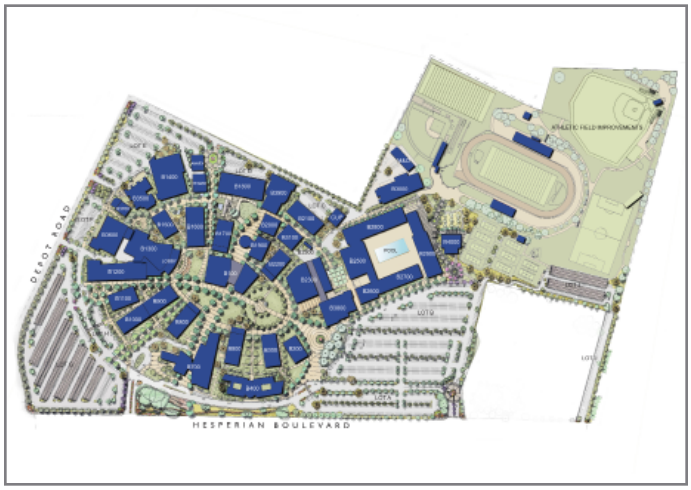

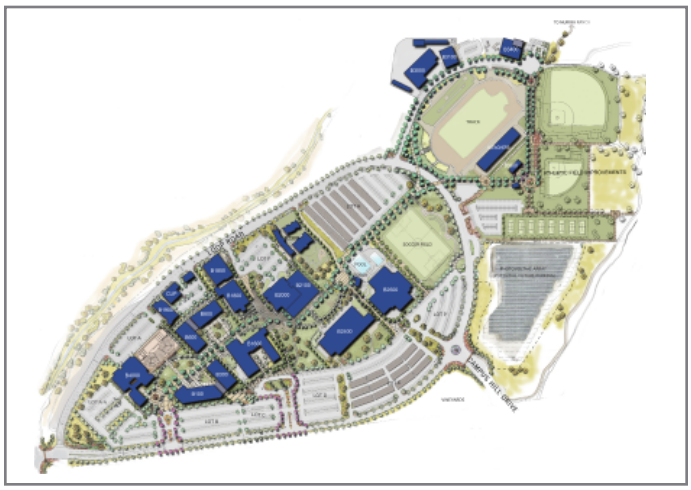

2012 Facilities Master Plan

Chabot-Las Positas Community College District

APPENDIX

July 17, 2012

Steinberg Architects

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1 | 2012 Facilities Master Plan Code Issues

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CHABOT-LAS POSITAS COMMUNITY COLLEGE DISTRICT – DISTRICT WIDE FACILITIES MASTER PLAN UPDATE
MASTER PLAN CODE ISSUES

Prepared For:

Steinberg Architects
60 Pierce Avenue
San José, CA 95110

February 27, 2012
Revised March 19, 2012
Revised May 3, 2012

RJA Project #: S56156
Steinberg Project # 10-130

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INTRODUCTION

The following is a summary of general building code items that should be considered during a Master Plan for a higher level education campus. Requirements are based upon the 2010 California Building Code (CBC) and the California Fire Code (CFC).

I. SITE ISSUES

A. Fire Department Vehicle Access

1. Code Reference: CFC 503

2. General Requirements: Roads capable of supporting fire apparatus are required in order that from any location a fire department vehicle may be parked, and that the ground level exterior wall is within 150 feet of the vehicle. This is to be measured by an approved route.

3. Specific Requirements:

   a) Multiple routes into a campus are usually required.

   b) Width: 20 feet clear.

   c) Height: 13 feet, 6 inches clear.

   d) Dead-end: 150 feet (without barrier head or turnaround).

   e) Turning radius, apparatus weights and other requirements are generally local requirements. Some jurisdictions have other local requirements.

4. Alternate Protection: The fire code allows the fire code official to modify the fire department vehicle access roads when buildings are fully sprinklered. Additional protection, such as standpipe outlets, is often provided.

5. Assembly occupancies with over 300 people are required to have their main exit to be on a road or have 20-foot clear access from the main exit to a road (CBC 1028.1).

B. Fire Flow

1. Code Reference: CFC 507, Appendix B.

2. General Requirement: An adequate water supply is required for manual fire fighting purposes. Higher water demands are required for larger buildings and buildings of unprotected wood construction. A poor water supply could dictate a higher construction type.

3. Specific Requirements:

a) Fire Flows are measured at 20 psi. Converting a water test to 20 psi is usually necessary.

b) Fire walls can be used to consider “separate buildings” for fire flow.

c) For covered buildings, a maximum 75 percent reduction of Table B105.1 flows can be granted for sprinklered buildings. Most jurisdictions allow only 50 percent.

d) Minimum flow permitted is 1,500 gpm.

e) Flows for four sprinklered (50 percent reduction), Type II-B buildings are as follows:

Building Area	**Flow**
<21,800 sq. ft.	1,500 gpm
37,900 sq. ft.	2,000 gpm
58,600 sq. ft.	2,500 gpm
83,700 sq. ft.	3,000 gpm
Unlimited	4,000 gpm

C. Hydrants

1. Code Reference: CFC 507.5, Appendix C

2. General Requirements: Fire hydrants are required along fire department vehicle access roads.

3. Specific Requirements:

   a) All portions of the exterior perimeter wall are to be within 400 feet of a hydrant.

   b) Spacing of hydrants is based upon required fire flow. A higher fire flow requires closer spacing.

   c) Typical hydrant spacing:

Fire Flow	**Spacing**
1,500 gpm	500 feet
2,000 gpm	450 feet
2,500 gpm	450 feet
3,000 gpm	400 feet

D. Accessibility

1. Code Reference: CBC 1127B, 1133 B.7 (and other sections include site items).

2. General Requirements: Access to be provided from public transportation stops, accessibility parking spaces, passenger loading zones, and public streets or sidewalks to each building, with each building having an accessible connecting path.

3. Specific Requirements:

   a) An accessible route is required throughout the campus.

   b) Each parking area to have designated accessible parking spaces based upon the total number of parking spaces.

c) Van parking to be included with accessible spaces.

II. BUILDING ISSUES

A. Occupancy

1. Code Reference: CBC 304, 303, 313.

2. General Requirements:

a) A-1 - Theaters, motion picture and television studios with live audiences.

b) A-2 – Restaurants, taverns and bars.

c) A-3 – Gymnasiums (no spectator seating), lecture halls, and libraries.

d) A-4 – Indoor viewing of sports with spectator seating.

e) B – Office and classrooms with occupant load under 50.

f) E – Daycare (more than 6 children; 2 and over).

g) H – Hazardous materials; possible in labs, lab storage, and maintenance.

h) I-2 – Childcare (more than 6 children; under 2).

i) M – Retail.

j) S – Storage occupancies.

k) U – Car ports, fences more than 6 feet high, and miscellaneous structures.

l) L – Labs (could also be a B or H occupancy).

3. Specific Requirements: None provided.

B. Construction Type

1. Code Reference: CBC Chapter 5, Table 503.

2. General Requirements: Construction Type is determined based upon building occupancy, building area and building height, with increased allowable area for separation between structures and automatic sprinklers.

3. Specific Requirements:

a) For higher educational buildings, Type II-B construction is often used due to economics. This construction is noncombustible with structural steel unprotected. 3-story "B" occupancies and 2-story "A-3" occupancies are permitted. Type III-B is also a common construction type at Chabot College.

b) The following tables provide approximate allowable areas of B and A-3 occupancies, protected by automatic sprinklers. Maximum allowable assumes 30 feet open space is completely around the building with allowable area assuming no open space of 20 feet on all sides.

Type II-B Construction

Occupancy	Height	Sprinklered	Minimum Allowable Area	Maximum Allowable Area
B	1	Yes	92,000	109,250
B	2	Yes	138,000	172,500
B	3	Yes	138,000	172,500
A-3	1	Yes	38,000	45,125
A-3	2	Yes	57,000	71,250

Type III-B Construction

Occupancy	Height	Sprinklered	Minimum Allowable Area	Maximum Allowable Area
B	1	Y	76,000	90,250
B	2	Y	114,000	142,500
B	3	Y	114,000	142,500
A-3	1	Y	38,000	45,125
A-3	2	Y	57,000	71,250

C. Other Approaches: Other approaches to increase building area include the use of fire walls per CBC 706. Also, multiple buildings can be considered one building (to reduce exterior wall or opening requirements), if the area of all buildings is less than the allowable area of the least construction type (see CBC 705.3 Exception).

D. Exterior Walls

1. Code Reference: CBC Table 602, Section 705.

2. General Requirements: Walls are required to be fire rated and openings in exterior walls are limited/protected based upon separation distances. These distances are to a property line, assumed property line for building on the same property or center of a public way.

3. Specific Requirements: Utilizing the Type II-B or Type III-B construction types and occupancies previously established, the following provides guidance on distance of an exterior wall to a “property line”.

Distance to Property Line	**Wall Rating Type II-B Construction**	**Wall Rating Type III-B Construction**	**Percent Unprotected (sprinklered)**
0 to <3 feet	1 hour	1-hour	Not permitted.
3 feet to <5 feet	1 hour	1-hour	15%
5 feet to <10 feet	1 hour	1-hour	25%
10 feet to <15 feet	0	1-hour	45%
15 feet to <20 feet	0	1-hour	75%
20 feet to <30 feet	0	1-hour	100%
30 feet or greater	0	0-hour	100%

4. Multiple buildings can be considered a single building (to reduce exterior wall opening requirements), if the area of all buildings is less than the allowable area of the least construction type (see CBC 705.3 Exception).

E. Exiting

1. Code Reference: CBC Chapter 10.

2. General Requirements: Exit access is required from all areas of a building to an exit. All exits are to lead to an exit discharge. Exit discharge is complete when at a public way or safe dispersal area.

3. Specific Requirements:

   a) Exiting is too detailed to provide specific requirements.

   b) Safe dispersal areas frequently used but not called out in a campus style facility, as access to the public way may be limited. Campus roads sometimes do not meet the definition of a public way (CBC 1002.1).

c) Assembly occupancies are required to have direct access to a public way or a 20-foot road that leads to a public way (see CBC 1028). This could be critical in a campus layout.

F. Atrium

1. Code Reference: CBC 708, 404.

2. General Requirements: CBC 708 requires all openings in a floor slab to be enclosed in a shaft. There are 16 exceptions to this requirement, including atria. Section 404 gives specific requirements for atria. An atrium is defined by an opening between two levels.

3. Specific Requirements:

a) Confirm the design does not meet (or can be changed) to meet another exception to CBC 708 in order that it not be an atrium.

b) Two stories open to each other can be an atrium.

c) Two-level atriums do not require smoke control. Smoke control is required for three or more level atrium.

d) Atria (all) require a maximum interior finish of Class B and travel distance to an exit on upper floors of 200 feet or less.

G. Automatic Sprinklers

1. Code Reference: CBC Section 903

2. General Requirements: Automatic sprinkler protection is generally provided in higher education facilities. Many code trade-off's make automatic sprinklers economical. Required in many A-3 buildings and L occupancies.

3. Specific Requirements: None provided.

4. Sprinkler Omissions:

   a) Existing structures at Chabot College are considered fully sprinklered as exterior canopies (not sprinklered) meet the following section of NFPA 13, 2010 Edition:

"8.15.7 Exterior Roofs, Canopies, Porte-Cocheres, Balconies, Decks, or Similar Projections.

8.15.7.1 Unless the requirements of 8.15.7.2, 8.15.7.3, or 8.15.7.4 are met, sprinklers shall be installed under exterior roofs, canopies, porte-cocheres, balconies, decks, or similar projections exceeding 4 ft (1.2 m) in width.

8.15.7.2 Sprinklers shall be permitted to be omitted where the canopies, roofs, porte-cocheres, balconies, decks, or similar projections are constructed with materials that are non-combustible, limited-combustible, or fire retardant-treated wood as defined in NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials.*

8.15.7.3 Sprinklers shall be permitted to be omitted from below the canopies, roofs, porte-cocheres, balconies, decks, or similar projections of combustible construction, provided the exposed finish material on the roofs, canopies, or porte-cocheres are noncombustible, limited combustible, or fire retardant-treated wood as defined in NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials*, and the roofs, canopies, or porte-cocheres contain only sprinklered concealed spaces or any of the following unsprinklered combustible concealed spaces:

(1) Combustible concealed spaces filled entirely with non-combustible insulation
(2) Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft^3 (4.5 m^3) or less in volume, including space below insulation that is laid directly on top or within the ceiling joists in an otherwise sprinklered attic *[see 11.2.3.1.4(4)(d)]*
(3) Concealed spaces over isolated small roofs, canopies, or porte-cocheres not exceeding 55 ft^2 (5.1m^2) in area

8.15.7.4 Sprinklers shall be permitted to be omitted from exterior exit corridors when the exterior walls of the corridor are at least 50 percent open and when the corridor is entirely of noncombustible construction.

8.15.7.5 Sprinklers shall be installed under roofs, canopies, porte-cocheres, balconies, decks, or similar projections greater than 2 ft (0.6m) wide over areas where combustibles are stored."

H. Fire Alarm

1. Code Reference: CBC Section 907.

2. General Requirements: A manual and automatic fire alarm system is required in all buildings used for education, including "B" higher education occupancies.

3. Specific Requirements: Many campuses have established requirements for specific manufacturer's systems to reduce training and maintenance costs.

I. Emergency Responder Radio Coverage

1. Code Reference: CFC Section 510.

2. General Requirements: All buildings shall have approved radio coverage for emergency responders within the building. This section is new to the 2010 CBC and may be overlooked.

3. Specific Requirements: This can be considered retroactive to existing buildings.

J. Emergency Notification

1. Code Reference: NFPA 72, Chapter 24 establishes specific requirements when it is being provided.

2. General Requirements: Campus communities are required to obtain immediate notification about various threats and emergency conditions in accordance with the Jeanne Clery Act (Federal).

3. Specific Requirements: Confirm campus guidelines for notification procedures in order that master planning does not interfere with existing programs. Incorporate established guidelines into proposed buildings.

K. Accessibility

1. Code Reference: CBC Chapter 11B (no housing).

2. General Requirements: Public buildings are required to be accessible to all people, including those with disabilities.

3. Specific Requirements: Assume all multistory/multilevel buildings have elevators.

Prepared by:

ROLF JENSEN & ASSOCIATES, INC.

5/3/12

Thomas M. Dusza, P.E. Date
Operations Manager

TMD/EB:ts
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2 | 2012 Facilities Master Plan Evaluation of Tier 1 Reports

Structural
Engineering &
Design

REVIEW OF TIER 1 REPORTS

CHABOT COLLEGE
HAYWARD, CALIFORNIA

June 6, 2012

PREPARED FOR:
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1.0 Introduction

1.1 Scope & Intent of Review

As part of the updating of the Facilities Master Plan for Chabot College, assessments of the existing building construction are being made to determine whether unaltered continued use, renovation, or replacement of individual buildings is desired for long-term planning purposes.

A major portion of the campus was first built starting around late 1964, with similar architectural and structural design used in the construction of many of the buildings designed at that time. There have been additional buildings added to the campus since that time. There have also been renovations and seismic upgrades made to a number of the original buildings.

A majority of the original construction at Chabot College has been previously evaluated in accordance with ASCE 31-03, *Seismic Evaluation of Existing Buildings,* with Tier 1 reports completed. For the Facilities Master Plan update, a review of the Tier 1 reports and other available construction documents for specific structures has been made. The structures reviewed include buildings B200, B900, B1000, B1300, B2200, B2300, and the Arcade (Colonnade) structure. At this time, it is assumed that building B100 will not remain in the Master Plan.

The scope for the review of these Tier 1 evaluations consists of the following:

- Review of available structural drawings.
- Review and confirmation of the existing ASCE 31-03 Tier 1 evaluations and related recommendations.
- Review of available documents detailing structural renovations and seismic strengthening previously completed at building B900.

1.2 Seismic Retrofit Work

When modernization work is carried out on existing California community college buildings, a seismic evaluation and retrofit of the existing structure may be either voluntary or mandatory. A mandatory seismic retrofit can be triggered if a) the total construction cost of modifications, not including the cost of structural rehabilitation, exceeds $25,000 and 50% of the replacement value of the building; or b) the total construction cost of modifications exceeds $25,000 but does not exceed 50% of the replacement value of the building, and the proposed modifications either increase the seismic mass or wind forces by more than 10% in any story, or decrease the design capacity of any existing structural component by more than 5%, unless the component has the capacity to resist the retrofit design forces. A mandatory seismic retrofit requires that the structure be brought into compliance with the current seismic design provisions of the applicable sections of the California Building Code.

If conditions for a mandatory seismic retrofit do not apply, a voluntary seismic retrofit may be undertaken. A voluntary seismic retrofit need not encompass full compliance with current code provisions. A voluntary retrofit allows work to be done based on a structural engineer's professional judgment, and can be limited to specific components, as long as the work does not have a detrimental effect on the structure overall. This can be a cost-effective way of mitigating seismic deficiencies within budgetary constraints. If a mandatory seismic retrofit is not triggered, any deficiencies noted by ASCE 31-03 Tier 1 reports can be considered as the best choices for voluntary seismic retrofit work

2.0 Building Report & Recommendation Reviews

2.1 Building B200

The reviewed documents for Building B200 include the following:

- *Tier 1+ Evaluation, Building 200 Administration Building*, prepared by Forell/Elsesser Engineers, Inc., June 6, 2008.
- *Administration Building #200*, structural drawings S-1 to S-7, and ST-1 to ST-3, by Leong, McClure & Messinger, Wildman & Morris, September 15, 1964.

The building is a one-story precast concrete building measuring approximately 170 feet by 96 feet. The gravity system is comprised of a plywood roof over wood joists, supported primarily by precast concrete walls at the perimeter and wood stud bearing walls at the interior. The lateral force-resisting system consists of a flexible wood roof diaphragm with precast concrete and wood shear walls.

The most significant structural deficiency noted in the Tier 1 report is the inadequate anchorage of the precast concrete walls for the required seismic out-of-plane forces. Without sufficient anchorage and ties to the roof diaphragm, the precast concrete walls could fall away from the building, resulting in a collapse of the roof. The recommendation to strengthen or add new out-of-plane anchors and diaphragm straps around the perimeter of the roof is valid.

The Tier 1 report also notes that the building is structurally connected to the covered walkway, or Arcade, structure. It is anticipated that the Arcade will be removed in the updated Master Plan. See section 2.6 on the Arcade/Colonnade for discussion on this element.

2.2 Buildings B900 & B1000

The reviewed documents for Buildings B900 and B1000 include the following:

- *Tier 1+ Evaluation, Building 900/1000 Humanities/Art*, prepared by Forell/Elsesser Engineers, Inc., October 25, 2007.
- *Seismic Evaluation, Chabot College, Buildings 300, 500, 800 & 900*, prepared by Dasse Design Inc., December 22, 2006.

- *Buildings 900 & 1000*, structural drawings S-1 to S-5, and ST-1 to ST-3, by Leong, McClure & Messinger, Wildman & Morris, September 8, 1964.

- *Chabot College Modernization of Buildings 800, 900 & 1000*, structural drawings S2.4, S2.5, and S3.1 to S3.5, by Dasse Design Inc., Record Drawings revision, June 30, 2009.

Buildings 900 and 1000 are each one-story precast concrete buildings measuring approximately 141 feet long by 73 feet wide, connected by an enclosed 20 foot wide by 73 foot long areaway. The gravity systems are comprised of plywood roofs over wood joists, supported primarily by precast concrete walls and cast-in-place concrete columns and pilasters at the perimeter, and wood stud bearing walls at the interior. The lateral force-resisting systems consist of a continuous flexible wood roof diaphragm over both buildings with precast concrete and wood shear walls.

As in Building 200, the most significant structural deficiency noted in both Tier 1 reports is the inadequate anchorage of the precast concrete walls for the required seismic out-of-plane forces. Without sufficient anchorage and ties to the roof diaphragm, the precast concrete walls could fall away from the buildings, resulting in a collapse of the roof. The recommendation to strengthen or add new out-of-plane anchors and diaphragm straps around the perimeter of the roof is valid.

At Building 900 only, modernization work in 2008-2009 included structural seismic upgrades. The seismic retrofit work included the addition of wall anchorage at the precast concrete walls to the roof diaphragm and strengthening of the existing plywood roof diaphragm. The completion of this work mitigates the deficiencies identified in the Tier 1 evaluation of Building 900.

Building 1000 was not included in the scope of the modernization work done, and thus, still contains the deficiencies noted in the Tier 1 evaluation.

2.3 Building B1300

The reviewed documents for Building B1300 include the following:

- *Tier 1+ Evaluation, Building 1300*, prepared by Forell/Elsesser Engineers, Inc., January 7, 2008.
- *Auditorium - Building 1300*, structural drawings S-1 to S-14, and ST-1 to ST-2, by Leong, McClure & Messinger, Wildman & Morris, December 15, 1965.

The building is primarily a one-story concrete and steel structure made up of three distinctive areas – a backstage preparatory/work area of roughly 64 feet by 114 feet, a stage/connector area measuring about 48 feet by 85 feet, and a fan-shaped auditorium of about 88 feet by 140 feet at the maximum with a partial rear balcony area. Additionally, there is a front lobby area and a small side connector corridor to adjacent Building 1200.

The roof gravity system varies. At the backstage area, it is comprised a concrete joist slab system supported by concrete beams on steel columns and precast

concrete walls. At the stage, the roof is concrete-topped metal deck supported by steel beams and columns. The auditorium roof system consists of precast, pre-stressed concrete T-joists supported on concrete walls. The lobby and side connector are cast-in-place concrete roof systems support by concrete walls. The auditorium balcony is a combination of cast-in-place concrete and concrete-topped metal deck supported by steel beams and concrete walls.

The lateral force-resisting system for the entire structure consists of cast-in-place and precast concrete shear walls.

The Tier 1 report notes that Building 1300 meets the life-safety performance criteria of ASCE 31-03. Some of the Tier 1checklist items that initially appeared to be non-compliant for life-safety performance were found to be adequate when further investigations were made using Tier 2 analyses. Since this building meets the life-safety performance criteria, no retrofit is required if the building is not significantly modified.

The updated Master Plan includes enclosing an area between Building 1300 and the adjacent Building 1200 at the front of the two buildings. Building 1300 and 1200 currently connect through a corridor, but the two buildings are seismically separated. To enclose an additional area between the buildings, it is recommended that any new construction also be separated by a seismic joint from the other structures. Based on the proposed layout for the additional enclosed area, a design utilizing two seismically separate structures would be recommended.

2.4 Building B2300

The reviewed documents for Building B2300 include the following:

- *Tier 1+ Evaluation, Building 2300 Student Center*, prepared by Forell/Elsesser Engineers, Inc., June 24, 2008.
- *Student Center Bldg #2300*, structural drawings S-1 to S-12, and ST-1 to ST-2, by Leong, McClure & Messinger, Wildman & Morris, August 24, 1964.

The building is a two-story precast concrete building measuring 136 feet by 160 feet with a second floor over approximately 65% of the ground floor footprint. The roof gravity system is comprised of a plywood roof over wood joists, supported by steel beams on concrete columns and precast concrete. The floor system is comprised of a concrete slab and joist system with concrete beams supported by the concrete columns and precast walls. The lateral force-resisting system consists of both precast and cast-in-place concrete shear walls.

The most significant structural deficiency noted in the Tier 1 report is the inadequate anchorage of the precast concrete walls at the roof level for the required seismic out-of-plane forces. Without sufficient anchorage and ties to the roof diaphragm, the precast concrete walls could fall away from the building, resulting in a collapse of the roof. The out-of-plane wall ties at the second floor were determined to be adequate for the prescribed lateral forces. The recommendation to strengthen or

add new out-of-plane anchors and diaphragm straps around the perimeter of the roof is valid.

2.5 Arcade/Colonnade Structure

The reviewed documents for the Arcade/Colonnade include the following:

- *Tier 1+ Evaluation, Covered Walkway Structure/Colonnade*, prepared by Forell/Elsesser Engineers, Inc., June 20, 2008.
- *Covered Walk*, structural drawings S-1 to S-9, and ST-1 to ST-2, by Leong, McClure & Messinger, Wildman & Morris, April 3, 1964.

The Arcade, or Colonnade, is a one-story concrete structure providing a covered walkway at the center of the campus. The plan layout is oval-shaped, running between buildings and sharing concrete columns with buildings 100, 200, 500, 800, 1300, 1700, and 2200. The typical width of the colonnade is about 22 feet, with a height of approximately 13 feet. A typical section is comprised of cast-in-place concrete columns and arched longitudinal beams with precast double-T joist-slab elements spanning between, and a topping slab over the precast units. Cast-in-place concrete beams are used to infill between precast panels and tie the columns together across the width of the colonnade. The gravity system consists of the precast double-T elements spanning between the cast-in-place concrete beams, supported by cast-in-place concrete columns. The lateral force-resisting system consists of cast-in-place concrete beam/column moment frames.

The Tier 1 report notes a number of deficiencies in the Arcade structure. The splice length of the longitudinal reinforcing in the columns is inadequate, being too short to fully develop the transfer of forces through the splices, resulting in the columns being inadequate for flexural, or moment, forces. The tie spacing in the columns is excessive and can also contribute to poor flexural behavior. The beam-column joints lack shear reinforcement, which can cause failure in a seismic event. The longitudinal arched beams are stronger than the columns, which would force flexural yielding into the columns.

To address the above issues, strengthening or reinforcing of the columns could be performed to enhance the flexural behavior and capacity as well as the shear capacity. The beam-column joints should also be strengthened.

The Tier 1 report also notes that the arcade/Colonnade is structurally connected to several buildings at shared columns. Since the lateral systems of the Arcade and the various buildings it is attached to are dissimilar, different motions between the structures would be expected in a seismic event, which could lead to partial collapse of the Arcade as well as local damage at the connection between the Arcade and each building it is attached to.

Where the Arcade is supported by an existing building column, the structures should be separated, with additional support framing added for the Arcade.

There are several different approaches being considered for the Arcade/Colonnade in the updated Master Plan. One possibility is that the Arcade will be removed in the updated Master Plan. If all or portions of the Arcade are removed, provisions should be made for careful demolition at locations where the Arcade is attached to existing buildings. The Arcade beams must be detached from the shared columns without compromising the support the column provides for the adjacent building. If removal does not occur, the colonnade columns should be strengthened along the height and at the beam-column joints and the colonnade structure should be separated from the adjoining buildings, per the recommendations of the Tier 1 report. The remaining proposal is to remove one or two of the double-T joist-slab elements near the center of the typical span. While this will reduce the loads to the structural elements of the Arcade, it would not negate the primary deficiencies noted in the Tier 1 report, for which the mitigation measures would still be applicable.

The arcade is also attached to Building B100 at the second level of the building to provide access to the upper floor level. If building B100 is to remain in use for staging while other areas of the campus are being renovated or constructed, the upper level access to building B100 must also remain where it provides exiting and access to the ground level or the upper level of adjacent building B300. When building B100 is removed, the attached arcade/upper level access should also be removed.

2.6 Building B2200

The reviewed documents for Building B2200 include the following:

- *Tier 1+ Evaluation, Building 2200 Health Science/Dental Health*, prepared by Forell/Elsesser Engineers, Inc., June 22, 2008.
- *Building No.2200*, structural drawings S-1 to S-3, and ST-1 to ST-7, by Leong, McClure & Messinger, Wildman & Morris, April 3, 1964.

The building is a two-story precast concrete building measuring 137 feet by 73 feet. The roof gravity system is comprised of a plywood roof over wood joists, supported by interior wood stud walls and perimeter precast concrete walls. The floor system is comprised of a concrete slab and joist system with concrete beams supported by the steel tube columns at the interior and the precast walls. The lateral force-resisting system consists of both precast and cast-in-place concrete shear walls.

The most significant structural deficiency noted in the Tier 1 report is the inadequate anchorage of the precast concrete walls at the roof level for the required seismic out-of-plane forces. Without sufficient anchorage and ties to the roof diaphragm, the precast concrete walls could fall away from the building, resulting in a collapse of the roof. Additionally, the roof diaphragm does not have adequate strength in the transverse (short) direction and should be strengthened. The recommendations to strengthen the roof diaphragm and strengthen or add new out-of-plane anchors and diaphragm straps around the perimeter of the roof are valid.

3.0 Conclusions

For use in developing an updated Facilities Master Plan for Chabot College, a review of the available existing documentation indicates that the existing Tier 1 reports for buildings B200, B900, B1000, B1300, B2200, B2300, and the Arcade (Colonnade) structure contain valid evaluations and retrofit recommendations for each structure.

Based on the Tier 1 reports and any subsequent modifications made for each structure, for the proposed Facilities Master Plan, the following summarizes potential deficiencies noted at each structure being considered. Buildings B200, B1000, B2200, and B2300 contain structural deficiencies which could be addressed in voluntary seismic retrofits. Buildings B900 and B1300 are in compliance with ASCE 31-03 for a Life-Safety standard of performance and do not contain non-compliant structural components or detailing.

The Arcade/Colonnade contains structural deficiencies which could be corrected, including the separation of the Arcade from buildings where it shares structural supports. Complete removal of the Arcade is feasible, provided care in demolition is taken where the Arcade attaches to existing buildings. Where the Arcade provides exiting from building B100, that portion of the arcade structure should remain in place until the removal of building B100.

Structural
Engineering &
Design

ASCE 31 SEISMIC EVALUATION

LAS POSITAS COLLEGE,
LIVERMORE, CALIFORNIA

BUILDING 800

APRIL 16, 2012

PREPARED FOR:
Steinberg Architects
60 Pierce Avenue
San Jose, CA 95110

PREPARED BY:
Crosby Group
2200 Bridge Parkway
Suite 104
Redwood City, CA 94065

1.0 Background

1.1 Scope & Intent of Evaluation

The ASCE 31-03 (formerly FEMA 310) Tier 1 report is intended to allow a rapid evaluation of the seismic capabilities of the structural system of the building. The objective of this evaluation is to determine if the building meets the 'Life Safety' performance level. Using the checklists provided in ASCE 31-03, building system and component deficiencies were identified and are described in this report.

The scope for this Tier 1 evaluation consisted of the following:

- Review available structural drawings
- Perform a site visit to review that the construction is substantially per the available drawings and to determine the general condition of the structure.
- Evaluate the building using the ASCE 31-03 checklists and quick check methodologies.
- Create a report describing the findings of the evaluation.

1.2 Building Description

The building under consideration was designed in 1978 per the 1973 edition of the Uniform Building Code. The single story building has an overall plan area of approximately 28,000 square feet. The gravity load carrying system generally consists of ½" plywood sheathing over 2x8 at 24" spacing joists. The joists are supported by 6¾x36 glued laminated girders, which in turn bear on plywood sheathed shear walls with 2x6 studs at 16" spacing. The lateral load resisting system consists of ½" plywood roof diaphragm and ½" plywood sheathed shear walls. The south side of the building contains precast concrete wall panel arches that form parts of the covered walkway. These wall panels also serve to resist lateral loads. The foundation system consists of concrete spread footings. Per ASCE 31 terminology, this building is classified as a Building Type W2. The building is composed of two seismically separate portions, separated at gridline 11.

1.3 Site Seismicity & Soil Profile

The building site is about 5-10 miles from both the Calaveras Fault and the Greenville Fault and is therefore prone to high seismic activity. There is insufficient data to classify the site profile at the site. A site soil report is also not available; therefore Site Class D is assumed per the recommendations of ASCE 31. All pseudo-static lateral demands required for the Tier 1 evaluation are computed based on this site classification.

In general site "Seismicity" or the potential for strong ground motion is classified into regions of Low, Medium, and High. These regions are based upon mapped site

accelerations S_S and S_1 which are then modified by site coefficients F_a and F_v to produce Design Spectral Accelerations S_{DS} (short period) and S_{D1} (1 second period).

The site accelerations place the subject property in a region of HIGH Seismicity. Design Spectral Accelerations computed for this site are as follows:
S_{DS}= 1.0g S_{D1}= 0.6g

2.0 Building 800

2.1 Site Visit

Crosby Group conducted a site visit on March 5, 2012, in order to validate existing conditions. Another objective of the site visit is to identify potential deficiencies, unusual conditions and details. Additionally, the site visit is meant to compare the existing documents (made available to Crosby Group) with actual field conditions and to identify any discrepancies. The condition of non- structural elements and components as they relate to the ASCE 31-03 was also evaluated.

All the findings following the site visit are presented as part of the ASCE 31-03 attached checklist.

2.2 Building Reference Documents

The available drawings are dated April 4, 1978, and were prepared by Delp W. Johnson, Poole, & Storm, Architects. Other building and site specific documentation was not available for review.

2.3 Building Materials & Strengths for Evaluation

Based on the available drawings the following materials and associated strengths were used in the evaluation.

- Concrete foundations: 28-day strength: f'_c = 2500 psi
- Precast wall panels: 28-day strength: f'_c = 4000 psi
- Reinforcing steel: ASTM A615 Grade 40 (F_y = 40 ksi)
- Wood framing members: Douglas Fir

2.4 Analysis Criteria

Performance Level: Life Safety
Building Type: Wood Framed Commercial and Industrial (W2)
Spectral Accelerations (from USGS):
S_s = 1.5g , S_1 = 0.6g
S_{DS} = 1.0g, S_{D1} = 0.6g

2.5 Tier 1 Evaluation Findings

The ASCE 31-03 Tier 1 screening identified several areas where the building was deemed non-compliant. The completed structural, geological, and nonstructural checklists are attached to this report. The most notable deficiency was the offset in the roof diaphragm along grid E in the sub-building between grid 1 and 11. The offset creates a split-level floor layout and thus violates the diaphragm continuity requirement. Accordingly, this also violates the roof chord continuity requirement.

Narrow shear walls were found in the design of the building (particularly on grid D' between 18 and 28 at the auto lab). See Figure 4 of Appendix A. These shear walls had an aspect ratio (height/base) greater than 2.0. The requirements set forth in ASCE 31-03 note that shear walls may not exceed this ratio as such walls are unlikely to perform as shear-resisting elements. However, in conducting quick-check calculations, it was discovered that the building meets the shear stress requirements without the contribution of these particular walls.

There was minimal evidence of deterioration of wood members in the building, however some instances of splitting were found. An example is included in Figure 5 of Appendix A. Occasional cracking was also found in the concrete floor slabs and is shown in Figure 6 of Appendix A.

Nonstructural components were generally deemed compliant, however storage racks seen in the welding area during the site visit (Figure 3 of Appendix A) appeared to be free-standing and may need to be anchored. According to the ASCE 31-03 checklists for Nonstructural Components, 'tall narrow contents' like the storage racks shall be anchored if the racks are over 4 feet tall and have a height-to-depth ratio greater than 3-to-1.

2.6 Conclusion & Mitigation Strategy

It is understood that the portion of the building which contains the electronics classroom, theater, and computer lab may be removed when the campus undergoes renovations in the next five years. The removal of this portion of the building will resolve the diaphragm continuity non-compliance noted above. However, calculations show that if this portion of the building is removed, the lateral system in the building may need to be strengthened. The existing layout of shear walls could be insufficient to resist the inertial forces from a design-level earthquake.

Removal of these areas may also create cases of reentrant corners for the building layout. Such corners pose risks to the remaining diaphragm and collector elements if not designed and checked appropriately. Further analysis is recommended to ensure that this option is safe and prudent; some remediation work may be required to tie the diaphragm back at the re-entrant corners.

APPENDIX A – SITE PHOTOS

Figure 1 - Building 800, East Elevation

Figure 2 - West Elevation

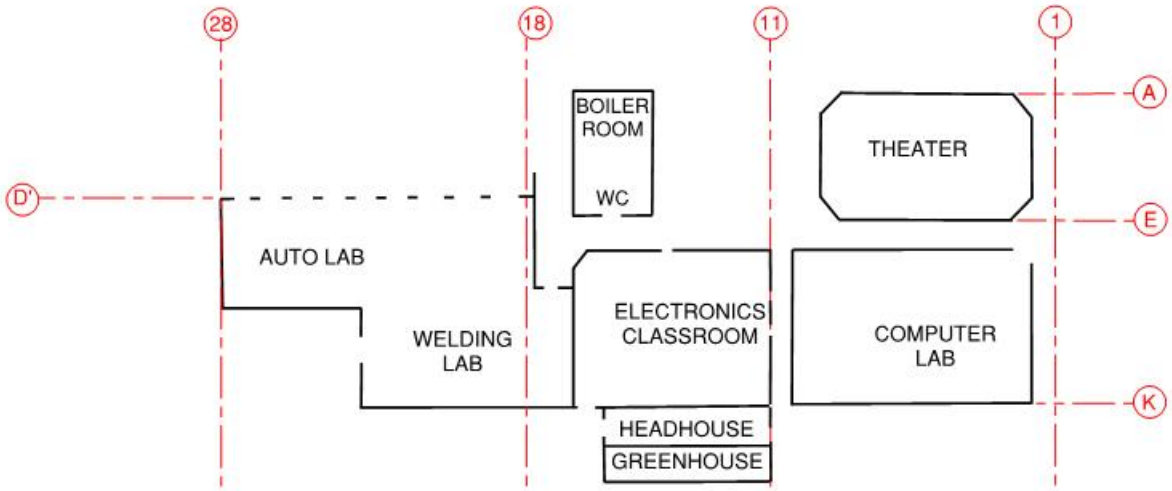
Figure 3 - Storage rack in auto lab

Figure 4 - East Elevation of auto lab

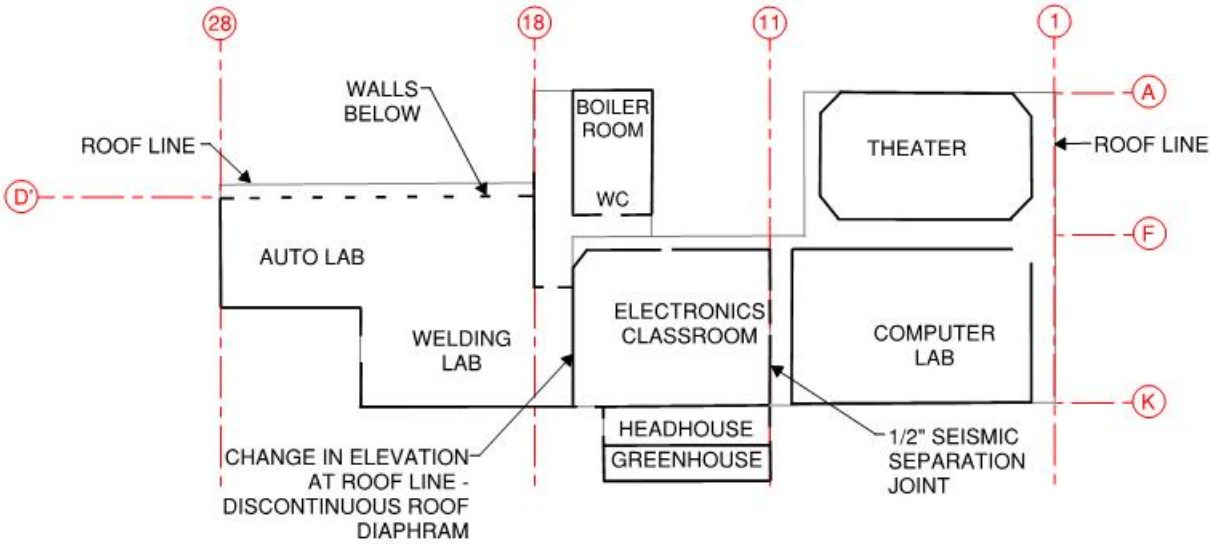
Figure 5 - Splitting in wood joist at covered walkway

Figure 6 - Cracking in concrete slab

APPENDIX B – BUILDING LAYOUT



FLOOR PLAN - BUILDING 800



ROOF PLAN - BUILDING 800

APPENDIX C - CHECKLISTS

ASCE-31 03 Basic Structural Checklist for Building Type W2: Wood Frames, Commercial and Industrial

C NC N/A	Item:	Crosby Group Comment:
	Building System	
C	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.	
N/A	MEZZANINES: Interior Mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure.	
N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70%t of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80%of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety & Immediate Occupancy.	The building is one-story.
N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occpancy, excluding one-story penthouses and mezzanines.	The building is one-story.
C	VERTICAL DISCONTINUITIES: All elements in the lateral-force-resisting system shall be continuous to the foundation.	
N/A	MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses and mezzanines need not be considered.	
C	DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken or loose.	The conditions that were observed did not show signs of deterioration. However, some splitting was found in one of the wooden joists, as shown in Figure 5 of Appendix A. It is recommended that a thorough investigation be completed including

		removal of finishes.
N/A	WOOD STRUCTURAL PANEL SHEAR WALL FASTENERS: There shall be no more than 15 percent of inadequate fastening such as overdriven fasteners, omitted blocking, excessive fastening spacing, or inadequate edge distance. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
	Lateral-Force-Resisting System	
C	REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal 2 for Life Safety and Immediate Occupancy.	
C	SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than the following values for Life Safety and Immediate Occupancy. Structural panel sheathing, 1,000 plf Diagonal sheathing, 700 plf Straight sheathing, 100 plf All other conditions, 100 plf	
N/A	STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings shall not rely on exterior stucco walls as the primary lateral-force-resisting system.	The building is one-story.
N/A	GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard shall not be used as shear walls on buildings over one story in height with the exception of the uppermost level of a multi-story building.	
C	NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 for Life Safety and 1.5-to-1 for Immediate Occupancy shall not be used to resist lateral forces developed in the building in levels of moderate and high seismicity. Narrow wood shear walls with an aspect ratio greater than 2-to-1 for Immediate Occupancy shall not be used to resist lateral forces developed in the building in levels of low seismicity.	Some walls, in both seismically separate buildings, have an aspect ratio greater than 2-to-1. However, they do not need to be modeled as shear walls in order to satisfy the shear stress check. → OK
N/A	WALLS CONNECTED THROUGH FLOORS: Shear walls shall have interconnection between stories to transfer overturning and shear forces through the floor.	The building is one-story.
N/A	HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story due to a sloping site, all shear walls on the downhill slope shall have an aspect ratio less than 1-to-1 for Life Safety and 1-to-2 for Immediate Occupancy.	The building is one-story.
N/A	CRIPPLE WALLS: Cripple walls below first-floor-level shear walls shall be braced to the foundation with wood structural panels.	
NC	OPENINGS: Walls with openings greater than 80 percent of the length shall be braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or	Wall on line D' between grids 28 and 18 contains openings greater than

	shall be supported by adjacent construction through positive ties capable of transferring the lateral forces.	80 percent of the length.
	Connections	
C	WOOD POSTS: There shall be a positive connection of wood posts to the foundation.	
C	WOOD SILLS: All wood sills shall be bolted to the foundation.	
C	GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support.	

<u>Supplemental Structural Checklist</u> for Building Type W2: Wood Frames, Commercial and Industrial

C NC N/A	Item:	Crosby Group Comment:
	Lateral-Force-Resisting System	
N/A	HOLD-DOWN ANCHORS: All shear walls shall have hold-down anchors constructed by acceptable construction practices, attached to the end studs. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
	Diaphragms	
NC	DIAPHRAGM CONTINUITY: The diaphragms shall not be composed of split-level floors and shall not have expansion joints.	Diaphragms between grids 11 and 1 are composed of split-level sheathing due to the vertical offset at grid E.
NC	ROOF CHORD CONTINUITY: All chord elements shall be continuous, regardless of changes in roof elevation.	Chords for the diaphragms between grids 11 and 1 are not continuous at the vertical offset at grid E.
N/A	PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
N/A	DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
C	STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered.	
C	SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems.	
N/A	UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy.	Diaphragms are blocked.

C	OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	
	Connections	
C	WOOD SILL BOLTS: Sill bolts shall be spaced at 6 feet or less for Life Safety and 4 feet or less for Immediate Occupancy, with proper edge and end distance provided for wood and concrete.	

Geologic Site Hazards and Foundations Checklist

C	NC	N/A	Item:	Crosby Group Comment:
			Geologic Site Hazards	
	C		LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 feet under the building for Life Safety and Immediate Occupancy.	
	C		SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure.	
	C		SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated	
			Condition of Foundations	
	C		FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure.	
	C		DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure.	
			Capacity of Foundations	
		N/A	POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy.	
	C		OVERTURNING: The ratio of the horizontal dimension of the lateral force resisting system at the foundation level to the building height (base/height) shall be greater than 0.6Sa.	
		N/A	TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles and piers are not restrained by beams, slabs or soils classified as Class A, B or C.	
		N/A	DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. The statement shall apply to the Immediate Occupancy Performance Level only.	
		N/A	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to Immediate Occupancy Performance Level only.	

Basic Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
	Partitions	
N/A	UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity.	
	Ceiling Systems	
N/A	SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Light Fixtures	
C	EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake.	Lighting observed appears to be anchored. It is recommended that a thorough inventory be completed to ensure full compliance.
	Cladding & Glazing	
N/A	CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements.	
N/A	CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel.	

N/A	INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage.	
N/A	PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-lane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
	Masonry Veneer	
N/A	SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy.	
N/A	TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements.	
	Parapets, Cornices, Ornamentation and Appendages	
N/A	URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
C	CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Masonry Chimneys	
N/A	URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Stairs	
N/A	URM WALLS: Walls around the stair enclosures shall not consist of unbraced hollow clay tile or uninforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted	

	where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors.	
	Building Contents and Furnishing	
NC	TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	It is recommended that the tall narrow storage shelves in the auto lab be evaluated for anchorage requirements. Anchorage is not visible. (See Figure 3 of Appendix A)
	Mechanical and Electrical Equipment	
C	EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake.	Equipment observed appears to comply. It is recommended that a thorough inventory be completed to ensure full compliance.
C	HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports.	Equipment observed appears to be braced, with undamaged supply lines. It is recommended that a thorough inventory be completed to ensure full compliance.
C	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the anchorage or supports of mechanical or electrical equipment.	Equipment supports observed appear to be free of deterioration, damage and corrosion. It is recommended that a thorough inventory be completed to ensure full compliance.
C	ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced.	Equipment observed appears to be braced. It is recommended that a thorough inventory be completed to ensure full compliance.
	Piping	
C	FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996).	Piping observed appears to be anchored and braced. It is recommended that a

		thorough inventory be completed to ensure full compliance.
C	FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings.	Piping observed appears to have flexible couplings. It is recommended that a thorough inventory be completed to ensure full compliance.
	Hazardous Materials Storage and Distribution	
C	TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires or other methods.	Substances observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.

Intermediate Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
C	LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips.	Tiles observed appear to be secured. It is recommended that a thorough inventory be completed to ensure full compliance.
C	INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wire or rigid members attached to the structure above at a spacing equal to or less than 12 feet.	Ceiling tiles observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.
N/A	SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 square feet of area.	
	Light Fixtures	
C	INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures.	Lighting observed appears to be supported. It is recommended that a thorough inventory be completed to ensure full compliance.
	Cladding and Glazing	
N/A	GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked.	
	Parapets, Cornices, Ornamentation, and Appendages	
N/A	CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement.	
C	APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6	

	feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3.	
	Masonry Chimneys	
N/A	ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof.	
	Mechanical and Electrical Equipment	
N/A	VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers.	
	Ducts	
N/A	STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints.	

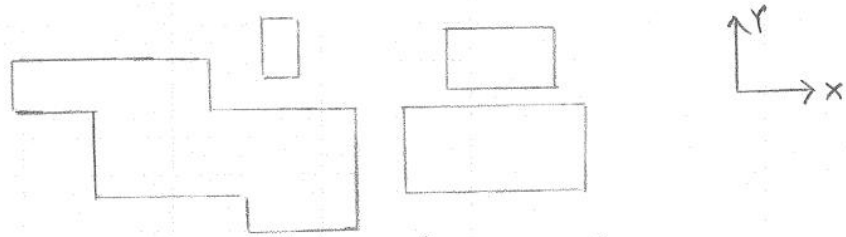
APPENDIX D – CALCULATIONS

Project: CHATSOT LAS POSITAS	Job No:	
Description: TIER 1 BUILDING 800 EVAL	Date: 03/07/12	Sht: 1
	By: MYL Ck:	

SHEAR STRESS CHECK

$$V_{J,AVG} = \frac{1}{m}\left\{\frac{V_J}{A_w}\right\}$$ $m = 4.0$ (ASCE 31-03 TABLE 3-7)

A_w = SUMMATION OF LENGTH OF ALL SHEAR WALLS IN DIRECTION OF LOADING



(BUILDING 2) (BUILDING 1)

KEY PLAN

CALCULATE BASE SHEAR

$V = C S_A W$ (ASCE 31-03 §3.5.2.1)

$C = 1.3$ (ASCE TABLE 3-4)

$S_A =$

$S_S = 1.5$ $F_A = 1.0$

$S_1 = 0.6$ $F_V = 1.5$

$S_{DS} = 2/3 F_A S_S = 1.0$

$S_{D1} = 2/3 F_V S_1 = 0.6$

} REGION OF HIGH SEISMICITY

$T = C_T h_N^{\beta}$

$= (0.6)(18.67')^{0.75}$

$= 0.54$ SEC

} SEE ASCE 31-03 §3.5.2.4 FOR C_T & β

$S_A = \frac{S_{D1}}{T} < S_{DS}$

$= 1.11$

USE $S_A = 1.0$

Project: CHASSOT LAS PESETAS	Job No:		
Description: TEEC \ BUILDINGS 800 EVAL	Date: 03/07/12		Sht: 2
	By: MYL	Ck:	

ASSUMPTIONS

- THE SMALLER BUILDINGS THAT COMPOSE OF "BUILDING 1" & "BUILDING 2" ARE TIED TOGETHER AND THUS ARE TREATED AS SINGLE BUILDINGS
- PLYWOODS ATTACHED TO CONCRETE PRECAST PANELS DO NOT ACT AS SHEAR WALLS
- PRECAST PANELS ARE TREATED AS 4'-0" WIDE SHEAR PANELS AT THE PIERS

Project: CHARBOT LAS POSITAS	Job No:		
Description: TIER 1 BUILDING 800 EVAL	Date: 03/07/12		Sht: 3
	By: MYL	Ck:	

BUILDING 1 DEAD LOADS

FRAMING

	MEMBER	WEIGHT *
GIRDERS	6 3/4" x 36" @ 14'	4.2 PSF
PURLINS	6 3/4" x 18" @ 14'	2.1 PSF
SUB-PURLINS	2" x 8" @ 24"	1.3 PSF

* SOURCE: WESTERN WOODS / DESIGN OF WOOD STRUCTURES

OTHER

INSULATION: 0.5 PSF
CEILING & ROOFING } 3.4 PSF

TOTAL DEAD LOAD = 15 PSF

WALL LOADS

1/2" SHEATHED PLYWOOD WALLS: 1.5 PSF *

LINE LOAD = 1.5 PSF x 15' x 1/2 x 2 = 22.5 PLF

ASSUME 15' HEIGHT
1/2 WEIGHT FOR TRIBS
PLYWOOD ON EACH SIDE

FOR SINGLE LAYER PLYWOOD = 11.25 PLF

9" THICK PRECAST PANELS:
150 PCF CONCRETE
18.5' HEIGHT

150 PCF x 3/4' x 18.5'/2 = 1041 PLF

USE HALF OF WEIGHT FOR TRIBS

Project: CHAPOT LAS VEGAS	Job No:	
Description: TIER 1 BUILDING 800 EVAL	Date: 03/07/12	Sht: 4
	By: MYL Ck:	

EXTERIOR JOIST FRAMING* (BETWEEN GRIDS 1 & 2)

6" x 10" @ 7'-0"

USE 19 PLF*

*NDS TABLE 1B SECTION PROPERTIES

WITH 7'-0" SPACING, 19 PLF/7' = 2.7 PSF

*DO NOT USE THESE CALCS/WEIGHTS

STUDS

2" x 6" @ 16" ⇒ 1.4 PSF

1.4PSF x 18.67' x 1/2 = 13.0 PLF

{ASSUME FOR HEIGHT} CONSERVATIVE

FOR HALF OF WALL FOR TRIB

Project: CHABOT LAS POSITAS	Job No:		
Description: TIER 1 BUILDING 800 EVAL	Date: 03/07/12		Sht: 3
	By: MYL	Ck:	

BUILDING 1 CALCULATE WEIGHT

FLOOR AREA =

(56' × 94') + (112' × 69') + (52' × 124'-5") + 5' × 40') = 14,682 FT²

PLYWOOD SHEAR PANELS (DOUBLE LAYER) = 181' (APPROX)

PLYWOOD SHEAR PANELS (SINGLE LAYER) = 319' (APPROX)

CONC PANELS = 258'

LENGTH OF STUD WALLS = 500'

TOTAL DEAD LOAD:

15 PSF × 14682 FT² + 22.5 PLF × 181' + 11.25 PLF × 319' + 1041 PLF × 258' + 13 PLF × 500'

= 502970 LB

$V = C S_A W$

$= 1.3 \cdot 1.0 \cdot 502970$ LB

$= 653861$ LB

$A_{w,x} = 306$ FT (APPROX)

$A_{w,Y} = 213$ FT (APPROX)

$$V_{S,AVG} = \frac{1}{m}\left\{\frac{V_S}{A_w}\right\}$$

$$= \frac{1}{4}\left\{\frac{653861 \text{ LB}}{213 \text{ FT}}\right\}$$

$= 767.4$ LB/FT < 1000 LB/FT

∴ SHEAR WALLS OK

Project: CHATEAU LAS ROSETAS	Job No:		
Description: TIER 1 BUILDINGS 800 EVAL	Date: 03/07/12		Sht: 6
	By: MYL	Ck:	

BUILDING 2

FLOOR AREA =
(44' × 140') + (30' × 36') + (82' × 68')
+ (42' × 75') + (30 1/3' × 72') = 19870 FT²

LENGTH OF WALLS: 717'

CALCULATE WEIGHT

15 PSF × 19870 FT² + 11.25 PLF × 717 FT
+ 13 PLF × 717 FT = 315,440 LB

$V = C_s W$
$= 1.3 \times 1.0 \times 315440$ LB
$= 410069$ LB

$V_{J,AVG} = \frac{1}{m}\left\{\frac{V_s}{A_w}\right\}$

$A_{w,x} = 408$ FT
$A_{w,y} = 309$ FT

$V_{J,AVG} = \frac{1}{4}\left\{\frac{410069 \text{ LB}}{309 \text{ FT}}\right\}$
$= 332$ LB/FT < 1000 LB/FT

∴ SHEAR WALLS O.K.

Project: CHABOT LAS POSTAS	Job No:		
Description: TIER 1 BUILDINGS 800 EVAL	Date: 03/12/12		Sht: 7
	By: MYL	Ck:	

OVERTURNING CHECK

$$\frac{\text{BASE}}{\text{HEIGHT}} > 0.6 S_A = 0.6$$

FOR BUILDINGS 1 & 2

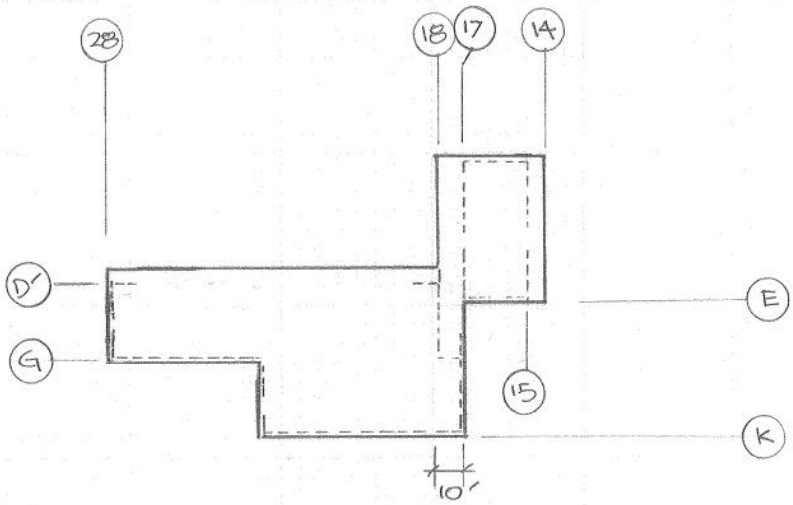
$$\frac{184 \text{ FT}}{18'-8''} = 4.5 > 0.6 \quad \text{O.K.}$$

Structural
Engineering &
Design

Project: CHABOT LAS POSITAS	Job No:		
Description: TIER 1 BUILDING 800 EVAL	Date: 03/13/12		Sht:
	By: MYL	Ck:	1

BUILDING SYSTEM CHECK *

* AFTER REMOVAL OF ELECTRONICS CLASSROOM AND GREENHOUSE



NEW PLAN VIEW (ROOF)
NTS

- - - SHEAR WALL

CHECK

1) SHEAR STRESS ON SHEAR WALLS (PER ASCE 31)
2) SHEAR CAPACITY OF WALLS AT LINE E B/W 17 AND 14
   - SHEATHING CAPACITY
   - CONNECTIONS
   - OVERTURNING

Project: CHAISOT LAS PORTAS	Job No:		
Description:	Date: 03/13/12		Sht:
TIER 1 BUILDING 800 FINAL	By: MYL	Ck:	2

SHEAR STRESS CHECK PER ASCE 31-03 §3.7.2

FLOOR AREA =

$(44' \times 140') + (42' \times 74.5') + (10' \times 124') + (30' \times 50') = 12{,}209\ FT^2$

LENGTH OF WALLS = 488 FT

CALCULATE DL

$15\ PSF \times 12{,}209\ FT^2 + 11.25\ PLF \times 488\ FT$
$+ 13\ PLF \times 488\ FT = 194{,}969\ LB$ USE 195 KIPS

$V = C\ S_a\ W$
$= 1.3 \times 1.0 \times 195\ KIPS$
$= 253.5\ KIPS$

$$V_{J,AVG} = \frac{1}{M}\left\{\frac{V_J}{A_W}\right\}$$

$A_{W,X}^{*} = 214\ FT$
$A_{W,Y}^{*} = 208\ FT$

* NOTE: NOT INCLUDING SHEATHING THAT IS LESS THAN 9 FT LONG AS SHEARING ACTION MAY NOT OCCUR. (LIMIT $h/b < 2.0$)

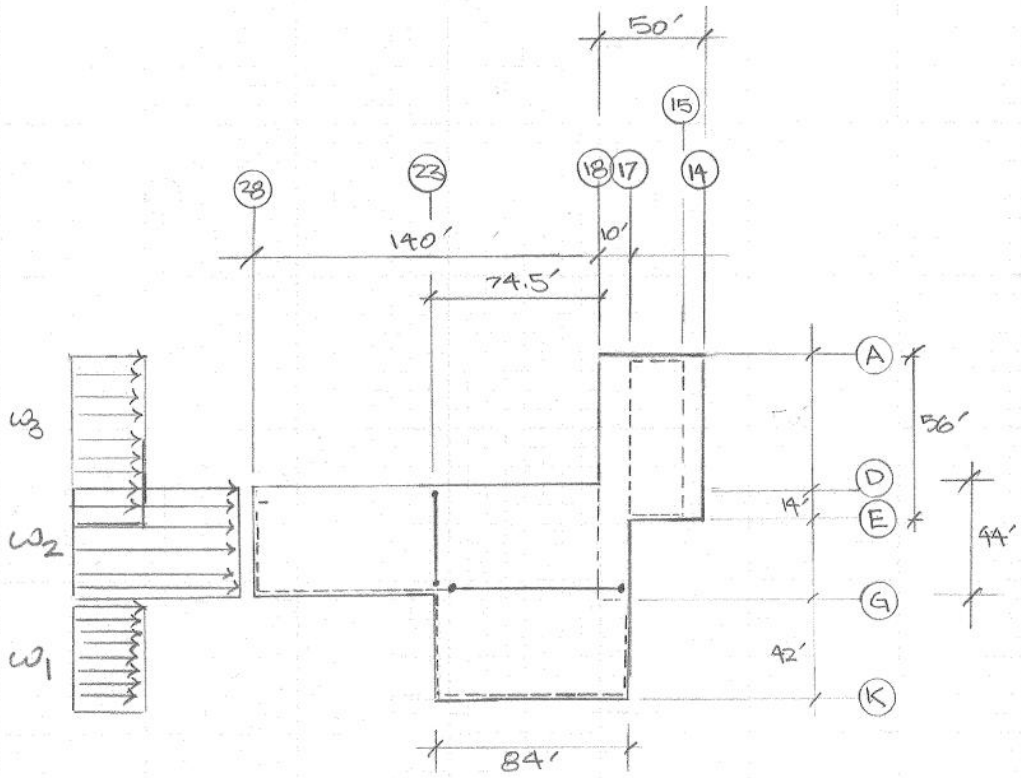
$$V_{J,AVG} = \frac{1}{4}\left\{\frac{253.5\ K}{208\ FT}\right\}$$

$= 305\ LB/FT < 1000\ LB/FT$

∴ SHEAR STRESS PER ASCE 31-03 OK ✓

Project: CHABOT LAS POSITAS	Job No:		
Description: TIER 1 BUILDING 800 EVAL	Date: 03/13/12		Sht: 3
	By: MYL	Ck:	

CHECK DIAPHRAGM BEHAVIOR AND SHEAR RESISTANCE AT LINE D & E



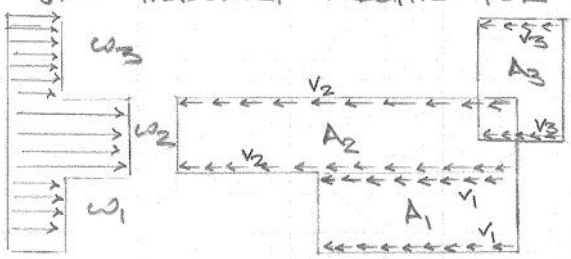
NOTES

COLLECTOR

SHEAR WALL

Project: CHABOT LAS POSITAS	Job No:	
Description: TSEIZ 1 BUILDING 800 EVAL	Date: 03/13/12	Sht: 4
	By: MYL Ck:	

USE TRIBUTARY WEIGHTS FOR ω_1, ω_2



SHEAR REACTION

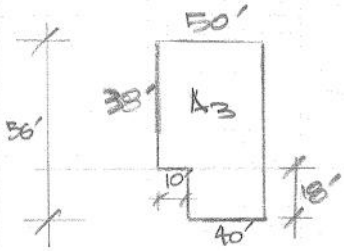
$\omega_1 = 15\,PSF \times 84' + (11.25\,PLF + 13\,PLF)(108')/42'$

PLYWOOD SHEATHING, STUDS FRAMING, TOTAL WALL LENGTH, AREA WEIGHT

$= 1037\ PLF$

$\omega_2 = 15\,PSF \times 150' + (11.25\,PLF + 13\,PLF)(180')/44'$

$= \underline{2350\ PLF}$



$A_3 = 38' \times 50' + 18' \times 40' = \underline{2620\ FT^2}$

$\omega_3 = (15\,PSF \times 2620\,FT^2)/56'$
$+ (11.25\,PLF + 13\,PLF)(148')/56'$

$= \underline{766\ PLF}$

CONVERT WEIGHTS TO BASE SHEARS

USING ASCE 7-05 PROVISIONS (EQUIV. LAT FORCE METHOD INSTEAD OF PSEUDO LAT. FORCE) §12.8 ASCE 7-05

$V = C_s W$

$= \frac{S_{DS}}{R/I} W$

$R = 6.5 \quad I = 1.25$ (OCC. III)

APPROX PERIOD

$T_a = C_t h_n^x$

$= (.02)(18.5\,FT)^{.75}$

$= .178\ s$

$C_s = \frac{S_{DS}}{R/I} = \frac{1.0}{6.25/1.25} = \underline{\underline{0.2}} < \frac{S_{D1}}{T(R/I)}$ $(= 0.67)$ $\underline{\underline{OK}}$

Project: CHAFFOT LAS POSITAS	Job No:		
Description: TIER 1 BUILDING 800 EVAL	Date: 03/13/12		Sht: 5
	By: MYL	Ck:	

CALCULATE SHEARS

$V_2 = \frac{w_2 L}{2} = (0.2 \times 2350\ PLF)(44')/2$

$= 10{,}340\ LBS$

$V_3 = \frac{w_3 L}{2} = (0.2 \times 766\ PLF)(36')/2$

$= 4290\ LBS$

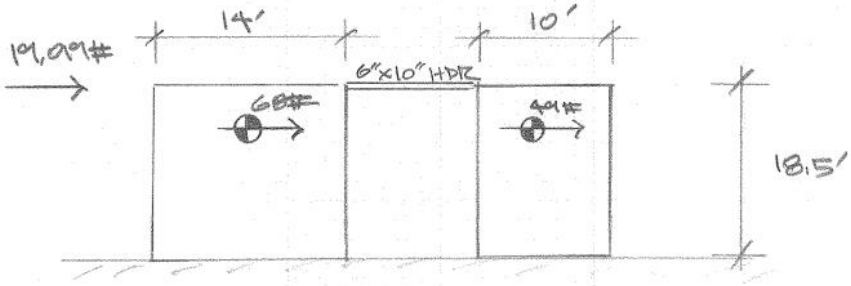
TOTAL ROOF SHEAR STRENGTH

$V = V_2 + V_3 = 14{,}630\ LBS$ (STRENGTH LEVEL)

$\rho = 1.3$ REDUNDANCY FACTOR

$V_E = 14{,}630\ LBS \times 1.3 = 19{,}019\ LBS$

ACTS ON SHEAR WALL (LINE E)



LINE E SHEAR WALLS

WALL SEISMIC FORCE (HORIZ) $\leftarrow C_s$

$(11.25\ PLF + 13\ PLF)(14\ FT)(0.2) = 68\ LB$

$(11.25\ PLF + 13\ PLF)(10\ FT)(0.2) = 49\#$

$19019\ LB + 68\ LB + 49\# = 19{,}136\#$

$V_u = 19{,}136\#/24' = 798\#/FT$

Project: CHABOT LAS POSITAS	Job No:		
Description: TEER	BUILDING 800 EVAL	Date: 03/13/12	Sht: 6
	By: MAL	Ck:	

CONVERT STRENGTH LEVEL LOADS TO ASD LOAD:

798 #/FT × 0.7 = 558.6 #/FT

ALLOWABLE UNIT LOAD PER AISI S100-05 TABLE 4.3A

= 920 PLF / 2 = 460 #/FT

Ω

WOOD STRUCT. PANEL SHEATHING
4" FASTENER SPACING
10d
1/2" SHEATHING

$V_R > R_N/\Omega$ NG

558.6 #/FT > 460 #/FT

NEED MORE SHEAR WALL
OR STRENGTHEN
⊖ SHEAR WALLS

Structural
Engineering &
Design

ASCE 31 SEISMIC EVALUATION

LAS POSITAS COLLEGE,
LIVERMORE, CALIFORNIA

BUILDING 2000

APRIL 16, 2012

PREPARED FOR:
Steinberg Architects
60 Pierce Avenue
San Jose, CA 95110

PREPARED BY:
Crosby Group
2200 Bridge Parkway
Suite 104
Redwood City, CA 94065

1.0 Background

1.1 Scope & Intent of Evaluation

The ASCE 31-03 (formerly FEMA 310) Tier 1 report is intended to allow a rapid evaluation of the seismic capabilities of the structural system of the building. The objective of this evaluation is to determine if the building meets the 'Life Safety' performance level. Using the checklists provided in ASCE 31-03, building system and component deficiencies were identified and are described in this report.

The scope for this Tier 1 evaluation consisted of the following:

- Review available structural drawings.
- Perform a site visit to review that the construction is substantially per the available drawings and to determine the general condition of the structure.
- Evaluate the building using the ASCE 31-03 checklists and quick check methodologies.
- Create a report describing the findings of the evaluation.

1.2 Building Description

Building 2000 was designed in 1990 per the 1988 edition of the Uniform Building Code. The single story building has an overall plan area of approximately 22,000 square feet. The gravity load carrying system generally consists of ½" plywood sheathing over 18TJI35 joists at 16" spacing. The joists are generally supported by wide flange structural steel girders, which in turn bear on W14x132 columns. The lateral load resisting system consists of structural steel moment frames, with W14x62 or W24x84 beams and W14x132 columns. The foundation system consists of concrete spread footings. Per ASCE 31 terminology, this building is classified as a Building Type S1A: Steel Moment Frame with Flexible Diaphragm. Building 2000 is adjacent to Building 2100, a smaller structure with a similar structural system. The buildings are separated by a 5" seismic joint.

1.3 Site Seismicity & Soil Profile

The building site is about 5-10 miles from both the Calaveras Fault and the Greenville Fault and is therefore prone to high seismic activity. There is insufficient data to classify the site profile at the site. A site soil report is also not available; therefore Site Class D is assumed per the recommendations of ASCE 31. All pseudo-static lateral demands required for the Tier 1 evaluation are computed based on this site classification.

In general site "Seismicity" or the potential for strong ground motion is classified into regions of Low, Medium, and High. These regions are based upon mapped site accelerations S_S and S_1 which are then modified by site coefficients F_a and F_v to produce Design Spectral Accelerations S_{DS} (short period) and S_{D1} (1 second period).

The site accelerations place the subject property in a region of HIGH Seismicity.
Design Spectral Accelerations computed for this site are as follows:
S_{DS}= 1.0g S_{D1}= 0.6g

2.0 Building 2000

2.1 Site Visit

Crosby Group conducted a site visit on March 5, 2012, in order to validate existing conditions. Another objective of the site visit is to identify potential deficiencies, unusual conditions and details. Additionally, the site visit is meant to compare the existing documents (made available to Crosby Group) with actual field conditions and identify any discrepancies. The condition of non-structural elements and components as they relate to the ASCE 31-03 was evaluated.

All the findings following the site visit are presented as part of the attached ASCE 31-03 checklist.

2.2 Building Reference Documents

The available drawings are dated July 27, 1990, and were prepared by Razzano Associates, Inc., along with Cometta and Cianfichi-Architectural and Planning. Other building and site specific documentation was not available for review.

2.3 Building Materials & Strengths for Evaluation

Based on the available drawings the following materials and associated strengths were used in the evaluation.

- Concrete foundations: 28-day strength: f'_c = 3000 psi
- Reinforcing steel: ASTM A500 Grade B (F_y = 42 ksi)
- Wood framing members: Douglas Fir, No. 1 Structural

2.4 Analysis Criteria

Performance Level: Life Safety
Building Type: Steel Moment Frames with Flexible Diaphragms (S1A)
Spectral Accelerations (from USGS):
S_s = 1.5g , S_1 = 0.6g
S_{DS} = 1.0g, S_{D1} = 0.6g

2.5 Tier 1 Evaluation Findings

The ASCE 31 Tier 1 Screening Phase identified several areas where the building was deemed non-compliant. The completed structural, geological, and nonstructural checklists are attached.

Nonstructural components were generally assessed as compliant. Evidence of wood and steel deterioration was not found on the superficial structure, though finishes may be removed to verify that deterioration has not occurred at structural members.

As is typical of buildings with moment-frame systems constructed before the 1994 Northridge earthquake, the moment connections in Building 2000 do not meet criteria set forth by ASCE 31-03 and are considered non-compliant.

Building 2000 is separated from the adjacent Building 2100 by a 5" seismic joint. The clear distance between the buildings was found to be non-compliant at some locations.

2.6 Conclusions & Mitigation Strategy

The non-compliant items listed in the attached ASCE 31-03 Tier 1 checklists and discussed above should be addressed. If voluntary upgrades to Building 2000 are anticipated in the near future, the seismic vulnerability of the building may be reviewed at that time, allowing the deficiencies at the moment frame connections to be addressed. The non-ductile moment frame connections found in the building are considered non-compliant.

Several methods are available for rehabilitation of pre-Northridge moment-frame connections. The haunch retrofit consists of a new wide flange section at the intersection of the bottom beam flange and column flange, with the haunch placed at an angle and welded to the existing members. Other options include cutting a dogbone shape into the beam flanges and improving the beam flange welds, or creating a slotted beam web connection using a proprietary system.

Building 2000 is separated from the adjacent Building 2100 by a 5" wide seismic joint, which is equal to 2.5% of the height of the adjacent building. The basic structural checklist recommends that the distance between adjacent buildings be greater than 4% of the height of the shorter building, or 8", consequently the clear distance between the buildings was found to be non-compliant. Though this joint is non-compliant, it is consistent with typical joints seen in similar buildings. Remediation at the joint is not immediately necessary. It is noted that Building 2100 may be removed in a campus renovation during the next five years.

It is understood that future plans for the campus call for interior renovations in Building 2000, along with the addition of a new building and covered walkway adjacent to Building 2000. If new buildings are constructed, they should be separated from the existing structure by appropriate seismic joints to ensure that each system remains independent. Portions of the existing concrete slab on grade may be removed and replaced to allow the re-routing of data and electrical lines throughout the building.

APPENDIX A – SITE PHOTOS

Entrance to Building 2000 Library

Entrance to Building 2000 Library

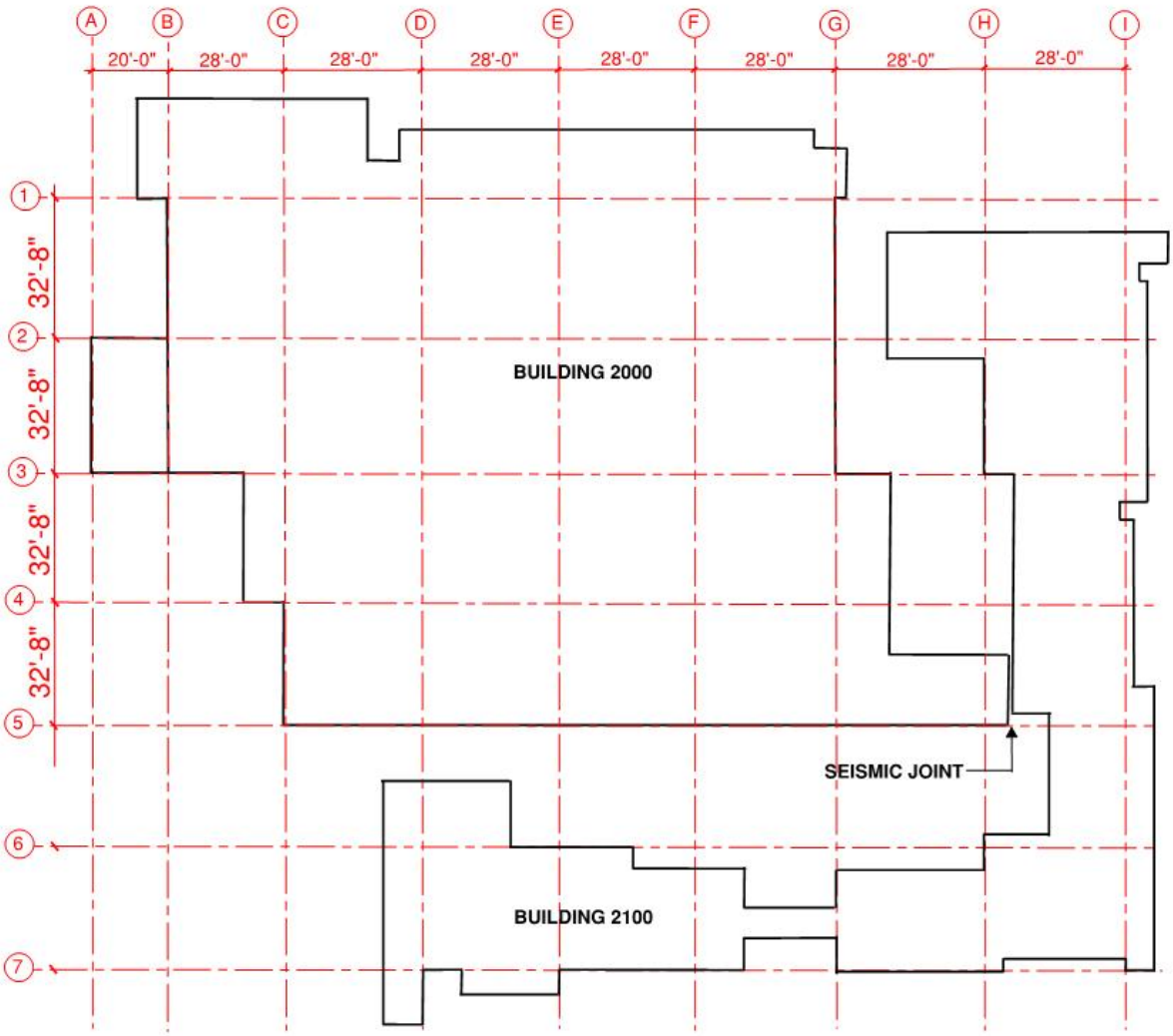
Interior of Building 2000 Library

Interior Classrooms in Library

Exterior of Building 2000

Seismic joint between Building 2000 and 2100

APPENDIX B – BUILDING LAYOUT



FLOOR PLAN - BUILDINGS 2000 AND 2100

APPENDIX C – CHECKLISTS

ASCE 31-03
Basic Structural Checklist for Building Type S1A: Steel Moment Frames with Flexible Diaphragms

C NC N/A	Item:	Crosby Group Comment:
	Building System	
C	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.	
NC	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy.	The width of the seismic joint is 5", which is less than the recommended clear distance. 16.67'*0.04 = 8 inches
N/A	MEZZANINES: Interior Mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure.	
N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines.	The building is one-story.
C	VERTICAL DISCONTINUITIES: All elements in the lateral-force-resisting system shall be continuous to the foundation.	
N/A	MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses and mezzanines need not be considered.	
C	DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken or loose.	The conditions that were observed did not show signs of deterioration. It is recommended that a thorough investigation be completed in the future, including removal of finishes.

C	DETERIORATION OF STEEL: There shall be no visible rusting, corrosion, cracking or other deterioration in any of the steel elements or connections in the vertical-or lateral-force-resisting systems.	The conditions that were observed did not show signs of deterioration. It is recommended that a thorough investigation be completed in the future, including removal of finishes.
	Lateral-Force-Resisting System	
C	REDUNDANCY: The number of lines of moment frames in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. The number of bays of moment frames in each line shall be greater than or equal to 2 for Life Safety and 3 for Immediate Occupancy.	
N/A	INTERFERING WALLS: All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements.	
C	DRIFT CHECK: The drift ratio of the steel moment frames, calculated using the Quick Check procedure of Section 3.5.3.1, shall be less than 0.025 for Life Safety and 0.015 for Immediate Occupancy.	
C	AXIAL STRESS CHECK: The axial stress due to gravity loads in columns subjected to overturning forces shall be less than 0.10Fy for Life Safety and Immediate Occupancy. Alternatively, the axial stress due to overturning forces alone, calculated using the Quick Check procedure of Section 3.5.3.6, shall be less than 0.30Fy for Life Safety and Immediate Occupancy.	
	Connections	
C	TRANSFER TO STEEL FRAMES: Diaphragms shall be connected for transfer of loads to the steel frames for Life Safety, and the connections shall be able to develop the lesser of the strength of the frames or the diaphragms for Immediate Occupancy.	
C	STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation for Life Safety, and the anchorage shall be able to develop the lesser of the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation, for Immediate Occupancy.	

Supplemental Structural Checklist for Building Type S1A: Steel Moment Frames with Flexible Diaphragms

	Item:	Crosby Group Comment:
NC	MOMENT RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.	
C	PANEL ZONES: All panel zones shall have the shear capacity to resist the shear demand required to develop 0.8 times the sum of the flexural strengths of the girders framing in at the face of the column.	
N/A	COLUMN SPLICES: All column splice details located in moment resisting frames shall include connection of both flanges and the web for Life Safety, and the splice shall develop the strength of the column for Immediate Occupancy.	The building is one-story.
C	STRONG COLUMN/WEAK BEAM: The percentage of strong column/weak beam joints in each story of each line of moment resisting frames shall be greater than 50 percent for Life Safety and Immediate Occupancy.	
C	COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Seismic Provisions for Structural Steel Buildings Table I-9-1 (AISC, 1997).	
N/A	BEAM PENETRATIONS: All openings in frame-beam webs shall be less than ¼ of the beam depth and shall be located in the center half of the beams. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
N/A	GIRDER FLANGE CONTINUITY PLATES: There shall be girder flange continuity plates at all moment resisting frame joints. This statement shall apply to the Immediate Occupancy Performance level only.	Building was evaluated to Life Safety Level.
N/A	OUT-OF-PLANE BRACING: Beam-column joints shall be braced out-of-plane. This statement shall apply to the Immediate Occupancy Performance level only.	Building was evaluated to Life Safety Level.
N/A	BOTTOM FLANGE BRACING: The bottom flanges of beams shall be braced out-of-plane. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
	Diaphragms	
C	CROSS TIES: There shall be continuous cross ties between diaphragm chords.	
N/A	PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
N/A	DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate	

	Occupancy Performance Level only.	
C	STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered.	
C	SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing.	
N/A	UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy.	
N/A	NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans less than 40 feet and shall have span/depth ratios less than 4-to-1. This statement shall apply to the Immediate Occupancy Performance Level only.	
C	OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	
	Connections	
N/A	UPLIFT AT PILE CAPS: Pile caps shall have top reinforcement and piles shall be anchored to the pile caps for Life Safety, and the pile cap reinforcement and pile anchorage shall be able to develop the tensile capacity of the piles for Immediate Occupancy.	

Geologic Site Hazards and Foundations Checklist

C NC N/A	Item:	Crosby Group Comment:
	Geologic Site Hazards	
C	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 feet under the building for Life Safety and Immediate Occupancy.	
C	SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure.	
C	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated	
	Condition of Foundations	
C	FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure.	
C	DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure.	
	Capacity of Foundations	
C	POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy.	
N/A	OVERTURNING: The ratio of the horizontal dimension of the lateral force resisting system at the foundation level to the building height (b/h) shall be greater than 0.6Sa.	
C	TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles and piers are not restrained by beams, slabs or soils classified as Class A, B or C.	
N/A	DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. The statement shall apply to the Immediate Occupancy Performance Level only.	
N/A	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only.	

Basic Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
	Partitions	
N/A	UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity.	
	Ceiling Systems	
C	SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Light Fixtures	
C	EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake.	Lighting observed appears to be supported. It is recommended that a thorough inventory be completed to ensure full compliance.
	Cladding & Glazing	
N/A	CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements.	
N/A	CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel.	
N/A	INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage.	
N/A	PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-lane with a minimum of 4 connections for each wall panel. Two connections per wall panel are	

	permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
	Masonry Veneer	
N/A	SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy.	
N/A	TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements.	
	Parapets, Cornices, Ornamentation and Appendages	
N/A	URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Tbl 3-2.	
N/A	CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Masonry Chimneys	
N/A	URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Stairs	
N/A	URM WALLS: Walls around the stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors.	
	Building Contents and Furnishing	
NC	TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or	It is recommended that the shelves in the library be evaluated for

	adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	anchorage requirements. Anchorage was not visible.
	Mechanical and Electrical Equipment	
C	EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake.	Equipment observed appears to be mounted. It is recommended that a thorough inventory be completed to ensure full compliance.
C	HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports.	Equipment observed appears to be braced, with undamaged supply lines. It is recommended that a thorough inventory be completed to ensure full compliance.
C	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the anchorage or supports of mechanical or electrical equipment.	Equipment supports observed appear to be free of deterioration, damage and corrosion. It is recommended that a thorough inventory be completed to ensure full compliance.
C	ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced.	Equipment observed appears to be braced. It is recommended that a thorough inventory be completed to ensure full compliance.
	Piping	
C	FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996).	Piping observed appears to be anchored and braced. It is recommended that a thorough inventory be completed to ensure full compliance.
C	FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings.	Piping observed appears to have flexible couplings. It is recommended that a thorough inventory be completed to ensure full compliance.
	Hazardous Materials Storage and Distribution	
C	TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires or other methods.	Substances observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.

Intermediate Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
C	LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips.	Tiles observed appear to be secured. It is recommended that a thorough inventory be completed to ensure full compliance.
C	INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wire or rigid members attached to the structure above at a spacing equal to or less than 12 feet.	Ceiling tiles observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.
N/A	SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 sq ft of area.	
	Light Fixtures	
C	INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures.	
	Cladding and Glazing	
N/A	GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 ft above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked.	
	Parapets, Cornices, Ornamentation, and Appendages	
N/A	CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement.	
N/A	APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3.	
	Masonry Chimneys	
N/A	ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof.	
	Mechanical and Electrical Equipment	
N/A	VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers.	

	Ducts	
N/A	STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints.	

The Crosby Group

Project: LPC Tier 1 Report	Date: 3/11/2012		Sht:
Description: Quick Checks	By: KMP	Ck:	

Loads - Steel

B2000 Roof

	Deck	Beams	Girders	Columns	Lateral	
Roofing	2.0	2.0	2.0	2.0	2.0	18 ga Metal w/ mansards
Gyp	4.4	4.4	4.4	4.4	4.4	2 layers gyp
Plywood	1.7	1.7	1.7	1.7	1.7	1/2" plywood
Beams		4.4	4.4	4.4	4.4	18" TJI 35 @16" oc
Girders			1.0	1.0	1.0	W24x62
Columns				1.0	1.0	W14x132
Sprinklers	1.0	1.0	1.0	1.0	1.0	
Insulation	0.5	0.5	0.5	0.5	0.5	6.25" insulation
Lighting	1.0	1.0	1.0	1.0	1.0	
Ceiling	1.0	1.0	1.0	1.0	1.0	Acoustic Tiles
Misc.	3.0	3.0	3.0	3.0	3.0	
Partitions					10.0	
RDL =	14.6	19.0	20.0	21.0	31.0	psf
RLL =	20.0	20.0	20.0	20.0	20.0	psf

The Crosby Group					
Project:	LPC Quick Checks	Date:	3/11/2012		Sht:
Description:	B2000	By:	KMP	Ck:	

CALCULATION OF PSEUDO LATERAL FORCE PER ASCE-31

V= CSaW

PERIOD:

C_t=	0.035	For Steel Moment Resisting Frame Type S1A
hn=	17	Height in feet from Base to Roof Level
B=	0.8	For Steel Moment Resisting Frame Type S1A
$T=C_t h_n^B$=	0.34	Fundamental Period of Vibration of the Building, Section 3.5.2.4
OR		
T=0.10n	0.1	For Steel Moment Resisting Frame

MAPPED SPECTRAL ACCELERATION:

S1=	0.6	Short Period Response Acceleration
Ss=	1.5	Spectral Response Acceleration at one-second Period

Assume Site Class D since soil report is not available

Fv=	1.5	per Table 3-5
Fa=	1	per Table 3-6

SD1=	2/3*FvS1=	0.6
SDS=	2/3*FaSs=	1

Sa=SD1/T=	1.7771499	
and < SDS		
so Sa=	1	Response Spectral Acceleration

EFFECTIVE SEISMIC WEIGHT:

Area=	22000	sf
DL=	31	
LL=	20	
W=	1122	kips

PSEUDO LATERAL FORCE:

C=	1.3	Modification Factor from Table 3-4
And V=CSaW=	1459	Kips

STORY DRIFT FOR MOMENT FRAMES X DIRECTION:

Dr= ((kb+kc)/(kbkc))*(h/12E)*Vc Drift Ratio: Interstory displacement/story ht

kb=	4.6	I/L for the representative **beam W24x62**
kc=	2.9	I/h for the representative **column W14x132**
h=	192	story height in inches
Ib=	1550	Moment of Inertia (in4)
Ic=	548	Moment of Inertia (in4)
L=	336	Beam Length from Center to Center of Adjacent Columns (in)
E=	29000	Modulus of Elasticity (ksi)
Vc=	47	Shear in the column (kips) - worst case
Dr=	0.0146	

STORY DRIFT FOR MOMENT FRAMES Y DIRECTION:

Dr= ((kb+kc)/(kbkc))*(h/12E)*Vc

kb=	6.0	I/L for the representative **beam W24x84**
kc=	2.9	I/h for the representative **column W14x132**
h=	192	story height in inches
Ib=	2370	Moment of Inertia (in4)
Ic=	548	Moment of Inertia (in4)
L=	392	Beam Length from Center to Center of Adjacent Columns (in)
E=	29000	Modulus of Elasticity (ksi)
Vc=	47	Shear in the column (kips)
Dr=	0.0133	

AXIAL STRESS DUE TO OVERTURNING IN X DIRECTION

pot = (1/m)(2/3)(Vhn/Lnf)(1/Acol)

m=	2	Component modification factor equal to 2 for Life Safety Level
V=	1459	Pseudo Lateral Force in kips
nf=	24	Number of frames in the direction of loading
hn=	17	Number of feet above base to roof level (ft)
L=	28	Length of frame in feet
Acol=	38.8	Area of end of column (in2)
pot=	0.3170	ksi
0.10Fy=	5	ksi

Check pot<0.10Fy "OK"

AXIAL STRESS DUE TO OVERTURNING IN Y DIRECTION

pot = (1/m)(2/3)(Vhn/Lnf)(1/Acol)

m=	2	Component modification factor equal to 2 for Life Safety Level
V=	1459	Pseudo Lateral Force in kips
nf=	20	Number of frames in the direction of loading
hn=	17	Number of feet above base to roof level (ft)
L=	33	Length of frame in feet
Acol=	38.8	Area of end of column (in2)
pot=	0.3260	ksi
0.10Fy=	5	ksi

Check pot<0.10Fy "OK"

The Crosby Group					
Project:	LPC Lateral Force Checks	Date:	3/11/2012		Sht:
Description:	B2000	By:	KMP	Ck:	

CHECK MOMENT RESISTING CONNECTIONS:

Moment connections shall develop the strength of the adjoining members or panel zones.

Beam Capacity **W24x84** φMn = φMp = φFyZx = 0.9*36ksi*224in^3 7258 k-in

d=	24.1	in
tf + 1/4=	1.02	in
hc=d-tf=	23.33	in
T=M/hc=	311	kips

CJP Weld Strength - capacity of the base metal controls with tension force normal to weld area

Lweld=bf=	9.02	in
Abm=tf*Lweld=	9.20	in^2
Fbm=	36	ksi
φRn=φFbmAbm=	298	kips

Check T<φRn **Weld is deficient**

Beam Capacity **W24x62** φMn = φMp = φFyZx = 0.9*36ksi*153in^3 4957 k-in

d=	23.7	in
tf + 1/4=	0.84	in
hc=d-tf=	23.11	in
T=M/hc=	215	kips

CJP Weld Strength - capacity of the base metal controls with tension force normal to weld area

Lweld=bf=	7.04	
Abm=tf*Lweld=	5.91	in^2
Fbm=	36	ksi
φRn=φFbmAbm=	192	kips

Check T<φRn **Weld is deficient**

Beam Capacity **W18x40** φMn = φMp = φFyZx = 0.9*36ksi*78.4in^3 2527 k-in

d=	17.9	in
tf + 1/4=	0.775	in
hc=d-tf=	17.375	in
T=M/hc=	145	kips

CJP Weld Strength - capacity of the base metal controls with tension force normal to weld area

Lweld=bf=	6.02	
Abm=tf*Lweld=	4.67	in^2
Fbm=	36	ksi
φRn=φFbmAbm=	151	kips

Check T<φRn **Weld develops the strength of adjoining bm**

CHECK PANEL ZONES:

All panel zones shall have the shear capacity to resist the shear demand required to develop 0.8 times the sum of the flexural strengths of the girders framing in at the face of the column.

Column W14x132

Ac=	38.8	in^2
Fy=	36	ksi
dc=	14.7	in
tw=	0.645	in

Beam W24x84

	Pr=	75	kips	required strength
	Pc=Py=FyA=	1396.8	kips	
Since Pr < 0.4Pc -------->	φRn=	?0.60Fydctw		
	φRn=	**184.3204**	kips	avail strength of the web PZ
Check φRn > Pr	**Panel zone has shear capacity as required**			

Beam W24x62

	Pr=	75	kips	required strength
	Pc=Py=FyA=	1396.8	kips	
Since Pr < 0.4Pc -------->	φRn=	?0.60Fydctw		
	φRn=	**184.3204**	kips	available strength oF web PZ
Check φRn > Pr	**Panel zone has shear capacity as required**			

Beam W18x40

	Pr=	75	kips	required strength
	Pc=Py=FyA=	1396.8	kips	
Since Pr < 0.4Pc -------->	φRn=	?0.60Fydctw		
	φRn=	**184.3204**	kips	available strength of web PZ
Check φRn > Pr	**Panel zone has shear capacity as required**			

CHECK STRONG COLUMN/WEAK BEAM:

The percentage of strong column/weak beam joints in ea story of ea line of meoment-resisting frames shall be greater than 50 percent.

Beam Capacity	**W24x84**	φMn =	7258	k-in
Beam Capacity	**W24x62**	φMn =	4957	k-in
Beam Capacity	**W18x40**	φMn =	2527	k-in
Column Capacity W14x132		φMn =	7582	k-in

**Moment capacity of column is greater than that of beams, therefore this building is compliant.

CHECK FOR COMPACT MEMBERS:

All frame elements shall meet section reqmts set forth by AISC Seismic Provisions for Structural Steel Buildings Table I-9-1

TABLE I-9-1
Limiting Width Thickness Ratios λ_p
for Compression Elements

Description of Element	Width-Thickness Ratio	Limiting Width-Thickness Ratios λ_p
Flanges of I-shaped rolled beams, hybrid or welded beams and channels in flexure	b/t	$52/\sqrt{F_y}$
Webs in combined flexural and axial compression	h_c/t_w	For $P_u/\phi_b P_y \leq 0.125$
		$\frac{520}{\sqrt{F_y}}\left[1 - 1.54\frac{P_u}{\phi_b P_y}\right]$
		For $P_u/\phi_b P_y > 0.125$
		$\frac{191}{\sqrt{F_y}}\left[2.33 - \frac{P_u}{\phi_b P_y}\right] \geq \frac{253}{\sqrt{F_y}}$
Round HSS in axial compression or flexure	D/t	$1300/F_y$
Rectangular HSS in axial compression or flexure	b/t or h_c/t	$110/\sqrt{F_y}$

W14X132 COLUMN:

Ag=	38.8	in2
hc=	10	in
tw=	0.645	in
b=	7.35	in
tf=	1.03	in
Fy=	36	ksi

Check Flanges:

b/t=	7.14	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	16	
Pu=	44	kips
Py=	1397	kips
φb=	0.9	
Pu/(φb*Py)=	0.035	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	91.65	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

W24X62 BEAM:

Ag=	18.2	in2
hc=	20.75	in
tw=	0.43	in
b=	3.5	in
tf=	0.59	in
Fy=	36	ksi

Check Flanges:

b/t=	5.93	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	48	
Pu=	73	kips
Py=	655	kips
φb=	0.9	
Pu/(φb*Py)=	0.124	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	107.06	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

W24X84 BEAM:

Ag=	24.7	in2
hc=	20.75	in
tw=	0.47	in
b=	4.535	in
tf=	0.77	in
Fy=	36	ksi

Check Flanges:

b/t=	5.89	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	44	
Pu=	73	kips
Py=	889	kips
φb=	0.9	
Pu/(φb*Py)=	0.091	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	100.82	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

W18X40BEAM:

Ag=	11.8	in2
hc=	15.5	in
tw=	0.315	in
b=	3	in
tf=	0.525	in
Fy=	36	ksi

Check Flanges:

b/t=	5.71	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	49	
Pu=	73	kips
Py=	425	kips
φb=	0.9	
Pu/(φb*Py)=	0.191	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	122.72	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

Structural
Engineering &
Design

ASCE 31 SEISMIC EVALUATION

LAS POSITAS COLLEGE,
LIVERMORE, CALIFORNIA

BUILDING 2100

APRIL 16, 2012

PREPARED FOR:
Steinberg Architects
60 Pierce Avenue
San Jose, CA 95110

PREPARED BY:
Crosby Group
2200 Bridge Parkway
Suite 104
Redwood City, CA 94065

1.0 Background

1.1 Scope & Intent of Evaluation

The ASCE 31-03 (formerly FEMA 310) Tier 1 report is intended to allow a rapid evaluation of the seismic capabilities of the structural system of the building. The objective of this evaluation is to determine if the building meets the 'Life Safety' performance level. Using the check-lists provided in ASCE 31-03, building system and component deficiencies were identified and are described in this report.

The scope for this Tier 1 evaluation consisted of the following:

- Review available structural drawings.
- Perform a site visit to review that the construction is substantially per the available drawings and to determine general condition of the structure.
- Evaluate the building using the ASCE 31-03 checklists and quick check methodologies.
- Create a report describing the findings of the evaluation.

1.2 Building Description

Building 2100 was designed in 1990 per the 1988 edition of the Uniform Building Code. The single story building has an overall plan area of approximately 10,000 square feet. The gravity load carrying system generally consists of ½" plywood sheathing over 18TJI35 joists at 16" spacing. The joists are supported by wide flange structural steel girders, which in turn bear on W14x132 columns. The lateral load resisting system consists of structural steel moment frames, with W14x62 or W24x84 beams and W14x132 columns. The foundation system consists of concrete spread footings. Per ASCE 31 terminology, this building is classified as a Building Type S1A: Steel Moment Frame with Flexible Diaphragm. Building 2100 is adjacent to Building 2000, a large library comprised of similar structural members. The buildings are separated by a 5" seismic joint.

1.3 Site Seismicity & Soil Profile

The building site is about 5-10 miles from both the Calaveras Fault and the Greenville Fault and is therefore prone to high seismic activity. There is insufficient data to classify the site profile at the site. A site soil report is also not available; therefore Site Class D is assumed per the recommendations of ASCE 31-03. All pseudo-static lateral demands required for the Tier 1 evaluation are computed based on this site classification.

In general site "Seismicity" or the potential for strong ground motion is classified into regions of Low, Medium, and High. These regions are based upon mapped site accelerations S_S and S_1 which are then modified by site coefficients F_a and F_v to produce Design Spectral Accelerations S_{DS} (short period) and S_{D1} (1 second period).

The site accelerations place the subject property in a region of HIGH Seismicity.
Design Spectral Accelerations computed for this site are as follows:
S_{DS}= 1.0g S_{D1}= 0.6g

2.0 Building 2100

2.1 Site Visit

Crosby Group conducted a site visit on March 5, 2012, in order to validate existing conditions. Another objective of the site visit is to identify potential deficiencies, unusual conditions and details. Additionally, the site visit is meant to compare the existing documents (made available to Crosby Group) with actual field conditions and identify any discrepancies. The condition of non- structural elements and components as they relate to the ASCE 31-03 was evaluated.

All the findings following the site visit are presented as part of the attached ASCE 31-03 checklist.

2.2 Building Reference Documents

The available drawings are dated July 27, 1990, and were prepared by Razzano Associates, Inc., along with Cometta and Cianfichi-Architectural and Planning. Other building or site specific documentation was not available for review.

2.3 Building Materials & Strengths for Evaluation

Based on the available drawings the following materials and associated strengths were used in the evaluation.

- Concrete foundations: 28-day strength: f'_c = 3000 psi
- Reinforcing steel: ASTM A500 Grade B (F_y = 42 ksi)
- Wood framing members: Douglas Fir, No. 1 Structural

2.4 Analysis Criteria

Performance Level: Life Safety
Building Type: Steel Moment Frames with Flexible Diaphragms (S1A)
Spectral Accelerations (from USGS):
S_s = 1.5g , S_1 = 0.6g
S_{DS} = 1.0g, S_{D1} = 0.6g

2.5 Tier 1 Evaluation Findings

The ASCE 31 Tier 1 Screening Phase identified several areas where the building was deemed non-compliant. The completed structural, geological, and nonstructural checklists are attached.

Nonstructural components were generally assessed as compliant. Evidence of wood and steel deterioration was not found on the superficial structure, though finishes must be removed to verify that deterioration has not occurred at structural members.

As is typical of buildings with moment-frame systems constructed before the 1994 Northridge earthquake, the moment connections in Building 2100 do not meet criteria set forth by ASCE 31-03 and are considered non-compliant.

Building 2100 is separated from the adjacent Building 2000 by a 5" seismic joint. The clear distance between the buildings was found to be non-compliant at some locations.

2.6 Conclusions & Mitigation Strategy

The non-compliant items listed in the attached ASCE 31-03 Tier 1 checklists and discussed above should be addressed. If voluntary upgrades to Building 2100 are anticipated in the near future, the seismic vulnerability of the building may be reviewed at that time, allowing the deficiencies in the moment frame connections to be addressed. The non-ductile moment frame connections found in the building are considered non-compliant.

Several methods for rehabilitation of pre-Northridge moment-frame connections may be considered. The haunch retrofit consists of a new wide flange section at the intersection of the bottom beam flange and column flange, with the haunch placed at an angle and welded to the existing members. Other options include cutting a dogbone shape into the beam flanges and improving the beam flange welds, or creating a slotted beam connection using a proprietary system.

Building 2100 is separated from the adjacent Building 2000 by a 5" wide seismic joint, which is equal to 2.5% of the height of the adjacent building. The basic structural checklist recommends that the distance between adjacent buildings be greater than 4% of the height of the shorter building, or 8", consequently the clear distance between the buildings was found to be non-compliant. Though this joint is non-compliant, it is consistent with typical joints seen in similar buildings. Remediation at the joint is not immediately necessary. It is noted that Building 2100 may be removed in a campus renovation during the next five years, but that interior renovations may take place before that time.

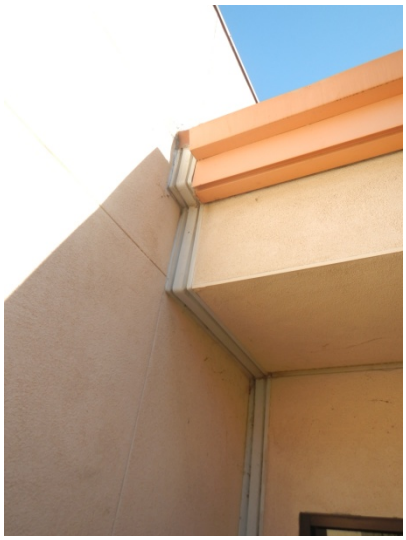
APPENDIX A - SITE PHOTOS

Exterior of the building

Entrance to the building

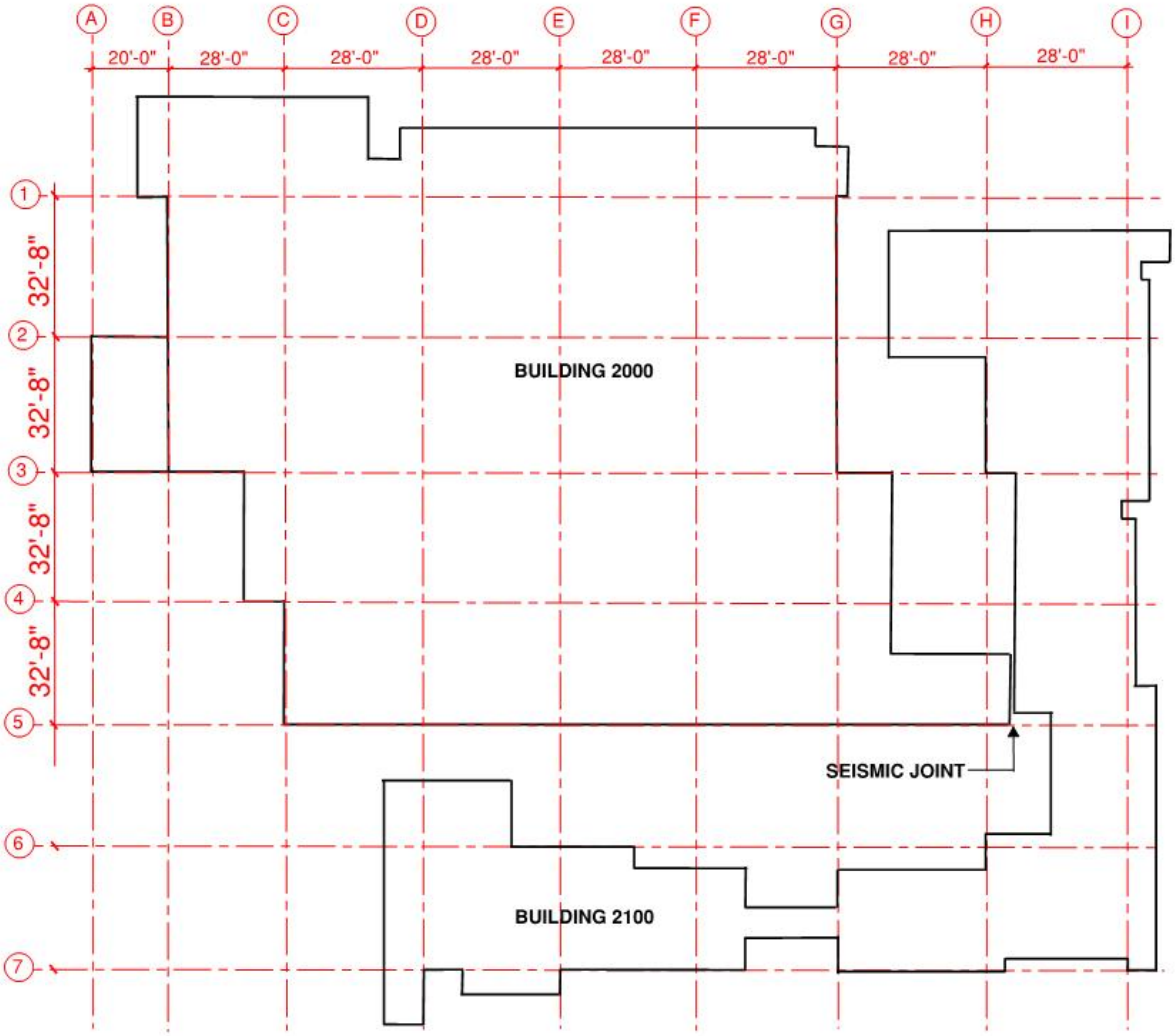
Exterior of the building

Interior courtyard



Seismic joint between Buildings 2000 and 2100

APPENDIX B – BUILDING LAYOUT



FLOOR PLAN - BUILDINGS 2000 AND 2100

APPENDIX C – CHECKLISTS

ASCE 31-03
Basic Structural Checklist for Building Type S1A: Steel Moment Frames with Flexible Diaphragms

C NC N/A	Item:	Crosby Group Comment:
	Building System	
C	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.	
NC	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy.	The width of the seismic joint is 5", which is less than the recommended clear distance. 16.67'*0.04 = 8 inches
N/A	MEZZANINES: Interior Mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure.	
N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines.	The building is one-story.
C	VERTICAL DISCONTINUITIES: All elements in the lateral-force-resisting system shall be continuous to the foundation.	
N/A	MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses and mezzanines need not be considered.	
C	DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken or loose.	The conditions that were observed did not show signs of deterioration. It is recommended that a thorough investigation be completed in the future, including removal of finishes.

C	DETERIORATION OF STEEL: There shall be no visible rusting, corrosion, cracking or other deterioration in any of the steel elements or connections in the vertical-or lateral-force-resisting systems.	The conditions that were observed did not show signs of deterioration. It is recommended that a thorough investigation be completed in the future, including removal of finishes.
	Lateral-Force-Resisting System	
C	REDUNDANCY: The number of lines of moment frames in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. The number of bays of moment frames in each line shall be greater than or equal to 2 for Life Safety and 3 for Immediate Occupancy.	
N/A	INTERFERING WALLS: All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements.	
C	DRIFT CHECK: The drift ratio of the steel moment frames, calculated using the Quick Check procedure of Section 3.5.3.1, shall be less than 0.025 for Life Safety and 0.015 for Immediate Occupancy.	
C	AXIAL STRESS CHECK: The axial stress due to gravity loads in columns subjected to overturning forces shall be less than 0.10Fy for Life Safety and Immediate Occupancy. Alternatively, the axial stress due to overturning forces alone, calculated using the Quick Check procedure of Section 3.5.3.6, shall be less than 0.30Fy for Life Safety and Immediate Occupancy.	
	Connections	
C	TRANSFER TO STEEL FRAMES: Diaphragms shall be connected for transfer of loads to the steel frames for Life Safety, and the connections shall be able to develop the lesser of the strength of the frames or the diaphragms for Immediate Occupancy.	
C	STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation for Life Safety, and the anchorage shall be able to develop the lesser of the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation, for Immediate Occupancy.	

Supplemental Structural Checklist for Building Type S1A: Steel Moment Frames with Flexible Diaphragms

	Item:	Crosby Group Comment:
NC	MOMENT RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.	
C	PANEL ZONES: All panel zones shall have the shear capacity to resist the shear demand required to develop 0.8 times the sum of the flexural strengths of the girders framing in at the face of the column.	
N/A	COLUMN SPLICES: All column splice details located in moment resisting frames shall include connection of both flanges and the web for Life Safety, and the splice shall develop the strength of the column for Immediate Occupancy.	The building is one-story.
C	STRONG COLUMN/WEAK BEAM: The percentage of strong column/weak beam joints in each story of each line of moment resisting frames shall be greater than 50 percent for Life Safety and Immediate Occupancy.	
C	COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Seismic Provisions for Structural Steel Buildings Table I-9-1 (AISC, 1997).	
N/A	BEAM PENETRATIONS: All openings in frame-beam webs shall be less than ¼ of the beam depth and shall be located in the center half of the beams. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
N/A	GIRDER FLANGE CONTINUITY PLATES: There shall be girder flange continuity plates at all moment resisting frame joints. This statement shall apply to the Immediate Occupancy Performance level only.	Building was evaluated to Life Safety Level.
N/A	OUT-OF-PLANE BRACING: Beam-column joints shall be braced out-of-plane. This statement shall apply to the Immediate Occupancy Performance level only.	Building was evaluated to Life Safety Level.
N/A	BOTTOM FLANGE BRACING: The bottom flanges of beams shall be braced out-of-plane. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
	Diaphragms	
C	CROSS TIES: There shall be continuous cross ties between diaphragm chords.	
N/A	PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
N/A	DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate	

	Occupancy Performance Level only.	
C	STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered.	
C	SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing.	
N/A	UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy.	
N/A	NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans less than 40 feet and shall have span/depth ratios less than 4-to-1. This statement shall apply to the Immediate Occupancy Performance Level only.	
C	OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	
	Connections	
N/A	UPLIFT AT PILE CAPS: Pile caps shall have top reinforcement and piles shall be anchored to the pile caps for Life Safety, and the pile cap reinforcement and pile anchorage shall be able to develop the tensile capacity of the piles for Immediate Occupancy.	

Geologic Site Hazards and Foundations Checklist

C	NC	N/A	Item:	Crosby Group Comment:
			Geologic Site Hazards	
	C		LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 feet under the building for Life Safety and Immediate Occupancy.	
	C		SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure.	
	C		SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated	
			Condition of Foundations	
	C		FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure.	
	C		DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure.	
			Capacity of Foundations	
	C		POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy.	
	N/A		OVERTURNING: The ratio of the horizontal dimension of the lateral force resisting system at the foundation level to the building height (base/height) shall be greater than 0.6Sa.	
	C		TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles and piers are not restrained by beams, slabs or soils classified as Class A, B or C.	
	N/A		DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. The statement shall apply to the Immediate Occupancy Performance Level only.	
	N/A		SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only.	

Basic Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
	Partitions	
N/A	UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity.	
	Ceiling Systems	
C	SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Light Fixtures	
C	EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake.	Lighting observed appears to be supported. It is recommended that a thorough inventory be completed to ensure full compliance.
	Cladding & Glazing	
N/A	CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
C	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements.	
N/A	CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel.	
N/A	INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage.	
N/A	PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-lane with a minimum of 4 connections for each wall panel. Two connections per wall panel are	

	permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
	Masonry Veneer	
N/A	SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy.	
N/A	TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements.	
	Parapets, Cornices, Ornamentation and Appendages	
N/A	URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Tbl 3-2.	
N/A	CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Masonry Chimneys	
N/A	URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Stairs	
N/A	URM WALLS: Walls around the stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors.	
	Building Contents and Furnishing	
C	TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or	

	adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Mechanical and Electrical Equipment	
C	EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake.	Equipment observed appears to be mounted. It is recommended that a thorough inventory be completed to ensure full compliance.
C	HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports.	Equipment observed appears to be braced, with undamaged supply lines. It is recommended that a thorough inventory be completed to ensure full compliance.
C	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the anchorage or supports of mechanical or electrical equipment.	Equipment supports observed appear to be free of deterioration, damage and corrosion. It is recommended that a thorough inventory be completed to ensure full compliance.
C	ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced.	Equipment observed appears to be braced. It is recommended that a thorough inventory be completed to ensure full compliance.
	Piping	
C	FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996).	Piping observed appears to be anchored and braced. It is recommended that a thorough inventory be completed to ensure full compliance.
C	FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings.	Piping observed appears to have flexible couplings. It is recommended that a thorough inventory be completed to ensure full compliance.
	Hazardous Materials Storage and Distribution	
C	TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires or other methods.	Substances observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.

Intermediate Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
C	LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips.	Tiles observed appear to be secured. It is recommended that a thorough inventory be completed to ensure full compliance.
C	INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wire or rigid members attached to the structure above at a spacing equal to or less than 12 feet.	Ceiling tiles observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.
N/A	SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 sq ft of area.	
	Light Fixtures	
C	INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures.	
	Cladding and Glazing	
N/A	GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 ft above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked.	
	Parapets, Cornices, Ornamentation, and Appendages	
N/A	CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement.	
N/A	APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3.	
	Masonry Chimneys	
N/A	ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof.	
	Mechanical and Electrical Equipment	
N/A	VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers.	

	Ducts	
N/A	STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints.	

APPENDIX D – CALCULATIONS

The Crosby Group

Project: LPC Tier 1 Report	Date: 3/11/2012		Sht:
Description: Quick Checks	By: KMP	Ck:	

Loads - Steel

B2100 Roof

	Deck	Beams	Girders	Columns	Lateral	
Roofing	2.0	2.0	2.0	2.0	2.0	18 ga Metal w/ mansards
Gyp	4.4	4.4	4.4	4.4	4.4	2 layers gyp
Plywood	1.7	1.7	1.7	1.7	1.7	1/2" plywood
Beams		4.4	4.4	4.4	4.4	18" TJI 35 @16" oc
Girders			1.0	1.0	1.0	W24x62
Columns				1.0	1.0	W14x132
Sprinklers	2.0	2.0	2.0	2.0	2.0	
Insulation	0.5	0.5	0.5	0.5	0.5	6.25" insulation
Lighting	1.0	1.0	1.0	1.0	1.0	
Ceiling	1.0	1.0	1.0	1.0	1.0	Acoustic Tiles
Misc.	3.0	3.0	3.0	3.0	3.0	
Partitions					10.0	
RDL =	15.6	20.0	21.0	22.0	32.0	psf
RLL =	20.0	20.0	20.0	20.0	20.0	psf

The Crosby Group					
Project:	LPC Quick Checks	Date:	3/11/2012		Sht:
Description:	B2100	By:	KMP	Ck:	

CALCULATION OF PSEUDO LATERAL FORCE PER ASCE-31

V= CSaW

PERIOD:

C_t=	0.035	For Steel Moment Resisting Frame Type S1A
hn=	17	Height in feet from Base to Roof Level
B=	0.8	For Steel Moment Resisting Frame Type S1A
$T=C_t h_n^B$=	0.34	Fundamental Period of Vibration of the Building, Section 3.5.2.4
OR		
T=0.10n	0.1	For Steel Moment Resisting Frame

MAPPED SPECTRAL ACCELERATION:

S1=	0.6	Short Period Response Acceleration
Ss=	1.5	Spectral Response Acceleration at one-second Period

Assume Site Class D since soil report is not available

Fv=	1.5	per Table 3-5
Fa=	1	per Table 3-6

SD1=	2/3*FvS1=	0.6
SDS=	2/3*FaSs=	1

Sa=SD1/T=	1.7771499	
and <	SDS	
so Sa=	1	Response Spectral Acceleration

EFFECTIVE SEISMIC WEIGHT:

Area=	10000	sf
DL=	31	
LL=	20	
W=	510	kips

PSEUDO LATERAL FORCE:

C=	1.3	Modification Factor from Table 3-4
And V=CSaW=	663	kips

STORY DRIFT FOR MOMENT FRAMES X DIRECTION:

Dr= ((kb+kc)/(kbkc))*(h/12E)*Vc Drift Ratio: Interstory displ/story height

kb=	4.6	I/L for the representative **beam W24x62**
kc=	2.9	I/h for the representative **column W14x132**
h=	192	story height in inches

Ib=	1550	Moment of Inertia (in4)
Ic=	548	Moment of Inertia (in4)
L=	336	Beam Length from Center to Center of Adjacent Columns (in)
E=	29000	Modulus of Elasticity (ksi)
Vc=	47	Shear in the column (kips) - worst case
Dr=	0.0146	

STORY DRIFT FOR MOMENT FRAMES Y DIRECTION:

Dr= ((kb+kc)/(kbkc))*(h/12E)*Vc

kb=	6.0	I/L for the representative **beam W24x84**
kc=	2.9	I/h for the representative **column W14x132**
h=	192	story height in inches
Ib=	2370	Moment of Inertia (in4)
Ic=	548	Moment of Inertia (in4)
L=	392	Beam Length from Center to Center of Adjacent Columns (in)
E=	29000	Modulus of Elasticity (ksi)
Vc=	47	Shear in the column (kips)
Dr=	0.0133	

AXIAL STRESS DUE TO OVERTURNING IN X DIRECTION

pot = (1/m)(2/3)(Vhn/Lnf)(1/Acol)

m=	2	Component modification factor equal to 2 for Life Safety Level
V=	663	Pseudo Lateral Force in kips
nf=	12	Number of frames in the direction of loading
hn=	17	Number of feet above base to roof level (ft)
L=	22	Length of frame in feet
Acol=	38.8	Area of end of column (in2)
pot=	0.3668	ksi
0.10Fy=	5	ksi

Check pot<0.10Fy "OK"

AXIAL STRESS DUE TO OVERTURNING IN Y DIRECTION

pot = (1/m)(2/3)(Vhn/Lnf)(1/Acol)

m=	2	Component modification factor equal to 2 for Life Safety Level
V=	663	Pseudo Lateral Force in kips
nf=	11	Number of frames in the direction of loading
hn=	17	Number of feet above base to roof level (ft)
L=	33	Length of frame in feet
Acol=	38.8	Area of end of column (in2)
pot=	0.2694	ksi
0.10Fy=	5	ksi

Check pot<0.10Fy "OK"

The Crosby Group					
Project:	LPC Lateral Force Checks	Date:	3/11/2012		Sht:
Description:	B2100	By:	KMP	Ck:	

CHECK MOMENT RESISTING CONNECTIONS:

Moment connections shall develop the strength of the adjoining members or panel zones.

Beam Capacity **W24x84** φMn = φMp = φFyZx = 0.9*36ksi*224in^3 7258 k-in

d=	24.1	in
tf + 1/4=	1.02	in
hc=d-tf=	23.33	in
T=M/hc=	311	kips

CJP Weld Strength - capacity of the base metal controls with tension force normal to weld area

Lweld=bf=	9.02	in
Abm=tf*Lweld=	9.20	in^2
Fbm=	36	ksi
φRn=φFbmAbm=	298	kips

Check T<φRn **Weld is deficient**

Beam Capacity **W24x62** φMn = φMp = φFyZx = 0.9*36ksi*153in^3 4957 k-in

d=	23.7	in
tf + 1/4=	0.84	in
hc=d-tf=	23.11	in
T=M/hc=	215	kips

CJP Weld Strength - capacity of the base metal controls with tension force normal to weld area

Lweld=bf=	7.04	
Abm=tf*Lweld=	5.91	in^2
Fbm=	36	ksi
φRn=φFbmAbm=	192	kips

Check T<φRn **Weld is deficient**

Beam Capacity **W18x40** φMn = φMp = φFyZx = 0.9*36ksi*78.4in^3 2527 k-in

d=	17.9	in
tf + 1/4=	0.775	in
hc=d-tf=	17.375	in
T=M/hc=	145	kips

CJP Weld Strength - capacity of the base metal controls with tension force normal to weld area

Lweld=bf=	6.02	
Abm=tf*Lweld=	4.67	in^2
Fbm=	36	ksi
φRn=φFbmAbm=	151	kips

Check T<φRn **Weld develops the strength of adjoining bm**

CHECK PANEL ZONES:

All panel zones shall have the shear capacity to resist the shear demand required to develop 0.8 times the sum of the flexural strengths of the girders framing in at the face of the column.

Column W14x132

Ac=	38.8	in^2
Fy=	36	ksi
dc=	14.7	in
tw=	0.645	in

Beam W24x84

	Pr=	75	kips	required strength
	Pc=Py=FyA=	1396.8	kips	
Since Pr < 0.4Pc -------->	φRn=	?0.60Fydctw		
	φRn=	**184.3204**	kips	avail strength of the web PZ
	Check φRn > Pr	**Panel zone has shear capacity as required**		

Beam W24x62

	Pr=	75	kips	required strength
	Pc=Py=FyA=	1396.8	kips	
Since Pr < 0.4Pc -------->	φRn=	?0.60Fydctw		
	φRn=	**184.3204**	kips	available strength oF web PZ
	Check φRn > Pr	**Panel zone has shear capacity as required**		

Beam W18x40

	Pr=	75	kips	required strength
	Pc=Py=FyA=	1396.8	kips	
Since Pr < 0.4Pc -------->	φRn=	?0.60Fydctw		
	φRn=	**184.3204**	kips	available strength of web PZ
	Check φRn > Pr	**Panel zone has shear capacity as required**		

CHECK STRONG COLUMN/WEAK BEAM:

The percentage of strong column/weak beam joints in ea story of ea line of meoment-resisting frames shall be greater than 50 percent.

Beam Capacity	**W24x84**	φMn =	7258	k-in
Beam Capacity	**W24x62**	φMn =	4957	k-in
Beam Capacity	**W18x40**	φMn =	2527	k-in
Column Capacity W14x132		φMn =	7582	k-in

**Moment capacity of column is greater than that of beams, therefore this building is compliant.

CHECK FOR COMPACT MEMBERS:

All frame elements shall meet section reqmts set forth by AISC Seismic Provisions for Structural Steel Buildings Table I-9-1

TABLE I-9-1
Limiting Width Thickness Ratios λ_p
for Compression Elements

Description of Element	Width-Thickness Ratio	Limiting Width-Thickness Ratios λ_p
Flanges of I-shaped rolled beams, hybrid or welded beams and channels in flexure	b/t	$52/\sqrt{F_y}$
Webs in combined flexural and axial compression	h_c/t_w	For $P_u/\phi_b P_y \leq 0.125$
		$\frac{520}{\sqrt{F_y}}\left[1 - 1.54\frac{P_u}{\phi_b P_y}\right]$
		For $P_u/\phi_b P_y > 0.125$
		$\frac{191}{\sqrt{F_y}}\left[2.33 - \frac{P_u}{\phi_b P_y}\right] \geq \frac{253}{\sqrt{F_y}}$
Round HSS in axial compression or flexure	D/t	$1300/F_y$
Rectangular HSS in axial compression or flexure	b/t or h_c/t	$110/\sqrt{F_y}$

W14X132 COLUMN:

Ag=	38.8	in2
hc=	10	in
tw=	0.645	in
b=	7.35	in
tf=	1.03	in
Fy=	36	ksi

Check Flanges:

b/t=	7.14	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	16	
Pu=	44	kips
Py=	1397	kips
φb=	0.9	
Pu/(φb*Py)=	0.035	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	91.65	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

W24X62 BEAM:

Ag=	18.2	in2
hc=	20.75	in
tw=	0.43	in
b=	3.5	in
tf=	0.59	in
Fy=	36	ksi

Check Flanges:

b/t=	5.93	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	48	
Pu=	73	kips
Py=	655	kips
φb=	0.9	
Pu/(φb*Py)=	0.124	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	107.06	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

W24X84 BEAM:

Ag=	24.7	in2
hc=	20.75	in
tw=	0.47	in
b=	4.535	in
tf=	0.77	in
Fy=	36	ksi

Check Flanges:

b/t=	5.89	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	44	
Pu=	73	kips
Py=	889	kips
φb=	0.9	
Pu/(φb*Py)=	0.091	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	100.82	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

W18X40BEAM:

Ag=	11.8	in2
hc=	15.5	in
tw=	0.315	in
b=	3	in
tf=	0.525	in
Fy=	36	ksi

Check Flanges:

b/t=	5.71	
ϕp=	52/(sqrtFy)	
ϕp=	8.67	
Check b/t <φp		OK

Check Web:

hc/tw=	49	
Pu=	73	kips
Py=	425	kips
φb=	0.9	
Pu/(φb*Py)=	0.191	
φp=	(520/sqrtFy)(1-1.54(Pu/φbPy))	
φp=	122.72	
253/(sqrtFy)=	42.17	
Check φp > 253/sqrtFy		OK
Check hc/tw < φp		OK

Structural
Engineering &
Design

ASCE 31 SEISMIC EVALUATION

LAS POSITAS COLLEGE,
LIVERMORE, CALIFORNIA

BUILDING 2200

APRIL 16, 2012

PREPARED FOR:
Steinberg Architects
60 Pierce Avenue
San Jose, CA 95110

PREPARED BY:
Crosby Group
2200 Bridge Parkway
Suite 104
Redwood City, CA 94065

1.0 Background

1.1 Scope & Intent of Evaluation

The ASCE 31-03 (formerly FEMA 310) Tier 1 report is intended to allow a rapid evaluation of the seismic capabilities of the structural system of the building. The objective of this evaluation is to determine if the building meets the 'Life Safety' performance level. Using the checklists provided in ASCE 31-03, building system and component deficiencies were identified and are described in this report.

The scope for this Tier 1 evaluation consisted of the following:

- Review available structural drawings
- Perform a site visit to review that the construction is substantially per the available drawings and to determine the general condition of the structure.
- Evaluate the building using the ASCE 31-03 checklists and quick check methodologies.
- Create a report describing the findings of the evaluation.

1.2 Building Description

The building under consideration was designed in 1995 per the 1991 edition of the Uniform Building Code. The single story re-locatable building has an overall plan area of approximately 9100 square feet. The gravity load carrying system generally consists of ¾" T&G plywood sheathing over light gage steel beams and joists. The joists bear on 2x4 studs @ 16" spacing sheathed with ½" plywood shear walls. The lateral load resisting system consists of ¾" plywood roof and floor diaphragms and ½" plywood sheathed shear walls. The foundation system consists of concrete spread footings. This re-locatable building does not conform exactly to a building classification in ASCE 31 terminology. However, it is similar to a typical wood frame building and therefore is evaluated using W2: Wood Frames, Commercial and Industrial checklist. The building is composed of three seismically separate portions, separated at gridlines 7/8 and 17/18.

1.3 Site Seismicity & Soil Profile

The building site is about 5-10 miles from both the Calaveras Fault and the Greenville Fault and is therefore prone to high seismic activity. There is insufficient data to classify the site profile at the site. A site soil report is also not available; therefore Site Class D is assumed per the recommendations of ASCE 31. All pseudo-static lateral demands required for the Tier 1 evaluation are computed based on this site classification.

In general site "Seismicity" or the potential for strong ground motion is classified into regions of Low, Medium, and High. These regions are categorized based upon mapped site accelerations S_S and S_1 which are then modified by site coefficients F_a and F_v to produce Design Spectral Accelerations S_{DS} (short period) and S_{D1} (1 second period).

The site accelerations place the subject property in a region of HIGH Seismicity. Design Spectral Accelerations computed for this site are as follows:
S_{DS}= 1.0g S_{D1}= 0.6g

2.0 Building 2200

2.1 Site Visit

Crosby Group conducted a site visit on March 5, 2012, to validate existing conditions. Another objective of the site visit is to identify potential deficiencies, unusual conditions and details. Additionally, the site visit is meant to compare the existing documents (made available to Crosby Group) with actual field conditions and identify any discrepancies, while also evaluating the condition of non- structural elements and components as they relate to the ASCE 31-03.

All the findings following the site visit are presented as part of the ASCE 31-03 checklist.

2.2 Building Reference Documents

The available drawings are dated August 1, 1995, and were prepared by Meehleis Modular Buildings, Inc. Other building and site specific documentation was not available for review.

2.3 Building Materials & Strengths for Evaluation

Based on the available drawings the following materials and associated strengths were used in the evaluation.

- Concrete foundations: 28-day strength: f'_c = 2500 psi
- Reinforcing steel: ASTM A615 Grade 40 (F_y = 40 ksi) for #3 & #4 bars and Grade 60 for #5 bars and larger
- Wood framing members: Douglas Fir

2.4 Analysis Criteria

Performance Level: Life Safety
Building Type: W2: Wood Frames, Commercial and Industrial
Spectral Accelerations (from USGS):
S_S = 1.5g, S_1 = 0.6g
S_{DS} = 1.0g, S_{D1} = 0.6g

2.5 Tier 1 Evaluation Findings

The structure complies with the majority of the items identified in the Structural and Supplemental Structural checklists. In addition, the structure passed the quick calculation check for the shear stress limitation imposed on the wood shear walls.

Nonstructural components were generally assessed as compliant. Evidence of deterioration of wood members was not found on the superficial structure, however rusting was found in the light gage steel members on the underside of the mansard/overhangs in several locations, as well as along the light gage steel roof framing members and connections. At the base of the building, where the exterior wall meets the concrete slab, rust was seen in multiple locations. Development of rust on structural members is non-compliant, per ASCE 31-03 standards.

2.6 Conclusions & Mitigation Strategy

The non-compliant items listed in the attached ASCE 31-03 Tier 1 checklists shall be addressed. If the building remains operable, it is recommended that the rust on structural members be assessed and that members whose structural capacity has been compromised by the rust be repaired or replaced.

At this time, it is understood that future plans may indicate removal of Building 2200 in the next five years and construction of a new building in its place.

APPENDIX A - SITE PHOTOS

Exterior canopy at front of building

Side of building

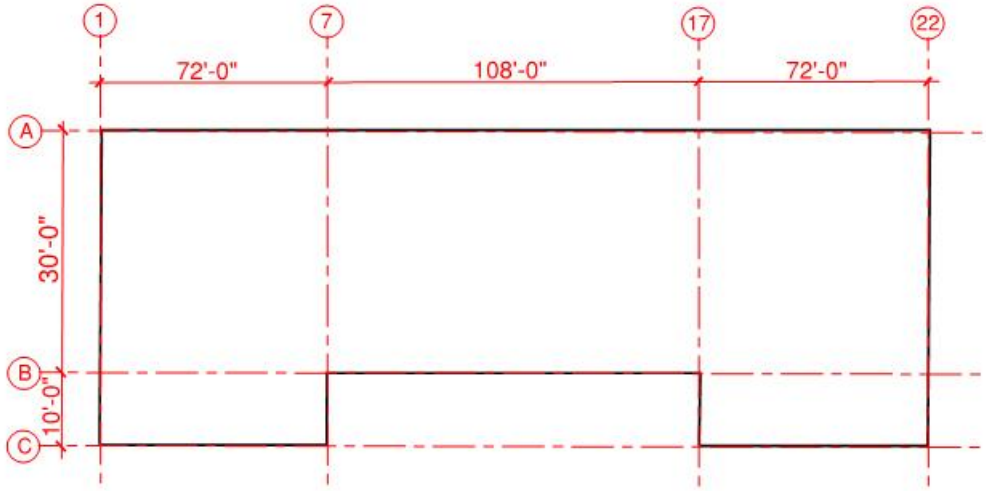
Exterior entrance to classroom

Typical classroom/lab area

Rust at exterior roof overhang

Rust at exterior roof overhang

APPENDIX B – BUILDING LAYOUT



FLOOR PLAN - BUILDING 2200

APPENDIX C – CHECKLISTS

ASCE 31-03 Basic Structural Checklist for Building Type W2: Wood Frames Commercial and Industrial

C NC N/A	Item:	Crosby Group Comment:
	Building System	
C	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.	
N/A	MEZZANINES: Interior Mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure.	
N/A	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy.	The building is one-story.
N/A	GEOMETRY: There shall be no changes in horizontal dimension of the lateral force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occpancy, excluding one-story penthouses and mezzanines.	The building is one-story.
C	VERTICAL DISCONTINUITIES: All elements in the lateral-force-resisting system shall be continuous to the foundation.	
N/A	MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses and mezzanines need not be considered.	
C	DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken or loose.	The conditions that were observed generally did not show signs of deterioration. It is recommended that a thorough investigation be completed in the future, including removal of finishes.
N/A	WOOD STRUCTURAL PANEL SHEAR WALL FASTENERS: There shall be no more than 15 percent of inadequate fastening such as overdriven fasteners, omitted blocking, excessive fastening spacing, or inadequate edge distance. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.

	Lateral-Force-Resisting System	
C	REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal 2 for Life Safety and Immediate Occupancy.	
C	SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than the following values for Life Safety and Immediate Occupancy. Structural panel sheathing, 1,000 plf Diagonal sheathing, 700 plf Straight sheathing, 100 plf All other conditions, 100 plf	
N/A	STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings shall not rely on exterior stucco walls as the primary lateral-force-resisting system.	
N/A	GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard shall not be used as shear walls on buildings over one story in height with the exception of the uppermost level of a multi-story building.	The building is one-story.
C	NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 for Life Safety and 1.5-to-1 for Immediate Occupancy shall not be used to resist lateral forces developed in the building in levels of moderate and high seismicity. Narrow wood shear walls with an aspect ratio greater than 2-to-1 for Immediate Occupancy shall not be used to resist lateral forces developed in the building in levels of low seismicity.	
N/A	WALLS CONNECTED THROUGH FLOORS: Shear walls shall have interconnection between stories to transfer overturning and shear forces through the floor.	The building is one-story.
N/A	HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story due to a sloping site, all shear walls on the downhill slope shall have an aspect ratio less than 1-to-1 for Life Safety and 1-to-2 for Immediate Occupancy.	The building is one-story.
N/A	CRIPPLE WALLS: Cripple walls below first-floor-level shear walls shall be braced to the foundation with wood structural panels.	
N/A	OPENINGS: Walls with openings greater than 80 percent of the length shall be braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or shall be supported by adjacent construction through positive ties capable of transferring the lateral forces.	
	Connections	
N/A	WOOD POSTS: There shall be a positive connection of wood posts to the foundation.	
NC	WOOD SILLS: All wood sills shall be bolted to the foundation.	Wood sills are bolted to floor beams. It is unclear whether floor beams are anchored to the foundations.
C	GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support.	

Supplemental Structural Checklist

C NC N/A	Item:	Crosby Group Comment:
	Lateral-Force-Resisting System	
N/A	HOLD-DOWN ANCHORS: All shear walls shall have hold-down anchors constructed by acceptable construction practices, attached to the end studs. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
	Diaphragms	
C	DIAPHRAGM CONTINUITY: The diaphragms shall not be composed of split-level floors and shall not have expansion joints.	
C	ROOF CHORD CONTINUITY: All chord elements shall be continuous, regardless of changes in roof elevation.	
N/A	PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
N/A	DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only.	Building was evaluated to Life Safety Level.
C	STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered.	
C	SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing. Wood commercial and industrial buildings may have rod-braced systems.	
N/A	UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy.	Diaphragms are blocked.
C	OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	
	Connections	
C	WOOD SILL BOLTS: Sill bolts shall be spaced at 6 feet or less for Life Safety and 4 feet or less for Immediate Occupancy, with proper edge and end distance provided for wood and concrete.	

Geologic Site Hazards and Foundations Checklist

C	NC	N/A	Item:	Crosby Group Comment:
			Geologic Site Hazards	
	C		LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 feet under the building for Life Safety and Immediate Occupancy.	
	C		SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure.	
	C		SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated	
			Condition of Foundations	
	C		FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure.	
	C		DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure.	
			Capacity of Foundations	
	N/A		POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy.	
	C		OVERTURNING: The ratio of the horizontal dimension of the lateral force resisting system at the foundation level to the building height (base/height) shall be greater than 0.6Sa.	
	N/A		TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles and piers are not restrained by beams, slabs or soils classified as Class A, B or C.	
	N/A		DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. The statement shall apply to the Immediate Occupancy Performance Level only.	
	N/A		SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only.	

Basic Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
	Partitions	
N/A	UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity.	
	Ceiling Systems	
N/A	SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Light Fixtures	
C	EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake.	Lighting observed appears to be supported. It is recommended that a thorough inventory be completed to ensure full compliance.
	Cladding & Glazing	
N/A	CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements.	
N/A	CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel.	
N/A	INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage.	

N/A	PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-lane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component checklist is required by Table 3-2.	
	Masonry Veneer	
N/A	SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy.	
N/A	TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing.	
N/A	DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements.	
	Parapets, Cornices, Ornamentation and Appendages	
N/A	URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Masonry Chimneys	
N/A	URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Stairs	
N/A	URM WALLS: Walls around the stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
N/A	STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors.	

	Building Contents and Furnishing	
N/A	TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2.	
	Mechanical and Electrical Equipment	
C	EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake.	Equipment observed appears to be mounted. It is recommended that a thorough inventory be completed to ensure full compliance.
C	HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports.	Equipment observed appears to be braced, with undamaged supply lines. It is recommended that a thorough inventory be completed to ensure full compliance.
C	DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the anchorage or supports of mechanical or electrical equipment.	Equipment supports appear to be free of damage and corrosion. It is recommended that a thorough inventory be completed to ensure full compliance.
C	ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced.	Equipment observed appears to be braced. It is recommended that a thorough inventory be completed to ensure full compliance.
	Piping	
C	FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996).	Piping appears to be braced. It is advised that a thorough inventory be completed to ensure full compliance.
C	FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings.	Piping observed appears to have flexible couplings. It is recommended that a thorough inventory be completed to ensure full compliance.
	Hazardous Materials Storage and Distribution	
C	TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires or other methods.	Substances observed appear to be restrained. It is recommended that a thorough inventory be completed to ensure full compliance.

Intermediate Nonstructural Component Checklist

C NC N/A	Item:	Crosby Group Comment:
C	LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips.	
	INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wire or rigid members attached to the structure above at a spacing equal to or less than 12 feet.	
N/A	SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 sq ft of area.	
	Light Fixtures	
	INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures.	
	Cladding and Glazing	
N/A	GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked.	
	Parapets, Cornices, Ornamentation, and Appendages	
N/A	CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement.	
N/A	APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3.	
	Masonry Chimneys	
N/A	ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof.	
	Mechanical and Electrical Equipment	
N/A	VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers.	
	Ducts	
N/A	STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints.	

APPENDIX D - CALCULATIONS

Project: CHABOT LAS POSITAS	Job No:	
Description: BUILDING 2200	Date: 03/27/12	Sht: 1
	By: MYL Ck:	

SHEAR STRESS QUICK CHECK

$V = C \cdot S_A \cdot W$ PSEUDO LATERAL FORCE

USE $C = 1.3$ (TABLE 3A OF ASCE 31-03)

$S_A = 1.0$ (FROM BUILDING 800 CALCS)

CALCULATE SEISMIC WEIGHT

ROOF FRAMING: ASSUME 15 PSF

WALL LOADS W/ STUDS:

1.9 PSF PLYWOOD × TRIB HT.

$1.9^{PSF} \times 6FT \times 3 = \underline{34.2\ PLF}$

CONSERVATIVE ASSUME 3 LAYERS

ADD 3 PLF FOR INSULATION

(0.5 PSF INSUL × 6 FT TRIB)

STUDS: 2×4 STUD @ 16" O.C. (0.9 PSF)

0.9 PSF × 6 FT TRIB HEIGHT = 5.4 PLF

TOTAL WALL LOAD = USE 43 PLF

PLAN AREA: 228.5 FT × 40 FT = 9140 FT²

WALL LENGTH: 2(228.5 FT) + 2(40 FT) + 20 FT = 557 FT

ESTIMATED BUILDING WEIGHT:

15 PSF × 9140 FT² + 43 PLF × 557 FT = 161 KIPS

PSEUDO LATERAL FORCE:

$V = C\ S_a\ W = 1.3 \cdot 1.0 \cdot 161\ K = \underline{210\ K}$

$V_g^{AVG} = \frac{1}{m}\left\{\frac{V_I}{A_w}\right\}$

$m = 4.0$ (ASCE 31-03 TABLE 3.7)

A_w = LENGTH OF WALL = 557 FT

$V_g^{AVG} = \frac{1}{4}\left\{\frac{210\ K}{557\ FT}\right\} = 95\ PLF < 1000\ PLF$

PLYWOOD PANELS OK ✓

Project: CHATSOT LAS POSITAS		Job No:	
Description: BUILDING 2200		Date: 03/27/12	Sht: 2
		By: MYL Ck:	

OVERTURNING QUICK CHECK

$$\frac{\text{BASE DIM.}}{\text{HEIGHT}} = \frac{40'}{12'} = 3.33 > 0.6 S_a = 0.6$$

OK ✓

3 | 2012 Facilities Master Plan Utility and Site Study

SANDIS | CIVIL ENGINEERS SURVEYORS PLANNERS

CHABOT LAS POSITAS

COMMUNITY COLLEGE CAMPUSES

UTILITY AND SITE STUDY

MAY 15, 2012

This report has been prepared for the sole use and benefit of the Chabot Las Positas Community College District in accordance with generally accepted civil engineering principles and practices. No warranty, either expressed or implied, is made. Any use of reliance of this report of the information herein by a third party shall be at such party's sole risk.

SANDIS | CIVIL ENGINEERS SURVEYORS PLANNERS

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1.0 EXECUTIVE SUMMARY:

As part of the 2012 Facilities Master Plan Update (FMP), the Chabot College and Las Positas College campus infrastructure was reviewed and analyzed. This study provides an assessment of the condition and capacity of the existing utility systems including the following: domestic water, fire water, reclaimed water (specifically for fire water systems), sanitary sewer and storm drainage. This study also includes an analysis of stormwater treatment measures available for meeting the state mandated stormwater quality requirements, referred as C.3 Requirements, for new development and redevelopment projects. Vehicular and pedestrian accesses at campus main entries are also analyzed as part of the 2012 FMP. Each new project of the 2012 FMP will incorporate infrastructure improvements for the building and the surrounding area, as required to service building utility demands and accessibility. This report does not include other District facilities and Centers. Electrical, Mechanical, Data/Technology, Hydronics, and Gas are discussed in separate Appendices included in the 2012 FMP.

The Chabot College campus is in the midst of Measure "B" bond building construction and site improvements. Currently, the campus utility systems have undergone partial upgrades for domestic water, fire water, and sanitary sewer as each project allowed. The 2012 FMP proposes for the Chabot College campus, demolition of approximately 180,650 gross square foot (gsf) of existing buildings, construction of approximately 257,710 gsf of new buildings, and renovation of approximately 106,760 gsf of existing buildings. The campus utility system will require upgrades to storm drainage, replacing sanitary sewer lines as needed and final replacement of the fire water system. All proposed projects will need to mitigate the stormwater prior to entering the storm drain system. In addition, the planned Chabot College campus site improvements for the 2012 FMP includes widening a portion of the Chabot College Drive entrance and expanding the existing drop-off area.

The Las Positas College (LPC) campus is also currently under construction to complete Measure "B" bond funded projects. Currently, 6 of 7 buildings have been constructed, and bioretention basins and an underground vault have been constructed as part of the campus-wide storm water management program. The 2012 FMP proposes the further demolition of approximately 102,070 gsf of existing buildings, construction of approximately 207,565 gsf of new buildings, renovation of approximately 38,185 gsf of existing buildings and the expansion of the Athletics Fields. The planned LPC campus site improvements include three campus entrances; Creative Center of Arts entrance, Student Services and Administration entrance and Isabel entrance. In addition, it is assumed that student enrollment will increase and a future parking lot is proposed will be required to accommodate the increase.

Site improvement recommendations are based on District Management input regarding existing traffic circulation. A complete traffic analysis is recommended to verify what each campus requires.

2.0 OVERVIEW:

The scope of this report includes an analysis for each campus of the existing campus utility infrastructure, the impacts to utilities of buildings proposed by the 2012 FMP, and recommended improvements to mitigate those impacts. In addition, this report includes recommendations regarding state mandated stormwater quality (C.3) requirements and site improvements to improve traffic circulation and pedestrian access at each campus entrances and parking lots.

2.1 UTILITY SYSTEMS

The following campus utility systems were analyzed in the 2012 FMP: domestic water, fire water, reclaimed water (specifically for fire water systems), sanitary sewer and storm drainage. Information regarding existing utilities was obtained and compiled from topographic surveys and aerial information, supplemental surveys, mechanical locating information from various project sites, and as-built information. All information was provided by the Chabot Las Positas Community College District (CLPCCD). Campus-wide systems were reviewed for capacity of each system and for general impacts of the proposed buildings. The capacities of each utility system are based on building square footage and building type. The types of building vary from academic, office and athletics.

For the Chabot College and LPC campuses the domestic water demand are based on existing water usage records provided by the District. This information was used to estimate the existing campus demand after Measure "B" bond building construction is complete. These estimates are conservative and indicate a slightly higher demand when compared to existing campus domestic water usage records. The existing domestic water mains for each campus have the capacity for increased demands proposed by the 2012 FMP.

For the Chabot College and LPC campuses, there are no known routine problems with blockages or capacity issues within the sanitary sewer systems. The existing sanitary sewer mains for each campus have capacity for any increased demands proposed by the 2012 FMP. Additional analysis is recommended for each proposed building location, to determine any upgrades for existing sewer lines located near the buildings to accommodate any increased demand.

Similarly, there have not been any drainage problems with regard to flooding or blockages within each campus storm drain systems. As part of each campus maintenance program, annual maintenance to clean inlets and structures of accumulated debris are performed. The existing storm drain mains for each campus do not have capacity for any additional runoff proposed by the 2012 FMP. Any new construction on campus will increase the impervious area and correspondingly increase stormwater runoff. To avoid upgrades to the storm drain mains, it is recommended that new buildings require a net zero increase peak runoff through stormwater mitigation.

Stormwater mitigation can be achieved using various aboveground and below ground methods. In addition, Stormwater mitigation measures used to help maintain capacity of the existing storm drain system can be used to meet state mandated C.3 requirements.

2.2 STORM WATER QUALITY (C.3) MITIGATION MEASURES

As part of the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program requires stormwater pollution control for proposed projects. The California

Regional Water Quality Control Board, San Francisco Bay Region, has issued the Municipal Regional Stormwater Permit (MRP) that the Chabot College and LPC campuses must comply to. As part of the MRP, stormwater treatment measures must comply with stormwater quality requirements (C.3 Requirements). These stormwater requirements are intended to improve the quality of the waterways by reducing erosion and limiting pollution from proposed development. In general this means the reduction of storm water discharge rates and volumes as well as treatment of stormwater.

In addition to meeting C.3 Requirements, implementing best management practices (BMPs) at a college environment allows additional educational benefits. Students and others community members are able to learn firsthand of the aesthetic and environmental benefits of sustainable design. As the future generations of designers complete their studies, they will already be familiar with green building technologies.

The Chabot College and LPC campuses are currently implementing stormwater mitigation measures to address C.3 Requirements. The Chabot College campus uses bioretention facilities and flow-through planters to meet stormwater quality requirements. The LPC campus implements a campus-wide stormwater mitigation measures with pervious pavement, flow-through planters, various bioretention basins and swales located through the campus. In addition, the LPC campus uses underground storage pipes and vaults to help reduce the stormwater flow rate before entering the storm drain campus mains.

As part of the 2012 FMP, each proposed building project shall implement stormwater mitigation measures (or BMPs) to meet C.3 Requirements. These BMPs include bioretention facilities, green roof, flow-through planters, and pervious pavement.

Bioretention Facilities

Bioretention facilities are surface reservoirs which retain runoff and filter it through vegetation and amended soils and encourage infiltration into the ground. They provide stormwater storage and reduce velocity and flow rate by using the stormwater to pond across the entire functional area of the bioretention facility before untreated runoff may be discharged via an overflow catch basin.

Bioretention facilities are potentially inexpensive, low maintenance and can be sized to have a treatment area equal to 4% of the impervious surface area of the treated site. This BMP works well where there is enough landscape area nearby a building or other impervious surface to easily discharge stormwater into the bioretention facility.

Green Roof

Green roofs consist of partially or completely covered roof area with vegetation and a growing medium. Green roofs serve several purposes for a building, these include; absorbing rainwater, creating a habitat for wildlife, and helps mitigate the heat island effect. Green roofs is an option for sustainable building development since they do not take up additional area beyond the building footprint and are considered a very successful BMP technology since they are on a surface that is traditionally impervious.

However, green roofs have additional costs associated with structural, plumbing, waterproofing, landscaping, and maintenance. All of these factors need to be carefully analyzed when considering a green roof. Having one exemplary sustainable building with a green roof is a great

way of promoting this technology and creating an educational opportunity to students while meeting stormwater requirements.

Flow-Through Planter

Flow-through planters are a landscape structure much like a planter box that is designed to temporarily capture and treat runoff by directing water through soil and vegetation before it is slowly directed towards the storm drain system. The planter box has impervious sides and bottom and does not infiltrate water into surrounding soils. Flow-through planters are ideal for sites with soil that does not drain well or soil moisture in general is a concern such as next to building foundation walls.

Because of extra material involved in the structure and waterproofing of these flow-through planters, they can be more expensive then bioretention facilities which in many situations can be placed in the same footprint. Flow-through planters are typically used only when the project cannot accommodate a bioretention facility because of soil conditions, landscape design, or costs.

Pervious Pavement

Pervious pavement consists of impervious paving stones paved in a pattern which creates void space to allow stormwater to infiltrate into the pavement base material. The base material provides storage while reducing the velocity and flow rate of the stormwater before discharging via a perforated pipe sub-drain. The pervious pavement must be adequately sized to retain the first inch of rainfall and allow infiltration back into the ground. Additional soils analysis is recommended to verify if pervious pavement can be used as a stormwater treatment measure.

2.3 SITE IMPROVEMENTS – VEHICULAR AND PEDESTRIAN ACCESS

As part of the 2012 FMP, site improvements were analyzed at each campus entrances based on District Management input regarding existing vehicular and pedestrian access. For the Chabot College campus, this report provides recommendations for the Chabot College Drive Entrance. For the LPC Campus, this report provides recommendations for three campus entrances: Creative Center of Arts entrance, Student Services and Administration entrance and Isabel entrance.

3.0 CHABOT COLLEGE:

The following section reviews the impacts of the proposed 2012 FMP to the existing Chabot College campus utility systems and provides recommendation to mitigate these impacts. This section also recommends site improvement to address vehicular and pedestrian access at the Chabot College Drive entrance.

As part of the 2012 FMP, there will be a demolition of approximately 180,650 gsf of existing building, new building areas of approximately 257,710 gsf and building renovations of approximately 106,760 gsf. There will be a net increase of approximately 77,060 gsf building gross square feet, for the Chabot College campus.

3.1 UTILITY SYSTEMS

Water Systems

There are three separate water systems that serve the Chabot College campus; domestic water, fire water, and irrigation, see Utility Exhibit, Appendix A.

Domestic Water

Existing System

The domestic water system on campus is provided by a 6-inch loop that encircles the Grand Court and is fed by a 6-inch line with a 4-inch meter in Hesperian Boulevard. Portions of the existing domestic water line consist of brittle transite pipe and are prone to developing fractures in the lines and causing leaks during construction activities. Any modifications of this line can require asbestos abatement. In addition, a second 6-inch domestic water loop has been installed that runs parallel to the existing domestic water loop. This line connects to the existing domestic water line after the existing backflow preventer and most of the existing buildings on campus have been re-fed to this line. Only a couple of buildings are still being served by the existing water loop.

The domestic water system experiences high pressure spikes and some buildings are equipped with pressure reducing valves to accommodate the high pressure spikes. In addition, pressure reducing valves were installed after the meter to alleviate the problems with pressure spikes. The existing domestic water peak demand for the entire campus is approximately 132 gallons per minute (gpm), see Appendix B.1 and B.2 for calculations.

Proposed System

The 2012 FMP proposes an increase of gross building footage and estimates total peak demand of 146 gpm. There is an 11% increase to the existing domestic water demand, see Appendix B.3 for calculations. The existing domestic water line has a capacity of approximately 500 gpm and it is not necessary to increase the connection size. Due to the high pressure spikes in the domestic water system, any new construction will require a pressure reducing valve for the building.

Since the current domestic water system essentially has two separate domestic water loops, it is recommended to abandon the existing domestic water line and re-feed any existing buildings to the 6-inch line upgrade. All new buildings should connect to the 6-inch line upgrade. Abandoning the existing water loop is recommended to prevent any future need to repair the existing transite pipe due to leaks or future construction.

Fire Water

Existing System

The fire water system on campus is provided by a dedicated 6-inch loop circling the majority of the main campus buildings and connects to the main line in Depot Road. Portions of the fire water system consist of transite pipe. Past upgrades to the fire water system included a second connection to the main in Hesperian Road, extending the campus loop around the Physical Education Complex, and adding a 6-inch fire water line bisecting the campus east/west through the Grand Court. The fire water system currently provides 4,300 gpm at a residual pressure of 20 psi. The overall system provides the required pressure and flow rates and there has not been any reported maintenance issues.

Proposed System

Proposed fire water demands are based on building square footage and assuming building type V-B for all buildings. All proposed buildings are assumed to be sprinklered and have a 50% sprinkler reduction for required fire flow demand. Based on the 2010 California Fire Code, the existing fire water system can handle a building area of 85,100 gsf assuming Type V-B with a 50% reduction. This will require a fire flow demand of 3,875 gpm at 20 psi. The 2012 FMP proposes building areas from 2,500 gsf to 73,740 gsf, therefore the existing system can provide the required fire flow demands. Overall, the existing fire water system does not require any upgrades. Portions of the existing 6-inch fire water loop located within or near proposed building footprints will need to be relocated and replaced as needed. Hydrant coverage will be required for any new construction per the current California Fire Code.

Irrigation

Existing System

The irrigation system on campus is provided by a dedicated 4-inch loop that from an on campus well encircles the Grand Court. There have not been any maintenance issues of the existing system.

Proposed System

The existing irrigation line will not need to be upgraded. For additional irrigation information see the Landscape Narrative as part of the 2012 FMP.

Sanitary Sewer

Existing System

The Chabot campus sanitary sewer system is a network of pipes that is made of two subsystems. The majority of campus drains to an 8-inch line in the service drive that discharges to a line in Depot Road. A smaller system of pipes collects the bathroom and buildings around the athletic fields and discharges to a line in West Street.

The 8-inch line discharging to Depot Road has an existing capacity of approximately 0.7 cubic feet per second (cfs). The portion of the Chabot College campus that discharges into this line has peak sanitary flow rate of approximately 0.29 cfs, with an average flow rate of 0.07 cfs, see Appendix B.2 for calculations. The existing 8-inch line is currently operating at approximately 43% of its capacity at peak demand. The smaller line discharging to West Road collects a small portion of the campus and was not included in this analysis.

Proposed System
The 2012 FMP proposes an increase of gross building footage and estimates that there will be a peak sanitary demand of 0.32 cfs, with an average flow rate of 0.08 cfs, see Appendix B.3 for calculations. The existing 8-inch line will be operating at 46% of its capacity at peak demand and no upgrades will be needed. Further analysis will be required for site specifics location of proposed buildings. Secondary sanitary sewer lines may need to be upsized due to increased demands in that area.

Storm Drainage

Existing System
The Chabot College campus is divided in four storm drainage areas that discharge to either Depot Road or West Street; see Utility Exhibit, Appendix A. The West Street connection is a 33-inch pipe that collects the northern part of campus, including the athletic fields and Parking Lot B. There are three Depot road connections; a 15-inch line that collects Parking Lot G, a 15-inch line that collects the Childcare Center and Building 700 area, and a 27-inch line located near the campus service drive that collects the rest of the campus area.

There have not been any drainage problems with regard to flooding or blockages within the storm drain system. As part of the campus maintenance program, annual maintenance to clean inlets and structures of accumulated debris is performed.

Proposed System
The 2012 FMP will propose an increase in impervious area for the LPC campus and stormwater mitigation will be required to maintain the existing storm drain main capacities. Due to limited space, underground vaults or pipes may need to be located under parking lots to help mitigate stormwater discharge off site. It is recommended that the campus develop a campus-wide Stormwater Management Plan that can address both quality and quantity of runoff for the overall campus.

3.2 SITE IMPROVEMENTS - VEHICULAR AND PEDESTRIAN ACCESS

Chabot College Drive

The Chabot College campus can be accessed from Hesperian Boulevard using two Chabot College Drive entrances. One entrance is located at the intersection at Turner Court and the other entrance is located near Building 700. Currently the Building 700 entrance has finished construction and will become a signalized entrance at Hesperian Boulevard into the campus. The intersection provides a one-lane in and one-lane out for the campus with a dedicated right turn onto the loop road. Based on District input, there are traffic circulation conflicts at this entrance due to vehicles accessing the dedicated right turn lane (northbound) onto the loop road and preventing vehicles from accessing the drop-off area by Building 700 or allowing vehicles to make a left-turn (southbound) into the loop road.

To help decrease the congestion, a recommendation would be to extend the right-turn lane closer to Hesperian Boulevard to allow vehicles faster access to the dedicated right-turn lane (northbound) onto the loop road. This will also provide a queuing space for vehicles heading northbound on the loop road and allow access to vehicles heading southbound on the loop road. The portion of the roadway to be extended/widened will occur after the one-lane entrance into the campus.

Another recommendation is to expand the existing drop-off area located at Building 700 to allow for better circulation and more vehicles to access this part of the campus. Recommendations include extending the drop-off area to allow access further north of the loop road and providing additional drop off area parallel to Building 700 or between Building 800 and Building 1000. Additional traffic analysis is recommended to warrant a drop-off expansion and appropriate location. See Landscape Narrative as part of the 2012 FMP for additional site improvement information.

4.0 LAS POSITAS COLLEGE:

The following section reviews the impacts of the proposed 2012 FMP to the existing LPC campus utility systems and provides recommendations to mitigate these impacts. This section also recommends site improvement to address vehicular and pedestrian access at three entrances to the campus. The three entrances are the Creative Center of Arts entrance, the Student Services and Administration entrance and the Isabel entrance.

As part of the 2012 FMP, there will be a demolition of approximately 102,070 gsf of existing building, new building areas of approximately 207,565 gsf and building renovations of approximately 38,185 gsf. There will be a net increase of approximately 105,495 gsf building gross square feet, for the LPC campus.

4.1 UTILITY SYSTEMS

Water Systems

There are three separate water systems that serve the LPC campus; domestic water, reclaimed fire water, and reclaimed irrigation. Each system is a looped system located within the Loop Road and is fed from the intersection at Collier Canyon Road and the Loop Road.

As a general recommendation, any proposed new construction at the LPC campus shall incorporate the use of reclaimed water for plumbing design. See Plumbing narrative as part of the 2012 FMP for additional information.

Domestic Water

Existing System

The domestic water system on campus is provided by an 8-inch loop located within the Loop Road and fed by an 8-inch line with a 3-inch meter in Collier Canyon Road, see Utility Exhibit, Appendix C. In addition, there is an 8-inch domestic water main that bisects the loop in a north/south direction along the western edge of the Physical Education building. The upper portion of the campus experiences low pressure due to the elevation change. This portion of the campus is located from the Student Services and Administration building and above. To account for the low pressure in this area, existing buildings have domestic water booster pumps. The existing domestic water peak demand for the LPC campus is approximately 84 gpm, see Appendix D.1 and D.2 for calculations.

Proposed System

The 2012 FMP proposes an increase of gross building footage and estimates total peak demand of 103 gpm. This is a 23% increase to the existing demand, see Appendix D.3 for calculations. The existing domestic water line has a capacity of approximately 400 gpm and it is not necessary to increase the connection size. In addition, due to the low pressure experienced at the upper portion of the campus, any new buildings located in this area will require domestic water booster pumps.

Reclaimed Fire Water

Existing System

The reclaimed fire water system on campus is provided by a dedicated 12-inch loop located along the Loop Road and connects to the main in Collier Canyon Road, see Utility Exhibit, Appendix C. In addition, there is a 12-inch reclaimed fire water line that bisects the loop in a north/south direction along the eastern edge of the Student Services and Administration building. The fire water system currently provides 3,375 gpm at a residual pressure of 20 psi. The overall system provides the required pressure and flow rates and there has not been any reported maintenance issues.

Proposed System

Proposed fire water demands are based on building square footage and assuming building type V-B for all buildings. All proposed buildings are assumed to be sprinklered and have a 50% sprinkler reduction for required fire flow demand. Based on the 2010 California Fire Code, the existing fire water system can handle a building area of 64,800 gsf assuming Type V-B with a 50% reduction. This will require a fire flow demand of 3,375 gpm at 20 psi. The 2012 FMP proposes building areas from 3,692 gsf to 57,365 gsf, therefore the existing system can provide the required fire flow demands. Overall, the existing fire water system does not require any upgrades. Hydrant coverage will be required for any new construction per the current California Fire Code.

Reclaimed Irrigation

Existing System

The reclaimed irrigation on campus is provided by a dedicated 8-inch loop located on the Loop Road and connects to a main in Collier Canyon Road. There have not been any maintenance issues of the existing system.

Proposed System

The existing irrigation line does not need to be upgraded. For additional irrigation information see the Landscape narrative as part of the 2012 FMP.

Sanitary Sewer

Existing System

The LPC campus sanitary sewer system is a network of pipes that drains into a 10-inch campus main. The sanitary sewer system drains from the northernmost portion of the campus near the Maintenance and Operations building and south towards Collier Canyon Road where it connects to a 12-inch main, see Utility Exhibit, Appendix C. The 10-inch campus main has an existing capacity of approximately 2.6 cfs. The LPC campus discharges into this line at peak sanitary flow rate of approximately 0.19 cfs, with an average flow rate of 0.05 cfs see Appendix D.1 and D.2 for calculations. The existing 10-inch line is currently operating at approximately 7% of its capacity.

Proposed System

The 2012 FMP proposes an increase of gross building footage and estimates that there will be a peak sanitary flow of 0.23 cfs, with an average flow rate of 0.06 cfs, see Appendix D.3 for calculations. The existing 10-inch line will be operating at 11% of its capacity and no upgrades are needed. Further analysis will be required for secondary sanitary sewer lines which may need to be upsized due to increased demands.

Storm Drainage

Existing System

The LPC campus is sub-divided into three large drainage areas; see Utility Exhibit, Appendix C. Stormwater runoff within these areas enters a complex system of storm drain piping. The northern portion (Area 1) of the campus drains to various stormwater mitigation facilities located throughout the campus prior to discharging into Collier Creek through various 12-inch, 24-inch and 36-inch outfalls. The southern portion of the campus (Area 2) drains to either a storage pipe system or underground vault to reduce the stormwater flow rate prior to discharging to a 30-inch outfall south of Loop Road. The Athletics Field (Area 3) drains into a separate storm drain system from the campus and discharges into an adjacent drainage swale northeast of the campus.

Proposed System

The 2012 FMP new construction proposes an increase in impervious area. New construction shall mitigate the stormwater prior to discharging to the existing system by maintaining the existing stormwater flow rate. Proposed stormwater mitigation measures must be designed using the Bay Area Hydrology Model (BAHM) software to analyze the effects of increased stormwater runoff and size the mitigation measures. The BAHM software models existing and post-project stormwater runoff based on local parameters and actual rainfall data at the LPC campus. It analyzes proposed stormwater mitigation measures to meet flow duration criteria and reduce undesirable impacts downstream of Collier Creek. Storm water mitigation measures for new construction can be achieved using bioretention swales, detention basins or underground storage vaults or storage pipes with weirs.

In addition, it is recommended that all new construction will need to incorporate into the design, stormwater mitigation measures that do not impact the existing detention basins and underground vaults on campus. Also, any new construction north of the Maintenance and Operation building and the expansion of the Athletics Field will be designed to discharge to the existing drainage swale to the east. This area will need to implement mitigation measures in order to maintain the existing flow rate prior to discharging into the drainage swale.

4.2 SITE IMPROVEMENT - VEHICULAR AND PEDESTRIAN ACCESS

The LPC campus can be accessed at two locations: Collier Canyon Road and Campus Hill Road. Based on District feedback, the main concerns regarding vehicular and pedestrian access for the LPC campus are traffic flow during peak hours, providing accessibility throughout the campus including the Athletics Fields and maintaining maintenance vehicle and fire truck access to the campus.

As part of the 2012 FMP there are three main entrance improvements for the LPC Campus. The main goals for each entrance are to provide campus identity, accommodate increased traffic volumes and provide better traffic circulation. With the completion if the Athletics Field and Hammerhead Roadway, it is recommended that a campus connection is made to the adjacent Murray Ranch property. In addition, this analysis assumes that the 2012 FMP new construction will increase student enrollment and create a need for additional parking.

Creative Center of Arts (CCA) Entrance

The Creative Center of Arts Entrance is located east of the Collier Canyon Road, south of the Loop Road. This entrance will provide access to the Creative Center of Arts building, Parking Lot A and Parking Lot B; see Utility Exhibit, Appendix C. Portions of the Loop Road from Collier

Canyon Road to this entrance will be widened to provide a left-turn lane and relieve congestion at the Collier Canyon Road entrance. The CCA entrance will have a pedestrian drop off area for access to the south portion of campus with 2-lanes in and 2-lanes out. In addition, this entrance will provide access to Parking Lot A and Parking Lot B. Parking Lot A and Parking Lot B will be designed with 90-degree parking stalls and 24-foot wide drive aisles for better circulation.

Student Services and Administration (SSA) Entrance
The existing SSA entrance is located at the center of the campus, south of the Loop Road. It will be expanded to provide a larger pedestrian drop-off area, see Utility Exhibit, Appendix C. This entrance will serve as the principle loading zone for buses and pedestrian drop-off. The new SSA Entrance shall maintain the existing service drive and fire truck access path west of the SSA building. This entrance will also maintain access to Parking Lot E and Parking Lot D. Parking Lot E and Parking Lot D will be designed with 90-degree stalls and 24-foot drive aisles for better circulation.

Isabel Entrance
The Isabel Entrance is the primary entrance located at Campus Hill Drive and the Loop Road, see Utility Exhibit, Appendix C. Since the new I-580 interchange and exit ramp to the campus was constructed there has been an increased traffic volume in this area. To help accommodate the additional traffic volume it is recommended that the Isabel Entrance have a rotary-type intersection for a fluid flow of traffic with dedicated right turn lanes for exiting and entering the campus. The Isabel Entrance will also provide an opportunity to promote campus identity using signs and wayfinding landscape features.

It is also recommended that the Isabel Entrance provide a new access location to Parking Lot P so that it aligns with Campus Hill Drive. This will improve access to Parking Lot P and improve traffic circulation at the Isabel Entrance.

Campus Bus, Maintenance Vehicles and Fire Truck Access
Currently the existing bus route runs along the southern portion of the Loop Road, with buses entering the campus from the Collier Canyon Road Entrance and exiting at Campus Hill Road. To help reduce congestion, it is recommended to route buses north along the Loop Road and provide bus stops north of the campus. This will help relieve congestion along the south portion of the Loop Road and provide additional and more direct access to the campus for students.

In addition, as part of the 2012 FMP, all new construction shall maintain the existing maintenance vehicle and fire truck access routes to the campus.

Campus Accessibility
The 2012 FMP new building construction and site improvements will need to maintain accessibility throughout the campus. Campus accessibility is required from Building 4000 through Building 1800, the Boulevard, Aquatics and north towards the Athletics Field. See Landscape Narrative as part of the 2012 FMP for additional information.

Athletics Field and Murray Ranch Connection
The 2012 FMP recommends a campus connection to Murray Ranch from the existing Hammerhead Roadway north of the Athletics Field. This area will also be an opportunity to incorporate campus connectivity. See Landscape Narrative as part of the 2012 FMP for additional information.

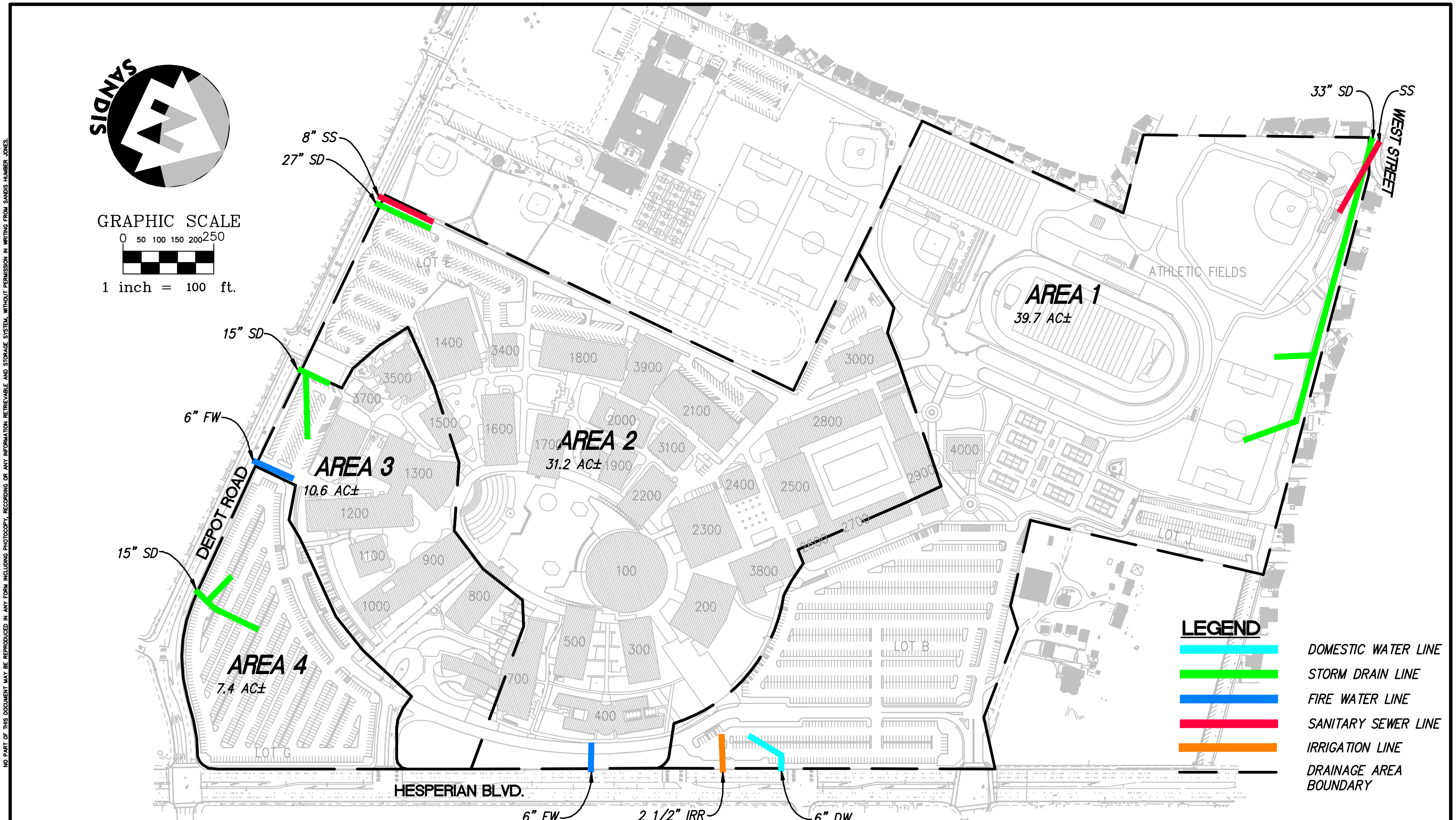
Future Parking Lot

It is assumed that the 2012 FMP new construction will create an increase in student population and create the need for additional parking. It is recommended that the existing photovoltaic area located north of the Isabel Entrance be used as a future parking lot. This is an ideal location since it will be accessible from the Isabel Entrance and provides additional parking for the expansion of the Athletics Field.

The future parking lot should be designed with 90-degree parking stalls and 24-foot drive aisles for optimum circulation. Access to the parking lot should be provided through the Loop Road.

If it is determined that additional parking is required, then the need for additional parking should be reviewed with the benefit of replacing the Photovoltaic Array or relocation. Any consideration to relocate the Photovoltaic Array within the lifespan (25 years from 2011) must consider the impact to the cost of utilities over that period.

APPENDIX A



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DATE: 05/24/12
SCALE: 1"=250'
DRAWN BY:
APPROVED BY: JMS
DRAWING NO.: 612003

CHABOT COMMUNITY COLLEGE

HAYWARD CALIFORNIA

UTILITY EXHIBIT
APPENDIX A

SHEET 1 OF SHEETS

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APPENDIX B

APPENDIX B.1 - CHABOT COLLEGE UTILITIES STUDY
EXISTING DOMESTIC WATER USAGE RECORDS

Domestic Water **(Based on Utility Bills; includes all existing buildings)**

Billing Period	Days of Service	100 ft^3 used	Usage (GPD)	Usage (GPM)	Usage (CFS)
03/23/11 - 05/25/11	63	2126	25,242	35.1	0.078
05/25/11 - 07/29/11	65	1536	17,676	24.5	0.055
07/29/11 - 09/26/11	59	2162	27,410	38.1	0.085
09/26/11 - 11/28/11	63	2301	27,320	37.9	0.085
11/28/11 - 01/27/12	60	1522	18,974	26.4	0.059
2011 DATA					
01/27/12 - 03/23/12	56	1970	26,314	36.5	0.081
2012 DATA					

Annual Average from 2011-2012	**Average= 23,823**	**Average= 33.1**	**Average= 0.074**

Notes:
1. Assumption: domestic water usage occurs 12 hrs/day

APPENDIX B.2 - CHABOT COLLEGE UTILITY STUDY
EXISTING DOMESTIC WATER AND SANITARY SEWER DEMANDS

SUMMARY OF CAMPUS BUILDINGS

Building Number	Building Name	Gross Area (gsf)	Avg Daily Use (gpd/gsf)	Demand (gpm)
B100	Library/Learning Resource Center	71,346	0.02	1.98
B200	Administration	19,664	0.03	0.82
B300	Language Arts Classroom	22,111	0.03	0.92
B400	IOB: Faculty Offices	36,360	0.03	1.52
B500	Social Sciences Classrooms	21,975	0.03	0.92
B700	CSSC: Student Services	58,827	0.03	2.45
B800	Shared Classrooms	21,974	0.03	0.92
B900	Humanities Classrooms	10,305	0.03	0.43
B1000	School of the Arts (SOTA)	12,646	0.03	0.53
B1100	Humanities Faculty Offices	5,550	0.03	0.23
B1200	Music/Little Theater	20,663	0.03	0.86
B1300	Auditorium	23,360	0.03	0.97
B1400	Technology Center	24,951	0.03	1.04
B1500	Applied Technology Offices/Classroom	7,168	0.03	0.30
B1600	Engineering/Applied Tech/Business	27,361	0.03	1.14
B1700	Math/Physics	20,306	0.03	0.85
B1800	Math/Physics	20,118	0.03	0.84
B1900	Science Lecture Halls/Planetarium	7,541	0.03	0.31
B2000	Science/Math Faculty Offices	10,222	0.03	0.43
B2100	Biology	19,084	0.03	0.80
B2200	Medical/Dental	17,970	0.08	2.00
B2300	Student Center/Clubs/Tutor/Security	37,859	0.03	1.58
B2400	DSRC	5,408	0.03	0.23
B2500	Gym	16,880	0.08	1.88
B2600	PE Offices, Classrooms	7,026	0.03	0.29
B2700	Women's Locker Rooms, Classrooms	11,614	0.08	1.29
B2800	Men's Locker Rooms	20,440	0.08	2.27
B2900	PE Classrooms	18,513	0.03	0.77
B3000	M&O	15,470	0.01	0.21
B3100	Emergency Medical Serv Classrooms	7,621	0.08	0.85
B3300	Campus Safety & Security	480	0.03	0.02
B3400	BMW Automotive Facility	5,000	0.03	0.21
B3500	Children's Center	12,368	0.03	0.52
B3600	Butler Building	11,520	0.03	0.48
B3700	Children's Center	2,400	0.03	0.10
B3800	Bookstore	13,928	0.03	0.58
B3900	Chemistry/Computer Classrooms	31,400	0.03	1.31
B4000	PE Offices	8,462	0.03	0.35
CUP	Central Utility Plant	4,287	0.01	0.06

Domestic Water Demands

Total Demand	33.2	**gpm**	0.074	**cfs**
Peak Factor	4		4	
Peak Demand	132.9	**gpm**	0.296	**cfs**

Sanitary Sewer Demands

Total Demand	33.2	**gpm**	0.074	**cfs**
Peak Factor	4		4	
Peak Demand	132.9	**gpm**	0.296	**cfs**

Notes:

1. Average daily use per square footage (gpd/sf) standards have been adjusted to represent actual usage based on domestic water usage records.
2. A hydraulic roughness coefficient, n, of 0.017 was used for VCP
3. Assume domestic water to sanitary sewer demand ratio of 1:1
4. Assumption: domestic water usage occurs 12 hrs/day

APPENDIX B.3 - CHABOT COLLEGE UTILITY STUDY
PROPOSED DOMESTIC WATER AND SANITARY SEWER DEMANDS

SUMMARY OF EX CAMPUS BUILDINGS TO REMAIN

Building Number	Building Name	Gross Area (gsf)	Avg Daily Use (gpd/gsf)	Demand (gpm)
B300	Language Arts Classroom	22,111	0.03	0.92
B400	IOB: Faculty Offices	36,360	0.03	1.52
B500	Social Sciences Classrooms	21,975	0.03	0.92
B700	CSSC: Student Services	58,827	0.03	2.45
B800	Shared Classrooms	21,974	0.03	0.92
B900	Humanities Classrooms	10,305	0.03	0.43
B1000	School of the Arts (SOTA)	12,646	0.03	0.53
B1200	Music/Little Theater	20,663	0.03	0.86
B1300	Auditorium	23,360	0.03	0.97
B1400	Technology Center	24,951	0.03	1.04
B1500	Applied Technology Offices/Classroom	7,168	0.03	0.30
B1600	Engineering/Applied Tech/Business	27,361	0.03	1.14
B1700	Math/Physics	20,306	0.03	0.85
B1800	Math/Physics	20,118	0.03	0.84
B1900	Science Lecture Halls/Planetarium	7,541	0.03	0.31
B2200	Medical/Dental	17,970	0.08	2.00
B2500	Gym	16,880	0.08	1.88
B2600	PE Offices, Classrooms	7,026	0.03	0.29
B2700	Women's Locker Rooms, Classrooms	11,614	0.08	1.29
B2800	Men's Locker Rooms	20,440	0.08	2.27
B2900	PE Classrooms	18,513	0.03	0.77
B3000	M&O	15,470	0.01	0.21
B3100	Emergency Medical Serv Classrooms	7,621	0.08	0.85
B3300	Campus Safety & Security	480	0.03	0.02
B3400	BMW Automotive Facility	5,000	0.03	0.21
B3500	Children's Center	12,368	0.03	0.52
B3700	Children's Center	2,400	0.03	0.10
B3800	Bookstore	13,928	0.03	0.58
B3900	Chemistry/Computer Classrooms	31,400	0.03	1.31
B4000	PE Offices	8,462	0.03	0.35
CUP	Central Utility Plant	4,287	0.01	0.06

SUMMARY OF NEW CAMPUS BUILDINGS/ REMODEL

Building Number	Building Use	Gross Area (gsf)	Avg Daily Use (gpd/gsf)	Demand (gpm)
B100	Library	73,743	0.02	2.05
B2300	Student Union	49,737	0.03	2.07
B200	Administration	25,665	0.03	1.07
B2100	Biology	32,538	0.03	1.36
B2000	Science Faculty	17,385	0.03	0.72
B1100	SOTA Faculty Offices/Tiered B1	17,069	0.03	0.71
B3600	700-seat Theater	23,077	0.03	0.96
LOBBY	Performing Arts Center - Expansion	10,000	0.03	0.42
ANNEX	Automotive BMW Storage	2,500	0.02	0.07
M&O	M&O Storage Building	6,000	0.02	0.17

Domestic Water Demands

Total Demand	36.3	**gpm**	0.081	**cfs**
Peak Factor	4		4	
Peak Demand	145.1	**gpm**	0.323	**cfs**

Sanitary Sewer Demands

Total Demand	36.3	**gpm**	0.081	**cfs**
Peak Factor	4		4	
Peak Demand	145.1	**gpm**	0.323	**cfs**

Sanitary Sewer Pipe Diameter (in) =	8	*8-inch sewer main leaving campus
Pipe Area (sf) =	0.35	
Pipe Wetted Perimeter (ft) =	2.09	
Slope (%) =	0.5	
Max Capacity (cfs) =	**0.7**	
Max Capacity (gpm) =	**293**	
Existing Capacity > Proposed Demand?	YES	

Notes:

1. Average daily use per square footage (gpd/sf) standards have been adjusted to represent actual usage based on domestic water usage records.
2. Max capacity calculated using Manning's Formula, $Q=(1.486/n)AR^{2/3}S^{1/2}$
3. Roughness Coefficient of n=0.017 used for VCP pipe
4. Assume domestic water to sanitary sewer demand ratio of 1:1
5. Assumption: domestic water usage occurs 12 hrs/day

APPENDIX C

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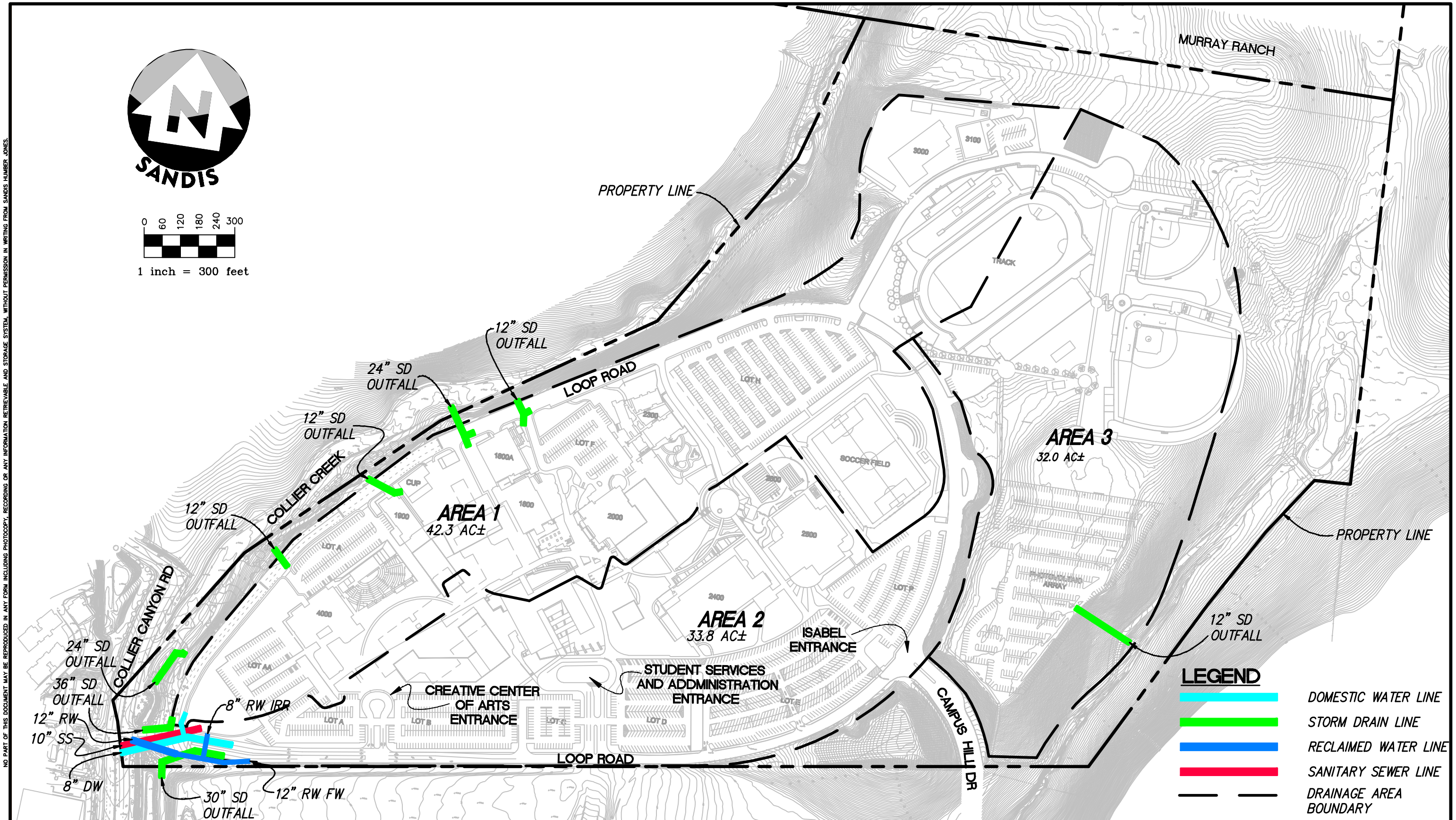

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LAS POSITAS COLLEGE

LIVERMORE CALIFORNIA

UTILITY EXHIBIT APPENDIX C

SHEET 1 OF SHEETS

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APPENDIX D

APPENDIX D.1 - LAS POSITAS COLLEGE UTILITIES STUDY
EXISTING DOMESTIC WATER USAGE RECORDS

Domestic Water **(Based on Utility Bills; includes all existing buildings)**

Billing Period	Days of Service	100 ft^3 used	Usage (GPD)	Usage (GPM)	Usage (CFS)
06/21/11 - 07/19/11	28	496	13,250	18.4	0.041
07/19/11 - 08/16/11	28	443	11,834	16.4	0.037
08/16/11 - 09/20/11	35	743	15,879	22.1	0.049
09/20/11 - 10/18/11	28	751	20,062	27.9	0.062
10/18/11 - 11/22/11	35	584	12,481	17.3	0.039
11/22/11 - 12/20/11	28	633	16,910	23.5	0.052
2011 DATA					
12/20/11 - 01/24/12	35	374	~~7,993~~	~~11.1~~	~~0.025~~
01/24/12 - 02/21/12	28	1,001	~~26,741~~	~~37.1~~	~~0.083~~
02/21/12 - 03/20/12	28	506	13,517	18.8	0.042
03/20/12 - 04/17/12	28	648	17,311	24.0	0.054
2012 DATA					

Annual Average from 2011-2012	**Average= 15,156**	**Average= 21.0**	**Average= 0.047**

Notes:

1. Assumption: domestic water usage occurs 12 hrs/day
2. Billing period 12/20/11 - 01/24/12 was not included in analysis due to campus winter break during his period.

APPENDIX D.2 - LAS POSITAS COLLEGE UTILITY STUDY
EXISTING DOMESTIC WATER AND SANITARY SEWER DEMANDS

SUMMARY OF CAMPUS BUILDINGS

Building Number	Building Name	Gross Area (gsf)	Avg Daily Use (gpd/gsf)	Demand (gpm)
B100	Administration	3,008	0.03	0.13
B200	Classrooms	3,008	0.03	0.13
B300	Photography, Visual Comm, CL	6,272	0.03	0.26
B400	Basic Skills, English Center, CL	6,090	0.03	0.25
B500	Fine Arts, Computer Lab, Classrooms	6,272	0.03	0.26
B600	Math X Lab, ILC	6,272	0.03	0.26
B700	A&R, Counseling, DSPS	6,736	0.03	0.28
B800	Lecture, Comp., Auto, Hort, Viti, Tech	28,530	0.03	1.19
B815	Auto Annex	1,702	0.01	0.02
B900	Career, Transfer, EOPS, CARE	1,300	0.03	0.05
B1000	Ricoh, Veteran's Center	1,920	0.03	0.08
B1100	CUP	3,480	0.01	0.05
B1300	Bookstore	5,760	0.01	0.08
B1310	Community Ed, Int'l Program	930	0.03	0.04
B1320	Financial Aid	1,000	0.03	0.04
B1600	New SSA Building	77,000	0.03	3.21
B1700	Student, Café, Health, Security	7,392	0.03	0.31
B1800	Science/Tech, CL, Labs, Offices	27,465	0.03	1.14
B1800A	Science Addition	20,789	0.03	0.87
B1900	LPC Tech Dept, District IT	10,203	0.03	0.43
B2000	Library/Learning Resource Center	32,562	0.01	0.45
B2100	Offices (lumped w 2000 in Fusion)	9,768	0.03	0.41
B2200	Classrooms	8,040	0.03	0.34
B2300	Child Development Center	22,647	0.03	0.94
B2400	Multi-Disciplinary Bldg	39,054	0.03	1.63
B2500	PE Complex, Gym, Offices, CL	64,737	0.06	5.39
B2600	Aquatics Center	3,264	0.06	0.27
B3000	District M&O	15,756	0.01	0.22
B3100	District M&O	7,680	0.01	0.11
B4000	Mertes Center for Arts	53,945	0.03	2.25

Domestic Water Demands

Total Demand	21.1	**gpm**	0.047	**cfs**
Peak Factor	4		4	
Peak Demand	84.3	**gpm**	0.188	**cfs**

Sanitary Sewer Demands

Total Demand	21.1	**gpm**	0.047	**cfs**
Peak Factor	4		4	
Peak Demand	84.3	**gpm**	0.188	**cfs**

Notes:

1. Average daily use per square footage (gpd/sf) standards have been adjusted to represent actual usage based on domestic water usage records.
2. A hydraulic roughness coefficient, n, of 0.017 was used for VCP
3. Assume domestic water to sanitary sewer demand ratio of 1:1
4. Assumption: domestic water usage occurs 12 hrs/day

APPENDIX D.3 - LAS POSITAS COLLEGE UTILITY STUDY
PROPOSED DOMESTIC WATER AND SANITARY SEWER DEMANDS

SUMMARY OF EX CAMPUS BUILDINGS TO REMAIN

Building Number	Building Name	Gross Area (gsf)	Avg Daily Use (gpd/gsf)	Demand (gpm)
B1100	CUP	3,480	0.01	0.05
B1310	Community Ed, Int'l Program	930	0.03	0.04
B1320	Financial Aid	1,000	0.03	0.04
B1600	New SSA Building	77,000	0.03	3.21
B1800	Science/Tech, CL, Labs, Offices	27,465	0.03	1.14
B1800A	Science Addition	20,789	0.03	0.87
B1900	LPC Tech Dept, District IT	10,203	0.03	0.43
B2300	Child Development Center	22,647	0.03	0.94
B2400	Multi-Disciplinary Bldg	39,054	0.03	1.63
B2500	PE Complex, Gym, Offices, CL	64,737	0.06	5.39
B2600	Aquatics Center	3,264	0.06	0.27
B3000	District M&O	15,756	0.01	0.22
B3100	District M&O	7,680	0.01	0.11
B4000	Mertes Center for Arts	53,945	0.03	2.25

SUMMARY OF NEW CAMPUS BUILDINGS/REMODEL

Building Number	Building Use	Gross Area (gsf)	Avg Daily Use (gpd/gsf)	Demand (gpm)
B2100	ILC/ACADEMIC	57,365	0.03	2.39
B300	ACADEMIC: Math	21,969	0.03	0.92
B100	ACADEMIC: Graphics	45,985	0.03	1.92
B600	ACADEMIC: GE/Offices	32,602	0.03	1.36
B800	ACADEMIC: CIS	31,723	0.03	1.32
B3400	Horticulture/Viticulture	8,615	0.03	0.36
B3200	Public Safety Education & Training Facility	6,154	0.03	0.26
B3600	Physical Education	3,692	0.03	0.15
B2000	Library/Learning Resource Center - REMODEL	38,185	0.01	0.53

Domestic Water Demands

Total Demand	25.8	**gpm**	0.057	**cfs**
Peak Factor	4		4	
Peak Demand	103.1	**gpm**	0.230	**cfs**

Sanitary Sewer Demands

Total Demand	25.8	**gpm**	0.057	**cfs**
Peak Factor	4		4	
Peak Demand	103.1	**gpm**	0.230	**cfs**

Slope (%) =	2.4
Max Capacity (cfs) =	**6.2**
Max Capacity (gpm) =	**2,787**
Existing Capacity > Proposed Demand?	YES

Notes:

1. Average daily use per square footage (gpd/sf) standards have been adjusted to represent actual usage based on domestic water usage records.
2. Max capacity calculated using Manning's Formula, $Q=(1.486/n)AR^{2/3}S^{1/2}$
3. Roughness Coefficient of n=0.017 used for VCP pipe
4. Assume domestic water to sanitary sewer demand ratio is 1:1
5. Assumption: domestic water usage occurs 12 hrs/day

4 | 2012 Facilities Master Plan
Telecommunications

Facilities Master Plan – Telecommunications Infrastructure

Chabot-Las Positas CCD

April 30, 2012

Mark Latz
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❖ Summary

As part of the 2012 Facilities Master Plan Update (FMP), this report covers the following areas:

- Telecommunications campus utilities/infrastructure, which includes underground pathways (conduit, pullboxes, etc), cabling, and network/IT spaces, supporting voice, data, and video communications (this infrastructure in turn supports the network and, by extension, also supports security, video surveillance, and others systems that rely on the network/backbone for their respective communications)
- Audiovisual systems deployed in classrooms, labs, common areas, meeting/conferencing rooms, etc.
- Electronic security systems, which includes access control and video surveillance

The 2012 FMP includes the following:

- Relocation of existing utilities (to make way for future buildings)
- Improvements to campus telecommunications utilities (primarily replacement of antiquated and non-working cabling)
- Campus emergency call stations, as applicable
- Telecommunications and network infrastructure for new buildings
- Audiovisual technology systems for new buildings
- Security systems for new buildings

This report is organized as “Overview”, “Chabot College”, and “Las Positas College”.

Technical Scope

❖ Overview

Sources

Sources of information for the study include a preliminary draft of the 2012 Facilities Master Plan, multiple campus plans (printed and electronic) of existing underground utilities, current versions of the district-wide standards for telecommunications infrastructure, audiovisual systems, and security systems, and personnel associated with the campus' utilities.

We studied the existing campus telecommunications infrastructure at Chabot College and Las Positas College. From the study's review and analysis, this report includes an assessment of the condition and capacity of the existing infrastructure to support current network services and long-term along with recommendations for improvements to support the 2012 FMP.

Common Aspects

The conceptual 2012 FMP includes relocation of existing infrastructure – the extent of which depends on the campus and the area on a given campus – to make way for demolition of existing buildings and construction of new buildings. Further, relocation of existing infrastructure must occur in a sequence so as to prevent interruption of telecommunications services to any operational spaces. This work will likely be executed in advance of primary projects (as secondary 'make-ready' projects).

The District-wide plan calls for redundant cabling on each campus from the main telecommunications center to each of the buildings. Chabot College will require some improvements to the existing pathways infrastructure to support this initiative and Las Positas has capacity within the existing infrastructure.

New Buildings

New and renovated buildings will receive new backbone cabling from the campus MDF and MPOE facilities and will receive telecommunications cabling, audiovisual systems, and security systems. With district-wide standards in place (covering telecommunications infrastructure, audiovisual systems, and security systems), the 2012 FMP will be executed according to the current version of district standards as adapted to each project. For example, educational rooms in new and renovated buildings will be "smart" in that lecture and computer classrooms will be, by and large, interchangeable with a standards-based technology fit-up. Faculty conferencing rooms will be consistent from building to building, even campus to campus, which will heighten the faculty's familiarity with operating these systems and will improve trouble-shooting by district staff.

Wi-Fi

Further, new and renovated buildings will receive a robust deployment of wireless network to support the college's Wi-Fi services. Trends on these campuses (state-wide, in fact) clearly indicate the need for greater support for more throughput of the colleges' wireless networks. Work of the 2012 FMP will strengthen the District's position as a competitive higher education facility with modern wireless amenities.

1. Chabot College

Chabot College has new campus-wide underground telecommunications infrastructure including new conduits, pullboxes, and modern backbone cabling. This utility loops the campus, servicing all the buildings renovated or constructed with funding from both the State and Measure 'B' bond funds, and can accommodate new and the continued renovation and technology upgrade of

the 2012 FMP. This new infrastructure, however, did not reach all buildings on the campus.

Backbone Replacement

Buildings are still connected to the campus backbone with failing multipair (copper) cabling and limited speed fiber optic cabling (multimode strands installed in the early 1990s). The backbone cabling requires replacement to meet bandwidth demands created by the ever-increasing student and faculty usage of wireless and wired network. As well, replacement of the antiquated backbone cabling will bring all buildings and sites to consistent connectivity.

New buildings, of course, will receive modern backbone cabling that will support the campus' high-speed network.

Impacts

The biggest impact of the conceptual 2012 FMP is the demolition of B200. This building houses the central headend of the campus-wide telephone system and is where the telecom utility (e.g., AT&T) enters and demarcates onto the campus. This impact requires replacement of the MPOE function, replacement of the telecom utility's service entrance, and either a phased relocation or an entire replacement of the campus' telephone system. The MPOE function could move to a new addition to B300, since B300 already houses the network headend and is supported by a generator. Further, this impact requires replacement of most of the multipair cabling on the campus.

Additional impacts include relocation of existing underground pathways around the future building planned where B200 exists today. Relocation of these utilities includes replacement of fiber optic cables (from B300) that route through these pathways.

2. Las Positas College

Las Positas College has new campus-wide underground telecommunications infrastructure including new conduits, pullboxes, and modern backbone cabling resulting from both the State and Measure 'B' bond funds.

Based on the conceptual FMP, the demolition plans will have no buildings remaining that do not have modern backbone cabling. New buildings, of course, will receive modern backbone cabling that will support the campus' high-speed network.

Impacts

The 2012 FMP conceptual plan will likely encroach onto an existing pullbox that backbone cabling routes through. This impact requires replacement of the some multipair cabling and fiber optic cabling that serves a small portion of the campus.

❖ Chabot College

'Legacy' Backbone Cabling

Though Chabot College received new backbone cabling, the college still operates their telecommunications and network systems over 'legacy' multipair cabling and fiber optic cabling. The legacy multipair cabling supports the campus'

telephones and this cabling has been continually failing over time. Further, the legacy fiber optic cabling cannot support the modern network backbone that the college currently deploys and requires replacement.

State and Measure 'B' Bond Improvements

State and Measure 'B' bonds funded new IT infrastructure within Building 300, including a new server room/network MDF, new utility infrastructure, (expanded underground pathways), and new fiber backbone cabling from the new MDF.

This new backbone partially covered the campus, specifically reaching the following buildings: B200, B300, B400 (IOB), B500, B700 (CSSC), B800, B900, B1100, B1200, B1300, B1400, B1700, B1800, B1900, B2200, B2500, B2600, B2700, B2800, B2900, and B4000.

The buildings that need upgraded cabling include (less buildings planned for demolition): B100, B1500, B1600, B2000, B2100, B2300, B2400, B3000, B3100, B3300, B3400, B3500, B3600, B3700, B3800, B3900, PE Athletic Fields (Press Boxes, Tennis, Track).

Impact to Campus Utilities

The 2012 FMP proposes demolition of the following existing buildings: B100, B200, B1100, B1500, B2000, B2100, B2300, B2400, and B3800.

1. Building 200

See "Main Telephone Services" following.

2. New Building at Existing 200 Footprint

A new building at the footprint of the existing B200 must consider the existing pullbox at the north-east corner of the building. This pullbox contains the telecom utility and the fiber campus backbone cables serving half (or more) of the campus.

3. New Building at Existing 3800 Footprint

A new building at the footprint of the existing B3800 must consider the existing conduit and pullbox infrastructure. Should the new construction impact the existing utility structures, then the new building project must include a reroute aspect to maintain telecommunications and network services to the affected 'downstream' buildings.

4. Other Buildings Noted for Potential Demolition

The other buildings are expected to not impact other buildings.

Main Telephone Services

The existing B200 building houses the telecom utility's MPOE (Main Point Of Entry) and the telephone services – which serves the entire campus. All telecommunications entering and leaving the campus route through B200.

Should the overall campus program include demolition of B200, replacement of the MPOE and related projects must be a primary consideration. Demolition of B200 requires replacement of the telecom utility's (incumbent utility is AT&T) service entrance, demarcation, and circuits delivery. The existing telecom service includes a substantial number of circuits and crossconnections from the demarcation fields to the premises fields. Replacement of the telecom utilities service entrance will undoubtedly require dual and bridged service based on the expected duration to cutover the services, circuits, and equipment.

The replacement could be an annex to B300 (located on the north wall at the west end – see SKT-01b). B300 received a generator; thus extending this stand-by power source to the MPOE and telephone system is ideal.

- Detailed MPOE Information – Size: The area required for a replacement space is approximately 500 ft^2.
- Detailed MPOE Information – Power: A replacement MPOE requires uninterruptible power (e.g., from a UPS system) to support the MPOE, telephone systems and Internet connectivity. The existing MPOE has a UPS system, which consideration could be given for re-use. For conceptual purposes, presume an equipment load of 10 kW.
- Detailed MPOE Information – Cooling: A replacement MPOE requires continuous cooling services (an augmented HVAC system or an upgrade to the existing system to increase capacity).

Campus Telephone Services: The campus operates an Avaya S8800 telephone system. This system must remain operational if B200 gets renovated or if the MPOE gets relocated. If relocated (under demolition of B200), careful planning would be required so as to maintain service with at most a 1 weekend service outage.

Backbone Cabling Replacement: Demolition of B200 will require replacement of the interbuilding multipair backbone cables. The pair counts, for purposes of a conceptual plan, shall match the existing counts.

- Detailed Multipair Cabling Information: The cables shall be twisted pair PIC, filled core, with an "ASP" sheath and compatible with Bell System type "ANMW" or RUS type "PE89". Compliant to District standards, the cables shall be spliced to input tails of Porta Systems {by Tii Network Technologies} #28300-ST-M110U BEP terminals, with 100-pair UTP or ARMM cables extending from the BEP's 110 output to modular patch panels with 1 pair terminated per patch panel port.

Campus Infrastructure Improvements

Backbone Cabling: As previously mentioned, the campus shall receive new multipair copper (for voice connectivity) backbone cabling from the MPOE and new fiber optic (for data connectivity) and multipair copper (for voice connectivity – counts vary with building size) backbone cables. These cables shall replace legacy cabling to existing buildings and provide connectivity for renovated and new buildings.

- Detailed Fiber Cabling Information: The cables shall be underground type, water-protected, with 48-strand zero water-peak singlemode strands.
- Detailed Multipair Information: See previous detailed description. The pair counts vary with building size.

Emergency Call Stations: Renovated campus areas shall receive new emergency call stations (stanchion-type "blue light phones"). The campus has emergency call stations and the 2012 FMP will support the campus' safety policy.

Secondary Backbone: In addition to the fiber requirements listed above, CLPCCD District ITS would like to implement a secondary fiber backbone to all buildings on campus from a secondary MDF for redundancy – the secondary MDF could be in B200 or its replacement. The fiber would be routed to each building through an alternate and diverse (as diverse as possible) from the primary backbone cabling. There would be common access into the building through the available conduit provisioning. This secondary fiber backbone would enable failover of a given building's network equipment to a stand-by core switch through the secondary fiber backbone, which would automatically enable if the primary switch were to see a building connection fail. The secondary fiber backbone to each building shall consist of a 48-strand zero water peak single mode fiber cable.

New Buildings

Campus Telecommunications Cabling: The new buildings require new campus telecom cabling from the main telecom room (either an improved or a replaced B200). The new campus telecom cabling shall consist of 48-strand zero water-peak single mode fiber (for data connectivity) and multipair copper cable (for voice connectivity – counts vary with building size and usage).

Telecom Rooms: The new buildings require new telecom rooms – at least 1 per floor and 1 per approximately 20,000 – 40,000 ft^2. The rooms shall comply with CLPCCD's standards.

Backbone and Horizontal Cabling: The new buildings require new intrabuilding backbone cabling (buildings with more than 1 telecom room) and require horizontal cabling from the telecom rooms to the user spaces. The cabling shall comply with CLPCCD's standards.

Electronic Security –Access Control and Video Surveillance: The new buildings require security system panels and access control devices (e.g., card readers, etc.). Further, the new buildings require cameras (IP-based) for video surveillance. The security systems shall comply with CLPCCD's standards.

Audiovisual Systems: The new buildings require audiovisual systems (instructional systems, presentation systems, etc.) based on room type. The AV system shall comply with CLPCCD's standards.

❖ Las Positas College

State and Measure 'B' Bond Improvements

State and Measure 'B' bonds funded a new campus backbone – both expanded underground pathways and new backbone cabling from a new IT building (B1900A). The new backbone cabling includes, per building, fiber optic (24-strand zero water-peak singlemode, for data connectivity) and multipair copper (for voice connectivity – counts vary with building size) backbone cabling.

This new backbone partially covered the campus, specifically reaching the following buildings: B200, B300, B400 (IOB), B500, B700 (CSSC), B800, B900, B1100, B1200, B1300, B1400, SSA, B1700, B1800, B1900, B2200, B2500, B2600, B2700, B2800, B2900, and B4000.

The buildings that need upgraded cabling include (less buildings planned for demolition): B100, B1500, B1600, B2000, B2100, B2300, B2400, B3000, B3100, B3300, B3400, B3500, B3600, B3700, B3800, B3900, PE Athletic Fields (Press Boxes, Tennis, Track).

Impact to Campus Utilities

The 2012 FMP proposes demolition of the following existing buildings: B100, B100B, B200, B300, B400 B500, B600, B700, B800, B900, B1000, B1300, B1300A, B1300B, B1300C, B1300D, B1310 B1320, B1700, B2100, and B2200 at some point in the future. Both time and sequence are subject to the requirements of the college and funding availability.

1. Pullbox 1300A

This demolition will likely impact existing infrastructure at pullbox 1300A – see sketch "SKT-02b". Backbone cables route through this pullbox that require replacement in advance of any demolition work that would impact this pullbox.

2. South-West End Demolition

Buildings 100/400/500/600 buildings (south-west end of campus) should be demolished in a sequence so as to prevent interruption to 'down stream' buildings and cause additional expense/work for temporary connections. If an 'upstream' building would be demolished while 'downstream' buildings remain, the impact would be to provide a reroute of infrastructure to keep the remaining buildings operational.

3. 2100 and 2200 Demolition

Demolition of buildings 2100 and 2200 are expected to have no impact to the campus infrastructure.

Campus Infrastructure Improvements

Emergency Call Stations: Renovated campus areas shall receive new emergency call stations (stanchion-type "blue light phones"). The campus has emergency call stations and the 2012 FMP will support the campus' safety policy.

Secondary Backbone: In addition to the fiber requirements listed above, CLPCCD District ITS would like to implement a secondary fiber backbone to all buildings on campus from a secondary MDF for redundancy – the secondary MDF would be within the IT Building. The fiber would be routed to each building through an alternate and diverse (as diverse as possible) from the primary backbone cabling. There would be common access into the building through the available conduit provisioning. This secondary fiber backbone would enable failover of a given building's network equipment to a stand-by core switch through the secondary fiber backbone, which would automatically enable if the primary switch were to see a building connection fail. The secondary fiber backbone to each building shall consist of a 48-strand zero water peak singlemode fiber cable.

New Buildings

Campus Telecommunications Cabling: The new buildings require new campus telecom cabling from the main telecom room (either an improved or a replaced B200). The new campus telecom cabling shall consist of 48-strand zero water-peak single mode fiber (for data connectivity) and multipair copper cable (for voice connectivity – counts vary with building size and usage).

Telecom Rooms: The new buildings require new telecom rooms – at least 1 per floor and 1 per approximately 20,000 – 40,000 ft^2. The rooms shall comply with CLPCCD's standards.

Backbone and Horizontal Cabling: The new buildings require new intrabuilding backbone cabling (buildings with more than 1 telecom room) and require horizontal cabling from the telecom rooms to the user spaces. The cabling shall comply with CLPCCD's standards.

Electronic Security –Access Control and Video Surveillance: The new buildings require security system panels and access control devices (e.g., card readers, etc.). Further, the new buildings require cameras (IP-based) for video surveillance. The security systems shall comply with CLPCCD's standards.

Audiovisual Systems: The new buildings require audiovisual systems (instructional systems, presentation systems, etc.) based on room type. The AV system shall comply with CLPCCD's standards.

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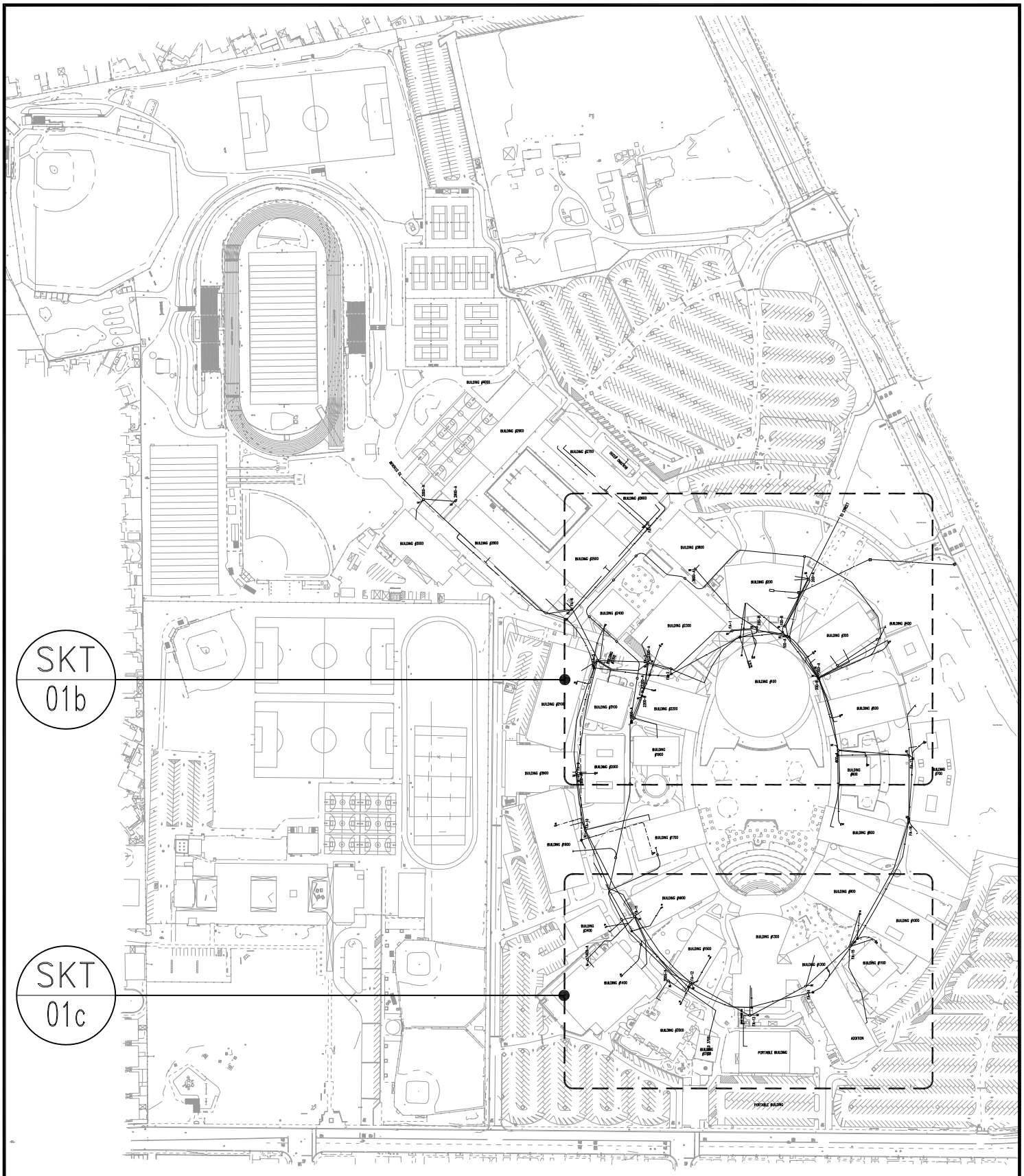

TEECOM
1333 BROADWAY STE 601
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www.teecom.com

PROJECT NAME: CLPCCD FMP

PROJECT No: 11005

DESCRIPTION:

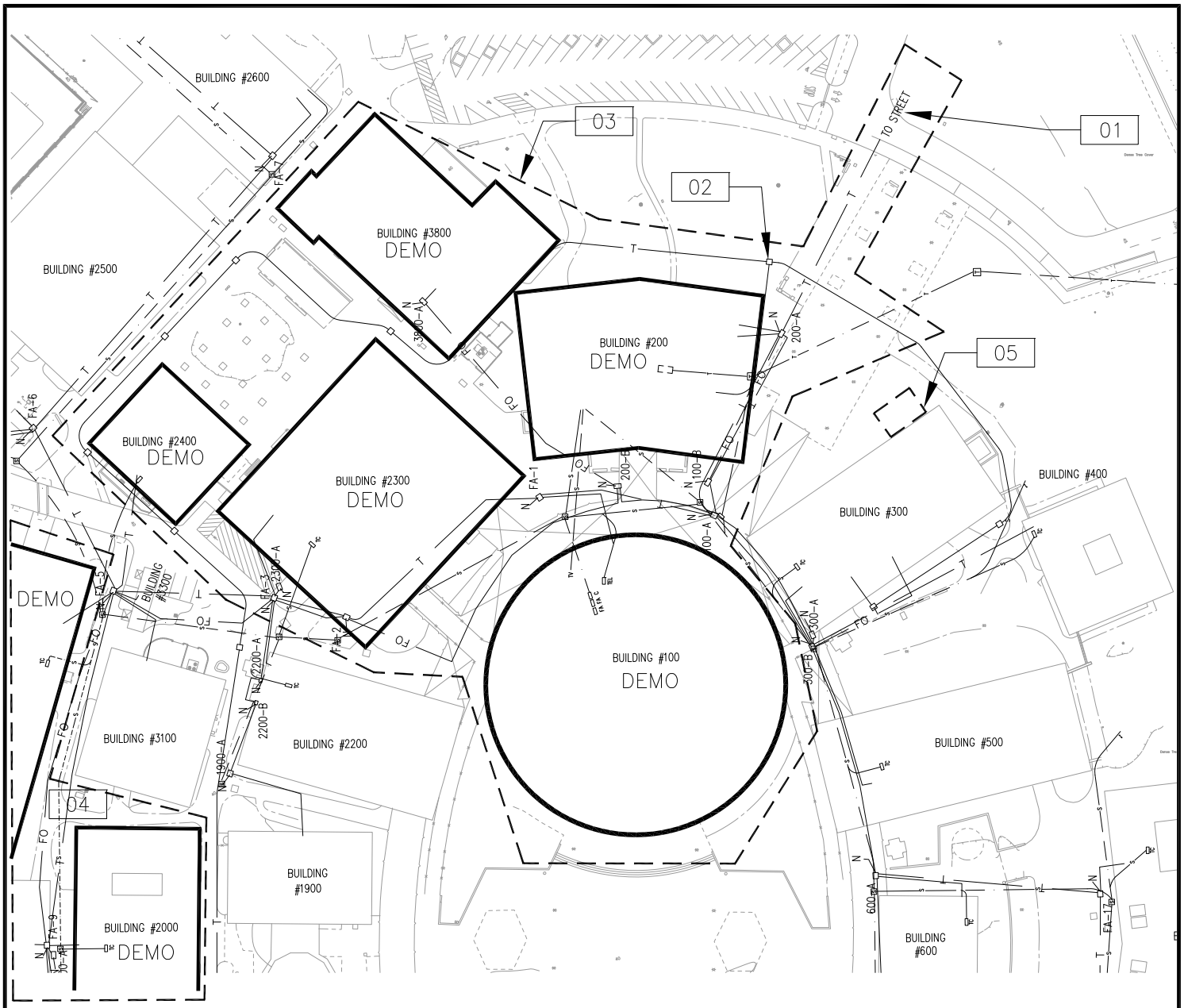
CHABOT COLLEGE
OVERALL CAMPUS PLAN

SKETCH No: SKT-01a

DATE: 2012.04.30

REVISION: 0

SCALE: NONE



01 (E) TELECOM UTILITY SERVICE ENTRANCE.

02 THIS (E) PULLBOX MUST REMAIN IN SERVICE.

03 THE UNDERGROUND TELECOM UTILITIES, IF IMPACTED BY DEMOLITION OF THESE BUILDINGS, MUST BE REROUTED THAT SERVE OTHER BUILDINGS.

04 DEMOLITION OF THESE BUILDINGS AND THE CONCEPTUAL FUTURE CONSTRUCTION, IS EXPECTED TO HAVE NO IMPACT ON THE OVERALL CAMPUS INFRASTRUCTURE PROVIDED DEMOLITION AND CONSTRUCTION DO NOT IMPACT THE UNDERGROUND TELECOM UTILITIES THAT SERVE OTHER BUILDINGS. FURTHER, THE (E) CONNECTIONS TO THE CAMPUS LOOP COULD POSSIBLY BE REUSED FOR THE FUTURE BUILDINGS.

05 POTENTIAL LOCATION OF REPLACEMENT MPOE.

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PROJECT NAME: CLPCCD FMP

PROJECT No: 11005

DESCRIPTION:

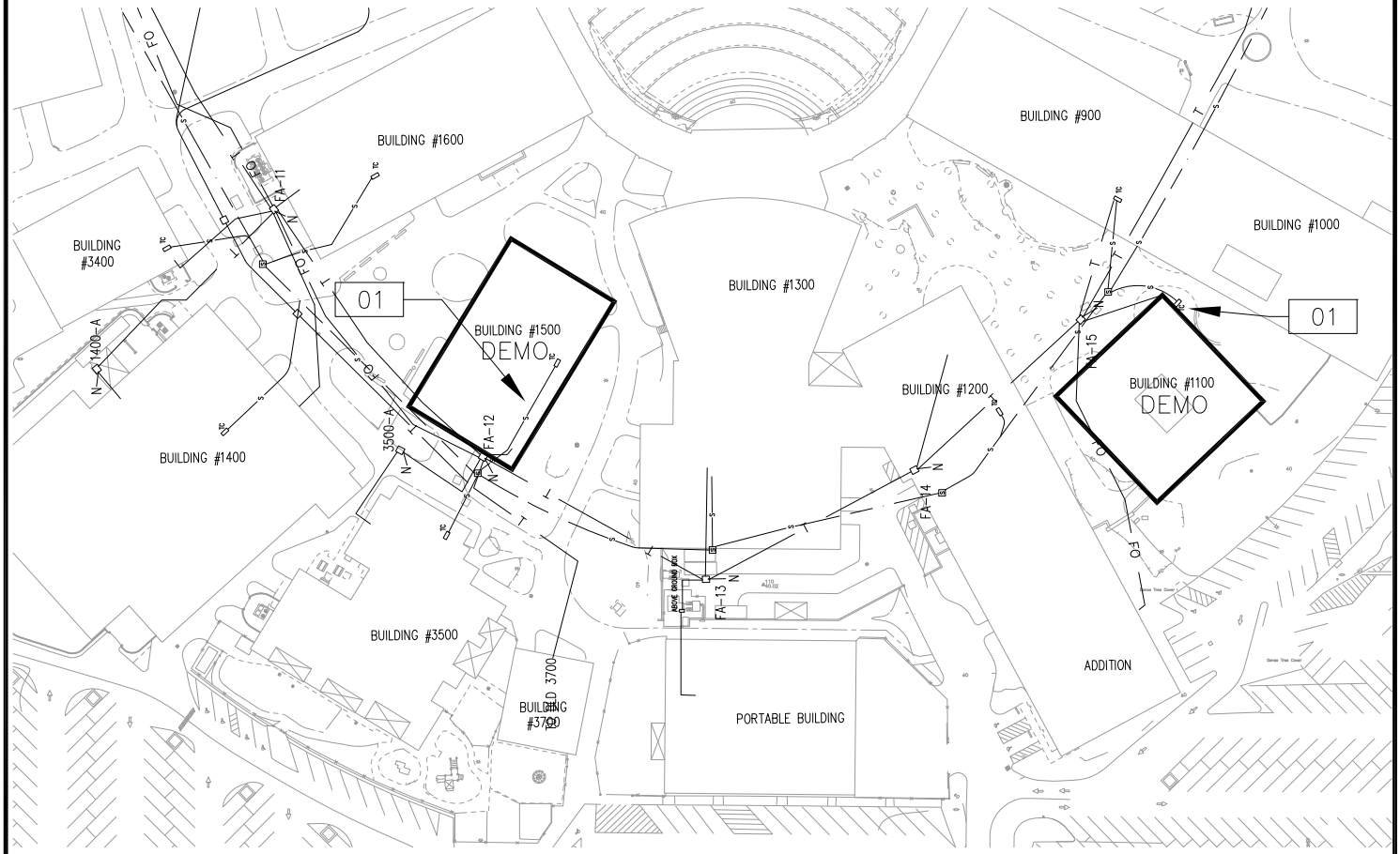
CHABOT COLLEGE
AREA OF DEMOLITION
NORTH

SKETCH No: SKT-01b

DATE: 2012.04.30

REVISION: 0

SCALE: NONE



01 DEMOLITION OF THESE BUILDINGS AND THE UNDERGROUND TELECOM UTILITIES, AS WELL AS THE CONCEPTUAL FUTURE CONSTRUCTION, IS EXPECTED TO HAVE NO IMPACT ON THE OVERALL CAMPUS INFRASTRUCTURE. FURTHER, THE (E) CONNECTIONS TO THE CAMPUS LOOP COULD POSSIBLY BE REUSED FOR THE FUTURE BUILDINGS.

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www.teecom.com

PROJECT NAME: CLPCCD FMP

PROJECT No: 11005

DESCRIPTION:

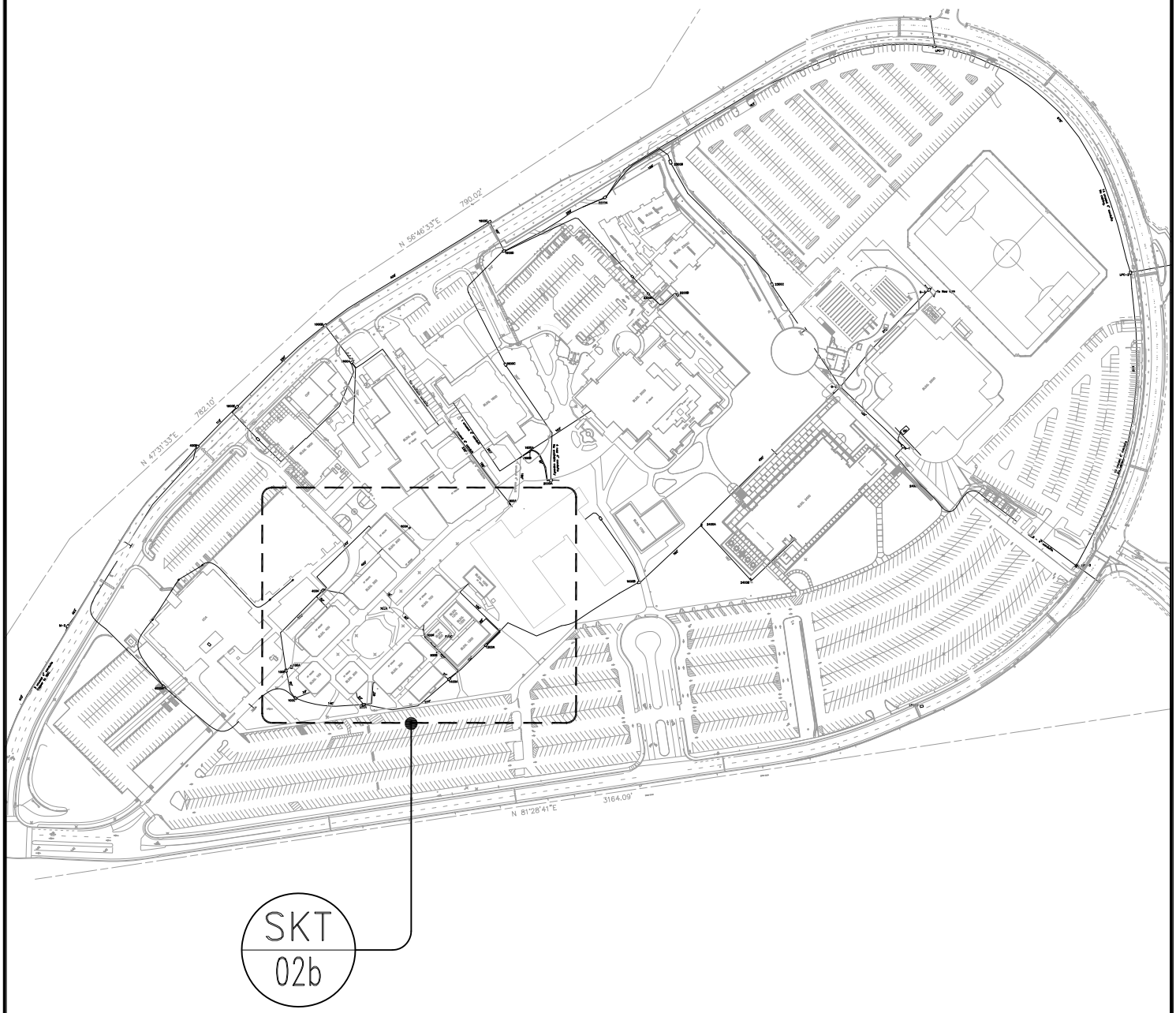
CHABOT COLLEGE
AREA OF DEMOLITION
SOUTH

SKETCH No: SKT-01c

DATE: 2012.04.30

REVISION: 0

SCALE: NONE



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PROJECT NAME: CLPCCD FMP

PROJECT No: 11005

DESCRIPTION:

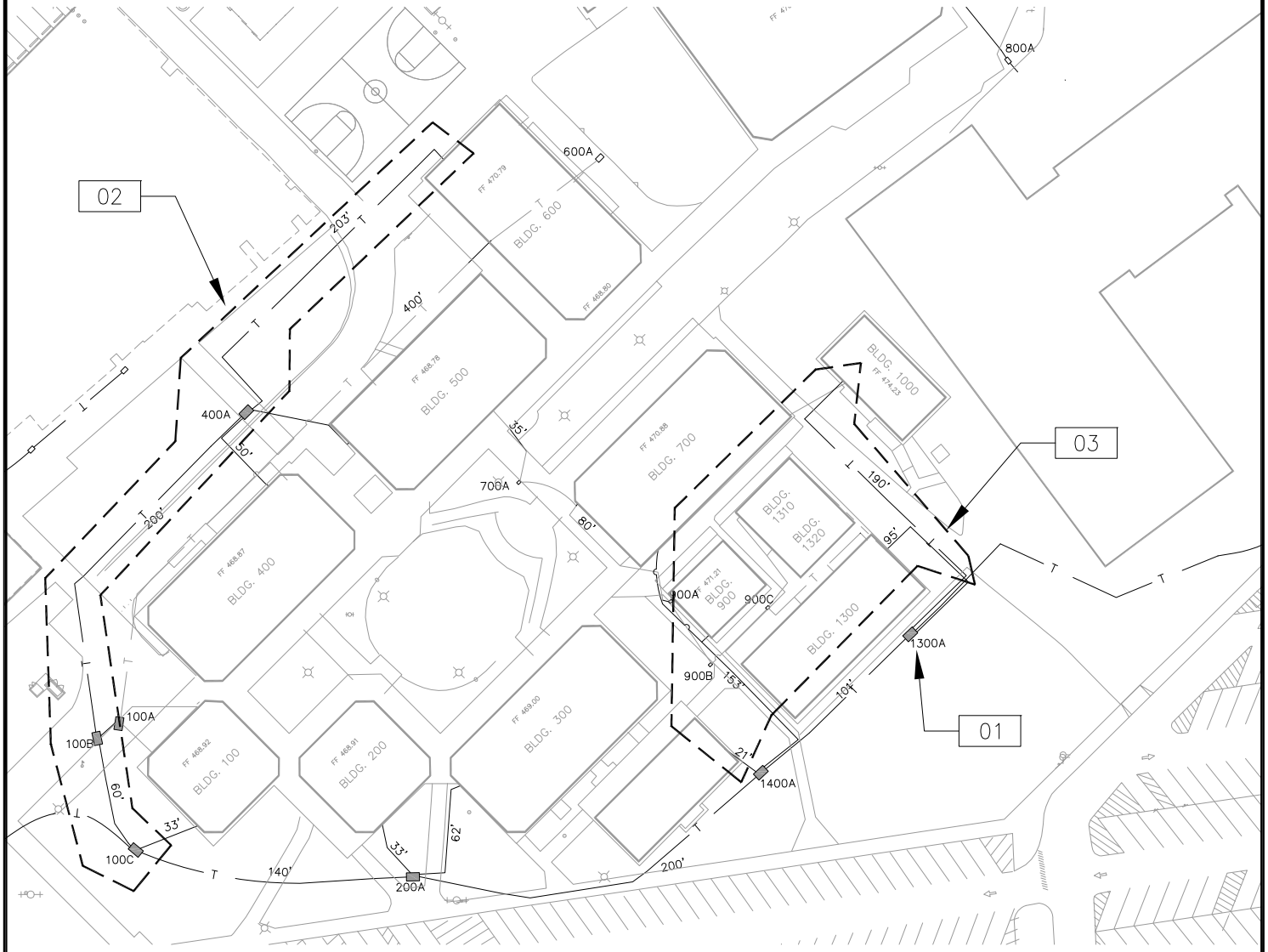
LAS POSITAS COLLEGE
OVERALL CAMPUS PLAN

SKETCH No: SKT-02a

DATE: 2012.04.30

REVISION: 0

SCALE: NONE



01 THIS PULLBOX, #1300A, NEEDS TO BE DEMOLISHED TO MAKE WAY FOR (F) BUILDING "B2". THIS IS IN THE MAIN LOOP AND WILL HAVE AN IMPACT TO THE (E) INFRASTRUCTURE.

02 THIS (E) INFRASTRUCTURE CAN BE DEMOLISHED WITH NO IMPACT TO OTHER BUILDINGS. NOTE: THE SEQUENCE OF DEMO REQUIRES ATTENTION AS A BLDG NEARER TO PULLBOX #100B WILL IMPACT 'DOWN STREAM' BUILDINGS.

03 THIS (E) INFRASTRUCTURE CAN BE DEMOLISHED WITH NO IMPACT TO OTHER BUILDINGS. NOTE: THE SEQUENCE OF DEMO REQUIRES ATTENTION SO AS TO PREVENT DISRUPTION OF SERVICE TO OTHER BUILDINGS.

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www.teecom.com

PROJECT NAME: CLPCCD FMP

PROJECT No: 11005

DESCRIPTION:

LAS POSITAS COLLEGE
AREA OF DEMOLITION

SKETCH No: SKT-02b

DATE: 2012.04.30

REVISION: 0

SCALE: NONE

5 | 2012 Facilities Master Plan MEP Considerations

MEP Masterplan

2012-0027

prepared for:
Steinberg Architects

prepared by:
Hormoz Janssens, PE, LEED AP
Bien Blando

May 10, 2012

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INTERFACE ENGINEERING

INTRODUCTION

An assessment and examination of the existing electrical and mechanical site infrastructure for the Chabot Community College and Las Positas Community College was performed to assist in determining feasibility of re-use of existing systems, adequacy of existing infrastructure, and impact of facility demolition and new construction on underground utilities and central services.

This report is based on a Campus investigation through several site visits conducted by the representatives from Interface Engineering and examination of existing record drawings supplied by the Facility and/or projects completed by Interface Engineering over the last six years on each Campus. The overall report will provide a description of existing conditions, observations, and recommendations for the existing infrastructure. Recommendations will include assessment of anticipated future loads and future expansion.

This report assesses and examines the existing primary electrical distribution for the Campus, and does not include investigation of the existing secondary Campus distribution. Similarly, the report on the mechanical systems is only looking at central systems and infrastructure and not individual building assessments and remediation.

CHABOT COLLEGE

MECHANICAL

EXECUTIVE SUMMARY

Summary of Existing Conditions and Observations

The Campus is serviced by a Central Plant, recently installed. The Central Plant services the Campus through a network of underground heating and chilled water piping stubbed out to each building. We believe the heating and cooling Central Plant has adequate capacity for the proposed Masterplan.

Table 1: Chiller Plant Capacity

Item	Peak Load (Tons)
Current Connected Load	900
Existing Buildings to be Connected Shortly	650
Masterplan Added Load	250
Sum of Total Loads	1,800
Installed Capacity	**2,000**

Table 2: Hydronic Heating Plant Capacity

Item	Peak Load (MBH Input)
Current Connected Load	16,000
Existing Buildings to be Connected Shortly	6,700
Masterplan Added Load	3,300
Sum of Total Loads	26,000
Installed Capacity	**30,000**

Summary of Recommendations

The following is expected to accommodate the Masterplan:

1. A detailed study of the Central Plant capacity prior to the start of construction of new buildings. The study will analyze the existing capacity and new construction to determine if/when there may be a need for added capacity.
2. Relocation of existing underground piping to accommodate new building footprints and/or footings (zone of influence).

OBSERVATIONS

Chilled Water Plant

The Campus is serviced with chilled water through a central chilled water plant. The Chiller Plant was installed in approximately 2008 and is in very good condition. The Central Plant consists of an ice storage system with glycol which is connected to a distribution loop through a heat exchanger. The distribution loop then feeds the Campus with chilled water. All of the equipment (chillers, pumps, heat exchangers, etc. are located in the renovated Building 2800 that was re-purposed for the

Central Plant. Directly outside of the building are the cooling tower system and above-grade ice storage tanks.

The system is currently extended to all buildings and hooked up to the following buildings:

1. Building 200
2. Building 300
3. Building 400
4. Building 500
5. Building 700
6. Building 800
7. Building 900
8. Building 1400
9. Building 1600
10. Building 1900
11. Building 2100
12. Building 2200
13. Building 2400
14. Building 3100
15. Building 3400
16. Building 3500
17. Building 3800
18. Building 3900
19. Building 4000

It is expected that the following buildings will be connected within the next year:

1. Building 1200
2. Building 1300
3. Building 1700
4. Building 1800
5. Building 2600
6. Building 2700
7. Building 2800
8. Building 2900

The following buildings do not presently have any cooling. Chilled water supply and return has been extended to an underground valve box at each building unless noted otherwise:

1. Building 1000
2. Building 1100
3. Building 1500
4. Building 2000
5. Building 2300
6. Building 2500 (heating only)
7. Building 3000 (gas heating only)
8. Building 3600 (gas heating only)
9. Building 3700 (portables with heat pumps)

The system was designed to make ice at night to take advantage of off-peak electrical rates as well as to reduce noise generation on Campus during the day. For peak days, the plant is designed to use the Ice Plant during low loads and augment the capacity of the Chiller Plant with ice as the load increases during the day. Currently, with the buildings that have been connected, it has been found that the system only has to make ice every other day and the system does not ever have to run the plant and ice storage at the same time. This implies that the existing load on the Chiller Plant is less than half of the capacity that has been installed.

Heating Hot Water Plant

The Campus is serviced with heating hot water through a central Boiler Plant. The plant was installed in approximately 2008 and is in very good condition. The Central Plant consists of three 10,000 MBH input gas boilers. The distribution loop is set up as a primary/secondary loop and feeds the Campus with heating hot water. All of the equipment (boilers, pumps, heat exchanger, etc. are located in the renovated Building 2800 that was re-purposed for the Central Plant. The boiler system is connected into the cogeneration system which uses its waste heat to heat the pool and warm up the return loop of the Boiler Plant.

The system is currently hooked up to the following buildings:

1. Building 200
2. Building 300
3. Building 400
4. Building 500
5. Building 700
6. Building 800
7. Building 900
8. Building 1000
9. Building 1100
10. Building 1400
11. Building 1500
12. Building 1600
13. Building 1900
14. Building 2000
15. Building 2100
16. Building 2200
17. Building 2300
18. Building 2400
19. Building 3100
20. Building 3400
21. Building 3500
22. Building 3800
23. Building 3900
24. Building 4000

It is expected that the following buildings will be connected within the next year:

1. Building 1200
2. Building 1300
3. Building 1700
4. Building 1800
5. Building 2500
6. Building 2600
7. Building 2700
8. Building 2800
9. Building 2900

The following buildings do not have use hydronic heating and do not have any potential hook-ups:

1. Building 3000 (gas heat)
2. Building 3600 (gas heat)
3. Building 3700 (heat pumps)

Chilled Water and Heating Hot Water Underground Distribution

The piping distribution is in a radial pattern around the Campus; however it is not in a loop that connects to itself and dead ends at approximately Building 300. The piping underground is new and in good shape. The schematic below indicates general routing of the systems (Figure 1):

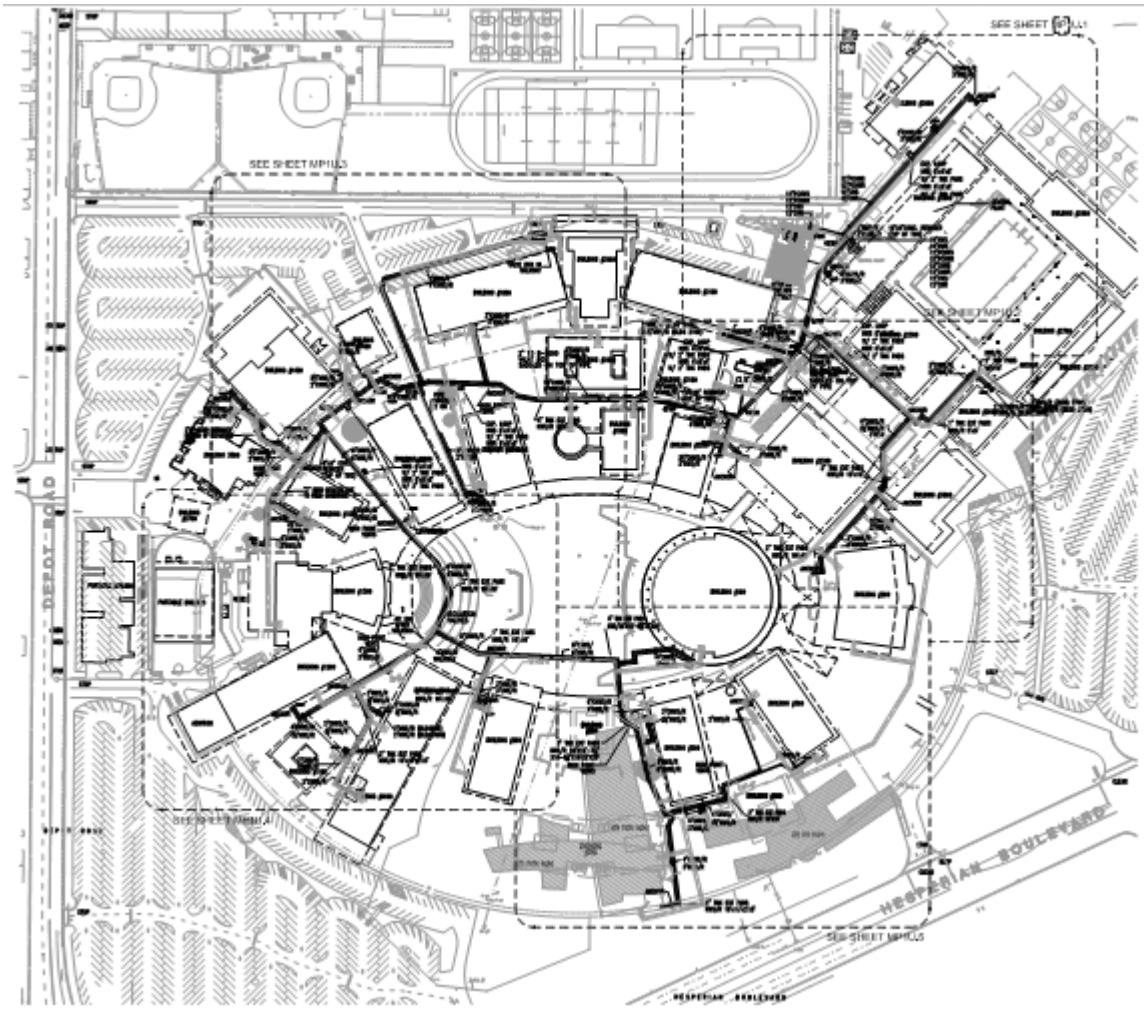

Figure 1: Hydronic Distribution

RECOMMENDATIONS

Chilled Water Plant

The following are the recommendations for the Chabot Chiller Plant:

1. A detailed study of the Central Plant capacity prior to the start of construction of new buildings. The study will analyze the existing capacity and new construction to determine if/when there may be a need for added capacity. It must be noted that many of the buildings proposed do not add any coincident load to the Campus (i.e. Cafeteria will be filled with students that come from other buildings, reducing the loads in those buildings; Library will be filled with students that come from other buildings, reducing the loads in those buildings).

Heating Hot Water Plant

The following are the recommendations for the Chabot Boiler Plant:

1. A detailed study of the Central Plant capacity prior to the start of construction of new buildings. The study will analyze the existing capacity and new construction to determine if/when there may be a need for added capacity. It must be noted that many of the buildings proposed do not add any coincident load to the Campus (i.e. Cafeteria will be filled with students that come from other buildings, reducing the loads in those buildings; Library will be filled with students that come from other buildings, reducing the loads in those buildings), therefore ventilation heating requirements should be minimized through the use of CO2 sensing.

Chilled Water and Heating Hot Water Underground Distribution

It is anticipated that all new buildings will be connected to the existing hydronic distribution as necessary during the design phase of each building. The following areas will need special attention:

1. There is existing hydronic distribution between Building 3800 and the future Building 2300 that will replace the existing Building 2300. This piping will need to be replaced and re-routed.
2. There is no hydronic distribution routed as far as the future proposed Building 200 (Administration). This building will be at the end of the loop and it is anticipated that the piping connection to underground will have to occur at the main between existing Building 500 and 100.

ELECTRICAL

EXECUTIVE SUMMARY

The electrical site infrastructure for Chabot Community College Campus was an analysis of the existing PG&E service and the existing medium voltage electrical distribution system, and discussions with Campus personnel and plant supervisors. The purpose of this electrical site infrastructure report is to evaluate and provide recommendations for the improvement of the existing medium voltage electrical distribution system.

The existing medium voltage distribution routing for the Campus is currently shown as radial distribution. This type of distribution is unreliable and power disruption-outage can easily occur.

The medium voltage cable routings are in the way of future expansion and addition to the site. The medium voltage cables being radial distribution were only sized to the load it is feeding. No future expansion or addition was provided.

The substations 'A', 'AA', 'B', 'C', 'D' and 'E' have surpassed the manufacturer's anticipated life and they are utilizing medium voltage fuses. The utility company PG & E requires to have main vacuum breakers for proper coordination of the PG & E up-stream equipment.

The transformers that are being served by the substation have also surpassed the manufacturer's service life and they should be replaced.

The transformers steps the voltage down from 12.47 KV down to usable voltages of 480/277 volt and feeds multiple buildings via underground conductors feeding distribution panels inside the individual building. The Campus has already experienced failure of the 480 volt distribution conductors and emphasized replacing them as one of the priority.

Summary of Recommendations

The following lists the major recommendations included in this report. A more detailed description for each recommendation is provided in associated report sections.

1. Provide redundancy for the incoming PG&E feed to the Campus, from another substation source.
2. Replace the incoming section for the Main Substation 'A' with a double incoming main section.
3. Replace the substation 'AA', substation 'B', substation 'C', substation 'D', substation 'E' with vacuum breaker type protection and control.
4. Modify the existing radial distribution design to a loop/ring distribution design approach. The modification will include upsizing all the feeders to accommodate the loop/ring connection.
5. Transfer loads between Campus feeders to balance Campus loads upon upgrade to a loop feed system.

6. Reroute existing Campus feeders as required to transfer and balance Campus loads between feeders.
7. Reroute existing Campus feeders as required to avoid areas that may cause disturbances and disruptions to the electrical distribution system or other underground utilities. Preferably away from future expansion and addition to the Campus.
8. Reroute existing Campus feeders as required to avoid areas that may cause disturbances and disruptions to the electrical distribution system or other underground utilities. Preferably away from future expansion and addition to the Campus.
9. Replace all 12.47 KV – 480/277 volt transformers with energy efficient types. Provide the proper sized transformers for the buildings connected.
10. Replace the 480Volt underground conductors feeding the buildings.
11. Replace the distribution panel in each building,
12. Provide an alternative power source (ie: addition to photovoltaic system, potential additional cogeneration, fuel cells to support base loads, new wind power generators).

OBSERVATIONS

Incoming Electrical Service

Incoming electrical service to the Chabot Community College Campus is derived from an overhead 12.47 kV PG&E pole located at Depot Road the south side of the Campus.

1. The PG&E overhead distribution lines are tapped and transition from the overhead pole lines to underground aluminum conductors, with 15kV insulation, in 5-inch conduit. The incoming PG&E overhead lines also serve other facilities and buildings outside of the Chabot Community College Campus (ie: neighboring residential houses, and connects to transmission lines along Hesperian Boulevard).
2. The PG&E transmission line at Hesperian Boulevard could be from another PG&E substation source were the secondary power source can be derived, needs verification from utility company.

Primary Distribution

The original Chabot Community College was first built in 1963. However, the 12.47kV distribution and most of the existing buildings comprising the Chabot Community College Campus were approximately installed and built in 1978. Major electrical renovations for the electrical site infrastructure were ongoing throughout the years. Various areas throughout the Campus were currently undergoing construction when the site visits were conducted for this report. The six-way, sectionalizing switch was recently installed at the time of the site visits. The majority of the existing electrical equipment is in good, working condition. The age of some equipment originally installed in 1978 may be nearing the manufacturer's recommended design life (typically, approximately 30 years). Overall, the age of the equipment is fair and operational.

1. The primary distribution for the Chabot Community College Campus consists of four 12.47kV medium voltage underground Campus feeders, Feeders F1, F2, F3, and F4. These underground Campus feeders are fed from substation 'A'. The Chabot Community College Campus Substation 'A' is rated at 600A, 15kV, 3 phase, 3 wire, and includes an outdoor NEMA 3R enclosure. The main substation consists of one 600 amp main breaker section, and four main outgoing feeder sections.

2. Feeders F1 and F2 should be replaced with 3#350 EPR in 4-inch conduits. Feeders F3 and F4 should be replaced with 3#350 EPR in 4-inch conduits. These four underground Campus feeders supply a 12.47kV radial distribution feed to respective distribution transformers throughout the Campus, and routed via various manholes and sectionalizing switches. The distribution transformers feed respective buildings throughout the Campus. Each distribution transformer is located either outside of the building or within the building's main electrical room.

3. The underground feeders and manholes appear to be in good operating condition. The underground feeders are routed in 4-inch conduits, and encased in concrete, which is good engineering design practice. Concrete encasement for underground feeders is ideal for protection against environmental conditions that may, for example, cause cracks to conduits, water leakage, or accidental damage by excavation.

RECOMMENDATIONS

This report focuses on the examination of the existing 12.47kV medium voltage distribution, the primary distribution for Chabot Community College Campus. Investigation for the secondary distribution is not included as part of the limited scope of work for this report. The recommendations described in this report section formulates best engineering design approaches for upgrading the primary distribution with respect to current Campus loads, ongoing load additions, and future expansion. These recommendations are designed to minimize disruption of the existing Campus electrical distribution system operations during and after implementation.

System Deficiencies and Limitations

As stated under Observations, the prior report section, the existing distribution is based on a radial design approach. To briefly reiterate the design flaws, a radial feeder design is more susceptible to overload conditions and does not inherently provide backup power during interruption of service. Currently, there is no reliability of the electrical distribution system.

System Immediate Needs

At the time of the investigation studies, Campus Feeder F4 was determined as being overloaded, while the other three Campus feeders, F1, F2, and F3, were lightly loaded. Since existing Campus Feeder F4 is overloaded, the general vicinity that is served by this feeder is now restricted from further load additions. Campus growth is not allowed in areas that are served only by Feeder F4.

Short Term & Long Term Solutions

Upsizing the existing Feeder F4 will temporarily solve the overloading issue, but overload to the feeder will be an ongoing issue. Reliability of the electrical system is compromised as a result. Thus, this short term solution is not considered a sound engineering design practice. The following recommended solutions will impact both short term and long term medium voltage distribution system and Campus feeders.

Recommended System Modifications

The following recommendations propose best engineering practices and key solutions to improve upon system reliability and maintenance through suggested upgrades, installation, and modifications. Recommendations are identified either as "Recommended", or "Highly Recommended", based on the level of impact to the existing medium voltage distribution system.

<u>Highly Recommended:</u>

1. The Chabot College Facilities Master Plan suggest the installation of a new building over the existing substation 'A' location, as recommended relocating the new substation 'A' within the vicinity of the PG&E vault would be the preferred location.

2. Modify the existing radial distribution design to a loop/ring distribution design approach. A loop distribution allows feeders to connect in a loop formation throughout the Campus via sectionalizing switches with bus tie. The Campus is thus no longer limited to a single path of power, but supplied with multiple paths of power provided by a loop design approach. Loads can be relocated from feeder to feeder as a means to balance loads between the Campus feeders. Continuity of service is ensured by switching from one feeder to another during fault or loss of a feeder. Hence, the loop distribution design approach is more reliable than a radial distribution design approach.

3. The second PG&E power source can be derived from Hesperian Boulevard and Turner Court. The PG& E overhead lines stop at Hesperian Boulevard and Turner Court. PG&E could run an underground feed to the Campus and connect substation 'E'. The other connection would be to the substation at building 500.

4. Replace all 12.47 KV – 480/277 volt transformers with energy efficient types. Provide the proper sized transformers for the buildings connected. The transformers have surpassed the manufacturer's anticipated service life.
5. Replace the 480Volt underground conductors feeding the buildings. The Campus has already experience conductor failure with the 480 volt distribution.
6. Replace the distribution panel in each building, the distribution panels have surpassed manufacturer's life of manufacturer are no longer in business.

Impact on Operations & Maintenance

Recommendations listed above collectively designs a solution for Chabot Community College Campus to maintain the electrical utility feed with minimal interruptions. The recommendation for a loop feed distribution design will maintain and balance loads between the four Campus feeders. Upgrading the existing primary distribution from a radial design to a loop feed will dramatically reduce the overall power usage and provide continuity of service throughout the Campus. The concept for a loop feed is to ensure that the electrical distribution system becomes more reliable. Existing conductors for Feeders F1 and F2 will require upsizing to match the existing conductor sizes of Feeders F3 and F4 to complete the loop distribution upgrade work. Feeders F3 and feeder F4 are the feeders that have the long distribution, all the way to the Ball Field 'F'. Feeder F1 is only for substation 'A' and feeder F2 is only for substation 'AA'. The feeders should be a loop/ring that any feeder that goes down, the loads could be easily transferred. The recommendation for a second incoming PG&E feed will further increase the reliability of the electrical distribution system.

FIRE ALARM SYSTEM

The Chabot Community College is a looped system. The head end is located in Building 2300 and connected to sub-panels in Building 800 and Building 1600.

The Campus will still be utilizing the same set up. Building 2300 is being demolished. A new Student Union/Student Health/Veteran/Security will replace the current structure and the fire alarm system head end will be located in the security office.

LAS POSITAS COLLEGE

MECHANICAL

EXECUTIVE SUMMARY

The Campus is serviced by a Central Plant, recently installed. The Central Plant services the Campus through a network of underground heating and chilled water piping stubbed out to each building. Unlike the Chabot Campus, some of the components of the Central Plant were determined to be installed at a later date. Therefore, expansion of the Central Plant systems will be required.

Summary of Recommendations

The following is expected to accommodate the Masterplan:

1. A detailed study of the Central Plant capacity prior to the start of construction of new buildings. The study will analyze the existing capacity and new construction to determine if/when there may be a need for added capacity.
2. A likely increase in the Central Plant cooling and heating capacity via addition of equipment is required.
3. Redesigning the IT building to allow for it to operate off its own existing back chiller as the primary chiller and reliance on the Central Plant only as the back source.
4. Relocation of existing underground piping to accommodate new building footprints and/or footings (zone of influence) as well as distribution to new buildings through the center of Campus.

OBSERVATIONS

Chilled Water Plant

The Campus is serviced with chilled water through a central chilled water plant. The Chiller Plant was installed in approximately 2009-2010 and is in very good condition. The Central Plant consists of an ice storage system with glycol which is connected to a distribution loop through a heat exchanger. The distribution loop then feeds the Campus with chilled water. All of the equipment (chillers, pumps, heat exchangers, etc. are located in a central utility plant Building 1100 next to the Information Technology Building. Directly outside of the building are the cooling tower system and above-grade ice storage tanks.

The system is currently hooked up to the following buildings:

1. Building 1900
2. Building 2300
3. Building 4000

It is expected that the following buildings will be connected prior to the future Masterplan facilities:

1. Building 1600
2. Building 1800
3. Building 1800A
4. Building 2000

The following buildings do not have any cooling or have existing chillers to remain and do not have any potential hook-ups:

1. Building 2400 (existing chiller)
2. Building 2500 (existing chiller)
3. Building 2600 (no cooling)
4. Building 3000 (existing RTU's)
5. Building 3100 (existing RTU's)

The system was designed to make ice at night to take advantage of off-peak electrical rates as well as to reduce noise generation on Campus during the day. For peak days, the plant is designed to use the Chiller Plant during low loads and augment the capacity of the Chiller Plant with ice as the load increases during the day. Currently, with the buildings that have been connected, it has been found that the system has to make ice on a daily basis during peak cooling demand; however the system does not ever have to run the plant and ice storage at the same time. This implies that the existing load on the Chiller Plant is approximately half of the capacity that has been installed.

Heating Hot Water Plant

The Campus is serviced with heating hot water through a central Boiler Plant. The plant was installed in approximately 2009-2010 and is in very good condition. The Central Plant consists of two 7,350 MBH input gas boilers. The distribution loop is set up as a primary/secondary loop and feeds the Campus with heating hot water. All of the equipment (boilers, pumps, heat exchanger, etc. are located in the Central Plant at Building 1100.

The system is currently hooked up to the following buildings:

1. Building 1900
2. Building 2300
3. Building 4000

It is expected that the following buildings will be connected prior to the future Masterplan facilities:

1. Building 1600
2. Building 1800
3. Building 1800A
4. Building 2000

The following buildings do not have any hydronic heating and do not have any potential hook-ups:

1. Building 2400 (existing boiler)
2. Building 2500 (existing boiler)
3. Building 2600 (existing boiler)
4. Building 3000 (existing RTU's)
5. Building 3100 (existing RTU's)

Chilled Water and Heating Hot Water Underground Distribution

The piping distribution a main pipe distribution that runs up/down the middle of the Campus; It is not in a loop that connects to itself or any type of radial pattern, this was not possible due to the existing utilities under grade. The piping underground is new and in good shape. The schematic below indicates general routing of the systems (Figure 2):

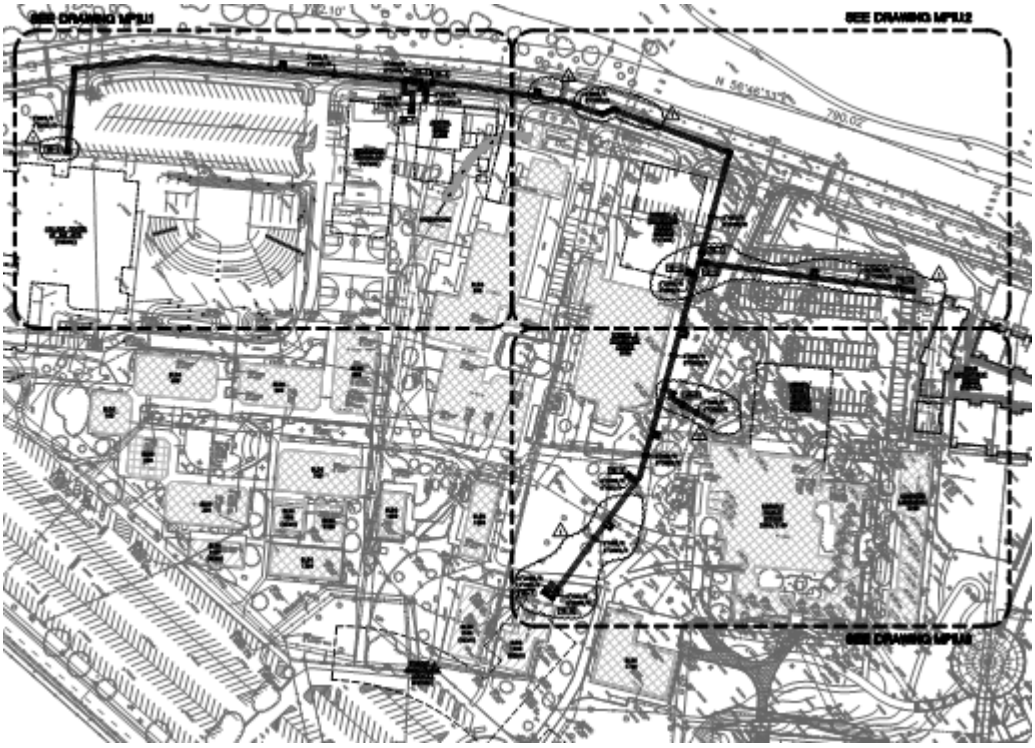

Figure 2: Hydronic Distribution

RECOMMENDATIONS

Chilled Water Plant

The following are the recommendations for the Las Positas Chiller Plant:

1. A detailed study of the Central Plant capacity prior to the start of construction of new buildings. The study will analyze the existing capacity and new construction to determine if/when there may be a need for added capacity.
2. It will be likely that the following will be required to accommodate the full build out of the Masterplan:
    a. Chiller 3 – 350 Ton chiller
    b. Cooling Tower 3 – 350 Ton cooling tower
    c. Primary Chilled Water Pump 3 – 775 GPM
    d. Condenser Water Pump 3 – 800 GPM
    e. Thermal Energy Storage Tanks 8, 9, 10, 11 – 450 Ton-Hrs each
3. Removal of the IT Building from the Central Plant. During low load conditions, large pumps are required to run for a very minimal Campus load to satisfy just the IT building. It is desired to re-pipe the system to typically run off its' existing air-cooled chiller as the primary cooling mechanism and only rely on the Chiller Plant as a back-up if the main cooling lost for any reason.

Addition of new equipment will be accommodated in the new Central Plant and no additional space is required. The existing electrical distribution is sized to support the additional equipment of the chilled water plant.

Heating Hot Water Plant

The following are the recommendations for the Las Positas Boiler Plant:

1. A detailed study of the Central Plant capacity prior to the start of construction of new buildings. The study will analyze the existing capacity and new construction to determine if/when there may be a need for added capacity.
2. It will be likely that the following will be required to accommodate the full build out of the Masterplan:
    a. Boiler 3 – 7,350 MBH Boiler
    b. Primary Hot Water Pump 3 – 410 GPM

Addition of new equipment will be accommodated in the new Central Plant and no additional space is required. The existing gas distribution is adequately sized to support the additional boiler and the existing electrical distribution is sized to support the additional pump.

Chilled Water and Heating Hot Water Underground Distribution

It is anticipated that all new buildings will be connected to the existing hydronic distribution as necessary during the design phase of each building. The following areas will need special attention:

1. New piping will be required to be routed to each building through the main spine of the Campus which will be a crowded utility tunnel and will require a lot of coordination.

ELECTRICAL

EXECUTIVE SUMMARY

Summary of Existing Conditions and Observations

The electrical site infrastructure report for Las Positas Community College Campus was written by Interface Engineering culminating from field investigations, data collection, analysis of the existing PG&E service and the existing medium voltage electrical distribution system, and discussions with Campus personnel and plant supervisors. The purpose of this electrical site infrastructure report is to evaluate and provide recommendations for the improvement of the existing medium voltage electrical distribution system.

The existing medium voltage distribution routing for the Campus is currently shown as radial distribution. This type of distribution is unreliable and power disruption-outage can easily occur.

The medium voltage cable routings are in the way of future expansion and addition to the site. The medium voltage cables being radial distribution were only sized to the transformer it is feeding. No future expansion or addition was provided.

Summary of Recommendations

The following lists the major recommendations included in this report. A more detailed description for each recommendation is provided in associated report sections.

1. Provide redundancy for the incoming PG&E feed to the Campus. From another substation source.
2. Replace the incoming section for the Main Switchgear ‘SG’ with a double incoming main fuse section.
3. Modify the existing radial distribution design to a loop/ring distribution design approach. The modification will include upsizing all the feeders to accommodate the loop/ring connection.
4. Transfer loads between Campus feeders to balance Campus loads upon upgrade to a loop feed system.
5. Reroute existing Campus feeders as required to transfer and balance Campus loads between feeders.

6. Reroute existing Campus feeders as required to avoid areas that may cause disturbances and disruptions to the electrical distribution system or other underground utilities. Preferably away from future expansion and addition to the Campus. This was initially done by providing the medium voltage loop along the perimeter of the parking lot and should have been followed through.
7. Provide an alternative power source (i.e.: potential additional cogeneration, fuel cells to support base loads, new wind power generators).

OBSERVATIONS

Incoming Electrical Service

Incoming electrical service to the Las Positas Community College Campus is derived from an overhead 21.6kV PG&E pole located at the west end of the Campus.

The PG&E overhead distribution lines are tapped via three 200E amp fuses, and transition from the overhead pole lines to 3#1/0, XLPE, aluminum conductors, with 25kV insulation, in 4-inch conduit. The PG&E conductors are routed, via a PG&E vault, to the Campus Main Switchgear 'SG' located near the vicinity of the Central Plant. The incoming PG&E overhead lines also serve other facilities and buildings outside of the Las Positas Community College Campus (i.e.: neighboring residential houses, farmhouses).

Primary Distribution

The original Las Positas Community College was first built in 1961. However, the 21.6kV distribution and most of the existing buildings comprising the Las Positas Community College Campus were approximately installed and built in 1978. Major electrical renovations for the electrical site infrastructure were ongoing throughout the years. Various areas throughout the Campus were currently undergoing construction when the site visits were conducted for this report. The six-way, sectionalizing switch was recently installed at the time of the site visits. The majority of the existing electrical equipment is in good, working condition. The age of some equipment originally installed in 1978 may be nearing the manufacturer's recommended design life (typically, approximately 30 years). Overall, the age of the equipment is fair and operational.

The primary distribution for the Las Positas Community College Campus consists of four 21.6kV medium voltage underground Campus feeders, Feeders F1, F2, F3, and F4. These underground Campus feeders are fed from 25kV Main Switchgear 'SG'. The Chabot-Las Positas Community College Campus Main Switchgear 'SG' is manufactured by S&C Electric Company, rated at 600A, 25kV, 3 phase, 3 wire, and includes an outdoor NEMA 3R enclosure. The main switchgear consists of one 200E amp main fuse section, and four main outgoing feeder sections.

Feeders F1 and F2 consist of 3#1 EPR in 4-inch conduits. Feeders F3 and F4 are sized at 3#1/0 EPR in 4-inch conduits. These four underground Campus feeders supply a 21.6kV radial distribution feed to respective distribution transformers throughout the Campus, and routed via various manholes and

sectionalizing switches. The distribution transformers feed respective buildings throughout the Campus. Each distribution transformer is located either outside of the building or within the building's main electrical room.

The underground feeders and manholes appear to be in good, operating condition. The underground feeders are routed in 4-inch conduits, and encased in concrete, which is good engineering design practice. Concrete encasement for underground feeders is ideal for protection against environmental conditions that may, for example, cause cracks to conduits, water leakage, or accidental excavation.

RECOMMENDATIONS

This report focuses on the examination of the existing 21.6kV medium voltage distribution, the primary distribution for Las Positas Community College Campus. Investigation for the secondary distribution is not included as part of the limited scope of work for this report. The recommendations described in this report section formulates best engineering design approaches for upgrading the primary distribution with respect to current Campus loads, ongoing load additions, and future expansion. These recommendations are designed to minimize disruption of the existing Campus electrical distribution system operations during and after implementation.

System Deficiencies and Limitations

As stated under Observations, the prior report section, the existing distribution is based on a radial design approach. To briefly reiterate the design flaws, a radial feeder design is more susceptible to overload conditions and does not inherently provide backup power during interruption of service. Currently, there is no reliability of the electrical distribution system.

System Immediate Needs

At the time of the investigation studies, Campus Feeder F4 was determined as being overloaded, while the other three Campus feeders, F1, F2, and F3, were lightly loaded. Since existing Campus Feeder F4 is overloaded, the general vicinity that is served by this feeder is now restricted from further load additions. Campus growth is not allowed in areas that are served only by Feeder F4. These areas include, but are not restricted to, Buildings B2400, B2500, B3100, Central Plant, Admin, CDC, Portables, Athletics, Aquatics and Soccer Field.

Short Term & Long Term Solutions

Upsizing the existing Feeder F4 will temporarily solve the overloading issue, but overload to the feeder will be an ongoing issue. Reliability of the electrical system is compromised as a result. Thus, this short term solution is not considered a sound engineering design practice. The following recommended solutions will impact both short term and long term medium voltage distribution system and Campus feeders.

RECOMMENDED SYSTEM MODIFICATIONS

The following recommendations propose best engineering practices and key solutions to improve upon system reliability and maintenance through suggested upgrades, installation, and modifications.

Recommendations are identified either as “Recommended”, or “Highly Recommended”, based on the level of impact to the existing medium voltage distribution system.

Highly Recommended:

Modify the existing radial distribution design to a loop/ring distribution design approach. A loop distribution allows feeders to connect in a loop formation throughout the Campus via sectionalizing switches with bus tie. The Campus is thus no longer limited to a single path of power, but supplied with multiple paths of power provided by a loop design approach. Loads can be relocated from feeder to feeder as a means to balance loads between the Campus feeders. Continuity of service is ensured by switching from one feeder to another during fault or loss of a feeder. Hence, the loop distribution design approach is more reliable than a radial distribution design approach.

The following outlines the proposed method to transition from radial to loop distribution:

Loop Fed Feeder F1/F2:

Highly Recommended:

1. Replace existing 80E amp fuse with 125E amp fuse for Feeder F1. Verify and replace conductor from 3#1 to 3#1/0 EPR, with 25kV insulation, in existing 4-inch conduit.
2. Provide manholes and sectionalizing switch as required for Feeder F1 rerouting. Relocate existing manhole from Cooling Tower area to outside of Central Plant Yard for rerouting of Feeder F1. Install additional, new manhole at Central Plant Yard area. Provide one 600A, 21.6kV, 3 pole, pad mount four-way sectionalizing switch with bus tie. Reroute Feeder F1 away from Communications Building. Rerouting of Feeder F1 will also allow Feeder F1 to serve the Central Plant in lieu of Feeder F4, alleviating some of the overloading on Feeder F4.
3. Connect incoming side of Feeder F1 to first leg of the new four-way sectionalizing switch.
4. Connect second leg of four-way sectionalizing switch to continue Feeder F1 feed to 2500 kVA, 21.6kV-480/277V, 3 phase, 4 wire distribution transformer located at the Central Plant. This distribution transformer feeds Switchboard ‘MSLCP’. This load transfer will provide more available load capacity for Feeder F4, alleviating current overload conditions on Feeder F4.
5. Connect third leg of four-way sectionalizing switch to continue Feeder F1 feed to Three-way Sectionalizing Switch ‘PMS1’. The three-way sectionalizing switch connects to 2000kVA distribution transformer. The distribution transformer serves Switchboard ‘MSBA’ and Switchboard ‘SWBD’. These switchboards serve Buildings CCA, B100, B200, B300, B400, B500, B600, and B1400.

Recommended:

1. Provide a new manhole and a four-way sectionalizing switch as required for Feeder F2 rerouting. Intercept Feeder F2, and connect to 2000kVA, 21.6kV-480/277V, 3 phase, 4 wire distribution transformer. This distribution transformer serves Distribution Panel 'DX'. This distribution panel feeds Main Switchboard 'SWBD', serving the Little Theater, Computer Lab, Technical Vocation Center and Automotive Lab, and B800. The new Science Building can also be fed from Distribution Panel 'DX'.
2. Connect incoming side of Feeder F2 to first leg of four-way sectionalizing switch. Thus, loop feed between Feeder F1 and F2 is created (aka combined Feeder F1/F2).
3. Spare fourth leg of four-way sectionalizing switch. Reserved for reconnection to Feeder F2
4. Verify 125E amp fuse rating for Feeder F2. Verify conductor for Feeder F2 as 3#1/0 EPR, with 25kV insulation.

Mandatory:

1. Replace undersized 125E amp fuse for combined Feeder F1/F2. Feeder F1 serves 2000kVA and 1500kVA, and Feeder F2 serves 2000kVA, which is equivalent to 147A for the combined feeder. The combined load is beyond the 125E amp fuse, and is the connected load without demand or diversity. Actual meter reading is required to verify loading and the transfer of loads.
2. Provide a new manhole and a four-way sectionalizing switch as required for Feeder F2 rerouting. Intercept Feeder F2, and connect to 2000kVA, 21.6kV-480/277V, 3 phase, 4 wire distribution transformer. This distribution transformer serves Distribution Panel 'DX'. This distribution panel feeds Main Switchboard 'SWBD', serving the Little Theater, Computer Lab, Technical Vocation Center and Automotive Lab, and B800. The new Science Building can also be fed from Distribution Panel 'DX'.
3. Connect incoming side of Feeder F2 to first leg of four-way sectionalizing switch. Thus, loop feed between Feeder F1 and F2 is created (aka combined Feeder F1/F2).
4. Spare fourth leg of four-way sectionalizing switch. Reserved for reconnection to Feeder F2.
5. Verify 125E amp fuse rating for Feeder F2. Verify conductor for Feeder F2 as 3#1/0 EPR, with 25kV insulation.

Loop Fed Feeder F3/F4:

Highly Recommended:

1. Spare third leg of four-way sectionalizing switch. Connect Feeder 3 to third leg of the four-way sectionalizing switch, continuing Feeder F3 feed to 750kVA, 21.6kV-480/277V, 3 phase, 4 wire distribution transformer serving Science/Technology Center Building B1800 and Library Building B2000.
2. Spare fourth leg of four-way sectionalizing switch. Connect Feeder F3 to fourth leg of four-way sectionalizing switch. Feeder F3 will now loop feed with Feeder F1 and Feeder F2 via the four-way sectionalizing switch. Thus, the loop feed between combined Feeder F1/F2 and Feeder F3 is created.

Recommended:

1. Verify 125E amp fuse rating for Feeder F3. Verify conductor for Feeder F3 as 3#1/0 EPR, with 25kV insulation.
2. Spare fourth leg of four-way sectionalizing switch.

Loop Fed Feeders F1/F2 and F3/F4:

Highly Recommended:

1. Connect Feeder F4 to third leg of Three-way Sectionalizing Switch 'PMS1-2'. Thus, loop feed is created between combined Feeder F1/F2 and combined Feeder F3/F4. This loop feed is equivalent to a loop feed for the overall Campus.

Recommended:

1. Route Feeder F3 and Feeder F4 together in existing spare 4-inch conduit. Replace conductor with 3#1/0 EPR, with 25kV insulation. Connect feeders to Four-way Sectionalizing Switch 'PMSE2-4'.

2. Reconnect Future Student Services Admission Building (SSA) from existing Four-way Sectionalizing Switch 'PMSE2-3' to 600A, 21.6kV, 3 pole, Three-way Sectionalizing Switch 'PMS1-2'.

3. Connect incoming side of Feeder F4 to first leg of Four-way Sectionalizing Switch 'PMSE2-3'.

4. Connect Feeder F4 to second leg of three-way sectionalizing switch, continuing Feeder F4 to distribution transformer serving SSA. Verify transformer size.

Alternative Recommendation:

1. Building 1800 and B2000 loads can be transferred to Feeder F1/F2 if there is available load capacity. Pending load meter readings of distribution transformer loads for Buildings 1800 and B2000. This alternative recommendation will create combined Feeder F3/F4 as the Campus loop feed.

2. Balance Campus load distribution between Campus feeders. Upon completion of a loop feed for the Campus, the overloaded Feeder F4 can be resolved by relocating some loads to the other three lightly loaded Campus Feeders F1, F2, and F3. Hence, load distribution between Campus feeders will be more balanced.

3. Execute proposed upgrade to modify distribution design to loop/ring feed, and balance Campus loads. The proposed upgrade to transition from radial to loop distribution will first provide a loop feed between Feeders F1 and F2, creating a combined Feeder F1/F2. Next, a loop feed will be provided between Feeders F3 and F4, creating a combined Feeder F3/F4. The Campus loop is then completed by providing a loop feed between Feeder F1/F2 and Feeder F3/F4. Relocation of existing manholes, and addition of new manholes and sectionalizing switches, will be provided as required to create a loop feed for the Campus.

4. Reroute existing Campus feeders as required to avoid areas that may cause disturbances and disruptions to the electrical distribution system. Currently, Feeder F1 is lightly loaded. However, the existing underground feeder routes beneath the Communications Building

(B1900) and the Central Plant Cooling Tower Yard. Routing through these areas pose great risk to the existing electrical distribution system. When a fault occurs at Feeder F1, required excavation will disturb other existing feeds to the Communications Building as well as other underground utilities. These other existing feeds serve critical Campus functions that require a 24/7 operation (i.e.: Campus police department, security, fire alarm, telecommunications for emergency electrical equipment, etc.). Such disturbances should be avoided to protect the operation of these critical functions for the Campus. Feeder F1 also routes underground through the Central Plant Cooling Tower Yard. This vicinity is subject to underground water runoff from the cooling tower. Water exposure to the medium voltage feeders should be avoided. Rerouting for Feeder F1 should therefore be performed as required to avoid these areas that will conflict with critical Campus functions and water runoff.

Recommended:

1. Provide redundancy for the incoming PG&E feed to the Campus. The incoming 21.6kV PG&E power to Las Positas Community College Campus is a single overhead transmission line only. The PG&E feed also serves neighboring residential homes and farmhouses. A fault occurrence either at the Campus or at these connected areas outside of the Campus will trigger downtime for the entire Campus. The incoming PG&E transmission line therefore requires redundancy. The Campus will require coordination work with the utility company to provide a second incoming feed, preferably from another separate substation in the area.

2. Replace the incoming section for the Main Switchgear 'SG' with a double incoming main fuse section. Modifications to the main switchgear components will impact the existing switchgear yard footprint. Modification to the existing switchgear yard layout is required.

3. Provide redundancy and minimize downtime by utilizing two Campus switchgears concurrently. Install one new double-ended switchgear at another location within the Campus. Maintain existing Switchgear 'SG' in operation. Transfer loads, as described above under Recommendation #4, upon installation of the double-ended switchgear to minimize downtime.

4. Route all the 21Kv to the perimeter of the parking lot and Campus roads close to the Central Plant and CCA building.

IMPACT ON OPERATIONS & MAINTENANCE

Recommendations listed above collectively designs a solution for Las Positas Community College Campus to maintain the electrical utility feed with minimal interruptions. The recommendation for a loop feed distribution design will maintain and balance loads between the four Campus feeders. Upgrading the existing primary distribution from a radial design to a loop feed will dramatically reduce the overall power usage and provide continuity of service throughout the Campus. The concept for a loop feed is to ensure that the electrical distribution system becomes more reliable. Existing conductors for Feeders F1 and F2 will require upsizing to match the existing conductor sizes

of Feeders F3 and F4 to complete the loop distribution upgrade work. The recommendation for a second incoming PG&E feed will further increase the reliability of the electrical distribution system.

FIRE ALARM SYSTEM

The Las Positas Community College has a networked E3 system. The main panel is located in District M&O Building B3000/B3100, FACP #3, Multi-Disciplinary Building 2400, FACP #1 and LPC Tech Dept, District IT Building B1900A, FACP #2.

The Campus will still be utilizing the same set up since the system is brand new.

The Fire Alarm Terminal Cabinet (FATC) located in each building that will be demolished, will be removed and spared at the main panel.

6 | 2012 Facilities Master Plan Climate Action Plan and Sustainability

CHABOT-LAS POSITAS COMMUNITY COLLEGE DISTRICT 2012 FACILITIES MASTER PLAN UPDATE

CLIMATE ACTION PLAN and SUSTAINABILITY

Executive Summary

On June 15, 2010 the Chabot-Las Positas Community College District (CLPCCD) Board of Trustees Adopted Resolution No. 12 -0910 – Adoption of the Chabot and Las Positas Colleges Climate Action Plans for the American College and University Presidents Climate Commitment. This action followed the signing of the American College and University Presidents Climate Commitment (ACUPCC) on August 21, 2007 and the commitment to developing carbon neutral campuses along with helping the local communities of Hayward and Livermore, within which the colleges operate, as well as the State of California to achieve their goals of dramatically reducing Green House Gas (GHG) emissions that have been put forth in local and statewide legislation. The referenced Climate Action Plans are located at the following web addresses:

- http://www.clpccd.org/bond/LPC/documents/LasPositasClimateActionPlan_FINAL_072010.pdf
- http://www.chabotcollege.edu/facilities/Measure%20B%20Faciilties%20Bond%20Updates/Chabot%20ClimateActionPlan%20FINAL14sept10.pdf

The CLPCCD and Colleges have aggressively identified and enacted appropriate Sustainability and Carbon Neutral strategies such as cool roofs, energy-efficient lighting, energy management systems, photovoltaic installations, waste reduction and recycling, new Central Utility Plants, grey water systems, electric vehicles and public transportation access programs.

Going forward, the Colleges' strategies cover the following five major areas:

- Building and energy
- Transportation
- Waste and Recycling
- Water
- Research, Education and Community Outreach

For CLPCCD, Sustainability is achieved through the strategies in these Climate Action Plans. The Principles for Sustainability are three-fold: Economic Sustainability, Environmental Sustainability, and Social Sustainability.

CLPCCD is committed to following through on these strategies.

Climate Action Plans

Each campus has an adopted Climate Action Plan specifically focused on reducing the carbon footprint of the Colleges' activities, practices and operations. The strategies included in each Action Plan consider:

- Building and energy
- Transportation
- Waste and Recycling
- Water
- Research, Education and Community Outreach

For CLPCCD, Sustainability permeated each of these Climate Action Plan strategies. The Principles for Sustainability are three-fold: Economic Sustainability, Environmental Sustainability, and Social Sustainability. Activities (policies), practices (procurement and design opportunities) and operations (daily actions) seek solutions that address all three:

- **Economic sustainability** is about maximizing life cycle value.
- **Environmental sustainability** involves reducing negative environmental impacts while also engaging natural systems in restorative processes.
- **Social sustainability** is embodied in creating a living and learning campus.

This section lists opportunities for Sustainability strategies that are integral with the design of the campus physical environment: Buildings, Landscape and Infrastructure. Although LEED is a recognized resource for Sustainability, there are many relevant regulations. The 2010 California Building Code includes sustainability requirements in Part 6, the Energy Code. Recently, the State of California enacted the second round of CalGreen legislation. Storm Water management is regulated by '*The Municipal Regional Storm Water Permit Provision C3*' (updated in 2011). Federal legislation is pending for a National Green Building Code. Each campus also has dynamic education programs and policies that may have implications for their respective built environment, for example Chabot College's Environmental Studies hopes to have a community demonstration and training building.

Activities, practices and operations strategies assignable to design projects include but are not limited to the following:

- Comply with the current Federal and State Green Building Codes
- As a minimum, meet LEED Silver or equivalent ratings for all new construction and renovation
- Meter consumption and remote management of all systems
- Incorporate efficient domestic water, non-potable water, and wastewater technologies
- Increase on-site production of power
- Enhance daylight in building design

- Reduce mechanical loads via means such as building orientation, glazing area, exterior wall construction and natural ventilation
- Consider alternative education delivery method such as distance learning
- Optimize space and fit-up configurations to extend utilization such as classrooms accommodating both lecture and computer labs
- Incorporate demonstrations of Sustainable design and strategies for community awareness, investigation and participation
- Consider 3rd party enhanced commissioning
- Promote alternative transportation
- Investigate Stormwater Management options
- Implement comprehensive recycling and composting program
- Minimize consumption of natural resources
- Measure and verify consumption
- Capitalize on incentive programs
- Procure energy efficient Furniture, Fixtures and Equipment
- Utilize Green Cleaning products
- Start the energy modeling exercises early and validate chosen options
- Engage natural systems and processes to filter water and clean the air
- Train the people who will maintain the new equipment and systems
- Inform the occupants on building system operations
- Document District Design Standards supporting Sustainability strategies

Conclusions

These strategies set the stage for a further reduction in per student GHG emissions. CLPCCD is committed to continually improve and sustain excellence in education, economic, social and environmental responsibility. The Climate Action Plans provide a pathway to achieving the near term goal for each college, of meeting a 15% reduction in emissions below 2008 levels by 2020 with consideration of the longer term vision of reaching carbon neutrality by 2050.

As the colleges and neighboring communities grow, the Climate Action Plans will be updated periodically to ensure continued movement towards academic, social, economic and ecological sustainability.

7 | 2012 Facilities Master Plan Budget Analysis

2012 FACILITIES MASTER PLAN UPDATE
CHABOT-LAS POSITAS COMMUNTY COLLEGE DISTRICT
BUDGET ANALYSIS

EXECUTIVE SUMMARY

The following is an analysis of the potential cost for the scope of work identified in the 2012 Facilities Master Plan Update prepared for the Chabot-Las Positas Community College District.

The cost data for the analysis is based on:

- Historical reference to bids received between 2005 and 2011 at Chabot and Las Positas Colleges
- Bid data from comparable projects at Community Colleges within the Bay Area
- Industry resources and trend data
- Research and analysis of materials and labor cost data prepared by TBD Consultants with attention to Bay Area construction market conditions as of June 2012
- Individual Building Programs showing functional areas together with concept sketch to show the number of levels and footprint assumptions
- The building data analysis included review of structural system (seismic upgrade), building systems, façade material , interior finishes and special construction associated with the Building Program
- Factors assigned to the total functional area to establish Gross Square Feet for the Building Program

The budget analysis format:

- Utilizes the District's Budget Development Worksheet typically prepared for all construction projects. The form incorporates the District's standard percentages in various line items.
- All figures are rounded to the nearest hundred as these are order-of-magnitude placeholders

For each College, a Master Summary distinguishes NEW and *RENOVATION p*rojects. Next, there is a Master Summary by Project.

The Master Summary by Project lists:

- Each Building as defined by educational requirements (Building Program) and includes related area of sitework and infrastructure with each project (Infrastructure systems include all utilities, central plants connections and Information Technology systems for a fully functional project. System-wide Infrastructure upgrades are also included.)
- The balance of Demolition, Infrastructure and Sitework to complete the 2012 FMPs.
- Athletic projects such as new fields, replacement bleachers.
- Assumption for swing space
- An 'ALLOWANCE' for specific projects that may occur

Escalation is approximately 4% per year for three years

Chabot College 2012 Facilities Master Plan Update

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BUDGET ANALYSIS

MASTER SUMMARY

Description	NEW	*RENOVATION*	TOTAL
Construction (Renovation)	$ -	$ 32,739,000	$ 32,739,000
Construction (New) incl Sitework	$ 182,457,000	$ -	$ 182,457,000
Construction (Temporary Facilities)	$ 3,933,000	$ -	$ 3,933,000
Construction (Demolition)	$ 1,873,000	$ -	$ 1,873,000
Construction (Hazmat Remediation)	$ 2,846,000	$ 1,310,000	$ 4,156,000
Total Construction	**$ 191,109,000**	**$ 34,049,000**	**$ 225,158,000**
Design	$ 18,388,000	$ 3,404,000	$ 21,792,000
Construction Management	$ 9,194,000	$ 1,702,000	$ 10,896,000
Specialty Consulting	$ 2,759,000	$ 511,000	$ 3,270,000
DSA Plan Check	$ 1,840,000	$ 341,000	$ 2,181,000
DSA Inspection (IOR)	$ 2,760,000	$ 511,000	$ 3,271,000
Testing & Inspections	$ 1,849,000	$ 341,000	$ 2,190,000
Furniture, Fixtures and Equipment	$ 5,515,000	$ 1,022,000	$ 6,537,000
PROJECT SUB-TOTAL:	**$ 233,414,000**	**$ 41,881,000**	**$ 275,295,000**
Design Contingency	$ 1,908,000	$ 341,000	$ 2,249,000
Bid Contingency	$ 5,721,000	$ 1,022,000	$ 6,743,000
Construction Contingency	$ 19,078,000	$ 3,405,000	$ 22,483,000
Project Contingency	$ 5,721,000	$ 1,022,000	$ 6,743,000
TOTAL PROJECT SUB-TOTAL:	**$ 265,842,000**	**$ 47,671,000**	**$ 313,513,000**
Escalation	$ 31,888,000	$ 5,725,000	$ 37,613,000
TOTAL PROJECT BUDGET:	**$ 297,730,000**	**$ 53,396,000**	**$ 351,126,000**

Chabot College 2012 Facilities Master Plan Update

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BUDGET ANALYSIS

MASTER SUMMARY BY PROJECT (New)

	NEW				
Description	**Library/Learning Center**	**Cafeteria etc**	**Admin / TV Center**	**Biology**	**Science Faculty**
Building Identity	**B100**	**B2300**	**B200**	**B2100**	**B2000**
Construction (Renovation)					
Construction (New)	$ 35,550,000	$ 27,625,000	$ 16,800,000	$ 20,582,000	$ 9,181,000
Construction (Temporary Facilities)	$ -	$ -	$ -		
Construction (Demolition)	$ 690,000	$ 322,000	$ 167,000	$ 162,000	$ 87,000
Construction (Hazmat Remediation)	$ 446,000	$ 500,000	$ 400,000	$ 400,000	$ 200,000
Total Construction	**$ 36,686,000**	**$ 28,447,000**	**$ 17,367,000**	**$ 21,144,000**	**$ 9,468,000**
Design	$ 3,668,000	$ 2,844,000	$ 1,735,000	$ 2,114,000	$ 947,000
Construction Management	$ 1,834,000	$ 1,422,000	$ 867,000	$ 1,057,000	$ 473,000
Specialty Consulting	$ 550,000	$ 427,000	$ 260,000	$ 317,000	$ 142,000
DSA Plan Check	$ 367,000	$ 285,000	$ 173,000	$ 211,000	$ 95,000
DSA Inspection (IOR)	$ 550,000	$ 427,000	$ 260,000	$ 317,000	$ 142,000
Testing & Inspections	$ 367,000	$ 284,000	$ 173,000	$ 211,000	$ 95,000
Furniture, Fixtures and Equipment	$ 1,100,000	$ 853,000	$ 520,000	$ 634,000	$ 284,000
PROJECT SUB-TOTAL:	**$ 45,122,000**	**$ 34,989,000**	**$ 21,355,000**	**$ 26,005,000**	**$ 11,646,000**
Design Contingency	$ 367,000	$ 284,000	$ 173,000	$ 211,000	$ 95,000
Bid Contingency	$ 1,100,000	$ 853,000	$ 520,000	$ 634,000	$ 284,000
Construction Contingency	$ 3,669,000	$ 2,844,000	$ 1,735,000	$ 2,114,000	$ 947,000
Project Contingency	$ 1,100,000	$ 853,000	$ 520,000	$ 634,000	$ 284,000
TOTAL PROJECT SUB-TOTAL:	**$ 51,358,000**	**$ 39,823,000**	**$ 24,303,000**	**$ 29,598,000**	**$ 13,256,000**
Escalation	$ 6,200,000	$ 4,777,000	$ 2,914,000	$ 3,552,000	$ 1,590,000
TOTAL PROJECT BUDGET:	**$ 57,558,000**	**$ 44,600,000**	**$ 27,217,000**	**$ 33,150,000**	**$ 14,846,000**

	NEW				
Description	**SOTA Off/ Recital Hall**	**700 Seat Theater**	**Perf Arts Center Exp**	**Auto BMW Storage**	**Fire Technology Off-site**
Building Identity	**B1100**	**B3600**	**Lobby/Backstage**	**Annex**	**ALLOWANCE**
Construction (Renovation)					
Construction (New)	$ 8,200,000	$ 17,672,000	$ 4,731,000	$ 3,494,000	$ 10,000,000
Construction (Temporary Facilities)	$ -	$ -	$ -	$ -	
Construction (Demolition)	$ 47,000	$ 98,000	$ -	$ -	
Construction (Hazmat Remediation)	$ 200,000	$ 600,000	$ 100,000	$ -	
Total Construction	**$ 8,447,000**	**$ 18,370,000**	**$ 4,831,000**	**$ 3,494,000**	**$ 10,000,000**
Design	$ 845,000	$ 1,837,000	$ 483,000	$ 349,000	$ 1,000,000
Construction Management	$ 422,000	$ 918,000	$ 242,000	$ 175,000	$ 500,000
Specialty Consulting	$ 127,000	$ 276,000	$ 72,000	$ 52,000	$ 150,000
DSA Plan Check	$ 85,000	$ 184,000	$ 48,000	$ 35,000	$ 100,000
DSA Inspection (IOR)	$ 127,000	$ 276,000	$ 73,000	$ 52,000	$ 150,000
Testing & Inspections	$ 85,000	$ 184,000	$ 48,000	$ 35,000	$ 100,000
Furniture, Fixtures and Equipment	$ 253,000	$ 551,000	$ 145,000	$ 105,000	$ 300,000
PROJECT SUB-TOTAL:	**$ 10,391,000**	**$ 22,596,000**	**$ 5,942,000**	**$ 4,297,000**	**$ 12,300,000**
Design Contingency	$ 85,000	$ 184,000	$ 48,000	$ 35,000	$ 100,000
Bid Contingency	$ 253,000	$ 551,000	$ 145,000	$ 105,000	$ 300,000
Construction Contingency	$ 845,000	$ 1,837,000	$ 483,000	$ 350,000	$ 1,000,000
Project Contingency	$ 253,000	$ 551,000	$ 145,000	$ 105,000	$ 300,000
TOTAL PROJECT SUB-TOTAL:	**$ 11,827,000**	**$ 25,719,000**	**$ 6,763,000**	**$ 4,892,000**	**$ 14,000,000**
Escalation	$ 1,420,000	$ 3,086,000	$ 812,000	$ 587,000	$ 1,680,000
TOTAL PROJECT BUDGET:	**$ 13,247,000**	**$ 28,805,000**	**$ 7,575,000**	**$ 5,479,000**	**$ 15,680,000**

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Description	NEW Arcade/ Colonnade	Maintenance Garage	Pool Deck	Stadium Bleachers	Practice Field
Building Identity	**ALLOWANCE**	**M&O**			
Construction (Renovation)					
Construction (New)	$ 3,000,000	$ 2,483,000	$ 5,244,000	$ 2,908,000	$ 550,000
Construction (Temporary Facilities)		$ -			
Construction (Demolition)	$ 300,000				
Construction (Hazmat Remediation)					
Total Construction	**$ 3,300,000**	**$ 2,483,000**	**$ 5,244,000**	**$ 2,908,000**	**$ 550,000**
Design	$ 300,000	$ 248,000	$ 524,000	$ 291,000	$ 55,000
Construction Management	$ 150,000	$ 124,000	$ 262,000	$ 145,000	$ 28,000
Specialty Consulting	$ 45,000	$ 37,000	$ 79,000	$ 44,000	$ 8,000
DSA Plan Check	$ 30,000	$ 25,000	$ 52,000	$ 29,000	$ 6,000
DSA Inspection (IOR)	$ 45,000	$ 37,000	$ 79,000	$ 44,000	$ 8,000
Testing & Inspections	$ 30,000	$ 35,000	$ 52,000	$ 29,000	$ 6,000
Furniture, Fixtures and Equipment	$ 90,000	$ 75,000	$ 157,000	$ 87,000	$ 17,000
PROJECT SUB-TOTAL:	**$ 3,990,000**	**$ 3,064,000**	**$ 6,449,000**	**$ 3,577,000**	**$ 678,000**
Design Contingency	$ 30,000	$ 25,000	$ 52,000	$ 29,000	$ 6,000
Bid Contingency	$ 90,000	$ 75,000	$ 157,000	$ 87,000	$ 17,000
Construction Contingency	$ 300,000	$ 248,000	$ 524,000	$ 291,000	$ 55,000
Project Contingency	$ 90,000	$ 75,000	$ 157,000	$ 87,000	$ 17,000
TOTAL PROJECT SUB-TOTAL:	**$ 4,500,000**	**$ 3,487,000**	**$ 7,339,000**	**$ 4,071,000**	**$ 773,000**
Escalation	$ 500,000	$ 413,000	$ 881,000	$ 489,000	$ 92,000
TOTAL PROJECT BUDGET:	**$ 5,000,000**	**$ 3,900,000**	**$ 8,220,000**	**$ 4,560,000**	**$ 865,000**

Description	NEW Javelin	Baseball	Swing Space	Misc Sitework - Parking Lot E,D,C,J	Infrastructure
Building Identity				**(not with Bld)**	
Construction (Renovation)					
Construction (New)	$ 262,000	$ 3,278,000		$ 4,012,000	$ 6,885,000
Construction (Temporary Facilities)			$ 3,933,000		
Construction (Demolition)					
Construction (Hazmat Remediation)					
Total Construction	**$ 262,000**	**$ 3,278,000**	**$ 3,933,000**	**$ 4,012,000**	**$ 6,885,000**
Design	$ 26,000	$ 328,000	$ 393,000	$ 401,000	
Construction Management	$ 13,000	$ 164,000	$ 197,000	$ 201,000	
Specialty Consulting	$ 4,000	$ 49,000	$ 60,000	$ 60,000	
DSA Plan Check	$ 3,000	$ 33,000	$ 39,000	$ 40,000	
DSA Inspection (IOR)	$ 4,000	$ 49,000	$ 60,000	$ 60,000	
Testing & Inspections	$ 3,000	$ 33,000	$ 39,000	$ 40,000	
Furniture, Fixtures and Equipment	$ 8,000	$ 98,000	$ 118,000	$ 120,000	
PROJECT SUB-TOTAL:	**$ 323,000**	**$ 4,032,000**	**$ 4,839,000**	**$ 4,934,000**	**$ 6,885,000**
Design Contingency	$ 3,000	$ 33,000	$ 39,000	$ 40,000	$ 69,000
Bid Contingency	$ 8,000	$ 98,000	$ 118,000	$ 120,000	$ 206,000
Construction Contingency	$ 26,000	$ 328,000	$ 393,000	$ 401,000	$ 688,000
Project Contingency	$ 8,000	$ 98,000	$ 118,000	$ 120,000	$ 206,000
TOTAL PROJECT SUB-TOTAL:	**$ 368,000**	**$ 4,589,000**	**$ 5,507,000**	**$ 5,615,000**	**$ 8,054,000**
Escalation	$ 44,000	$ 550,000	$ 661,000	$ 674,000	$ 966,000
TOTAL PROJECT BUDGET:	**$ 412,000**	**$ 5,139,000**	**$ 6,168,000**	**$ 6,289,000**	**$ 9,020,000**

Chabot College 2012 Facilities Master Plan Update

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BUDGET ANALYSIS

MASTER SUMMARY BY PROJECT (Renovation)

Description	RENOVATION				
	Perf Arts	Em Medical	Childrens Center	Childrens Center	Sch of Arts
Building Identity	**B1300**	**B3100**	**B3500**	**B3700**	**B1000**
Construction (Renovation)	$ 5,555,000	$ 1,758,000	$ 1,038,000	$ 318,000	$ 3,422,000
Construction (New)	$ -	$ -	$ -	$ -	$ -
Construction (Temporary Facilities)	$ -	$ -	$ -	$ -	$ -
Construction (Demolition)	$ -	$ -	$ -	$ -	$ -
Construction (Hazmat Remediation)	$ 300,000	$ 100,000	$ -	$ -	$ 200,000
Total Construction	**$ 5,855,000**	**$ 1,858,000**	**$ 1,038,000**	**$ 318,000**	**$ 3,622,000**
Design	$ 585,000	$ 186,000	$ 104,000	$ 32,000	$ 362,000
Construction Management	$ 293,000	$ 93,000	$ 52,000	$ 16,000	$ 181,000
Specialty Consulting	$ 88,000	$ 28,000	$ 16,000	$ 5,000	$ 54,000
DSA Plan Check	$ 59,000	$ 19,000	$ 10,000	$ 3,000	$ 36,000
DSA Inspection (IOR)	$ 88,000	$ 28,000	$ 16,000	$ 5,000	$ 54,000
Testing & Inspections	$ 59,000	$ 19,000	$ 10,000	$ 3,000	$ 36,000
Furniture, Fixtures and Equipment	$ 176,000	$ 56,000	$ 31,000	$ 10,000	$ 109,000
PROJECT SUB-TOTAL:	**$ 7,203,000**	**$ 2,287,000**	**$ 1,277,000**	**$ 392,000**	**$ 4,454,000**
Design Contingency	$ 59,000	$ 19,000	$ 10,000	$ 3,000	$ 36,000
Bid Contingency	$ 176,000	$ 56,000	$ 31,000	$ 10,000	$ 109,000
Construction Contingency	$ 586,000	$ 186,000	$ 104,000	$ 32,000	$ 362,000
Project Contingency	$ 176,000	$ 56,000	$ 31,000	$ 10,000	$ 109,000
TOTAL PROJECT SUB-TOTAL:	**$ 8,200,000**	**$ 2,604,000**	**$ 1,453,000**	**$ 447,000**	**$ 5,070,000**
Escalation	$ 984,000	$ 312,000	$ 174,000	$ 53,000	$ 610,000
TOTAL PROJECT BUDGET:	**$ 9,184,000**	**$ 2,916,000**	**$ 1,627,000**	**$ 500,000**	**$ 5,680,000**

Description	RENOVATION				
	Eng Fac	Engineering	Med/Dental	Chemistry / Computer	M and O
Building Identity	**B1500**	**B1600**	**B2200**	**B3900**	**B3000**
Construction (Renovation)	$ 2,870,000	$ 9,026,000	$ 2,132,000	$ 3,355,000	$ 3,265,000
Construction (New)	$ -	$ -	$ -	$ -	$ -
Construction (Temporary Facilities)	$ -	$ -	$ -	$ -	$ -
Construction (Demolition)	$ -	$ -	$ -	$ -	$ -
Construction (Hazmat Remediation)	$ 200,000	$ 200,000	$ 70,000	$ 120,000	$ 120,000
Total Construction	**$ 3,070,000**	**$ 9,226,000**	**$ 2,202,000**	**$ 3,475,000**	**$ 3,385,000**
Design	$ 307,000	$ 923,000	$ 220,000	$ 347,000	$ 338,000
Construction Management	$ 153,000	$ 461,000	$ 110,000	$ 174,000	$ 169,000
Specialty Consulting	$ 46,000	$ 138,000	$ 33,000	$ 52,000	$ 51,000
DSA Plan Check	$ 31,000	$ 92,000	$ 22,000	$ 35,000	$ 34,000
DSA Inspection (IOR)	$ 46,000	$ 138,000	$ 33,000	$ 52,000	$ 51,000
Testing & Inspections	$ 31,000	$ 92,000	$ 22,000	$ 35,000	$ 34,000
Furniture, Fixtures and Equipment	$ 92,000	$ 277,000	$ 66,000	$ 104,000	$ 101,000
PROJECT SUB-TOTAL:	**$ 3,776,000**	**$ 11,347,000**	**$ 2,708,000**	**$ 4,274,000**	**$ 4,163,000**
Design Contingency	$ 31,000	$ 92,000	$ 22,000	$ 35,000	$ 34,000
Bid Contingency	$ 92,000	$ 277,000	$ 66,000	$ 104,000	$ 101,000
Construction Contingency	$ 307,000	$ 923,000	$ 220,000	$ 347,000	$ 338,000
Project Contingency	$ 92,000	$ 277,000	$ 66,000	$ 104,000	$ 101,000
TOTAL PROJECT SUB-TOTAL:	**$ 4,298,000**	**$ 12,916,000**	**$ 3,082,000**	**$ 4,864,000**	**$ 4,737,000**
Escalation	$ 517,000	$ 1,554,000	$ 367,000	$ 586,000	$ 568,000
TOTAL PROJECT BUDGET:	**$ 4,815,000**	**$ 14,470,000**	**$ 3,449,000**	**$ 5,450,000**	**$ 5,305,000**

Las Positas College 2012 Facilities Master Plan Update

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BUDGET ANALYSIS

MASTER SUMMARY

Description	*RENOVATION*	NEW	TOTAL
Construction (Renovation)	$ 11,150,000	$ -	$ 11,150,000
Construction (New)		$ 144,000,000	$ 144,000,000
Construction (Expansion)	$ -	$ -	$ -
Construction (Replacement)	$ -	$ -	$ -
Construction (Temporary Facilities)	$ -	$ 950,000	$ 950,000
Construction (Demolition)	$ -	$ 677,400	$ 677,400
Construction (Hazmat Remediation)	$ 400,000	$ -	$ 400,000
Total Construction	**$ 11,550,000**	**$ 145,627,400**	**$ 157,177,400**
Design	$ 1,150,000	$ 15,025,200	$ 16,175,200
Construction Management	$ 580,000	$ 7,252,500	$ 7,832,500
Specialty Consulting	$ 175,000	$ 2,213,500	$ 2,388,500
DSA Plan Check	$ 115,000	$ 1,450,500	$ 1,565,500
DSA Inspection (IOR)	$ 175,000	$ 2,213,500	$ 2,388,500
Testing & Inspections	$ 115,000	$ 1,450,500	$ 1,565,500
Furniture, Fixtures and Equipment	$ 350,000	$ 4,371,500	$ 4,721,500
PROJECT SUB-TOTAL:	**$ 14,210,000**	**$ 179,604,600**	**$ 193,814,600**
Design Contingency	$ 115,000	$ 1,475,500	$ 1,590,500
Bid Contingency	$ 350,000	$ 4,371,500	$ 4,721,500
Construction Contingency	$ 1,150,000	$ 14,555,200	$ 15,705,200
Project Contingency	$ 350,000	$ 4,396,500	$ 4,746,500
TOTAL PROJECT SUB-TOTAL:	**$ 16,175,000**	**$ 204,403,300**	**$ 220,578,300**
Escalation	$ 2,000,000	$ 24,618,700	$ 26,618,700
TOTAL PROJECT BUDGET:	**$ 18,175,000**	**$ 229,022,000**	**$ 247,197,000**

Las Positas College 2012 Facilities Master Plan Update

BUDGET ANALYSIS

MASTER SUMMARY BY PROJECT

	RENOVATION	NEW		
Description	***Library Renovation***	**ILC / Math / HS**	**Academic / Service**	**Academic**
Building Identity	**B2000**	**B2100**	**B300**	**B100**
Construction (Renovation)	$ 11,150,000			
Construction (New)		$ 21,900,000	$ 9,650,000	$ 19,150,000
Construction (Temporary Facilities)	$ -	$ -	$ -	$ -
Construction (Demolition)	$ -	$ 100,000	$ 100,000	$ 100,000
Construction (Hazmat Remediation)	$ 400,000	$ -	$ -	$ -
Total Construction	**$ 11,550,000**	**$ 22,000,000**	**$ 9,750,000**	**$ 19,250,000**
Design	$ 1,150,000	$ 2,200,000	$ 975,000	$ 1,925,000
Construction Management	$ 580,000	$ 1,100,000	$ 500,000	$ 975,000
Specialty Consulting	$ 175,000	$ 325,000	$ 150,000	$ 300,000
DSA Plan Check	$ 115,000	$ 225,000	$ 100,000	$ 200,000
DSA Inspection (IOR)	$ 175,000	$ 325,000	$ 150,000	$ 300,000
Testing & Inspections	$ 115,000	$ 225,000	$ 100,000	$ 200,000
Furniture, Fixtures and Equipment	$ 350,000	$ 650,000	$ 300,000	$ 575,000
PROJECT SUB-TOTAL:	**$ 14,210,000**	**$ 27,050,000**	**$ 12,025,000**	**$ 23,725,000**
Design Contingency	$ 115,000	$ 225,000	$ 100,000	$ 200,000
Bid Contingency	$ 350,000	$ 650,000	$ 300,000	$ 575,000
Construction Contingency	$ 1,150,000	$ 2,200,000	$ 975,000	$ 1,900,000
Project Contingency	$ 350,000	$ 675,000	$ 300,000	$ 575,000
TOTAL PROJECT SUB-TOTAL:	**$ 16,175,000**	**$ 30,800,000**	**$ 13,700,000**	**$ 26,975,000**
Escalation	$ 2,000,000	$ 3,700,000	$ 1,650,000	$ 3,225,000
TOTAL PROJECT BUDGET:	**$ 18,175,000**	**$ 34,500,000**	**$ 15,350,000**	**$ 30,200,000**

	NEW			
Description	**Academic**	**Academic**	**Viti. / Hort.**	**Public Safety**
Building Identity	**B600**	**B800**	**B3400 B**	**B3400 A**
Construction (Renovation)				
Construction (New)	$ 13,100,000	$ 12,500,000	$ 4,700,000	$ 2,950,000
Construction (Temporary Facilities)	$ -	$ -	$ -	$ -
Construction (Demolition)	$ 125,000	$ 200,000	$ -	$ -
Construction (Hazmat Remediation)	$ -	$ -	$ -	$ -
Total Construction	**$ 13,225,000**	**$ 12,700,000**	**$ 4,700,000**	**$ 2,950,000**
Design	$ 1,325,000	$ 1,275,000	$ 475,000	$ 300,000
Construction Management	$ 650,000	$ 625,000	$ 225,000	$ 150,000
Specialty Consulting	$ 200,000	$ 200,000	$ 75,000	$ 50,000
DSA Plan Check	$ 125,000	$ 125,000	$ 50,000	$ 25,000
DSA Inspection (IOR)	$ 200,000	$ 200,000	$ 75,000	$ 50,000
Testing & Inspections	$ 125,000	$ 125,000	$ 50,000	$ 25,000
Furniture, Fixtures and Equipment	$ 400,000	$ 375,000	$ 150,000	$ 100,000
PROJECT SUB-TOTAL:	**$ 16,250,000**	**$ 15,625,000**	**$ 5,800,000**	**$ 3,650,000**
Design Contingency	$ 125,000	$ 125,000	$ 50,000	$ 25,000
Bid Contingency	$ 400,000	$ 375,000	$ 150,000	$ 100,000
Construction Contingency	$ 1,325,000	$ 1,275,000	$ 475,000	$ 300,000
Project Contingency	$ 400,000	$ 375,000	$ 150,000	$ 100,000
TOTAL PROJECT SUB-TOTAL:	**$ 18,500,000**	**$ 17,775,000**	**$ 6,625,000**	**$ 4,175,000**
Escalation	$ 2,250,000	$ 2,225,000	$ 775,000	$ 500,000
TOTAL PROJECT BUDGET:	**$ 20,750,000**	**$ 20,000,000**	**$ 7,400,000**	**$ 4,675,000**

Las Positas College 2012 Facilities Master Plan Update

Master Summary by Project

	NEW			
Description	**Phys Ed -Locker**	**Sports Fields**	**Telescope**	**Automotive**
Building Identity	**B3600**		**ALLOWANCE**	**ALLOWANCE**
Construction (Renovation)				
Construction (New)	$ 2,300,000	$ 14,400,000	$ 1,000,000	$ 5,000,000
Construction (Temporary Facilities)	$ -			
Construction (Demolition)	$ -			
Construction (Hazmat Remediation)	$ -			
Total Construction	**$ 2,300,000**	**$ 14,400,000**	**$ 1,000,000**	**$ 5,000,000**
Design	$ 225,000	$ 1,425,000	$ 100,000	$ 500,000
Construction Management	$ 100,000	$ 725,000	$ 50,000	$ 250,000
Specialty Consulting	$ 25,000	$ 225,000	$ 15,000	$ 75,000
DSA Plan Check	$ 25,000	$ 150,000	$ 10,000	$ 50,000
DSA Inspection (IOR)	$ 25,000	$ 225,000	$ 15,000	$ 75,000
Testing & Inspections	$ 25,000	$ 150,000	$ 10,000	$ 50,000
Furniture, Fixtures and Equipment	$ 75,000	$ 425,000	$ 30,000	$ 150,000
PROJECT SUB-TOTAL:	**$ 2,800,000**	**$ 17,725,000**	**$ 1,230,000**	**$ 6,150,000**
Design Contingency	$ 25,000	$ 150,000	$ 10,000	$ 50,000
Bid Contingency	$ 75,000	$ 425,000	$ 30,000	$ 150,000
Construction Contingency	$ 225,000	$ 1,425,000	$ 100,000	$ 500,000
Project Contingency	$ 75,000	$ 425,000	$ 30,000	$ 150,000
TOTAL PROJECT SUB-TOTAL:	**$ 3,200,000**	**$ 20,150,000**	**$ 1,400,000**	**$ 7,000,000**
Escalation	$ 400,000	$ 2,425,000	$ 175,000	$ 850,000
TOTAL PROJECT BUDGET:	**$ 3,600,000**	**$ 22,575,000**	**$ 1,575,000**	**$ 7,850,000**

	NEW				
Description	**Inman Property**	**Demolition**	**Swing Space**	**Sitework**	**Infrastructure**
Building Identity	**ALLOWANCE**	**Misc**			
Construction (Renovation)					
Construction (New)	$ 500,000			$ 16,125,000	$ 20,725,000
Construction (Temporary Facilities)			$ 950,000		
Construction (Demolition)		$ 52,400			
Construction (Hazmat Remediation)					
Total Construction	**$ 500,000**	**$ 52,400**	**$ 950,000**	**$ 16,125,000**	**$ 20,725,000**
Design	$ 500,000	$ 5,200	$ 95,000	$ 1,625,000	$ 2,075,000
Construction Management	$ 25,000	$ 2,500	$ 50,000	$ 800,000	$ 1,025,000
Specialty Consulting	$ 7,500	$ 1,000	$ 15,000	$ 250,000	$ 300,000
DSA Plan Check	$ 5,000	$ 500	$ 10,000	$ 150,000	$ 200,000
DSA Inspection (IOR)	$ 7,500	$ 1,000	$ 15,000	$ 250,000	$ 300,000
Testing & Inspections	$ 5,000	$ 500	$ 10,000	$ 150,000	$ 200,000
Furniture, Fixtures and Equipment	$ 15,000	$ 1,500	$ 25,000	$ 475,000	$ 625,000
PROJECT SUB-TOTAL:	**$ 1,065,000**	**$ 64,600**	**$ 1,170,000**	**$ 19,825,000**	**$ 25,450,000**
Design Contingency	$ 5,000	$ 500	$ 10,000	$ 175,000	$ 200,000
Bid Contingency	$ 15,000	$ 1,500	$ 25,000	$ 475,000	$ 625,000
Construction Contingency	$ 50,000	$ 5,200	$ 100,000	$ 1,625,000	$ 2,075,000
Project Contingency	$ 15,000	$ 1,500	$ 25,000	$ 475,000	$ 625,000
TOTAL PROJECT SUB-TOTAL:	**$ 1,150,000**	**$ 73,300**	**$ 1,330,000**	**$ 22,575,000**	**$ 28,975,000**
Escalation	$ 85,000	$ 8,700	$ 150,000	$ 2,700,000	$ 3,500,000
TOTAL PROJECT BUDGET:	**$ 1,235,000**	**$ 82,000**	**$ 1,480,000**	**$ 25,275,000**	**$ 32,475,000**