mapped under California Geological Survey's Seismic Hazard Mapping Act.

Based on our interpretation of the materials encountered within the deeper borings performed by Fugro, Borings B-2, B-8, and B-13, and materials encountered within the previous borings by others, it is our opinion that the susceptibility for the materials present beneath the site to liquefy is very low.

5.5.2 Seismically Induced Waves

During a major earthquake, strong waves such as tsunamis or seiches may be generated in large bodies of water and may cause damage to structures located in close proximity to them. The tsunami, or seismic sea wave, is an open ocean phenomenon caused by fault displacement, volcanism, or other abrupt movement on the ocean floor, that often occur at a considerable depth. According to the United States Geological Survey Maps Showing Areas of Potential Inundation by Tsunamis in the San Francisco Bay Region, California, dated 1972, the Indian Valley Campus is not located within a zone designated for potential damage after a tsunami event.

The seiche is a wave that occurs in an enclosed basin as a result of fault displacement in the basin bottom, large landslides into the basin, earthquakes motion impacting the basin, or from periodic oscillation or sloshing of the water in the basin. No body of water susceptible to seiches is located in the vicinity of the Indian Valley Campus.

5.5.3 Inundation Due to Dam or Embankment Failure

According to the Association for Bay Area Government's Dam Failure Inundation Hazard Map for Novato, Plate 9, found at http://www.abag.ca.gov/cgi-bin/pickdamx.pl (ABAG, 1995), the Indian Valley Campus is not located in an area that has potential of being impacted by any level of inundation due to dam failure. A small, man-made embankment impounds a small pond

located to the west of the College of Marin's property at IVC. It is our opinion that the flow of water resulting from a breach of this embankment would not impact the campus and would be contained within the banks of Ignacio Creek.

5.5.4 Flooding Hazard

The main portion of the campus is located along Ignacio Creek at the base of a valley at about Elevation 160 to 180 feet (relative to mean sea level datum). According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the City of Novato, revised in 1989, the Indian Valley Campus is outside the limit of detailed study. The map indicates that the campus is within an area with a Zone X designation. Zone X is defined as an area determined to be outside the 500-year flood plain. However, the map indicates that Ignacio Creek up to the limit of detailed study immediately west of Arrowhead Lane, is within an area designated as Zone AE, defined as an area within the 100-year floodplain with the base flood elevation determined. The map indicates that the floodway is contained within the channel. The base flood elevation to the west of Arrowhead Lane is +142 feet (relative to the NVGD 29 datum). Plate 10, *Flood Hazard Map*, shows the campus plotted on the Flood Insurance Rate Map.

The 1967 CCA report presented results of a flooding analysis prepared by Murray & McCormick, which indicate that the maximum computed 100-year flow rate in the north fork of Arroyo del San Jose (Ignacio Creek) would be 500 cubic feet per second. They concluded that the channel at that time, if maintained, could carry that flow.

The site is not within an area that may be inundated by a 100-year flood according to a United States Geological Survey publication by Limerinos, et al., 1973.

This information is preliminary and is being refined by other team members as part of the current assessment of the Indian Valley College campus. Updated information from others will be included in the final version of this report.

5.5.5 Landsliding

As noted in Section 5.3.1, the campus is not located within a quadrangle that has been currently mapped by the California Geological Survey under the Seismic Hazard Mapping Act, which includes mapping of landslide hazard zones. Rice (1974) maps the lower portions of the campus where most development is located as being in an area of most stability (in a scale of 1 to 4). The slopes bordering the valley are classified as 2 and 3.

Landslides as presented in the *Site Plan and Geologic Map*, Plate 3, are older scars are deposits. It is possible that future smaller scale landsliding could occur within these features, particularly from the area mapped as Franciscan mélange matrix (KJfm) due to the unstable nature of the materials present within that formation. The current development area is substantially distant from these source zones that future instabilities, should they occur, would not impact campus structures, but could impact the perimeter roadway that trends along the base of the slope south of the campus.

5.5.6 Other Shaking Hazards

We have also considered the possibility of the occurrence of other seismic hazards. Due to the low liquefaction potential at the site, we judge the possibility of lateral spreading of buildings and their foundations toward the open face of Ignacio Creek to be remote. Ground cracking and lurching are relatively unknown phenomena, and in our opinion, they can be caused by any of the phenomena discussed above.

We note that ground shaking during an earthquake could cause objects within buildings that are not rigidly attached to the building structure (such as desks and book shelves) to undergo some differential movements with respect to the structure. Building construction should include designs that reduce such potential differential movements and the adverse effects of such movements where they cannot be prevented.

6.0 CLOSING

This report has been prepared for the exclusive use of the Marin Community College District and their consultants for specific application to the Indian Valley Campus. This report should be reviewed and updated for each specific campus improvement project. In the event that there are any changes in the ownership, nature, or design, of the project, the conclusions and recommendations contained in this report shall not be considered valid unless 1) the project changes are reviewed by Fugro West, Inc., and 2) conclusions and recommendations presented in this report are modified or verified in writing. Reliance on this report by others must be at their risk unless we are consulted on the use or limitations. We cannot be responsible for the impacts of any changes in engineering geologic standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for unconsulted use of segregated portions of this report.

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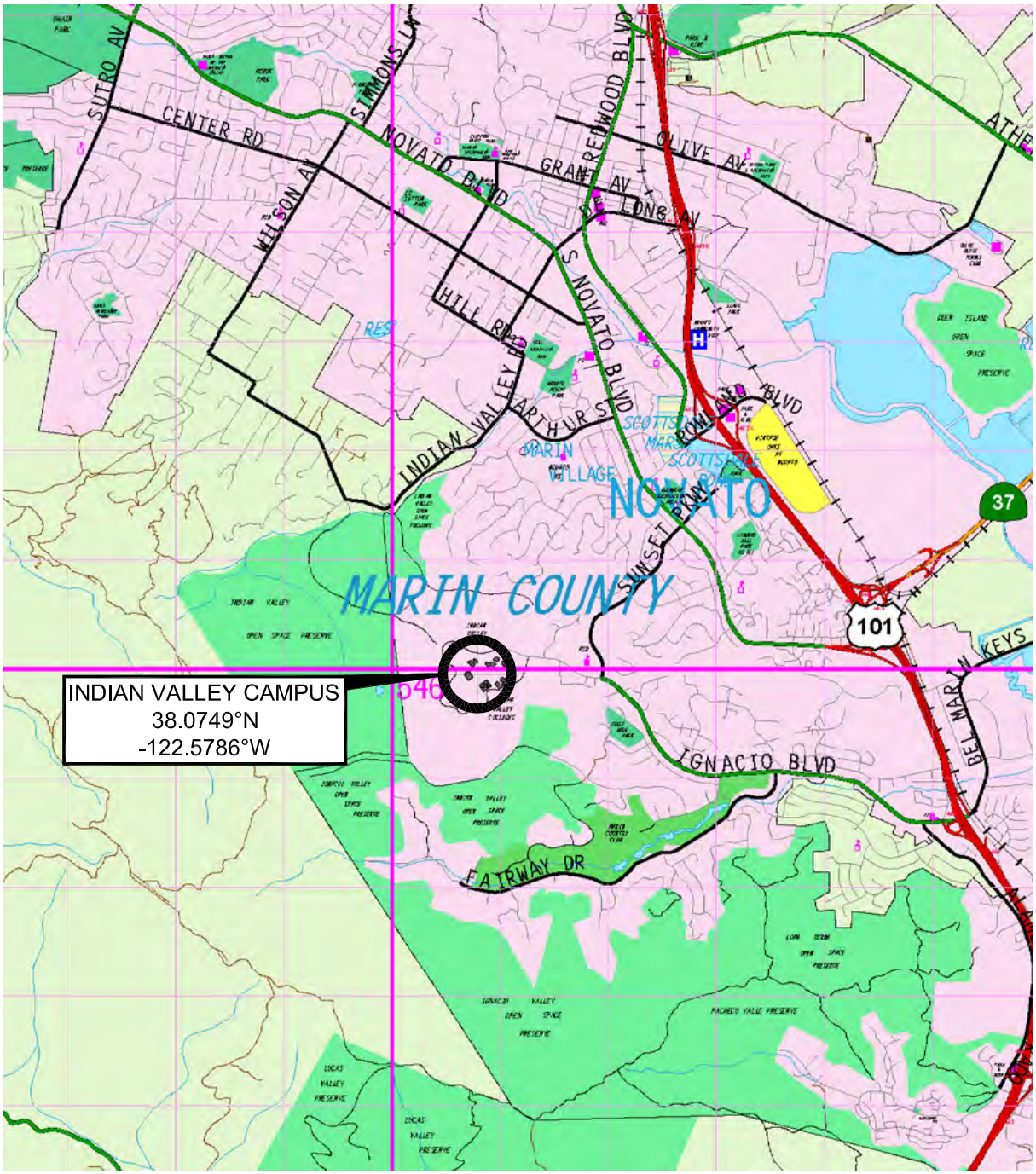
PLATES



SOURCE: This Base Map was based on 2006 Street Guide, Bay Area Counties, The Thomas Guide.

NORTH

0 4000 8000

FEET

SITE VICINITY MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 1

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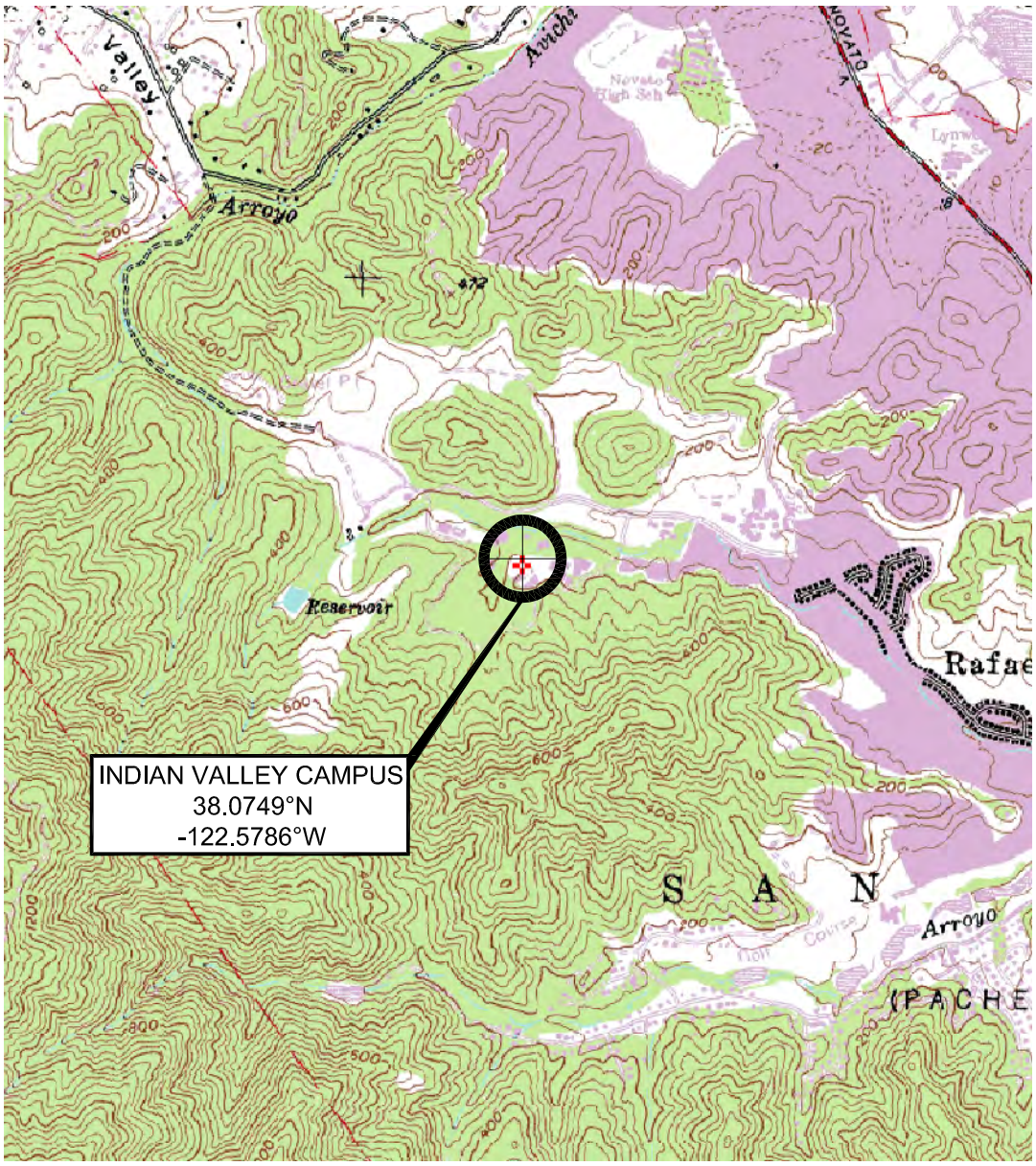

SOURCE: This Local Topographic Map was based on www.topo.com

LOCAL TOPOGRAPHIC MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 2

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GEOLOGIC DESCRIPTIONS

Qf	FILL (LARGER DEPOSITS SHOWN)
Qls	LANDSLIDE
Qc	COLLUVIUM
Qal	ALLUVIUM
KJfs	FRANCISCAN COMPLEX SANDSTONE AND SHALE
KJfm	FRANCISCAN COMPLEX MELANGE MATRIX

GEOLOGIC CONTACT (APPROXIMATE)
QUERIED WHERE UNCERTAIN,
DOTTED WHERE CONCEALED

FAULT (APPROXIMATE)
QUERIED WHERE UNCERTAIN,
DOTTED WHERE CONCEALED

LANDSLIDE CROWN

LEGEND

PB-7 APPROXIMATE LOCATION OF PREVIOUS BORING BY COOPER CLARK & ASSOCIATES

PB-17 APPROXIMATE LOCATION OF PREVIOUS BORING BY COOPER CLARK & ASSOCIATES

C-24 APPROXIMATE LOCATION OF PREVIOUS BORING BY COOPER CLARK & ASSOCIATES

P-23 APPROXIMATE LOCATION OF PREVIOUS BORING BY COOPER CLARK & ASSOCIATES

PB-17 APPROXIMATE LOCATION OF PREVIOUS BORING BY COOPER CLARK & ASSOCIATES

B-18 APPROXIMATE LOCATION OF EXPLORATORY BORING BY FUGRO (2005)

NORTH

0 100 200
FEET

PLATE 3
SITE PLAN AND GEOLOGIC MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

BASE MAP SOURCE: Provided by CSW Stuber-Stroeh Engineering Group, Inc.

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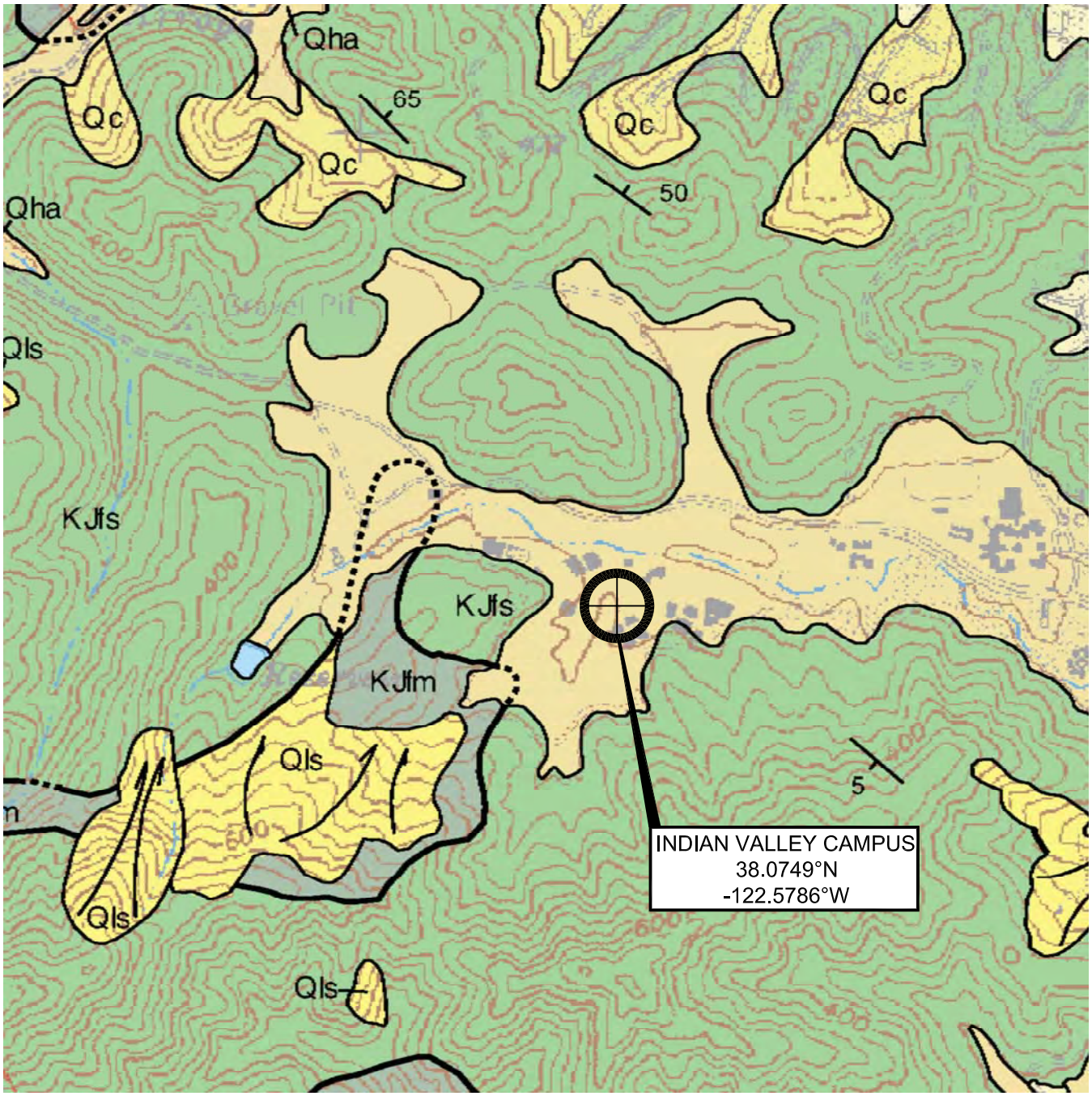

SOURCE: Geologic Map of the Novato 7.5' Quadrangle, Marin and Sonoma Counties, California: A Digital Database, Version 1.0 by Salem R. Rice, Theodore C. Smith, Rudolph G. Strand, David L.Wagner, Carolyn E. Randolph-Loar, Robert C. Witter and Kevin B. Clahan

LEGEND:

- Qc — Colluvium. Unconsolidated and unsorted soil and weathered rock fragments accumulated on or at the base of slopes.
- Qha — Holocene alluvium, undivided- Alluvium deposited on fans, terraces, or in basins. Gravel, sand, and silt that are poorly to moderately sorted.
- Qpf — Latest Pleistocene (<~30,000) alluvial fan deposits. Similar to Holocene fans (Qhf), but they are more dissected.
- Qls — Landslides. Includes debris flow and block slump landslides. Arrows show the direction of movement.
- KJfs — Franciscan Complex sandstone and shale- Thick bedded, arkosic sandstone ar interbedded shale. Arkose is composed of coarse, fairly well sorted quartz and feldspar grains with minor fine-grained matrix.
- KJfm — Franciscan Complex melange- tectonic mixture of masses of resistant rock types including sandstone, altered mafic volcanic rock (greenstone), chert, serpentinite, and exotic metamorphic rocks embedded in a sheared, shaley matrix. Blocks within the melange large enough to be shown on the map are: ss, sandstone and shale; ch, chert; mv, metamorphosed basaltic rocks; gs, greenstone.

NORTH

0 1000 2000
FEET

REGIONAL GEOLOGIC MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 4

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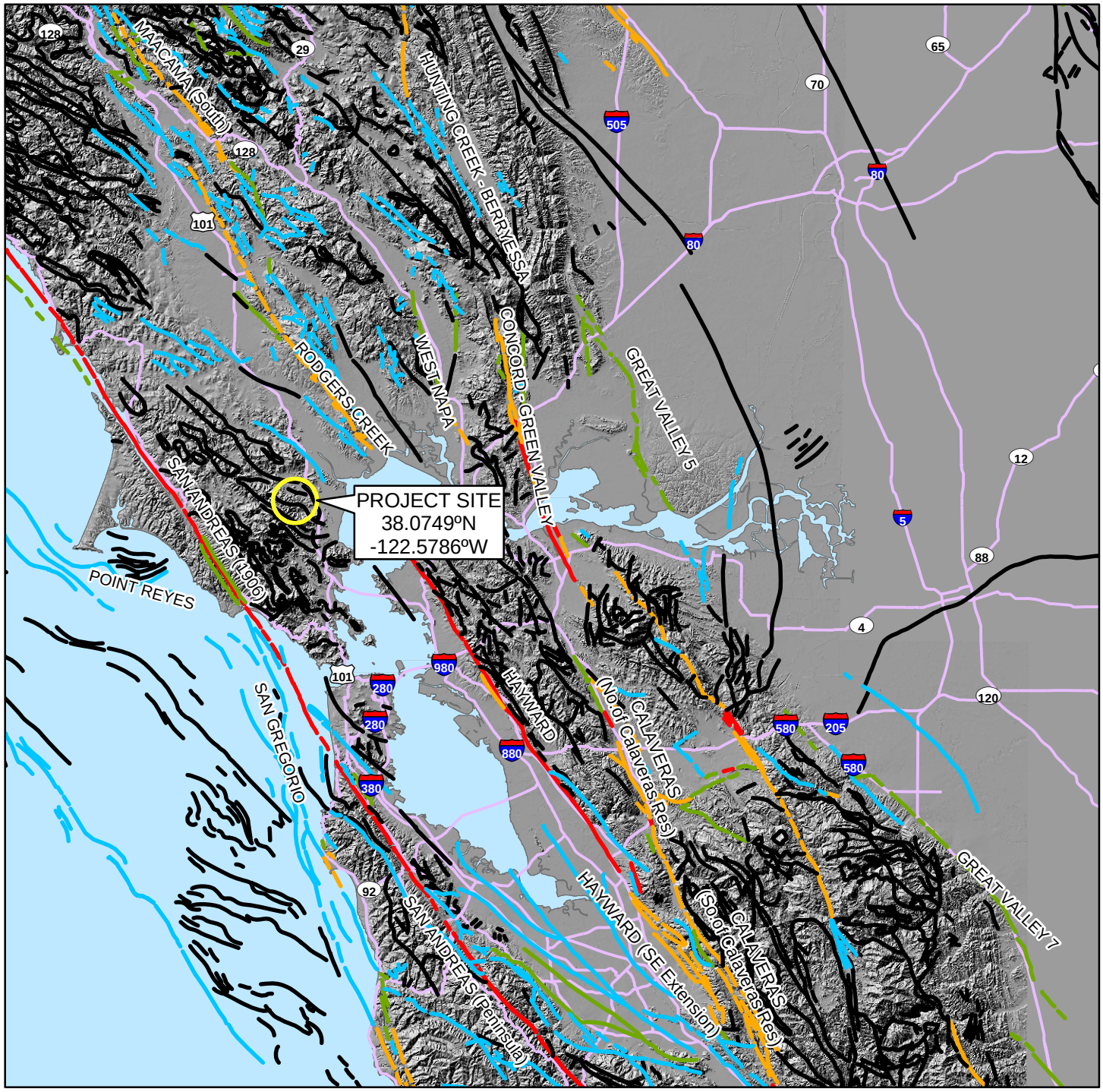

Source: California Division of Mines and Geology (California Geological Survey)
http://gmw.consrv.ca.gov/shmp/index.htm, (2000)

NORTH

0 10 20 40

Miles

LEGEND

- QUATERNARY
- PREQUATERNARY
- LATE QUATERNARY
- HISTORIC
- HOLOCENE

REGIONAL FAULT LOCATION MAP

College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 5

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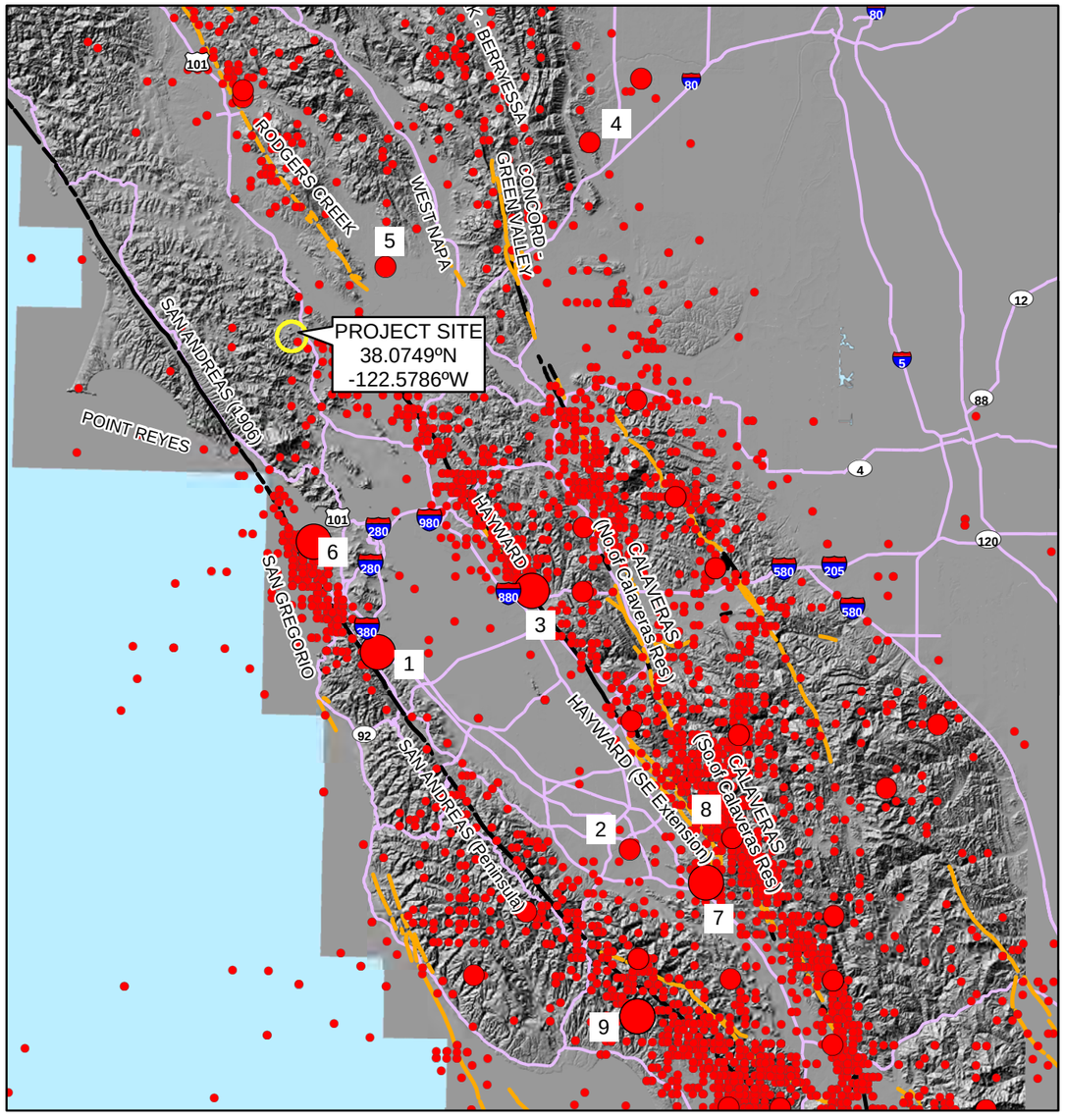


G:\jobdocs\1715\1715.001\GIS\Earthquake Magnitude with regional fault map_IVC.mxd, 12/15/05, aazerki

Sources: California Division of Mines and Geology (California Geological Survey) http://gmw.consrv.ca.gov/shmp/index.htm;
U.S.G.S. Open File Report 94-647; http://neic.usgs.gov/neis/epic/epic_rect.html

Known Magnitude ≥6.5 Earthquakes Since 1836

	Eathquake	Magnitude
1	San Francisco Peninsula, CA - June, 1938	6.5
2	South Santa Cruz Mountains, CA - October 8, 1865	6.3
3	Hayward, CA - October 21, 1868	6.8
4	Vacaville, CA - April 19, 1892	6.4
5	Mare Island, CA - April 19, 1898	6.2
6	1906 Earthquake, CA - April 18, 1906	8.2
7	Morgan Hill, CA - July 6, 1911	6.6
8	Morgan Hill, CA - April 24, 1984	6.2
9	Loma Prieta, CA - October 18, 1989	7.1

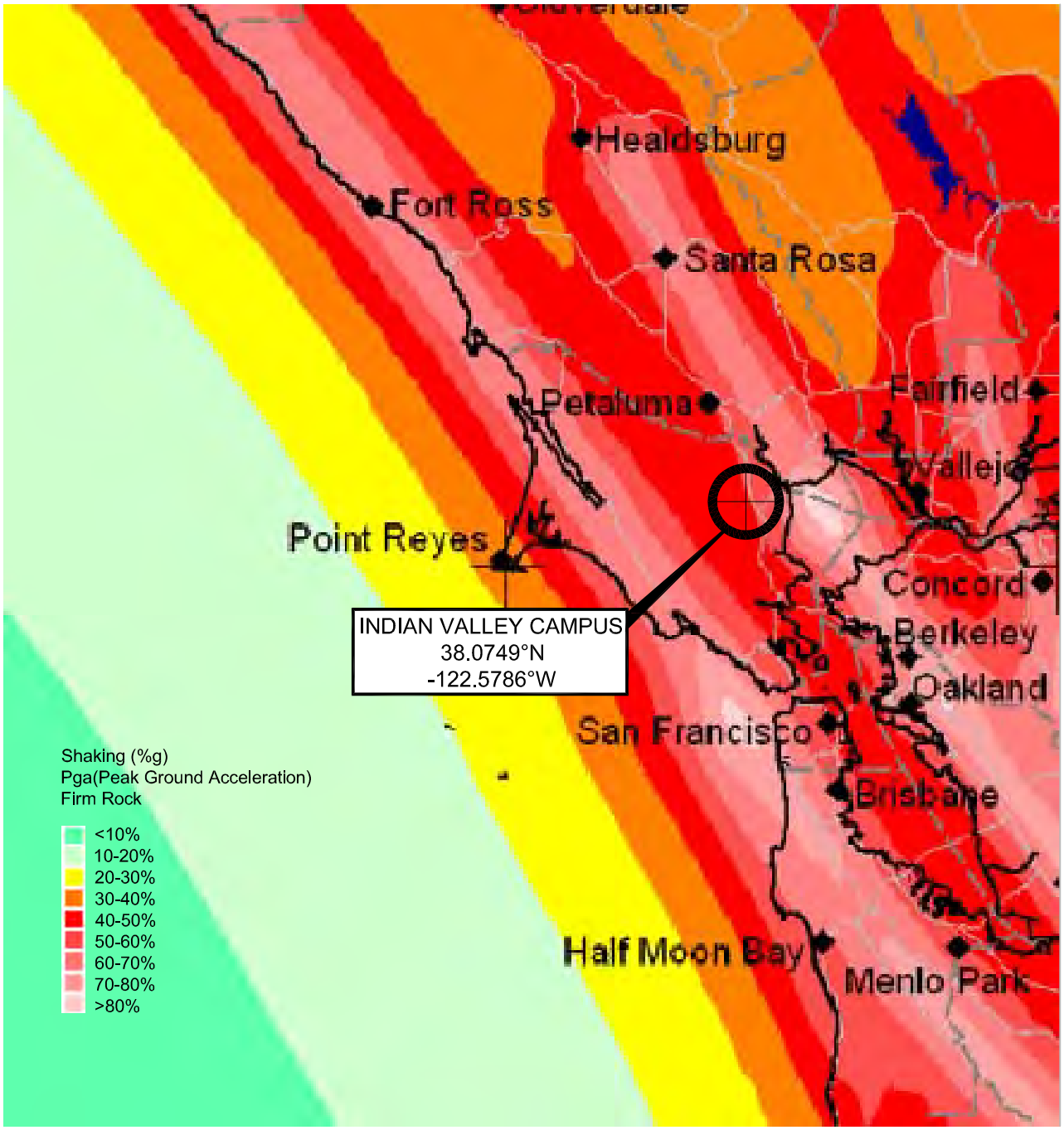
Note: The above earthquakes are identified on the map by a white square labeled with the reference number. Dates are given in Greenwich Mean Time

LEGEND

- MAJOR ROAD
- HISTORIC FAULT
- HOLOCENE FAULT
- <5.5 MAGNITUDE EARTHQUAKE
- 5.5-6.4 MAGNITUDE EARTHQUAKE
- ≥6.5 MAGNITUDE EARTHQUAKE

NORTH
0 10 20
Miles

REGIONAL EPICENTER MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California



SOURCE: This Probabilistic Seismic Hazards Map is based on http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamap.asp

NORTH

PROBABILISTIC SEISMIC HAZARD MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 7

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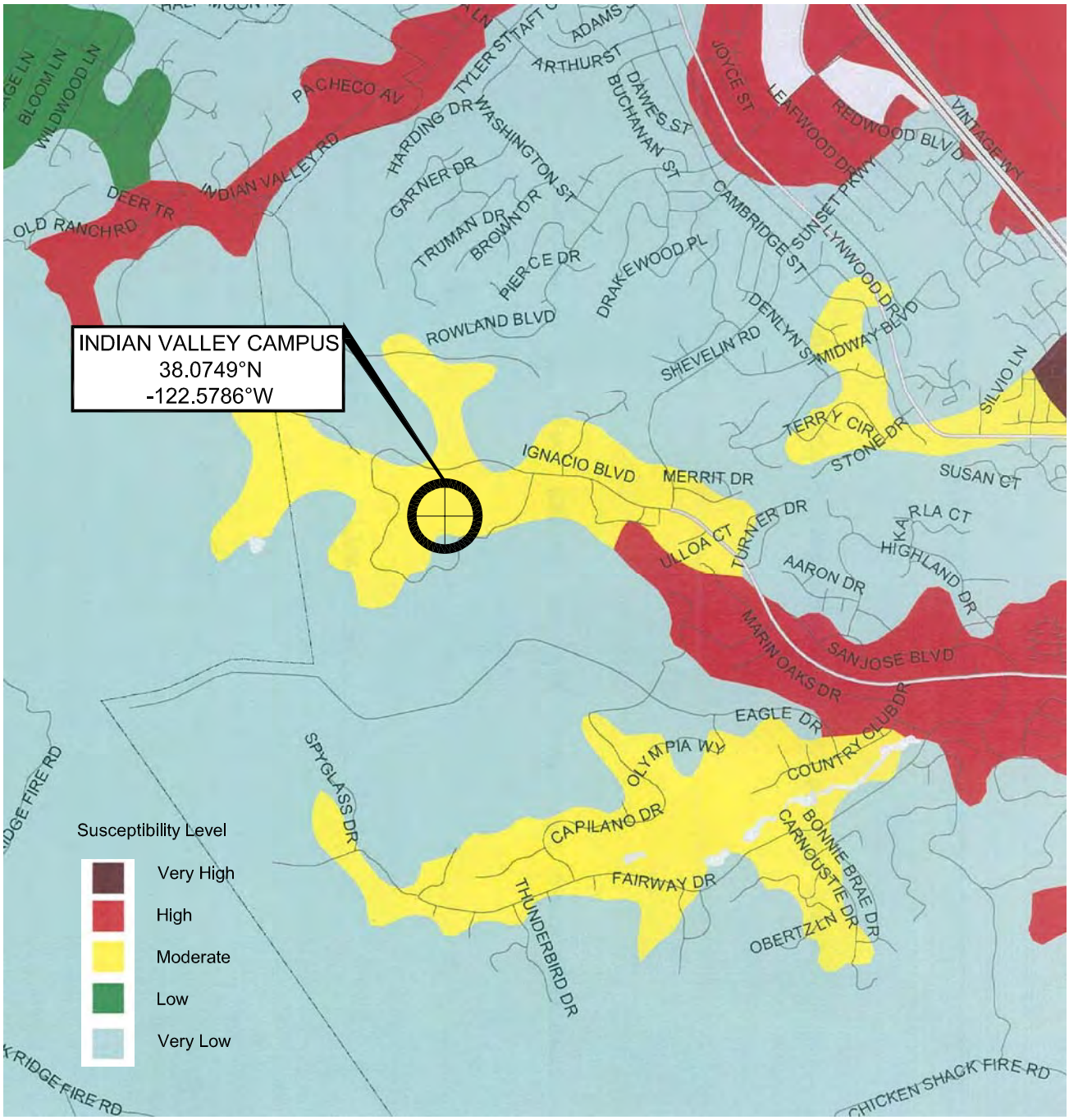

SOURCE: This ABAG Liquefaction Susceptibility Map was based on work by William Lettis & Associates, Inc. and USGS. USGS Open-File Report 00-444, Knudsen & others, 2000.

NORTH

0 1000 2000

FEET

ABAG LIQUEFACTION SUSCEPTIBILITY MAP

College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 8

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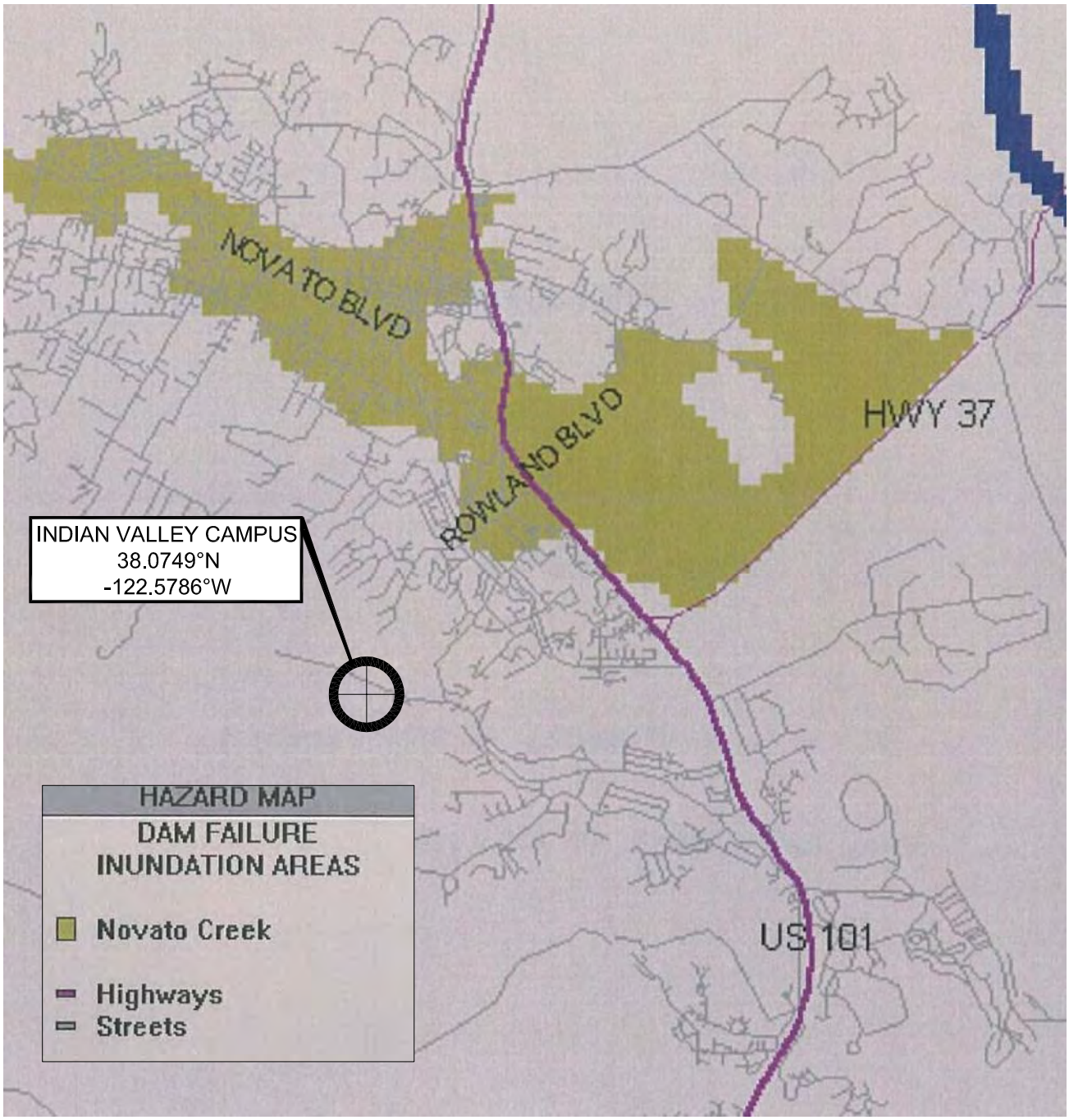

SOURCE: This Association of Bay Area Government (ABAG) Dam Failure Inundation Hazard Map for Novato was based on http://www.abag.ca.gov.

NORTH

ABAG DAM FAILURE MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 9

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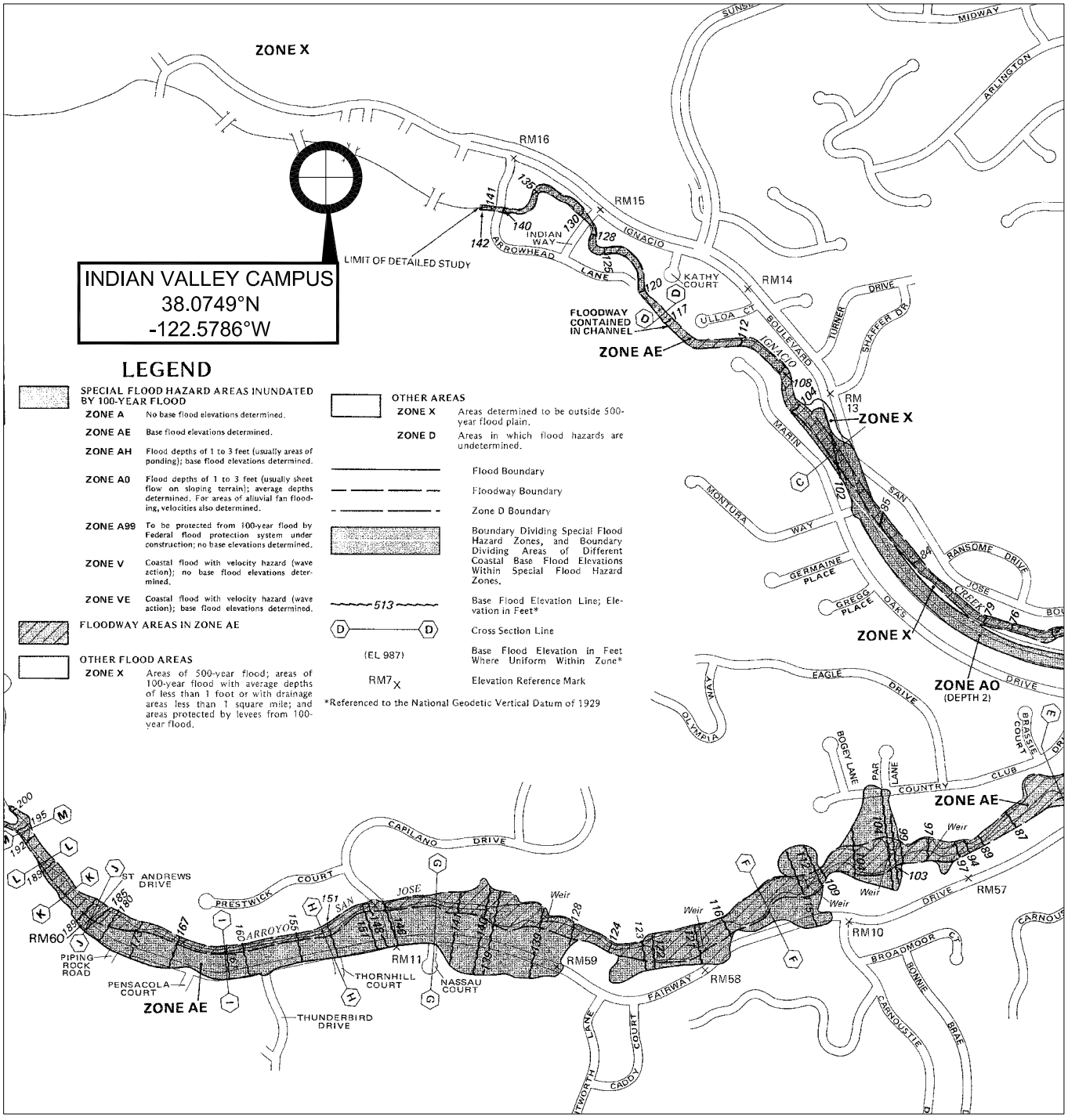

SOURCE: Federal Emergency Management Agency, Flood Insurance Rate Map, City of Novato, California, Community Panel Number 060178-0004 C, map revised September 29, 1989.

NORTH

0 1000 2000

FEET

FLOOD HAZARD MAP

College of Marin, Indian Valley Campus
Novato, Marin County, California

PLATE 10

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APPENDIX A
FIELD EXPLORATION

APPENDIX A
FIELD EXPLORATION

The field exploration consisted of a surface reconnaissance, geologic mapping and a subsurface exploration program. Prior to the undertaking the subsurface drilling program, permits for the borings were obtained from Marin County Environmental Health Department. In addition, the boring locations were reviewed with College of Marin facilities personnel and the project civil engineer, CSW/Stuber-Stroeh, who assisted with utility clearance. Underground Service Alert (USA) was also notified of the intention to perform the subsurface exploration. A representative from the Federated Indians of Graton Rancheria was onsite full-time during our field work to identify Indian midden, if encountered. An archeologist was also onsite part-time to identify historic artifacts, if encountered. A project-specific Health & Safety Plan was prepared prior to the exploration according to standard Fugro safety protocol, and the contents of the document were shared with the drilling subcontractor's field personnel.

The subsurface exploration was conducted using a truck-mounted drill rig equipped with hollow-stem auger and solid-flight augers. Two, 8-inch-diameter exploratory borings, designated B-2 and B-13, were drilled on October 18, 2005, with a CME-75 drill rig, to a maximum depth of 45 feet. Boring B-2 was converted to a piezometer. Boring B-8 was drilled on October 19, 2005, with a DR 10K drill rig equipped with 8-inch-diameter hollow-stem augers. This boring extended to a depth of 45 feet and was converted to a piezometer. Fifteen 8-inch-diameter borings extending to depths of 5 feet were drilled with the DR 10 K drill rig using solid flight augers. These borings, designated B-1, B-3 through B-7, B-9 through B-12, and B-14 through B-18, were drilled between October 19 and 21, 2005. The approximate locations of the exploratory borings are shown on the *Site Plan and Geologic Map*, Plate 3. The materials encountered in the borings were logged by our engineer as the drilling progressed. The soils are described in accordance with the Unified Soil Classification System (ASTM D-2487.) Upon completion of our field exploration, the borings were backfilled with neat cement grout and capped with concrete, with exception for B-2 and B-8, which were converted to piezometers. The logs of the borings, as well as a key for the classification of the soil (Plate A-1), are included as part of this appendix.

The piezometers constructed in Borings B-2 and B-8, are of the open-standpipe variety. The standpipe material consists of nominal 2-inch-diameter, flush-joint, Schedule 40 PVC pipe. The 10-foot-long screen interval placed near the bottom of the borehole consists of factory constructed, 0.020-inch-wide slots. Filter pack placed around the screen interval consists of #3 Monterey sand that extended at least 2 feet above the slotted interval. Bentonite pellets were installed as a seal for an interval of at least 2 feet above the sand filter pack. The remainder of the annular space around the standpipe, and above the bentonite seal, consists of Portland cement grout placed neat against the borehole wall. Traffic-rated covers were installed above the completed piezometers to provide security and protection for the instruments.

Representative soil samples were obtained from the borings using a Modified California split-barrel drive sampler (outside diameter of 3.0 inches, inside diameter of 2.5 inches) and a Standard Penetration Test (SPT) split-barrel drive sampler (outside diameter of 2.0 inches,

inside diameter of 1.375 inches). All samples were transmitted to our laboratory for evaluation and appropriate testing. Both sampler types are indicated in the "Sampler" column of the boring logs as designated in Plate A-1.

For borings drilled with the CME-75 drill rig, resistance blow counts were obtained with the samplers by dropping a 140-pound hammer through a 30-inch free fall using an automatic hammer system. The sampler was driven 18 inches, or a shorter distance where hard resistance was encountered, and the number of blows were recorded for each 6 inches of penetration. The blows per foot recorded on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches. Due to the use of the automatic hammer system the blow counts are not standard penetration resistance values.

Resistance blow counts with the DR 10K drill rig were obtained with the samplers by dropping a 140-pound hammer through a 30-inch free fall using a down-hole wire line hammer system. The sampler was driven 18 inches, or a shorter distance where hard resistance was encountered, and the number of blows were recorded for each 6 inches of penetration. The blows per foot recorded on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches. Due to the use of the down-hole wire line hammer system, the blow counts are not standard penetration resistance values.

The elevations indicated on the boring logs were obtained by interpreting the topographic contours on an undated drawing provided by CSW/Stuber-Stroeh. The topographic survey for the project was performed by Sandis Humber Jones.

The attached boring logs and related information show our interpretation of the subsurface conditions at the dates and locations indicated, and it is not warranted that they are representative of subsurface conditions at other locations and times.

Previous Borings PB-1 through PB-17, C-1 through C-24, and P-1 through P-23, by Cooper-Clark & Associates were drilled between August 7 and 14, 1972, using truck-mounted 18-inch-diameter, helical-auger equipment and/or truck-mounted, 24-inch-diameter rotary-bucket equipment. Previous Borings PB-1 through PB-17 were drilled by Cooper-Clark & Associates on February 18 and 19, 1975, using a truck mounted 12-inch-diameter, helical-auger equipment and on February 24, 1975 with truck mounted, 5-inch-diameter rotary wash equipment.

MAJOR DIVISIONS			GROUP NAMES	
COARSE-GRAINED SOILS (More than 50% retained on the No. 200 sieve)	GRAVELS (MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE)	Clean gravels less than 5% fines	GW	Well-Graded Gravel
			GP	Poorly Graded Gravel
		Gravels with more than 12% fines	GM	Silty Gravel
			GC	Clayey Gravel
	SANDS (MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE)	Clean sand less than 5% fines	SW	Well-Graded Sand
			SP	Poorly Graded Sand
		Sands with more than 12% fines	SM	Silty Sand
			SC	Clayey Sand
FINE-GRAINED SOILS (50% or more passes the No. 200 sieve)	SILTS AND CLAYS (Liquid Limit Less than 50%)		ML	Silt
			CL	Lean Clay
			OL	Organic Silt
	SILTS AND CLAYS (Liquid Limit Greater than 50%)		MH	Elastic Silt
			CH	Fat Clay
			OH	Organic Clay
HIGHLY ORGANIC SOILS			PT	Peat or Highly Organic Soils
			FILL	Debris or Mixed Fill
			AC	Asphalt Concrete Pavement with Aggregate Base

GENERAL NOTES

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Sloped line in break column indicates transitional boundary

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

SAMPLER DRIVING RESISTANCE

Number of blows with 140 lb. hammer, falling 30-in. to drive sampler 1-ft. after seating sampler 6-in.; for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
50/7"	50 blows drove sampler 7" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval (Ref=Refusal)

STRENGTH TEST METHOD

U = Unconfined Compression
Q = Unconsolidated Undrained Triaxial
T = Torvane
P = Pocket Penetrometer
M = Miniature Vane
F = Field Vane

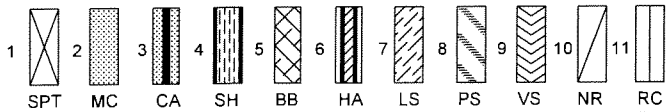
OTHER TESTS

k = Permeability
Consol = Consolidation
Gs = Specific Gravity
MA = Particle Size Analysis
EI = Expansion Index
OVM = Organic Vapor Measurement

WATER LEVEL SYMBOLS

- Initial or perched water level
- Final ground water level
- Seepages encountered

SAMPLER TYPE



Samplers and sampler dimensions (unless otherwise noted in report text) are as follows:

1 SPT Sampler, driven 1 3/8" ID, 2" OD
2 MOD CA Liner Sampler 2 3/8" ID, 3" OD
3 CA Liner Sampler 1 7/8" ID, 2.5" OD
4 Thin-walled Tube, pushed 2 7/8" ID, 3" OD
5 Bulk Bag Sample (from cuttings)
6 Hand Auger Sample
7 Lexan Sample
8 Pitcher Sample
9 Vibracore Sample
10 No Sample Recovered
11 Rock Core

SOIL STRUCTURE

Fissured: Containing shrinkage or relief cracks, often filled with fine sand or silt, usually more or less vertical.

Pocket: Inclusion of material of different texture that is smaller than the diameter of the sample.

Parting: Inclusion less than 1/8 inch thick extending through the sample.

Seam: Inclusion 1/8 inch to 3 inches thick extending through the sample.

Layer: Inclusion greater than 3 inches thick extending through the sample.

Laminated: Soil sample composed of alternating partings or seams of different soil types.

Interlayered: Soil sample composed of alternating layers of different soil type.

Intermixed: Soil sample composed of pockets of different soil type, and layered or laminated structure is not evident.

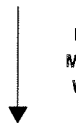
CONSISTENCY

Clays	Blows/Foot SPT	Undrained Shear Strength (ksf)
Very Soft	0 - 2	0 - 0.25
Soft	3 - 4	0.25 - 0.5
Firm	5 - 8	0.5 - 1
Stiff	9 - 16	1 - 2
Very Stiff	17 - 32	2 - 4
Hard	Over 32	Over 4

RELATIVE DENSITY

Sands and Gravels	Blows/Foot SPT
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Over 50

INCREASING VISUAL MOISTURE CONTENT



Information on each boring log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as from laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines on the logs may be transitional and approximate in nature. Water level measurements refer only to those observed at the time and places indicated, and can vary with time, geologic condition, or construction activity.

TERMS AND SYMBOLS USED ON BORING LOGS

PLATE A-1

WEATHERING *	
FRESH	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer blows if crystalline.
VERY SLIGHT	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rings under hammer blows if crystalline.
SLIGHT	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks, some occasional feldspar crystals are dull and discolored. Crystalline rock rings under hammer blows.
MODERATE	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer blows and shows significant loss of strength as compared with fresh rock.
MODERATELY SEVERE	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.
SEVERE	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In some granitoid rocks, all feldspar kaolinized to some extent. Some fragments of strong rock usually remain.
VERY SEVERE	All rock except quartz discolored or stained. Rock "fabric" discernible, but rock mass effectively reduced to "soil" with only fragments of strong rock remaining.
COMPLETE	Rock reduced to "soil." Rock "fabric" not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

* After GSA, Engineering Geology Division, Data Sheet 1, 1980.

STRENGTH	
VERY STRONG	Resists breakage from hammer blows; but will yield dust and small chips.
STRONG	Withstands a few hammer blows; but will yield large fragments.
MODERATELY STRONG	Withstands a few firm hammer blows.
WEAK	Crumbles with light hammer blows.
FRIABLE	Can be broken down with hand and finger pressure.

ROCK QUALITY DESIGNATION	
RQD	ROCK MASS QUALITY
90-100	Excellent
75-90	Good
50-75	Fair
25-50	Poor
0-25	Very Poor

Sandstone

Claystone

Shale

Siltstone

Rock Quality Designation (RQD) is the ratio of the total length of core segments longer than 4 in. to the total length of the core run, expressed as a percentage. Mechanical breaks are ignored in the calculation of total length of segments greater than 4 in. long. RQD will always be equal to, or less than, % Recovery.

Percent Recovery is the ratio of the total length of core recovered to the total length of the core run, expressed as a percentage.

DISCONTINUITY SPACING		
JOINTS	BEDDING, CLEAVAGE, FOLIATION	SPACING
VERY CLOSE	VERY THIN	Less than 2 inches
CLOSE	THIN	2 inches to 1 foot
MODERATELY CLOSE	MEDIUM	1 foot to 3 feet
WIDE	THICK	3 feet to 10 feet
VERY WIDE	VERY THICK	Greater than 10 feet

HARDNESS	
VERY HARD	Cannot be scratched with a knife; metal powder left on sample.
HARD	Scratched with knife with difficulty; trace of metal powder left on samples; scratch faintly visible.
MODERATELY HARD	Readily scratched with knife, scratch leaves heavy trace of dust and is readily visible.
LOW HARDNESS	Gouged or grooved to 1/16 inch by firm pressure on knife; scratches with penny.
SOFT	Gouged or grooved readily with knife; small thin pieces can be broken by finger pressure.
VERY SOFT	Carves with knife; scratched by fingernail.

ROUGHNESS OF DISCONTINUITY SURFACES	
SMOOTH	Appears smooth and is essentially smooth to the touch. May be slickensided.
SLIGHTLY ROUGH	Asperities on surfaces are visible and distinct.
MEDIUM ROUGH	Asperities are clearly visible and surface feels abrasive.
ROUGH	Large angular asperities can be seen. Some ridge and high side angle steps are evident.
VERY ROUGH	Near vertical steps and ridges occur on surfaces.

ROCK MASS PHYSICAL DESCRIPTION

LOCATION: South side of Parking Lot 1

SURFACE EL: 153.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (5 inches)							
1		B1			Lean CLAY with sand (CL): very stiff, brown, moist, fine-grained sand							
2		1		(33)		108	21					
3		2										
4		3		21	Sandy Lean CLAY (CL): very stiff, yellowish brown, moist, fine-grained sand			64			4.0 P	
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 21, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-1

College of Marin, Indian Valley Campus
Novato, California

LOCATION: North approach to Bridge 6

SURFACE EL: 157.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1		(34)	Asphalt Concrete (3 inches) Sandy SILT (ML): very stiff, brown, dry, fine- to medium-grained sand, with trace gravel (weak sandstone fragments)							
		2										
		3		17							>4.5 P	
5												
		4		(27)	Sandy Lean CLAY (CL): very stiff, yellowish brown, damp to moist, fine to coarse-grained sand, with silt and weak sandstone fragments	112	12					
		5										
10					▽							
					Silty CLAY with sand (CL): stiff, reddish brown and gray, wet, fine-grained sand							
		6		10				64				
15					- grades gray at 15 feet							
					Silty GRAVEL with sand (GM): dense, yellowish and reddish brown, wet, fine and coarse, subangular to subrounded gravel (weak fine-grained sandstone fragments), fine-grained sand							
		7		(45)								
		8										
20					Sandy Lean CLAY (CL): stiff, brown, wet, fine-grained sand							
		9		18								

Continued

BORING DEPTH: 45.0 ft
DEPTH TO WATER: 12.0 ft
BACKFILL: Established as a Piezometer
COMPLETION DATE: October 18, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: CME 75
DRILLED BY: Clear Heart Drilling, Rick
LOGGED BY: J Hagen

LOG OF BORING NO. B-2

College of Marin, Indian Valley Campus
Novato, California

LOCATION: North approach to Bridge 6

SURFACE EL: 157.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
	10		23	Silty CLAY (CL): very stiff, dark gray, moist to wet, trace fine-grained sand, zones of gravel (weak sandstone fragments)							
30											
	11		17	Clayey GRAVEL (GC): medium dense, yellowish and reddish brown, wet, fine, (weak sandstone fragments in a gray clay binder)							
35											
	12		(19)	Gravelly Lean CLAY (CL): stiff, brown and gray, wet, gravel (fine and coarse, subrounded to subangular, weak sandstone fragments)							
	13										
40											
	14		50/6"	SILTSTONE: soft, brown, wet, weak							
45											

BORING DEPTH: 45.0 ft
DEPTH TO WATER: 12.0 ft
BACKFILL: Established as a Piezometer
COMPLETION DATE: October 18, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: CME 75
DRILLED BY: Clear Heart Drilling, Rick
LOGGED BY: J Hagen

LOG OF BORING NO. B-2

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Perimeter Road, near Miwok Cluster

SURFACE EL: 219.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B4			SILT with sand (ML): very stiff, yellowish brown, moist, fine-grained sand							R-Value
2		1		(50/5")								
		2			SILTSTONE: soft, brown, moist							
3												
				ref/5"								
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 21, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-4

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Perimeter Road

SURFACE EL: 220.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B5			Sandy Lean CLAY (CL): very stiff, reddish brown, moist, fine-grained sand, with a trace of gravel							R-Value
2		1		(41)								
3		2				110	6					
4		3		26	CLAYSTONE: soft, reddish brown, moist, with a trace of sand							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 21, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-5

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Perimeter Road

SURFACE EL: 239.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
		B6			Sandy Lean CLAY (CL): hard, reddish brown, moist, fine to medium-grained sand							
1												
2		1		(50/6")	CLAYSTONE: soft, reddish brown, moist, with a trace of fine- to medium-grained sand							
		2										
3				90								
4		3										
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 21, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-6

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Perimeter Road

SURFACE EL: 236.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (4 inches)							
1		B7			Sandy Lean CLAY (CL): stiff, orangish brown, moist, fine-grained sand							
2		1		62	CLAYSTONE: medium hard, brown, moist, with fine-grained sand							
3												
4					SHALE: hard, gray to black							
5												
6												
7												
8												
9												

BORING DEPTH: 4.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 21, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-7

College of Marin, Indian Valley Campus
Novato, California

LOCATION: South approach to Bridge 2

SURFACE EL: 205.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
	B8			Asphalt Concrete (2.5 inches)							
				Silty SAND (SM): dense, brown, dry to damp, fine-grained, with rootlets and a trace of gravel (fine, friable sandstone fragments)							
	1		(63)		87	9					
	2		30					34	17		
5											
	3		34	- grades clayey, damp to moist, with gravel (coarse, friable sandstone fragments) at 8.5 feet							
10				- grades gravelly at 10 feet with coarse and subangular gravel							
				Gravelly Lean CLAY (CL): hard, brown, moist, (yellowish and reddish brown, fine-grained, severely weathered sandstone fragments in clay matrix)							
	4		(46)								
	5				112	17					
15											
	6		24	- grades coarse gravel at 18.5 feet							
20											
				- grades wet with less gravel below 23.5 feet							
	7		(16)								
	8			Sandy Lean CLAY (CL): stiff, gray and brown,			60			1.2 P	

Continued

BORING DEPTH: 45.0 ft
DEPTH TO WATER: 23.0 ft
BACKFILL: Established as a Piezometer
COMPLETION DATE: October 19, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: J Hagen

LOG OF BORING NO. B-8

College of Marin, Indian Valley Campus
Novato, California

LOCATION: South approach to Bridge 2

SURFACE EL: 205.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
				wet, fine-grained sand						1.2 P	
	9		(46)	Clayey SAND with gravel (SC): dense, dark gray, wet, fine- to coarse-grained, subangular gravel, fine and coarse (sandstone fragments)			17				MA
30	10										
	11		34	Lean CLAY with sand (CL): hard, brown with gray mottling, wet, fine-grained sand			57				
35											
40	12		(82)								
	13			- grades gravelly (fine, angular, sandstone fragments)						4.2 P	
	14		50/5"	SHALE: moderately hard, grayish brown, wet							
45											

BORING DEPTH: 45.0 ft
DEPTH TO WATER: 23.0 ft
BACKFILL: Established as a Piezometer
COMPLETION DATE: October 19, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: J Hagen

LOG OF BORING NO. B-8

College of Marin, Indian Valley Campus
Novato, California

LOCATION: North side of Parking Lot 8

SURFACE EL: 206.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B9			Lean CLAY with sand (CL): firm, dark brown, moist, fine- to medium-grained sand, trace of silt							
2		1		(9)								
3		2				103	19					
4		3		8	- grades firm to stiff below 3.5 feet			60			3.0 P	
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 19, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-9

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Ignacio Blvd. at west entrance of Parking Lot 7

SURFACE EL: 211.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3.5 inches)							
1		B10			Sandy SILT (ML): firm, orangish brown, moist, fine-grained sand							R-Value
2		1		(ref/5")	SHALE: moderately hard, gray, moist							
3		2		ref/5"								
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-10

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Northeast side of Parking Lot 7

SURFACE EL: 203.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B11			Sandy Lean CLAY (CL): stiff, reddish brown, moist, fine- to medium-grained sand							R-Value
2		1		(16)								
3		2				110	18					
4		3		10	- grades brown below 3.5 feet						1.3 P	
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-11

College of Marin, Indian Valley Campus
Novato, California

LOCATION: South side of Parking Lot 6

SURFACE EL: 183.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B12			Well-graded SAND with silt and gravel (SW-SM): medium dense, reddish brown, moist, fine to medium-grained, some gravel (coarse, subangular claystone fragments)							
2		1		(28)				9				MA
3												
4		2		48	Clayey GRAVEL (GC-GW): dense, reddish brown, moist, fine and coarse, angular (claystone fragments)							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-12

College of Marin, Indian Valley Campus
Novato, California

LOCATION: East of the north approach to Bridge 4

SURFACE EL: 176.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
					Asphalt Concrete (2.5 inches)							
		1		(25)	Sandy SILT with gravel (ML): very stiff, brown, dry, fine- to medium-grained sand, with rootlets and gravel (reddish sandstone)							
		2										
		3		24								
5												
					Silty SAND (SM): medium dense, brown, moist, fine-grained, light brown and reddish gravel (fine, friable sandstone fragments)							
		4		(38)								
		5										
10												
					Gravelly Lean CLAY (CL): stiff, brown and gray, moist, fine, angular gravel (sandstone fragments), with a trace of fine-grained sand and a trace of organics							
		6		13								
15												
		7		(27)	- increase in sand content at 18.5 feet, wet at 20 feet			57			3.1 P	
		8										
20												
		9		ref/2.5"	SANDSTONE: soft, orangish brown, moist, fine-grained, moderate weathering							

Continued

BORING DEPTH: 29.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 18, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: CME 75
DRILLED BY: Clear Heart Drilling, Rick
LOGGED BY: J Hagen

LOG OF BORING NO. B-13

College of Marin, Indian Valley Campus
Novato, California

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: East of the north approach to Bridge 4 SURFACE EL: 176.0 ft +/- 0.5 (rel. MSL datum) MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		10	⊠	ref/3.5"	- grades gray, moderately hard at 28.5 feet							
30												
35												
40												
45												

BORING DEPTH: 29.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 18, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: CME 75
DRILLED BY: Clear Heart Drilling, Rick
LOGGED BY: J Hagen

LOG OF BORING NO. B-13

College of Marin, Indian Valley Campus
Novato, California

LOCATION: South side of Parking Lot 5

SURFACE EL: 173.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B14			Sandy Lean CLAY (CL): very stiff to hard, orangish brown, moist, fine- to medium-grained sand, with coarse gravel (claystone fragments)							R-Value
2				(49)								
3		1 2									>4.5 P	
4		3		30								
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-14

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Ignacio Blvd. at dogbone

SURFACE EL: 171.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B15			Lean CLAY with sand (CL): firm, reddish brown, moist, fine to medium-grained sand							R-Value
2		1		(9)								
3		2									2.0 P	
4		3		6								
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-15

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Middle of Parking Lot 3

SURFACE EL: 165.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B16			Lean CLAY with sand (CL): very stiff, brown to reddish brown, moist, fine-grained sand							R-Value
2		1		(27)		105	16					
3		2										
4		3		19	- grades orangish brown below 3.5 feet						>4.5 P	
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-16

College of Marin, Indian Valley Campus
Novato, California

LOCATION: North side of Parking Lot 2

SURFACE EL: 159.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B17			Lean CLAY with sand (CL): stiff, orangish brown, moist, fine-grained sand							
2		1		(20)								
3		2										
4		3		14	Clayey SAND (SC): medium dense, reddish brown, moist, fine- to medium-grained, trace of gravel			24			>4.5 P	
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-17

College of Marin, Indian Valley Campus
Novato, California

LOCATION: Ignacio Blvd. near northeast corner of Parking Lot 2

SURFACE EL: 159.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches)							
1		B18			Clayey SAND (SC): medium dense, reddish brown, moist, fine-grained							R-Value (0-5')
2		1		(25)		114	13					
3		2										
4		3		16								
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland Cement, Concrete Cap
COMPLETION DATE: October 20, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Rock mass physical description on Plate A-2.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: DR 5K
DRILLED BY: Clear Heart Drilling, Pablo/Ryan
LOGGED BY: L Al Atik

LOG OF BORING NO. B-18

College of Marin, Indian Valley Campus
Novato, California

APPENDIX B
LABORATORY TESTING PROGRAM

APPENDIX B
LABORATORY TESTING PROGRAM

The laboratory testing program was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the site.

The natural water content was determined on 10 samples of the materials recovered from the borings in accordance with ASTM Test Designation D-2216. These water contents are recorded on the boring logs at the appropriate sample depths. Dry density determinations were performed on 10 samples of the subsurface soils to evaluate their physical properties. The results of these tests are shown on the boring logs at the appropriate sample depths.

Atterberg Limit determinations were performed on one sample of the subsurface soils to determine the range of water content over which this material exhibits plasticity. The Atterberg limits were determined in accordance with ASTM Test Designations D-428 and D-424. These values are used to classify the soil in accordance with the Unified Soil Classification System and to indicate the soil's compressibility and expansion potentials. The results of this test are presented on Plate B-1, and on the log of the boring at the appropriate sample depth.

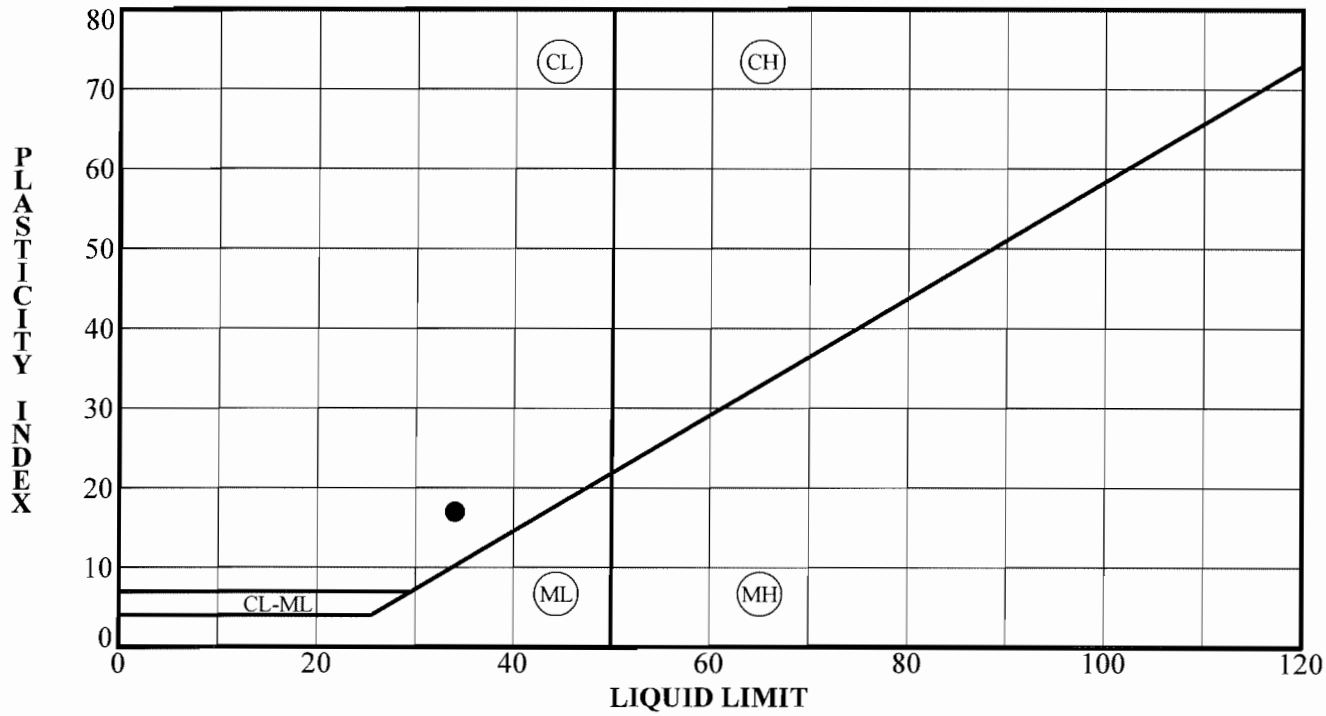
The percent passing the #200 sieve was determined on seven samples of the subsurface soils to aid in the classification of these soils. These tests were performed in accordance with ASTM Designation D-1140. The results of these tests are shown on the boring logs at the appropriate sample depths.

Gradation tests were performed on two samples of the subsurface soils in accordance with California Test Method No. 202. These tests were performed to assist in the classification of the soils and to determine their grain size distribution. The results of these tests are presented on Plate B-2.

Eight resistance R- value tests were performed on representative samples of the surface soils onsite to provide data for pavement design. The tests were performed in accordance with California Test Method 301-F. The results of the tests are presented below:

RESULTS OF R-VALUE TESTS

Boring Number	Description of Material	Dry Density (pcf)	Water Content (%)	Exudation Pressure (psi)	Expansion Pressure (psf)	R-Value
B-4	Light brown SAND with clay (SP-SC)	108.2	17.5	159	17	17
		108.8	16.4	278	44	60
		112.1	15.3	326	48	68
R-Value = 65 at Exudation pressure of 300 psi						
B-5	Red brown clayey SAND (SC-CL)	110.3	16.4	191	0	14
		112.0	15.9	247	22	36
		113.7	14.8	350	79	50
R-Value = 48 at Exudation pressure of 300 psi						
B-10	Brown clayey SAND (SC)	112.9	16.5	159	0	15
		113.2	15.5	231	0	37
		115.2	14.4	358	0	60
R-Value = 51 at Exudation pressure of 300 psi						
B-11	Brown sandy CLAY (CL)	111.5	16.9	151	0	16
		113.4	15.8	223	0	35
		113.3	14.8	326	0	43
R-Value = 37 at Exudation pressure of 300 psi						
B-14	Dark brown sandy CLAY (CL)	110.1	16.7	191	0	9
		112.6	15.6	247	0	18
		115.6	14.6	509	127	51
R-Value = 26 at Exudation pressure of 300 psi						
B-15	Brown clayey SAND (SC-CL)	112.3	16.5	183	0	38
		112.2	15.4	342	48	45
		113.4	14.4	557	105	51
R-Value = 43 at Exudation pressure of 300 psi						
B-16	Brown clayey SAND (SC-CL)	112.1	16.5	191	0	15
		113.7	15.4	278	61	41
		114.8	14.4	342	96	47
R-Value = 43 at Exudation pressure of 300 psi						
B-18	Red brown clayey SAND (SC)	112.9	15.4	175	0	53
		113.1	14.9	302	0	55
		112.0	14.4	398	0	59
R-Value = 55 at Exudation pressure of 300 psi						



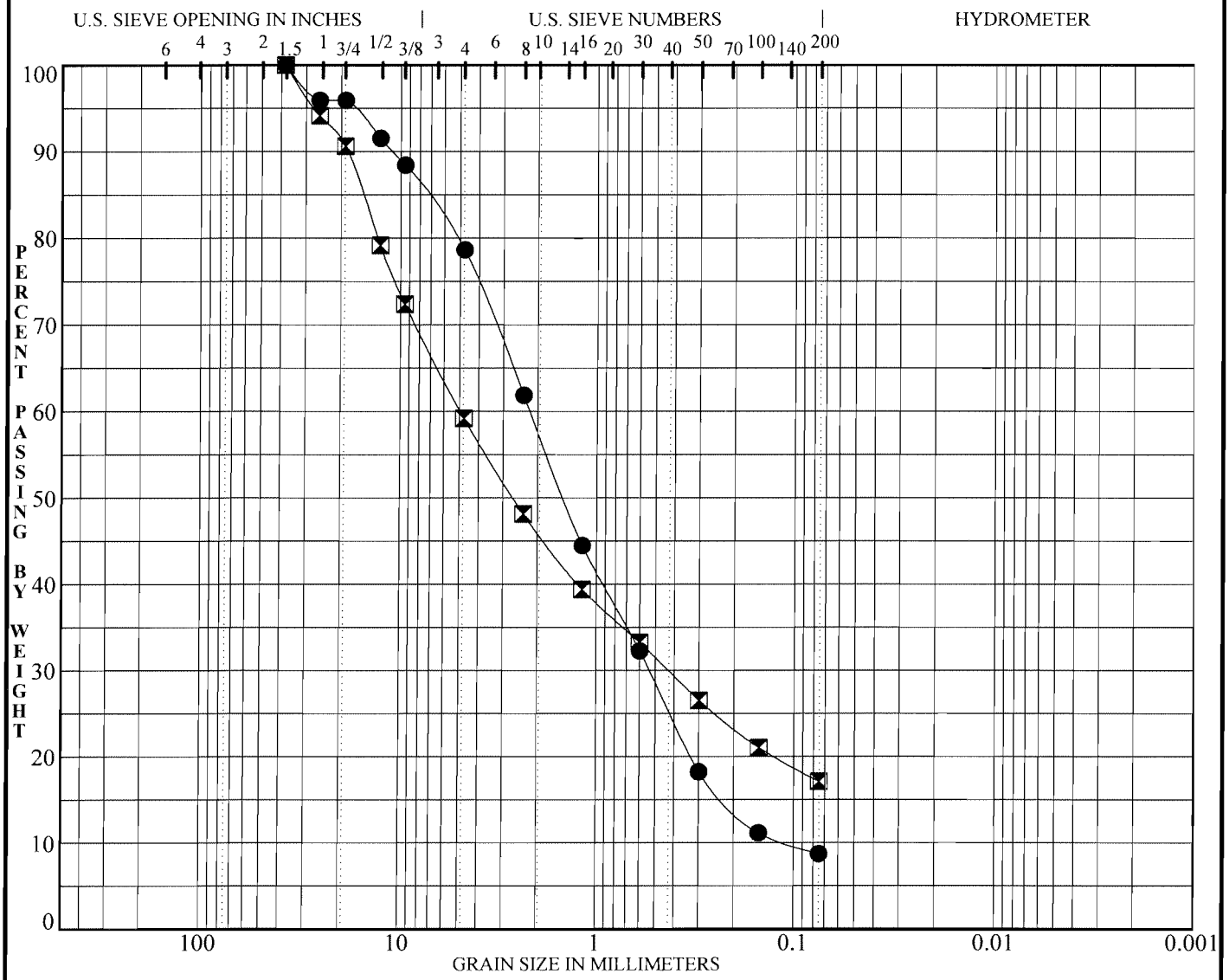
Key Symbol	Boring No.	Depth (Feet)	Liquid Limit	Plasticity Index	Liquidity Index	Water Content (%)	% Passing #200 Sieve	USCS
●	B-8	3.5	34	17	---	---		

ATTERBERG 1715.001.GPJ VERSION-012505.GDT 12/9/05

FUGRO	PREP'D BY: APP'D BY: DATE 12/9/05 DWG FILE	PLASTICITY CHART AND DATA **COLLEGE OF MARIN, INDIAN VALLEY CAMPUS** **Novato, California**

FIGURE **B-1**

PROJECT No. 1715.001



Cobbles	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	

Key Symbol	Boring No.	Depth (Feet)	% Passing No. 200 Sieve	% Passing No. 4 Sieve	Sample Descsription	USCS
●	B-12	2.5	9	79	Rust brown SAND with silt and gravel	SM-SW
⊠	B-8	29.5	17	59	Gray brown clayey SAND with gravel	SC

FUGRO

PREP'D BY:
APP'D BY:
DATE: 12/9/05
DWG FILE:

GRADATION TEST DATA

COLLEGE OF MARIN, INDIAN VALLEY CAMPUS
Novato, California

FIGURE
B-2
PROJECT No.
1715.001

GRADATION_B 1715-001 V012505.GPJ STD.GDT 12/9/05

APPENDIX C
CORROSION ANALYSIS RESULTS

California State Certified Laboratory No.2153

CERCO analytical, inc.

3942-A Valley Avenue
Pleasanton, CA 94566-4715
Tel: 925.462.2771
Fax: 925.462.2775

9 November, 2005

Job No.0511024
Cust. No.11608

Mr. Jon Hagen
Fugro West, Inc.
1000 Broadway, Suite 200
Oakland, CA 94607

Subject: Project No.: 1715.001
Project Name: College of Marin-Indian Valley Campus
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Hagen:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on November 3, 2005. Based on the analytical results, a brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, all samples are classified as "moderately corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations range from none detected to 100 mg/kg. Because the chloride ion concentrations are less than 300 ppm, they are determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentrations are none detected and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of samples B2/2, B9/1 and B13/2 range from 6.6 to 7.1 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures. Sample B5/1 has a pH of 5.6. Any soils with a pH of <6.0 is considered to be corrosive to buried iron, steel, mortar-coated steel and reinforced concrete structures. Therefore, corrosion prevention measures need to be considered for structures to be placed in this acidic soil.

The redox potentials range from 420 to 500-mV which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific design recommendations or consultation, please call ***JDH Corrosion Consultants, Inc. at (925) 927-6630.***

We appreciate the opportunity of working with you on this project. If you have any questions, or if you required further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO Analytical, Inc.

3942-A Valley Avenue, Pleasanton, CA 94566-4715 (925) 462-2771 Fax (925) 462-2775

FINAL RESULTS

Client:	Fugro West, Inc.	Date Sampled:	Not Indicated
Client's Project No.:	1715.001	Date Received:	3-Nov-2005
Client's Project Name:	College of Marin- Indian Valley Campus	Date of Report:	9-Nov-2005
Authorization:	Signed Chain of Custody	Matrix:	Soil

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
0511024-001	B2/2 @ 3-3.5'	420	6.6	-	3,600	-	29	N.D.
0511024-002	B5/1 @ 2.5-3'	480	5.6	-	2,900	-	100	N.D.
0511024-003	B9/1 @ 2.5-3'	480	7.1	-	4,500	-	16	N.D.
0511024-004	B13/2 @ 3-3.5'	500	6.6	-	6,600	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Detection Limit:	-	-	10	-	50	15	15
Date Analyzed:	4-Nov-2005	8-Nov-2005	-	8-Nov-2005	-	8-Nov-2005	8-Nov-2005

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis

N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

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GEOTECHNICAL INVESTIGATION
COLLEGE OF MARIN
INDIAN VALLEY CAMPUS - MAIN BUILDING
NOVATO, CALIFORNIA

July 20, 2007

Project 739.09

Prepared For:
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CERTIFICATION

This document is an instrument of service, prepared by or under the direction of the undersigned professionals, in accordance with the current ordinary standard of care. The service specifically excludes the investigation of radon, asbestos, toxic mold and other biological pollutants, and other hazardous materials. The document is for the sole use of the client and consultants on this project. Use by third parties or others is expressly prohibited without written permission. If the project changes, or more than two years have passed since issuance of this report, the findings and recommendations must be reviewed by the undersigned.

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GEOTECHNICAL INVESTIGATION
COLLEGE OF MARIN
INDIAN VALLEY CAMPUS - MAIN BUILDING
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GEOTECHNICAL INVESTIGATION
COLLEGE OF MARIN
INDIAN VALLEY CAMPUS - MAIN BUILDING
NOVATO, CALIFORNIA

I. INTRODUCTION

This report summarizes our geotechnical investigation regarding the planned Main Building at the College of Marin, Indian Valley Campus (IVC) in Novato, California. The purpose of our geotechnical investigation is to evaluate site conditions and provide geotechnical recommendations for the design and construction of the project. This report is intended for the exclusive use of the College of Marin, CSW/Stuber-Stroeh Engineering Group and the project design team for this project and specific site. No other use is authorized without our written consent.

The scope of our geotechnical investigation is outlined in our Agreement between Consultant and Subconsultant dated May 29. 2007 and includes the following:

- Review of existing geotechnical and geologic data,
- Description of subsurface conditions based on exploration with 6 soil borings,
- Geologic hazards evaluation and recommended mitigation measures,
- Seismicity evaluation with site specific spectral accelerations,
- Recommended foundation type and geotechnical design criteria,
- Concrete slab-on-grade recommendations,
- Criteria for site grading and trench backfill,
- Geotechnical drainage recommendations
- Presentation of our investigation in a geotechnical report.

II. PROJECT DESCRIPTION

The College of Marin - IVC Main Building will be a new structure located in an existing parking area of the Indian Valley campus. The Indian Valley Campus is located at 1800 Ignacio Boulevard, Novato, Marin County, California. The site location and coordinates are presented on Figure 1, Site Map.

Detailed plans regarding the proposed construction have not been prepared, however it is our understanding the project includes constructing a two-story, steel frame, approximately 30,000 square foot administration / educational building with moderate foundations loads (up to 300 kips). We anticipate other ancillary items such as concrete flat work, new asphalt pavement parking areas and utilities will be constructed as well. Minor site grading is anticipated.

The design team includes the College of Marin (Owner), VBN Architects of Oakland, California, CSW/Stuber-Stroeh of Novato, California (Civil Engineer), and ZFA of San Francisco, California (Structural Engineer).

III. SITE CONDITIONS

A. Regional Geology

The site is located within the Coast Range Geomorphic Province of California. The regional bedrock geology consists of complexly folded, faulted, sheared, and altered sedimentary, igneous, and metamorphic rock of the Jurassic-Cretaceous age (65-190 million years ago) Franciscan Complex. Bedrock is characterized by a diverse assemblage of greenstone, sandstone, shale, chert, and mélange, with lesser amounts of conglomerate, calc-silicate rock, schist and other metamorphic rocks.

The regional topography is characterized by northwest-southeast trending mountain ridges and intervening valleys that were formed by movement between the North American and the Pacific Plates. Continued deformation and erosion during the late Tertiary and Quaternary Age (the last several million years) formed the prominent Marin coastal ridges and the inland depression that is now the San Francisco Bay. The more recent seismic activity within the Coast Range Geomorphic Province is concentrated along the San Andreas Fault zone, a complex group of generally north to northwest trending faults.

Regional geologic mapping by the California Geology Survey (CGS 2002) indicate the site is underlain by Holocene age (present to 8,000 years ago) alluvial deposits of gravel, sand and silt that are poorly to moderately sorted (well-graded). The regional geology in the vicinity of the project site is shown on Figure 2.

B. Seismicity

Active Faults in the Region – The site is located within the seismically active San Francisco Bay Region and will therefore experience the effects of future earthquakes. Such earthquakes could occur on any of several active faults within the region. The active faults are classified into two types. Type A faults are capable of large magnitude earthquakes and have a high rate of seismic activity. Type B faults are capable of large magnitude earthquakes with a low rate of seismic activity or are smaller faults with a high rate of seismic activity. These faults are shown on the Active Fault Map, Figure 3.

Historic Fault Activity – Numerous earthquakes have occurred in the region within historic times. The results of our computer database search indicate that 57 earthquakes (Richter Magnitude 5.0 or larger) have occurred within 100 kilometers of the site area between 1735 and 2005. Using empirical attenuation relationships, the maximum historic ground acceleration (median peak) within the study area is approximately 0.18g. The five most significant historic earthquakes to affect the project site are summarized in Table A.

TABLE A
SIGNIFICANT EARTHQUAKE ACTIVITY
College of Marin – IVC Main Building
Novato, California

Epicenter (Latitude, Longitude)	Historic Richter Magnitude	Year	Distance	Maximum Peak Site Acceleration
37.70, -122.50	8.3	1906	42 km	0.18 g
38.20, -122.40	6.2	1898	20 km	0.14 g
37.80, -122.20	6.8	1836	44 km	0.10 g
37.60, -122.40	7.0	1838	54 km	0.09 g
37.70, -122.10	6.8	1868	59 km	0.08 g

References: Sources: USGS (2004), Abrahamson and Silva (1997), Seed, et. al. (1997)

The calculated site accelerations should only be considered as reasonable estimates. Many factors (soil conditions, orientation to the fault, etc.) can influence the actual ground surface accelerations. Significant deviations from the values presented are possible due to geotechnical and geologic variations from the typical conditions used in the empirical correlations.

Probability of Future Earthquakes – The historical records do not directly indicate either the maximum credible earthquake or the probability of such a future event. To evaluate earthquake probability in this region, the USGS has assembled a group of researchers into the "Working Group on California Earthquake Probabilities" to estimate the probabilities of earthquakes on active faults. Potential sources were analyzed considering fault geometry, geologic slip rates,

geodetic strain rates, historic activity, and micro-seismicity, to arrive at estimates of probabilities of earthquakes with a Moment Magnitude greater than 6.7 by 2032.

The probability studies focus on seven "fault systems" within the Bay Area. Fault systems are composed of different, interacting fault segments capable of producing earthquakes within the individual segment or in combination with other segments of the same fault system. The probabilities for the individual fault segments in the San Francisco Bay Area are presented on Figure 3.

In addition to the seven fault systems, the studies included probabilities of "background earthquakes." These earthquakes are not associated with the identified fault systems and may occur on lesser faults (i.e., West Napa) or previously unknown faults (i.e., the 1989 Loma Prieta and 2000 Napa/Mt. Veeder Earthquake). When the probabilities on all seven fault systems and the background earthquakes are combined mathematically, there is a 62 percent chance for a magnitude 6.7 or larger earthquake to occur in the Bay Area by the year 2032. Smaller earthquakes (between magnitudes 6.0 and 6.7), capable of considerable damage depending on proximity to urban areas, have about an 80 percent chance of occurring in the Bay Area by 2032 (USGS, 2002).

Additional studies by the USGS regarding the probability of large earthquakes in the Bay Area are on going. These current evaluations include data from additional active faults and updated geological data.

C. Surface Conditions

The project site is currently developed as a community college. The college campus contains 1 and 2-story structures, asphalt walkways, and landscaped areas. The proposed building site is the existing, level Lot 2 parking area and that consists of asphalt-concrete paved driveways and parking stalls with isolated landscape areas. The existing site conditions are shown on Figure 4. Prior to subsurface exploration, underground service alert (USA) was notified in order to identify any active underground utilities. Sewer and storm drains exist in the project vicinity. No other underground utilities were marked at the site. Additionally, we consulted plans provided by the school district that revealed the approximate location of existing utilities. A 60-inch storm

drain is located to the north and a sewer line to the east of the planned building. Electrical lines for the existing parking area lights exist throughout the parking lot.

D. Field Exploration and Laboratory Testing

We explored subsurface conditions with six soil borings drilled with truck mounted equipment on May 25, 2007 at the locations shown on Figure 4. The borings were logged by our field geologist and select soil samples were collected for laboratory testing to determine their pertinent engineering properties. The borings were drilled to depths between 27 and 34 feet below the ground surface. A soil classification chart and a rock classification chart are presented along with the boring logs on Figures A1 through A14. Soil samples were taken to our laboratory and were tested to obtain pertinent engineering properties including moisture content, dry density, particle size analysis (sieve analysis), and unconfined strength. The results of moisture content, dry density and unconfined strength tests are presented on the boring logs. The sieve analyses are presented on Figures A15 – A17. Soil samples of the soils in the upper 5 were composited for corrosion tests. The corrosion test results are presented on Figure A-18. The subsurface exploration program is discussed in more detail and presented with the boring logs and laboratory testing results in Appendix A.

E. Subsurface Conditions

The subsurface conditions are consistent with the mapped geology and consistent of alluvial flood-plain materials, which are deposited as ancient rivers meandered across Pacheco Valley. Due to the variable nature of the alluvial soils, the determination of the various soil layers are based on similar soil type, consistency, and engineering properties.

The subsurface conditions encountered in the borings consist of interbedded, variable loose to medium dense clayey sand and medium stiff to stiff sandy clay. The upper 3 to 5 feet of soils at the project site is moist, medium stiff clay with sand. Below the upper clay layer to a depth of about 10 feet is moist medium dense clayey sand or medium stiff sandy clay. Below 10 feet the soils grade wet and more variable. In several borings, loose saturated layers of clayey sand were encountered at variable depths; these layers are possible liquefiable materials. Underlying the alluvial deposits, at a depth of about 25 to 30 feet, is sheared shale and

sandstone bedrock of the Franciscan Complex. The interpreted subsurface conditions across the project site are shown of the geologic cross section presented on Figure 5.

Groundwater was observed between 9 and 15.5 feet below the ground surface shortly after drilling. These observations may not represent the stabilized groundwater level. Groundwater levels will fluctuate with the seasons and may be nearer to the ground surface during periods of intense rainfall or for a period of time after significant rainfall.

IV. GEOLOGIC HAZARDS

A. General

The primary geologic hazards identified at the site are very strong seismic shaking, liquefaction, and seismically induced settlement. Other hazards, such as fault rupture, expansive soils or slope instability are not considered significant at the site. A brief description of each geologic hazard and, if needed, mitigation measures is listed in the following sections.

B. Fault Surface Rupture

Under the Alquist-Priolo Earthquake Fault Zoning Act[1], the California Division of Mines and Geology (CDMG, now known as the California Geological Survey) produced 1:24,000 scale maps showing all known active faults and defining zones within which special fault studies are required. The project site is not located within an Alquist-Priolo Earthquake Fault Zone. The closest active faults are the San Andreas fault located 11.1 miles (17.9 km) to the west and the Rodgers Creek fault located 7.1 miles (11.4 km) to the east. The potential for fault surface rupture is therefore remote.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

C. Seismic Shaking

The site will likely experience seismic ground shaking similar to other areas in the seismically active San Francisco Bay Area. Earthquakes along several active faults in the region, as shown on Figure 3, could cause moderate to strong ground shaking at the site.

Deterministic Seismic Hazard Analysis – Deterministic Seismic Hazard Analysis (DSHA) predicts the intensity of earthquake ground motions by analyzing the characteristics of nearby faults, distance to the faults and rupture zones, earthquake magnitudes, earthquake durations, and site-specific geologic conditions. Empirical relations developed for rock sites (Abrahamson and Silva, 1997) modified to account for the stiff subsurface conditions (Seed et. al. 1997) provide

[1] The Alquist Priolo Earthquake Fault Zoning Act prohibits placing most structures for human occupancy across traces of active faults. Maps of these fault zones are issued by the Department of Conservation Division of Mines and Geology.

approximate estimates of median peak site accelerations. A summary of the principal active faults affecting the site, their closest distance, moment magnitude of characteristic earthquake and probable peak ground accelerations, which an earthquake on the fault could generate at the site are shown in Table B.

TABLE B
DETERMINISTIC PEAK GROUND ACCELERATION
College of Marin – IVC Main Building
Novato, California

Fault	Moment Magnitude for Characteristic Earthquake	Closest Estimated Distance (kilometers)	Median Peak Ground Acceleration (g)[1]
San Andreas	7.9	18	0.25
Rodgers Creek	7.1	11	0.29
Hayward	7.1	12	0.24
San Gregorio	7.2	34	0.13
Hunting Creek	7.1	53	0.08

(1) Average of four attenuation relationship for rock sites

Probabilistic Seismic Hazard Analysis – Probabilistic Seismic Hazard Analysis (PSHA) analyzes all possible earthquake scenarios while incorporating the probability of each individual event to occur. The probability is determined in the form of the recurrence interval, which is the average rate at which an earthquake of some size will be exceeded. Therefore, the design earthquake is not solely dependent on the fault with the closest distance to the site and/or the largest magnitude, but rather the probability of given seismic events of occurring.

The Division of State Architects (DSA) requires two probabilistic seismic hazard ground motions to be utilized for the project design. The first ground motion is the Upper-Bound Earthquake Ground-Motion (PGA_{UBE}) and is caused by an earthquake with 10% chance of exceedance in 100-years. The second ground motion defined by DSA is the Design-Basis Earthquake Ground-Motion (PGA_{DBE}) and is caused by an earthquake with a 10% chance of exceedance in 50-years. Because the PGA_{UBE} has a longer return period and larger earthquakes, larger ground motions can be expected. DSA requires the more conservative PGA_{UBE} to be utilized when determining the sites susceptibility to liquefaction and the PGA_{DBE} to be utilized for structure design.

Utilizing the FRISKSP program we recommend utilizing the PGA_{UBE} and PGA_{DBE} listed below in Table C. The ground motions given by the FRISKSP program were for rock sites. As with the DSHA, we modified the given rock motions to account for the soil conditions. Peak ground accelerations up to 0.5g on rock sites will typically amplify on soil sites, while rock motions greater than 0.5g will typically de-amplify.

TABLE C
PROBABILISTIC SEISMIC HAZARD ANALYSIS
College of Marin – IVC Main Building
Novato, California

	Chance of Exceedance	Statistical Return Period	Peak Ground Acceleration, Rock	Peak Ground Acceleration, Stiff Soil
PGA_{UBE}	10% in 100 years	949 years	0.50g	0.50g
PGA_{DBE}	10% in 50 years	475 years	0.41g	0.43g

Reference: FRISKSP, Seed et al, 1997
Project Coordinates: latitude 38.0759, longitude -122.5753

The potential for strong seismic shaking at the project site is high. Due to their close proximity, the San Andreas, Hayward, and Rogers Creek Faults present the highest potential for severe ground shaking. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Evaluation: *Less than significant with mitigation.*

Mitigation: *Mitigation for seismic shaking includes designing the structures in accordance with the most recent version of the California Building Code (CBC, 2001). Recommended seismic coefficients are provided in Section V of this report.*

D. Liquefaction Potential

Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena include liquefaction-induced settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular

deposits. The project site is mapped in a zone of moderate liquefaction susceptibility as shown on Figure 6. Loose to medium dense granular deposits were observed below the groundwater elevation. Therefore, the risk of liquefaction at the site is moderate to high.

To evaluate soil liquefaction, the seismic energy from an earthquake is compared with the ability of the soil to resist pore pressure generation. The earthquake energy is termed the cyclic stress ratio (CSR) and is a function of the maximum credible earthquake peak ground acceleration, PGA and depth. The soil resistance is based on the relative density, and the amount and plasticity of the fines (clayey and silty materials that pass the #200 sieve). The relative density of cohesionless soil is correlated with Standard Penetration Test (SPT) blow count data and corrected for, hammer efficiency, overburden and percent fines $(N_1)_{60,CS}$ measured during exploration.

Liquefaction analyses (Seed et: al., 2003) indicate that intermittent layers of the loose saturated granular sand layers of variable thickness will likely liquefy during a maximum credible seismic event. The results of our liquefaction analyses are presented on Figure 7.

The principal adverse affect of liquefaction occurring at the site is post liquefaction settlement. The magnitude of the settlement is dependant on the thickness of the liquefiable layer. Based on our analyses (Tokimatsu & Seed, 1984), post liquefaction settlement is estimated to vary from 1 to 4 inches across the site. Because the thicknesses and location of the liquefiable layers vary throughout the site, differential settlement may occur. Damage due to the sudden differential settlement may include structural building damage, severed utilities, cracked flatwork, and vertical separations.

Evaluation: *Less than significant with mitigation.*

Mitigation: *Liquefaction mitigation measures can include In-situ densification of soils or supporting the structure on deep foundations. Considering the site conditions, deep foundations appear to be the more practical mitigation measure. Foundation recommendations are provided in subsequent sections of this report. Additionally, flexible utility connections and emergency shutoffs should be utilized*

to minimize the threat of severed utility lines and the subsequent dangers (i.e. fire).

E. Seismic Induced Ground Settlement

Seismic ground shaking can induce settlement of unsaturated, loose, granular soils. Settlement occurs as the loose soil particles rearrange into a denser configuration when subjected to seismic ground shaking. Varying degrees of settlement can occur throughout such a deposit and could result in differential settlement of structures founded on such deposits. We did not encounter soils susceptible to significant seismically induced ground settlement during our exploration. Therefore, the risk of seismically induced settlement is low during an upper bound seismic event.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

F. Lateral Spreading, Lurching and Ground Cracking

Lurching and associated ground cracking can occur during strong ground shaking. The ground cracking generally occurs along the tops of slopes where stiff soils are underlain by soft deposits or along steep slopes or channel banks. Since these conditions do not exist near the project site, the potential for lurching and ground cracking hazards are considered to be low. Lateral spreading involves large blocks of earth sliding towards a free face on an inclined, continuous, liquefied soil layer. Liquefiable soil layers are present at the project site and potential for lateral spreading does exist. However, based on the subsurface exploration, the liquefiable layers occur at differing elevations and do not appear continuous. Thus the potential for damage from lateral spreading appears to be low.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

G. Settlement

New surface loads can cause consolidation of soft clays or compression of loose soils. The expected subsurface conditions are not prone to significant settlement. Therefore, the potential

for structural damage from significant settlement is low.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

H. Erosion

Sandy soils on moderate slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated surface water flow. The potential for erosion is increased when established vegetation is disturbed or removed. The project site is flat and paved, therefore the risk of significant erosion at the site is low.

Evaluation: *No significant impact.*
Mitigation: *The project Civil Engineer should design the site drainage to collect surface water into storm drain systems and discharge water at appropriate locations. Re-establishing vegetation on disturbed areas will minimize erosion. Erosion control measures during and after construction should conform to the most recent version of the Erosion and Sediment Control Field Manual (California Regional Water Quality Control Board, 2002).*

I. Seiche and Tsunami

Seiche and tsunamis are short duration, earthquake-generated water waves in large enclosed bodies of water and the open ocean, respectively. The extent and severity of a seiche would be dependent upon ground motions and fault offset from nearby active faults. The site is located over 1 mile west of San Pablo Bay and is at an elevation of approximately 40 feet above sea level. Therefore, the risk of seiche or tsunami at the site is remote.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

J. Flooding

The adverse impact from flooding is water damage to structures and furnishings. Although the site is located adjacent Pacheco Creek, and the Federal Emergency Management Agency (FEMA) flood maps indicate the site is not located within the 100 year or 500 year flood zone, as shown on Figure 8. Therefore the risk of large scale flooding is low.

Evaluation: *Less than significant with mitigation.*

Mitigation: *The surface grades need to be designed to account for surface drainage from surrounding areas. Site grading and drainage design is generally performed by the project Civil Engineer.*

K. Settlement/Subsidence

Significant settlement can occur when new loads are placed at sites that are located over soft compressible clays, such as bay mud. Soft compressible clays were not encountered in the subsurface exploration. The potential for significant settlement at the site is low.

Evaluation: *No significant impact.*

Mitigation: *No mitigation measures are required.*

L. Expansive Soil

Expansive soil occurs when clay particles interact with water causing volume changes in the clay soil. The clay soil may swell when saturated and shrink when dried. This phenomenon generally decreases in magnitude with increasing confinement pressure at depth. These volume changes may damage lightly loaded foundations, flatwork, and pavement. Expansive soil also causes soil creep on sloping ground. Expansive soils were not observed during our site inspection or in the subsurface exploration. The potential for expansive soil damage is low.

Evaluation: *No significant impact.*

Mitigation: *No mitigation measures are required.*

M. Slope Instability

Weak soils and bedrock on moderate to steep slopes can move downslope due to gravity. Slope instability is often initiated or accelerated from soil saturation and groundwater pressure. Slope movement can vary from slow, shallow soil creep to large, sudden debris flows. Landslides can cause significant damage to structures and improvements, and sudden landslides can result in loss of life. The topography of the site is relatively flat. Therefore, the potential for landsliding at the project site is very low.

Evaluation: *No significant impact.*

Mitigation: *No mitigation measures are required.*

N. Soil Corrosion

Corrosive soil can damage buried metallic structures, cause concrete spalling and deteriorate rebar reinforcement. Laboratory testing was performed on representative samples of the near-surface site soils to evaluate pH, electrical resistivity, chloride and sulfate contents. These laboratory test results are presented on Figure A-18.

The results of our corrosivity testing indicate the upper soil layer has a resistivity of approximately 13,000 ohm-cm, a pH of about 5.65, soluble sulfate content about 13 parts per million (ppm), and a chloride content about 10 ppm. Per Caltrans (2003) criteria, a project site would be classified as corrosive if the soils have more than 500 ppm of chlorides, more than 2000 ppm sulfates, or a pH less than 5.5. Based on the test results the project site would classify as non-corrosive.

Evaluation: *No significant impact.*

Mitigation: *No mitigation measures are required.*

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Based on the results of our site investigation and evaluation, we conclude that from a geotechnical standpoint the site conditions are suitable for the planned development. The primary geotechnical concerns for design and construction are strong seismic ground shaking at the site, liquefaction seismically induced settlement, and supporting relatively large foundation loads. The planned structure should be constructed on deep foundations to reduce the effects of liquefaction and settlement. Specific recommendations addressing design and construction issues are presented in the subsequent sections of this report.

B. Seismic Design

The site will experience strong ground shaking similar to other areas of the seismically active San Francisco Bay Region. Mitigation of strong ground shaking may include structural design in conformance with the provisions of the most recent version (2001) of the California Building Code (CBC) or site specific accelerations presented in the following sections.

California Building Code

Based on the interpreted subsurface conditions and closest fault type and distance, we recommend the seismic coefficients and site values shown in Table D to calculate the design base shear of the new construction.

TABLE D
SEISMIC DESIGN FACTORS
College of Marin – IVC Main Building
Novato, California

Factor Name	Coefficient	CBC Table[1]	Site Specific Value
Seismic Zone Factor	Z	16A-I	0.40
Soil Profile Type	$S_{A,B,C,D,E, or F}$	16A-J	S_D
Near Source Factor[2]	N_a	16A-S	1.00
Near Source Factor	N_v	16A-T	1.14
Seismic Coefficient[2]	C_a	16A-Q	0.44
Seismic Coefficient	C_v	16A-R	0.73
Seismic Source Type[3]	A, B or C	16A-U	A

(1) Soil Profile Type S_D Description: Stiff Soil Profile, Shear Wave Velocity between 1200 ands 600 feet per second, Standard Penetration Test N values between 50 and 15, and Undrained Shear Strength between 2,000 and 1,000 psf.
(2) The project Structural Engineer should determine if the Near Source Factor (Na) and Seismic Coefficient (Ca) may be reduced based on building type and structure irregularities (CBC 1629A.4.2 and 1630A.2.3.2)
(3) Seismic Source Type A: Faults that are capable of producing large magnitude events and have a high rate of seismic activity.

The coefficients presented on Table D are for stiff soil sites (S_D). The structural engineer should utilize these values if the liquefiable soils have been mitigated or deep foundations are utilized to support the structure. If the threat of liquefaction is not mitigated then the site should be classified as a site requiring site-specific evaluation (S_F) and will require further analysis.

Site Specific Response Spectrum

A site specific response spectrum was produced utilizing SHAKE 2000 (Schnabel, Lysmer, and Seed 1972). SHAKE analyzes vertical propagating shear waves as they travel through varying horizontal soil layers. Subsurface conditions and data from our exploration were utilized to develop an idealized soil profile. Details of the site specific seismic evaluation are presented in Appendix B. The result of our SHAKE analyses and recommended acceleration response spectrum is shown on Figure 9.

C. Site Grading

Based on the current project conditions, only minor site grading is anticipated. Site preparation and grading should conform to the following recommendations and criteria:

1. Surface Preparation – Clear all grass, brush, roots, over-sized debris and organic material from areas that will be within the new project work area. Excavate loose soil to expose firm natural soils. Any landscaping vegetation within the building areas should be scraped from the surface, stockpiled for reuse in landscaping or removed from the site. Any construction debris or abandoned utilities encountered during site grading should be removed from the site. Utilities could also be abandoned in place in many cases provided cement grout completely fills any void in the utility. Rocks or concrete pieces larger than 6 inches encountered during subgrade preparation or site grading should be removed from the site.

2. Materials – Clean non-expansive soil and rock mixtures generated from on-site excavations may be suitable for use as fill provided the material is well mixed, maximum particle sizes are less than 6 inches, and have a maximum PI of 20. Materials used for retaining wall backfills should also be smaller than 4 inches. Processing will include removal and/or crushing of rock, mixing and moisture conditioning as described below.

If imported fill is required, the material shall consist of soil and rock mixtures that: (1) are free of organic material, (2) have a Liquid Limit less than 40 and a Plasticity Index of less than 20, and (3) have a maximum particle size of 4 inches. Any imported fill material needs to be tested to determine its suitability for use as fill material.

3. Compacted Fill – Where fills or structures are planned, the subgrade surface should be scarified to a depth of 8 inches, moisture conditioned to near optimum moisture content and compacted to a minimum of 90 percent relative compaction. Relative compaction refers to the ratio in percent of the in-situ dry density to the maximum laboratory density. The maximum laboratory dry density and optimum moisture content of fill materials should be determined in accordance with ASTM Test Method D-1557, "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb. Rammer and 18-in. Drop." New fill or backfill should be conditioned to a moisture content within 3 percent of the optimum moisture content. Properly

moisture conditioned and cured on-site materials should subsequently be placed in loose horizontal lifts of 8 inches thick or less, and uniformly compacted to at least 90 percent relative compaction. In areas where new asphalt pavement will be installed, the upper 8 inches should be further compacted to 95 percent relative compaction to provide a firm and unyielding surface.

D. Foundation Design

Due to the presence of liquefiable sands layers underlying the site, we recommend supporting the proposed structure on deep foundations. The foundations should extend through the loose alluvial soils into the underlying weathered sandstone and shale bedrock. Based on our experience with similar projects, we recommend one of the following deep foundation systems to support the structure:

Drilled Piers – Piers may be drilled through the loose saturated alluvial soils and "socketed" into the underlying weathered sandstone bedrock. However, due to the presence of loose and saturated sands, the drilled piers may need to be either cased or excavated utilizing drilling mud to prevent hole collapse. Design criteria for drilled piers is presented below in Table E.

TABLE E
DRILLED PIER FOUNDATION DESIGN CRITERIA
College of Marin – IVC Main Building
Novato, California

Minimum diameter:		18 inches
Minimum penetration into weathered bedrock:		5 feet
	Static[1]	Seismic[1]
Skin Friction (dead plus live loads)[2,3,4]:		
Upper 10 feet	750 psf	1500 psf
10 to 25 feet (liquefiable sand layers)	750 psf	300 psf
Weathered Rock	2000 psf	4000 psf
End Bearing	0 psf	10,000 psf
Lateral passive resistance [4,5,6]:		
Upper 10 feet	300 pcf	500 pcf
10 to 25 feet (liquefiable sand layers)	300 pcf	100 pcf
Weathered Rock[6]	600 pcf	1000 pcf

Notes:
(1) Static criteria are long term design loads not including seismic loading. Seismic criteria are for short term seismic loading.
(2) Uniform pressure distribution.
(3) Uplift resistance is equal to 80% the downward skin friction.
(4) Neglect the upper 1 foot
(5) Apply values over effective width of two pier diameters.
(6) Equivalent fluid pressure. Maximum passive not to exceed 10 times the design criteria. Include overburden for starting pressure.

The lateral capacity with deflection and induced moment with depth of the proposed drilled piers were also analyzed. To analyze the deflection and moments we utilized LPILE Plus 4.0, a lateral pile capacity program developed by Ensoft. The analyses were performed for both free-head conditions (piers with flexible connection into the pile cap) and fixed head conditions (piers with significant embedment and structural connection into the pile cap). The piers were analyzed with lateral loads of 50 and 100 kips for 24" and 30" piers with 30' depths. We also analyzed piers with both shear and moment from a 5, 10 and 15 kip load applied 30 feet above the pier. The results of our lateral pile analyses are presented on in Appendix C.

Auger Cast Piles – Auger cast piles are piers constructed by drilling a hollow shaft auger into the ground to the specified depth. As the augers are slowly withdrawn from the soil, high strength cement grout is pumped under pressure through the hollow shaft displacing the loose soil cuttings. A steel rebar cage can be placed through the cement grout while it is still fluid to add additional support. The auger cast piles should extend through the loose colluvial soils and into the underlying weathered sandstone.

Driven Piles/Mini Piles – Driven piles or mini-piles may be utilized to support the proposed structure. As with drilled piers, the piles/mini-piles should be driven through the loose saturated alluvial soils to bear on the weathered sandstone bedrock. The loose alluvial deposits may densify during the pile driving process, therefore reducing the probability of liquefaction. Based on our experience with similar projects, full size driven piles may not be cost effective for a project of this size. However, smaller diameter (4 to 6 inch) steel mini-piles may be practical. The piles are installed with pneumatic hammers and driven to the required depth to achieve the design capacity. Mini-piles may be pressure grouted to increase the vertical capacities. These specialized piles require additional equipment and analyses to determine the capacities. We can provide vertical and lateral pile capacities for a given pile type if requested.

As mentioned above, footings/pile caps or grade beams may be utilized to provide additional lateral resistance. Pile cap design criteria is provided below on Table H.

TABLE H
PILE CAP DESIGN CRITERIA
College of Marin – IVC Main Building
Novato, California

Minimum width:	15 inches
Minimum embedment depth (below lowest adjacent grade):	18 inches
Base friction coefficient:	0.35
Lateral Passive Resistance[1,2,3]:	300 pcf

(1) Equivalent Fluid Pressure, not to exceed 3000 psf.
(2) Ignore uppermost 6-inches around the building perimeter unless concrete or asphalt surfacing exists adjacent to foundation.
(3) May increase design values by 1/3 for total design loads including seismic.

Helical Anchors – Helical anchors may be utilized to support the proposed structure. Helical anchors utilize 1 to 4 circular bearing plates varying in diameter from 8 to 14-inches, vertically spaced approximately 2 feet on center on a 1-1/2 to 2-1/4 inch steel rods. The anchors are "screwed" into the ground to the desired depth, adding extension rods as needed to achieve the desired depth. The helical anchors should be installed through the underlying loose saturated alluvial soils and bear on the weathered sandstone bedrock. Depending on the number and size of the helices on each anchor, vertical design capacities up to 20 to 30 kips per anchor can be reasonably achieved. Variations in capacities can be determined for different configurations, if required. The capacities of helical anchors are confirmed in the field during installation. Helical anchors should be structurally connected to footings/pile caps or grade beams that provide lateral capacity. We should provide additional recommendations and specifications for helical anchors if they are utilized in the design.

Rammed Aggregate Piers – Rammed aggregate piers, such as Geopiers, may be utilized to support the proposed structure. The rammed aggregate piers are heavily compacted crushed rock that is compacted within a drilled hole. Relatively thin lifts of crushed rock are placed and compacted to backfill the excavation, forming a rammed aggregate pier with a high bearing capacity (i.e. 5,000 psf) at the ground surface. The rammed aggregate piers should extend through the loose alluvial soils and bear on the weathered sandstone bedrock. The rammed aggregate piers will also compact the surrounding soils and may act as a conduit to relieve excess pore water pressure generated during a seismic event, therefore reducing risk of liquefaction.

E. Concrete Slabs-on-Grade

Concrete slab-on-grade floors should be designed to be structurally connected to and span between foundation supports and grade beams. Interior reinforced concrete slab-on-grade floors should be at least 5 inches thick and reinforced with steel reinforcing bars (not wire mesh). Unless otherwise recommended by the Structural Engineer, we recommend crack control joints in both directions and that the reinforcing bars extend through the control joints. The Structural Engineer should design the concrete slab floors. Some notes for the structural design of concrete slabs are presented in Appendix D.

To improve interior moisture conditions, a 4-inch layer of clean, free draining, 3/4-inch angular gravel or crushed base rock should be placed beneath the interior concrete slabs to form a capillary moisture break. The base rock must be placed on a properly moisture conditioned and compacted subgrade that has been approved by the Geotechnical Engineer. A plastic membrane vapor barrier, 10 mils or thicker, should be placed over the compacted base rock. The vapor barrier shall meet the ASTM E 1745 Class A requirements and be installed per ASTM 1643. Eliminating the capillary moisture break and/or plastic vapor barrier may result in excess moisture intrusion through the floor slabs resulting in poor performance of floor coverings, mold growth, or other adverse conditions. A 2-inch layer of dry sand should be placed over the vapor barrier to prevent puncture of the plastic membrane and aid in slab curing.

Exterior reinforced concrete slabs-on-grade can be placed directly on a properly prepared subgrade as described in Section V.C. To improve slab performance, we recommend thickening exterior slabs to 5 inches and reinforcing with steel bars. Exterior slabs may be underlain with 4 inches or more of Caltrans Class 2 Aggregate Base compacted to at least 92 percent relative compaction. Additional notes for concrete slabs-on-grade are included in Appendix C. Some movement should be expected for exterior concrete slabs as the underlying soils react to seasonal moisture changes.

F. Site and Foundation Drainage

The site is relatively flat and there is a possibility that new grading or buildings could result in adverse drainage patterns and water ponding around buildings. Careful consideration should therefore be given to design of finished grades at the site. We recommend that the building areas be raised slightly and that the adjoining landscaped areas be sloped downward at least 0.25 feet for 5 feet (5 percent) from the buildings. Where hard surfaces, such as concrete or asphalt adjoin foundations, slope these surfaces at least 0.10 feet in the first 5 feet (2 percent).

Site drainage should be discharged away from the building area and outlets should be designed to reduce erosion of the soils immediately down slope. Site drainage improvements should be connected into the existing City storm drainage system if possible.

G. Utility Trench Backfills

Excavations for utilities will be in loose to medium stiff alluvial soil. Bedrock is not likely to be encountered. Trench excavations having a depth of 5 feet or more must be excavated and shored in accordance with OSHA regulations. Pursuant to OSHA classifications, on-site clay and sandy soils may be considered as Type C. Bedding materials for utility pipes should be well graded sand with 90 to 100 percent of particles passing the No. 4 sieve and no more than 5 percent finer than the No. 200 sieve. Provide the minimum bedding beneath the pipe in accordance with the manufacturer's recommendation, typically 3 to 6 inches. Trench backfill may consist of on-site soils, moisture conditioned, and placed in thin lifts and compacted to at least 90 percent relative compaction. The upper 12 inches of backfill for trenches within areas of asphalt paving should consist of properly moisture conditioned Caltrans Class 2 Aggregate Base compacted to at least 95 percent relative compaction. Use equipment and methods that are suitable for work in confined areas without damaging utility conduits.

H. Pavement Design

Subgrade preparation for asphalt-paved areas should follow the recommendations in the site preparation and grading (Section V.C.) of this report. Additionally, the subgrade should be smooth and unyielding under a moving, fully-loaded water truck. The subgrade should also be maintained at a near optimum moisture content prior to placement of aggregate baserock. Areas of soft or saturated soils encountered during construction should be excavated and replaced with properly moisture conditioned fill or aggregate base. During construction, the subgrade material must be examined and tested, if need be, to confirm that the R-value exceeds the assumed preliminary design value.

We have calculated the pavement section for the asphalt entrance driveway in accordance with Caltrans procedures for flexible pavement design (1990). We have estimated R-value of 10 for the preliminary pavement design and a range of Traffic Indices (T.I.). The recommended pavement section is presented on Table F below.

TABLE F
RECOMMENDED PAVEMENT SECTION
College of Marin – IVC Main Building
Novato, California

T.I.	Asphalt Concrete [1,2]	Aggregate Base
3.0	2.0 inches	6.0 inches
4.0	3.0 inches	7.0 inches
5.0	3.0 inches	10.0 inches

(1) The asphalt concrete should conform to the criteria for asphalt presented in Section 39 of the Caltrans Standard Specifications. The asphalt concrete shall be placed in layers not exceeding 2.5 inches in thickness and compacted to at least 95 percent relative compaction.

(2) To reduce the asphalt pavement section the "general rule of thumb" of 1 inch of asphalt equals 2 inches of aggregate base applies.

The aggregate base material should conform to Class 2 Aggregate Base in the current edition of Caltrans Standard Specifications. The aggregate base should be moisture conditioned to near optimum moisture content and compacted in layers not exceeding 6 inches to at least 95 percent relative compaction.

If desired, rigid (concrete) pavements subjected to vehicle loads should be designed in accordance with Portland Cement Concrete Pavement (PCCP) Structural Thickness Guidelines designated in the Caltrans Highway Design Manual. Subgrade preparation should follow the same recommendations as for flexible pavements.

VI. SUPPLEMENTAL GEOTECHNICAL SERVICES

We must review the plans and specifications for the project when they are nearing completion to confirm that the intent of our geotechnical recommendations has been incorporated and provide supplemental recommendations, if needed.

During construction, we need to observe and/or test site preparation and surface drainage. We also need to observe foundation excavations for the structures and associated improvements to confirm that the soils encountered during construction are consistent with the design criteria.

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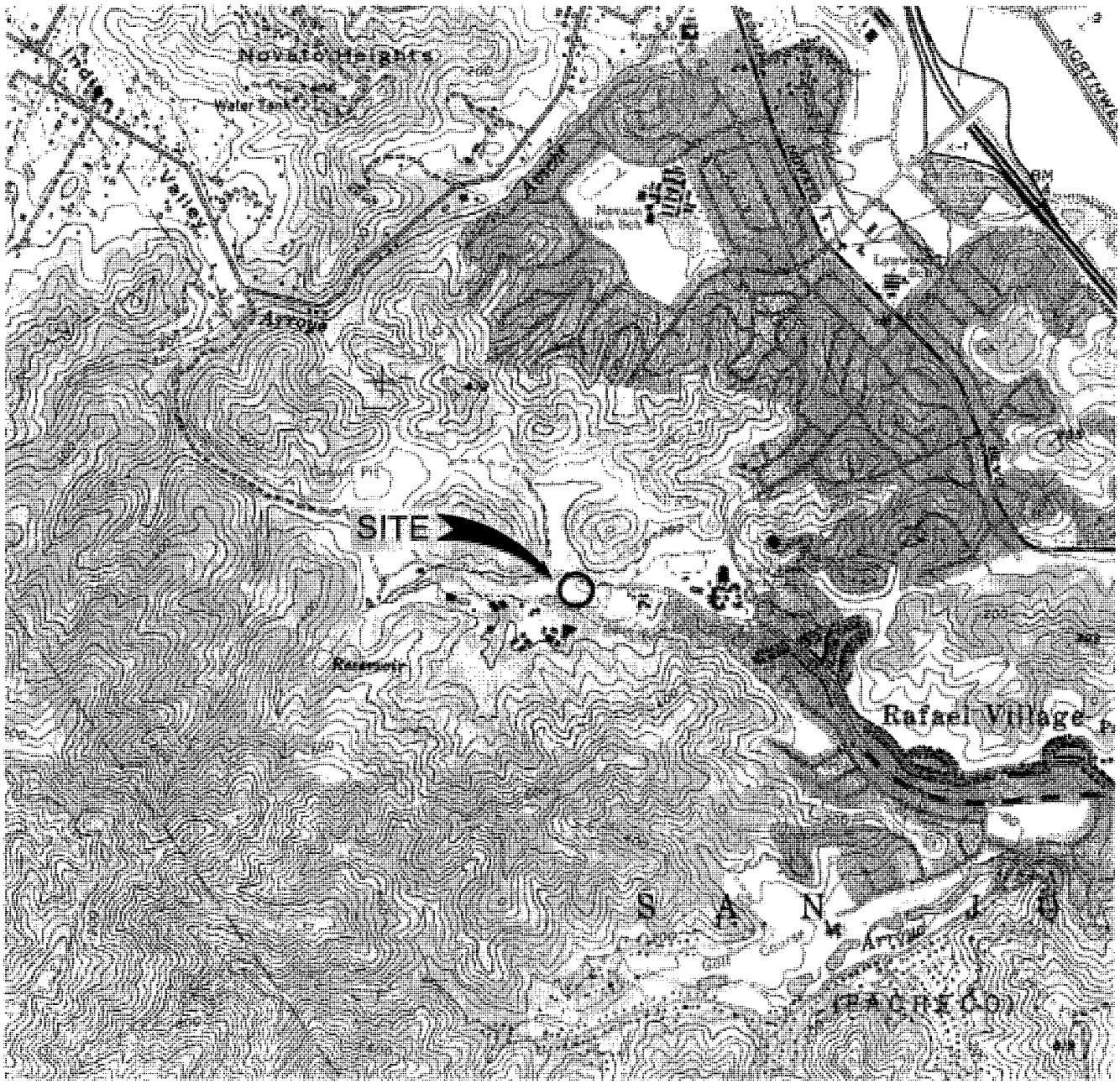

SCALE

0 1000 2000 4000 FEET

0 500 1000 METERS

SITE LOCATION

PROJECT SITE COORDINATES:
LATITUDE, 38.0759°
LONGITUDE, -122.5753°

NORTH

REFERENCE: DeLorme 3D TopoQuads, 1999; Based on USGS 7.5 Minute Novato Quadrangle

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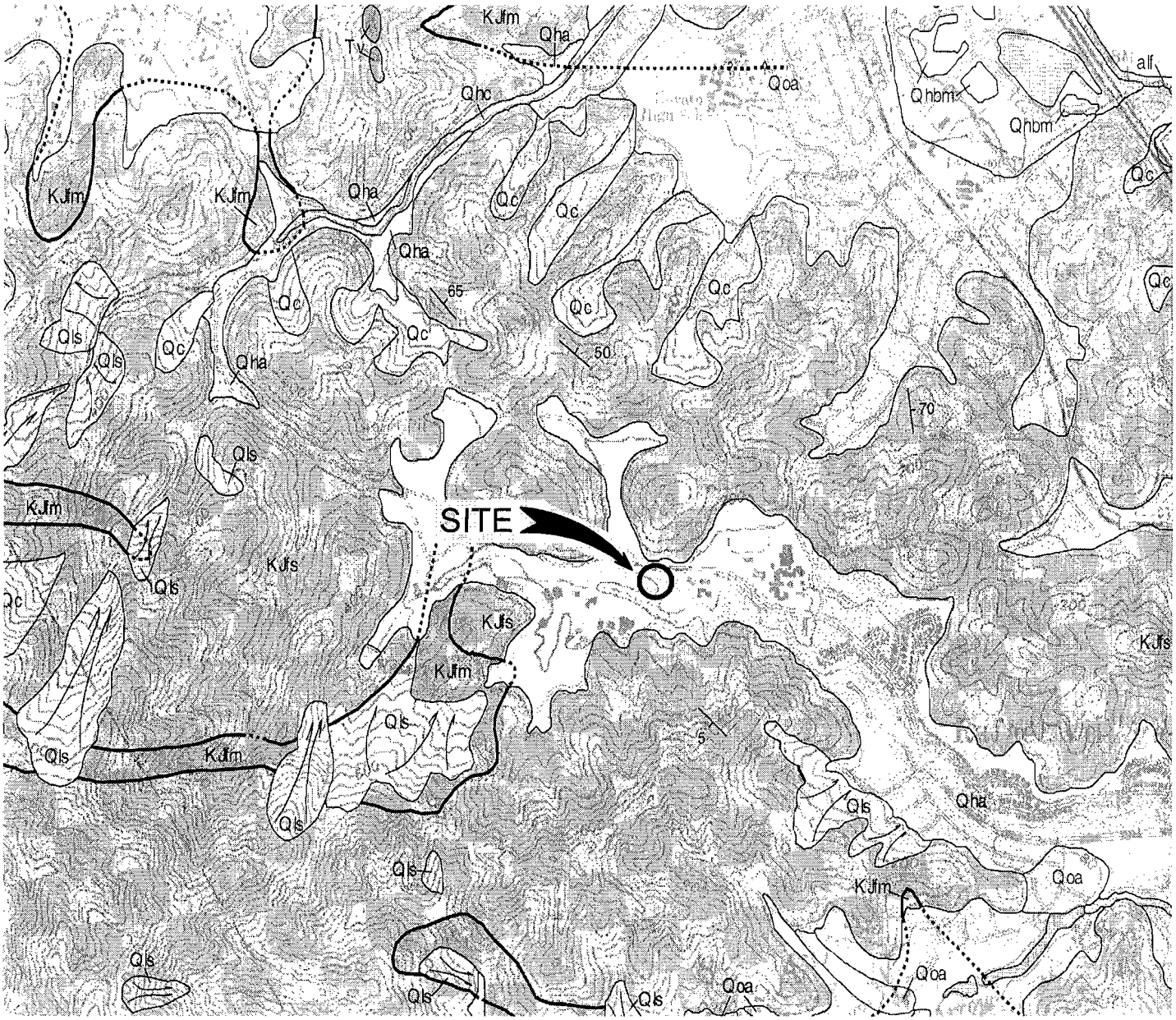
SITE LOCATION MAP
CSW/ST2 - COM IVC Main Building
Novato, California

1

Project No. 739.09 Date 6/6/07 Approved By: GMS

Figure



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Explanation

Qha: Holocene alluvium - poorly to moderately sorted gravel, sand and silt
Qls: Landslide - including debris flow and block slump landslides
KJfs: Franciscan Complex sandstone and shale - thick bedded, arkosic sandstone and interbedded shale
KJfm: Franciscan Complex melange - tectonic mixture of masses of resistant rock types embedded in a sheared, shaley matrix

SCALE

0 1000 2000 4000 FEET

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GEOLOGIC MAP
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Novato, California

2

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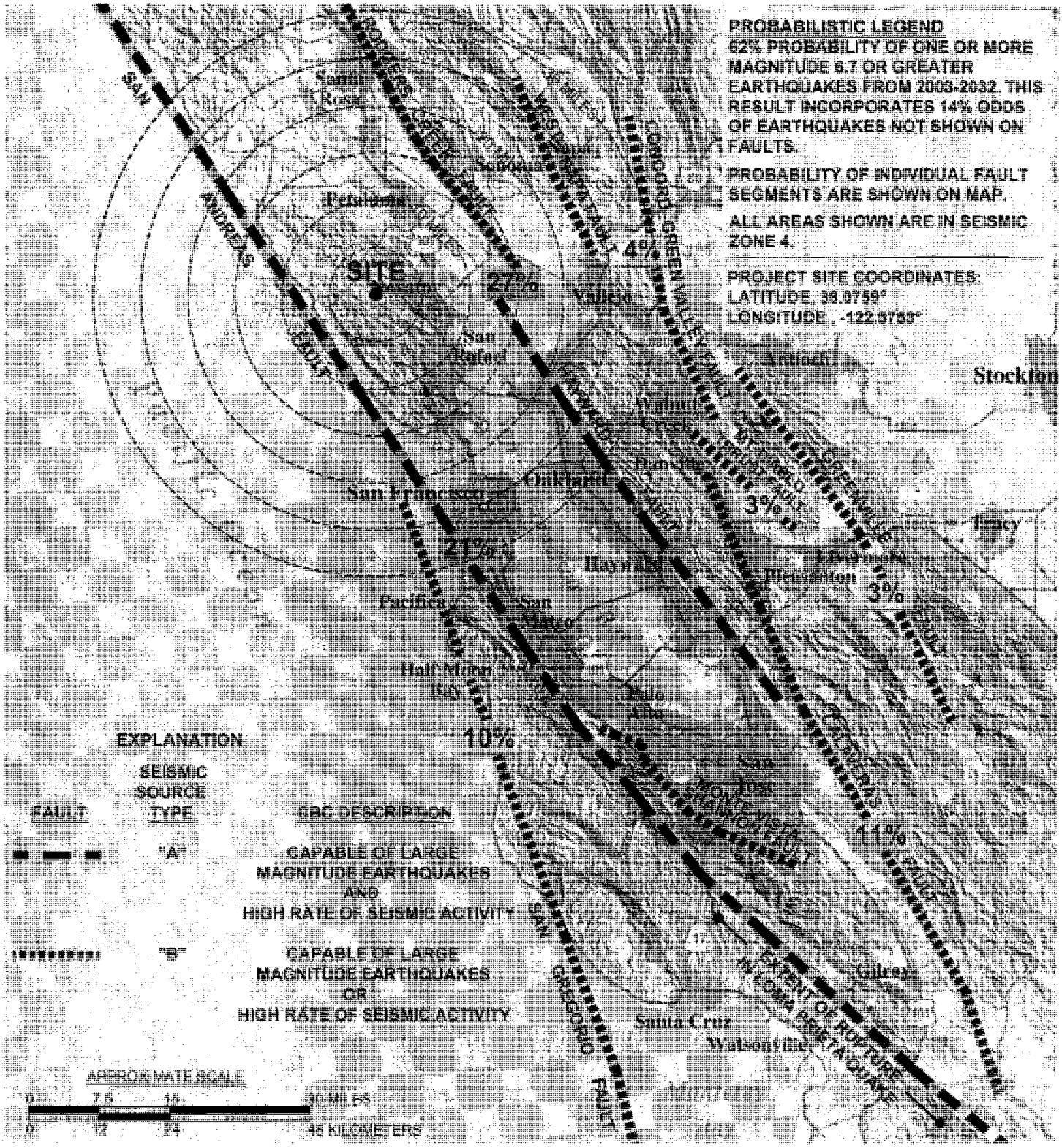
Figure



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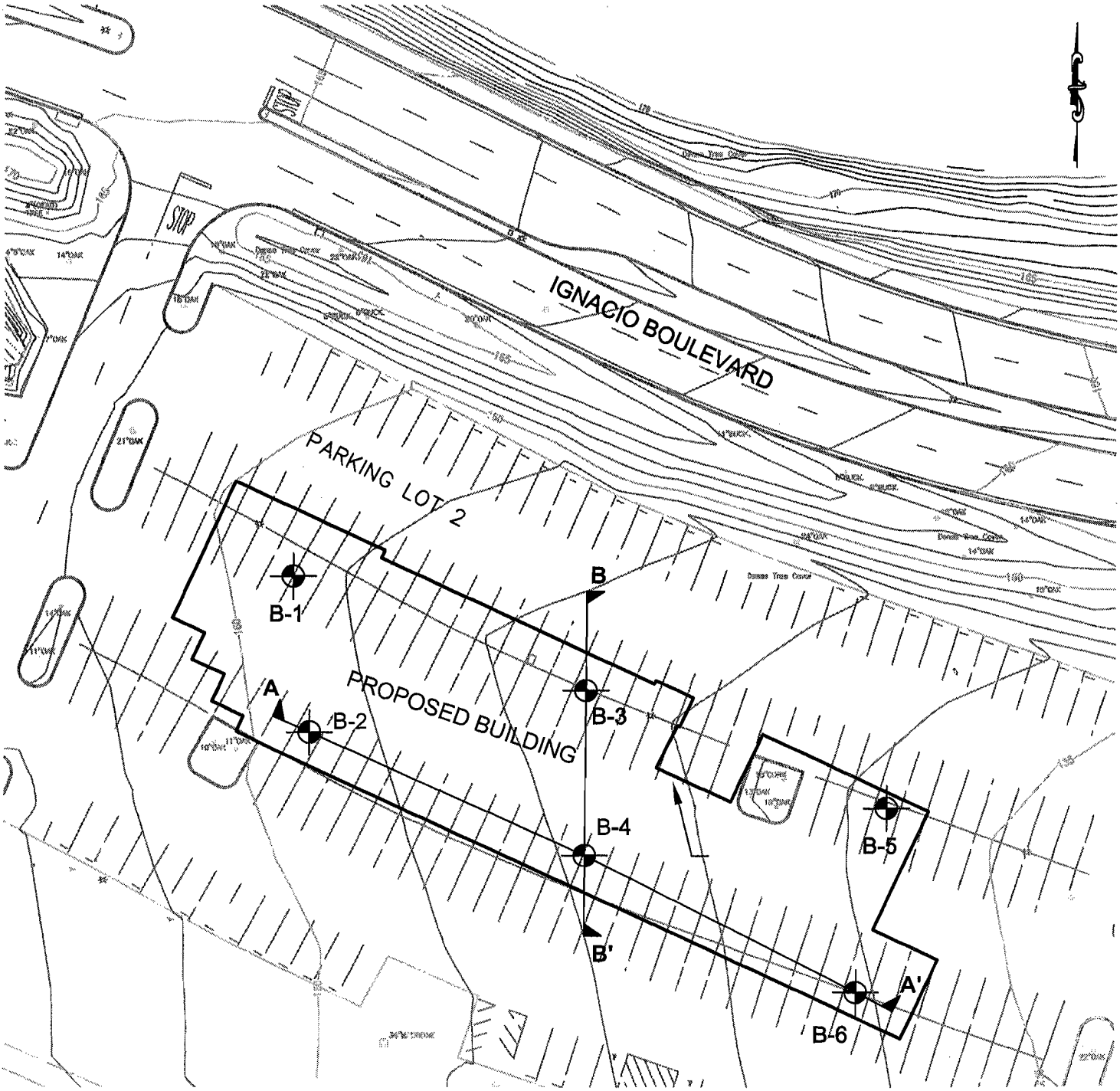
ACTIVE FAULT MAP
CSW/ST2 - COM IVC MAIN BUILDING
Novato, California

3

Project No. 739.09 | Date 6/6/07 | Approved By: | Figure



REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

SCALE

0 25 50 100 FEET

APPROXIMATE BORING LOCATION BY MPEG, 2007

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SITE PLAN
CSW/ST2 - COM IVC MAIN BUILDING
Novato, California

4

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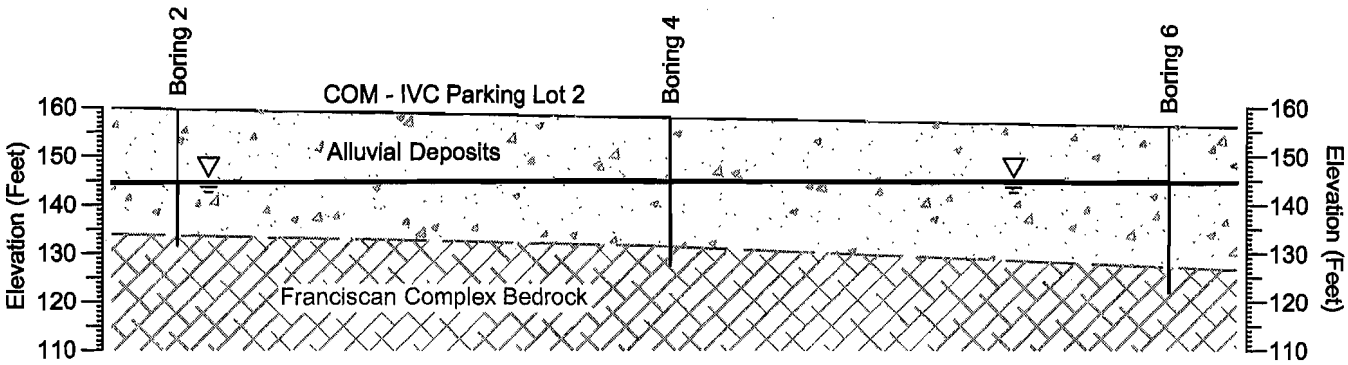
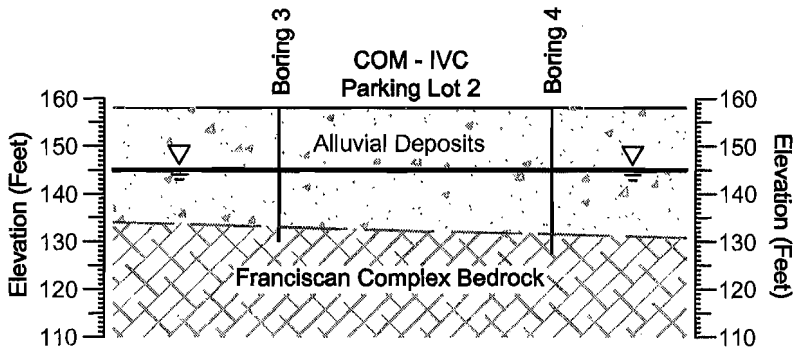
Figure



SECTION A-A'



SECTION B-B'

Explanation

- Alluvial deposits consisting of interbedded medium stiff to stiff, clay with sand and loose to medium dense clayey sand, occasional gravel
- Franciscan Complex shale with sandstone interbeds, sandstone, and shale melange
- Groundwater elevation

SCALE

0 20 40 80 FEET

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GEOLOGIC CROSS SECTION
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Novato, California

5

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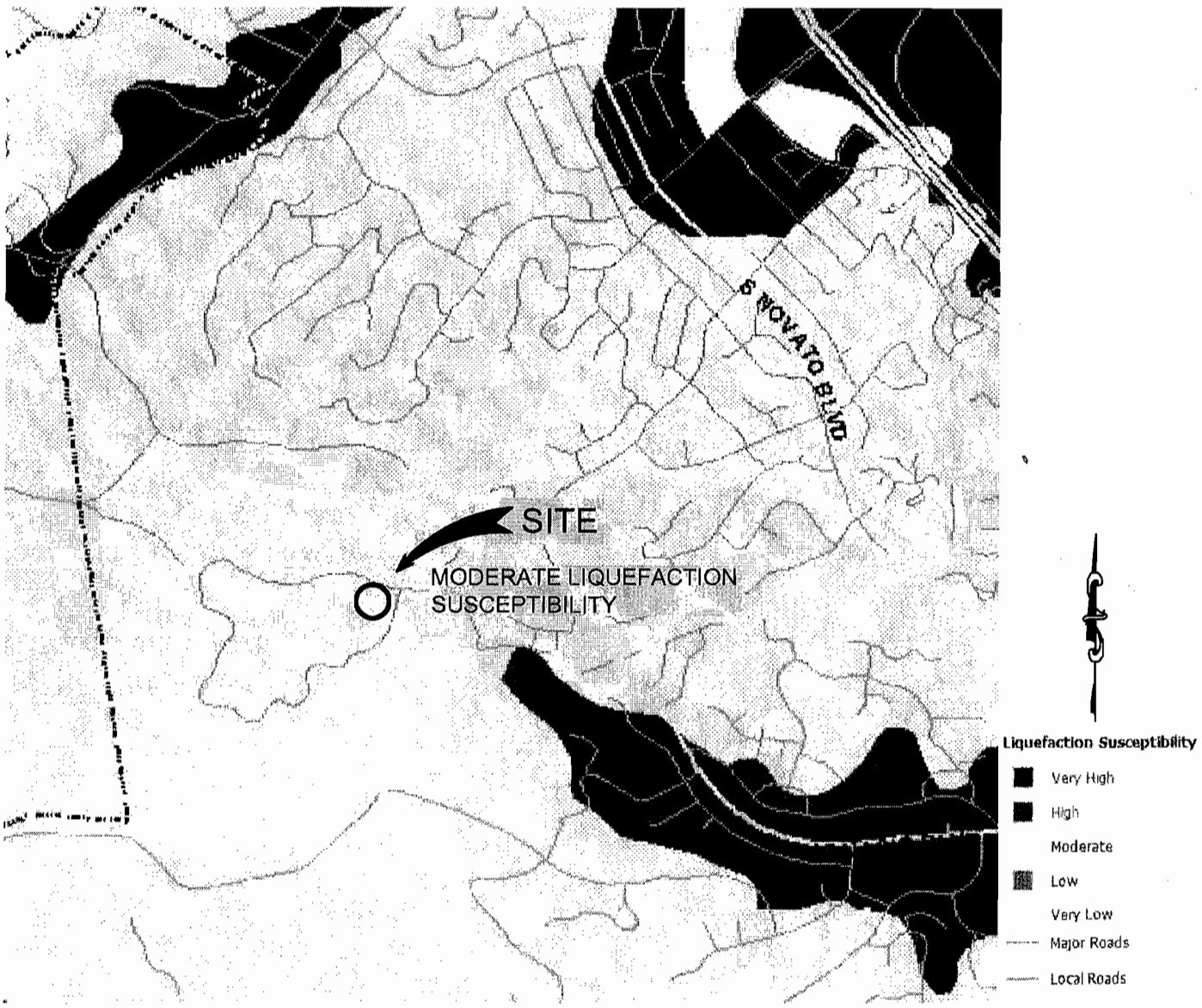

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LIQUEFACTION POTENTIAL MAP
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6

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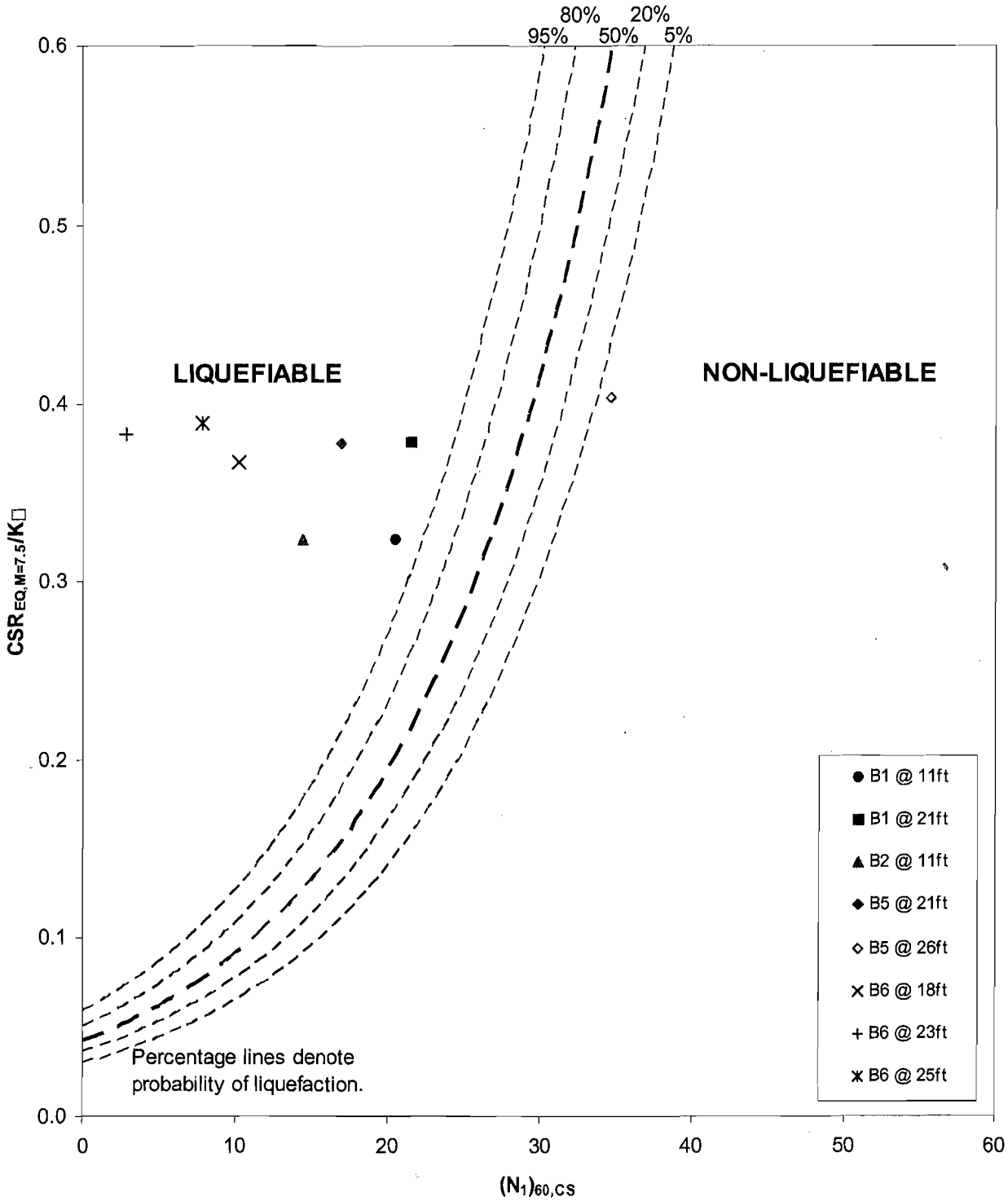
Probabilistic SPT-Based Liquefaction Triggering Analysis



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LIQUEFACTION ANALYSES
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7

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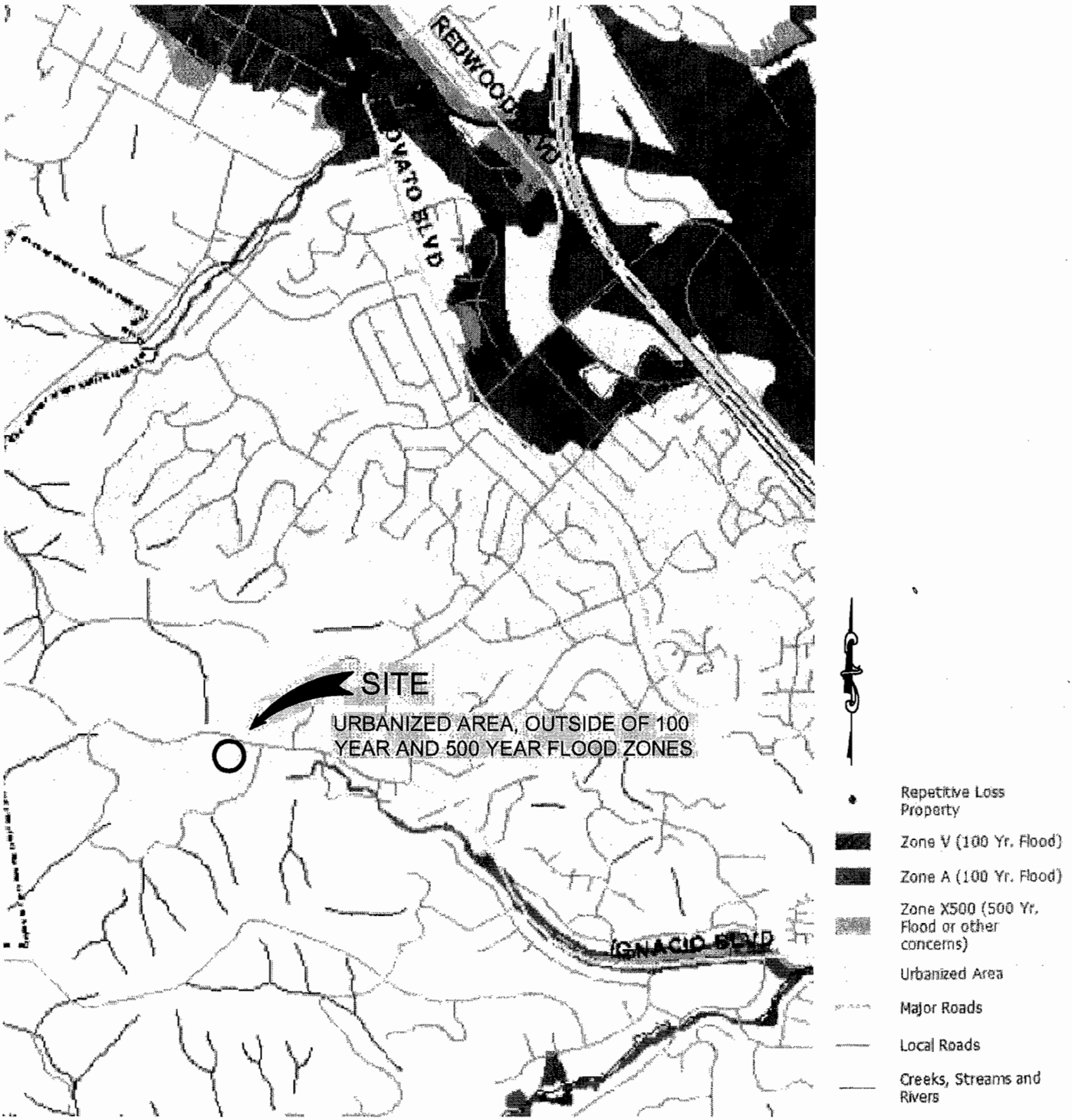
Figure



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FLOOD MAP
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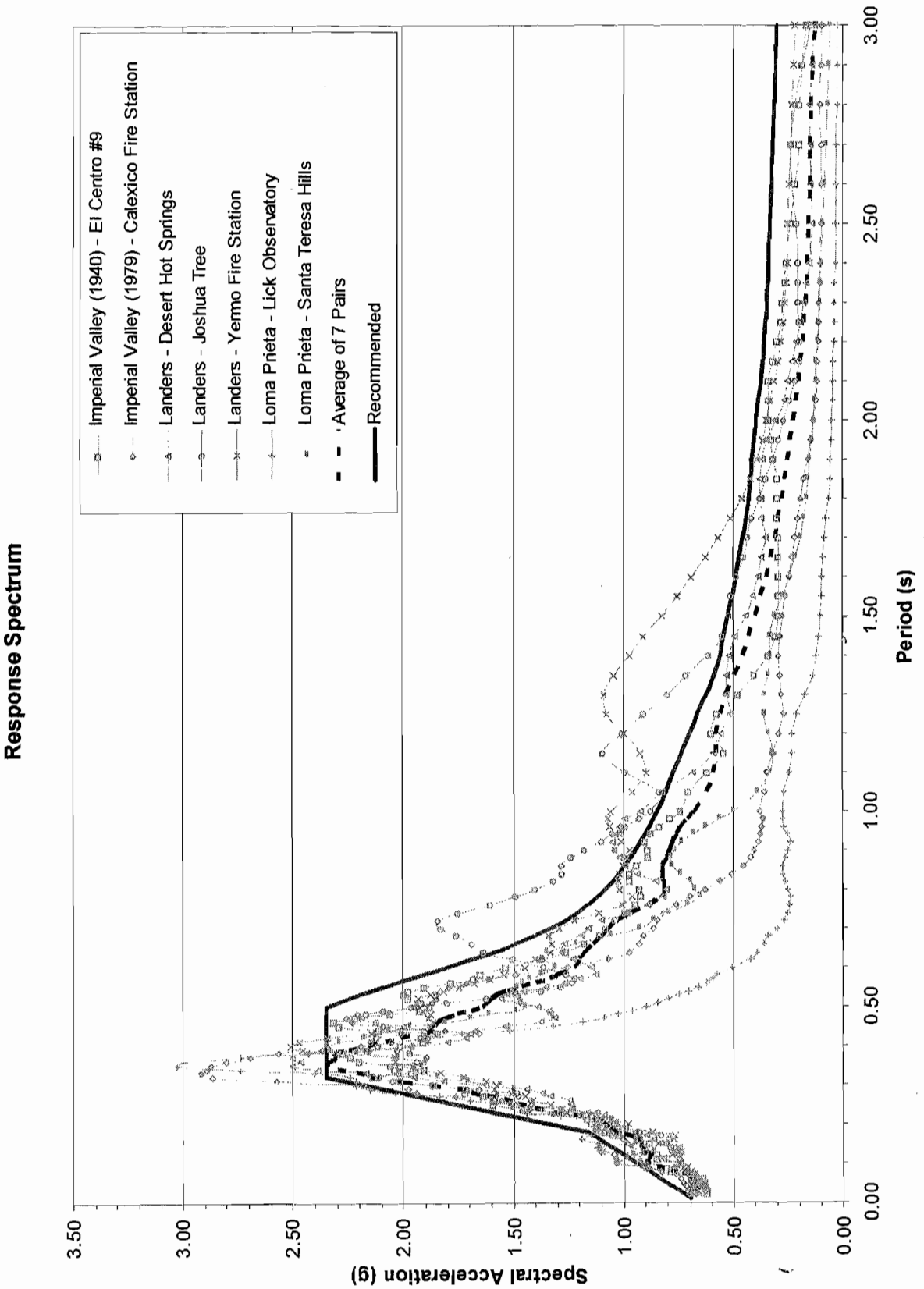

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RESPONSE SPECTRUM
COM - IVC Main Building
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Figure

APPENDIX A
SUBSURFACE EXPLORATION AND LABORATORY TESTING

1.0 Subsurface Exploration – Auger Borings

We explored subsurface conditions at the site by drilling 6 test borings on May 25, 2007 utilizing a truck mounted drilling rig and 6-inch solid flight augers. The boring locations are shown on Figure 4. Test borings were drilled to depths between 27 and 34 feet below the ground surface.

We obtained "undisturbed" samples using a 3-inch (75-mm) diameter, split-barrel California sampler with 2.5 by 6-inch brass tube liners. The 2-inch Standard Penetration Test (SPT) split-barrel sampler was interrnittently used to aid in soil property indexing, identification, and liquefaction analysis. The samplers were driven with a 140-pound (63.5-kg) hammer falling 30 inches (760 mm). The number of blows required to drive the samplers 18 inches (460 mm) was recorded and is reported on the boring logs as blows per foot for the last 12 inches (305 mm) of driving. The samples obtained were examined in the field, sealed to prevent moisture loss, and transported to our laboratory.

The soils encountered were logged and identified in general accordance with ASTM Standard D 2487, "Field Identification and Description of Soils (Visual-Manual Procedure)." This standard is briefly explained on Figure A-1, Soil Classification Chart and Figure A-2, Rock Classification Chart. The exploratory boring logs are presented on Figures A-3 to A-14.

2.0 Laboratory Testing

We conducted laboratory tests on selected intact and bulk samples to verify field identifications and to evaluate engineering properties. The following laboratory tests were conducted in general accordance with the ASTM standard test method cited:

- Laboratory Determination of Water (Moisture Content) of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D 2216;
- Density of Soil in Place by the Drive-Cylinder Method, ASTM D 2937;
- Unconfined Compressive Strength of Cohesive Soil, ASTM D 2166;
- Amount of Material in Soils Finer Than the No. 200 (75 µm) Sieve, ASTM D 1140;
- Particle Size Analysis of Soils, ASTM D 422;
- pH in soil, EPA 9040;
- Resistivity in Soil, SM 2510; and
- Anions in soil (sulfate and chloride), EPA 300.

The moisture content, dry density, finer than #200 sieve, and unconfined compression test results are shown on the exploratory boring logs, Figures A-3 through A-14 and the result of the particle size analysis and corrosion results are summarized on Figures A-15 through A-18.

The exploratory boring logs, description of soils encountered and the laboratory test data reflect conditions only at the location of the boring at the time they were excavated or retrieved. Conditions may differ at other locations and may change with the passage of time due to a variety of causes including natural weathering, climate and changes in surface and subsurface drainage.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS		SYMBOL	DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW	Well-graded sands or gravely sands, little or no fines
		SP	Poorly-graded sands or gravely sands, little or no fines
	SAND with fines	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT	Peat, muck, and other highly organic soils
ROCK			Undifferentiated as to type or composition

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

AL	ATTERBERG LIMITS TEST
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress

SAMPLER TYPE

UNDISTURBED CORE SAMPLE: MODIFIED CALIFORNIA OR HYDRAULIC PISTON SAMPLE

STANDARD PENETRATION TEST SAMPLE

X DISTURBED OR BULK SAMPLE

ROCK OR CORE SAMPLE

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the location and time of exploration. Subsurface rock, soil and water conditions may differ in locations and with the passage of time. Lines defining interface between differing soil or rock description are approximate and may indicate a gradual transition.

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SOIL CLASSIFICATION CHART
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FRACTURING AND BEDDING

Fracture Classification	Spacing	Bedding Classification
Crushed	less than 3/4 inch	Laminated
Intensely fractured	3/4 to 2-1/2 inches	Very thinly bedded
Closely fractured	2-1/2 to 8 inches	Thinly bedded
Moderately fractured	8 to 24 inches	Medium bedded
Widely fractured	2 to 6 feet	Thickly bedded
Very widely fractured	greater than 6 feet	Very thickly bedded

HARDNESS

Low	Carved or gouged with a knife
Moderate	Easily scratched with a knife, friable
Hard	Difficult to scratch, knife scratch leaves dust trace
Very hard	Rock scratches metal

STRENGTH

Friable	Crumbles by rubbing with fingers
Weak	Crumbles under light hammer blows
Moderate	Indentations <1/8 inch with moderate blow with pick end of rock hammer
Strong	Withstands few heavy hammer blows, yields large fragments
Very strong	Withstands many heavy hammer blows, yields dust, small fragments

WEATHERING

Complete	Minerals decomposed to soil, but fabric and structure preserved
High	Rock decomposition, thorough discoloration, all fractures are extensively coated with clay, oxides or carbonates
Moderate	Fracture surfaces coated with weathering minerals, moderate or localized discoloration
Slight	A few stained fractures, slight discoloration, no mineral decomposition, no affect on cementation
Fresh	Rock unaffected by weathering, no change with depth, rings under hammer impact

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the location and time of exploration. Subsurface rock, soil and water conditions may differ in other locations and with the passage of time.

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ROCK CLASSIFICATION CHART
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Project No. 739.09 | Date 6/11/07 | Approved By: | Figure

BORING 1

EQUIPMENT: Truck-Mounted B-53 Drill Rig with 6-Inch Solid Flight Augers
DATE: 5/25/07
ELEVATION: 159.5 Feet*
*REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
					0	0			~ 2.5-Inches Asphalt Concrete
	1100 UC	25	21.5	100	1	5			CLAY WITH SAND (CL) dark brown, dry, stiff, ~85% low plasticity clay, ~15% fine-grained sand (Alluvium)
		21	17.8	111	2				CLAYEY SAND (SC) medium orange-brown, wet, medium dense, ~65% fine to coarse-grained sand, ~35% low plasticity clay (Alluvium)
SA 22.1% P200		18	13.9		3	10			CLAYEY SAND WITH GRAVEL (SC) medium brown, wet, medium dense, ~50% fine to coarse-grained sand, ~20% low plasticity clay, ~30% fine to coarse-grained gravel (Alluvium)
34.7% P200	1200 UC	37	15.3	118	4 5	15			CLAY WITH SAND (CL) light gray with orange mottling, wet, medium dense, ~65% fine-grained sand, ~35% low plasticity clay (Alluvium)
					6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 1 (CONTINUED)

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
32.4% P200		42	15.9	119	20 / 7			CLAY WITH SAND (CL) light gray with orange mottling, wet, medium dense, ~65% fine-grained sand, ~35% low plasticity clay (Alluvium)
		50/3"	11.9		25 / 8			SHALE WITH SANDSTONE INTERBEDS dark gray, highly fractured, low hardness, friable to weak, moderately weathered
		50/4"	10.8					
					9 / 30			Bottom of boring at 27.4 feet Groundwater measured at 9 feet 5.5 hours after drilling
					10			
					35 / 11			
					12 / 40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Project No. 739.09 Date 6/11/07 Approved By: GS

Figure

BORING 2

EQUIPMENT: Truck-Mounted B-53 Drill Rig with 6-Inch Solid Flight Augers
DATE: 5/25/07
ELEVATION: 159.5 Feet*
*REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
					0	0			~ 2-Inches Asphalt Concrete
	1400 UC	23	17.3	102	1	5			CLAY WITH SAND (CL) dark brown, dry, stiff, ~85% low plasticity clay, ~15% fine-grained sand (Alluvium)
SA 14.5% P200		27	14.4	119	3	10			CLAYEY SAND WITH GRAVEL (SC) medium brown, moist to wet, ~55% fine to coarse-grained sand , ~30% fine to coarse-grained gravel, ~15% low plasticity clay (Alluvium) driller notes stiff drilling
					6	20			CLAYEY SAND / SANDY CLAY (SC / CL)

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 2 (CONTINUED)

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
47.5% P200		19	21.3		20 – 7			CLAYEY SAND / SANDY CLAY (SC / CL) light gray with orange mottling, wet, medium dense, ~50% very fine-grained sand, ~50% low plasticity clay (Alluvium) driller notes hard drilling
		50/2" 50/1.5"	1.2		25 – 8 – 9			SANDSTONE olive-brown, low to moderate hardness, weak to moderately strong, moderately weathered Bottom of boring at 28.1 feet due to auger and sampler refusal Groundwater measured at 15 feet 5 hours after drilling
					30 – 10			
					35 – 11			
					40 – 12			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Project No. 739.09 Date 6/11/07 Approved By:

Figure

BORING 3

EQUIPMENT: Truck-Mounted B-53 Drill Rig with 6-Inch Solid Flight Augers

DATE: 5/25/07

ELEVATION: 157.5 Feet*

*REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
					0	0			~ 2-Inches Asphalt Concrete
									CLAY WITH SAND (CL) dark brown, dry, medium stiff to stiff, ~85% low plasticity clay, ~15% fine-grained sand (Alluvium)
					1	5			
					2				
									drilling to rock
					3	10			
					4				
						15			
					5				
					6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 3 (CONTINUED)

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
					20			drilling to rock
					7			
					25			SHALE WITH SANDSTONE INTERBEDS gray, low hardness, friable to weak, moderately weathered
		75/11"	6.6		8			
					9			Bottom of boring at 27.9 feet Groundwater measured at 14.5 feet immediately after drilling
					30			
					10			
					35			
					11			
					12			
					40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 4

EQUIPMENT: Truck-Mounted B-53 Drill Rig with 6-Inch Solid Flight Augers
DATE: 5/25/07
ELEVATION: 158 Feet*
*REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
					0	0			~ 2.5-Inches Asphalt Concrete
									CLAY WITH SAND (CL) dark brown, dry, medium stiff to stiff, ~85% low plasticity silty clay, ~15% fine-grained sand (Alluvium)
34.2% P200		15	16.0	100	1				CLAYEY SAND (SC) medium brown, moist to wet, loose to medium dense, ~65% fine to medium-grained sand, ~35% low plasticity clay (Alluvium)
						5			
					2				
45.9% P200		14	19.6	109	3	10			CLAYEY SAND / SANDY CLAY (SC / CL) medium brown, wet, loose, ~55% fine to medium-grained sand, ~45% low plasticity clay, occasional fine-grained gravel (Alluvium)
					▽				
						15			
68.8% P200		35	21.7	106	5				CLAY WITH GRAVEL AND SAND (CL) medium to dark gray with orange-brown mottling, wet, stiff to very stiff, ~70% low to medium plasticity clay, ~15% fine-grained gravel, ~15% fine-grained sand (Alluvium)
					6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 4 (CONTINUED)

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
					20			CLAY WITH GRAVEL AND SAND (CL) medium to dark gray with orange-brown mottling, wet, stiff to very stiff, ~70% low to medium plasticity clay, ~15% fine-grained gravel, ~15% fine-grained sand (Alluvium)
					7			
					25			
					8			SHALE MELANGE dark gray, crushed, low hardness, friable, completely weathered by tectonic processes
					9			
		79/11"	8.6		30			Bottom of boring at 30.4 feet due to auger refusal Groundwater measured at 13 feet 3.5 hours after drilling
					10			
					35			
					11			
					12			
					40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 5

EQUIPMENT: Truck-Mounted B-53 Drill Rig with 6-Inch Solid Flight Augers
DATE: 5/25/07
ELEVATION: 155.5 Feet*
*REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
					0 – 0			~ 2-Inches Asphalt Concrete
								CLAY WITH SAND (CL) dark brown, dry, medium stiff to stiff, ~85% low plasticity silty clay, ~15% fine-grained sand (Alluvium)
					1 – 5			
					2			
								driller notes stiff drilling
					3 – 10			
					4			
					15 ▽			
					5			
50.3% P200		9	23.0					SANDY CLAY / CLAYEY SAND (CL / SC) light brown, wet, soft, ~50% low plasticity clay, ~50% very fine-grained sand (Alluvium)
					6 – 20			CLAYEY SAND (SC)

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 5 (CONTINUED)

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
					20			
SA 36.8% P200		12	21.7		7			CLAYEY SAND (SC) light orange-brown, wet, loose, ~60% very fine-grained sand, ~40% low plasticity clay (Alluvium)
					25			
SA 16.8% P200		34	14.4		8			CLAYEY SAND WITH GRAVEL (SC) light brown, wet, medium dense, ~55% fine to coarse-grained sand, ~30% fine-grained gravel, ~15% low plasticity clay (Residual Soil)
		50/4"	9.9		9			SANDSTONE light brown, dry, low hardness, friable, moderately weathered, poorly cemented
					30			Bottom of boring at 29.4 feet Groundwater measured at 15.5 feet 1.25 hours after drilling
					10			
					35			
					11			
					12			
					40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 6

EQUIPMENT: Truck-Mounted B-53 Drill Rig with 6-Inch Solid Flight Augers
DATE: 5/25/07
ELEVATION: 156 Feet*
*REFERENCE: COLLEGE OF MARIN, INDIAN VALLEY CAMPUS, BY CSW/STUBER-STROEH ENGINEERING GROUP, INC., DATED 2/22/07

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
					0	0			~ 2-Inches Asphalt Concrete
	2500 UC	25	17.3	113	1	5			CLAY WITH SAND (CL) dark brown, moist to wet, medium stiff to very stiff, ~80% low plasticity silty clay, ~20% fine to coarse-grained sand (Alluvium)
47.7% P200	800 UC	16	19.2	109	2				CLAYEY SAND / SANDY CLAY (SC/ CL) dark brown, moist to wet, loose to medium dense, ~50% fine to coarse-grained sand, ~50% low plasticity silty clay (Alluvium)
					3	10			
SA 63.3% P200		22	22.0	106	4				SANDY CLAY (CL) dark brown, wet, medium stiff, ~65% low plasticity clay, ~35% fine to coarse-grained sand, approximately 2-inch thick, loose layers of clayey sand and fine-grained gravel with clay
						15			
					5				
SA 12.6% P200			30.3						CLAYEY SAND WITH GRAVEL (SC) medium brown, loose to medium dense, wet, ~55% to 75% fine to coarse-grained sand, ~15% clay, ~10% to 30% fine-grained gravel (Alluvium)
SA 16.6% P200		19	26.9		6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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Figure

BORING 6 (CONTINUED)

OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
					20			CLAYEY SAND WITH GRAVEL (SC) medium brown, loose, wet, ~55% to 75% fine to coarse-grained sand, ~15% clay, ~10% to 30% fine-grained gravel (Alluvium)
SA 16.6% P200			24.0		7			
69.8% P200		5	28.6		25			thin sandy clay layer between 24.0ft and 24.5ft, grades ~50% fine to coarse-grained sand, ~35% low plasticity clay, ~15% fine-grained gravel
34.9% P200		8	24.6		8			
					9			SHALE MELANGE dark gray, dry, crushed, low hardness, friable, completely weathered by tectonic processes
		50/4"	9.6		30			
					10			
		50/2"	8.8					
					35			Bottom of boring at 34.2 feet Groundwater measured at 11.5 feet 2 hours after drilling
					11			
					12			
					40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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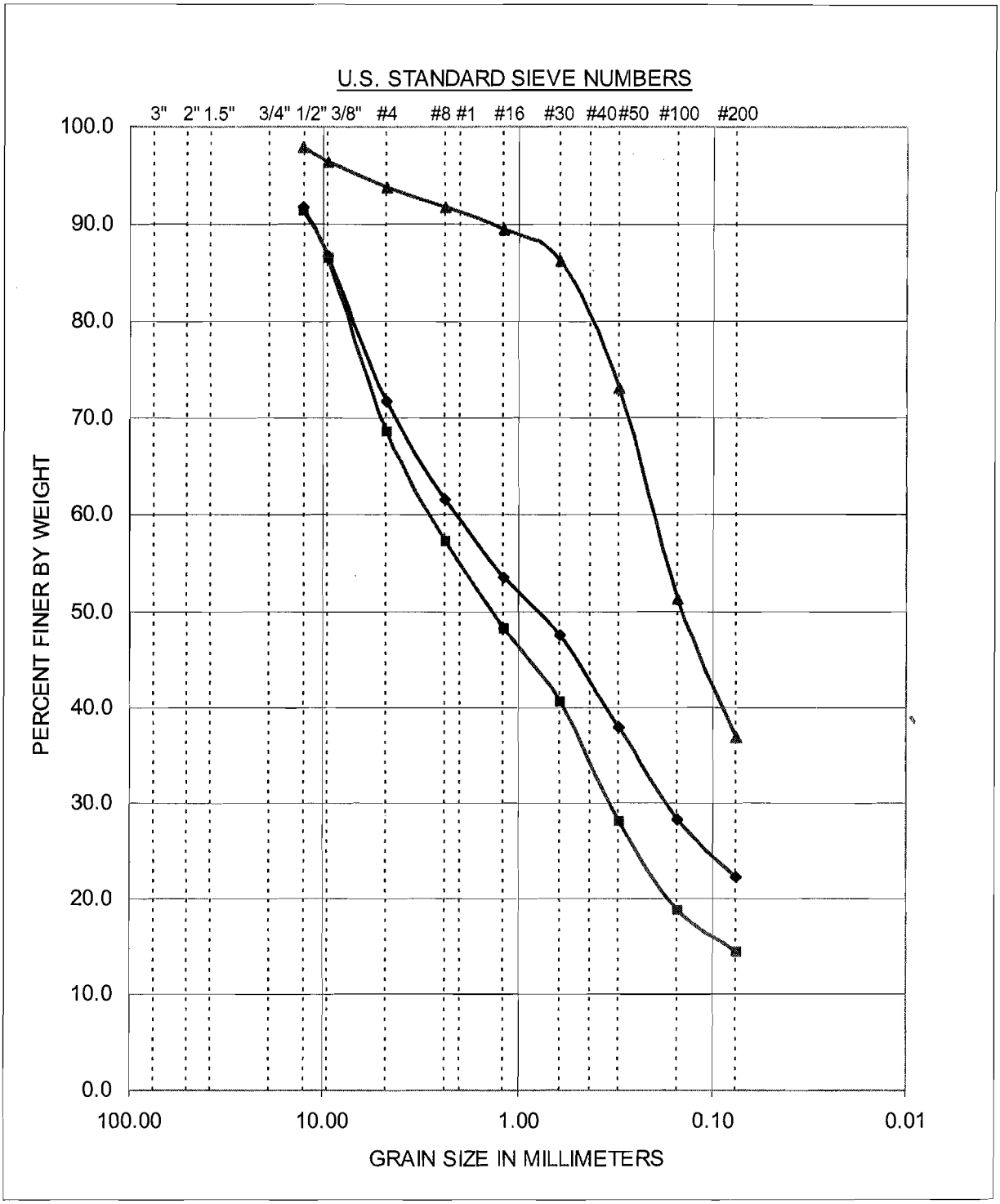
Figure



SYMBOL	SAMPLE SOURCE	CLASSIFICATION
◆	Boring 1 at 10.0 Feet	Clayey Sand with Gravel (SC)
■	Boring 2 at 11.0 Feet	Clayey Sand with Gravel (SC)
▲	Boring 5 at 20.0 Feet	Clayey Sand (SC)

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SIEVE ANALYSES
CSW/ST2 - COM IVC Main Building
Novato, California

A-15

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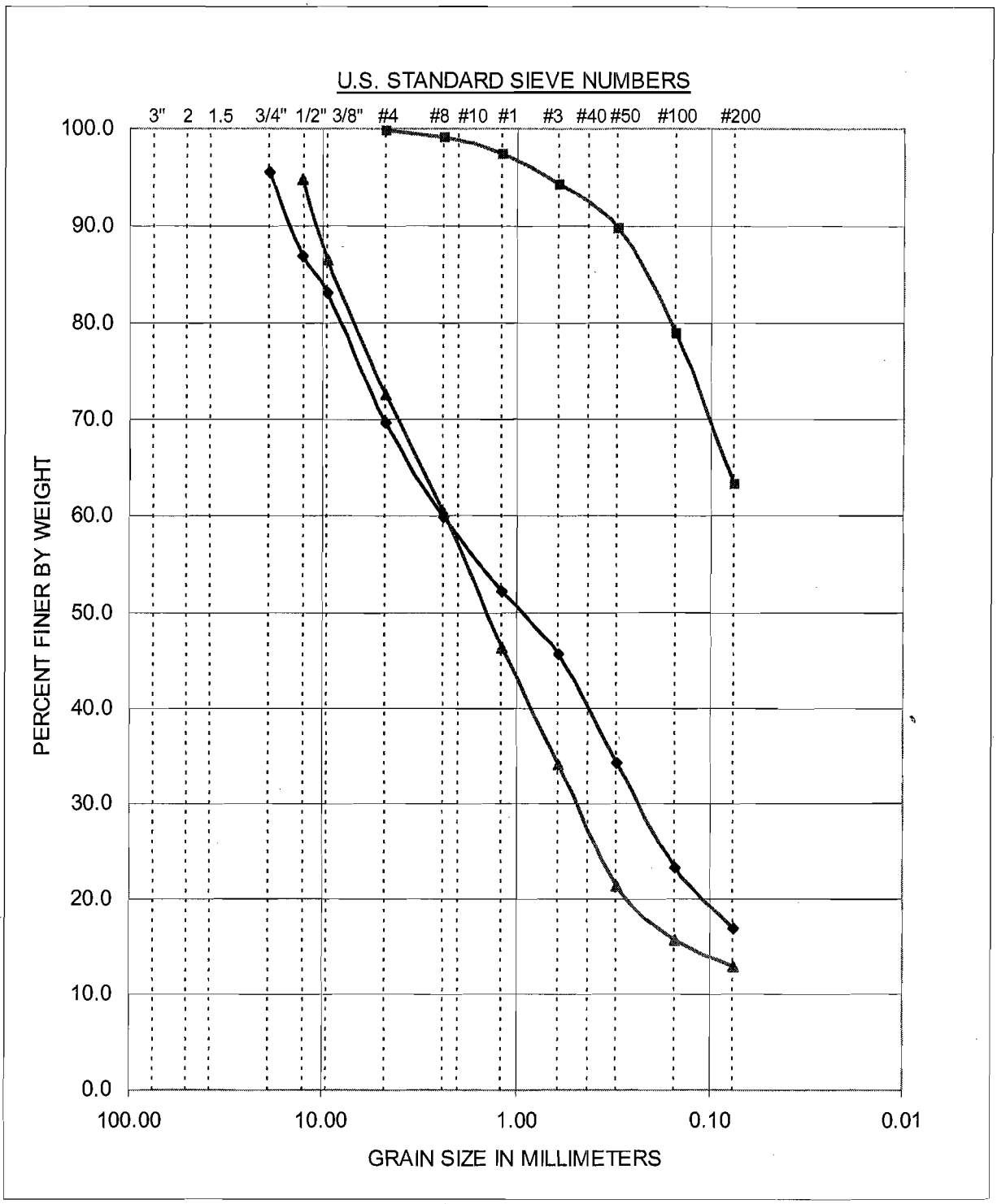
Figure



SYMBOL	SAMPLE SOURCE	CLASSIFICATION
◆	Boring 5 at 25.0 Feet	Clayey Sand with Gravel (SC)
■	Boring 6 at 14.0 Feet	Sandy Clay (CL)
▲	Boring 6 at 18.5 Feet	Well-Graded Sand with Clay and Gravel (SW-SC)

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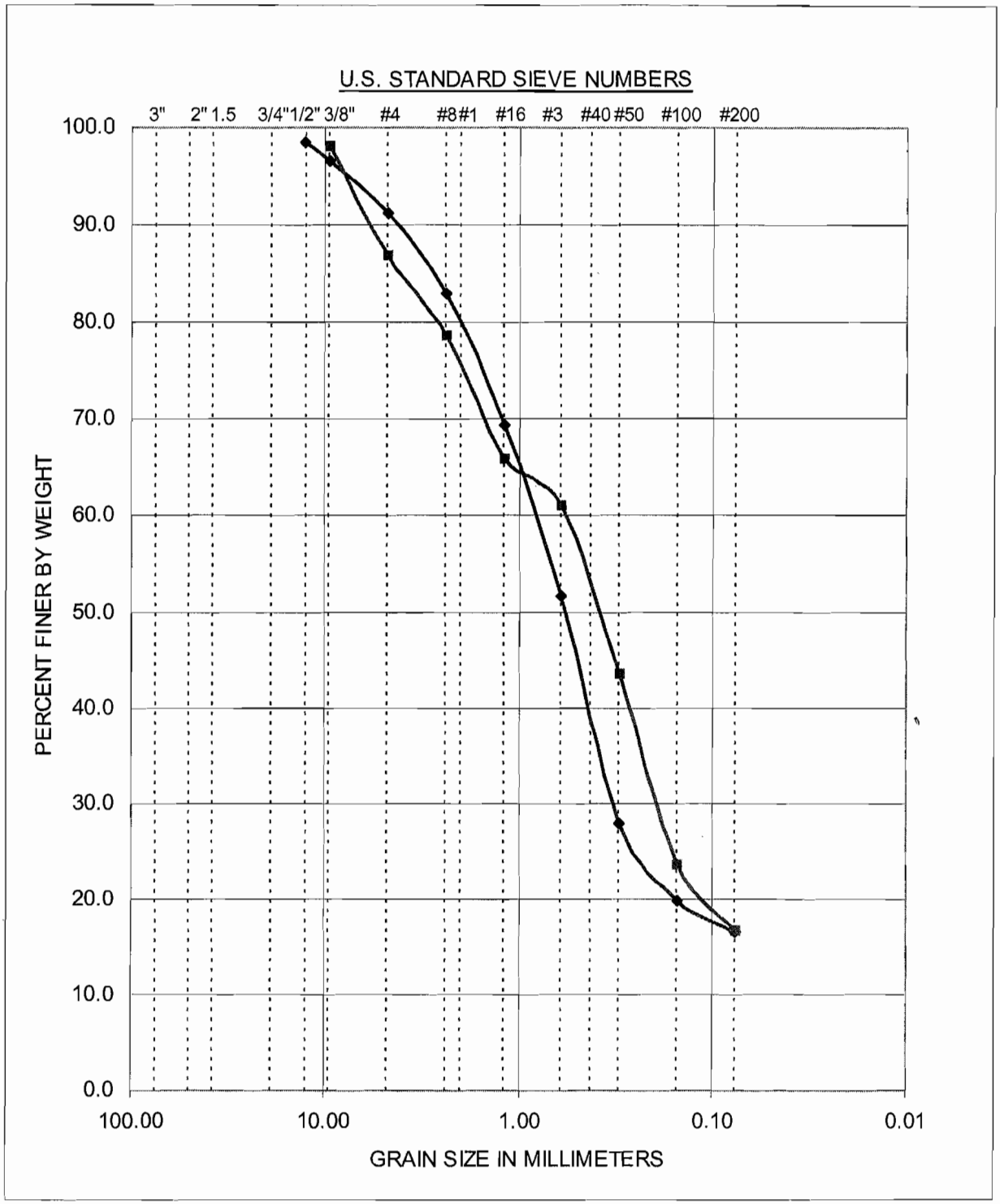
Project No. 739.09 Date 6/26/07 Approved By:

Figure



SYMBOL	SAMPLE SOURCE	CLASSIFICATION
◆	Boring 6 at 19.0 Feet	Clayey Sand (SC)
■	Boring 6 at 23.0 Feet	Clayey Sand (SC)

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SIEVE ANALYSES
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Project No. 739.09 Date 6/26/07 Approved By: GPS

Figure

pH in Soil

Lab#	Sample ID	Compound Name	Result (pH Units)	RDL (pH Units)
7060504-01	**Upper 6' Bore Composite**	pH	5.65	1.00

Date Sampled:	05/25/07	Date Analyzed:	06/05/07	QC Batch: B002562
Date Received:	06/05/07	Method:	EPA 9040	

Resistivity in Soil

Lab#	Sample ID	Compound Name	Result (MOhms-cm)	RDL (MOhms-cm)
7060504-01	**Upper 6' Bore Composite**	Resistivity	0.0130	0.0001

Date Sampled:	05/25/07	Date Analyzed:	06/05/07	QC Batch: B002562
Date Received:	06/05/07	Method:	SM 2510	

Anions in Soil

Lab#	Sample ID	Compound Name	Result (mg/kg)	RDL (mg/kg)
7060504-01	**Upper 6' Bore Composite**	Chloride	10	5.0
		Sulfate as SO4	13	5.0

Date Sampled:	05/25/07	Date Analyzed:	06/05/07	QC Batch: B002562
Date Received:	06/05/07	Method:	EPA 300.0	

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FILE: FILE:739.09_Corrosion.dwg

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CORROSION TEST RESULTS
CSW/ST2 - COM IVC Main Building
Novato, California

A-18

Project No. 739.09 | Date 6/25/07 | Approved By: | Figure

APPENDIX B
SITE SPECIFIC PROBABILISTIC SEISMIC HAZARD ANALYSIS

A. Introduction

We performed a site specific probable seismic hazard analyses to develop a seismic response spectrum based on the soil conditions at the project site. Our evaluation included a probabilistic seismic hazard assessment, development of a target spectrum, selection and adjustment of ground motion to correlate with the target, shake analyses to determine soil amplification of rock motions, and recommendation of a site specific response spectrum.

B. Probabilistic Seismic Hazard Assessment

A probabilistic analysis incorporates uncertainties in time, recurrence intervals, size, and location (along faults) of hypothetical earthquakes. This method thus accounts for likelihood (rather than certainty) of occurrence and provides levels of ground acceleration that might be more reasonably hypothesized for a finite exposure period.

Our probabilistic seismic hazard assessment includes review of statewide estimates of peak horizontal ground accelerations conducted for California (Peterson, et al., 1996). In 2002, the United States Geological Survey (USGS) and the California Geological Survey (CGS) updated the model by introducing new parameters and updated fault locations (Cao et al., 2003). In addition, a site-specific probabilistic seismic hazard analysis was performed to evaluate anticipated peak ground acceleration (PGA) using the computer program FRISKSP developed by Blake (2001). FRISKSP calculates the probability of occurrence of various ground accelerations at a site over a period of time and the probability of exceeding expected ground accelerations within the lifetime of the proposed structure from the significant earthquakes within a specific radius of search. For the probabilistic analysis, a search radius of 62 miles (100 kilometers) was selected. The earthquake magnitudes used in this program are based on the current CGS fault model.

The results of the probabilistic seismic hazard evaluation are used to develop site specific acceleration response spectra for the project site utilizing SHAKE2000. Various recorded seismic motions were input into SHAKE200 to develop our recommended response spectrum. Detailed steps taken to produce the response spectrum are presented below.

C. Target Spectra and Earthquake Input Motions

To select earthquake motions to input into The SHAKE program, we first developed a "target" acceleration response spectrum for a probabilistic rock motion. The "target" spectrum was created by utilizing FRISKSP (Blake 2001) for the Design-Basis Earthquake Ground-Motion (PGA_{DBE}) with a 10% chance of exceedance in 50-years (475 year return period). The target spectrum was created by inputting the project site's coordinates (38.0759°, -122.5753°) into FRISKSP utilizing the attenuation relationships by Abrahamson & Silva (1997), Boore et al (1997), and Sadigh et al (1997) for rock sites. The results of the analysis indicate a peak bedrock acceleration (PGA) of 0.43 g.

The project site's coordinates were then input into the USGS Seismic Hazard website to determine the characteristic earthquake faults and mechanisms that would produce an earthquake with a 10% chance of exceedance in 100 years. The resulting output is outlined below in Table B-1.

TABLE B-1
USGS INTERACTIVE DE-AGGREGATIONS, 1996
COLLEGE OF MARIN - IVC MAIN BUILDING
NOVATO, CALIFORNIA

Source	% Contribution	Distance	Magnitude
San Andreas – 1906	51.1	17.7 km	7.9
Hayward – All	13.2	15.6 km	7.1
Hayward – N. Segment	10.7	15.2 km	6.9
Rodgers Creek	15.0	16.7 km	7.0

Based on the results of the USGS Seismic Hazard analysis, 50% of motions were derived from a magnitude 7.9 strike slip earthquake at 18 km from the site. The remaining 50% was derived from a magnitude 7.0 strike slip earthquakes 16 km from the site. Therefore, the seismic motions selected were predominately strike slip events in the range of magnitudes of 7.9 +/- ~0.5 at 18 km +/- ~10 km and magnitudes of 7.0 +/- ~0.5 at 16 km +/- ~10 km. A summary of the selected input motions is presented below on Table B-2.

TABLE B-2
SHAKE EARTHQUAKE INPUT MOTIONS
COLLEGE OF MARIN - IVC MAIN BUILDING
NOVATO, CALIFORNIA

Earthquake	Date	Magnitude	Distance	Station
Imperial Valley	5/19/1940	7.0	12.2 km	El Centro Array Sta #9
Imperial Valley	10/15/1979	6.5	10.6 km	Calexico Fire Station
Landers	6/28/1992	7.3	23.2 km	Desert Hot Springs
Landers	6/28/1992	7.3	11.6 km	Joshua Tree
Landers	6/28/1992	7.3	24.9 km	Yermo Fire Station
Loma Prieta	10/18/1989	6.9	17.9 km	UCSC Lick Observatory
Loma Prieta	10/18/1989	6.9	27.3 km	San Jose – Santa Teresa Hills

Each motion above contains 2 components, 90 degrees from each other. The square root of the sum of the squares (SRSS) of each spectral acceleration component for a given seismic motion was plotted with the target spectra. The SRSS of each spectra pair was scaled to more closely match the target spectra. The results of our target spectra plotted with the input motions are presented on Figure B-1.

D. SHAKE2000

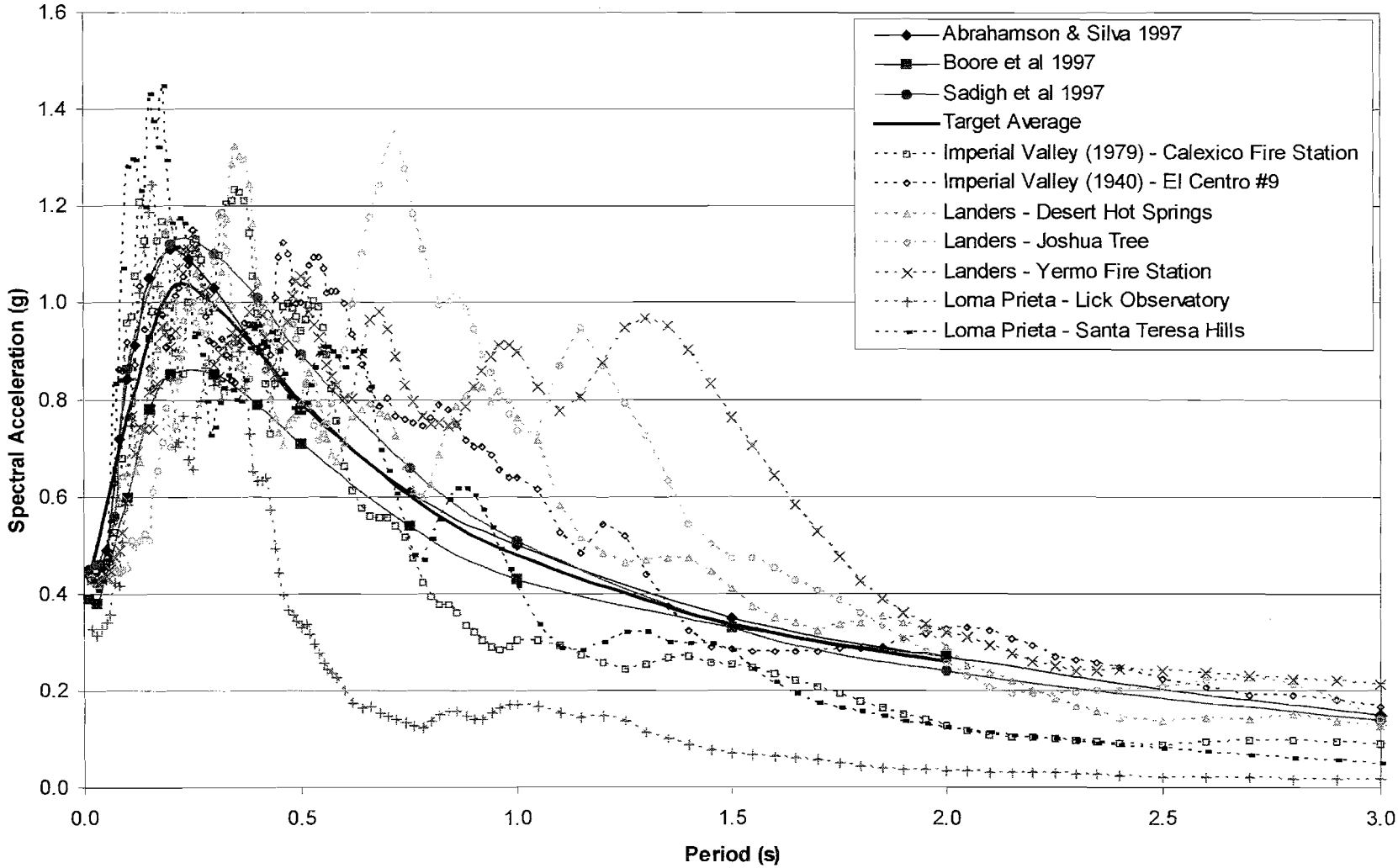
Based on our subsurface exploration, we developed an idealized soil profile for the project site to input into SHAKE2000. We utilized several empirical relationships to determine the maximum shear modulus (G_{MAX}) and shear wave velocity (V_S). The idealized soil profile input into SHAKE2000 is outlined below in Table B-3.

TABLE B-3
SHAKE IDEALIZED SOIL PROFILE
COLLEGE OF MARIN - IVC MAIN BUILDING
NOVATO, CALIFORNIA

Soil Type	Thickness	Unit Weight, γ	V_S	G_{MAX}
Clay with Sand	5 ft	125 pcf	590 fps	1,300 ksf
Clay with Sand	10 ft	125 pcf	590 fps	1,300 ksf
Clayey Sand	15 ft	120 pcf	670 fps	1,750 ksf
Weathered Bedrock	N/A	140 pcf	2500 fps	27,000 ksf

Once the soil profile was input into SHAKE2000, each component of each motion was input into the soil profile. Each component was magnified by the value determined when fitting the motions to the target spectra. The SRSS of the spectral acceleration output pair was plotted, as well as the average of the seven motions, along with our recommended spectral acceleration, is shown on Figure B-2.

Target Spectra & Input Motions



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TARGET SPECTRUM
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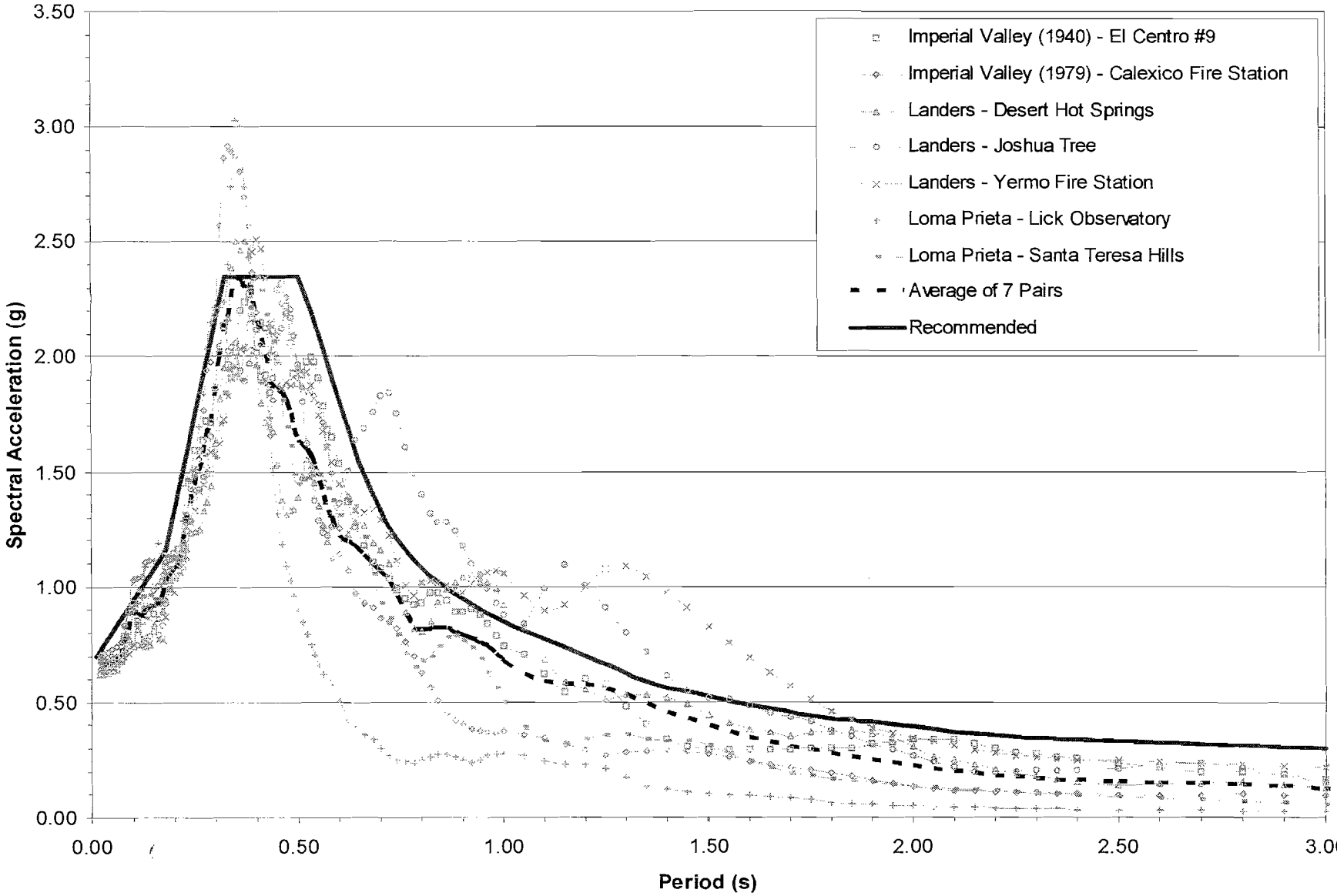
B-1

Project No. 739.09 | Date 7/10/07 | Approved By: [illegible]

Figure

Response Spectrum



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RESPONSE SPECTRUM
COM - IVC Main Building
Novato, California

B-2

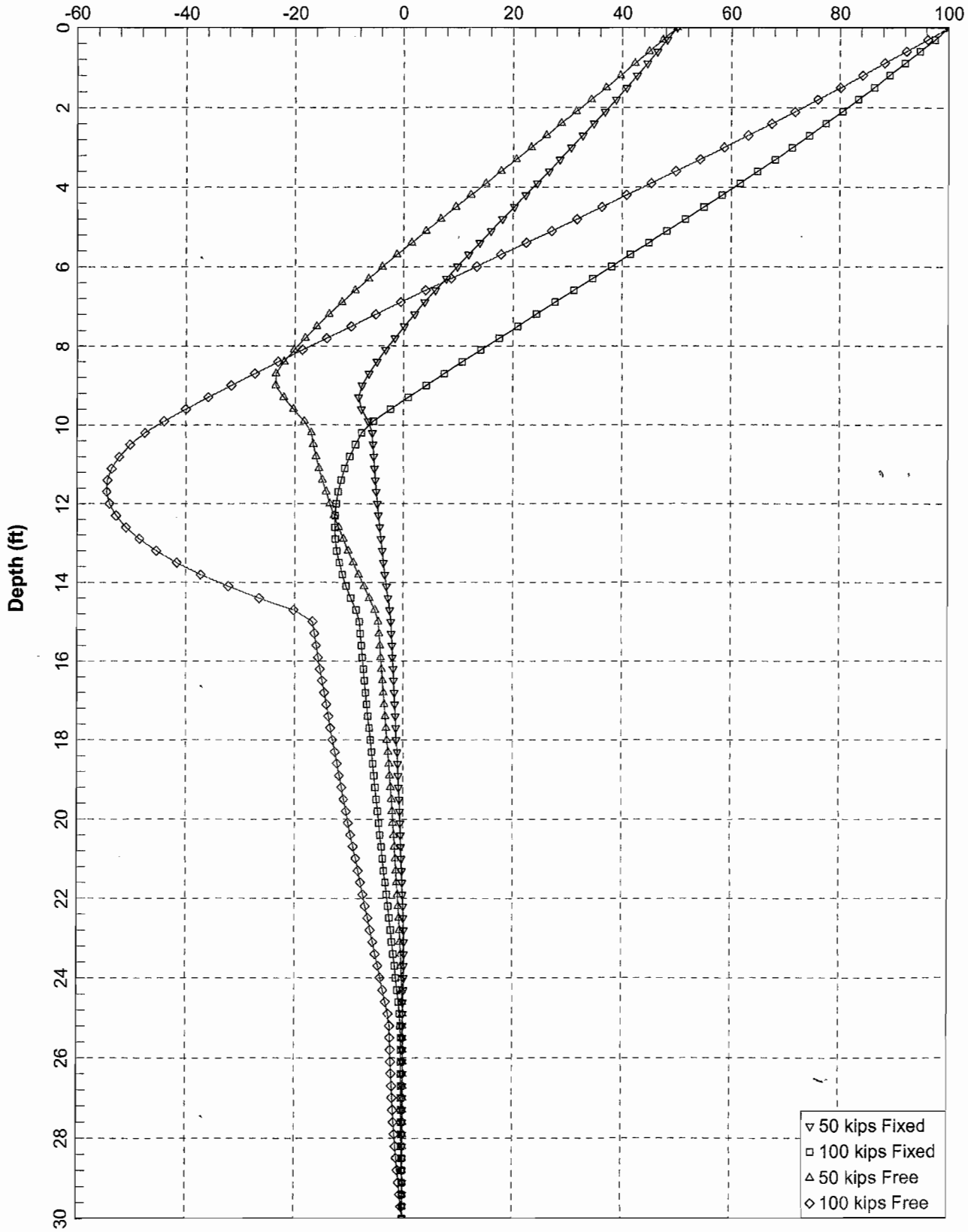
Project No. 739.09 | Date 7/10/07 | Approved By:

Figure

APPENDIX C
LATERAL PIER ANALYSIS (L-Pile)

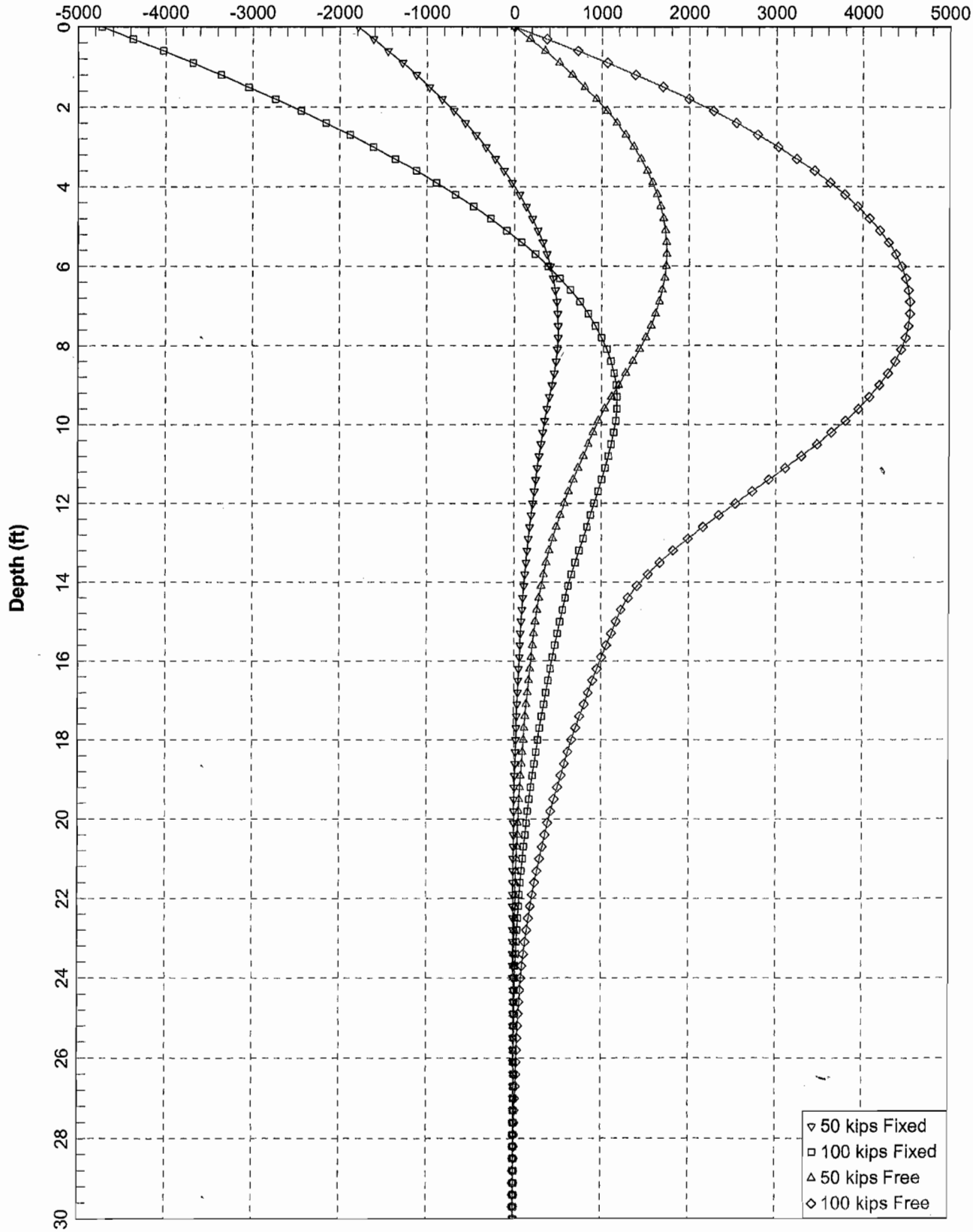
24" Pier 300 kip Axial Load

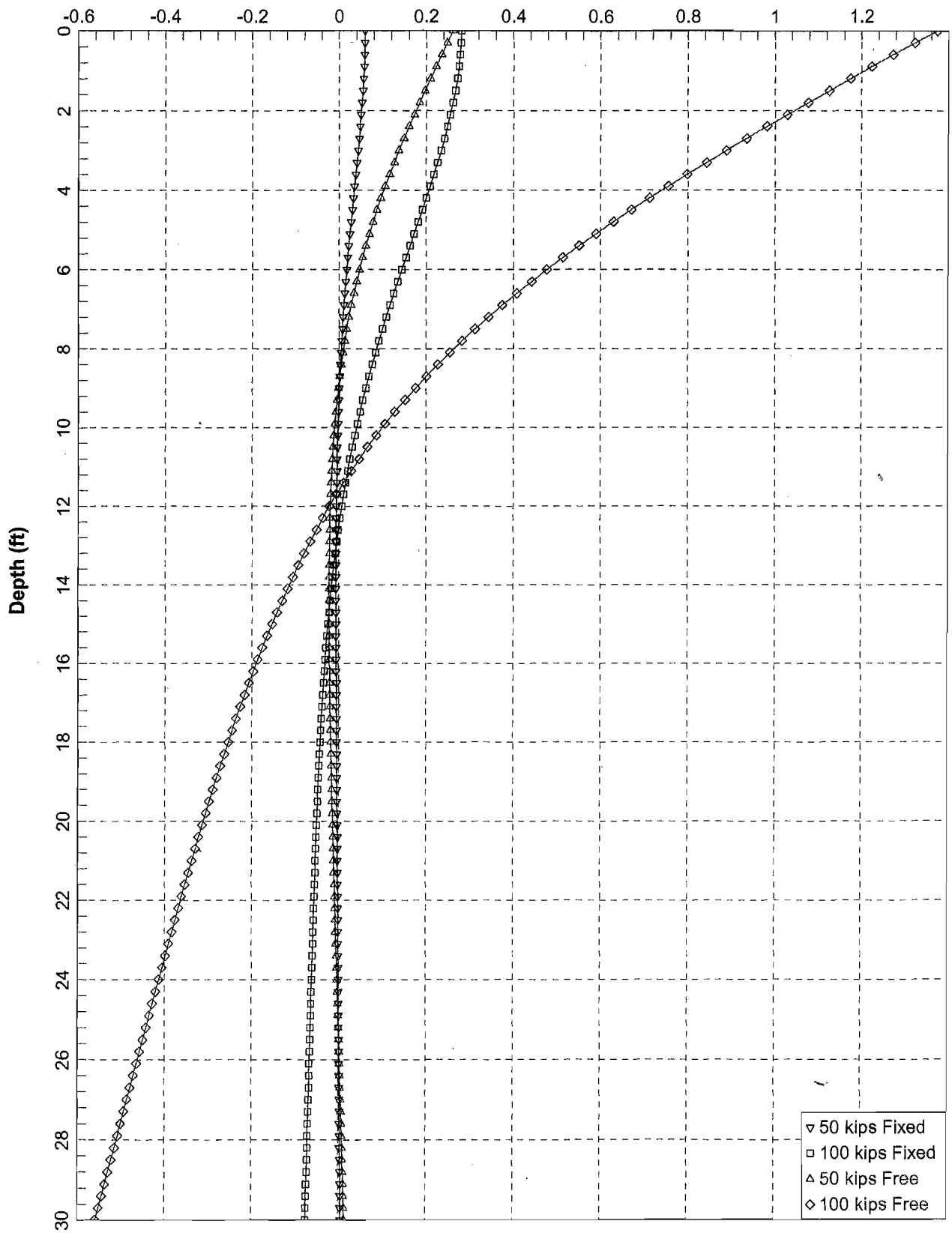
Shear Force (kips)

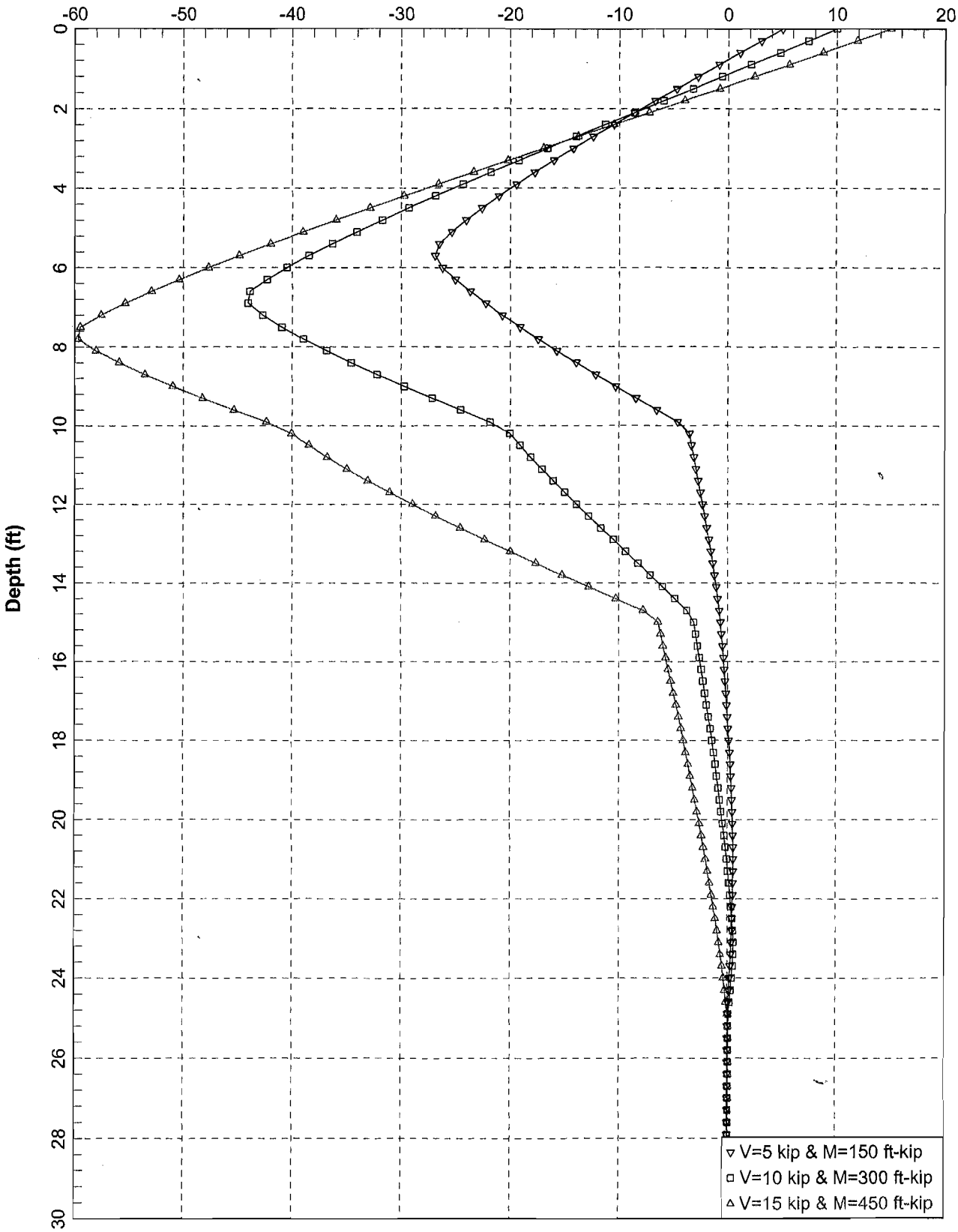


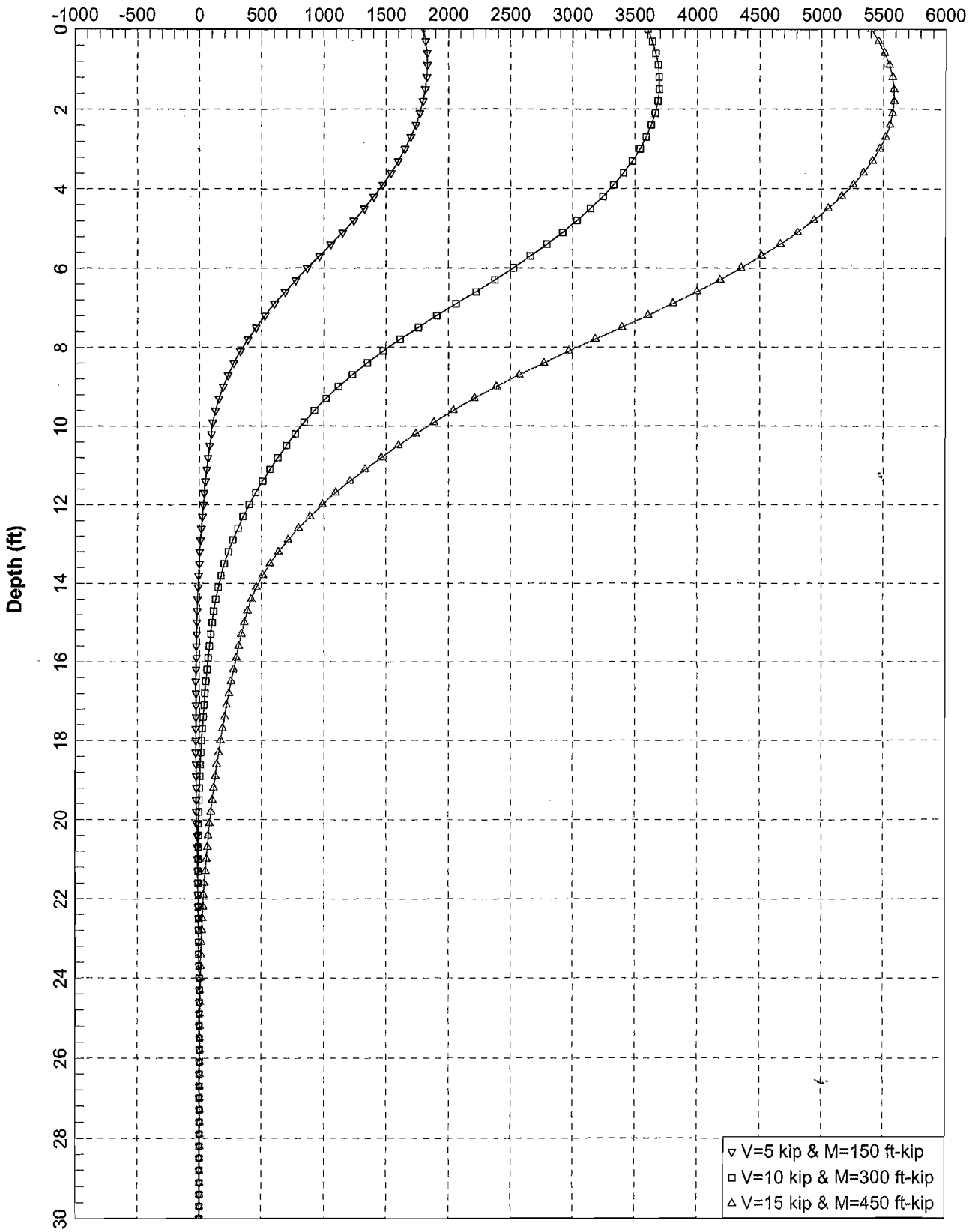
24" Pier 300 kip Axial Load

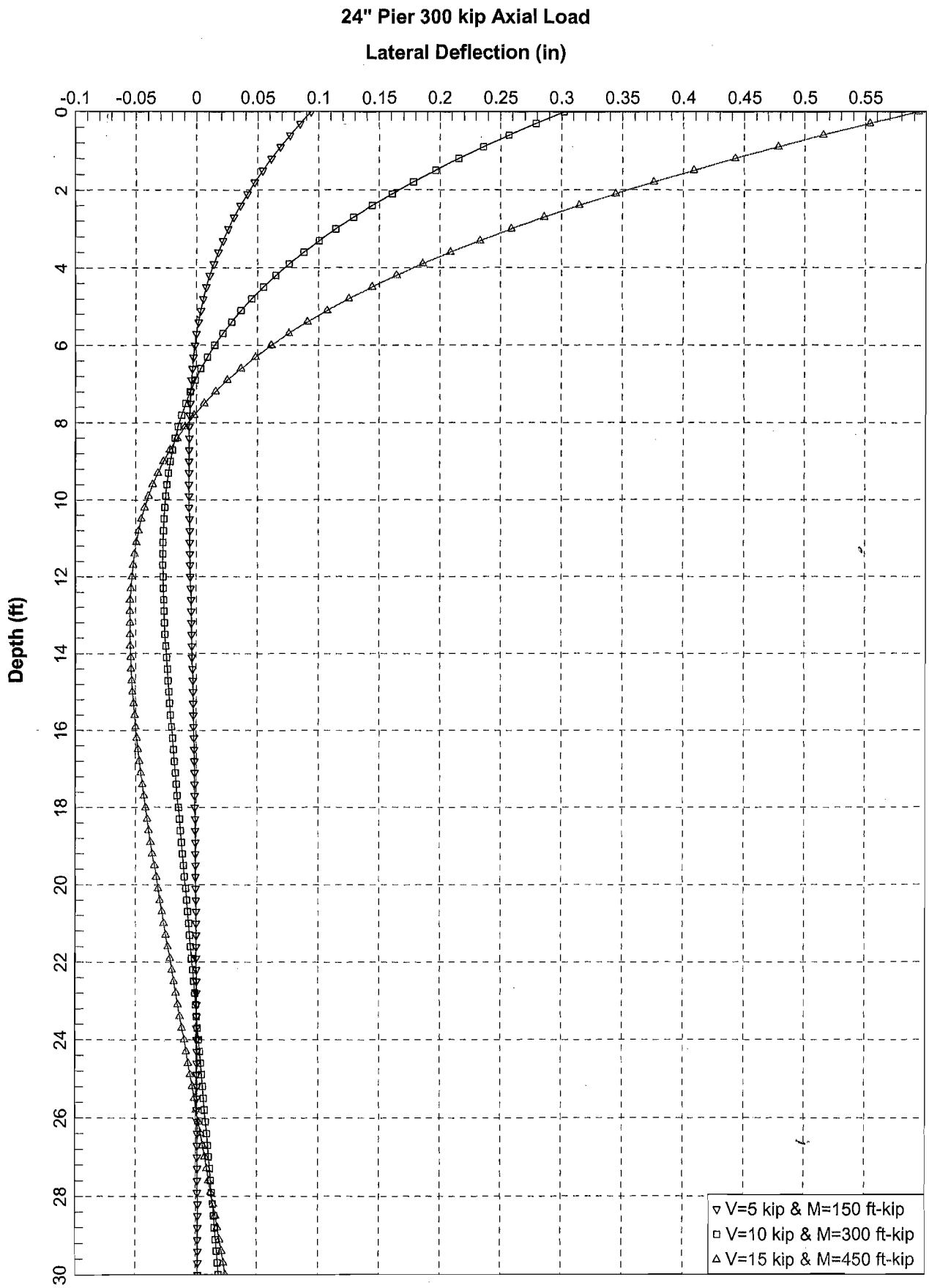
Unfactored Bending Moment (in-kips)

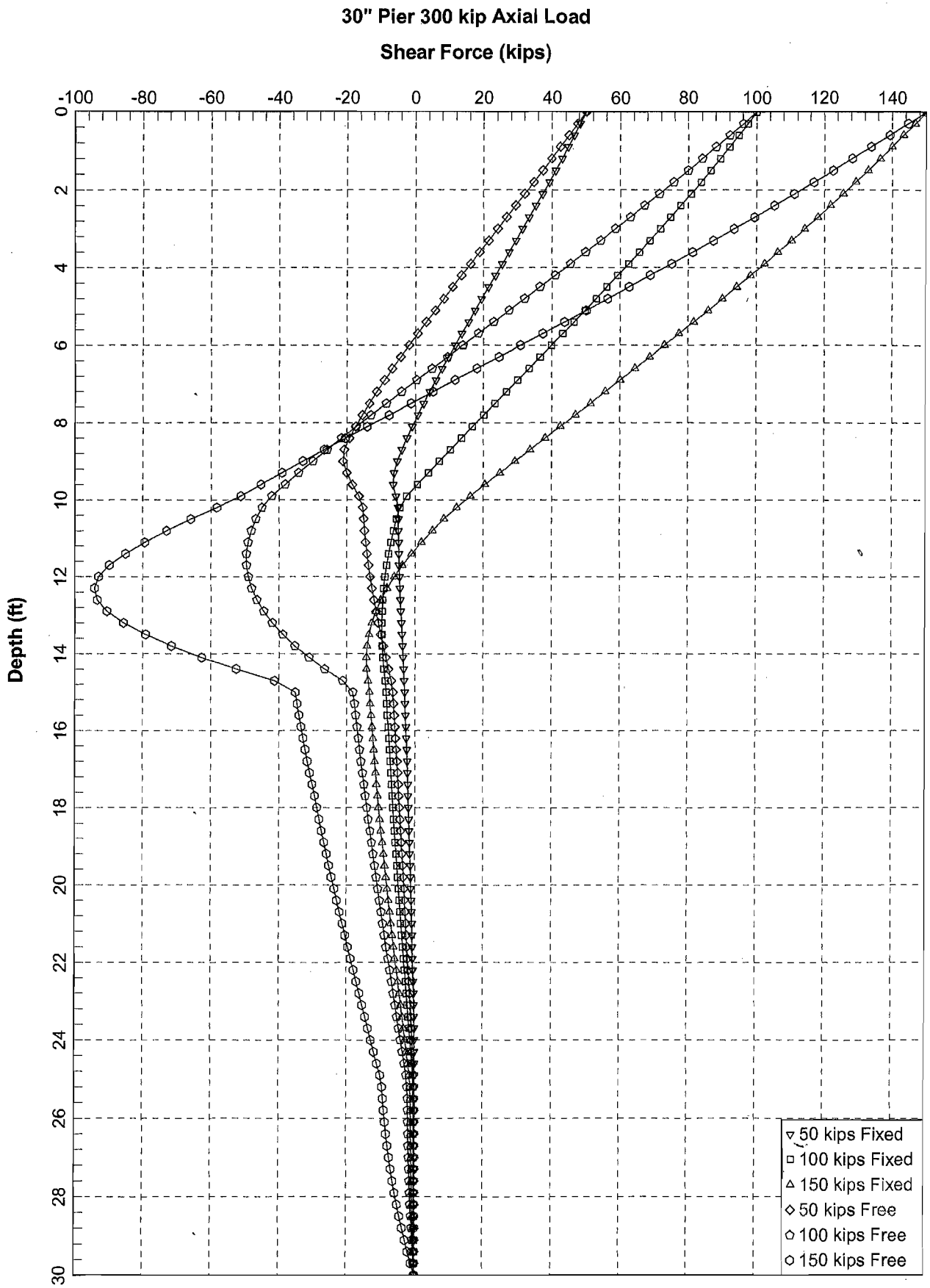


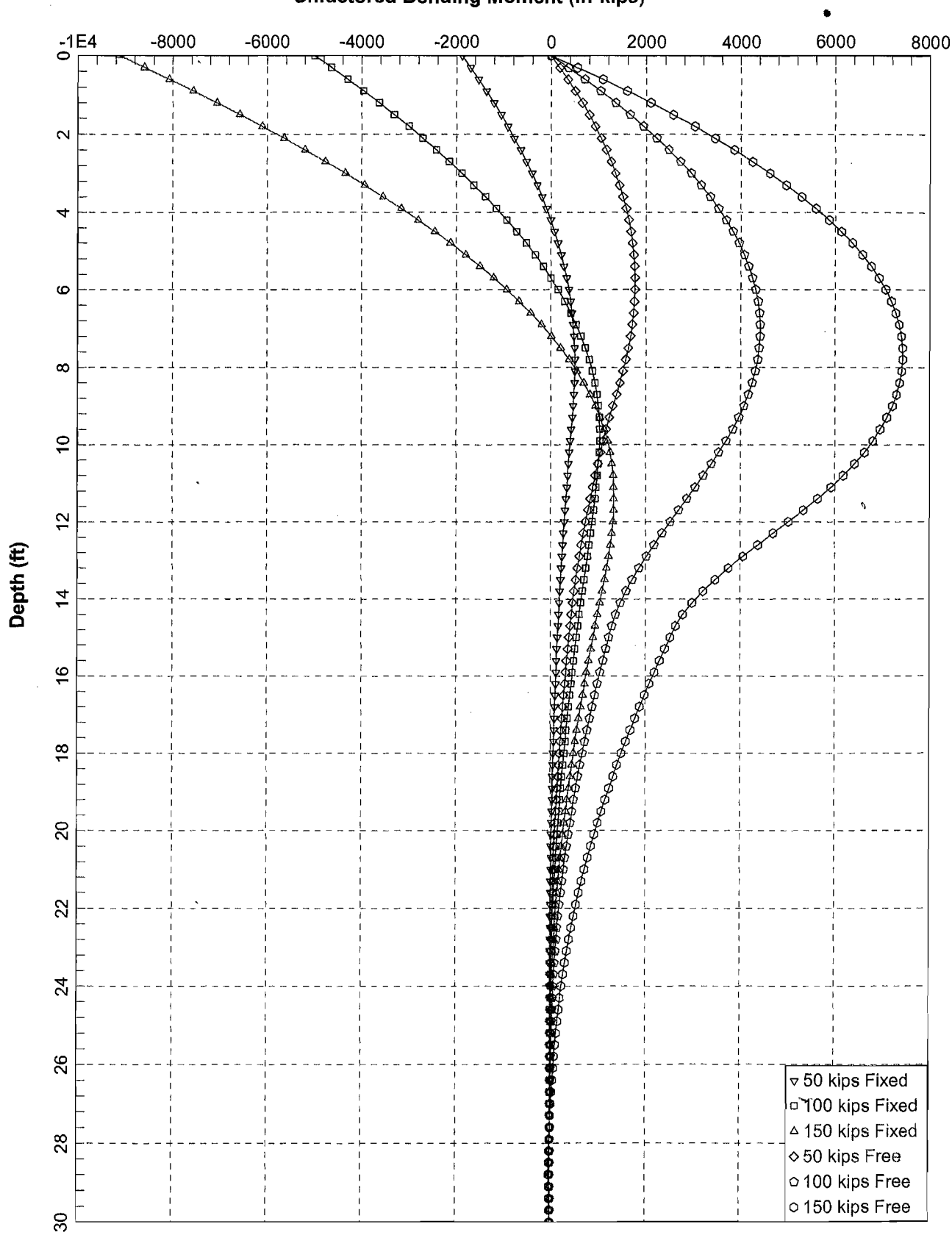

24" Pier 300 kip Axial Load
Lateral Deflection (in)
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
50 kips Fixed
100 kips Fixed
50 kips Free
100 kips Free

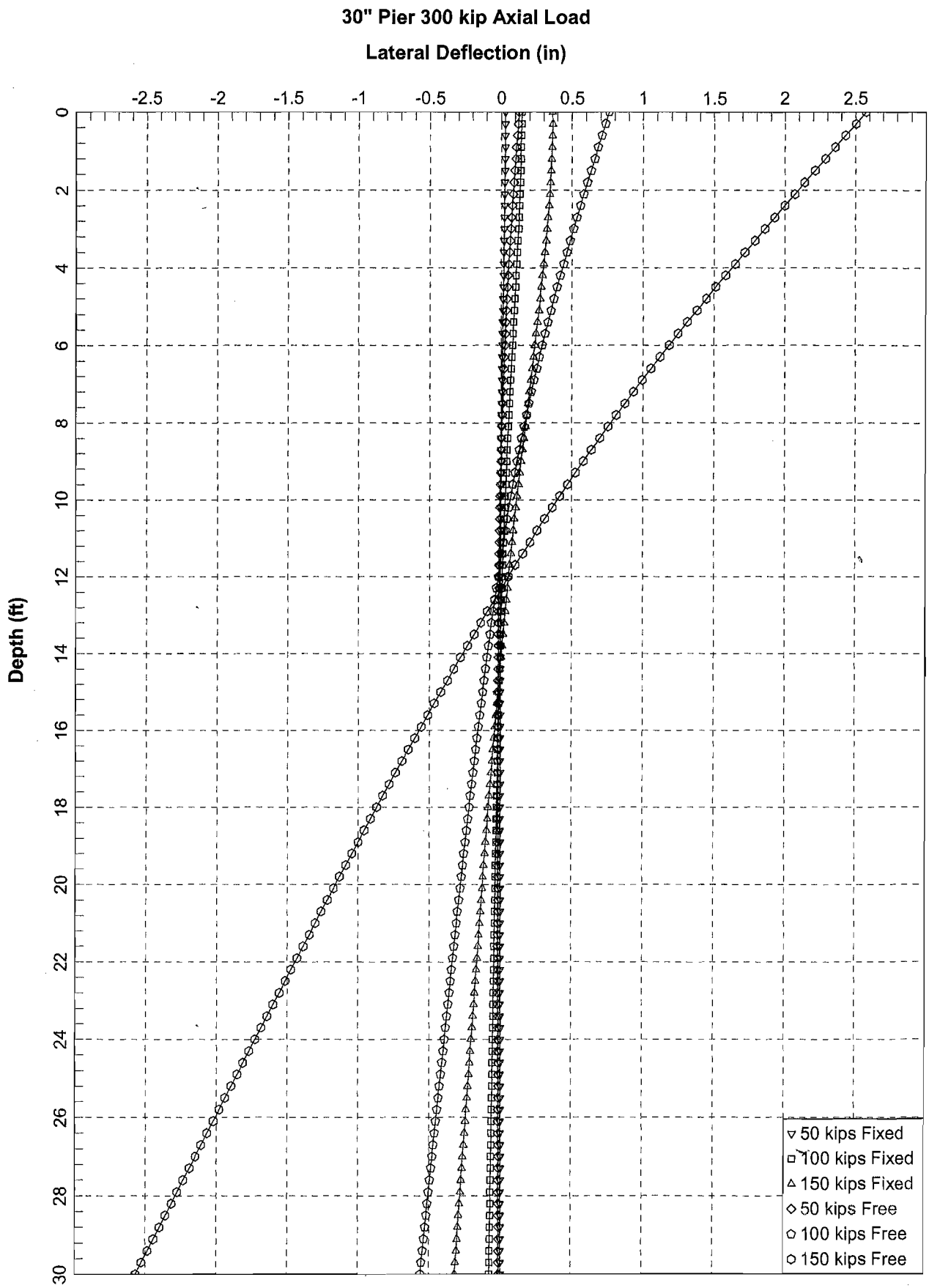

24" Pier 300 kip Axial Load
Shear Force (kips)
-60
-50
-40
-30
-20
-10
0
10
20
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Depth (ft)
V=5 kip & M=150 ft-kip
V=10 kip & M=300 ft-kip
V=15 kip & M=450 ft-kip

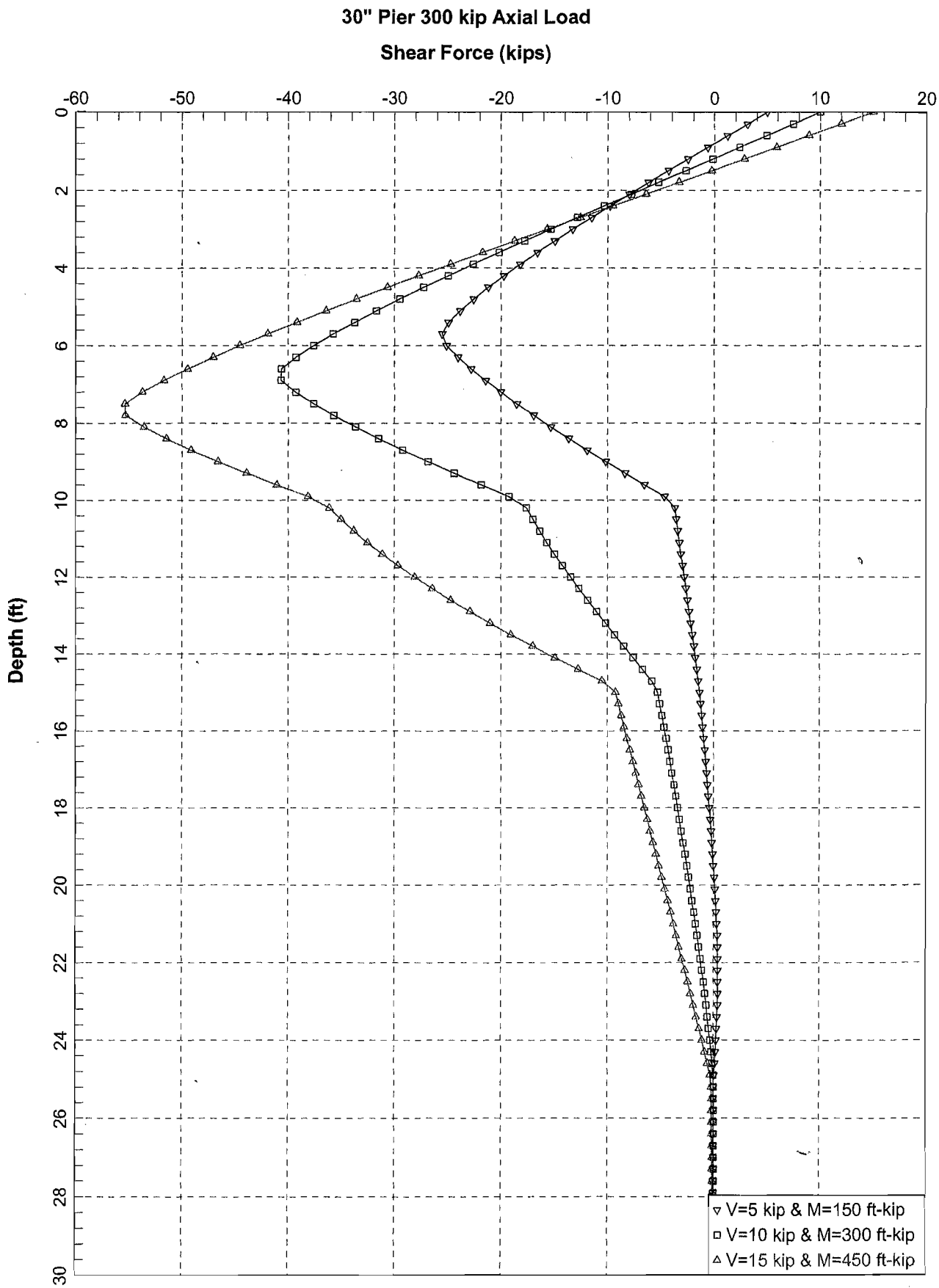

24" Pier 300 kip Axial Load
Unfactored Bending Moment (in-kips)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
V=5 kip & M=150 ft-kip
V=10 kip & M=300 ft-kip
V=15 kip & M=450 ft-kip

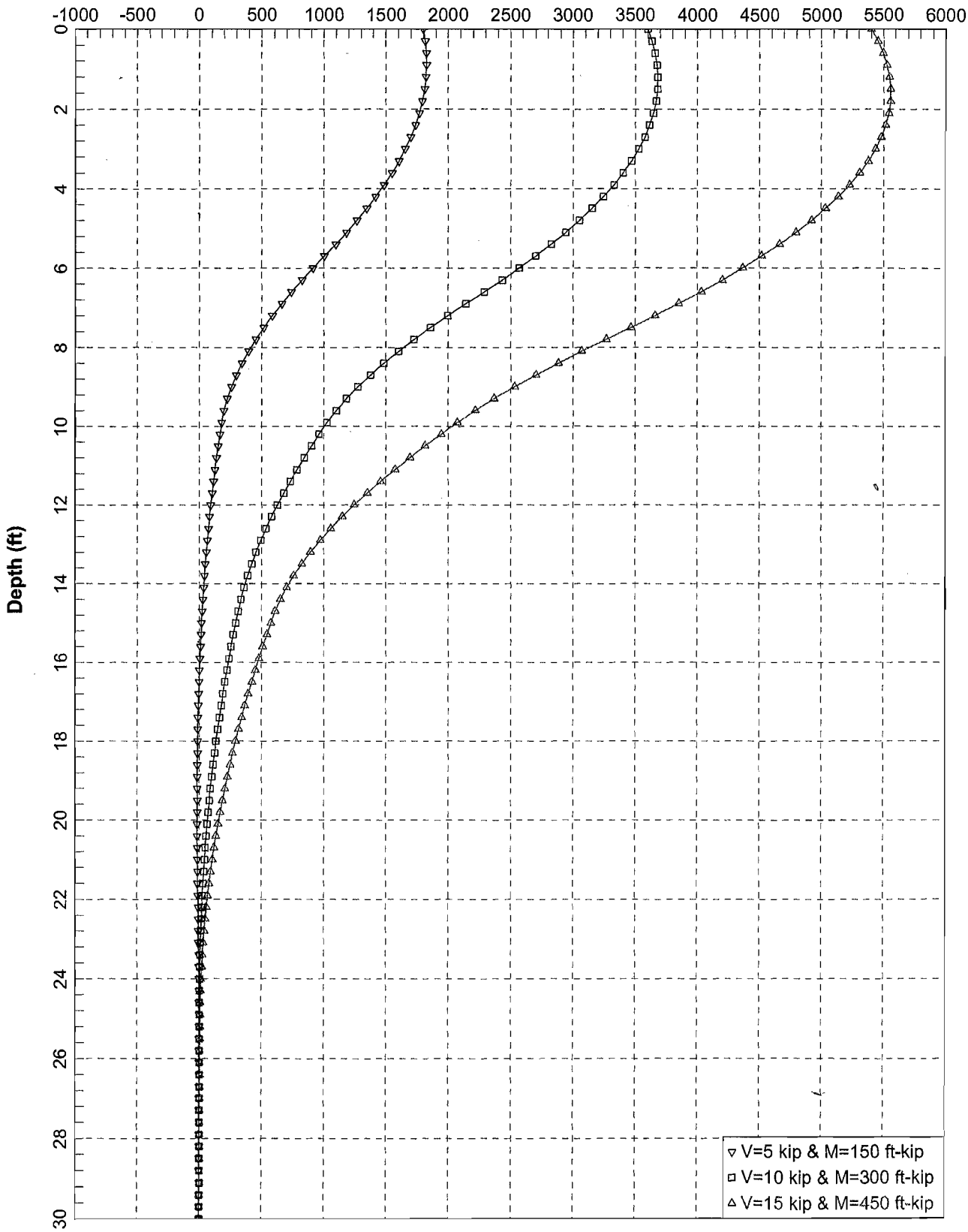

24" Pier 300 kip Axial Load
Lateral Deflection (in)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
V=5 kip & M=150 ft-kip
V=10 kip & M=300 ft-kip
V=15 kip & M=450 ft-kip

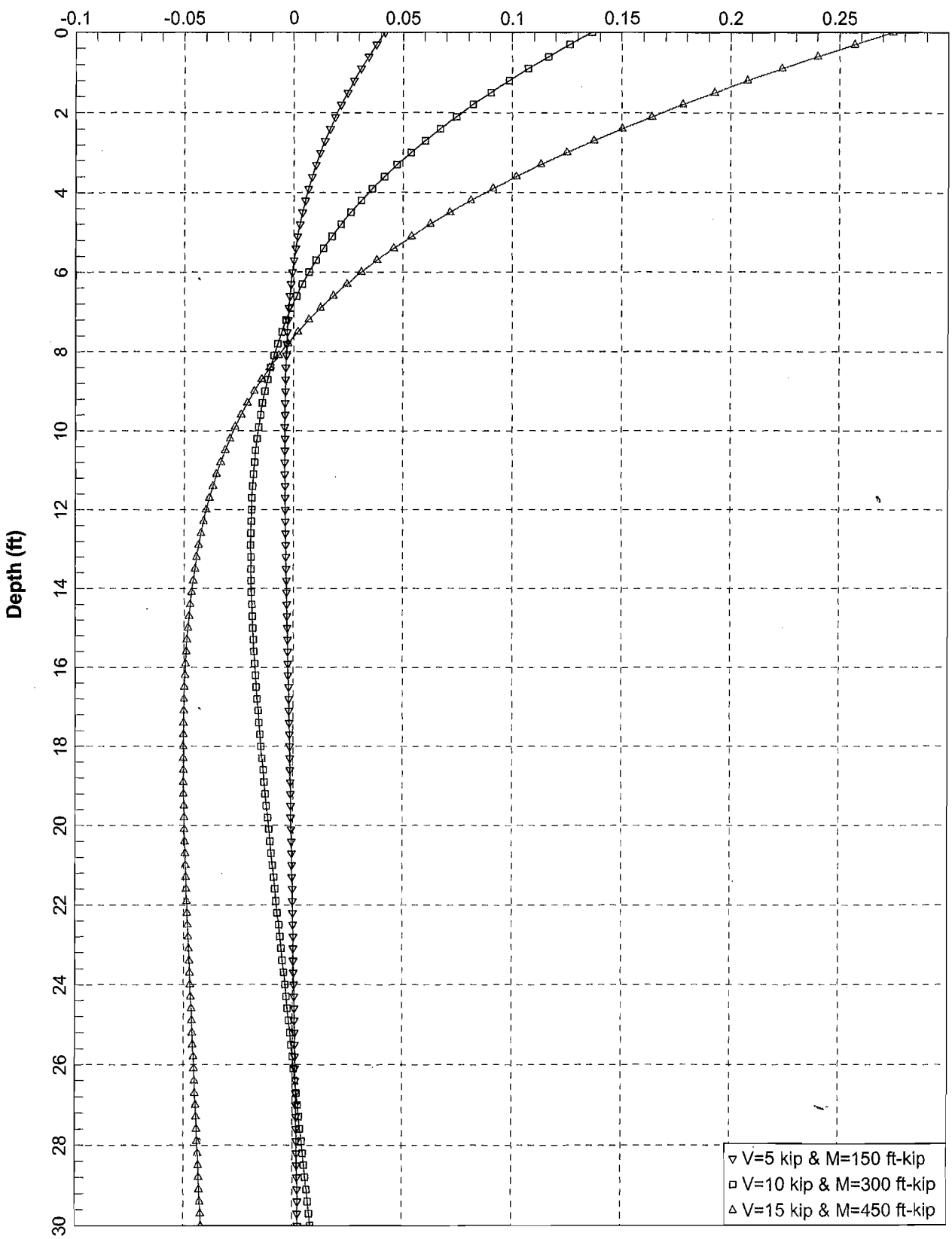

30" Pier 300 kip Axial Load
Shear Force (kips)
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
140
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
50 kips Fixed
100 kips Fixed
150 kips Fixed
50 kips Free
100 kips Free
150 kips Free


30" Pier 300 kip Axial Load
Unfactored Bending Moment (in-kips)
-1E4
-8000
-6000
-4000
-2000
0
2000
4000
6000
8000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
50 kips Fixed
100 kips Fixed
150 kips Fixed
50 kips Free
100 kips Free
150 kips Free


30" Pier 300 kip Axial Load
Lateral Deflection (in)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
50 kips Fixed
100 kips Fixed
150 kips Fixed
50 kips Free
100 kips Free
150 kips Free


30" Pier 300 kip Axial Load
Shear Force (kips)
-60
-50
-40
-30
-20
-10
0
10
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
V=5 kip & M=150 ft-kip
V=10 kip & M=300 ft-kip
V=15 kip & M=450 ft-kip


30" Pier 300 kip Axial Load
Unfactored Bending Moment (in-kips)
-1000
-500
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
V=5 kip & M=150 ft-kip
V=10 kip & M=300 ft-kip
V=15 kip & M=450 ft-kip


30" Pier 300 kip Axial Load
Lateral Deflection (in)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
V=5 kip & M=150 ft-kip
V=10 kip & M=300 ft-kip
V=15 kip & M=450 ft-kip

APPENDIX D
DESIGN NOTES FOR CONCRETE SLABS-ON-GRADE

These "design notes" are for the general guidance of the project Civil Engineer or Architect who is responsible for the actual design of concrete slabs-on-grade for the project.

Recommendations are given in the body of the report for the subgrade support of concrete flatwork. However, concrete slabs-on-grade often perform poorly for various non-geotechnical reasons. These notes are offered as a reminder of factors which can influence slab performance. The designer should refer to the recommendations and design guidelines published by the Portland Cement Association, The American Concrete Institute and the Northern California Cement Promotion Group.

THICKNESS and STRENGTH. For residential walks, automobile driveways and garage floors, it is normal practice to use 4-inch thick slabs of 2500 psi concrete. For improved performance, the design may be upgraded to 5-inch thick slabs of 3000 psi concrete. Concrete streets and driveways subjected to truck traffic and concrete residential floors should be designed for the specific loads and job conditions.

SHRINKAGE. All concrete shrinks as it cures. Shrinkage will amount to 1/16 to 1/8 inch per 20-foot length. A concrete mix with a high water/cement ratio results in increased shrinkage and greater shrinkage cracking. A low water/cement ratio will reduce shrinkage and cracking.

REINFORCEMENT. It is normal to use non-reinforced concrete for residential concrete slabs. However, wire mesh or light steel reinforcement will minimize crack width and resist vertical offset across cracks.

CRACK CONTROL JOINTS. Crack control joints are used to control the location of the inevitable shrinkage cracks. Crack control joints should extend to a depth of 1/4 to 1/3 of the thickness of the slab and be spaced about 20 to 30 times the slab thickness (i.e., for a 4-inch thick slab, joints should be spaced 6 to 10 feet apart). If mesh is used in the slab, it should be continuous through the joints. If reinforcing steel is used, No. 3 or No. 4 bars should be used and only every other bar should extend across the joint. Keyed joints or dowels may also be considered. To be effective, the joints must be tooled into the fresh concrete or saw cut within 4 to 12 hours of the pour, while the concrete is still green.

ISOLATION JOINTS AND EXPANSION JOINTS. Isolation joints should be provided where vertical or horizontal movement is expected. The joints should extend for the full slab thickness and contain a compressible joint filler. Mesh and reinforcement should not extend across the joint. Joints used to accommodate expansion should be spaced about 60 feet apart.

CURING. Where aggregate base and a vapor barrier are placed under the slab, 2 inches or more of moist sand should directly underlay the slab to aid in more uniform curing between top and bottom. The slab should be cured with wet curing methods or moisture retention curing compounds. Particular care should be taken in hot and windy weather.

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/THE BEST PEOPLE ON EARTH exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
THE BEST PEOPLE ON EARTH

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
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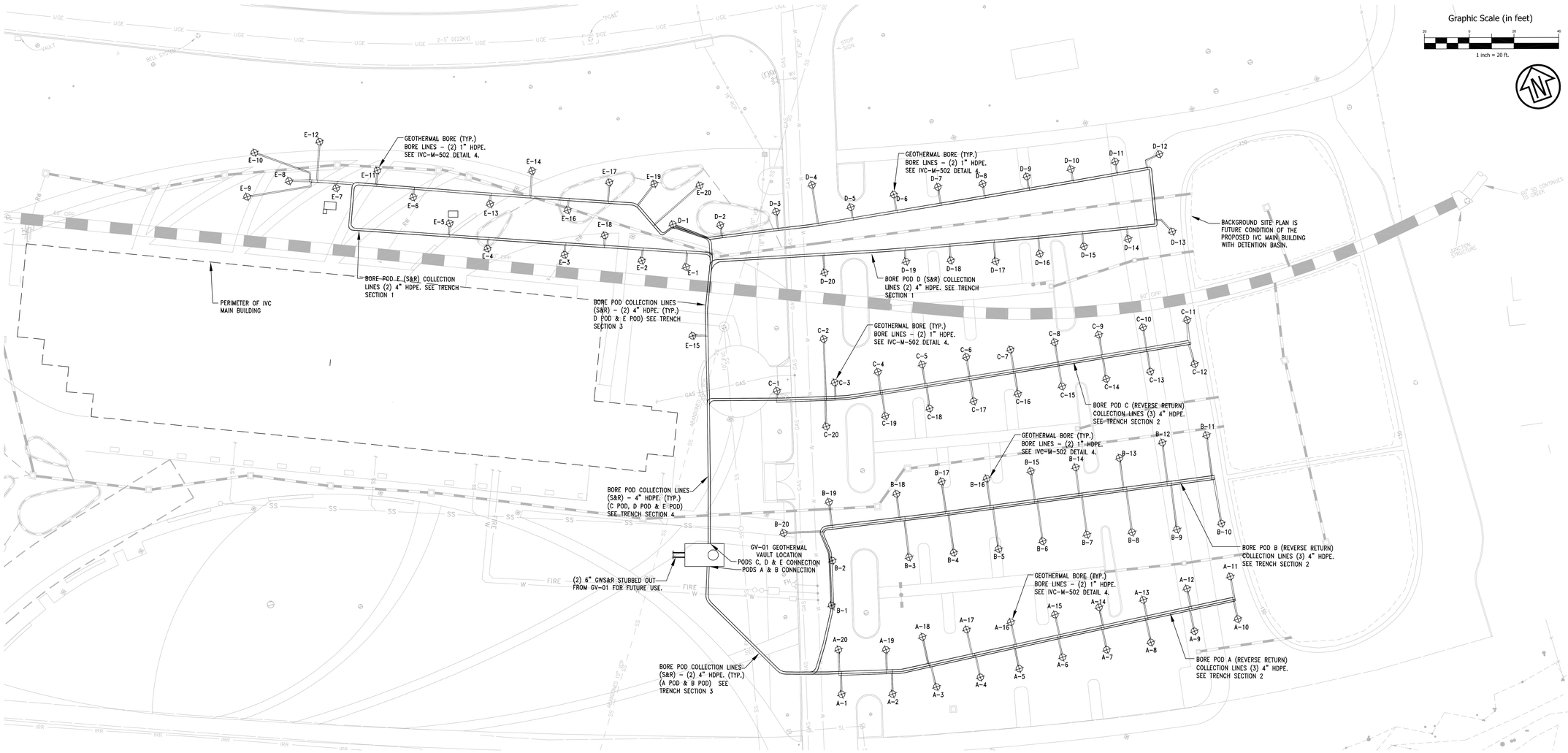
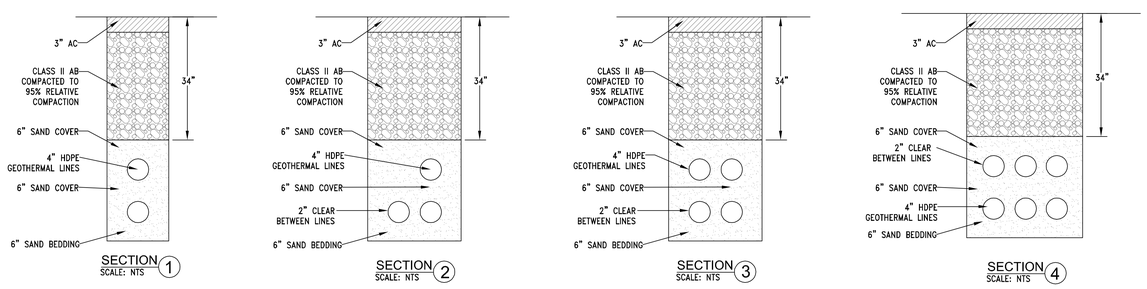


GEOTHERMAL FIELD PLAN

SCALE: 1" = 20'-0"



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Kentfield, CA 94904

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CSW/STUBER-STROEH ENGINEERING
45 LEVERONI COURT
NOVATO, CA. 94949

CSW | ST2

rev.	date	issue
	12.22.2008	RECORD DRAWING

GEOTHERMAL FIELD PACKAGE

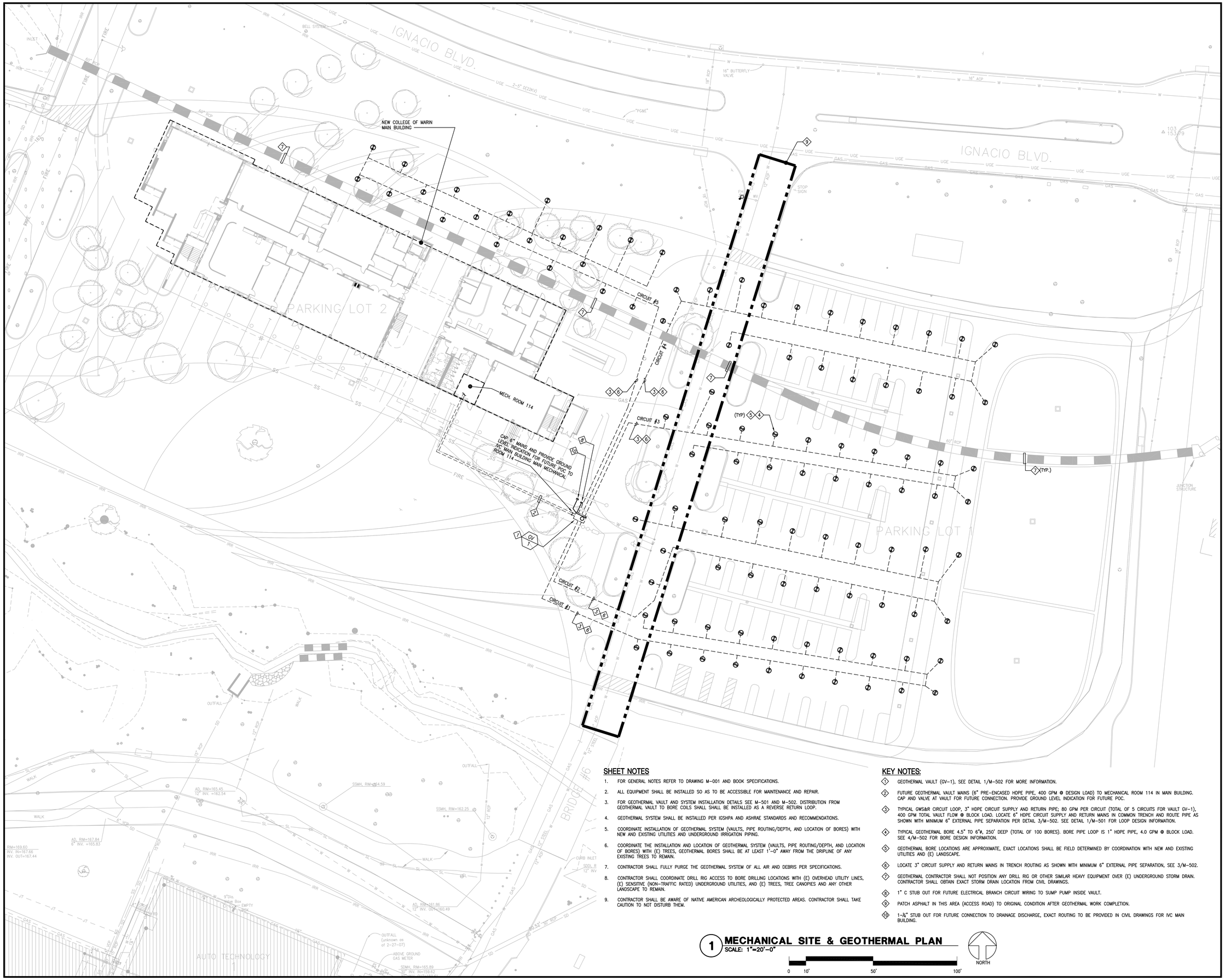
Indian Valley Campus

District Project # 305B & 417B

AE Project # 205271.2 date: 12/22/08

GEOTHERMAL PHASE 1
FIELD PLAN
RECORD DRAWINGS

IVC-C-101



SHEET NOTES

1. FOR GENERAL NOTES REFER TO DRAWING M-001 AND BOOK SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE INSTALLED SO AS TO BE ACCESSIBLE FOR MAINTENANCE AND REPAIR.
3. FOR GEOTHERMAL VAULT AND SYSTEM INSTALLATION DETAILS SEE M-501 AND M-502. DISTRIBUTION FROM GEOTHERMAL VAULT TO BORE COILS SHALL SHALL BE INSTALLED AS A REVERSE RETURN LOOP.
4. GEOTHERMAL SYSTEM SHALL BE INSTALLED PER IGSHPA AND ASHRAE STANDARDS AND RECOMMENDATIONS.
5. COORDINATE INSTALLATION OF GEOTHERMAL SYSTEM (VAULTS, PIPE ROUTING/DEPTH, AND LOCATION OF BORES) WITH NEW AND EXISTING UTILITIES AND UNDERGROUND IRRIGATION PIPING.
6. COORDINATE THE INSTALLATION AND LOCATION OF GEOTHERMAL SYSTEM (VAULTS, PIPE ROUTING/DEPTH, AND LOCATION OF BORES) WITH (E) TREES, GEOTHERMAL BORES SHALL BE AT LEAST 1'-0" AWAY FROM THE DRIPLINE OF ANY EXISTING TREES TO REMAIN.
7. CONTRACTOR SHALL FULLY PURGE THE GEOTHERMAL SYSTEM OF ALL AIR AND DEBRIS PER SPECIFICATIONS.
8. CONTRACTOR SHALL COORDINATE DRILL RIG ACCESS TO BORE DRILLING LOCATIONS WITH (E) OVERHEAD UTILITY LINES, (E) SENSITIVE (NON-TRAFFIC RATED) UNDERGROUND UTILITIES, AND (E) TREES, TREE CANOPIES AND ANY OTHER LANDSCAPE TO REMAIN.
9. CONTRACTOR SHALL BE AWARE OF NATIVE AMERICAN ARCHEOLOGICALLY PROTECTED AREAS. CONTRACTOR SHALL TAKE CAUTION TO NOT DISTURB THEM.

KEY NOTES:

1. GEOTHERMAL VAULT (GV-1), SEE DETAIL 1/M-502 FOR MORE INFORMATION.
2. FUTURE GEOTHERMAL VAULT MAINS (6" PRE-ENCASED HDPE PIPE, 400 GPM @ DESIGN LOAD) TO MECHANICAL ROOM 114 IN MAIN BUILDING. CAP AND VALVE AT VAULT FOR FUTURE CONNECTION. PROVIDE GROUND LEVEL INDICATION FOR FUTURE POC.
3. TYPICAL GWS&R CIRCUIT LOOP, 3" HDPE CIRCUIT SUPPLY AND RETURN PIPE; 80 GPM PER CIRCUIT (TOTAL OF 5 CIRCUITS FOR VAULT GV-1), 400 GPM TOTAL VAULT FLOW @ BLOCK LOAD. LOCATE 6" HDPE CIRCUIT SUPPLY AND RETURN MAINS IN COMMON TRENCH AND ROUTE PIPE AS SHOWN WITH MINIMUM 6" EXTERNAL PIPE SEPARATION PER DETAIL 3/M-502. SEE DETAIL 1/M-501 FOR LOOP DESIGN INFORMATION.
4. TYPICAL GEOTHERMAL BORE 4.5" TO 6"ø, 250' DEEP (TOTAL OF 100 BORES). BORE PIPE LOOP IS 1" HDPE PIPE, 4.0 GPM @ BLOCK LOAD. SEE 4/M-502 FOR BORE DESIGN INFORMATION.
5. GEOTHERMAL BORE LOCATIONS ARE APPROXIMATE, EXACT LOCATIONS SHALL BE FIELD DETERMINED BY COORDINATION WITH NEW AND EXISTING UTILITIES AND (E) LANDSCAPE.
6. LOCATE 3" CIRCUIT SUPPLY AND RETURN MAINS IN TRENCH ROUTING AS SHOWN WITH MINIMUM 6" EXTERNAL PIPE SEPARATION, SEE 3/M-502.
7. GEOTHERMAL CONTRACTOR SHALL NOT POSITION ANY DRILL RIG OR OTHER SIMILAR HEAVY EQUIPMENT OVER (E) UNDERGROUND STORM DRAIN. CONTRACTOR SHALL OBTAIN EXACT STORM DRAIN LOCATION FROM CIVIL DRAWINGS.
8. 1" C STUB OUT FOR FUTURE ELECTRICAL BRANCH CIRCUIT WIRING TO SUMP PUMP INSIDE VAULT.
9. PATCH ASPHALT IN THIS AREA (ACCESS ROAD) TO ORIGINAL CONDITION AFTER GEOTHERMAL WORK COMPLETION.
10. 1-¼" STUB OUT FOR FUTURE CONNECTION TO DRAINAGE DISCHARGE, EXACT ROUTING TO BE PROVIDED IN CIVIL DRAWINGS FOR IVC MAIN BUILDING.

1 MECHANICAL SITE & GEOTHERMAL PLAN

SCALE: 1"=20'-0"

0 10' 50' 100'

NORTH

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

SWINERTON MANAGEMENT & CONSULTING

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REGISTERED PROFESSIONAL ENGINEER
MARK A. ATKA
M33075 (exp. 06/30/09)
MECHANICAL
STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
XX-XXXXXX
AC XX FLS XX SSS XX
DATE 00.00.0000

REVISION
AC XX FLS XX SSS XX
DATE 00.00.0000

key plan

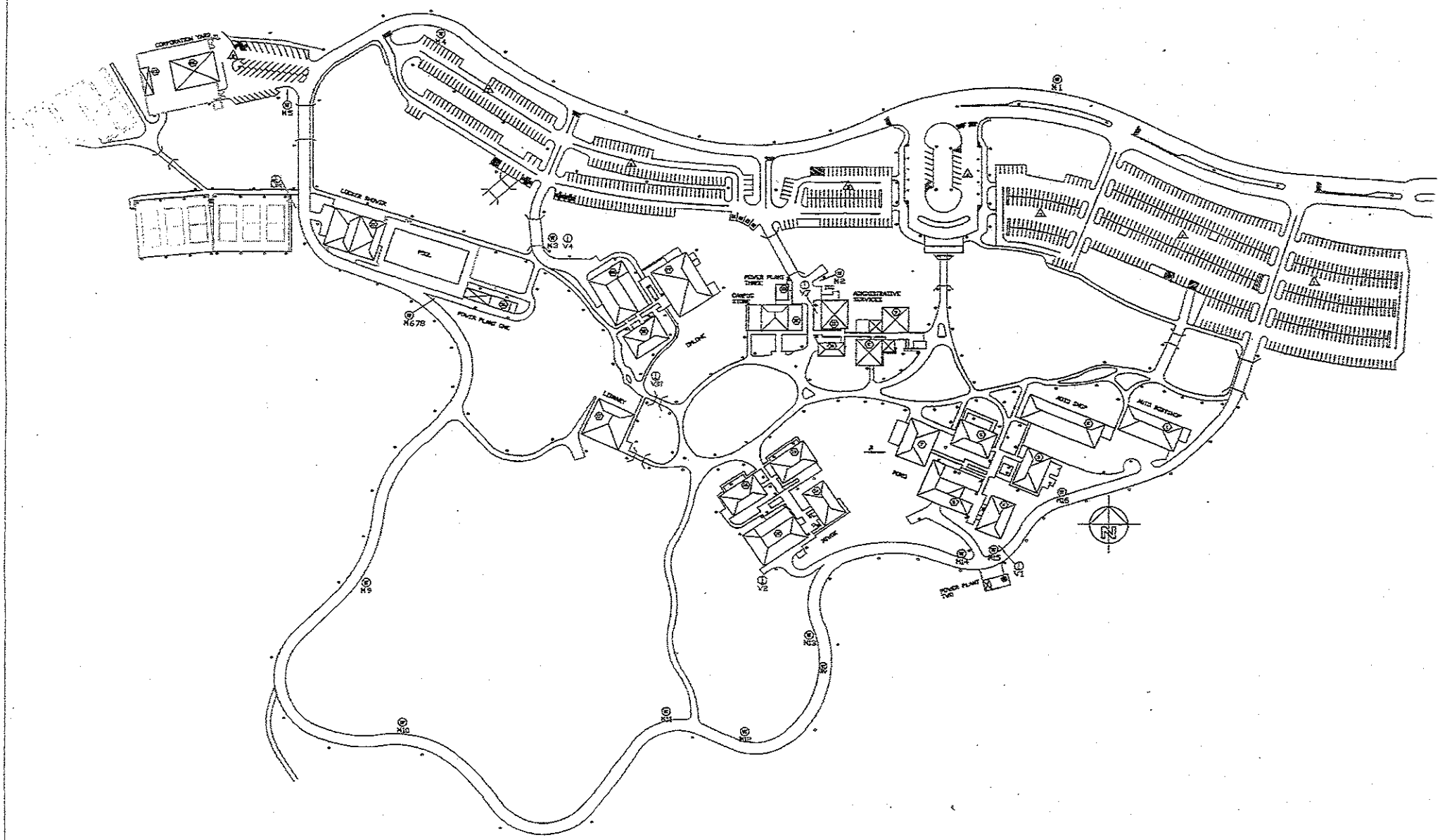
rev.	date	issue
1	12/04/2007	ISSUED FOR BID
2	11/06/2007	ISSUED FOR COST ESTIMATE

GEOTHERMAL FIELD PACKAGE
Indian Valley Campus

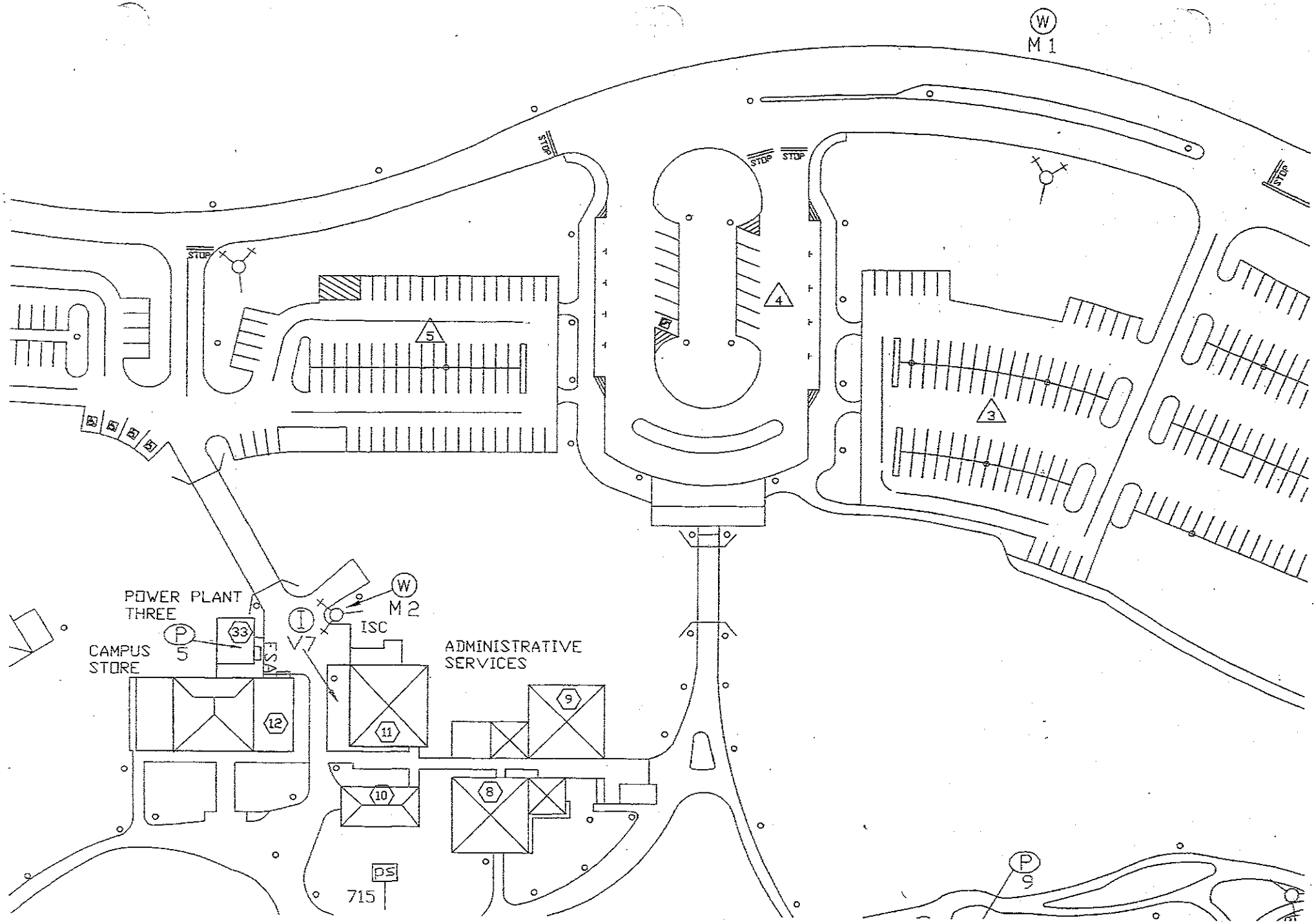
District Project # 417B
AE Project # 205271.25 Date: 12-04-07

MECHANICAL GEOTHERMAL FIELD PLAN

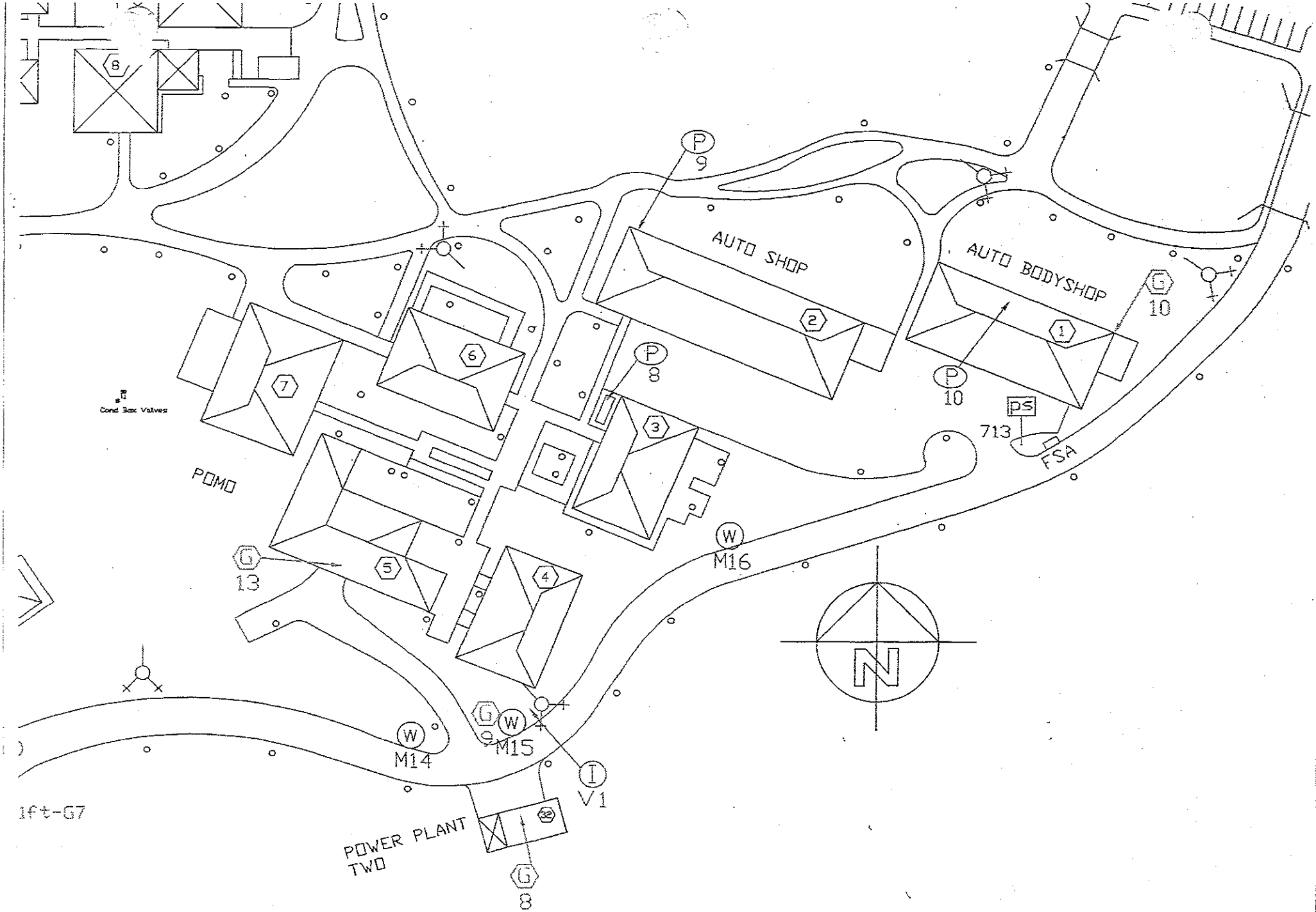
M-101



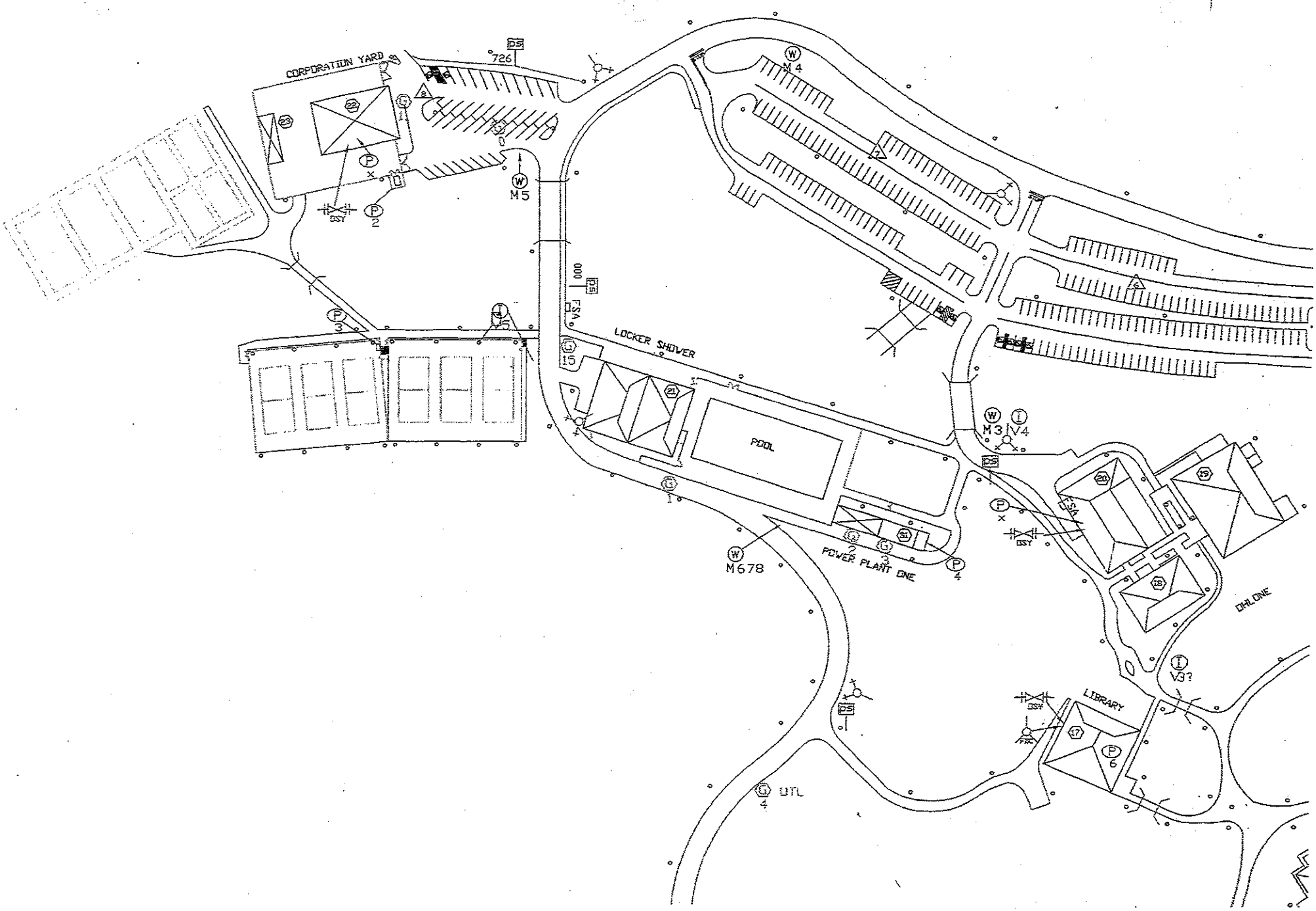
Marin Community College Indian Valley Campus	IVC SITE MAP	Scale None Date 10/29/01	1 of 1	RNT



Marin Community College Indian Valley Campus	IVC SITE MAP N.E.	Scale None Date 11/19/2002	1 of 1	RNT



Marin Community College Indian Valley Campus	IVC SITE MAP S.E.	Scale None Date 11/19/2002	1 of 1	RNT



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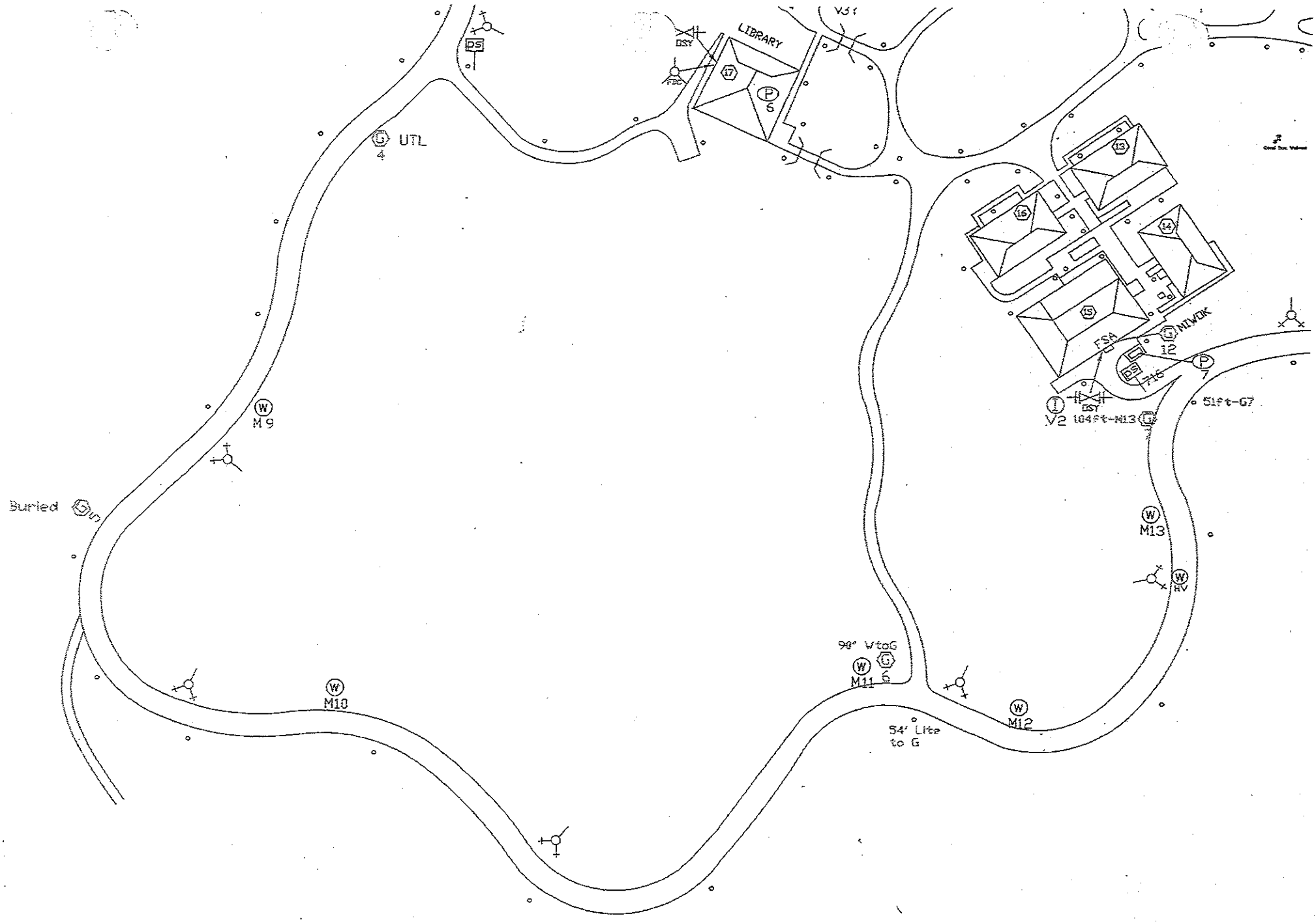

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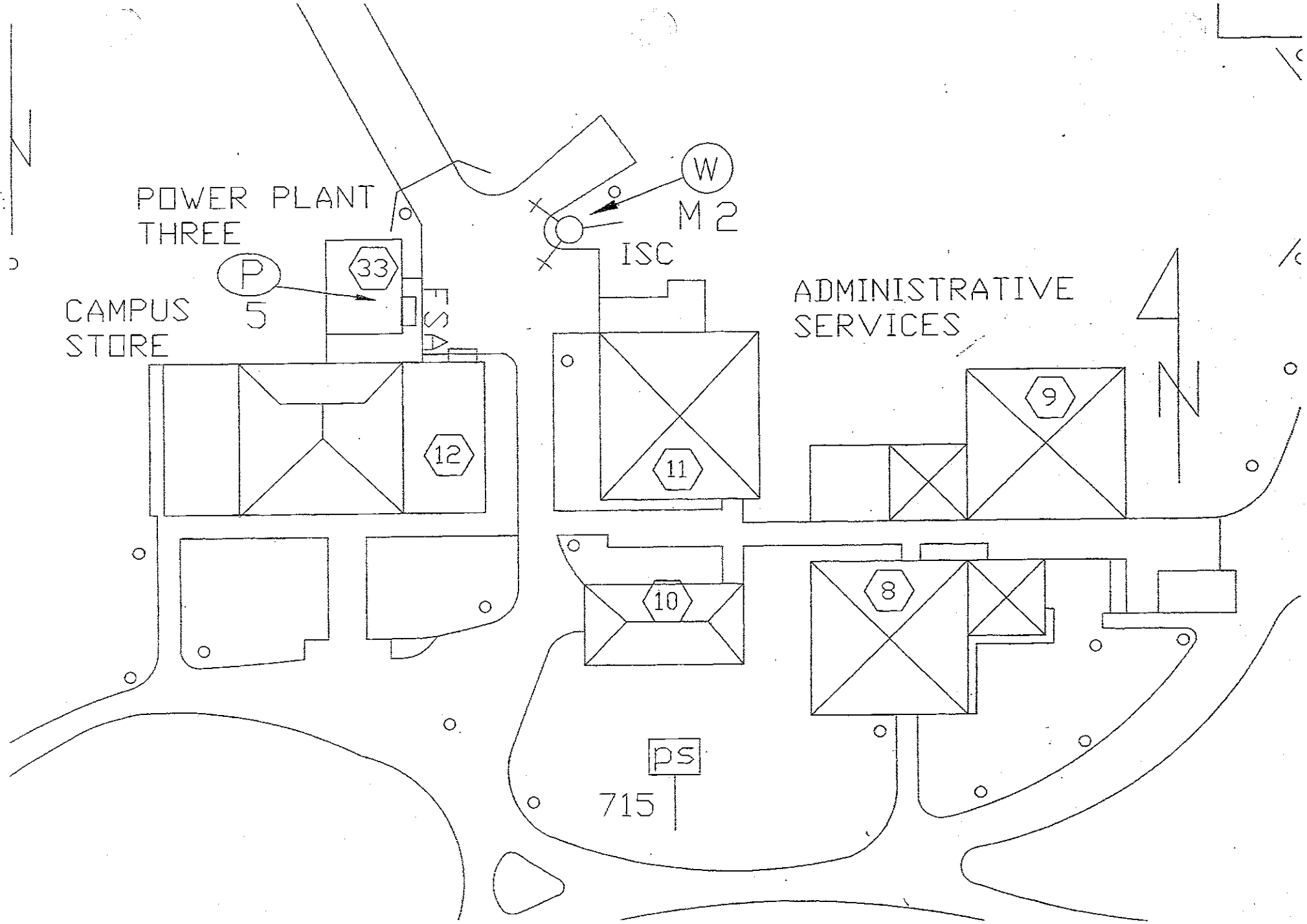
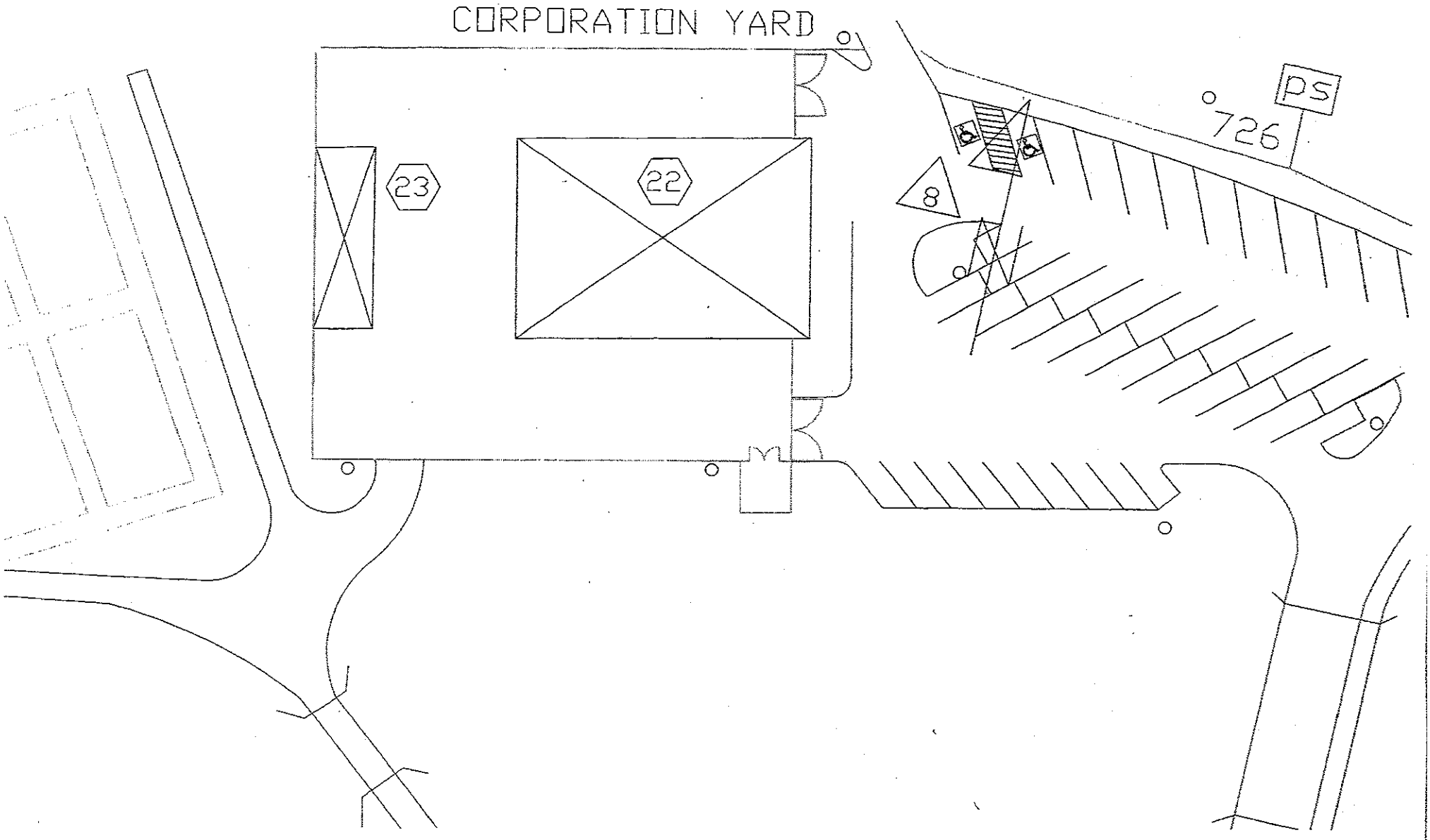
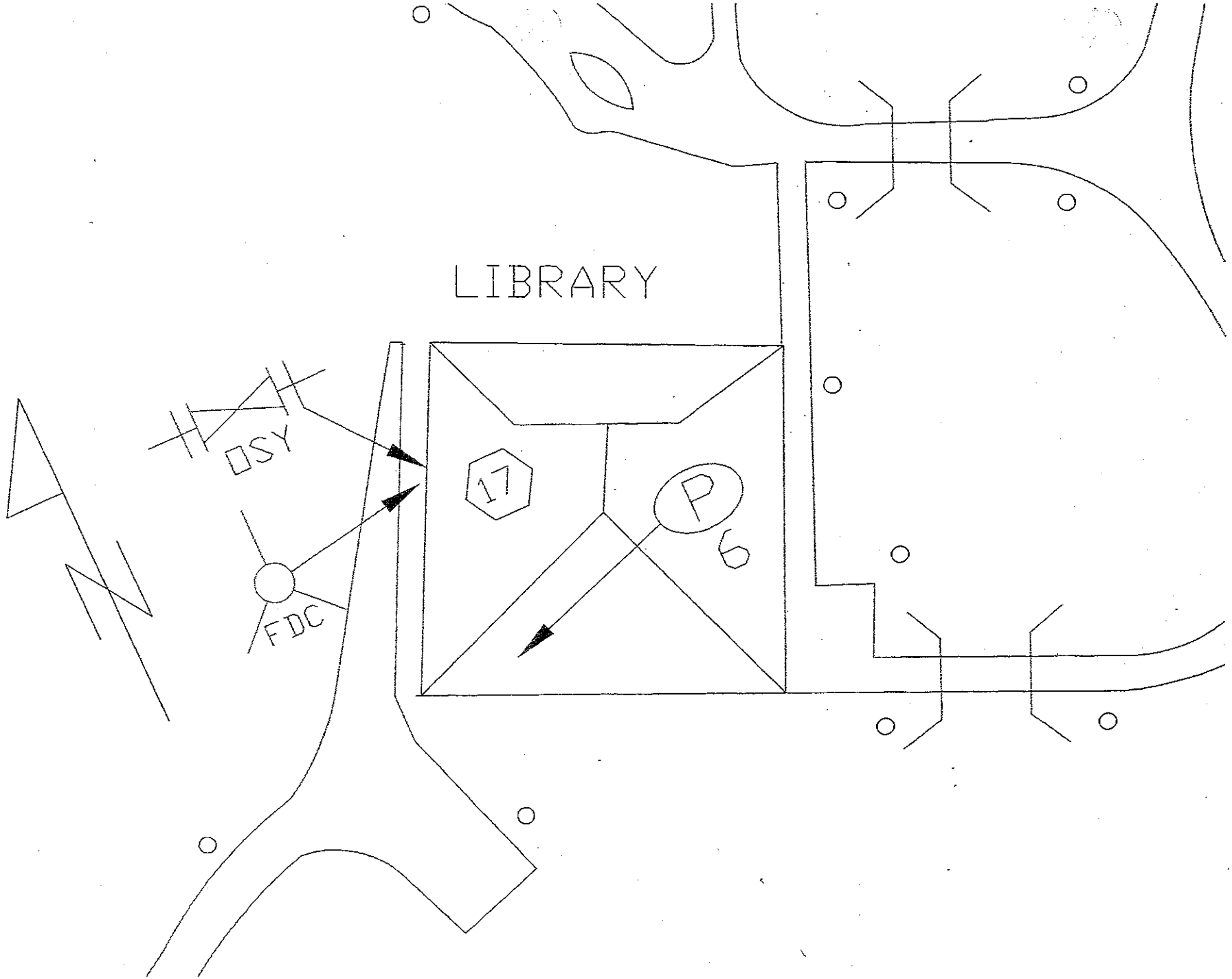


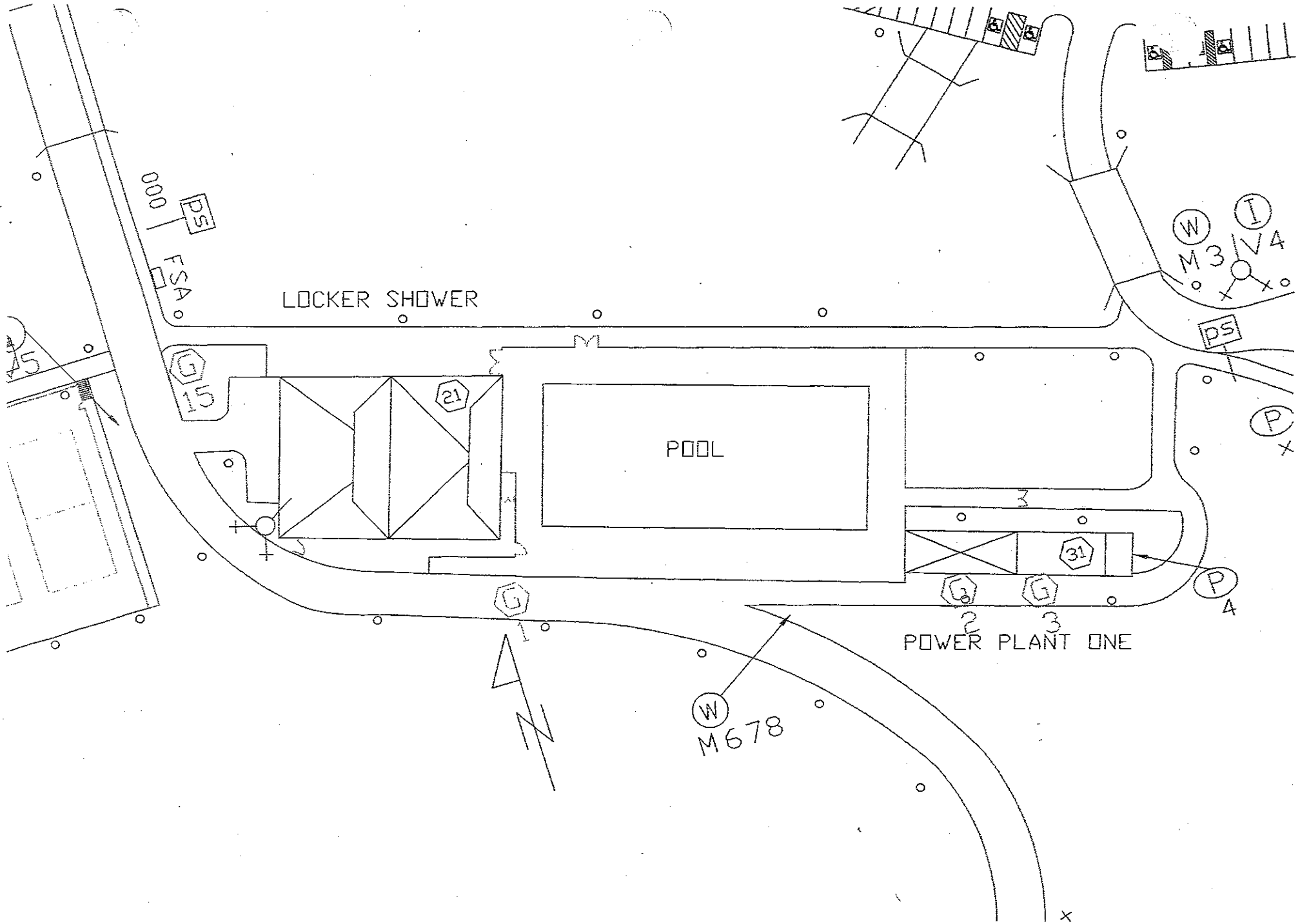
Marin Community College Indian Valley Campus	ADMINISTRATIVE SERVICES AREA PLAN	Scale None Date 10/19/01	1 of 1	RNT



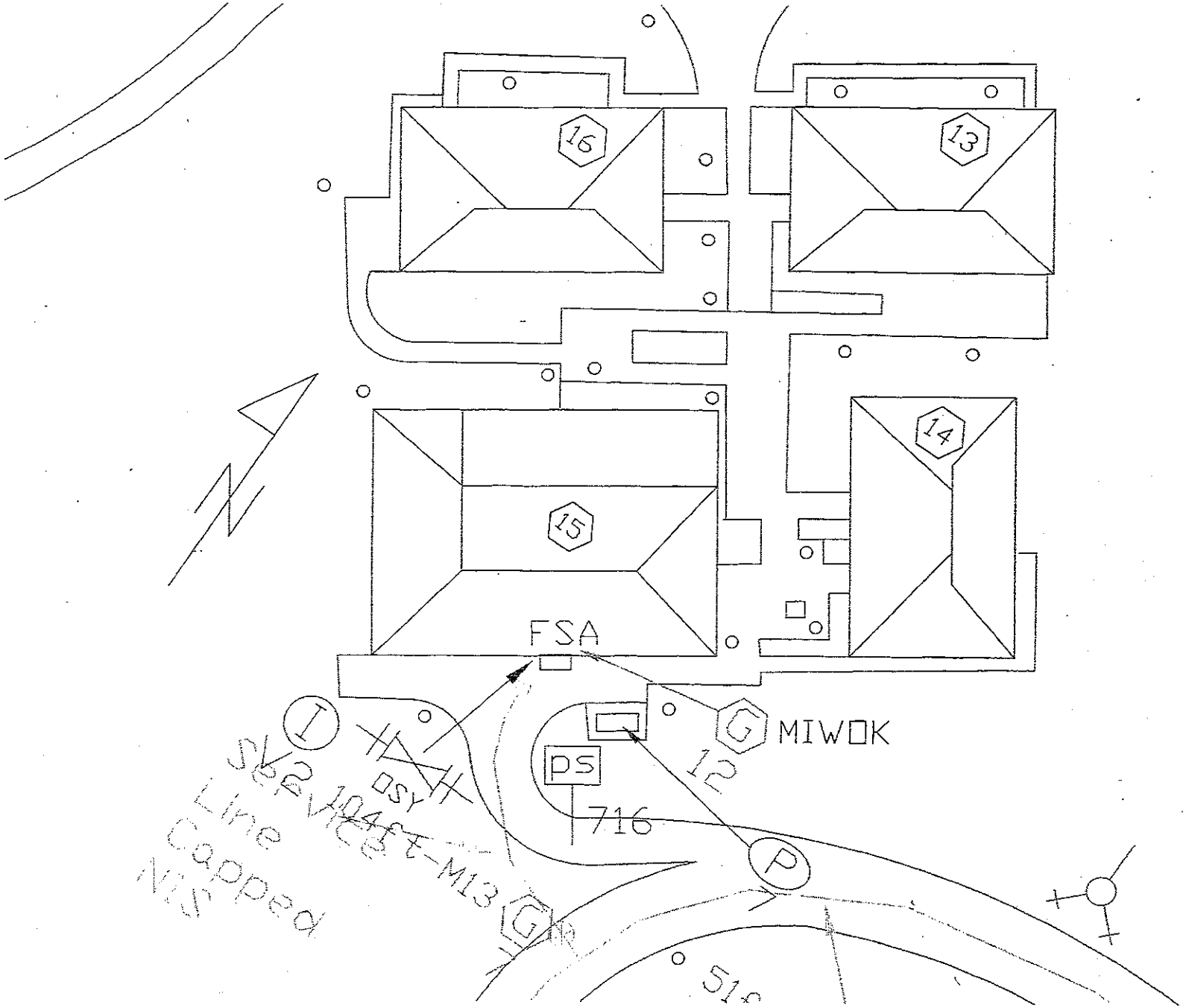
Marin Community College Indian Valley Campus	CORPORATION YARD AREA PLAN	Scale None Date 10/29/01	1 of 1	RNT



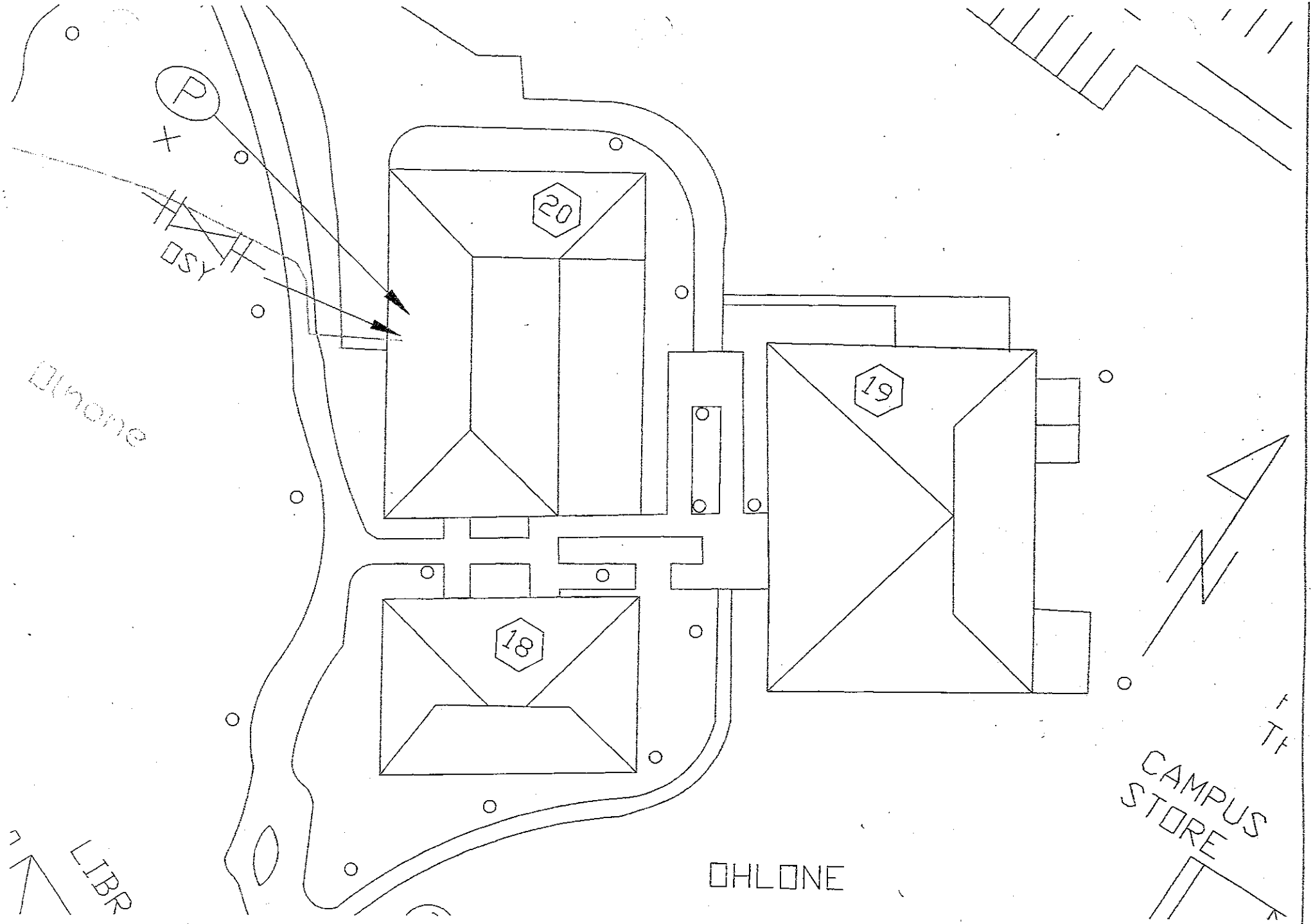
Marin Community College Indian Valley Campus	LIBRARY AREA PLAN	Scale None Date 10/19/99	1 of 1	RNT



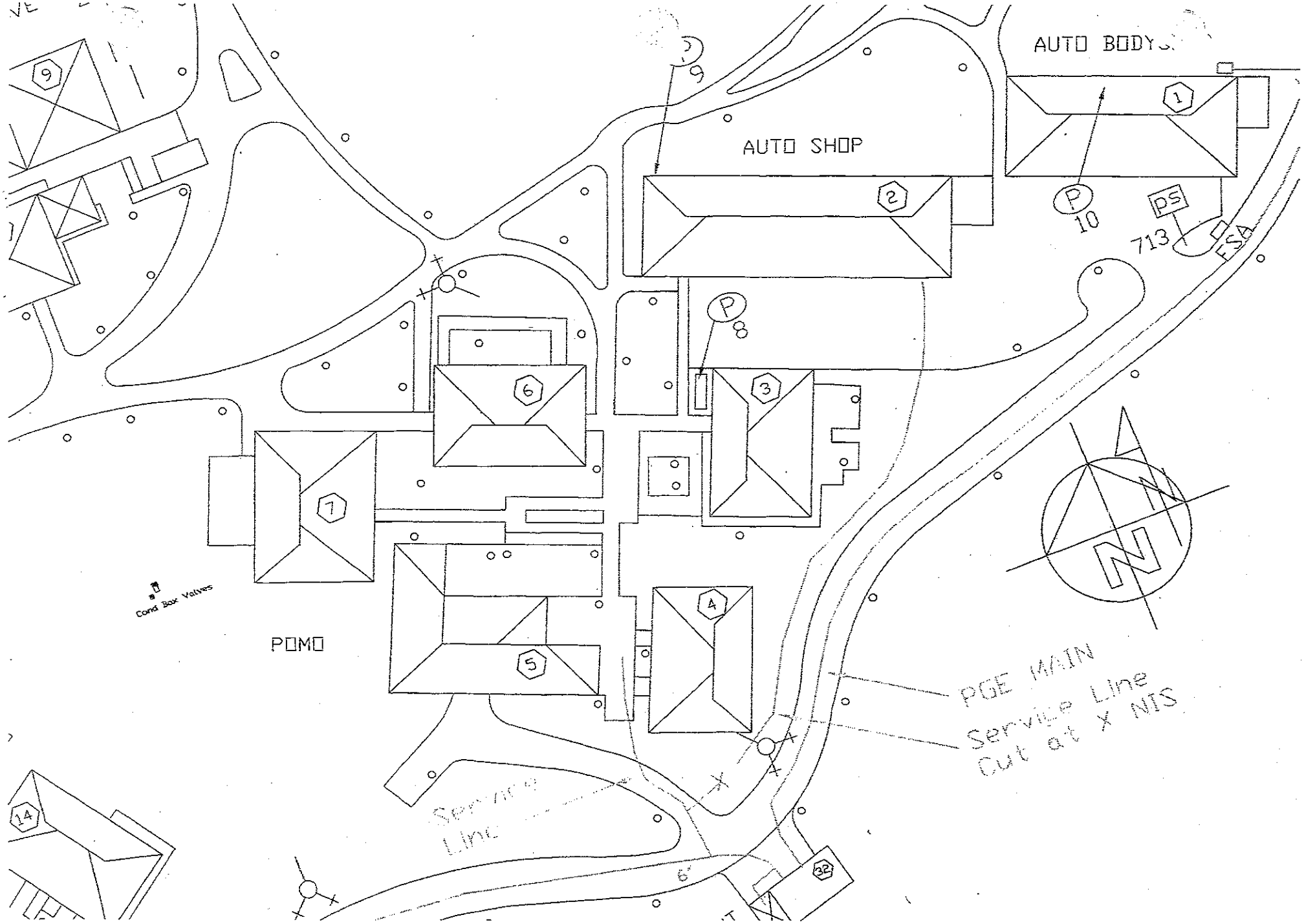
Marin Community College Indian Valley Campus	LOCKER SHOWER AREA PLAN	Scale None Date 11/19/02	1 of 1	RNT



Marin Community College Indian Valley Campus	MIWOK AREA PLAN	Scale None Date 3/30/99	1 of 1	RNT



Marin Community College Indian Valley Campus	OHLONE AREA PLAN	Scale None Date 10/19/99	1 of 1	RNT



Marin Community College Indian Valley Campus	POMO AREA PLAN	Scale None Date 2/18/00	1 of 1	RNT

Measure C
Bond Spending Implementation Plan for College of Marin (2007-2013)

INDIAN VALLEY CAMPUS

Draft Environmental Impact Report

SCH #2007032097

July 2007

Prepared for
Marin Community College District

Prepared by
Amy Skewes-Cox, AICP
Environmental Planner

"The College of Marin has helped me find the passion to excel."

"DJ" Bola, College of Marin Student, 2007*

* "DJ" Bola spoke at the President's Circle breakfast held on May 1, 2007.

MEASURE C BOND SPENDING IMPLEMENTATION PLAN

FOR

COLLEGE OF MARIN (2007-2013): INDIAN VALLEY CAMPUS

DRAFT ENVIRONMENTAL IMPACT REPORT

SCH #2007032097

Prepared for

Marin Community College District

Prepared by

Amy Skewes-Cox, AICP
Environmental Planner

With

Donald Ballanti
Tom Camara
Environmental Collaborative
Fehr & Peers
Royston Hanamoto, Alley & Abey
Illingworth & Rodkin, Inc.
LSA Associates
Natalie Macris
Peak & Associates
Placemakers
Questa Engineering
Ripley & Scoggin
Wordsmith Word Processing

JULY 2007

PROJECT TITLE:	Measure C Bond Spending Implementation Plan for College of Marin (2007-2013), Indian Valley Campus, Draft Environmental Impact Report
LEAD AGENCY:	Marin Community College District
PROJECT LOCATION:	Indian Valley Campus
JURISDICTION:	City of Novato
CHANGE IN SQUARE FOOTAGE:	25,000 to 37,000 new gross square feet
PRIMARY NEW BUILDINGS:	Main Building Complex
PRIMARY RENOVATED STRUCTURES:	Transportation Technology Complex
REZONING:	None
GENERAL PLAN AMENDMENT:	None
TIMING OF CONSTRUCTION:	2007 to 2013
EIR SCHEDULE:	Draft EIR out for review: July 24 to September 6, 2007 Final EIR published: Approximately October 2007 Certification by Marin Community College District Board of Trustees: Anticipated November 2007
COLLEGE WEBSITE FOR CEQA DOCUMENTS:	http://www.marin.edu/MeasureC/public_notices/index.htm

Written comments on this Draft EIR should be submitted by 5:00 PM, **September 6, 2007, to:**

Ms. Debra Mathau, Construction Manager
Swinerton Management and Consulting
P.O. Box 144003
835 College Avenue, MS-3
Kentfield, CA 94904

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1. INTRODUCTION

This document is an Environmental Impact Report (EIR) prepared in accordance with the California Environmental Quality Act of 1970 (CEQA), as amended. The Marin Community College District is the lead agency for the project evaluated in this EIR.

The proposal to adopt the Bond Spending Implementation Plan (Draft) is a "project," as defined by the Guidelines for Implementation of the California Environmental Quality Act (CEQA Guidelines), Section 15378. The Bond Spending Implementation Plan (also referred to as the "Implementation Plan") can be found on the College's website (http://www.marin.edu) under "Measure C Updates."

The CEQA Guidelines (Section 15064) require the preparation of an EIR when a lead agency determines that there is evidence that a project may have a significant effect on the environment. The need to prepare an EIR for the project was established by the District as a result of a preliminary evaluation of the likely effects of the project. A Notice of Preparation – Draft Environmental Impact Report (NOP) was issued for the proposed project on March 12, 2007.

CEQA requires preparation of an EIR when there is evidence that a project may have a significant effect on the environment.

According to CEQA Section 21002.1: "The purpose of an EIR is to identify the significant effects of a project on the environment, to identify alternatives to the project, and to indicate the manner in which significant effects can be mitigated or avoided." As defined by CEQA Guidelines Section 15382, a "significant effect on the environment" means a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." The EIR process also serves to involve members of the public in the decision-making process.

This EIR has been prepared to provide the Marin Community College District Board of Trustees with the information necessary to decide whether or not to approve the project as currently proposed. The illustrations of the project contained herein, although necessarily conceptual in nature, describe the major features of the project such as site layout, total new estimated square footages on the Indian Valley campus of the College of Marin, and proposed changes in terms of access, utilities, and parking.

This EIR is both a "Program EIR" and a "Project EIR" as defined by CEQA. As stated in CEQA Guidelines Section 15168:

A Program EIR is an EIR which may be prepared on a series of actions that can be characterized as one large project and are related either:

1) *Geographically,*
2) *As logical parts in the chain of contemplated actions,*
3) *In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or*
4) *As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways*. (CEQA Guidelines, 2007)

This EIR is a "Program EIR" for the overall Bond Spending Implementation Plan, including the Ignacio Creek Management Plan, which is a component of the Implementation Plan.

A "Project EIR" addresses the environmental impacts of a specific development project. In this case, this EIR addresses the new Main Building Complex and the Transportation Technology Complex at the project level, since schematic drawings had been completed for these buildings as of the printing of this Draft EIR.

When a Program EIR has been adopted for a project, subsequent activities in the program must be examined in light of the Program EIR to determine whether an additional environmental document must be prepared. Because the two main components of the Bond Spending Implementation Plan (i.e., new Main Building Complex and Transportation Technology Complex) have been addressed at a "project level," future CEQA review should not be required for these two projects. Some of the smaller projects that are components of the Implementation Plan may be found to be Categorically Exempt under CEQA and a Notice of Exemption may be filed with the County Clerk.

1.1 PROJECT BACKGROUND

The Bond Spending Implementation Plan for the Indian Valley campus was developed by the District under the direction of the Director of Modernization. A number of consulting firms assisted in the development of the Implementation Plan by first completing detailed assessments of existing conditions on both the Kentfield campus and the Indian Valley campus of the College of Marin. These assessments determined which buildings could be improved by renovations and which buildings needed to be demolished and replaced. The assessments also noted environmental conditions of concern such as fragile areas related to biological resources and cultural resources, areas of high noise levels, and local circulation constraints.

A number of public meetings were also held in order to solicit public input on how the college should develop over the coming years. Once the Draft Bond Spending Implementation Plan was developed, the environmental consultants prepared Initial Study Checklists for both campuses. These Initial Studies and

the Notice of Preparation, stating that an EIR would be prepared, were circulated for public review from March 12 to April 10, 2007. In addition, scoping meetings were held on each campus, to provide an overview of the CEQA process and to solicit input regarding environmental issues of concern. A summary of public comments is provided in Appendix A. The main issues of concern for the Indian Valley campus were the following:

- Desire to draw parking and traffic to the west end of the new Main Building.
- Issue of downstream runoff affecting houses.
- Construction noise.
- Geothermal drilling.
- Issue of repaving Ignacio Boulevard in 2007.
- Archaeological issues.
- Hazards during construction such as hazardous emissions.
- Odors and need for scrubbers and better ventilation.
- Whether operations would be changing.
- Activity at east end of campus such as parking lot use and associated noise.
- Desire to keep bus route at center of "dog-bone."
- Desire to consider visitor parking only and short-term parking at east end of new Main Building.
- Issue of nighttime parking and possible exceptions to allow parking closer to buildings.
- Desire to put high intensity uses at west end of new Main Building such as cafeteria and library.
- How entrance to bioswale area at east end of parking lot will be protected/secure.

The above issues are addressed herein under various topics found in Chapter 4.

1.2 PUBLIC REVIEW

The Draft EIR will be circulated for review and comment for 45 days.

This Draft EIR will be circulated for review and comment by the public and other interested parties, agencies, and organizations for a 45-day period from July 19, 2007 to September 4, 2007. Following public review, a Final EIR will be prepared that responds to comments received during the public review period. The District Board of Trustees will review and consider the Final EIR prior to any decision to approve, revise, or reject the proposed project that is the Bond Spending Implementation Plan. No construction is planned, with the exception of minor categorically exempt projects, until after adoption of the Final EIR and approval of the Implementation Plan. Approval of the project would be

accompanied by written findings for each significant adverse environmental effect identified in the EIR. When making findings, the District must adopt a monitoring or reporting program for mitigation measures that are conditions of project approval and that are necessary to reduce or avoid significant effects on the environment. This monitoring or reporting program is designed to ensure CEQA compliance during project implementation. The project-specific mitigation monitoring program will be included in the Final EIR.

1.3 ORGANIZATION OF THE EIR

This Draft EIR is organized into the following chapters:

Chapter 1, Introduction: Provides an introduction and overview that describes the intended use of this EIR, project background, the EIR process, and organization of the document.

Chapter 2, Summary: Briefly describes the project and concerns associated with it, identifies levels of significance for each impact addressed in the EIR, summarizes the project-specific effects of the project, and compares impacts of the project with those of alternatives to the project.

Chapter 3, Project Description: Contains information on the project site, project objectives, and project characteristics.

Chapter 4, Environmental Setting, Impacts and Mitigation Measures: Contains an analysis of environmental topics. The discussion of each topic is divided into an *Introduction* that identifies background documents used in the analysis; an *Environmental Setting* section that describes baseline environmental information; and an *Environmental Impacts and Mitigation Measures* section that describes project-specific impacts and mitigation measures.

Chapter 5, Alternatives: Assesses impacts of three alternatives to the project, including a No Project Alternative as required by CEQA. The alternatives are compared to the proposed project and an "Environmentally Superior Alternative" is identified.

Chapter 6, CEQA Considerations: Contains sections required by CEQA, including a discussion of cumulative impacts, growth inducement, and significant unavoidable impacts.

Chapter 7, Report Preparation: Lists the persons directly involved in preparing this report.

Chapter 8, Bibliography and Persons Consulted: Lists the persons, agencies, and organizations contacted during preparation of this report.

Chapter 9, Glossary and Abbreviations: Provides a list of commonly used acronyms and the full terminology.

1.4 REFERENCES

CEQA Guidelines, 2007. California Environmental Quality Act, Public Resources Code Sections 21000 to 21178, As Amended January 1. Website: http://www.ceres.ca.gov/ceqa/, May 2.

2. SUMMARY

This section briefly describes the Measure C Bond Spending Implementation Plan for the Indian Valley campus of the College of Marin (the "project") and the environmental issues associated with its adoption and implementation. This section also summarizes the project-specific impacts and mitigation measures identified in this EIR (Table 2-1) and identifies the alternatives to the project that will be considered.

PROJECT UNDER REVIEW

The Bond Spending Implementation Plan proposes one new building and modernization of other buildings.

The proposed project includes the adoption of the proposed Bond Spending Implementation Plan (also referred to as the "Implementation Plan") for the Indian Valley campus, located at the terminus of Ignacio Boulevard in the City of Novato. This Implementation Plan includes the plans for new construction and remodeling on the campus as envisioned in the $249.5 million Measure C Bond Program adopted by the Marin County voters in 2004. At the end of the six-year construction period, the building area on the Indian Valley campus would increase from the current 176,820 gross square feet (gsf) to 201,820 to 213,820 gsf (an increase of 25,000 to 37,000 gsf). The focus of the EIR is on new construction. Remodeling of buildings would not result in any significant impacts and would primarily entail upgrades to interior elements, roofing, and HVAC systems.

The Implementation Plan proposes one new building (see Figure 2-1): a new Main Building Complex to be located on the north side of Ignacio Creek in Parking Lot 2. This complex would house classrooms, general labs, student services, learning labs, and library space. The building would be between 25,000 and 37,000 gross square feet in size. An outdoor "green space" at the south side of the building near the creek is proposed as a student gathering and picnic area. Elevations and a site plan for this building can be found in Appendix E.

Buildings that would be modernized would include the Transportation Technology Complex (Pomo 1 and 2). Pomo 4 and Power Plants 1, 2, and 3 may also be upgraded and/or modernized; this work might include roof replacement and replacement and relocation of the heating distribution system (campus boilers) and replacement of the high-voltage distribution system.

Site improvements on the campus would include landscaping, pathways, lighting, and utilities. A new pedestrian/emergency access bridge is proposed across Ignacio Creek to link the west area of the new Main Building Complex and the rest of the campus to the south. A new geothermal system is proposed in Parking Lots 1 and 2 to allow the District to reduce long-term energy demands of

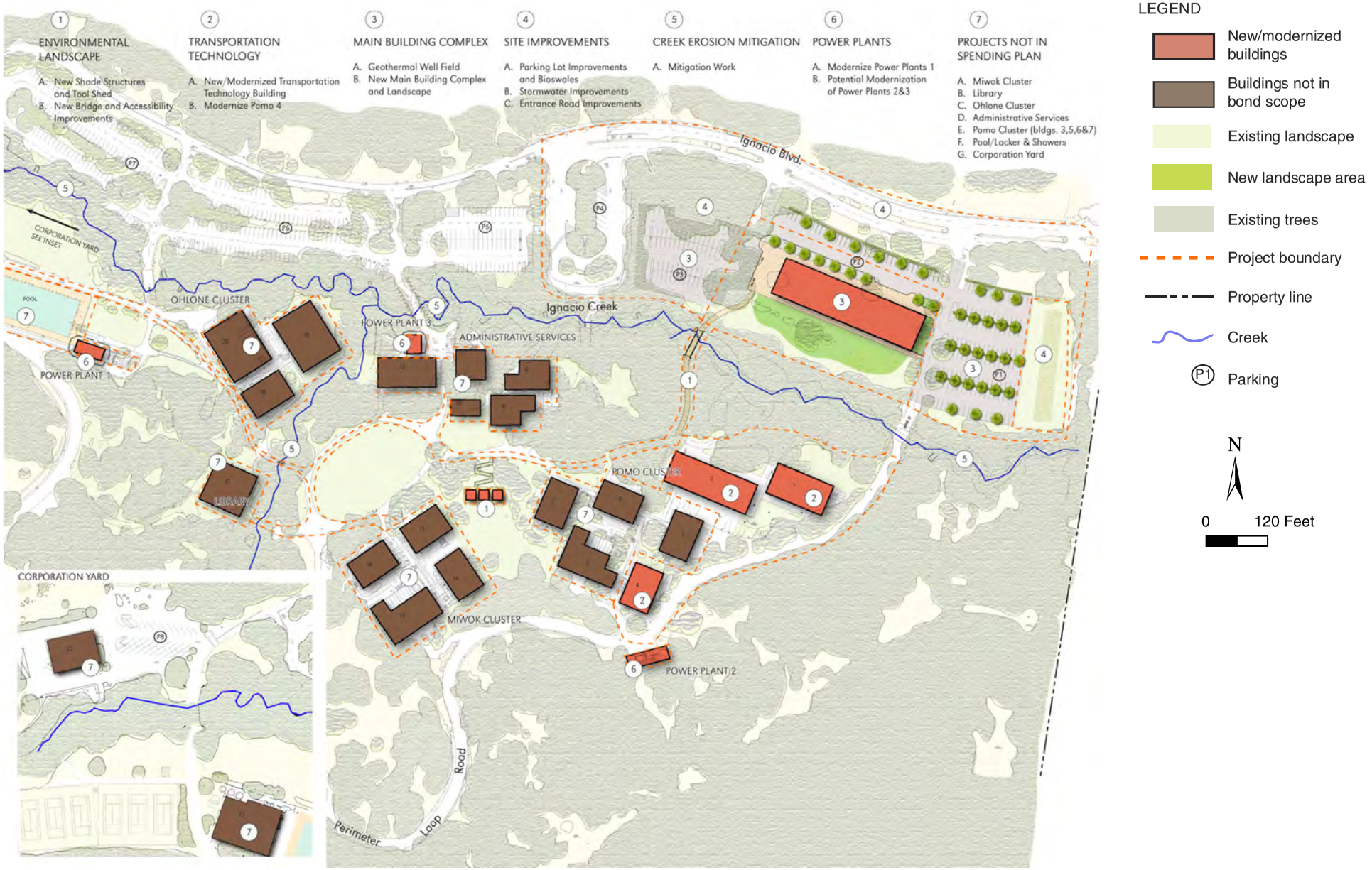

Figure 2-1

SOURCE: RHAA 2007

INDIAN VALLEY CAMPUS BOND SPENDING IMPLEMENTATION PLAN

the proposed Main Building Complex. New bioswales and detention basins are proposed to improve water quality downstream of the campus and to reduce peak stormwater flows. No major access or roadway improvements are proposed.

AREAS OF POTENTIAL CONTROVERSY

In March 2007, the Notice of Preparation (NOP) for this EIR was circulated to state, regional, and local agencies and to several community organizations and individuals.[1] The District received one comment letter on the NOP from the North Marin Water District (NMWD) regarding water conservation, use of recycled water, and required agreements with the NMWD.

A public scoping meeting was held for the proposed project on March 28, 2007 at the campus. The overall project was presented and the public was asked to comment on environmental issues of concern. The public comments addressed potential light and noise issues, archaeological concerns, flooding, and other topics (see Appendix A).

IMPACTS AND MITIGATION MEASURES

Under CEQA, a significant effect on the environment is defined as a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by a project, including effects on land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. The criteria of significance used to determine whether or not effects are significant are included in the introduction to each topic discussion in this EIR.

This EIR presents information in the following 12 impact categories: Land Use and Planning; Geology, Soils and Seismicity; Biological Resources; Hydrology and Water Quality; Hazardous Materials; Cultural Resources; Transportation; Air Quality; Noise; Public Services; Public Utilities; and Energy and Sustainability.

This EIR identifies one significant unavoidable project-level impact related to short-term construction noise. The EIR also identifies potentially significant impacts related to all the topics except land use and planning. Mitigation measures are proposed that would reduce these potentially significant impacts to less-than-significant levels.

Prior to approval of the project and after certification of the Final EIR, written findings regarding each of the identified environmental impacts must be prepared. Also, a monitoring program for each mitigation measure must be adopted. This monitoring program will be prepared as part of the Final EIR for this project but does not need to be formally adopted until the preparation of

[1] The NOP mailing list is available at the office of Swinerton Management & Consulting, Building MS-3 on the Kentfield campus.

findings after certification of the Final EIR. For significant unavoidable impacts, a statement of overriding considerations must be prepared to address how economic, social, legal, technological or other benefits of the project outweigh the significant, unavoidable impacts that have been identified. This statement accompanies the findings prior to project approval.

ALTERNATIVES TO THE PROJECT

Three alternatives to the proposed project are evaluated in Chapter 5, Alternatives:

- Alternative 1: No Project
- Alternative 2: Relocate New Main Building Complex to South Side of Ignacio Creek
- Alternative 3: No New Main Building Complex

The environmental impacts of each alternative are compared. The ability of each alternative to meet project objectives is also evaluated. None of the alternatives would meet the objectives identified for the project but the "Environmentally Superior" alternative (in addition to the No Project Alternative) would be Alternative 3, No New Main Building Complex.

SUMMARY TABLE

Table 2-1 summarizes project impacts and mitigation measures. The table identifies the level of impact both before and after mitigation.

Table 2-1 Summary of Impacts and Mitigation Measure

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
Land Use and Planning			
Implementation of the project would not result in potentially significant land use impacts or require land use-related mitigation measures.			
Geology, Soils and Seismicity			
GEOLOGY-1: Strong shaking associated with an earthquake could damage existing and proposed structures at the Indian Valley campus.	PS	GEOLOGY-1a: The District shall complete a design-level Geotechnical Investigation Report prepared by a Registered Geotechnical Engineer and Structural Design Plans as prepared by a Registered Structural Engineer for all new campus construction. Proper foundation and structural engineering and construction shall be performed in accordance with the recommendations of a Registered Geotechnical Engineer and a Registered Structural Engineer.	LTS
		GEOLOGY-1b: All new buildings and structures shall comply with the California Building Code and Uniform Building Code and compliance shall be verified by the California Division of the State Architect (DSA) in the review of building plans. Incorporation of seismic construction standards would reduce the potential for catastrophic effects of ground shaking such as complete structural failure to an acceptable standard, but would not entirely eliminate the hazard of seismically induced ground shaking. Implementation of the above measures would reduce impacts from strong seismic ground shaking to a less-than-significant level.	
GEOLOGY-2: Soil erosion or the loss of topsoil could occur during construction, particularly during storms.	PS	GEOLOGY-2: The District shall prepare an Erosion Control and Storm Water Pollution Prevention Plan prior to the onset of demolition, site grading, or construction. Please see Section 4.4, Hydrology and Water Quality, for impacts and mitigation measures for construction-related storm runoff. With implementation of the standard control measures therein, impacts from substantial soil erosion or the loss of topsoil would be reduced to less-than-significant levels.	LTS

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
GEOLOGY-3: Expansive soils could affect foundations and other building elements associated with adoption of the Bond Spending Implementation Plan.	PS	GEOLOGY-3: The District shall design and construct all new structures in accordance with geotechnical investigation recommendations (see Mitigation Measure GEOLOGY-1a), including recommended mitigation measures for expansive clay soils. Potential measures for control of expansive clay soils include the following: (1) Use of deeper foundations than normal. (2) Use of non-expansive layer under floor slabs and pavements. (3) Treating site soils with lime to reduce the expansion potential and increase the strength. (4) Additional reinforcing for slabs and walkways. (5) Grading around structures to assure positive drainage away from structures. The District's compliance with the above mitigation measure would reduce the impact of potentially expansive soils to a less-than-significant level.	LTS
Biological Resources			
BIOLOGY-1: Adoption and implementation of the proposed Bond Spending Implementation Plan could affect a number of special-status animal species.	PS	BIOLOGY-1a: Prior to any in-channel construction activities in Ignacio Creek and the main tributary drainages, a pre-construction survey shall be conducted by a qualified biologist to confirm absence of any northwestern pond turtle, foothill yellow-legged frog, California red-legged frog, or steelhead within the construction zone. Details of the pre-construction and avoidance measures shall consist of the following: (1) A pre-construction survey shall be conducted no more than 15 days prior to initiation of construction within the creek channel. (2) Before any in-channel construction activities begin, a qualified biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include (a) handout of a brochure with a description and photographs of the species of concern and their remote potential for their occurrence in the creek corridor, (b) the general measures that are being implemented to ensure avoidance as they relate to the project, and (c)	LTS

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
BIOLOGY-1 *continued*		procedures to follow if construction personnel believe they have encountered one or more of these species, such that all work shall stop in the vicinity and the qualified biologist immediately contacted to verify the species and recommend appropriate actions before construction resumes. (3) All fueling and maintenance of vehicles and other equipment, and staging areas, shall be located at least 50 feet from the creek channel to prevent any water quality degradation. All workers shall be informed of the importance of preventing spills and the appropriate measures to take should a spill occur. These issues shall be addressed in contract specifications. (4) If any species of concern are encountered, either during the pre-construction survey or during construction, construction work shall stop and a Species Avoidance Program shall be prepared by a qualified biologist through consultation with trustee agencies. Appropriate construction restrictions shall be established based on recommendations of the qualified biologist to ensure that no inadvertent take occurs while the Species Avoidance Program is being prepared. If northwestern pond turtles or foothill yellow legged frog are encountered, the qualified biologist shall informally consult with the California Department of Fish and Game (CDFG). If California red-legged frog are encountered, the U.S. Fish and Wildlife Service (USFWS) shall be consulted on the appropriate methods to ensure avoidance of inadvertent take of this listed species. If steelhead are encountered, the National Marine Fisheries Service (NMFS) shall be consulted on the appropriate methods to insure avoidance of inadvertent take of this listed species. (5) If required, the Species Avoidance Program shall define measures that serve to adequately avoid inadvertent loss of the species of concern during all aspects of project construction, including vegetation removal, any channel dewatering, and installation of proposed improvements. Monitoring shall be provided by the qualified biologist as necessary to ensure no inadvertent take occurs during construction. The qualified biologist shall be authorized to modify construction practices and to require additional avoidance and protective measures necessary to prevent loss of individual turtles or frogs.	

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
BIOLOGY-1 *continued*		(6) If any species of concern are encountered, a draft of the Species Avoidance Program shall be submitted to the Marin Community College District Director of Modernization for review and approval prior to any in-channel disturbance. If California red-legged frog and/or steelhead are encountered during the pre-construction survey, evidence of incidental take authorization from trustee agencies shall be provided as part of the required Species Avoidance Program. (7) Final reports summarizing the results of the pre-construction survey and, if required, the Species Avoidance Program, shall be submitted to the Marin Community College District Director of Modernization.	
		BIOLOGY-1b: Construction restrictions shall be implemented for activities within Ignacio Creek and main tributary drainage channel to avoid possible inadvertent take of steelhead, although the potential for occurrence of this species is highly unlikely and is in part dependent on removal of downstream barriers that preclude movement onto the Indian Valley campus. Restrictions shall consist of the following: (1) Any in-channel construction activities shall be restricted to the period when stray or dispersing anadramous fish would not be expected within the Ignacio Creek channel (i.e., from June 15 through October 15). (2) Adequate measures shall be taken to minimize disturbance and sedimentation, temporarily contain flow of any surface water across the construction zone, and ensure that no listed fish species are trapped within the construction zone prior to commencement of dewatering or other in-channel disturbance.	
		BIOLOGY-1c: Any active raptor or loggerhead shrike nests in the vicinity of proposed grading and new construction shall be avoided until young birds are able to leave the nest (i.e., fledged) and forage on their own. This measure shall not apply to ongoing maintenance and building repair, to which raptors are already acclimated. Avoidance may be accomplished either by scheduling grading and vegetation removal during the non-nesting period (September through February), or if this is not feasible, by conducting a pre-construction survey for active nests. A pre-construction survey report verifying that no active	

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
BIOLOGY-1 *continued*		nests are present shall be submitted to the Marin Community College District Director of Modernization for review and approval prior to initiation of grading or construction during the nesting season, or verifying that nesting has been completed as detailed below. Provisions of the pre-construction survey and nest avoidance measures, if necessary, shall include the following: (1) If grading and new construction are scheduled during the active nesting period (March through August), a qualified wildlife biologist shall be retained by the District to conduct a pre-construction nesting survey no more than 15 days prior to initiation of grading to provide confirmation on presence or absence of active nests in the vicinity. (2) If active nests are encountered, species-specific measures shall be prepared by a qualified biologist through informal consultation with the CDFG and implemented to prevent nest abandonment. At a minimum, grading and new construction in the vicinity of the nest shall be deferred until the young birds have fledged. A nest-setback zone of at least 300 feet shall be established for raptors and 100 feet for loggerhead shrike and passerine birds within which all construction-related disturbances shall be prohibited. The perimeter of the nest-setback zone shall be fenced or adequately demarcated, and construction personnel restricted from the area. (3) If permanent avoidance of the nest is not feasible, impacts shall be minimized by prohibiting disturbance within the nest-setback zone until a qualified biologist verifies either a) that the birds have not begun egg-laying and incubation, or b) that the juveniles from the nest are foraging independently and capable of independent survival at an earlier date than usual. (4) A survey report of findings verifying that any young have fledged shall be submitted for review and approval by the Marin Community College District Director of Modernization prior to initiation of grading or new construction in the nest-setback zone. Following approval by the Director of Modernization, grading and construction in the nest-setback zone may proceed as proposed. The combination of the above measures, as needed, would reduce this impact to a less-than-significant level.	

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
BIOLOGY-2: Construction activities in or near Ignacio Creek and tributary drainages could adversely affect regulated waters and contribute to water quality degradation.	PS	BIOLOGY-2: Disturbance to jurisdictional wetlands and waters shall be avoided and minimized to the extent feasible, with the exception of the stabilization and restoration efforts to Ignacio Creek and the main tributary drainage. Appropriate authorizations shall be obtained from the U.S. Army Corps of Engineers, Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG) where avoidance is determined to be infeasible, and required conditions implemented to protect and mitigate any adverse impacts on existing habitat and water quality. Where required by jurisdictional agencies, a detailed mitigation plan shall be prepared by a qualified wetland consultant for any wetlands or waters affected by proposed improvements, with replacement provided at a minimum 1:1 ratio. The plan shall clearly identify the total jurisdictional areas affected by proposed improvements, as well as habitat to be created, restored, or enhanced as part of the required mitigation. Any replacement mitigation shall be consolidated to the degree possible to improve existing habitat values. The plan shall specify performance criteria, maintenance and long-term management responsibilities, monitoring requirements, and contingency measures. Monitoring shall be conducted by the consulting wetland specialist until the success criteria are met.	LTS
Hydrology and Water Quality			
HYDROLOGY-1: Construction under the Bond Spending Implementation Plan could cause soil erosion, sedimentation, and other effects on water quality.	PS	HYDROLOGY-1a: The District shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) prior to the onset of site grading or construction. (1) The Erosion Control Plan shall include erosion control/soil stabilization techniques such as straw mulching, erosion control blankets, erosion control matting, and hydro-seeding. Silt fences used in combination with fiber rolls shall be installed downslope of all graded slopes. Fiber rolls shall be installed in the flow path of graded areas receiving concentrated flows and silt fences and other proven sediment retention structures shall be placed around all soil stockpiles. The construction entrances shall be stabilized to prevent tracking of dirt onto roads next to the site through the use of a gravel base, erosion control blankets, or other approved elements.	LTS

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HYDROLOGY-1 *continued*		(2) After construction is completed, all drainage facilities shall be inspected for accumulated sediment, and these drainage structures shall be cleared of debris and sediment. Long-term mitigation measures to be included in the project SWPPP shall include, but not be limited to, the following: (3) Description of potential sources of erosion and sediment at the project site, and any hazardous or potentially hazardous materials and chemicals. This description shall include a thorough assessment of existing and potential pollutant sources. (4) Development of a monitoring and implementation plan. Maintenance requirements and frequency, including vector control, clearing of clogged or obstructed inlet or outlet structures, and vegetation/landscape maintenance, shall be carefully described. (5) The SWPPP shall be adjusted, as necessary, to address any inadequacies of the best management practices (BMPs).	
		HYDROLOGY-1b: The District shall implement "best management practices" (BMPs) for preventing the discharge of other construction-related NPDES pollutants beside sediment (i.e., paint, concrete, etc.) to downstream waters, including the following measure: (1) Parking lots and other paved areas shall be swept regularly to eliminate the majority of litter and debris washing into storm drains and thus entering local waterways. The combination of the above measures would reduce this impact to a less-than-significant level.	

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HYDROLOGY-2: Runoff from the Indian Valley campus could increase non-point source pollution in receiving waters such as San Francisco Bay.	PS	HYDROLOGY-2a: The District shall design the proposed bio-retention basin to improve water quality by allowing sediments and particulates to settle prior to discharging to downstream waterways. By retaining runoff, the bio-retention ponds shall allow for some pollutant removal through infiltration and vegetative uptake. Many pollutants in stormwater, including lead, copper, zinc, phosphorus, and hydrocarbons, are associated with sediment and fine particulates. Thus, the ability of a stormwater practice to remove many nutrients, trace metals, and hydrocarbons is largely related to its ability to remove suspended sediment and particulates. The basin shall serve the purposes of both peak storm runoff detention and water quality control. The basin shall discharge to a storm drain pipe that outfalls to Ignacio Creek south of Parking Lot 1. In order to optimize both the stormwater detention and water quality control aspects, the following steps shall be taken: (1) The basin shall be designed to drain slowly over 24 hours. (2) The basin shall include a coarse pollutant basin, or forebay, just above the storage basin to remove coarse materials as they enter the storage basin. The coarse pollutant basin shall be deep enough to detain average seasonal flows for about five minutes and prevent the resuspension of deposited sediments. (3) The coarse pollutant basin and the storage basin shall be lined with hardy wetland vegetation and grass, respectively. (4) The basin shall be designed with an emergency spillway for 50-year storm events. (5) Excess sediment decreases basin efficiency and must be removed to ensure basin features function as designed. Two staff gauges shall be placed in appropriate areas of the dry detention pond to monitor sediment accumulation. The staff gauges shall track the rate of sedimentation and identify the need for sediment removal.	LTS

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HYDROLOGY-2 *continued*		(6) Sediment shall be removed when an average of 1.5 feet of sediment has accumulated in the basin. (7) Sediment shall be removed by mechanical means such as a small excavator or loader. Care should be taken to ensure that the basin is restored to the proper invert elevations. (8) It may be necessary to re-seed both the coarse pollutant basin and the storage basin after maintenance. Initially during construction, sediment input into the basin would be high. The basin would likely need to be cleaned within 1 to 2 years after project completion. Adequate access for basin maintenance shall be provided.	
		HYDROLOGY-2b: A maintenance and operations plan shall be developed by the District as part of the overall design of the bio-retention basin. The basin shall receive periodical maintenance including desilting, vegetation clearing, and trash and debris removal.	
		HYDROLOGY-2c: The District shall ensure that the bio-retention basin shall be designed per the latest edition of the California Municipal BMP Manual or other standards approved by the State Water Resources Control Board (SWRCB) prior to construction.	
		HYDROLOGY-2d: The District shall incorporate, where feasible within design constraints, grassed swales (bioswales) into the project drainage system for runoff conveyance and filtering of pollutants. Rather than have concrete drainage swales to transport the runoff to roadside ditches, these swales shall be lined with grass or appropriate vegetation to encourage the biofiltration of sediment, phosphorus, trace metals, and petroleum from runoff prior to discharge into the formal drainage network. General design guidelines relevant to optimizing the pollutant removal mechanisms of grassed swales are (1) a dense, uniform growth of fine-stemmed herbaceous plants for optimal filtering of pollutants; (2) vegetation that is tolerant to the water, climatological, and soil conditions of the project site is preferred; (3) grassed swales that maximize water contact with the vegetation and soil surface	

PS = Potentially Significant; LTS = Less Than Significant; SU = Significant and Unavoidable

Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HYDROLOGY-2 *continued*		have the potential to substantially improve removal rates, particularly of soluble pollutants; and (4) pollutant removal efficiency is increased as the flow path length is increased. Grassed/vegetated swales treat concentrated flow and must be sized wide enough to maintain low-flow velocities and maximize surface area. A minimum of 1,200 square feet of swale per impermeable acre is recommended. Entrances to swales shall be equipped with flow spreaders to dissipate energy and avoid erosion and have a maximum longitudinal slope of 5 percent.	
		HYDROLOGY-2e: The District shall develop a long-term maintenance plan for the bioswale to include the following: (1) regular mowing to promote growth and increase density and pollutant uptake (vegetative height should be no more than 8 inches, cuttings must be promptly removed and properly disposed of); (2) removal of sediments during summer months when they build up to 6 inches at any spot, cover bioswale vegetation, or otherwise interfere with bioswale operation; and (3) reseeding of bioswale as necessary, whenever maintenance or natural processes create bare spots. The combination of these mitigation measures would reduce the impact to a less-than-significant level.	
HYDROLOGY-3: Alteration of the existing drainage pattern at the Indian Valley campus could result in increased erosion on and off the site.	PS	HYDROLOGY-3a: Where possible, the District shall use biotechnical bank stabilization techniques as erosion protection within Ignacio Creek (Questa Engineering, 2006). Biotechnical erosion control techniques include planted rock rip rap, large woody debris, coir fiber logs, willow staking, soil reinforcement products, and other pre-approved erosion protection materials. The use of concrete reinforcement should be minimized to the greatest extent possible and only used to protect infrastructure.	LTS
		HYDROLOGY-3b: The District shall ensure that all stormwater drainage shall be released in such a manner as to prevent erosion within Ignacio Creek by using existing outfalls and dissipators. The combination of these mitigation measures would reduce the impact to a less-than-significant level.	

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
Hazardous Materials			
HAZARDS-1: The routine transportation, use or disposal of hazardous materials associated with the adoption of the Bond Spending Implementation Plan could result in hazardous conditions.	PS	HAZARDS-1a: The District shall develop a Demolition and Disposal Plan to reduce hazards related to the demolition, staging, and removal of construction-related and hazardous materials, including building remodeling waste materials. The plan shall include measures for handling the spill of liquids such as fuels or hydraulic fluids as well as abatement of hazardous materials and airborne dust. This plan shall be submitted to the California Division of the State Architect (DSA) for approval prior to any demolition.	LTS
		HAZARDS-1b: The Demolition and Disposal Plan for safe renovation of existing structures shall include asbestos dust control and shall incorporate site surveys for the presence of potentially hazardous building materials. The plan shall address both on-site worker protection and off-site resident protection from both chemical and physical hazards.	
		HAZARDS-1c: All contaminated building materials shall be tested for contaminant concentrations and shall be disposed of at appropriate licensed landfill facilities. Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations must be followed for demolition of facilities with minimum quantities listed by the NESHAP of regulated asbestos-containing materials. All demolitions must include notification of the appropriate regulatory agency, even if no asbestos is present at the site, and all demolitions and renovations are "subject" to the Asbestos NESHAP insofar as owners and operators must determine if and how much asbestos is present at the site (EPA, 2006). Prior to obtaining a demolition permit from the Bay Area Air Quality Management District (BAAQMD), an asbestos demolition survey shall be conducted in accordance with the requirements of BAAQMD Regulation 11, Rule 2.	
		HAZARDS-1d: Prior to building demolition, hazardous building materials such as peeling, chipping and friable lead-based paint and asbestos-containing building materials shall be removed in accordance with all applicable guidelines, laws, and ordinances. The plan shall include a program of air monitoring for dust particulates and attached contaminants. Dust control and suspension of work during dry windy days shall be addressed in the plan.	

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HAZARDS-1 *continued*		HAZARDS-1e: For the impact of flaking and peeling lead-based paint, the requirements of Title 8, California Code of Regulations, Section 1532.1 (T8 CCR 1532.1) shall be followed. These requirements include but are not limited to the following: (1) Loose and peeling lead-containing paint shall be removed prior to building demolition. Workers conducting removal of lead paint must receive training in accordance with T8 CCR 1532.1. (2) The lead paint removal project shall be designed by a California Department of Health Services (DHS)-certified lead project designer, project monitor or supervisor. (3) The District shall prepare a written Lead Compliance Plan that meets the requirements of the lead construction standard by any contractor that affects lead coatings. (4) Workers who may be exposed above the "Action Level" must have blood lead levels tested prior to commencement of lead work and at least quarterly thereafter for the duration of the project. Workers who are terminated from the project shall have their blood lead levels tested within 24 hours of termination. (5) A written exposure assessment must be prepared in accordance with T8 CCR 1532.1. (6) Any amount of lead waste generated, including painted building components, shall be characterized for proper disposal in accordance with Title 22, Section 66261.24.	
		HAZARDS-1f: The District shall apply all Existing Facilities Assessment Hazardous Material Report recommendations for asbestos-containing materials, lead-containing materials, and other hazardous materials. Building-specific recommendations shall be followed prior to demolition, during construction, and during future facility operations. These recommendations include: (1) Label unidentified hazardous waste. (2) Store hazardous materials in code-compliant cabinets. (3) Maintain quantities within limits of fire codes.	

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HAZARDS-1 *continued*		(4) Update the Hazardous Materials Report on a regular basis to reflect the actual chemical inventories. (5) For laboratory sinks, evaluate permitting and requirements by Publicly Owned Treatment Works for acid waste line discharge and pre-treatment, such as dilution tanks. (6) Test fume ventilation hoods and exhaust systems annually. (7) Create "chain of responsibility" for hazardous materials/wastes. (8) Provide complete set of Materials Safety Data Sheets (MSDS) where materials are stored and used. (9) Inventory and remove fixtures and structural elements that may contain hazardous materials prior to renovation or demolition. (10) Obtain regulatory agency underground storage tank (UST) closure, if necessary.	
		HAZARDS-1g: The District's Hazardous Materials Business Plan (HMBP) shall be updated for the safe storage and use of all hazardous chemicals. The HMBP shall include the type and quantity of hazardous materials, a site map showing where hazardous materials are stored and where they may be used and transported from, risks of using these materials, material safety data sheets for each material, a spill prevention plan, an emergency response plan, employee training consistent with Occupational Safety and Health Administration (OSHA) guidelines, and emergency contact information. The District qualifies for the program if it stores a hazardous material equal to or greater than the minimum reportable quantities. These quantities are 55 gallons for liquids, 500 pounds for solids and 200 cubic feet (at standard temperature and pressure) for compressed gases. Some exemptions apply. The HMBP shall be submitted prior to the start of operation of the new facilities, and must be entirely reviewed and updated at least once every three years, or within 30 days of any significant change. Some of these changes are new emergency contact information, major increases or decreases in hazardous	

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HAZARDS-1 *continued*		materials storage, and/or changes in location of hazardous materials. Plans shall be submitted to the County of Marin Certified Unified Programs Agency (CUPA), managed by the Marin County Department of Public Works Waste Management Division. The Marin County Department of Public Works Waste Management Division may inspect the College at least once a year to make sure that the HMBP is complete and accurate.	
		HAZARDS-1h: Building spaces shall be designed to handle the intended use, with sprinklers, alarms, vents, and secondary containment structures, where applicable. These systems must pass plan review through the Division of the State Architect.	
		HAZARDS-1i: During construction, the utilities (including sprinkler systems) shall pass pressure and flush tests to make sure they perform as designed. At the end of construction, occupancy shall not be allowed until a final inspection is made by the Novato Fire Protection District for conformance of all building systems with the Fire Code and National Fire Protection Agency Requirements. The inspection shall include testing of sprinklers systems, alarm systems, ventilation and airflow systems, and secondary containment systems. The inspection shall include a review of the emergency evacuation plans. These plans shall be modified as deemed necessary.	
		HAZARDS-1j: All transportation of hazardous materials and hazardous waste to and from the site shall be in accordance with Title 49 of the Code of Federal Regulations, US Department of Transportation (DOT), State of California Department of Transportation (Caltrans), and local laws, ordinances and procedures including placards, signs, and other identifying information. Implementation of the above mitigation measures would reduce the impact of routine transportation, use, or disposal of hazardous materials to a less-than-significant level.	

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
HAZARDS-2: An accidental hazardous materials release could occur on the Indian Valley campus with current campus operations. While the Bond Spending Implementation Plan would reduce the risk of accidental hazardous materials releases by providing for renovations and life safety and general code upgrades to the Transportation Technology Complex in Pomo 1 and 2, the potential remains for such a release.	PS	HAZARDS 2a: The District shall check the State and federal lists of regulated substances for chemicals that pose a major threat to public health and safety or the environment because they are highly toxic, flammable, or explosive. This list is available from the Marin County Department of Public Works Waste Management Division. Should the campus qualify for the California Accidental Release Program (CalARP), as determined in consultation with Marin County Department of Public Works Waste Management Division, the District shall complete a CalARP registration form and submit it to the Environmental Health Department. Following registration, the District shall submit a Risk Management Plan (RMP). RMPs are designed to handle accidental releases and ensure that businesses have the proper information to provide to emergency response teams if an accidental release occurs. The storage or handling of more than a threshold quantity (TQ) of a regulated substance requires the development and implementation of a Risk Management Plan. RMPs describe impacts to public health and the environment if a regulated substance is released near schools, residential areas, hospitals, and child care facilities. RMPs must include procedures for keeping employees and customers safe, handling regulated substances, training staff, maintaining equipment, storing materials safely, and responding to an accidental release.	LTS
		HAZARDS-2b: Employee training shall include spill prevention, clean-up, and notification procedures in accordance with the Occupational Health and Safety Administration (OSHA) and the State level CAL-OSHA. This includes having sufficient clean-up materials such as spill kits, absorbent rags, and sand available to staff for containing and cleaning up spills and leaks, as well as procedures for proper disposal of contaminated materials. Implementation of the combination of these mitigation measures would reduce the impact of accidental releases of hazardous materials to a less-than-significant level.	

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
Cultural Resources			
CULTURAL-1: Ground-disturbing activities associated with the proposed project have the potential to affect prehistoric archaeological deposits that have been identified on the Indian Valley campus.	PS	CULTURAL-1: Once specific development plans are finalized a qualified archaeologist shall review such plans and prepare a Treatment Plan (Plan) that provides specific treatments for areas where ground disturbance would occur on campus. The Plan shall take into account locations where archaeological deposits have been identified on campus relative to where ground-disturbing activities would occur. The Plan shall outline the appropriate courses of action, which may include, but are not necessarily limited to, preconstruction archaeological testing—necessary to determine the presence/absence of archaeological deposits and to evaluate whether such deposits qualify as historical or unique archaeological resources—and monitoring of ground-disturbing activities. The Plan shall identify the appropriate courses of action should archaeological deposits be identified during preconstruction archaeological testing or during project implementation. Archaeological deposits identified during preconstruction archaeological testing or project implementation shall be evaluated to determine if they qualify as historical resources or unique archaeological resources as defined in CEQA. If archaeological deposits are determined to be historical resources or unique archaeological resources, and adverse effects on such resources are anticipated, mitigation of project impacts on the resource shall occur. Mitigation may include, but is not limited to, thorough recording on Department of Parks and Recreation form 523 records (DPR 523), data recovery excavation, and public outreach. If preconstruction archaeological testing is to occur at or within the immediate vicinity of a prehistoric archaeological site, a qualified cultural resources consultant approved by the Federated Indians of Graton Rancheria shall be retained to monitor the excavations to ensure Native American artifacts, skeletal remains, and cremated remains are treated appropriately and that appropriate regulatory procedures for the treatment of human remains are followed.	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
CULTURAL-2: Ground-disturbing activities associated with the proposed project have the potential to affect previously unidentified historic and prehistoric archaeological deposits on the Indian Valley campus.	PS	CULTURAL-2: If historic or prehistoric archaeological deposits are encountered during preconstruction testing (in areas identified by the Treatment Plan—see Mitigation Measure CULTURAL-1), a qualified archaeologist shall evaluate such deposits to determine if they qualify as historical or unique archaeological resources as defined in CEQA Sections 21084.1 and 21083.2(g). If such deposits qualify as neither an historical nor a unique archaeological resource (i.e., they are not significant), no further protection of the deposits is necessary. If the deposits are determined to be significant, project effects on such deposits shall be avoided or impacts must be mitigated. Mitigation may include, but is not limited to, thorough recording on Department of Parks and Recreation form 523 records (DPR 523), data recovery excavation, and public outreach. If archaeological deposits are encountered during project implementation, all work within 25 feet of the discovery shall be redirected and a qualified archaeologist contacted (if an archaeological monitor is not present) to assess the finds and make recommendations. Project personnel shall not collect or move any archaeological materials. It is recommended that adverse effects on such deposits be avoided by project activities. If such deposits cannot be avoided, they shall be evaluated to determine if they qualify as historical or unique archaeological resources. If the deposits are not significant, avoidance is not necessary. If the deposits are significant, they shall be avoided or adverse effects must be mitigated. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the archaeological materials discovered. The report shall be submitted to the Director of Modernization and the Northwest Information Center.	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
CULTURAL-3: Ground-disturbing activities associated with the proposed project have the potential to affect human remains on the Indian Valley campus.	PS	CULTURAL-3: If human remains are encountered during project implementation or preconstruction archaeological testing, work within 25 feet of the discovery shall be redirected and the County Coroner notified immediately. At the same time, an archaeologist shall be contacted (if an archaeologist is not on-site) to assess the situation. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission shall identify a Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations of the MLD. The report shall be submitted to the Director of Modernization and the Northwest Information Center.	LTS
Transportation			
TRANSPORTATION-1: Ongoing campus construction would affect vehicle, bicycle, and pedestrian circulation within the Indian Valley campus and may create unsafe conditions.	PS	TRANSPORTATION-1: The District shall develop a Construction Management Plan prior to commencement of any construction activities. The Construction Management Plan shall include: (a) Location of construction staging and a description of the level and type of construction-related traffic; (b) Recommendations for comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak hours; lane closure procedures; signs, cones, and other warning devices for drivers; and designation of construction access routes; (c) Description of the maximum number of construction employees during any single phase of project construction, and a forecast of the number of AM and PM peak hour trips to be generated by those employees; (d) Provision of dedicated parking for all construction employees, site visitors, and inspectors;	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
TRANSPORTATION-1 *continued*		(e) Provisions to remove construction-related debris; and (f) Designation of pedestrian and bicycle facilities around the construction and staging areas. The combination of the above elements in a Construction Management Plan would reduce this impact to a less-than-significant level.	
TRANSPORTATION-2: Potential conflicts between bus circulation and vehicle access to parking spaces may result from the proposed routing of buses to serve the main campus and the new Main Building Complex.	PS	TRANSPORTATION-2: The project shall provide a bus circulation route that would not force buses to use parking aisles to reach the proposed new campus bus stop unless such a route is approved by the Marin County Transit District and Golden Gate Transit District. The Marin Community College District shall coordinate with the Marin County Transit District and Golden Gate Transit to develop an acceptable route and bus stop location prior to construction of the new Main Building Complex.	LTS
TRANSPORTATION-3: Bicycle circulation routes and bicycle parking locations within the Indian Valley campus are not yet defined as part of the project, and thus conflicts with policies to encourage alternative transportation could result.	PS	TRANSPORTATION-3: The District shall adopt a campus bicycle plan for the Indian Valley campus that shows existing and planned bicycle paths, lanes, and routes; and the recommended location of bicycle parking and shower facilities. Bicycle parking shall be placed in visible locations adjacent to buildings (to reduce the likelihood of theft). The District may want to restrict bicycle use within the inner campus area. This plan shall be adopted prior to completion of the new Main Building Complex.	LTS
TRANSPORTATION-4: Increased motor vehicle traffic generated by the project would contribute to an increase in energy consumption, air pollutants, and vehicle trips in Marin County and could conflict with County policies aimed at supporting alternative transportation and reduced private vehicular use.	LTS	TRANSPORTATION-4: The District shall develop and implement a Transportation Demand Management (TDM) program. The TDM program should include some or all of the following provisions: (a) Establish a transportation kiosk or office on campus to distribute information on traveling to and from campus via multiple travel modes, with an emphasis on alternatives to automobile trips. (b) Collaborate with the Marin County Transit District and Golden Gate Transit to investigate the provision of subsidized or reduced-cost transit passes for students, faculty, and staff.	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
TRANSPORTATION-4 *continued*		(c) Continue to offer internet courses to reduce the need to drive to and from campus. (d) Explore options for vanpool or shuttle bus service between the Kentfield and Indian Valley campuses. (e) Encourage carpooling by providing preferential parking and reduced parking fees for carpoolers. (f) Explore options for encouraging use of neighborhood electric vehicles (NEV) and other low-emission options (including shuttles and/or van-pools), including on-campus maintenance vehicles. (g) Provide one or more "bicycle stations" on campus, to include shower and locker facilities.	
Air Quality			
AIR-1: Construction activities such as clearing, excavation and grading operations, construction vehicle traffic, and wind blowing over exposed earth would generate fugitive particulate matter emissions that would temporarily affect local air quality and possibly affect nearby sensitive receptors.	PS	AIR-1a: Consistent with guidance from the Bay Area Air Quality Management District (BAAQMD), the following measures shall be required of construction contracts and specifications: (1) Water all active construction areas at least twice daily and more often during windy periods; active areas adjacent to existing land uses shall be kept damp at all times, or shall be treated with non-toxic stabilizers or dust palliatives. (2) Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard. (3) Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites. (4) Sweep daily (preferably with water sweepers) all paved access roads, parking areas, and staging areas at construction sites; water sweepers shall vacuum up excess water to avoid runoff-related impacts on water quality. (5) Sweep streets daily (preferably with water sweepers) if visible soil material is carried onto adjacent public streets.	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
AIR-1 *continued*		AIR-1b: All neighboring properties located within 500 feet of a construction site boundary shall be provided with the name and phone number of a designated construction dust control coordinator who can respond to complaints by suspending dust-producing activities or providing additional personnel or equipment for dust control. Residents shall also be provided with the phone number of the BAAQMD. The dust control coordinator shall be available during all times when demolition, grading, or excavation is occurring and shall maintain a log of complaints. The above measures include all feasible measures for construction emissions identified by the BAAQMD for large sites near sensitive receptors and additional measures beyond those recommended by the BAAQMD. According to the BAAQMD threshold of significance for construction impacts, implementation of the combination of the above measures would reduce construction impacts of the project to a less-than-significant level.	
AIR-2: During construction, various diesel-powered vehicles and equipment would be in use. Exposure of sensitive receptors to diesel particulate would represent a potentially significant impact.	PS	AIR-2: The following measures shall be required of construction contracts and specifications for construction of the geothermal field: (a) Minimize idling time for diesel equipment and diesel trucks (5 minutes maximum). (b) Maintain properly tuned equipment. (c) Use on-road trucks and non-road diesel-powered equipment that are certified as meeting EPA/CARB Tier 2 standards. Such equipment is the cleanest currently available. The above measure would ensure that health risks due to diesel particulate construction impacts of the project would be reduced to a less-than-significant level.	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
Noise			
NOISE-1: Demolition and construction activities would occur over a period of about six years and would generate high noise levels at noise-sensitive uses when construction is located adjacent to these uses.	PS	NOISE-1: Construction equipment shall be well-maintained and used judiciously to be as quiet as practical. Contract specifications shall incorporate the following measures, as appropriate: (a) Limit demolition and construction activities to daytime hours between 7:00 AM and 5:00 PM. (b) To the extent feasible, route construction truck traffic directly to campus construction sites via Ignacio Boulevard. (c) Use "quiet" models of air compressors and other stationary noise sources where technology exists. (d) Equip all internal combustion engine-driven equipment with mufflers that are in good condition and appropriate for the equipment. (e) Locate all staging areas and stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from residences or noise-sensitive campus areas and buildings. (f) Prohibit all unnecessary idling of internal combustion engines. (g) Notify all adjacent residents and campus staff and students of the construction schedule in writing or by posting signs. (h) Erect a temporary noise control blanket barrier on the geothermal drill rig on the side facing adjacent residences or noise-sensitive campus areas or buildings. Noise control blanket barriers can be rented or purchased and quickly erected. (i) Designate the Campus Construction Manager as the campus noise disturbance coordinator, responsible for responding to complaints about construction noise. The name and telephone number of the Campus Construction Manager shall be posted at the construction site and made available to adjacent residents prior to the onset of construction. (j) Provide a written schedule of "noisy" construction activities (e.g., geothermal drilling) to nearby residents.	SU

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
NOISE-1 *continued*		(k) Prohibit construction worker radios from being audible beyond the limits of the construction site. The combination of the above measures would reduce construction noise but not to a less-than-significant level. This impact would remain significant and unavoidable during the construction phase.	
Public Services			
SERVICES-1: The project would increase the number of students and the amount of building area on the Indian Valley campus, thereby increasing exposure of people and structures to wildland fire hazards.	PS	SERVICES-1: The Marin Community College District shall: (a) Comply with applicable laws and regulations, including Urban-Wildland Interface Code of the Novato Fire Protection District, 2005-1 (2005). This includes maintenance of defensible space between structures and other measures as directed by the Novato Fire Protection District. (b) Coordinate plans for adding a fire alarm/monitoring system with the Novato Fire Protection District. (c) Work with the Novato Fire Protection District and/or the State Architect to ensure that all new building construction meets current code requirements. The combination of the above measures would reduce the impact to a less-than-significant level.	LTS
SERVICES-2: Depending on final site and building designs, the Bond Spending Implementation Plan could continue or worsen existing emergency access problems on the campus.	PS	SERVICES-2: The Marin Community College District shall coordinate final site and building plans with the Novato Fire Protection District and Marin Community College Police Department to ensure that long-term emergency access to structures and fire hydrants is adequate.	LTS
Public Utilities			
Implementation of the project would not result in potentially significant public utilities impacts or require public utilities--related mitigation measures.			

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
Energy and Sustainability			
ENERGY-1: Transportation energy demands would increase at the Indian Valley campus due to an increase in students in the coming years. Without options for alternative transit, students would continue to use private vehicles for campus access, resulting in increased fuel consumption and associated impacts related to use of fossil fuels, air quality degradation, and associated global warming.	PS	ENERGY-1: The District shall develop and implement a Transportation Demand Management (TDM) program as described in Mitigation Measure TRANSPORTATION-4. Refer to Mitigation Measure TRANSPORTATION-4 related to potential ways to reduce reliance on the private automobile for access to and from the campus.	LTS
ENERGY-2: Modernization of the Transportation Technology Complex, renovation of existing buildings, and construction of the new Main Building Complex at the Indian Valley campus would produce a significant amount of debris that has the potential to be recycled. Building renovation and new construction would also produce debris that could be recycled. Some waste materials, such as asbestos, may be hazardous.	PS	ENERGY-2a: Measures to increase recycling of construction and demolition material from implementation of the Bond Spending Implementation Plan shall include the following: (1) Preparation of a "Materials Management Plan" prior to the onset of building demolition, renovation, or new construction that identifies (a) types of materials to be recycled or reused, (b) contractor specifications, (c) required record-keeping), (d) storage areas for materials, (e) recycling goals by types of material, and (f) coordination with hazardous materials disposal requirements. The Materials Management Plan shall ensure that at least 50 percent of non-hazardous construction waste from building renovation and new construction is recycled, in accordance with the Bond Spending Implementation Plan Design Guidelines. (2) Inclusion of specific Materials and Resources LEED requirements in the specifications, including but not limited to the following as applicable to individual projects: Materials and Resources (MR) Prerequisite 1, Storage and Collection of Recyclables; Building Reuse MR credit 1.1 or 1.2; Recycled Content MR credit 4.1 or 4.2; and Certified Wood MR credit 7. (3) Record-keeping on the campus of amounts and types of waste sent to recyclers. (4) Documentation of "recyclable" materials from demolition and renovation that could possibly be incorporated into new buildings to reduce District costs. (5) Provision of a list of local recycling operators to contact for any construction and demolition debris. (6) Provision of adequate on-campus storage areas where recyclable materials can be separated and stored temporarily after demolition.	LTS

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Table 2-1 *continued*

Impact	Level of Sig. Without Mitigation	Mitigation Measure	Level of Sig. After Mitigation
ENERGY-2 *continued*		ENERGY-2b: The District shall ensure that all contractors comply with federal, State, and local regulations related to disposal of hazardous material contained in construction and demolition debris. The combination of the above measures would reduce this potential impact to a less-than-significant level. The measures would also help the District meet LEED requirements for construction waste management, which include (1) developing and implementing a construction waste management plan, and (2) diverting 50 percent of construction and demolition wastes from landfills, or recycling or reusing 25 percent of these wastes on-site (U.S. Green Building Council, 2005b).	
ENERGY-3: Implementation of the Bond Spending Implementation Plan could result in the preclusion of the use of alternative energy systems such as rooftop solar collectors unless specific steps are taken at the design stage of new buildings to prevent shading by buildings or vegetation.	PS	ENERGY-3: The District shall consider ensuring that rooftop structural systems of new and renovated buildings are designed to allow future solar systems. New landscaping plans shall be reviewed prior to implementation to ensure that new trees would not block solar access to rooftops that could be used for solar systems.	LTS
ENERGY-4: New landscape improvements such as outdoor lighting would result in increased electrical energy demands that would make increased demands on non-renewable energy sources.	PS	ENERGY-4: The District shall incorporate the use of solar lighting for outdoor areas and pathways, assuming that adequate lumen levels to ensure safety can be provided by such systems, and, if required, the systems can be affordably integrated with existing lighting systems to remain.	LTS

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3. PROJECT DESCRIPTION

3.1 INTRODUCTION

The Marin Community College District Board of Trustees, hereinafter referred to as the Trustees, will serve as the lead agency for the California Environmental Quality Act (CEQA) document for the proposed Bond Spending Implementation Plan (hereinafter also referred to as the Implementation Plan) for the Indian Valley campus. The Implementation Plan is the outcome and the guiding document for the Measure C Bond Program that was passed by the Marin County voters in 2004. This bond program provided $249.5 million to be used for modernization and new construction at the District's three campuses. The three campuses are the Kentfield campus, the Indian Valley campus, and the Bolinas Marine Biology Laboratory facility.

The Implementation Plan is the outcome of the Measure C Bond Program passed by Marin County voters in 2004.

At this time, there are no planned changes for the Bolinas campus. Thus, the focus of the Implementation Plans is on renovations at the Kentfield and Indian Valley campuses. Two separate Environmental Impact Reports (EIRs) are being prepared—one for each campus, for two separate Implementation Plans. The Trustees will be responsible for certifying each EIR to ensure that the documents meet all the requirements of the California Environmental Quality Act. After the certification of the EIRs, the Implementation Plans can be approved. This EIR addresses the Implementation Plan for the Indian Valley campus.

The District has undergone a detailed planning process since 2005, beginning with assessments of all existing facilities on both the Kentfield and Indian Valley campuses. These assessments were intended to provide the District with a detailed evaluation of structural, life safety and other aspects of each structure on the campuses and provide recommendations for repair or replacement of specific building systems. The assessments were also used to make recommendations for complete building replacements based upon the extent of repairs required to bring structures up to current building code standards. A number of Community Forums were held at both campuses to solicit community input on changes that should occur on each campus. Site constraints were presented and the architectural firm of Steinberg Architects and the landscape firm of Royston Hanamoto Alley & Abey (RHAA) developed Implementation Plans that identified the proposed improvements to the two main campuses over time.

Since the development of the Bond Spending Implementation Plans, additional architectural firms have been retained to develop designs for the following individual buildings at the Indian Valley campus:

- Main Building Complex – new structure
- Transportation Technology Complex – renovated structures

Schematic designs for these buildings had been completed at the time of preparation of this EIR; therefore, this EIR serves as a "Project EIR" for these buildings. For the remaining provisions of the Implementation Plan (including the Ignacio Creek Management Plan, which is a component of the Implementation Plan), this EIR is a Program EIR, as defined in Section 15168 of the CEQA Guidelines. A Program EIR addresses a series of actions that are related and part of one large project. Thus, cumulative impacts can be addressed and program-wide mitigation measures can be recommended. If a later activity would have impacts that are not addressed in the Program EIR, additional environmental review may be needed at that time.

The action that the Trustees will take relevant to the subject of this EIR is the approval/adoption of the Bond Spending Implementation Plan for the Indian Valley campus, which can be reviewed at the Swinerton Management & Consulting Offices, Building MS-3, Kentfield Campus, 835 College Avenue, Kentfield, CA or on the College's website (http://www.marin.edu/MeasureC/public_notices/index.htm) with subheadings of "Measure C Updates" followed by "Public Notices & Announcements."

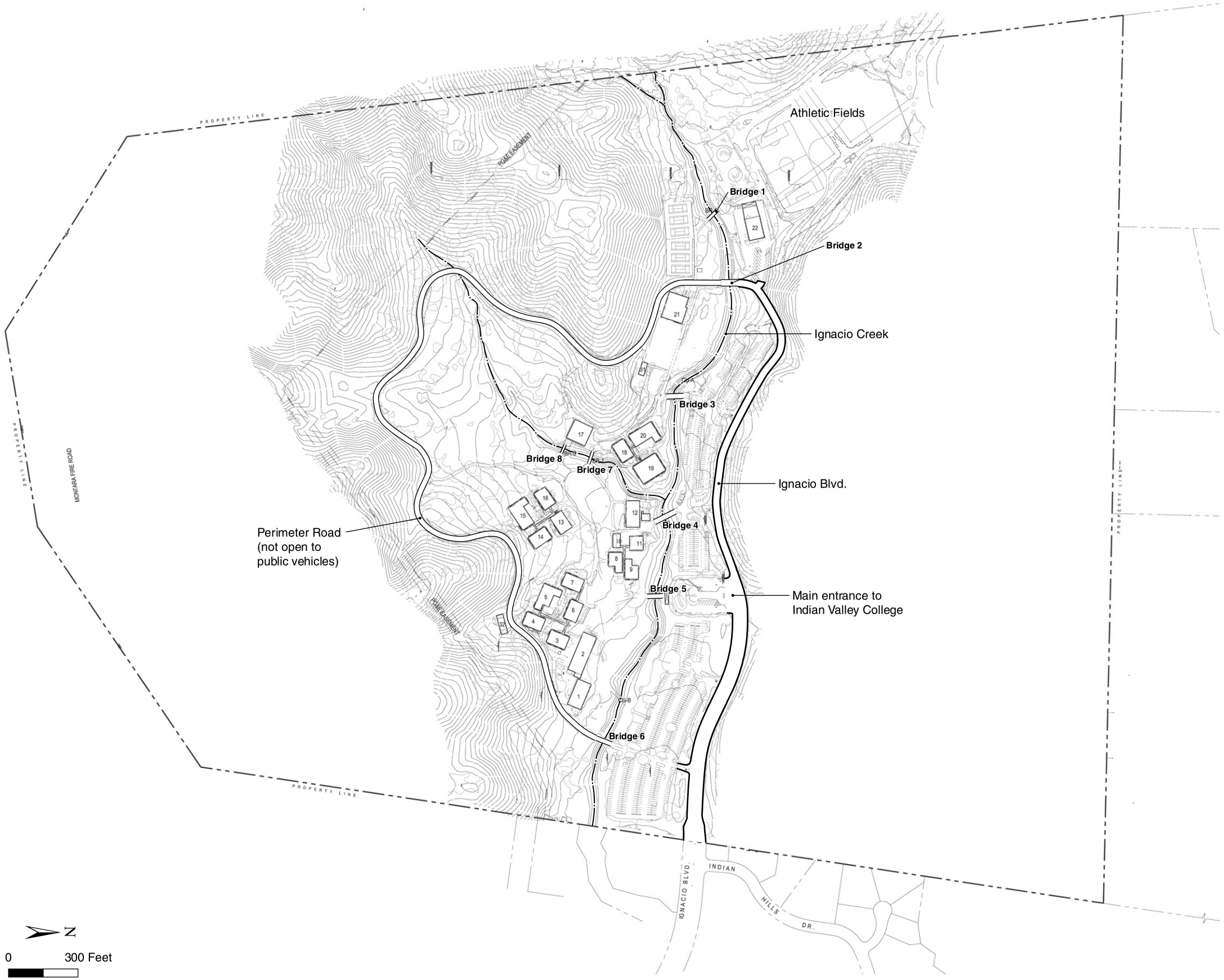
3.2 PROJECT LOCATION

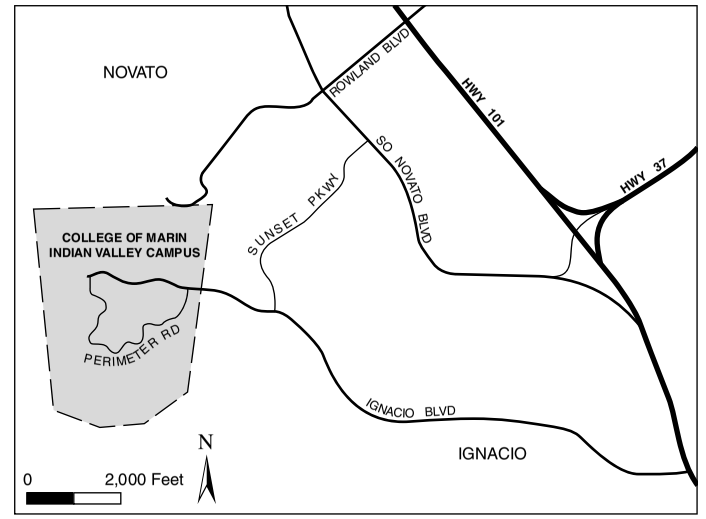
The Indian Valley campus of the College of Marin is located in northern Marin County in the incorporated community of Novato. The main access to the 333-acre campus is provided via Ignacio Boulevard, which intersects U.S. Highway 101 to the east. The campus forms the terminus of this roadway. A regional and project location map is provided in Figure 3-1.

3.3 PROJECT SITE CHARACTERISTICS

The Indian Valley campus (see Figure 3-2) includes approximately 176,820 gross square feet (gsf) of building area in 24 buildings (including three power plants). Of the total acreage, about 87 acres are developed as the "main" campus where all of the academic buildings are concentrated. Ignacio Creek forms a major natural feature that flows through the center of the campus, separating the existing parking area from the academic core. Numerous pedestrian and service vehicular bridges provide access across the creek to the main campus (see Figure 3-1).

A total of 900 parking spaces are provided on the campus in eight surface parking lots. All of these lots are located on the north side of Ignacio Creek, in the vicinity of the main campus (see Figure 3-2).





REGIONAL LOCATION

LEGEND

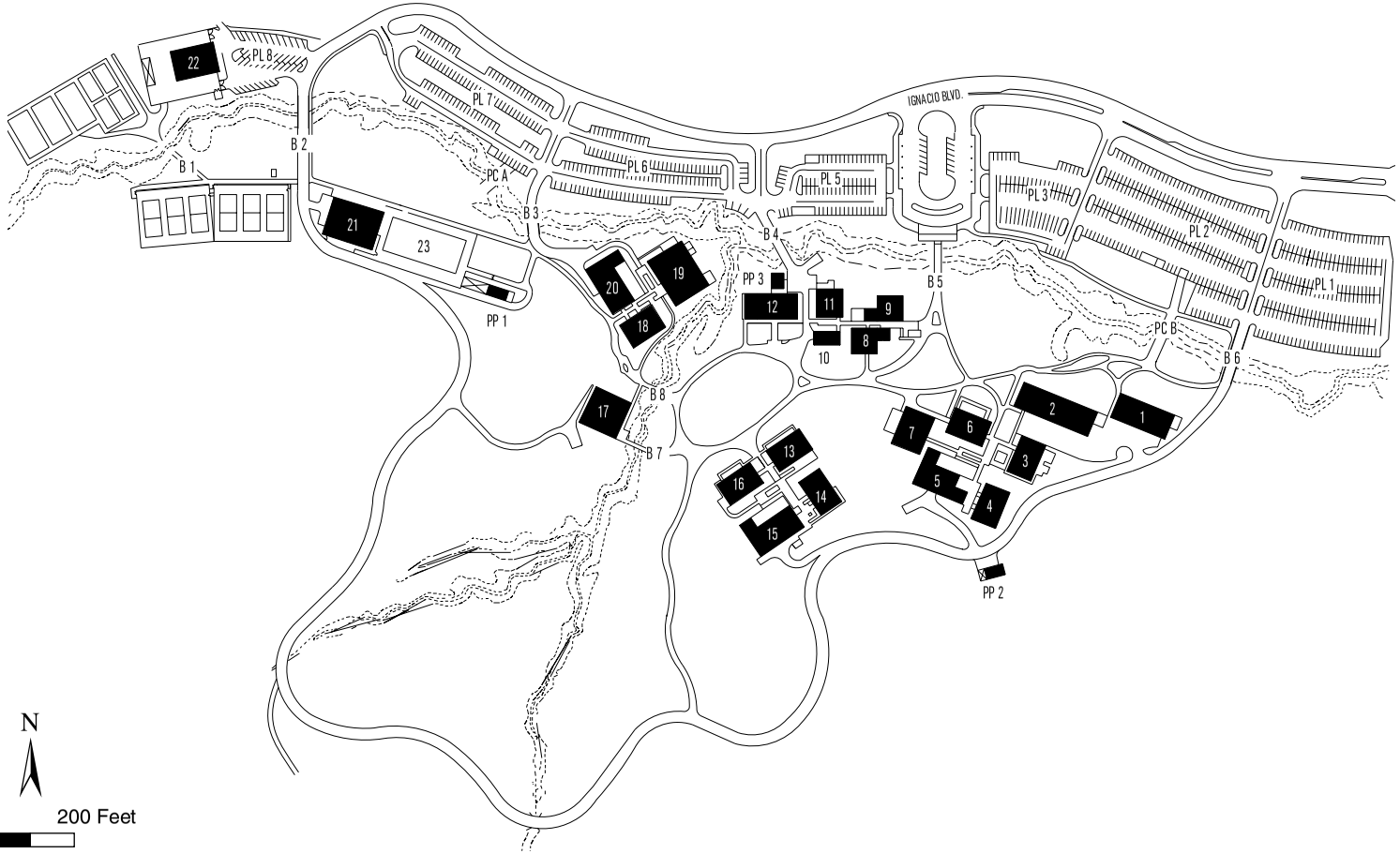
- Campus property boundary
- Existing buildings
- PG&E easement
- Creek

SOURCE:CSW 2005

AMY SKEWES-COX
ENVIRONMENTAL PLANNING

Figure 3-1

REGIONAL AND PROJECT LOCATION FOR INDIAN VALLEY CAMPUS



NO. BUILDING NAME

POMO CLUSTER
1 Auto Body & Fender
2 Auto Technology Lab
3 General Classrooms/ Medical Labs/ Offices
4 Machine & Metals Technology
5 Math Lab/ Food Vending
6 General Classrooms/ Labs/ Offices
Geology/Geography/ Chemistry/ Biology
7 General Classrooms/ Labs/ Offices/ Language
ADMINISTRATIVE SERVICES
8 Student Services
9 Administrative Services
10 Associated Students
11 Information Systems Services
12 College Bookstore/ Child Care Center
MIWOK CLUSTER
13 Art Labs/Art Gallery/ General Classrooms
14 Foreign Languages Classes/ Offices
15 Studio Theatre/ Student Lounge/ Deli
16 Digital Village
17 Library/ Eops/ Foreign Language
OHLONE CLUSTER
18 Computer Labs/ Offices/ Court Reporting Labs
19 General Classrooms/ Labs/ Offices
Office Occupations/ Court Reporting
20 Food Vending/ P.E./ Classrooms/ Multi Media
21 Pool/ Shower-locker Building
22 Campus Police/ Corporation Yard
23 Pool
PARKING LOTS
PL 1 Parking Lot 1
PL 2 Parking Lot 2
PL 3 Parking Lot 3
PL 4 Parking Lot 4
PL 5 Parking Lot 5
PL 6 Parking Lot 6
PL 7 Parking Lot 7
PL 8 Parking Lot 8
BRIDGES AND PAVED CULVERTS
B 1 Bridge 1- Pedestrian only
B 2 Bridge 2
B 3 Bridge 3
B 4 Bridge 4
B 5 Bridge 5- Pedestrian only
B 6 Bridge 6
B 7 Bridge 7- Pedestrian only
B 8 Bridge 8- Pedestrian only
PC A Paved Culvert A
PC B Paved Culvert B
POWER PLANTS
PP 1 Power Plant 1
PP 2 Power Plant 2
PP 3 Power Plant 3

Figure 3-2

SOURCE:Steinberg Architects, 2006

INDIAN VALLEY CAMPUS DETAIL WITH BUILDING IDENTIFICATION

The western portion of the campus includes sports fields and the campus swimming pool. These fields and swimming pool are shared with the community and local schools for public/school sports events. Oak and bay-covered hillsides surround the main campus and form a "bowl" around the western portion of the campus (see Figure 3-3). This area is the main watershed of Ignacio Creek. No development is proposed to occur in this existing hillside area of the campus.

The Indian Valley campus has existed since the mid-1970s when the Marin Community College District expanded its facilities to serve residents of northern Marin County. Up until that time, the only community college serving Marin residents was the Kentfield campus of the College of Marin.

3.4 PROJECT NEED

The District has undertaken a number of studies to evaluate the existing condition of buildings at the Indian Valley campus. The first study was the "Facility Condition Assessment Report" undertaken in 2003 by 3D/I (3D/I, 2003). This report formed the basis of the requested improvements for the Measure C Bond Program that was approved by the County's voters in 2004.

Many of the Indian Valley campus buildings are in a state of disrepair and have significant fire and life safety issues. However, all buildings at the Indian Valley campus have been found to be seismically safe.

3.5 PROJECT CHARACTERISTICS

The Implementation Plan at the Indian Valley campus would be constructed over a six-year period. At completion, the campus is expected to have an enrollment of about 1,180 students, which would be about a 19-percent increase over the 2006-2007 enrollment of 987 students. Table 3-1 presents existing and projected enrollment and building space. Figure 3-4 illustrates the proposed site plan of the Bond Spending Implementation Plan.

The Implementation Plan would be constructed over a six-year period.

MODERNIZATION AND CONSTRUCTION OF NEW BUILDINGS

Three buildings and the three existing power plant structures on the Indian Valley campus would be upgraded/modernized. No buildings are proposed for demolition at this time. Detailed assessments were done by a team of engineers, architects, and specialists in hazards, ventilation, and other specialties during 2006 (Marin Community College District, 2006a). These recent assessments augmented the work done by 3D/I in 2003 (3D/I, 2003). Full copies of these assessments can be viewed at the offices of Swinerton Management & Consulting located on the Kentfield campus, Building MS-3 or on the College's website.

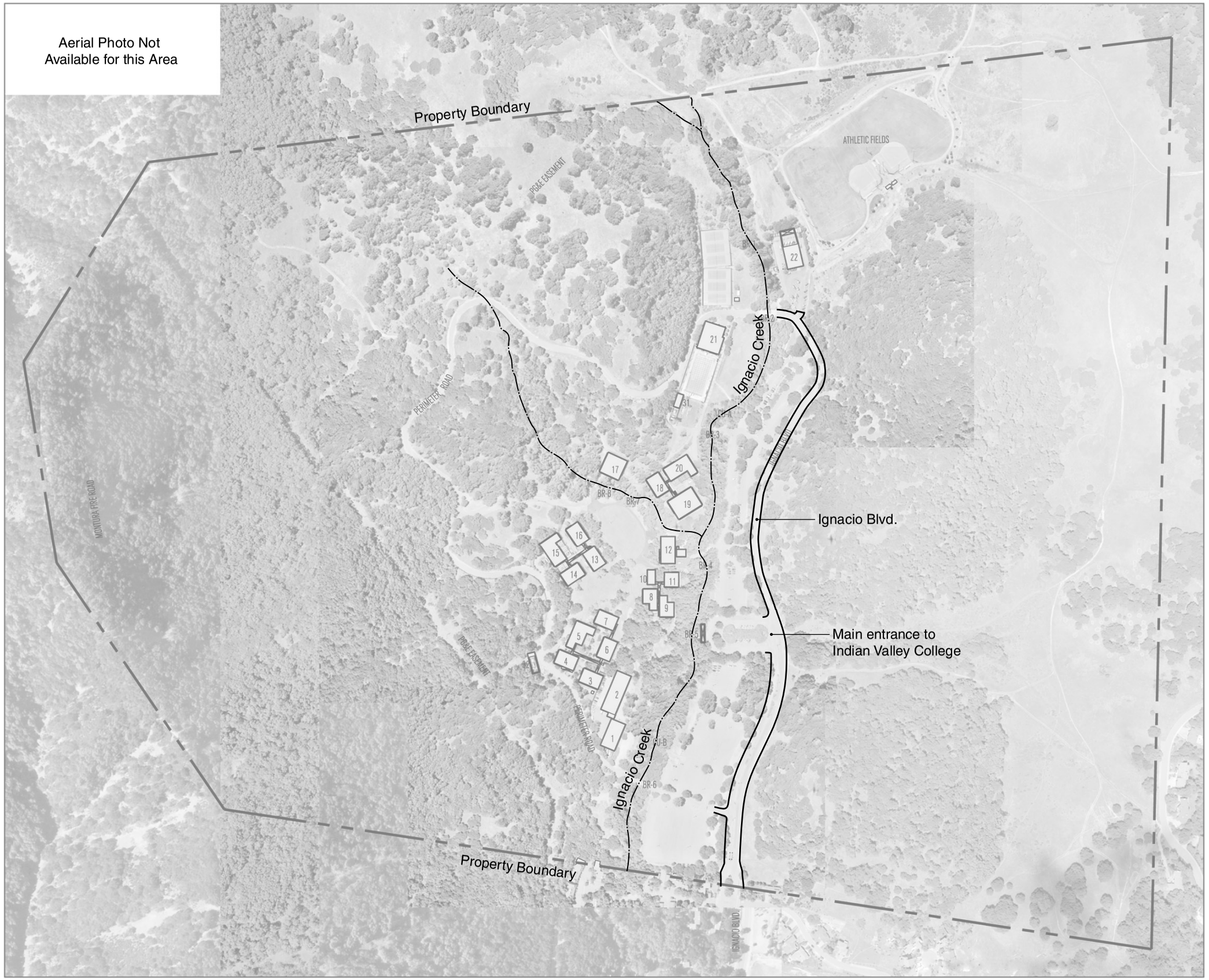


Figure 3-3

AERIAL PHOTOGRAPH OF INDIAN VALLEY CAMPUS

SOURCE:CSW/St^2

AMY SKEWES-COX
ENVIRONMENTAL PLANNING

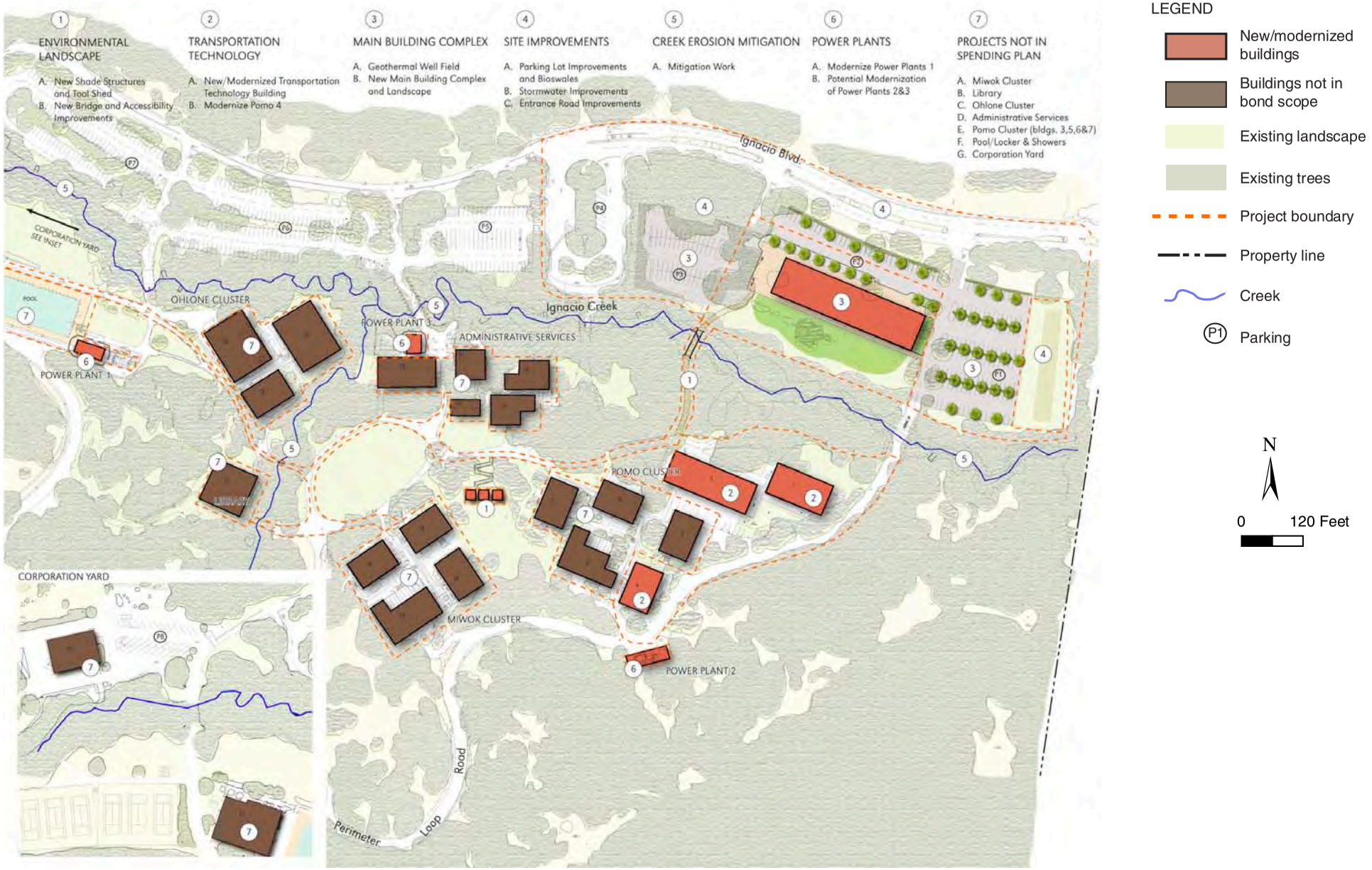


Figure 3-4

SOURCE: RHAA 2007

INDIAN VALLEY CAMPUS BOND SPENDING IMPLEMENTATION PLAN

Table 3-1 Existing and Projected Student Enrollment, Faculty/Staff, and Building Area

	Existing	Total at Completion of Bond Spending Implementation Plan	Change
Number of Students	987	1,179	+192
Number of Faculty & Staff	120	120	0
Gross Square Feet of Building Area (Approximate)	176,820	201,820 to 213,820	+25,000 to 37,000

The proposed new building would be a new Main Building Complex to be located on the north side of Ignacio Creek in Parking Lot 2 (see Figure 3-4). This complex would house classrooms, general labs, student services, learning labs, and library space. The building would be between 25,000 and 37,000 gross square feet in size. An outdoor "green space" at the south side of the building near the creek is proposed as a student gathering and picnic area. Elevations and a site plan for this building can be found in Appendix E.

Buildings that would be modernized would include the Transportation Technology Complex (Pomo 1 and 2). (See Appendix G for site plan and elevations for this project.) Pomo 4 and Power Plants 1, 2, and 3 may also be upgraded and/or modernized; this work might include roof replacement and replacement and relocation of the heating distribution system (campus boilers) and replacement of the high-voltage distribution system.

SITE IMPROVEMENTS: LANDSCAPING, PATHWAYS, LIGHTING, PARKING, AND UTILITIES

In addition, the project would include overall site improvements such as new landscaping; new pathways; reconfiguration of Parking Lots 1, 2, and 3 and the existing entry parking area; and new utility lines as required for individual projects (water, wastewater, gas, electricity, and telecommunications).

Landscaping, Parking Lots, and Ignacio Creek Improvements. The main areas proposed for new landscape improvements include Parking Lots 1, 2, and 3; the existing parking entry area; and the main campus entry (see Figure 3-5). Landscape plans are scheduled for concept development in the next months. The Design Guidelines for the Indian Valley campus address the goal of new plantings that are native, drought-tolerant, and low maintenance. These same Guidelines address paving materials, irrigation, seatwalls and stairs, lighting, site

LEGEND

- Major Campus Space/Plaza
- Major Corridors
- Pedestrian Gateways
- Vehicular Gateways
- Buildings- New/Modernized
- Buildings- Existing
- Property Line

N

0 120 Feet

Figure 3-5

SOURCE: RHAA 2007

LANDSCAPE CONCEPTS FOR INDIAN VALLEY CAMPUS

furnishings and a number of other elements in the design of the new improvements (Marin Community College District, 2006a). The Implementation Plan also proposes an additional pedestrian bridge linking the west area of the new Main Building Complex and the rest of campus to the south.

The eastern portion of Parking Lot 1 is proposed to be converted to a landscape area with stormwater detention features and native plantings to provide a buffer for adjacent residential neighbors. Parking Lots 2 and 3 would have new tree plantings and stormwater improvements to enhance the landscape (see Figure 3-5).

Creek mitigation measures would be implemented for Ignacio Creek, which has undergone severe erosion to the point of threatening adjacent buildings and infrastructure. Some examples of mitigation measures include stabilization measures such as strategic installation of rip-rap in the creek to stop scour at all existing vehicular and pedestrian bridges, strategic replacement of non-native plants with native plants along the creek banks, removal of old construction bridge structures in the creek that have caused increased erosion over time, and other miscellaneous hydrology improvements.

Outdoor lighting would be designed to maximize public safety and security while minimizing visual intrusion to adjacent residential areas. Outdoor light fixtures would include shrouds and other shielding as appropriate. Lighting along pedestrian corridors would be low-level lights. To the extent practicable, area lighting and security lighting would be controlled by the use of timed switches and/or motion detector activation to reduce energy consumption.

Pathways and Bridges. As required by the Division of the State Architect (DSA), pedestrian pathways would be upgraded to meet Americans with Disabilities Act (ADA) requirements. One new pedestrian bridge may be provided to replace the existing bridge. However, the existing bridge is not a "real bridge" but a remnant of a temporary construction access that was never removed when the campus was constructed 35 years ago. The removal is viewed as a mitigation measure and is also proposed as a means to alleviate erosion in this reach of the creek. The new bridge would be in addition to the existing pedestrian bridges and would be intended to link the new building more closely to the central campus near Parking Lot 3. This bridge would provide access for pedestrians only. The bridge is proposed to be the approximate width of the creek with additional length necessary to create a clear span across the creek so that no new infrastructure in or disturbance of the creek would be necessary.

Pedestrian pathways would be upgraded to meet Americans with Disabilities Act (ADA) requirements.

Campus entrances may be redesigned. Figure 3-6 shows the proposed pedestrian circulation system.

Utility Lines. New and renovated buildings would be served by electricity, chilled water, natural gas, wastewater, telecommunications (phone, fiber optics, and other signal systems), storm drainage, and water. In general, new trenches

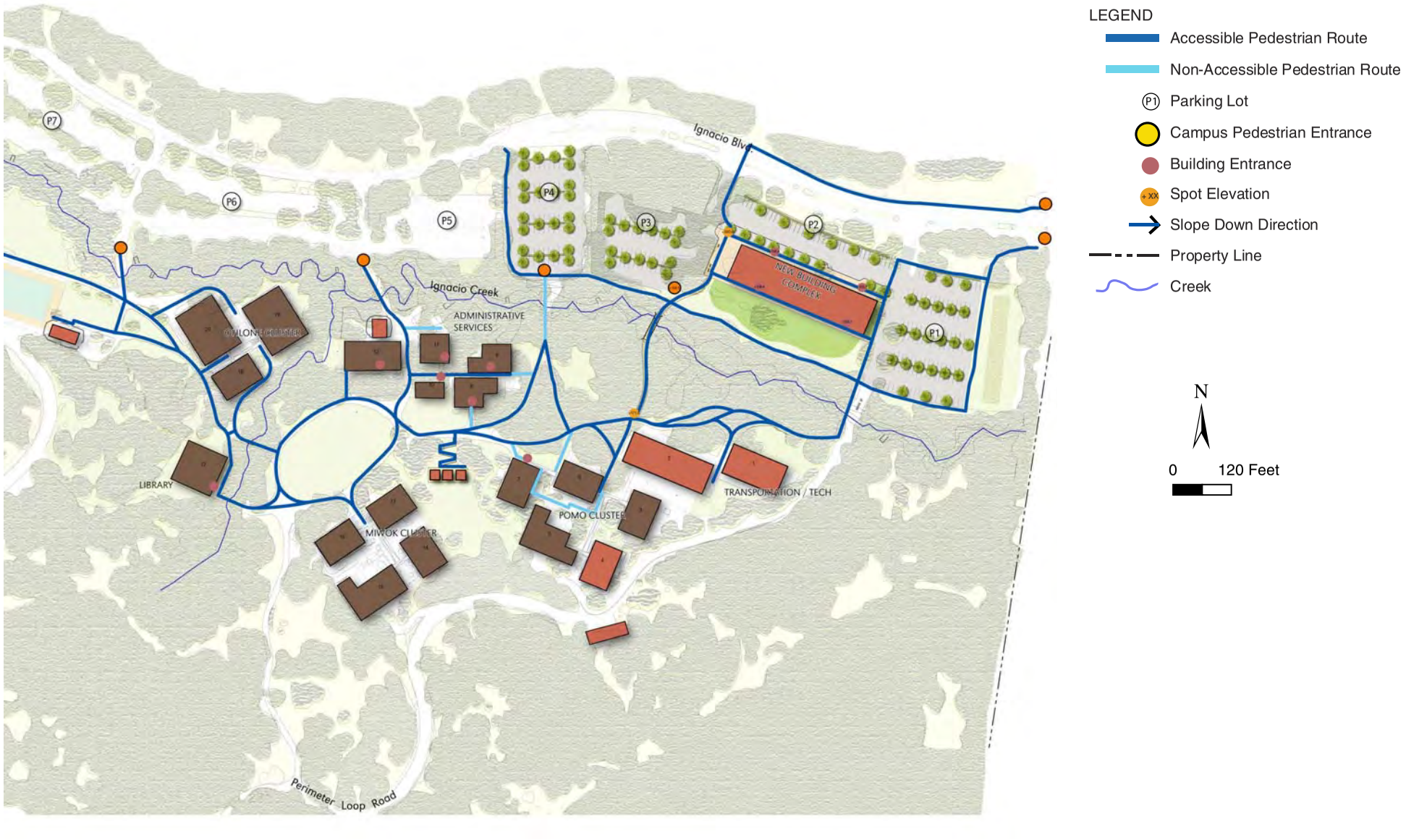


Figure 3-6

SOURCE: RHAA 2007

PEDESTRIAN CIRCULATION AT INDIAN VALLEY CAMPUS

would be constructed on the main campus in the area of Pomo 1 and 2 and the area serving the new Main Building Complex.

A new gas main was recently installed on the campus due to leaks and fire hazards associated with the old gas main. This project has been completed and is not addressed in this EIR.

A geothermal field is proposed for Parking Lots 1 and 2.

A geothermal field is proposed for Parking Lots 1 and 2 (Figure 3-7). This field would allow the College to reduce the energy needs of the proposed new Main Building Complex by taking advantage of the cooling provided by the temperature differential below the earth's surface. The geothermal system would circulate a water-based solution through a buried loop system to take advantage of the constant temperatures about 200 to 300 feet below the surface. The system would then be connected to the cooling/heating system for the campus buildings to minimize the heating/cooling necessary by the use of traditional non-renewable energy sources (i.e., natural gas and electricity from non-renewable sources).

PHASING OF FACILITIES

A summary of the projects in their projected order is shown in Table 3.2. A total of 25,000 to 37,000 net new gross square feet (gsf) of building area would be developed. The overall construction is expected to be completed by 2013.

BUILDING MASS, HEIGHT AND DESIGN

The proposed new Main Building Complex would be two stories in height and would be designed as recommended in the *Design Goals, Principles, Guidelines: College of Marin Facilities Development Plan* (Marin Community College District, 2006b). Schematic-level design documents had been completed for the new Main Building Complex and the Transportation Technology Complex as of the printing of the Draft EIR (see Appendix E and Appendix G).

Vehicle Access, Parking and Bicycle Facilities

Few changes to the existing vehicle access and circulation patterns on the Indian Valley campus are proposed. Vehicle circulation is shown in Figure 3-8. The main changes would entail restriping of parking spaces and new landscaping in parking areas. Vehicular access to the new Main Building Complex would be from Ignacio Boulevard. The total number of parking spaces in the parking lot in this area (Lot 2) would be reduced, but initial assessments have shown an excess of spaces for daily campus needs. New bicycle facilities, including bike racks, changing rooms and showers, have been identified in the schematic design documents to comply with the stated District LEED goals.

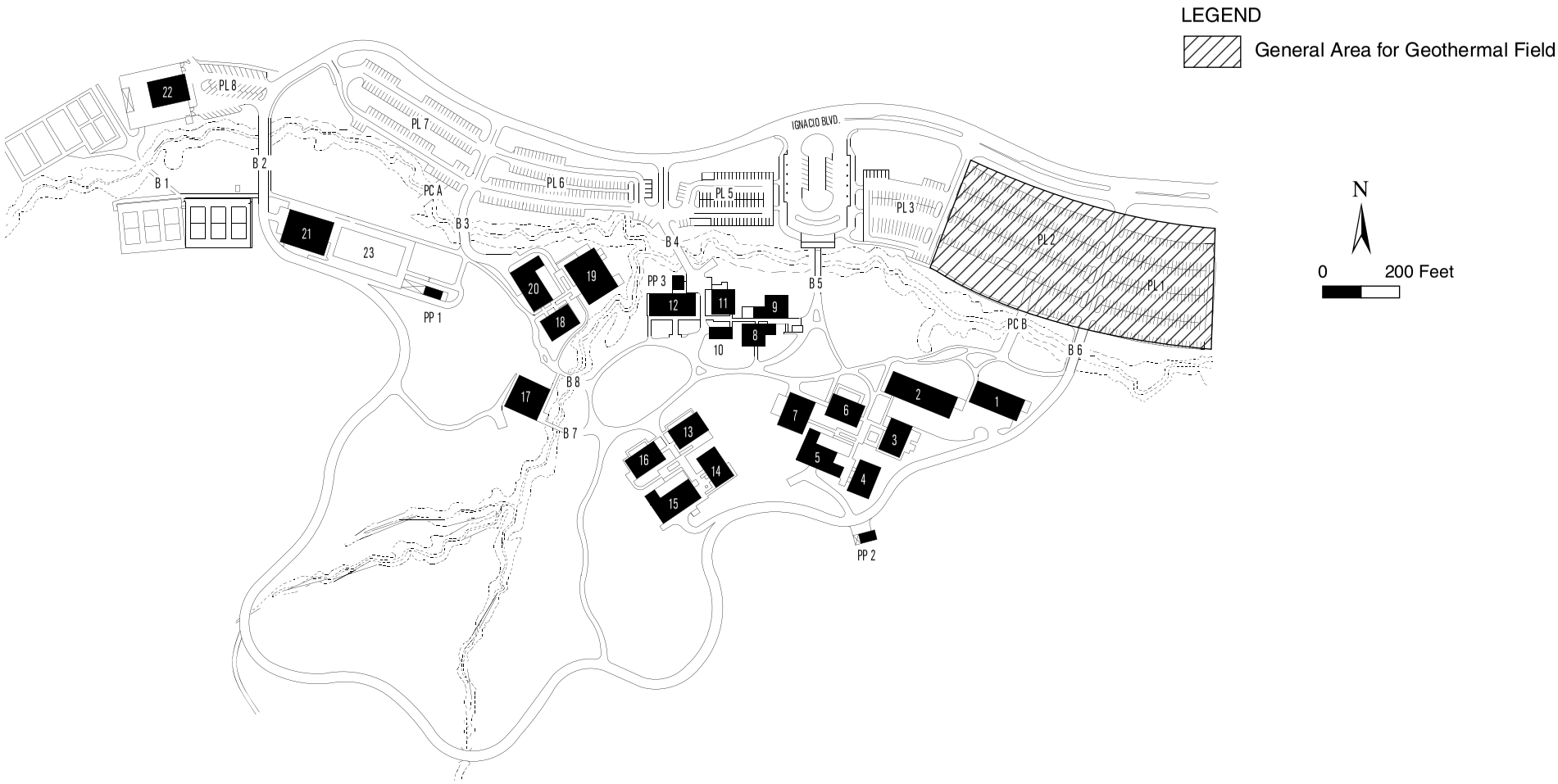


Figure 3-7

SOURCE:Steinberg Architects, 2006

PROPOSED GEOTHERMAL FIELD AT INDIAN VALLEY CAMPUS

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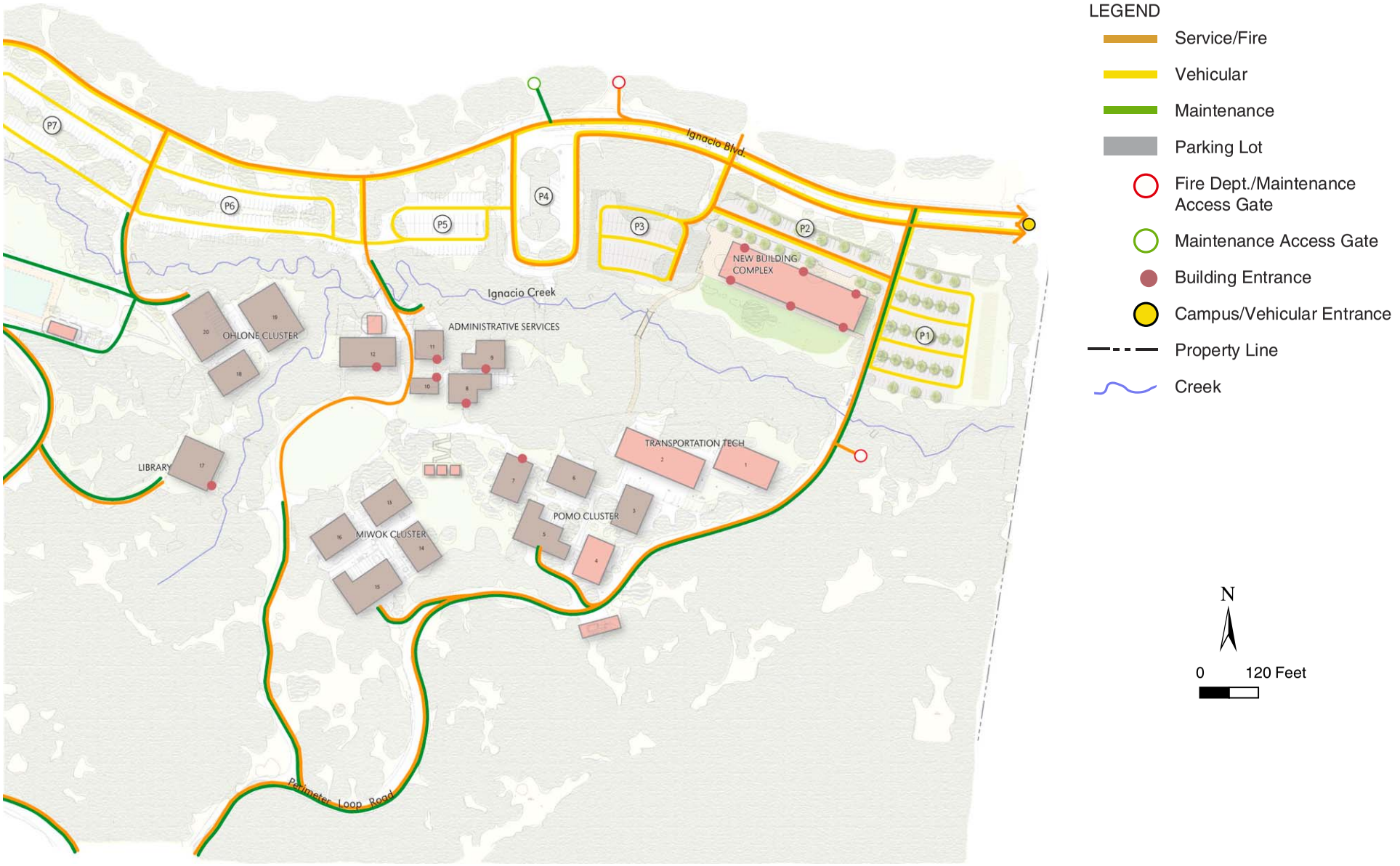


Figure 3-8

SOURCE: RHAA 2007

VEHICULAR CIRCULATION AT INDIAN VALLEY CAMPUS

Table 3-2 Phased New/Modernized Projects at Indian Valley Campus

Order of Project	Use	Existing GSF	Proposed GSF	GSF to be Demolished	Summary
1	Shade Structure , Tool Shed and Greenhouse	NA	1,500	NA	These structures are intended to support the storage of tools and plants currently housed on the Kentfield campus in support of the Environmental Landscape program.
1B	New Bridge	NA	NA	NA	A new bridge may be constructed near Parking Lot 3 to provide pedestrian access to the main campus.
2A	Modernized Transportation Technology Buildings (Pomo 1 and 2)	17,900	NA	0	The existing auto tech buildings at the eastern end of the campus (Pomo 1 and 2) would be modernized in the existing building footprints.
2B	Modernized Pomo 4	5,600	NA	NA	Minor modernization may occur at Pomo 4, the Machine Shop.
3A	Geothermal Field	NA	NA	NA	A geothermal field would be developed in Parking Lots 1 and 2 near the proposed new Main Building Complex.
3B	New Main Building Complex	NA	35,000	NA	The new Main Building Complex would house classrooms, labs, and other primary facilities. This would be the first campus building to be located on the north side of Ignacio Creek. Landscaping would be provided around the building and a southern open space for socializing would be provided.
4A/B/C	Parking Lot Improvements and Bioswales	NA	NA	NA	These improvements would include landscaping, stormwater detention, and bioswales to improve water quality.
5A	Creek Erosion Mitigation	NA	NA	NA	Some examples of mitigation measures include stabilization measures such as strategic installation of rip-rap in the creek to stop scour at all existing vehicular and pedestrian bridges, strategic replacement of non-native plants with native plants along the creek banks, removal of old construction bridge structures in the creek that have caused increased erosion over time, and other miscellaneous hydrology improvements.
6A and 6B	Power Plants Modernization	NA	NA	NA	Power plants would be modernized and may include new distribution lines and boilers and 12-kilovolt switchgear.
TOTAL		23,500[a]	36,500	0	For the EIR, a range of new square footage of 25,000 to 37,000 gsf will be assessed. The EIR will address a general program that may have changes in overall square footage as projects are designed.

Notes: gsf = gross square feet. NA = not applicable. When buildings are modernized and no square footage changes are proposed, "NA" is shown. See Figure 3.4 for location of projects.

[a] The total existing gsf does not include many buildings that are not proposed for modernization such as the Miwok Cluster, the Library, Administrative Services, Ohlone Cluster, and most of Pomo Cluster.

Site Grading

Site development for the new Main Building Complex would require minor grading to prepare the site. Grading would be balanced and would not require the import of fill. Most areas of the developed portions of the campus are generally level.

Energy-Efficient Design

Facilities would be designed with efficient heating and cooling systems beginning with the orientation of the buildings on the site and the placement of the windows on the buildings to maximize natural winter heat gain and minimal summer heat gain. Furthermore, the new Main Building Complex would be constructed of building systems that provide appropriate levels of thermal protection. Skylights and clearstory windows would assist in providing required lighting. The building would be conditioned with a steady state water system controlled by a geothermal field adjacent to the new Main Building Complex where maximum efficiencies can be achieved (see description below). To maximize efficient use, all mechanical and electrical systems and lighting would be controlled via a central energy management system (EMS), which is the current system used by both campuses. Pomo 1 and 2 would not use a geothermal field. The College's consultants are investigating the possibility of diverting stormwater runoff near Pomo 1 and 2 into a planned bio-swale area to the east of the project, thus slowing down the peak water flows and filtering the water before it enters the existing storm water system pipe and creek outfall structure.

GEOTHERMAL GROUND COUPLED HEAT EXCHANGE SYSTEM

The number and depth of geothermal bores would be based on the results of the test bores currently being evaluated. However, it is estimated that the Indian Valley campus would require about 200 bores approximately 200 feet in depth. As already noted, the District is proposing to develop a geothermal field in Parking Lots 1 and 2. (See Figure 3-7 for general location of proposed geothermal field.) The number and depth of bores would depend on the test bore thermal conductivity evaluation that is currently underway. The tests will determine the earth's ability to reject and absorb heat. Areas with high water content tend to provide higher thermal conductivity, and greater energy exchange and energy efficiency.

Geothermal technology, also referred to as "geoexchange," relies primarily on the earth's natural thermal energy, a renewable resource, to heat and cool. Below the earth's surface the temperature is constant. In Marin County, these temperatures are usually 58° to 62° Fahrenheit (F). This is an ideal temperature for both heating and cooling.

Each bore hole contains a single loop of pipe with a U-bend at the bottom. After the pipe is inserted, the hole is backfilled and grouted. Each vertical pipe is then connected to a horizontal pipe, which is also concealed underground.

Geoexchange systems do the work that ordinarily requires two appliances, a boiler and an air conditioner (chiller). Geoexchange works differently from heat pumps that use the outdoor air as their heat source or heat sink. Geoexchange systems do not have to work as hard (which means they use considerably less energy) because they draw heat from a source whose temperature is moderate. The temperature of the ground a few feet beneath the earth's surface remains relatively constant throughout the year, even though the outdoor air temperature may fluctuate greatly with the change of seasons. At a depth of approximately 6 feet, for example, the temperature of soil at the campus remains constant between 58°F and 62°F. This is why well water drawn from below ground is cool even on the hottest summer days.

In winter, it is much easier to capture heat from the soil at a moderate 58° to 62°F than from the atmosphere when the air temperature is much colder. Conversely, in summer, the relatively cool ground absorbs a building's rejected heat more readily than the hot outdoor air.

Approximately 70 percent of the energy used in a geoexchange heating and cooling system is renewable energy from the ground. Federal agencies such as the Environmental Protection Agency and the Department of Energy, as well as State agencies such as the California Energy Commission, promote the use of geoexchange systems.

The District is committed to obtaining leadership in Energy and Environmental Design (LEED) certification.

Leadership in Energy and Environmental Design (LEED)

The District is committed to obtaining Leadership in Energy and Environmental Design (LEED) certification, which allots points for various energy-saving and environmentally preferable features. All design and engineering firms hired by the District to work on the Bond projects have LEED-certified professionals on their staff assigned to the District projects. In addition, the District is using a LEED-certified commissioning agent for enhanced commissioning of all systems on new projects. This is in keeping with the District-stated mandate to achieve a minimum of LEED certification on all projects, with a goal of LEED silver on the new main projects. Also, "green building" design principles are addressed at length in the *Design Goals, Principles, Guidelines (Volume IB)* document of the Bond Spending Implementation Plan. See Appendix D for a LEED Checklist that shows how specific points are obtained for various levels of LEED certification.

HOURS OF OPERATION

Hours of operation at the Indian Valley campus would be 8:00 AM to 10:00 PM Monday through Friday, and would not change from existing hours of operation. Some classes (Auto Tech, Art, etc.) would also be offered on Saturdays as they

are now. Vacation weeks in the school calendar would vary by season as they do now.

3.6 PROJECT OBJECTIVES

The Marin Community College District is committed to upgrading the College's facilities in compliance with the Measure C Bond Program. The following objectives have been identified for the project:

1. Provide functional instructional and administrative space to meet program requirements.
2. Provide upgrades to the existing Indian Valley campus to serve the growing population in this area.
3. Provide job training and academic programs to assist the unemployed and underemployed in obtaining employment and advancement.
4. Provide lower division college classes for transfer students to 4-year university programs.
5. Participate in a collaborative partnership with other educational providers, the business community, and local government to better serve the community.
6. Improve campus facilities to accommodate a total campus population of approximately 1,180 students at completion of the Bond Spending Implementation Plan.
7. Focus development within the existing central Indian Valley campus.
8. Obtain LEED certification on all new and renovated projects.
9. Provide a new Main Building Complex on the north side of Ignacio Creek to house many of the existing programs within a new modern facility and with shared resource spaces.
10. Modernize the Transportation Technology Complex (two buildings) including new auto tech labs and other instructional areas; replace existing outdated equipment and upgrade computer technology.
11. Provide for minor modernization to Pomo 4 building, which supplies program support space to the Transportation Technology Complex.
12. Upgrade the Pomo 1 and 2 buildings for energy conservation.
13. Improve disabled access on exterior pathways.
14. Enhance job training.
15. Incorporate "green building" practices into all capital improvement projects.

3.7 PROJECT APPROVAL AND FUNDING PROCESS

The Marin Community College District is the principal authority for the proposed project. The Board of Trustees for the District would be responsible for certifying the EIR.

The following additional agencies would be involved in discretionary approvals and permits required for various project components:

- The State Chancellor's Office reviews all community college facilities projects and makes recommendations to the Board of Governors (BOG). The BOG then sets project priorities and submits a capital outlay request to the Department of Finance, the Governor, and the Legislature for state funding in the annual State budget.
- The Department of Finance provides fiscal and budget management for the Governor's executive branch of State government.
- The Office of the Legislative Analyst reviews the project budget as staff for the Legislature and advises them on budget requests for community college facility projects.
- The California Post-Secondary Education Commission (CPEC) coordinates programs of higher education to ensure they conform to the State Plan for Higher Education. CPEC advises the legislature regarding capital outlay for educational facilities.
- The Division of State Architect (DSA) reviews community college project designs to determine compliance with the California Building Code, fire safety, and Americans with Disabilities Act (ADA) requirements.
- The State Fire Marshal's Office has delegated fire code regulatory responsibilities for community college facilities to DSA.
- The Regional Water Quality Control Board (RWQCB) oversees permitting for projects that could affect water quality. The project would be covered under the State National Pollutant Discharge Elimination System (NPDES) General Construction Permit, which is accomplished by filing a Notice of Intent (NOI) with the RWQCB. A Storm Water Pollution Prevention Plan (SWPPP) may be required for the project.

3.8 REFERENCES

3D/I, 2003. *Facility Condition Assessment Report.* April.

Marin Community College District, 2006a. *Volume 2, Existing Facilities Assessments: Indian Valley.* December.

Marin Community College District, 2006b. *Design Goals, Principles, Guidelines: College of Marin Facilities Development Plan.* December.

4. ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

This section addresses project-related impacts within the following 12 topic categories:

- Land Use and Planning
- Geology, Soils and Seismicity
- Biological Resources
- Hydrology and Water Quality
- Hazardous Materials
- Cultural Resources
- Transportation
- Air Quality
- Noise
- Public Services
- Public Utilities
- Energy and Sustainability

Each of the 12 topic sections in this EIR presents information in three parts, as described below.

INTRODUCTION

This section addresses the primary studies and other documents used in report preparation. All of these reports and documents are incorporated by reference into this EIR.

ENVIRONMENTAL SETTING

This section briefly describes elements of the project setting relevant to a discussion of impacts in the topic category.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section identifies potential impacts based on the identified significance criteria. If impacts are determined to be less than significant, a statement is made to this effect under the subsection entitled "Less-Than-Significant Impacts." Potentially significant project-specific impacts are numbered and summarized in **bolded** text. The level of significance prior to mitigation is also identified. The bolded text is then followed by a discussion of the particular impact. Mitigation

measures (indented text) that can reduce such impacts follow this discussion with a number that corresponds to the number of the impact. A statement regarding the level of significance of each impact after mitigation follows the mitigation measures for that impact. The term "PS" stands for "potentially significant" and "LTS" stands for "less than significant." The term "SU" stands for "significant and unavoidable."

4.1 LAND USE AND PLANNING

INTRODUCTION

This section of the EIR addresses the existing land use conditions at the Indian Valley campus and the immediate surroundings, and evaluates the project's compatibility with nearby land uses. This section also analyzes the project's consistency with the California Education Code and Novato General Plan and zoning. The following documents and other sources were reviewed:

- State of California, 2007. California Education Code (www.legalinfo.ca.gov/calow.html);
- Marin County Open Space District website (www.marinopenspace.org);
- Marin County, 2003. *Indian Valley Specific Plan*;
- City of Novato, 1996. *Novato General Plan* (www.ci.novato.ca.us); and
- City of Novato, 2006. Municipal Code.

ENVIRONMENTAL SETTING

EXISTING LAND USES ON THE PROJECT SITE

Approximately 246 acres – about 74 percent of the campus – are undeveloped.

The Indian Valley campus comprises approximately 333 acres. The campus presents a "park-like" setting with extensive tree coverage and approximately 246 acres, or about 74 percent of the campus, undeveloped. The remaining 87 acres are developed with college facilities. Ignacio Boulevard provides the primary access to the campus. Existing campus development is located south of Ignacio Boulevard. A perimeter road, with restricted access, encircles the majority of campus buildings and other facilities with the exception of the corporation yard, sports fields, and hard courts, which are located west of the Ignacio Boulevard terminus. College lands located north of Ignacio Boulevard are undeveloped and include oak/bay-covered hillsides and grasslands.

Figure 3-2 shows the existing campus site plan. The parking lots and main entrance/drop-off area are located between Ignacio Boulevard and Ignacio Creek. South of the creek is the campus core which includes classrooms, labs, student services, administration and other support facilities. The campus core buildings are sited in four clusters connected via a pedestrian pathway network. The corporation yard, pool, and sports fields are located in the western part of the campus.

Two fire road segments located on the Indian Valley campus connect with fire roads that are part of a trail system maintained by the Marin County Open Space District. A spur of the Montura Fire Road traverses the southern portion of the

campus and connects with the perimeter road (see Figure 4.1-1). The Montura Fire Road provides access to the Ignacio Valley Open Space Preserve. The Indian Valley Fire Road trailhead is located at the terminus of Ignacio Boulevard, and crosses the campus near the sports fields, continuing west to the Indian Valley Open Space Preserve. Figure 4.1-1 shows the trail system.

ON-SITE EASEMENTS

The campus contains several on-site easements. A 40- to 50-foot-wide Pacific Gas & Electric Company (PG&E) easement traverses the campus south of the perimeter road. Easements for transmission and distribution of water to the North Marin Water District cross the campus along the north and east property lines and at the western portion of the campus. Additionally, there is a 10-foot easement for gas and underground facilities along the perimeter road, and a 10-foot-wide easement for electrical facilities along Ignacio Boulevard. Figure 4.1-2 shows the approximate locations of the on-site easements.

EXISTING SURROUNDING LAND USES

The Indian Valley campus is surrounded by open space and residential development. Within a ¼-mile radius, the primary land uses are as follows: 1) west of campus – open space, including the Indian Valley Open Space Preserve; 2) north of campus – open space and a single-family residential subdivision; 3) east of campus – San Jose Middle School, single-family residential, multi-family residential, and Josef Hoog Park; and 4) south of campus – open space, including Ignacio Valley Open Space Preserve, and a single-family residential subdivision.

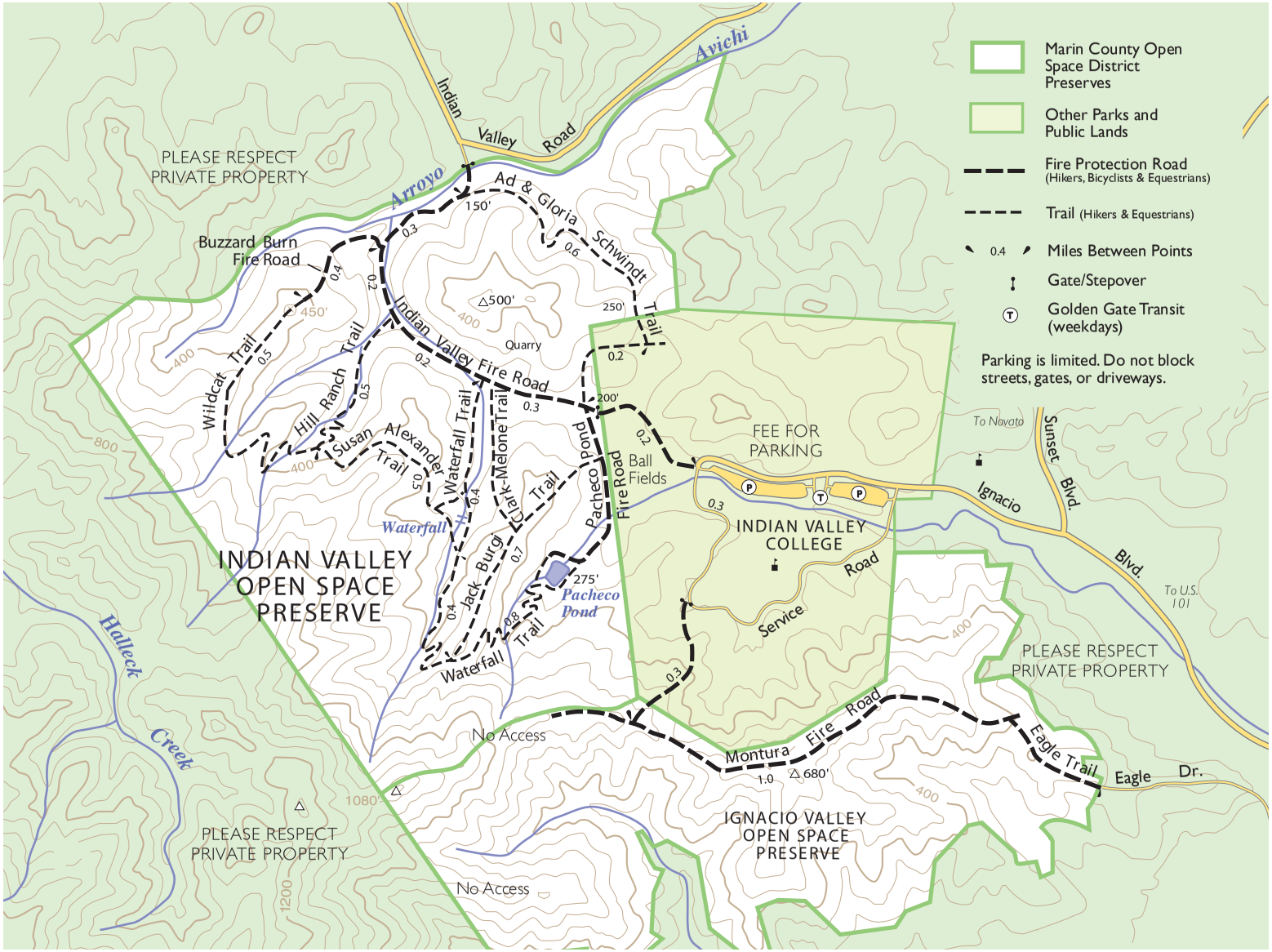
REGULATORY SETTING

California Education Code

The California Education Code includes standards for community college sites (State of California, 2007). These standards relate to locating a campus or constructing new buildings on an existing campus within a special studies zone or area designated as geologically hazardous, and locating a campus or constructing new buildings on an existing campus within 2 miles of an operative airport runway (Sections 81031 – 81033).

Novato General Plan and Zoning Code

The Marin Community College District is constitutionally exempt from local land use regulations when using District property in furtherance of the District's educational purposes. However, this Draft EIR evaluates the project's consistency with local land use regulations and policies for the purposes of CEQA compliance and also because it is the District's goal that local land use controls be acknowledged and adhered to as much as feasible.



Note: The Montara Fire Road is incorrectly shown in this graphic. This road is actually located within the Indian Valley Campus boundaries, based on recent surveys. See Figure 3-3.

Figure 4.1-1

SOURCE: Marin County Open Space District, 2007

INDIAN VALLEY CAMPUS AND INDIAN VALLEY OPEN SPACE PRESERVE

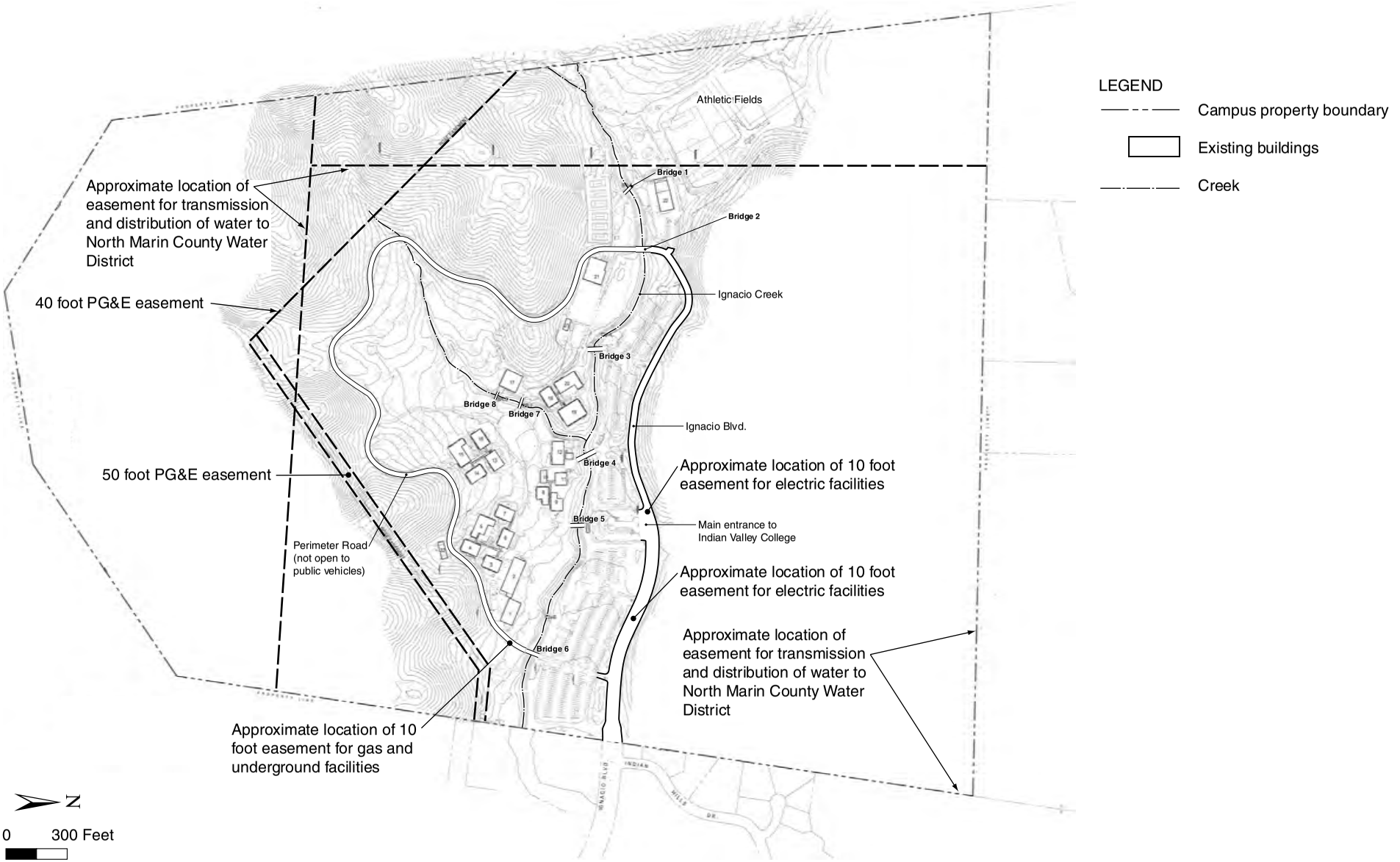


Figure 4.1-2

SOURCE:CSW 2005

ON-SITE EASEMENTS FOR INDIAN VALLEY CAMPUS

AMY SKEWES~COX
ENVIRONMENTAL PLANNING

The Indian Valley campus is designated "Community Facility" by the Novato General Plan. This land use designation allows for public buildings, schools, recreation and cultural facilities, public libraries and other public use buildings and facilities. The property is also zoned Community Facility, a zoning that allows government offices, schools, meeting halls, public libraries and other municipal uses. The college use at the project site is consistent with the General Plan designation and zoning.

Indian Valley Specific Plan

The Indian Valley Specific Plan (Specific Plan), adopted by the County of Marin in 2003, presents goals, objectives, policies and programs designed to preserve the unique attributes of Indian Valley. The Specific Plan focuses on residential development in the planning area. However, the Indian Valley campus is addressed in the Transportation and Circulation section of the Specific Plan.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

For the purposes of this Draft EIR, new development at the project site would present a significant land use impact if the project would:

- Physically divide an established community;
- Create land use conflicts on- or off-campus;
- Conflict with any applicable land use plans or regulations of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- Conflict with any applicable habitat conservation plan or natural community conservation plans.

LESS-THAN-SIGNIFICANT IMPACTS

Project Overview

The project would result in the modernization of the existing Transportation Technology Complex (Pomo 1 and 2) and the potential modernization of Pomo 4 and Power Plants 1, 2, and 3. Building modernizations would occur within the existing building footprints. A new Main Building Complex containing 25,000 to 37,000 square feet would be constructed on a portion of Parking Lot 2. Site improvements would include landscaping; reconfiguring of Parking Lots 1, 2, and 3; upgrading of pedestrian pathways to meet Americans with Disabilities Act (ADA) requirements; proposed redesign work at campus entrances; a proposed replacement pedestrian bridge across Ignacio Creek; and outdoor lighting. A

bioswale would be located in a portion of Parking Lot 1. A geothermal well field would be constructed in the building vicinity in Parking Lots 1 and 2. No buildings are proposed for demolition. Chapter 3, Project Description, provides detailed information on the proposed project. Figure 3-4 show the proposed project site plan.

As addressed in the Initial Study Checklist for the project (available on College of Marin website), the Bond Spending Implementation Plan would not physically divide an established community, or conflict with any applicable habitat conservation plan or natural community conservation plan.

On-Site Land Use Impacts

Overall, the project would improve access and use of the facilities on-campus. The proposed modernization of existing buildings would improve these facilities for use by the students. This would represent a positive impact as it would enhance the learning experience for current and future students at the college.

Upgrades to pedestrian pathways to meet Americans with Disabilities Act (ADA) requirements would improve access for all students, staff, and visitors on the campus. New lighting would improve visibility and safety.

The new Main Building Complex would be constructed on a portion of the existing Parking Lot 2 and therefore its construction would not increase impervious surface area at the campus. The new Main Building Complex would provide a convenient location for visitors and students alike to register for classes and inquire about classes and student services. The new Main Building Complex would consolidate administration and student services at one location. While this building in addition to nearby landscape improvements would eliminate approximately 325 parking spaces, there is an adequate supply of parking to serve the campus, even with the loss of these parking spaces (see Section 4.7, Transportation, of this Draft EIR).

The proposed bioswale, stormwater bio-retention area, and geothermal field would be located on a portion of the existing Parking Lots 1 and 2, and therefore would not disturb any portion of the campus that is currently undeveloped. These improvements would be beneficial to the environment; the bioswale would improve water quality and slow down stormwater runoff, and the geothermal field would reduce energy consumption (as discussed in Sections 4.4 and 4.12 of this Draft EIR).

Impacts on Surrounding Land Uses

Student enrollment would undergo a very modest increase of less than 1 percent per year over the next six years. Therefore, the increase in intensity of use at the campus is considered to be a less-than-significant land use impact.

Very limited construction would occur, and impacts from project construction would be temporary. Refer to Sections 4.7 (Transportation), 4.8 (Air Quality), and 4.9 (Noise) for more detailed discussion of potential construction-related impacts.

Consistency with California Education Code

The project would be consistent with the California Education Code. The campus is not within a special studies zone or geologic hazardous area. Please refer to the Section 4.2, Geology, Soils and Seismicity, of this Draft EIR, which addresses geologic and soils conditions at the campus.

As indicated in the *Initial Study for Measure C Bond Spending Implementation Plan for College of Marin (2007-2013) Indian Valley Campus* (Marin Community College District, 2007), the Indian Valley campus is not within 2 miles of an operative airport runway. The nearest airport is Gnoss Field located about 5 miles northeast of the campus.

Consistency with Novato General Plan

Implementation of the project would be consistent with the applicable policies of the Land Use Element of the Novato General Plan. Appendix B presents the project relationship to applicable Novato General Plan policies.

Consistency with Indian Valley Specific Plan

The project would be consistent with the Indian Valley Specific Plan. As discussed in the Specific Plan, Indian Valley property owners have voiced opposition to any new access roads across Marin County Open Space District properties to connect the northwest portion of the Indian Valley campus with Indian Valley Road. The project does not propose a new vehicular access to the western portion of the campus via Indian Valley Road and would be consistent with Policy 3.2.3 of the Specific Plan.

POTENTIALLY SIGNIFICANT IMPACTS

Implementation of the project would not result in potentially significant land use impacts or require land use-related mitigation measures.

REFERENCES

City of Novato, 2006. Novato Municipal Code, Chapter XIX, Zoning. As amended January 23, 2006.

City of Novato, 1996. *Novato General Plan.*

Marin County, 2003. *Indian Valley Specific Plan.* Adopted March 4.

Marin Community College District, 2007. *Initial Study for Measure C Bond Spending Implementation Plan for College of Marin (2007-2013) Indian Valley Campus.* March. Prepared by Amy Skewes–Cox.

Marin County Open Space District, www.marinopenspace.org. Review of website April 26, 2007.

State of California, 2007. California Education Code, Division 7, Community Colleges, Part 49 Education Facilities, Section 81031-81033.

4.2 GEOLOGY, SOILS AND SEISMICITY

INTRODUCTION

This section describes the geology, soils, seismicity, site conditions, and regulatory setting of the project site, and identifies potential impacts and recommends mitigation measures for the proposed Bond Spending Implementation Plan (Implementation Plan) at the Indian Valley campus. Information regarding the setting was drawn from numerous data sources including:

- Fugro West, Inc., 2005. *Baseline Geologic Hazards Study, College of Marin, Indian Valley Campus, Novato.* December;
- The College of Marin Indian Valley Campus Bond Spending Implementation Plan;
- United States Geological Survey (USGS) Open File Reports (OFR) of the area, including a map of geology (USGS MF 2337, 2000) and landslides (USGS OFR 97-745, 1997);
- Review of Official California Geologic Survey (CGS) (formerly the California Division of Mines and Geology (CDMG)) Maps, including the San Rafael Quadrangle Alquist-Priolo (A-P) Earthquake Fault Zone Map (1982), the Fault Activity Map of California (1994); and the California Earthquakes Map, 1800-1999 (2001); and
- Various government websites, including the Association of Bay Area Governments (ABAG) website (www.abag.gov) for a summary of hazards ranging from liquefaction to distribution of landslides.

ENVIRONMENTAL SETTING

PROJECT REGION

Regional Seismicity

The project area lies in the tectonically active Coast Ranges Geomorphic Province of Northern California, on the east side of the Marin Peninsula. The geologic and geomorphic structure of the northwest-trending ridges and valleys in the region, including the San Francisco Bay, is controlled by active tectonism along the boundary between the North American and Pacific Tectonic Plates, which is the San Andreas Fault System. Regional faults have predominantly right-lateral strike-slip (horizontal) movement, with lesser dip-slip (vertical) components of displacement. Within the project area there are three major faults that display a major right-lateral strike-slip (horizontal) movement, with lesser dip-slip (vertical) components of displacement: the San Andreas fault, the Rodgers

Creek fault, and the Hayward fault (USGS, 2001). The other active faults in the area include the Rodgers Creek, Napa, and Concord/Green Valley faults (ABAG, 2007a). The nearest fault is the San Andreas, passing approximately 10 miles southwest of the site. The other nearby active faults include the Hayward (11 miles east), Rodgers Creek (9 miles north), West Napa (18 miles east), and Concord-Green Valley fault (25 miles northeast) (see Figure 4.2-1).

Seismicity of the project region has resulted in several major earthquakes during the historic period, including the 1868 Hayward Earthquake, the 1906 San Francisco Earthquake, and most recently, the 1989 Loma Prieta Earthquake (CDMG, 2000). The closest recorded large magnitude earthquake, magnitude 6.2, occurred 16 miles to the east at Mare Island in 1898, followed by the 1906 8.3 magnitude San Francisco event, 21 miles to the south. Numerous small (less than 5.5 magnitude), non-damaging earthquakes occur frequently in the project vicinity, while larger potentially damaging earthquakes occur occasionally. Surface rupture caused by earthquakes occurs when movement on a fault deep within the earth breaks through to the surface. According to the 1997 CGS Fault Hazard map, the project area is not in a surface rupture hazard zone (Hart and Bryant, 1999).

The closest large earthquakes occurred 16 miles east at Mare Island in 1898 and 21 miles south in San Francisco in 1906.

Regional Geology

The project area is located in the foothills, at the south end of the City of Novato, in an area underlain by rocks of the Franciscan Complex. This Mesozoic rock group is composed of weakly to strongly metamorphosed greywacke (sandstone), siltstone, shale, limestone, basalt, serpentinite, chert, and other rocks formed from Jurassic oceanic crust and pelagic (deep sea) deposits. Also included in the formation are overlying Late Jurassic to Late Cretaceous sedimentary deposits. High-pressure and low-temperature metamorphic mineral assemblages are common in the Franciscan complex, but there are also high-grade metamorphic blocks surrounded by sheared lightly metamorphosed shale.

Regional geology is shown on the Geologic Map of Marin County (USGS, 2000) included in the Fugro West study (2005) (see Appendix C, Figure C-1). The majority of the project area is mapped as Quaternary Alluvium, with Franciscan sandstone and shale and sandstone on the uplands. Franciscan complex melange and landslides are mapped to the southwest.

PROJECT SITE

Site Overview and Topography

The Indian Valley campus was constructed in the 1970s on 330 acres of the former Pacheco Ranch. The major drainage, Ignacio Creek (previously Arroyo San Jose), runs the length of the campus from west to east in an incised channel. Most of the campus buildings are south of the main creek channel, while parking and athletic areas are to the north. An additional, deeply incised

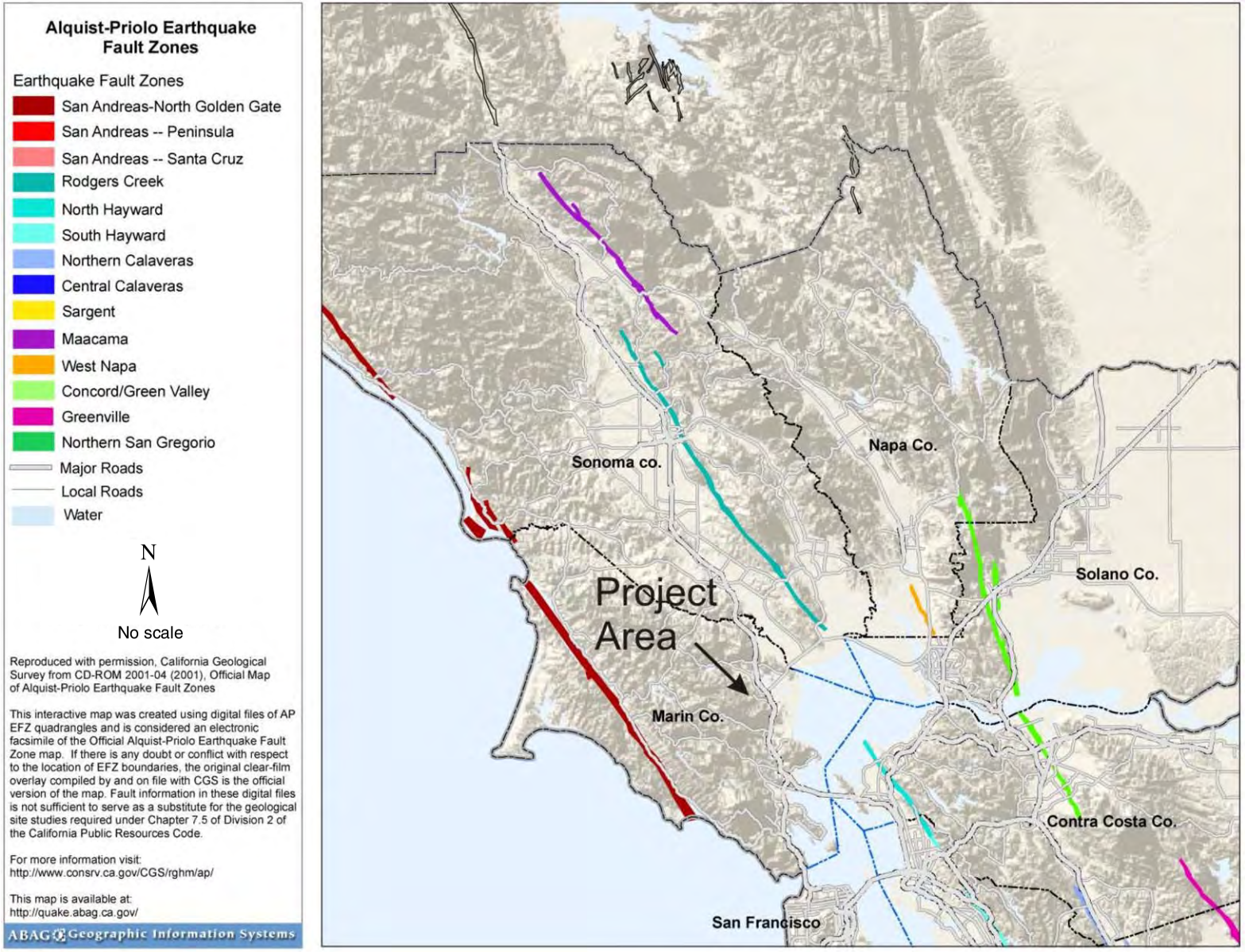


Figure 4.2-1

SOURCE: ABAG, 2007

LOCAL EARTHQUAKE FAULT ZONES: INDIAN VALLEY CAMPUS

tributary drainage channel flows south to north through the campus to join Ignacio Creek. Six bridges cross Ignacio Creek, while two bridges connect the east and west sides of the smaller drainage. Elevations at the main campus area range from 151 feet in the east to 220 feet in the west. The undeveloped surrounding woodland and grassland hillslopes rise from 220 to 450 feet in the north and 730 feet in the south. Residential areas are located less than a tenth of a mile from the campus' easterly parking lot.

Site Geology and Soils

USGS geologic maps of the Indian Valley area indicate that the campus is located on variable thicknesses of Quaternary alluvial deposits. Soils on hills and occurring through the campus and along the creek consist primarily of naturally occurring fine, mixed clay and sandy loams.

Two soil types are present: the Tocaloma Saurin Bonnydoon Association, and Xerorthents – Urban Land (U). The Tocaloma and Saurin series consist of moderately deep, well-drained soils that formed in material weathered from sandstone and shale. Tocaloma and Saurin soils are on hills and have slopes of 2 to 75 percent. Basically, they are sandy and clay loams that encounter strongly weathered, fractured sandstone at approximately 40 inches depth or less. The Bonnydoon component is found in the northern part of the Ignacio Creek watershed. The Bonnydoon series differs from the Tocaloma and Saurin series in that it consists of shallow, somewhat excessively drained soils, and is found on slightly steeper slopes of 5 to 85 percent. The Bonnydoon series is a loam over white to yellowish-brown, fine-grained, weathered and fractured sandstone. The upper horizons of the Tocaloma Saurin Bonnydoon Association generally consist of moist loams, fine to very fine roots, and fine to very fine interstitial pores. Pebbles comprise up to 40 percent of the B horizon in the Tocaloma series, and 10 percent of the B horizon in the Saurin series; gravel ranges from 5 to 15 percent throughout the Bonnydoon profile. The Xerorthents type follows the drainage of Ignacio Creek, and is used to describe the highly variable, disturbed flatlands.

Project Area Landsliding and Slope Instability

The majority of the Indian Valley campus property is located in the relatively flat, stable areas of the valley bottom. Landslide crowns are located 2 miles to the southwest along the perimeter road at the southern end of the campus, at the base of north-facing slopes (Fugro West, Inc., 2005).

Ground shaking from a seismic event can cause slope failure, rockfall, and debris flows. Most of the developed portion of the site is distant from any slopes that could be unstable. However, portions of the site that are adjacent to steeply sloped creek channels could fail under seismic shaking.

Primary Seismic Hazards – Surface Fault Rupture

A number of active and potentially active faults are present in the region (see Figure 4.2-1). According to criteria of the State of California Geological Survey (CGS, 2006), active faults are those that have experienced either historic or documented surface fault rupture within the last 11,000 years. The Alquist-Priolo Earthquake Fault Zoning Act of 1972 initiated a program of mapping active and potentially active faults. According to the program, active faults must be zoned and development projects within the Earthquake Fault Zones investigated to establish the location and age of any faulting across the development site. Active and potentially active faults in Marin County have undergone extensive investigation in the past. The Association of Bay Area Governments (ABAG) has summarized results from many of these studies to quantify the potential impact to certain areas, while the California Geological Survey has established Earthquake Fault Zone (EFZ) boundaries. According to these maps, the Indian Valley campus is not located within an EFZ. No faults zoned as active by the State of California are mapped at the project site and the site does not include any areas mapped as an Earthquake Fault Zone under the Alquist-Priolo Earthquake Fault Zoning Act of 1972. The risk of surface fault rupture near the Indian Valley campus project is considered to be non-existent (ABAG, 2007a).

Cooper-Clark & Associates performed mapping studies, resistivity surveys, and magnetometer surveys of the area (Cooper-Clark & Associates, 1976). They concluded that an inactive fault passes through the project area. That data was not available for study, however, and subsequent studies and mapping by Rice et al. (1973) and the Geologic Hazards Study found no corroborating evidence to substantiate existence of that fault (Fugro West, Inc., 2005).

Probabilistic Seismic Hazard Assessment Design Basis Earthquake (DBE), with a 10-percent probability of being exceeded in 50 years, produces a 40- to 50-percent Peak Ground Acceleration for the project area (CGS, 2006) (see Appendix C, Figure C-2). Based on these findings, the Geologic Hazards Study concluded that, to evaluate individual buildings, a site-specific analysis would need to be conducted for each building, taking into account local soil conditions, and should determine both DBE ground motions and Upper Bound Earthquake (UBE, 10 percent probability of exceedance in 100 years) ground motions.

Secondary Seismic Hazards

The site will likely be subjected to strong seismic ground shaking during the life of the project.

Ground Shaking. The San Francisco Bay Area is a seismically active region and the site will likely be subjected to strong seismically induced ground shaking within the design life of the project. The site is located within Seismic Zone 4 of the California Building Code, which is considered the most seismically active zone.

According to the USGS Working Group on California Earthquake Probabilities (WGCEP), which assesses the probability of earthquakes in the San Francisco Bay region, there is a 62-percent probability that an earthquake of Richter

Magnitude 6.7 or greater will strike the area during the next 30 years (WGCEP, 2003).

The intensity of ground shaking will vary with the distance and magnitude of the earthquake causing the ground shaking. This ground shaking intensity has been predicted by the USGS and CGS for most of the Bay Area, including the project site, and is summarized on the ABAG website using the Modified Mercalli scale (Appendix C, Table C-1). The maximum intensity ground shaking expected to occur at the site would be a Modified Mercalli intensity level of VII to VIII (strong to very strong) in response to a major rupture along the San Andreas fault equivalent to the 1906 earthquake. A major rupture on the Rodgers Creek fault is also predicted to cause strong ground shaking (level VII), while a major earthquake on the Hayward fault or more distant faults is expected to cause moderate ground shaking of the site. Such ground shaking is not predicted to destroy well-built structures, but could badly damage or destroy unreinforced masonry or poorly built structures. Many structures are expected to suffer light to moderate damage should there be very strong ground shaking.

Peak ground accelerations for the site with a 10-percent probability of being exceeded in a 50-year period are estimated at 50 to 60 percent of the acceleration due to gravity (CGS, 2006). Actual ground motions resulting from ground acceleration may be amplified or dampened depending on the underlying geologic materials. Deep soft soils tend to amplify waves whereas shallow soils overlying hard bedrock tends to dampen shaking intensity. Since shallow stiff soils occur over most of the project site, the amplification of seismic waves is expected to be minimal.

Seismically Induced Liquefaction. Liquefaction is the temporary transformation of saturated and very low cohesion or cohesionless soils into a viscous liquid as a result of ground shaking. According to ABAG, soils at the site have a moderate susceptibility to liquefaction (ABAG, 2007b). The soil borings of the Geologic Hazards Study also indicated soil conditions were encountered that would be only moderately likely to cause liquefaction. Based on examination of soil borings, the Geologic Hazards Study determined the susceptibility of the ground surface on the Indian Valley campus to liquefaction to be very low (Fugro West, Inc., 2005).

Seismically Induced Densification. Dynamic densification or ground subsidence can occur when dry, low-cohesion soils collapse as a result of seismic shaking. This is particularly true of unconsolidated sandy fill, or ground overlying hollow areas above caves, mines, or areas with excessive open pore space from groundwater removal. Since these conditions do not occur at the site, dynamic densification is not considered a hazard.

Seismically Induced Lurch Cracking and Ridgetop Fissuring and Shattering. Lurching is the sudden swaying, rolling, or spreading of the ground during a strong earthquake. Lurch cracking is the development of fissures or cracks on

slopes underlain by weak soils under high ground acceleration. The fill and alluvial soils on the campus may be susceptible to lurch cracking. Another related phenomenon is ridgetop fissuring and shattering, thought to be the result of intense amplification or focusing of seismic energy due to local topographic features. Linear fault-like fissures and shattering of surface soils on the crests of steep, narrow ridgelines were well-documented after the 1989 Loma Prieta and 1994 Northridge earthquakes. This phenomenon can result in severe structural damage, particularly if it occurs on high, narrow ridges flanked by slopes steeper than about 2.5:1 (horizontal to vertical). These topographic features do not exist on the Indian Valley campus; thus, ridgetop fissuring and shattering is not considered a hazard.

Unstable Geologic Unit or Soils. According the site geology map and soil logs, fill soils and alluvial sediments are present on the Indian Valley campus. Fill and alluvial soils may settle due to new building loads and may settle under design loading conditions resulting in differential settlement of structures. Expansive soils such as clays can increase and decrease in volume, especially with moisture content changes, and are often present in fluvial environment depositional zones. Campus geology as indicated in the site geologic maps does not include expansive clays. However, site soil borings have found soils of medium expansive soils in the Pomo Cluster.

Structural Condition of Existing Buildings as Related to Seismic Events

Degenkolb Engineers performed an ASCE 31: Seismic Evaluation of Existing Buildings to assess the structural and non-structural "life safety" of the campus buildings (Degenkolb Engineers, 2006). The assessment included a Tier 1 screening to identify buildings that are compliant, and a Tier 2 evaluation of the potential seismic deficiencies for the remaining buildings. ASCE 31 contains no classification for the campus' wood-framed structures with cantilevered columns. For these buildings, the 2001 California Building Code provisions were applied. The evaluation found that the structures meet the life safety performance objectives found in ASCE 31. However, the structural recommendations of the report called for a detailed examination and repair schedule for the gluelam beams that have deteriorated due to weather exposure, as well as an evaluation of the free standing walkways lacking longitudinal seismic bracing at the Ohlone and Miwok clusters (Degenkolb Engineers, 2006). Bracing was also recommended for numerous non-structural elements such as lighting, heating, storage, and wall partitions throughout the campus.

REGULATORY SETTING

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the California Legislature in 1972 to mitigate the hazard to structures from surface faulting.

The Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, the city or county with jurisdiction must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code Sections 2690-2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and seismically induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

California Building Code

The California Building Code (CBC) has been adopted by most jurisdictions in California to oversee construction. The CBC defines four Seismic Zones in California, which are ranked according to their seismic hazard potential. Zone 1 has the least seismic potential and Zone 4 has the highest seismic potential. The Bay Area is located in Seismic Zone 4 and thus development is required to comply with all design standards applicable to Seismic Zone 4. The earthquake protection law (California Heath and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum standards for seismic safety and structural design to meet earthquake protection requirements are set forth in Chapter 16 of the CBC.

Novato Municipal Code and Division of State Architect

Chapter V (Development Standards) and Chapter VI (Excavations and Fills) of the Novato Municipal Code require submittal of plans to the City Engineer and Community Development Department. However, the College of Marin is exempt from local building codes. Instead, the Division of the State Architect (DSA) will review building plans to ensure compliance with the California Code.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

For the purposes of this Draft EIR, development of the project site would cause a significant geology or soils impact if the project would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault (refer to California Geological Survey Special Publication 42);
  - strong seismic ground shaking;
  - seismic-related ground failure, including liquefaction; or
  - landslides.
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse; or
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994 or most current edition), creating substantial risks to life or property.

For other criteria related to geology, soils, and seismicity (e.g., mineral resources or use of septic systems), the Initial Study completed for the project (see the CEQA Initial Study, Indian Valley campus on the College of Marin website) concluded that the project would have less-than-significant impacts.

LESS-THAN-SIGNIFICANT IMPACTS

The following impacts were identified in the Initial Study or by this EIR to be less than significant:

- Alteration or destruction of a unique geological feature. The Indian Valley campus does not contain any unique geological features.
- Surface fault rupture. According to the latest available maps, the Indian Valley campus is not located within an Alquist-Priolo Earthquake Fault Zone boundary. No faults zoned as active by the State of California are mapped at the project site. The Geologic Hazards Study (Fugro West, Inc., 2005) found that previous findings of a fault on the site could not be substantiated. Published geologic maps of the area show the nearest fault, the Rogers Creek fault, as lying approximately 9.8 miles northeast of the site, and the San Andreas fault lying 11 miles to the southwest (see Figure 4.2-1).

- Landslides. The Indian Valley campus is in an area where active landslides have been mapped. Older landslide scars and small-scale slides occur on slopes over 1,000 feet away from the current campus area. The perimeter road along the base of slope south of campus would be the only facility that could potentially be affected. This road is used as a secondary access. Since there are multiple ways to reach campus buildings, temporary closure of the perimeter road would not affect the safety of campus occupants.
- Unstable soils, lateral spreading, subsidence, or liquefaction. Liquefaction is the process by which saturated cohesionless soils lose shear strength during seismic ground shaking. Lateral spreading is the large displacement of surficial soil blocks as a result of subsurface liquefaction, usually over moderate slopes. Contraction of plastic soils may also result in subsidence. Based on soil mapping, previous soil borings by Cooper-Clark & Associates, and borings by Fugro West, Inc., no potentially liquefiable soils are present in the project area (Fugro West, Inc., 2005). Therefore, the potential for liquefaction, lateral spreading, and subsidence would be very low.

POTENTIALLY SIGNIFICANT IMPACTS

According to CEQA Guidelines, exposure of people or structures to major geological hazards is a significant adverse impact. The primary geologic hazards affecting the project site are strong seismic ground shaking. The basic criterion applied to the analysis of impacts is whether construction of the project would create, or be founded, on unstable geologic conditions that would last beyond the short-term construction period. This analysis of geological hazards is primarily based on the degree to which the site geology could produce hazards to people, structures, and the environment from earthquakes, fault rupture, landslides and other slope instabilities, expansion and compression of clay soils, and other geologic hazards.

Impact GEOLOGY-1: Strong shaking associated with an earthquake could damage existing and proposed structures at the Indian Valley campus. (PS)

The Indian Valley campus is located in the seismically active region of the San Francisco Bay Area and is within the effective proximity of active faults. The campus is likely to experience a strong seismic event during the lifetime of the Bond Spending Implementation Plan. Strong ground shaking at the campus would occur. This may cause impacts to existing and future buildings and structures. The existing buildings meet life safety performance objectives; however, new buildings and structures would need to be designed to withstand seismic ground shaking.

> *Mitigation Measure GEOLOGY-1a: The District shall complete a design-level Geotechnical Investigation Report prepared by a Registered Geotechnical Engineer and Structural Design Plans as prepared by a*

Registered Structural Engineer for all new campus construction. Proper foundation and structural engineering and construction shall be performed in accordance with the recommendations of a Registered Geotechnical Engineer and a Registered Structural Engineer.

Mitigation Measure GEOLOGY-1b: All new buildings and structures shall comply with the California Building Code and Uniform Building Code and compliance shall be verified by the California Division of the State Architect (DSA) in the review of building plans.[1] Incorporation of seismic construction standards would reduce the potential for catastrophic effects of ground shaking such as complete structural failure to an acceptable standard, but would not entirely eliminate the hazard of seismically induced ground shaking.

Implementation of the above measures would reduce impacts from strong seismic ground shaking to a less-than-significant level. (LTS)

Impact GEOLOGY-2: Soil erosion or the loss of topsoil could occur during construction, particularly during storms. (PS)

The Implementation Plan would involve demolition of existing pavement and construction of new buildings and structures on the campus. Bare, erosive soils would be exposed during the excavation and grading for construction of new buildings and structures. Temporary stockpiles of loose soil may be created. The exposed soils would be subject to erosion during winter storm events. Grading would disturb site soils, potentially leading to impacts to Ignacio Creek. This would be a potentially significant impact during and following site construction activities. The project does not propose to create slopes greater than 3 horizontal to 1 vertical feet, and would not increase erosion due to slope failure.

Mitigation Measure GEOLOGY-2: The District shall prepare an Erosion Control and Storm Water Pollution Prevention Plan prior to the onset of demolition, site grading, or construction. Please see Section 4.4, Hydrology and Water Quality, for impacts and mitigation measures for construction-related storm runoff. With implementation of the standard control measures therein, impacts from substantial soil erosion or the loss of topsoil would be reduced to less-than-significant levels. (LTS)

Impact GEOLOGY-3: Expansive soils could affect foundations and other building elements associated with adoption of the Bond Spending Implementation Plan. (PS)

[1] The DSA provides design and construction oversight for K-12 schools and community colleges, similar to how local building departments provide such oversight for other types of development.

The Fugro West, Inc., 2005 study found clayey soils of low to medium potential for expansion underlying the project site, specifically in Parking Lot 5. Soils could be subject to changes in volume due to changes in moisture content, which can affect building foundations, roadways, walkways, parking, and other subsurface structures.

> *Mitigation Measure GEOLOGY-3: The District shall design and construct all new structures in accordance with geotechnical investigation recommendations (see Mitigation Measure GEOLOGY-1a), including recommended mitigation measures for expansive clay soils. Potential measures for control of expansive clay soils include the following:*
>
> - *Use of deeper foundations than normal.*
> - *Use of non-expansive layer under floor slabs and pavements.*
> - *Treating site soils with lime to reduce the expansion potential and increase the strength.*
> - *Additional reinforcing for slabs and walkways.*
> - *Grading around structures to assure positive drainage away from structures.*
>
> *The District's compliance with the above mitigation measure would reduce the impact of potentially expansive soils to a less-than-significant level. (LTS)*

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4.3 BIOLOGICAL RESOURCES

INTRODUCTION

This section of the EIR provides a summary of the biological resources on the Indian Valley campus and an assessment of the potential impacts of the proposed Bond Spending Implementation Plan. Section C.11, Biological Resources, of the *Background Report* provides a detailed description of the biological and potential jurisdictional wetlands on the Indian Valley campus and the regulatory framework related to the protection of sensitive resources such as jurisdictional wetlands, special-status species, and sensitive natural communities (Marin Community College District, 2006a). Information from the *Background Report* is summarized below, together with an analysis of the potential impacts of proposed improvements.

Biological resources were identified through the review of available information and surveys of the Indian Valley campus. Field reconnaissance surveys were conducted by the EIR biologist on August 11, October 18, and November 21, 2005 to confirm mapping of vegetative cover types, to determine wildlife habitat and any important resources, and to determine the potential for occurrence of special-status species. Systematic surveys were conducted by a qualified botanist on March 23 and 27, May 19, and July 17, 2006 to determine whether any special-status plant species occur within portions of the campus property where future modifications may occur as part of the Bond Spending Implementation Plan. No protocol surveys for special-status animal species such as the federally listed threatened California red-legged frog were conducted as part of this *Background Report* because of the marginal habitat conditions on the Indian Valley campus. Supplemental field work was conducted on August 28, 2006 as part of a detailed wetland delineation prepared using methodology from the U.S. Army Corps of Engineers (Corps) *Wetland Delineation Manual* (Environmental Laboratory, 1987).

ENVIRONMENTAL SETTING

VEGETATION AND WILDLIFE

The Indian Valley campus consists of largely undeveloped land in the upper watershed of Arroyo San Jose, in the southwestern area of Novato. When first developed, the main campus was sensitively sited along Ignacio Creek, the main tributary to Arroyo San Jose, and set among the mature native trees. Development associated with existing college improvements (structures, parking lots, roadways and pathways, ball fields and irrigated turf areas), has replaced native vegetative cover, primarily on the valley floor along Ignacio Creek. Remaining natural areas support a mosaic of mixed hardwood woodlands, oak

savanna, non-native grassland and successional brushfields, and riparian woodland and scrub along the Arroyo San Jose tributaries. Figure 4.3-1 shows the general extent of the various vegetation types and potential jurisdictional waters on the site. Existing vegetative cover and associated wildlife habitats are summarized below.

Mixed Oak Woodland

The majority of the Indian Valley campus supports a cover of dense to open woodlands and savanna, dominated by several species of oak and other native tree species. Common tree species include black oak (*Quercus kelloggii*), valley oak (*Q. lobata*), coast live oak (*Q. agrifolia*), blue oak (*Q. douglasii*), California bay (*Umbellularia californica*), and madrone (*Arbutus menziesii*). Where the woodland canopy is closed, understory vegetation is generally sparse, composed of poison oak (*Toxicodendron diversilobum*), coyote brush (*Baccharis pilularis*), toyon (*Heteromeles arbutifolia*) and other shrub and groundcover species. Where the canopy is open or sparse, the understory is dominated by a relatively dense cover of non-native grassland species.

When first developed, the main campus was sensitively sited along Ignacio Creek, the main tributary to Arroyo San Jose, and set among the mature native trees.

Sudden Oak Death (SOD), a disease of increasing concern in Marin County and other parts of coastal California, is affecting oaks and other species in the woodland, with a noticeable decline and loss of a number of coast live oaks at the Indian Valley campus. The Fire Mitigation Program implemented in the fall of 2006 removed a number of coast live oaks that were dead or in severe decline because of SOD and related conditions.

The mature woodlands provide denning, nesting, and foraging opportunities for numerous species of small mammals, reptiles, and birds. Mammals and reptiles found in the woodlands include deer mouse, woodrat, stripped skunk, grey squirrel, western skink, newts, ensatina, ring-necked snake, and rubber boa. Larger mammals such as black-tailed deer and predatory species such as grey fox, mountain lion, and coyote most likely forage throughout the undeveloped woodlands and open savanna. The trees provide nesting cavities, perching and foraging opportunities, and nesting substrate for numerous species of birds, including jays, woodpeckers, kinglets, and bushtits. Several species of raptors use the mature trees for roosting and possibly nesting with foraging in the understory and areas of open grassland. These raptor species include red-tailed hawk, Cooper's hawk, white-tailed kite, turkey vulture, great-horned owl, and barn owl. The understory of the woodlands and savanna on the Indian Valley campus is used by species associated with grasslands, or species common in developed areas where buildings and other improvements are surrounding the remaining trees.

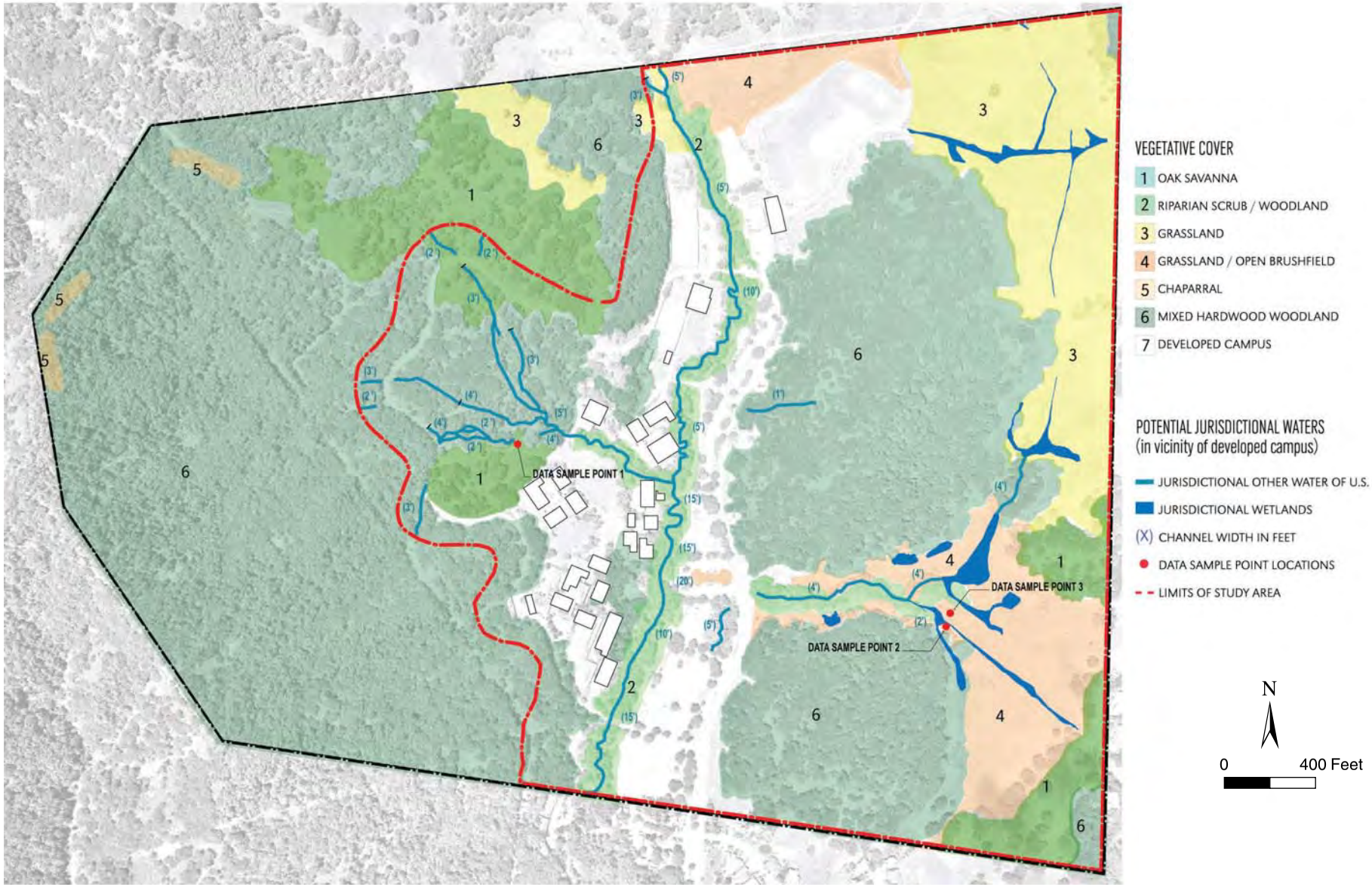

Figure 4.3-1

SOURCE: RHAA and Environmental Collaborative, 2007

VEGETATIVE COVER AND BIOLOGICAL RESOURCES: INDIAN VALLEY CAMPUS

Riparian Woodland and Scrub

Riparian woodland and scrub occur along Ignacio Creek and the main tributaries, dominated by several species of native trees and shrubs. Native tree species along the riparian corridors include coast live oak, California bay, California buckeye (*Aesculus californica*), and valley oak. In some locations, willow (*Salix lasiolepis*) forms dense thickets of shrubs and small trees. Understory species are generally sparse, with a few species of ferns, honeysuckle (*Lonicera* sp.), and poison oak growing along the creek banks. The highly invasive, non-native Himalayan blackberry (*Rubus discolor*) forms impenetrable thickets along some segments of the corridor. Severe downcutting of the channel bottom and erosion of channel banks are occurring along some reaches of the creek, undermining and toppling trees in a number of locations.

Although the limited understory and areas of severe erosion limit the overall wildlife habitat values, the riparian corridor continues to provide important wildlife resources to a wide variety of species. Surface water is available for aquatic-dependent organisms and serves as a source of drinking water for terrestrial mammals and birds. Some reaches of the creek appear to be at least intermittent in nature, providing pools of surface water during the dry, summer months. The creek channel most likely serves as a movement corridor for aquatic and terrestrial species. Wildlife dependent on the cover provided by the riparian woodland and scrub include black-tailed deer, black-tailed jackrabbit, grey and red fox, rufous-sided towhee, scrub jay, flycatchers, warblers, aquatic garter snake, western toad, and possibly other amphibians. No evidence of any fish was observed during field reconnaissance surveys, and large structures downstream and on the Indian Valley campus prevent migration by anadromous fish into the upper watershed.

Grasslands

Past grazing activities and fire suppression have contributed to changes in the grasslands on the site, eliminating most of the native grasslands and leading to the spread of brushy chaparral and scrub cover on the site. The remaining open areas on the Indian Valley campus support a cover dominated by non-native grasses and forbs. Seasonal seeps are scattered through the grasslands, particularly in the northern portion of the Indian Valley campus, supporting species indicative of transitional and wetland habitat. Species composition in the grasslands varies, depending on the extent of past and ongoing disturbance, nature of underlying soils, depth to groundwater, and frequency and duration of soil saturation. Common species are generally not native and include slender oats (*Avena barbata*), soft brome (*Bromus hordeaceus*), bur clover (*Medicago polymorpha*), storksbill filaree (*Erodium cirutarium*), and common vetch (*Vicia sativa* ssp. *sativa*).

Native coyote brush is spreading into the grasslands in a number of locations, forming large brushfields. Many of these brushfields were removed as part of the

Fire Mitigation Program. Grasslands along the fringe of the improved main campus are dominated by ruderal (weedy) species such as wild radish (*Raphanus sativa*), sweet fennel (*Foeniculum vulgare*), and bull thistle (*Cirsium vulgare*).

Highly invasive species such as Sweet fennel, French broom (*Genista monspessulana*), and Scotch broom (*Cytisus scoparius*) are spreading along road margins and disturbed areas near the main campus.

The locations mapped as "potential wetlands" in Figure 4.3-1 are generally seasonal seeps dominated by a cover of native California oatgrass (*Danthonia* sp.) and iris-leaf rush (*Juncus xiphioides*). These areas appear to function as grasslands and brushlands in drier periods, and then become saturated during the winter and spring for a long enough time into the growing season that wetland indicator species are present. These potential wetland areas are difficult to characterize given the overstory of brush and seasonal fluctuation in functioning as both wetlands and grasslands.

The grasslands provide important foraging opportunities for numerous small mammals, passerine birds, and insects, such as California vole, pocket gopher, black-tailed jackrabbit, western meadowlark, western kingbird, savannah sparrow, white-crowned sparrow, and American goldfinch. These species provide abundant prey opportunities for predatory birds, mammals, and reptiles, such as gopher snake, raccoon, stripped skunk, grey and red fox, red-tailed hawk, American kestrel, great-horned owl, and barn owl.

Developed Areas/Ornamental Landscaping

Buildings, roadways, parking lots, other impervious surfaces, turf, and ornamental landscaping occupy the developed portion of the Indian Valley campus. Existing landscaping consists of a mixture of native and non-native trees, shrubs, and groundcovers. Planted trees and shrubs include native coast live oak and coast redwood (*Sequoia sempervirens*), and non-native pines, acacias, bottlebrush, and oleander, among others. Planted turf covers much of the ground around the existing buildings in the campus center and the large playfield at the western edge of the valley floor. As noted above, native trees, primarily mature oaks and bays, were retained throughout the improved campus grounds when the campus was first developed. Several highly invasive plant species occur within the improved campus grounds and are spreading through undeveloped portions of the Indian Valley campus. These include Himalayan blackberry and periwinkle (*Vinca major*), which is spreading along the creek channels, and fennel and broom, which are spreading along roadways and fire trails.

The developed portion of the site generally has less wildlife habitat value, compared to the surrounding remaining natural areas. Impervious surfaces, turf, and routine maintenance limit protective cover and foraging opportunities.

Wildlife in these developed areas are typically more acclimated to human activity and include species common in suburban habitats such as scrub jay, brown towhee, mourning dove, house finch, house sparrow, American robin, mockingbird, Norway rat, and house mouse. The mature trees do provide roosting and potential nesting substrate for numerous species of birds, although no raptor nests were observed during the field reconnaissance surveys. Bats are known to roost under sheathing installed over support beams of many of the buildings on the campus, and attempts to exclude their access because of concerns over health and safety issues have been only partly successful.

SPECIAL-STATUS SPECIES

Special-status species are plants and animals that are legally protected under the State and/or federal Endangered Species Acts or other regulations, as well as other species that are considered rare enough by the scientific community and trustee agencies to warrant special consideration, particularly with regard to protection of isolated populations, nesting or denning locations, communal roosts, and other essential habitat. Species with legal protection under the federal and State Endangered Species Acts often represent major constraints to development, particularly when they are wide-ranging or highly sensitive to habitat disturbance and where proposed development would result in a "take" of these species. "Take" as defined by the federal Endangered Species Act (ESA) means to "harass, harm, pursue, hunt, shoot, kill, trap, capture, or collect" a threatened or endangered species. "Harm" is further defined by the U.S. Fish and Wildlife Service (USFWS) to include the killing or harming of wildlife due to significant obstruction of essential behavior patterns (i.e., breeding, feeding, or sheltering) through significant habitat modifications or degradation. The California Department of Fish and Game (CDFG) also considers the loss of listed species habitat as "take," although this policy lacks statutory authority and case law support under the California Endangered Species Act (CESA).

The California Natural Diversity Data Base (CNDDB) records and other information sources indicate that a number of special-status plant and animal species occur in the Novato vicinity (CDFG, 2005, 2006a, and 2006b). A general occurrence record for only one species, Mt. Tamalpais jewel-flower (*Streptanthus glandulosus* ssp. *pulchellus*), extends over the southern edge of the campus property. Numerous other special-status plant and animal species have varying potentials for occurrence on the site, as discussed below.

Special-Status Plant Species

Based on the CNDDB records, the *Inventory of Rare and Endangered Plants of California* (CNPS, 2001), and other information sources, a number of special-status plant species have the potential to occur in the remaining undeveloped lands of the site. Species of particular concern reported from within 5 miles of the campus property are all maintained on the CNPS *Inventory* as List 1B species (rare and endangered in California and elsewhere), and include, among

others, Mount Tamalpais jewel-flower, Napa false indigo (*Amorpha californica* var. *napensis*), bent-flowered fiddleneck (*Amsinkia lunaris*), Mt. Tamalpais manzanita (*Arctostaphylos hookeri* ssp. *montana*), fragrant fritillary (*Fritillaria liliacea*), Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), Marin County navarretia (*Navarretia rosulata*), and Marin checkerbloom (*Sidalcea hickmanii* ssp. *virisdis*).

No special-status plant species are suspected to occur in the vicinity of the main campus.

No special-status plant species have been reported on the site, and none were detected during systematic detailed surveys conducted in spring and summer of 2006. Given the results of the detailed surveys, no special-status plant species are suspected to occur in the vicinity of the main campus or locations where future improvements are currently being considered as part of the Bond Spending Implementation Plan.

Special-Status Animal Species

A number of bird, mammal, reptile, fish, and invertebrate species with special-status are known or suspected from the Novato vicinity and northeastern Marin County area. These include:

- Cooper's hawk (*Accipiter cooperi*)
- Sharp-shinned hawk (*Accipiter striatus*)
- Golden eagle (*Aquila chrysaetos*)
- Western burrowing owl (*Athene cunicularia*)
- Tricolored blackbird (*Agelaius tricolor*)
- Northern harrier (*Circus cyaneus*)
- White-tailed kite (*Elanus caeruleus*)
- Prairie falcon (*Falco mexicanus*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*)
- Loggerhead shrike (*Lanius ludovicianus*)
- California black rail (*Laterallus jamaicensis coturniculus*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- California clapper rail (*Rallus longirostris obsoletus*)
- California tiger salamander (*Ambystoma californiense*)
- Northwestern pond turtle (*Clemmys marmorata*)
- California red-legged frog (*Rana aurora draytonii*)
- Foothill yellow-legged frog (*Rana boylii*)
- Delta smelt (*Hypomesus transpacificus*)
- Coho salmon (*Oncorhynchus kisutch*)
- Steelhead (*Oncorhynchus mykiss*)
- Sacramento splittail (*Pognichthys macrolepidotus*)
- California freshwater shrimp (*Syncaris pacifica*)
- Pallid bat (*Antrozous pallidus*)
- Yuma myosits (*Myotis yumanensis*)
- Salt marsh harvest mouse (*Reithrodontomys raviventris*)

Based on the field reconnaissance surveys and habitat suitability analysis, suitable habitat for many of these species is absent from the site, particularly for species associated with salt marsh and open water habitat not found on the site such as salt marsh harvest mouse, California clapper rail, California black rail, common yellowthroat, Delta smelt and Sacramento splittail.

Table 4.3-1 provides information on the name, status, preferred habitat, and potential for occurrence of those species considered to have some potential for occurrence on the Indian Valley campus. Most of the special-status animal species known or suspected from the Indian Valley campus are bird species that may occasionally forage in the vicinity but for which no evidence of nesting was observed during the field reconnaissance surveys. These include western burrowing owl, Cooper's hawk, loggerhead shrike, northern harrier, sharp-shinned hawk, tricolored blackbird, and white-tailed kite. Information on the habitat characteristics and potential for occurrence of these species on the Indian Valley campus is summarized below.

It should be noted that there remains a potential for occasional use of the Indian Valley campus vicinity by other species of concern as well, such as golden eagle, prairie falcon, peregrine falcon, ferruginous hawk (*Buteo regalis*), Aleutian Canada goose (*Branta canadensis leucopareia*), and merlin (*Falco columbarius*). This usage, however, would be limited to occasional wintering activity by migratory bird species or possible occasional foraging activity by species for which essential breeding habitat is absent from the Indian Valley campus.

Coho Salmon and Steelhead Trout. Coho salmon and steelhead trout are both listed as threatened under the federal ESA and are anadromous, spawning in coastal streams and rivers and then migrating to and maturing in the ocean. Timber harvest activities, overgrazing, gravel mining operations, channel modifications and removal of riparian vegetation, flood control and hydroelectric facilities, and secondary water quality degradation have all contributed to a decline of these species. Both species are known from the San Pablo Bay and tributary creeks, although there are no records of either species from Arroyo San Jose. The intermittent nature of the main tributary across the site, together with the existence of major drop structures, precludes the existence of either species in the upper watershed, even seasonally when flows are higher. A number of in-channel barriers in the lower reaches of Arroyo San Jose currently preclude migration of these species into the upper watershed, including the Indian Valley campus.

California Red-legged Frog. This species is listed as threatened by the USFWS and is recognized as a California Species of Concern (CSC) by the CDFG. It typically occurs in aquatic habitat of streams and ponds, but can disperse

Table 4.3-1 Special-Status Animal Species Known or Suspected to Occur in the Region

Species	Status Federal/State	Preferred Habitat Type (Potential Occurrence at Site)
Invertebrates		
California freshwater shrimp	FE/SE	Permanent streams with pools (unlikely – marginal aquatic habitat present in main drainage)
Amphibians/Reptiles/Fish		
California tiger salamander	FT/CSC, CP	Vernal pools, ponds, streams and adjacent grassland (unlikely – suitable breeding habitat absent/not known from Marin County)
California red-legged frog	FT/CSC, CP	Ponds, streams, adjacent riparian and upland (unlikely – marginal aquatic habitat along main drainage)
Foothill yellow-legged frog	FSC/CSC, CP	Permanent streams with cobbles (unlikely – suitable permanent aquatic habitat absent)
Northwestern pond turtle	FSC/CSC, CP	Pond, rivers, and streams (possible – marginally suitable habitat along main drainage and in off-site upstream reservoir)
Steelhead	FT/-	Open water of Bay and Delta, tributary rivers and streams (unlikely – marginally suitable habitat along main drainage)
Coho salmon	FE/SE	Open water of Bay and Delta, tributary rivers and streams (unlikely – marginally suitable habitat along main drainage)
Birds		
White-tailed kite	-/CP	Grassland (possible – no known nesting reported or observed)
Burrowing owl	FSC/CSC	Grassland (possible – no known nesting reported or observed)
Cooper's hawk	-/CSC	Riparian/grassland (possible – no known nesting reported or observed)
Golden eagle	-/CSC,CP	Open grassland and savanna (unlikely – suitable nesting habitat absent/occasional foraging possible)
Loggerhead shrike	FSC/CSC	Grassland and scrub (possible – no known nesting reported or observed)
Northern harrier	-/CSC	Grassland (possible – no known nesting reported or observed)
Peregrine falcon	De-listed/ SE,CP	Open water and grassland (unlikely – suitable nesting habitat absent/occasional foraging possible)
Prairie falcon	-/CSC	Grassland (unlikely – suitable nesting habitat absent/occasional foraging possible)
Sharp-shinned hawk	-/CSC	Riparian and grassland (possible – no known nesting reported or observed)

Table 4.3-1 *continued*

Species	Status Federal/State	Preferred Habitat Type (Potential Occurrence at Site)
Tricolored blackbird	FSC/CSC	Freshwater marsh and fields (unlikely – no known nesting reported or observed)
Mammals		
Pallid bat	-/CSC	Roosts under bridges and in caves, mines, and buildings (unlikely – suitable forage habitat present but roost locations unlikely)
Yuma myotis	FSC/CSC	Roosts in buildings, trees mines, caves, bridges (unlikely – suitable foraging habitat present but roost locations unlikely)

Federal Status:
- FE = Listed as "endangered" under the federal Endangered Species Act (ESA).
- FT = Listed as "threatened" under the federal ESA.
- C = A candidate species under review for federal listing. Includes species for which the USFWS currently has sufficient biological information to support listing endangered or threatened.
- FSC = Federal Special Concern species.

State Status:
- SE = Listed as "endangered" under the California Endangered Species Act (ESA).
- ST = Listed as "threatened" under the California ESA.
- CP = California fully protected or protected species; individual may not be possessed or taken at any time.
- CSC = California Special Concern species identified by the California Department of Fish and Game (CDFG); taxa have no formal legal protection but nest sites and communal roosts are generally recognized as significant biotic features.

Potential Occurrence On Site:
- Known = Reported or observed.
- Possible = Suitable habitat present, although no individuals observed or reported.
- Unlikely = Suitable habitat either marginal or absent, and likelihood of occurrence on the site is low to non-existent.

Source: Environmental Collaborative, 2007b.

considerable distances in search of breeding and aestivation[1] sites. Continued loss of upland dispersal habitat, fragmentation of remaining breeding locations, competition and predation by bullfrogs, and degradation of aquatic habitat are primary concerns regarding protection and recovery of this species. This species has historically been reported throughout Marin County, although no occurrences are known from the Arroyo San Jose watershed or southern Novato vicinity. The main channel of Ignacio Creek on the site is at best marginal dispersal habitat for this species due to the intermittent nature and absence of permanent pools, lack of refuge locations from predators and protective cover, and likelihood of heavy predation by raccoons. There is a remote possibility that if individuals are

[1] Aestivation refers to generally low activity periods, typically during winter cold or summer heat.

present in the watershed but have been undetected in the past, they may occasionally disperse along the channel in search of suitable breeding habitat.

Northwestern Pond Turtle. Northwestern pond turtle typically occurs in ponds and streams with permanent pools used as retreat habitat. Individuals are known to establish nests in protected uplands near aquatic habitat, sometimes several hundred feet from pools and ponds used for retreat. The absence of deep pools and the intermittent nature of the main drainage limit the likelihood that pond turtles are permanent residents on the site, but it is possible that individuals may occasionally move along the channel in search of suitable habitat, such as Pacheco Pond in the open space lands just southwest of the main campus.

Bird Species. There is a possibility that one or more special-status bird species could establish nests on the Indian Valley campus, which would be protected under the Migratory Bird Treaty Act when in active use. No nests were observed during the field reconnaissance surveys, but no detailed surveys were conducted and nests could also be established in the future. This includes nesting by white-tailed kite, northern harrier, burrowing owl, Cooper's hawk, sharp-shinned hawk, and loggerhead shrike. The mature trees also provide suitable nesting habitat for more common raptors, such as red-tailed hawk, great horned owl, and American kestrel. Additional detailed surveys would be necessary to confirm presence or absence of any nesting activity, and this could change in the future as nests are abandoned and new nests established.

Bats. Pallid bat and Yuma myotis are considered to possibly forage in the Indian Valley campus vicinity, but suitable roosting habitat is absent. Both of these species as well as more common bat species occur in a variety of habitats at lower elevations in California, and are known to roost in buildings, trees, mines, caves, bridges, and rock crevices. Bat roosting observed in the support structures of several of the buildings on the campus is believed to be by common colonial species, given the proximity to human activity.

California Freshwater Shrimp. California freshwater shrimp is known from several perennial streams in Marin, Sonoma, and Napa counties. This species has not been reported from the Arroyo San Jose watershed. Because the main drainage across the site is intermittent in nature, it is highly unlikely that this species is present.

JURISDICTIONAL WATERS

Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted to life in saturated soil.

Although definitions vary to some degree, wetlands are generally considered to be areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted to life in saturated soil. Wetlands are recognized as important features on a regional and national level due to their high inherent value to fish and wildlife, use as storage areas for storm and flood waters, and water recharge, filtration, and purification functions. Technical

standards for delineating wetlands have been developed by the U.S. Army Corps of Engineers (Corps) and the USFWS, which generally define wetlands through consideration of three criteria: hydrology, soils, and vegetation.

As provided under Section 404 of the Clean Water Act, the Corps is responsible for regulating the discharge of fill material into waters of the United States. The term "waters" includes wetlands and non-wetland bodies of water that meet specific criteria as defined in the Code of Federal Regulations. In general, a permit must be obtained before fill can be placed in wetlands or other waters of the U.S. The type of permit depends on the amount of acreage and the purpose of the proposed fill, subject to discretion of the Corps.

On the State level, jurisdictional authority of the CDFG over wetland areas is established under Section 1600 of the Fish and Game Code, which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. The Fish and Game Code stipulates that it is unlawful to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake without notifying the CDFG, incorporating necessary mitigation, and obtaining a Streambed Alteration Agreement. In addition, the State Regional Water Quality Control Board (RWQCB) is responsible for upholding state water quality standards. Pursuant to Section 401 of the Clean Water Act, projects that apply for a Corps permit for discharge of dredge or fill material, and projects that qualify for a Nationwide Permit must obtain water quality certification from the local RWQCB.

Based on the preliminary wetland delineation, potential jurisdictional waters in the project site vicinity consist of Ignacio Creek and tributary ephemeral drainages, together with a complex of seasonal wetlands, seeps, and springs in uplands on the site (see Figure 4.3-1). The estimated width of channel segments below the Ordinary High Water Mark (OHWM) is shown in Figure 4.3-1, together with the location of potential seasonal wetlands. The scattered seasonal wetlands and springs in the northern portion of the site are dominated by iris-leaved rush, penny-royal (*Mentha pulegium*), and California oat grass, which transition to the surrounding grassland habitat.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The proposed project would have a significant impact on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-

status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFG or USFWS;
- Have a substantial adverse effect on federal protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marshes, vernal pools, coastal areas, etc.) through direct removal, filling, hydrological interruption or other means;
- Interfere substantially with movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any applicable local policies protecting biological resources; or
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Communities Conservation Plan (NCCP), or other approved local, regional or State habitat conservation plan.

LESS-THAN-SIGNIFICANT IMPACTS

The potential impacts of the proposed Bond Spending Implementation Plan on biological resources would generally be less than significant. No Habitat Conservation Plans have been adopted encompassing the Novato vicinity, and the project would therefore not conflict with any such plans. The Marin Community College District is exempt from local regulations, but the proposed improvements would not conflict with the goals and policies of the Novato General Plan or intent of relevant ordinances. Relevant ordinances include Waterway and Riparian Protection (Section 19.35 of the Zoning Code), Wetland Protection and Restoration (Section 19.36 of the Zoning Code), and Regulating Alteration or Removal of Trees on Private Property (Section 17-1 of the Zoning Code). The Ignacio Creek corridor does not qualify as a sensitive natural community type, although it is a regulated waters and any in-channel activity would require agency authorizations as discussed further below.

The proposed Bond Spending Implementation Plan would not substantially interfere with wildlife movement opportunities or impede the use of native wildlife nursery sites. Most of the Indian Valley campus would remain undeveloped, and new structures would be located in areas of existing development or existing parking areas. Improvements to Ignacio Creek would be limited to stabilization measures to protect existing bridge structures and to control severe erosion. Replacement of an existing in-channel crossing with a clear span pedestrian bridge is possible. These modifications would actually improve the habitat values of the riparian corridor, and adequate measures would be undertaken to minimize construction-related disturbance and possible inadvertent take of any special-status animal species, as discussed further below. Setbacks would be

provided from Ignacio Creek and mature native trees would generally be avoided, although specific language addressing this approach to development has not been stated as goals or guidelines in the proposed Design Guidelines (Marin Community College District, 2006b).

Outdoor lighting would include shrouds and other shielding as appropriate, and lighting along pedestrian corridors would be low-level lights to minimize disruption to surrounding residents and existing habitat. New landscaping would be provided around the perimeter of new structures, parking areas, and elsewhere. The proposed Design Guidelines include a goal that new plantings be native, drought-tolerant, and low maintenance, which would serve to improve the wildlife habitat value of landscaping.

POTENTIALLY SIGNIFICANT IMPACTS

In general, proposed development is not expected to have any significant adverse impacts on biological or wetland resources. These resources include special-status species and jurisdictional waters associated with Ignacio Creek and tributary drainages. However, there is a possibility that sensitive resources could be adversely affected during construction if careful controls are not followed. These controls would need to confirm absence of any special-status animal species that have a remote potential to occur within the creek channel, confirm absence of any nesting bird species in the vicinity of construction zones, and minimize disturbance within areas of jurisdictional waters and obtain agency authorization for any activities that would modify these areas. The possible inadvertent impacts on sensitive resources during project construction would be considered potentially significant impacts, as discussed further below.

Impact BIOLOGY-1: Adoption and implementation of the proposed Bond Spending Implementation Plan could affect a number of special-status animal species. (PS)

There is a remote possibility that implementation of the proposed Bond Spending Implementation Plan, and the related development and construction, may adversely affect a number of special-status species. This possible impact includes potential loss or disruption to raptor nesting activity and inadvertent take of several special-status animal species that have a remote potential for occurrence in the Ignacio Creek corridor.

Although essential habitat is absent on the Indian Valley campus, there is a remote possibility that several special-status animal species may occasionally disperse along the Ignacio Creek corridor. These include northwestern pond turtle, foothill yellow-legged frog, and possibly California red-legged frog. Although essential aquatic habitat for these species is absent on the site, it is possible they could disperse along this reach of Ignacio Creek. There is also a remote possibility that existing barriers to fish migration in the Arroyo San Jose watershed could be removed as part of some future habitat restoration effort, in

which case there would be a possibility that anadromous fish, particularly steelhead, could once again reach Ignacio Creek within the Indian Valley campus. Proposed improvements in or near the Ignacio Creek channel, such as the proposed stabilization measures to protect existing bridge structures and to control severe erosion, could result in the loss of individual special-status animal species if present in the construction area. Restrictions on the timing of any in-channel construction activities would reduce the likelihood of inadvertent take of these species. This impact would be considered potentially significant unless pre-construction surveys have been undertaken and adequate avoidance measures implemented, if required.

Loggerhead shrike and several species of raptors are known to forage on the Indian Valley campus, and construction could destroy nests or result in nest abandonment. No evidence of any nesting activity was observed near proposed facility improvements, and the likelihood of new nests being established is remote given the developed nature of the area. However, in the remote instance that nests are established in the future, tree and brush removal necessary to accommodate improvements could inadvertently result in the destruction of a nest in active use. Construction activities within about 300 feet of an active nest could also result in its abandonment, and any activities that result in the destruction or abandonment of an active nest would be a violation of the Migratory Bird Treaty Act. Pre-construction surveys would be necessary to ensure that no new nests are present and appropriate avoidance is provided until any young have fledged. This potential impact is considered potentially significant unless pre-construction surveys were undertaken and adequate avoidance measures implemented.

No populations of special-status plant species have been reported from the Indian Valley campus, or were observed during systematic surveys of the campus area. No such species are believed to occur in the vicinity of proposed improvements associated with the Bond Spending Implementation Plan. Given the absence of any populations, there would be no impact on special-status plant species.

> *Mitigation Measure BIOLOGY-1a: Prior to any in-channel construction activities in Ignacio Creek and the main tributary drainages, a pre-construction survey shall be conducted by a qualified biologist to confirm absence of any northwestern pond turtle, foothill yellow-legged frog, California red-legged frog, or steelhead within the construction zone. Details of the pre-construction and avoidance measures shall consist of the following:*
>
> *(1) A pre-construction survey shall be conducted no more than 15 days prior to initiation of construction within the creek channel.*
>
> *(2) Before any in-channel construction activities begin, a qualified biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include (a) handout of a*

brochure with a description and photographs of the species of concern and their remote potential for their occurrence in the creek corridor, (b) the general measures that are being implemented to ensure avoidance as they relate to the project, and (c) procedures to follow if construction personnel believe they have encountered one or more of these species, such that all work shall stop in the vicinity and the qualified biologist immediately contacted to verify the species and recommend appropriate actions before construction resumes.

(3) All fueling and maintenance of vehicles and other equipment, and staging areas, shall be located at least 50 feet from the creek channel to prevent any water quality degradation. All workers shall be informed of the importance of preventing spills and the appropriate measures to take should a spill occur. These issues shall be addressed in contract specifications.

(4) If any species of concern are encountered, either during the pre-construction survey or during construction, construction work shall stop and a Species Avoidance Program shall be prepared by a qualified biologist through consultation with trustee agencies. Appropriate construction restrictions shall be established based on recommendations of the qualified biologist to ensure that no inadvertent take occurs while the Species Avoidance Program is being prepared. If northwestern pond turtles or foothill yellow legged frog are encountered, the qualified biologist shall informally consult with the California Department of Fish and Game (CDFG). If California red-legged frog are encountered, the U.S. Fish and Wildlife Service (USFWS) shall be consulted on the appropriate methods to ensure avoidance of inadvertent take of this listed species. If steelhead are encountered, the National Marine Fisheries Service (NMFS) shall be consulted on the appropriate methods to insure avoidance of inadvertent take of this listed species.

(5) If required, the Species Avoidance Program shall define measures that serve to adequately avoid inadvertent loss of the species of concern during all aspects of project construction, including vegetation removal, any channel dewatering, and installation of proposed improvements. Monitoring shall be provided by the qualified biologist as necessary to ensure no inadvertent take occurs during construction. The qualified biologist shall be authorized to modify construction practices and to require additional avoidance and protective measures necessary to prevent loss of individual turtles or frogs.

(6) If any species of concern are encountered, a draft of the Species Avoidance Program shall be submitted to the Marin Community College District Director of Modernization for review and approval prior to any in-channel disturbance. If California red-legged frog and/or steelhead are encountered during the pre-construction survey,

evidence of incidental take authorization from trustee agencies shall be provided as part of the required Species Avoidance Program.

(7) Final reports summarizing the results of the pre-construction survey and, if required, the Species Avoidance Program, shall be submitted to the Marin Community College District Director of Modernization.

Mitigation Measure BIOLOGY-1b: Construction restrictions shall be implemented for activities within Ignacio Creek and main tributary drainage channel to avoid possible inadvertent take of steelhead, although the potential for occurrence of this species is highly unlikely and is in part dependent on removal of downstream barriers that preclude movement onto the Indian Valley campus. Restrictions shall consist of the following:

(1) Any in-channel construction activities shall be restricted to the period when stray or dispersing anadramous fish would not be expected within the Ignacio Creek channel (i.e., from June 15 through October 15).

(2) Adequate measures shall be taken to minimize disturbance and sedimentation, temporarily contain flow of any surface water across the construction zone, and ensure that no listed fish species are trapped within the construction zone prior to commencement of dewatering or other in-channel disturbance.

Mitigation Measure BIOLOGY-1c: Any active raptor or loggerhead shrike nests in the vicinity of proposed grading and new construction shall be avoided until young birds are able to leave the nest (i.e., fledged) and forage on their own. This measure shall not apply to ongoing maintenance and building repair, to which raptors are already acclimated. Avoidance may be accomplished either by scheduling grading and vegetation removal during the non-nesting period (September through February), or if this is not feasible, by conducting a pre-construction survey for active nests. A pre-construction survey report verifying that no active nests are present shall be submitted to the Marin Community College District Director of Modernization for review and approval prior to initiation of grading or construction during the nesting season, or verifying that nesting has been completed as detailed below. Provisions of the pre-construction survey and nest avoidance measures, if necessary, shall include the following:

(1) If grading and new construction are scheduled during the active nesting period (March through August), a qualified wildlife biologist shall be retained by the District to conduct a pre-construction nesting survey no more than 15 days prior to initiation of grading to provide confirmation on presence or absence of active nests in the vicinity.

(2) If active nests are encountered, species-specific measures shall be prepared by a qualified biologist through informal consultation with the CDFG and implemented to prevent nest abandonment. At a minimum, grading and new construction in the vicinity of the nest shall be deferred until the young birds have fledged. A nest-setback zone of at least 300 feet shall be established for raptors and 100 feet for loggerhead shrike and passerine birds within which all construction-related disturbances shall be prohibited. The perimeter of the nest-setback zone shall be fenced or adequately demarcated, and construction personnel restricted from the area.

(3) If permanent avoidance of the nest is not feasible, impacts shall be minimized by prohibiting disturbance within the nest-setback zone until a qualified biologist verifies either a) that the birds have not begun egg-laying and incubation, or b) that the juveniles from the nest are foraging independently and capable of independent survival at an earlier date than usual.

(4) A survey report of findings verifying that any young have fledged shall be submitted for review and approval by the Marin Community College District Director of Modernization prior to initiation of grading or new construction in the nest-setback zone. Following approval by the Director of Modernization, grading and construction in the nest-setback zone may proceed as proposed.

The combination of the above measures, as needed, would reduce this impact to a less-than-significant level. (LTS)

Impact BIOLOGY-2: Construction activities in or near Ignacio Creek and tributary drainages could adversely affect regulated waters and contribute to water quality degradation. (PS)

Potential impacts to jurisdictional waters would include direct modifications to creek channels, as well as indirect changes associated with the increased potential for erosion and water quality degradation. Potential erosion and degradation of the creek channel and riparian habitat typically result from increased urban runoff volumes and degraded water quality associated with development. New development typically magnifies the volume of runoff and potential for urban pollutants, with perhaps the greatest potential damage resulting from sedimentation during the construction phase of construction and from new non-point discharge of automobile by-products, fertilizers, and herbicides. However, the Bond Spending Implementation Plan has focused new development on existing parking lots and includes the use of bioswales that would actually improve existing conditions in the vicinity of the new Main Building Complex at the Indian Valley campus. Implementation of adequate erosion control measures and use of Best Management Practices would serve to address potential indirect impacts on wetlands and water quality, as discussed in Section 4.4, Hydrology and Water Quality, of this EIR.

Aspects of the proposed Bond Spending Implementation Plan could directly affect jurisdictional waters. These include the proposed replacement bridge crossing of Ignacio Creek, measures to protect existing bridge column support caps along Ignacio Creek and the main tributary drainage, and bank stabilization and enhancement work to control erosion and channel downcutting. Stabilization and management of the creek channel appear necessary to prevent further undermining of bridges, retaining walls, and possibly structures, and to improve the habitat value of this natural feature. A preliminary management plan (Questa Engineering Corporation, 2006) has been prepared addressing the existing severe erosion conditions along Ignacio Creek and identifying primary options for their management. One of these options involves a maintenance approach addressing the immediate problems at the point sources of erosion and responding to current erosive conditions in the creek. This approach would implement storm drainage best management practices, retain large woody debris in the channel bottom, and repair priority locations of creek bank erosion. The second option is a more proactive approach entailing a comprehensive, long-term creek erosion management program. This long-term program would reconfigure the existing campus storm drainage infrastructure, stabilize the channel grade along the creek bed with a series of rock weirs, provide adequate setback of campus facilities, and retain large woody debris in the channel. The District is currently focusing on addressing immediate threats to bridge structures and severe bank erosion. Improvements identified in the preliminary management plan are currently being refined based on input from regulatory agencies to further reduce areas of localized erosion using biotechnical stabilization methods while emphasizing the use of best management practices along the creek corridor. No improvements are proposed in areas of mapped potential jurisdictional wetlands indicated in Figure 4.3-1, and no impacts on these features are anticipated.

Proposed modifications to potential jurisdictional waters along the Ignacio Creek and tributary drainage channels would require authorization from the Corps, RWQCB, and CDFG. The extent of jurisdictional waters on the Indian Valley campus must still be verified by the Corps, which could result in changes to the extent of mapped features shown in Figure 4.3-1. However, there is no evidence of jurisdictional other waters or wetlands in the immediate vicinity of the proposed Main Building Complex or other locations where improvements are proposed, and no additional impacts are anticipated beyond the modifications to Ignacio Creek and the tributary drainage discussed above. Given the required authorization from jurisdictional agencies and sensitivity of the creek corridors, the potential impact on unvegetated jurisdictional other waters is considered a potentially significant impact.

> *Mitigation Measure BIOLOGY-2: Disturbance to jurisdictional wetlands and waters shall be avoided and minimized to the extent feasible, with the exception of the stabilization and restoration efforts to Ignacio Creek and the main tributary drainage. Appropriate authorizations shall be obtained*

from the U.S. Army Corps of Engineers, Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG) where avoidance is determined to be infeasible, and required conditions implemented to protect and mitigate any adverse impacts on existing habitat and water quality. Where required by jurisdictional agencies, a detailed mitigation plan shall be prepared by a qualified wetland consultant for any wetlands or waters affected by proposed improvements, with replacement provided at a minimum 1:1 ratio. The plan shall clearly identify the total jurisdictional areas affected by proposed improvements, as well as habitat to be created, restored, or enhanced as part of the required mitigation. Any replacement mitigation shall be consolidated to the degree possible to improve existing habitat values. The plan shall specify performance criteria, maintenance and long-term management responsibilities, monitoring requirements, and contingency measures. Monitoring shall be conducted by the consulting wetland specialist until the success criteria are met. (LTS)

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4.4 HYDROLOGY AND WATER QUALITY

INTRODUCTION

This section is based on a review of the existing facilities site assessments prepared for the campus, as well as site visits conducted by Questa Engineering personnel, and correspondence with CSW/Stuber-Stroeh Engineering Group. As part of the background studies for the Bond Spending Implementation Plan, a study of Ignacio Creek on the Indian Valley campus was initiated to assess existing conditions in the creek, including bank erosion, failing trees, and bridge conditions. The reports and documents reviewed include:

- CSW/Stuber-Stroeh Engineering Group, 2005. *Hydrology Report (Existing Conditions) for College of Marin, Indian Valley Campus.* November.
- Questa Engineering Corporation, 2006. *Ignacio Creek Management Report.* August.
- CSW/Struber-Stroeh Engineering Group, Inc., 2006. *College of Marin Indian Valley Campus Site Assessment.* December.
- Soil Conservation Service, United States Department of Agriculture, 1985. *Soil Survey of Marin County.*
- Fugro West, Inc., 2005. Project Description by Baseline. *Geologic Hazards Study College of Marin Kentfield Campus (Geohazard Study)*. December.
- Government websites, including the Marin County Stormwater Management Program, Friends of Corte Madera Creek, and Association of Bay Area Governments (ABAG) for goals, regulations, and a summary of hazards ranging from flooding to dam inundation risk (March and April 2007).

ENVIRONMENTAL SETTING

Ignacio Creek flows east through the campus; it ultimately joins Novato Creek before draining into San Pablo Bay.

The Indian Valley campus lies roughly 5 miles south of downtown Novato within the Novato Creek watershed. Ignacio Creek, a tributary to Novato Creek, flows in an easterly direction for approximately 3,500 feet parallel to Ignacio Boulevard for the entire length of the Indian Valley campus. The creek has its confluence with Arroyo San Jose 0.8 mile southeast from the campus. It ultimately joins Novato Creek before draining into San Pablo Bay.

CLIMATE

The climate of the Novato Creek watershed is strongly influenced by the Pacific Ocean. The climate in the study area is typical of the climate throughout the San Francisco Bay Area; winters are mild and summers are moderately warm. Minimum and maximum daily temperatures vary approximately 30 degrees in the warm summer months, and about 15 to 20 degrees in the cooler months.

Average summer temperatures range from 52ºF to 78ºF, and average winter temperatures range from 41ºF to 55ºF (NOAA, 1997).

Rainfall in the San Francisco Bay region is strongly influenced by geographic features and varies significantly with elevation and by location within the region. The normal annual precipitation in the Novato Creek watershed varies from a maximum of over 30 inches in the western and southern portions of the basin to a minimum of about 22 inches in the northern and eastern portions of the basin, with a basin-wide mean of 28 inches (FEMA, 1989). Over 90 percent of the annual precipitation occurs in the 6-month period from November through April. The prevailing winds are usually from the north.

SOILS

Soils on hills and occurring through the Indian Valley campus and along Ignacio Creek consist primarily of naturally occurring fine, mixed clay, and sandy loams. Two soil types are present: the Tocaloma Saurin Bonnydoon Association, and Xerorthents – Urban Land. The Tocaloma and Saurin series consist of moderately deep, well-drained soils that formed in material weathered from sandstone and shale. Tocaloma and Saurin soils are on hills and have slopes of 2 to 75 percent. Basically, they are sandy and clay loams that encounter strongly weathered, fractured sandstone at approximately 40 inches depth or less. The Bonnydoon component is found in the northern part of the Ignacio Creek watershed. The Bonnydoon series differs from the Tocaloma and Saurin series in that it consists of shallow, somewhat excessively drained soils, and is found on slightly steeper slopes of 5 to 85 percent. The Bonnydoon series is a loam over white to yellowish-brown, fine-grained, weathered and fractured sandstone. The upper horizons of the Tocaloma Saurin Bonnydoon Association generally consist of moist loams, fine to very fine roots, and fine to very fine interstitial pores. Pebbles comprise up to 40 percent of the B horizon in the Tocaloma series, and 10 percent of the B horizon in the Saurin series; gravel ranges from 5 to 15 percent throughout the Bonnydoon profile. The Xerorthents type follows the drainage of Ignacio Creek, and is used to describe the highly variable, disturbed flatlands. The soils occurring on the Indian Valley campus range from moderately to highly erosive (SCS, 1985).

WATERSHED HYDROLOGY

Ignacio Creek and its main tributary drain a watershed of 292 acres (0.46 square mile), with the tributary contributing roughly a third of the entire flow at the creek's campus outlet. The headwaters lie approximately ¾-mile upstream of the campus. Vegetation in the watershed varies from oak/bay woodlands on north-facing slopes to arid annual grasslands along the south-facing slopes of the watershed. The clay topsoils, when saturated, have low permeability rates. Flows in the creek respond quickly to bursts of rainfall extending longer than 30 minutes. Tables 4.4-1 and 4.4-2 illustrate the discharge rates (in cubic feet per second [cfs]) at two different locations along Ignacio Creek for the 10-, 50-, 100-

and 500-year storm events. The flows shown in Table 4.4-1 are from the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FEMA, 1989) at the confluence of Ignacio Creek and Arroyo San Jose. The flows shown in Table 4.4-2 shows peak flow rates predicted for the Indian Valley campus, calculated from the FEMA flows using a correction factor of 0.55 to account for the decrease in watershed area between the Arroyo San Jose confluence site and the Indian Valley campus.

The recent CSW/Stuber-Stroeh Engineering Group (2005) analysis of the upper watershed predicted that the peak 100-year flow at the most downstream reach on campus is 444 cfs. Ignacio Creek takes runoff from the north that originates at the parking lots that line the northern boundary of the campus.

SITE HYDROLOGY

The Indian Valley campus is located in the upper Ignacio Creek valley. Numerous smaller tributary channels flow from the surrounding hills across the campus facilities and into the creek. In most instances these tributaries are intercepted, collected, and conveyed into a concrete pipe storm drain system (see Figure 4.4-1). Main drainage lines then discharge into the creek through a series of large concrete outfalls. Parking lot runoff is collected in a series of small pipe drop inlets, asphalt curbs, and pipelines that discharge directly to the creek. Throughout the campus, there are numerous miscellaneous storm drain pipes smaller than 12 inches in diameter that collect and convey runoff from small areas of the campus.

The flow from the northern side of the Ignacio Creek valley is collected into a large 60-inch pipe that crosses underneath Ignacio Boulevard near the main campus entrance and discharges into an open channel bordering Parking Lot 2. The channel transitions to a pipe that is aligned underneath Parking Lot 2. The pipe extends through an existing residential neighborhood and finally discharges to Ignacio Creek about 500 feet downstream of the campus.

FLOODING

While there are no mapped 100-year floodplains on the campus shown on the Flood Insurance Rate Map (FEMA, 1989), the CSW/Stuber-Stroeh Engineering Group (2005) hydraulic analysis of Ignacio Creek does predict minor flooding at the culvert near the first vehicle bridge at the base of the campus. Approximately 277 cfs is conveyed in the culvert, while 145 cfs flows around and over the culvert. As water constricts into the culvert, it creates shallow, backwater flooding behind the culvert for roughly 200 feet beginning at the north bank terrace. The shallow flooding encompasses the creek channel and extends briefly into the grassy areas between the creek and Parking Lot 2.

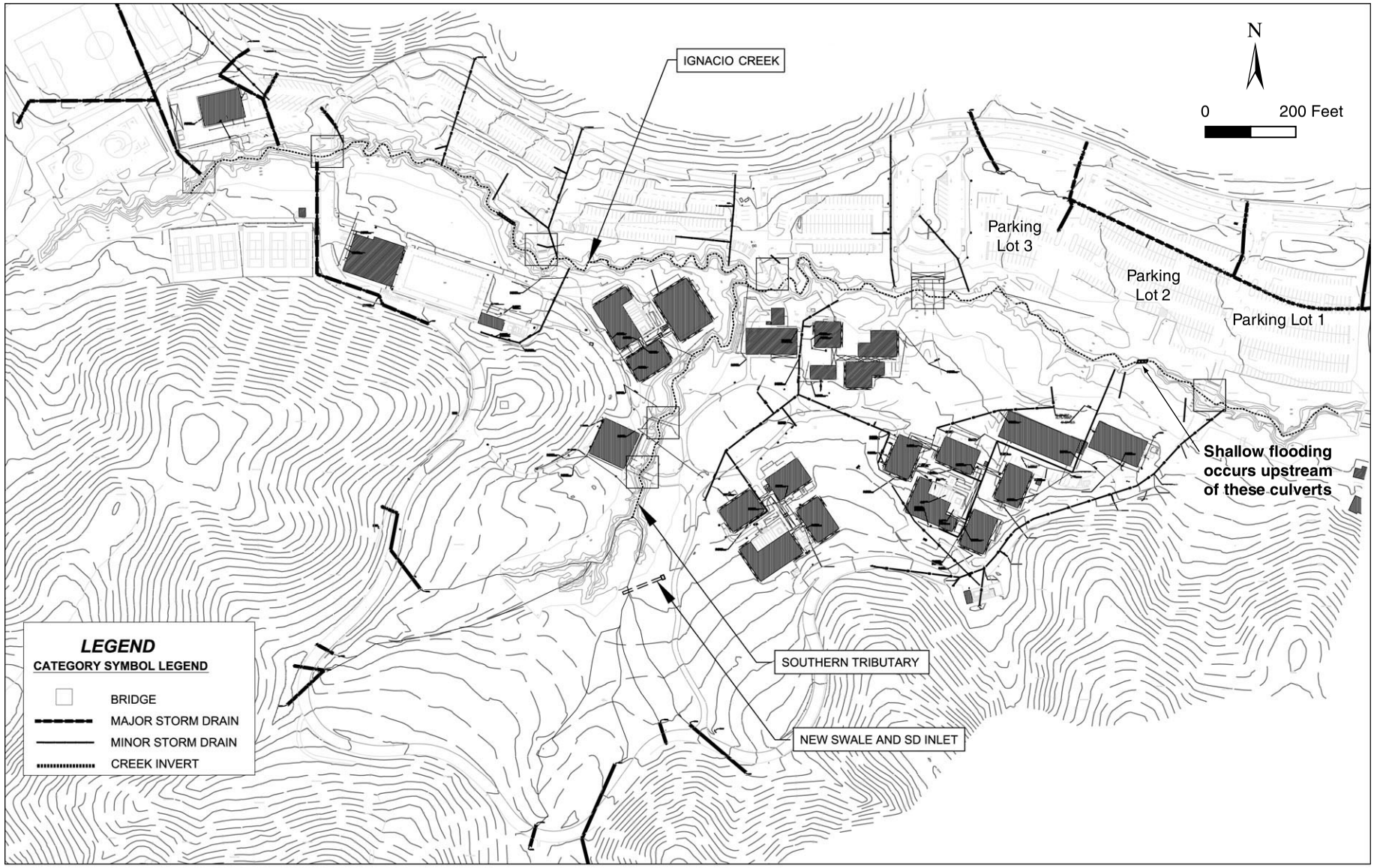

Figure 4.4-1

SOURCE: Questa Engineering, 2007

EXISTING DRAINAGE AT INDIAN VALLEY CAMPUS

Table 4.4-1 Discharges for Ignacio Creek at Arroyo San Jose Confluence

Recurrence Interval	Discharge (cubic feet per second)
10-year	400
50-year	650
100-year	800
500-year	1,000

Source: FEMA, 1989.

Table 4.4-2 Peak Discharges for Ignacio Creek at Indian Valley Campus

Recurrence Interval	Discharge (cubic feet per second)
10-year	220
50-year	358
100-year	444
500-year	550

Source: CSW/Stuber-Stroeh Engineering Group, 2005.

Currently, this minor flooding does not affect any campus facilities, though the pedestrian path between Parking Lot 2 and the paved culvert at the creek does experience shallow flooding and may be impassable or hazardous during peak flows.

Geomorphically, the flow constriction at the culvert and the consequent backwater have likely discouraged bank erosion at the reach above the culvert, slowing velocities to allow sediment deposition and creating shallow terraces. The greatest flooding threat appears to be the potential for debris to clog the existing culverts for both the interior drainage network and the creek. If these culverts were to plug with debris, water would back up and flow around or over these structures, causing erosion and posing a threat to public safety.

It should be noted that this culvert is proposed for removal as part of the Creek Erosion Mitigation Program. The channel bed is to be stabilized as part of the planned creek improvements (see discussion below).

CREEK MANAGEMENT ISSUES

Natural stream channels alternately aggrade (i.e., accumulate sediment) and degrade (i.e., scour sediment), depending on the flow rate in the channel. If a channel carries high sediment loads, or is flowing through erodible materials, the flow velocity must be high enough to avoid the net accumulation of sediment and, at the same time, low enough so it does not initiate progressive and long-term bed scouring. This balance means that the transport capacity of the flow should be equal to the rate of sediment supply over the long term.

The Ignacio Creek channel has incised throughout the Indian Valley campus reach. Numerous factors such as reduction of sediment input, knickpoint or headcut migration upstream, increased runoff, and the removal of woody debris have contributed to this problem. This is the primary geomorphological mechanism occurring in Ignacio Creek that accounts for its current eroded state. Numerous knickpoints and grade controls have been identified within the creek system. As the channel bed incises, the banks steepen and become more vertical. As the banks steepen, they become unstable, eventually failing and slumping. Many of the creek banks on the campus exhibit unstable vertical banks (see Figure 4.4-2). The channel is in an evolutionary cycle to widen its top width and develop new floodplain terraces within its new top of banks.

Many of the vertical creek banks on the campus are unstable.

As part of the CEQA team, Questa Engineering developed a Draft Creek Management Plan in 2006 (Questa Engineering, 2006). This plan addresses erosion at the campus bridges and Identifies buildings that may be at risk in the future. The plan also outlines considerations for managing woody debris in the channel. These are discussed further under "Environmental Impacts and Mitigation Measures" below.

GROUNDWATER

The Indian Valley campus is underlain by the Franciscan Formation, which is primarily a mélange of basalt, blueschist, chert and hard sandstone that is sheared and jumbled into a varied mix. Overlaying this bedrock base is approximately 10 to 40 feet of clayey soil and weathered clayey sandstone. Based on geotechnical boring data, groundwater is generally coincident with the creek areas (Fugro West, Inc., 2005). Borings that were conducted near the creek found groundwater levels that were at or very near the creek bed elevations. Borings completed farther away from the creek encountered little or no groundwater. It therefore can be deduced that the shallow groundwater table generally runs parallel to the creek and may be found primarily at the contact between the overlaying sediment and the bedrock. Numerous seeps were noted at this contact where it could be observed in the creek channel.

The groundwater within the Ignacio Creek valley is not used for municipal drinking water or for major agricultural use. The groundwater withdrawal in the area is

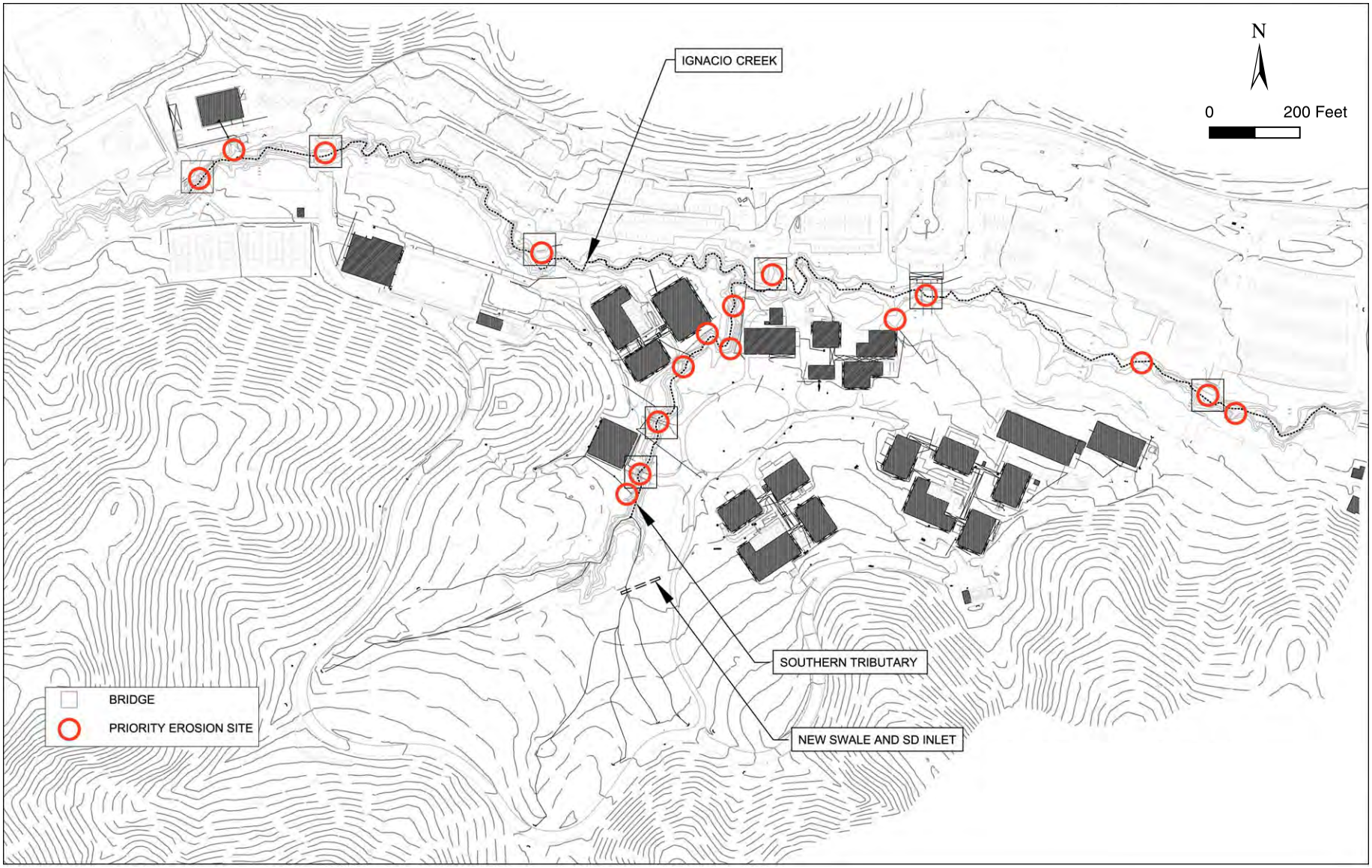

Figure 4.4-2

SOURCE: Questa Engineering, 2007

EXISTING SITES OF EROSION AT INDIAN VALLEY CAMPUS

typically limited to the shallow zone or deeper fractured rock zones. These fractured rock aquifers tend to yield only small volumes of water to wells. Groundwater is not used at the Indian Valley campus for campus landscape irrigation.

SURFACE WATER QUALITY

Water quality in Ignacio Creek through the campus is considered good. Water quality issues in the area are directly related to land use. The watershed above the college campus is primarily open space and athletic fields. As such, the types of pollutants entering the creek channel are primarily sediment from eroding banks and minor amounts of nutrients from the fertilizers applied to the playing fields. Downstream of the college, the water quality is affected by more urbanized land uses. Runoff from the campus parking lots and residential subdivisions downstream contribute non-point-source-type pollutants such as oil and grease, herbicides and pesticides, heavy metals, and other urban-type pollutants. The San Francisco Bay Regional Water Quality Control Board has listed Novato Creek as an impaired water body because of high diazinon levels. Diazinon is common pesticide used in landscape areas.

Water quality in Ignacio Creek through the campus is considered good.

REGULATORY SETTING

Site development may be subject to laws, regulations, and regulatory programs administered by local, State, and federal regulators. In some cases, federal laws are administered and enforced by state and local government. In other cases, State and local regulations in California are stricter than those imposed by federal law. This section summarizes relevant regulatory programs, laws, and regulations with respect to hydrology and water quality.

Federal Laws and Regulations (Clean Water Act)

The Federal Water Pollution Control Act Amendments of 1972 were enacted to protect water quality in the United States. As amended by Congress in 1977, this Act became commonly known as the Clean Water Act (CWA) and has been amended several times since its inception. It is the primary federal law regulating water quality in the United States, and forms the basis for several State and local laws throughout the country. Its objective is to reduce or eliminate water pollution in the nation's rivers, streams, lakes, and coastal waters. The CWA prescribes the basic federal laws for regulating discharges of pollutants and sets minimum water quality standards for all waters of the United States. At the federal level, the U.S. Environmental Protection Agency (EPA) administers the CWA. At the State and regional level, the CWA is administered and enforced by the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs). The State of California has developed a number of water quality laws, rules, and regulations to assist in the implementation of the CWA and related federally mandated water quality requirements. In many cases, the federal requirements set minimum standards,

and the laws, rules, and regulations adopted by the State and regional boards are more restrictive (i.e., more protective of the environment).

State Laws and Regulations

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act established the SWRCB and the RWQCBs as the principal State agencies having primary responsibility for coordinating and controlling water quality in California. The Porter-Cologne Act establishes the responsibility of the RWQCBs for adopting, implementing, and enforcing water quality control plans (Basin Plans). These plans set forth the State's water quality standards (i.e., beneficial uses of surface waters and groundwater) and the objectives or criteria necessary to protect those beneficial uses.

NPDES Permit Requirements. The CWA has nationally regulated the discharge of pollutants to the waters of the U.S. from any point source since 1972. In 1987, amendments to the CWA added Section 402(p), which established a framework for regulating non-point source (NPS) stormwater discharges under the National Pollutant Discharge Elimination System (NPDES). The current NPDES stormwater program regulates stormwater discharges from industrial facilities, large and medium-sized municipal separate storm sewer systems (those serving more than 100,000 persons), small municipal separate stormwater systems, and construction sites that disturb one or more acres of land. Under the program, the construction associated with the Bond Spending Implementation Plan would be required to comply with two NPDES permit requirements.

The NPDES General Construction Permit Requirements apply to clearing, grading, and disturbances to the ground (such as excavation). The Marin Community College District general contractor would submit a Notice of Intent (NOI) with the SWRCB Division of Water Quality. The NOI includes general information on the types of construction activities that would occur on the site. The District contractor would also be required to submit a site-specific plan called the Stormwater Pollution Prevention Plan (SWPPP) for construction activities. The SWPPP would include a description of Best Management Practices (BMPs) to minimize the discharge of pollutants from the site during construction.

Local Programs and Regulations

San Francisco Bay Water Quality Control Plan (Basin Plan). The San Francisco Bay RWQCB is responsible for the development, adoption, and implementation of the Water Quality Control Plan (Basin Plan) for the San Francisco Bay region. The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay Region. The Basin Plan identifies beneficial uses of surface waters and groundwater within its region and specifies water quality objectives to maintain the continued beneficial uses of these waters. The proposed project

would be required to adhere to all applicable water quality objectives identified in the Basin Plan.

According to the Basin Plan (SWRCB), the beneficial uses of the Novato Creek watershed include cold freshwater habitat for fish (COLD,) non-contact water recreation activities such as hiking, sunbathing and camping (REC-2); harvesting shellfish (SHELL); fish spawning (SPWN); and wildlife habitat (WILD). Water contact recreation such as swimming, wading, fishing, and diving (REC-2) is listed as a potential beneficial use.

Marin County Stormwater Pollution Prevention Program (MCSTOPPP). The San Francisco Bay RWQCB requires Marin County municipalities to develop a plan for protecting the water quality of San Francisco Bay and the Pacific Ocean from polluted stormwater. The Marin County Stormwater Pollution Prevention Program (MCSTOPPP) represents the effort of a number of Marin agencies, including the City of Novato, to comply with these requirements. Their efforts are summarized in the Marin County Stormwater Pollution Prevention Program: Action Plan 2010 (EOA, 2005). This plan includes performance standards adopted by each local agency for practices such as routine clearing of drain inlets, street sweeping, spill prevention and clean-up, and asphalt paving or concrete work. Each agency is responsible for ensuring that its local program meets RWQCB requirements by implementing these performance standards. Areas addressed include Municipal Maintenance Activities, Illicit Discharge Controls, Construction Controls, Industrial and Commercial Discharge Controls, and Public Information and Participation. The Marin Community College District is not a party to MCSTOPPP but would be expected to comply through established County programs and permits. Stormwater drainage runoff from the proposed project site would be expected to comply with MCSTOPPP.

Marin County Flood Control and Water Conservation Flood Zone 1. Marin County Flood Control and Water Conservation Zone 1 works with the City of Novato to ensure adequate drainage in the Ignacio Creek watershed area in public and private rights-of-way. This includes regular maintaining of public drainageways, catch basins, and drop inlets to reduce flooding, as well as coordinating improvements to or adding drainage infrastructure to protect public safety and accommodate new development. The District maintains the campus drainage infrastructure through an ongoing maintenance and repair program. A Storm Drain Repairs project was completed in 2006 that addressed system flushing, repair of some failed sections of concrete pipe, joints, and other miscellaneous inlet repairs and swale work. A SWPPP was filed as part of this project.

The District would continue to work with the County and MCSTOPPP to ensure adequate on-site drainage and water quality controls since site runoff would be directed into the municipal system.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

For the purposes of this Draft EIR, the project would cause a significant hydrology or water quality impact if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (i.e., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place structures within a 100-year flood hazard area that would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Cause inundation by seiche, tsunami, or mudflow.

LESS-THAN-SIGNIFICANT IMPACTS

The following CEQA criteria were determined in the Initial Study (see College of Marin website) and this EIR to represent a less-than-significant impact or no impact based on site conditions and the implementations being proposed. The project would not:

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (i.e., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted). The proposed new geothermal well field, being a completely closed system, would not affect groundwater resources.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site. Currently, a minor amount of flooding occurs at an existing creek crossing south of Parking Lot 2. The Bond Spending Implementation Plan calls for removal of the crossing and the associated culverts, deepening of the creek center line, widening of the creek channel, and the installation of rock weir gradient controls. These restoration improvements are designed to improve flood capacity and would be designed so that the creek channel would be capable of conveying 100-year flows.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality. (See discussion of water quality impacts under "Potentially Significant Impacts" below.)
- Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
- Place structures within a 100-year flood hazard area that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Cause inundation by seiche, tsunami, or mudflow.

POTENTIALLY SIGNIFICANT IMPACTS

This section addresses potentially significant impacts related to hydrology and water quality from adoption of the Bond Spending Implementation Plan, based on the significance criteria identified above.

Impact HYDROLOGY-1: Construction under the Bond Spending Implementation Plan could cause soil erosion, sedimentation, and other effects on water quality. (PS)

The project would involve the construction of one new building in Parking Lot 2, a bio-retention area, and possibly a new clear span pedestrian bridge. Site grading, ingress and egress of construction equipment and staging areas would remove protective vegetation and disturb the ground, thereby exposing soil to increased erosion from stormwater runoff, site watering, and wind. As a result, the project could potentially generate temporary increases in sediment loads and associated urban pollutants to vicinity waterways during the construction period. Eroded soil contains nitrogen, phosphorus, and other nutrients, which, when transported to water bodies, can trigger algal blooms that reduce water clarity, deplete oxygen, and create odors. The overall increase in turbidity and resulting decline in photosynthesis can be a detriment to the entire aquatic ecosystem. Eroded sediment may also contribute to flooding and erosion downstream by clogging drains or natural waterways, thereby rerouting stormwater into areas not designed to handle the flow. This can cause channel incision, slope instability, and flooding. The proposed project would have a potentially significant impact from degradation of water quality as a result of construction.

Mitigation Measure HYDROLOGY-1a: The District shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) prior to the onset of site grading or construction.

(1) The Erosion Control Plan shall include erosion control/soil stabilization techniques such as straw mulching, erosion control blankets, erosion control matting, and hydro-seeding. Silt fences used in combination with fiber rolls shall be installed downslope of all graded slopes. Fiber rolls shall be installed in the flow path of graded areas receiving concentrated flows and silt fences and other proven sediment retention structures shall be placed around all soil stockpiles. The construction entrances shall be stabilized to prevent tracking of dirt onto roads next to the site through the use of a gravel base, erosion control blankets, or other approved elements.

(2) After construction is completed, all drainage facilities shall be inspected for accumulated sediment, and these drainage structures shall be cleared of debris and sediment.

Long-term mitigation measures to be included in the project SWPPP shall include, but not be limited to, the following:

(3) Description of potential sources of erosion and sediment at the project site, and any hazardous or potentially hazardous materials and chemicals. This description shall include a thorough assessment of existing and potential pollutant sources.

(4) Development of a monitoring and implementation plan. Maintenance requirements and frequency, including vector control, clearing of clogged or obstructed inlet or outlet structures, and vegetation/landscape maintenance, shall be carefully described.

(5) The SWPPP shall be adjusted, as necessary, to address any inadequacies of the best management practices (BMPs).

Mitigation Measure HYDROLOGY-1b: The District shall implement "best management practices" (BMPs) for preventing the discharge of other construction-related NPDES pollutants beside sediment (i.e., paint, concrete, etc.) to downstream waters, including the following measure:

(1) Parking lots and other paved areas shall be swept regularly to eliminate the majority of litter and debris washing into storm drains and thus entering local waterways.

The combination of the above measures would reduce this impact to a less-than-significant level. (LTS)

Impact HYDROLOGY-2: Runoff from the Indian Valley campus could increase non-point source pollution in receiving waters such as San Francisco Bay. (PS)

There has been no known water quality monitoring of runoff from the project site or vicinity. Non-point source (NPS) pollutants are washed by rainwater from roofs, landscape areas, and streets and parking areas into the drainage network. An increase in NPS pollutants could have adverse effects on wildlife, vegetation, and human health. NPS pollutants could also infiltrate into groundwater and degrade the quality of potential groundwater drinking sources. Though the Bond Spending Implementation Plan would result in a net loss of parking lots, an increase in oil, grease, metals, and petroleum hydrocarbons is likely, due to the projected increase in enrollment and use of parking facilities. Due to the variability of urban runoff characteristics, it is difficult to estimate pollutant loads for oil and grease and total petroleum. The generation of water pollution as a result of future use following development is considered potentially significant for the proposed project.

On-site runoff from the project would be filtered by a grassed bioswale, and a new detention water quality basin would be constructed to filter runoff specifically from the Pomo Cluster, which contains the Transportation Technology Complex (see Figures 4.4-3 and 4.4-4). Both the bioswale and bio-retention basin would serve to remove grease and petroleum hydrocarbons; the bio-retention basin would also remove sediment from on-site runoff.

Mitigation Measure HYDROLOGY-2a: The District shall design the proposed bio-retention basin to improve water quality by allowing sediments and particulates to settle prior to discharging to downstream waterways. By retaining runoff, the bio-retention ponds shall allow for some pollutant removal through infiltration and vegetative uptake. Many pollutants in stormwater, including lead, copper, zinc, phosphorus, and hydrocarbons, are associated with sediment and fine particulates. Thus,

the ability of a stormwater practice to remove many nutrients, trace metals, and hydrocarbons is largely related to its ability to remove suspended sediment and particulates.

The basin shall serve the purposes of both peak storm runoff detention and water quality control. The basin shall discharge to a storm drain pipe that outfalls to Ignacio Creek south of Parking Lot 1.

In order to optimize both the stormwater detention and water quality control aspects, the following steps shall be taken:

(1) The basin shall be designed to drain slowly over 24 hours.

(2) The basin shall include a coarse pollutant basin, or forebay, just above the storage basin to remove coarse materials as they enter the storage basin. The coarse pollutant basin shall be deep enough to detain average seasonal flows for about five minutes and prevent the resuspension of deposited sediments.

(3) The coarse pollutant basin and the storage basin shall be lined with hardy wetland vegetation and grass, respectively.

(4) The basin shall be designed with an emergency spillway for 50-year storm events.

(5) Excess sediment decreases basin efficiency and must be removed to ensure basin features function as designed. Two staff gauges shall be placed in appropriate areas of the dry detention pond to monitor sediment accumulation. The staff gauges shall track the rate of sedimentation and identify the need for sediment removal.

(6) Sediment shall be removed when an average of 1.5 feet of sediment has accumulated in the basin.

(7) Sediment shall be removed by mechanical means such as a small excavator or loader. Care should be taken to ensure that the basin is restored to the proper invert elevations.

(8) It may be necessary to re-seed both the coarse pollutant basin and the storage basin after maintenance. Initially during construction, sediment input into the basin would be high. The basin would likely need to be cleaned within 1 to 2 years after project completion. Adequate access for basin maintenance shall be provided.

Mitigation Measure HYDROLOGY-2b: A maintenance and operations plan shall be developed by the District as part of the overall design of the bio-retention basin. The basin shall receive periodical maintenance including desilting, vegetation clearing, and trash and debris removal.

Mitigation Measure HYDROLOGY-2c: The District shall ensure that the bio-retention basin shall be designed per the latest edition of the California

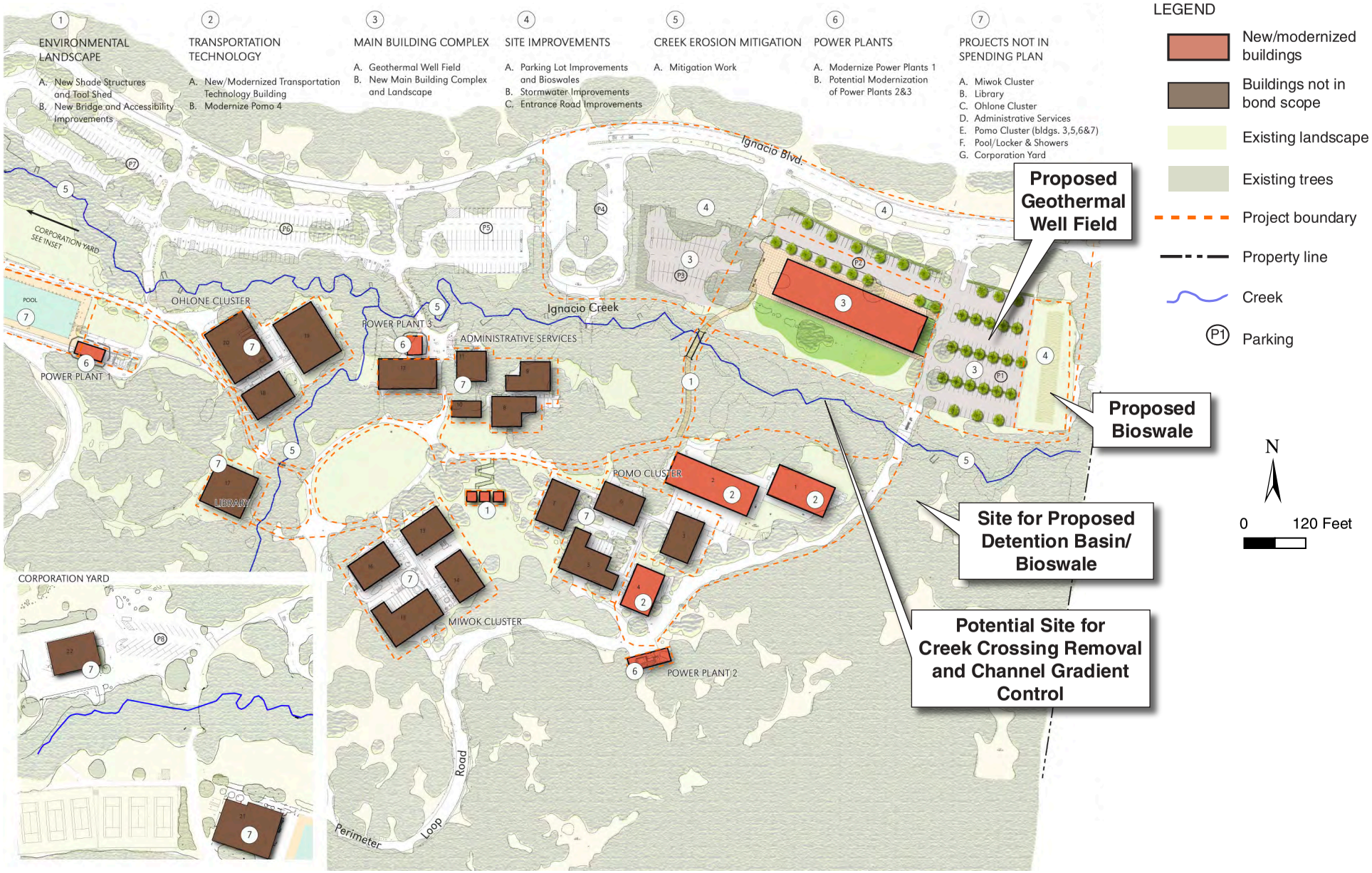

Figure 4.4-3

SOURCE: Questa Engineering and CSW/St^2 ,2007

HYDROLOGIC FEATURES PROPOSED FOR INDIAN VALLEY CAMPUS

Figure 4.4-4

SOURCE: CSW/St^2 and RHAA, 2007

ON-SITE BIOSWALE AT INDIAN VALLEY CAMPUS

Municipal BMP Manual or other standards approved by the State Water Resources Control Board (SWRCB) prior to construction.

Mitigation Measure HYDROLOGY-2d: The District shall incorporate, where feasible within design constraints, grassed swales (bioswales) into the project drainage system for runoff conveyance and filtering of pollutants. Rather than have concrete drainage swales to transport the runoff to roadside ditches, these swales shall be lined with grass or appropriate vegetation to encourage the biofiltration of sediment, phosphorus, trace metals, and petroleum from runoff prior to discharge into the formal drainage network. General design guidelines relevant to optimizing the pollutant removal mechanisms of grassed swales are (1) a dense, uniform growth of fine-stemmed herbaceous plants for optimal filtering of pollutants; (2) vegetation that is tolerant to the water, climatological, and soil conditions of the project site is preferred; (3) grassed swales that maximize water contact with the vegetation and soil surface have the potential to substantially improve removal rates, particularly of soluble pollutants; and (4) pollutant removal efficiency is increased as the flow path length is increased.

Grassed/vegetated swales treat concentrated flow and must be sized wide enough to maintain low-flow velocities and maximize surface area. A minimum of 1,200 square feet of swale per impermeable acre is recommended. Entrances to swales shall be equipped with flow spreaders to dissipate energy and avoid erosion and have a maximum longitudinal slope of 5 percent.

Mitigation Measure HYDROLOGY-2e: The District shall develop a long-term maintenance plan for the bioswale to include the following: (1) regular mowing to promote growth and increase density and pollutant uptake (vegetative height should be no more than 8 inches, cuttings must be promptly removed and properly disposed of); (2) removal of sediments during summer months when they build up to 6 inches at any spot, cover bioswale vegetation, or otherwise interfere with bioswale operation; and (3) reseeding of bioswale as necessary, whenever maintenance or natural processes create bare spots.

The combination of these mitigation measures would reduce the impact to a less-than-significant level. (LTS)

Impact HYDROLOGY-3: Alteration of the existing drainage pattern at the Indian Valley campus could result in increased erosion on and off the site. (PS)

The Bond Spending Implementation Plan would alter the existing drainage patterns in such a way that erosion could occur both during and after construction. During the construction period, grading operations would result in

the removal of on-site soil cover and the exposure of site soils to the erosional forces of runoff. Construction activities could also result in the erosion of topsoil on the project site and subsequent sedimentation of Ignacio Creek. (See Impact HYDROLOGY-1.)

Once the project is completed, on-site runoff would be discharged to existing storm drain outfalls in Ignacio Creek. The velocity of discharge at the storm drain outfalls could be erosive and result in the erosion of the creek bank and channel. Furthermore, the HEC-RAS model data for developed conditions of the project site indicate that the flow velocity of water in Ignacio Creek would be erosive in several areas of the creek channel during passage of the 100-year storm event. Erosion and sedimentation of Ignacio Creek could impair water quality in the creek and at receiving waters downstream of the project site. Thus, the alteration of existing drainage patterns of the site so as to increase flooding is considered a potentially significant impact of the proposed project.

> *Mitigation Measure HYDROLOGY-3a: Where possible, the District shall use biotechnical bank stabilization techniques as erosion protection within Ignacio Creek (Questa Engineering, 2006). Biotechnical erosion control techniques include planted rock rip rap, large woody debris, coir fiber logs, willow staking, soil reinforcement products, and other pre-approved erosion protection materials. The use of concrete reinforcement should be minimized to the greatest extent possible and only used to protect infrastructure.*
>
> *Mitigation Measure HYDROLOGY-3b: The District shall ensure that all stormwater drainage shall be released in such a manner as to prevent erosion within Ignacio Creek by using existing outfalls and dissipators.*
>
> *The combination of these mitigation measures would reduce the impact to a less-than-significant level. (LTS)*

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4.5 HAZARDOUS MATERIALS

INTRODUCTION

A hazardous material is a substance or combination of substances that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health and safety or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Hazardous waste (a subset of hazardous materials) refers to hazardous material that is abandoned, discarded, or recycled.

This section describes the history of hazardous materials used at the Indian Valley campus and the potential threat to future site users and the surrounding environment resulting from the proposed development.

The information presented below was drawn from several sources of data including:

- CSW/Struber-Stroeh Engineering Group, Inc., 2006. *College of Marin Indian Valley Campus Site Assessment.* December.
- Steinberg Architects, 2006. *Bond Spending Implementation Plan*. December.
- Ninyo and Moore, 2006. *Existing Facilities Assessment: Indian Valley Campus.* December.
- Review of the Department of Toxic Substances and Control (DTSC) Database (www.envirostor.dtsc.ca.gov).
- Review of the State Water Resources Control Board Geotracker Database (geotracker.swrcb.ca.gov).

ENVIRONMENTAL SETTING

SITE HISTORY

The Indian Valley campus was constructed in the early 1970s on the former Pacheco Ranch. The campus site was historically used as a working ranch. The campus encompasses approximately 330 acres, though only a small portion of that area is developed with one- and two-story buildings arranged in a series of clusters. Other buildings include the library, the pool complex, the corporation yard, and three small power plants. The campus is located in the valley bottom and Ignacio Creek separates the college parking from the main campus complex. Several bridges cross Ignacio Creek throughout the campus (see Figure 3-2).

REGULATORY SETTING

Jurisdictional Authority

REGULATORY AGENCIES

FEDERAL:
U.S. Environmental Protection Agency

STATE:
Department of Toxic Substances Control
State Water Resources Control Board

LOCAL:
SF Bay Regional Water Quality Control Board
Marin County Waste Management Division
City of Novato

At the federal level, the chief regulator of hazardous materials is the U.S. Environmental Protection Agency (EPA), Region IX for Northern California. At the State level, the Department of Toxic Substances Control (DTSC) is chiefly responsible for regulation, handling, use, and disposal of hazardous materials. The State Water Resources Control Board (SWRCB) is involved in regulation and permitting wherever there is potential discharge of hazardous materials into waterways and underground aquifers, including regulation of stormwater runoff through the general permit required for construction projects exceeding 1 acre in size. The local branch of the SWRCB is the San Francisco Bay Regional Water Quality Control Board (RWQCB).

Regulation of toxic and hazardous substances is locally administered through the Marin County Department of Public Works Waste Management Division, which acts as the Certified Unified Program Agency (CUPA). A CUPA is certified by the California Environmental Protection Agency to handle certain hazardous materials and hazards programs. The CUPA program was established under the amendments to the California Health and Safety Code made by SB 1082 in 1994, which allows for local agencies, such as counties, cities, or joint powers authorities, to assume responsibility for programs such as the Hazardous Materials Business Plan/Emergency Response Plan, Hazardous Waste/Tiered Permitting, Underground Storage Tanks, Aboveground Storage Tanks, California Accidental Release Program, and the Uniform Fire Code Hazardous Materials Management Plan.

The Marin County Department of Public Works Waste Management Division is responsible for solid waste collection and diversion, coordination of Household Hazardous Waste (HHW) disposal, and inspection of hazardous materials/waste sites within all areas of the County, except Novato. The City of Novato has its own HHW program.

The County Waste Management Division provides staff support to the Marin Hazardous and Solid Waste Joint Powers Authority (JPA). The JPA is a State-approved regional agency encompassing Marin's cities and unincorporated areas. This agency was created to reduce disposal requirements and to promote reuse and recycling. This regional agency develops and implements Marin County's Regional Integrated Waste Management Plan, monitors Marin County's diversion rates, and coordinates the operation of Marin County's permanent HHW collection facility for all jurisdictions except the City of Novato. The City of Novato implements its own HHW program in conjunction with Novato Sanitary District. It operates a disposal drop-off facility that is open the first and third Sundays and Mondays of each month.

Regulatory Programs

A Hazardous Materials Business Plan is used to keep track of the use of hazardous materials by the campus in accordance with both State and federal laws. The Hazardous Waste Generator Program was started in 1984 when the State of California DTSC authorized the County to inspect and regulate non-permitted hazardous waste generators in Marin County based on the Hazardous Waste Control Law found in the California Health and Safety Code Division 20, Chapter 6.5 and regulations found in the California Code of Regulations, Title 22, Division 4.5.

The District has registered and complies with the hazardous waste generator program. The State of California Department of Toxic Substances Control authorized the Marin County Department of Public Works Waste Management Division to inspect and regulate non-permitted hazardous waste generators in Marin County based on the Hazardous Waste Control Law found in California Health and Safety Code Division 20, Chapter 6.5 and regulations found in the California Code of Regulations, Title 22, Division 4.5. Regulations require that generation of any amount of hazardous waste, as defined by regulation, have proper storage, management, and disposal.

The United States Environmental Protection Agency (USEPA), under Cooperative Agreement L-009450-1-0 to the SWRCB, funds the groundwater protection program wholly or in part. In conjunction with these laws, the underground storage tank program was created to regulate the chief source of underground contamination, leaking underground storage tanks or fuel tanks.

Many regulatory agencies maintain a database of sites. Currently, both the DTSC (http://www.envirostor.dtsc.ca.gov/public/) and SWRCB (http://www.swrcb.ca.gov/tankpage.html) maintain online searchable databases of hazardous materials sites. A search of this database indicated that no hazardous sites exist at the Indian Valley campus or surrounding zip code area.

Other databases with information on hazardous materials sites include the Federal Superfund list started through the Comprehensive Environmental Response, Conservation, and Liability Act (CERCLA) of 1980 and the USEPA; the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); DTSC's HAZNET; the leaking underground storage tank information system (LUST); and the Cortese list. Air pollution is regulated through the Bay Area Air Quality Management District (BAAQMD).

These programs and regulations are intended to restrict environmental contamination (including hazards to wildlife), provide protection for natural resources, and limit public exposure to harmful chemicals. Specific programs intended to protect workers from exposure to hazardous materials and from accidental upset are covered under the Occupational Health and Safety Administration at both the federal level (OSHA) and the State level (CAL-OSHA).

Title 40 of the Federal Code of Regulations covers worker training and safety regulations pertinent to hazardous materials. OSHA regulations for hazardous waste operations training in California are found in Title 29 of the California Code, Section 1910.120(e).

Transportation of hazardous materials on the highways is regulated primarily through the federal Department of Transportation (DOT) and the California Department of Transportation (Caltrans). This regulation system includes a system of placards, labels, and shipping papers required to identify the hazards of shipping each class of hazardous materials. Existing federal and State laws address the risks associated with the transport of hazardous materials. These laws include regulations outlined in the Hazardous Materials Transportation Act administered by the DOT. Caltrans is mandated to implement the regulations established by the DOT, which is published as the Federal Code of Regulations, Title 49, commonly referred to as 49 CFR. The California Highway Patrol (CHP) enforces these regulations. Regulations of hazardous materials and wastes include the manufacture of packaging and transport containers, packing and repacking, labeling, marking or placarding, handling, spill reporting, routing of transports, training of transport personnel, and registration of highly hazardous material transport.

HAZARDOUS MATERIALS ON CAMPUS

The main issues on campus stem from the existence of hazardous building materials and hazardous classroom and maintenance supplies.

Each building and facility on the Indian Valley campus was assessed and sampled for hazardous building materials (HBM) and hazardous materials and waste (HMW) (Ninyo and Moore, 2006). Physical surveys, material sampling, and records searches were conducted to determine the occurrence of existing and past hazardous materials on the campus. Primarily, the historic hazardous materials issues stem from the existence of hazardous building materials and hazardous classroom and maintenance supplies on campus. Hazardous building materials would also include the occurrence of lead-containing paint (LCP), asbestos-containing pipes (ACP), and asbestos-containing materials (ACM). The assessments also investigated whether there was a potential for the occurrence of polychlorinated biphenyls (PCBs). Table 4.5-1 shows a summary of the hazardous materials identified at the campus buildings during the initial assessments.

In general, all of the buildings contain hazardous building materials such as LCP, ACM, and small amounts of PCBs contained in the light ballasts, mercury in old thermostats, and old refrigeration and hydraulic systems. These materials do not pose a significant risk to occupants if undisturbed. However, these materials do degrade over time so that eventually these materials will have to be replaced and disposed of properly as renovations occur.

Different buildings and different departments have varying amounts of and ways of handling hazardous materials and waste generated by the Indian Valley campus. Some departments' hazardous materials and waste were stored in

Table 4.5-1 Hazardous Materials by Building/Building Cluster

Building	HMW	ACP	ACM	PCBs	LCP	Old USTs	AST
Pomo Cluster	X	X	X	X	X	X	
Admin/Child Center	X	X	X	X	X		
Miwok Cluster		X	X	X	X		
Library		X	X	X	X		
Ohlone Cluster	X	X	X	X	X		
Pool Complex			X	X	X	X	
Corporation Yard	X		X	X	X	X	X
Bridges	X						
Central Power Plant	X	X	X	X	X		

Notes: HMW: Hazardous Materials and Waste
ACP: Asbestos Containing Pipe
ACM: Asbestos Containing Materials
PCBs: Polychlorinated Biphenyls
LCP: Lead-Containing Paint
USTs: Underground Storage Tanks
AST: Aboveground Storage Tank
Source: Ninyo and Moore, 2006.

double containment containers. Other departments and buildings throughout the campus had supplies and various amounts of hazardous materials that were not stored in code-compliant containers (Ninyo and Moore, 2006).

Six underground storage tanks (USTs) were previously located on the Indian Valley campus. Four tanks were removed from the area around the Pomo Cluster. Three of the tanks contained gasoline and were removed in 1989. The fourth tank was a waste oil tank that was removed in 1991. Sampling of the area with previous gasoline tanks was completed and a minor amount of petroleum hydrocarbons were found. The area beneath the waste oil tank was found to be clean. Subsequent sampling completed in 2002 and 2003 found that some contamination was present in the backfill of the gasoline tank site down to 7 feet. Sampling of groundwater about 35 feet below surface did not contain measurable concentrations of petroleum hydrocarbons. The fifth UST found on campus was located at the corporation yard. This tank was a 500-gallon gasoline tank that was on the north side of the building and was removed in 1991. Subsequent sampling of the surrounding soil and excavation showed no

measurable concentrations of petroleum hydrocarbons. A sixth UST was located near the pool complex. This UST was a 15,000-gallon fiberglass diesel fuel tank that was removed in 1993. Post-removal sampling of the surrounding soil found no adjacent soil contamination (Ninyo and Moore, 2006).

One aboveground storage tank (AST) is located near the corporation yard. This tank is code-compliant and situated in a double-walled containment system.

PCBs may be found in hydraulic fluid that is used in numerous hydraulic lifts and elevators throughout the campus buildings. According to the site assessments, PCB-containing hydraulic fluid was not manufactured after 1979, but given the age of the campus buildings and facilities, there is a potential for some of these machines to have older PCB-containing hydraulic fluid in them.

Most of the hazardous materials on the campus site are in an undisturbed condition and thus do not pose a hazard for building occupants. The predominant hazardous materials risks for the campus would be the proper storage, collection, and disposal of hazardous material generated from building renovation and/or daily campus operations. This issue is discussed further under "Environmental Impacts and Mitigation Measures" below.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The project would have a significant impact related to hazardous materials if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Produce hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼-mile of an existing or proposed school;
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;
- Be located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, and would result in a safety hazard for people residing or working in the project area; or

- Be within the vicinity of a private airstrip and result in a safety hazard for people residing or working in the project area.

LESS-THAN-SIGNIFICANT IMPACTS

The following CEQA criteria were determined in the Indian Valley Initial Study (see College of Marin website) and this EIR to represent a less-than-significant impact or no impact based on site conditions and the proposed actions of the Bond Spending Implementation Plan.

The project would not cause a safety hazard in the vicinity of a public airport or private airstrip because the project site is not in the vicinity of any airport.

The project would not be located on any site where hazardous materials have been identified.

POTENTIALLY SIGNIFICANT IMPACTS

Impact HAZARDS-1: The routine transportation, use or disposal of hazardous materials associated with the adoption of the Bond Spending Implementation Plan could result in hazardous conditions. (PS)

The proposed Bond Spending implementation Plan for the Indian Valley campus includes renovation of numerous existing structures and construction of a new Main Building Complex. The renovation of the Transportation Technology Complex would likely require some demolition prior to renovation. There are likely to be both hazardous and potentially hazardous construction materials stored and used during the campus renovations that would eventually require disposal. Also, there are potential hazards and risk of fire or explosion associated with campus activities such as in the Transportation Technology Complex. Transportation of hazardous materials to and from the site would also occur along local roads such as Ignacio Boulevard crossing Ignacio Creek and Arroyo Grande creek crossings. The risk of accidental upset and environmental contamination from routine transport, storage, use, and disposal of hazardous and potentially hazardous materials to the public and environment is a potentially significant impact.

One nearby school, San Jose Middle School, is located 0.3 mile east of the Indian Valley campus. Provided that the renovation and construction-related mitigation measures are implemented as recommended below, the proposed project is not expected to create any hazardous conditions for nearby schools.

> *Mitigation Measure HAZARDS-1a: The District shall develop a Demolition and Disposal Plan to reduce hazards related to the demolition, staging, and removal of construction-related and hazardous materials, including building remodeling waste materials. The plan shall include measures for handling the spill of liquids such as fuels or hydraulic fluids as well as*

abatement of hazardous materials and airborne dust. This plan shall be submitted to the California Division of the State Architect (DSA) for approval prior to any demolition.

Mitigation Measure HAZARDS-1b: The Demolition and Disposal Plan for safe renovation of existing structures shall include asbestos dust control and shall incorporate site surveys for the presence of potentially hazardous building materials. The plan shall address both on-site worker protection and off-site resident protection from both chemical and physical hazards.

Mitigation Measure HAZARDS-1c: All contaminated building materials shall be tested for contaminant concentrations and shall be disposed of at appropriate licensed landfill facilities. Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations must be followed for demolition of facilities with minimum quantities listed by the NESHAP of regulated asbestos-containing materials. All demolitions must include notification of the appropriate regulatory agency, even if no asbestos is present at the site, and all demolitions and renovations are "subject" to the Asbestos NESHAP insofar as owners and operators must determine if and how much asbestos is present at the site (EPA, 2006). Prior to obtaining a demolition permit from the Bay Area Air Quality Management District (BAAQMD), an asbestos demolition survey shall be conducted in accordance with the requirements of BAAQMD Regulation 11, Rule 2.

Mitigation Measure HAZARDS-1d: Prior to building demolition, hazardous building materials such as peeling, chipping and friable lead-based paint and asbestos-containing building materials shall be removed in accordance with all applicable guidelines, laws, and ordinances. The plan shall include a program of air monitoring for dust particulates and attached contaminants. Dust control and suspension of work during dry windy days shall be addressed in the plan.

Mitigation Measure HAZARDS-1e: For the impact of flaking and peeling lead-based paint, the requirements of Title 8, California Code of Regulations, Section 1532.1 (T8 CCR 1532.1) shall be followed. These requirements include but are not limited to the following:

(1) Loose and peeling lead-containing paint shall be removed prior to building demolition. Workers conducting removal of lead paint must receive training in accordance with T8 CCR 1532.1.

(2) The lead paint removal project shall be designed by a California Department of Health Services (DHS)-certified lead project designer, project monitor or supervisor.

(3) The District shall prepare a written Lead Compliance Plan that meets the requirements of the lead construction standard by any contractor that affects lead coatings.

(4) Workers who may be exposed above the "Action Level" must have blood lead levels tested prior to commencement of lead work and at least quarterly thereafter for the duration of the project. Workers who are terminated from the project shall have their blood lead levels tested within 24 hours of termination.

(5) A written exposure assessment must be prepared in accordance with T8 CCR 1532.1.

(6) Any amount of lead waste generated, including painted building components, shall be characterized for proper disposal in accordance with Title 22, Section 66261.24.

Mitigation Measure HAZARDS-1f: The District shall apply all Existing Facilities Assessment Hazardous Material Report recommendations for asbestos-containing materials, lead-containing materials, and other hazardous materials. Building-specific recommendations shall be followed prior to demolition, during construction, and during future facility operations. These recommendations include:

(1) Label unidentified hazardous waste.

(2) Store hazardous materials in code-compliant cabinets.

(3) Maintain quantities within limits of fire codes.

(4) Update the Hazardous Materials Report on a regular basis to reflect the actual chemical inventories.

(5) For laboratory sinks, evaluate permitting and requirements by Publicly Owned Treatment Works for acid waste line discharge and pre-treatment, such as dilution tanks.

(6) Test fume ventilation hoods and exhaust systems annually.

(7) Create "chain of responsibility" for hazardous materials/wastes.

(8) Provide complete set of Materials Safety Data Sheets (MSDS) where materials are stored and used.

(9) Inventory and remove fixtures and structural elements that may contain hazardous materials prior to renovation or demolition.

(10) Obtain regulatory agency underground storage tank (UST) closure, if necessary.

Mitigation Measure HAZARDS-1g: The District's Hazardous Materials Business Plan (HMBP) shall be updated for the safe storage and use of all hazardous chemicals. The HMBP shall include the type and quantity of hazardous materials, a site map showing where hazardous materials are

stored and where they may be used and transported from, risks of using these materials, material safety data sheets for each material, a spill prevention plan, an emergency response plan, employee training consistent with Occupational Safety and Health Administration (OSHA) guidelines, and emergency contact information. The District qualifies for the program if it stores a hazardous material equal to or greater than the minimum reportable quantities. These quantities are 55 gallons for liquids, 500 pounds for solids and 200 cubic feet (at standard temperature and pressure) for compressed gases. Some exemptions apply.

The HMBP shall be submitted prior to the start of operation of the new facilities, and must be entirely reviewed and updated at least once every three years, or within 30 days of any significant change. Some of these changes are new emergency contact information, major increases or decreases in hazardous materials storage, and/or changes in location of hazardous materials. Plans shall be submitted to the County of Marin Certified Unified Programs Agency (CUPA), managed by the Marin County Department of Public Works Waste Management Division. The Marin County Department of Public Works Waste Management Division may inspect the College at least once a year to make sure that the HMBP is complete and accurate.

Mitigation Measure HAZARDS-1h: Building spaces shall be designed to handle the intended use, with sprinklers, alarms, vents, and secondary containment structures, where applicable. These systems must pass plan review through the Division of the State Architect.

Mitigation Measure HAZARDS-1i: During construction, the utilities (including sprinkler systems) shall pass pressure and flush tests to make sure they perform as designed. At the end of construction, occupancy shall not be allowed until a final inspection is made by the Novato Fire Protection District for conformance of all building systems with the Fire Code and National Fire Protection Agency Requirements. The inspection shall include testing of sprinklers systems, alarm systems, ventilation and airflow systems, and secondary containment systems. The inspection shall include a review of the emergency evacuation plans. These plans shall be modified as deemed necessary.

Mitigation Measure HAZARDS-1j: All transportation of hazardous materials and hazardous waste to and from the site shall be in accordance with Title 49 of the Code of Federal Regulations, US Department of Transportation (DOT), State of California Department of Transportation (Caltrans), and local laws, ordinances and procedures including placards, signs, and other identifying information.

Implementation of the above mitigation measures would reduce the impact of routine transportation, use, or disposal of hazardous materials to a less-than-significant level. (LTS)

Impact HAZARDS-2: An accidental hazardous materials release could occur on the Indian Valley campus with current campus operations. While the Bond Spending Implementation Plan would reduce the risk of accidental hazardous materials releases by providing for renovations and life safety and general code upgrades to the Transportation Technology Complex in Pomo 1 and 2, the potential remains for such a release. (PS)

Mitigation measures for accidental release of hazardous materials during construction are included in Section 4.4, Hydrology and Water Quality, as related to the implementation of a Stormwater Pollution Prevention Plan (SWPPP). These mitigation measures include implementation of best management practices for preventing the discharge of construction-related pollutants such as diesel fuel, hydraulic oil, lead-based paint, concrete, and asbestos to the environment. Implementation of Mitigation Measures HAZARDS-1a through HAZARDS-1j would also reduce hazards associated with accidents.

Mitigation Measure HAZARDS 2a: The District shall check the State and federal lists of regulated substances for chemicals that pose a major threat to public health and safety or the environment because they are highly toxic, flammable, or explosive. This list is available from the Marin County Department of Public Works Waste Management Division.

Should the campus qualify for the California Accidental Release Program (CalARP), as determined in consultation with Marin County Department of Public Works Waste Management Division, the District shall complete a CalARP registration form and submit it to the Environmental Health Department. Following registration, the District shall submit a Risk Management Plan (RMP). RMPs are designed to handle accidental releases and ensure that businesses have the proper information to provide to emergency response teams if an accidental release occurs. The storage or handling of more than a threshold quantity (TQ) of a regulated substance requires the development and implementation of a Risk Management Plan.

RMPs describe impacts to public health and the environment if a regulated substance is released near schools, residential areas, hospitals, and child care facilities. RMPs must include procedures for keeping employees and customers safe, handling regulated substances, training staff, maintaining equipment, storing materials safely, and responding to an accidental release.

Mitigation Measure HAZARDS-2b: Employee training shall include spill prevention, clean-up, and notification procedures in accordance with the

Occupational Health and Safety Administration (OSHA) and the State level CAL-OSHA. This includes having sufficient clean-up materials such as spill kits, absorbent rags, and sand available to staff for containing and cleaning up spills and leaks, as well as procedures for proper disposal of contaminated materials.

Implementation of the combination of these mitigation measures would reduce the impact of accidental releases of hazardous materials to a less-than-significant level. (LTS)

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4.6 CULTURAL RESOURCES

INTRODUCTION

This section evaluates the proposed project's potential impacts on cultural resources. Cultural resources are sites, buildings, structures, objects, and districts that may have traditional or cultural value due to their historical significance. The California Environmental Quality Act (CEQA) requires that effects on cultural resources by discretionary projects be considered in the planning process.

This section contains (1) a summary of the project area's cultural setting, and (2) a discussion of potential impacts on cultural resources and recommended mitigation measures to reduce such impacts to less-than-significant levels.

ENVIRONMENTAL SETTING[1]

The prehistoric, ethnographic, and historical contexts for the project area and vicinity are summarized below. Relevant State and local regulations are also reviewed, and study results are discussed.

CULTURAL RESOURCE SETTING OF THE PROJECT AREA

Prehistory

When the first native people arrived in the San Francisco Bay Area roughly 10,000 years ago, the land and environment were very different from what they are today. Before 10,000 years ago, the Sacramento River flowed through the Golden Gate and crossed a coastal plain before reaching the Pacific, many miles west of the modern coastline. There was no bay before 8,000 years ago, and many of the marshlands were not even present before 3,000 years ago. This special circumstance of a rapidly evolving environment created a unique set of conditions that greatly affected how and where the native peoples lived. Their ancient villages and resource collection areas have become what scientists call archaeological sites.

Beginning in 1906, Nels C. Nelson, working with the University of California, Berkeley, did the first regional study of primarily San Francisco Bay archaeological sites. Nelson identified 425 sites, consisting mostly of mounds of shell along the San Francisco Bay and San Pablo Bay shorelines and associated estuaries. Many of these shell mounds contained the remains of the occupants and other artifacts associated with their daily lives. During the early decades of

[1] Adapted from *Existing Facilities Assessment: Archaeological Resources for the College of Marin Indian Valley Campus,* prepared by Peak and Associates (December 2006).

the 20th century, archaeologists excavated many of these shell mounds and through a scientific technique developed during the 1950s, radiocarbon dating, the approximate years that each village and resource collection area were used were determined.

With this information in hand, archaeologists could develop a chronology (time-line) of the region's prehistoric cultures. By 1948, Richard Beardsley had tentatively defined cultural sequences for Central California that he later refined in 1954 (Beardsley, 1948, 1954). A generation later, another archaeologist, David Fredrickson, once again attempted to make sense of the region's prehistory with his own synthesis (Fredrickson, 1973).

The Indian Valley campus and vicinity are known to contain prehistoric archaeological sites.

The Indian Valley campus and vicinity are known to contain prehistoric archaeological sites. Former College of Marin professor John McBeath excavated C-113, a prehistoric habitation site on the Indian Valley campus, and identified stone tools, stone tool debris, and human remains (Peak and Associates, 2006). Another prehistoric habitation site, CA-MRN-471, is near the campus and was excavated by Thomas Jackson (1972). The site includes a variety of artifacts made of shell, bone, and stone; structural remains; and human remains. A radiocarbon date indicates that CA-MRN-471 was occupied from at least A.D. 1350.

Ethnography

The Coast Miwok occupied what is now Marin County and part of Sonoma County, as far north as the vicinity of Sebastopol. There is extensive coastline in this territory and resources from the sea and salt marshes were important in Coast Miwok subsistence. Sea mammals were not part of the diet but various species of fish were taken with nets, seines, weirs, spears, and line-with-gorge technologies, as appropriate. Even more important in the diet were clams and some species of mussel.

The most important food resource, as with most California Indians, was the acorn. It was leached to remove most of the tannic acid and then ground into meal and prepared in various ways. It was particularly valuable because the meal could be stored against times of shortage of other foods. Despite the relative abundance of their food sources, winter and early spring were still times of short food supply, and stored acorns, along with kelp harvested along the coast, were then the primary foods (Kelly, 1978).

Villages were situated so as to be near food resources at various times of year. The Coast Miwok moved among residences on the coast, around salt or freshwater marshes and on interior streams so that they would be close to the most abundant food supply available at a particular season. Dwellings were conical brush-on-frame structures capable of sheltering up to ten individuals. Other structures included semi-subterranean sweathouses, which served as something of a men's club, and – at major villages – a dancehouse for religious

ceremonies. The dancehouse was basically the same construction as the sweathouse, only larger.

Archaeology has provided an extensive collection of the stone tools that were used, but it is clear from ethnology that basketry and cordage were used for the majority of utilitarian objects. These materials do not preserve well, so they are uncommon in archaeological sites. Basket-making was a highly developed skill and baskets were woven tightly enough to hold water. Cooking of acorn mush was accomplished by dropping hot rocks into baskets containing the mush. Cordage was used for the variety of nets used in taking fish, birds, and small mammals.

Through much of aboriginal California, shell beads served as a form of currency. As a coastal people, the Coast Miwok had access to the raw material and bead manufacturing was an important industry because it provided currency to trade for goods from neighboring groups. This allowed the Coast Miwok to import obsidian from the Wappo to the north to use in making arrowheads and other edged tools. Chert was used to form more utilitarian edged implements, but obsidian was the preferred material. Yellow ocher was also obtained from the Wappo for paint and venison and magnesite cylinders were obtained from the Pomo (Kelly, 1978).

The traditional lifeways of the Coast Miwok were disrupted after the founding of the mission at San Francisco in 1776 and the later missions at San Rafael and Sonoma. Forced movement of Coast Miwok to the missions and the determination of the friars to convert the natives to Christianity and destroy all vestiges of their former life, along with epidemic diseases of the whites, soon left few natives who could remember the pre-contact culture.

History

The Indian Valley campus lies on lands of the Rancho San Jose land grant, awarded to Don Ignacio Pacheco in 1840 by Governor Alvarado. Pacheco was a native Californian, born in San José in 1808. He became a soldier like his father before him, rising to the rank of sergeant in ten years of service. At the end of his military service in 1838, he settled on a tract of land south of the Feliz grant of Rancho de Novato and claimed the land. In 1846, Pacheco served as Alcalde at San Rafael, holding court in the large hall of the San Rafael Arcángel mission. Pacheco received a patent for his grant of 6,659 acres from the United States government in 1861. When he died, he left his family home and 600 acres of land to his daughter, and his five sons divided the rest of the land (Hoover, Rensch and Rensch, 1970).

The 1873 map of Marin County shows the land as a portion of the 937-acre holding of G. Pacheco, apparently Gumesindo, the second eldest son of Don Ignacio. The ranch headquarters for Gumesindo Pacheco appear to be located

on what is now the campus, although it is difficult to confirm considering the scale of the 1873 map. It is not known how long the family retained the land.

Historic Architecture

No historic architecture exists on the Indian Valley campus.

No historic architecture exists on the Indian Valley campus. The campus buildings were constructed in the 1970s.

REGULATORY SETTING

California Environmental Quality Act (CEQA) and Other State Regulations

CEQA defines a "historical resource" as a resource that meets one or more of the following criteria: 1) listed in, or determined eligible for listing, in the California Register of Historical Resources (California Register); 2) listed in a local register of historical resources as defined in Public Resources Code (PRC) Section 5020.1(k); 3) identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or 4) determined to be a historical resource by a project's lead agency (CEQA Section 21084.1 and CEQA Guidelines Section 15064.5(a)). A historical resource consists of:

> "Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California…. Generally, a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historical Resources." (CEQA Guidelines Section 15064.5(a)(3))

In accordance with CEQA Guidelines Section 15064.5(b), a substantial adverse change in the significance of a historical resource is a significant effect on the environment.

CEQA requires a lead agency to determine if an archaeological cultural resource meets the definition of a historical resource, a unique archaeological resource, or neither (CEQA Guidelines Section 15064.5(c)). Prior to considering potential impacts, the lead agency must determine whether an archaeological cultural resource meets the definition of a historical resource in CEQA Guidelines Section 15064.5(c)(1). If the archaeological cultural resource meets the definition of a historical resource, then it is treated like any other type of historical resource in accordance with CEQA Guidelines Section 15126.4. If the archaeological cultural resource does not meet the definition of a historical resource, then the lead agency determines if it meets the definition of a unique archaeological resource as defined at CEQA Section 21083.2(g). In practice, however, most archaeological sites that meet the definition of a unique archaeological resource

will also meet the definition of a historical resource (Bass, Herson, and Bogdan, 1999:105). Should the archaeological cultural resource meet the definition of a unique archaeological resource, then it must be treated in accordance with CEQA Section 21083.2. If the archaeological cultural resource does not meet the definition of a historical resource or an archaeological resource, then effects to the resource are not considered significant effects on the environment (CEQA Guidelines Section 15064.5(c)(4)).

California Health and Safety Code (HSC) Section 7050.5 states that in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the remains are discovered has determined whether or not the remains are subject to the coroner's authority. If the human remains are of Native American origin, the coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Native American Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods.

Public Resources Code (PRC) Section 5097.5 provides for the protection of cultural and paleontological resources. This PRC section prohibits the removal, destruction, injury, or defacement of archaeological and paleontological features on any lands under the jurisdiction of State or local authorities.

Marin Community College District Policy 8.0025 (Excavations in Midden Areas)

Policy 8.0025, adopted by the Marin Community College District on August 5, 1981 and revised on April 9,1985, identifies appropriate procedures for excavating in Native American middens on College of Marin campuses. The policy states that the campus resident archaeologist shall be notified ten days prior to excavating in areas that have been designated as "fragile areas" by the College. Such notification shall occur when disturbing soil 6 inches below the surface or 1 inch below the surface in extremely fragile areas. The resident archaeologist shall assess the potential impact of the proposed excavation. If it is determined that there is no significant archaeological impact of the proposed work, this shall be confirmed in writing by the resident archaeologist within ten days and excavation may proceed. If it appears that there is a significant archaeological impact, this shall be documented and specific mitigation measures shall contain significance for a specified period, not to exceed 45 days.

STUDY RESULTS

LSA Associates, Inc. (LSA) completed an archaeological study of the project area. The purpose of this study was to (1) identify archaeological sites that may meet the California Environmental Quality Act (CEQA) definition of a historical or

archaeological resource and may be affected by the proposed project, (2) identify potentially significant impacts of the proposed project on historical and archaeological resources and human remains, and (3) provide program-level mitigation measures for potentially significant impacts on historical and archaeological resources and human remains.

The cultural resources study included background research, including a records search and a literature review. The results of this study are summarized below.

Archaeological Sites On Campus

Background research identified three documented archaeological sites within the Indian Valley campus: C-113, C-114, and PA-06-44.[2] The locations of C-113 and C-114 correspond to "areas of archaeological concern" designated on a map and memo prepared by former College of Marin professor John McBeath (1978). McBeath excavated at C-113 and recovered flaked stone and human remains. Presently, a parking lot is at the reported location of C-113. The reported location of C-114 is partially covered by walkways and a parking lot. Peak and Associates, Inc. (2006) recently visited the reported location of C-114 and identified "unusually dark-colored sediment," but no surface prehistoric artifacts. Historical or modern artifacts and features were identified, however, consisting of a small concrete footing, a metal wire embedded in two bay trees, a concrete water trough, concrete fragments, and the remains of a small water tank. An archaeologist with LSA Associates, Inc. recently conducted a brief field review in the vicinity of the reported locations of C-113 and C-114 and identified midden containing shell, bone, obsidian, and heat-affected rock. PA-06-44 consists of a scatter of chert debitage and a chert core on the western edge of the project area.

In addition to these three documented archaeological sites, Peak and Associates, Inc. (2006) identified shell midden on campus, which may have been redeposited from another location.[3]

Peak and Associates' cultural resources study (2006) is the only archaeological survey to be done of the Indian Valley campus project area. The Peak study

[2] The site identifiers "C-113" and "C-114" were assigned by the Northwest Information Center (NWIC) of the California Historical Resources Information System. "C" numbered sites indicate resources which have been reported to the NWIC but not officially recorded on California Department of Parks and Recreation form 523 (DPR 523) records. "PA-06-44" is the temporary field number assigned for this resource by Peak and Associates, Inc., who first identified the site in July 2006.

[3] The reported locations of archaeological resources within the Indian Valley campus project area are shown on maps provided to the District. The locations of archaeological sites should not be disclosed to the public to deter "pot-hunting," vandalism, and other activities that could have a detrimental effect on the integrity of the resource. The legal authority to restrict cultural resources information is in California Government Code Sections 6254.10 and 6254(r) and California Government Code of Regulations Section 15120(d).

resulted in the identification of two previously unrecorded sites within the project area: a lithic scatter (PA-06-44) and an area with shell midden.

Archaeological Sites in Project Area

Two prehistoric archaeological sites have been recorded within a ¼-mile of the project area. These sites, along with the documented sites on the Indian Valley campus, suggest intensive use of the Arroyo San Jose watershed during prehistory. CA-MRN-471 is near the project area and contains archaeological deposits indicative of a habitation site. Thomas Jackson excavated CA-MRN-471, also known as San Jose Village, in the early 1970s, uncovering evidence of four semi-subterranean structures; *Olivella*, clam disc and steatite beads; *Haliotis* ornaments; bone tools, such as awls and scapula "saws"; numerous projectile points (e.g., "arrowheads"); mortars and pestles; stone pipes; and grooved stones, probably used as net sinkers. Radiocarbon dates obtained from charcoal recovered during Jackson's (1974) excavation indicates San Jose Village was occupied from approximately A.D. 1350. Approximately ¼-mile northwest of the project area is CA-MRN-488, a linear distribution of chert and obsidian debitage and tools.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

For the purposes of this Draft EIR, development of the project site would present a significant cultural resources impact if the project would:

- Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5;
- Cause a substantial adverse change in the significance of a archaeological resource pursuant to Section 15064.5; or
- Disturb any human remains, including those interred outside of formal cemeteries.

LESS-THAN-SIGNIFICANT IMPACTS

The project would not have any impacts on historic resources (structures greater than 50 years in age).

POTENTIALLY SIGNIFICANT IMPACTS

The proposed project may have potentially significant impacts on archaeological deposits and human remains. Possible impacts and recommended mitigation measures are discussed below.

Impact CULTURAL-1: Ground-disturbing activities associated with the proposed project have the potential to affect prehistoric archaeological deposits that have been identified on the Indian Valley campus. (PS)

The campus contains three documented prehistoric archaeological sites: C-113, C-114, and PA-06-44. Additionally, two undocumented archaeological sites, consisting of midden in the vicinity of the reported locations of C-113 and C-114 and a midden deposit on the main campus, were identified during recent field reviews. The exact boundaries of archaeological sites in the Indian Valley campus project area have not been determined.

Construction of parking lots, walkways, and landscaping has disturbed archaeological deposits on the Indian Valley campus. These deposits, however, may retain sufficient integrity to qualify as historical or archaeological resources as defined in CEQA Sections 21084 and 21083.2(g). Project ground-disturbing activities, including but not limited to landscape improvements, creek improvements, construction of a geothermal field and Main Building Complex, and upgrading of pathways, would be necessary to achieve project objectives. These ground-disturbing activities have the potential to disturb or destroy prehistoric archaeological deposits, which would result in a substantial adverse change in the deposits' significance. As described in CEQA Guidelines Section 15064.5(b), a substantial adverse change in the significance of a historical resource occurs when the characteristics that convey the resource's historical significance and justify its eligibility for or inclusion in the California Register are materially impaired. Material impairment may result from physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings (CCR Title 14, Chapter 3, Section 15064.5(b)(1)). Implementation of Mitigation Measure CULTURAL-1 would ensure that impacts on archaeological deposits that qualify as historical resources or unique archaeological resources under CEQA would be reduced to less-than-significant levels.

> *Mitigation Measure CULTURAL-1: Once specific development plans are finalized a qualified archaeologist shall review such plans and prepare a Treatment Plan (Plan) that provides specific treatments for areas where ground disturbance would occur on campus. The Plan shall take into account locations where archaeological deposits have been identified on campus relative to where ground-disturbing activities would occur. The Plan shall outline the appropriate courses of action, which may include, but are not necessarily limited to, preconstruction archaeological testing—necessary to determine the presence/absence of archaeological deposits and to evaluate whether such deposits qualify as historical or unique archaeological resources—and monitoring of ground-disturbing activities. The Plan shall identify the appropriate courses of action should archaeological deposits be identified during preconstruction archaeological testing or during project implementation.*

Archaeological deposits identified during preconstruction archaeological testing or project implementation shall be evaluated to determine if they qualify as historical resources or unique archaeological resources as defined in CEQA. If archaeological deposits are determined to be historical resources or unique archaeological resources, and adverse effects on such resources are anticipated, mitigation of project impacts on the resource shall occur. Mitigation may include, but is not limited to, thorough recording on Department of Parks and Recreation form 523 records (DPR 523), data recovery excavation, and public outreach.

If preconstruction archaeological testing is to occur at or within the immediate vicinity of a prehistoric archaeological site, a qualified cultural resources consultant approved by the Federated Indians of Graton Rancheria shall be retained to monitor the excavations to ensure Native American artifacts, skeletal remains, and cremated remains are treated appropriately and that appropriate regulatory procedures for the treatment of human remains are followed. (LTS)

Impact CULTURAL-2: Ground-disturbing activities associated with the proposed project have the potential to affect previously unidentified historic and prehistoric archaeological deposits on the Indian Valley campus. (PS)

Significant historic-period archaeological deposits have not been identified on the Indian Valley campus.[4] Given the historical use of the project area, however, historic-period archaeological deposits may exist on campus. The 1873 map of Marin County shows the ranch headquarters of Gumesindo Pacheco, son of Don Ignacio Pacheco, possibly at the current location of the Indian Valley campus, and there is a possibility that subsurface deposits associated with his ranch may exist on campus. Such deposits may include, but are not limited to, wood, stone, walls and other structural remains; debris-filled wells or privies; and deposits of wood, glass, ceramics, metal, and other refuse. Additionally, the project area may contain prehistoric archaeological sites not identified by previous studies. Implementation of Mitigation Measure CULTURAL-2 would ensure that impacts on previously unidentified archaeological deposits would be reduced to less-than-significant levels.

Mitigation Measure CULTURAL-2: If historic or prehistoric archaeological deposits are encountered during preconstruction testing (in areas identified by the Treatment Plan—see Mitigation Measure CULTURAL-1),

[4] Peak and Associates, Inc. identified historical or modern deposits within the reported boundary of C-114, consisting of a small concrete footing, a metal wire embedded in two bay trees, a concrete water trough, concrete fragments, and the remains of a small water tank. None of these deposits appear eligible for listing in the California Register of Historical Resources, although further study would be necessary to verify this.

a qualified archaeologist shall evaluate such deposits to determine if they qualify as historical or unique archaeological resources as defined in CEQA Sections 21084.1 and 21083.2(g). If such deposits qualify as neither an historical nor a unique archaeological resource (i.e., they are not significant), no further protection of the deposits is necessary. If the deposits are determined to be significant, project effects on such deposits shall be avoided or impacts must be mitigated. Mitigation may include, but is not limited to, thorough recording on Department of Parks and Recreation form 523 records (DPR 523), data recovery excavation, and public outreach.

If archaeological deposits are encountered during project implementation, all work within 25 feet of the discovery shall be redirected and a qualified archaeologist contacted (if an archaeological monitor is not present) to assess the finds and make recommendations. Project personnel shall not collect or move any archaeological materials. It is recommended that adverse effects on such deposits be avoided by project activities. If such deposits cannot be avoided, they shall be evaluated to determine if they qualify as historical or unique archaeological resources. If the deposits are not significant, avoidance is not necessary. If the deposits are significant, they shall be avoided or adverse effects must be mitigated. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the archaeological materials discovered. The report shall be submitted to the Director of Modernization and the Northwest Information Center. (LTS)

Impact CULTURAL-3: Ground-disturbing activities associated with the proposed project have the potential to affect human remains on the Indian Valley campus. (PS)

Archaeological excavations by former College of Marin professor John McBeath on the Indian Valley campus have yielded human remains. The remains are believed to have been recovered in the general vicinity of Parking Lot 3. There is a high possibility that additional human remains are present within the project area. Implementation of Mitigation Measure CULTURAL-3 would ensure that impacts on human remains would be reduced to less-than-significant levels.

Mitigation Measure CULTURAL-3: If human remains are encountered during project implementation or preconstruction archaeological testing, work within 25 feet of the discovery shall be redirected and the County Coroner notified immediately. At the same time, an archaeologist shall be contacted (if an archaeologist is not on-site) to assess the situation. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission shall identify a Most Likely Descendant (MLD) to inspect the site and provide

recommendations for the proper treatment of the remains and associated grave goods.

Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations of the MLD. The report shall be submitted to the Director of Modernization and the Northwest Information Center. (LTS)

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4.7 TRANSPORTATION

INTRODUCTION

This section addresses potential transportation impacts related to the proposed adoption of the Bond Spending Implementation Plan for the Indian Valley campus, based on data collected and site visits conducted at the Indian Valley campus from 2005 to 2007. Observations of pedestrian, bicycle, and motor vehicle conditions were made and parking occupancy counts were conducted. The analysis evaluates traffic conditions at three intersections near campus. Potential transportation impacts resulting from the project, including those occurring during construction, are described in this section.

ENVIRONMENTAL SETTING

Pathways in the central campus are in good condition; outside the central area, many pathways need repairs.

PEDESTRIAN CIRCULATION

Figure 4.7-1 shows the existing circulation network at the Indian Valley campus. Extensive minor and major pedestrian pathways exist throughout the campus. Pathways in the central campus are in good condition; outside the central area, many pathways need repairs. Recreational visitors currently take advantage of the informal trail system on the District's property. This system includes fire roads and hiking trails (see Figure 4.7-1). These unpaved hiking and biking trails connect with outlying areas such as lands owned by the Marin County Open Space District.

BICYCLE CIRCULATION

Bicycling is a primary mode of transport for many college campuses, although the dispersed living patterns of College of Marin students limit widespread bicycling for transportation to and from the Indian Valley campus. Figure 4.7-2 shows existing and planned bicycle routes that provide access to the Indian Valley campus. As shown in Figure 4.7-2, the campus is well-served by existing bicycle lanes/shoulders[1] on Ignacio Boulevard and by proposed bicycle lanes/shoulders along Sunset Parkway and Novato Boulevard.

[1] Bike lanes are distinguished from bicycle shoulders by the following distinctions: Bike lanes are 4 to 6 feet wide with "bike lane" signage and pavement markings. Shoulders are often wider than 6 feet and generally do not include "bike lane" pavement markings.

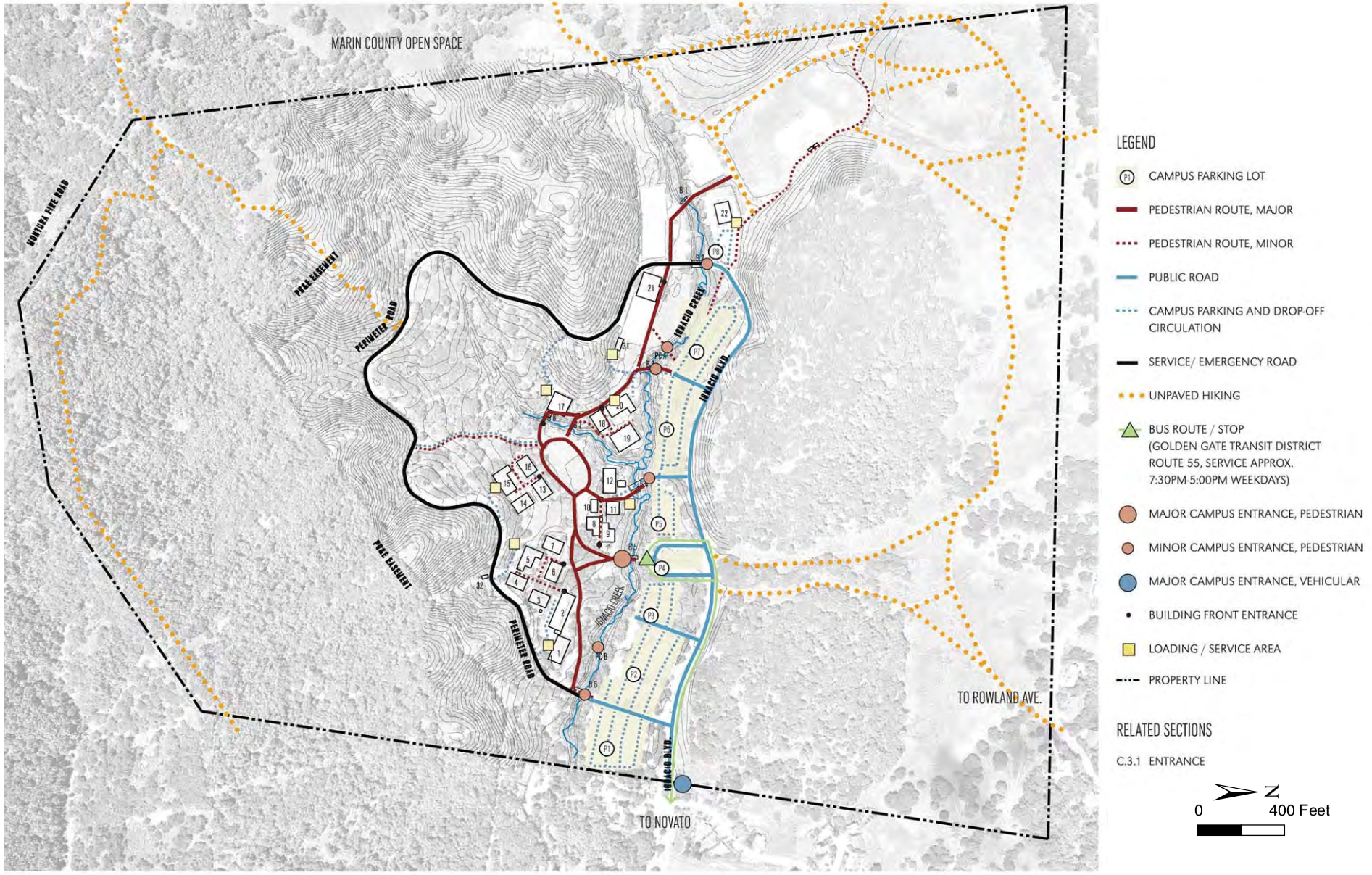
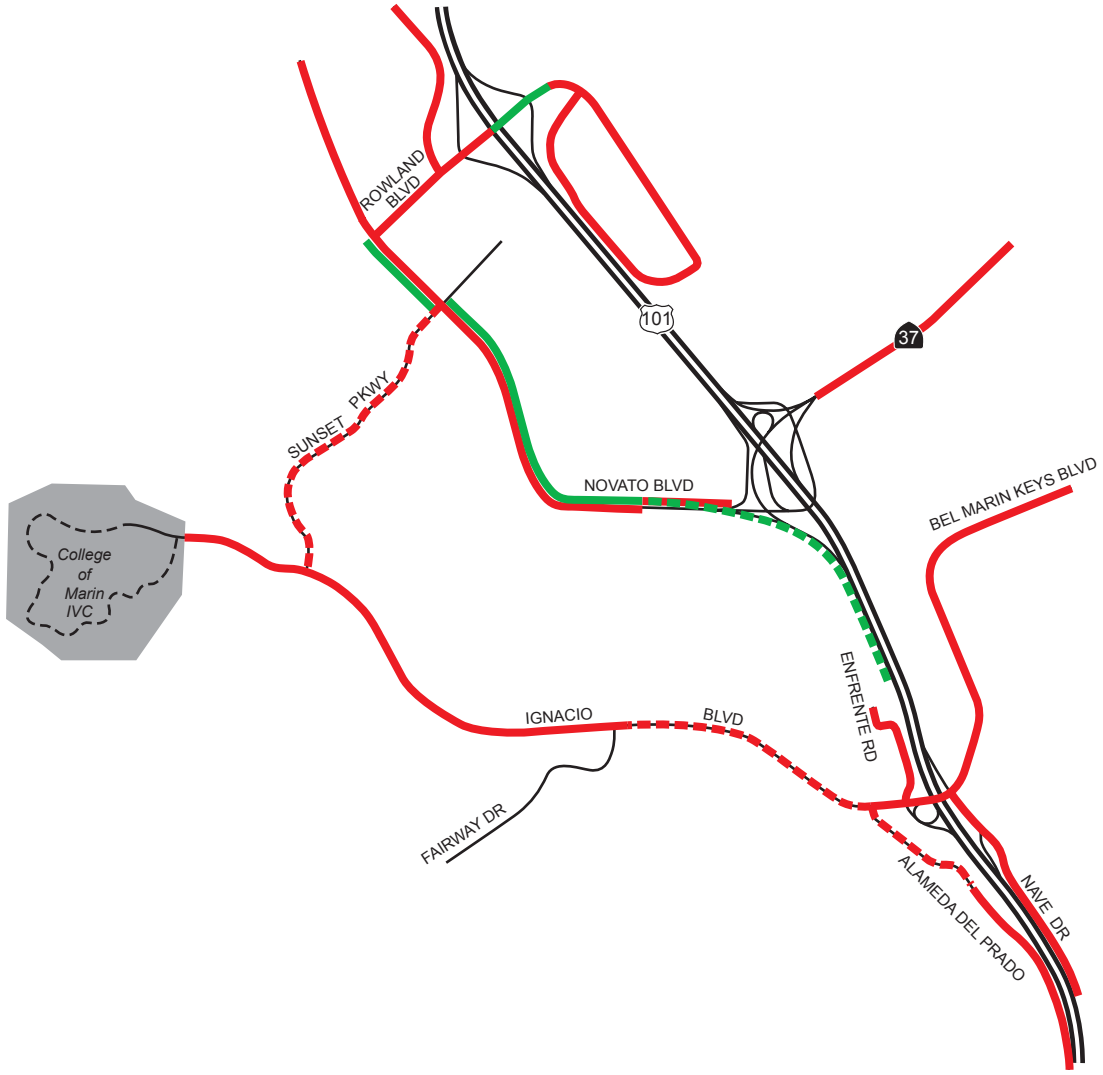


Figure 4.7-1

SOURCE:Steinberg Architects, 2006

EXISTING CIRCULATION NETWORK INDIAN VALLEY CAMPUS



LEGEND:

- Existing Bike Path
- Proposed Bike Path
- Existing Bike Lanes/Shoulders
- Proposed Bike Lanes/Shoulders

N

Not to scale

Figure 4.7-2

EXISTING AND PLANNED BICYCLE ROUTES
INDIAN VALLEY CAMPUS

SOURCE: Fehr and Peers, 2007

MOTOR VEHICLE CIRCULATION

Project Site Location

The Indian Valley campus is located at the western terminus of Ignacio Boulevard, a four-lane roadway that connects the campus to the U.S. Highway 101 corridor. Within the campus property, Ignacio Boulevard transitions from a four-lane to a two-lane roadway. The roadway provides access to the eight campus parking lots.

Study Intersections and Level of Service

Traffic operations at intersections are typically described in terms of "Level of Service." Level of service is a qualitative measure of the effect of several factors on traffic operating conditions, including speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort, and convenience. It is generally measured quantitatively in terms of vehicular delay and described using a scale that ranges from Level of Service (LOS) A to F, with LOS A representing essentially free-flow conditions and LOS F indicating over-capacity conditions with substantial congestion and delay.

The analysis of study intersections was conducted using methods described by the Transportation Research Board (TRB) in the 2000 Highway Capacity Manual (HCM) (TRB, 2000). For intersections, level of service is based on "control delay." Control delay is the delay directly associated with the traffic control device (i.e., a stop sign or a traffic signal) and specifically includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. These delay estimates are considered meaningful indicators of driver discomfort and frustration, fuel consumption, and lost travel time. Tables 4.7-1 and 4.7-2 present the relationship between level of service and control delay for signalized and unsignalized intersections, respectively.

This analysis evaluates traffic conditions at three intersections near campus. At each study intersection, AM and PM peak period traffic counts were conducted and the peak hour level of service for each intersection was calculated. Figure 4.7-3 shows the location of the three study intersections, which adjoin the Indian Valley campus:

1. Ignacio Boulevard / Sunset Parkway
2. Ignacio Boulevard / Enfrente Road / U.S. Highway 101 Southbound Ramp
3. Novato Boulevard / Sunset Parkway

Table 4.7-3 shows the existing level of service at each study intersection. As shown, these intersections generally operate acceptably, although the Ignacio Boulevard / Sunset Parkway intersection operates unacceptably during the AM peak hour. The morning delay at this stop-controlled intersection is primarily attributed to trips generated by the drop-offs at San Jose Middle School adjacent

Table 4.7-1 Signalized Intersection Level of Service (LOS) Criteria

LOS	Average Control Delay (seconds/vehicle)	Description
A	< 10.0	Operations with very slight delay, with no approach phase fully utilized.
B	10.1 – 20.0	Operations with slight delay and an occasional approach phase is fully utilized.
C	20.1 - 35.0	Operations with average delay. Individual cycle failures begin to appear.
D	35.1 – 55.0	Operations with tolerable delay. Many vehicles stop and individual cycle failures are noticeable.
E	55.1 - 80.0	Operations with high delay, up to several signal cycles. Long queues form upstream of intersection.
F	> 80.0	Operation with excessive and unacceptable delays. Volumes vary widely depending on downstream queue conditions.

Source: Transportation Research Board, Highway Capacity Manual, Special Report 209, 2000.

Table 4.7-2 Stop-Controlled Intersection Level of Service (LOS) Criteria

LOS	Average Control Delay (seconds/vehicle)	Description
A	< 10.0	Minimal delay for stop-controlled approaches.
B	10.1 – 15.0	Very light congestion; short delays.
C	15.1 – 25.0	Light congestion; average delays.
D	25.1 – 35.0	Significant congestion on critical approaches, but intersection is functional. Moderate to lengthy delays.
E	35.1 – 50.0	Severe congestion with some longstanding queues on critical approaches. Extremely lengthy delays.
F	> 50.0	Extreme congestion, with very high delays and lengthy queues unacceptable to most drivers.

Source: Transportation Research Board, Highway Capacity Manual, Special Report 209, 2000.

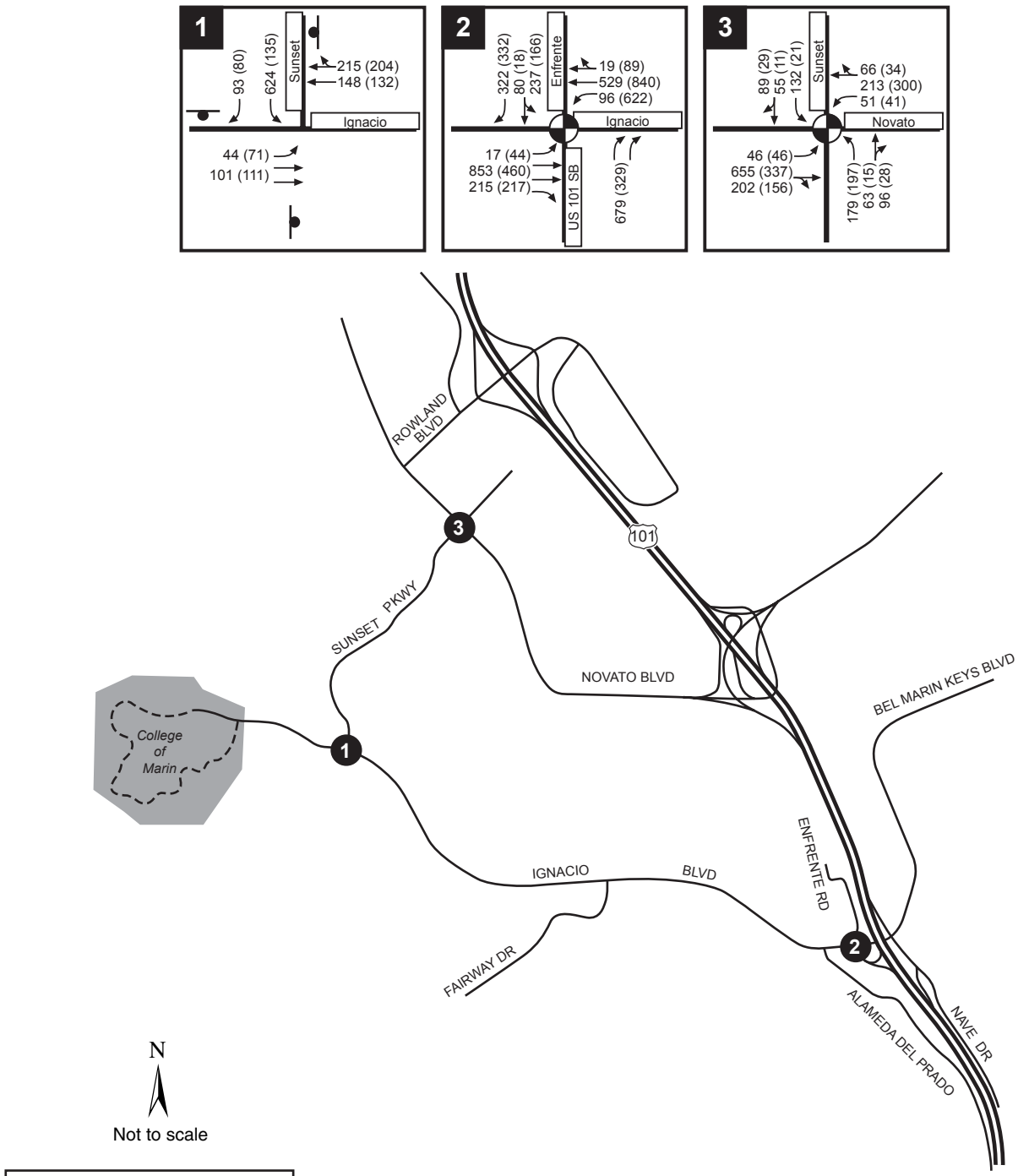


Figure 4.7-3

STUDY INTERSECTIONS AND PEAK HOUR TRAFFIC VOLUMES
INDIAN VALLEY CAMPUS

SOURCE: Fehr and Peers, 2007

Table 4.7-3 Intersection Level of Service – Existing Conditions

Intersection	Traffic Control	AM Peak Hour LOS (Delay/Vehicle)[a]	PM Peak Hour LOS (Delay/Vehicle)[a]
1. Ignacio Boulevard / Sunset Parkway	All-way Stop	F (>50)	A (9.9)
2. Ignacio Boulevard / Enfrente Road / U.S. Highway 101 SB Ramp	Signalized	B (19.1)	C (25.9)
3. South Novato Boulevard / Sunset Parkway	Signalized	C (21.1)	B (17.3)

[a] Average control delay is reported. Average delay measured in seconds per vehicle.
Source: Fehr & Peers, 2007.

to this intersection and traffic exiting Sunset Parkway to travel east on Ignacio Boulevard towards U.S. Highway 101. The intersection of Ignacio Boulevard / Enfrente Road / U.S. Highway 101 Southbound Ramp is part of a system of signals including the northbound ramps, Alameda del Prado and Nave Drive. The system operates at LOS D.

Motor Vehicle Parking

The Indian Valley campus includes a total of approximately 900 parking spaces. Parking occupancy data at the Indian Valley campus were derived from 48-hour traffic volume machine counts that were conducted for traffic entering and exiting the campus on Ignacio Boulevard on Tuesday, October 18, and Wednesday, October 19, 2005. The number of occupied parking spaces was extrapolated for specific time periods. Data are presented for the morning (9:00 AM), mid-afternoon (2:00 PM) and evening (6:00 PM) periods. Results are displayed in Table 4.7-4.

The campus has excess parking capacity.

Observations conducted on Wednesday, September 21, 2005 found that parking occupancy is generally spread across Lots 2 through 7 during daytime hours, with a slightly higher concentration of occupied spaces near the main turnaround area and near the pool, while occupancy of Lot 8 increased during evening hours. Lot 1 was found to be virtually unoccupied during all hours.

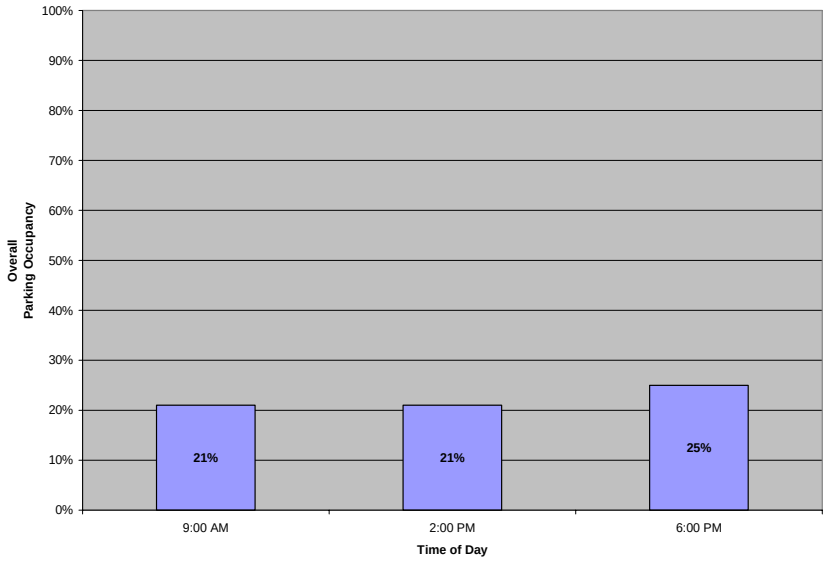
As shown in Figure 4.7-4, based on data collected on Tuesday, October 18, 2005, the peak parking occupancy is 21 percent during the 9:00 AM and 2:00 PM periods, while the peak occupancy increases to 25 percent at 6:00 PM.

The Indian Valley campus has excess parking capacity, indicating that a substantial reduction in parking supply would not result in a shortage in parking.

Table 4.7-4 Parking Occupancy at Indian Valley Campus

Date	Total Spaces	9:00 AM Occupied	2:00 PM Occupied	6:00 PM Occupied
Tuesday, October 18, 2005	900	188	187	227
Wednesday, October 19, 2005	900	176	192	155

Figure 4.7-4 Percent Occupied Parking Spaces at Indian Valley Campus: Tuesday, October 18, 2005



This creates an opportunity to focus redevelopment within existing parking lot areas, which would provide the added benefit of reducing walking distances on campus and creating a denser campus core.

PUBLIC TRANSIT

Transit does not play a large role in accommodating local trips within Marin County. Key factors limiting greater use of transit include dispersed land use patterns, the prevalence of free or inexpensive parking, and long headways between buses.

As shown on Table 4.7-5, the Indian Valley campus is currently served by one bus route operated by the Golden Gate Transit District. Headways between buses are 60 minutes. This bus route serves a bus stop located within a drop-off

Table 4.7-5 Golden Gate Transit Services: Indian Valley Campus

Route	Frequency	Type	Notes
55	Weekdays only 7:00 AM to 8:00 PM Every 60 minutes	Marin County Local Route	Bel Marin Keys to Indian Valley Campus and Downtown Novato

Note: College of Marin (Kentfield or Indian Valley campus) is a time point on all schedules.
Source: Fehr & Peers, 2005.

area located adjacent to Parking Lot 4. Figure 4.7-1 shows the path of bus travel along Ignacio Boulevard and the location of the campus bus stop.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The project would have a significant transportation impact if it would:

- Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access;
- Result in inadequate parking capacity; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

The *Novato General Plan* establishes level of service standards for use in evaluating the impacts of proposed development projects, making improvements to the roadway system, and determining appropriate traffic impact fees (City of Novato, 1996). According to the *Novato General Plan*, the City's level of service standards are as follows:

- At intersections with signals or all-way stop signs, maintain LOS D or better operations.
- At intersections with stop signs on side streets only, maintain LOS E or better operations for controlled movements.

According to the *Novato General Plan*, mitigation measures that reduce side street delay, such as traffic signals, all-way stops, and/or center two-way left-turn lanes, will be considered only when LOS F conditions are projected for side street traffic. In addition, the volume of traffic should also be considered when evaluating the severity of side street traffic operations.

Therefore, for purposes of this analysis, a project impact on a signalized intersection is considered significant if:

- The proposed project causes an intersection operating at acceptable level of service under existing or future (without project) conditions to deteriorate to unacceptable level of service during the AM or PM peak hour;
- The proposed project exacerbates unacceptable level of service at an intersection under existing conditions by increasing the average delay by five or more seconds per vehicle during the AM or PM peak hour, or the proposed project causes an intersection operating at unacceptable level of service under existing conditions to deteriorate one letter grade during the AM or PM peak hour; or
- The proposed project contributes traffic to an intersection expected to experience a cumulatively significant impact (i.e., future traffic volumes expected to cause unacceptable operations at a study intersection during the AM or PM peak hour) and the addition of project traffic would increase the forecasted average delay by five or more seconds.

For unsignalized intersections, a project impact is considered significant if:

- Any of the criteria for signalized intersections were met, and the expected AM or PM peak hour traffic volumes at the intersection are expected to meet the peak hour volume traffic signal warrant criteria contained in the *Manual on Uniform Traffic Control Devices*, 2003 Edition.

LESS-THAN-SIGNIFICANT IMPACTS

Increased Motor Vehicle Traffic

Enrollment increases occurring with the project would generate new motor vehicle trips (i.e, additional students traveling to and from campus). Based upon the forecasted enrollment increase provided by the College, impacts resulting from additional motor vehicle traffic were evaluated.

Vehicle Trip Generation. In order to forecast the amount of traffic that the project would generate, national and local data on trip generation rates for junior

colleges were reviewed. National data were derived from the Institute of Transportation Engineers (ITE) *Trip Generation* (7th Edition, 2003). Local data were derived from traffic counts conducted by Fehr & Peers at Napa Valley College, which has a similar level of automobile usage as College of Marin. (Although daily vehicle counts for the Indian Valley campus are available as well, other uses on the Indian Valley campus, such as the charter high school, distort the trip generation rate. Therefore, the Indian Valley data were not used to derive a trip generation rate for this study).

Table 4.7-6 provides a comparison of the national and local trip generation rates for junior colleges.

Table 4.7-6 Comparison of Trip Generation Rates

Data Source	Trip Rates (per student)
National Data (ITE)[a]	
AM Peak Hour	0.12 trip
PM Peak Hour	0.12 trip
Daily	1.20 trips
Local Data (Fehr & Peers)[b]	
AM Peak Hour	0.15 trip
PM Peak Hour	0.12 trip
Daily	2.50 trips

[a] National data derived from Institute of Transportation Engineers (ITE) rate for "junior/community college" (land use 540).
[b] Local data derived from counts conducted by Fehr & Peers in March 2004 at Napa Valley College campus in Napa, California.
Source: Fehr & Peers, 2007.

Since the local trip generation rate is likely more consistent with the suburban characteristics of College of Marin, the higher rate (from Napa Valley College) was used to forecast vehicle trip generation resulting from the project. Table 4.7-7 shows the trip generation forecast, based on the anticipated enrollment increase of 192 students at the Indian Valley campus by 2013. As shown, the project would generate 29 trips during the AM peak hour, 23 trips during the PM peak hour, and 480 daily trips.

Trip Distribution. In order to evaluate the likely impact of additional vehicle traffic on study intersections, project trips were distributed to primary transportation routes to and from the Indian Valley campus. Figure 4.7-5 shows the distribution of project trips and the assignment of those trips to each of the three study intersections.

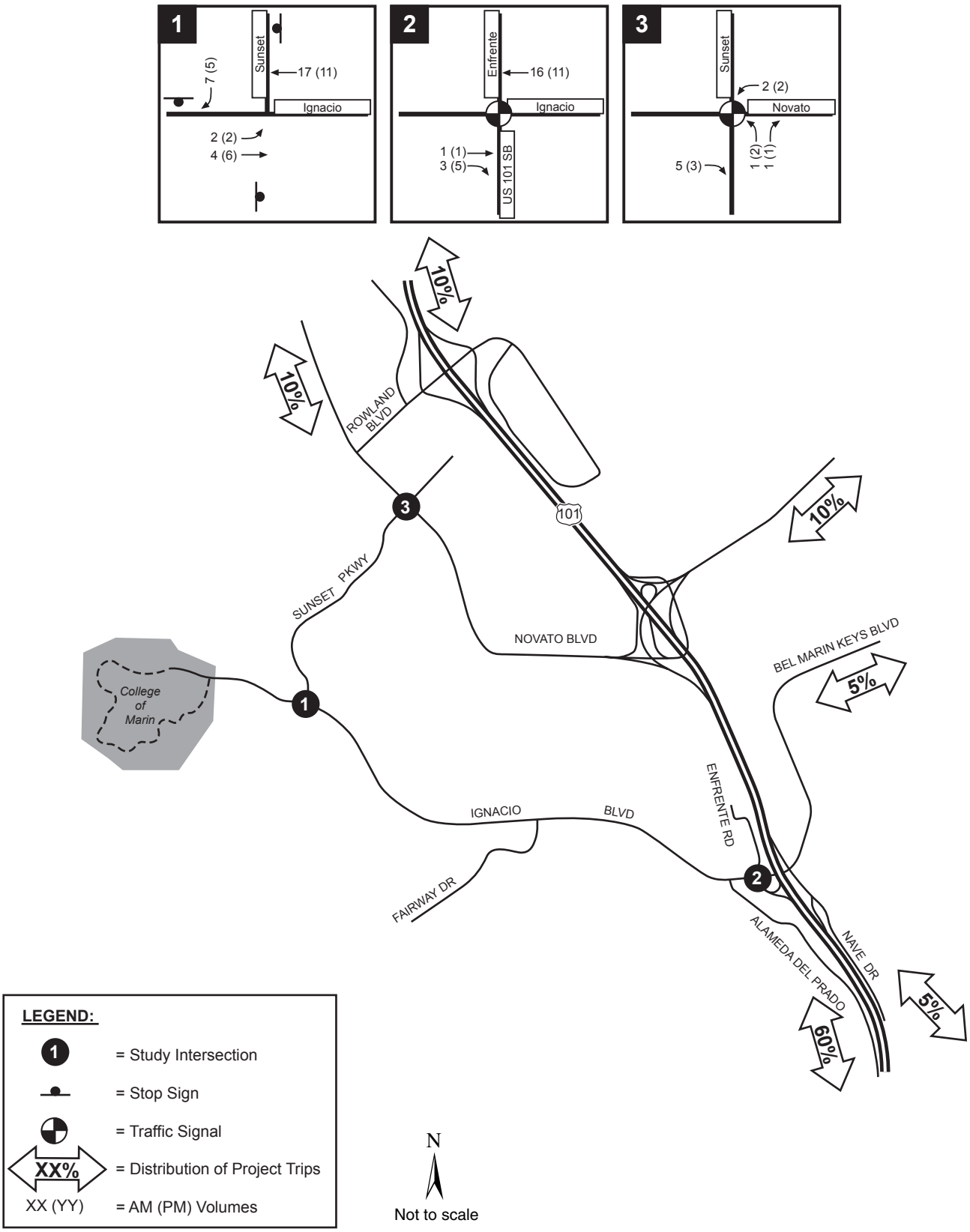


Figure 4.7-5

PROJECT TRIP DISTRIBUTION (MOTOR VEHICLES): INDIAN VALLEY CAMPUS

SOURCE: Fehr and Peers, 2007

Table 4.7-7 Vehicle Trip Generation – Indian Valley Campus

Enrollment Growth (Year 2013)	Time Period	Vehicle Trips Generated by Project
+192 students	AM Peak Hour	29 trips
	PM Peak Hour	23 trips
	Daily	480 trips

Source: Fehr & Peers, 2007.

Existing Plus Project Conditions. Table 4.7-8 shows the existing level of service at each of three study intersections near the Indian Valley campus, and the resulting level of service with the addition of project trips ("Existing Plus Project" conditions). As shown, level of service would be virtually unaffected by the addition of project trips. Level of service would remain at an acceptable level at the intersections of Sunset Parkway / South Novato Boulevard and Ignacio Boulevard/ Enfrente Road / U.S. Highway 101 Southbound Ramp.

Table 4.7-8 Intersection Level of Service (LOS) – Existing Plus Project Conditions

		Peak Hour LOS (Delay/Vehicle)[a]			
		Existing Conditions		Existing Plus Project Conditions	
Intersection	Traffic Control	AM	PM	AM	PM
1. Ignacio Boulevard / Sunset Parkway	All-way Stop	F (80.5)	A (9.9)	F (81.4)	A (10.0)
2. Ignacio Boulevard / Enfrente Road / U.S. Highway 101 SB Ramp	Signalized	B (19.1)	C (25.9)	B (19.1)	C (25.9)
3. South Novato Boulevard / Sunset Parkway	Signalized	C (21.1)	B (17.3)	C (21.3)	B (17.4)

[a] Average control delay is reported. Average delay measured in seconds per vehicle.
Source: Fehr & Peers, 2007.

Level of service at the Ignacio Boulevard/Sunset Parkway intersection would also be unaffected, although this intersection would continue to operate at LOS F during the AM peak hour. This delay is primarily attributable to heavy traffic volumes making the southbound left-turn movement from Sunset Parkway to

Ignacio Boulevard eastbound. The addition of college traffic would cause the average delay to increase by less than one second. Therefore, impacts on "Existing Plus Project" conditions would be less than significant.

Future (Year 2013) Conditions. Buildout of the project would occur by the year 2013. In order to evaluate likely traffic conditions at buildout, a forecast of background traffic growth for the year 2013 was prepared. Typically, traffic studies in Novato use the City's *2002 Citywide Traffic Model Update* to forecast future year conditions. However, since the City's model data were not available for each of the three study intersections, and since the City's model assumes a longer time horizon (approximately 20 years), the City's model data were not used for this analysis.

For the purposes of this analysis, an 8-percent increase in background traffic growth was assumed. This represents a growth rate of one percent per year from 2005 to 2013. Using this forecast, an analysis of year 2013 (without project) traffic conditions was conducted. Figure 4.7-6 shows the 2013 (without project) peak hour traffic volumes at each study intersection. Project trips (as shown on Figure 4.7-5) were then added to the 2013 traffic volumes in order evaluate year 2013 (with project) conditions.

Table 4.7-9 provides a comparison of year 2013 conditions with and without the project at each of the three study intersections. As shown, the level of service would be virtually unaffected by the addition of project trips. The level of service would remain at an acceptable level at the intersections of Sunset Parkway/ South Novato Boulevard and Ignacio Boulevard/ Enfrente Road / U.S. Highway 101 Southbound Ramp.

Level of service at the Ignacio Boulevard/Sunset Parkway intersection would also be unaffected, although this intersection would continue to operate at LOS F (with or without the project) during the AM peak hour. This delay is primarily attributable to heavy traffic volumes making the southbound left-turn movement from Sunset Parkway to Ignacio Boulevard eastbound. The addition of college traffic would cause the average delay to increase by less than one second. Therefore, project impacts to year 2013 traffic conditions would be less than significant.

Based upon the analysis described above, the project would not cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system.

Congestion Management Program. The Transportation Authority of Marin (TAM) is a 12-member board comprised of representatives from the Marin County Board of Supervisors and the City or Town Council of each local government in Marin County. Formerly known as the Marin County Congestion Management Agency, TAM is required to prepare, update, and monitor a Congestion Management Program (CMP) that does the following:

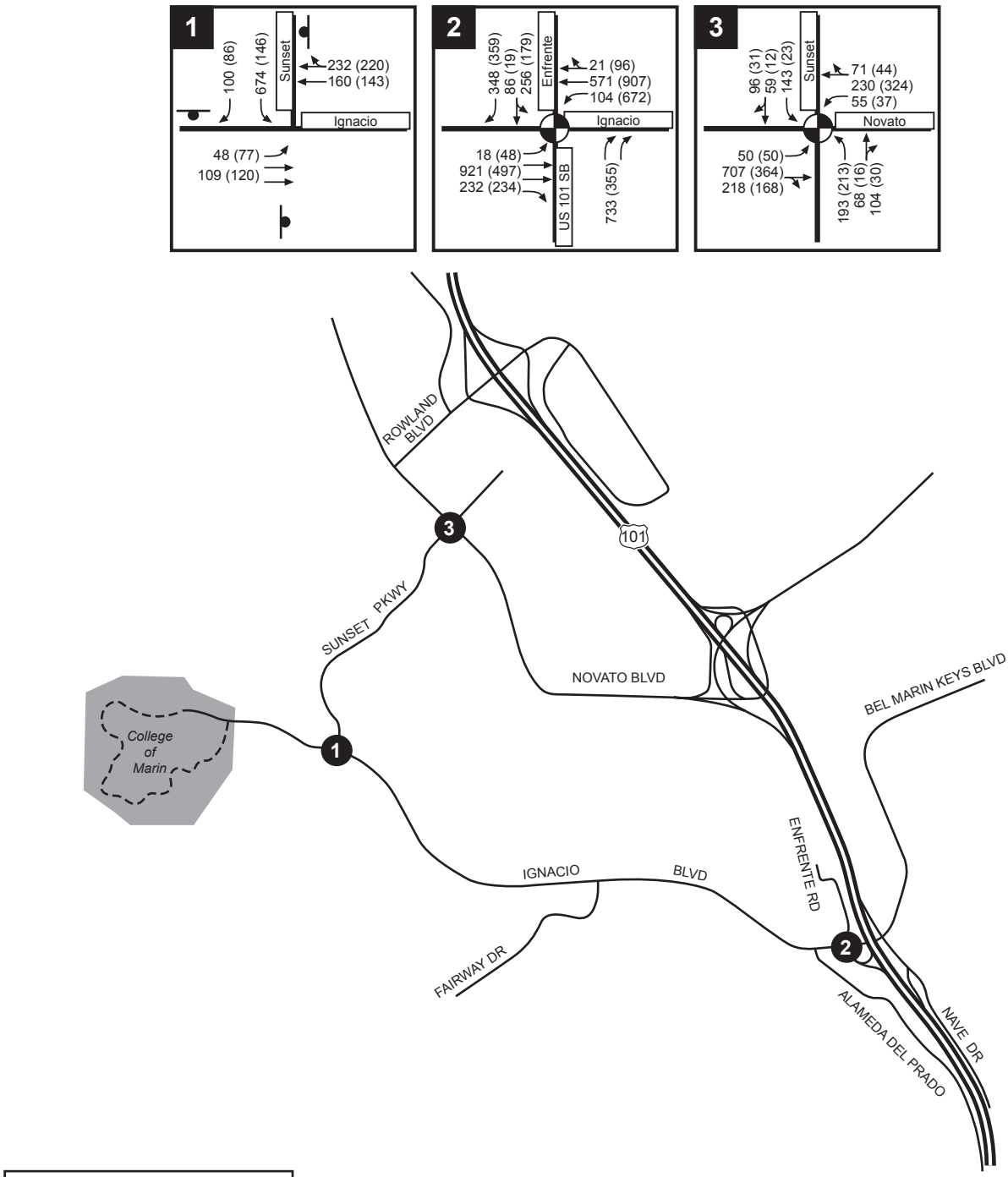


Figure 4.7-6

YEAR 2013 (WITHOUT PROJECT) PEAK HOUR TRAFFIC VOLUMES: INDIAN VALLEY CAMPUS

SOURCE: Fehr and Peers, 2007

Table 4.7-9 Intersection Level of Service (LOS) – Year 2013 Conditions

Intersection	Traffic Control	Peak Hour LOS (Delay/Vehicle)[a]			
		Year 2013 Without Project		Year 2013 With Project	
		AM	PM	AM	PM
1. Ignacio Boulevard / Sunset Parkway	All-way Stop	F (91.3)	A (9.9)	F (92.2)	A (10.0)
2. Ignacio Boulevard / Enfrente Road / U.S. Highway 101 SB Ramp	Signalized	B (19.4)	C (26.7)	B (19.3)	C (26.7)
3. South Novato Boulevard / Sunset Parkway	Signalized	C (23.6)	B (17.4)	C (23.9)	B (17.6)

[a] Average control delay is reported. Average delay measured in seconds per vehicle.
Source: Fehr & Peers, 2007.

- Identifies a network of transportation facilities, and design level of service standards for highways and roadways, and monitors congestion levels periodically.
- Establishes performance measures to evaluate current and future multi-modal system performance for the movement of people and goods.
- Identifies and encourages alternatives to the single-occupant vehicle through the use of Transportation Demand Management (TDM) techniques.
- Develops a process to determine the impacts of local development decisions on the regional transportation network, facilitating integration of decisions about land development, transportation investment, and air quality.
- Develops a computer travel model and database to be used for estimating future transportation needs and impacts.
- Develops and updates a seven-year capital improvement program to promote the goals of the CMP.

The *2005 Marin County Congestion Management Program* was adopted in September 2005. The following routes near the Indian Valley campus are part of the designated CMP network:

- Novato Boulevard and South Novato Boulevard
- Rowland Boulevard
- Bel Marin Keys Boulevard
- U.S. Highway 101

Based on the analysis of traffic operations at Novato Boulevard/Sunset Parkway and Ignacio Boulevard/Enfrente Road/U.S. Highway 101 Southbound Ramp, impacts on CMP facilities near the Indian Valley campus would be less than significant. Furthermore, since the project would generate fewer than 30 trips during both the AM and PM peak hours, impacts on U.S. Highway 101 are not likely to be significant. Therefore, the project would not exceed a level of service standard established by TAM.

Conclusion. For the reasons discussed above, impacts resulting from increased motor vehicle traffic generated by the project would be less than significant.

Air Traffic

The Indian Valley campus is not located near a major airport and the project would have no impact on air traffic patterns.

Emergency Access

Figure 3-7 shows the planned vehicle circulation system at the Indian Valley campus with the project. As shown, service and fire truck access is provided by the perimeter loop road and several shorter routes through the campus core. The modernization of Pomo 1 and 2 would include a widened existing pathway to the north of the buildings to accommodate fire access vehicles as requested in preliminary plan review with the Novato Fire Protection District (NFPD) in 2007. The proposed new campus building within Parking Lot 2 would be easily accessible from adjoining parking aisles.

In addition, pedestrian pathways would be upgraded to meet Americans with Disabilities Act (ADA) requirements. Figure 3-6 shows the existing and proposed pedestrian circulation system at the Indian Valley campus.

Impacts on emergency access would be less than significant with implementation of Mitigation Measure SERVICES-2, which requires final site plans to be coordinated with the Novato Fire Protection District and Marin Community College Police Department to ensure adequate emergency access. (See further discussion in Section 4.10, Public Services, of this EIR.)

Reduced Parking Capacity

Landscape improvements are proposed for Parking Lots 1, 2, and 3, the existing parking entry area, and the main campus entry. Also, the eastern portion of Parking Lot 1 is proposed to be converted to a landscape area with stormwater detention and bioswale features and native plantings to provide a buffer for adjacent residential neighbors. Parking Lots 2 and 3 would have new tree plantings and stormwater improvements to enhance the landscape.

As a result of these improvements, and the planned new building in Parking Lot 2, the project would result in removal of approximately 325 parking spaces.

Following the reduction in parking supply, approximately 575 parking spaces would remain on the Indian Valley campus.

Peak parking demand under existing conditions is approximately 227 parking spaces. Since enrollment would increase by approximately 19 percent by 2013, it is reasonable to assume a proportionate increase in parking demand. Based on this methodology, peak parking demand in 2013, with the project, would increase to approximately 270 parking spaces. In order to efficiently accommodate this peak demand, provision of 297 parking spaces would be recommended to provide a 10-percent vacancy rate (thus allowing for efficient movements as motorists arrive on campus and search for available spaces).

Since the recommended provision of parking spaces to meet demand in the year 2013 is 297 spaces, and since a total of approximately 575 parking spaces would be provided, the parking supply would be adequate to meet demand. The reduction in parking supply would not result in a shortage of parking on campus. Project impacts on parking would be less than significant.

No significant impacts related to pedestrian circulation would occur. A pedestrian circulation plan is shown in Figure 3-6, showing both accessible (i.e., ADA-compliant) and non-accessible pedestrian routes.

POTENTIALLY SIGNIFICANT IMPACTS

Based on the significance criteria identified above, the Bond Spending Implementation Plan would have the following potentially significant transportation impacts.

Impact TRANSPORTATION-1: Ongoing campus construction would affect vehicle, bicycle, and pedestrian circulation within the Indian Valley campus and may create unsafe conditions. (PS)

Development of the project would occur over a period of years, resulting in ongoing construction on the campus. If not properly planned and monitored, ongoing construction may result in hazardous conditions for vehicle, pedestrian, and bicycle travel on campus.

Development of a Construction Management Plan would address the characteristics of construction-related traffic associated with development. Such plans identify construction phasing as well as the level and type of construction-related traffic.

> *Mitigation Measure TRANSPORTATION-1: The District shall develop a Construction Management Plan prior to commencement of any construction activities. The Construction Management Plan shall include:*

(a) Location of construction staging and a description of the level and type of construction-related traffic;

(b) Recommendations for comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak hours; lane closure procedures; signs, cones, and other warning devices for drivers; and designation of construction access routes;

(c) Description of the maximum number of construction employees during any single phase of project construction, and a forecast of the number of AM and PM peak hour trips to be generated by those employees;

(d) Provision of dedicated parking for all construction employees, site visitors, and inspectors;

(e) Provisions to remove construction-related debris; and

(f) Designation of pedestrian and bicycle facilities around the construction and staging areas.

The combination of the above elements in a Construction Management Plan would reduce this impact to a less-than-significant level. (LTS)

Impact TRANSPORTATION-2: Potential conflicts between bus circulation and vehicle access to parking spaces may result from the proposed routing of buses to serve the main campus and the new Main Building Complex. (PS)

The project includes a proposed change in the routing of buses serving the Indian Valley campus. Buses currently circulate through a turnaround within Parking Lot 4 (P4) to serve the campus bus stop. Since there are few parking spaces in this area and a wide roadway that circulates through this area in a one-way direction, buses have few impediments to travel when entering or existing this location. However, as shown below in Figure 4.7-7, this area would be redesigned and a new campus bus stop would be provided to serve the new "Main Building Complex. Potential conflicts would result between buses and motor vehicles entering and exiting parking spaces (especially when motorists are backing up out of parking spaces adjacent to the bus route) and at locations where the bus route intersects parking lot drive aisles.

Other aspects of the project would not substantially increase any hazards related to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Mitigation Measure TRANSPORTATION-2: The project shall provide a bus circulation route that would not force buses to use parking aisles to reach the proposed new campus bus stop unless such a route is approved by the Marin County Transit District and Golden Gate Transit

Figure 4.7-7 Proposed On-Campus Bus Routes

District. The Marin Community College District shall coordinate with the Marin County Transit District and Golden Gate Transit to develop an acceptable route and bus stop location prior to construction of the new Main Building Complex. (LTS)

Impact TRANSPORTATION-3: Bicycle circulation routes and bicycle parking locations within the Indian Valley campus are not yet defined as part of the project, and thus conflicts with policies to encourage alternative transportation could result. (PS)

Students and faculty travel on transportation facilities within the City of Novato to reach the Indian Valley campus. The *Novato General Plan* includes several key objectives aimed at promoting alternative transportation (City of Novato, 1996):

- Novato General Plan Objective TR-5 encourages reduced dependence on the automobile.
- Novato General Plan Objective TR-6 calls for infrastructure improvements that will make it easier and safer for people to travel by bicycle and on foot.

The project does contain some measures that address college-related bicycle circulation, such as bicycle parking facilities, changing rooms, and showers. However, the project has not addressed bicycle circulation between the edge of campus and campus buildings. Due to the large number of disabled students, bicycle circulation in the inner campus is not recommended.

Adoption of a bicycle circulation plan as part of the project would mitigate this impact. Figure 4.7-8 shows a conceptual version of a potential bicycle plan for

Figure 4.7-8

SOURCE: Fehr & Peers, 2007

CONCEPTUAL BICYCLE PLAN FOR INDIAN VALLEY CAMPUS

the Indian Valley campus. Bicycle parking should be placed in visible locations adjacent to buildings (to reduce the likelihood of theft). In addition, the construction of a new building creates an opportunity to provide shower and locker facilities for bicyclists.

Mitigation Measure TRANSPORTATION-3: The District shall adopt a campus bicycle plan for the Indian Valley campus that shows existing and planned bicycle paths, lanes, and routes; and the recommended location of bicycle parking and shower facilities. Bicycle parking shall be placed in visible locations adjacent to buildings (to reduce the likelihood of theft). The District may want to restrict bicycle use within the inner campus area.

This plan shall be adopted prior to completion of the new Main Building Complex. (LTS)

Impact TRANSPORTATION-4: Increased motor vehicle traffic generated by the project would contribute to an increase in energy consumption, air pollutants, and vehicle trips in Marin County and could conflict with County policies aimed at supporting alternative transportation and reduced private vehicular use. (LTS)

Many college and university campuses have adopted aggressive Transportation Demand Management (TDM) programs to reduce reliance on automobile travel and encourage other modes of travel. Although impacts resulting from increased motor vehicle traffic generated by the project would be less than significant, establishment of a TDM program at the Indian Valley campus would support campus goals related to sustainability, and address potential energy and air quality impacts resulting from the project. Additionally, Impact ENERGY-1 identifies an impact resulting from increased energy usage due to the increase in automobile trips to and from campus that could potentially be addressed through implementation of a TDM program.

Mitigation Measure TRANSPORTATION-4: The District shall develop and implement a Transportation Demand Management (TDM) program. The TDM program should include some or all of the following provisions:

(a) Establish a transportation kiosk or office on campus to distribute information on traveling to and from campus via multiple travel modes, with an emphasis on alternatives to automobile trips.

(b) Collaborate with the Marin County Transit District and Golden Gate Transit to investigate the provision of subsidized or reduced-cost transit passes for students, faculty, and staff.

(c) Continue to offer internet courses to reduce the need to drive to and from campus.

(d) Explore options for vanpool or shuttle bus service between the Kentfield and Indian Valley campuses.

(e) Encourage carpooling by providing preferential parking and reduced parking fees for carpoolers.

(f) Explore options for encouraging use of neighborhood electric vehicles (NEV) and other low-emission options (including shuttles and/or van-pools), including on-campus maintenance vehicles.

(g) Provide one or more "bicycle stations" on campus, to include shower and locker facilities. (LTS)

REFERENCES

City of Novato, 1996. *Novato General Plan.*

County of Marin, 2001. *Marin County Unincorporated Area Bicycle and Pedestrian Master Plan.*

Fehr & Peers, 2004. *Transportation Impact Study for Napa Valley College Master Plan*.

Institute of Transportation Engineers (ITE), 2003. *Trip Generation* (7th Edition).

Transportation Authority of Marin, 2005. *Marin Congestion Management Program*.

Transportation Research Board (TRB), 2000. *Highway Capacity Manual.*

4.8 AIR QUALITY

INTRODUCTION

This section describes the impacts of the proposed project on air quality. The section was prepared using thresholds of significance recommended by the Bay Area Air Quality Management District. It describes existing air quality, direct and indirect emissions associated with the project, and mitigation measures warranted to reduce or eliminate any identified significant impacts.

ENVIRONMENTAL SETTING

CLIMATE

The Indian Valley campus is located in eastern Marin County, part of the nine-county San Francisco Bay Air Basin. Marin County is bounded on the west by the Pacific Ocean, on the east by San Pablo Bay, on the south by the Golden Gate and on the north by the Petaluma Gap. The prevailing wind directions are northwesterly and southeasterly reflecting the influence of marine air flows through the Golden Gate to the south and the Petaluma Gap to the northwest.

The eastern side of Marin County has warmer weather than the western side because of its distance from the ocean and because the hills that separate eastern Marin from western Marin occasionally block the flow of marine air. Temperatures in Novato are moderated by the cooling effect of the bay in summer and the warming effect of the bay in winter.

Eastern Marin County has a higher potential for air pollution than the rest of the county.

Eastern Marin County has a relatively higher potential for air pollution compared to the rest of Marin County. High air pollution potential means that the sheltering terrain and relatively light winds often limit the atmosphere's ability to transport and dilute pollutants. However, because Marin County does not have many polluting industries and is located on the up-wind edge of the air basin, current air quality is good despite a high climatological pollution potential (BAAQMD, 1999).

AMBIENT AIR QUALITY STANDARDS

Criteria Pollutants

Both the U.S. Environmental Protection Agency and the California Air Resources Board (CARB) have established ambient air quality standards for common pollutants. These ambient air quality standards are levels of contaminants that represent safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover “criteria” pollutants, a term used because the health and other effects of each pollutant are described in

criteria documents. The federal and California State ambient air quality standards are summarized in Table 4.8-1.

The federal and State ambient standards were developed independently with differing purposes and methods, although both processes attempt to avoid health-related effects. As a result, the federal and State standards differ in some cases. In general, the California State standards are more stringent. This is particularly true for ozone and particulate matter (PM_{10} and $PM_{2.5}$)

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Cars and trucks release at least 40 different TACs. The most important, in terms of health risk, are diesel particulate, benzene, formaldehyde, 1,3-butadiene and acetaldehyde.

Public exposure to TACs can result from emissions associated with normal operations, as well as accidental releases. Health effects of TACs can include cancer, birth defects, neurological damage, and death.

AMBIENT AIR QUALITY

The State and federal ambient air quality standards cover a wide variety of pollutants. Only a few of these pollutants are problems in the Bay Area either due to the strength of the emission or the climate of the region. The BAAQMD monitors several pollutants at its monitoring site in San Rafael. Table 4.8-2 summarizes violations of air quality standards in San Rafael for the three-year period from 2004 to 2006. Table 4.8-2 shows that all State and federal ambient air quality standards are met with the exception of the State standard for PM_{10}, for which the standard was exceeded one day in 2004.

GLOBAL WARMING GASES

The greenhouse effect is a natural process by which some of the radiant heat from the sun is captured in the lower atmosphere of the earth. The gases that help capture the heat are called greenhouse gases. While greenhouse gases are not normally considered air pollutants, all of these gases have been identified as forcing the earth's atmosphere and oceans to warm above naturally occurring temperatures. Some greenhouse gases occur naturally in the atmosphere, while others result from human activities. Naturally occurring greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Certain

Table 4.8-1 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standard	State Standard
Ozone	1-Hour	--	0.09 PPM
	8-Hour	0.08 PPM	0.07 PPM
Carbon Monoxide	8-Hour	9.0 PPM	9.0 PPM
	1-Hour	35.0 PPM	20.0 PPM
Nitrogen Dioxide	Annual Average	0.05 PPM	--
	1-Hour	--	0.25 PPM
Sulfur Dioxide	Annual Average	0.03 PPM	--
	24-Hour	0.14 PPM	0.04 PPM
	1-Hour	--	0.25 PPM
PM_{10}	Annual Average	--	20 µg/m^3
	24-Hour	150 µg/m^3	50 µg/m^3
$PM_{2.5}$	Annual	15 µg/m^3	12 µg/m^3
	24-Hour	35 µg/m^3	--
Lead	Calendar Quarter	1.5 µg/m^3	--
	30 Day Average	--	1.5 µg/m^3
Sulfates	24 Hour	--	25 µg/m^3
Hydrogen Sulfide	1-Hour	--	0.03 PPM
Vinyl Chloride	24-Hour	--	0.01 PPM

Notes: PPM = Parts per Million
µg/m^3 = Micrograms per Cubic Meter
Source: CARB, 2007a.

human activities, such as transportation and the burning of fossil fuels, add to the levels of most of these naturally occurring gases.

According to the 2006 California Climate Action Team Report (CCAT, 2006) the following climate change effects are predicted in California over the course of the next century:

- A diminishing Sierra snow pack declining by 70 to 90 percent, threatening the State's water supply.
- Increasing temperatures from 8 to 10.4°F under the higher emission scenarios, leading to a 25- to 35-percent increase in the number of days ozone pollution levels are exceeded in most urban areas.

Table 4.8-2 Summary of Air Quality Data for San Rafael

Pollutant	Standard	Days Exceeding Standard in: 2004	2005	2006
Ozone	Federal 1-Hour	0	0	0
Ozone	State 1-Hour	0	0	0
Ozone	Federal 8-Hour	0	0	0
Carbon Monoxide	State/Federal 8-Hour	0	0	0
Nitrogen Dioxide	State 1-Hour	0	0	0
PM_{10}	Federal 24-Hour	0	0	0
PM_{10}	State 24-Hour	1	0	0

Source: CARB, 2007b.

- Coastal erosion along the length of California, and sea water intrusion into the Delta from a 4- to 33-inch rise in sea level.[1] This would exacerbate flooding in already vulnerable regions.
- Increased vulnerability of forests due to pest infestation and increased temperatures.
- Increased challenges for the state's important agriculture industry from limited water, increasing temperatures, and saltwater intrusion into the Delta.
- Increased electricity demand, particularly in the hot summer months.

SENSITIVE RECEPTORS

"Sensitive receptors" for air pollution include residences, schools, playgrounds, child care centers, retirement and convalescent homes, hospitals, and medical clinics.

The Bay Area Air Quality Management District defines sensitive receptors as facilities where sensitive receptor population groups (children, the elderly, the acutely ill and the chronically ill) are likely to be located. These land uses include residences, schools, playgrounds, child care centers, retirement homes, convalescent homes, hospitals, and medical clinics.

Sensitive receptors near the Indian Valley campus include residences just east of the campus on both sides of Ignacio Boulevard and the San Jose Middle School farther east on the north side of Ignacio Boulevard.

[1] This sea level rise could possibly be higher over a 100-year period, based on recent planning efforts being undertaken in the California Delta region.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The proposed project would have a significant impact related to air quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollution concentrations;
- Create objectionable odors affecting a substantial number of people;
- Exceed the probability of 10 in one million of a maximally exposed individual contracting cancer; or
- Have ground level concentrations of non-carcinogenic TACs that would result in a Hazard Index greater than one for the maximally exposed individual.

The CEQA Guidelines further state that, where available, the significance criteria established by the applicable air district may be used to make these determinations. The document *BAAQMD CEQA Guidelines* provides the following definitions of a significant air quality impact (BAAQMD, 1999):

- A project contributing to carbon monoxide (CO) concentrations exceeding the State Ambient Air Quality Standard of 9 parts per million (ppm) averaged over 8 hours or 20 ppm for 1 hour would be considered to have a significant impact.
- A project that generates criteria air pollutant emissions in excess of the BAAQMD annual or daily thresholds would be considered to have a significant air quality impact. The current thresholds are 15 tons per year or 80 pounds per day for Reactive Organic Gases (ROG), Nitrogen Oxides (NO_x) or PM_{10}. Any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact.
- Any project with the potential to frequently expose members of the public to objectionable odors would be deemed to have a significant impact.
- Any project with the potential to expose sensitive receptors or the general public to substantial levels of TACs would be deemed to have a significant impact.

Despite the establishment of both federal and State standards for $PM_{2.5}$, the BAAQMD has not developed a threshold of significance for this pollutant. For this analysis, $PM_{2.5}$ impacts would be considered significant if project emissions of PM_{10} exceed 80 pounds per day.

The BAAQMD significance threshold for construction dust impacts is based on the appropriateness of construction dust controls. The BAAQMD guidelines provide feasible control measures for construction emissions of PM_{10}. If the appropriate construction controls are implemented, air pollutant emissions for construction activities would be considered less than significant.

LESS-THAN-SIGNIFICANT IMPACTS

Increased Carbon Monoxide Concentrations

Project traffic would add to carbon monoxide concentrations near streets and intersections providing access to the site. The *BAAQMD CEQA Guidelines* provide that no quantified carbon monoxide air quality analysis is required for projects generating fewer than 2,000 vehicle trips per day, unless warranted by the specific nature of the project or project setting. Project trip generation would be well below 2,000 trips per day and the project is located in an area with relatively low background levels of carbon monoxide. While project traffic would add to existing levels of carbon monoxide along streets providing access to the site, there is no reason to expect that concentrations would be increased such that the State or federal ambient standards would be exceeded. Because new project traffic would not cause any new violations of the 8-hour standards for carbon monoxide, nor contribute substantially to an existing or projected violation, project impacts on local carbon monoxide concentrations are considered to be less than significant.

Increased Regional Emissions of Ozone Precursors and Particulate Matter

Additional vehicle trips to and from the project would result in new air pollutant emissions within the air basin. The emissions from these new trips would not exceed the BAAQMD thresholds of significance. Regional emissions associated with project vehicle use have been calculated using the URBEMIS2002 emission model. The URBEMIS2002 output is included in Appendix F.

The incremental daily emission increase associated with project land uses is identified in Table 4.8-3 for reactive organic gases and oxides of nitrogen (two precursors of ozone) and PM_{10}. The Bay Area Air Quality Management District has established threshold of significance for ozone precursors and PM_{10} of 80 pounds per day. Project emissions shown in Table 4.8-3 would not exceed these thresholds of significance, so the proposed project would have a less-than-significant effect on regional air quality.

Table 4.8-3 Project Regional Emissions in Pounds Per Day

	Reactive Organic Gases	Nitrogen Oxides	PM_{10}
Vehicle Emissions	4.6	3.1	3.8
BAAQMD Significance Threshold	80.0	80.0	80.0

Notes: BAAQMD = Bay Area Air Quality Management District.
Source: Ballanti, 2007.

Potential Conflicts with Regional Air Plans

The proposed project would not conflict with or obstruct implementation of the applicable air quality plan because it would not cause a substantial change in population or employment that would not be accounted for by the regional air quality plans.

Operational Exposure to Toxic Air Contaminants

The project would not exceed the probability of 10 in one million of a maximally exposed individual contracting cancer since the proposed project would not create any new permanent sources of TACs.

Increased Emission of Global Warming Gases

Transportation is the largest source of greenhouse gas emissions in the Bay Area and would be the source of most of the greenhouse gases emitted by the proposed project. Other smaller sources would be power plants and on-site fuel combustion for heating. On-road emissions from vehicles were estimated using the CARB's EMFAC-2007 model emission factors for carbon dioxide ($CO_{2)}$). Vehicle emissions for methane and nitrous oxides were based on published emission factors (BAAAQMD, 2006). The resulting estimated daily emissions of greenhouse gases associated with the project are shown in Table 4.8-4.

To provide a context for project greenhouse gas emissions, it is useful to consider the state of California as a whole. California is a substantial producer of greenhouse gas emissions. Carbon dioxide accounts for approximately 85 percent of total emissions, and methane and nitrous oxide account for almost an additional 14 percent. Each gas contributes to global warming at a different relative rate. Methane has a global warming potential 21 times that of carbon dioxide, while nitrous oxide is 310 times that of the same amount of carbon dioxide.

Table 4.8-4 Project Greenhouse Gas Emissions in Pounds Per Day

	Carbon Dioxide (CO_2)	Nitrous Oxide (N_2O)	Methane (CH_4)
Pounds Per Day	2,442	0.025	0.068
Tons Per Year	445	0.0045	0.0125

Source: Ballanti, 2007.

According to the California Climate Action Team, total carbon dioxide emissions in California from fossil fuel combustion in 2002 were 360 million tons, accounting for approximately 7 percent of U.S. emissions from this source.

There are currently no federal, State, county, or air district thresholds of significance by which the above emissions can be determined to be significant or not. Greenhouse gas impacts of a single project are therefore considered too speculative to allow a determination of significance. While no mitigation measures are required, the energy efficiency aspects of the project described in Section 4.12, Energy and Sustainability, would act to reduce the generation of greenhouse gases.

Objectionable Odors

The project would allow continuation of college uses of the Indian Valley campus. These uses would not generate any significant objectionable odors.

POTENTIALLY SIGNIFICANT IMPACTS

The following section addresses potentially significant impacts related to air quality from adoption of the Bond Spending Implementation Plan, based on the significance criteria stated above.

Impact AIR-1: Construction activities such as clearing, excavation and grading operations, construction vehicle traffic, and wind blowing over exposed earth would generate fugitive particulate matter emissions that would temporarily affect local air quality and possibly affect nearby sensitive receptors. (PS)

Dust-generating construction activities are of primary concern during the summer months when the dry, windy climate in the project area creates a high potential for dust generation when and if underlying soils are exposed. According to the *BAAQMD CEQA Guidelines*, emissions of ozone precursors (ROG and NOx) and carbon monoxide related to construction equipment are already included in the emission inventory that is the basis for regional air quality plans, and thus are not expected to impede attainment or maintenance of ozone and carbon

monoxide standards in the Bay Area. Thus, the main effects of construction activities would be increased dustfall and locally elevated levels of particulate matter downwind of construction activity.

Construction activities would be occurring at numerous locations within the campus intermittently over a six-year period. In general, potential for dust generation is limited, as there would be little earthmoving or excavation occurring, and no demolition would occur. No soil would need to be imported or exported to or from the site. Nevertheless, there may be occasions when construction dust has the potential for creating a nuisance at nearby properties or for students/faculty on campus. This is considered a potentially significant impact, but is normally mitigable.

Mitigation Measure AIR-1a: Consistent with guidance from the Bay Area Air Quality Management District (BAAQMD), the following measures shall be required of construction contracts and specifications:

(1) Water all active construction areas at least twice daily and more often during windy periods; active areas adjacent to existing land uses shall be kept damp at all times, or shall be treated with non-toxic stabilizers or dust palliatives.

(2) Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.

(3) Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.

(4) Sweep daily (preferably with water sweepers) all paved access roads, parking areas, and staging areas at construction sites; water sweepers shall vacuum up excess water to avoid runoff-related impacts on water quality.

(5) Sweep streets daily (preferably with water sweepers) if visible soil material is carried onto adjacent public streets.

Mitigation Measure AIR-1b: All neighboring properties located within 500 feet of a construction site boundary shall be provided with the name and phone number of a designated construction dust control coordinator who can respond to complaints by suspending dust-producing activities or providing additional personnel or equipment for dust control. Residents shall also be provided with the phone number of the BAAQMD. The dust control coordinator shall be available during all times when demolition, grading, or excavation is occurring and shall maintain a log of complaints.

The above measures include all feasible measures for construction emissions identified by the BAAQMD for large sites near sensitive receptors and additional measures beyond those recommended by the

BAAQMD. According to the BAAQMD threshold of significance for construction impacts, implementation of the combination of the above measures would reduce construction impacts of the project to a less-than-significant level. (LTS)

Impact AIR-2: During construction, various diesel-powered vehicles and equipment would be in use. Exposure of sensitive receptors to diesel particulate would represent a potentially significant impact. (PS)

In 1998, CARB identified particulate matter from diesel-fueled engines as a TAC. CARB completed a risk management process that identified potential cancer risks for a range of activities using diesel-fueled engines (CARB, 2000). High-volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (e.g., distribution centers and truck stops) were identified as having the highest associated risk.

Health risks from TACs are a function of both concentration and duration of exposure. Unlike emissions from the above types of sources, construction equipment diesel emissions are temporary, affecting an area for a period of weeks or months at any one location. Additionally, construction-related sources are mobile and transient in nature, and the bulk of the emission generally occurs within the project site at a safe distance from most nearby sensitive receptors.

For the proposed project, the largest exposure of sensitive receptors would occur during construction of the geothermal field. The drilling and trenching equipment used to create the network of underground pipes needed for the geothermal field would place equipment such as portable drills and trenchers near existing homes just east of the campus. During daylight hours, the prevailing winds would carry pollutants towards these homes. Nearby residents could be affected by diesel emissions. While the San Jose Middle School is also located east of the project, it is roughly one-half mile away, a distance that would allow substantial dilution of construction emissions before they would affect the campus.

Mitigation Measure AIR-2: The following measures shall be required of construction contracts and specifications for construction of the geothermal field:

(a) Minimize idling time for diesel equipment and diesel trucks (5 minutes maximum).

(b) Maintain properly tuned equipment.

(c) Use on-road trucks and non-road diesel-powered equipment that are certified as meeting EPA/CARB Tier 2 standards. Such equipment is the cleanest currently available.

The above measure would ensure that health risks due to diesel particulate construction impacts of the project would be reduced to a less-than-significant level. (LTS)

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4.9 NOISE

INTRODUCTION

The major issues evaluated in this section include the compatibility of the proposed Indian Valley campus uses with the noise environment at the project site and the potential for long-term or short-term noise impacts to occur at existing nearby sensitive development as a result of operational activity noise, construction noise, and increased traffic noise on local roadways. This section presents a discussion of the fundamentals of environmental acoustics, regulatory background information, a discussion of the existing noise environment in and around the project site, and an evaluation of the potential for noise impacts resulting from the project.

ENVIRONMENTAL SETTING

FUNDAMENTALS OF ENVIRONMENTAL ACOUSTICS

The objectionable effects of noise can be attributed to either pitch or loudness.

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable effects of noise can be attributed to either pitch or loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher-pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

Several noise metrics, or scales, are used to describe noise. A *decibel (dB)* is a unit of measurement that indicates the relative amplitude of sound pressure. Zero on the decibel scale is based on the lowest sound level that a healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while an increase of 20 decibels results from 100 times the energy, and a 30-decibel increase results from an energy increase of 1,000 times. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 4.9-1.

There are several methods of characterizing sound. The most common method in California is the *A-weighted sound level* or *dBA*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in

Table 4.9-1 Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	The sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 PM and 7 AM.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7 PM to 10 PM and after addition of 10 decibels to sound levels measured in the night between 10 PM and 7 AM.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Illingworth & Rodkin, Inc., 2007.

Table 4.9-2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be used. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the receptor's distance from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night—because excessive noise interferes with the ability to sleep—24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level, CNEL*, is a measure of the cumulative noise exposure in a community, with a 5-dB penalty added to evening (7:00 PM to 10:00 PM) and a 10-dB addition to nocturnal (10:00 PM to 7:00 AM) noise levels. The *Day/Night Average Sound Level, L_{dn},* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

REGULATORY BACKGROUND INFORMATION

The State of California and the City of Novato have each established regulations, plans, and policies designed to limit noise exposure at noise-sensitive land uses. These include (1) the State CEQA Guidelines, Appendix G; and (2) the Noise Element of the *Novato General Plan*. The CEQA Guidelines are addressed under "Environmental Impacts and Mitigation Measures" below.

The Safety and Noise chapter of the *Novato General Plan* contains policies and programs to maintain appropriate noise levels and to protect noise-sensitive land uses such as residences and schools from excessive noise levels. Residential and institutional land uses would be considered "normally acceptable" if exterior noise levels do not exceed 60 dBA L_{dn} and would be considered "conditionally acceptable" if exterior noise levels range from 60 to 75 dBA L_{dn}. In addition, Safety (SF) Program 38.4 specifies that mitigation measures be investigated for projects that would cause a substantial increase in noise in adjacent residential areas or in residential areas affected by traffic generated by the proposed project. Noise increases of more than 3 dBA L_{dn} would be considered significant if the resulting noise level would exceed the "normally acceptable" level and

Table 4.9-2 Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 300 meters		Rock concert
	110 dBA	
Pile driver at 20 meters	100 dBA	
		Night club with live music
	90 dBA	
Large truck pass by at 15 meters		
	80 dBA	Noisy restaurant
		Garbage disposal at 1 meter
Gas lawn mower at 30 meters	70 dBA	Vacuum cleaner at 3 meters
Commercial / urban area daytime		Normal speech at 1 meter
Suburban expressway at 90 meters	60 dBA	
Suburban daytime		Active office environment
	50 dBA	
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
		Quiet bedroom at night
Wilderness area	20 dBA	
	10 dBA	Threshold of human hearing
	0 dBA	

Source: Illingworth & Rodkin, Inc., 2007.

increases of more than 5 dBA L_{dn} would be considered significant if the resulting noise level would remain within the "normally acceptable" range.

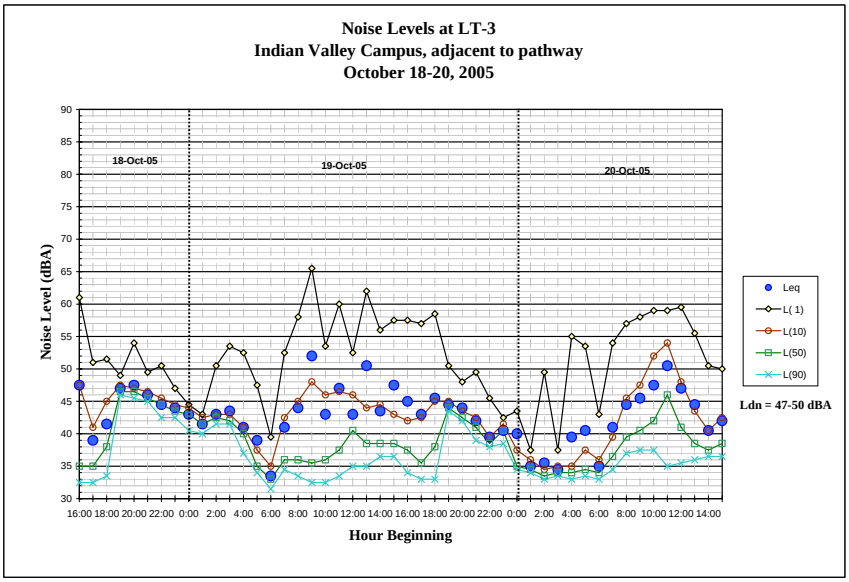
EXISTING NOISE ENVIRONMENT

Ambient noise levels at the Indian Valley campus are low.

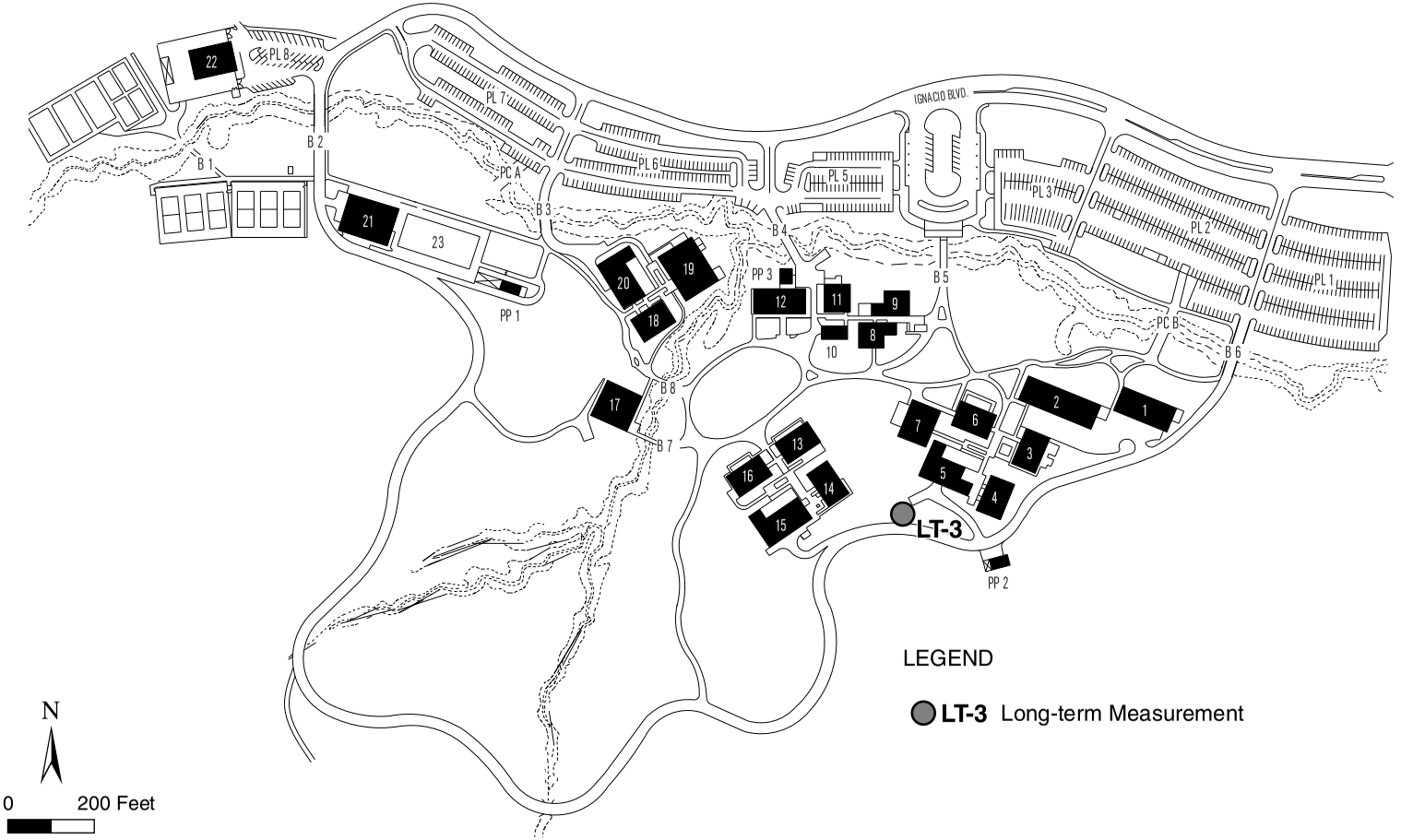
A site visit was conducted in August 2005 and a noise monitoring survey was conducted in October 2005 by staff of Illingworth & Rodkin, Inc. to identify sensitive receivers and quantify existing noise levels at the Indian Valley campus and at the nearest noise-sensitive uses to the project site. Ambient noise levels at the Indian Valley campus are low and the primary noise sources affecting the area are local noise sources such as occasional traffic movements, natural sounds (water, birds, wind), and campus activities. Noise-sensitive residential land uses are interspersed in areas surrounding the site, with the nearest residences located on the east side of the campus, adjacent to the parking area at the campus entrance.

The noise monitoring survey included one long-term (24-hour) measurement between 4:00 PM on October 18, 2005 and 4:00 PM on October 20, 2005 to characterize the ambient noise environment at and around the Indian Valley campus. Monitoring Station LT-3 was located in the southern portion of the campus as shown in Figure 4.9-2. As shown in Figure 4.9-1, noise levels at this location ranged from 33 to 52 dBA L_{eq} and the calculated L_{dn} level was 47 to 50 dBA. Thus, ambient noise levels at Indian Valley campus are significantly lower than at the Kentfield campus, and noise levels at nearby noise-sensitive receptors would be considered to be normally acceptable by the City of Novato Noise Element.

Figure 4.9-1 Daily Trend in Noise Levels at Monitoring Station LT-3



Source: Illingworth & Rodkin, 2007.



LEGEND

LT-3 Long-term Measurement

N

0 200 Feet

NO. BUILDING NAME

POMO CLUSTER
1 Auto Body & Fender
2 Auto Technology Lab
3 General Classrooms/ Medical Labs/ Offices
4 Machine & Metals Technology
5 Math Lab/ Food Vending
6 General Classrooms/ Labs/ Offices
Geology/Geography/ Chemistry/ Biology
7 General Classrooms/ Labs/ Offices/ Language
ADMINISTRATIVE SERVICES
8 Student Services
9 Administrative Services
10 Associated Students
11 Information Systems Services
12 College Bookstore/ Child Care Center
MIWOK CLUSTER
13 Art Labs/Art Gallery/ General Classrooms
14 Foreign Languages Classes/ Offices
15 Studio Theatre/ Student Lounge/ Deli
16 Digital Village
17 Library/ Eops/ Foreign Language
OHLONE CLUSTER
18 Computer Labs/ Offices/ Court Reporting Labs
19 General Classrooms/ Labs/ Offices
Office Occupations/ Court Reporting
20 Food Vending/ P.E./ Classrooms/ Multi Media
21 Pool/ Shower-locker Building
22 Campus Police/ Corporation Yard
23 Pool
PARKING LOTS
PL 1 Parking Lot 1
PL 2 Parking Lot 2
PL 3 Parking Lot 3
PL 4 Parking Lot 4
PL 5 Parking Lot 5
PL 6 Parking Lot 6
PL 7 Parking Lot 7
PL 8 Parking Lot 8
BRIDGES AND PAVED CULVERTS
B 1 Bridge 1-Pedestrian only
B 2 Bridge 2
B 3 Bridge 3
B 4 Bridge 4
B 5 Bridge 5-Pedestrian only
B 6 Bridge 6
B 7 Bridge 7-Pedestrian only
B 8 Bridge 8-Pedestrian only
PC A Paved Culvert A
PC B Paved Culvert B
POWER PLANTS
PP 1 Power Plant 1
PP 2 Power Plant 2
PP 3 Power Plant 3

Figure 4.9-2

SOURCE:Steinberg Architects, 2006

INDIAN VALLEY CAMPUS NOISE MEASUREMENT LOCATION

A survey of noise generated during test drilling for the proposed geothermal field was conducted in March 2007. These data are presented in the impact discussion below.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

A project's noise effects would be considered significant if the project would result in the following:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels; or
- For a project within the vicinity of a private airstrip, exposure of people residing or working in the project area to excessive noise levels.

LESS-THAN-SIGNIFICANT IMPACTS

Noise and Land Use Compatibility

The City of Novato considers exterior noise levels of 60 dBA L_{dn} or less to be compatible with institutional land uses. Existing ambient noise levels at the Indian Valley campus are low, and with the project noise-sensitive areas throughout the campus vicinity would meet the City of Novato noise and land use criteria. The project would therefore have a less-than-significant impact in relation to land use/noise compatibility standards.

Exposure to Excessive Ground-Borne Vibration

The project does not propose any permanent sources of ground-borne vibration and no construction methods that generate substantial vibration, such as pile-driving, are anticipated. Exposure to ground-borne vibration would therefore be a less-than-significant impact.

Project-Generated Traffic Noise Increases

Based on traffic volumes provided for the project's traffic study, traffic noise levels would increase by less that 1 dBA L_{dn} as a result of project traffic. Transportation-related increases of more than 3 dBA L_{dn} would be significant if the resulting noise level would exceed the "normally acceptable" level, and increases of more than 5 dBA L_{dn} would be considered significant if the resulting noise level would remain within the "normally acceptable" range. Traffic noise level increases of less than 1 dBA L_{dn} would not be measurable and would not be considered to be substantial. Project traffic would increase noise levels by less than 1 dBA L_{dn} and would therefore have a less-than-significant impact.

Project-Generated Mechanical Equipment Noise

Due to the open design of the Indian Valley campus, existing mechanical equipment noise is not substantial at nearby noise-sensitive receptors. The proposed geothermal system would reduce the need to use large chillers, and mechanical equipment noise would be anticipated to decrease from existing levels. As part of the Implementation Plan, Power Plants 1, 2, and 3 may be modernized, which would include replacement and relocation of the heating distribution system (campus boilers) and replacement of the high-voltage distribution system. The nearest noise-sensitive receivers are residences to the east of the campus, which would be about 1,000 feet from the closest proposed power plant. At this distance, mechanical noise levels would not be audible above ambient noise levels. This is a less-than-significant impact.

Exposure to Excessive Aircraft Noise Levels

The Indian Valley campus is not within an airport land use plan. Gnoss Field, the nearest airport, is located more than 2 miles northeast of the campus. Aircraft noise would not cause a significant impact, as stated in the Initial Study for the Indian Valley campus Bond Spending Implementation Plan. The Initial Study can be viewed on the College of Marin website.

POTENTIALLY SIGNIFICANT IMPACTS

The following section addresses potentially significant impacts related to noise from adoption of the Implementation Plan, based on the significance criteria stated above.

Impact NOISE-1: Demolition and construction activities would occur over a period of about six years and would generate high noise levels at noise-sensitive uses when construction is located adjacent to these uses. (PS)

The construction activities of the Implementation Plan would generate noise levels that would exceed ambient noise levels at noise-sensitive receptors in the vicinity of the project site and are anticipated to take place over a multi-year

period. The implementation Plan would involve site improvements, such as the establishment of utilities, removal of existing pavement, excavation to create the foundations, building framing, paving, and landscaping. The hauling of any excavated material and construction materials would generate truck trips on local roadways.

Noise impacts from construction activities depend on the various pieces of construction equipment, the timing and length of noise-generating activities, the distance between the noise-generating construction activities and receptors that would be affected by the noise, and shielding. Construction activities for individual projects are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating. Construction noise levels would vary by stage and vary within stages based on the amount of equipment in operation and location where the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 4.9-3 and 4.9-4. Table 4.9-3 shows the average noise level ranges by construction phase and Table 4.9-4 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise is in the range of 80 to 90 dBA at a distance of 50 feet from the source, with the exception of impact pile-driving, which causes noise levels of up to 105 dBA at a distance of 50 feet.

The highest noise levels are normally generated during grading, excavation, and foundation construction. The erection of large buildings from steel structures can also cause considerable noise for fairly long durations and would not typically be shielded by the surrounding structures. Jackhammers typically generate maximum noise levels of 85 dBA at a distance of 50 feet. Large pieces of earth-moving equipment, such as graders, scrapers, and bulldozers, generate maximum noise levels of 85 to 90 dBA at a distance of 50 feet.

A component of the proposed Implementation Plan is the geothermal ground-coupled heat exchange system. Parking Lots 1 and 2 along Ignacio Boulevard are designated as the location for the geothermal heat exchange system. It is currently estimated that this project component would require approximately 200 boreholes in the ground drilled to a depth of approximately 200 feet. The final number and depth of bores would depend on the test bore thermal conductivity evaluation which is currently underway. Noise levels resulting from the drilling operation were measured on March 28, 2007 at the Kentfield campus in Parking Lot 9 west of the existing Science Center, where a test bole was drilled. The drilling is the primary source of noise associated with this construction project. The drilling is accomplished with a truck and trailer based drill rig; a larger diesel-powered compressor runs the drilling equipment. During the drilling of the test hole, the initial drilling generated noise levels about 78 to 79 dBA at 50 feet. The drill bit was basically pushed into the ground. After about 30 minutes, the drill bit encountered more resistance and the noise level increased to about 86 dBA at a distance of about 50 feet. Measurements were made at several different positions around the drill rig with similar results. Additional noise measurements

Table 4.9-3 Typical Ranges of Energy Equivalent Construction Noise Levels at 50 Feet, L_{eq} in dBA

	Office Building, Hotel, Hospital, School, Public Works		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II
Ground Clearing	84	84	84	84
Excavation	89	79	88	78
Foundations	78	78	88	88
Erection	87	75	79	78
Finishing	89	75	84	84

Notes: I = All pertinent equipment present at site.
II = Minimum required equipment present at site.
Source: U.S. Environmental Protection Agency, 1973.

were made at a distance of 100 feet west of the drill rig where the level was reduced to 78 dBA, and at 400 feet to the west of the drill rig where the noise level was reduced to 60 to 62 dBA. The attenuation rate between the 100-foot and the 400-foot positions indicated some excess attenuation that is not uncommon and normally results from ground absorption. This construction activity generates noise levels similar to excavation and other construction activities using large diesel-powered internal combustion engines.

It is anticipated that it would take 2 to 3 hours to drill each hole. There would be up to six drill rigs operating in the project area at one time. The nearest residences are located east of the construction site. Noise levels at these homes resulting from the drilling equipment would typically range from 70 to 80 dBA.

Average noise levels at 100 feet from the more typical construction activity on the campus would range from 70 to 80 dBA during busy construction periods. These noise levels would drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor. Intervening structures would result in lower noise levels, especially for activities below grade. Noise levels would be elevated at nearby residences by 10 to 20 dBA during typical busy construction periods, and by up to 30 dBA during drilling activities. On-campus buildings, outdoor areas, and residences would be intermittently exposed to high levels of noise (75 to 85 dBA) throughout the construction period. The large noise level increases over extended periods of time would be significant.

Table 4.9-4 Construction Equipment 50-Foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[a.b]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[c]	70	Continuous
Compressor (Other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous

Table 4.9-4 *continued*

Equipment Category	L_{max} Level (dBA)[a,b]	Impact/Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

[a] Measured at 50 feet from the construction equipment, with a "slow" (1-second) time constant.
[b] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.
[c] Portable air compressor rated at 75 cubic feet per minute (cfm) or greater and that operates at greater than 50 pounds per square inch (psi).
Source: Illingworth & Rodkin, Inc., 2007.

Construction truck traffic would occur intermittently through the years of construction. The numbers of daily truck trips would vary depending upon the location, place, and intensity of activity.

Mitigation Measure NOISE-1: Construction equipment shall be well-maintained and used judiciously to be as quiet as practical. Contract specifications shall incorporate the following measures, as appropriate:

(a) Limit demolition and construction activities to daytime hours between 7:00 AM and 5:00 PM.

(b) To the extent feasible, route construction truck traffic directly to campus construction sites via Ignacio Boulevard.

(c) Use "quiet" models of air compressors and other stationary noise sources where technology exists.

(d) Equip all internal combustion engine-driven equipment with mufflers that are in good condition and appropriate for the equipment.

(e) Locate all staging areas and stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from residences or noise-sensitive campus areas and buildings.

(f) Prohibit all unnecessary idling of internal combustion engines.

(g) Notify all adjacent residents and campus staff and students of the construction schedule in writing or by posting signs.

(h) Erect a temporary noise control blanket barrier on the geothermal drill rig on the side facing adjacent residences or noise-sensitive campus areas or buildings. Noise control blanket barriers can be rented or purchased and quickly erected.

(i) Designate the Campus Construction Manager as the campus noise disturbance coordinator, responsible for responding to complaints about construction noise. The name and telephone number of the Campus Construction Manager shall be posted at the construction site and made available to adjacent residents prior to the onset of construction.

(j) Provide a written schedule of "noisy" construction activities (e.g., geothermal drilling) to nearby residents.

(k) Prohibit construction worker radios from being audible beyond the limits of the construction site.

The combination of the above measures would reduce construction noise but not to a less-than-significant level. This impact would remain significant and unavoidable during the construction phase. (SU)

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4.10 PUBLIC SERVICES

INTRODUCTION

This section describes the Bond Spending Implementation Plan's potential impacts on fire protection and police services and facilities that serve the Indian Valley campus.

ENVIRONMENTAL SETTING

FIRE PROTECTION SERVICES

Novato Fire Protection District Services

The Novato Fire Protection District provides fire protection and emergency medical services to the campus.

The Novato Fire Protection District (NFPD) provides fire protection and emergency medical services to the Indian Valley campus. The NFPD services include but are not limited to structural fire suppression, wildland fire suppression, response to hazardous materials incidents, urban search and rescue, water rescue, vehicle extrication, technical rescue, and basic life support and advanced life support medical services (NFPD, 2007).

Staffing. The NFPD's daily emergency response staffing is 20 personnel. This staffing includes one battalion chief, four three-person engine companies, one three-person truck company, and two two-person paramedic ambulances (NFPD, 2007).

All NFPD personnel are either emergency medical technicians (EMTs) or paramedics. Most engine companies are staffed with at least one firefighter/ paramedic, and thus have the ability to administer advanced life support (ALS) pre-hospital emergency medical care immediately upon their arrival. The NFPD's two ambulances are staffed with two paramedics each and respond along with an engine company to all medical emergencies (NFPD, 2007).

Calls for Service. Each year, NFPD emergency response personnel respond to more than 4,700 incidents, of which approximately 3,000 (or 64 percent) are medical in nature (NFPD, 2007).

Responding Fire Stations. The closest fire stations to the Indian Valley campus are (1) Station 1, located at 7025 Redwood Boulevard about 1.5 miles northeast of campus; and (2) Station 4, located at 319 Enfrente Road about 1.5 miles southeast of campus.

At Station 1, current staffing consists of one battalion chief, one three-person Type 1 paramedic engine company, one three-person truck company, and one two-person ALS paramedic ambulance. Personnel at Station 1 also staff, as

needed, a Type III engine, a water tender, and a heavy rescue squad. Station 1's primary emergency response zone is the downtown Novato area. Units from this station also respond as second due units to incidents in the remainder of the district (NFPD, 2007).

At Station 4, current staffing consists of one three-person Type 1 paramedic engine company and one two-person ALS paramedic ambulance. Station 4's primary emergency response zone is the area south of Highway 37 and Novato Boulevard. Units from this station also respond as necessary to incidents in the response zones of Station 1 and Station 2 (located at 450 Atherton Avenue) (NFPD, 2007).

Existing On-Site Fire Flow

The College of Marin's engineering consultant obtained fire flow (emergency water flow) testing requirements from the NFPD and conducted fire flow testing in September and October 2005 in coordination with the North Marin Water District (NMWD). The consultant reviewed the fire flow test data with the NMWD and the NFPD fire marshal. No fire flow deficiencies were noted. The assessment did note, however, that many existing structures on the Indian Valley campus do not have fire sprinkler systems (Steinberg Architects, 2006a).

Existing Emergency Access

The existing facilities assessment prepared by the College of Marin's engineering consultant noted that, according to the NFPD fire marshal, NFPD access to existing structures on the Indian Valley campus is poor (Steinberg Architects, 2006a).

Existing Fire Alarm System

The Indian Valley campus uses a Simplex fire alarm system that has been operating since 1974. The fire alarm system is distributed through the campus via cables in underground conduits. The system notifies the NFPD in the event of a fire . However, many buildings have equipment that is non-compliant with current building codes.

POLICE SERVICES

The Marin Community College Police Department provides police services to the Indian Valley campus. The police department is part of a countywide mutual aid agreement and contracts with other agencies as needed to augment services (Lacy, 2007).

Staffing

The Marin Community College Police Department employs seven sworn officers: one chief, one sergeant, and five officers. The department also employs two

part-time sworn officers, along with one non-sworn employee for office duty, one part-time Health and Safety employee, and two (one current) Police Cadets (part-time non-sworn) for parking control and non-hazardous reports. The department is currently short-handed by one officer (Steinberg Architects, 2006c; Lacy, 2007).

The department ensures that one officer is available to cover both the Indian Valley and Kentfield campuses 24 hours a day, seven days a week. The department operates three shifts, providing one sworn officer per shift (Lacy, 2007).

A Marin Community College Police Department office is located in the corporation yard on the Indian Valley campus.

A Marin Community College Police Department office is located in the corporation yard (at Building 22) on the Indian Valley campus. While the department is based on the Kentfield campus (Building TB-1), one officer visits the Indian Valley campus every day. When the officer is not on campus, people needing service on the Indian Valley campus must notify the police administrative office at the Kentfield campus. Assuming there is no traffic, the average travel time between the Kentfield and Indian Valley campuses is 20 minutes. Due to the small size of the department, there are times (during evenings, nights, and weekends) when one or the other of the campuses has no on-site police coverage. Should an emergency arise during these times, Marin County law enforcement agencies may provide mutual aid services. The same would be true if the campus police department needed back-up (Steinberg Architects, 2006c; Lacy, 2007).

Calls for Service

For the three-year period from 2003 to 2005, the Marin Community College Police Department responded to or initiated 50,562 calls for service on the two campuses. Non-sworn police personnel responded to or initiated 16,004 (or 32 percent) of these calls, and sworn personnel responded to or initiated the remaining 34,558 calls (68 percent). Sworn personnel thus responded to or initiated an average of 960 calls per month, 32 calls per day, or 11 calls per shift (Steinberg Architects, 2006c; Lacy, 2007).

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

Appendix G of the CEQA Guidelines provides that a project would have a significant impact on public services if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable

service ratios, response times, or other performance objectives for any of the public services:

- Fire protection;
- Police protection;
- Schools;
- Parks; or
- Other public facilities.

For fire protection/emergency medical and police services, Appendix G further provides that a project would have a significant impact if it would:

- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

LESS-THAN-SIGNIFICANT IMPACTS

Fire Protection and Emergency Medical Services

The project would not create a need for new or altered fire protection/emergency medical facilities or equipment, since enrollment and building area at the Indian Valley campus would not increase substantially.

The Implementation Plan at the Indian Valley campus would be constructed over six years. At completion, the campus is expected to have an enrollment of about 1,180 students, which is about a 19-percent (193-student) increase over the 2006-2007 enrollment of 987 students. The number of faculty and staff (120 people) would not change. Building area at the campus would increase by about 25,000 to 37,000 gross square feet. One new building would be constructed, a new Main Building Complex on the north side of Ignacio Creek, and two buildings would be substantially renovated, Pomo 1 and 2 for the Transportation Technology Complex. Pomo 4 and three existing power plants on the campus would have minor modernization. No buildings are proposed for demolition at this time.

The enrollment and building area increases may create new demand for fire protection/emergency medical services. Project construction may also temporarily increase demand (due to possibilities for fire or injury). These demand increases would not be large enough to create a need for new or altered Novato Fire Protection District (NFPD) facilities or equipment.

Emergency water flow is expected to be adequate for the project. If fire sprinkler and/or fire alarm systems are provided in new and remodeled buildings, the project would improve fire protection on campus (which could reduce demands on NFPD services). Regardless of whether these systems are included,

however, the project is not expected to create a need for new or altered NFPD facilities or equipment.

Police Services

The project would not create a need for new or altered police facilities or equipment, since enrollment and building area at the Indian Valley campus would not increase substantially (see description under "Fire Protection and Emergency Medical Services" above). With development under the Implementation Plan, the police office would remain in its current location in the corporation yard at Building 22.

The enrollment and building area increases may create new demand for police services. Project construction may also temporarily increase demand (due to possibilities for vandalism, etc.). These demand increases would not be large enough to create a need for new or altered Marin Community College Police Department facilities or equipment, however.

In addition, the Implementation Plan contains extensive design guidelines to address landscape lighting and security. The Implementation Plan also contains a design guideline calling for open sight lines, clear circulation, lack of hidden corners, and proper lighting in buildings, along with highly visible security cameras and call-points (Steinberg Architects, 2006). These measures may help to prevent crime and thus may help reduce the need for police services.

POTENTIALLY SIGNIFICANT IMPACTS

The following section addresses potentially significant impacts as related to public services from adoption of the Bond Spending Implementation Plan, based on the significance criteria identified above.

Impact SERVICES-1: The project would increase the number of students and the amount of building area on the Indian Valley campus, thereby increasing exposure of people and structures to wildland fire hazards. (PS)

The Indian Valley campus adjoins undeveloped open space, an area of open grassland and woodland that is subject to elevated fire hazard risk and emergency response constraints. The campus is therefore is susceptible to wildland fire hazards. Existing buildings on the campus have wood shingle roofs and some are not sprinklered or not fully sprinklered. The Bond Spending Implementation Plan would provide new code-compliant equipment and systems on all new and renovated projects, including fire sprinklers and addressable systems compatible with NFPD standards as discussed with the NFPD in project-related schematic design review in 2007. Building renovations proposed as part of the project would provide new fire alarms, monitoring systems, and new sprinklers. The new Main Building Complex would meet current code requirements.

Mitigation Measure SERVICES-1: The Marin Community College District shall:

(a) Comply with applicable laws and regulations, including Urban-Wildland Interface Code of the Novato Fire Protection District, 2005-1 (2005). This includes maintenance of defensible space between structures and other measures as directed by the Novato Fire Protection District.

(b) Coordinate plans for adding a fire alarm/monitoring system with the Novato Fire Protection District.

(c) Work with the Novato Fire Protection District and/or the State Architect to ensure that all new building construction meets current code requirements.

The combination of the above measures would reduce the impact to a less-than-significant level. (LTS)

Impact SERVICES-2: Depending on final site and building designs, the Bond Spending Implementation Plan could continue or worsen existing emergency access problems on the campus. (PS)

The project proposes few changes to the existing vehicle access and circulation patterns on the Indian Valley campus. The Bond Spending Implementation Plan Circulation Plan shows private vehicle access restricted to Ignacio Boulevard and the parking lots, with the perimeter loop road remaining for maintenance, service, and emergency use only. The main drop-off and bus stop would remain at the existing location at Parking Lot 4. Four new fire hydrants would be provided at the new Main Building complex. A total of four fire/maintenance gates would be provided off Ignacio Boulevard and the Perimeter Road. In addition, the modernization of Pomo 1 and 2, the Transportation Technology Complex, would include widening the existing pedestrian path to the north of the buildings for fire vehicle access as requested by NFPD at the schematic design document review in 2007.

In addition, the Implementation Plan contains the following design goals and principles that would assist with emergency evacuation (Steinberg Architects, 2006d):

- Provide campus gateways at key access points.
- Promote a pedestrian-oriented, universally accessible campus.
- Create a network of routes that supports an ease of travel for all levels of mobility and that accommodates the rich mix of students arriving at different times of day.
- Provide clear, consistent, and concise signage at key orientation points.

The Implementation Plan also contains a design guideline to "design all primary pedestrian surfaces to take fire truck load" (Steinberg Architects, 2006d).

As noted under "Environmental Setting" above, NFPD staff have indicated that access to existing structures on the Indian Valley campus is poor. While the Implementation Plan proposes relatively few access and circulation changes, it may offer an opportunity to improve NFPD access to structures.

> *Mitigation Measure SERVICES-2: The Marin Community College District shall coordinate final site and building plans with the Novato Fire Protection District and Marin Community College Police Department to ensure that long-term emergency access to structures and fire hydrants is adequate. (LTS)*

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4.11 PUBLIC UTILITIES

INTRODUCTION

This section describes the Bond Spending Implementation Plan's potential impacts on water, wastewater, and solid waste. Existing providers of these utilities and services for the Indian Valley campus are described. For evaluation of impacts on the storm drainage system, please refer to Section 4.4, Hydrology and Water Quality, of this EIR.

ENVIRONMENTAL SETTING

WATER

The North Marin Water District provides water service to Novato, including the Indian Valley campus.

Water Service in Novato

The North Marin Water District (NMWD) provides water service to Novato, including the Indian Valley campus. About 80 percent of NMWD water comes from the Russian River (supply purchased from the Sonoma County Water Agency), and the remaining 20 percent comes from Stafford Lake in Novato (NMWD, 2007a).

The NMWD Novato service area has a slight current deficit in water, but NMWD expects that additional imported Sonoma County Water Agency supplies and recycled water use would meet projected demand in the future. As of 2005, existing supply in the Novato service area was 12,010 acre-feet per year (afy) and demand was estimated at 12,125 afy. At build-out of the service area in 2030, supply is expected to be 15,694 afy and demand is estimated at 15,444 afy (County of Marin, 2007a).

On-Site Water Facilities

Domestic Water. Two main water lines serve the Indian Valley campus. One line is located under the perimeter road, and the other is located under Ignacio Boulevard (Steinberg Architects, 2006a). There are 16 water meters on the campus, 7 of which are dedicated to irrigation only (NMWD, 2007c).

As part of an existing facilities assessment, the College of Marin's engineering consultant reviewed existing water supply with NMWD staff. The assessment concluded that the NMWD system was strong, with moderate pressure due to nearby NMWD water storage and transmission mains. No water supply deficiencies were noted for the Indian Valley campus (Steinberg Architects, 2006b).

Irrigation. The NMWD also provides irrigation water to the campus. As part of the existing facilities assessment, the Marin Community College District's landscape architects found that only 40 percent of the irrigation system on the campus is functioning (Steinberg Architects, 2006a).

WASTEWATER

Wastewater Collection and Treatment

The Novato Sanitary District provides wastewater service to the Indian Valley campus.

The Novato Sanitary District (NSD) provides wastewater service to the Indian Valley campus. The NSD operates two wastewater treatment plants: the Novato Treatment Plant, which serves the northern two-thirds of Novato, and the Ignacio Treatment Plant, which serves the southern third of the city. Each treatment plant provides primary and secondary treatment plus ammonia removal and filtration. During the summer months, the treated water is recycled and used to irrigate pastures and operate a wildlife pond adjacent to Highway 37. During the winter months, the treated water flows to San Pablo Bay via an outfall pipe (NSD, 2007).

Currently, the Novato Treatment Plant handles 3.60 million gallons per day (mgd), which represents 79 percent of its 4.53-mgd (dry weather) capacity. The Ignacio Treatment Plant handles 1.60 mgd, which also represents 79 percent of its 2.02-mgd (dry weather) capacity. Both plants are expected to reach their capacities by 2025 (County of Marin, 2007a).

On-Site Wastewater Lines

Wastewater lines on the Indian Valley campus consist of a 6-inch main collection line that crosses Ignacio Creek and laterals to individual buildings. The Marin Community College District's engineering consultant conducted an assessment of an 1,800-linear-foot portion of the main collection line in October 2005. The assessment found deficiencies that included sagging in portions of the system, a joint separation, settling of manholes, and root intrusion into several joints. The assessment recommended that the entire system be hydroflushed regularly (at least once a year), the line over the creek be realigned, and root intrusion at all affected joints be removed (Steinberg Architects, 2006c).

SOLID WASTE

Solid Waste Collection and Recycling Services

Novato Disposal provides solid waste collection service to the Novato area, including the Indian Valley campus. Recycling facilities include a recycling center at 7576 Redwood Boulevard that accepts glass, plastic, metal cans, newspaper, cardboard, and mixed household/office paper (Novato Disposal, 2007).

Landfill

Most solid waste from Marin County is disposed at the Redwood Landfill, a permitted Class III disposal site located north of Novato. The landfill is situated on almost 420 acres, of which 222.5 acres are used for disposal and accept waste from residential, commercial, and institutional customers as well as green and wood waste, scrap metal, and inert waste. The landfill expects to add a resource recovery service in the next few years (Jones, 2007).

Based on its currently permitted capacity of 19.1 million cubic yards, the Redwood Landfill has a remaining life of about 17 years.

Current Landfill Capacity. The landfill's currently permitted capacity is 19.1 million cubic yards. Based on its currently permitted capacity, the Redwood Landfill has a remaining site life of about 17 years and its earliest possible closure date is 2024 (Jones, 2007).

Proposed Landfill Expansion Plans. Currently proposed expansion plans estimate that the landfill could extend its site life by as many as 13 years, to 2037, depending on permitted revisions to the rate of fill. Alternatives evaluated in an EIR prepared for the landfill expansion could extend the site life to as late as 2051. Expansion plans that could affect the amount of waste that can be accepted at the landfill include the following:

- Changes to the landfill design, including increasing the landfill's capacity and modifying the landfill's final contours. These changes would increase the total capacity of the landfill to 34.8 million cubic yards, enabling the landfill to accept waste from areas outside of Marin County.
- Changes to waste operations, including changes in the quantity and types of waste received. Currently, the landfill accepts non-hazardous waste, including residential waste, agricultural waste, commercial waste, and construction and demolition wastes. The landfill has requested permits to expand its recycling and composting programs, which would process additional green and wood materials. Additional requests include changes in the facility's sludge processing.
- Changes to the environmental controls at the landfill, including changes to the permitted design of the leachate collection and removal system, along with perimeter levee reconstruction, changes in surface water management, changes in landfill gas management, changes in the landfill cover design, and changes in the approach to remediating an unpermitted waste disposal area on the site.

The landfill expansion plans are currently under environmental review, with local and State permits pending (County of Marin, 2007a).

Acceptance of Asbestos Waste. According to Redwood Landfill staff, as of March 22, 1993, the landfill has accepted all non-friable and less-than-one-percent friable asbestos waste. Redwood Landfill staff note that crushed or friable asbestos waste that cannot be accepted at the Redwood Landfill site can be disposed at other sites that are set up to handle asbestos waste, such as

Altamont Landfill in the East Bay (Steinberg Architects, 2006b), which is located approximately 70 miles from the Indian Valley campus.

Marin County Plans and Requirements

Marin County Integrated Waste Management Plan. The California Integrated Waste Management Act (CIWMA) required all cities and counties to develop Integrated Waste Management Plans to outline how each agency was to meet the 25-percent and 50-percent mandates of waste reduction by the year 2000. In response, Marin County's public agencies, private waste haulers, and facility operators developed Marin County's Integrated Waste Management Plan, which was adopted in April 1998.

The Marin County Integrated Waste Management Plan identifies recycling programs necessary to meet the State's 25-percent and 50-percent recycling mandates and incorporates a Countywide Siting Element (CSE) and Regional Summary Plan (RSE). The County prepared and adopted its CSE in 1995 in accordance with provisions of the California Integrated Waste Management Act. The CSE was developed to document the waste disposal capacity needed to accommodate solid waste generated for disposal by Marin County and its cities and towns for a 15-year period, (i.e., 1995 through 2010). The CSE sets forth goals and policies to guide Marin County's disposal practices. Capacities of solid waste disposal facilities coupled with future annual countywide solid waste disposal estimates are presented to assess the need for expansion of existing facilities and/or siting of new facilities within the next 15 years. In addition, the CSE details criteria and a process for evaluating proposed disposal sites.

In 1996, Marin's cities and towns, along with the County, formed the Marin Hazardous and Solid Waste Joint Powers Authority (JPA). The JPA provides household hazardous waste collection, and recycling and disposal information to ensure Marin's compliance with State recycling mandates and other education for the citizens and businesses of Marin County. The JPA is comprised of the cities and towns of Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Novato, Ross, San Anselmo, San Rafael, Sausalito, and Tiburon, and the County of Marin. In 1997, the California Integrated Waste Management Board (CIWMB) recognized the JPA as a Regional Agency. This Regional Agency status allows the JPA members to report to the State as one political body (instead of 12) as was previously required.

Following the establishment of the JPA, the County in conjunction with the JPA has updated the Integrated Waste Management Plan approximately every five years. In addition, the County and the JPA issued a Regional Integrated Waste Management Plan Report (RIWMP Report) that both updates the Integrated Waste Management Plan and serves as a current planning document summarizing waste management problems facing Marin. The RIWMP Report identifies actions necessary to comply with CIWMA requirements for documenting source reduction and recycling efforts. In addition, the RIWMP

Report assesses solid waste disposal capacity requirements to meet the County's disposal needs through the subsequent 15-year period.

Recycling/Reuse Requirements for Construction and Demolition Debris. To help carry out the state's waste reduction mandates, Marin County has adopted requirements for reduction and recycling of construction and demolition debris. In adopting the regulations (County of Marin, 2007b), the County found that "except in unusual circumstances, it is feasible to divert at least fifty percent of all C&D [construction and demolition] debris from most construction, demolition, and renovation projects."

The regulations require that applicants for construction, demolition, and renovation projects submit a waste management plan (WMP) to the County that estimates the amount (volume or weight) of debris that will be generated, the amounts that can be reused or recycled, and the amount that will be sent to a landfill. The County's Community Development Agency reviews WMPs for feasibility and returns approved WMPs to applicants with construction or demolition permits.

Applicants must then submit documentation, such as receipts or reports that are issued by the vendor, facility, or waste hauler that collected or received each type of material and that show the volume or weight of the material received. To issue these receipts or reports, the vendor, facility, or waste hauler must have a minimum diversion rate of 50 percent as reported to the JPA.

The Community Development Agency may withhold issuance of the final occupancy permit for a project until the agency has approved the project's recycling/reuse documentation. The agency can only approve the documentation if it indicates that at least 50 percent of the construction and demolition debris generated by the project has been diverted. It should be noted that the Marin Community College District, while exempt from local land use controls, will review regulations such as those associated with construction/demolition debris and determine if compliance is feasible.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The project would have a significant impact on water services if it would:

- Require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or

- Require new or expanded entitlements to have sufficient water supplies available to serve the project if existing entitlements and resources are not adequate.

The project would have a significant impact on wastewater services if it would:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

The project would have a significant impact on solid waste disposal services if it would:

- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs; or
- Not comply with federal, State, or local statutes and regulations related to solid waste.

LESS-THAN-SIGNIFICANT IMPACTS

Water Service

The project would not require the NMWD to seek new water entitlements or to pursue additional water supply or storage projects (NMWD, 2007c, 2007d).

Projected Water Demand Increase. The Implementation Plan at the Indian Valley campus would be constructed over six years. At completion, the campus is expected to have an enrollment of about 1,180 students, which is about a 19-percent (193-student) increase over the 2006-2007 enrollment of 987 students. The number of faculty and staff (120 people) would not change. Building area at the campus would increase by about 25,000 to 37,000 gross square feet (gsf). One new building would be constructed, a new Main Building Complex on the north side of Ignacio Creek, and two buildings would be substantially renovated, Pomo 1 and 2 for the Transportation Technology Complex. Pomo 4 and three existing power plants would have minor modernization. No buildings are proposed for demolition at this time. The new Main Building Complex would receive water service (including chilled water) through new trenches.

The enrollment and building area increases would create new demand for water service. Based on the estimated building area increase of 25,000 to 37,000 gsf, the increase in water demand is estimated at 6,340 to 9,389 gallons per day

(gpd), not including irrigation demand (Lucas, 2007). Irrigation would create additional demand for NMWD water, although this demand would not increase substantially over existing conditions since no major new landscaping is proposed at the Indian Valley campus. It is likely that the campus is not currently using all of the water allotted to existing meters and that the remaining allotment could be assigned to the new uses on the site (NMWD, 2007d). However, when the campus was originally constructed the water main was sized for approximately 17 additional campus buildings that were never constructed. The construction of the new Main Building Complex is not expected to require a major expansion of on-site water lines. Nevertheless, the NMWD has requested a variety of water-conserving measures such as those proposed by the Implementation Plan and discussed below.

Implementation Plan Provisions. The Implementation Plan (Steinberg Architects, 2006d) contains provisions for reducing water use, including design guidelines that state as follows: "Reduce water use through careful specification of appliances, fixtures and fittings, i.e. movement detector taps and WC flush controls. Low flow urinals and toilets are preferred. Many water-use strategies and systems can be put in place. In order of good to best, use rainwater for irrigation (good), for toilet flushing (better), for domestic consumption (best). Incorporate leak detection systems."

The Implementation Plan (Steinberg Architects, 2006d) also includes the following design guidelines for irrigation:

- Use the adopted campus standard irrigation equipment.
- Continue to upgrade the irrigation system for water efficiency.
- Monitor water usage and seek future water use reductions.
- Install flow sensors where necessary to take advantage of the system controller's capabilities.
- Extend irrigation in areas where it is needed, especially parking lots.
- Repair damaged lines where necessary.
- Maintain large tree health to reduce watering needs in microclimates.
- Design planting for the microclimate in specific parts of the campus.

Conclusions. The water demand increase associated with the project (6,340 to 9,389 gallons per day) would not be large enough to create a need for new NMWD water entitlements or new or expanded NMWD water supply or storage projects. Implementation Plan design guidelines would assist in controlling and reducing future water demand.

While not necessary as mitigation for impacts on water supply, the Marin Community College District may wish to consider ways of meeting LEED standards for water efficiency in buildings and for greywater and stormwater

reuse. The District has committed to obtaining a minimum of LEED certification on all new projects with the goal of LEED silver on the new and renovated projects at the Indian Valley campus.

Wastewater Service

Since enrollment and building area increases at the Indian Valley campus would be relatively small and existing Novato Sanitary District (NSD) treatment facilities have excess capacity, it is expected that NSD would have sufficient capacity to handle the proposed new development.

Projected Increase in Wastewater Generation. As already described above, the Implementation Plan at the Indian Valley campus would be constructed over six years; at completion, student enrollment is expected to increase by about 19 percent and building area would increase by about 25,000 to 37,000 gross square feet (gsf). The enrollment and building area increases would create new demand for wastewater service. Based on the estimated building area increase of 25,000 to 37,000 gsf, the increase in wastewater generation is estimated at 5,072 to 7,511 gallons per day (gpd) (Lucas, 2007).

Implementation Plan Provisions. The Implementation Plan (Steinberg Architects, 2006d) contains provisions that would help to reduce wastewater, including design guidelines that state as follows: "Reduce water use through careful specification of appliances, fixtures & fittings i.e. movement detector taps and WC flush controls. Low flow urinals and toilets are preferred. Many water-use strategies and systems can be put in place. In order of good to best, use rainwater for irrigation (good), for toilet flushing (better), for domestic consumption (best). Incorporate leak detection systems."

Conclusions. The increase in wastewater generation is not expected to create a need for new or altered wastewater treatment facilities or cause any exceedance of Regional Water Quality Control Board wastewater treatment requirements.

Solid Waste Disposal Services

Impact on Landfill Capacity. The Redwood Sanitary Landfill is expected to have adequate capacity to serve the project.

As already described above, the Implementation Plan at the Indian Valley campus would be constructed over six years; at completion, student enrollment is expected to increase by about 19 percent and buildng area would increase by about 25,000 to 37,000 gross square feet (gsf). The enrollment and building area increases would generate additional solid waste requiring disposal at a landfill, but the waste increase would be relatively small and would not exceed the capacity of the landfill.

The proposed building construction and renovation on the campus would also temporarily generate solid waste. However, the Implementation Plan contains design guidelines stating that construction waste would be recycled, that demolition material would be evaluated for reuse, and that cut and fill on the site would be equalized to reduce soil transport and landfill costs (Steinberg Architects, 2006d).

Conflicts with Statutes and Regulations. The project is not expected to cause any conflicts with federal, State, or local statutes and regulations related to solid waste. The Marin Community College District, while exempt from local land use controls, would review regulations such as Marin County's waste management plan (WMP) and construction debris recycling requirements and determine if compliance is feasible. As described above, the Bond Spending Implementation Plan provides for recycling of more than 50 percent of the anticipated construction waste, meeting Marin County's requirement for a recycling rate of at least 50 percent.

Other Issues. Building renovation and construction may involve handling of hazardous waste, and ongoing activities on the campus may generate hazardous wastes. These issues are addressed in Section 4.5, Hazardous Materials, of this EIR.

POTENTIALLY SIGNIFICANT IMPACTS

Implementation of the project would not result in potentially significant impacts as related to public utilities.

REFERENCES

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4.12 ENERGY AND SUSTAINABILITY

INTRODUCTION

This section of the EIR addresses both energy and sustainability as related to the proposed adoption of the Bond Spending Implementation Plan for the Indian Valley campus. The California Environmental Quality Act (CEQA Guidelines Appendix F) recommends that energy implications of projects be evaluated, with a special emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy. The District's efforts to reduce overall energy usage on the campus are addressed below.

Sustainability is defined in a variety of ways, but one definition is the following:

> *"…sustainability is defined as aligning our built environment and socioeconomic activities with the natural systems that support life. In the long run, sustainability means adapting human activities to the constraints and opportunities of nature. Central to this definition is meeting the needs of both the present and the future." (Marin County, 2005)*

"…combustion of fossils fuels in the transportation sector was the single largest source of California's greenhouse gas emissions in 2002, with the industrial sector as the second largest source, and electricity production from both in-state and out-of-state sources, the third largest …
California Energy Commission, 2005

The draft Marin Countywide Plan that is currently under review addresses a number of sustainability principles. These are addressed below as they may relate to the College of Marin, especially as related to energy use, natural resources, and the environment.

The issue of global warming associated with the emission of greenhouse gas emissions is addressed briefly herein, especially as related to energy consumption. However, greenhouse gas emissions are also briefly addressed in Section 4.9, Air Quality, of this EIR.

ENVIRONMENTAL SETTING

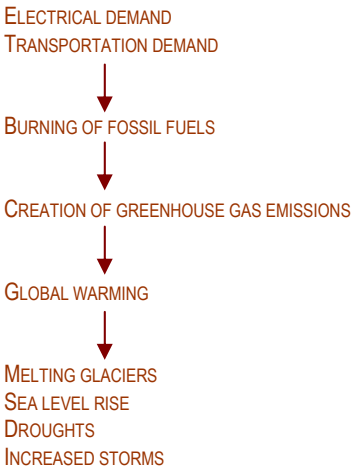
ENERGY DEMAND OVERVIEW

The Indian Valley campus requires energy for a variety of campus operations such as the following:

- Heating and cooling.
- Operation of campus equipment such as computers, laboratory equipment, and other machines.
- Lighting.
- Transportation fuel.

In the State of California, 78.3 percent of the electricity is provided by in-state resources but the majority of the sources are from non-renewable sources such as natural gas and coal. "Renewable" resources (e.g., wind power and solar energy) provide only 10.73 percent of California's electricity (California Energy Commission, 2007) (see Table 4.12-1).

The burning of fossil fuels to meet heating, cooling, and electrical demands is directly connected to the creation of greenhouse gases that contribute to global warming. Global warming concerns have come to the forefront of environmental and other policies at the local, State, and federal levels due to issues such as climate change, sea level rise, increased droughts and wildfires, and other significant changes on a global level.



Pacific Gas & Electric Company (PG&E) is the distributor of electricity and gas locally, and at both College of Marin campuses. While PG&E has embarked on a number of programs to increase the use of renewable resources, their primary sources of energy for electricity are from natural gas (47 percent), hydroelectric (22 percent), nuclear (12 percent), coal (2 percent), and oil (2 percent). Renewable sources of electricity were 15 percent of the total energy sources in 1999 for PG&E (Marin County, 2005), and these included geothermal, biomass, wind, and solar.

In fiscal year, 2005-2006, the Marin Community College District paid $743,900 in electricity-related charges and $66,400 in gas-related charges to PG&E (PG&E, 2007b). Approximately 31 percent of the electrical charges were for the Indian Valley campus and the remaining 69 percent were for the Kentfield campus. For the natural gas charges, only 2.5 percent were related to usage at the Indian Valley campus while the remainder were related to the Kentfield campus.

No renewable energy sources such as solar systems currently exist at either the Kentfield campus or the Indian Valley campus. At one time a study was completed on the feasibility of implementing a solar system for the heating of the pool at the Indian Valley campus, but it was decided at that time that it was not financially feasible (Thompson, 2007).

Building Energy Demand

In the U.S., buildings account for one-third of the total U.S. energy demand and about two-thirds of the electrical demand (U.S. Green Building Council, 2005). This demand is largely met by non-renewable resources. Buildings also account for about 30 percent of greenhouse gas emissions, 30 percent of raw material use, and 30 percent of waste output (U.S. Green Building Council, 2007a).

At the Indian Valley campus, a gas-fired system is used for almost all of the heating of buildings, and electricity is used for lighting and air conditioning. Many of the heating and air conditioning systems are outdated and inefficient. For

Table 4.12-1 California's Major Sources of Energy in 2005

Source of Energy	Percentage of Total for California	Sources of Electricity
Petroleum		
–In State	37.22	
–Alaska and Foreign	62.78	
Electricity		
– In State	78.33	Natural Gas (37.7%); Nuclear (14.5%); Large Hydro (17%); Coal (20%); Renewable (10.7%)
– Imports	21.67	
Natural Gas		
– In State	15.0	
– Canada, Rockies and Southwest	85.0	

Source: California Energy Commission, 2007.

example, as noted in the building assessments, many of the chillers are over 40 years old and in poor condition. Thus, many buildings have been without working air conditioning systems. Many components of mechanical systems such as heating, ventilation, and air conditioning (HVAC) equipment were found to be beyond their service life (Marin Community College District, 2006).

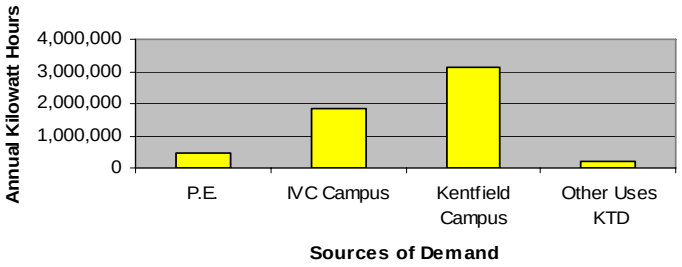
Many of the Indian Valley campus lighting systems were found to not be energy-efficient. Both incandescent and fluorescent fixtures are used, but many of these are outdated.

Energy use for both campuses is shown in Figures 4.12-1 and 4.12-2. As can be seen, the Indian Valley campus has significantly lower energy demands than the Kentfield campus.

Transportation Energy Demand

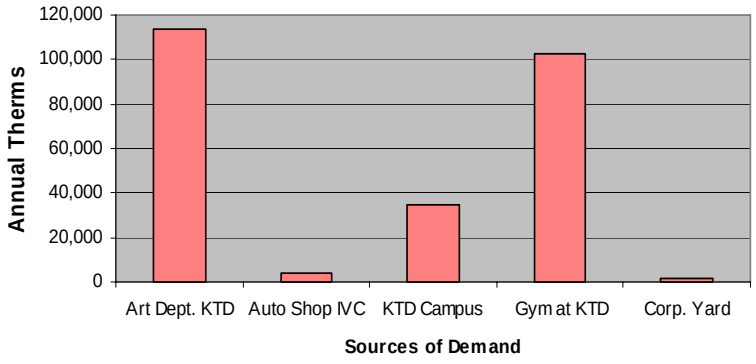
While energy demand is often associated with how buildings are constructed, operated, and maintained, or how machinery is operated, another huge element of energy demand is associated with transportation fuel used by students and faculty/staff coming to and going from the campus. No students or staff reside on the Indian Valley campus and on-campus housing is not required to be provided by community college districts. Therefore, many students commute from great distances and rely on private automobiles, resulting in a significant demand for fuel. The only public transit options available to students, faculty, and staff are buses run by the Golden Gate Transit District and taxi service. Bus service is addressed in Section 4.7, Transportation, of this EIR.

Figure 4.12-1 College of Marin Energy Use (2005-2006) in Annual KWH



Notes: KWH = Kilowatt hours
IVC = Indian Valley campus
KTD = Kentfield campus
Source: PG&E, 2007a.

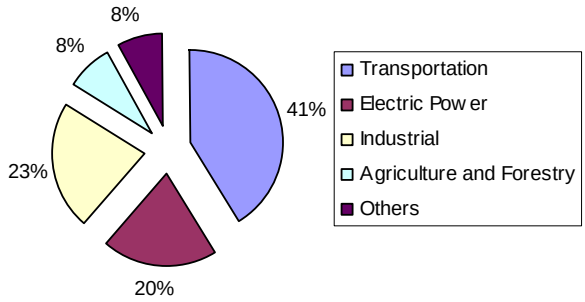
Figure 4.12-2 Natural Gas Usage at College of Marin (2005-2006)



Notes: IVC = Indian Valley campus
KTD = Kentfield campus
Source: PG&E, 2007b.

As mentioned above, the transportation sector accounts for the largest source of greenhouse gas emissions in the State of California due to the combustion of fossil fuels (see Figure 4.12-3).

Figure 4.12-3 Sources of California's Greenhouse Gas Emissions (by End Use Sector)



Source: California Energy Commission, 2005.

ECOLOGICAL FOOTPRINT

The term "ecological footprint" refers to a measure of the use of natural resources against the planet's actual biocapacity. It is expressed as the number of acres of a biologically productive area required to support one person, and can be extrapolated to population clusters, regions, or the entire planet. In Marin County, the average ecological footprint has been calculated to be 27 acres per person. This compares to the average American ecological footprint of 24 acres per person, the average for Italy of 9 acres per person, or the world average of 5.5 acres per person (Marin County, 2005).

To reduce the ecological footprint within Marin County, efforts are underway to increase the use of renewable resources, to provide fuel-efficient transportation choices, and to promote "green" building and business practices. Green building design and construction practices as defined by the U.S. Green Building Council include the following (Southface Energy Institute, 2007):

- Sustainable site planning
- Water efficiency
- Energy efficiency
- Conservation of materials and resources
- Protection of indoor environmental quality

The issues of transportation, use of renewable resources, and green building design are addressed under "Environmental Impacts and Mitigation Measures" below.

RELEVANT MARIN COUNTYWIDE PLAN PROVISIONS

The draft Marin Countywide Plan contains a number of policies related to energy and sustainability that address the following overall goals:

- Decreased energy use;
- Increased renewable resource use; and
- Adoption of green building standards.

Recycling and reuse of resources is especially relevant for the Indian Valley campus, where a number of buildings are proposed for renovation and new buildings would be constructed. Recovering construction and demolition materials has a number of advantages, such as (1) conserving limited space in existing landfills, (2) reducing disposal costs, and (3) reducing environmental effects of extraction, transportation, and processing of new materials.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The project would have a significant energy or sustainability impact if it would:

- Significantly increase energy demand for non-renewable resources during the construction and operation stages of the project;
- Involve building demolition, renovation, or new construction without recycling of waste materials;
- Increase peak period energy demands significantly;
- Result in significant increased transportation energy demands; or
- Limit opportunities for use of renewable energy resources (i.e., increase shading of rooftops or other structures where solar systems may be installed at a future date).

LESS-THAN-SIGNIFICANT IMPACTS

Increased Building Energy Demand for Non-Renewable Resources

One new building at the Indian Valley campus is proposed to include a variety of energy conservation elements and to be designed to achieve at least a Leadership in Energy and Environmental Design (LEED) "silver certification." The District has adopted a resolution that all new buildings will be LEED-certified. The three types of certification are silver, gold, or platinum, with each level representing an increased degree of energy and other conservation measures incorporated into the overall building design. All design and engineering firms hired by the District to work on the Bond projects must have LEED-certified professionals on their staff assigned to the District projects. In addition, the

District is using a LEED-certified commissioning agent for enhanced commissioning of all systems on new projects. This is in keeping with the District-stated mandate to achieve a minimum of LEED certification on all projects, with a goal of LEED silver on the new main projects. LEED certification is a program established by the U.S. Green Building Council and is described as follows:

> *The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. (U.S. Green Building Council, 2007a)*[1]

Overall energy demand at the Indian Valley campus may be reduced simply by the fact that building renovations would make existing buildings more energy-efficient. However, the new Main Building Complex would increase overall energy usage on the campus due to the additional new square footage requiring heating and cooling. It is not possible to compare existing vs. new energy demand because many of the building components at the campus have been non-functional. For example, many of the existing air conditioning systems are outdated and have been operating inefficiently. New buildings would be designed to have efficient systems and to allow a more comfortable environment for students.

Recently, the College commissioned a study, using computer modeling, to compare the energy use of a standard California-energy-code-compliant HVAC system with two high-efficiency LEED certified systems. Title 24 is the California code that requires specific energy conservation measures to be implemented in new construction. The "LEED" systems in the computer modeling included the following components:

- Variable speed chillers
- Enthalpy wheel energy recovery
- Nighttime cold water energy storage
- High-efficiency boilers
- Reduced window area
- Geothermal ground couple heat pump system
- "Cool roof" instead of base model roof

[1] For more information on the LEED program, the reader is referred to the website of the U.S. Green Building Council: http://www.usgbc.org/DisplayPage.aspx?CategoryID=19.

The results of the study showed that energy savings of as great as 68 to 69 percent could be achieved as compared to the energy consumed with Title 24-compliant structures (Alfa Tech Cambridge Group, 2006). When these energy savings are looked at over a 25-year life cycle, financial savings to the College could range from 1.1 to 2.6 million dollars. On an annual basis, savings of over $100,000 per year for the overall campus could result. The energy savings would be greatest for electricity, which is a large component of the campus energy demand.

With the proposed District's emphasis on LEED certification for new buildings and the implementation of a geothermal system to reduce energy demands, the Bond Spending Implementation Plan would not result in wasteful use of non-renewable energy resources during the operational stages of the project. In addition, the "Design Goals, Principles, Guidelines" document (Volume 1B) of the Bond Spending Implementation Plan addresses a number of "green building" principles that should be incorporated into all new buildings on the campus.

More information on the LEED Checklist can be found in Appendix D.

Construction Energy Demands

Construction-related energy demands would increase during the six-year buildout period. Diesel fuel and electricity are likely to be the greatest sources of construction energy. However, this energy demand is not expected to be wasteful and the savings over the life of the project by the conservation measures resulting from new buildings are likely to far offset any energy use increase during construction. This result is largely due to the inefficient building design and outdated equipment that currently creates unnecessary energy demands for campus operations.

Peak Period Energy Demands

Peak period energy demands (i.e., daytime hours and times of high air conditioning needs in hot weather) are not expected to be significant with adoption of the Bond Spending Implementation Plan. The proposal for a geothermal field at the campus tied into overall heating and cooling systems would reduce peak period demands by lowering the temperature differential for heaters and chillers. In addition, all new buildings would include energy conservation measures that would reduce energy requirements. No significant impacts related to peak period energy demands would result.

POTENTIALLY SIGNIFICANT IMPACTS

The following section addresses potentially significant impacts related to energy use and sustainability from adoption of the Bond Spending Implementation Plan, based on the significance criteria stated above.

Impact ENERGY-1: Transportation energy demands would increase at the Indian Valley campus due to an increase in students in the coming years. Without options for alternative transit, students would continue to use private vehicles for campus access, resulting in increased fuel consumption and associated impacts related to use of fossil fuels, air quality degradation, and associated global warming. (PS)

Without any on-site campus housing and only limited affordable housing near the Indian Valley campus, many students must rely on private automobiles for access to and from the campus. This automobile usage has associated impacts related to carbon dioxide emissions and global warming. (See Section 4.8, Air Quality, of this EIR.)

> *Mitigation Measure ENERGY-1: The District shall develop and implement a Transportation Demand Management (TDM) program as described in Mitigation Measure TRANSPORTATION-4. Refer to Mitigation Measure TRANSPORTATION-4 related to potential ways to reduce reliance on the private automobile for access to and from the campus. (LTS)*

Impact ENERGY-2: Modernization of the Transportation Technology Complex, renovation of existing buildings, and construction of the new Main Building Complex at the Indian Valley campus would produce a significant amount of debris that has the potential to be recycled. Building renovation and new construction would also produce debris that could be recycled. Some waste materials, such as asbestos, may be hazardous. (PS)

The exact amount of construction and renovation debris cannot be determined at this stage but would also result in increased demands for landfill capacity. Construction debris contains bulky, heavy materials such as the following:

- Concrete
- Wood
- Asphalt
- Gypsum (main component of drywall)
- Metals
- Bricks
- Glass
- Plastics
- Building components (doors, windows, plumbing fixtures)
- Site material (rocks, earth, stumps vegetation)

Hazardous materials from building modernization may include asbestos, which is often found in older buildings in association with insulation material and other hazards such as lead paints. Physical surveys, material sampling and records searches were conducted to determine the occurrence of existing and past hazardous materials on the campus. Hazardous building materials include lead-

containing paint (LCP), asbestos containing pipes (ACP), and asbestos containing materials (ACM). The assessments also determined if there is potential for the occurrence of polychlorinated biphenyls (PCBs) (Ninyo and Moore, 2006). These are addressed in more detail in Section 4.5, Hazardous Materials, of this EIR.

In general, all of the buildings contain hazardous building materials such as lead-based paint, asbestos-containing materials and the potential for small amounts of PCBs contained in the light ballasts, mercury in old thermostats, and old refrigeration and hydraulic systems. These materials do not pose a significant risk to occupants if undisturbed. However, these materials do degrade over time so that eventually these materials will have to be replaced and disposed of properly as renovations occur.

Mitigation Measure ENERGY-2a: Measures to increase recycling of construction and demolition material from implementation of the Bond Spending Implementation Plan shall include the following:

(1) Preparation of a "Materials Management Plan" prior to the onset of building demolition, renovation, or new construction that identifies (a) types of materials to be recycled or reused, (b) contractor specifications, (c) required record-keeping), (d) storage areas for materials, (e) recycling goals by types of material, and (f) coordination with hazardous materials disposal requirements. The Materials Management Plan shall ensure that at least 50 percent of non-hazardous construction waste from building renovation and new construction is recycled, in accordance with the Bond Spending Implementation Plan Design Guidelines.

(2) Inclusion of specific Materials and Resources LEED requirements in the specifications, including but not limited to the following as applicable to individual projects: Materials and Resources (MR) Prerequisite 1, Storage and Collection of Recyclables; Building Reuse MR credit 1.1 or 1.2; Recycled Content MR credit 4.1 or 4.2; and Certified Wood MR credit 7.

(3) Record-keeping on the campus of amounts and types of waste sent to recyclers.

(4) Documentation of "recyclable" materials from demolition and renovation that could possibly be incorporated into new buildings to reduce District costs.

(5) Provision of a list of local recycling operators to contact for any construction and demolition debris.

(6) Provision of adequate on-campus storage areas where recyclable materials can be separated and stored temporarily after demolition.

Mitigation Measure ENERGY-2b: The District shall ensure that all contractors comply with federal, State, and local regulations related to disposal of hazardous material contained in construction and demolition debris.

The combination of the above measures would reduce this potential impact to a less-than-significant level. The measures would also help the District meet LEED requirements for construction waste management, which include (1) developing and implementing a construction waste management plan, and (2) diverting 50 percent of construction and demolition wastes from landfills, or recycling or reusing 25 percent of these wastes on-site (U.S. Green Building Council, 2005b). (LTS)

Impact ENERGY-3: Implementation of the Bond Spending Implementation Plan could result in the preclusion of the use of alternative energy systems such as rooftop solar collectors unless specific steps are taken at the design stage of new buildings to prevent shading by buildings or vegetation. (PS)

At this time, it is not known exactly which buildings may be able to incorporate rooftop thermal or photovoltaic (PV) systems. Some roofs may be designed as "green roofs" to allow rooftop plantings as both a visual and energy conservation amenity. However, other roofs may be able at a future date to incorporate PV systems. The benefit of rooftop solar systems is that this location reduces requirements to use landscaped and other open space areas of the campus for future solar systems. Given the changing angles of the sun over the day and over seasons, it is important that rooftops be designed to take maximum advantage of available solar energy. Given the mild climate of Marin County, a huge opportunity exists to capture solar energy on campus buildings.

At the time of design review of renovated or new buildings, it is critical that the future incorporation of rooftop solar systems not be precluded by existing or future landscaping or other buildings. For example, if new tree plantings would result in a significant shading of rooftops at a future date during critical solar periods, the District should require a revision to the landscape plan. Similarly, a shading analysis for each new project would determine if other rooftops would be shaded by new buildings.

Mitigation Measure ENERGY-3: The District shall consider ensuring that rooftop structural systems of new and renovated buildings are designed to allow future solar systems. New landscaping plans shall be reviewed prior to implementation to ensure that new trees would not block solar access to rooftops that could be used for solar systems. (LTS)

Impact ENERGY-4: New landscape improvements such as outdoor lighting would result in increased electrical energy demands that would make increased demands on non-renewable energy sources. (PS)

The Bond Spending Implementation Plan calls for landscape and access improvements such as redesigned pathways and new outdoor lighting. With new lighting, the demand for electricity would increase on the campus, resulting in increased demands for non-renewable energy sources unless alternative energy sources are used.

> *Mitigation Measure ENERGY-4: The District shall incorporate the use of solar lighting for outdoor areas and pathways, assuming that adequate lumen levels to ensure safety can be provided by such systems, and, if required, the systems can be affordably integrated with existing lighting systems to remain. (LTS)*

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5. ALTERNATIVES

The CEQA Guidelines require that an EIR evaluate a range of reasonable alternatives to the project.

The State CEQA Guidelines (Section 15126.6) require that an EIR describe and evaluate the comparative merits of a range of reasonable alternatives to the project, or to the location of the project, that could feasibly attain most of the basic objectives of the project. The Guidelines further require that the discussion focus on alternatives capable of avoiding or substantially lessening any of the significant effects of the project, including the "No Project" Alternative. Furthermore, if the environmentally superior alternative is the "No Project" Alternative, the EIR must also identify an environmentally superior alternative from among the other alternatives.

The project objectives are discussed in Chapter 3, Project Description. This discussion will focus on alternatives that could address potentially significant impacts. The EIR identifies potentially significant impacts that can be reduced to a less-than-significant level with implementation of mitigation measures (land use and planning, geology, biological resources, hydrology and water quality, hazardous materials, cultural resources, transportation, air quality, noise, public services, public utilities, and energy and sustainability).

Three alternatives are evaluated in this section:

- Alternative 1: No Project
- Alternative 2: Relocate New Main Building Complex to South Side of Ignacio Creek
- Alternative 3: No New Main Building Complex

5.1 SUMMARY OF ALTERNATIVES

ALTERNATIVE 1: NO PROJECT

Under this alternative, the proposed Bond Spending Implementation Plan would not be implemented. However, modernization of existing buildings is assumed to be necessary to meet current code and ADA requirements including: limited minor code upgrades to the Auto Technology Center, accessibility upgrades in compliance with ADA requirements, and life safety upgrades. The improvements would occur in a piecemeal fashion in contrast with the proposed project, which would offer an organized approach to modernizing the campus within a defined schedule. No structures would be demolished.

ALTERNATIVE 2: RELOCATE NEW MAIN BUILDING COMPLEX TO SOUTH SIDE OF IGNACIO CREEK

Under this alternative, the new Main Building Complex would be constructed at the location of the existing Miwok Cluster, which would be demolished. This

would place the new Main Building Complex in a more centralized location on the campus. The 217 parking spaces in Parking Lot 2 would be retained. The remaining components of the Bond Spending Implementation Plan would be the same as with the proposed project. This alternative would require complete conceptual redesign of the new Main Building Complex and it may present some challenging vehicular access issues. No new bridge across the creek would be built. The bio-retention area in the existing parking lot would be built to improve water quality downstream of the campus.

ALTERNATIVE 3: NO NEW MAIN BUILDING COMPLEX

With this alternative, no new Main Building Complex would be constructed and no new square footage would be added at the Indian Valley campus. The Auto Technology Center would be replaced in its current footprint and modernized. Other buildings on the campus would also undergo modernization to bring them up to code and to make them suitable for classroom space.

5.2 ALTERNATIVES CONSIDERED AND REJECTED

The one alternative considered but rejected was an alternative to demolish the Ohlone Cluster and the Library. These buildings both require modernization to meet current and future educational programming needs. This alternative was rejected because the buildings could not be rebuilt in their same footprint due to environmental concerns and their proximity to the creek. The square footage provided by these buildings was considered necessary for projected campus growth.

5.3 IMPACTS OF ALTERNATIVES

This section summarizes the impacts of each alternative as compared to the proposed project. When impacts are similar to the proposed project, this is called out. A comparison of the alternatives to the proposed project is provided in Table 5-1.

ALTERNATIVE 1: NO PROJECT

Impacts

The approval of the No Project Alternative would eliminate potentially significant (but mitigable) impacts of the proposed project (e.g., impacts on land use, geology, biological resources, hydrology and water quality, hazardous materials, cultural resources, transportation, air quality, noise, and energy and sustainability). No significant and unavoidable impacts such as construction noise would result from this alternative. No new Main Building Complex would be constructed and the parking lot would be left in its existing condition. No

Table 5-1 Comparison of Impacts of Project Alternatives (After Mitigation)

Environmental Issue Area	PP Proposed Project	ALT 1 No Project	ALT 2 Relocate New Main Building Complex to South Side of Ignacio Creek	ALT 3 No New Main Building Complex
Air Quality	LTS	LTS-	LTS	LTS-
Biological Resources	LTS	LTS-	LTS+	LTS-
Cultural Resources	LTS	LTS-	LTS-	LTS-
Geology/Soils	LTS	LTS-	LTS	LTS
Hazardous Materials	LTS	LTS-	LTS	LTS
Hydrology/Water Quality	LTS	LTS	LTS	LTS
Land Use/Planning	LTS	LTS	LTS	LTS
Noise	LTS/SU	LTS-	LTS/SU	LTS/SU
Transportation	LTS	LTS-	LTS	LTS
Services	LTS	LTS-	LTS+	LTS-
Utilities	LTS	LTS-	LTS-	LTS-
Energy/Sustainability	LTS	LTS+	LTS-	LTS-
Air Quality	LTS	LTS-	LTS	LTS

Notes: PP = Proposed Project
ALT 1 = No Project Alternative
ALT 2 = Relocate New Main Building Complex to South Side of Creek
ALT 3 = No New Main Building Complex
+ = Greater adverse impact than proposed project
- = Lesser adverse impact than proposed project
Source: A. Skewes-Cox, 2007.

access improvements would occur and no improvements to safety by placing a main building closer to the road would result. No improvements to water quality by the construction of bioswales and detention basins at the campus would occur. None of the beneficial impacts of the channel erosion control, stabilization, and restoration would occur under this alternative either, and conditions would continue to be addressed on a localized basis as existing improvements continue to be undermined and threatened.

Ability to Meet Project Objectives

The No Project Alternative would not support some of the project objectives as shown in Table 5-2. The limited modernization that would occur would help to meet project objectives. Such modernization is assumed to occur under the No Project Alternative.

ALTERNATIVE 2: RELOCATE NEW MAIN BUILDING COMPLEX TO SOUTH SIDE OF IGNACIO CREEK

Impacts

This alternative would not have some of the impacts associated with the new Main Building Complex proposed by the project, such as potential impacts to archaeological resources where such resources have been identified. Construction of the new Main Building Complex at the site of the Miwok Cluster would eliminate disturbance to natural areas of the campus; however, demolition of the Miwok Cluster would result in significant demolition debris and the overall campus square footage would be reduced.

Siting the new Main Building Complex at the location of the existing Miwok Cluster would consolidate student services and re-enforce the sense of a campus quad on the south side of the creek. At this location, the new Main Building Complex would draw students and visitors to the campus core, enhancing activity on the pathways connecting the building clusters, as compared to the proposed project, which would slightly disperse student and visitor activity over a greater portion of the campus and would reduce pedestrian activity at the campus core.

This alternative also would have vehicle access issues because a new site on the south side of the creek, like the existing Miwok Cluster, would have limited automobile access. Safety concerns could remain since little development would occur close to the road where access is improved.

Overall, it is assumed that the new Main Building Complex would have similar square footage to the Miwok Cluster. Thus, building square footage at the campus would not increase and associated increased water/wastewater demands would not occur.

Other impacts would be similar to those of the proposed project. The beneficial erosion control, stabilization, and restoration would occur under this alternative, which would address the threat to existing bridges and other structures along Ignacio Creek and main tributary.

Visually, this alternative would have a building more screened from the roadway and may result in less light and glare for nearby residents. However, these potential visual impacts were not considered significant for the proposed project

Table 5-2 Relationship of Alternatives to Project Objectives

Project Objectives	PP Proposed Project	ALT 1 No Project	ALT 2 Relocate New Main Building Complex to South Side of Ignacio Creek	ALT 3 No New Main Building Complex
1. Provide functional instructional and administrative space to meet program requirements.	X	O	X	O
2. Provide upgrades to the existing Indian Valley campus to serve the population in this area.	X	O	X	X
3. Provide job training and academic programs to assist the unemployed and underemployed in obtaining employment and advancement.	X	X	X	X
4. Provide lower division college classes for transfer students to 4-year university programs	X	X	X	X
5. Participate in a collaborative partnership with other educational providers, the business community, and local government to better serve the community.	X	X	X	X
6. Improve campus facilities to accommodate a total campus population of approximately 1,180 students at completion of the Bond Spending Implementation Plan.	X	O	O	O
7. Focus development within the existing central Indian Valley campus.	X	X	X	X
8. Obtain LEED certification on all new and renovated projects.	X	O	X	X
9. Provide a new Main Building Complex on the north side of Ignacio Creek to house many of the existing programs within a new modern facility and with shared resource spaces.	X	O	O	O

Table 5-2 *continued*

Project Objectives	PP Proposed Project	ALT 1 No Project	ALT 2 Relocate New Main Building Complex to South Side of Ignacio Creek	ALT 3 No New Main Building Complex
10. Modernize the Transportation Technology Complex (two buildings) including new auto tech labs and other instructional areas; replace existing outdated equipment and upgrade computer technology.	X	O	X	X
11. Provide for minor modernization to Pomo 4 building, which supplies program support space to the Transportation Technology Complex.	X	X	X	X
12. Upgrade the Pomo 1 and 2 buildings for energy conservation.	X	O	X	X
13. Improve disabled access on exterior pathways.	X	X	X	X
14. Enhance job training.	X	X	X	X
15. Incorporate "green building" practices into all capital improvement projects.	X	O	X	X

Notes: PP = Proposed Project
ALT 1 = No Project Alternative
ALT 2 = Relocate new Main Building Complex to South Side of Ignacio Creek
ALT 3 = No New Main Building Complex
X = Alternative would meet project objective
O = Alternative would not meet project objective or would meet objective to a lesser extent than the proposed project (i.e., would not substantially meet the objective).
Source: A. Skewes-Cox, 2007.

due to siting and proposed landscaping. Other impacts would be similar to the proposed project.

Ability to Meet Project Objectives

As shown in Table 5-2, this alternative would meet all of the objectives of the proposed project except for the objective to provide a new Main Building Complex on the north side of the creek and to allow expansion of the student

population. It cannot be determined if the reduced square footage would allow the projected growth of the campus over the six-year planning period. However, the reduced square footage is likely to limit student growth.

ALTERNATIVE 3: NO NEW MAIN BUILDING COMPLEX

Impacts

This alternative would have none of the impacts associated with the new Main Building Complex such as potential impacts to archaeological resources. However, few impacts have been identified for this building as proposed by the project.

The beneficial erosion control, stabilization, and restoration would occur under this alternative, which would address the threat to existing bridges and other structures along Ignacio Creek and main tributary.

Overall student growth may be more limited without this alternative due to reduced on-campus square footage, with subsequent reduced impacts related to traffic, water demand, wastewater demand, and service demands.

No new construction noise that could disturb nearby residents would occur in this area of the campus. No access improvements at the campus entrance would occur, and no new lighting would occur as associated with the new Main Building Complex proposed by the project.

Ability to Meet Project Objectives

As with the two other alternatives, this alternative would meet all identified project objectives except the objective to create a new Main Building Complex north of the creek and the objective to accommodate an increased student population.

5.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The CEQA Guidelines require that the Environmentally Superior Alternative be identified. If the environmentally superior alternative is the No Project Alternative, the EIR must also identify an environmentally superior alternative from among the other alternatives.

The No Project Alternative would be the environmentally superior alternative because no new major impacts would occur at the campus in terms of land disturbance, construction, and other activities. However, this alternative would also not result in any new major energy savings that would occur due to the proposed geothermal system. The lack of new bioswales and detention basins would also mean that downstream water quality would not improve and stormwater flows would not be reduced.

In addition to the No Project Alternative, Alternative 3, No New Main Building Complex, would be the other Environmentally Superior Alternative because this alternative would result in lower air quality, biological resources, public services and utilities impacts than with the project and Alternative 2.

This alternative would meet most of the project objectives except it would not provide a New Main Building Complex on the north side of the creek and it likely would not accommodate a total campus population of 1,180 students due to a lower square footage than for the project.

6. CEQA CONSIDERATIONS

6.1 SIGNIFICANT IRREVERSIBLE EFFECTS

CEQA states that impacts associated with a proposed project may be considered to be significant and irreversible for the following reasons:

- Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible, since a large commitment of such resources makes the removal or non-use thereafter unlikely;
- Primary impacts and, particularly, secondary impacts (such as a highway improvement that provides access to a previously inaccessible area) generally commit future generations to similar uses; and
- Irreversible damage can result from environmental accidents associated with the project.

This project would include the construction of one new building on the Indian Valley campus and the renovation/remodeling of other buildings. The structures are permanent buildings; therefore, their installation would constitute an irreversible use of these lands, as it is unlikely that the buildings would be removed for many years. The proposed project would irretrievably commit materials to the construction and maintenance of the new building. In addition, the construction and operation of the proposed project would result in the use of energy, including fossil fuels. The District is committed to reducing energy use and has proposed the installation of a geothermal system to minimize energy demand.

The project is not expected to result in any activities likely to result in accidents that could lead to irreversible environmental damage.

6.2 SIGNIFICANT UNAVOIDABLE IMPACTS

All potential impacts identified for the project could be mitigated to a less-than-significant level except for construction-related noise.

6.3 GROWTH INDUCEMENT

The new Main Building Complex would occur near the center of the campus. No wastewater or water lines associated with the project would cross undeveloped lands or have growth- inducing effects due to such infrastructure. All new development would occur within the existing boundaries of the College of Marin

Indian Valley campus. No significant growth inducement would be created by the project.

6.4 CUMULATIVE IMPACTS

The CEQA Guidelines require a discussion of the cumulative effects that could result from a project. As an overall master plan to be constructed over a six-year period, the project itself addresses the cumulative impacts of overall campus growth. No other projects are proposed in the vicinity of the Indian Valley campus (Grunt, 2007).

Cumulative traffic has already been addressed for the year 2013, as discussed in Section 4.7, Transportation, of the EIR. Overall, no significant cumulative impacts are expected and no additional mitigation measures would be required beyond those already recommended for the project.

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9. GLOSSARY AND ABBREVIATIONS

GLOSSARY

A-WEIGHTED SOUND LEVEL (dBA): The sound level measured on an instrument containing an "A" filter, which electronically simulates the frequency response of the human ear under an average intensity of sound.

ACCEPTABLE: Satisfies the evaluation criteria.

ADVERSE: A term used to describe unfavorable, harmful or detrimental changes in environmental conditions.

ALTERNATIVE: One choice of action from several that are concurrently possible.

AMBIENT NOISE: The all-encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far.

AQUIFER: A natural underground formation that is saturated with water, and from which water can be withdrawn.

ASSESSMENT: Determination of the nature, amount, importance, or value of a change in an environmental condition.

ASSIGNABLE SQUARE FEET (ASF): A physical planning term referring to the amount of floor space in a building that is usable by programs. ASF does not include hallways, bathrooms, or floor space used by heating, ventilating, and air conditioning equipment.

AVERAGE DAILY TRIPS: The number of vehicles passing a given point on a road going in a given direction during a 24-hour period.

BACKGROUND NOISE: See Ambient Noise.

BASELINE: The ambient environmental condition existing in the absence of project development. "Future baseline" is a description of conditions that could occur in the future assuming no project development.

BEDROCK: The solid rock that underlies gravel, soil, and other superficial material.

BUILDOUT: A condition in which all development allowed by an adopted plan has been completed.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL): The average continuous noise level over a 24-hour period, with special weighting factors applied to noise events occurring in the nighttime (10:00 PM to 7:00 AM), the evening (7:00 PM to 10:00 PM), and the daytime (7:00 AM to 7:00 PM).

CRITERIA POLLUTANTS: Ozone, carbon monoxide, nitrogen dioxide, inhalable particulates (particulate matter less than 10 microns), and lead, as defined by the California Air Resources Board.

CUMULATIVE IMPACT: Environmental impact of the project under study plus proposed/pending off-campus projects in the immediate vicinity of the project sites.

DAY-NIGHT AVERAGE SOUND LEVEL (Ldn): The A-weighted average sound level in decibels during a 24-hour period with a 10 dB weighting applied to nighttime sound levels (10:00 PM to 7:00 AM). This exposure method is similar to the CNEL, but gives the same weighting to the evening time period (7:00 PM to 10:00 PM) as it does to the daytime period (7:00 AM to 7:00 PM).

DECIBEL (dB): A unit for expressing the relative intensity (loudness) of sounds. The decibel is the logarithm of the ratio of the intensity of a given sound to the faintest sound discernible by the human ear.

DESIGN CAPACITY: The capacity at which a water distribution pipe, pump or reservoir or a wastewater pipe or treatment plant is intended to operate.

ENDANGERED: A species or subspecies of plant or animal whose prospects of survival and reproduction are in immediate jeopardy.

ENVIRONMENT: The natural and human physical conditions that exist in an area of study, including land, air, water, minerals, flora, fauna, ambient noise, traffic levels, safety levels, and objects of historic or aesthetic significance.

ENVIRONMENTAL IMPACT: The evaluation of change in an environmental condition with respect to explicit criteria.

ENVIRONMENTAL IMPACT REPORT: A public document prepared under the California Environmental Quality Act used by a governmental agency to analyze the significant environmental effects of a

proposed project, to identify alternatives, and to disclose possible ways to reduce or avoid possible environmental damage.

EROSION: Process by which material is removed from the earth's surface (including weathering, dissolution, abrasion, and transportation).

ESTIMATE: A statement regarding future conditions based on non-mathematical analysis.

FAULT: A fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.

FEASIBLE: Capable of successfully being accomplished by reasonably available means.

GLARE: A light source, either reflected or direct, that is annoying or distracting.

GRADING: Alteration of existing slope and/or shape of the ground surface.

GRANITIC BEDROCK: Bedrock composed of any holocrystalline quartz-bearing plutonic rock.

GROUND RUPTURE: Seismically-induced fracturing of the ground surface.

GROUNDWATER: Water beneath the surface of the earth.

HAZARDOUS SUBSTANCE: A material or form of energy that could cause injury or illness to persons, livestock, or the natural environment.

HEADCUTTING: The progressive upstream erosion of a vertical face or drop in the bed of a stream channel.

IGNEOUS ROCK: Rock formed by the solidification of molten or partially molten material from within the earth.

IMPERVIOUS SURFACE: Ground surface that cannot be penetrated by water. Includes paved and compacted surfaces, as well as those covered by buildings.

INFILTRATION: With reference to water and wastewater conveyance lines, infiltration is the introduction of underground water, such as groundwater, into wastewater collection systems. Infiltration results in increased wastewater flow levels.

INFLOW: With reference to water and wastewater conveyance lines, inflow is surface water, such as rainfall runoff, that enters a wastewater collection system. Inflow results in increased wastewater flow levels.

INFRASTRUCTURE: Permanent utility installations, including roads, water supply lines, sewage collection pipes, and power and communications lines.

INTERSECTION CAPACITY: The maximum number of vehicles that has a reasonable expectation of passing through an intersection in one direction during a given time period under prevailing roadway and traffic conditions.

KILOWATT: A measure of the rate of electrical flow.

KILOWATT-HOUR: A measure of a quantity of electrical consumption.

LANDFILLING: A procedure for the disposal of solid wastes. The wastes are placed in a designated disposal site and covered with dirt or other fill material.

LANDSLIDE: Any downslope mass movement of rock or soil, including rock falls, earth flows, and landslides in the technical sense (a soil mass that retains its essential internal arrangement and becomes disjointed from its subsurface interface).

LESS THAN SIGNIFICANT: An environmental condition change that does not exceed a stated CEQA standard of significance.

LEVEL OF SERVICE: A measure of the mobility characteristics of an intersection, as determined by vehicle delay that is estimated by a volume-to-capacity (V/C) ratio. A V/C ratio of less than 0.60 corresponds to level of service "A," while a ratio of 1.00 and above corresponds to level of service "F."

LIQUEFACTION: A geologic phenomenon in which surface and near-surface materials (soils, alluvium, etc.) behave like a liquid during seismic shaking.

LONG-RANGE VIEWS: Views of distances greater than 2,000 feet.

METAMORPHIC ROCK: A geologic formation that is transformed from sedimentary deposits by contact with heat from intrusion of molten material.

MID-RANGE VIEWS: Views of distances ranging from 500 to 2,000 feet.

MITIGATION MEASURE: Action taken to reduce or eliminate environmental impacts.

MOBILE SOURCES: A source of air pollution that is related to vehicles, such as automobiles or buses.

NOISE: Annoying, harmful, or unwanted sound.

PASSIVE SOLAR DESIGN: The use of non-mechanical architectural features and landscape to control solar heat gain.

PEAK HOUR: In reference to public services infrastructure or transportation systems, the hour in which the greatest use occurs.

PERCENT SLOPE: A common way of expressing the slope of terrain, which is derived by dividing the change in elevation by the horizontal distance traversed. A 45-degree slope can thus be expressed as a 100-percent slope.

PERCOLATION: Downward movement of groundwater through soil and bedrock.

PROJECT: The whole of an action undertaken by or on behalf of The Board of Trustees of the Marin Community College District that has a potential for resulting in a physical change in the environment, either directly or indirectly.

RAPTOR: A bird of prey, such as a hawk, eagle, or owl.

RARE: A condition in which a species or subspecies, although not presently threatened with extinction, exists in such small numbers throughout its range that it may be endangered if its environment is degraded or reduced in size.

RECYCLING: A variety of processes by which reusable materials in the solid or hazardous waste streams are separated for reuse.

RETROFIT: Replacement of existing fixtures with new or modified fixtures to improve efficiency.

RICHTER MAGNITUDE: A logarithmic scale ranging from one to ten, used to express the total energy of an earthquake. An increase of one unit represents a 60-fold increase in energy.

RIPARIAN VEGETATION: Plant life associated with a natural body of water.

RIPRAP: A loose assemblage of broken rock or concrete.

SANITARY FLOW: That portion of wastewater flow that is generated by domestic, industrial, and commercial customers, as distinct from inflow and infiltration.

SEDIMENTATION: Process by which material suspended in water is deposited in a body of water.

SHORT-RANGE VIEWS: Views of distances between 0 and 500 feet, characterized by a high level of discernible visual detail.

SIGNIFICANT ADVERSE IMPACT: An environmental impact that exceeds a stated CEQA standard of significance. An economic or social change by itself is not considered a significant adverse impact. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACT: An environmental impact that exceeds a stated CEQA standard of significance that cannot be reduced to a less-than-significant level with the implementation of feasible mitigation measures.

SILT: Soil composed of particles finer than fine sand and coarser than clay.

STATIONARY SOURCE: A source of air pollution that is not mobile, such as a heating plant or an exhaust stack from a laboratory.

SURFACE WATER: Water running in streams or rivers.

THERMS: A unit of energy use equal to 100,000 British thermal units (BTU).

TRANSPORTATION DEMAND MANAGEMENT: Programs designed to reduce demands on transportation systems by influencing how and when commute trips occur.

TRANSPORTATION SYSTEMS MANAGEMENT: Programs designed to encourage alternatives to private automobile use, such as increased reliance on public transit, carpooling, and bicycles.

VEGETATION COMMUNITY: A group of plant species commonly occurring together in roughly similar proportions.

VIEWSHED: The area that can be seen from a specified location.

VOLUME-TO-CAPACITY RATIO: In reference to transportation, ratio of peak hour use to capacity.

WATERCOURSE: The path followed by surface water flow; shown on U.S. Geological Survey maps as solid or dashed blue lines.

WATERSHED: The area of a landscape from which surface runoff flows to a given point; a drainage basin.

WILDLIFE CORRIDORS: A natural corridor, such as an undeveloped ravine, that is frequently used by wildlife to travel from one part of the campus to another.

ABBREVIATIONS

AC - FT/YR: Acre-feet (of water) Per Year

ADT: Average Daily Trips

ABAG: Association of Bay Area Governments

AQMP: Air Quality Management Plan

ASF: Assignable Square Feet

BAAQMD: Bay Area Air Quality Management District

BTU: British Thermal Unit

CEQA: California Environmental Quality Act

CFS: Cubic Feet Per Second

CNDDB: California Natural Diversity Data Base

CNEL: Community Noise Equivalent Level

CNPS: California Native Plant Society

CU.FT.: Cubic Feet

dB: Decibel

dBA: A-weighted sound level

DEIR: Draft Environmental Impact Report

EIR: Environmental Impact Report

EPA: US Environmental Protection Agency

FEIR: Final Environmental Impact Report

GPD: Gallons Per Day

GPM: Gallons Per Minute

GSF: Gross Square Feet

HVAC: Heating, Ventilating, and Air Conditioning

I/I: Inflow and Infiltration

KW: Kilowatt

KWH: Kilowatt-Hour

Ldn: Day-night Average Sound Levels

MGD: Million Gallons Per Day

MSL: Mean Sea Level

NAAQS: National Ambient Air Quality Standards

NOP: Notice of Preparation

OSHA: Occupational Safety and Health Administration (Federal)

PG&E: Pacific Gas and Electric Company

pH: A measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity, and decreasing with increasing acidity

PM_{10}: Inhalable Particulate Matter (under 10 microns in size)

PSI: Pounds Per Square Inch

ROG: Reactive Organic Gasses

RWQCB: Regional Water Quality Control Board

SOI: Sphere of Influence

TAC: Toxic Air Contaminants

TDM: Travel Demand Management

THC: Total Hydrocarbons

TOG: Total Organic Gasses

TSP: Total Suspended Particulate Matter

TSM: Transportation Systems Management

UBC: Uniform Building Code

USGS: United States Geological Survey

V/C: Volume-to-Capacity Ratio

APPENDIX A PUBLIC SCOPING MEETING COMMENTS

A public scoping meeting was held on the Indian Valley campus on March 28, 2007 and at the Kentfield campus on March 29, 2007. The projects for the campuses were described and the public was given an opportunity to talk about environmental issues of concern that should be addressed in the Environmental Impact Report.

The following public concerns regarding the Indian Valley campus were expressed at these meetings:

- Need to draw parking and traffic to the west end of the new Main Building.
- Issue of downstream runoff affecting houses.
- Construction noise.
- Geothermal drilling.
- Issue of repaving Ignacio Boulevard in 2007.
- Archaeological issues.
- Hazards during construction such as hazardous emissions.
- Odors and need for scrubbers and better ventilation.
- Whether operations would be changing.
- Activity at east end of campus such as parking lot use, associated noise.
- Need to keep bus route at center of “dog-bone”.
- Need to consider visitor parking only and short-term parking at east end of new Main Building.
- Issue of nighttime parking and possible exceptions to allow parking closer to buildings.
- Need to put high intensity uses at west end of new Main Building such as cafeteria and library.
- How entrance to bioswale area at east end of parking lots will be prevented.

APPENDIX B PROJECT RELATIONSHIP TO PLAN POLICIES

The project's relationship to applicable policies of the Novato General Plan is presented below.

The table presents each applicable policy and then discusses the project relationship to the policy (i.e., is the project consistent with the policy or would the project be in conflict with the policy). If the project is not consistent with the policy, a mitigation measure is identified to ensure project consistency with the policy.

Table B-1 Project Relationship to Policies of Novato General Plan (1996)

Policy	Project Relationship	Need for Mitigation to Ensure Consistency with Policy
LU Policy 2: Development Consistent with General Plan. Allow development at any density within the range shown by Land Use Designation Map provided applicable objectives policies and programs of all chapters of the General Plan are met. Maximum densities (top stated density range applied to gross acreage) may in some cases be achieved, but there is no guarantee of achieving the maximum density.	The project would include the modernization of several existing buildings, construction of a new educational building and access improvements at the Indian Valley campus. These facilities would be consistent with the site's "Community Facility" land use designation.	None necessary
LU Policy 3: Motorized Vehicle Access. Motorized vehicle access to Indian Valley College's campus shall not be provided via Indian Valley Road.	The project does not propose any new vehicle access roads to the campus. Improvements to existing campus entrances along Ignacio Boulevard are the only roadway improvements proposed by the project.	None necessary
LU Policy 4: Clustering of Development. Encouraging clustering of development on sites with environmental constraints in order to achieve environmental goals and attain gross densities within the range of the land use designation. Clustering of development may result in net densities on some portions of a site exceeding the maximum densities in LU Table 2.	The campus buildings are sited in four clusters. The clusters would be maintained with the project.	None necessary
LU Policy 5: Compatibility with Surroundings. Ensure that clustered development is compatible with the surrounding residential neighborhoods.	The campus presents a park-like setting. The building clusters are set back from Ignacio Boulevard with generous open space areas surrounding them. The new Main Building Complex would be constructed at the location of an existing parking lot and would be two stories in height. The project would be compatible with existing residential development.	None necessary
LU Policy 7: Growth Management. Recognize the available and planned capacity of infrastructure and public services when considering proposal for development.	The project would accommodate the moderate increase in student enrollment generated by population growth in Marin County. The project incorporates power- and water-conserving plumbing fixtures that would reduce demand on existing and planned infrastructure capacity.	None necessary

Table B-1 *continued*

Policy	Project Relationship	Need for Mitigation to Ensure Consistency with Policy
LU Policy 9: Constraints Analysis. Assess environmental constraints when considering development of lands with high environmental value or significant hazards. Encourage development sponsors to use such Constraints Analysis in designing their projects, to avoid unnecessary expense in redesigning their project to incorporate the issues defined by Constraints Analysis. The Constraints Analysis expands the City's current development analysis on property. The property owner is being provided the option of submitting the Constraints Analysis prior to submittal of the project application and environmental documentation or submitting it with the environmental documentation. The Constraints Analysis is an analysis in addition to that required by CEQA.	A site assessment was undertaken to identify potential site constraints including geologic hazards, flood hazards, cultural resources, biological resources, and building condition. The new Main Building Complex was sited on the basis of the site assessment.	None necessary
LU Policy 10A: Urban Growth Boundary. An Urban Growth Boundary is established as shown on LU Map 1. Land use designations outside the Urban Growth Boundary have been established for long-term planning purposes. For the 20-year duration of the Urban Growth Boundary, development outside the Urban Growth Boundary shall be limited to nonurban uses such as agricultural, conservation, parkland, and open space uses except as provided herein. The City, its departments, boards, commissions, officers and employees, shall not grant, or approve any general plan amendment, rezoning, or zoning ordinance amendment, specific plans, master plan, precise development plan, tentative or final subdivision map, conditional use permit, building permit or any other discretionary or ministerial land use or development approval or entitlement for urban land uses outside of the Urban Growth Boundary except as provided in this policy.	The Indian Valley campus is within the Urban Growth Boundary.	None necessary

Note: Policies listed in this table are those that relate specifically to College of Marin, the land use designations of the Novato General Plan, or large-scale land use, environmental, or sustainability issues. The Marin Community College District is constitutionally exempt from local land use regulations when using District property in furtherance of the District's educational purposes. However, this Draft EIR evaluates the project's consistency with local land use regulations and policies for the purposes of CEQA compliance and also because it is the District's goal that local land use controls be acknowledged and adhered to as much as feasible.
Source: City of Novato, *Novato General Plan*, 1996.

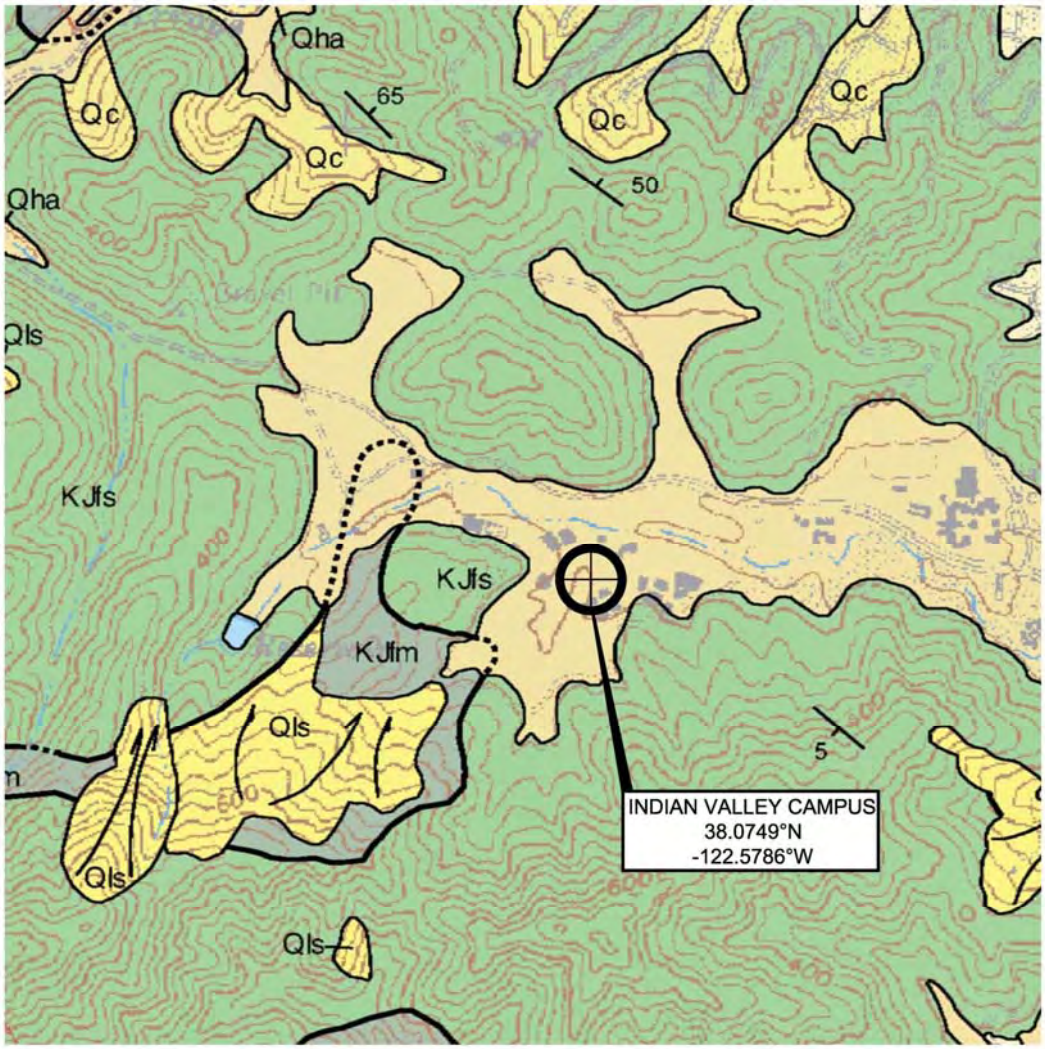
APPENDIX C GEOLOGICAL BACKGROUND DATA

Appendix C:

Table C-1
Modified Mercalli Intensity (MMI) Index Scale (Abridged)

Intensity	Description
I	People do not feel any Earth movement.
II	A few people might notice movement if they are at rest and/or on the upper floors of tall buildings.
III	Many people indoors feel movement. Hanging objects swing back and forth. People outdoors might not realize that an earthquake is occurring.
IV	Most people indoors feel movement. Hanging objects swing. Dishes, windows, and doors rattle. The earthquake feels like a heavy truck hitting the walls. A few people outdoors may feel movement. Parked cars rock.
V	Almost everyone feels movement. Sleeping people are awakened. Doors swing open or close. Dishes are broken. Pictures on the wall move. Small objects move or are turned over. Trees might shake. Liquids might spill out of open containers.
VI	Everyone feels movement. People have trouble walking. Objects fall from shelves. Pictures fall off walls. Furniture moves. Plaster in walls might crack. Trees and bushes shake. Damage is slight in poorly built buildings. No structural damage.
VII	People have difficulty standing. Drivers feel their cars shaking. Some furniture breaks. Loose bricks fall from buildings. Damage is slight to moderate in well-built buildings; considerable in poorly built buildings.
VIII	Drivers have trouble steering. Houses that are not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Well-built buildings suffer slight damage. Poorly built structures suffer severe damage. Tree branches break. Hillsides might crack if the ground is wet. Water levels in wells might change.
IX	Well-built buildings suffer considerable damage. Houses that are not bolted down move off their foundations. Some underground pipes are broken. The ground cracks. Reservoirs suffer serious damage.
X	Most buildings and their foundations are destroyed. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, lakes. The ground cracks in large areas. Railroad tracks are bent slightly.
XI	Most buildings collapse. Some bridges are destroyed. Large cracks appear in the ground. Underground pipelines are destroyed. Railroad tracks are badly bent.
XII	Almost everything is destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move.

Source: Federal Emergency Management Agency (FEMA), 1992, abridged from Wood and Neumann, 1931.

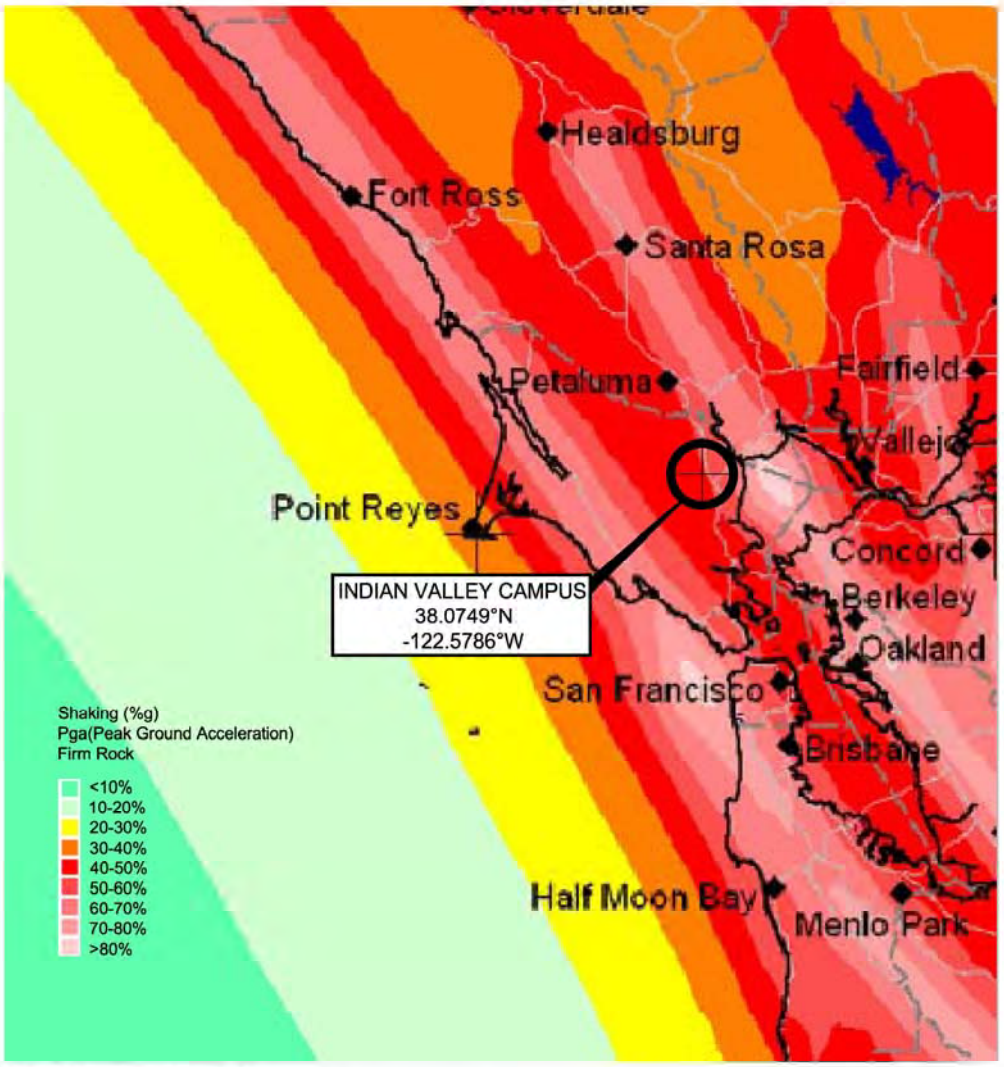


SOURCE: Geologic Map of the Novato 7.5' Quadrangle, Marin and Sonoma Counties, California: A Digital Database, Version 1.0 by Salem R. Rice, Theodore C. Smith, Rudolph G. Strand, David L.Wagner, Carolyn E. Randolph-Loar, Robert C. Witter and Kevin B. Clahan. Fugro West, Inc., 2005

LEGEND:

- Qc — Colluvium. Unconsolidated and unsorted soil and weathered rock fragments accumulated on or at the base of slopes.
- Qha — Holocene alluvium: undivided- Alluvium deposited on fans, terraces, or in basins.. Gravel, sand, and silt that are poorly to moderately sorted.
- Qpf — Latest Pleistocene (<=30,000) alluvial fan deposits. Similar to Holocene fans (Qhf), but they are more dissected.
- Qls — Landslides.. includes debris flow and block slump landslides. Arrows show the direction of movement.
- KJfs — Franciscan Complex sandstone and shale- Thick bedded, arkosic sandstone in interbedded shale. Arkose is composed of coarse, fairly well sorted quartz and feldspar grains with minor fine-grained matrix.
- KJfm — Franciscan Complex melange- tectonic mixture of masses of resistant rock types including sandstone, altered mafic volcanic rock (greenstone), chert, serpentinite, and exotic metamorphic rocks embedded in a sheared, shaley matrix. Blocks within the melange large enough to be shown on the map are: ss, sandstone and shale; ch, chert; mv, metamorphosed basaltic rocks; gs, greenstone.

Figure C-1
REGIONAL GEOLOGIC MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California



SOURCE: Fugro West, Inc., 2005
This Probabilistic Seismic Hazards Map is based on http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamap.asp

NORTH

Figure C-2
PROBABILISTIC SEISMIC HAZARD MAP
College of Marin, Indian Valley Campus
Novato, Marin County, California

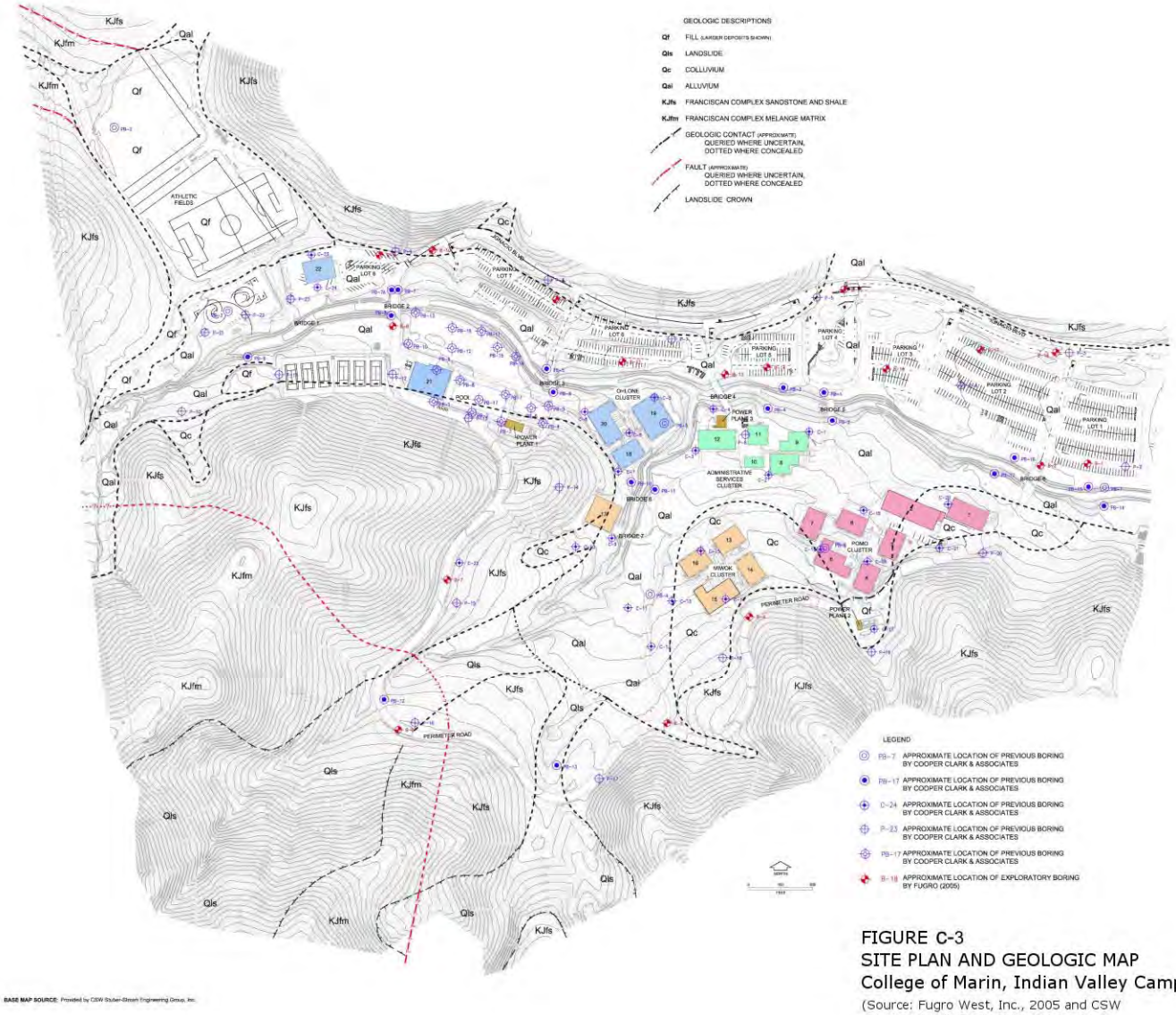


FIGURE C-3
SITE PLAN AND GEOLOGIC MAP
College of Marin, Indian Valley Campus
(Source: Fugro West, Inc., 2005 and CSW Struber-Stoeh Engineering Group, Inc.)

APPENDIX D LEED CHECKLIST

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist
<< enter project name >>
<< enter city, state, other details >>

Yes	?	No			
			Sustainable Sites	14 Points	
Y			Prereq 1	Construction Activity Pollution Prevention	Required
			Credit 1	Site Selection	1
			Credit 2	Development Density & Community Connectivity	1
			Credit 3	Brownfield Redevelopment	1
			Credit 4.1	Alternative Transportation, Public Transportation Access	1
			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
			Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles	1
			Credit 4.4	Alternative Transportation, Parking Capacity	1
			Credit 5.1	Site Development, Protect of Restore Habitat	1
			Credit 5.2	Site Development, Maximize Open Space	1
			Credit 6.1	Stormwater Design, Quantity Control	1
			Credit 6.2	Stormwater Design, Quality Control	1
			Credit 7.1	Heat Island Effect, Non-Roof	1
			Credit 7.2	Heat Island Effect, Roof	1
			Credit 8	Light Pollution Reduction	1
Yes	?	No			
			Water Efficiency	5 Points	
			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
			Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
			Credit 2	Innovative Wastewater Technologies	1
			Credit 3.1	Water Use Reduction, 20% Reduction	1
			Credit 3.2	Water Use Reduction, 30% Reduction	1
Yes	?	No			
			Energy & Atmosphere	17 Points	
Y			Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Fundamental Refrigerant Management	Required
			Credit 1	Optimize Energy Performance	1 to 10
			Credit 2	On-Site Renewable Energy	1 to 3
			Credit 3	Enhanced Commissioning	1
			Credit 4	Enhanced Refrigerant Management	1
			Credit 5	Measurement & Verification	1
			Credit 6	Green Power	1
					continued...
Yes	?	No			
			Materials & Resources	13 Points	
Y			Prereq 1	Storage & Collection of Recyclables	Required
			Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	Building Reuse, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
			Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
			Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
			Credit 3.1	Materials Reuse, 5%	1
			Credit 3.2	Materials Reuse, 10%	1
			Credit 4.1	Recycled Content, 10% (post-consumer + ½ pre-consumer)	1
			Credit 4.2	Recycled Content, 20% (post-consumer + ½ pre-consumer)	1
			Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
			Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	1
			Credit 6	Rapidly Renewable Materials	1
			Credit 7	Certified Wood	1
Yes	?	No			
			Indoor Environmental Quality	15 Points	
Y			Prereq 1	Minimum IAQ Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
			Credit 1	Outdoor Air Delivery Monitoring	1
			Credit 2	Increased Ventilation	1
			Credit 3.1	Construction IAQ Management Plan, During Construction	1
			Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
			Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
			Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
			Credit 4.3	Low-Emitting Materials, Carpet Systems	1
			Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
			Credit 5	Indoor Chemical & Pollutant Source Control	1
			Credit 6.1	Controllability of Systems, Lighting	1
			Credit 6.2	Controllability of Systems, Thermal Comfort	1
			Credit 7.1	Thermal Comfort, Design	1
			Credit 7.2	Thermal Comfort, Verification	1
			Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
			Credit 8.2	Daylight & Views, Views for 90% of Spaces	1
Yes	?	No			
			Innovation & Design Process	5 Points	
			Credit 1.1	Innovation in Design: Provide Specific Title	1
			Credit 1.2	Innovation in Design: Provide Specific Title	1
			Credit 1.3	Innovation in Design: Provide Specific Title	1
			Credit 1.4	Innovation in Design: Provide Specific Title	1
			Credit 2	LEED® Accredited Professional	1
Yes	?	No			
			Project Totals (pre-certification estimates)		69 Points

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points

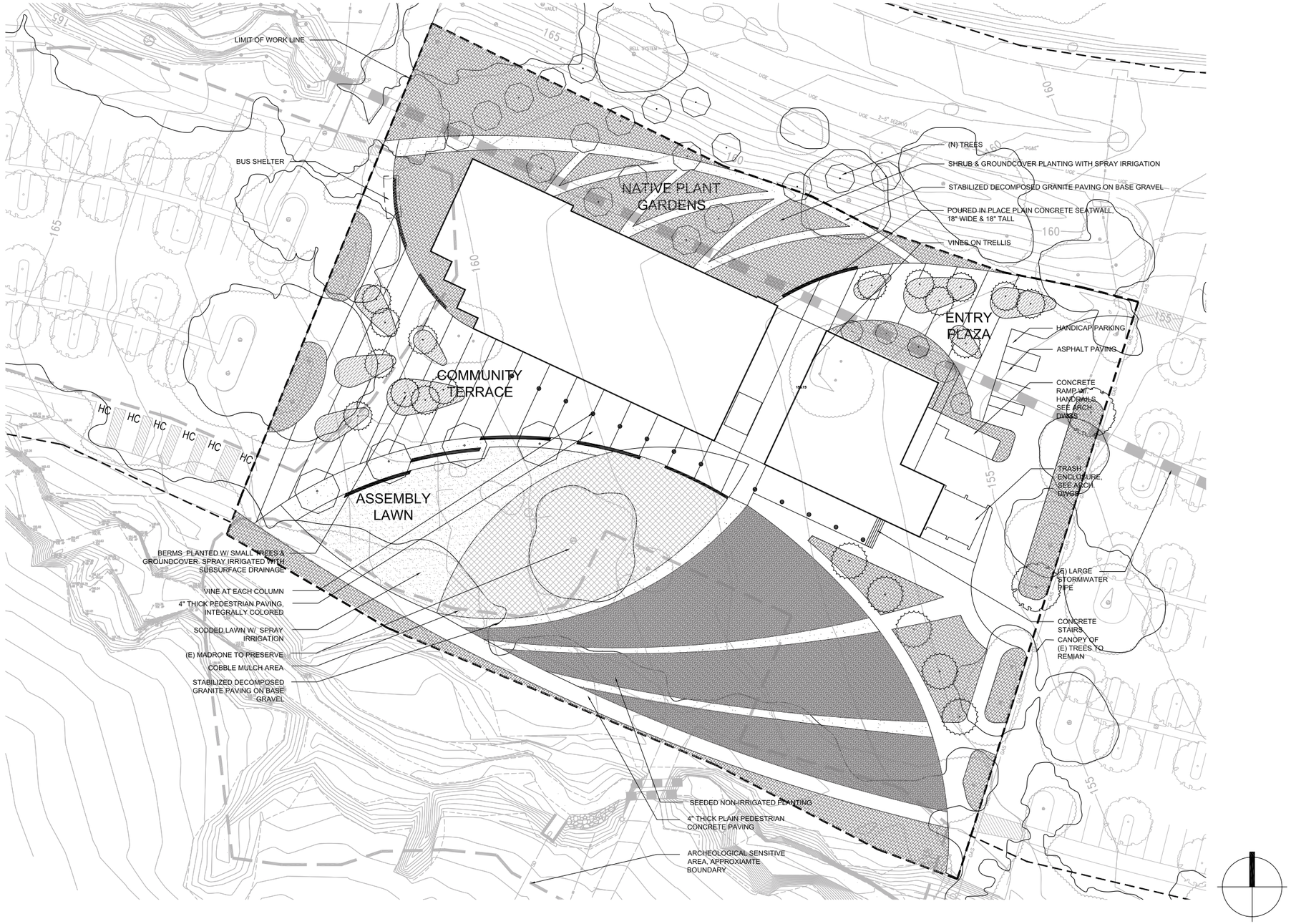
APPENDIX E SITE PLANS AND ELEVATIONS FOR NEW MAIN BUILDING COMPLEX

COLLEGE OF MARIN

ILLUSTRATIVE SCHEMATIC PLAN
COLLEGE OF MARIN - INDIAN VALLEY CAMPUS - MAIN BUILDING

RHAA
MAY 25, 2007

VBN ARCHITECTS



COLLEGE OF MARIN

COLLEGE OF MARIN
INDIAN VALLEY CAMPUS - NEW MAIN BUILDING

ROYSTON HANAMOTO ALLEY & ABEY

R | H | A | A

LANDSCAPE ARCHITECTS & PLANNERS

225 Miller Avenue Mill Valley, CA 94941 415.383.7900
323 Geary Street, #602 San Francisco, CA 94102 415.861.7900

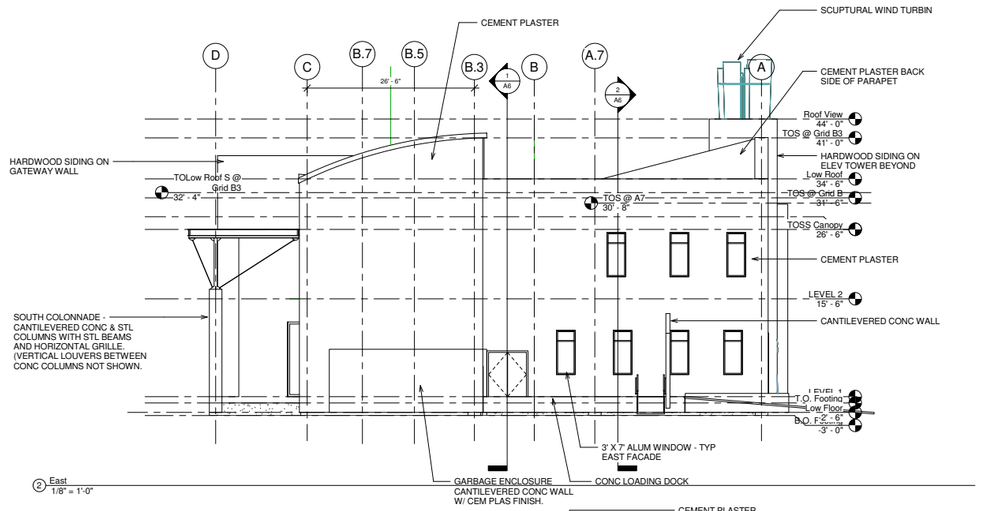
Project Number	06025
Date	May 18 2007
Drawn By	-
Checked By	-

L1.0

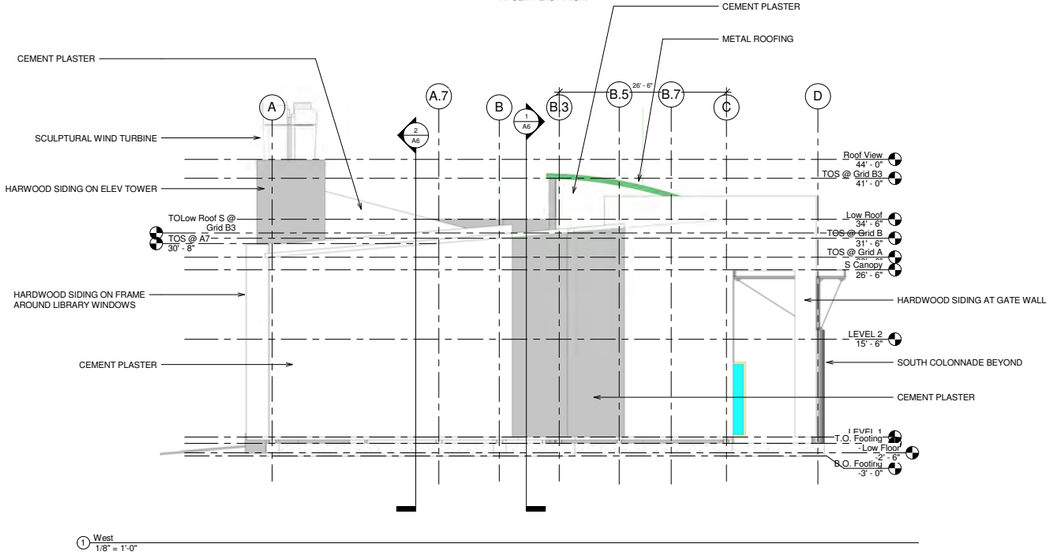
Scale 1" = 20'

VBN ARCHITECTS

5/17/2007 12:42:49 PM



② East
1/8" = 1'-0"



① West
1/8" = 1'-0"

COLLEGE OF MARIN

East / West Elevations

COLLEGE OF MARIN - SCHEMATIC DESIGN ESTIMATE

Project Number	06025
Date	May 21, 2007
Drawn By	Author
Checked By	Checker
	A4.3
Scale	1/8" = 1'-0"

VBN ARCHITECTS

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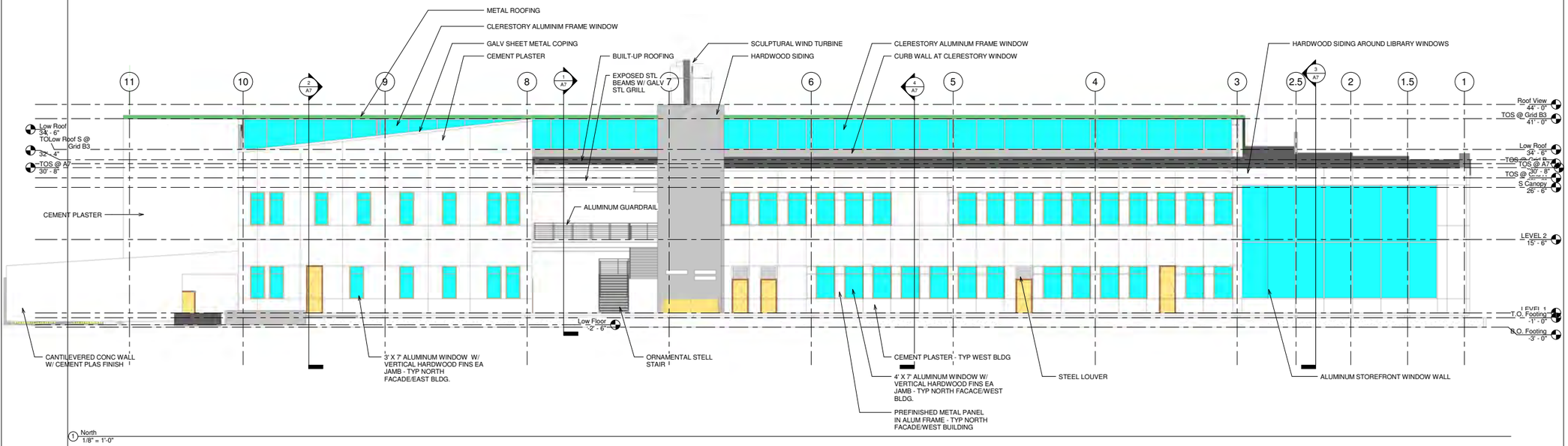

1 North
1/8" = 1'-0"

COLLEGE OF MARIN

North Elevation

COLLEGE OF MARIN - SCHEMATIC DESIGN ESTIMATE

Project Number	06025
Date	May 21, 2007
Drawn By	Author
Checked By	Checker

A4.1

Scale 1/8" = 1'-0"

VBN ARCHITECTS

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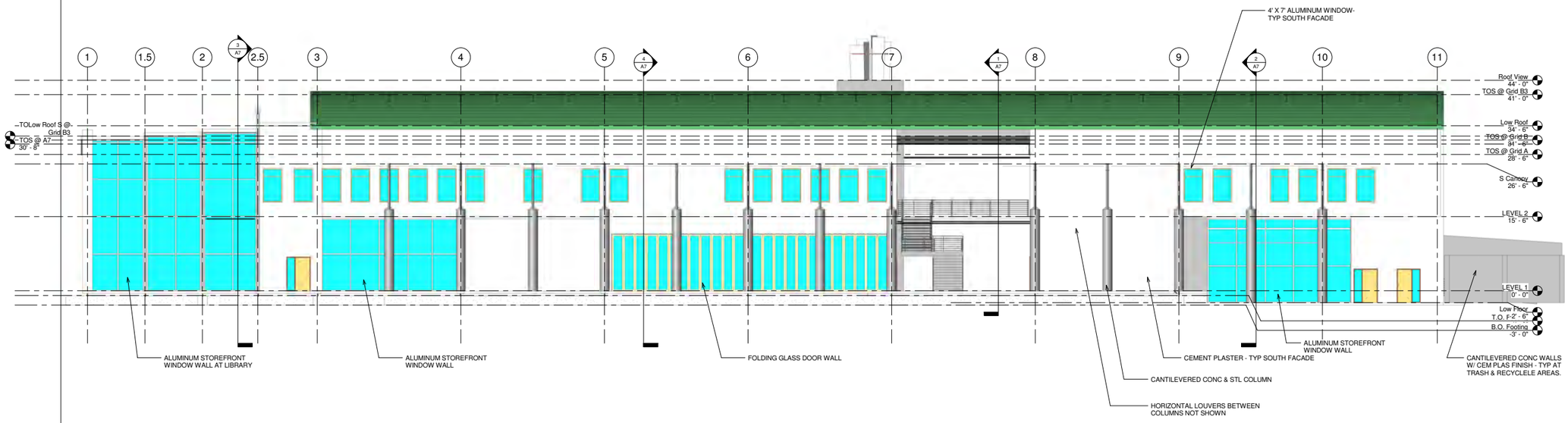

3 South
1/8" = 1'-0"

COLLEGE OF MARIN

South Elevation

COLLEGE OF MARIN - SCHEMATIC DESIGN ESTIMATE

Project Number	06025
Date	May 21, 2007
Drawn By	Author
Checked By	Checker
	A4.2
Scale	1/8" = 1'-0"

VBN ARCHITECTS

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APPENDIX F AIR DATA

Estimates of regional emissions generated by project traffic were made using a program called URBEMIS-2002.[1] URBEMIS-2002 is a program that estimates the emissions that result from various land use development projects. Land use projects can include residential uses such as single-family dwelling units, apartments and condominiums, and nonresidential uses such as shopping centers, office buildings, and industrial parks. URBEMIS-2002 contains default values for much of the information needed to calculate emissions. However, project-specific, user-supplied information can also be used when it is available.

Inputs to the URBEMIS-2002 program include trip generation rates, vehicle mix, average trip length by trip type and average speed. Trip generation rates for the project were provided by the project transportation consultant. Average trip lengths and vehicle mixes for the Bay Area were used. Average speed for all types of trips was assumed to be 30 MPH.

The URBEMIS-2002 run assumed summertime conditions with an ambient temperature of 85 degrees F.

The analysis was carried out assuming a 2010 vehicle mix. The URBEMIS-2002 outputs are attached.

[1] Jones and Stokes Associates, 2003. *Software User's Guide: URBEMIS2002 for Windows with Enhanced Construction Module,* Version 8.7. April.

Page: 1
05/12/2007 9:28 AM

URBEMIS 2002 For Windows 8.7.0

File Name: <Not Saved>
Project Name: Indian Valley
Project Location: San Francisco Bay Area
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	4.61	3.14	31.63	0.02	3.75

Page: 2
05/12/2007 9:28 AM

URBEMIS 2002 For Windows 8.7.0

File Name: <Not Saved>
Project Name: Indian Valley
Project Location: San Francisco Bay Area
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Junior college (2 yrs)	4.61	3.14	31.63	0.02	3.75
TOTAL EMISSIONS (lbs/day)	4.61	3.14	31.63	0.02	3.75

Includes correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2010 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

No. Unit Type	Total Units	Acreage	Trip Rate	Trips
Junior college (2 yrs)	192.00		2.50 trips/students	480.00

Sum of Total Trips 480.00

Total Vehicle Miles Traveled 2,467.08

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.70	1.10	98.70	0.20
Light Truck < 3,750 lbs	15.20	2.00	96.00	2.00
Light Truck 3,751- 5,750	16.20	1.20	98.10	0.70
Med Truck 5,751- 8,500	7.30	1.40	95.90	2.70
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20

Lite-Heavy	10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy	14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy	33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000	lbs	0.00	0.00	0.00	100.00
Urban Bus		0.20	0.00	50.00	50.00
Motorcycle		1.60	68.80	31.20	0.00
School Bus		0.10	0.00	0.00	100.00
Motor Home		1.40	7.10	85.70	7.20

Travel Conditions

	Residential				Commercial	
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.8	4.6	6.1	11.8	5.0	5.0
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip Speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	27.3	21.2	51.5			

% of Trips - Commercial (by land use)
Junior college (2 yrs) 5.0 2.5 92.5

Page: 3
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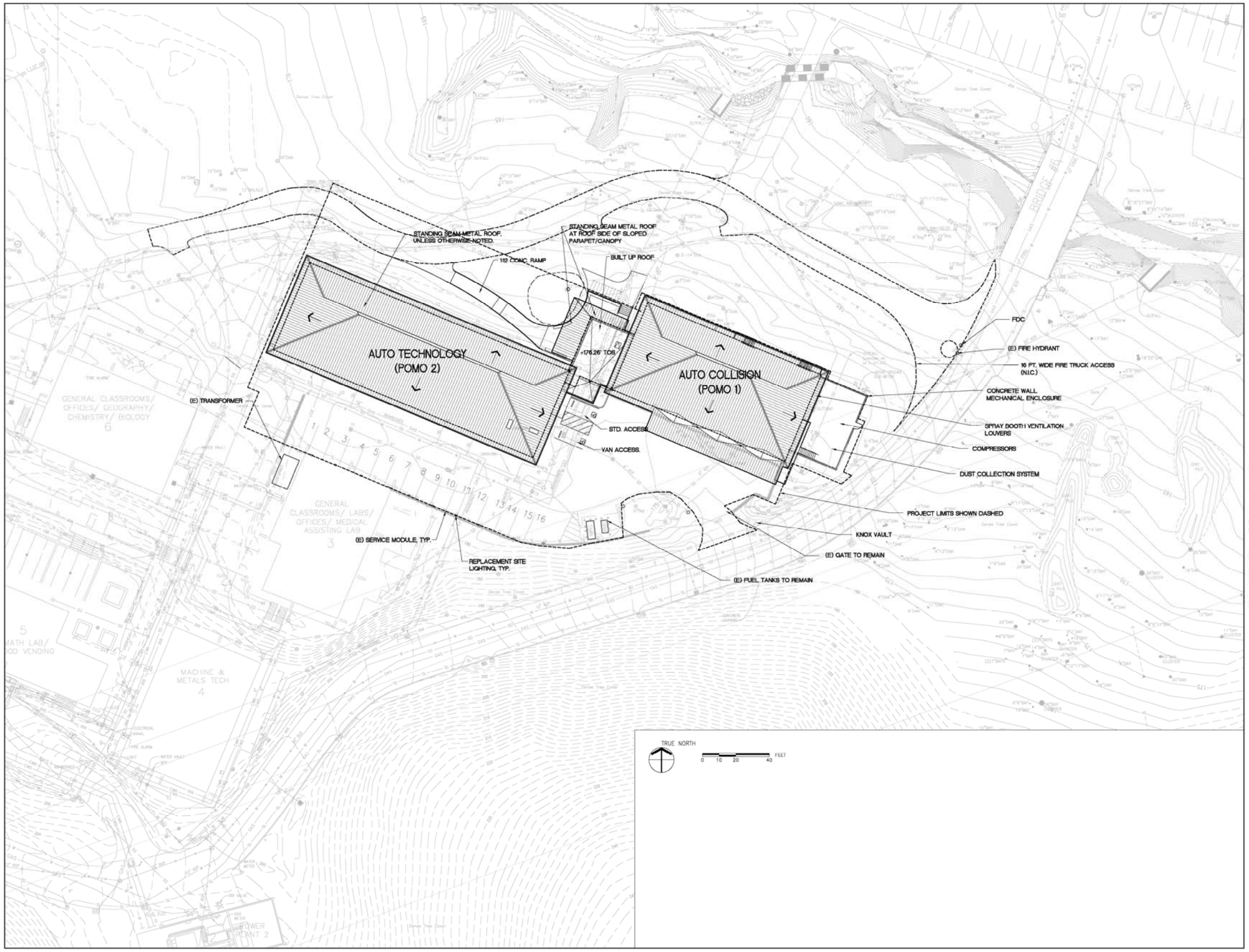
Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Operations

The operational emission year changed from 2005 to 2010.

APPENDIX G SITE PLAN AND ELEVATIONS FOR TRANSPORTATION TECHNOLOGY COMPLEX



HARDISON KOMATSU IVELICH & TUCKER
ARCHITECTURE PLANNING INTERIORS
538 Ninth Street, Suite 240
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T: 510 . 625 . 9800
OAKLAND SAN FRANCISCO

TRANSPORTATION TECHNOLOGY COMPLEX

COLLEGE OF MARIN
INDIAN VALLEY CAMPUS
NOVATO, CALIFORNIA

JOB NO. 30181
DRAWN
CHECKED
JOB CAPTAIN
DATE 04/17/07
REVISIONS

DRAWING TITLE
SITE PLAN

SCALE 1" = 20'-0"

A1.1

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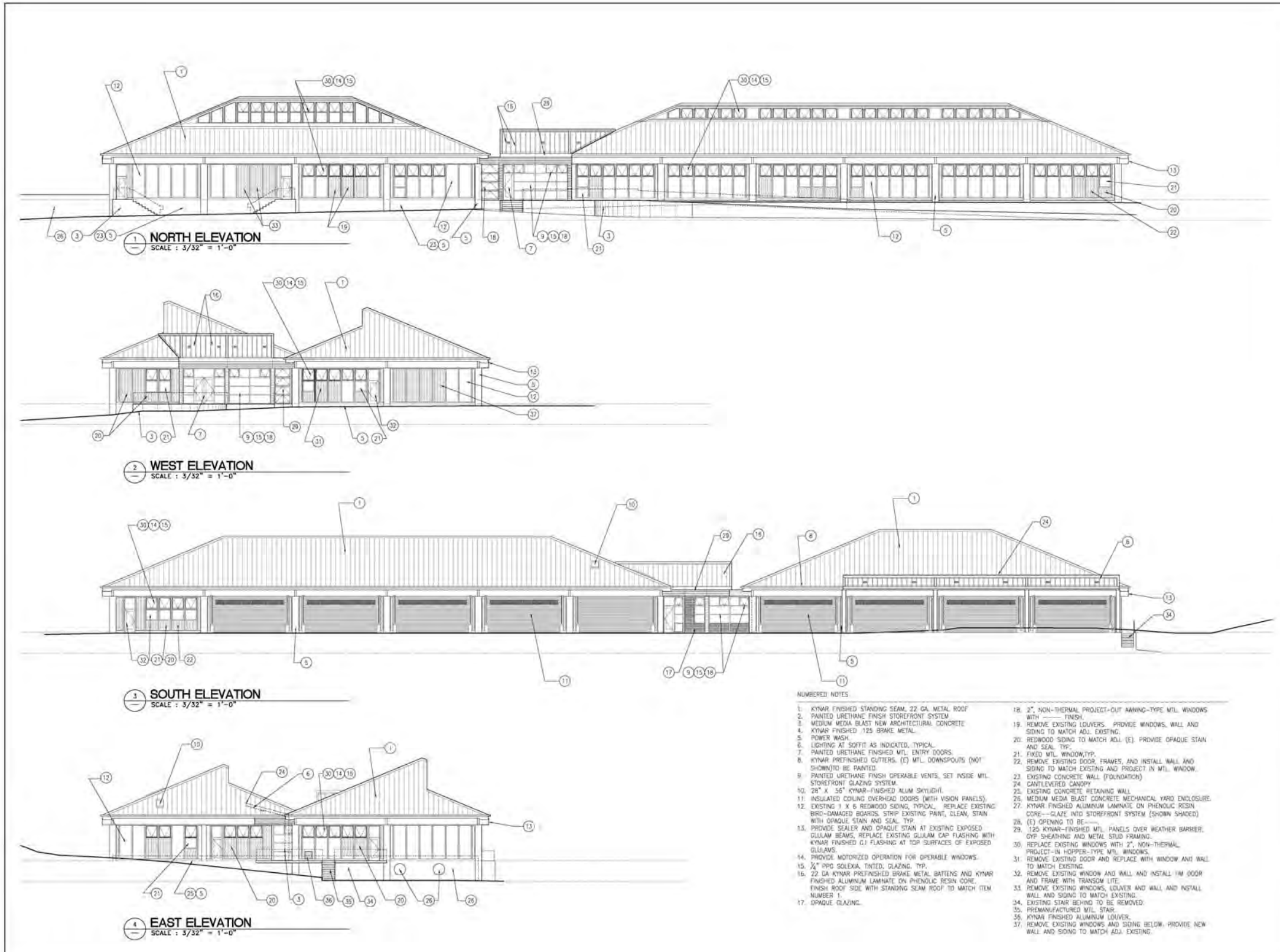

NUMBERED NOTES:

1. KYNAR FINISHED STANDING SEAM, 22 GA. METAL ROOF
2. PAINTED URETHANE FINISH STOREFRONT SYSTEM.
3. MEDIUM MEDIA BLAST NEW ARCHITECTURAL CONCRETE
4. KYNAR FINISHED .125 BRAKE METAL.
5. POWER WASH.
6. LIGHTING AT SOFFIT AS INDICATED, TYPICAL.
7. PAINTED URETHANE FINISHED MTL. ENTRY DOORS.
8. KYNAR PREFINISHED GUTTERS. (E) MTL. DOWNSPOUTS (NOT SHOWN)TO BE PAINTED.
9. PAINTED URETHANE FINISH OPERABLE VENTS., SET INSIDE MTL. STOREFRONT GLAZING SYSTEM.
10. 28" X 56" KYNAR-FINISHED ALUM SKYLIGHT.
11. INSULATED COILING OVERHEAD DOORS (WITH VISION PANELS).
12. EXISTING 1 X 6 REDWOOD SIDING, TYPICAL. REPLACE EXISTING BIRD-DAMAGED BOARDS. STRIP EXISTING PAINT, CLEAN, STAIN WITH OPAQUE STAIN AND SEAL. TYP.
13. PROVIDE SEALER AND OPAQUE STAIN AT EXISTING EXPOSED GLULAM BEAMS. REPLACE EXISTING GLULAM CAP FLASHING WITH KYNAR FINISHED G.I. FLASHING AT TOP SURFACES OF EXPOSED GLULAMS.
14. PROVIDE MOTORIZED OPERATION FOR OPERABLE WINDOWS.
15. ¼" PPG SOLEXIA, TINTED, GLAZING, TYP.
16. 22 GA KYNAR PREFINISHED BRAKE METAL BATTENS AND KYNAR FINISHED ALUMINUM LAMINATE ON PHENOLIC RESIN CORE. FINISH ROOF SIDE WITH STANDING SEAM ROOF TO MATCH ITEM NUMBER 1.
17. OPAQUE GLAZING.
18. 2", NON-THERMAL PROJECT-OUT AWNING-TYPE MTL. WINDOWS WITH ——— FINISH.
19. REMOVE EXISTING LOUVERS. PROVIDE WINDOWS, WALL AND SIDING TO MATCH ADJ. EXISTING.
20. REDWOOD SIDING TO MATCH ADJ. (E). PROVIDE OPAQUE STAIN AND SEAL. TYP.
21. FIXED MTL. WINDOW,TYP.
22. REMOVE EXISTING DOOR, FRAMES, AND INSTALL WALL AND SIDING TO MATCH EXISTING AND PROJECT IN MTL. WINDOW.
23. EXISTING CONCRETE WALL (FOUNDATION)
24. CANTILEVERED CANOPY
25. EXISTING CONCRETE RETAINING WALL
26. MEDIUM MEDIA BLAST CONCRETE MECHANICAL YARD ENCLOSURE.
27. KYNAR FINISHED ALUMINUM LAMINATE ON PHENOLIC RESIN CORE---GLAZE INTO STOREFRONT SYSTEM (SHOWN SHADED)
28. (E) OPENING TO BE———
29. .125 KYNAR-FINISHED MTL. PANELS OVER WEATHER BARRIER, OVP SHEATHING AND METAL STUD FRAMING.
30. REPLACE EXISTING WINDOWS WITH 2", NON-THERMAL, PROJECT-IN HOPPER-TYPE MTL. WINDOWS.
31. REMOVE EXISTING DOOR AND REPLACE WITH WINDOW AND WALL TO MATCH EXISTING.
32. REMOVE EXISTING WINDOW AND WALL AND INSTALL 1HM DOOR AND FRAME WITH TRANSOM LITE.
33. REMOVE EXISTING WINDOWS, LOUVER AND WALL AND INSTALL WALL AND SIDING TO MATCH EXISTING.
34. EXISTING STAIR BEHIND TO BE REMOVED.
35. PREMANUFACTURED MTL. STAIR
36. KYNAR FINISHED ALUMINUM LOUVER.
37. REMOVE EXISTING WINDOWS AND SIDING BELOW. PROVIDE NEW WALL AND SIDING TO MATCH ADJ. EXISTING.

HK I&T
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OAKLAND SAN FRANCISCO

TRANSPORTATION TECHNOLOGY COMPLEX

COLLEGE OF MARIN
INDIAN VALLEY CAMPUS
NOVATO, CALIFORNIA

JOB NO. 30181
DRAWN
CHECKED
JOB CAPTAIN
DATE 04/17/07
REVISIONS

DRAWING TITLE
ELEVATIONS

SCALE 3/32" = 1' - 0"

A3.1

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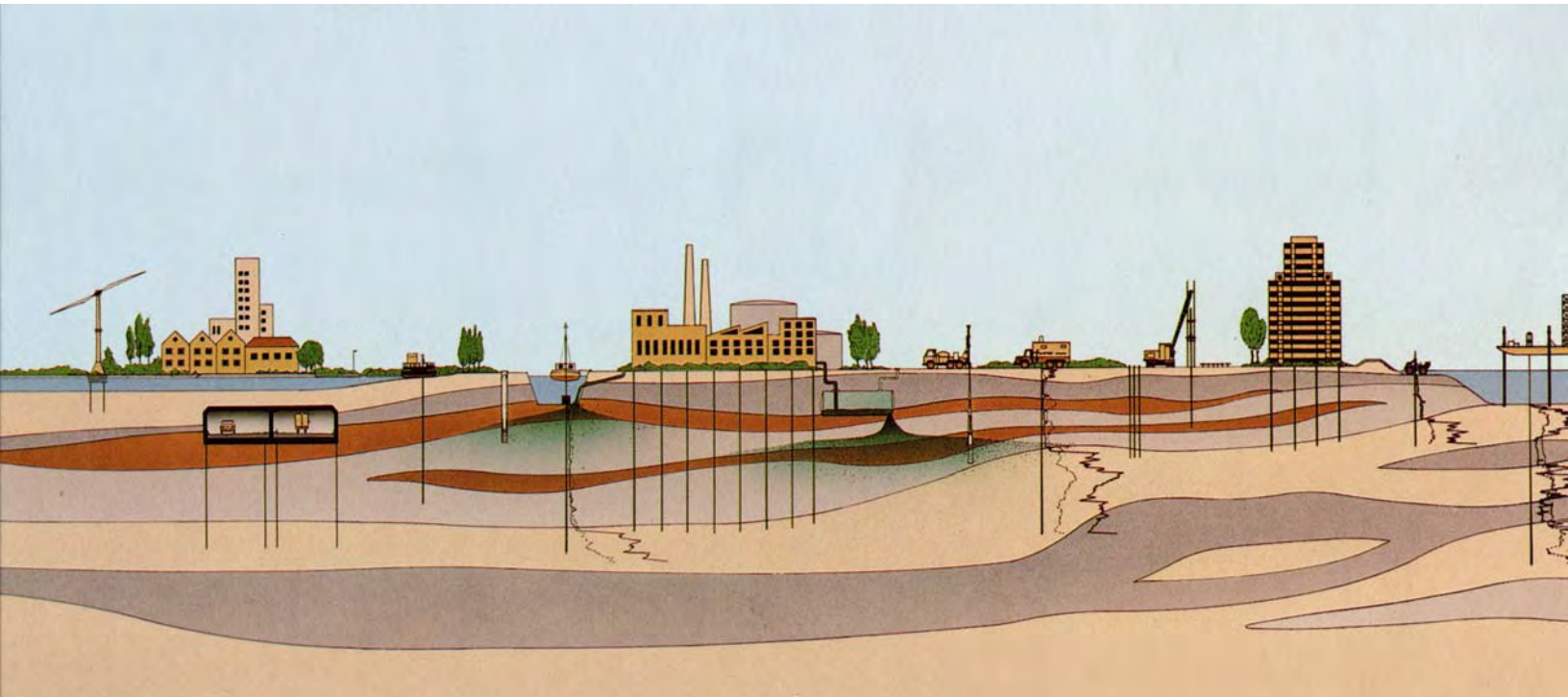
FUGRO WEST, INC.

BASELINE GEOLOGIC HAZARDS STUDY
COLLEGE OF MARIN
KENTFIELD CAMPUS
KENTFIELD, MARIN COUNTY, CALIFORNIA

Prepared for:
COLLEGE OF MARIN

DECEMBER 2005

Project No. 1715.001



FUGRO WEST, INC.

1000 Broadway, Suite 200
Oakland, California 94607
Tel: (510) 268-0461
Fax: (510) 268-0137

December 15, 2005
Project No. 1715.001

Marin Community College District
c/o Swinerton Management
P.O. Box 144003
835 College Avenue, Building MS-3
Kentfield, California 94904-4003

Attention: Ms. Suzanne Brown

Subject: Baseline Geologic Hazards Study, Kentfield Campus
College of Marin, Kentfield, California

Dear Ms. Brown:

As requested, Fugro West, Inc., has performed a baseline geologic hazards study for the Kentfield Campus of the College of Marin in Kentfield, California. This report provides information regarding our limited geotechnical field exploration and laboratory testing program and our general assessment of geologic hazards for the Kentfield Campus. This baseline geologic hazard assessment report will need to be updated for each specific area of focus prior to submittal to the Division of the State Architect (DSA).

We trust that this report provides the information that you require at this time. If you have questions or comments concerning the contents of this report, please do not hesitate to call.

Sincerely,

FUGRO WEST, INC.

Mark R. Caruso, P.G., C.E.G.
Associate Engineering Geologist

Corey T. Dare, P.E., G.E.
Principal Engineer

JCH/CTD/MRC:rp

Copies Submitted: (7) Addressee

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1.0 INTRODUCTION

This report presents the results of the limited geotechnical study and baseline geologic hazard study conducted by Fugro West, Inc., (Fugro) for the College of Marin, Kentfield Campus, in Kentfield, California.

The baseline geologic hazard study was performed based on requirements contained in the document titled, *California Geological Survey – Note 48, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings.* This document is used by the California Geological Survey (CGS) in their evaluation of geologic hazard reports which are presented to conform with the requirements of the California Department of General Services, Division of the State Architect (DSA), which are presented in their Interpretation of Regulations Document titled, *Geologic Hazard Report Requirements*, IR A-4, dated July 21, 2005. The latest version of the CGS's *Note 48* is dated January 1, 2004, with supporting documentation provided by the CGS dated July 1, 2005.

1.1 SITE AND PROJECT DESCRIPTION

The project site is the College of Marin's Kentfield Campus, located at 835 College Avenue, Kentfield, in Marin County, California, as shown on the *Site Vicinity Map*, Plate 1. The approximate geographic center of the campus is located at latitude 37.9550°N and longitude –122.5500°W, as shown on the *Local Topographic Map*, Plate 2.

The College of Marin Kentfield Campus was initially sited adjacent to Corte Madera Creek at the transition area from where the creek was contained within an incised channel descending from topographic highlands to where the creek entered a marsh environment adjacent to San Francisco Bay. Development of the campus initially began along the southwest side of what is now known as Sir Francis Drake Boulevard, northwest of College Avenue, and southeast of Laurel Avenue, on a topographic nose underlain by rock. Corte Madera Creek passed downslope and southwest of the topographic nose. Across the creek to the southwest, the initial athletic facilities were constructed on alluvium associated with the Corte Madera Creek drainage.

Development of the campus took place in stages, with portions of the topographic nose being cut and filled to accommodate new campus structures. The marsh area to the southeast of College Avenue, that formerly contained the meandering Corte Madera Creek, was eventually filled to allow development of an extensive physical education complex, including a football field, track, baseball fields, parking areas and a swimming pool facility. Corte Madera Creek was contained in a concrete channel, and diverted to the northeast, away from this area, to facilitate development of the campus.

Further development within the current campus area has continued with many multi-story buildings and associated parking areas. Additional parking areas have also been

developed by acquiring properties to the northeast of Sir Francis Drake Boulevard, northwest of Laurel Avenue and southwest of Kent Avenue.

The current project is directed at assessing the campus property and existing facilities, and to provide substantial upgrades to many of the existing structures. A number of the older structures are to be removed to allow reconfiguration of the general campus layout, and make room for new structures that are an integral part of the campus master plan.

1.2 PURPOSE AND SCOPE OF SERVICES

The purpose of our geologic hazard study, limited subsurface exploration and laboratory-testing program was to obtain information on subsurface conditions to aid in the evaluation of the geologic hazard, geotechnical and seismology aspects of the project. The scope of our services performed included, but was not limited to, the items listed on the following page:

- Review of existing geologic and geotechnical reports provided by College of Marin, review of available published and unpublished geologic maps and reports, and review of stereo-paired aerial photographs of the site and vicinity;
- Performance of a geologic reconnaissance of the college property and preparation of a reconnaissance level geologic map for the developed portion of the campus;
- Conducting a limited geotechnical subsurface exploration and laboratory testing program to supplement the available information on subsurface conditions;
- Develop seismic design parameters per the 2001 California Building Code;
- Perform a preliminary Probabilistic Seismic Hazard Assessment (PSHA) based on the 2002 USGS/CGS probabilistic seismic hazard assessment model for the Design Basis Earthquake, 10 percent probability of exceedance in 50 years (475-year return period) event that can be used by the structural engineer for preliminary structural assessment purposes; and
- Preparing this baseline geologic hazards and preliminary geotechnical study report presenting the results of our geotechnical field exploration, laboratory testing program, geologic hazard evaluation, seismic analysis, discussion of geotechnical issues and geotechnical recommendations.

2.0 DATA REVIEW, EXPLORATION AND LABORATORY TESTING

The limited geotechnical exploration and laboratory testing program described herein was developed to provide general characterization of the subsurface materials.

2.1 REVIEW OF EXISTING DATA

Prior to conducting our geotechnical field exploration and laboratory testing program, Fugro reviewed relevant available information relating to geotechnical, geologic, and seismic

data, as well as results of previous explorations performed within the campus property, including the following reports:

- "Preliminary Report, Soil Investigation, Proposed Science Building, College of Marin, Kentfield, California," dated June 16, 1966, prepared by Harding Miller Lawson & Associates (HMLA);
- "Report, Soil Engineering Services, Athletic Field, College of Marin, Kentfield, California," dated March 15, 1968, prepared by HMLA;
- "Foundation Recommendations, Light Towers, College of Marin Athletic Field, Kentfield, California," dated June 28, 1968, prepared by HMLA;
- "Report, Foundation Investigation, Harlan Center, College of Marin, Kentfield, California," dated December 13, 1968, prepared by HMLA;
- *Drainage of Marshland Area Lands of Marin Community College District, Kentfield, California*, dated November 13, 1974, prepared by Koretsky King Associates; and
- *Corte Madera Flood Control Project*, dated January 2000, prepared by US Army Corps of Engineers.

Exploration locations presented in previous reports within the project vicinity are plotted on the *Site Plan and Geologic Map*, Plate 3. Data from previous explorations were used in our general analysis of subsurface conditions and site geology.

2.2 FIELD EXPLORATION

2.2.1 General

One of the California Geologic Survey's (CGS's) requirements for a geologic hazard study and associated geotechnical assessment, is that there be one subsurface exploration point (e.g., borehole, cone penetrometer sounding, etc.) for every 5,000 square feet of proposed building footprint area, with a minimum of two exploration points per building. Previously completed exploration points can be used to partially satisfy this requirement if the exploration method utilized (drilling and sampling techniques) is acceptable by today's standards. The subsurface explorations completed by previous investigators during the 1960s for the campus structures provide some information concerning properties of the subsurface materials and the transitions between material types, but the borings were generally not performed using drilling and sampling methods that would be acceptable by today's standards, and would be of limited use.

Should detailed assessment of individual structures, or locations for new structures, within the Kentfield Campus be required, a subsurface exploration program that satisfies CGS's criteria for minimum number of exploration points would be developed.

2.2.2 Current and Previous Studies

Fugro conducted 23 exploratory borings for a pavement condition study, and a preliminary geotechnical assessment of materials adjacent to Corte Madera Creek and at the Larkspur Annex, as a part of the geotechnical study for the project. The field exploration was conducted between October 28, 2005, and November 3, 2005. The exploratory borings, designated B-1 through B-23, were drilled with a truck-mounted drill rig. Borings B-1, B-14, B-16, and B-17 were drilled to depths of 20½, 38, 25½, and 20½ feet, respectively, using hollow-stem augers. Boring B-14, drilled adjacent to the south side of Corte Madera Creek near the site for a proposed bridge, was completed as a 2-inch-diameter open-standpipe piezometer for monitoring of the groundwater elevation. All other borings extended to depths of between 5 and 6½ feet below the existing ground surface and were drilled using solid flight augers. The information gathered from the shallow borings was used to prepare a pavement analysis for the campus, the results of which are presented in a separate report. Additionally, on October 28, 2005, we performed two probes, B-8A and B-14A, using a 3-inch-diameter solid-flight auger. B-8A and B-14A extended to depths of 3½ and 17 feet, respectively, and were for determining the possible presence of Indian midden or other artifacts at these locations. The locations of the exploratory borings are shown on the *Site Plan and Geologic Map*, Plate 3.

Six, previous borings were performed by Harding Miller Lawson & Associates (HMLA) in 1966. These borings were performed for a science building that was proposed in the current parking lot 4. These borings were drilled to depths of 21½ to 36 feet with a 16-inch-diameter bucket auger. In March 1968, HMLA performed six borings extending to depths of between 30 and 60½ feet in the area of the current track. These previous borings were drilled with rotary wash drilling equipment. Five additional previous borings were performed by HMLA in December 1968 for the Harlan Center. These previous borings were drilled with a 6-inch-diameter flight auger to depths of between 21½ and 27½ feet. Since these borings were performed, significant grading and construction has occurred at the site. A summary of subsurface conditions encountered in the current, and the previous borings as applicable, is presented in Section 4.0. The approximate locations of previous borings are shown on the *Site Plan and Geologic Map*, Plate 3.

Reference was made in various structural design drawings for the campus buildings to geotechnical reports prepared by HMLA for various other Kentfield Campus buildings, including the Fine Arts Center, Physical Education Center, Learning Resource Center, and the existing Science Center. None of these reports were in the District's files. Therefore, no subsurface data from these investigations could be utilized for this report.

Logs of the recent exploratory borings and details regarding the field exploration are included in Appendix A. The subsurface conditions encountered in the exploratory borings are summarized in Section 4.2.

2.3 LABORATORY TESTING

Geotechnical laboratory testing was conducted on the soil samples collected from the recently completed borings at Fugro's soil mechanics laboratory in Oakland, California. The

geotechnical laboratory test program included: classification tests (fines content, Atterberg limits, water content, unit weight) and R-value testing for the pavement study. The results of the laboratory tests are presented on boring logs (Appendix A) at the appropriate sample depths, and in Appendix B, *Laboratory Test Results*.

Due to the presence of hydrocarbon odor, one soil sample recovered from Boring B-1 at a depth of 10½ feet was delivered to McCampbell Analytical, Inc., in Pacheco, California, for environmental testing. Tests included TPH-g, TPH-d, TPH-mo, and LUFT 5 Metals. It is noted that this sample was not preserved in conformance to standard environmental sampling protocol prior to delivery to the testing laboratory due to the unanticipated discovery of this material.

2.4 CORROSION TESTING

Corrosion testing was also conducted on four selected samples at Cerco Analytical, Inc., in Pleasanton, California. Four samples were retrieved from Borings B-2, B-15 and B-18. The depths at which the corrosion tests were conducted are shown on the boring logs provided in Appendix A, and the corrosion test results are discussed below.

2.4.1 Tests for Buried Concrete

Soluble sulfate concentration, chloride ion concentration, and pH tests were performed on the three samples. These tests provide an indication of the corrosion potential of the soil environment on buried concrete structures. The table below presents the depth at which the samples were collected and the laboratory test results.

Test No.	Sample	Sulfate (mg/kg)	Chloride (mg/kg)	pH
1	B-2 @ 2.5-3 ft	ND	ND	7.5
2	B-15 @ 2.5-3 ft	ND	ND	7.0
3	B-18 @ 2-2.5 ft	16	1,700	7.2

N.D. = None Detected

Based on guidelines presented by the Portland Cement Association (PCA) in their publication, *Design and Control of Concrete Mixtures* (13th Edition, 1990) and on the *1997 Uniform Building Code* (UBC), cement used to construct below grade concrete structures will be subjected to a moderate degree of sulfate exposure if the measured sulfate levels exceeds 150 mg/kg. Based on CERCO Analytical, Inc.'s, (CERCO's) evaluation, the detected sulfate ion concentrations range from ND to 16 mg/kg. The sulfate concentration from the three samples was determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

Based on CERCO's evaluation, chloride ion concentrations range from non-detectable (ND) to 1,700 mg/kg. Because the chloride ion concentration in B-18 is greater than 300 mg/kg, the soil is determined to be sufficient to corrode the steel embedded in a concrete mortar coating.

Based on CERCO's evaluation, the pH of the soils tested ranges from 7.0 to 7.5, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

For specific long-term corrosion control design recommendations, we recommend that a corrosion engineer evaluate the corrosion potential of the soil environment on buried concrete structures and steel pipe coated with cement-mortar.

2.4.2 Tests for Buried Ferrous Metals

In addition to the pH tests described above, the resistivity and redox tests were performed on the same soil samples as discussed above. These tests may be evaluated together to provide an indication of the corrosion potential of the soil environment on buried ferrous metals such as steel or cast-iron pipes. The results of these tests are presented in the table below.

Test No.	Sample	Resistivity (ohm-cm)	Redox potential (mV)
1	B-2 @ 2.5-3 ft	10,000	460
2	B-15 @ 2.5-3 ft	7,400	470
3	B-18 @ 2-2.5 ft	250	470

Based on the resistivity measurement, CERCO classified soil sample No. 3 as "severely corrosive". Sample No. 2 was classified as "moderately corrosive", and sample No. 1 as "mildly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron pipeline should be protected against corrosion as well.

The measured soil reduction-oxidation (redox) potentials for the three samples ranged from 460 to 470 mV. CERCO classified these samples as being indicative of aerobic soil conditions. Appendix C presents the complete results of corrosion tests and recommendations provided by CERCO.

3.0 BACKGROUND AND GEOLOGIC SETTING

3.1 REGIONAL GEOLOGIC SETTING

The Kentfield Campus is located within the Coast Ranges Geomorphic Province in Northern California. The general geology of the site vicinity is presented on the *Regional Geologic Map*, Plate 4. The Coast Ranges province is characterized by a series of tectonically driven events that includes development of generally northwest-trending faults and folds, erosion and deposition. The Bay Area experienced uplift and faulting in several episodes during late Tertiary time (about 25 to 2 million years ago) producing a series of northwest-trending

valleys and mountain ranges, including the San Francisco Peninsula, the Diablo Range, and the intervening San Francisco Bay. During this time, the process of erosion was cutting down the relative high areas and the eroded materials were being deposited in the low-lying areas as sand, gravel and clay alluvium. The existing landscape we see today is the result of these processes taking place over millions of years. These same geological processes of bedrock erosion in the upland areas and deposition of alluvium within lowland areas are continuing today.

3.2 TECTONIC ENVIRONMENT AND REGIONAL GEOLOGY

During the period between approximately 140 million to about 28 million years ago, a subduction zone existed along western North America, and belts of oceanic rock were accreted to northern California along the active subduction-zone margin (Harden, 2001). The subduction zone was in the approximate position of the Coast Ranges about 100 million years ago, and fragments of the oceanic crust that collided with North America at that time are currently present in the Coast Ranges as the Franciscan Complex. The Franciscan Complex rocks form the heart of the Coast Ranges, and are found in two northwest-trending belts that are composed of a number of geologic terranes that were juxtaposed and mixed during subduction and accretion along the North American margin. These rocks originate from a variety of sources including volcanic and sedimentary rocks formed on seamounts, deep oceanic crust, deep ocean floor sediments, and sediments deposited in trenches. Among these rocks are altered submarine basalts, radiolarian chert and minor limestone, with the most abundant rock types being mudstone and greywacke (sandstone) deposited as turbidite sequences. Metamorphic rocks found in the Franciscan include blueschist and eclogitic rocks, with serpentinite found along fault zones and within the matrix of mélange units. Contacts between these different types of rock are considered fault contacts.

The Franciscan rocks can be roughly divided into three units called the Coastal Belt, Central Belt and Eastern Belt. Marin County and the Kentfield Campus property is located within the Central Belt of the Franciscan that is considered primarily a mélange that generally consists of blocks of submarine basalt, blueschist, chert and resistant greywacke (sandstone) present within a matrix of highly sheared weaker rock material. This rock matrix material can include shale, argillite, siltstone, serpentinite and sandstone, much of which may be sheared to the consistency of a soil (Medley 1994, 2001). The Central Belt in Marin County was estimated by Medley (1994) to be comprised of blocks of greywacke (60–70%), volcanic rocks (15-20%), serpentinite (15-20%), chert (5-10%), with the remaining blocks consisting of rare limestone and exotic metamorphic rock. The blocks may also be composed of intact siltstone and sandstone/siltstone sequences.

3.3 SEISMICITY

Kentfield Campus is located in the San Francisco Bay Area, which is considered one of the most seismically active regions in the United States. Significant earthquakes have occurred in the San Francisco Bay Area and are believed to be associated with crustal movements along a system of subparallel fault zones that generally trend in a northwesterly direction. The campus location is shown with respect to the locations of many of these faults on the *Regional*

Fault Location Map, Plate 5, and *Regional Epicenter Map*, Plate 6. The project site is located in Seismic Zone 4, and is not located in a State Designated Fault-Rupture Hazard Zone established in accordance with the Alquist-Priolo Earthquake Fault Zoning Act.

Earthquake intensities will vary throughout the Bay Area depending upon the magnitude of earthquake, the distance of the site from the causative fault, and the type of materials underlying the site. The site will be subjected to at least one moderate to severe earthquake that will cause strong ground shaking.

Since the early 1800s, major earthquakes have been recorded along the San Andreas fault system. Table 1 presents large magnitude (M_w>6.0) regional earthquakes that are suspected to have occurred within 100 miles of the site from 1800 to 2002, and Table 2 presents historic earthquakes (M_w>4.0) that occurred within 10 miles of the site.

Table 1. Large Magnitude (M_w>6.0) Regional Earthquakes Within 100 Miles of the Site

Epicenter Location	Date	Moment Magnitude	Distance (mi)	Distance (km)	Compass Direction to Epicenter
San Francisco	June 21, 1808	6.3	11.0	17.8	South
San Francisco	April 18, 1906	8.3	17.8	28.7	South
Mare Island	March 31, 1898	6.5	18.8	30.2	Northeast
San Francisco Peninsula	June 1, 1838	7.0	25.8	41.6	South
Hayward	October 21, 1868	6.8	30.2	48.6	Southeast
Unavailable	May 19, 1889	6.0	35.5	57.1	East
Vacaville	April 19, 1892	6.4	42.8	68.9	Northeast
Fremont	November 26, 1858	6.1	47.4	76.3	Southeast
Dixon	April 21, 1892	6.2	51.6	83.0	Northeast
South Santa Cruz Mountains	October 8, 1865	6.5	57.5	92.6	Southeast
1984 Morgan Hill	April 24, 1984	6.1	64.0	102.9	Southeast
1911 Morgan Hill	July 1, 1911	6.5	65.5	105.3	Southeast
Loma Prieta	October 18, 1989	7.0	73.2	117.8	Southeast
Gilroy	June 20, 1897	6.2	87.5	140.8	Southeast
Unavailable	April 24, 1890	6.0	89.5	144.1	Southeast
Pacific Ocean	October 22, 1926	6.1	93.5	150.5	South
Unavailable	October 18, 1800	7.0	94.5	152.0	Southeast
Pacific Ocean	October 22, 1926	6.1	97.9	157.5	South

Table 2. Historic Earthquakes (M_w>4.0) Within 10 Miles of the Site

Epicenter Location	Date	Moment Magnitude	Distance (mi)	Distance (km)	Compass Direction to Epicenter
Mount Tamalpais	January 7, 1926	4.0	2.6	4.3	Southwest
Mount Tamalpais	September 18, 1902	4.6	4.7	7.5	Southwest
Bolinas	August 18, 1999	4.5	8.1	13.0	Southwest
San Pablo Bay	June 30, 1893	4.6	8.7	14.0	Northeast

The computer program EQSEARCH, v3.00, was used to access the historical seismicity information presented in Tables 1 and 2. The site is shown with respect to the locations of historical earthquake epicenters on the *Regional Epicenter Map*, Plate 6.

Table 3 presents San Francisco Bay Area fault parameters published by the State of California Geological Survey (formerly the California Division of Mines and Geology, [CDMG]). These parameters are used to evaluate seismic hazards pertaining to San Francisco Bay Area faults. The site is not located within a Fault-Rupture Hazard Zone as established by the Alquist-Priolo Earthquake Fault Zoning Act.

Table 3. San Francisco Bay Area Fault Parameters

Fault System Generating Earthquake	Fault Length (km)[1]	Distance To Nearest Segment of Fault from Site (km)	Upper Bound Earthquake Mw_{max}[1]	Slip Rate (mm/yr)[1]
San Andreas (North Coast South)	190	12.1	7.4	24.0
Hayward (Northern)	35	16.6	6.4	9.0
Rodgers Creek	62	17.8	7.0	9.0
San Andreas (Peninsula)	85	18.8	7.1	17.0
San Gregorio (North)	110	21.4	7.2	7.0
Point Reyes	47	24.8	7.0	0.3
Hayward (Southern)	53	32.7	6.7	9.0
West Napa	30	35.3	6.5	1.0
Concord	17	42.4	6.2	4.0
Green Valley (South)	25	42.4	6.2	5.0
Mount Diablo Thrust	25	45.5	6.6	2.0
Green Valley (North)	14	48.7	6.2	5.0
Calaveras (Northern)	45	49.7	6.8	6.0
Monte Vista-Shannon	45	62.9	6.7	0.4
Hunting Creek - Berryessa	60	63.0	7.1	6.0
Greenville (North)	27	63.2	6.6	2.0
Great Valley 5	28	68.2	6.5	1.5

Fault System Generating Earthquake	Fault Length (km)[1]	Distance To Nearest Segment of Fault from Site (km)	Upper Bound Earthquake Mw_{max} [1]	Slip Rate (mm/yr)[1]
Great Valley 4	42	68.6	6.6	1.5
Maacama - Garberville	182	69.6	7.5	9.0
Greenville (South)	24	83.0	6.6	2.0
Calaveras (Central)	59	86.1	6.2	15.0
Collayomi	29	91.7	6.5	0.6
Great Valley 3	55	92.5	6.9	1.5
Great Valley 7	45	93.1	6.7	1.5
San Andreas (Santa Cruz Mtn)	62	98.5	7.0	17.0

[1] CGS (2003) California fault parameters from www.consrv.ca.gov/CGS/rghm/psha/index.htm

3.4 SITE HISTORY

The campus is located downslope, and east, of Mount Tamalpais on property that was formerly Butler Estate. Mount Tamalpais provided the scenic background for the campus that was interspersed with a wide variety of trees that were an outstanding characteristic of the Butler Estate. An initial campus plan was developed in 1938 by landscape architect Horace Cotton, that utilized the vast collection of trees and backdrop of Mount Tamalpais as the focus of the design. The first permanent campus structure, called the Tamalpais Center, was purchased by the College, and is believed to have inspired the early architectural style on the campus. Early structures were designed with the “Art Deco Missionesque” style that included pastel stucco walls, terra cotta tile roofs, accompanied by classical style columns with semi-circular arches. The Administrative Center and Fusselman Hall are remnants of campus structures displaying this architectural style. The apparent theme building for the campus was Harlan Hall that was demolished in 1969 and replaced with the present building in 1971.

During the later 1960s and the early 1970s, a number of other structures were added to the campus. These structures included the Austin Science Center, the Compton Learning Resources Center, the Deedy Student Services Center, the Diamond Physical Education Center, and the Expansion to the Fine Arts Center. In the decades since the major construction period, there has been no major new construction on the Kentfield Campus other than expansion of parking lot facilities.

4.0 SITE CONDITIONS

4.1 SURFACE CONDITIONS

The primary campus facilities, and earliest developed portion of the Kentfield Campus, is sited on a southwest-trending spur ridge off of a prominent northwest trending ridge that locally provides the northeast boundary of Ross Valley, as shown on the *Local Topographic Map*, Plate

2. Corte Madera Creek descends to the southeast through Ross Valley and passes along the base of the spur ridge along its path to San Francisco Bay. Campus development has extended beyond the spur ridge that is underlain by rock, into the alluvium filled valley area southwest of Corte Madera Creek. Some of the marshland area associated with the creek, to the southeast, and downstream toward San Francisco Bay, that allowed the flow of Corte Madera Creek to slow by meandering, has since been partially filled to allow for expansion of the campus, primarily a Physical Education Facility with a swim center, track, baseball and soccer fields, the Larkspur Annex, and associated parking areas.

Flood control concerns required that the Corte Madera Creek channel, which is under tidal influence, be lined with concrete within the reach above and through the campus. Development of the marsh area required further containment of the creek within lined channels, and abandonment of the formerly meandering path.

The campus is generally reached from along the northwest trending Sir Francis Drake Boulevard, although entrance to the campus and the parking lots is primarily from College Avenue and Laurel Avenue that extend to the southwest off of Sir Francis Drake Boulevard. College Avenue passes over Corte Madera Creek to reach the southern portion of the campus. The southwest boundary for the campus is Kent Avenue, which merges with College Avenue near the southern end of the campus development, transitioning to Magnolia Avenue. Additional parking lots not within the main campus are located to the northeast of Sir Francis Drake Boulevard, northwest of Laurel Avenue and southwest of Kent Avenue. A bridge within the campus provides access for vehicles and pedestrians across Corte Madera Creek.

Topographically, the highest point within the campus is at the northeast corner of Parking Lot 2 at about Elevation 45 feet, as shown on the *Site Plan and Geologic Map*, Plate 3. The central portion of the campus along the spur ridge is located at about Elevation 30 feet. Along the south side of the concrete-lined Corte Madera Creek, the alluvial soils in this area generally range from between Elevation 10 feet and Elevation 15 feet. East of College Avenue, in the former marshland area filled to provide for construction of the various physical education facilities and the Larkspur Annex, the ground surface generally ranges from between Elevation 5 feet to Elevation 10 feet.

Vegetation within the upland portion of the site consists of various groves of redwood trees, along with a large variety of other tree types that were part of the attraction of the Butler Estate property. The corridor along Corte Madera Creek is lined with tall trees, but the number of trees along the creek has been reduced over time.

4.2 SUBSURFACE CONDITIONS

The location of the features and subsurface exploration points discussed below, can be seen on the *Site Plan and Geologic Map*, Plate 3.

4.3 SUBSURFACE CONDITIONS

4.3.1 Taqueria

According to Boring B-1, the pavement section encountered in the Taqueria parking lot near the corner of Sir Francis Drake Boulevard and College Avenue consisted of about 3½ inches of asphalt concrete (AC) over 4½ inches of aggregate baserock (AB). Below the pavement section, we encountered fill consisting of medium dense gravel to about 2½ feet and medium dense silty sand to about 8 feet. Below the fill layer, we encountered residual soil to a depth of about 14 feet. The residual soil consisted of medium dense clayey sand. Medium hard sandstone was encountered between depths of about 14 feet and the maximum depth explored of about 20½ feet below the ground surface.

4.3.2 Parking Lot 2, East Side of Parking Lot 3, and Harlan Center Area

Borings B-2 through B-4 and Previous Borings PB-1 through PB-5 (HLA, 1968) were performed in the areas of Parking Lot 2, Parking Lot 3 (eastern, upper half) and the Harlan Center. Pavement sections in the parking lots consisted of 2 inches of AC over 3 to 6 inches of AB. Below the pavement and ground surface, these borings encountered 3 to 5 feet of soft to very stiff sandy silt underlain by 7 to 12 feet of medium dense to dense clayey sand. Below the clayey sand, borings encountered stiff to very stiff sandy clay which extended to the maximum depth explored of 27½ feet below the ground surface. About 1 foot of very dense clayey sand was encountered in Previous Boring PB-5 at a depth of 22½ feet. The upper 5 feet in the parking lots generally consisted of stiff to hard sandy clay and silt.

4.3.3 West Side of Parking Lot 3 and Parking Lot 4

Based on Boring B-5, the pavement section on the west side of Parking Lot 4 consisted of 2½ inches of AC over 6 inches of AB. Based on Borings B-6 and B-7, the pavement section in Parking Lot 4 consisted of 5 inches of AC over 6 inches of AB. The subsurface soils encountered in the Parking Lot 3 area consisted of firm to stiff sandy clay which extended to a depth of 5 feet. Previous Borings PB-1 through PB-7 (HLA, 1966), were performed in the area of Parking Lot 4. In Parking Lot 4, the near surface soils consisted of 3 to 6 feet of fill. The fill consisted of firm to stiff sandy clay and medium dense to dense clayey sand and gravel. Below the bottom of the fill layer (Elevation 8 to 10 feet), the subsurface materials encountered consisted of soft to stiff clay and sandy clay interbedded with loose to dense clayey and silty sand and gravel which extended approximately to Elevations -15½ to -18 feet. This material extended only to an Elevation of -2½ feet in Previous Boring PB-1. Below these elevations, the previous borings encountered hard sandstone and shale, which extended to the maximum depth explored of between about 21½ and 36 feet.

4.3.4 Fusselman Hall

Boring B-8 was performed at the southwest end of Fusselman Hall. This boring encountered weak and friable sandstone from below the thin asphalt concrete pavement to the maximum depth explored of 3 feet.

4.3.5 Proposed Bridge Crossing

Borings B-14-A and B-14 were advanced in Parking Lot 15 near the southwest side of Corte Madera Creek. The subsurface materials encountered in this area consisted of 5 to 6½ feet of fill extending to Elevations 4 to 5½ feet. The fill consisted of stiff sandy clay and loose clayey sand. Below the fill, we encountered marsh deposits consisting of firm to stiff lean to fat clay and sandy clay. The marsh deposits extended to depths of 13 to 25 feet below the ground surface (Elevations -2½ to -14½ feet). Below a depth of 25 feet, we encountered very loose to loose clayey sand. The sand became medium dense at a depth of 35 feet (Elevation -24½ feet). Claystone was encountered at a depth of 35 feet and extended to the maximum depth explored of 38 feet.

4.3.6 Parking Lots 6 and 7

Five-foot deep borings performed in Parking Lots 6 and 7 encountered 3 to 4½ inches of AC over 5 to 10 inches of AB. Below the pavement section, the borings encountered firm to very stiff sandy clay and silt to depths of 3 to 5 feet. Below this material, we encountered stiff to hard fat clay. On the western side of Parking Lot 7, we encountered medium dense clayey sand below the pavement.

4.3.7 Physical Education Area

Pavement sections in this area consisted of 2 to 3½ inches of AC over 4 to 8 inches of AB. Below the pavement, fill was found to extend to depths of 3 to 5 feet. The fill consisted of loose clayey sand to sand, stiff sandy clay, and medium dense clayey gravel. Below the fill, we encountered marsh deposits consisting of soft to stiff fat clay which extended to the bottom of the 5-foot borings.

Previous Borings PB-1 through PB-6 (HLA, 1968), were performed in the track area prior to development. These borings encountered 0 to 6 feet of soft to firm sandy clay fill over marsh deposits and alluvium. These materials generally consisted of soft clays and loose to medium dense clayey sand, which extended to the maximum depth explored of about 60½ feet (Elevation -57 feet). Sandstone was encountered in PB-5 below a depth of 35 feet (Elevation -31½ feet).

4.3.8 Larkspur Annex

Borings B-16 and B-17 in the Larkspur Annex encountered near surface fills. The fill consisted of 3½ to 7 feet of medium dense to very dense clayey sand. Marsh deposits consisting of very soft to soft fat clay extended to depths of about 21 feet in Boring B-16, and 10 feet in B-17. Below the marsh deposits, medium dense gravel with clay and sand was encountered in Boring B-16 to a depth of 25 feet. Very stiff clay with sand and fat clay was encountered in Boring B-17 between depths of about 10 and 19 feet. Sandstone and claystone were encountered in Borings B-16 and B-17 at depths of 25 and 19 feet, respectively, and extended to the maximum depths explored of 25½ and 20½ feet, respectively.

4.3.9 Parking Lot 15

The pavement section encountered in parking Lot 15 consisted of 3 to 3½ inches of AC over 4 to 5½ inches of AB. Below the pavement, stiff to very stiff clay with sand and medium dense clayey sand and gravel were encountered to a depth of 5 feet below the ground surface.

The attached boring logs and related information depict location specific subsurface conditions, encountered during our field investigation. The approximate locations of the borings were determined by pacing and should be considered accurate only to the degree implied by the method used. The passage of time could result in changes in the subsurface conditions due to environmental changes. It is noted that most, if not all, of the campus improvements were done after completion of the previous borings and a portion of the subsurface materials encountered may have been removed or fill may have been placed above the locations. Site specific borings should be performed at each structure to verify the current conditions and to satisfy CGS requirements.

4.4 SITE GEOLOGY

As discussed in Section 3.2, *Regional Geology and Tectonic Setting*, Marin County and the Kentfield Campus property are located within the Central Belt of the Franciscan Formation. This formation is considered primarily a mélange that generally consists of blocks of submarine basalt, blueschist, chert and resistant greywacke (sandstone) present within a matrix of highly sheared weaker rock material. The blocks may also be composed of intact siltstone and sandstone/siltstone sequences. As shown on the *Regional Geologic Map*, Plate 4, the Kentfield Campus has been generally mapped by Blake, et al. (2000) as being located on a block of Cretaceous age sandstone and shale (Kfs) that is surrounded by mélange matrix materials, or sheared rock, noted on this geologic map as mélange (fsr). Southwest and downslope of the sandstone and shale block, Blake, et al. (2000) have mapped alluvium (Qal) associated with Corte Madera Creek and downstream along the creek toward the southeast, they have mapped the area as artificial fill over marine and marsh deposits (Qmf). Geologic mapping of the area performed at a larger scale by Rice, et al. (1976), generally agrees with the more recent mapping, although the spur ridge on which the main campus structures are located is shown as underlain by Franciscan sandstone and shale.

The *Site Plan and Geologic Map*, Plate 3, presents the geology of the Kentfield Campus as mapped during our geologic field reconnaissance and through our study of stereo-paired aerial photographs. Sandstone and shale rock for the Franciscan (KJfs) underlie the upslope portion of the campus, and the most of the mapped slopes to the west and southwest of the campus. Franciscan mélange matrix (KJfm) was found within the mapped area on the slope at the west end of Parking Lot 15, west of Kent Avenue. A colluvial filled swale (Qc) was found between the shale and sandstone (KJfs) and mélange (KJfm) at the west end of Parking Lot 15. Alluvial materials (Qal) associated with Corte Madera Creek and its upslope tributaries, were present along Laurel Avenue and within the lower elevation portion of the campus northeast of Corte Madera Creek. The area south of the creek was underlain by alluvial soils that continued to the south and southeast past College Avenue, eventually transitioning to fill materials placed over the marsh deposits (Qf/Qm) to facilitate development of the Larkspur Annex, and Physical

Education Center and associated playing fields and facilities. Marsh deposits (Qm) were encountered beneath the alluvial materials (Qal) in many locations. Other notable deposits of fill were also mapped on Plate 3; these included fills placed adjacent to Corte Madera Creek for wall backfill and to create developable areas. Other fills were noted for development of Parking Lot 15, and apparent fills below the Maintenance Shop and Maintenance Office along Kent Avenue.

4.5 SURFACE GEOLOGIC RECONNAISSANCE

A reconnaissance of the Kentfield campus was performed by our Certified Engineering Geologist to map the site geology, and to observe conditions along Corte Madera Creek and within the filled areas at the south side of the campus. The reconnaissance included the perimeter parking areas and areas within the marshlands by the Larkspur Annex and Athletic Fields to the limits of the College of Marin property. The discussion presented under Section 4.3, *Site Geology*, and the geologic mapping presented on the *Site Plan and Geologic Map*, Plate 3, are a presentation of the pertinent portion of the information gathered during that reconnaissance.

4.6 GROUNDWATER

Groundwater was encountered in Fugro's Borings B-5, B-14, B-16, and B-17 at depths of 3½, 23, 19, and 14 feet (Elevations +11, -12½, -10½, and -4 feet), respectively. Fugro's Boring B-14, performed along the south side of Corte Madera Creek, was completed as an open-standpipe piezometer. During drilling, groundwater was measured in this boring at a depth of about 23 feet (Elevation -12½ feet). A subsequent groundwater measurement at a depth of 7 feet (Elevation +3.5 feet) was recorded in this piezometer on December 9, 2005. It should be noted that the water level within Corte Madera Creek is influenced by the tides within San Francisco Bay, and the groundwater elevation measured within the piezometer will also be influenced by those tidal fluctuations.

Groundwater was encountered in previous borings performed in 1966 at Parking Lot 4 at depths of 9 to 14½ feet, Elevations -2½ to +5 feet, respectively, at the time of drilling. At the Harlan Center, previous borings encountered groundwater at depths of 16½ to 21½ feet, Elevations 4½ to 13½ feet. In low-lying areas of the campus where marsh deposits are overlain by fill material, the groundwater table may be assumed to be at the top of the marsh deposits.

We note that fluctuations in the groundwater level could occur due to change in seasons, variations in rainfall, tidal influences, and other factors.

5.0 GEOLOGIC HAZARDS EVALUATION

Geologic hazards can be grouped into seismic and non-seismic categories. Seismic hazards can be further subdivided into surface fault offset, strong ground motion, and ground deformation hazard due to seismic shaking. Seismic ground deformation includes liquefaction, seismically induced waves, inundation due to dam or embankment failure, flooding hazard and

landsliding. Certain types of ground deformation and water movement, however, can also occur under non-seismic conditions, so there is some overlap between seismic and non-seismic hazards. In general, the list of potential geologic hazards can also include such rare occurrences as mine collapse, hydro-compaction, and peat oxidation, but these rare hazards do not warrant discussion in connection with the Kentfield Campus.

5.1 SURFACE FAULT OFFSET

5.1.1 Aerial Photograph Review

A Fugro State-of-California-Certified Engineering Geologist (CEG) reviewed historic, black and white, stereo-paired aerial photographs of the project site and vicinity to discern geomorphic evidence of geologic hazards. Aerial photographs were reviewed at Pacific Aerial Survey in Oakland, California. The stereo-paired aerial photographs reviewed for the project are listed in the reference section at the end of this report.

The earliest photographs viewed for the campus were from 1946. The spur ridge where the main campus buildings are located appears to extend steeply down to the tree lined Corte Madera Creek. A athletic field (track) was located at the current site of the Science Center, and a large building appears to be located southwest of the intersection of College Avenue and Corte Madera Creek. The Larkspur Annex area supported a number of buildings in similar locations to where they are today. The area where the athletic field currently exist was marsh area displaying older abandoned meanders, and small levees that may have contained ponds or acted as a type of flood control structure. The 1963 photographs indicated that some development had taken place in the Physical Education Center area, and buildings were present along Laurel Avenue. The spur ridge, where it descends to the creek, appears to have been cut, possibly to provide access along the base above the creek. By 1970, Corte Madera Creek had been converted to a concrete lined channel toward the east from College Avenue. The track was now located partially over the location of a previous meander, with other old, abandoned meanders still visible. The Physical Education Center appears as it does today. The parking lots to the northeast of Sir Francis Drake Boulevard had been constructed. Along Laurel Avenue, the Fine Arts Building had been constructed, requiring a cut above Laurel Avenue. The Student Services Building, Science Center and Maintenance Shop 2 were now present. The dense growth of trees lining Corte Madera Creek appears substantially thinner that observed in the earlier photos.

Corte Madera Creek was completely lined with concrete through the full reach extending through the campus as observed in the 1975 photos. The baseball fields by the Larkspur Annex appeared relatively new in the 1982 photos, whereas, the same baseball fields began to appear deteriorated in the 1990 photos. The campus appeared much as it does today in the more recent photographs from 1995, 1999 and 2000.

5.1.2 Fault Rupture Hazard Zoning by the State

The Alquist-Priolo Earthquake Fault Zoning Act (Act) was signed into law December 22, 1972, and went into effect March 7, 1973. The purpose of the Act is to prohibit the location of

most structures for human occupancy across traces of active faults and to thereby mitigate the hazard of surface fault rupture. Under the Act, the State Geologist is required to delineate *Earthquake Fault Zones*, previously known as *Special Studies Zones*, along known active faults in California. All of the Earthquake Fault Zone maps issued prior to January 1, 1977, were based almost solely on the mapping and interpretations of others. Later maps were based extensively on interpretations of the Fault Evaluation and Zoning Program staff that presented their findings in *Fault Evaluation Reports* (FERs). The campus is not located within an area considered to have the potential for fault rupture hazard and is therefore not included in the Earthquake Fault Zones mapping. We consider the potential for surface fault rupture on the campus to be very low.

5.2 STRONG GROUND MOTION

A preliminary Probabilistic Seismic Hazard Assessment (PSHA) was performed based on the 2002 USGS/CGS probabilistic seismic hazard assessment model (revised 2003) found at http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamain.html. This model is for the Design Basis Earthquake (DBE), 10 percent probability of exceedance in 50 years (475-year return period) event. The model provides three values of ground motion, the peak ground acceleration (PGA) and spectral acceleration (Sa) at 0.2 second and 1.0 second periods. Plate 7, *Probabilistic Seismic Hazard Map*, presents the college site on the CGS probabilistic seismic hazard map. Results of our analysis are presented below. If individual buildings are to be assessed, a site-specific PSHA should be performed for each site taking into account local soil conditions. The site-specific analysis should include determination of both design basis earthquake (DBE) ground motions and Upper Bound Earthquake (UBE, 10 percent probability of exceedance in 100 years) ground motions.

Table 4. Seismic Design Parameters per 2002 USGS/CGS for Structures on Alluvium and Soft Rock

Ground Motion	Alluvium (S_D)	Soft Rock (S_C)
PGA	0.484	0.469
Sa (0.2 s)	1.160	1.091
Sa (1.0 s)	0.688	0.599

5.3 SEISMIC DESIGN BY CALIFORNIA BUILDING CODE (CBC)

Structures should be designed to resist the lateral forces generated by earthquake shaking in accordance with local design practice. This section presents seismic design criteria for the 2001 California Building Code (CBC).

Table 5. Seismic Design Parameters per 2001 CBC for Structures on Very Dense Soil (S_D) and Soft Rock (S_C)

Description	Parameter	1998 CBC Reference
Seismic zone	4	Plate 16A-2
Seismic zone factor (Z)	0.4	Plate 16A-I
Soil profile type	S_C or S_D	Plate 16A-J
Seismic Coefficients		
C_a (for S_c sites)	$0.40N_a$	Table 16A-Q
C_v (for S_c sites)	$0.56N_v$	Table 16A-R
C_a (for S_D sites)	$0.44N_a$	Table 16A-Q
C_v (for S_D sites)	$0.64N_v$	Table 16A-R
Near source factors		
N_a	1.0	Table 16A-S
N_v	1.12	Table 16A-T

The near source factor N_v is greater than unity as a result of the site's proximity to a Type A fault, San Andreas. The near source factors N_a and N_v are equal to unity at distances greater than or equal to 10 km and 15 km, respectively, from a Type A Near-source Zone.

5.4 SHAKING HAZARD

During a moderate to severe earthquake occurring on any of the previously mentioned active faults, strong ground shaking at the college will likely occur. Strong ground shaking not only can cause the structures to shake, but it also has the potential capability of inducing other phenomena that can indirectly cause damage to structures. These phenomena include soil liquefaction, seismically induced waves such as tsunamis and seiches, inundation due to dam or embankment failure, flooding, landsliding, and other shaking hazards such as lateral spreading, ground cracking, lurching and water movement. Detailed discussions of these phenomena with respect to the site are presented in the subsequent paragraphs.

5.4.1 Liquefaction

Soil liquefaction is a phenomenon primarily associated with saturated cohesionless soil layers located close to the ground surface. These soils lose strength during cyclic loading, such as imposed by earthquakes. During the loss of strength, the soil acquires "mobility" sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, uniformly graded, saturated, fine-grained sands that lie close to the ground surface; a depth usually considered less than 50 feet.

According to the Association of Bay Area Governments (ABAG) liquefaction susceptibility interactive map, Plate 8, found at http://gis.abag.ca.gov/website/liq/viewer.htm (ABAG 2003), the college is predominantly located in an area where the subsurface materials are considered to have a high to very high susceptibility for liquefaction. The San Rafael

quadrangle has not yet been mapped under California Geological Survey's Seismic Hazard Mapping Act.

Based on our interpretation of the materials encountered within our recent borings and within the previous borings by others, it is our opinion that potentially liquefiable materials are present beneath the project site, particularly below the portions of the campus underlain by alluvial soils and marsh deposits associated with Corte Madera Creek. Loose sand was encountered below marsh deposits in Boring B-14, between the depths of 24 and 33 feet, and loose sands were also present in the near-surface alluvial soils encountered in Borings B-11, B-12 and B-13. In addition, loose sands were identified below marsh deposits, between approximate depths of 20 and 40 feet, in previous borings drilled at the site of the track area, southeast of the Physical Education Center.

Where site-specific geologic hazard and geotechnical studies will need to be performed for buildings located in areas underlain by alluvial soils, and areas where fill materials have been placed over marsh deposits, the additional subsurface exploration will need to focus on determining the susceptibility to liquefaction of the subsurface materials in those areas. Of the existing major campus buildings, the Diamond Physical Education Center would need to be closely evaluated for liquefaction potential in the event future construction work is planned.

5.4.2 Seismically Induced Waves

During a major earthquake, strong waves such as tsunamis or seiches may be generated in large bodies of water and may cause damage to structures located in close proximity to them. The tsunami, or seismic sea wave, is an open ocean phenomenon caused by fault displacement, volcanism, or other abrupt movement on the ocean floor, that often occur at a considerable depth. According to the United States Geological Survey Maps Showing Areas of Potential Inundation by Tsunamis in the San Francisco Bay Region, California, dated 1972, the Kentfield Campus is not located within a zone designated for potential impact after a tsunami event.

The seiche is a wave that occurs in an enclosed basin as a result of fault displacement in the basin bottom, large landslides into the basin, or from periodic oscillation or sloshing of the water in the basin. No body of water susceptible to seiches is located in the vicinity of the campus that could impact the Kentfield Campus.

5.4.3 Inundation Due to Dam or Embankment Failure

According to the ABAG map of Dam Failure Inundation Hazard Map for Kentfield, Plate 9, found at http://www.abag.ca.gov/bayarea/eqmaps/damfailure/dammaps/srafdamf.gif (ABAG, 1995), the Kentfield Campus is located in an area that has potential of being impacted by inundation due to embankment failure from Phoenix Lake. Phoenix Lake's spillway is located at approximately Elevation 180 feet. Partial or complete failure of the embankment would send flood waters downslope to the northeast within Ross Creek and through the town of Ross. Sleepy Hollow Creek, that descends from the north into the town of Ross, converges with Ross Creek within the town of Ross adjacent to Sir Francis Drake Boulevard. The two creeks

combine for form Corte Madera Creek which continues the downslope descent to the southeast and past the College of Marin campus in Kentfield.

The actual impact to the campus of an embankment failure from Phoenix Lake would depend on many factors that include; extent of the embankment breach, pool elevation of the lake at the time of the breach, current flow level within the creek, current tidal influence, and the future of work to raise the walls of the channel along Corte Madera Creek. We understand that there are studies being performed to address this issue.

5.4.4 Flooding Hazard

Corte Madera Creek bisects the campus, with a relative upland area located to the northeast of the creek, and an alluvial floodplain area located southwest of the creek. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for unincorporated Marin County, effective March 1, 1982, the area of the campus within Kentfield and south and west of Corte Madera Creek is within a Zone A designated area. Zone A is defined as an area determined to be within the 100-year flood plain where base flood elevations and flood hazard factors are not determined. The areas to the north and east of Corte Madera Creek, and the Physical Education Center, are within an area designated as Zone C, or areas of minimal flooding. According to the FEMA map for Larkspur, effective March 15, 1984, the area to the south of parking lots 11 and 12 is either within Zones A1, A2, or B. Zones A1 and A2 are within the 100-year flood plain. The base flood elevations for Zones A1 and A2 are 6 and 7 feet, respectively. Zone B is an area between the limits of the 100-year and 500-year flood, or certain areas subject to 100-year flooding with average depths less than 1 foot or where the contributing drainage area is less than 1 square mile, or areas protected by levees from the base flood. Plate 10, *Flood Hazard Map*, shows the campus location plotted on the Flood Insurance Rate Map.

The majority of the campus is not within an area that may be inundated by a 100-year flood, according to a United States Geological Survey publication by Limerinos, et al., 1973. However, Limerinos did map the approximate area of the campus that FEMA mapped as Zones A1 and A2 as being an area that may be inundated by a 100-year flood.

This information is preliminary and is being refined by other team members as part of the current assessment of the college. Updated information from others will be included in a future version of this report when certain facilities are addressed on a site-specific basis.

5.4.5 Landsliding

The San Rafael quadrangle has not yet been mapped under California Geological Survey's Seismic Hazard Mapping Act which includes mapping of landslide hazard zones. Smith, et al (1976) include the lower portions of the campus, and the higher elevation portions of the campus as being in a Zone 1 area that is considered most stable. The slope between the highland and lowland portion of the campus was mapped as Zone 2, areas underlain by competent rock but flanked by relatively steep, potentially unstable slopes. The area along the west side of Parking Lot 15, mapped as mélange matrix (KJfm) as colluvium (Qc) on the *Site*

Plan and Geologic Map, Plate 3, is considered to be within a Zone 3 area. Smith, et al. (1976) define Zone 3 as areas where the steepness of the slopes approaches the limits of stability for the underlying geologic materials. Should a landslide occur in this area, no structures would be impacted, although the parking lot and vehicles parked in the vicinity of a possible landslide could suffer damage.

5.4.6 Other Shaking Hazards

We have also considered the possibility of the occurrence of other seismic hazards. Due to the site topography, and the absence of a free face near developed portions of the campus, even considering the moderate to high potential for liquefaction of the subsurface materials at the site, we consider the possibility for lateral spreading to impact buildings to be low. Lateral spreading could possibility occur within the undeveloped, southern portion of the campus where slopes consisting of fill materials border adjacent to sloughs within the tidal marsh.

Ground cracking and lurching are relatively unknown phenomena, and in our opinion, they can be caused by any of the phenomena discussed above.

We note that ground shaking during an earthquake could cause objects within buildings that are not rigidly attached to the building structure (such as desks and book shelves) to undergo some differential movements with respect to the structure. Building construction should include designs that reduce such potential differential movements and the adverse effects of such movements where they cannot be prevented.

6.0 CLOSING

This report has been prepared for the exclusive use of the Marin Community College District and their consultants for specific application to the Kentfield Campus. This report should be reviewed and updated for each specific campus improvement project. In the event that there are any changes in the ownership, nature, or design, of the project, the conclusions and recommendations contained in this report shall not be considered valid unless 1) the project changes are reviewed by Fugro West, Inc., and 2) conclusions and recommendations presented in this report are modified or verified in writing. Reliance on this report by others must be at their risk unless we are consulted on the use or limitations. We cannot be responsible for the impacts of any changes in engineering geologic standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for unconsulted use of segregated portions of this report.

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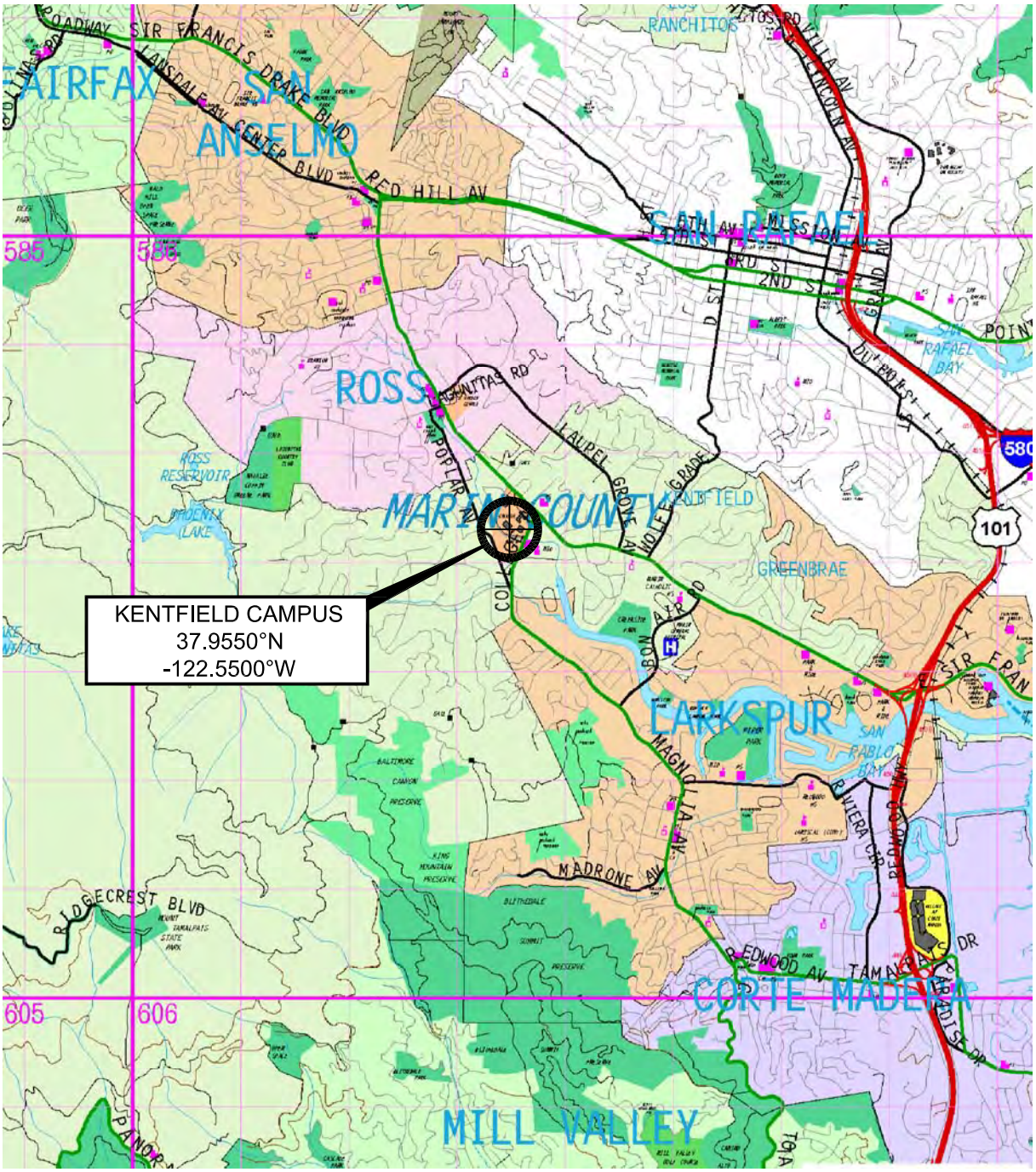
PLATES



SOURCE: This Base Map was based on 2006 Street Guide, Bay Area Counties, The Thomas Guide.

NORTH

0 4000 8000

FEET

SITE VICINITY MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 1

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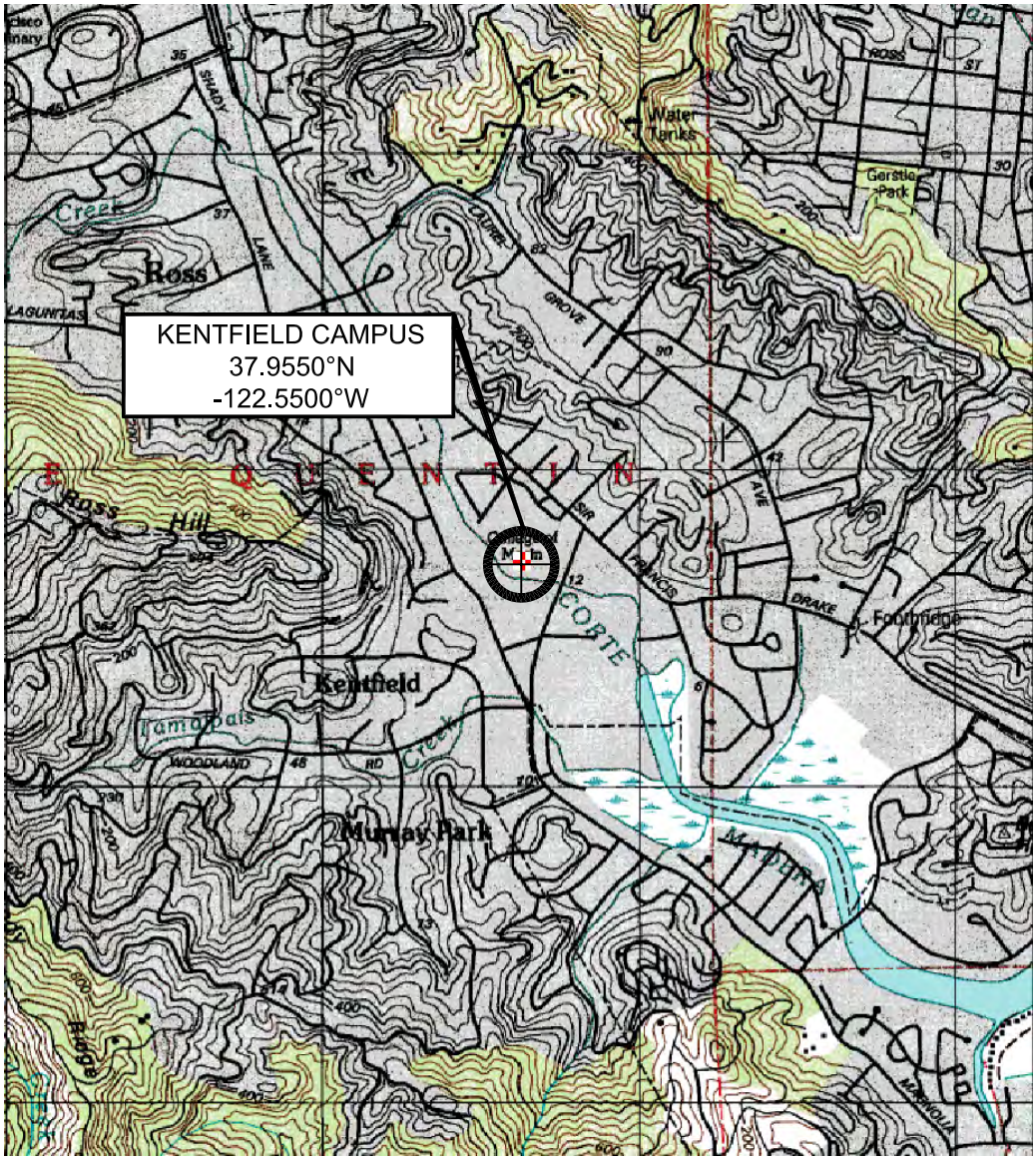

SOURCE: This Local Topographic Map was based on www.topo.com

NORTH

0 2000 4000

FEET

LOCAL TOPOGRAPHIC MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 2

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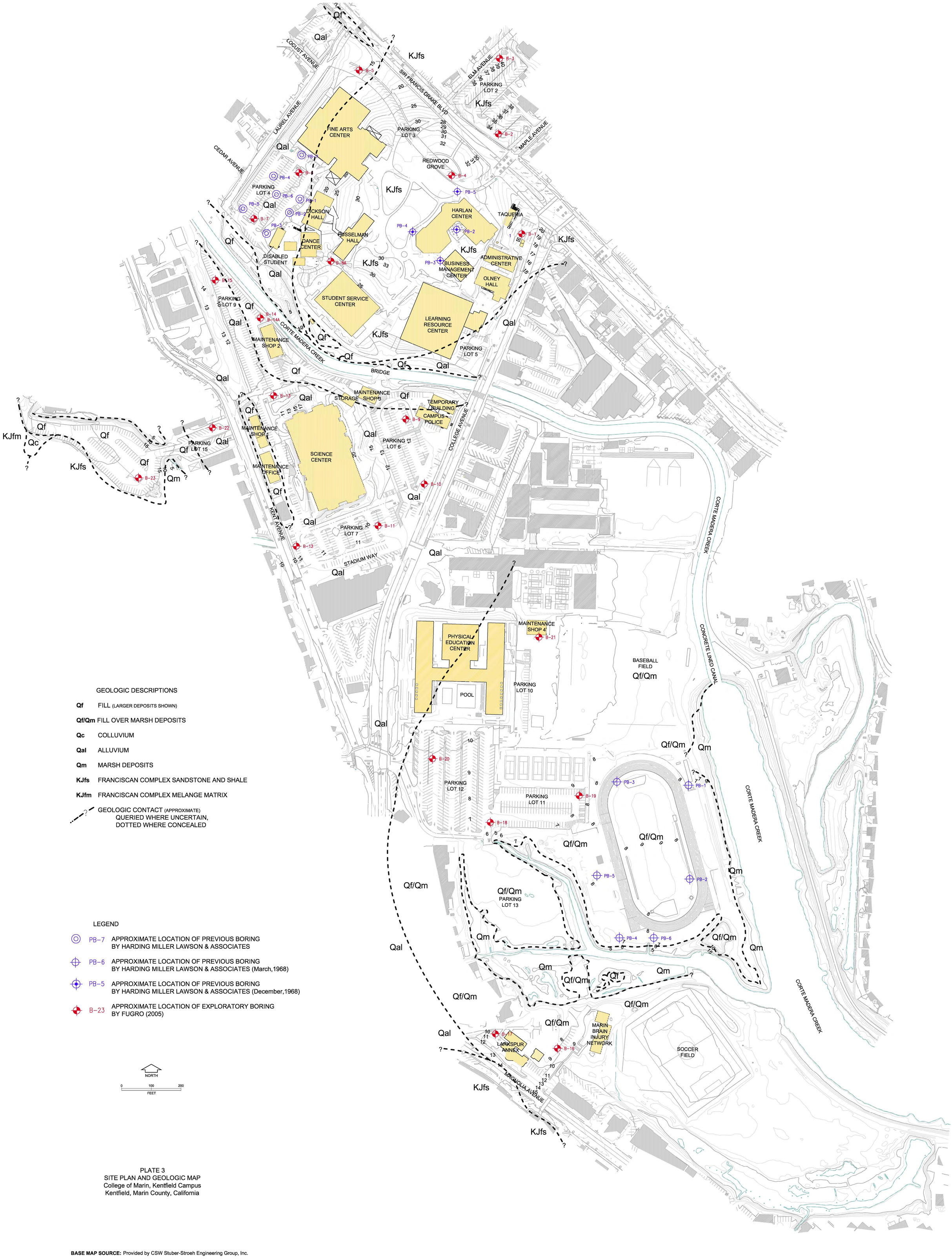

GEOLOGIC DESCRIPTIONS

Qf FILL (LARGER DEPOSITS SHOWN)

Qf/Qm FILL OVER MARSH DEPOSITS

Qc COLLUVIUM

Qal ALLUVIUM

Qm MARSH DEPOSITS

KJfs FRANCISCAN COMPLEX SANDSTONE AND SHALE

KJfm FRANCISCAN COMPLEX MELANGE MATRIX

GEOLOGIC CONTACT (APPROXIMATE)
QUERIED WHERE UNCERTAIN,
DOTTED WHERE CONCEALED

LEGEND

PB-7 APPROXIMATE LOCATION OF PREVIOUS BORING BY HARDING MILLER LAWSON & ASSOCIATES

PB-6 APPROXIMATE LOCATION OF PREVIOUS BORING BY HARDING MILLER LAWSON & ASSOCIATES (March,1968)

PB-5 APPROXIMATE LOCATION OF PREVIOUS BORING BY HARDING MILLER LAWSON & ASSOCIATES (December,1968)

B-23 APPROXIMATE LOCATION OF EXPLORATORY BORING BY FUGRO (2005)

PLATE 3
SITE PLAN AND GEOLOGIC MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

BASE MAP SOURCE: Provided by CSW Stuber-Stroeh Engineering Group, Inc.

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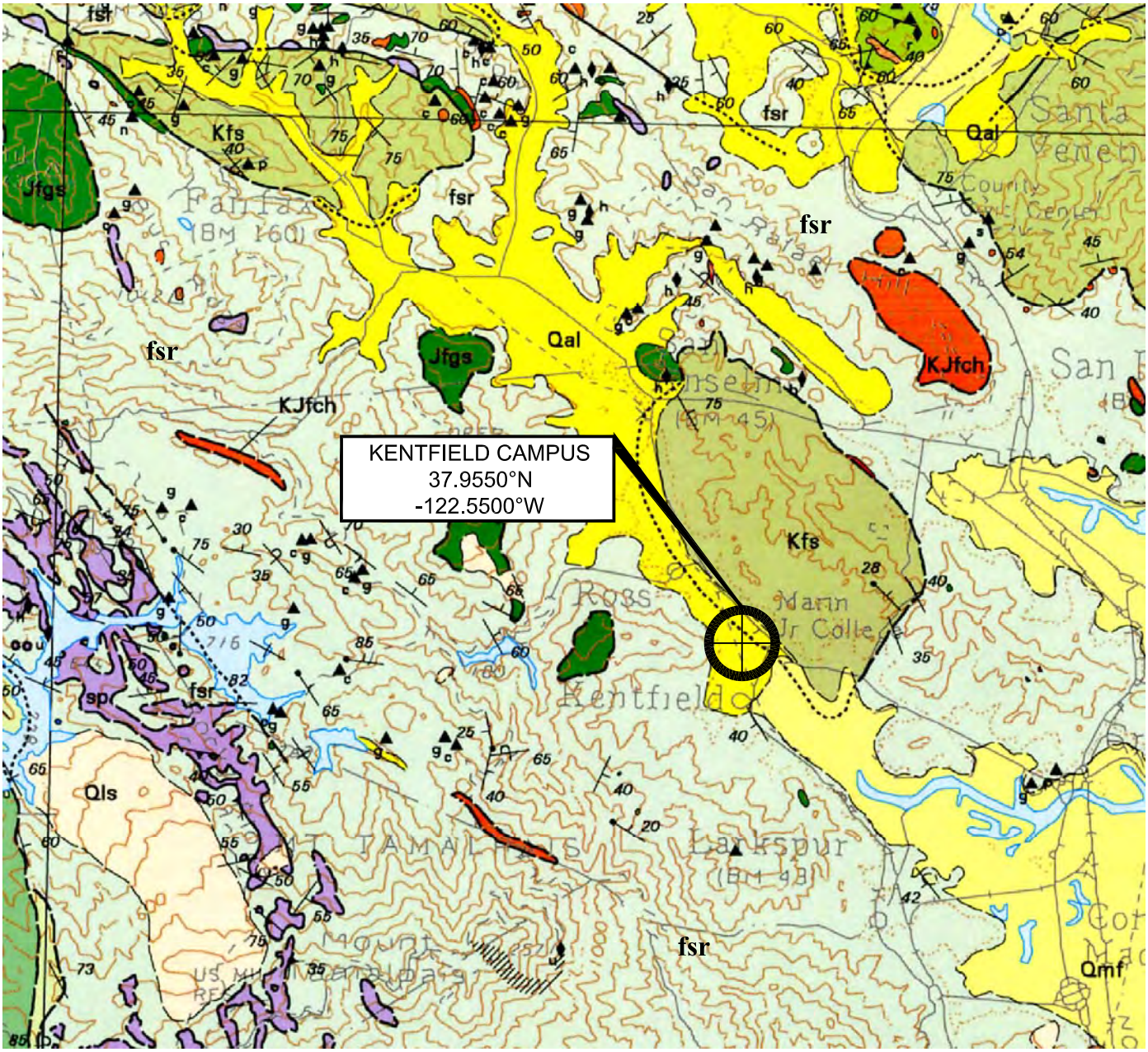

SOURCE: Geologic Map and Map Database of Parts of Marin, San Francisco, Alameda, Contra Costa, and Sonoma Counties, California by M.C. Blake Jr., R.W. Graymer, and D.L. Jones. Digital databse by Adam Soule and R.W. Graymer, 2000.

LEGEND:

	Franciscan Complex
Kfs	Sandstone and shale (Cretaceous)
fsr	Melange
Qal	Alluvium (Quaternary)
Qmf	Artificial fill over marine and marsh deposits (Quaternary)

NORTH

0 5000 10000

FEET

REGIONAL GEOLOGICAL MAP

College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 4

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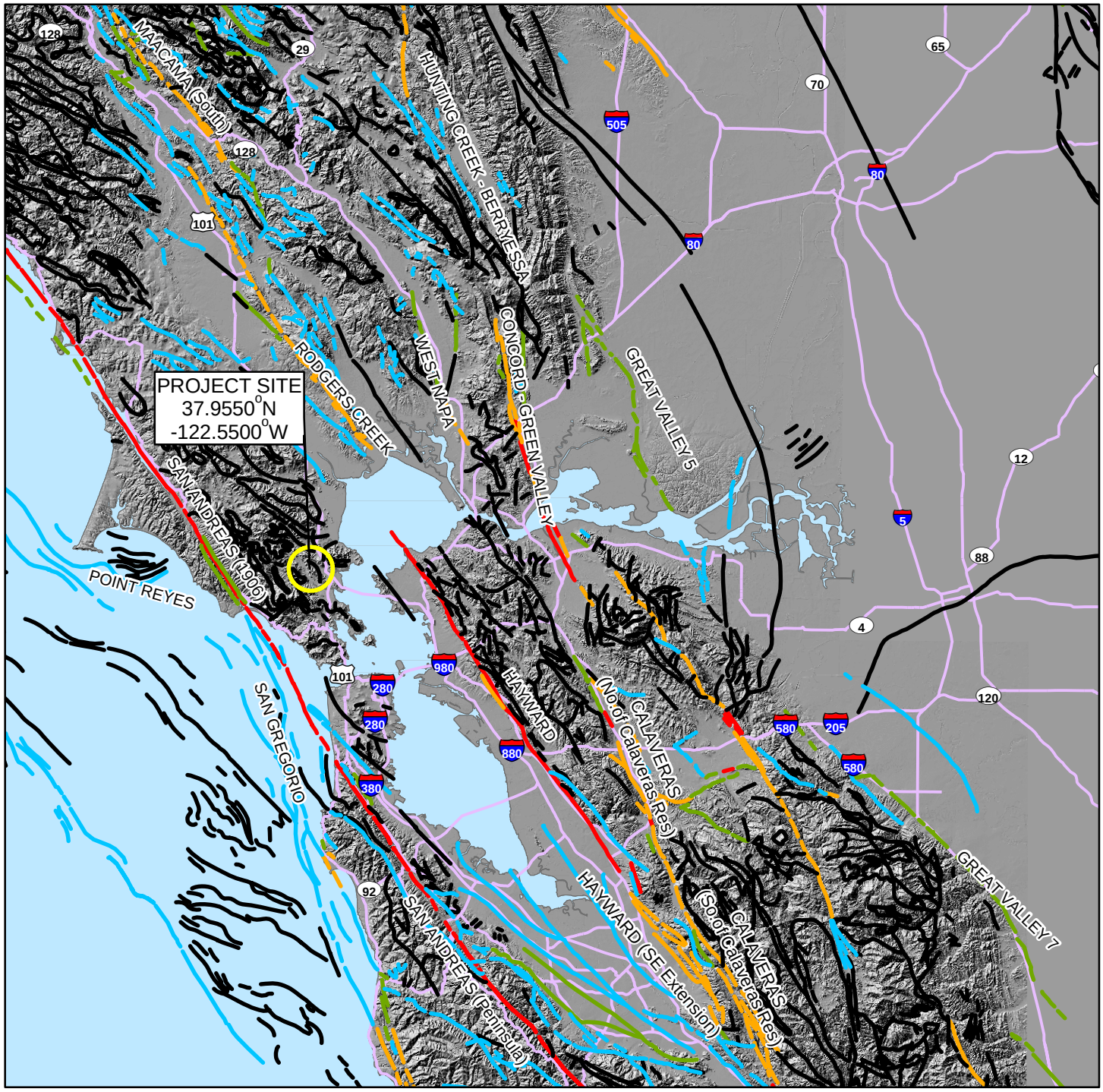

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Source: California Division of Mines and Geology (California Geological Survey)
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NORTH

0 10 20 40

Miles

LEGEND

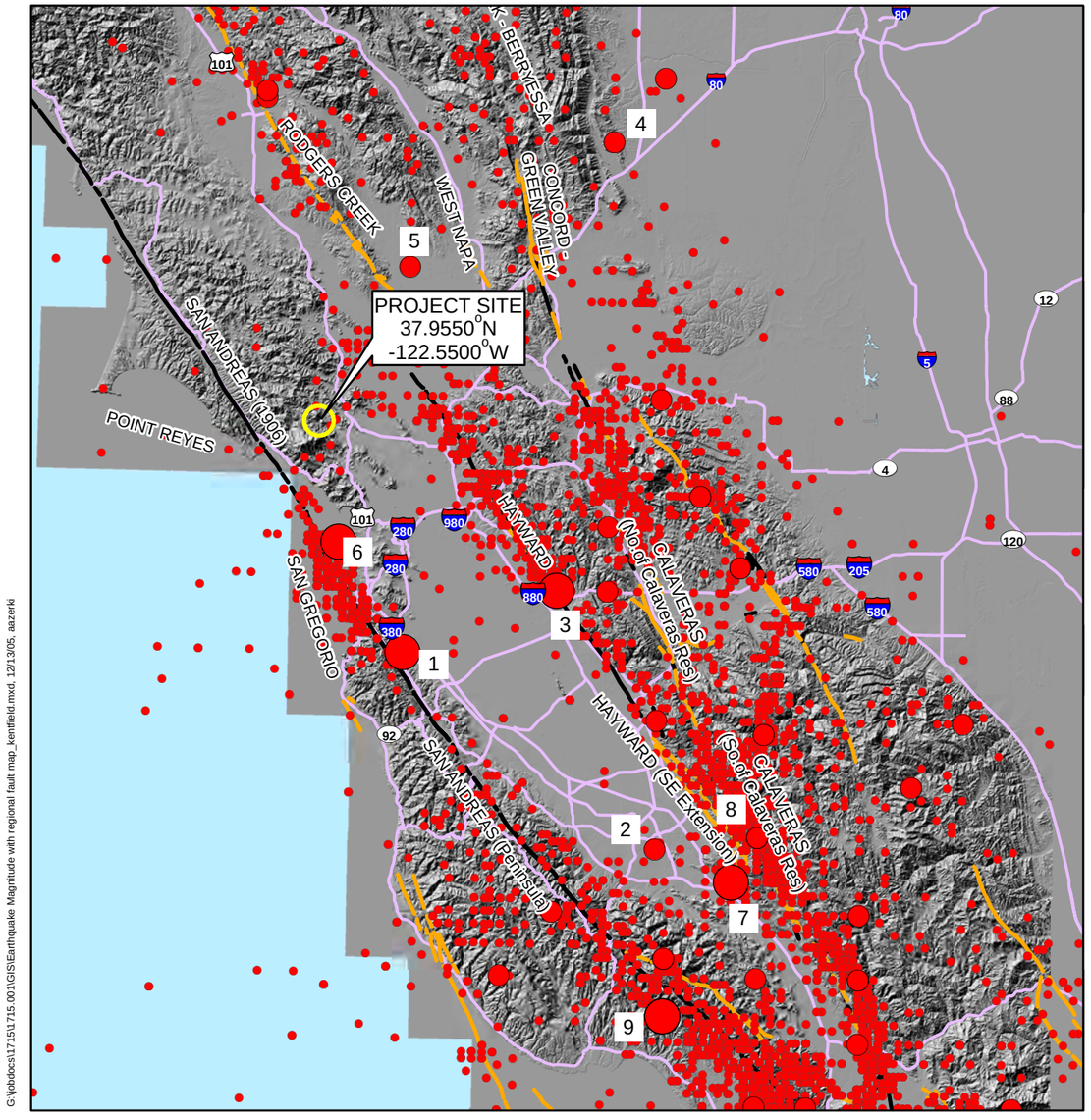
- QUATERNARY
- PREQUATERNARY
- LATE QUATERNARY
- HISTORIC
- HOLOCENE

REGIONAL FAULT LOCATION MAP

College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 5

December 2005
Project No. 1715.001



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Sources: California Division of Mines and Geology (California Geological Survey) http://gmw.consrv.ca.gov/shmp/index.htm;
U.S.G.S. Open File Report 94-647; http://neic.usgs.gov/neis/epic/epic_rect.html

Known Magnitude ≥6.5 Earthquakes Since 1836

	Eathquake	Magnitude
1	San Francisco Peninsula, CA - June, 1938	6.5
2	South Santa Cruz Mountains, CA - October 8, 1865	6.3
3	Hayward, CA - October 21, 1868	6.8
4	Vacaville, CA - April 19, 1892	6.4
5	Mare Island, CA - April 19, 1898	6.2
6	1906 Earthquake, CA - April 18, 1906	8.2
7	Morgan Hill, CA - July 6, 1911	6.6
8	Morgan Hill, CA - April 24, 1984	6.2
9	Loma Prieta, CA - October 18, 1989	7.1

Note: The above earthquakes are identified on the map by a white square labeled with the reference number. Dates are given in Greenwich Mean Time

LEGEND

- MAJOR ROAD
- HISTORIC FAULT
- HOLOCENE FAULT
- <5.5 MAGNITUDE EARTHQUAKE
- 5.5-6.4 MAGNITUDE EARTHQUAKE
- ≥6.5 MAGNITUDE EARTHQUAKE

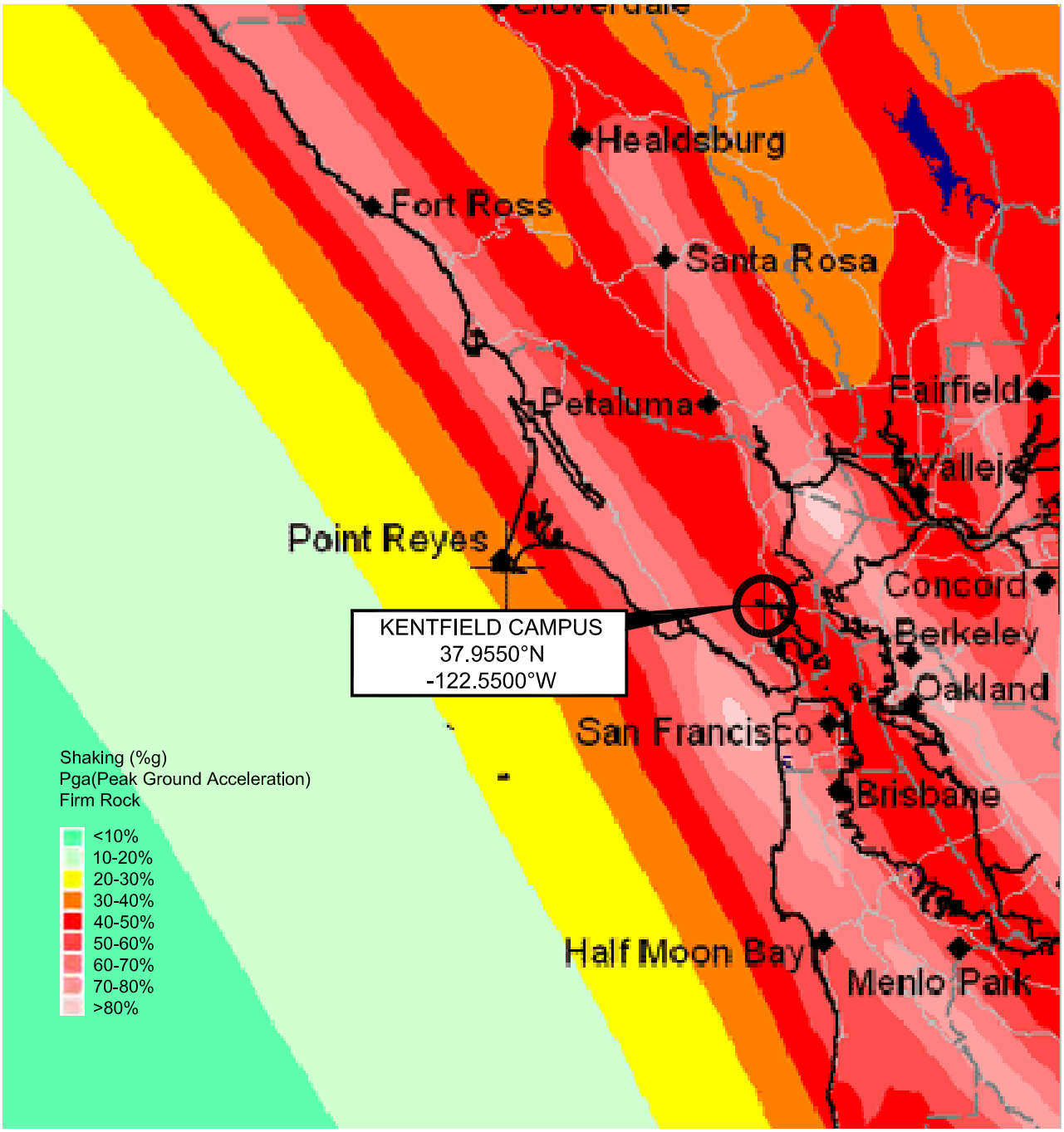
NORTH

0 10 20

Miles

REGIONAL EPICENTER MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 6



SOURCE: This Probabilistic Seismic Hazards Map was based on http://www.consrv.ca.gov/cgs/rghm/pshamap/pshamap.asp

NORTH

PROBABILISTIC SEISMIC HAZARD MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 7

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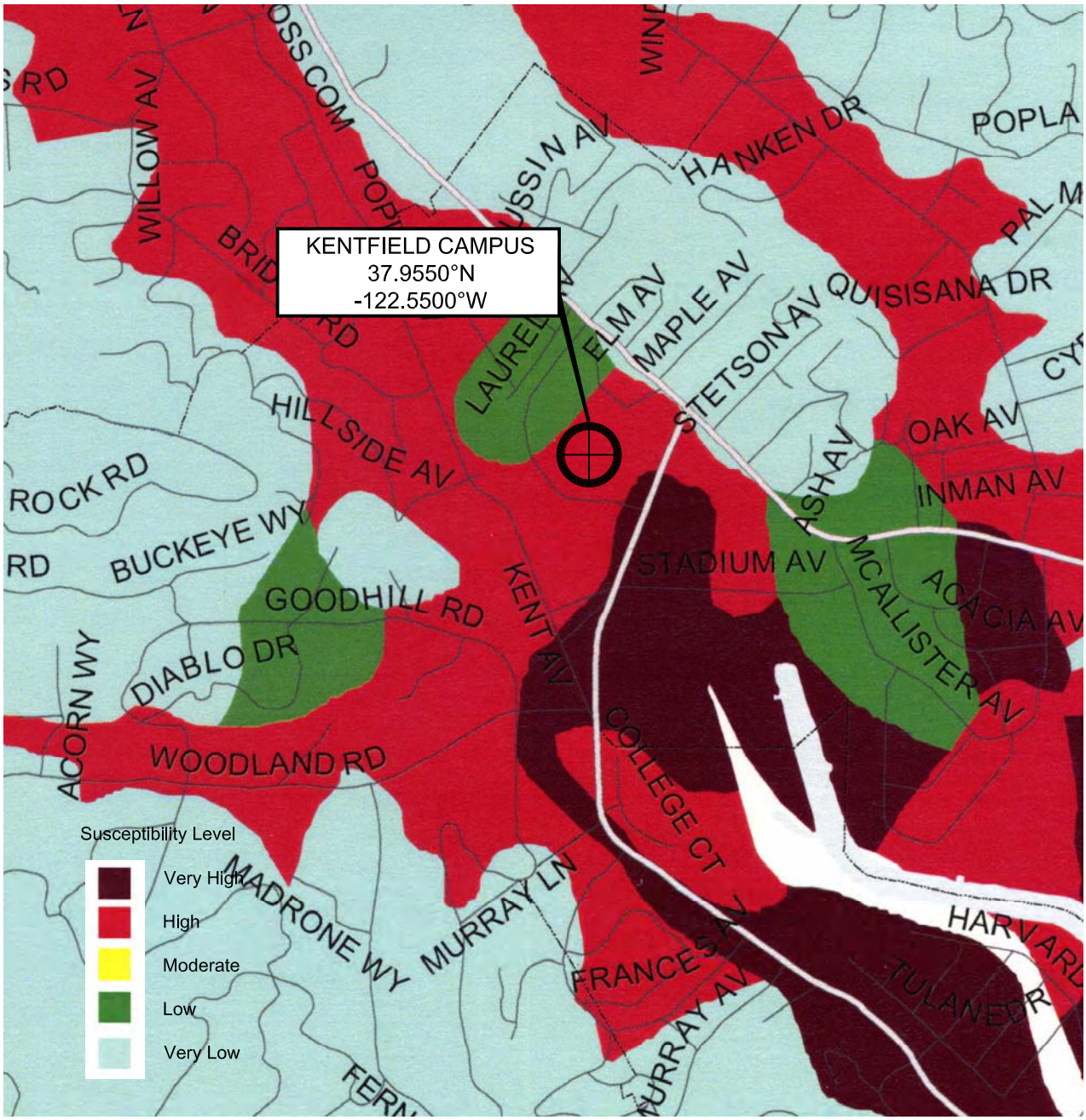
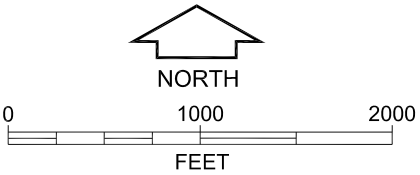


SOURCE: This Association of Bay Area Governments (ABAG) Liquefaction Susceptibility Map was based on work by William Lettis & Associates, Inc. and USGS. USGS Open-File Report 00-444, Knudsen & others, 2000.



ABAG LIQUEFACTION SUSCEPTIBILITY MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 8

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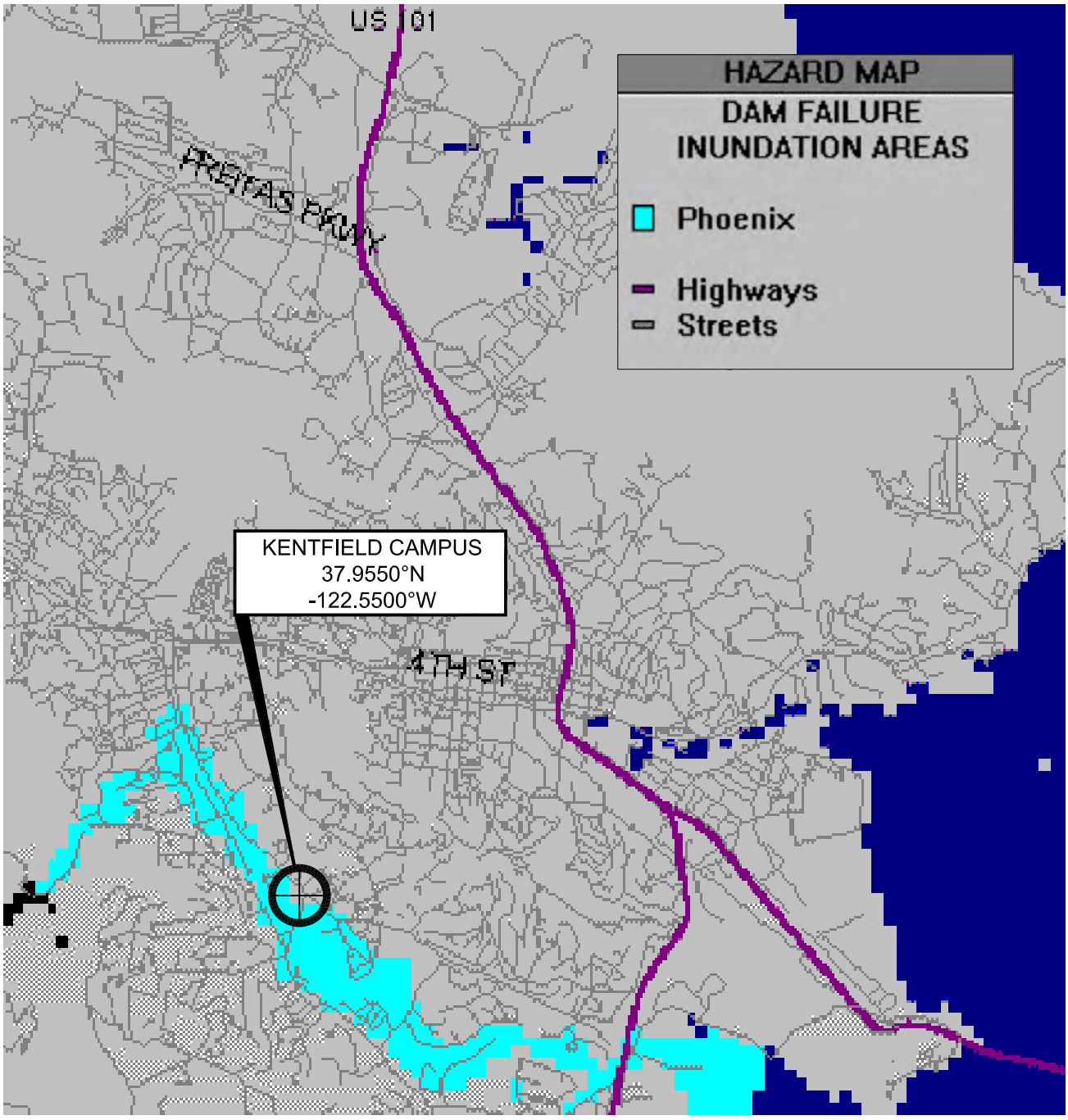

SOURCE: This Association of Bay Area Governments (ABAG) Dam Failure Inundation Hazard Map for San Rafael was based on http://www.abag.ca.gov.

NORTH

ABAG DAM FAILURE MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 9

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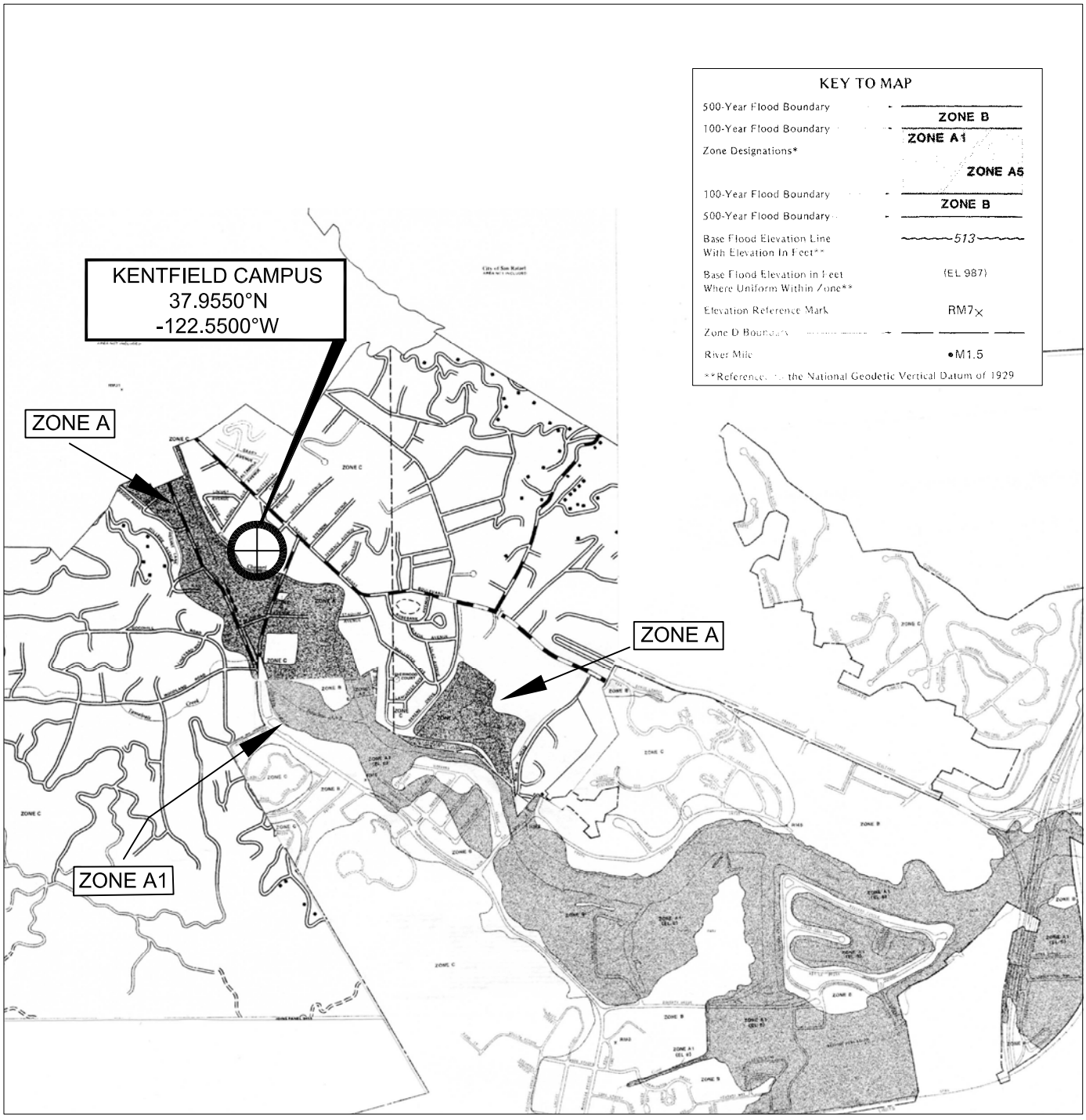


G:\jobdocs\1715\1715.001\Drawings\Kentfield\A1715.001-007.dwg 12-13-05 12:45:59 PM aazerki

SOURCE: This Flood Hazard Map was based on Federal Emergency Management Agency Flood Insurance Rate Maps for Larkspur, California and Marin County, California.

NORTH

0 2000 4000

FEET

FLOOD HAZARD MAP
College of Marin, Kentfield Campus
Kentfield, Marin County, California

PLATE 10

APPENDIX A
FIELD EXPLORATION

APPENDIX A
FIELD EXPLORATION

The field exploration consisted of a surface reconnaissance and a subsurface exploration program. Prior to the undertaking the subsurface drilling program, permits for the borings were obtained from Marin County Environmental Health Department. In addition, the boring locations were reviewed with College of Marin facilities personnel who assisted with utility clearance. Underground Service Alert (USA) was also notified of the intention to perform the subsurface exploration. A representative from the Federated Indians of Graton Rancheria was onsite full-time during our field work to identify Indian midden, if encountered. An archeologist was also onsite part-time to identify historic artifacts, if encountered. A project-specific Health & Safety Plan was prepared prior to the exploration according to standard Fugro safety protocol, and the contents of the document were shared with the drilling subcontractor's field personnel.

The subsurface exploration was conducted using a truck-mounted drill rig equipped with hollow stem auger and solid-flight augers. Two 3-inch-diameter borings for archeological purposes, designated B-8A and B-14A, were drilled on October 28, 2005, with a Mobile B-24 drill rig, to depths of 3½ and 17 feet, respectively. Twenty-two exploratory borings, designated B-1 through B-23, excepting B-8, were drilled between October 31, 2005, and November 3, 2005, with a DR 10K drill rig, to a maximum depth of 38 feet. Boring B-14 was converted to a piezometer. Fifteen, 8-inch-diameter borings extending to depths of 5 feet were drilled with the DR 10 K drill rig using solid-flight augers. These borings, designated B-1, B-3 through B-7, B-9 through B-12, and B-14 through B-18, were drilled between October 19 and 21, 2005. The approximate locations of the exploratory borings are shown on the *Site Plan and Geologic Map*, Plate 3. The materials encountered in the borings were logged by our engineer as the drilling progressed. The soils are described in accordance with the Unified Soil Classification System (ASTM D-2487.) Upon completion of our field exploration, the borings were backfilled with neat cement grout and capped with concrete, with exception for B-14 which was converted to a piezometer. The logs of the borings, as well as a key for the classification of the soil (Plate A-1), are included as part of this appendix.

The piezometer constructed in Boring B-14 is of the open-standpipe variety. The standpipe material consists of nominal 2-inch-diameter, flush-joint, Schedule 40 PVC pipe. The 10-foot-long screen interval placed near the bottom of the borehole consists of factory constructed, 0.020 inch wide slots. Filter pack placed around the screen interval consists of #3 Monterey sand that extended at least 2 feet above the slotted interval. Bentonite pellets were installed as a seal for an interval of at least 2 feet above the sand filter pack. The remainder of the annular space around the standpipe, and above the bentonite seal, consists of Portland cement grout placed neat against the borehole wall. A traffic-rated cover was installed above the completed piezometer to provide security and protection for the instrument.

Representative soil samples were obtained from the borings using a Modified California split-barrel drive sampler (outside diameter of 3.0 inches, inside diameter of 2.5 inches) and a Standard Penetration Test (SPT) split-barrel drive sampler (outside diameter of 2.0 inches, inside diameter of 1.375 inches). All samples were transmitted to our laboratory for evaluation

and appropriate testing. Both sampler types are indicated in the "Sampler" column of the boring logs as designated in Plate A-1.

Resistance blow counts with the DR 10K drill rig were obtained with the samplers by dropping a 140-pound hammer through a 30-inch free fall using a down-hole wire line hammer system. The sampler was driven 18 inches, or a shorter distance where hard resistance was encountered, and the number of blows were recorded for each 6 inches of penetration. The blows per foot recorded on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches. Due to the use of the down-hole wire line hammer system, the blow counts are not standard penetration resistance values.

The elevations indicated on the boring logs were obtained by interpreting the topographic contours on an undated drawing provided by CSW/Stuber-Stroeh. The topographic survey for the project was performed by Sandis Humber Jones.

The attached boring logs and related information show our interpretation of the subsurface conditions at the dates and locations indicated, and it is not warranted that they are representative of subsurface conditions at other locations and times.

MAJOR DIVISIONS			GROUP NAMES	
COARSE-GRAINED SOILS (More than 50% retained on the No. 200 sieve)	GRAVELS (MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE)	Clean gravels less than 5% fines	GW	Well-Graded Gravel
			GP	Poorly Graded Gravel
		Gravels with more than 12% fines	GM	Silty Gravel
			GC	Clayey Gravel
	SANDS (MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE)	Clean sand less than 5% fines	SW	Well-Graded Sand
			SP	Poorly Graded Sand
		Sands with more than 12% fines	SM	Silty Sand
			SC	Clayey Sand
FINE-GRAINED SOILS (50% or more passes the No. 200 sieve)	SILTS AND CLAYS (Liquid Limit Less than 50%)		ML	Silt
			CL	Lean Clay
			OL	Organic Silt
	SILTS AND CLAYS (Liquid Limit Greater than 50%)		MH	Elastic Silt
			CH	Fat Clay
			OH	Organic Clay
HIGHLY ORGANIC SOILS			PT	Peat or Highly Organic Soils
			FILL	Debris or Mixed Fill
			AC	Asphalt Concrete Pavement with Aggregate Base

GENERAL NOTES

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Sloped line in break column indicates transitional boundary

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

SAMPLER DRIVING RESISTANCE

Number of blows with 140 lb. hammer, falling 30-in. to drive sampler 1-ft. after seating sampler 6-in.; for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
50/7"	50 blows drove sampler 7" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval (Ref=Refusal)

STRENGTH TEST METHOD

U = Unconfined Compression
Q = Unconsolidated Undrained Triaxial
T = Torvane
P = Pocket Penetrometer
M = Miniature Vane
F = Field Vane

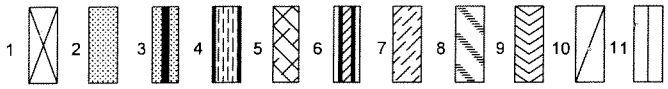
OTHER TESTS

k = Permeability
Consol = Consolidation
Gs = Specific Gravity
MA = Particle Size Analysis
EI = Expansion Index
OVM = Organic Vapor Measurement

WATER LEVEL SYMBOLS

- Initial or perched water level
- Final ground water level
- Seepages encountered

SAMPLER TYPE



Samplers and sampler dimensions (unless otherwise noted in report text) are as follows:

1 SPT Sampler, driven 1 3/8" ID, 2" OD
2 MOD CA Liner Sampler 2 3/8" ID, 3" OD
3 CA Liner Sampler 1 7/8" ID, 2.5" OD
4 Thin-walled Tube, pushed 2 7/8" ID, 3" OD
5 Bulk Bag Sample (from cuttings)
6 Hand Auger Sample
7 Lexan Sample
8 Pitcher Sample
9 Vibracore Sample
10 No Sample Recovered
11 Rock Core

SOIL STRUCTURE

Fissured: Containing shrinkage or relief cracks, often filled with fine sand or silt, usually more or less vertical.

Pocket: Inclusion of material of different texture that is smaller than the diameter of the sample.

Parting: Inclusion less than 1/8 inch thick extending through the sample.

Seam: Inclusion 1/8 inch to 3 inches thick extending through the sample.

Layer: Inclusion greater than 3 inches thick extending through the sample.

Laminated: Soil sample composed of alternating partings or seams of different soil types.

Interlayered: Soil sample composed of alternating layers of different soil type.

Intermixed: Soil sample composed of pockets of different soil type, and layered or laminated structure is not evident.

CONSISTENCY

Clays	Blows/Foot SPT	Undrained Shear Strength (ksf)
Very Soft	0 - 2	0 - 0.25
Soft	3 - 4	0.25 - 0.5
Firm	5 - 8	0.5 - 1
Stiff	9 - 16	1 - 2
Very Stiff	17 - 32	2 - 4
Hard	Over 32	Over 4

RELATIVE DENSITY

Sands and Gravels	Blows/Foot SPT
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Over 50

INCREASING VISUAL MOISTURE CONTENT

Dry
Moist
Wet

Information on each boring log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as from laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines on the logs may be transitional and approximate in nature. Water level measurements refer only to those observed at the time and places indicated, and can vary with time, geologic condition, or construction activity.

TERMS AND SYMBOLS USED ON BORING LOGS

PLATE A-1

WEATHERING *

FRESH	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer blows if crystalline.
VERY SLIGHT	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rings under hammer blows if crystalline.
SLIGHT	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks, some occasional feldspar crystals are dull and discolored. Crystalline rock rings under hammer blows.
MODERATE	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer blows and shows significant loss of strength as compared with fresh rock.
MODERATELY SEVERE	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.
SEVERE	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In some granitoid rocks, all feldspar kaolinized to some extent. Some fragments of strong rock usually remain.
VERY SEVERE	All rock except quartz discolored or stained. Rock "fabric" discernible, but rock mass effectively reduced to "soil" with only fragments of strong rock remaining.
COMPLETE	Rock reduced to "soil." Rock "fabric" not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

* After GSA, Engineering Geology Division, Data Sheet 1, 1980.

STRENGTH

VERY STRONG	Resists breakage from hammer blows; but will yield dust and small chips.
STRONG	Withstands a few hammer blows; but will yield large fragments.
MODERATELY STRONG	Withstands a few firm hammer blows.
WEAK	Crumbles with light hammer blows.
FRIABLE	Can be broken down with hand and finger pressure.

ROCK QUALITY DESIGNATION

RQD	ROCK MASS QUALITY
90-100	Excellent
75-90	Good
50-75	Fair
25-50	Poor
0-25	Very Poor

Sandstone

Claystone

Shale

Siltstone

Rock Quality Designation (RQD) is the ratio of the total length of core segments longer than 4 in. to the total length of the core run, expressed as a percentage. Mechanical breaks are ignored in the calculation of total length of segments greater than 4 in. long. RQD will always be equal to, or less than, % Recovery.

Percent Recovery is the ratio of the total length of core recovered to the total length of the core run, expressed as a percentage.

DISCONTINUITY SPACING

JOINTS	BEDDING, CLEAVAGE, FOLIATION	SPACING
VERY CLOSE	VERY THIN	Less than 2 inches
CLOSE	THIN	2 inches to 1 foot
MODERATELY CLOSE	MEDIUM	1 foot to 3 feet
WIDE	THICK	3 feet to 10 feet
VERY WIDE	VERY THICK	Greater than 10 feet

HARDNESS

VERY HARD	Cannot be scratched with a knife; metal powder left on sample.
HARD	Scratched with knife with difficulty; trace of metal powder left on samples; scratch faintly visible.
MODERATELY HARD	Readily scratched with knife, scratch leaves heavy trace of dust and is readily visible.
LOW HARDNESS	Gouged or grooved to 1/16 inch by firm pressure on knife; scratches with penny.
SOFT	Gouged or grooved readily with knife; small thin pieces can be broken by finger pressure.
VERY SOFT	Carves with knife; scratched by fingernail.

ROUGHNESS OF DISCONTINUITY SURFACES

SMOOTH	Appears smooth and is essentially smooth to the touch. May be slickensided.
SLIGHTLY ROUGH	Asperities on surfaces are visible and distinct.
MEDIUM ROUGH	Asperities are clearly visible and surface feels abrasive.
ROUGH	Large angular asperities can be seen. Some ridge and high side angle steps are evident.
VERY ROUGH	Near vertical steps and ridges occur on surfaces.

ROCK MASS PHYSICAL DESCRIPTION

LOCATION: Taqueria Parking Lot

SURFACE EL: 20.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
					Asphalt Concrete (3.5 inches) over Aggregate Baserock (4.5 inches)							
					GRAVEL (GM): medium brown, dry to damp, fine and coarse, angular, with fine- to coarse-grained sand, trace silt and clay (FILL)							
		1		(15)		103	13					
		2			SAND (SM): medium dense, medium brown, dry to damp, fine- to coarse-grained, with gravel (fine, angular), some silt (FILL)	94	14				0.9 U	
		3		12				47			>4.5 P	
5					- some gravel, more silt at 3 feet							
					SAND (SC): medium dense, mottled shades of light reddish brown (iron staining), moist, fine-grained, some clay and silt, slight hydrocarbon odor at 10 feet (RESIDUAL SOIL)							
10				(46)		111	18				2.6 U	
					SANDSTONE: moderately hard, medium yellow brown, dry, moderate weathering, fine-grained, silty							
15		6		84	- with clay and silt at 16 feet							
20		7		50/4"								

BORING DEPTH: 20.5 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 3, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-1

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 2, south side

SURFACE EL: 33.4 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (2 inches) over Aggregate Baserock (6 inches)							
1					Sandy CLAY (CL): very stiff to hard, orangish brown, dry, fine-grained sand							
2		1		(50)								
3		2				120	12					
4		3		27								
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-2

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 2, north side

SURFACE EL: 39.6 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (2 inches) over Aggregate Baserock (3 inches)							
1					Sandy SILT (ML): stiff to very stiff, orangish brown, dry to moist, fine grained sand							
2		1		(24)								
3		2			Lean CLAY with sand (CL): very stiff, orangish brown, moist, fine grained sand							
4		3		30	grades sandy (fine- to medium-grained), very stiff to hard							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-3

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 3, southeast end

SURFACE EL: 32.2 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (2 inches) over Aggregate Baserock (5 inches)							
1					Sandy SILT (ML): very stiff, orange brown, moist, fine- to coarse-grained sand, trace of fine and coarse, subangular gravel							
2		1		(30)								
3		2										
4				26								
5		3		26								
6												
7												
8												
9												

BORING DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-4

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 3, northwest end

SURFACE EL: 14.6 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (2.5 inches) over Aggregate Baserock (6 inches)							
1					Sandy Lean CLAY (CL): stiff, dark brown, moist, fine-grained sand							
2		1		(16)								
3		2				110	18					
		3		6	CLAY with sand (CL): firm, dark gray brown, wet, fine-grained sand, trace of fine and coarse, subrounded gravel, trace of organics						2.3 P	
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: 3.5 ft
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-5

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 4, northwest side

SURFACE EL: 14.6 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (5 inches) over Aggregate Baserock (6 inches)							
1					Well-graded SAND with clay (SW-SC): medium dense, gray, moist, fine- to coarse-grained sand, trace of gravel							
2		1		(20)								
3		2			Sandy Fat CLAY (CH): stiff, gray, moist, fine-to coarse-grained sand							
		3		5	- grades firm at 3.5 feet						3.0 P	
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-6

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 4, southeast side

SURFACE EL: 14.8 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (5 inches) over Aggregate Baserock (6 inches)							
1					Well-graded GRAVEL with silt (GW-GM): medium dense, light brown, moist, coarse, subangular							
2		1		(21)								
3		2			SAND with clay (SC): medium dense, gray, moist to wet, fine- to medium-grained, trace of gravel							
		3		12	Fat CLAY with sand (CH): stiff, gray, moist, fine- to coarse-grained sand						4.5 P	
4					Clayey SAND (SC): medium dense, gray, moist, fine- to coarse-grained sand							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-7

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Fusselman Hall, southwest end

SURFACE EL: 24.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
1				54	SANDSTONE: fine-grained, closely jointed, iron staining on joint surfaces, iron staining penetrates rock fabric, friable, weak							
2				57								
3												
4												
5												
6												
7												
8												
9												

BORING DEPTH: 3.5 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 28, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Boring perfomed only to explore for artifacts

DRILLING METHOD: 3-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: Mobile B-24
DRILLED BY: Ram Geotechnical, Angel
LOGGED BY: M Caruso

LOG OF BORING NO. B-8

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 6, north end

SURFACE EL: 12.6 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3.5 inches) over Aggregate Baserock (5 inches)							
1					Sandy Lean CLAY (CL): firm, brown, moist, fine- to coarse-grained sand, trace of fine and coarse, subangular gravel							
2		1		(9)								
3		2										
		3		14	Fat CLAY with sand (CH): stiff, gray, moist, fine-grained sand, trace of organics (marsh deposits)							
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-9

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 6, next to College Avenue

SURFACE EL: 11.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches) over Aggregate Baserock (5 inches)							
1					Sandy SILT (ML): very stiff, light brown, dry, fine- to coarse-grained sand, trace of fine, subangular gravel							
2		1		(28)								
3		2		16							>4.5 P	
4												
5		3		31	Fat CLAY with sand (CH): very stiff to hard, gray, moist, fine-grained sand (marsg deposits)							
6												
7												
8												
9												

BORING DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-10

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 7, east end

SURFACE EL: 10.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (4 inches) over Aggregate Baserock (5 inches)							
1					Sandy Lean CLAY (CL): stiff, light brown, moist, fine- to medium-grained sand							
2		1		(16)								
3		2			Fat CLAY (CH): stiff, gray, moist, (Marsh Deposits)						2.8 P	
4		3		9								
5					Poorly-graded SAND with clay (SP-SC): loose, brown, moist, fine-grained							
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-11

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 7, next to Kent Avenue

SURFACE EL: 11.4 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (4.5 inches) over Aggregate Baserock (10 inches)							
2		1		(21)	Clayey SAND with gravel (SC): medium dense, brown and gray, moist, medium- to coarse-grained, subangular gravel							
3		2				105	10					
4		3		6	- loose at 3½ feet							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-12

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 9, next to Science Center

SURFACE EL: 9.9 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (4 inches) over Aggregate Baserock (6 inches)							
1					Silty SAND (SM): loose, brown, moist, fine- to medium-grained							
2				(10)								
3		1										
4		2		6	SILT with sand (ML): firm, brown, moist, fine-grained sand							
5					Fat CLAY (CH): firm, dark gray, moist, (marsh deposits)							
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-13

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Next to creek in Parking Lot 9

SURFACE EL: 10.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
					Asphalt Concrete (3 inches) over Aggregate Baserock (2 inches)							
		1		(8)	Clayey SAND (SC): loose, brown, moist, fine- to medium-grained, trace of coarse, subrounded gravel (FILL)			17				
		2		5	- no gravel, with fine-grained sand							
5					CLAY (CL-CH): stiff, brown to gray, moist, trace of fine-grained sand							
10		3		(18)		98	26					
		4				99	25				1.6 U 2.8 P	
					- grades gray at 13 feet							
15		5		(9)	- grades firm, greenish gray at 15 feet	103	27					
		6				104	26				0.4 U	
20		7		(10)				47				
		8				103	24					
					SAND with clay (SC): loose, gray, wet, fine-grained							

Continued

BORING DEPTH: 38.0 ft
DEPTH TO WATER: 23.0 ft
BACKFILL: Piezometer Installed
COMPLETION DATE: November 3, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-14

College of Marin, Marin County, Kentfield Campus
Kentfield, California

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: Next to creek in Parking Lot 9 SURFACE EL: 10.5 ft +/- 0.5 (rel. MSL datum) MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		9		(12)								
		10				104	21	47				
30		11		3	- grades very loose with fine- to medium-grained			38				MA
35		12		15	- grades medium dense at 35 feet							
		13		90	CLAYSTONE: hard, gray, dry, trace of fine-grained sand							
40												
45												

BORING DEPTH: 38.0 ft
DEPTH TO WATER: 23.0 ft
BACKFILL: Piezometer Installed
COMPLETION DATE: November 3, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-14

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 9, west of Corte Madera Creek, ~30 feet from fence line

SURFACE EL: 10.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
				10	CLAY (CL): stiff, medium brown, damp, some sand (fine-grained) (FILL)							
				9	- layer of gravel (fine, subangular to round) at 2½ to 3 feet							
				7	- sandy (fine) at 3 to 4 feet							
					- medium dark brown, no gravel, trace sand (fine) from about 4 feet							
5				9	SAND (SM): loose, medium brown, damp, fine- to coarse-grained							
				9	CLAY (CH): stiff, dark gray, trace organics, few pores (marsh deposits)							
				6	- trace sand (fine), firm							
				17								
10				13	CLAY (CL/CH): very stiff, brown, mottled reddish brown and gray, trace sand (fine), trace organics, common pores (marsh deposits)							
					- stiff at 12 feet							
				8	CLAY (CL): firm, mottled blue gray and medium brown, moist, some sand (fine- to medium-grained), trace organics (marsh deposits)							
				7	- blue gray, interbed of sand (fine- to medium-grained, soft between 14 and 14.75 feet							
15				6	- trace to some sand (fine-grained), moist, soft							

BORING DEPTH: 17.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 28, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.
2. Boring performed only to explore for artifacts

DRILLING METHOD: 3-in. dia. Solid Stem Auger
HAMMER TYPE: Rope and Cathead, 140 lb
RIG TYPE: Mobile B-24
DRILLED BY: Ram Geotechnical, Angel
LOGGED BY: M Caruso

LOG OF BORING NO. B-14A

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 9

SURFACE EL: 11.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (4.5 inches) over Aggregate Baserock (3 inches)							
1					Well-graded SAND with clay (SW-SC): very loose to loose, brown, moist, fine-grained							
2		1		(7)								
3		2										
		3		7	Lean CLAY with sand (CL): firm, dark brown, moist, fine-grained sand							
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: October 31, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 4-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-15

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Larkspur Annex, next to greenhouse

SURFACE EL: 9.0 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1			Clayey SAND with gravel (SC): very dense, brown, dry to moist, fine- to medium-grained, coarse, subangular gravel (FILL)			41				MA
		2		(50/4")		113	10					
		3		50/3"								
5												
					Fat CLAY (CH): very soft, gray, moist, trace of organics (marsh deposits)							
		4										
		5		(2)		55	75				0.2 U 4.0 T	
10												
15		6		(6)	- grades soft at 15 feet	85	37					
		7				70	52				0.1 U 3.0 T	
					▽							
								21				
20		8		(21)	Well-graded GRAVEL with clay and sand (GW-GC): medium dense, gray, wet, fine and coarse, subangular, fine- to coarse-grained sand	123	14					
		9										
25		10		50/1"	SANDSTONE: brown, dry, fine-grained							

BORING DEPTH: 25.5 ft
DEPTH TO WATER: 19.0 ft
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 2, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 7-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-16

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Larkspur Annex, next to Magnolia Avenue

SURFACE EL: 10.1 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
					Asphalt Concrete (3 inches)							
		1		(11)	Clayey SAND (SC): medium dense, brown, moist, medium-grained, trace of gravel and organics (FILL)			40				
		2				103	19					
		3		2	Fat CLAY (CH): soft, greenish gray, moist, trace of organics (marsh deposits)						3.0 P	
5												
					Lean CLAY with sand (CL): very stiff, orangish brown, moist, fine-grained sand (marsh deposits)							
10		4		(31)		~~105~~	~~21~~					
		5				107	22				4.7 U +4.5 P	
					▽							
15		6		(26)		86	38					
		7			Fat CLAY (CH): very stiff, greenish gray, moist, with a trace of organics (marsh deposits)	81	41				1.6 U 3.8 P	
					CLAYSTONE: gray, dry, moderate weathering, trace of fine-grained sand							
20		8		50/3"								

BORING DEPTH: 20.5 ft
DEPTH TO WATER: 14.0 ft
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 2, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 7-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-17

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 11, southwest corner

SURFACE EL: 6.4 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0				Asphalt Concrete (2.5 inches) over Aggregate Baserock (8 inches)							
1				Well-graded SAND with clay (SW-SC): loose, brown, moist, fine- to coarse-grained, trace of gravel (FILL)							
2	1		(14)								
3	2			Fat CLAY (CH): soft to firm, gray, moist, trace of organics (marsh deposits)						1.8 P	
4	3		5								
5											
6											
7											
8											
9											

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-18

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 11, northeast corner

SURFACE EL: 8.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches) over Aggregate Baserock (4 inches)							
1					Poorly-graded SAND with clay (SP-SC): loose, gray, moist, fine-grained (FILL)							
2		1		(5)								
3		2			- grades SW-SC with a trace of gravel, organics, fine- to coarse-grained at 3 feet							
4		3		4	Fat CLAY (CH): soft, greenish gray, wet, trace of fine-grained sand and organics (marsh deposits)							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-19

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 12, near northwest corner

SURFACE EL: 9.6 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3.5 inches) over Aggregate Baserock (5 inches)							
1					Sandy Lean CLAY (CL): stiff, brown, moist, fine- to medium-grained sand, trace of gravel (FILL)							
2		1		(25)								
3		2										
		3		10							>4.5 P	
4					Fat CLAY with sand (CH): stiff, gray, moist, fine grained sand (marsh deposits)							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 2, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-20

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 10, south side of Maintenance Shop 4

SURFACE EL: 9.1 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (2 inches) over Aggregate Baserock (4 inches)							
1					Clayey GRAVEL (GC): medium dense, gray, moist, coarse, subangular, with fine- to medium-grained sand (FILL)							
2		1		(32)								
3		2				122	13					
		3		16								
4												
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 2, 2005
NOTES: 1.. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-21

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 15, near Kent Avenue

SURFACE EL: 9.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete Pavement (3.5 inches) over Aggregate Baserock (5.5 inches)							
1					Sandy CLAY (CL): stiff, gray, moist, fine-grained sand							
2		1		(15)								
3		2				108	19					
4		3		9	Fat CLAY (CH): stiff, gray, moist, (marsh deposits)							
5												
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-22

College of Marin, Marin County, Kentfield Campus
Kentfield, California

LOCATION: Parking Lot 15, south side of main lot

SURFACE EL: 14.5 ft +/- 0.5 (rel. MSL datum)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
0					Asphalt Concrete (3 inches) over Aggregate Baserock (4 inches)							
1					Lean CLAY with sand (CL): very stiff, brown to gray, moist, fine- to medium-grained sand (FILL)							
2		1		(27)								
3		2										
4		3		14	Clayey SAND (SC): medium dense, brown, moist, fine- to medium-grained							
5					Poorly-graded GRAVEL (GP): medium dense, brown, moist, coarse, subangular							
6												
7												
8												
9												

BORING DEPTH: 5.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Portland cement capped with concrete
COMPLETION DATE: November 1, 2005
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Solid Stem Auger
HAMMER TYPE: Automatic Trip, 140 lb
RIG TYPE: DR 10K
DRILLED BY: Clear Heart Drilling, Pablo
LOGGED BY: L Al Atik

LOG OF BORING NO. B-23

College of Marin, Marin County, Kentfield Campus
Kentfield, California

APPENDIX B
LABORATORY TESTING PROGRAM

APPENDIX B
LABORATORY TESTING PROGRAM

The laboratory testing program was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the site.

The natural water content was determined on 24 samples of the materials recovered from the borings in accordance with ASTM Test Designation D-2216. These water contents are recorded on the boring logs at the appropriate sample depths. Dry density determinations were performed on 24 samples of the subsurface soils to evaluate their physical properties. The results of these tests are shown on the boring logs at the appropriate sample depths.

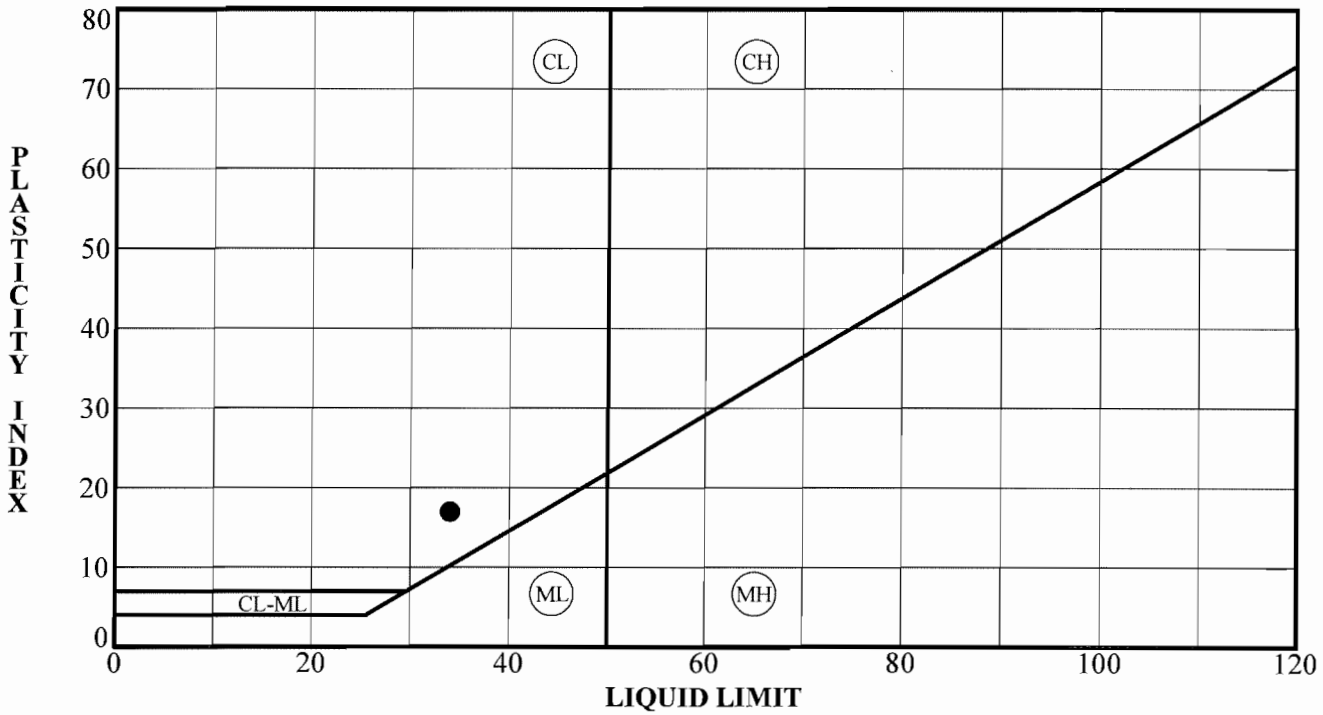
Unconfined compression tests were performed on eight undisturbed samples of the clayey subsurface soils to evaluate the undrained shear strength of these materials. The unconfined tests were performed in accordance with ASTM Test Designation D-2166 on samples having a diameter of 2.4 inches and a height-to-diameter ratio of at least 2. Failure was taken as the peak normal stress. The results of these tests are presented on the appropriate boring logs at the appropriate sample depths and on Figures B-2 through B-9.

Eleven resistance R-value tests were performed on representative samples of the surface soils onsite to provide data for pavement design. The tests were performed in accordance with California Test Method 301-F. The results of the tests are presented below:

RESULTS OF R-VALUE TESTS

Boring Number	Description of Material	Dry Density (pcf)	Water Content (%)	Exudation Pressure (psi)	Expansion Pressure (psf)	R-Value
B-1	Gray brown GRAVEL with silt and sand (GW-GM)	128.5	10.3	135	0	20
		129.7	9.4	310	0	50
		128.5	8.9	485	0	74
R-Value = 648 at Exudation pressure of 300 psi						
B-2	Rust brown clayey SAND (SC)	118.6	12.8	199	0	47
		118.3	12.2	263	0	49
		119.3	11.7	406	35	56
R-Value = 50 at Exudation pressure of 300 psi						
B-5	Dark gray brown sandy CLAY (CL-SC)	111.3	16.4	159	0	13
		114.5	15.3	239	0	24
		114.2	14.2	318	9	38
R-Value = 36 at Exudation pressure of 300 psi						
B-6	Dark gray brown SAND with clay (SC)	123.6	10.6	239	0	49
		124.1	10.2	278	0	58
		126.0	9.7	565	57	65
R-Value = 61 at Exudation pressure of 300 psi						

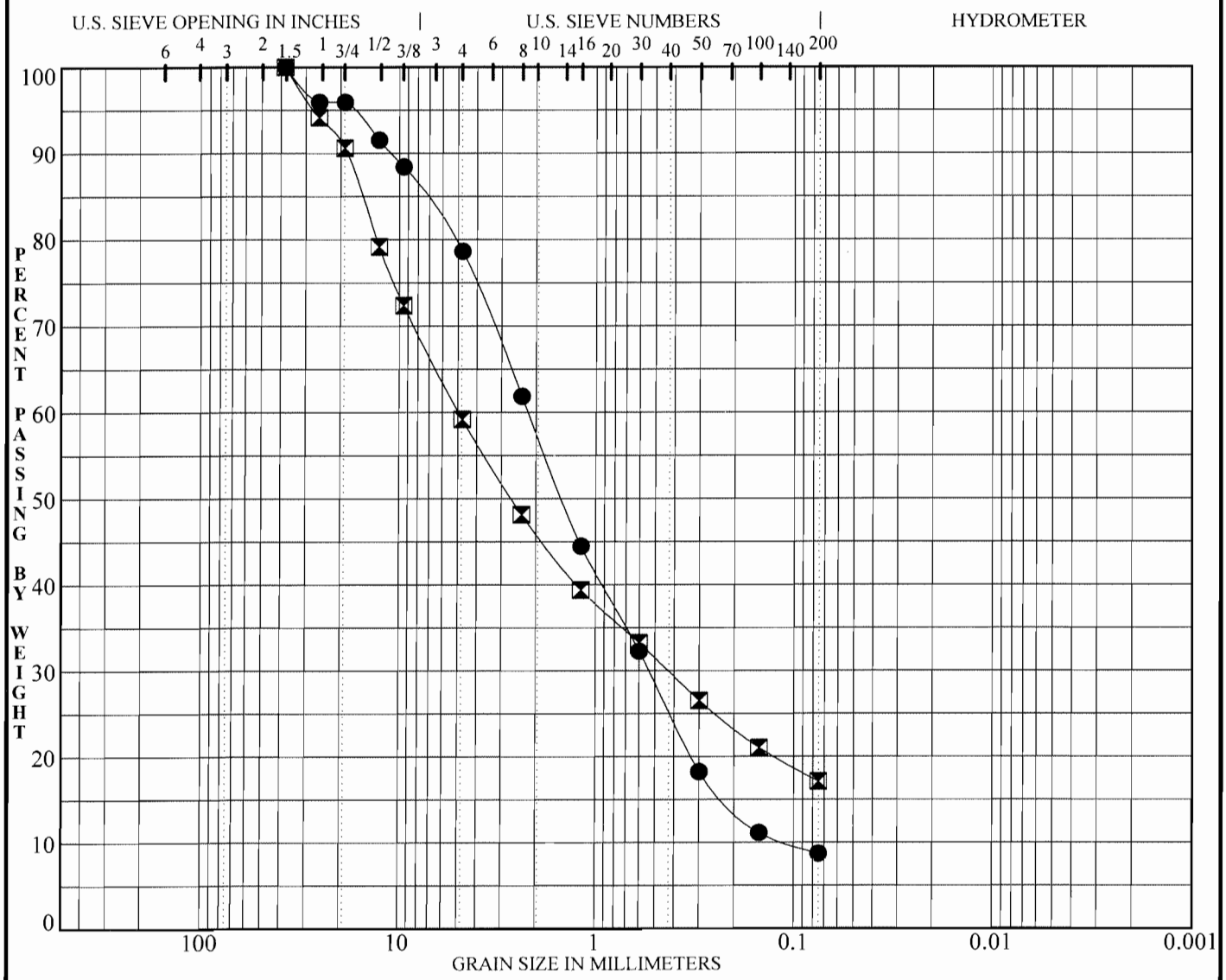
Boring Number	Description of Material	Dry Density (pcf)	Water Content (%)	Exudation Pressure (psi)	Expansion Pressure (psf)	R-Value
B-9	Brown SAND with clay (SP-SC)	115.6	15.0	183	9	26
		115.3	14.0	263	35	49
		116.9	12.9	366	70	71
R-Value = 58 at Exudation pressure of 300 psi						
B-12	Red brown gravelly SAND (SP-GP)	131.1	9.6	207	0	43
		130.2	9.1	270	0	59
		131.8	8.1	461	0	70
R-Value = 62 at Exudation pressure of 300 psi						
B-13	Brown clayey SAND (SC)	115.9	14.4	175	0	32
		115.8	13.4	278	31	52
		117.7	12.3	589	87	58
R-Value = 54 at Exudation pressure of 300 psi						
B-15	Brown clayey SAND (SC)	115.6	13.2	183	0	48
		117.9	12.7	398	31	54
		118.0	12.2	438	52	59
R-Value = 49 at Exudation pressure of 300 psi						
B-19	Dark gray brown clayey SAND (SC)	117.9	12.4	207	0	55
		117.7	11.9	286	4	59
		117.5	11.4	398	13	61
R-Value = 59 at Exudation pressure of 300 psi						
B-20	Dark gray brown sandy CLAY (CL-SC)	116.9	14.0	215	0	34
		118.0	13.5	255	52	38
		118.4	13.0	374	61	47
R-Value = 41 at Exudation pressure of 300 psi						
B-23	Brown sandy CLAY (CL-SC)	110.6	17.3	183	0	10
		112.9	16.3	247	44	16
		115.8	15.2	318	83	37
R-Value = 30 at Exudation pressure of 300 psi						



Key Symbol	Boring No.	Depth (Feet)	Liquid Limit	Plasticity Index	Liquidity Index	Water Content (%)	% Passing #200 Sieve	USCS
●	B-8	3.5	34	17	---	---		

ATTERBERG 1715.001.GPJ VERSION-012505.GDT 12/9/05

PREP'D BY:	PLASTICITY CHART AND DATA	FIGURE
APP'D BY:		B-1
DATE 12/9/05	COLLEGE OF MARIN, INDIAN VALLEY CAMPUS Novato, California	PROJECT No.
DWG FILE		1715.001



Cobbles	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	

Key Symbol	Boring No.	Depth (Feet)	% Passing No. 200 Sieve	% Passing No. 4 Sieve	Sample Descsription	USCS
●	B-12	2.5	9	79	Rust brown SAND with silt and gravel	SM-SW
⊠	B-8	29.5	17	59	Gray brown clayey SAND with gravel	SC

FUGRO

PREP'D BY:
APP'D BY:
DATE: 12/9/05
DWG FILE

GRADATION TEST DATA

COLLEGE OF MARIN, INDIAN VALLEY CAMPUS
Novato, California

FIGURE
B-2
PROJECT No.
1715.001

GRADATION_B 1715-001 V012505.GPJ STD.GDT 12/9/05

APPENDIX C
CORROSION ANALYSIS RESULTS

California State Certified Laboratory No.2153

C E R C O
analytical, inc.

3942-A Valley Avenue
Pleasanton, CA 94566-4715
Tel: 925.462.2771
Fax: 925.462.2775

9 November, 2005

Job No.0511024
Cust. No.11608

Mr. Jon Hagen
Fugro West, Inc.
1000 Broadway, Suite 200
Oakland, CA 94607

Subject: Project No.: 1715.001
Project Name: College of Marin-Indian Valley Campus
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Hagen:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on November 3, 2005. Based on the analytical results, a brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, all samples are classified as "moderately corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations range from none detected to 100 mg/kg. Because the chloride ion concentrations are less than 300 ppm, they are determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentrations are none detected and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of samples B2/2, B9/1 and B13/2 range from 6.6 to 7.1 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures. Sample B5/1 has a pH of 5.6. Any soils with a pH of <6.0 is considered to be corrosive to buried iron, steel, mortar-coated steel and reinforced concrete structures. Therefore, corrosion prevention measures need to be considered for structures to be placed in this acidic soil.

The redox potentials range from 420 to 500-mV which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific design recommendations or consultation, please call ***JDH Corrosion Consultants, Inc. at (925) 927-6630.***

We appreciate the opportunity of working with you on this project. If you have any questions, or if you required further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO Analytical, Inc.

3942-A Valley Avenue, Pleasanton, CA 94566-4715 (925) 462-2771 Fax (925) 462-2775

FINAL RESULTS

Client:	Fugro West, Inc.	Date Sampled:	Not Indicated
Client's Project No.:	1715.001	Date Received:	3-Nov-2005
Client's Project Name:	College of Marin- Indian Valley Campus	Date of Report:	9-Nov-2005
Authorization:	Signed Chain of Custody	Matrix:	Soil

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
0511024-001	B2/2 @ 3-3.5'	420	6.6	-	3,600	-	29	N.D.
0511024-002	B5/1 @ 2.5-3'	480	5.6	-	2,900	-	100	N.D.
0511024-003	B9/1 @ 2.5-3'	480	7.1	-	4,500	-	16	N.D.
0511024-004	B13/2 @ 3-3.5'	500	6.6	-	6,600	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Detection Limit:	-	-	10	-	50	15	15
Date Analyzed:	4-Nov-2005	8-Nov-2005	-	8-Nov-2005	-	8-Nov-2005	8-Nov-2005

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis

N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

CIRCULATION PLAN - VEHICULAR

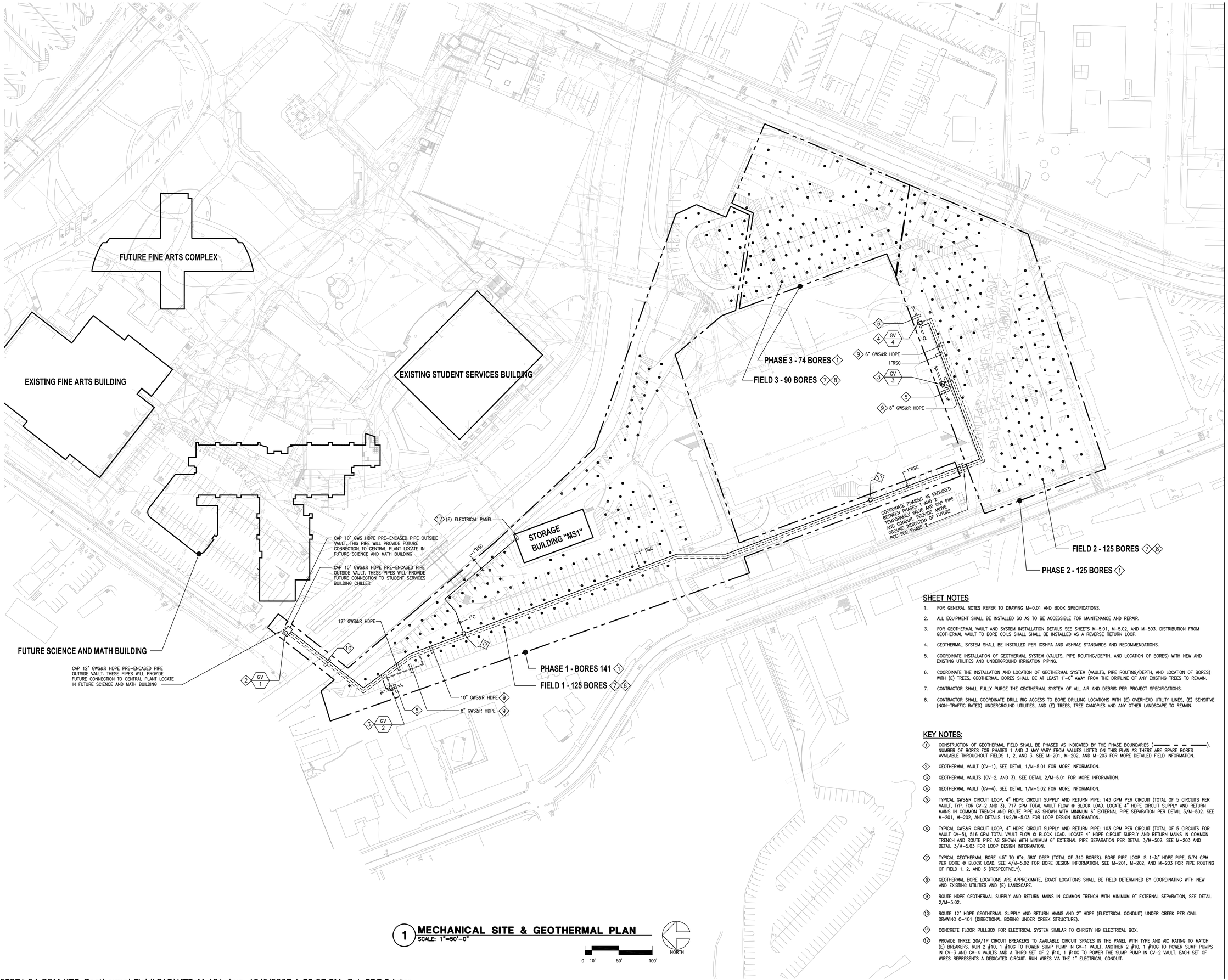
KENTFIELD CAMPUS

LEGEND:

- SERVICE / FIRE
- VEHICULAR
- MAINTENANCE
- P17 PARKING LOT
- BUILDING ENTRANCE
- CAMPUS / VEHICULAR ENTRANCE
- SERVICE / FIRE ENTRANCE
- PROPERTY LINE

0 30 60 120 FEET

12.12.2006 SCALE:1"=60'



1 MECHANICAL SITE & GEOTHERMAL PLAN

SCALE: 1"=50'-0"

0 10' 50' 100'

NORTH

SHEET NOTES

1. FOR GENERAL NOTES REFER TO DRAWING M-0.01 AND BOOK SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE INSTALLED SO AS TO BE ACCESSIBLE FOR MAINTENANCE AND REPAIR.
3. FOR GEOTHERMAL VAULT AND SYSTEM INSTALLATION DETAILS SEE SHEETS M-5.01, M-5.02, AND M-503. DISTRIBUTION FROM GEOTHERMAL VAULT TO BORE COILS SHALL SHALL BE INSTALLED AS A REVERSE RETURN LOOP.
4. GEOTHERMAL SYSTEM SHALL BE INSTALLED PER IGSHPA AND ASHRAE STANDARDS AND RECOMMENDATIONS.
5. COORDINATE INSTALLATION OF GEOTHERMAL SYSTEM (VAULTS, PIPE ROUTING/DEPTH, AND LOCATION OF BORES) WITH NEW AND EXISTING UTILITIES AND UNDERGROUND IRRIGATION PIPING.
6. COORDINATE THE INSTALLATION AND LOCATION OF GEOTHERMAL SYSTEM (VAULTS, PIPE ROUTING/DEPTH, AND LOCATION OF BORES) WITH (E) TREES, GEOTHERMAL BORES SHALL BE AT LEAST 1'-0" AWAY FROM THE DRIPLINE OF ANY EXISTING TREES TO REMAIN.
7. CONTRACTOR SHALL FULLY PURGE THE GEOTHERMAL SYSTEM OF ALL AIR AND DEBRIS PER PROJECT SPECIFICATIONS.
8. CONTRACTOR SHALL COORDINATE DRILL RIG ACCESS TO BORE DRILLING LOCATIONS WITH (E) OVERHEAD UTILITY LINES, (E) SENSITIVE (NON-TRAFFIC RATED) UNDERGROUND UTILITIES, AND (E) TREES, TREE CANOPIES AND ANY OTHER LANDSCAPE TO REMAIN.

KEY NOTES:

1. CONSTRUCTION OF GEOTHERMAL FIELD SHALL BE PHASED AS INDICATED BY THE PHASE BOUNDARIES (— — — —). NUMBER OF BORES FOR PHASES 1 AND 3 MAY VARY FROM VALUES LISTED ON THIS PLAN AS THERE ARE SPARE BORES AVAILABLE THROUGHOUT FIELDS 1, 2, AND 3. SEE M-201, M-202, AND M-203 FOR MORE DETAILED FIELD INFORMATION.
2. GEOTHERMAL VAULT (GV-1), SEE DETAIL 1/M-5.01 FOR MORE INFORMATION.
3. GEOTHERMAL VAULTS (GV-2, AND 3), SEE DETAIL 2/M-5.01 FOR MORE INFORMATION.
4. GEOTHERMAL VAULT (GV-4), SEE DETAIL 1/M-5.02 FOR MORE INFORMATION.
5. TYPICAL GWS&R CIRCUIT LOOP, 4" HDPE CIRCUIT SUPPLY AND RETURN PIPE; 143 GPM PER CIRCUIT (TOTAL OF 5 CIRCUITS PER VAULT, TYP. FOR GV-2 AND 3), 717 GPM TOTAL VAULT FLOW @ BLOCK LOAD. LOCATE 4" HDPE CIRCUIT SUPPLY AND RETURN MAINS IN COMMON TRENCH AND ROUTE PIPE AS SHOWN WITH MINIMUM 6" EXTERNAL PIPE SEPARATION PER DETAIL 3/M-502. SEE M-201, M-202, AND DETAILS 1&2/M-5.03 FOR LOOP DESIGN INFORMATION.
6. TYPICAL GWS&R CIRCUIT LOOP, 4" HDPE CIRCUIT SUPPLY AND RETURN PIPE; 103 GPM PER CIRCUIT (TOTAL OF 5 CIRCUITS FOR VAULT GV-5), 516 GPM TOTAL VAULT FLOW @ BLOCK LOAD. LOCATE 4" HDPE CIRCUIT SUPPLY AND RETURN MAINS IN COMMON TRENCH AND ROUTE PIPE AS SHOWN WITH MINIMUM 6" EXTERNAL PIPE SEPARATION PER DETAIL 3/M-502. SEE M-203 AND DETAIL 3/M-5.03 FOR LOOP DESIGN INFORMATION.
7. TYPICAL GEOTHERMAL BORE 4.5" TO 6"ø, 380' DEEP (TOTAL OF 340 BORES). BORE PIPE LOOP IS 1-¼" HDPE PIPE, 5.74 GPM PER BORE @ BLOCK LOAD. SEE 4/M-5.02 FOR BORE DESIGN INFORMATION. SEE M-201, M-202, AND M-203 FOR PIPE ROUTING OF FIELD 1, 2, AND 3 (RESPECTIVELY).
8. GEOTHERMAL BORE LOCATIONS ARE APPROXIMATE, EXACT LOCATIONS SHALL BE FIELD DETERMINED BY COORDINATING WITH NEW AND EXISTING UTILITIES AND (E) LANDSCAPE.
9. ROUTE HDPE GEOTHERMAL SUPPLY AND RETURN MAINS IN COMMON TRENCH WITH MINIMUM 9" EXTERNAL SEPARATION, SEE DETAIL 2/M-5.02.
10. ROUTE 12" HDPE GEOTHERMAL SUPPLY AND RETURN MAINS AND 2" HDPE (ELECTRICAL CONDUIT) UNDER CREEK PER CIVIL DRAWING C-101 (DIRECTIONAL BORING UNDER CREEK STRUCTURE).
11. CONCRETE FLOOR PULLBOX FOR ELECTRICAL SYSTEM SIMILAR TO CHRISTY N9 ELECTRICAL BOX.
12. PROVIDE THREE 20A/1P CIRCUIT BREAKERS TO AVAILABLE CIRCUIT SPACES IN THE PANEL WITH TYPE AND AIC RATING TO MATCH (E) BREAKERS. RUN 2 #10, 1 #10G TO POWER SUMP PUMP IN GV-1 VAULT, ANOTHER 2 #10, 1 #10G TO POWER SUMP PUMPS IN GV-3 AND GV-4 VAULTS AND A THIRD SET OF 2 #10, 1 #10G TO POWER THE SUMP PUMP IN GV-2 VAULT. EACH SET OF WIRES REPRESENTS A DEDICATED CIRCUIT. RUN WIRES VIA THE 1" ELECTRICAL CONDUIT.

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

SWINERTON MANAGEMENT & CONSULTING

ALFATECH CAMBRIDGE
120 MONTGOMERY STREET, SUITE 717 415-439-5000
SAN FRANCISCO, CALIFORNIA 94104 FAX: 415-756-5040
SAN JOSE • SAN FRANCISCO • NEW YORK/NEW JERSEY
LOS ANGELES • PALO ALTO • SINGAPORE • AUSTRALIA
J:\Projects\ 205271.24

ALFA TECH CAMBRIDGE GROUP
120 MONTGOMERY STREET, SUITE 715
SAN FRANCISCO, CA 94601

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. ALEA
M33075
Exp. 06/30/09
MECHANICAL
STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
XX-XXXXXX
AC XX FLS XX SSS XX
DATE 00.00.0000

REVISION
AC XX FLS XX SSS XX
DATE 00.00.0000

key plan

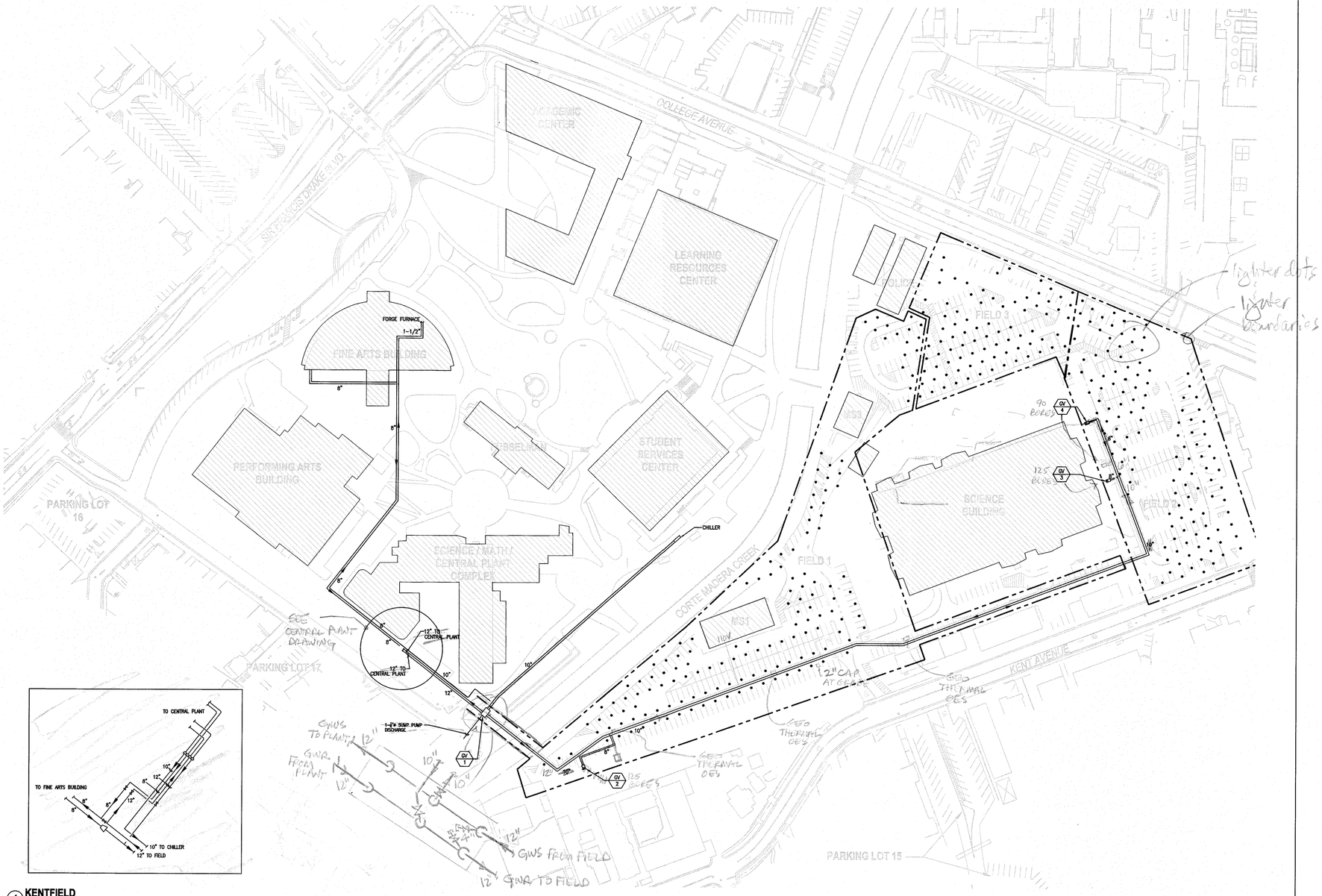
rev.	date	Issue
2	12/04/2007	ISSUED FOR BID
1	11/06/2007	ISSUED FOR COST ESTIMATE

GEOTHERMAL FIELD PACKAGE
Kentfield Campus

District Project # 305B
AE Project # 205271.24 Date: 12-04-07

MECHANICAL
GEOTHERMAL
FIELD PLAN
KTD-M-101

to draft



1 **KENTFIELD**
1" = 50'-0"

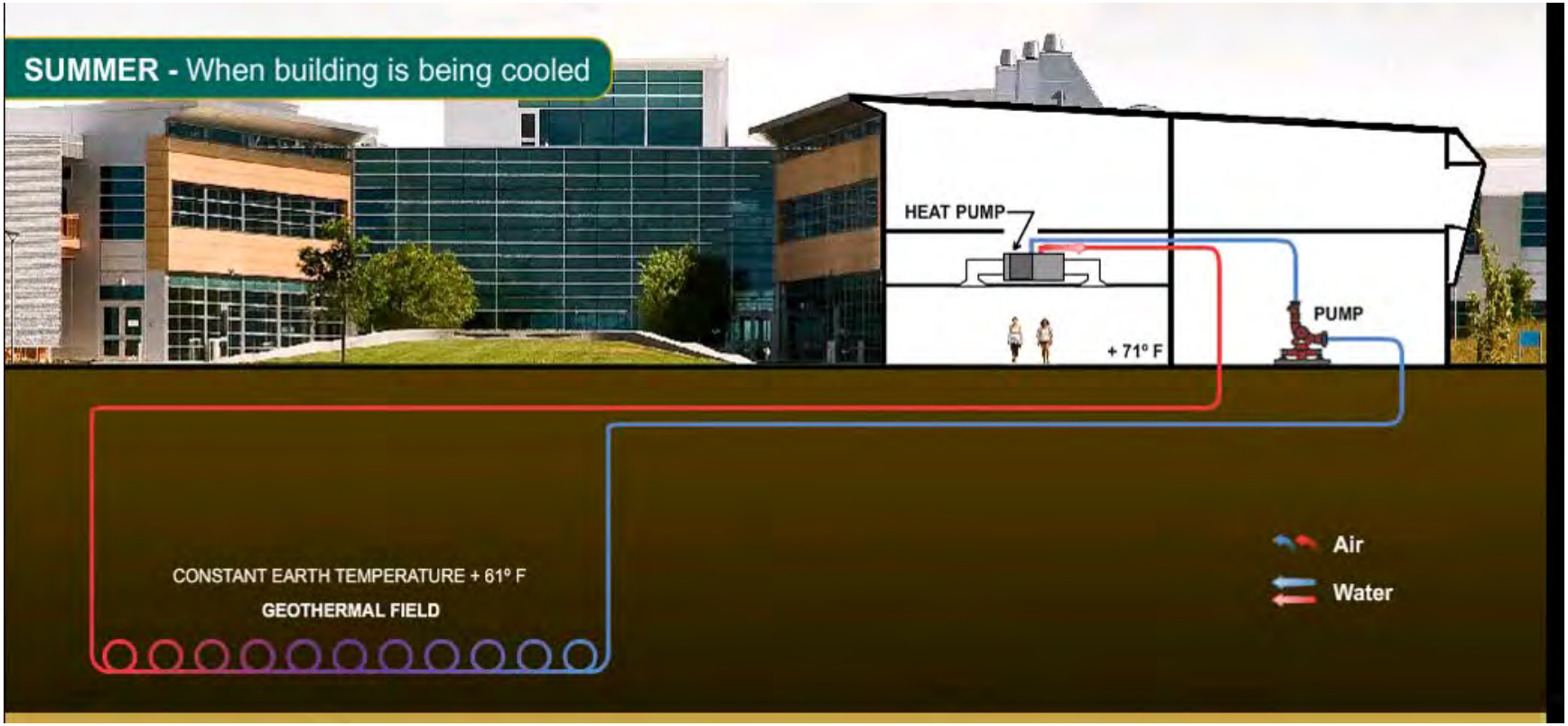
Sustainable Mechanical Systems

- Geothermal
- Photovoltaics

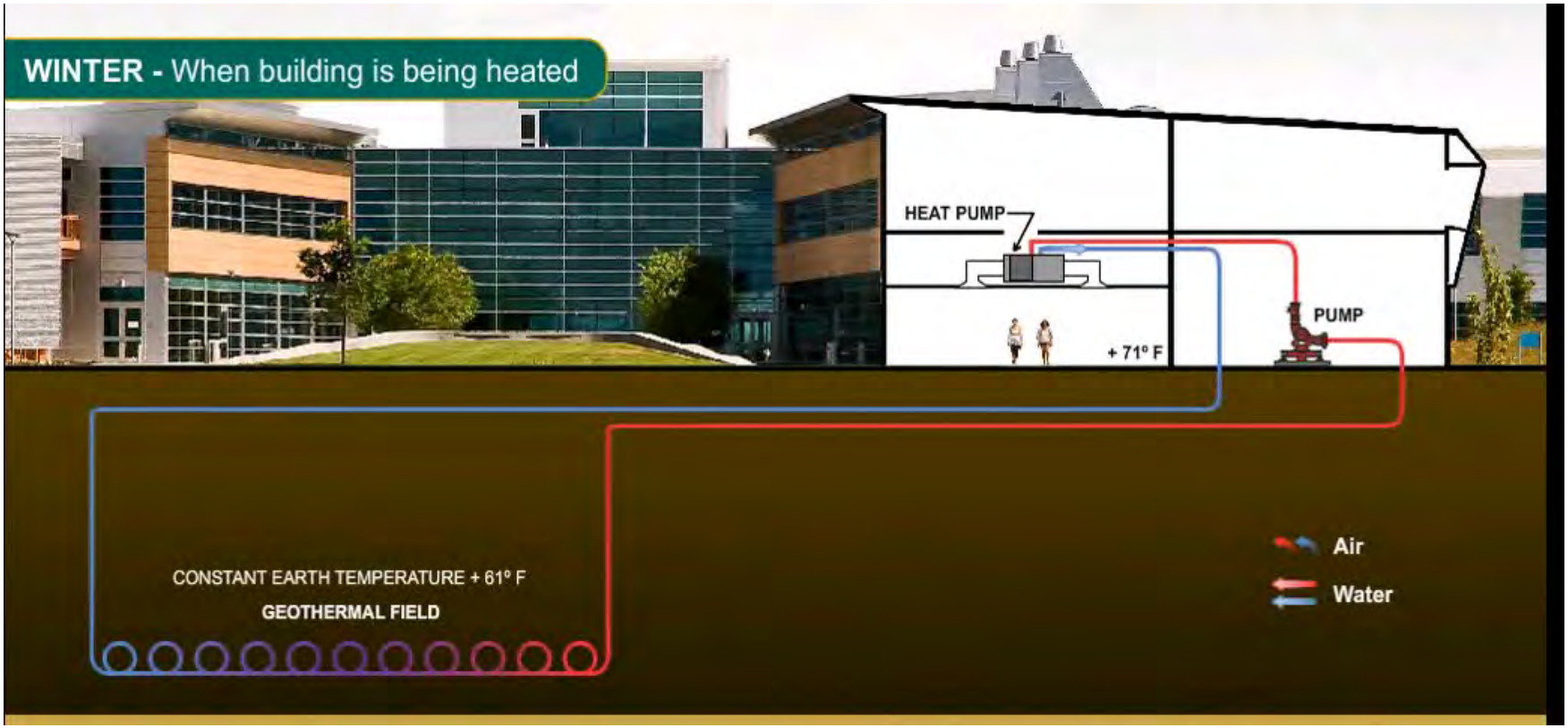
Geothermal Systems

- Kentfield
  680Tons – 340Bores
- Indian Valley
  ph1 :100Tons – 100Bores
  ph2: 95Tons – 95Bores
- Bore depths vary 250 feet & 350 feet
- Both fields are under parking areas

Geothermal Cooling (Summer)



Geothermal Heating (Winter)

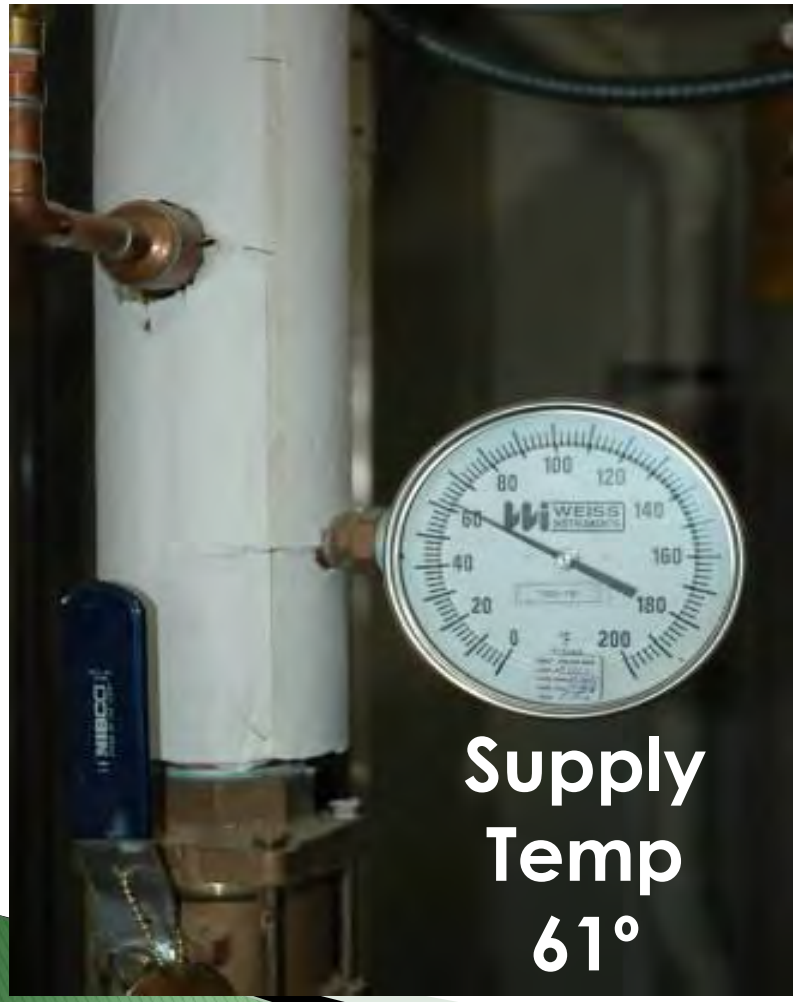


Geothermal System within the Building

Room Smaller than Conventional Systems

Geothermal Supply and Return Manifold

Supply and Return Water Temperature

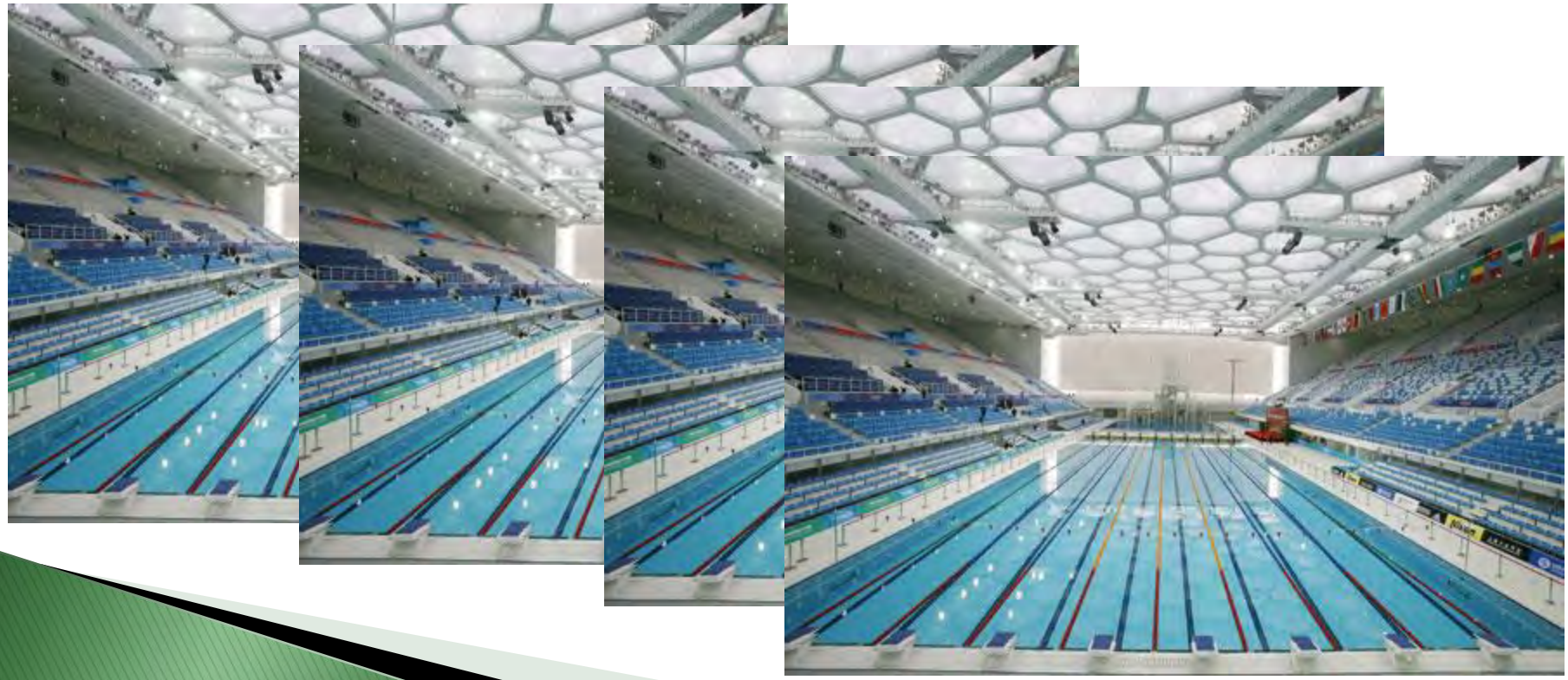


Water Consumption

- Conventional Systems
- Water Evaporation
- Geothermal no water evaporation

Conventional Water Consumption

- 1,540,000 gal / year = 4 Olympic Pools
- No geothermal water consumption



College of Marin PE Building Photovoltaic Panel Array

- The umbrella style shade features
- 240 Peak KW clean power
- 353 annual MW/HRS

- PVs provide 50 % of peak KW demand
- Net zero energy April – August
- Rebates from CSI

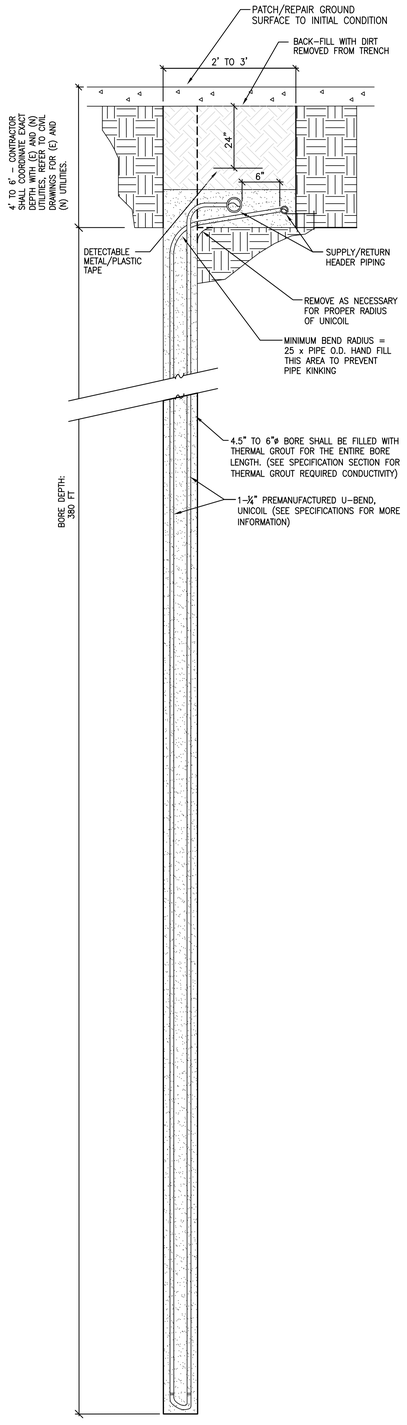
PVs- Educational Points

Real Time Power Monitoring

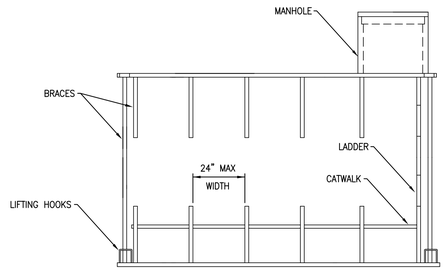
In Summary

The Passive and Active Energy Saving Features of Marin College will result in:

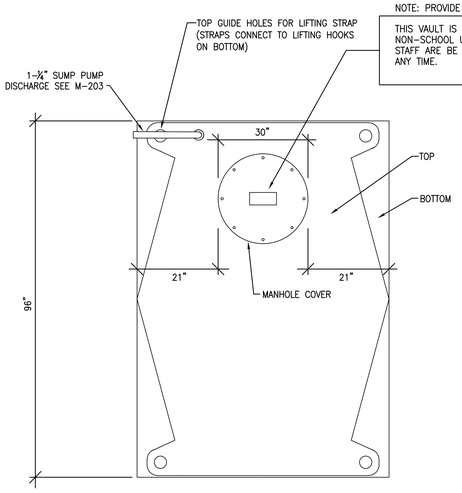
- 50% Reduction in Purchased Power/yr (PE)
- Carbon Emissions Reduced by 421 tons/yr = 1,051,310 miles not driven or enough electricity to supply 123 homes for a year
- 1,540,000 gal/yr water not used



GEOTHERMAL BORE DETAIL | 4



SIDE SECTION VIEW

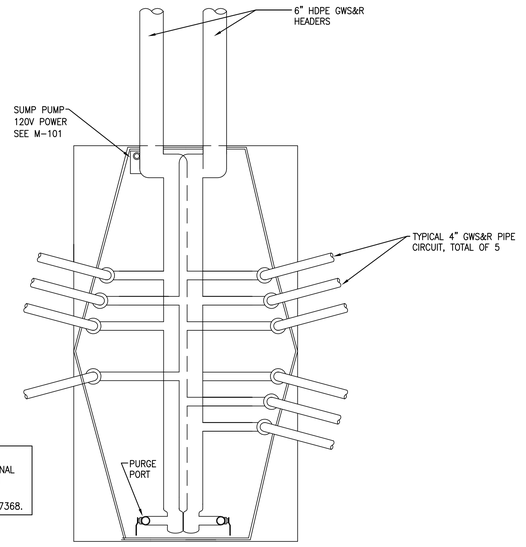


TOP VIEW

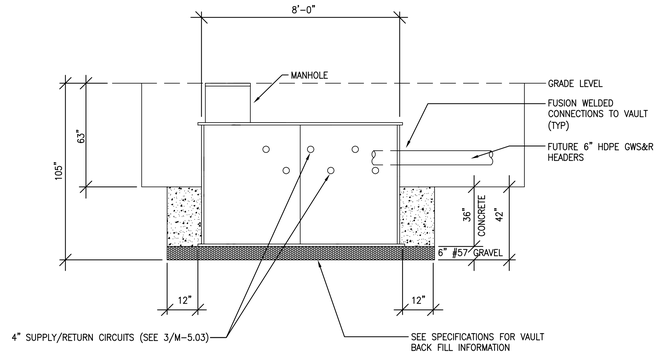
NOTE: PROVIDE PLAQUE ON MANHOLE TO READ

THIS VAULT IS TO BE USED EXCLUSIVELY FOR NON-SCHOOL USE. NO STUDENT OR INSTRUCTIONAL STAFF ARE BE PERMITTED TO USE OR ENTER AT ANY TIME.

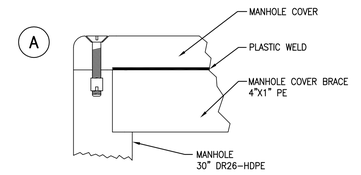
EDUCATION CODE 17368.

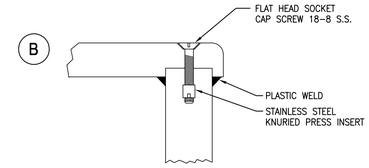


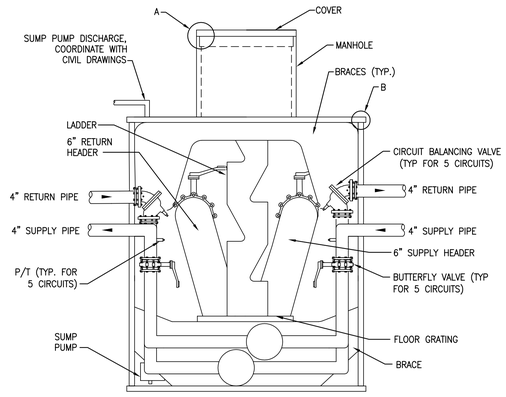
TOP SECTION VIEW



SIDE VIEW / INSTALLATION VIEW

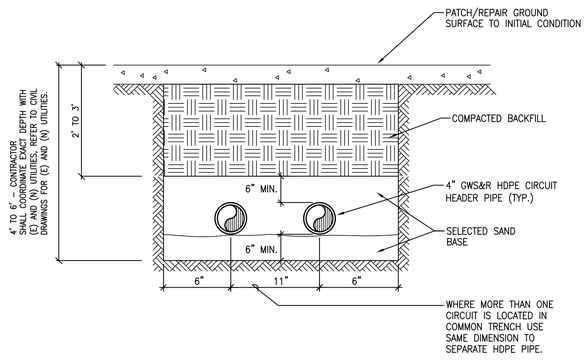




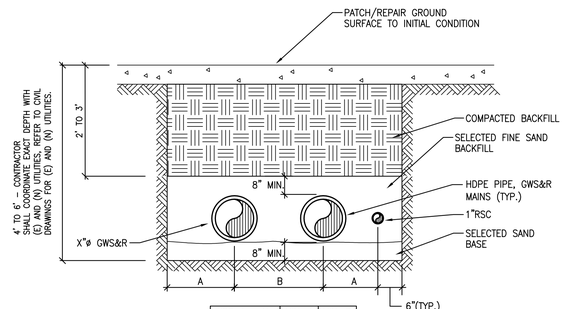


END SECTION VIEW

GEOTHERMAL VAULT (GV-4) DETAIL | 1



DIRECT BURIED HDPE GWS&R CIRCUIT PIPE DETAIL | 3



PIPE ø = X	MIN. A	MIN. B
6"	11"	14"
8"	14"	18"
10"	16"	20"
12"	18"	22"

DIRECT BURIED HDPE PRE-ENCASED GWS&R PIPE DETAIL | 2

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REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. ALEA
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DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
XX-XXXXXX
AC XX FLS XX SSS XX
DATE 00.00.0000

REVISION
AC XX FLS XX SSS XX
DATE 00.00.0000

key plan

rev.	date	Issue
1	12/04/2007	ISSUED FOR BID
2	11/06/2007	ISSUED FOR COST ESTIMATE

GEOTHERMAL FIELD PACKAGE
Kentfield Campus

District Project # 305B
AE Project # 205271.24 Date: 12-04-07

MECHANICAL DETAILS

KTD-M-502

COLLEGE OF MARIN

TREE HEALTH PROJECT
KENTFIELD CAMPUS

JULY 10, 2014

CLIENT

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LANDSCAPE GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA ADMINISTRATIVE CODE, THE UNIFORM BUILDING CODE, CAL-OSHA AND STATE REQUIREMENTS, AND THE GOVERNING BUILDING AUTHORITY. ALL CODES, STANDARDS AND SPECIFICATIONS SHALL BE AS AMENDED TO DATE, ANY VIOLATION WILL RESULT IN STOPPING OF ALL WORK UNTIL THE VIOLATION IS CORRECTED.

2. THE DRAWINGS AND SPECIFICATIONS DESCRIBE IN GENERAL THE QUALITY AND CHARACTER OF THE MATERIALS, SHAPE AND CONFIGURATION OF IMPROVEMENTS AND THE DESIGN INTENT OF THE COMPLETED WORK. MISCELLANEOUS ITEMS OF WORK, MATERIAL, EQUIPMENT, ETC., NECESSARY TO COMPLETE THE WORK SHALL BE PROVIDED BY THE CONTRACTOR WHETHER OR NOT MENTIONED IN THE SPECIFICATIONS OR SHOWN ON THE DRAWINGS. SPECIFIC NOTES AND DETAILS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS.

3. PROTECT EXISTING FACILITIES FROM DAMAGE. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE DISTRICT. BARRICADES, SIGNS LIGHTS, ETC., REQUIRED FOR THE PROTECTION OF PUBLIC, PERSONNEL, PROPERTY AND MATERIAL SHALL BE PROVIDED FOR AND MAINTAINED DURING CONSTRUCTION BY THE CONTRACTOR, AND SHALL CONFORM TO ALL GOVERNING CODES, ORDINANCES AND REGULATIONS. THE CONTRACTOR SHALL EMPLOY ALL MEANS NECESSARY TO CONTROL DUST AT AND NEAR THE SITE OF WORK AND ALONG APPROACH ROUTES TO THE WORK SITE.

4. PROVIDE ALL TOOLS, TRANSPORTATION, UTILITIES, TEMPORARY FACILITIES, AND OTHER SERVICES AS NECESSARY FOR PROPER EXECUTION OF THE WORK, AND SHALL ASSUME FULL RESPONSIBILITY FOR PROTECTION AND SAFEKEEPING OF THESE ELEMENTS DURING CONSTRUCTION. THE CONTRACTOR SHALL CONTACT THE DISTRICT'S REPRESENTATIVE FOR DESIGNATION OF THE MATERIAL STORAGE AREA AT THE JOB SITE.

5. MAINTAIN "GOOD HOUSEKEEPING" PRACTICES AT THE JOB SITE. REMOVE DEBRIS PROMPTLY FROM THE JOB SITE AND DISPOSE OF AT AN APPROVED DUMPSITE. LEAVE THE JOB SITE "BROOM CLEAN" AT THE END OF EACH WORKDAY. BEFORE ACCEPTANCE BY THE DISTRICT'S REPRESENTATIVE, THE COMPLETED CONSTRUCTION SHALL BE CLEARED, AND ALL OTHER TOUCHUP WORK COMPLETED.

6. FIELD INVESTIGATE, VERIFY AND BE RESPONSIBLE FOR ALL CONDITIONS, ELEVATIONS AND DIMENSIONS OF THE PROJECT, AS SHOWN ON OR REFERENCED IN THE DRAWINGS AND SPECIFICATIONS, AND NOTIFY THE DISTRICT'S REPRESENTATIVE ABOUT ANY CONDITION REQUIRING MODIFICATION OR CHANGE PRIOR TO BIDDING. EXAMINE THE DRAWINGS AND SPECIFICATIONS AND CLEARLY UNDERSTAND THE EXISTING CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED PRIOR TO BIDDING. ENTERING INTO AN AGREEMENT WITH THE DISTRICT INDICATES THAT THE CONTRACTOR HAS VISITED THE SITE, FAMILIARIZED HIMSELF OR HERSELF WITH EXISTING CONDITIONS AND REVIEWED SAME WITH REQUIREMENTS OF CONTRACT DOCUMENT. NO ALLOWANCES OF ANY KIND WILL BE MADE FOR ANY EXTRA COST DUE TO THE CONTRACTOR'S FAILURE TOO INFORM THE DISTRICT'S REPRESENTATIVE OF DISCREPANCIES IN TIME TO ISSUE CORRECTIVE ADDENDA PRIOR TO BIDDING. THE CONTRACT DOCUMENTS ILLUSTRATE THE INTENT OF THE WORK TO BE PERFORMED.

7. CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

8. THE EXISTENCE AND LOCATIONS OF ANY UNDERGROUND UTILITY PIPELINES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. USE CAUTION IN ALL EXCAVATION OPERATIONS.

9. WHERE ELEVATIONS OF EXISTING UTILITIES ARE UNKNOWN, POTHOLE AND VERIFY PRIOR TO STARTING CONSTRUCTION. CONTACT DISTRICT'S REPRESENTATIVE IF THERE ARE CONFLICTS WITH THE DESIGN.

10. UNDERGROUND UTILITIES INDICATED ARE FOR INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES INCLUDING TELEPHONE, WATER, GAS, TV, TRAFFIC SIGNAL STREET LIGHTING, ETC. WITH THE APPROPRIATE AGENCY. NEITHER THE DISTRICT NOR THE LANDSCAPE ARCHITECT ASSUMES RESPONSIBILITY THAT THE UNDERGROUND UTILITIES INDICATED WOULD BE THOSE ENCOUNTERED. CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT (U.S.A. 800-642-2444) 48 HOURS MINIMUM PRIOR TO ANY EXCAVATION.

11. CONTRACTOR IS RESPONSIBLE FOR COORDINATING HIS WORK TO AVOID CONFLICTS BETWEEN SEWER LATERALS, STORM DRAINS AND WATER MAINS.

12. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE DISTRICT'S REPRESENTATIVE OF ANY DIFFERENCES IN LOCATIONS OF EXISTING UTILITIES FROM THAT SHOWN, OR ANY CONFLICTS WITH THE DESIGN BEFORE CONTINUING WORK IN THAT AREA.

13. UTILITY CONNECTIONS AND DISCONNECTIONS NECESSARY TO COMPLETE THE WORK SHALL BE PERFORMED IN SUCH MANNER IN ORDER TO MINIMIZE UTILITY SERVICE INTERRUPTIONS TO FACILITY OPERATIONS IN THE VICINITY OF CONSTRUCTION. COORDINATE ALL "DOWN TIME" WITH THE DISTRICT AND WITH THE APPROPRIATE AGENCY.

14. PROVIDE ADEQUATE COVER FOR THE PROTECTION OF ALL EXISTING UTILITIES DURING THE CONSTRUCTION OF THIS PROJECT.

15. ANY PERMANENT MONUMENTS OR POINTS DAMAGED OR DESTROYED SHALL BE REPLACED BY A LICENSED ENGINEER OR LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.

16. CONTRACTOR SHALL COORDINATE THEIR WORK WITH THE WORK UNDER CONTRACTS THAT MAY BE UNDERWAY CONCURRENTLY WITH THIS PROJECT.

17. OBTAIN ENCROACHMENT PERMITS REQUIRED FOR WORKING WITHIN EXISTING PUBLIC RIGHT-OF-WAYS. NOTIFY DISTRICT'S REPRESENTATIVE FOURTEEN (14) DAYS PRIOR TO START OF WORK WITHIN EXISTING PUBLIC RIGHT-OF-WAYS.

18. TRAFFIC CONTROL: PRIOR TO BEGINNING ANY WORK ON EXISTING STREETS, PARKING LOTS, OR DRIVEWAYS, ADVANCE-WARNING SIGNS SHALL BE INSTALLED. TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH CALTRANS "MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES" CURRENT EDITION AND ANY ADDITIONAL COUNTY REQUIREMENTS. FAILURE TO COMPLY MAY RESULT IN IMMEDIATE STOPPAGE OF WORK UNTIL THE PROPER TRAFFIC CONTROL IS IN ORDER.

19. PROVIDE BARRICADE TO PROTECT THE GENERAL PUBLIC AND TO PREVENT UNCONTROLLED ACCESS TO THE SITE AT ALL TIMES.

20. PROVIDE FOR EGRESS AND INGRESS TO ON-SITE FACILITIES THAT ARE TO REMAIN OPERATIONAL DURING ALL PHASES OF THE WORK.

21. CONTRACTOR SHALL BE RESPONSIBLE FOR MATCHING EXISTING STREETS, SURROUNDING LANDSCAPE, AND OTHER IMPROVEMENT WITH A SMOOTH TRANSITION IN GRADING TO AVOID ANY ABRUPT OR APPARENT CHANGES IN GRADES OR CROSS SLOPE, LOW SPOTS, OR HAZARDOUS CONDITIONS.

22. WASTEWATER GENERATED DURING THE WORK SHALL NOT BE DISCHARGED TO THE STORM DRAIN SYSTEM. THE CONTRACTOR SHALL MAKE ARRANGEMENTS TO ELIMINATE DISCHARGE TO THE STORM DRAIN SYSTEM AND, IF NECESSARY, PROVIDE AN AREA FOR ON SITE WASHING ACTIVITIES DURING CONSTRUCTION. MATERIALS THAT COULD CONTAMINATE STORM RUNOFF SHALL BE STORED IN AREAS WHICH ARE DESIGNED TO PREVENT EXPOSURE TO RAINFALL AND NOT ALLOW STORM WATER TO RUN ONTO THE AREA.

23. FLUSHING OF STREETS AND PARKING LOTS TO REMOVE DIRT AND DEBRIS IS PROHIBITED UNLESS PROPER SEDIMENT CONTROLS ARE USED. PREFERABLY, AREAS REQUIRING CLEANING SHOULD BE SWEPT.

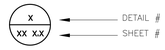
24. ANY REVISIONS OR ADDITIONAL WORK REQUIRED AS A RESULT OF FIELD CONDITIONS OR LOCAL GOVERNING AUTHORITIES SHALL BE BROUGHT TO THE ATTENTION OF THE DISTRICT'S REPRESENTATIVE BEFORE THE WORK IS PERFORMED. WORK PERFORMED BY THE CONTRACTOR WITHOUT WRITTEN AUTHORIZATION SHALL BE THE FULL RESPONSIBILITY OF THE CONTRACTOR WHO SHALL BEAR ALL COSTS ATTRIBUTABLE THERETO. ANY AND ALL REVISIONS SHALL BE IN WRITTEN CHANGE ORDER FORM AND APPROVED AND AUTHORIZED BY THE DISTRICT BEFORE BEGINNING WORK.

25. ANY DEVIATIONS OR CHANGES IN THESE PLANS, WITHOUT OFFICIAL APPROVAL OF THE LANDSCAPE ARCHITECT SHALL ABSOLVE THE LANDSCAPE ARCHITECT OF ANY AND ALL RESPONSIBILITY OF SAID DEVIATION OR CHANGE.

26. IF ARCHAEOLOGICAL MATERIALS ARE UNCOVERED DURING STUMP REMOVAL, GRADING, TRENCHING OR OTHER EXCAVATION, EARTHWORK WITHIN 100 FEET OF THESE MATERIALS SHALL BE STOPPED AND THE FIND REPORTED TO THE PROPER AUTHORITIES. A PROFESSIONAL ARCHAEOLOGIST SHALL HAVE AN OPPORTUNITY TO EVALUATE THE SIGNIFICANCE OF THE FIND AND SUGGEST APPROPRIATE MITIGATION MEASURES, IF THEY ARE DEEMED NECESSARY. SKELETAL MATERIALS MUST BE REPORTED PROMPTLY TO THE COUNTY CORONER.

ABBREVIATIONS AND LEGEND

A.G.	ABOVE GRADE
BLDG.	BUILDING
BR	BRIDGE
BTWN.	BETWEEN
CLR	CLEAR
CONC.	CONRETE
CU	CULVERT
(E)	EXISTING
MAX.	MAXIMUM
MIN.	MINIMUM
N/A	NOT APPLICABLE
(N)	NEW
(N.I.C.)	NOT IN CONTRACT
NTS	NOT TO SCALE
SHT.	SHEET
TYP.	TYPICAL
W/	WITH



TREE(S) TO BE REMOVED

TREE(S) TO BE PRUNED/THINNED/FERTILIZED/TREATED

TREE(S) TO BE PRESERVED & MONITORED (N.I.C.)

TREE CANOPY

NOTE: TREE TRUNK SYMBOL LOCATIONS SHOWN ON PLANS ARE APPROXIMATE. SEE LOCATION DESCRIPTION IN TREE ASSESSMENT TABLES FOR DETAILED LOCATION DESCRIPTION. VERIFY THE IDENTITY OF TREES IN THE FIELD WITH EXISTING TREE TAGS.

PROPERTY LINE

MATCH LINE

LIST OF DRAWINGS

SHEET NO.	TITLE	TREES COVERED
L-1.00	KENTFIELD CAMPUS KEYMAP	--
L-1.01	ENLARGED PLAN, COLLEGE AVE & SIR FRANCES DRAKE INTERSECTION	1-26
L-1.02	ENLARGED PLAN, CIRCLE DRIVE EAST	34-46
L-1.03	ENLARGED PLAN, CIRCLE DRIVE MIDDLE	47-71
L-1.04	ENLARGED PLAN, CIRCLE DRIVE WEST	72-99
L-1.05	ENLARGED PLAN, CENTRAL QUAD NORTH	101-121
L-1.06	ENLARGED PLAN, REDWOOD GROVE & CENTRAL QUAD SOUTH	122-158
L-1.07	ENLARGED PLAN, FINE ARTS NORTH	161-191
L-1.08	ENLARGED PLAN, FINE ARTS EAST	209-214
L-1.09	ENLARGED PLAN, FINE ARTS SOUTH	223-258
L-1.10	ENLARGED PLAN, FINE ARTS WEST	265-280
L-1.11	ENLARGED PLAN, DICKSON HALL COMPLEX	287-297
L-1.12	ENLARGED PLAN, PARKING LOT #4	301-305
L-1.13	ENLARGED PLAN, FUSSELMAN HALL & STUDENT SERVIES CENTER	306-328
L-1.14	ENLARGED PLAN, SCIENCE CENTER NORTH	329-346, 451
L-1.15	ENLARGED PLAN, SCIENCE CENTER SOUTH	347-361
L-1.16	ENLARGED PLAN, PARKING LOT #6	362-377
L-1.17	ENLARGED PLAN, PARKING LOTS #7 & #9	378-394
L-1.18	ENLARGED PLAN, ADMINISTRATIVE CENTER	395-404
L-1.19	ENLARGED PLAN, HARLAN CENTER/OLNEY HALL	410-411
L-1.20	ENLARGED PLAN, LEARNING RESOURCE CENTER/OLNEY HALL	426-436
L-1.21	ENLARGED PLAN, CORTE MADERA CREEK/COLLEGE AVENUE	437-448
L-1.22	ENLARGED PLAN, PARKING LOT #2	452-466
L-1.23	KENTFIELD CAMPUS - RIPARIAN ZONE, PARKING LOT #17	467, UN-NUMBERED TREES
L-1.24	ENLARGED PLAN, PHYSICAL EDUCATION BUILDING SOUTHWEST	468-489
L-1.25	ENLARGED PLAN, PHYSICAL EDUCATION BUILDING NE & COLLEGE AVE	490-509
L-1.26	ENLARGED PLAN, PARKING LOT #11 AND PARKING LOT #12 SOUTH	510-520
L-1.27	ENLARGED PLAN, PARKING LOT #12	522-529
L-1.28	ENLARGED PLAN, RUNNING TRACK	539-537
L-1.29	ENLARGED PLAN, PHYSICAL EDUCATION BUILDING NORTH & BALL FIELD NE	538-546
L-1.30	ENLARGED PLAN, PARKING LOT #15 WEST & SOUTH	547-563
L-1.31	ENLARGED PLAN, PARKING LOT #15 NORTHEAST	564-578
L-1.32	ENLARGED PLAN, PARKING LOT #15 NORTHWEST & PARKING LOT #16	565-607

PROJECT SITE:

COLLEGE OF MARIN - KENTFIELD CAMPUS

COLLEGE OF MARIN - KENTFIELD CAMPUS
835 COLLEGE AVENUE
KENTFIELD, CA 94904-2590

COLLEGE OF
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rev.	date	issue

TREE REMOVAL

Kentfield Campus

District Project #

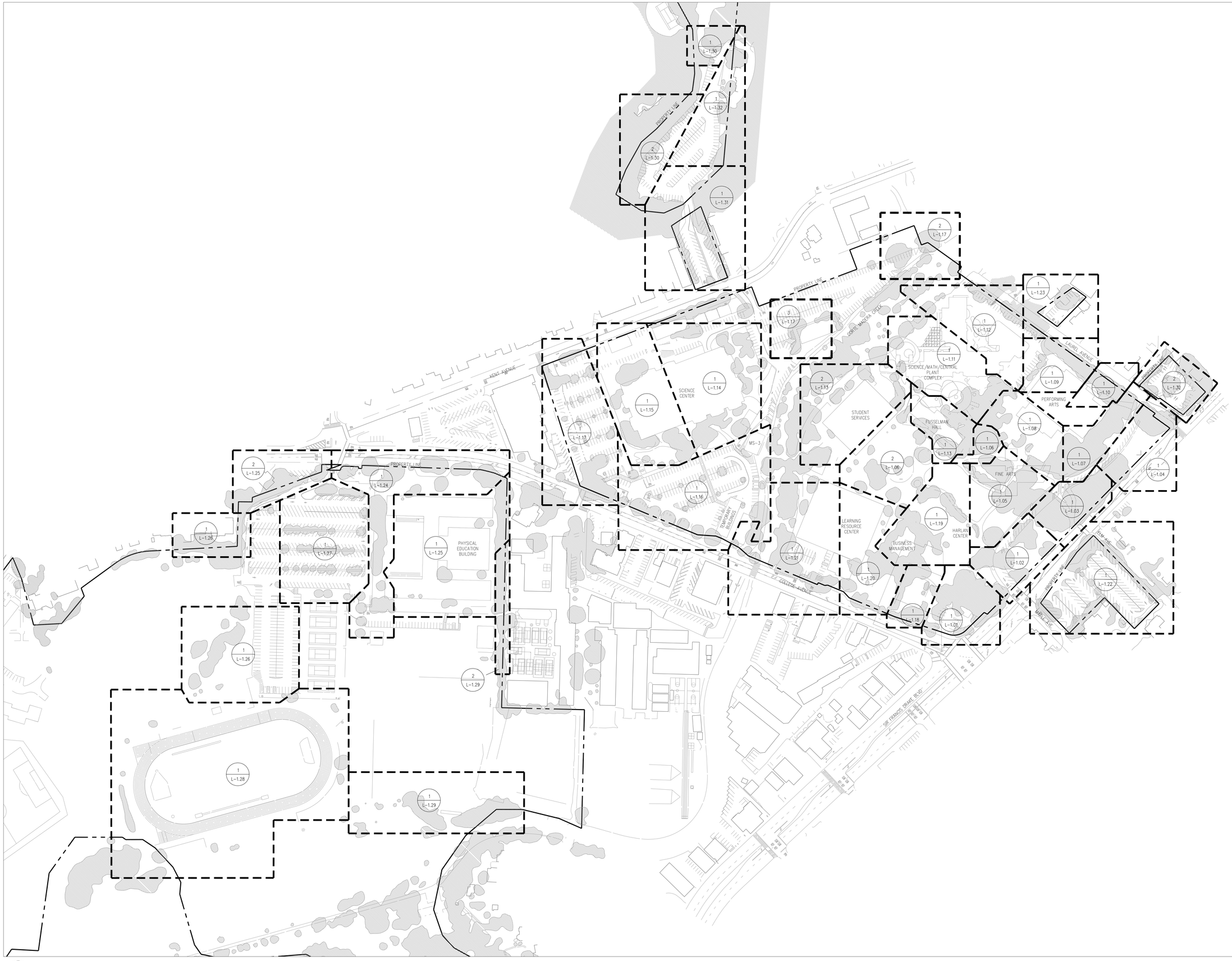
AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: NTS

INDEX, NOTES, & ABBREVIATIONS

L-0.00



1 KENTFIELD CAMPUS SITE PLAN

1" = 100', CONTOUR INTERVAL = 1'

0 50 100 150 FEET

COLLEGE OF MARIN
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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 100' 0 50 100

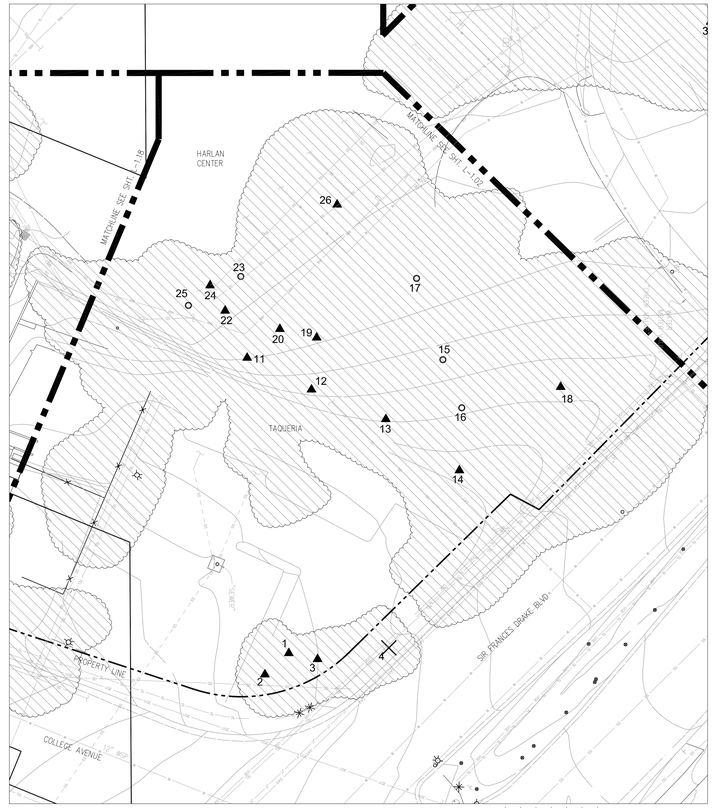
ENLARGED SITE KEYPLAN
KENTFIELD CAMPUS

L-1.00

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
1		Coast Redwood	*Sequoia sempervirens*	Tree closest to the intersection of College Ave. and Sir Francis Drake.	18"	Good	Good	None		Prune branches and foliage up to 10' for visual clearance.	3
2		Coast Redwood	*Sequoia sempervirens*	Approximately 5' southeast of T-1. This tree is 11' northeast from one parking spot. It is 7' south of another parking spot. It is approximately 8.5' to the curb of the intersection of the sidewalk of Sir Francis Drake and College Ave.	12"	Good	Good	None		Prune branches and foliage up to 10' for visual clearance.	3
3		Coast Redwood	*Sequoia sempervirens*	North-most tree in the center parking lot island. This tree is approximately 2' northwest of a railroad tie for the asphalt parking space. The tree is 5' south of the intersection of the Sir Francis Drake and College Avenue sidewalks	12"	Good	Good	None		Prune branches and foliage up to 10' for visual clearance.	3
4		Coast Redwood	*Sequoia sempervirens*	Approximately 15' north/northwest of T-3	24"	Good	Good	Severe. Damaging sidewalk.		Removal for ADA compliance.	3
11		Coast Redwood	*Sequoia sempervirens*		24"	Good; this tree is being heavily impacted by construction, Soil is piled at base of tree. Construction path is directly adjacent to root zone.	Good; edge tree.	None		This tree needs to be monitored closely after construction. Remove sprouts for visual clearance.	1
12		Coast Redwood	*Sequoia sempervirens*	Approximately 12' north of T-11	36"	Good; edge tree. Two feet from construction path.	Good	None		Monitor tree for stress post construction.	2
13		Coast Redwood	*Sequoia sempervirens*	10' north of T-12	24"	Good; edge tree. Two feet from construction path.	Good	None		Monitor tree for stress post construction.	2
14		Coast Redwood	*Sequoia sempervirens*	Approximately 8' north of T-13	30"	Good; edge tree. Two feet from construction path.	Good	None		Monitor tree for stress post construction.	2
15		Coast Redwood	*Sequoia sempervirens*	Approximately 18-20' north/northwest of T-14	5'	Good; dominant.	Good	None		None	5
16		Coast Redwood	*Sequoia sempervirens*	Approximately 8' north/northwest of T-15	48"	Good	Good	None		None	5
17		Coast Redwood	*Sequoia sempervirens*	12' east-northeast of T-15	18"	Good	Good	None		None	5
18		Coast Redwood	*Sequoia sempervirens*	8-10' north/northeast of T-17	24"	Good; interior tree.	Good	None		Prune sprouts at base.	3
19		Coast Redwood	*Sequoia sempervirens*	Approximately 10-12' due east of T-18. This tree is 4.5' from the Taqueria wire fence	36"	Good; edge tree. Three feet from construction path.	Good	None		Prune sprouts. Monitor for stress post construction.	2
20		Coast Redwood	*Sequoia sempervirens*	8' north/northwest of T-19; approximately 8-10' south/southwest of T-18	30"	Good; ten feet from construction path.	Good	None		Prune sprouts. Monitor for stress post construction.	2
22		Coast Redwood	*Sequoia sempervirens*	15' north of T-20	30"	Good	Good to fair; asymmetrical canopy.	None		Prune sprouts for visual clearance.	3
23		Coast Redwood	*Sequoia sempervirens*	Approximately 10' south of T-22; approximately 4" from the wood border of the soil path	30"	Fair to good. Interior tree. Low LCR	Fair	None		None	5
24		Coast Redwood	*Sequoia sempervirens*	Approximately 6' west-northwest of T-23; 10' southeast of T-22	72"	Good; dominant tree in stand.	Good. Some over extending branches in lower canopy.	None		Consider reducing some lower branches to mitigate failure.	4
25		Coast Redwood	*Sequoia sempervirens*	Approximately 25' due west of T-15; adjacent to the lawn area	42"	Good	Good	None		None	5
26		Valley Oak	*Quercus lobata*	25' south of T-25; north of the humanities building	36"	Fair; mature. In TPZ	Fair; asymmetrical crown. Recently had crown cleaning.	None		Clear ivy from base. Monitor cables annually.	4

TREE ASSESSMENT & SCHEDULE OF WORK TABLE NOTES:

1. TREE NUMBER, SPECIES, SIZE, LOCATION, CONDITION, AND OBSERVED INFRASTRUCTURE CONFLICTS ARE PROVIDED FOR INFORMATION ONLY.
2. DESCRIPTION OF WORK IN THE SCHEDULE OF WORK TABLE SHALL TAKE PRECEDENCE OVER SYMBOLS ON THE PLAN.
3. TREE LOCATIONS INDICATED ON THE DRAWING ARE APPROXIMATE. TREE LOCATION IS FURTHER DESCRIBED IN THE TREE LOCATION COLUMN OF THE ASSESMENT TABLE. CONTRACTOR TO VERIFY ACTUAL TREE LOCATION IN THE FIELD USING EXISTING TREE TAGS LOCATED AT THE BASE OF THE TREE TRUNK.
4. INFORMATION LISTED IN THE "OBSERVED INFRASTRUCTURE CONFLICTS" COLUMN IS PROVIDED FOR THE CONTRACTOR'S CONVENIENCE ONLY AND IS BASED ON CONDITIONS VISIBLE AND OBSERVED IN THE FIELD. REFER ALSO TO UNDERGROUND UTILITY LOCATIONS SHOWN ON THE PLANS. CONTRACTOR TO VERIFY ALL UTILLITY CONFLICTS AT EACH TREE. SEE ALSO LANDSCAPE GENERAL NOTES SHEET L-0.00 FOR ADDITIONAL INFRASTRUCTURE AND UTILITY NOTES.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR POTHOLING ALL SIDES OF TREE STUMPS TO BE GROUND TO VERIFY LOCATION AND DEPTH OF ANY UTILITIES AFFECTED BY STUMP GRINDING. MINIMUM DEPTH OF POTHOLING SHALL BE 18" (6" DEEPER THAN ANTICIPATED STUMP GRINDING DEPTH).
6. DECIDUOUS TREES, PARTICULARLY ELMS AND ASH TREES ARE IDEALLY PRUNED IN EARLY WINTER DURING THEIR DORMANT PERIOD. PINE AND FIR TREES ARE IDEALLY NOT PRUNED DURING THE SUMMER WHEN THEY ARE SUSCEPTIBLE TO BEETLES. CONTRACTOR TO PROVIDE SCHEDULE OF PRUNING FOR DISTRICT ARBORIST'S APPROVAL AT THE START OF THE PROJECT IN ORDER TO ASCERTAIN THE BEST POSSIBLE TIME TO PRUNE THE TREES WITHIN THE DURATION OF THE CONTRACT.
7. SEE SPECS. SECTION 31 13 16: PRUNING, TREE REMOVAL, AND FERTILIZATION FOR ADDITIONAL INFORMATION.



1 COLLEGE AVE. & SIR FRANCES DRAKE BLVD. INTERSECTION (TREES 1-26)
1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

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rev.	date	issue

TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

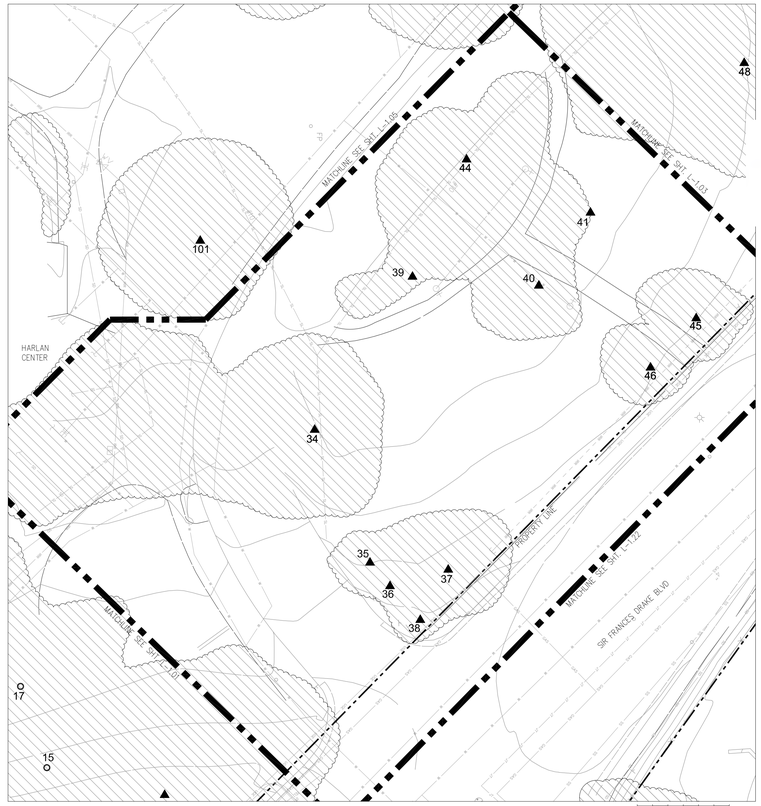
scale: 1" = 20' 0 10 20 30

COLLEGE & SIR FRANCES DRAKE (TREES 1-26)

L-1.01

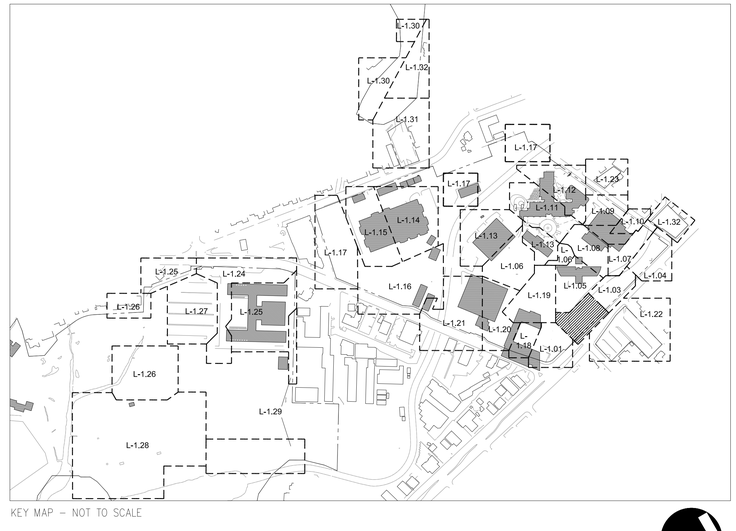
		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
34		Glant Sequoia	*Sequoiadendron giganteum*	In southwestern part of Circle Dr. area; just south of lawn area; immediately adjacent to a cut stump to the east-northeast	72"	Good. Infected with seiridium canker.	Good. Some crossing branches and deadwood.	None		Pole prune for visibility to 10'. Prune or remove shrubs for visibility.	2
35		European White Birch	*Betula pendula*	In island of trees located to the northeast of the glant sequoia with three European White Birch; within a large juniper thatch; 9.7' south/southwest of the bus stop on Sir Francis Drake	24"	Good	Fair. Some evidence of branch loss.	None		Prune branches less than 2" diameter up to 10' for visual clearance. Prune or remove understory shrubs for visibility.	4
36		European White Birch	*Betula pendula*	6' to the northeast of T-35; immediately west of the east-most entrance to the Circle Dr.	12"	Fair	Fair. Suppressed.	None		Prune branches less than 2" diameter up to 10' for visual clearance. Prune or remove understory shrubs for visibility.	2
37		European White Birch	*Betula pendula*	Southwest of T-36; 9' west of the Circle Dr.	12"	Fair	Poor	None		Prune branches less than 2" diameter up to 10' for visual clearance. Prune or remove understory shrubs for visibility.	2
38		Juniper	*Juniperus sp.*	Southwest of T-37	Multi-stemmed	Fair	Fair	None	Thick understory shrub growth	Prune or remove understory shrubs for visibility.	3
39		English Holly	*Ilex aquifolium*	35' west of T-34; 3'- 4' from parking area on Circle Dr.; 25' northwest of the flagpole	12"	Poor. Semi-defoliated.	Fair	None.		Reassess in spring. Possible removal for health.	4
40		Port Orford Cedar	*Chamaecyparis lawsoniana*	Located up the stone path; at the southwest corner of the T intersection of the stone path through the Circle Dr. area	48"	Good.	Very poor. Co-dominant leaders targeting roads and a bus stop.	Insignificant.		Prune all branches to 10' for visibility. Install cabling between two spars.	1
41		Lawson Cypress	*Chamaecyparis lawsoniana*	Southeastern corner of the T intersection of the stone path that goes through the Circle Dr.; 15-20' from T-40	48"	Good	Poor. Co-dominant leaders with included bark. Two very interesting low branches forming subordinate trees.	None.		Prune low branches up to 10' excluding the two large interesting ones.	1
44		English Holly	*Ilex aquifolium*	2.5' north of curb for the parking area	12"	Fair. Sparse foliage.	Fair	None		Prune 3" branches up to 7'.	4
45		Northern White Cedar	*Thuja occidentalis*	7' west of the flagstone walk, entering off Sir Francis Drake and 7' from the Sir Francis Drake sidewalk	Multi-stemmed	Fair but stressed.	Fair	None		Remove surrounding shrubs, procumbent branches and interior branches with little or no foliage.	2
46		Northern White Cedar	*Thuja occidentalis*	Approximately 5' east of the flagstone walk and 7' south of the Sir Francis Drake sidewalk	Multi-stemmed	Fair but stressed.	Fair	None		Remove surrounding shrubs, procumbent branches and interior branches with little or no foliage.	2

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 CIRCLE DRIVE EAST (TREES 34-46)

1" = 20', CONTOUR INTERVAL = 1'



KEY MAP – NOT TO SCALE

COLLEGE OF MARIN
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TREE REMOVAL

Kentfield Campus

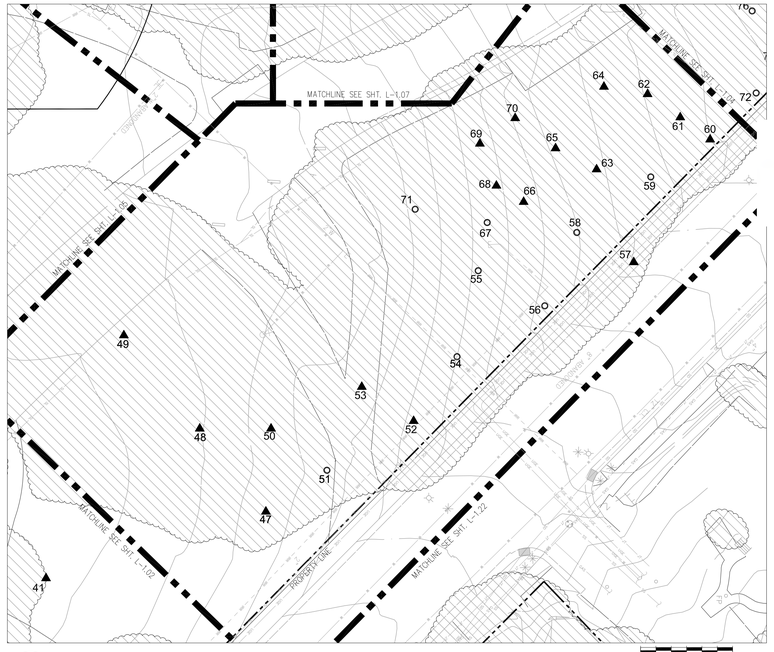
District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10 20 30'

CIRCLE DRIVE EAST
(TREES 27-46)

L-1.02

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
47		Incense Cedar	*Calocedrus decurrens*	Southeast of the sidewalk connecting with the Sir Francis Drake sidewalk and the crosswalk north across Sir Francis Drake	72"	Good	Poor to fair. 3 co-dominant stems.	None		Prune foliage up to 10' for visual clearance.	4
48		Coast Redwood	*Sequoia sempervirens*	Approximately 25' south of T-47 and midway between T-47 and T-49	60"	Good	Good	None.		Prune suckers for visibility.	3
49		Zelcova	*Zelcova serrata*	South of T-48.	60"	Good	Fair. Some odd pruning cuts in the past and some decay in the base.	None.	There are some dead branches over the parking area/road with defoliated bark that target cars and pedestrians.	Prune deadwood greater than 3" in diameter especially one ~10" limb over the road.	2
50		Chestnut	*Castanea sp.*	Approximately 8' southeast of T-51 (Dracaena) and 20' southwest of T-47	18"	Good	Fair to good.	None		Prune small diameter branches up to 10'	3
51		C.F. Dracaena	*Dracaena sp.*	Approximately 10-12' east of the accessible sidewalk that goes out to a crosswalk across Sir Francis Drake; approximately 8' northwest of T-50	8' tall	Good	Good	None		None	5
52		Coast Redwood	*Sequoia sempervirens*	In a V-shaped area 5' west of the large sidewalk connecting to the crosswalk; 12' south of the Sir Francis Drake sidewalk; approximately 6' east of T-53	60"	Good	Fair. Subordinate stem at 80' targeting SFD.	Some lifting of pavement. No trip hazard.		Remove sprouts at base for visual clearance.	2
53		Coast Redwood	*Sequoia sempervirens*	6' west of T-52; approximately 4' northeast of T-54	36"	Good	Good. Interior so low LCR.	None		Remove sprouts at base for visual clearance.	2
54		Coast Redwood	*Sequoia sempervirens*	4' southwest of T-53; approximately 4' southeast of T-55	48"	Good	Good	None		None	5
55		Coast Redwood	*Sequoia sempervirens*	4' northwest of T-54 and approximately 10' east/southeast of T-56	48"	Good	Good	None		None	5
56		Coast Redwood	*Sequoia sempervirens*	Approximately 6' south of the sidewalk along Sir Francis Drake; approximately 15' east of a sidewalk that enters from the campus down to Sir Francis Drake	60"	Good	Good	None		None	5
57		Black Oak	*Quercus kellogii*	2.5' west of the sidewalk descending toward the road; approximately 5' from a broken water valve access; approximately 12' from the traffic signal control for electric underground	30"	Fair. Fair amount of large diameter deadwood in canopy targeting sidewalks.	Fair to good.	None		Prune deadwood over sidewalks.	3
58		Coast Redwood	*Sequoia sempervirens*	Approximately 15' south/southwest of T-57; approximately 5' northeast of T- 59	24"	Good	Good	None		None	
59		Coast Redwood	*Sequoia sempervirens*	Approximately 15' west of the sidewalk descending from campus	30"	Good	Fair. J-butt/invagination and extremely low LCR.	None		None	
60		Coast Redwood	*Sequoia sempervirens*	Approximately 8' west of T-58	12"	Fair. Suppressed.	Fair. Reformed top.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
61		Incense Cedar	*Calocedrus decurrens*	20-25' south of the Sir Francis Drake sidewalk and 12' west of T-60	36"	Faith to good.	Fair. Corrected lean towards SFD.	None		Prune up to 10' for visual clearance.	3
62		Coast Redwood	*Sequoia sempervirens*	Mid-stand in a grove of trees	18"	Good	Good. Prior topping but it appears stable at the new height. Several nests in canopy.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
63		Coast Redwood	*Sequoia sempervirens*	At west end of small stand of Redwoods just east of the grove of Birch	24"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
64		Coast Redwood	*Sequoia sempervirens*	Southwest most tree in grove of Redwoods just before the grove of Birch; approximately 10' north of the sidewalk running along the parking area	36"	Good	Good	Slight pavement disturbance.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
65		Coast Redwood	*Sequoia sempervirens*	Approximately 12' north of the sidewalk running along the parking area to the south	18"	Good	Good	None		Prune branches and foliage up to 10'.	3
66		Coast Redwood	*Sequoia sempervirens*	Approximately 15' north of the sidewalk along the parking area; mid-grove on the south side of the group of trees	48"	Good	Fair to good. Asymmetric canopy away from stand. Slight lean.	None		Remove understory plants other than ferns. Prune sprout growth at base and foliage up to 10'.	2
67		Coast Redwood	*Sequoia sempervirens*	Approximately 10' north/northwest of T-66	36"	Good	Good	None		None	5
68		Coast Redwood	*Sequoia sempervirens*	Approximately 15' southwest of the curved sidewalk that descends from the campus down to Sir Francis Drake and 8' west of T-69	Dual stem; 30" & 18"	Good	Fair. Co-dominant stems.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	4
69		Coast Redwood	*Sequoia sempervirens*	Approximately 4-5' west of the descending sidewalk	36"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
70		Coast Redwood	*Sequoia sempervirens*	Approximately 9' west of the descending sidewalk and approximately 15' north of the sidewalk adjacent to the parking area	30"	Good	Fair to good. Subordinate stem at 40' targeting street parking.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance. Remove subordinate stem.	3
71			*Prunus sp.*	In an island between the sidewalk that descends north to the crosswalk on Sir Francis Drake; approximately 12' west of the sidewalk, 10' east of another sidewalk and approximately 15' north of the parking area	6"	Good	Good. Grafted.	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 CIRCLE DRIVE MIDDLE (TREES 47-71)

1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

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835 College Avenue
Kentfield, CA 94904

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10' 20'

CIRCLE DRIVE MIDDLE
(TREES 47-71)

L-1.03

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
72		European White Birch	*Betula pendula*	Approximately 10' south of the Sir Francis Drake sidewalk	16"	Fair. Some branch dieback.	Poor. Acute angle crotches and crossing branches.	None.	Deadwood is of a relatively small diameter and not a significant concern.	None	5
73		European White Birch	*Betula pendula*	Approximately 10' south of the sidewalk along Sir Francis Drake and 6' west of tree #72	12"	Fair. Some branch dieback.	Fair	None.		None.	5
76		European White Birch	*Betula pendula*	Approximately 6' east of black-top sidewalk	12"	Poor	Poor. Stunted growth and branch dieback.	None		None	5
77		Coast Redwood	*Sequoia sempervirens*	Approximately 6' south of T-76; approximately 7' east of the black-top sidewalk	24"	Good	Good	Slight lifting of sidewalk.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
82		European White Birch	*Betula pendula*	Mid-grove to the west of the black top sidewalk; along the west edge of this grove	12"	Poor. Significant dieback.	Poor. Many stub cuts and broken branches.	None	This tree will continue to decline and will not recover.	None	5
84		European White Birch	*Betula pendula*	Approximately 8' north/northwest of a Coast Redwood which is close to the sidewalk along the parking area; one of the southmost trees	12"	Very poor. Nearly dead.	Very poor. The base is covered with fungal fruiting bodies indicating sapwood decay and compromised structure.	None.	This tree could fall at any time.	Remove	1
92		Coast Redwood	*Sequoia sempervirens*	Less than 1' west of the black-top sidewalk that goes from the parking area to the sidewalk by Sir Francis Drake	24"	Good	Good	Slightly lifting black-top.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
94		Coast Redwood	*Sequoia sempervirens*	In a planting island between the black-top extension of the sidewalk along the parking area and the parking area curb; 2-3' north of the parking area curb and 3' south of the black-top walkway	42"	Fair to good. Somewhat sparse canopy.	Good	Slight lifting of sidewalk.		Prune up to 10'.	4
95		Coast Redwood	*Sequoia sempervirens*	7' north of the black-top extension of the parking lot sidewalk; approximately 15' east of concrete sidewalk along Laurel Ave.	60"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
96		Coast Redwood	*Sequoia sempervirens*	Along the east edge of the grove, about mid-grove	48"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
97		Coast Redwood	*Sequoia sempervirens*	Along the east perimeter of the grove	48"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
98		Coast Redwood	*Sequoia sempervirens*	Approximately 15' east of the sidewalk along Laurel Ave.	36"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
99		Coast Live Oak	*Quercus agrifolia*	Near northwest edge of this group of trees; 7' from the sidewalk along Laurel Ave.	30"	Good	Good	None		Prune up to 10' for visual clearance. Remove redwood sapling under canopy to prevent competition.	2

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

0 10 20 30 FEET

1 CIRCLE DRIVE WEST (TREES 72-99)

1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

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Kentfield, CA 94904

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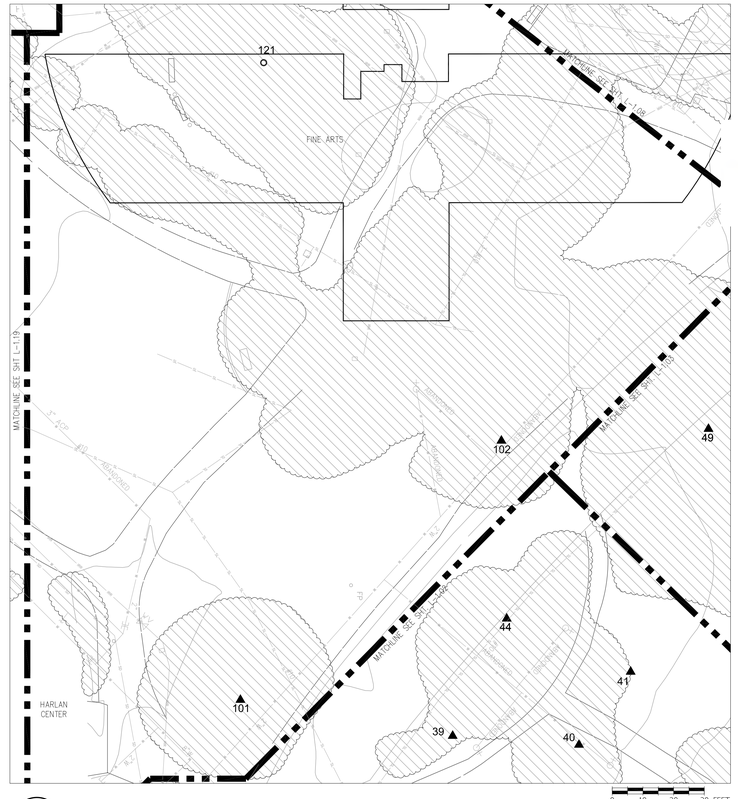
CIRCLE DRIVE WEST
(TREES 72-100)

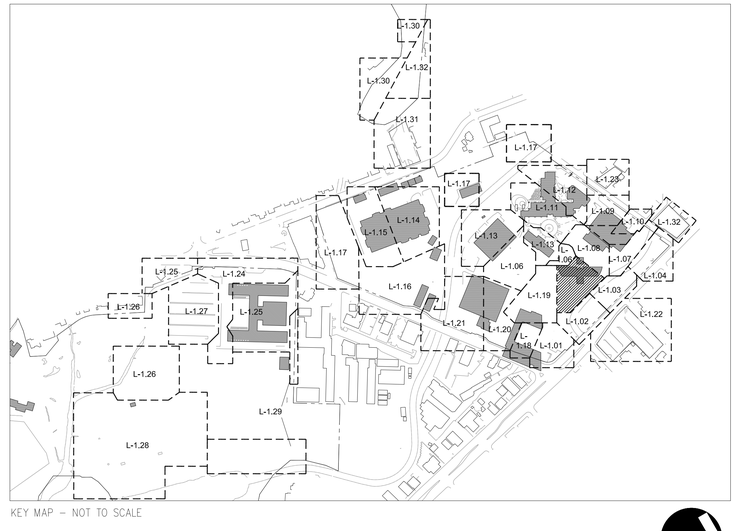
L-1.04

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
101		Bronze Beech	*Fagus sylvatica*	Northeast most tree in Section 2; approximately 15' west of a black-top sidewalk; approximately 15-20' south of the black-top sidewalk on the south perimeter of the parking area	48"	Good	Fair to good. Double stem and crossing branches.	None.		Prune lower branches less than 4" diameter up to 10'.	3
102		Pin Oak	*Quercus palustris*	Immediately south, within 1' of the curb of the parking area off of Circle Dr.; in the middle of the black-top sidewalk	18"	Fair to poor. Stressed from construction.	Poor. Common attachment of the main scaffold branches. Grafted at base to coast live oak root stock. Poor past pruning.	Cracked curb.		Reassess in spring. There appears to be a good deal of deadwood in the canopy.	1
121		Coast Redwood	*Sequoia sempervirens*	5' east of the west perimeter black-top sidewalk	12"	Good	Good	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 CENTRAL QUAD NORTH (TREES 101-121)
1" = 20', CONTOUR INTERVAL = 1'



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TREE REMOVAL

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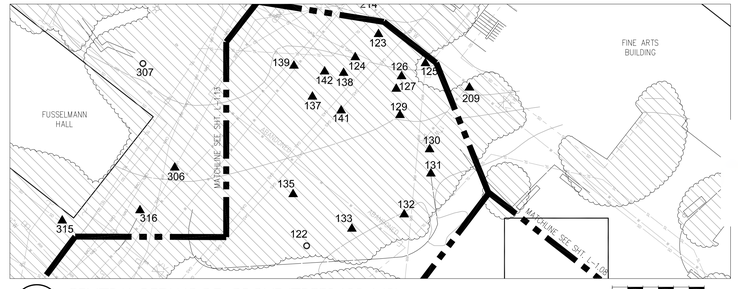
CENTRAL QUAD NORTH
(TREES 101-121)

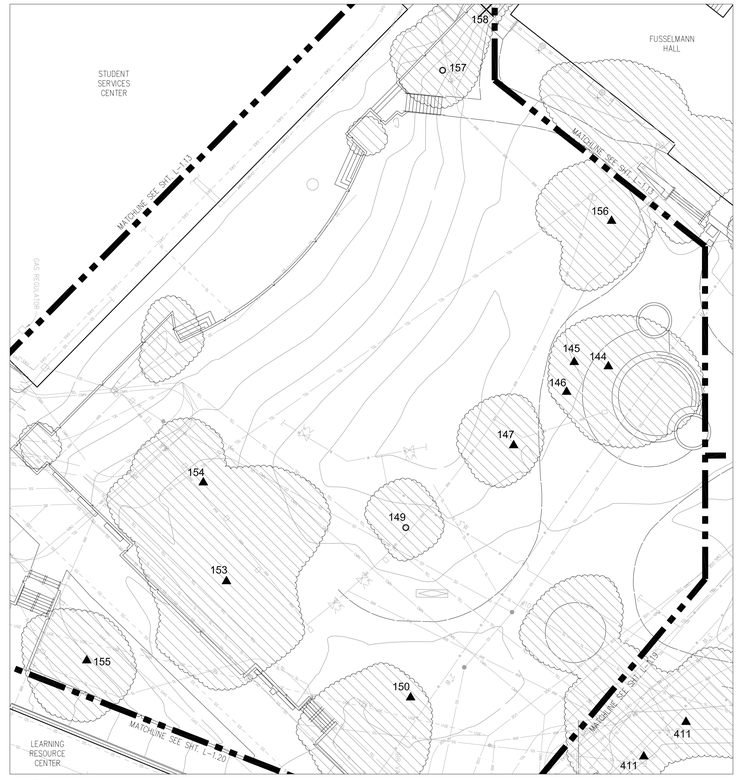
L-1.05

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
122		Mimosa	*Albizia julibrissin*	Southeast corner of this planting zone just over a bench and recycling bin	18"	Good	Fair. Strong corrected lean.	None		None	5
123		Coast Redwood	*Sequoia sempervirens*	Northeast corner of the grove; located 4' east of the west perimeter sidewalk	36"	Good	Good	Cracking black-top.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
124		Coast Redwood	*Sequoia sempervirens*	2.5' south of T-123	48"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
125		Coast Redwood	*Sequoia sempervirens*	3' east of T-123	48"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
126		Coast Redwood	*Sequoia sempervirens*	Immediately adjacent to concrete bench; 4' east of T-125 and approximately 4.5' northwest of T-127	60"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
127		Coast Redwood	*Sequoia sempervirens*	At northeast corner of this grouping; approximately 4' T-129 and about 5' from T-126	72"	Good	3 stems. 2 broken.	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
129		Coast Redwood	*Sequoia sempervirens*	Approximately 3' from T-130; in the center of this Redwood grove	36"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
130		Coast Redwood	*Sequoia sempervirens*	On the east side of the grove between T-131 and T-127	18"	Good	Broken top and suppressed.	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
131		Coast Redwood	*Sequoia sempervirens*	Approximately 4' south of T-130 and 8' north of T-132	24"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
132		Coast Redwood	*Sequoia sempervirens*	Southeast corner of this grove	60"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
133		Coast Redwood	*Sequoia sempervirens*	Located 3' northwest of T-132	12"	Good	Good. Suppressed.	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
135		Coast Redwood	*Sequoia sempervirens*	Internal tree	18"	Good	Good. Suppressed.	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
137		Coast Redwood	*Sequoia sempervirens*	Along the south perimeter of the stand near the southwest corner of the grove	36"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
138		Coast Redwood	*Sequoia sempervirens*	Southwest-most tree in the grove	24"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
139		Coast Redwood	*Sequoia sempervirens*	2' north of T-138; 1' south of T-141; approximately 7' east of black-top pathway that leads to the BBQ area	36"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
141		Coast Redwood	*Sequoia sempervirens*	Approximately 1' north of T-139	18"	Good	Good. Suppressed.	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
142		Coast Redwood	*Sequoia sempervirens*	Approximately 3' north of T-141	24"	Good	Good	None/insignificant.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
144		Loquat	*Eriobotrya japonica*	Grouping of three Loquats in a planter box, toward the southwest corner of Zone 2	Cluster of three	Fair. Much deadwood present with black coating covering various branches.	Fair	None		Crown cleaning	2
145		Loquat	*Eriobotrya japonica*	Northeast tree in this grouping of three	Cluster of three	Fair. Much deadwood present with black coating covering various branches.	Fair	None		Crown cleaning. Remove any blight infected areas during the summer. Switch to bubbler irrigation.	2
146		Loquat	*Eriobotrya japonica*	South-most tree in the grouping of three	Cluster of three	Fair. Much deadwood present with black coating covering various branches.	Fair	None		Crown cleaning	2
147		Port Orford Cedar	*Chamaecyparis lawsoniana*	Toward the south end of the lawn area and approximately 30' southeast of the Loquat	24"	Good.	Good	None	Adventitious sprouts present that have a potential to compete with main stem	Remove all competing sprouts down to grade.	2
149		Ginkgo	*Ginko biloba*	Approximately 30' east/southeast of the cedar	16"	Good. Excellent trunk taper.	Fair to good	None		None	5
150		Sweetgum	*Liquidambar styraciflua*	Above the retaining wall between the Learning Resource Center and the quadrangle	24"	Fair	Fair to good	None	2" dead limb hanging in canopy	Remove dead limb	4
153		Big Leaf Maple	*Acer macrophyllum*	In a large planting island east of the retaining wall near the Student Resource Center	44"	Fair; epiphytes present in main crotch at 7' suggesting possible decay. Old cabling system present. Cables display slacking. One cable is attached in to a dead stub.			Large dead limb extending east north east.	Crown cleaning. Cabling system needs maintenance. Additional risk assessment.	1
154		Akebono Cherry	*Prunus x yedoensis 'Akebono'*	In planting bed near stair and retaining wall east of the Student Resource Center	18"	Fair to poor. Mature tree in decline. Sun scald present.	Poor to fair	None		Trim back long extending limb.	4
155		Camphor	*Cinnamomum camphora*	North of the Learning Resource Center along the sidewalk	20"	Fair. Girdling roots present.	Fair	None		Crown cleaning.	4
156		European Horsechestnut	*Aesculus hippocastanum*	East of a large stump in front of Fusselman Hall	16"	Fair to good	Fair	New construction present within 5' of root crown. Roots have been disturbed to install new bench footings. Concrete has been poured within root zone.	Tree should be monitored during and after construction.	Monitor for signs of decline and schedule health assessment if symptoms are present.	2
157		Swamp Cypress		Off of the southeast corner of Fusselman Hall and the northwest corner of the Student Services Building	12"	Fair	Good	None		None	5
158		Dawn Redwood	*Metasequoia glyptostroboides*	Near the southeast corner of Fusselman Hall	14"	Poor health due to confined root zone and high albedo area.	Fair. Two competing leaders.	None	Longevity of this tree is in doubt due to its placement and high albedo.	Remove	1

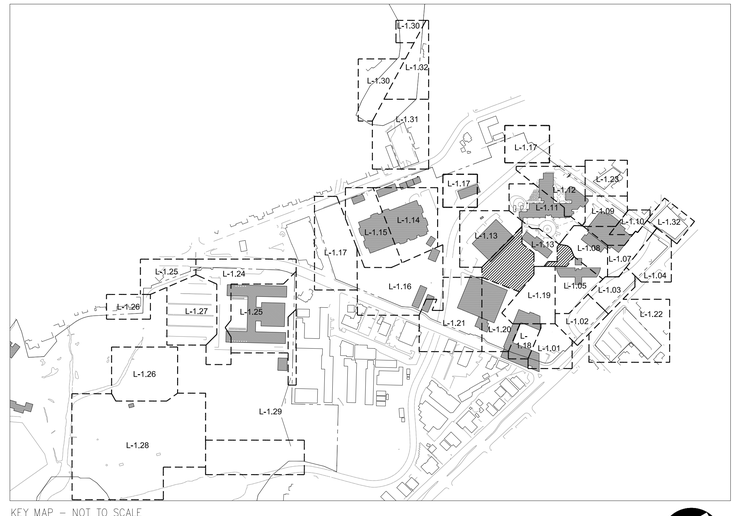
NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 CENTRAL REDWOOD GROVE (TREES 122-142)
1" = 20', CONTOUR INTERVAL = 1'



2 CENTRAL QUAD SOUTH (TREES 144-158)
1" = 20', CONTOUR INTERVAL = 1'



KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

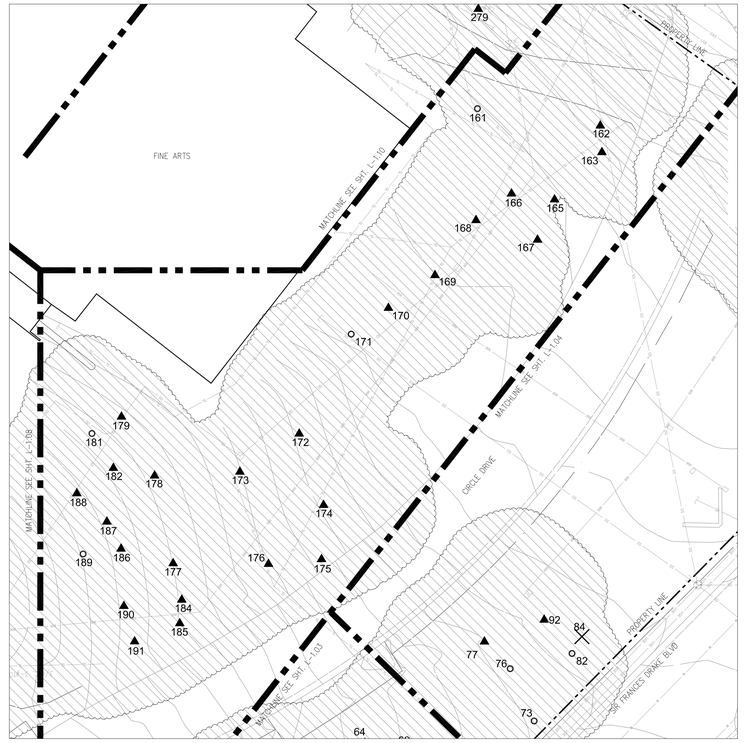
District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10' 20'

REDWOOD GROVE & CNTRL QUAD SO. (TREES122-158)

L-1.06

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
161		Coast Redwood	*Sequoia sempervirens*	4' south of the sidewalk north of the Fine Art Center; approximately 5' from the sidewalk leading to the east entrance, next to the black-top driveway for this building	12"	Fair; sparse crown with competition on either side.	Good	None		None	5
162		Coast Redwood	*Sequoia sempervirens*	In a planter box between the driveway entrance to the Fine Art Building and the sidewalk for the building; approx. 20' north/northeast of the northwest corner of the building; approximately 1.5' south from a cement retaining wall for the driveway and approximately 2' north of the cement walkway	20"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	3
163		Coast Redwood	*Sequoia sempervirens*	7' northeast of the northeast corner of the concrete slab to the ascending sidewalk	12	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	3
165		Coast Redwood	*Sequoia sempervirens*		10"	Good	Good	None		Limb up branches < 3" in diameter up to 10' high for visual clearance. Remove all sprouts down to grade.	2
166		Coast Redwood	*Sequoia sempervirens*	Approximately 7' south of the concrete perimeter to the planting area; approx. 18-20' north of the sidewalk along the north side of the building	32"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
167		Coast Redwood	*Sequoia sempervirens*	10' north of the sidewalk along the north side of the building and approximately 12' south of the concrete perimeter of the planting area	30"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
168		Coast Redwood	*Sequoia sempervirens*	Approximately 4' north of the water valve; approx. 8' north of the concrete sidewalk along the north side of the building; approx. 4' south of the concrete perimeter to the planting area	34"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
169		Coast Redwood	*Sequoia sempervirens*	Opposite the center door on the north side of the building; 2' north of the sidewalk (along the north side of the building) and 3' south of the concrete perimeter	22"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance.	2
170		Coast Redwood	*Sequoia sempervirens*	Within 20' of the northeast corner of the brick building; approximately 4' north of the north sidewalk; approx. 3' south of the concrete perimeter to the planting area	44"	Good. Top appears to have broken out but doesn't seem to have had any affect on overall health.	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance.	2
171		Coast Redwood	*Sequoia sempervirens*	10' north of the north sidewalk along the building; approx. 22' north of the northeast corner of the brick building	35"	Good	Good	None		None	5
172		Coast Redwood	*Sequoia sempervirens*	Approximately 15' north of T-171	12"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
173		English Oak	*Quercus robur*	Approximately 12' east of the T-172 and 171; approx.15' north of a descending stairway, the sidewalk opposite the northeast corner of the brick music building	22"	Fair	Fair. Multiple stems arising from main trunk at 10'	None	Deadwood evident in crown.	Crown cleaning	3
174		English Oak	*Quercus robur*	Located between T-173 and T-175	20"	Fair	Fair	None	Deadwood evident in crown.	Crown cleaning	3
175		English Oak	*Quercus robur*	Northeast-most tree off of the northeast corner of the brick Music Building; approximately 12' west of a black-top walkway that goes down to the northeast corner of the building and northeast entrance; approx. 12' south of the curb to the parking area; approx. 15' east of the last tree	22"	Fair	Fair	None	Deadwood evident in crown.	Crown cleaning	3
176		Coast Redwood	*Sequoia sempervirens*	3' east of the descending black-top sidewalk down to the northeast corner of the music building; approx. 15' southwest of a Monterey pine	18"	Fair; showing signs of stress post construction. Pitch present on trunk. Sparse crown.	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade. Irrigate to mitigate stress.	2
177		Incense Cedar	*Calocedrus decurrens*	Approximately 8' east of the head of the descending stairway to the northeast corner of the brick music building	10"	Fair; being shaded out by adjacent redwood grove.	Good	None		Remove deadwood. Remove vines at base of tree.	4
178		Coast Redwood	*Sequoia sempervirens*	Approximately 15' south/southeast of T-177, and approximately 20' north of a large dominant Atlas Cedar	14"	Fair; suppressed by adjacent redwoods.	Fair. Asymmetrical canopy.	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	3
179		Hollyleaf Cherry	*Prunus ilicifolia*	Approximately 15' northwest of the large Cedar and just outside of the clay storage unit for the kiln; approx. 12' north/northwest of a stone bench	Multi-stem; approx. 10" at base of trunk	Good	Good	None	Vines growing around root crown	Remove vines from base of tree. Prune to raise canopy to a height of 5' for visual clearance	3
181		Coast Redwood	*Sequoia sempervirens*	Approximately 25' north of the concrete walk along the north part of the Art Building; in the center of the Redwood grove	16"	Good	Fair. Asymmetrical crown.	None		None.	5
182		Coast Redwood	*Sequoia sempervirens*	In the center of the stand and is a dominant tree	30"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	3
184		Coast Redwood	*Sequoia sempervirens*	Approximately 2' south of the black-top sidewalk along the south side of the parking area	24"	Fair; top of tree is sparse. Recent construction to adjacent walkway seems to be causing stress.	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade. Irrigate to mitigate stress.	2
185		Coast Redwood	*Sequoia sempervirens*	Located in the center of the stand	10"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
186		Coast Redwood	*Sequoia sempervirens*	Located mid-grove	22"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
187		Coast Redwood	*Sequoia sempervirens*	Located mid-grove	18"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
188		Coast Redwood	*Sequoia sempervirens*	At the south side of the grove; near the north concrete wall of the Art Building; approximately 20' northeast of the Atlas Cedar	32"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
189		Coast Redwood	*Sequoia sempervirens*	Located mid-stand	24"	Good	Good	None		None	5
190		Coast Redwood	*Sequoia sempervirens*	Located mid-grove	22"	Fair to good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	2
191		Coast Redwood	*Sequoia sempervirens*	Less than 1' from the black-top sidewalk that runs along the south perimeter of the parking area	28"	Fair; Significant root mass removed due to construction on northeast side of tree. Sparse growth at top of tree.	Fair	None	Tree should be monitored for decline.	Monitor tree for decline. Remove all sprouts and branches < 3" in diameter up to ten feet.	2

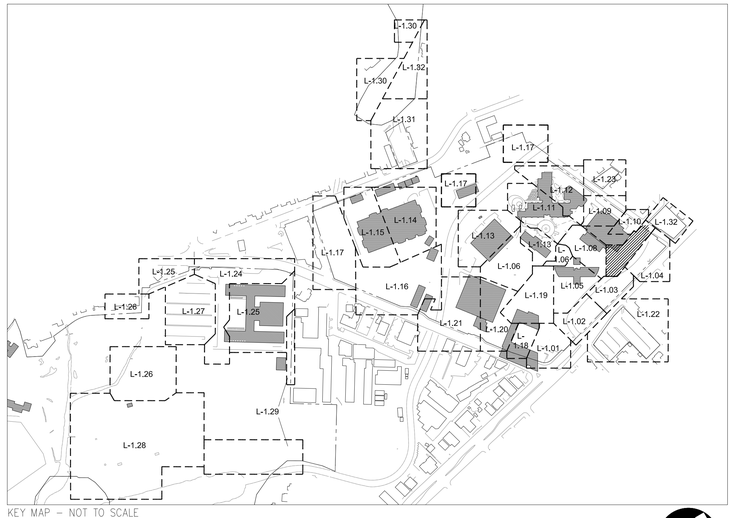
NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 FINE ARTS NORTH (TREES 161-191)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET



KEY MAP - NOT TO SCALE

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Kentfield, CA 94904

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

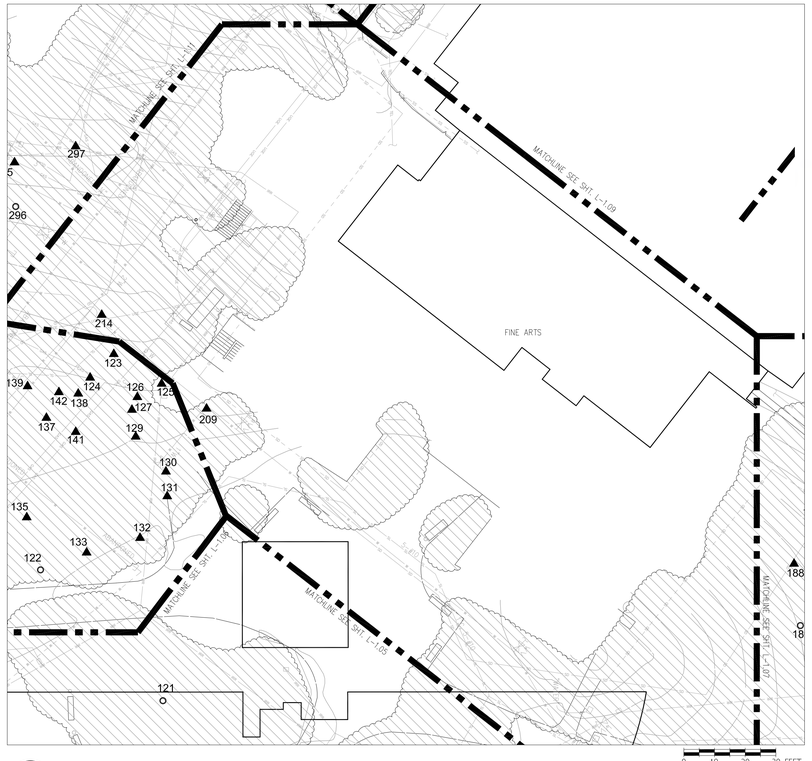
scale: 1" = 20' 0 10' 20'

FINE ARTS NORTH
(TREES 159-192)

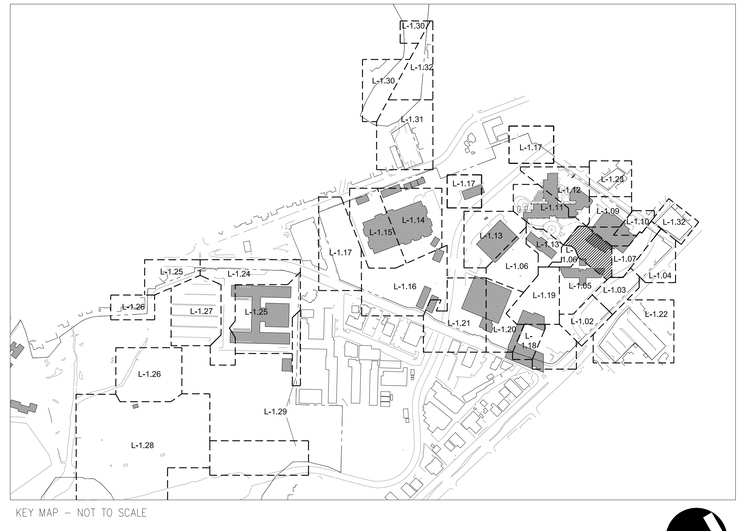
L-1.07

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
209		American Persimmon	*Diospyros virginiana*	Opposite an equipment enclosure at the south end of the Fine Arts Building; within 4' of the black-top sidewalk	10"	Fair to poor; mature to over mature.	Fair; leggy structure. Has been directionally pruned away from pathway.	None		Reduce crown 15% and crown clean.	3
214		Coast Redwood	*Sequoia sempervirens*	In the middle of the black top sidewalk that descends to the west parking lot	24"	Good; some roots have been dug up to accommodate placement of rocks around a drainage grate.	Good	Good	Damage from digging probably won't cause significant damage.	Supply irrigation to mitigate root disturbance.	3

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 FINE ARTS EAST (TREES 209-214)
1" = 20', CONTOUR INTERVAL = 1'



KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

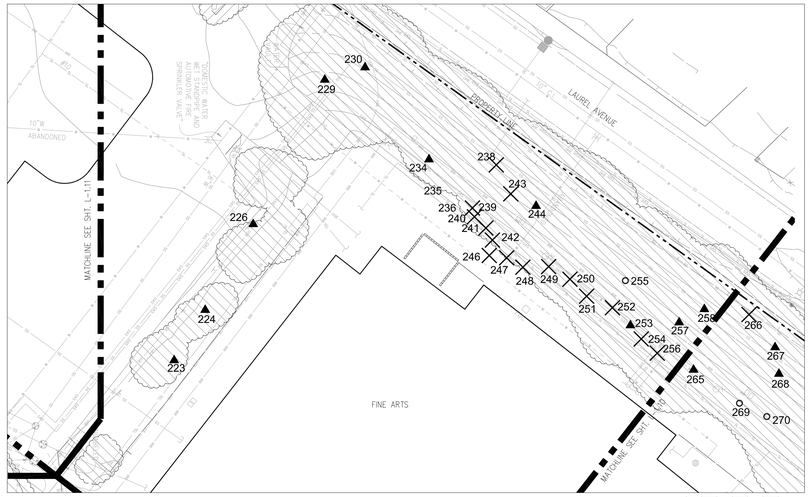
District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10 20 30'

FINE ARTS EAST
(TREES 193-221)

L-1.08

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
223		Coast Redwood	*Sequoia sempervirens*	Opposite the studio theater entrance; 10' south of the black-top sidewalk along the south side of the building; approximately 10' north of the west parking lot north curb	18"	Good	Good	None		Limb up branches < 3" in diameter up to 8' for visual clearance.	3
224		Coast Redwood	*Sequoia sempervirens*	Approximately 15' west of T-223 and approximately 8' south of the sidewalk along the south end of the building; toward the center of the building wall	8"	Good	Good	None		Limb up branches < 3" in diameter up to 8' for visual clearance.	3
226		Coast Redwood	*Sequoia sempervirens*	Approximately 7' south of the black-top sidewalk along the south side of the Fine Art Theater; within 25' of the southwest corner of the building	10"	Good; top died out at one time and has come back with multiple sprouts.	Good	None		Prune top to select one dominant leader. Prune sprouts down to grade and raise canopy to 8'	3
229		Coast Redwood	*Sequoia sempervirens*	Southeast-most tree in the planting strip; approximately 8' from the curved curb that connects the drive along the west side of the Theater Arts Building and the drive apron to the north exit from the parking lot	Double trunk; 28", 28"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance.	3
230		Coast Redwood	*Sequoia sempervirens*	Southwest-most tree in the planting area; approximately 6' south of a manhole and 10' north of the curb to the north exit driveway apron from the west parking lot; approx. 15' east/northeast of an underground electric facility adjacent to a power-pole	Double trunk; 20", 24"	Good	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove all sprouts down to grade.	3
234		Coast Live Oak	*Quercus agrifolia*	4' west of the curb to the driveway apron along west side of the Studio Arts Building	14"	Fair; significant damage from tall trucks.	Fair	None		Prune to raise canopy for clearance from trucks.	2
235		Carolina Laurel Cherry	*Prunus caroliniana*	Approximately 4.5' from the curb along the driveway that runs west of the Fine Art Center; approximately 15' north/northeast of T-234	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
236		Carolina Laurel Cherry	*Prunus caroliniana*	Approximately 3' north of T-235	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
238		Coast Redwood	*Sequoia sempervirens*	Approximately 15' up slope from the black-top sidewalk along Laurel; approx. 20' down slope from the west curb of the west side driveway	30"	Fair; sparse upper crown. Appears to be stressed. Three adjacent giant sequoia were removed which was a significant change for this tree.	Fair to good	None	Thick ivy is growing at base of the tree.	Remove all competing ivy. The ivy competes for water and nutrients.	3
239		Carolina Laurel Cherry	*Prunus caroliniana*	Approximately 3.5' west of the curb to the driveway along the west side of the Fine Arts Building	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
240		Ornamental Cherry	*Prunus sp.*	4' west of the curb to the driveway along the west side of the Fine Arts building	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	
241		Carolina Laurel Cherry	*Prunus caroliniana*	North of T-240	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	
242		Carolina Laurel Cherry	*Prunus caroliniana*	4' from the curb and 4' north of T-241	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	
243		Coast Redwood	*Sequoia sempervirens*	Approximately 6' northeast from a sewer line clean out area; approx. 20' upslope of the black-top sidewalk along Laurel Ave.; 20' downslope of the curve to the driveway west of the Fine Arts building	Double trunk. 18" and 22"	Good	Good	None	Thick ivy is growing at base of the tree.	Remove	
244		Coast Redwood	*Sequoia sempervirens*	Within 2' east of the black-top sidewalk along Laurel Ave.; approximately 10' east of the curve along Laurel Ave.	30"	Fair; cavity at base four feet in length.	Fair	None	Irrigation head very close to root crown.	More extensive tree risk assessment to observe extent of decay at root crown. Limb up branches < 3" in diameter up to ten feet for visual clearance.	3
246		Carolina Laurel Cherry	*Prunus caroliniana*	4' west of the west driveway curb for the Fine Arts Building; up-slope of T-243	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
247		Carolina Laurel Cherry	*Prunus caroliniana*	3' north of the tree T-246	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
248		Carolina Laurel Cherry	*Prunus caroliniana*	4' west of the curb to the west driveway for the Fine Arts Building	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
249		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
250		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
251		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
252		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4'	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
253		Coast Redwood	*Sequoia sempervirens*		24"	Good	Good	None	4" diameter sprout growing at base off the main trunk	Limb up branches < 3" in diameter up to ten feet for visual clearance. Remove 4" diameter sprout at base of tree down to grade.	3
254		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
255		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
256		Carolina Laurel Cherry	*Prunus caroliniana*	In a row 4' west of the curb to the west driveway for the Fine Arts Building	4"	Fair; being shaded out by adjacent redwood grove.	Fair	None	These shrubs serve no purpose and are being shaded out by the redwoods.	Remove	2
257		Coast Redwood	*Sequoia sempervirens*	Approximately 12' upslope from the black-top sidewalk along Laurel Ave.; along the high power lines and secondaries	Cluster of six stems; ~14"	Fair to good. 100% LCR	Good	None	Raising canopy should be a priority	Limb up branches < 3" in diameter up to ten feet for visual clearance.	2
258		Coast Redwood	*Sequoia sempervirens*	Approximately 12' upslope from the black-top sidewalk along Laurel Ave.	18"	Fair; stressed. Sparse crown.	Good	None		Limb up branches < 3" in diameter up to ten feet for visual clearance.	3

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 FINE ARTS SOUTH (TREES 222-258)
1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

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8 Willow Street, San Rafael, CA 94901 415.454.4212 fax 415.454.4218

rev. date issue

TREE REMOVAL

Kentfield Campus

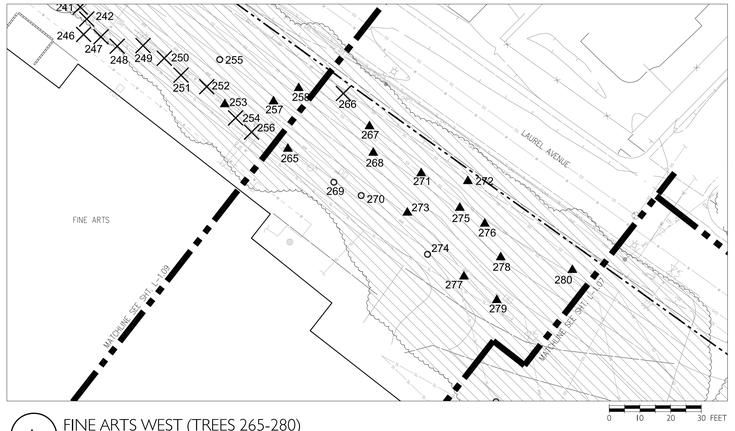
District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10' 20'

FINE ARTS SOUTH
(TREES 222-258)

L-1.09

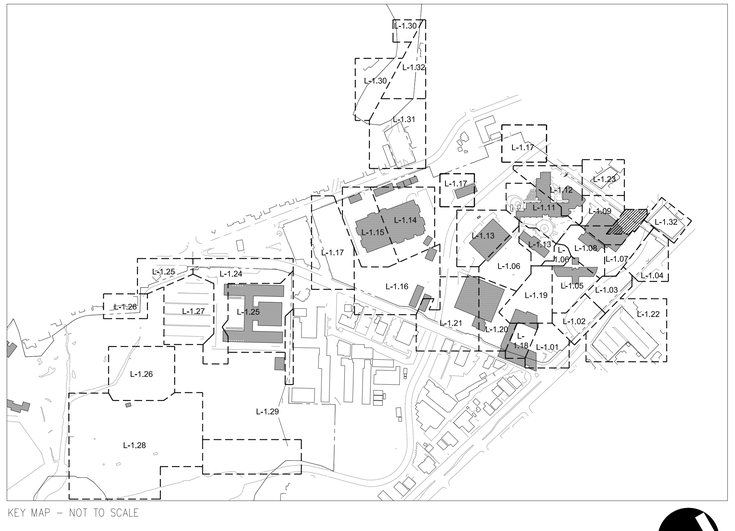
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
		TREE ASSESSMENT								SCHEDULE OF WORK	
265		Coast Redwood	*Sequoia sempervirens*	Approximately 15' directly upslope from tree T-266; approximately 2' down-slope of the curb	36	Good	Good	None		Prune sprout growth.	3
266		Coast Redwood	*Sequoia sempervirens*	Approximately 7' upslope from the black-top sidewalk along Laurel Ave.	24"	Fair to good; past decay at base seems to have healed over.	Poor to fair; twisting shape at top. Subordinate leader growing where limbs have been removed for power line clearance.	None	Thick ivy at base of tree seems to be keeping soil very moist. Tree is being out-competed by adjacent trees.	Remove to reduce competition in the stand.	2
267		Coast Redwood	*Sequoia sempervirens*	Approximately 12' north of tree T-266 and 7' upslope of the sidewalk along Laurel Ave.	18'	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
268		Coast Redwood	*Sequoia sempervirens*	Approximately 10' up-slope of the black-top sidewalk along Laurel Ave.; 20' downslope of the curb to the west driveway for the Fine Arts building	Clump of four trees at 12" each	Fair; These are interior trees and are crowding one another.	Fair.	None.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
269		Coast Redwood	*Sequoia sempervirens*	Approximately 15' up-slope of T-268; approximately 10' downslope of the curb	12"	Good	Good	None		None	5
270		Coast Redwood	*Sequoia sempervirens*	Approximately 15' down-slope of the curb and up-slope of the dominant T-271	16"	Good	Good	None		None	5
271		Coast Redwood	*Sequoia sempervirens*	Approximately 10' up-slope of the sidewalk along Laurel Ave.	36"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
272		Coast Redwood	*Sequoia sempervirens*	Approximately 9' up-slope of the sidewalk along Laurel Ave; extends directly up towards the power lines	Sprout growth post- removal	Good	Poor. Too crowded.	None		Either select a single sprout to remain to fill the space or regularly cut back all the sprouts.	2
273		Coast Redwood	*Sequoia sempervirens*	8' from the west curb of the Fine Arts building driveway	Multi-stem; 36", 30", 12"	Fair to good.	Fair. Co-dominant leaders but they look OK.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	4
274		Coast Redwood	*Sequoia sempervirens*	10' west of the driveway curb	30"	Good	Good	Some apparent root damage to the adjacent driveway.		None	5
275		Coast Redwood	*Sequoia sempervirens*	2' upslope of the sidewalk along Laurel Ave, and about 20' below T-274	24"	Fair to good	Fair to good. Asymmetric canopy away from stand.	None.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
276		Coast Redwood	*Sequoia sempervirens*	10' from the sidewalk along Laurel Ave.; down-slope of T-277	Multi-stem; 18",12" , 12"	Good	Fair. Co-dominant leaders but they look ok.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	3
277		Coast Redwood	*Sequoia sempervirens*	Approximately 8' west of the curb to the west driveway for the Fine Arts building	30"	Good	Good	Some sidewalk damage from roots.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
278		Coast Redwood	*Sequoia sempervirens*	Mid-stand approximately 20' below the driveway west of the Fine Arts building and 20' above the sidewalk along Laurel Ave.	12"	Good	Good	Some sidewalk damage from roots.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
279		Coast Redwood	*Sequoia sempervirens*	Approximately 8' up-slope of the sidewalk along Laurel Ave.; approximately 12' from the fire hydrant	18"	Good	Good	Some sidewalk damage from roots.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2
280		Coast Redwood	*Sequoia sempervirens*	Most northerly tree in this planting island; approximately 8' from the driveway curb and south of a black-top sidewalk that turns up the driveway from the Laurel Ave. sidewalk	36"	Good	Good	Some sidewalk damage from roots.		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance.	2

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 FINE ARTS WEST (TREES 265-280)

1" = 20', CONTOUR INTERVAL = 1'



KEY MAP – NOT TO SCALE

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

JACOBS

Royston Hanamoto Alley & Abey
323 Geary Street, #602
San Francisco, CA, 94102

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Kentfield Campus

District Project #

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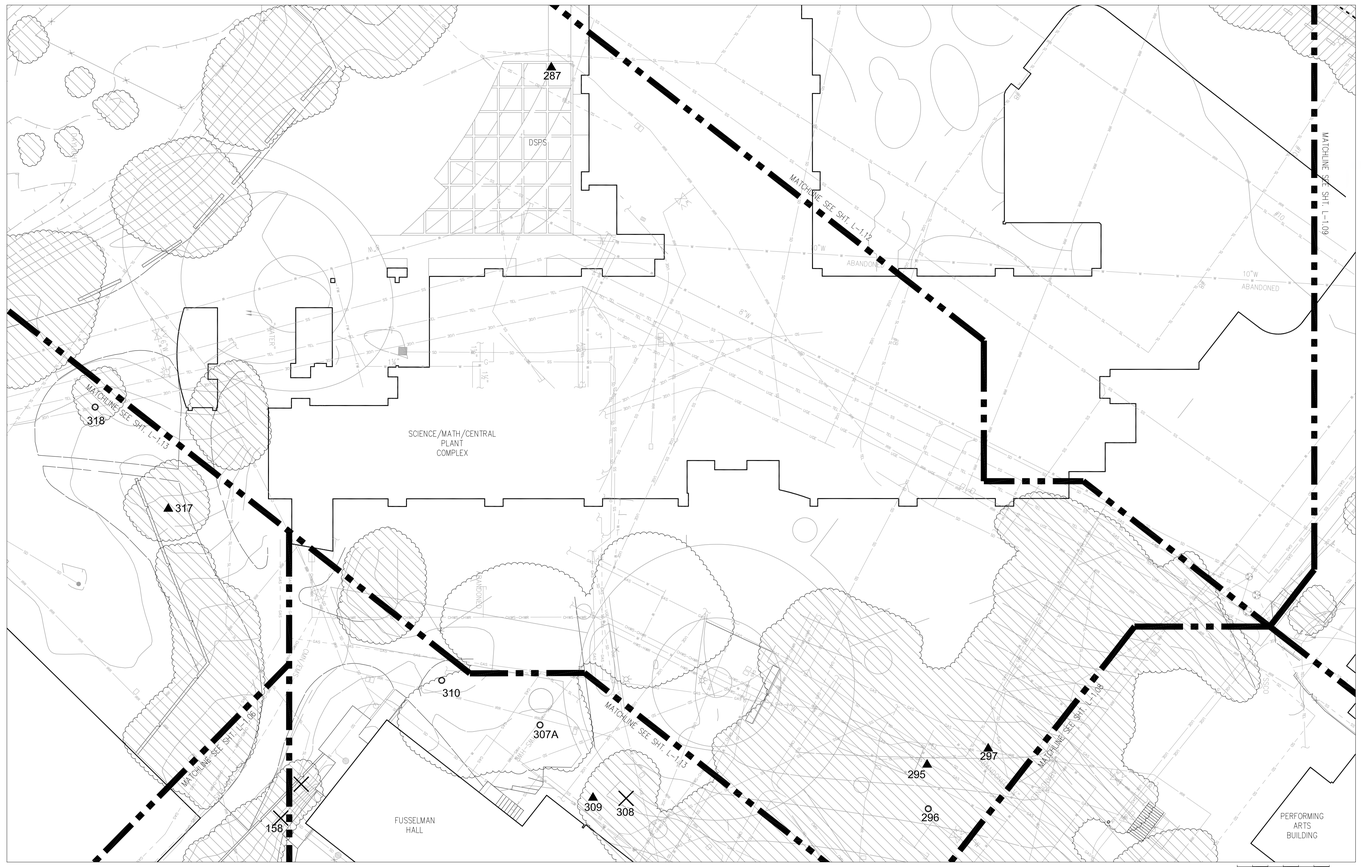
FINE ARTS WEST
(TREES 259-280)

L-1.10



1 PARKING LOT #4/DICKSON HALL COMPLEX (TREES 287-297)

1" = 20', CONTOUR INTERVAL = 1'

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
287		Southern Magnolia	*Magnolia grandiflora*	10' off the south side of the new Math and Science Building	12"	Fair to good; past wounds from vehicle traffic	Fair	None		Crown cleaning	4
295		Giant Sequoia	*Sequoiadendron giganteum*	In a planting island off of the northeast corner of Dickson Hall	5'	Fair; sieridium canker observed in upper and lower canopy	Good	None		Crown cleaning	4
296		Coast Redwood	*Sequoia sempervirens*	15-20' to the north of the Giant Sequoia; immediately adjacent to the black-top pathway that leads down between Dickson Hall and the Fine Arts Building; within 5' of the BBQ pit area	24"	Good	Good	None		None	5
297		Giant Sequoia	*Sequoiadendron giganteum*	Off of the northeast corner of Dickson Hall; 12' off of the northeast corner in a planting island that is between Dickson Hall and the Fine Arts Building	4.5'	Fair to good; sieridium canker present but not significant.	Fair; co-dominant leaders with included bark.	None	Cabling system is too low in canopy.	Have cabling system inspected by qualified arborist.	2

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

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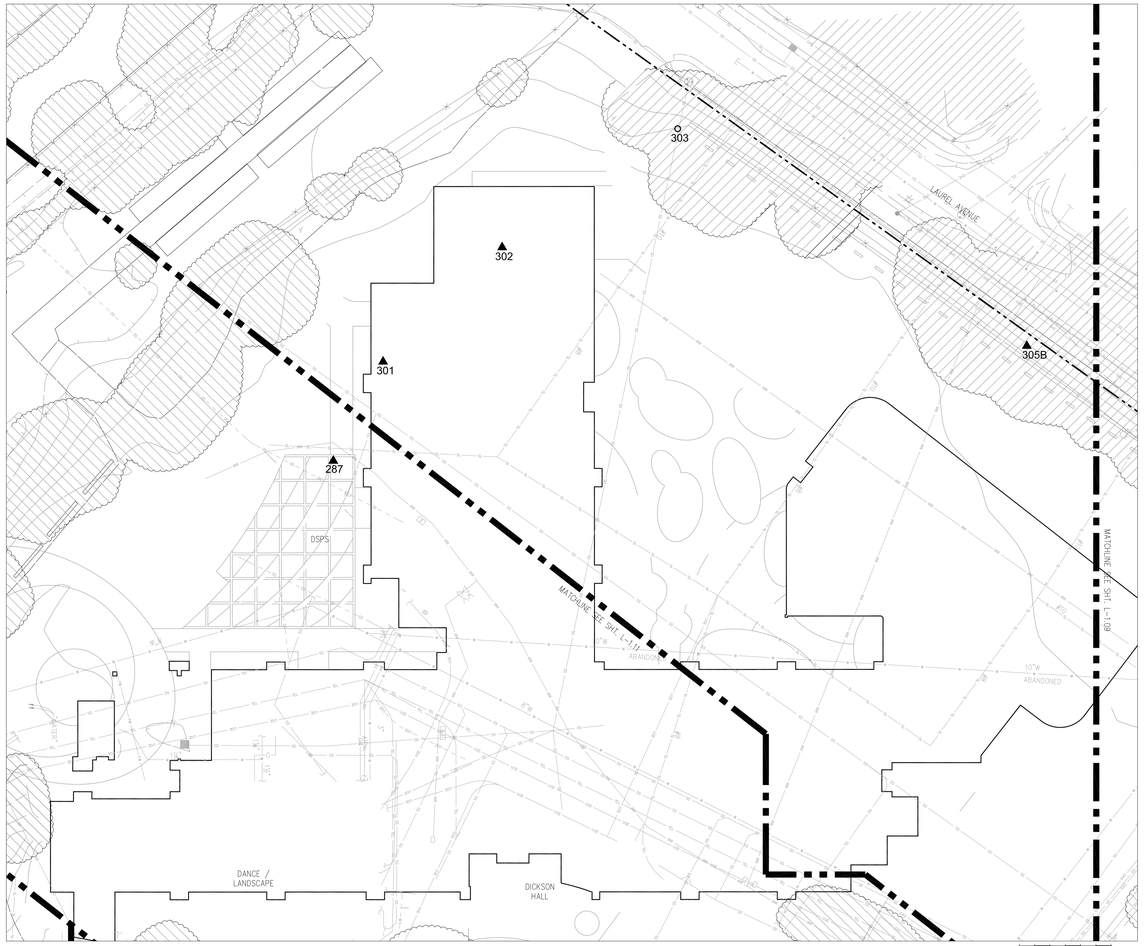
DICKSON HALL COMPLEX
(TREES 281-299)

L-1.11



1 PARKING LOT #4/DICKSON HALL COMPLEX (TREES 301-305)

1" = 20', CONTOUR INTERVAL = 1'

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
301		Coast Redwood	*Sequoia sempervirens*	Southeast corner of parking lot #3; near the DSPS building and across the road to the south	Two main stems; 36" and 18"	Fair to good	Fair; the tree has two stems. One stem is dominant the other is subordinate.	None	Small 6" sprout growing off southwest side of tree.	Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance. Remove 6" sprout down to grade.	3
302		Evergreen Ash	*Frazinus uhdei*	At the south edge of the parking lot #3	18"	Fair	Fair	None		Crown cleaning to remove deadwood	4
303		Coast Live Oak	*Quercus agrifolia*	In the southwest corner planting island of parking area #3	Clump of two trees 12" and 32"	Fair; the larger tree has had a large branch removed to accommodate a new fence.	Fair	None		None	5
305	b	Deodar Cedar	*Cedrus deodara*	On the west side of parking lot #3; the north- most tree in the planting island between the parking area and the black-top sidewalk along Laurel Ave.	24"	Good	Good	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01..

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Kentfield Campus

District Project #

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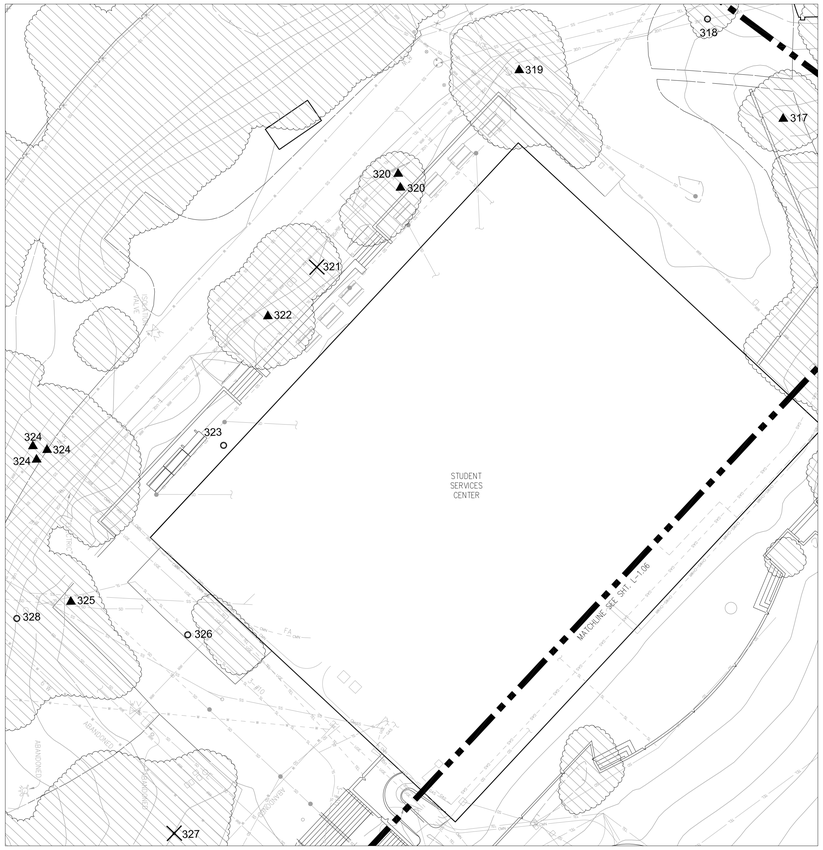
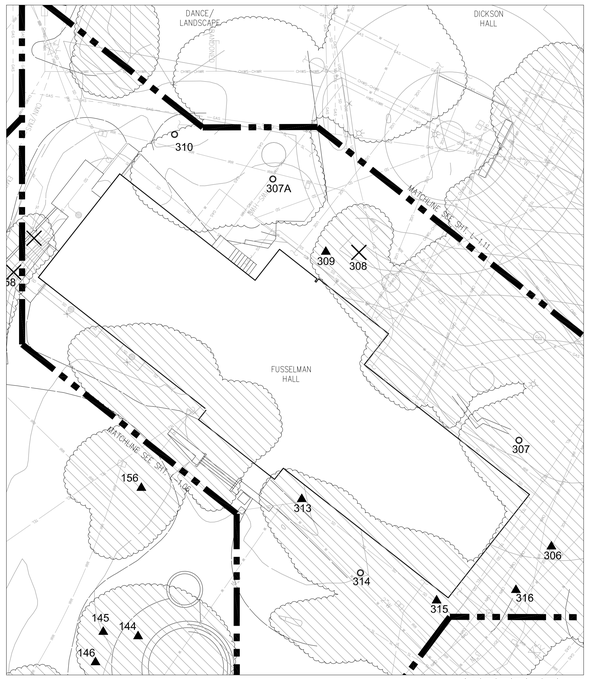
PARKING LOT #4
(TREES 300-305)

L-1.12



2 STUDENT SERVICES CENTER (TREES 317-328)

1" = 20', CONTOUR INTERVAL = 1'



1 FUSSELMAN HALL (TREES 306-316)

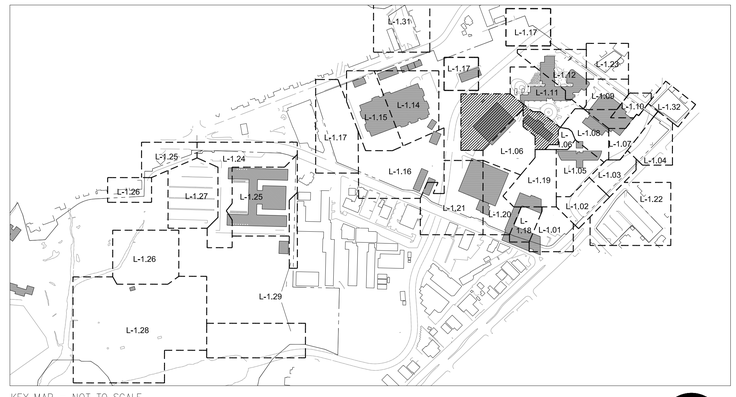
1" = 20', CONTOUR INTERVAL = 1'

Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
		TREE ASSESSMENT								SCHEDULE OF WORK	
306		Coast Redwood	*Sequoia sempervirens*	10' from the northwest corner of Fusselman Hall; southeast of the Redwood grove picnic area	24"	Fair	Fair; was topped in the past and has lost apical control.	Growing into building.		Prune off of building	3
307	a	Japanese Maple	*Acer palmatum*	Off of the northwest corner of a sitting area near the northwest corner of Fusselman Hall; 7' northwest of the privacy wood fence for the sitting area	Multi stem; 8 4" stems	Fair; tree is adjacent to newer construction. Has some cracking stems and old wounds.	Fair to good	None		None	5
308		Japanese Maple	*Acer palmatum*	west side of Fusselman Hall	Multi-stem	Very Poor; all stems show cracking bark and three stems are completely dead.	Poor	None		Remove	1
309		Little Leaf Linden	*Tilia Chordata*	30' east/southeast of circular landscaped area between fusselman hall and new Science and Math Building	18"	Fair; mature. Decaying roots at base. Hollow sound when contacted with sounding hammer.	Fair to poor. Narrow angle branch attachment on long reaching limbs.	None	More thorough risk assessment needed.	Question contractors about possible root disturbance during construction. May need root crown excavation.	1
310		Japanese Maple	*Acer palmatum*	Near the southwest corner of Fusselman Hall; west side of the building	Dual stem; 4" each	Fair; canopy has been raised significantly and poorly pruned.	Fair	None		None	5
311		Coast Live Oak	*Quercus agrifolia*	Off of the southeast corner of Fusselman Hall; 2' south of a ramp entrance to the south side of the building	6"	Fair to good; growing close to building.	Fair	None		Prune to select one leader. Prune off building.	4
313		Crape Myrtle	*Lagerstromia speciosa*	North side of the east entrance of Fusselman Hall	10"	Fair	Fair	Growing on roof.		Trim away from building.	4
314		Japanese Maple	*Acer palmatum*	On the east side of Fusselman Hall to the north of the main entrance on this side of the building	12"	Fair to good; mature.	Good	None		None	5
315		Camphor	*Cinnamomum camphora*	Off of the northeast corner of Fusselman Hall; shades the Dr. George Shukerman-Swift bench	24"	Fair; mature. Minor decay at root crown.	Fair	None	Material piled up at root crown. Dead branch hanging over Sugarman Swift bench.	Crown clean to remove deadwood. Clear root crown of excess material to mitigate rot. It is a mature tree with large stretching limb silver bench and walkway. Recommend to reduce crown 10-15%	3
316		Japanese Maple	*Acer palmatum*	North side of Fusselman Hall; both stems are within 1.5' of the black-top sidewalk leading into stairwell and doorway toward the northeast and northwest corner of the buildings	Two trees; 12" each	Fair to good; heavy lean away from building toward walkway. Eastern most tree branches are conflicting with adjacent camphor.	Fair	Growing 1' from building foundation		Prune conflicting branches to mitigate damage to both the camphor and the maple.	3

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
		TREE ASSESSMENT								SCHEDULE OF WORK	
317		Coast Live Oak	*Quercus agrifolia*	Northwest corner of the Student Services Building; northwest corner of the parking area to the west of the Student Services Building; 1.5' from a large retaining wall at the northwest corner of the parking area	6"	Good; juvenile.	Fair	None		Prune to develop one central leader.	4
318		Valley Oak	*Quercus lobata*	On west side of the Student Services Building; west of the parking area	6"	Fair; growing in a confined area bordered by a retaining wall	Fair	None		None	5
319		Catalpa	*Catalpa speciosa*	Off of the southwest corner of the Student Services Building	24"	Fair; mature to over mature. Low vigor.	Fair	None	SW-reaching branch towards enclosed high voltage area has been damaged by vehicles and has large crack at attachment. Guy wire extends through canopy and is in direct contact with tree.	Remove deadwood over 2" in diameter. Remove SW extending branch approximately 8" in diameter which has cracks at base and evidence of vehicle damage.	2
320		Sweetshade	*Hymenosporum flavum*	Within 3' of a cement retaining wall; off of the south side of the Student Services Center; west of the west-most set of doors on the south side of the building	12"	Fair to poor; decay column from base of tree to first crotch. Decay in center most leader.	Poor to fair	None	The center most leader splits into three with decay in the middle stem.	Remove center leader or just the stem with significant decay. Reduce crown to reduce heavily weighted areas.	3
321		Pin Oak	*Quercus palustris*	In center planting island off of the south side of the Student Services Building; east of the west-most stairway on the south side of the building	8"	Fair; basin planted	Poor; lateral branch taking over as leader.	None	Combination of basin planting and poor structure.	Remove and replace.	2
322		Coast Redwood	*Sequoia sempervirens*	In the center planting island just west of the east-most stairway on the south side of the building	36"	Good	Good	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance. Remove sprouts down to grade.	3
323		Sweetshade	*Hymenosporum flavum*	1.5' from the foundation of the Student Services Building; 7' from the east entrance on the south side of the building; west of the Emeritus College Office	12"	Good	Good	Growing one foot from foundation with no ill affects. Has been pruned away from building with good results.		None	5
324		Coast Redwood	*Sequoia sempervirens*	Off of the southeast corner of the Student Services Building; south of the cement retaining wall for the patio area; north of a black-top driveway on south side of the building	Four stems at 18" each	Good	Good to fair; many crossing branches.	None		Prune sprouts at base. Prune branches and foliage up to 10' for visual clearance. Remove all sprouts down to grade.	3
325		Corkscrew Willow	*Salix babylonica 'Crispa'*	Off of the southeast corner of the Student Services Building; on the east side of the stairway leading to the black-top drive	Multiple stems at 24" and 20"	Good to fair; mature.	Fair; Multi-stemmed but okay.	Lifting concrete creating; trip hazard.		Augment the top of the concrete stairs to mitigate trip hazard.	2
326		Loquat	*Eriobotrya japonica*	South of the east entrance to the Student Services Building; under the eve of the building and is in conflict with the eve	Three stems at 10" each.	Fair; tree was topped to encourage growth away from building. Copious sprouts arising from topping cuts.	Fair. Strong lean away from building.	None		None	5
327		Siberian Elm	*Ulmus pumila*	In the lawn area between the (east) Student Services Building and (west) Learning Resource Center; north of the bridge to parking area 1 & 2	42"	Fair to poor; over mature. Tree has many old heading cuts with decay.	Poor to fair; decay present on limbs overhanging pathway.	None	There are many attachment points adjacent to decay.	Remove	1
328		Ash	*Fraxinus sp.*	In the south end of the grassy area between the Learning Resource Center and the Student Services Building	24"	Good	Good to fair	Surface roots visible in grass but no advanced decay present.		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



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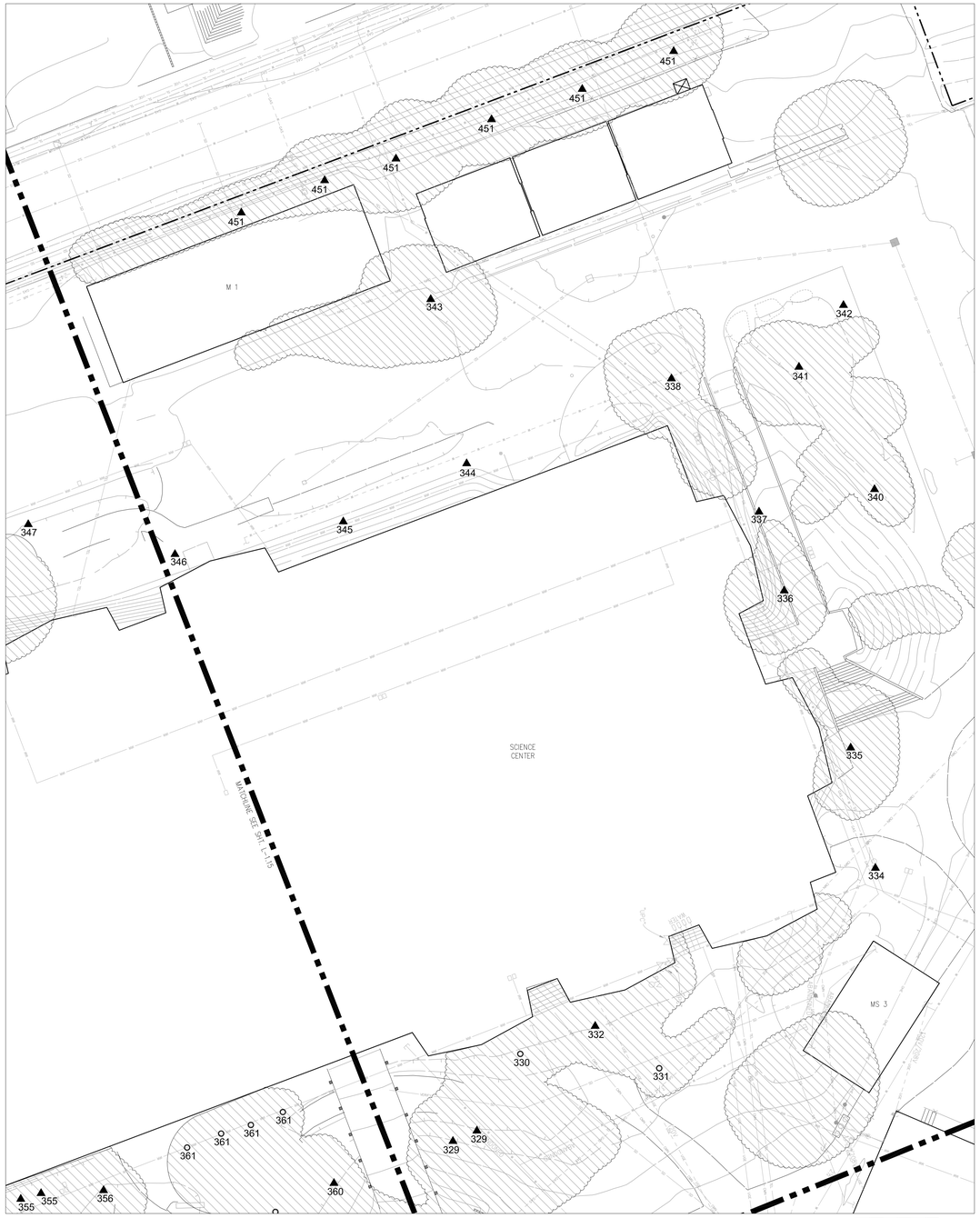
FUSSELMAN HALL
(TREES 306-316)

L-1.13



1 SCIENCE CENTER NORTH (TREES 329-346, 451)

1" = 20', CONTOUR INTERVAL = 1'

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
329	a	Little-Leaf Linden	*Tilia cordata*	20 feet north of T-329	24"	Fair to good	Fair. Large co-dominant stem at 8'.	None	Large co-dominant stem not cause for concern.	Prune large water sprouts.	4
329		Little-Leaf Linden	*Tilia cordata*	North side of the east entrance to the Science Building; up-slope (east) from a cement walkway leading to the entrance	20"	Fair to Good	Good	None		Prune branches to raise canopy to 8'. Remove lowest west extending branch. Clear vegetation around root crown by 2'	3
330		Japanese Maple	*Acer palmatum*	On the east side of the Science Building; north of the main entrance	Group of 2;at 8" each	Good	Good. Old wounds with decay on main stems.	None		None	5
331		Three Flowered Maple	*Acer triflorum*	10' east of the east side of the Science Building; north of a black-top pathway that leads to the parking garage under the building, on the north side of the main entrance	12"	Good	Good	None		None	5
332		Ginkgo	*Ginko biloba*	On the east side of the Science Building; approximately 10' from the black-top sidewalk leading to the parking garage under the Science Building	12"	Good	Fair	None		Limb up branches less than 3" in diameter to 10' height for visual clearance	4
334	a	Monterrey Cypress	*Cupressus macrocarpa*	Off the Northeast corner of building	18"	Poor to Fair. Significant bleeding along main stem	Poor to fair. Slight lean with co-dominant stems and asymmetrical canopy.	Branches growing on wires and building	Tree is a significant visual impairment and poorly placed.	Removal	2
334		European Olive	*Olea europea*	10' east of the east side of the building and 15' from the northeast corner	Multi-stem	Good	Good	Branches growing on to building		Limb up to 9' for visual clearance branches less than 3" in diameter	4
335		Coast Redwood	*Sequoia sempervirens*	12' north of the Science Building near the northeast corner	30"	Good	Good	None		Clear understory and limb up to 10'	3
336		Boxelder	*Acer negundo*	On the north side of the Science Building; west of the main entrance on this side of the building	Multiple 12" stems	Good	Good	Significant. Stems arise from underneath the building. Branches growing onto building.		Prune branches from building for clearance	4
337		Catalina Ironwood	*Lionothamnus floribundus explenifolius*	Near the northwest corner of the Science Building; on the north side of the building; 10' to the north of the building	Multi-stem; 6" each	Good	Good	None		Prune dead wood	4
338		Coast Live Oak	*Quercus agrifolia*	At the northwest corner of the Science Building	24"	Good	Good	Branches growing on to building		Limb up to 10' for visual clearance branches less than 3" in diameter	4
340		Hackberry	*Celtis sp.*	10' south of the parking along the north side of the Science Building	12"	Good	Good. 1 larger crossing branch	None	Canopy too low to prune for visual clearance	Prune deadwood	4
341		Japanese Pagoda	*Sophora japonica*	Located off of the northwest corner of the Science Building	20"	Good	Good	None		Prune deadwood. Remove lowest WSW facing limb, and lowest SE extending branch for visual clearance.	3
342		Canary Island Date Palm	*Phoenix canariensis*	Northwest corner of the planting island on the north side of the Science Building	40"	Good	Good	None	Some fronds have been nicked due to careless pruning.	Any pruning in the future should be performed with sterilized pruning tools due to the risk of disease.	5
343		Elm	*Ulmus sp.*	West side of the black-top drive on the west side of the Science Building	30"	Fair	Fair. Wounds present at 2' on base of tree. Copious water sprouts arising from past heading cuts.	None		Structural rehabilitation by qualified arborist.	3
344		Strawberry Tree	*Arbutus unedo*	West side of the Science Building; between the foundation of the building and the cement sidewalk; east of the cement sidewalk; approximately 8' west of the foundation	8"	Good	Good	Shading windows		Raise canopy to 6' for visual clearance	4
345		Strawberry Tree	*Arbutus unedo*	South of the air conditioning fenced-in unit on the west side of the building	8"	Good	Good	Shading windows		Raise canopy to 6' for visual clearance	4
346		Dracaena	*Cordyline sp.*	West of the wood sitting area on the west side of the science building	Multi stemmed	Good	Good	None		Remove any stalks protruding into walkway.	3
451		Camphor	*Cinnamomum camphora*	The trees are lined up along the east of receiving building; between the building and the black top	Cluster of four multi-stemmed trees	Fair; mature.	Fair	None		Raise all branches < 3" in diameter to 10'. Remove deadwood. Trim foliage off building.	3

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

KEY MAP – NOT TO SCALE

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10' 20' 30'

SCIENCE CENTER NORTH
(TREES 329-346)

L-1.14

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
347		Canary Island Date Palm	*Phoenix canariensis*	On the west side of the Science Building and west of the cement sidewalk along the southwest side of the building	40"	Good	Good	None		Any pruning in the future should be performed with sterilized pruning tools due to the risk of Fusarium wilt. Fusarium oxysporum.	5
349		Messmate Stringybark	*Eucalyptus obliqua*	Near the southwest corner of the Science Building; 15-20' from the southwest corner; on the west side of the building	Multiple 15-20" stems	Good	Good	None		None	5
350		Honey Locust	*Gleditisia triacanthos 'inermos'*	Off of the southwest corner of the building; approximately 8' from the southwest walkway retaining wall	12"	Good	Good	None		None	5
351		Privet	*Ligustrum lucidum*	Near the southwest corner of the Science Building; 4' from the cement retaining wall for the southwest cement walkway	Multiple 3-6" stems	Good	Good	None	Insect activity present on foliage.	Raise canopy to 6' branches < 3" in diameter for clearance	3
353		Coast Redwood	*Sequoia sempervirens*	Near the memorial for Gordon L. Chan; along the cement pathway for parking lot 2; grouping of Redwood trees includes one tree north of the dirt path; two trees are off of the southeast corner of the Science Building	18"	Fair	Good	None	Foliar necrosis present. Necrotic leaves appear white. Possibly botryosphearia.	Raise canopy to 10' branches < 3" in diameter for clearance	4
355		Dawn Redwood	*Metasequoia glyptostroboides*	Directly off the southeast corner of the parking structure	10"	Good	Good		Tree is dedicated to Robert K. Chamberlain	Limb up to 6' for visual clearance.	3
356		Chinese Tallow Tree	*Sapium sebiferum*	Off of the southeast corner of the Science Building	18"	Fair to Good	Fair to good. One co-dominant leader leans over walkway with strong branch attachment.	None		Crown cleaning	4
357		Evergreen Pear	*Pyrus kawakamii*	Off of the southeast corner of the Science Building in a grassy planting area; within 6' of the black-top for the parking lots (where parking lots 1 & 2 merge)	18"	Good	Poor to fair. 2 prior limb failures.	None	Large reaching branches with included bark.	Aggressive limb reduction to mitigate risk of limb failure over walkway.	2
358		Water Gum	*Tristaniopsis laurina*	Within 3' of the black-top path that goes around the east side of the building; near the intersection of parking lot 1 & 2	12"	Good	Good	None		Raise canopy over pavement to 8' for walkway clearance.	4
359		Evergreen Pear	*Pyrus kawakamii*	Next to the main entrance on the east side of the Science Building; on the south side of the pathway leading to the entrance	18"	Good	Good	None		None	5
360	a	Catalpa	*catalpa sp.*	Located on east side of building on south side of main entrance	8"	Good	Good	None		None	
360		Little-Leaf Linden	*Tilia cordata*	South of the main east entrance to the Science Center	18"	Good	Good	None	Multiple dead limbs suspended in canopy	Remove hanging dead branches and deadwood	2
361		Japanese Maple	*Acer palmatum*	On the east side of the building and south of the main entrance; within 15' from the foundation to the building	Cluster of four	Good	Good	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

1 SCIENCE CENTER SOUTH (TREES 347-361)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project #

date: 07/10/14

drawn by: TS, IC, DZ

checked by: NL

scale: 1" = 20'

SCIENCE CENTER SOUTH
(TREES 347-361)

L-1.15

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
362		Ash	*Fraxinus sp.*	In a planting area in the middle of parking lot #1; north end of parking lot #1	14"	Good	Fair to good	None		Crown reduction	4
363		Northern White Cedar	*Thuja occidentalis*	Northwest corner of parking lot 1	Cluster of 3 multi-stem trees	Good	Good	None		Remove foliage up to 6'	4
364		Southern Magnolia	*Magnolia grandiflora 'St. Mary's'*	North end of parking lot #1; between the parking lot and a black-top sidewalk that runs along the riparian area	8"	Poor. Sparse crown. Water stress. No evidence of irrigation.	Good	None	As an evergreen species, Magnolia need available water year around.	Irrigation is needed	2
365		Cottonwood	*Populus sp.*	Northeast corner of temporary Health Services Building	42"	Good	Poor. Co-dominant stems with included bark extending to ground level	None	It may be more economical to remove the tree instead of continuing mitigation pruning.	Possible removal candidate.	1
366		European Olive	*Olea Europa*	Located in planting island between handicapped parking area and stop sign; 5' west of crosswalk	Multi-stem; 4 6" stems	Fair; tree is very susceptible to vehicle damage and has some scars at base.	Good	None		None	5
367		Ash	*Fraxinus sp.*	In the middle of parking lot 1 in a planting island across from the main east entrance to the Science Building	8"	Fair. Visible root girdling.	Fair	None		Prune branches < 3" to 8' for vehicle clearance	3
368		European Olive	*Olea europea*	In the middle of parking lot #1; on the southeast portion of the parking lot; in a center planting area that is surrounded completely by black-top	12"	Good	Poor to fair	Cracking pavement from root ball		Raise canopy to 10' for vehicle clearance	3
370		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-369; sidewalk tree	32"	Fair to good	Fair	Slight raising of pavement. Not significant		Raise canopy to 15' for bus/ road clearance branches < 3" in diameter	2
371		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-370; sidewalk tree	18"	Fair to good	Fair	None		Raise canopy to 10' for clearance and remove deadwood branches < 3" in diameter	3
372		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-371; a sidewalk tree; on south side of the driveway entrance for parking lot #1	18"	Fair to good	Fair	None		None	5
373		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-372; the center tree in this planting strip between the parking lot #1 and College Ave.; between the two driveway entrances to the parking lots	24"	Fair to good	Fair	None		None	5
374		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-373; north of the second entrance to parking lot #1	20"	Poor	Fair	None		Remove deadwood, cut back decaying branch extending Southwest over parking lot	1
375		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-374; south of the second entrance to parking lot #1 and 2	24"	Good	Fair	None		None	5
376	a	Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-375	24"	Fair	Fair	None		None	5
376		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-375	6"	Good	Fair	None	Appears to be replacement tree	Prune for structure. Develop one central leader. It is important to develop strong structure when the tree is young, especially because it is a street tree.	1
377		Flowering Ash	*Fraxinus ornus*	Along College Ave. proceeding south from T-376; south-most Ash in this row of trees along College Ave.	30"	Fair to good	Fair	Slight pavement lifting from roots	Trunk is growing into metal brace at base of tree. Much deadwood in canopy overhanging parking lot.	Remove deadwood. Remove metal structure at base of tree to allow for wound closure.	2

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

1 PARKING LOT #6 (TREES 362-377)

1" = 20', CONTOUR INTERVAL = 1'

KEY MAP - NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10 20

PARKING LOT #6
(TREES 362-377)

L-1.16

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
390		Valley Oak	*Quercus lobata*	At the northwest end of the parking lot #4; on the edge of the campus property and a residential area	Dual stem; 30" each	Good.	Good; displays strong branch attachment	None		Weight reduction on east extending branches that hang over parking lot.	4
391		Valley Oak	*Quercus lobata*	This tree is in the north-most part of this parking lot #4; the northwest side of the tree is not accessible, it is immediately adjacent to a rock pillar and wooden fence that proceeds from the east side of the tree	36"	Good; main stem is covered in ivy. Fair amount of deadwood. Date palm growing underneath canopy with little conflict.			Large diameter deadwood present. Tree hangs into adjacent private residence over a bocce ball court.	Remove deadwood. Inspect canopy for structural defects by qualified arborist.	
392		Coast Redwood	*Sequoia sempervirens*	At the north end of parking lot #4; next to the riparian zone; within 3' of the chain link fence that runs along the riparian corridor	Dual stem; 30" and 18"	Fair to good; protective fencing has been installed to protect tree base where a significant amount of bark was removed.	Fair; dual stem with included bark.	Minor lifting of pavement leading toward bike path.		None	5

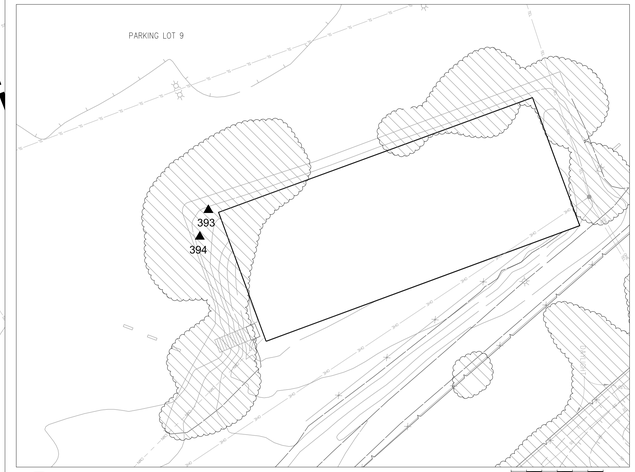
		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
393		Coast Live Oak	*Quercus agrifolia*	At the southeast corner of a rectangular building that is in the east part of parking lot #4; within 3' of the parking lot black-top	18"	Fair to poor; drought stress. Poorly placed growing directly into pavement surrounding adjacent building.	Fair; leaning towards parking lot. Has much history of pruning to clear from building.	Growing five feet from adjacent building. Moderate risk to building.		Continue to prune for building clearance.	4
394		Valley Oak	*Quercus lobata*	At the southeast corner of a rectangular building that is in the east part of parking lot #4; there is asphalt within 6" of the base of the tree on the upslope side	18"	Fair; exposed roots; on a cut bank	Fair	Situated 5' from corner of building but no apparent damage.		Raise canopy for vehicle clearance. Remove deadwood.	3

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
378		Little-Leaf Linden	*Tilia cordata*	At the south edge of parking lot #1	Group of 6. Two have been removed.	Fair to Good. Poor: 2 west northwest facing trees	Fair to good. Poor: 2 trees Northwest facing trees	None	Two trees have significant decay due to apparent sun scalding.	Remove two most Northwesterly facing trees	1
379		Little-Leaf Linden	*Tilia cordata*	In planting island between parking lot #1 and 2	Group of 6. Approx. 12"	Poor	Poor	None.	Entire group is being affected by sun scald and increased heat levels due to proximity to parking lot. Fruiting bodies present with advanced decay.	Remove entire group and replace with more heat tolerant species.	1
380		European Olive	*Olea europea*	At the northwest corner of parking lot #2; Intersection of parking lot #1 and 2; south of the handicapped parking	Dual stems; 12" each	Fair	Fair	Lifting pavement.		None	5
381		Ash	*Fraxinus ssp*	In a center planting area of parking lot #2; center planting tree toward the north end of the parking lot toward the center; across from the Chan memorial and Redwood trees	5"	Fair to good	Fair to good	None		None	5
382		Flowering Ash	*Fraxinus ornus*	In center planter in parking lot #2	8"	Good	Fair to good	None		None	5
383		Flowering Ash	*Fraxinus ornus*	Toward the southwest corner of the parking lot in a planting area between the south fence between the parking lot and grocery store	12"	Good	Good	Slight lifting of pavement		None	5
384		Flowering Ash	*Fraxinus ornus*	In the southwest corner of the parking lot #2	18"	Fair. Soil is very moist around this tree. Bark is moist as well due to vine growing up the trunk.	Fair	None		Remove deadwood	3
385		Coast Redwood	*Sequoia sempervirens*	In the southwest corner of the parking lot #2; they are between the parking lot and the black-top driveway behind the woodland market	Cluster of three trees	Good; these trees have vigorous roots. There is soil compaction to the north of these trees from vehicles driving on the planting island. There is cracking in the street and near a fire hydrant.	Good	There is cracking in the street and near a fire hydrant that is just west of the west-most tree.		None	5
386		Flowering Ash	*Fraxinus ornus*	Near the southwest portion of parking lot #2	12"	Good	Good	None		None	5
387		Black Oak	*Quercus kellogii*	In parking lot # 2	10"	Fair to poor. Much deadwood present in canopy. Wounding from possible sun scald at five feet in main crotch.	Fair	None	Tree is stressed.	Tree could benefit from watering.	3
388		Ash	*Fraxinus sp.*	In the northwest corner of parking lot #2						None	
389		Camphor	*Camphora cinamomum*	At west edge of parking lot #2; oriented north and south of one another	Cluster of two trees	Southern most tree has fair health. Northern most tree; Displays sparse crown with stunted, yellow foliage	Good	None	Northern tree is very stressed.		
390		Valley Oak	*Quercus lobata*	At the northwest end of the parking lot #4; on the edge of the campus property and a residential area	Dual stem; 30" each	Good.	Good; displays strong branch attachment	None		Weight reduction on east extending branches that hang over parking lot.	4
391		Valley Oak	*Quercus lobata*	This tree is in the north-most part of this parking lot #4; the northwest side of the tree is not accessible, it is immediately adjacent to a rock pillar and wooden fence that proceeds from the east side of the tree	36"	Good; main stem is covered in ivy. Fair amount of deadwood. Date palm growing underneath canopy with little conflict.			Large diameter deadwood present. Tree hangs into adjacent private residence over a bocce ball court.	Remove deadwood. Inspect canopy for structural defects by qualified arborist.	
392		Coast Redwood	*Sequoia sempervirens*	At the north end of parking lot #4; next to the riparian zone; within 3' of the chain link fence that runs along the riparian corridor	Dual stem; 30" and 18"	Fair to good; protective fencing has been installed to protect tree base where a significant amount of bark was removed.	Fair; dual stem with included bark.	Minor lifting of pavement leading toward bike path.		None	5
449		Incense Cedar	*Calocedrus decurrens*	In the receiving area ("do not enter" area) off of the west side of the science building. The tree is adjacent to the fence that runs between this area and the sidewalk along the west side of the science building	12"	Fair; root system surrounded by pavement. Crown is competing with adjacent ash tree.	Good	None	Vine is growing throughout canopy.	Remove vine from canopy.	3
450		Ash	*Fraxinus sp.*	To the west of T-449	20"	Fair; Past branch failure evident; Northwesterly facing leader with included bark at attachment.	Poor fair	None		Risk of failure could be mitigated with 15% crown reduction and deadwood removal.	2

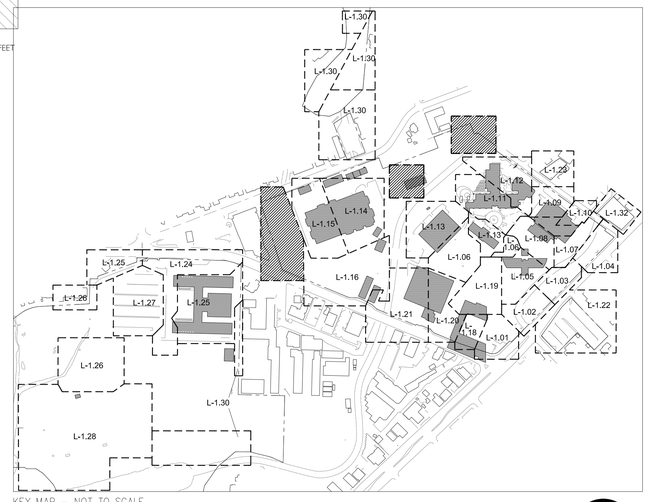
NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

3 PARKING LOT #7 (TREES 378-392, 449-450)
1" = 20', CONTOUR INTERVAL = 1'

1 PARKING LOT #9 (TREES 390-392)
1" = 20', CONTOUR INTERVAL = 1'



2 PARKING LOT #9 (TREES 393-394)
1" = 20', CONTOUR INTERVAL = 1'



KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10' 20' 40'

PARKING LOTS #7 & #9
(TREES 378-394)

L-1.17

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
404		Valley Oak	*Quercus lobata*	20' west/northwest of the new Administration Building	32"	Good; mature; evidence of prior fracture in main crotch.	Good to fair.	None	Heavily impacted by construction. Located 5' from construction path.	Monitor regularly post construction.	1

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

1 ADMINISTRATIVE CENTER (TREES 404)

1" = 20', CONTOUR INTERVAL = 1'

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TREE REMOVAL

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District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10 20 30'

ADMINISTRATIVE CENTER
(TREES 395-408)

L-1.18

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
410		Coast Redwood	*Sequoia sempervirens*	On west side of the Harlen Center; both trees are within 12" of the foundation	Cluster of two at 24" each	Good; development on both sides of this tree.	Good	None		Monitor post construction for stress.	2
411		Japanese Maple	*Acer palmatum*	At the southwest corner of the Harlen Center	Cluster of two mature, multi stem	Fair; mature, root zones affected by removal of path. No apparent adverse affects.	Good	None		Monitor post construction for stress.	3

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

1 HARLAN CENTER / BUSINESS MANAGEMENT (TREES 410-411)
1" = 20', CONTOUR INTERVAL = 1'

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TREE REMOVAL

Kentfield Campus

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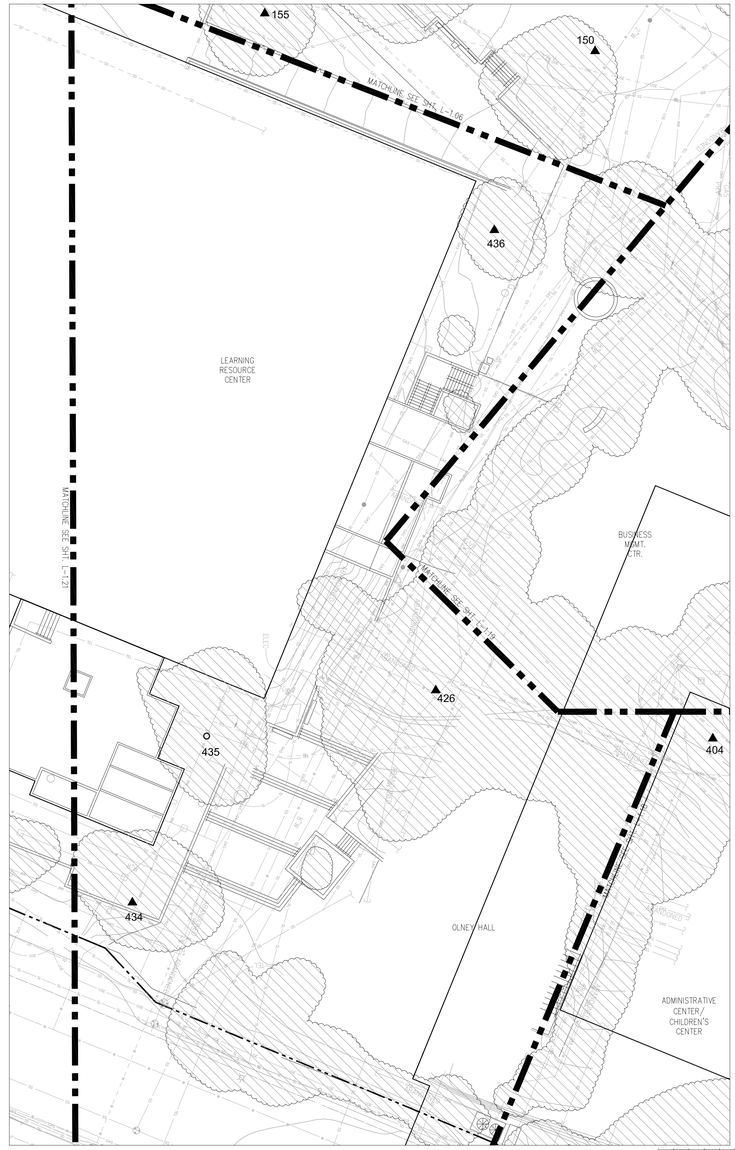
scale: 1" = 20' 0 10 20 30'

HARLAN CENTER / OLNEY HALL (TREES 409-425)

L-1.19

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
426		Coast Live Oak	*Quercus agrifolia*	Located at the southwest corner of Olney Hall; south side of the building	42"	Fair; heavily stressed. Heavily impacted by construction. 25-30% canopy was removed to accommodate new Administration Building. Large roots were severed.	Poor to fair; asymmetrical canopy.	None		Monitor closely during and after construction.	1
434		African Sumac	*Rus laucea*	Northeast corner of the Learning Resource Center; opposite the south entrance to Olney Hall; on the east side of the building	Multi stem	Good; vigorous sprouting.	Fair	None		Remove sprouts for visual clearance. Raise canopy for walkway clearance.	2
435		C.F. Siberian Elm	*Ulmus pumila*	On the north side of the Student Learning Resource Center	Cluster of two	Fair; mature	Poor; heavy lean. Slight decay of tension roots.	None		None	5
436		Mayten	*Maytenus boaria*	On the northwest corner of the Learning Resource Center	18"	Fair, decay column on main stem.	Fair	None		Raise canopy to provide sidewalk clearance.	3

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 LEARNING RESOURCE CENTER / OLNEY HALL (TREES 426-436)
1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

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TREE REMOVAL

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LEARNING RESOURCE CTR/ OLNEY (TREES 426-436)

L-1.20

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
437		Southern Magnolia	*Magnolia grandiflora 'St. Mary's'*	At the southwest corner of the Learning Resource Center	18"	Good; vines heavily constricting base of tree.	Good	None		Remove vines at base of tree to minimize competition for water and nutrients.	5
438		European White Birch	*Betula pendula*	Near the southwest corner of the Learning Resource Center; 15' to the east of the Magnolia (T-437)	18"	Good; minor dieback in crown	Good	None		None	5
439		Shantung Maple	*acer truncatum*	On the west side of the south entrance to the Learning Resource Center	Multi stemmed at 6" a stem	Good	Good	None		None	5
440		English Elm	*Ulmus procera*	Located at the entrance to the parking area (Lot #5), on the east side of the Learning Resource Center	Three of seven trees were removed.	Fair to poor; largest of four remaining trees is in good health other than many water sprouts.	Fair; eastern most tree has strong lean over college Ave..	None	Trees are crowded; many crossing and rubbing branches	Remove three most easterly trees, leaving the largest tree to occupy the area.	2
441		English Elm	*Ulmus procera*	West and adjacent to the sidewalk on College Ave.; the north-most tree in the cluster of Elms near the entrance to parking lot #5	24"	Good; mature. Old wound with some decay at 10' on north side of tree.	Fair to good	None	Small tree growing underneath this tree will eventually conflict.	Remove understory tree to mitigate conflict or trim yearly.	4
442		C.F. Balkan Ash	*Fraxinus holotricha*	Along College Ave. in between the cluster of Elms and the mature trees near the main entrance to the college; in the middle of a Cherry Laurel hedge	12"	Good	Good	None		None	5
443		English Elm	*Ulmus procera*	North and south of the stairway entrance into Lot #5; northeast corner of the lot	24"	Fair; mature	Fair	Slight lifting of pavement	Deadwood present throughout crown on both trees.	Crown cleaning to remove deadwood.	2
444		Camphor	*Cinnamomum camphora*	East of the Learning Resource Center in the planting island between the east side of the building and the sidewalk along College Ave.	Multiple 6" stems	Fair; necrotic leaf tips throughout crown	Good	None		None	5
445		European White Birch	*Betula pendula*	Between the Camphor and the Acacia in the planting island on the east side of the Learning Resource Center	6"	Good	Fair; co-dominant stems	None		None	5
446		Ash	*Fraxinus sp.*	At the northeast corner of the Police building; one is in a center planting between two parts of the black-top sidewalk along the riparian area; one is a sidewalk tree along College Ave.; one is south of the black-top and in the planting island at the corner of the building	Cluster of four trees approximately 12" in diameter	Fair	Fair	None		None	5
447		Evergreen Pear	*Pyrus kawakamii*	Located on the north side of the police building	20"	Good	Good		Minor deadwood	None	5
448		Tulip Tree	*Liriodendron tulipifera*	On the north side of the police building	12"	Poor to fair; over mature. Low vigor. Decay in main stem	Poor to fair	None		None	5
449		See Sheet L-1.17									
450		See Sheet L-1.17									
451		See Sheet L-1.14									

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

1 CORTE MADERA CREEK / COLLEGE AVENUE (TREES 437-448)

1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

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TREE REMOVAL

Kentfield Campus

District Project #

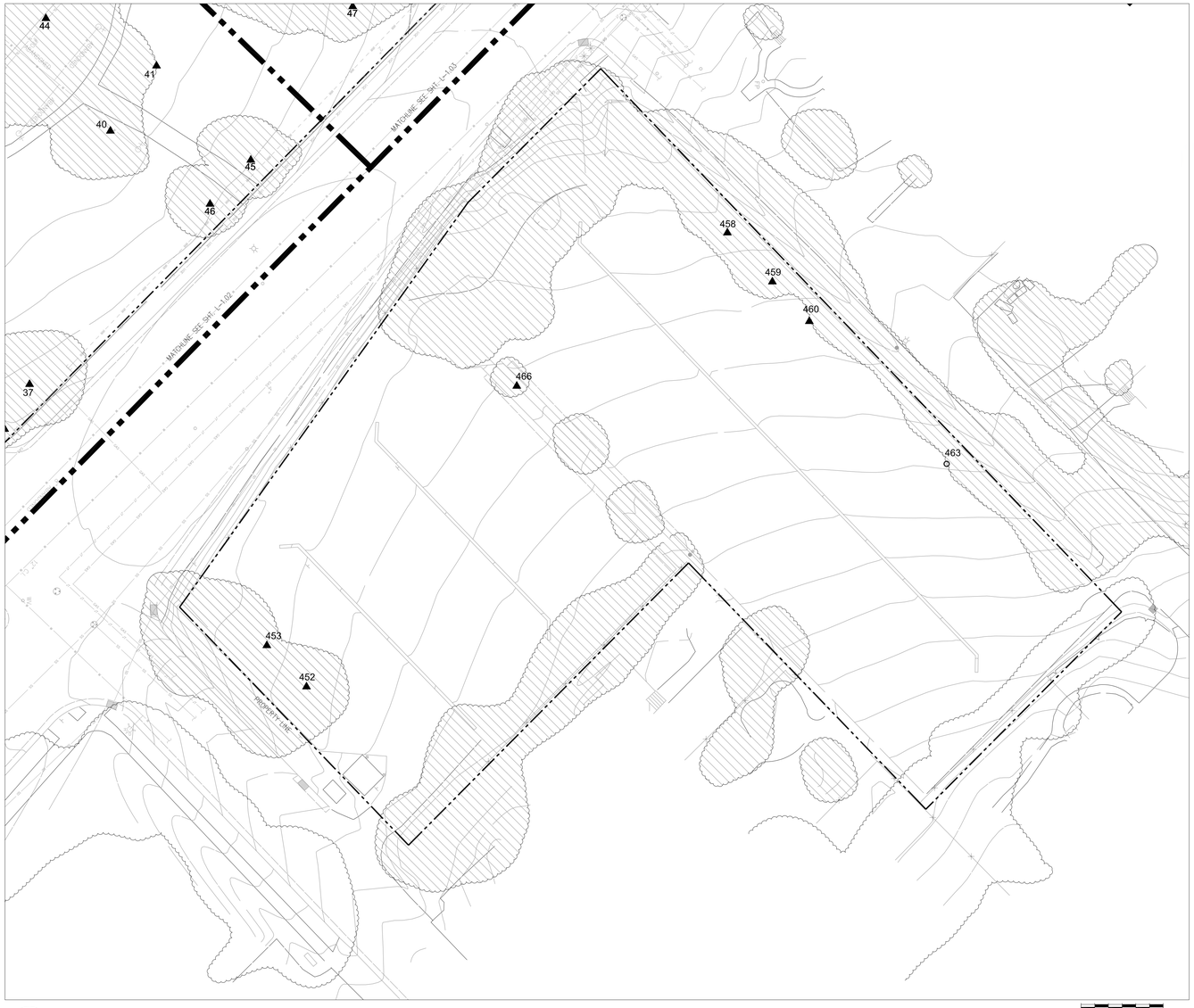
AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10' 20'

CORTE MADERA CREEK / COLLEGE (TREES 437-448)

L-1.21



1 PARKING LOT 2 (TREES 452-466)

1" = 20', CONTOUR INTERVAL = 1'

Tree #		TREE ASSESSMENT: Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	SCHEDULE OF WORK: Recommendations	Priority
452		English Elm*	*Ulmus campestris**	Located in the planting island that is between Maple Ave. and the parking lot north of Sir Francis Drake; the north-most large tree in the planting strip	30"	Fair; mature	Fair; fair amount of deadwood hanging under canopy. Cavity at 7' on main trunk.	None		Crown cleaning. Remove sprout growth on main trunk.	3
453	a	English Elm	*Ulmus campestris**	10' southwest of T-453						Conflicting with infrastructure. Poorly located. Removal recommended.	2
453		English Elm*	*Ulmus campestris**	Near the southeast corner of the parking lot north of Sir Francis Drake; in the planting island between Maple Ave. and the parking lot north of Sir Francis Drake	30"	Fair; mature	Fair; fair amount of deadwood hanging in canopy.	None		Crown cleaning. Remove sprout growth on main trunk. Remove understory brush for visual clearance.	1
458		English Elm	*Ulmus campestris**	In the planting area along the west edge of the parking lot north of Sir Francis Drake; the south-most in the planting island and closest to the corner of Elm St. and Sir Francis Drake	18"	Fair; mature.	Fair; some larger deadwood.	None		Remove sprouts < 3" in diameter for vehicle clearance.	3
459		English Elm	*Ulmus campestris**	North of T-458 in the west-most planting area between the parking lot and Elm Ave.	24"	Fair; mature	Fair	None	Understory oak sprouts present.	Preserve understory oak sprouts for possible replacement in future.	3
460		English Elm	*Ulmus campestris**	North of T-459; in the planting area at the west edge of the parking area	24"	Fair; mature	Fair	None		Prune to un-weigh branch reaching over Elm Ave.	3
463		Ash	*Fraxinus sp.*	North of T-459; in the planting area at the west edge of the parking area	18"	Fair to poor; over mature but stable.	Fair. Has been pruned back significantly to preserve the tree.	None		None	5
466			*Prunus sp.*	In center planting island in the parking lot north of Sir Francis Drake; south of T-465	N/A						

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10' 20'

PARKING LOT 2
TREES (452-466)

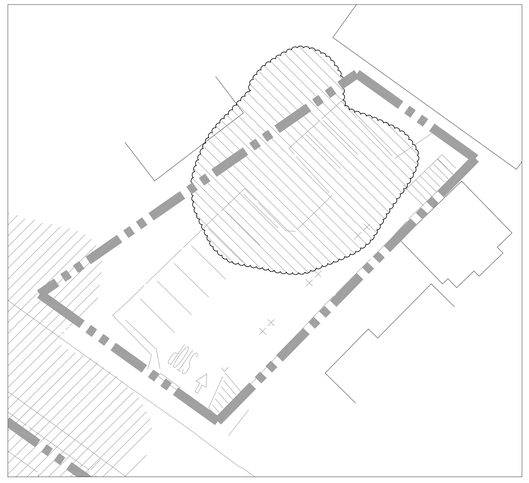
L-1.22

NOTES: RIPARIAN ZONE TREE REMOVAL:

1. On the south side of the riparian zone remove all of the acacia and eucalyptus trees. Work includes all trees from the edge of the creek wall to the pedestrian path and for a length of 945' (from the center of the campus police building proceeding west to the two stemmed redwood near the edge of College property). An approximate tally of trees includes two trees to the east of the pedestrian bridge and 18 trees to the west of the pedestrian bridge.

2. On the northeast side of the riparian zone remove all of the acacia and eucalyptus trees. Work includes all trees from the edge of the creek wall to the maintenance roadway for a length of 740' (from the center of the pedestrian bridge to the edge of the college property). An approximate tally of acacia trees includes 55 medium sized and 80 small sized (< 3" diameter) trees. An approximate tally of the eucalyptus includes 2 small trees and 3 large trees. Where stump grinding is not feasible, immediate after the tree is cut, apply systemic herbicide to stump per the specifications Section 31 10 00.

3. Remove three box elders located near the planted Zelcova.



1 PARKING LOT 17 (TREES 467)
1" = 20', CONTOUR INTERVAL = 1'

TREE ASSESSMENT						SCHEDULE OF WORK		
TREE NUMBER	SPECIES	SIZE	LOCATION	CONDITION	OBSERVED INFRASTRUCTURE CONFLICTS	WORK DESCRIPTION	*Pruning class (1,2,3)*	*Stump grinding (Y/N)*
467	Black Walnut (Juglans nigra)	Mature to over mature.	Located in the parking area on the west side of Laurel Ave. It is northwest of the parking lot (P-3) and west of Dickson Hall.	Fair to guarded; tree was previously topped. There are old mechanical wounds on the north side of the trunk, there is good callus tissue formation. Decay was detected on the north side of the trunk. There is a also a cable in this tree.	Tree, No significant construction impacts.	**Contractor shall fell Black Walnut and cut into lengths to be approved by District's Representative. Provide 3 days notice to District's Representative prior to felling. Coordinate with District's Representative and return wood to College. Contractor shall deliver wood to an on campus location as determined by the District's Representative.**	N/A	**"Y Backfill w/ soil."**

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

2 KENTFIELD CAMPUS - RIPARIAN ZONE
1" = 50'

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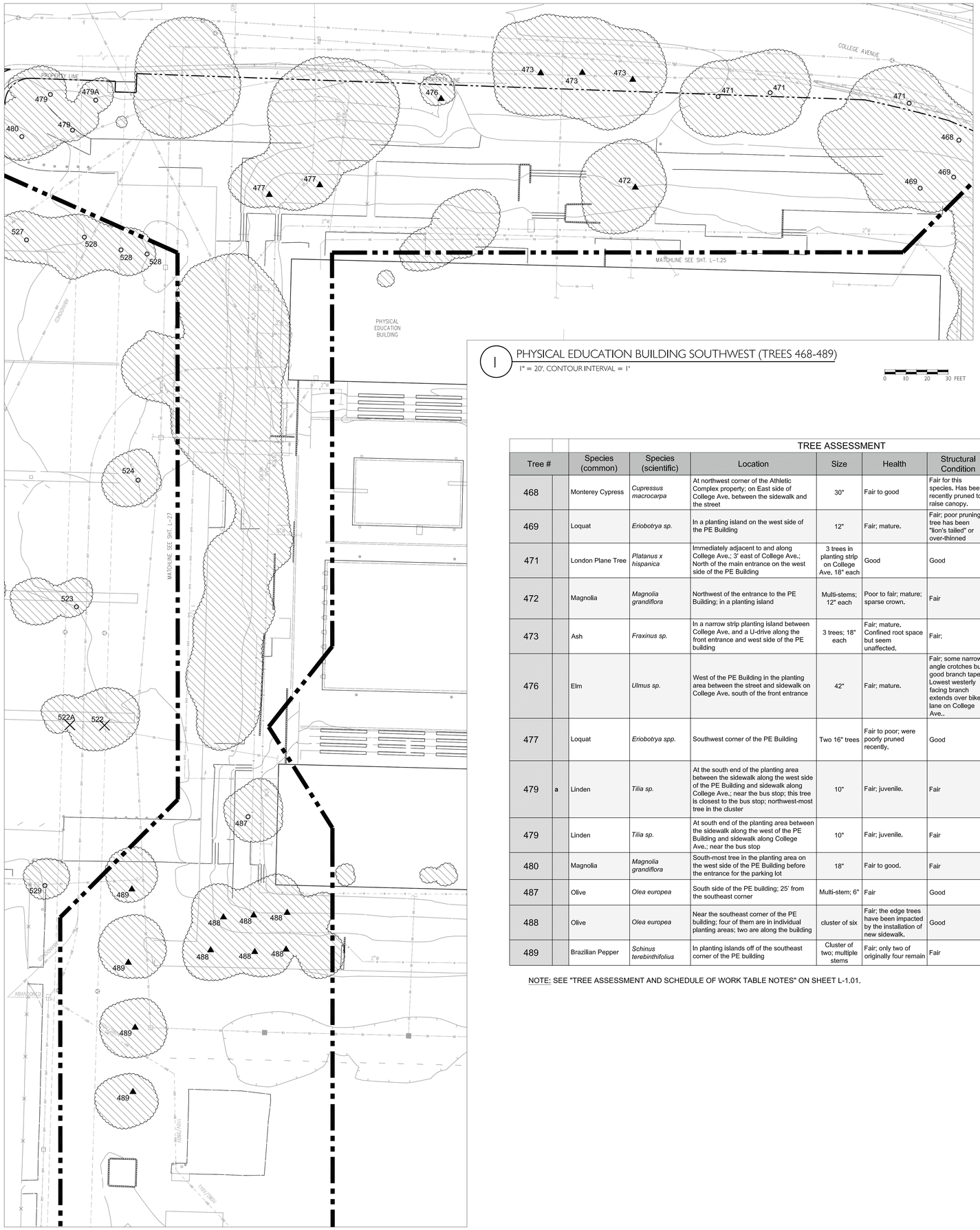
TREE REMOVAL

Kentfield Campus

District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 60' 0 30' 60'

RIPARIAN CORRIDOR & PARKING LOT 17

L-1.23



1 PHYSICAL EDUCATION BUILDING SOUTHWEST (TREES 468-489)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

KEY MAP – NOT TO SCALE

Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
		TREE ASSESSMENT								SCHEDULE OF WORK	
468		Monterey Cypress	*Cupressus macrocarpa*	At northwest corner of the Athletic Complex property; on East side of College Ave, between the sidewalk and the street	30"	Fair to good	Fair for this species. Has been recently pruned to raise canopy.	None		None	5
469		Loquat	*Eriobotrya sp.*	In a planting island on the west side of the PE Building	12"	Fair; mature.	Fair; poor pruning; tree has been "lion's tailed" or over-thinned	None		None	5
471		London Plane Tree	*Platanus x hispanica*	Immediately adjacent to and along College Ave.; 3' east of College Ave.; North of the main entrance on the west side of the PE Building	3 trees in planting strip on College Ave, 18" each	Good	Good	None		None	5
472		Magnolia	*Magnolia grandiflora*	Northwest of the entrance to the PE Building; in a planting island	Multi-stems; 12" each	Poor to fair; mature; sparse crown.	Fair	Conflicting with light next to bench.	Tree is stressed. It is possible that soil was compacted during construction.	Prune foliage off light. Fertilize. Apply mulch.	3
473		Ash	*Fraxinus sp.*	In a narrow strip planting island between College Ave. and a U-drive along the front entrance and west side of the PE building	3 trees; 18" each	Fair; mature. Confined root space but seem unaffected.	Fair;	None		Remove water sprouts up to 15' on main trunks.	3
476		Elm	*Ulmus sp.*	West of the PE Building in the planting area between the street and sidewalk on College Ave. south of the front entrance	42"	Fair; mature.	Fair; some narrow angle crotches but good branch taper. Lowest westerly facing branch extends over bike lane on College Ave..	Work has been done 10' south of tree as maintenance or to install structures for water lines.	It is unknown if roots were disturbed when installing concrete slab for water mains.	Crown cleaning. Reduce weight on lowest westerly facing limb. Monitor for decline due to possible impacts from construction.	2
477		Loquat	*Eriobotrya spp.*	Southwest corner of the PE Building	Two 16" trees	Fair to poor; were poorly pruned recently.	Good	None	Trees may have been impacted by installation of concrete pathway.	These show decline most likely from construction activities. Monitor for decline.	4
479	a	Linden	*Tilia sp.*	At the south end of the planting area between the sidewalk along the west side of the PE Building and sidewalk along College Ave.; near the bus stop; this tree is closest to the bus stop; northwest-most tree in the cluster	10"	Fair; juvenile.	Fair	None		None	5
479		Linden	*Tilia sp.*	At south end of the planting area between the sidewalk along the west of the PE Building and sidewalk along College Ave.; near the bus stop	10"	Fair; juvenile.	Fair	None		None	5
480		Magnolia	*Magnolia grandiflora*	South-most tree in the planting area on the west side of the PE Building before the entrance for the parking lot	18"	Fair to good.	Fair	None		None	5
487		Olive	*Olea europea*	South side of the PE building; 25' from the southeast corner	Multi-stem; 6"	Fair	Good	None		None	5
488		Olive	*Olea europea*	Near the southeast corner of the PE building; four of them are in individual planting areas; two are along the building	cluster of six	Fair; the edge trees have been impacted by the installation of new sidewalk.	Good	None		Mulch and fertilize	4
489		Brazilian Pepper	*Schinus terebinthifolius*	In planting islands off of the southeast corner of the PE building	Cluster of two; multiple stems	Fair; only two of originally four remain	Fair	None		Prune to maintain vehicle clearance	4

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

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rev. date issue

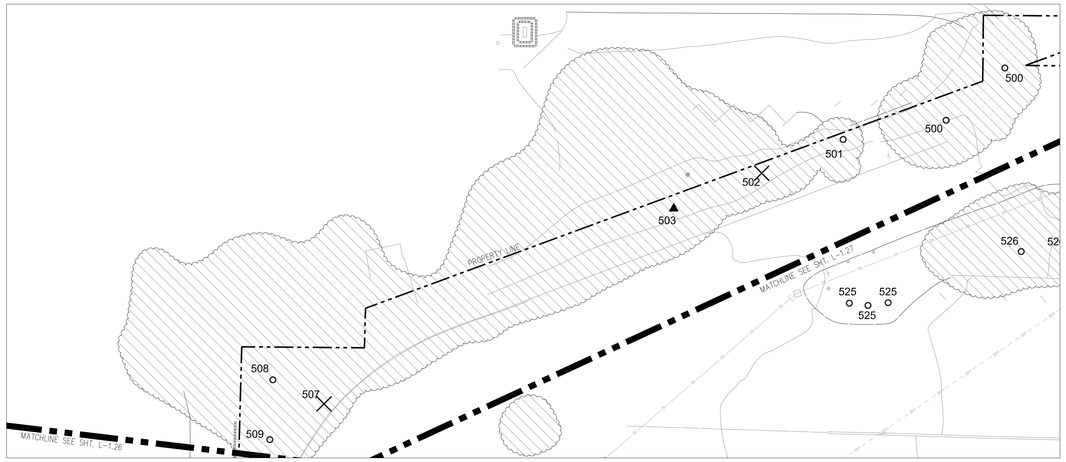
TREE REMOVAL

Kentfield Campus

District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10' 20'

PHYSICAL ED. BUILDING SW (TREES 468-489)

L-1.24



2 COLLEGE AVENUE (TREES 497-509)

1" = 20', CONTOUR INTERVAL = 1'

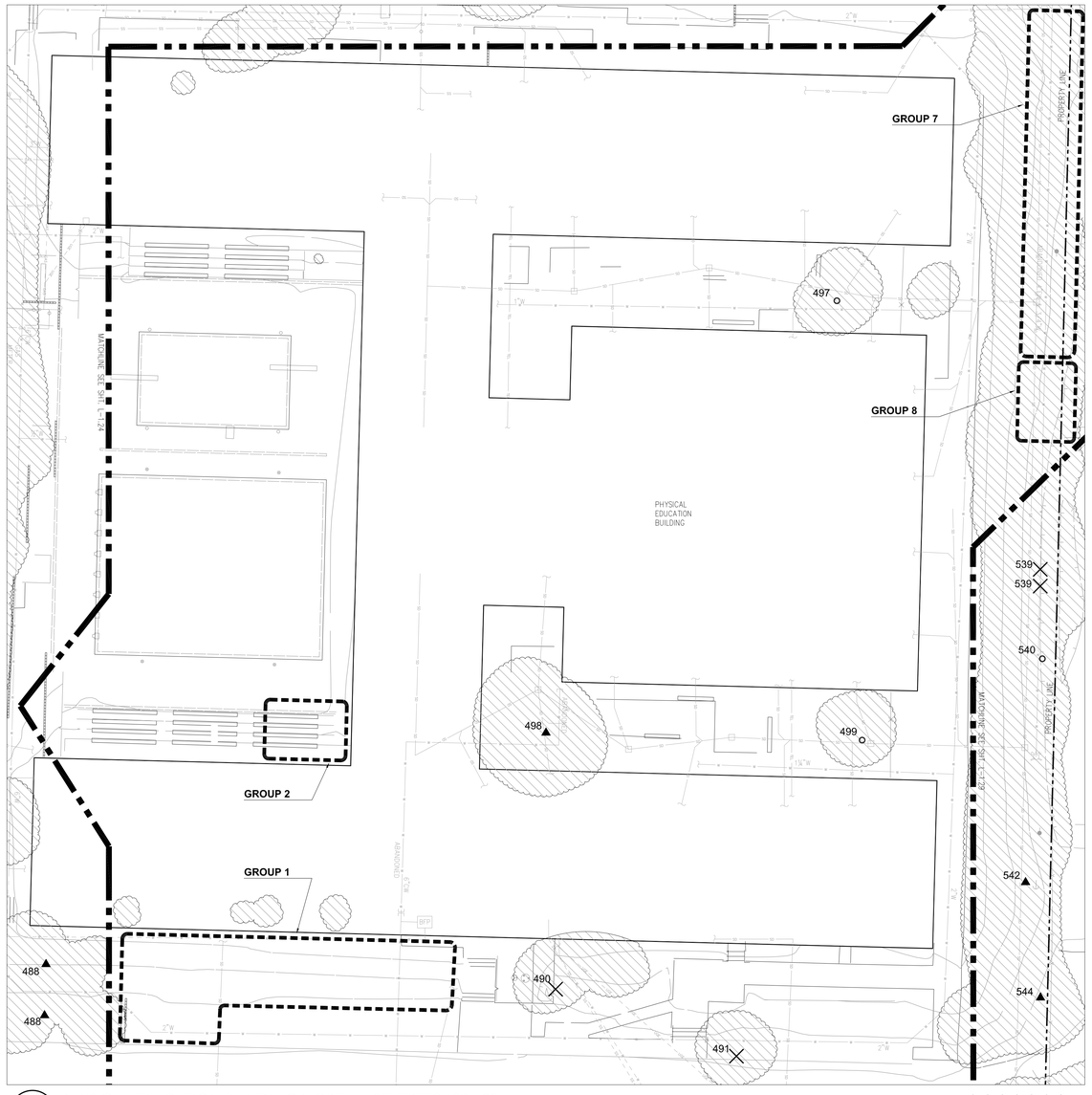
0 10 20 30 FEET

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
497		Magnolia	*Magnolia veitchii*	15-20' south of T-494; inside the west patio area of the PE Building	12"	Trunk splits into two stems at 3". Tree is flowering nicely.	Good	None		None	5
498		Magnolia	*Magnolia Grandiflora*	Within the east patio area inside the PE Building	24,"	Fair; yellowing and slight die-back in crown.	Fair to good	None	May have been impacted by construction.	Clear ground cover around root crown	3
499		Michelia	*Michelia doltsopa*	North end of the east patio area inside of the PE Building; 10 – 15' south of the junipers (T-492)	20" below split in to multiple stems	Fair to good	Good	None		None	5
500		Allepo Pine	*Pinus halepensis*	South side of the driveway entrance into the parking lot for the PE Building; in a planting area that is covered with wood chips; immediately east of College Ave	Two trees; 24" each	Fair; tree 15' northwest of speed limit sign has co-dominant stems.	Tree closest to crosswalk has a corrected lean and copious cones.	Some lifting of pavement		None	5
501		Plum	*Prunus sp.*	West of the asphalt parking area along College Ave.; between the parking along College and the entrance to the parking lot on south side of the PE Building	Multi-stemmed 3"	Fair; mature.	Fair	None		None	5
502		Coast Live Oak	*Quercus agrifolia*	West of PE Building parking lot in a planting area with wood chips; 15' south of T-501	12"	Good; recently pruned to clear street signs and lights.	Fair; tight v-crotch at 5'	None	Small valley oaks growing underneath and will eventually compete with live oak.	Remove competing Valley Oaks	4
503		Coast Live Oak	*Quercus agrifolia*	West of the PE Building parking lot; 25' south of T-502	18"	Good; root crown obstructed by vines.	Good	None		Clear root crown of vines.	4
507		Eucalyptus	*Eucalyptus globulus*	West of PE Building parking lot; south of T-503	Removed but has sprouted back	Two 6" stems				Remove	2
508		Incense Cedar	*Calocedrus deccurens*	Southwest of T-507	8"	Good	Good	None		None	5
509		Privet	*Ligusturm lucidum*	In the planting area along the west side of the PE building parking lot; 20' southwest of T-507	Multi-stem; 4"	Good	Fair	None		None	5

Group 1 – Athletic Complex/Physical Education Building	Juniper (Juniperus spp.), Mayten (Maytenus boaris), and Bottlebrush (Callistemon spp.)		This is a dense cluster of vegetation on the east side of the building.			**"Thin Bottlebrush. Provide structural pruning for Mayten tree."**	**2**	N/A
Group 2 – Athletic Complex/Physical Education Building	Japanese Maples (Acer palmatum) and Podocarpus		It is a planting area inside of the Men's and Women's locker rooms Inside of the Physical Education Building.	The Men's locker room has three Japanese Maples (Acer palmatum) and a Podocarpus. All of which are malformed and leggy. The Maples are infected with Verticillium Wilt. The Women's locker room has one Japanese maple that also appears to be diseased.	N/A	**Remove.**	N/A	**Y**
Group 7: Physical Education Building/Athletic Complex	Cotoneaster (Cotoneaster spp.), Manzanita (Arctostaphylos spp.), Cherry laurel (Prunus laurocerasus), Hawthorn (Crataegus spp.), Plum (Prunus spp.), and Rosemary (Rosmarinus officinalis)		Near the northwest corner of the Physical EducationComplex/Athletic Center this group of vegetation is along the fence to the north proceeding to the east.			**Prune to increase visibility and for fire safety.**	**2**	N/A
Group 8: Physical Education Building/Athletic Complex	Plum (Prunus spp.)		Located just to the east of Group 7 and across from the west patio area inside the Physical EducationBuilding, where the magnolias (tree 494 & 495) are located.	The plums are multi-stemmed trees.		**Thin out some stems to provide clearance for public and fire safety.**	**2**	N/A

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
490		Plum	*Prunus cerasifera 'Atropurpurea'*	Off of the east side of the PE building, near the laundry facilities	Removed and replaced by valley oak.					Poor tree choice to be growing with such vigorous ground cover. Suggest replacing tree with alternative species.	4
491		Mayten	*Maytenus boaria*	Near the northeast corner of the building; 8' north of the stairway entrance near the northeast corner of the building; between the sidewalk and the parking lot	16"	Poor to fair; mature to over mature. Dieback in crown. Thick understory grasses are choking the tree out.	Fair		Tree is in apparent decline. If tree is replaced at some point grass must be removed out from around the drip line of the tree.	Removal and replacement is an option.	4
497		Magnolia	*Magnolia veitchii*	15-20' south of T-494; inside the west patio area of the PE Building	12"	Trunk splits into two stems at 3". Tree is flowering nicely.	Good	None		None	5
498		Magnolia	*Magnolia Grandiflora*	Within the east patio area inside the PE Building	24,"	Fair; yellowing and slight die-back in crown.	Fair to good	None	May have been impacted by construction.	Clear ground cover around root crown	3
499		Michelia	*Michelia doltsopa*	North end of the east patio area inside of the PE Building; 10 – 15' south of the junipers (T-492)	20" below split in to multiple stems	Fair to good	Good	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 PHYSICAL EDUCATION BUILDING NORTHEAST (TREES 490-499)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

KEY MAP - NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10' 20'

PHYS ED BLDG NE & COLLEGE AVE (490-509)

L-1.25

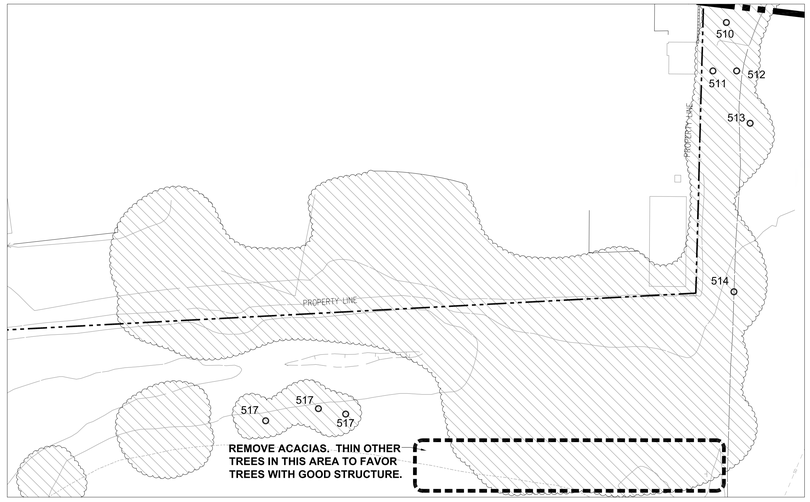
2 PARKING LOT #11 (TREES 520)

1" = 20', CONTOUR INTERVAL = 1'

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
520		Elm	*Ulmus sp.*	At east end of parking lot #11 and west of the track area; near the northeast corner of the parking lot	Dead					Remove	2

Group 3: Athletic Complex and Physical Education Building	Acacia (Acacia melanoxylon) , Eucallyptus (Eucalyptus globulus 'Globulus') and (Eucalyptus globulus 'Compacta'), Ash (Fraxinus spp.) , and Plum (Prunus spp.)		This is vegetation along the south side of Parking Lot 11, the lot south of the tennis courts.	Most of these trees are over-grown and have been relatively un-maintained by our observations.		**Remove Acacia.**	N/A	**Y**

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

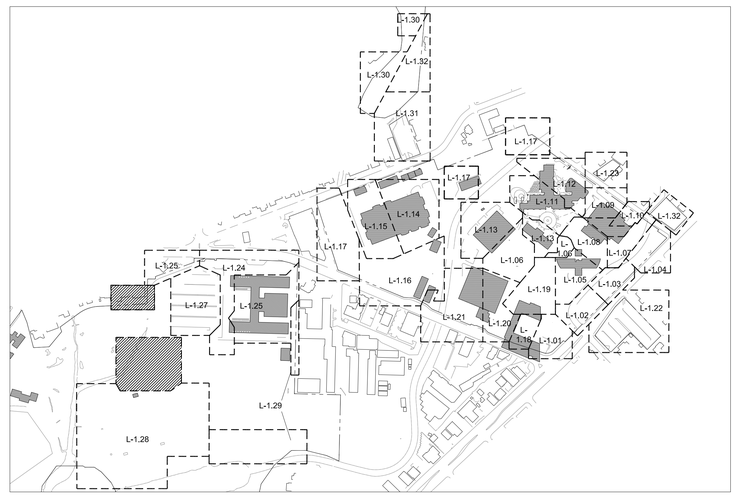


1 PARKING LOT #12 SOUTH (TREES 510-517)

1" = 20', CONTOUR INTERVAL = 1'

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
510		Elm	*Ulmus sp.*	South of T-508	6"	Good	Good	None		None	5
511		Elm	*Ulmus sp.*	Eeast of a gravel pathway from the adjacent neighborhood into the PE Building parking lot	8"	Good	Good	None		None	5
512		Catalina Ironwood	*Lionothamnus floribundus explenifolius*	East of gravel path from the adjacent neighborhood into the PE Building parking lot	12"	Good	Good	None		None	5
513		Plum	*Prunus sp.*	East of T-511 and T-512	Multi-stem; 3"	Fair; mature.	Fair	None		None	5
514		Elm	*Ulmus sp.*	South of PE Parking area; east of T-513	12"	Good	Fair; some v-crotching	None		None	5
517		Coast Live Oak	*Quercus agrifolia*	South of T- 516; midway across the length of the parking lot on the west side	Cluster of three; 12", 8", 4"	Fair to good	Good	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



KEY MAP - NOT TO SCALE

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

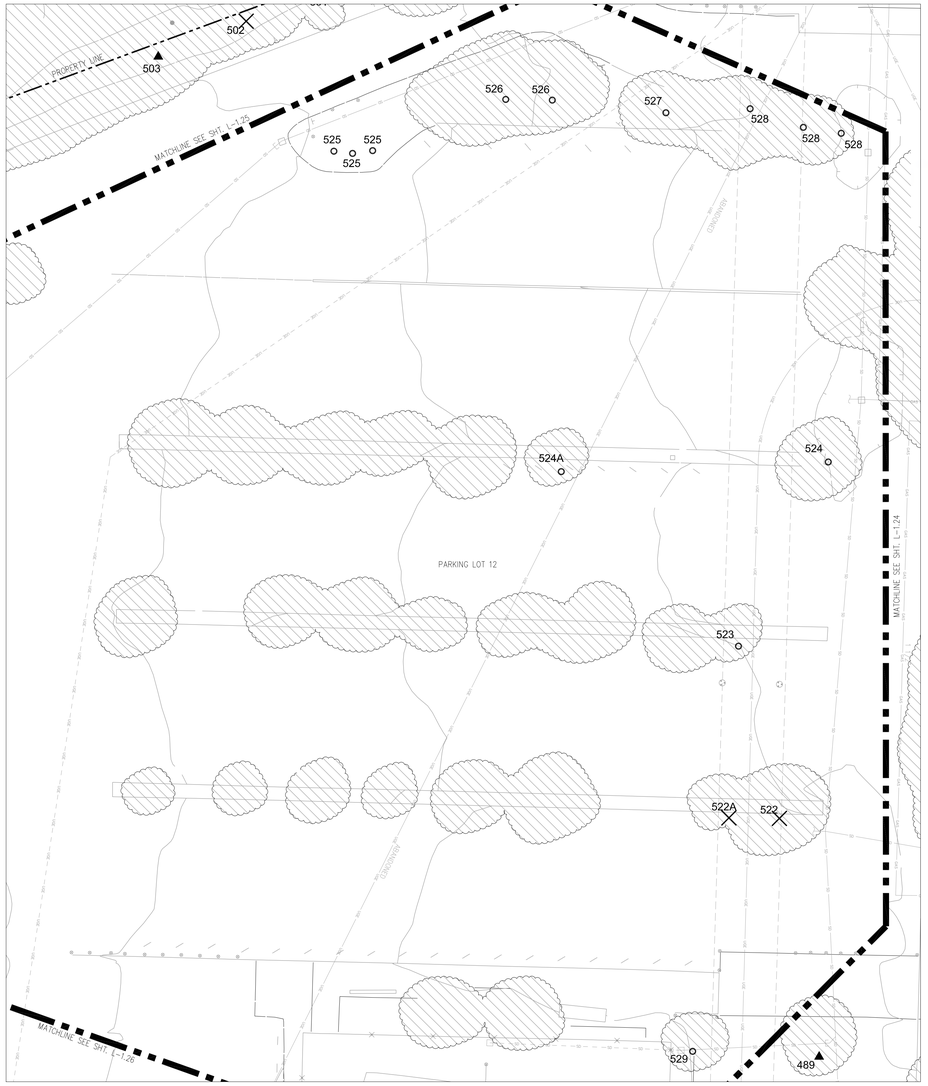
scale: 1" = 20' 0 10' 20'

PKG. LOT #11 & PKG LOT #12 SOUTH (TREES 510-520)

L-1.26

Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
		TREE ASSESSMENT								SCHEDULE OF WORK	
522	a	Ash	*Fraxinus sp.*	In east-most planting island in the PE Building parking lot	4"	Poor	Poor	None	Deformed base. Will never become a well formed tree.	Remove and replace	4
522		Ash	*Fraxinus sp.*	In the east-most planting island in the PE building parking lot	12"	Fair; mature. Large deadwood present. Three sections of decayed bark on southwest facing side of trunk.	Fair	None		Remove deadwood	2
523		Ash	*Fraxinus sp.*	In a middle planting island in the PE building parking lot	12"	Fair	Fair	None		None	5
524	a	Ash	*Fraxinus sp.*	30' south of the PE complex in a circular planting island	10"	Fair	Fair; poor pruning. Tree has been lion's tailed	None		None	5
524		Ash	*Fraxinus sp.*	In the west-most planting island in the PE building parking lot	12"	Fair	Fair; decay column on southwest facing portion of trunk probably due to sun scald.	None		None	5
525		Bottlebrush	*Callistemon sp.*	West side of the PE Building parking lot; near the southwest corner of the parking lot	cluster of three; 8" each	Good	Good	None		None	5
526		Chinese Elm	*Ulmus parvifolia*	West side of the PE parking lot; in planting island between the entrance and the lot; north of T-525	Dual stem; 12" each	Fair; tree is crowded on both sides.	Fair	None		None	5
527		Olive	*Olea europea*	12' north of T-526; in the planting island between the entrance and the parking lot; immediately east of the parking lot entrance sign	Multiple 6" stems	Good	Fair	None		None	5
528		Ginko	*Ginko biloba*	North end of the planting island between the exit of the parking lot and the parking lot itself	cluster of three; 10" each	Good; topped in the past.	Fair	None		None	5
529		Coast Live Oak	*Quercus agrifolia*	Northwest corner of the tennis courts; between the planters with the Catalina Ironwood and the tennis courts	Co-dominant stems; 10" each	Fair to good.	Fair; co-dominant stems arising at	None.		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 PHYSICAL EDUCATION BUILDING NORTHEAST (TREES 522-529)

1" = 20', CONTOUR INTERVAL = 1'

KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10' 20'

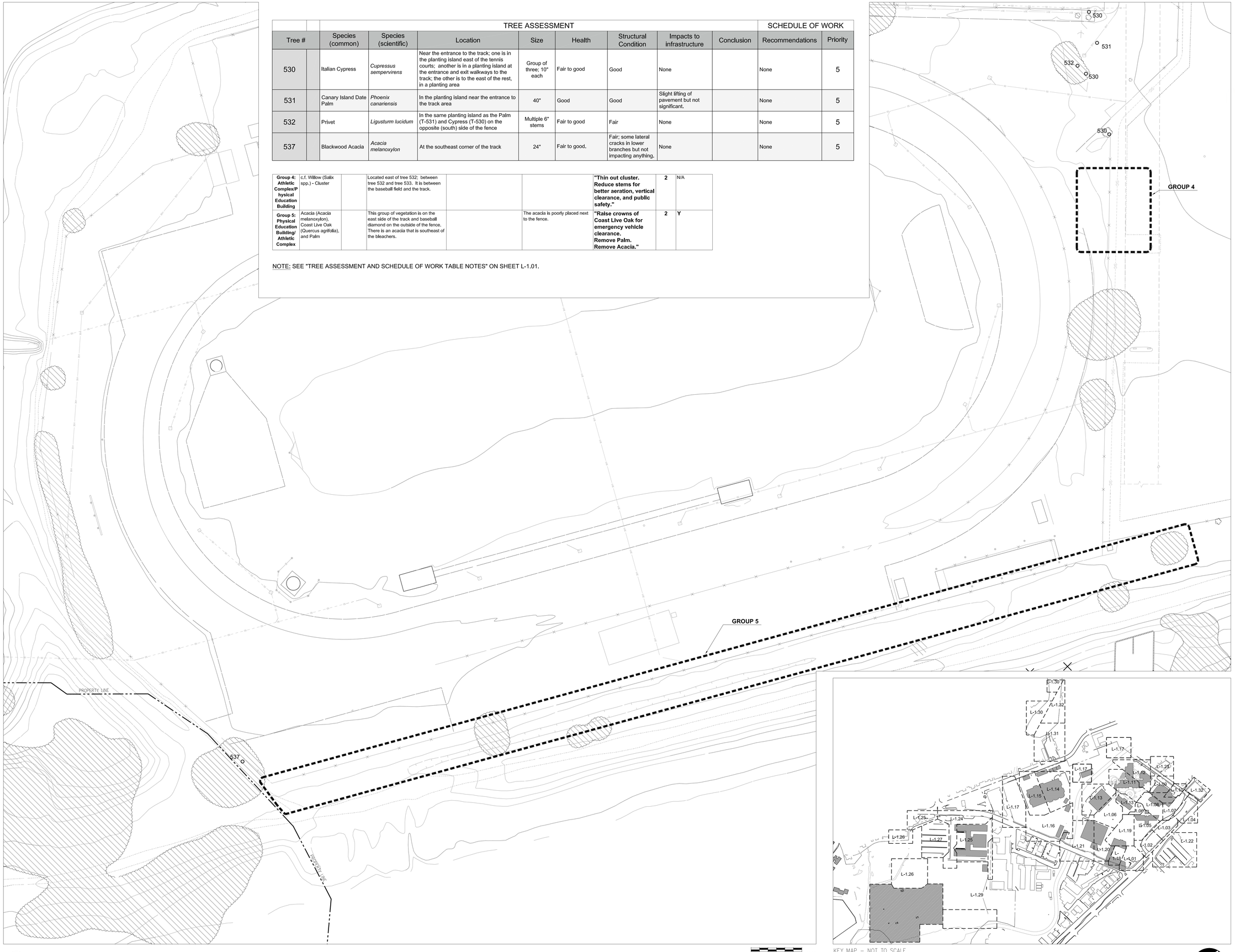
PARKING LOT #12
(TREES 521-529)

L-1.27

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
530		Italian Cypress	*Cupressus sempervirens*	Near the entrance to the track; one is in the planting island east of the tennis courts; another is in a planting island at the entrance and exit walkways to the track; the other is to the east of the rest, in a planting area	Group of three; 10" each	Fair to good	Good	None		None	5
531		Canary Island Date Palm	*Phoenix canariensis*	In the planting island near the entrance to the track area	40"	Good	Good	Slight lifting of pavement but not significant.		None	5
532		Privet	*Ligusturm lucidum*	In the same planting island as the Palm (T-531) and Cypress (T-530) on the opposite (south) side of the fence	Multiple 6" stems	Fair to good	Fair	None		None	5
537		Blackwood Acacia	*Acacia melanoxylon*	At the southeast corner of the track	24"	Fair to good.	Fair; some lateral cracks in lower branches but not impacting anything.	None		None	5

Group 4: Athletic Complex/Physical Education Building	c.f. Willow (Salix spp.) - Cluster		Located east of tree 532; between tree 532 and tree 533. It is between the baseballl field and the track.			**"Thin out cluster. Reduce stems for better aeration, vertical clearance, and public safety."**	**2**	N/A
Group 5: Physical Education Building/ Athletic Complex	Acacia (Acacia melanoxylon), Coast Live Oak (Quercus agrifolia), and Palm		This group of vegetation is on the east side of the track and baseball diamond on the outside of the fence. There is an acacia that is southeast of the bleachers.		The acacia is poorly placed next to the fence.	**"Raise crowns of Coast Live Oak for emergency vehicle clearance. Remove Palm. Remove Acacia."**	**2**	**Y**

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



KEY MAP – NOT TO SCALE

0 10 20 30 FEET

1 RUNNING TRACK(TREES 530-537)
1" = 20', CONTOUR INTERVAL = 1'

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TREE REMOVAL

Kentfield Campus

District Project #
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scale: 1" = 20' 0 10 20

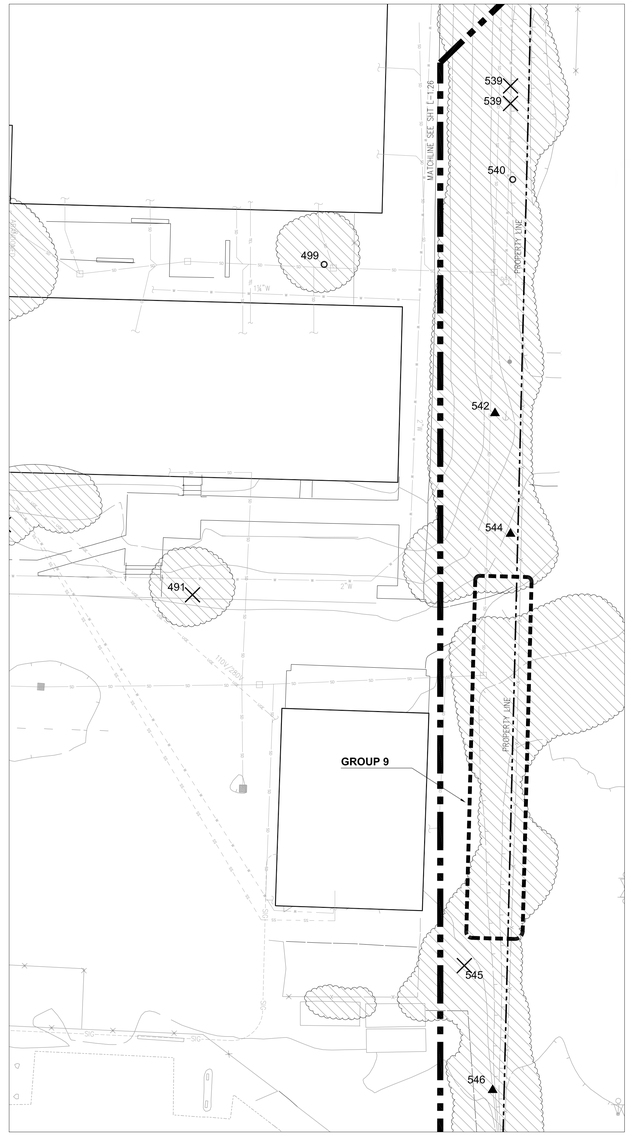
RUNNING TRACK
TREES (530-537)

L-1.28

539		Coast Live Oak	*Quercus agrifolia*	Near fence between the middle school and Athletic Complex property	10"	Fair	Fair	Growing very close to fence and directly under power lines.		Remove	2
540		Coast Live Oak	*Quercus agrifolia*	Approximately 7' to the east of T-539; adjacent (within 8") to the fence between the middle school and the Athletic Complex	10"	Poor; crown die back, Irrigation					
542	a	Coast Live Oak	*Quercus Agricola*		12"	Fair to good	Good	Growing within 1" of fence and directly under power lines.		Prune to maintain height underneath power lines.	4
542	a	Silver Wattle	*Acacia dealbata*	25' east of T-542	Clump of acacia growing in between fences of COM property and adjacent school					Remove	2
542		Coast Live Oak	*Quercus agrifolia*	25' west of T-541; immediately adjacent to the chain link fence	10"	Fair	Fair	Growing directly into fence and directly underneath power pole.	Tree is horribly placed and is sure to ruin the fence and grow up in the power lines.	Remove or trim to maintain height below power lines.	2
544		Blackwood Acacia	*Acacia melanoxylon*	Along east end of the fence before the driveway between the middle school and the PE Complex.	Clump of trees(approx. 15)	Fair	Fair	None	Empty beer bottles demonstrate evidence of undesirable activity in the area.	Remove understory shrubs and stems < 3" in diameter for visual clearance.	1
545		Eucalyptus	*Eucalyptus spp.*	Located within Group #9	18"	Fair; multiple wounds closing over at 3' on both sides of trunk.	Fair	In direct conflict with fence. Branches hang over fence towards adjacent school playground		Remove	2
546		Coast Live Oak	*Quercus agrifolia*	Located near the fence between the middle school and the Athletic Complex on the west side of the baseball diamond.	20"	Good	Good	Growing onto fence.		Trim off of fence	4

Group 6: Physical Education Building/Athletic Complex	Numerous Red Iron Bark Eucalyptus, Acacia, and other shrubs and vines.		Located at the northeast corner of the baseball diamond on the outside of the fence.	The Red Iron Bark Eucalyptus trees are all in fair to poor condition. These trees are prone to breakage and it looks as though several of them have been headed back severely in the past.		**Remove Red Iron Bark Eucalyptus.**	N/A	**Y**
Group9: Physical Education Building/Athletic Complex	A Cluster of mainly Blackwood Acacia (Acacia melanoxylon), some Eucalyptus (Eucalyptus spp.), a plum (Prunus spp.), and cotoneaster shrubs (Cotoneaster spp.)		This is the area of vegetation between the middle school basketball courts and the area behind the sheds in Parking Lot 11.			**Thin for public visibility and fire safety.**	**3**	N/A

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 PHYSICAL EDUCATION BUILDING NORTH (TREES 539-546)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

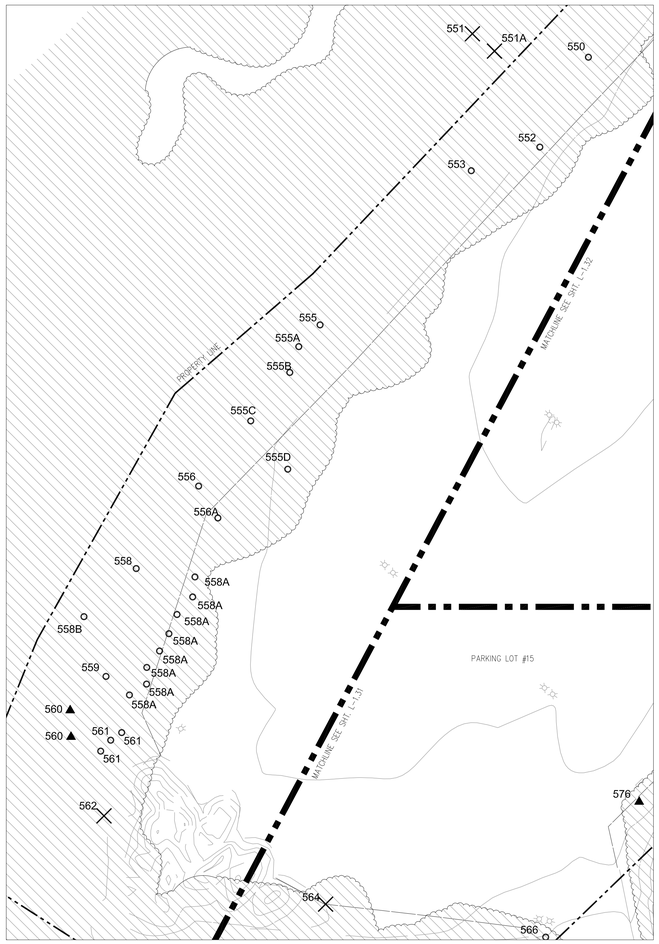
AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 0 10 20

PHYSICAL ED. BLDG. N & BALL FIELD NE (538-546)

L-1.29



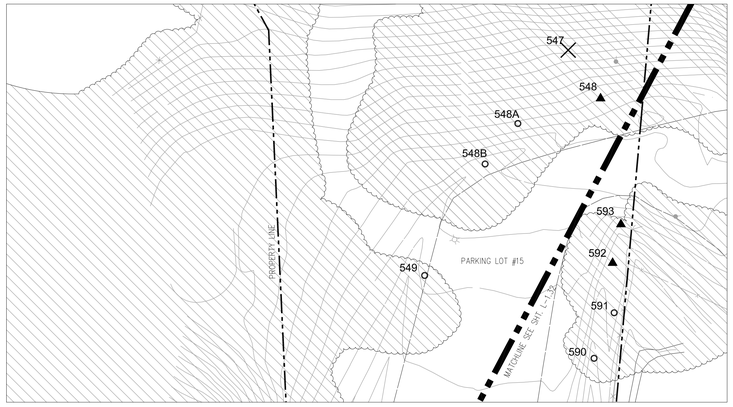
2 PARKING LOT #15 SOUTH (TREES 550-563)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
						TREE ASSESSMENT				SCHEDULE OF WORK	
550		California Buckeye	*Aesculus californica*	Near the curve in the parking lot; on the south-southwest side of the parking area; approximately 15' up-slope from the asphalt	Multi-stem	Good; mature.	Fair	None		None	5
552		California Buckeye	*Aesculus californica*	Approximately 10-15' southeast of T-550; up-slope and 20' from the parking lot	Good; mature. Pocket of decay at root crown.	Fair	None			None	5
553		California Bay Laurel	*Umbellularia californica*	Approximately 10' south-southeast of T-552	12"	Fair; leaning towards parking lot.	Good	None		None	5
555	a	California Bay Laurel	*Umbellularia californica*	Southeast of T-555	6"	Good	Good	None		None	5
555	b	California Bay Laurel	*Umbellularia californica*	Southeast of T-555	6"	Good	Good	None		None	5
555	c	California Bay Laurel	*Umbellularia californica*	Approximately 20' southeast of T-555; approx. 20' up-slope from the parking lot asphalt	6"	Good	Good	None		None	5
555	d	California Bay Laurel	*Umbellularia californica*	Approximately 15-20' up-slope and east-southeast of T-555C	6"	Good	Good	None		None	5
555		California Bay Laurel	*Umbellularia californica*	Northeast of T-554	Multi-stem	Fair; multiple stems arising from parent trunk.	Fair	None		None	5
556	a	California Bay Laurel	*Umbellularia californica*	Directly down-slope of T-556	6"	Good	Fair; heavy lean toward parking lot			None	5
556		California Bay Laurel	*Umbellularia californica*		6"	Good	Good	None		None	5
558	a	California Bay Laurel	*Umbellularia californica*	Below T-558	6"	Good	Fair; heavy lean toward parking lot			None	5
558		California Bay Laurel	*Umbellularia californica*		24"	Fair	Fair	None		None	5
559		California Bay Laurel	*Umbellularia californica*		Multiple 6" stems arising from a decayed mother stump.	Good	Fair	None		None	5
560		California Bay Laurel	*Umbellularia californica*	Located approximately 20-25' southeast of T-559	Dual stem; 24" and 30"	Fair; mature. Large decay columns present.	Fair. Lean toward parking lot.	None		Uphill of the two stems. Remove the north northwest extending scaffold limb.	1
561		California Bay Laurel	*Umbellularia californica*	Southeast corner of the parking lot; on the south side; approaching the southeast corner; 10-15' above the asphalt	Multiple stems arising from mother stump	Fair; have been headed back since last survey to clear	Fair	None		None	5
562		Eucalyptus	*Eucalyptus sp.*	Near southeast corner of Parking Lot #15; it is on the east side of the parking area	54"	Poor; decay fungi present. Fruiting bodies present and mycelia fan present at base and in main stem. Evidence of defoliating insects.	Good; has been pruned away from parking lot with lean toward the creek.	None		Immediate Removal	1

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



1 PARKING LOT #15 WEST (TREES 547-549)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
						TREE ASSESSMENT				SCHEDULE OF WORK	
547		Coast Live Oak	*Quercus agrifolia*	At the north end of Parking Lot #15; on the west side natural area; approximately 35' up-slope from the pavement	12"	Fair; significant rot at root crown. Leaning towards guy wires. Wounds from climbing spikes present on main stem from prior line clearance.	Poor	Potential impact to power pole if tree were to fail.		Remove.	2
548	a	Coast Live Oak	*Quercus agrifolia*	Approximately 15-20' south of T-547; up-slope from the asphalt parking area by approximately 18-20'	18"	Fair; small LCR. Leaning on adjacent valley oak.	Poor; lacking lateral branches.	None		None	5
548	a	California Bay	*Umbellularia californica*	Approximately 8-10' down-slope and east of T-547; a power pole is approximately 4' to the northwest of the tree base	6"	Good	Good	None		None	5
548	b	Valley Oak	*Quercus lobata*	Approximately 8-10' up-slope from the asphalt parking lot; at the north end of the parking lot on the west side; approximately 20' south and east of T-548A	18"	Good	Good	None		None	5
548		Willow	*Salix sp.*	Approximately 8-10' down-slope and east of T-547; a power pole is approximately 4' to the northwest of the tree base	6"	Fair to good; there is a northwest facing branch conflicting with guy wires.	Good.	None		Prune limb to eliminate conflict with guy wires.	4
549		Valley Oak	*Quercus lobata*	At the north end of Parking Lot #15; approximately 4.5' from the asphalt parking area; approx. 15-20' southwest of the north-most light pole in the parking lot	12"	Fair; copious amounts of galls present and tree is located in small drainage area.	Good	None		None	5

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20' 0 10' 20'

PARKING LOT #15 WEST & SOUTH (TREES 547-563)

L-1.30

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
564		Red Maple	*Acer rubrum*	Near the southeast corner of this parking area	12"	Poor to fair; mature to over mature.	Poor; decay in main leader.			Remove	2
565		Valley Oak	*Quercus kellogii*	East/southeast of T-564	18"	Fair; mature. Being shaded out by neighboring valley oak.	Fair; moderate lean toward parking lot.			None	5
566		C.F. Valley Oak	*Quercus lobata*	At the intersection between the west and east portions of Parking Lot #15; at the southwest corner of the access road/bridge between the two lots; there is a culvert in this area	30"	Good; mature.	Fair; heavy lean toward creek.	None		None	5
567		Privet	*Ligustrum sp.*	Along the wood fence between the fence and the parking area asphalt; along the east portion of Parking Lot #15	18"	Good	Fair; v-crotch structure in main crotch.	Growing directly into neighboring fence. Lifting concrete on walkway by adjacent apt. complex.		Clear root crown of vines.	4
568		Evergreen Pear	*Pyrus kawakamii*	East of T-567	Dual stem; 6" each	Fair	Poor; v-crotch with included bark at tree base.	Encroaching parking lot light		Remove	2
569		Privet	*Ligustrum sp.*	At the southeast corner of the east portion of Parking Lot #15	3 stems at 12'	Fair; minor decay present at base.	Poor; three stems arising at ground level with included bark where they meet.	None		None	5
570		Catalina Cherry		Within the center planting isle between the entrance/exit of east portion Parking Lot #15; off of Kent Avenue	18"	Good; past branch failure on north side of tree, most likely from a vehicle.	Fair to good	None		Prune for vehicle clearance.	3
571	a	Privet, Hawthorn, Plum	*Ligustrum, Crataegus, Prunus*	Along the north side of the east portion of Parking Lot #15, west from T-571	Multi-stem	Good	Good	None		None	5
571		Tree Of Heaven	*Ailanthus altissima*	Northeast corner of the east portion of Parking Lot #15 along Kent Ave.; between the sidewalk on Kent Ave. and the beginning of the asphalt parking spaces	Group of about 15	Poor; advanced decay on all trees. Very active termite presence.	Poor	None	Invasive exotic species. There is a pear tree growing in the middle of this cluster of trees that could take over after removal of Tree of Heaven.	Remove all tree of heaven	1
571	a			*Dead tree located in between T-571 and 572*						Remove	1
572		Ash	*Fraxinus sp.*	Southwest of the light post	Dual stem; 6" each	Fair	Poor to fair; large decay column along stem over parking lot.	None		Reduce to condense crown. Consider removal due to poor structure and decay.	1
574		California Bay Laurel	*Umbellularia californica*	South of the fence line between the parking area and the adjacent apartment complex	30"	Fair; mature. Was topped in past. Copious amounts of vines growing up tree.	Fair	Lifting pavement of pedestrian walkway.		Remove deadwood. Reduce canopy 15% to mitigate long reaching stems.	2
575		California Bay Laurel	*Umbellularia californica*	Along the north side of the entrance between the east and west portions of Parking Lot #15	Multi-stem; three 18" stems.	Fair; mature. Some dieback in crown. Decay at base which is typical in this species.	Fair; stems with moderate lean over parking lot.	Lifting pavement of pedestrian walkway.		Remove deadwood. Reduce canopy 15% to mitigate long reaching stems.	2
576		Coast Live Oak	*Quercus agrifolia*	At the intersection of the east and west parking lots; on the northeast corner of the west portion of Parking Lot #15	18"	Fair to poor; sparse crown; foliar dieback.	Good	None		Monitor decline.	3
577		California Bay Laurel	*Umbellularia californica*	Approximately 20' west of T-576; on north side of the west portion of Parking Lot #15; approx. 10' north of the asphalt	12"	Fair	Fair	None.		Remove vines.	4
578		Coast Live Oak	*Quercus agrifolia*	Southwest of T-577; approximately 7-8' north of the asphalt parking area	6"	Fair; vines are affecting the health of this tree.	Fair; leans over parking lot.	None		Remove vines	4

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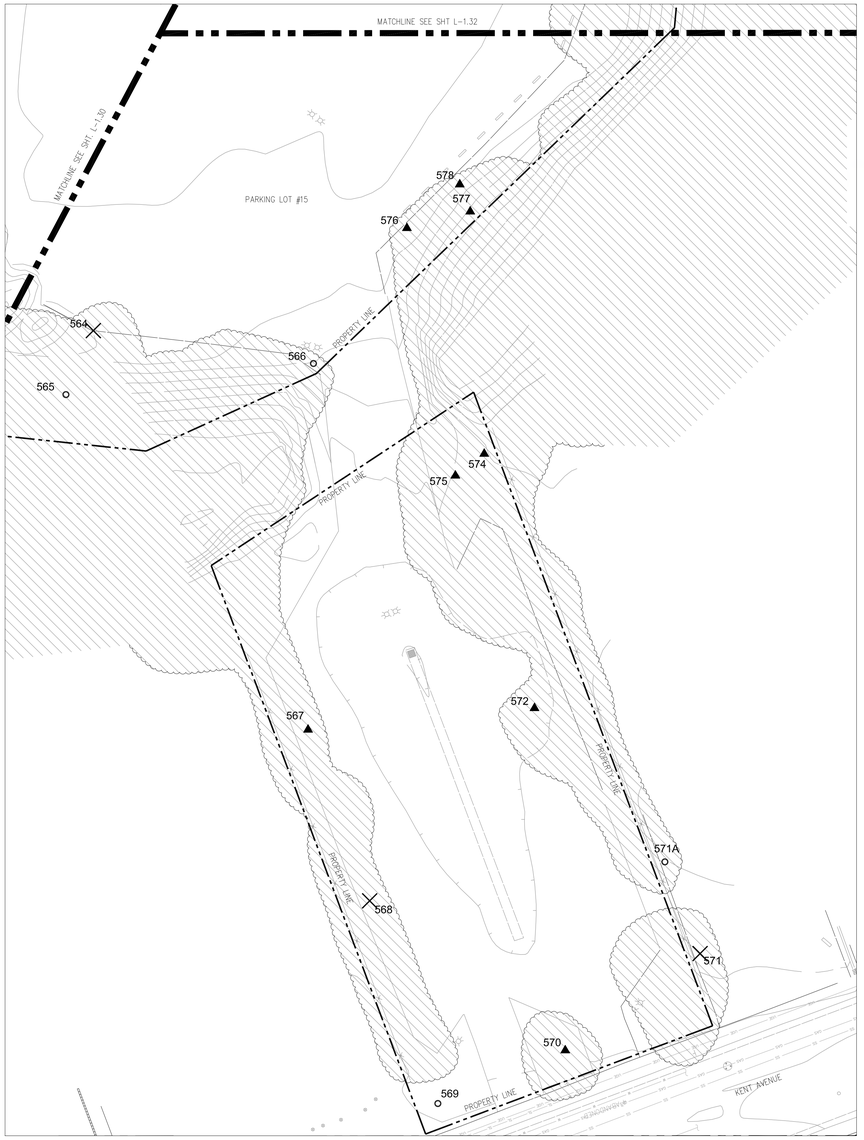

1 PARKING LOT #15 NORTHEAST (TREES 564-678)

1" = 20', CONTOUR INTERVAL = 1'

0 10 20 30 FEET

KEY MAP – NOT TO SCALE

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TREE REMOVAL

Kentfield Campus

District Project #

AE Project # date: 07/10/14

drawn by: TS, IC, DZ checked by: NL

scale: 1" = 20' 1 . 1' . 1" 1'

PARKING LOT #15 NE
TREES (564-579)

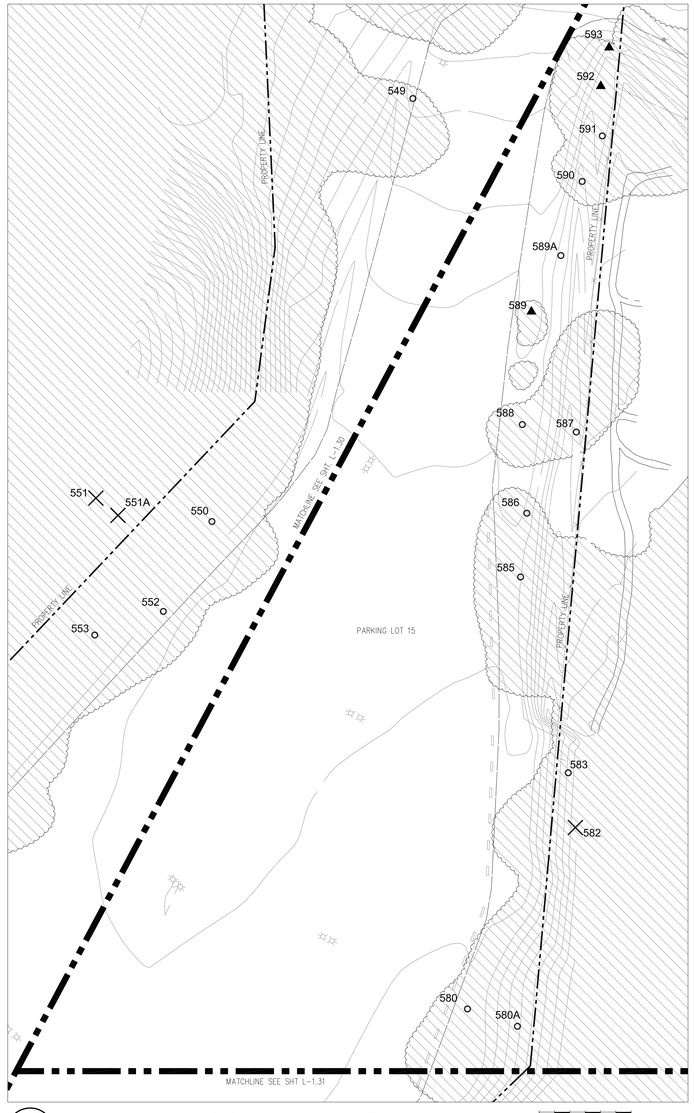
L-1.31

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
580		Privet	*Ligustrum sp.*		Multi-stem	Good	Good	None		None	5
582		Coast Live Oak	*Quercus agrifolia*	Approximately 15' west of T-580	6"	Poor; advanced decay at root crown.	Fair to poor. Heavy lean toward parking lot.	None		Remove.	1
583		Coast Live Oak	*Quercus agrifolia*	Approximately 10-15' northwest of T-582	12"	Good	Fair; slight lean.	None		None	5
585		California Bay Laurel	*Umbellularia californica*	Northwest of T-584	These trees are 20' off parking lot and not significant to note.					None	
586		California Bay Laurel	*Umbellularia californica*	West of T-585	These trees are 20' off parking lot and not significant to note.					None	
587		California Bay Laurel	*Umbellularia californica*	Approximately 15-20' northwest of T-585	These trees are 20' off parking lot and not significant to note.					None	
588		California Bay Laurel	*Umbellularia californica*	Approximately 10' south of T-587	These trees are 20' off parking lot and not significant to note.					None	
589		Coast Redwood	*Sequoia sempervirens*	West of a cleared opening (area without trees); approximately 4' north of the parking lot and consists of one major stem and a subordinate limb to the east	Dual stem; 18" and 6"	Good; remarkably healthy foliage. Wildlife has been impacting bark but not significant.	Fair to Good; dual stem.	None		Raise canopy to 10' for visual clearance.	2
589		California Bay Laurel	*Umbellularia californica*	Southwest of T-587	These trees are 20' off parking lot and not significant to note.						
590		Italian Stone Pine	*Pinus pinea*	West/northwest of T-589	12"	Fair; tree experienced whole root ball failure in past but continues to display good vigor.	Fair	None		None.	5
591		Douglas Fir	*Pseudotsuga menziesii*	Approximately 30-35' west of T-590	12"	Good	Good	None		None	5
592		Deodar Cedar	*Cedrus deodorant*	Approximately 35-40' to the west of T-591; approx. 5' from the asphalt parking area	12"	Good	Good	None		Trim back branches from parking spot and raise canopy 5' for visual clearance.	4
593		Willow	*Salix sp.*	On the north side of the northwest exit from Parking Lot #15; on the north side of the drainage and approximately 35' northeast of the stop sign at parking lot exit	12"	Good	Goof	None	Pine and oak saplings becoming established underneath this willow.	Raise canopy for vehicle clearance. Remove pine and oak saplings.	2

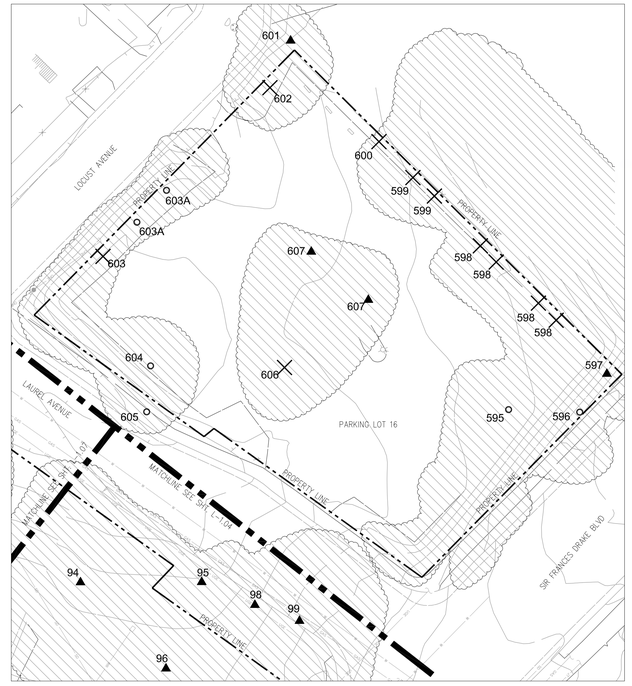
NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.

		TREE ASSESSMENT								SCHEDULE OF WORK	
Tree #		Species (common)	Species (scientific)	Location	Size	Health	Structural Condition	Impacts to infrastructure	Conclusion	Recommendations	Priority
595		Incense Cedar	*Calocedrus decurrens*	In a dirt planting area between two parking spaces near the northwest corner of Parking Lot #16	24"	Fair; sparse crown. Limited root zone.	Good	None		None	5
596		Coast Live Oak	*Quercus agrifolia*	Northwest of T-595; approximately 3.5-4' down-slope from the sidewalk along Sir Francis Drake Blvd	18"	Good	Good	None		None	
597		Incense Cedar	*Calocedrus decurrens*	20' Northwest of T-596 directly adjacent to SFD	24"	Good; mature.	Fair to good; corrected south-southeast lean.	Located 1' from electrical boxes but no apparent damage.	Black acacia sprouts growing at base.	Remove all black acacia sprouts.	1
598		Blackwood Acacia	*Acacia melanoxylon*	Along the west side of Parking Lot #16; there are four trees between the asphalt and the wood fence that separates the college and a private property	cluster of four trees	Fair; seems that tree was removed and has sprouted back.	Fair	None	Sprout growth is encroaching adjacent parking space.	Remove and stump grind.	1
599		Tree Of Heaven	*Ailanthus altissima*	South/southwest of T-598; immediately adjacent to the wood fence that separates the college property from private property; the north-most stem's base grows partially through the fence; the south-most stem's base is on the college side of the fence	Removed but re-sprouting	Good	Poor			Ask neighbor to stay on top of removing the sprouts as the species is highly undesirable.	2
600		Plum	*Prunus sp.*	5' southeast of T-601	Multi-stem: 6" each	Poor; being shaded out by redwood. Canopy enveloped by ivy.	Poor, heavy lean.	None		Remove	2
601		Coast Redwood	*Sequoia sempervirens*	At the northwest corner of Parking Lot #16; between Locust Rd. and the southwest corner of the parking lot	24"	Good	Good	Lifting pavement		Raise canopy to 10' for vehicle clearance. Remove ivy and sprout growth.	3
602		Purple Leaf Plum	*Prunus sp.*	On east side of the southwest exit for Parking Lot #16	Multi-stem; 5 6" stem.	Very poor; over mature. Tree is in decline.	Poor.	None		Remove	2
603	A	California Pepper	*Shinus molle*	10' southeast of T-603	12"	Fair; sapsucker damage	Good	None		None	5
603		California Pepper	*Schinus molle*	Along the south side of Parking Lot #16	12"	Fair; sapsucker damage	Good	Significant damage to parking lot from roots lifting pavement.	Competing with adjacent oak tree	Remove to clear space for adjacent oak tree to take over. Oak tree shows no signs of damaging Infrastructure.	2
604		California Pepper	*Schinus molle*	Near the southeast corner of Parking Lot #16; on the east side of the parking lot; between an asphalt parking space and a walkway that leads to a stairwell that goes down to the sidewalk along Laurel Ave.	12"	Fair; many vines growing into canopy.	Good	None		None	5
605		Plum	*Prunus sp.*	Northeast of T-604; a concrete retaining wall is immediately east of the tree's base; it is approximately 3-4' east of the asphalt parking area	Multi-stem: 6" each	Fair to good.	Good	None		None	5
606		Black Locust	*Robinia pseudo-acacia*	In the center planting isle of Parking Lot #16	Dual stem; 18" and 12"	Poor to fair; mature to over mature. Evidence of branch failure on Southwest side of tree.	Very poor; tight v crotch with included bark extending to base of root crown.	Lifting parent.	If tree fails it has potential to impact vehicles and pedestrians.	Remove tree.	2
607		Incense Cedar	*Calocedrus decurrens*	In the central planting isle of Parking Lot #16	18"	Fair	Good	None		Raise canopy for vehicle clearance.	4

NOTE: SEE "TREE ASSESSMENT AND SCHEDULE OF WORK TABLE NOTES" ON SHEET L-1.01.



2 PARKING LOT #15 NORTHWEST (TREES 580-593)
1" = 20', CONTOUR INTERVAL = 1'
0 10 20 30 FEET



1 PARKING LOT #16 (TREES 595-607)
1" = 20', CONTOUR INTERVAL = 1'
0 10 20 30 FEET

KEY MAP – NOT TO SCALE

COLLEGE OF MARIN
835 College Avenue
Kentfield, CA 94904

JACOBS

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rev. date issue

TREE REMOVAL

Kentfield Campus

District Project #
AE Project # date: 07/10/14
drawn by: TS, IC, DZ checked by: NL
scale: 1" = 20'

PARKING LOT #15 NW & PKG LOT #16 (580-607)

L-1.32