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County Of Santa Cruz

GENERAL SERVICES DEPARTMENT
701 OCEAN STREET, SUITE 330, SANTA CRUZ, CA 95060-4073
(831) 454-2210 FAX: (831) 454-2710 TDD: (831) 454-2123
NANCY GORDON, DIRECTOR

June 21, 2011 Agenda: June 28, 2011

Board of Supervisors
County of Santa Cruz
701 Ocean Street
Santa Cruz, CA 95060

Santa Cruz Veterans Memorial Building Repair Project Update

Members of the Board:

On May 24, 2011 your Board received an update on the status of the Santa Cruz Veterans Memorial Building repair project. At that time, we advised your Board that Vanir Construction Management, who is contracted to the County for pre-design project services, has completed most of their evaluative work, but soils testing results were still pending. Those results have now been received and incorporated into the final report.

Building Repair

Your Board has received copies of Vanir's final repair recommendations report and a copy has been placed on file with the Clerk of the Board. The scope of repair work recommended for the project will provide for a building that is safe for occupancy, while assuring that repairs meet the California Historic Building Code in a cost effective and expedited manner. County staff has met with Vanir project team members to review their recommendations and concur with their approach to the repair project. In summary, the work includes the following elements:

- Structural safety – install connections between the roof and concrete walls, improve diaphragm continuity, improve weak story shear and add structural additions to the foundation to stiffen and tie the foundations together.
- Occupant safety - electrical impacted in course of repair will be to appropriate code requirements, with electrical panels grounded and relocated from areas susceptible to flooding, installation of a fire alarm system and improved emergency egress, installation of new boiler and asbestos/lead paint abatement.

The recommended repair work is anticipated to take approximately 20 months to complete at an estimated cost of $3.5 million dollars, which includes contingencies, project management costs and testing. Due to the logistical challenges presented at the site, much of the efforts will involve handwork with laborers and wheel barrels. Staff anticipates working with area businesses and organizations for off- peak time access, and based on early inquiries anticipates excellent local cooperation.

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Funding

The County Administrative Office has been working with Rutan & Tucker, the County's bond counsel, and Harrell & Company Advisors, the County's financial advisor, about funding the repair project. Funding will be in the form of long-term Certificates of Participation or COPs. The COPs will be secured by lease payments to be paid by the County to the County's Public Financing Authority for property with sufficient value to cover the proposed payments. Typically, the County uses assets with an essential purpose for this leasing process, which results in the highest available rating. In order to proceed expeditiously with establishing funding for the repair project, your Board is requested to authorize staff to engage Rutan & Tucker and Harrell & Company Advisors, pursuant to existing contracts, to assist staff in determining the appropriate security and term for the COPs, to prepare the any required financing documents for consideration of the Board on August 2, 2011, submit such financing to rating agencies and prepare other documents necessary for the sale of COPs.

It is therefore recommended that your Board:

1. Accept this update on the Santa Cruz Veterans Memorial Building repair project and authorize County staff to proceed with steps necessary for implementation of the Vanir report recommendations;
2. Direct General Services to return on August 2, 2011 with negotiated contract documents for Vanir Construction Management Services, Inc to provide phased design and project management services for the completion of repairs on the Santa Cruz Veterans Memorial Building as outlined in their final project report; and
3. Authorize the County Administrative Office to take necessary administrative steps for returning on August 2, 2011 with a recommended Board action for the issuance of a Certificates of Participation for funding the repair as scoped.

Very truly yours,

Nancy Gordon
General Services Director

RECOMMENDED:

SUSAN A. MAURIELLO
County Administrative Officer

cc: CAO; County Counsel; Risk Management; Public Works; Human Services Department; Santa Cruz Veterans Board of Trustees; Veterans Memorial Council; Vanir Construction Management Services, Inc; Rutan and Tucker; Harrell and Company Advisors..

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County of Santa Cruz

BOARD OF SUPERVISORS

701 OCEAN STREET, SUITE 500, SANTA CRUZ, CA 95060-4069
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JOHN LEOPOLD	ELLEN PIRIE	NEAL COONERTY	GREG CAPUT	MARK W. STONE
FIRST DISTRICT	SECOND DISTRICT	THIRD DISTRICT	FOURTH DISTRICT	FIFTH DISTRICT

AGENDA: 6/28/11

June 24, 2011

BOARD OF SUPERVISORS
County of Santa Cruz
701 Ocean Street
Santa Cruz, CA 95060

RE: SANTA CRUZ VETERANS MEMORIAL BUILDING

Dear Members of the Board:

As the Board is aware, the Santa Cruz Veterans Memorial Building is currently closed and unused. The Board of Supervisors is currently reassessing the closure of the Santa Cruz Veterans Memorial Building with the intent of reopening the building as soon as possible.

Veterans are valued members of our society who have contributed and sacrificed for this country. It is the aim of our County to provide services for a number of veterans and veteran matters, including but not limited to: providing assistance in vocational rehabilitation and employment; offering veterans service benefits; counseling returning service members; assisting homeless, minority, women, and elderly veterans; and assisting surviving spouses and dependents.

The value of the Veterans Memorial Building is unmeasurable because it represents a center for the veterans to meet and to provide the aforementioned services. The primary function of the building is to provide a central place for volunteers and advocates of veterans to meet. This central location allows for the pooling of helping hands and outside expertise in helping veterans. Of secondary use, the Veterans Memorial Building has served broader community-based functions such as providing rental space for yoga, dance, and singing classes, general community activities, events and weddings, and can continue to be a central market space for entrepreneurs

During the process of condemning and subsequently closing the building, local veterans have felt they have not been included in the process and have even worked with alternate engineers and consultants. Many veterans have given close consideration to the findings in the Duquette report, the findings of Civil Engineer Paul Cox, and correspondence with the State Historical Building Safety Board. These three items of

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correspondence have been especially promising for veterans because they offered potential scenarios in which they could access their facilities much sooner than projected. They also contradicted the generally accepted Streeter report, which many veterans stand opposed to as it calls for extended non-occupancy.

It is my request that during Tuesday's meeting we specifically address these items for the purpose of clarifying County staff's acceptance or rejection of their content and why such positions have been taken. County staff have been committed to resolving this issue as best as possible, and many staff members working most intimately on the project are veterans themselves. For the purpose of transparency, I would like local veterans committed to the reopening of the Veterans Memorial Building to have their concerns specifically addressed. Moreover, I would like for veterans to hear why staff is proposing to take action in accordance with the newly presented Vanir report, with special attention given to the relevance of the soil sampling.

Finally, I would also like to have discussion on the possibility of local veterans having access to the building one last time before major construction begins. I have been particularly touched by elderly World War II veterans who are fearful of never again being able to see the building, which holds many dear memories for themselves and their families. If such action is impossible because of liability, I would at least like them to be given an explanation of why that is so.

I, therefore, recommend that the Board direct staff to address these specific points of concern to the veterans and accept the Duquette report, the letter from the State Historical Building Safety Board, and the report of Civil Engineer Paul Cox for the purpose of transparency and to provide the veterans with an opportunity to openly discuss the reports.

Sincerely,

Greg Caput

GREG CAPUT, Supervisor
Fourth District

GC:ted
Attachments

cc: County Administrative Officer; General Services Director; County Counsel; Robert Patton, Commander, Veterans of Foreign Wars Bill Motto Post 5888; Veterans of Foreign Wars Post 10110; Veterans of Foreign Wars Post 17; United Veterans Council; Santa Cruz Veterans Memorial Building Board of Trustees; American Legion Post 121

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STATE HISTORICAL BUILDING SAFETY BOARD

June 6, 2011

Robert Patton, Commander
Veterans of Foreign Wars
Bill Motto Post 5888
846 Front Street
Santa Cruz, CA 95060

Dear Commander Patton:

Thank you for your inquiry on the application of the California Historical Building Code (CHBC) to the Veterans Memorial Building, 846 Front Street, Santa Cruz, California 95060; National Register of Historic Places No. 1992000423.

By way of background, the CHBC is adopted pursuant the State Historical Building Code Law, Health and Safety Code (H&SC) Sections 18950-18961. Section 18954 specifies the application of the CHBC to qualified historic buildings:

> 18954. Repairs, alterations, and additions necessary for the preservation, restoration, rehabilitation, moving, or continued use of a qualified historical building or structure may be made if they conform to this part. The building department of every city or county or other local agency that has jurisdiction over the enforcement of code within its legal authority shall apply the alternative standards and regulations adopted pursuant to Section 18959.5 in permitting repairs, alterations, and additions necessary for the preservation, restoration, rehabilitation, safety, moving, or continued use of a qualified historical building or structure.

The applicable provisions for application of the CHBC are found in section 8-102.1:

> **8-102.1 Application.** The CHBC is applicable to all issues regarding code compliance for qualified historical buildings or properties. The CHBC may be used in conjunction with the regular code to provide solutions to facilitate the preservation of qualified historical buildings or properties. The CHBC shall be used by any agency with jurisdiction and whenever compliance with code is required for qualified historical buildings or properties.
>
> 1. The state or local enforcing agency, pursuant to authority provided under Section 18954 of the Health and Safety Code, shall apply the provisions of the CHBC in permitting repairs, alterations, and additions necessary for the preservation, restoration, reconstruction, rehabilitation, relocation or continued use of a qualified historical building or property when so elected by the private property owner. (Emphasis added)

The code text identified above specifically mentions the use of the CHBC by "the agency with jurisdiction" and mentions a private property owner. In the case of the Veterans Memorial Building the agency with jurisdiction and the property owner are one in the same.

You provided the following documents related to the subject property:

1. Letter dated April 9, 2010, to the Board of Supervisors, County of Santa Cruz, from Nancy Gordon, General Services Director and Susan A. Mauriello, County Administrative Officer. The letter included a report from the Streeter Group, Inc.
2. Letter dated March 4, 2010, from Paul Cox, Civil Engineer.
3. Letter dated April 18, 2011, from Steven P. Duquette, S.E., Duquette Engineering.

The Executive Summary of the report from the Streeter Group states the report was "prepared in order to form a professional opinion as to whether or not the Veterans Memorial building . . . is safe to occupy during a significant earthquake. Our opinion is based on site observations, review of original construction documents, limited material and soil testing and analysis of the existing lateral force resisting system of the building. Our analysis is per the American Society of Civil Engineers (ASCE) publication 31-03 titled *Seismic Evaluation of Existing Buildings* with a minimum Life Safety design performance level."

The April 9, 2010, letter to the Board of Supervisors draws two conclusions. First, based on the seismic evaluation from the Streeter Group and William Fisher Architect, the building represents a risk to the occupants during a seismic event and "must be brought up to the minimum life safety standards." This is based on structural deficiencies that do not meet the minimum life safety performance standards. Additionally, a cost estimate developed for planning purposes was based on assumptions made by the engineer regarding certain design criteria. The design criterion does not consider the application of the provisions in the CHBC.

The March 4, 2010, letter from Mr. Cox addresses the application of the CHBC in the evaluation of the building's apparent structural deficiencies and possible remediation in detail. This is an accepted methodology in addressing structural deficiencies in a qualified historic building based on the CHBC.

As shown above in Section 8-102.1 Application, Item 1, the use of the CHBC is at the discretion of the private property owner, in this case the County of Santa Cruz. It is their right to apply the ASCE 32-03, Seismic Evaluation of Existing Buildings, as the criteria under which the Veterans Memorial Building is evaluated. That being said, consideration of the provisions of the CHBC as the minimum standard is a worthwhile, cost effective, option. The CHBC is the appropriate code for use in the proposed seismic upgrade of the Santa Cruz Veterans Memorial Building.

The SHBSB will not comment on the professional opinions of the engineers preparing the documents identified above. As stated, the provisions of the CHBC could be used to address the conditions found at the Veterans Memorial Building.

Sincerely,

Richard T. Conrad, FAIA
Executive Director, SHBSB

cc: SHBSB Executive Committee
Milford Wayne Donaldson, FAIA, California Historic Preservation Officer
Tim Brandt, AIA

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April 18, 2011

Robert Patton, Commander
Veterans of Foreign Wars
Bill Motto Post 5888
846 Front Street
Santa Cruz, CA 95060

DUQUETTE

4340 Stevens Creek Blvd
Suite 200
San Jose, CA 95129

Phone (408) 615-9200
Fax (408) 615-9900

Subject: Veterans Memorial Building 846 Front Street, Santa Cruz.

Duquette Engineering has been asked to review documents regarding the subject building, comments on their findings and visit the site to observe the existing conditions. The documents provided are;

1. Seismic Evaluation Report by the Streeter Group.
2. Preliminary Geotechnical Assessment by Bauldry Engineering.
3. Letter prepared by Paul Cox
4. As-built drawings of the original construction.

Duquette Engineering has reviewed the documents and in general we agree with their findings, however, where we disagree is the level of retrofit required to provide life safety performance and the perception that the deficiencies identified are unique to this building or have become more severe with age.

Concrete, and masonry structures with wood diaphragms constructed prior to 1970 commonly have the following deficiencies in their order of importance;

- Insufficient anchorage of the walls to the wood diaphragms.
- Insufficient cross ties to fully develop the wall anchors.
- Insufficient shear transfer between the wood diaphragms and the perimeter shear wall elements.
- Insufficient diaphragm capacity.
- Insufficient collectors.
- Insufficient shear wall or weak story shear.
- Lack of proper detailing of the reinforcing steel to meet the current standard of practice. One of these details is minimum reinforcement standards.

The existing structure is a two story, cast-in-place reinforced concrete structure with wood frame roof and floor diaphragms and a full basement. This structure was constructed prior to 1932, and therefore has these deficiencies. These conditions have existed since the structure was built. During that time it has served the community well.

This is a common issue with older structures throughout the City, County, State and Nation. If the building owner does not modify these structures in a way that will weaken the existing condition, State and local codes have no provisions that require retrofit. It is up to the owner to establish a level of acceptable risk for their properties and act accordingly. I would suggest that the county owns many of these older structures that they are working to maintain and repurpose. It is my understanding that the county has offered another older cast-in-place structure as a temporary home for the Veteran's group. This replacement structure most likely has many of the deficiencies identified in their current home and indicates an inconsistent approach to dealing with these older structures.

During our visual inspection of the Veteran's Building, we found a very well maintained building that had only one visible maintenance issue. In several areas particularly in the corners of the pilasters the concrete cover has spalled away and exposing rusted reinforcing steel. This condition is often caused by too little concrete cover. Moisture penetrates through the concrete cover and rusts the reinforcing steel, which expands and spalls the concrete cover away completely. This condition is easily repaired with modern concrete repair techniques and is clearly not a life safety concern.

We do not want to give the wrong impression, we believe that retrofit is the prudent course of action, however, our past experience is that owners would not evict good long standing tenants for this work to be accomplished and certainly not during the planning and permitting phases. Duquette Engineering is very experienced with retrofit of buildings of this type both historic and non-historic structures. The prevailing code for this building is the California Historic Building Code, CHBC. This code has provisions for retrofit of each of the deficiencies mentioned but with reduced loading requirements and room for engineering judgment when it comes to the minimum detailing requirements of the code.

The one deficiency that has not been mentioned to this point is the capacity of the foundations and liquefaction. There is no specific CHBC requirement for retrofit of foundations for liquefaction. Again this is not a condition that is unique to this building. In fact this soil condition most likely exists for every building within a few blocks of the site. It is our opinion that, when the remainder of the deficiencies have been corrected, foundation settlements due to liquefaction, will not create catastrophic or local collapse of the structure and therefore would not be a life safety concern.

To sum up Duquette engineering agrees that the structure should be retrofitted using the California Historic Building Code as the governing code. The minimum life safety retrofit should include retrofit of;

- Wall Anchorage to the wood diaphragms.
- Cross ties to fully develop the wall anchors.
- Shear transfer between the wood diaphragms and the perimeter shear wall elements.
- Diaphragm capacity.
- Collectors.
- Shear walls or weak story shear.

Much of this retrofit work can be accomplished with minimal disruption to tenants, if the work is properly phased.

We hope that the information and opinion provided is clear. If you have any questions or require additional information, please feel free to call.

Very Truly Yours,
DUQUETTE ENGINEERING

Steven P. Duquette SE
President

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ENGINEERING

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Historic Project Experience

Project Title: Hood Mansion

Project Duties: Provide structural engineering support services for the project team. These services provided include, historic structures report, preliminary design, construction documents and construction observation.

Project Description: The project consists of, structural retrofit and restoration of an existing historic 8000 square foot two-story unreinforced masonry mansion.

Dollar Value of construction: Approximately $1.5 million

Location: 440 Hood House Drive

Owner: County of Sonoma Parks Department

Percent participation by team member: Responsible for 100% of the structural services.

Outcome: The structural work is 100% complete. Construction was completed in spring of 2008.

Change Orders: There were no significant change orders. The total cost of the project was under the original budget.

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Historic Project Experience

Project Title: Lincoln Avenue Retrofit

Project Duties: Provide structural engineering support services for the project. These services provided include, preliminary design, construction documents, and construction observation.

Project Description: The project consists of, structural retrofit of an existing historic two-story unreinforced masonry retail/residential building. The existing structures was seismically retrofitted to meet the requirements of the City of San Jose's seismic retrofit ordinance. This was accomplished with limited impact to the historic fabric of the buildings and with extremely limited tenant impact.

Dollar Value of construction: $133,000.00

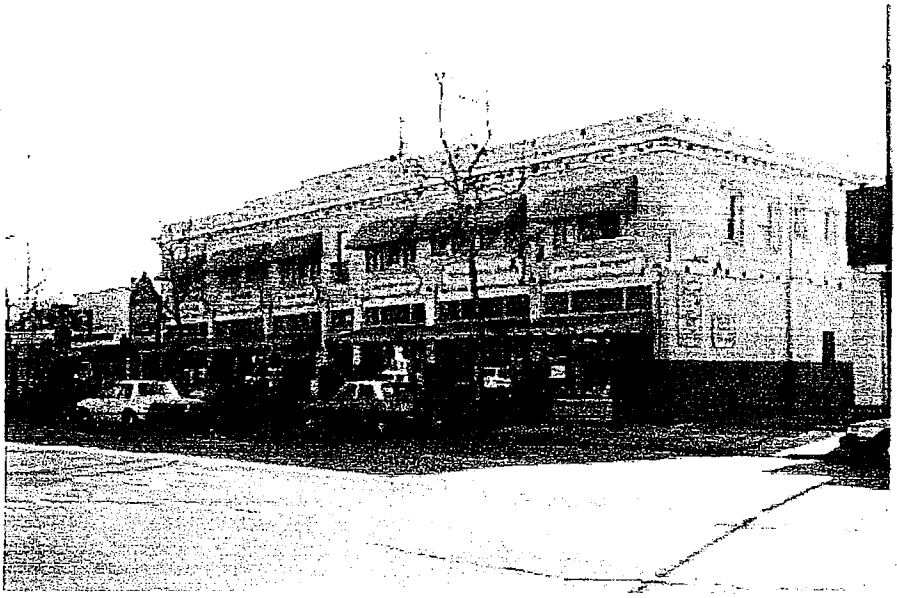
Location: 1385 Lincoln Avenue, San Jose, CA

Owner: David Cayton

Percent participation by team member: Responsible for 100% of the structural services.

Outcome: The project was completed on schedule and on budget. In addition the building owner did not need to remove any of the tenants during the construction.

Change Orders: There were no change orders on the project.



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Historic Project Experience

Project Title: Original Joe's

Project Duties: Provide structural engineering support services for the project team. These services provided include, preliminary design, construction documents, and construction observation.

Project Description: The project consists of, structural retrofit and conversion of a five story concrete office/retail building to residential/retail.

Dollar Value of construction: $9,000,000.00

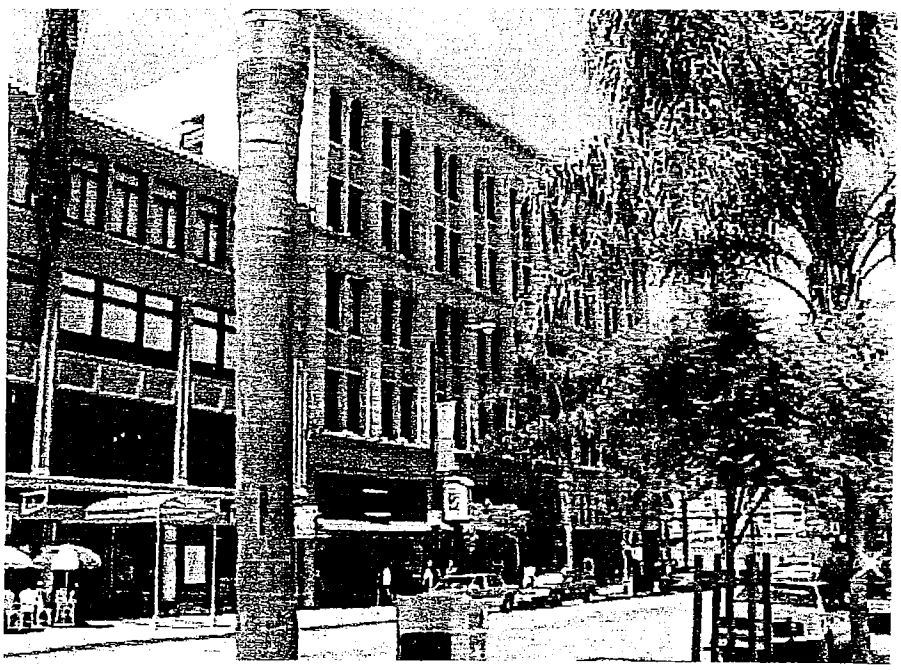
Location: 301 South First Street, San Jose

Owner: Pacific Properties III

Percent participation by team member: Responsible for 100% of the structural services.

Outcome: The structural work is 100% complete. Construction was completed in December of 2008.

Change Orders: There were no significant change orders. The total cost of the project was under the original budget.



Historic Project Experience

Project Title: Palo Alto History Museum

Project Duties: Provide structural engineering support services for the project team. These services provided include, kick-off meeting, conduct site visit to document existing conditions, Historic Structures Report, preliminary design, construction documents, and construction observation..

Project Description: The project consists of, rehabilitation of a historic two story reinforced concrete structure.

Dollar Value of construction (Budget estimation): $7,000,000.00

Location: Palo Alto, CA

Owner: City of Palo Alto

Percent participation by team member: Responsible for 100% of the structural services.

Outcome: The Structural Assessment Reports and the Construction Documents have been completed. Construction is scheduled to begin in 2012

Change Orders: N/A

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Project Experience

Project Title: Del Monte Foods, Plant #3

Project Duties: Provide structural engineering support services. These services provided include, preliminary study of the facilities structural system, construction documents, prioritizing, phasing and construction observation.

Project Description: Salvage of a small portion of this historic cast in place concrete Del Monte packing plant. The components were reconfigured and used as a community building for a new housing development.

Dollar Value of construction: $250,000.00

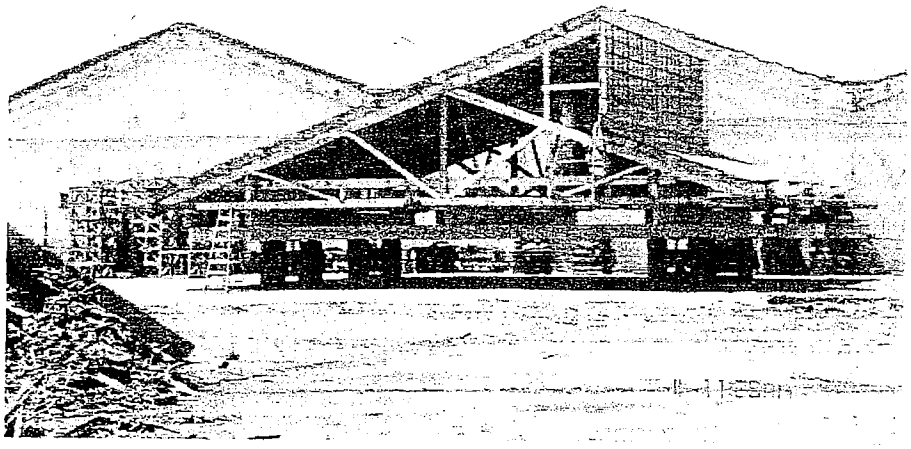
Location: Auzerias Avenue, San Jose, CA

Owner: Del Monte Foods

Percent participation by team member: Responsible for 100% of the structural services.

Outcome: The project was completed on schedule and on budget.

Change Orders: There were no change orders on the project.



PAUL COX
890 Camelia Street
Berkeley, California 94710-1436
510-528-1975

March 4, 2010

Robert Patton, Commander
Veterans of Foreign Wars
Bill Motto Post 5888
846 Front Street
Santa Cruz, California 95060

Re: Santa Cruz Veterans Memorial Building

Dear Commander Patton,

This letter is to provide my observations and opinions on the condition of, and structural issues surrounding, the Santa Cruz Veterans Memorial Building that was suddenly closed by the County on January 21, 2010, due to County of Santa Cruz concerns over its structural safety. This letter is based on my site visit, my review of the January 21 letter by County staff, the January 18 letter by William Fisher Architecture, and the January 18 letter by the Streeter Group.

I am a California State licensed civil engineer and a 24-year member of the VFW Post 5888. I have 25 years experience across the United States specializing in investigation of existing buildings, including issues related to seismic loads, wind loads, overloads, fire, aging, historic preservation, repair design, and retrofit design.

On January 27, I visited the Santa Cruz Veterans Memorial Building at the request of VFW Post 5888, of which I am a member. I was escorted by Anthony Loero of Santa Cruz County General Services Department, William Fisher of William Fisher Architecture, Inc., and Hugh Zike of Streeter Group, Inc. These gentlemen graciously showed me around the building, pointed out the areas of concern and described their approach to the structural issues. Our inspection included the attic space over the auditorium, the roof, the auditorium, and the exterior walls on both sides and the rear of the building. I briefly looked at the original 1930s-era building drawings Mr. Fisher had with him. We did not inspect the basement or the front portion of the building as it was represented to me that these areas do not exhibit any visible damage conditions.

Other than removing a few pieces of loose concrete from exterior pilasters, I did not remove finishes to expose underlying conditions or perform destructive or non-destructive tests. I have not performed a mathematical analysis of the building. Other than as mentioned above I have not had the opportunity to review existing drawings or other documents related to the building. I base my opinions on 25 years' experience investigating and designing repairs to—and mitigations of—existing structures of all types, including many building of similar vintage and condition to the Veterans Building. The above caveats notwithstanding, I spent sufficient time at the building to form a firm and clear opinion as to its condition.

OBSERVATIONS

Building Description: All the building exterior walls and columns are steel-reinforced concrete, and it is likely that certain of the interior partitions are also. The floor, ceiling, and roof framing throughout the building are wood with heavy timber roof trusses and major beams. The building was constructed in the early

1930s except for the concrete stage structure at the back of the auditorium. Mr. Fisher believes the stage may have been added in the 1950s, but had not at the time of my visit found documentation to confirm it. The stage addition is about 15 feet deep. The original back wall of the auditorium was solid concrete, or nearly so, but about half the wall width has been removed to create the proscenium arch for the stage. The original concrete wall is intact above the proscenium arch, and is functionally now a deep beam, perhaps 8 feet tall. The nature of the reinforcement within this unintended beam is not known. The new back wall of the stage was erected over four short concrete columns. The nature of the stage's horizontal framing could not be determined during our visual survey. The auditorium sits over an equal-sized banquet room known as the bunker that is partially below grade. The side walls of the auditorium/bunker are concrete with windows. The four timber floor beams and four roof trusses that span the auditorium bear on four reinforced-concrete pilasters built into each side wall.

Roof Trusses: From our cursory inspection of the attic spaces, the heavy timber roof trusses and secondary lumber framing appear sound, with no indications of sag, decay, member splits, misalignment, or overloading damage. At least two of the trusses have steel brackets connecting the truss bearing points to the pilasters and side walls that appear to be retrofitted. We speculated that this work was installed at the time that trapeze anchors were installed on the trusses for the use by a community group in the auditorium. Messrs. Fisher and Zike had not identified any damage in the attic areas of the building.

County Observed Damage: As the letters from William Fisher Architecture and Streeter Group indicated, they have identified loose pieces of concrete on some of the eight pilasters along the north and south walls of the auditorium; loose concrete on some of the short columns under the back (west) wall of the stage; and corrosion to steel reinforcement under the loose concrete. They indicated that they had not found any other damage in the building that caused them concern, nor did I observe any other damage.

Spalling Concrete: I, too, observed loose concrete and corroded steel. Known as spalling, such loose concrete is not damage from overloading, or damage from seismic events, or poor quality concrete, or inadequate design, or poor construction. Instead, it is a deterioration process related simply to the age of the building and deferred maintenance.

The exposed concrete material itself appears to be in good condition; and it appears hard an properly colored, and the cracks split some of the aggregate, indicating that the cement paste and aggregate are sound.

Stirrups: Also in the pilasters, we observed some exposed horizontal steel stirrups that wrap around the vertical steel. These stirrups are open loops spaced about 24 inches apart in the areas we could see, and are typically 1/4-inch diameter smooth "pencil rods." One of these exposed rods has corroded through. I assume in his letter Mr. Streeter was referring to this rod that had "deteriorated completely in some locations."

Historic Building Code: Since the Santa Cruz Veterans Memorial Building is on the National Register of Historic Places, it is regulated by the 2007 California Historic Building Code, Part 8 of Title 24 (CHBC), for purposes of "preservation, restoration, rehabilitation…or reconstruction…" The intent of the CHBC is to "facilitate the preservation and continuing use of qualified historical buildings…" [my emphasis] Among other things, this code controls the terms under which this building can be declared hazardous. The CHBC defines terms pertinent to this discussion, as follows:

- "Life Safety Hazard: See Distinct Hazard"
- "Distinct Hazard: Any clear and evident condition that exists as an immediate danger to the safety of the occupants or public right of way. Conditions that do no meet the requirements of current regular codes and ordinances *do not*, of themselves, constitute a distinct hazard." [italics in original]

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- "Imminent Threat: Any condition within or affecting a qualified historical building or property which, in the opinion of the authority having jurisdiction, would qualify a building or property as dangerous to the extent that the life, health, property or safety of the public, its occupants or those performing necessary repair, stabilization or shoring work are in immediate peril due to conditions affecting the building or property. Potential hazards to persons using, or improvements within, the right-of-way may not be construed to be "imminent threats" solely for that reason if the hazard can be mitigated by shoring, stabilization, barricades, or temporary fences."

In addition, Section 8-102.5 Unsafe buildings or Properties states, "When a qualified historical building...is determined to be unsafe as defined in the regular code, the requirements of the CHBC are applicable to the work necessary to correct the unsafe conditions. Work to remediate the buildings...need only address the correction of the unsafe conditions, and it shall not be required to bring the entire qualified historical building...into compliance with regular code."

For vertical loads, the CHBC structural section requires that, "The capacity of the structure to resist gravity loads shall be evaluated and the structure strengthened as necessary. The evaluation shall include all parts of the load path. Where no distress is evident, and a complete load path is present, the structure may be assumed adequate by having withstood the test of time..."

For seismic loads, the CHBC requires that the structure's ability to resist wind and seismic loads be evaluated, and that unsafe conditions in the lateral-load-resisting system be corrected to meet certain minimum strengths.

DISCUSSION

Spalling Mechanism: New concrete is extremely alkaline, and where concrete surrounds the reinforcing steel, the steel will be protected from corrosion. However, as reinforced concrete buildings age, there are gradual changes to the chemistry of the cement paste that have no effect on the concrete material strength but do reduce its alkalinity—eventually to the point that it no longer protects the steel. If oxygen and moisture are present, steel can then begin to corrode. When steel corrodes, the rust products swell to about six times the volume of the original steel. Concrete is strong in compression, but it is very weak in tension; so the internal tension forces from corrosion swelling soon overcome the concrete's tensile strength and cause it to crack (spall). This deterioration process accelerates after the concrete has cracked because it provides a channel for even more water and oxygen to reach the steel.

Eventually, chunks of concrete can be dislodged and fall from the building, exposing the underlying corroded steel. While this is a disturbing sight—and the public must be protected from falling debris—spalling is not, in itself, an indication that the building has become unsafe. It requires very little corrosion on the surface of steel reinforcement to blow off the overlying concrete. Typically the remaining cross-sectional area—and load-bearing capacity—of large bars is not significantly compromised simply because they have corroded enough to crack the concrete cover. My observation of the exposed vertical steel bars in the pilasters and columns at the Veterans Building is consistent with my past experience in that regard: the bars have destroyed the concrete cover in a few areas, but the bars themselves do not appear to have lost significant cross-sectional area. The very limited quantity of the obvious damage supports that contention. That is, by the time some of the bars have corroded enough to become compromised, the extent of the corrosion is normally exhibited over large areas, not just small corner spalls such as those present on the Veterans Building.

Additionally, when the strength of a reinforced column or beam is analyzed by engineers, the concrete cover to the outboard side of the reinforcement is neglected in the tension region. Thus, for the critical tension case,

the cover does not count structurally. The function of the concrete cover is to protect the steel from the weather, which is a serviceability issue, not a structural one.

The four columns and beams supporting the back wall of the stage are in the same condition as the pilasters: they have superficial spalling of the concrete cover due to corrosion of the underlying steel. Despite Mr. Fisher's assertion, there is no reason to replace any of the columns or beams.

It should be noted that if the concrete has is not cracked, there can be little corrosion of the underlying steel. Thus, in the areas of the building that are away from the existing spalls and are not cracked, the steel is likely to be in good condition.

Stirrups: Obviously, a small-diameter steel rod will corrode through much more quickly than a large-diameter one. However, to say that the complete corrosion of a small rod on a column is a significant structural matter is a significant overstatement. While modern ductile reinforced concrete design in seismic zones requires columns to have careful detailing and closely-spaced continuous-spiral stirrups, the need for such detailing was not understood when this building was designed. At that time, the sole purpose of an occasional loop of pencil rod was to hold the vertical steel in alignment within the forms until the concrete could be placed. Once the concrete was cured, the pencil rods were not expected to have any function whatsoever; and, in fact, because of their wide spacing, small diameter, discontinuity, and inability to provide confinement for the concrete, they contribute nothing to the serviceability, strength, or ductility of an in-service column. Thus, if one or a few of these rods are corroded through, it will have no influence whatsoever on the behavior of the column during the cyclic loads imposed by an earthquake.

Building Code Requirements: Mr. Streeter described "significant cracking" and "significant risk of injury or death...should a seismic event occur," but he did not call for the building to be closed. Mr. Fisher called the pilaster damage "extremely significant," described "extreme danger" for the public if an earthquake occurs, and called for the auditorium to be closed. While neither Mr. Fisher nor Mr. Streeter used any of the three CHBC hazard terms listed above in their letters, they clearly intended to raise the alarm as to the seismic capacity of the building, but they did not identify an "imminent threat...due to conditions affecting the building." That is, they did not indicate that they thought the building could collapse under its own weight or normal live loads. As described above, it is my opinion that, while there is minor spalling at the pilasters, this does not constitute distress due to loading, nor does it affect gravity load-carrying capacity.

As for the seismic capacity, it is clear from its age, its design, and its condition that the building does not meet current code requirements for seismic capacity. For any building professional to suggest that it be investigated and upgraded is simply prudence. But, as defined by the CHBC, "distinct hazard" cannot exist merely because the building does not meet current regular codes. Similarly, "imminent threat" cannot exist if the hazard "can be mitigated by...stabilization [or] barricades."

Unoccupied Building Costs: As a practical matter, the County should keep in mind that uninhabited buildings often experience accelerated deterioration through a variety of mechanisms. Undetected leaks, vandalism, maintenance neglect, stagnant plumbing, rusted mechanical systems, condensation and mildew in unheated spaces, varmints, and other insults can result in much higher costs when the time comes to reoccupy a facility.

CONCLUSIONS

Instead of characterizing the observed damage to the steel and spalling concrete as "extremely significant," as Mr. Fisher did in his letter, I would characterize it as insignificant structurally, but a significant maintenance

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issue that could—if left unrepaired—become significant structurally in years to come. Similarly, instead of indicating that the "deterioration observed presents a significant risk of injury or death to the occupants of the auditorium should a seismic event occur," as Mr. Streeter did in his letter, I would characterized the observed deterioration as an indication that the County should immediately move to protect the public from falling concrete by preventing people from leaning against the pilasters—which has already been accomplished by the judicious application of yellow tape. The observed deterioration itself in no other way presents significant risk. The building likely has seismic deficiencies; but these deficiencies are completely unrelated to the spalling, and the County should not conflate the two issues.

For existing vertical loads on the structure, it is my opinion that the observed damage to the concrete pilasters, walls, and columns is not significant, and in no way justifies closure of the building. In addition, the California Historic Building Code forbids its closure because neither a distinct hazard nor an imminent threat exist.

For potential seismic loads on the structure, I concur that the building capacity should be carefully evaluated. Given the archaic nature of the existing construction, some level of seismic upgrade will likely be warranted, but is not mandated by any code requirements. However, the mere existence of seismic-response deficiencies does not constitute a distinct hazard or an imminent threat as defined by the CHBC, because these deficiencies represent only potential hazards. While it may be necessary to empty the building during the construction of a seismic retrofit, it is my opinion that there is no justification for its closure based on the current condition of the building, nor will it be necessary to close the building during the evaluation or retrofit design phases.

Lastly, due diligence requires the County to let a contract on a non-emergency basis to repair the spalling concrete as part of a maintenance program—an easy, effective, and essentially permanent repair if properly conceived and installed. Again, this can be accomplished without closing the building.

I hope this letter has helped to clarify for you the condition of the Veterans' Building, and assists you in getting it reopened immediately.

Sincerely,

Paul Cox, C.E. 45152

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County of Santa Cruz

GENERAL SERVICES DEPARTMENT
701 OCEAN STREET, SUITE 330, SANTA CRUZ, CA 95060-4073
(831) 454-2210 FAX: (831) 454-2710 TDD: (831) 454-2123
NANCY GORDON, DIRECTOR

June 27, 2011 Agenda: June 28, 2011

Board of Supervisors
County of Santa Cruz
701 Ocean Street
Santa Cruz, CA 95060

SANTA CRUZ VETERANS MEMORIAL BUILDING REPAIR/FINANCING

Dear Members of the Board:

The purpose of this letter is to provide your Board with a history of the actions taken by the County since the decision to close the Veterans Memorial Building. County staff have worked diligently in identifying various options for an appropriate strategy in addressing the building's repair needs.

In mid January 2010, County staff received a report from the veterans building manager that there were large pieces of concrete falling from the building onto the patio in the rear of the site. Upon initial examination, staff felt that an assessment of the problem by a structural engineer was prudent, in view of the safety risks posed by the falling materials. After on site investigations within the next few days, the structural engineer recommended building closure due to the life safety concerns; this closure went into effect on January 21, 2010. Staff efforts were then focused on relocating services and determining a more comprehensive analysis to clearly identify the extent of the building's problems. On February 23, 2010 your Board authorized the contract for a structural engineering analysis, and staff issued purchase orders for initial soils and material testing.

On a parallel path, County staff continued to meet to discuss the Board of Trustees contract to move from a facility agreement to one of long range planning and fundraising. Although the contract was agreement was completed in FY 2010/11, it was not implemented. Discussion of alternative siting for veterans services also began, including site visits to various County owned properties and local commercial rentals. On April 8, 2020, the United Veterans Council (UVC) filed litigation naming the County, and hearings on the UVC's request for temporary restraining order and preliminary injunction were conducted, with a trial date set for November 2010.

The completed structural engineering report was submitted to your Board on April 13, 2010. This evaluative assessment confirmed that the building was currently unsafe for occupancy and determined that the building was repairable; the preliminary estimate for the recommended baseline seismic repair was $1,600,000. County staff worked to ascertain the availability of grant

funding for public sector, veterans and historical building restoration. In July 2010, staff submitted a grant application to the Economic Development Administration (EDA). This funding request was not successful.

The determination that the building was repairable meant that further research and evaluations were necessary. First, staff had to determine the project scope which would then inform the County in selecting an appropriate funding mechanism. Second, a timetable for the work needed to be generated, including the various elements that would be required by the building's situation and an estimate of actual project costs. Further soils analysis was secured to inform the engineering evaluation. Your Board authorized staff to go forward in negotiating contracts for construction management services to create a cost estimate, repair timetable and finalization of a repair strategy in March 2011, with an anticipated submission to your Board no later than the end of June 2011.

The County moved staff from 1040 Emeline and made the first floor available for the veterans groups as an interim location. Work to the over 5,000 square feet of the first floor included paint, ramps, kitchen remodel, flag pole and patio installations and a monitored security system. To date, the veterans have not occupied the Emeline property. The County and UVC's attorneys have continued to participate in mediation regarding the interim location.

County staff (General Services and Public Works) and the County's contracted engineers and construction experts have not altered their original opinion that the building remains unsafe to occupy. The evaluative assessment work by the engineering firms with which the County contracted have confirmed the wisdom and validity of the decision to immediately close the building for life safety concerns as to all occupants. The protection of the public both in terms of the facility itself and the liability poised by the results of follow up investigation of a significant seismic problem was at the forefront of our decision process.

Alternatives to the site were considered, including the use of pylons to anchor the foundation to bedrock. The completed evaluation work has shown that those alternative approaches would be less cost effective than the repair approach that is recommended. Additionally, staff did look at the potential of razing and rebuilding the facility, while retaining the building facade. This approach is heavily utilized with older structures of historical significance, but in view of the County's economic situation, was not deemed a viable alternative.

The consultant's final repair recommendation calls for repair of the seismic issues that were first identified, at a cost of $3.5 million. The additional work that is recommended results either from the demolition/construction itself (replacement of the boiler, electrical system improvements, hazardous materials abatement) or life safety requirements imposed by the fire marshal (fire alarm system, emergency exiting improvements). The cost of the repair also includes contingencies for unanticipated conditions, project management costs and testing. Due to the logistical challenges presented at the site, much of the efforts will involve handwork with laborers and wheel barrels. The scope of the repair will result in a safe building with improved occupant and visitor safety and comfort.

Funding

Your Board is well aware of the significant funding constraint upon the County in contemplating a repair project at this cost. Staff efforts to ascertain any funding available through state, federal or private resources were not successful, further exacerbated by the nationals' economic reality at

present. Plant acquisition for County projects has been very limited, with new funding available in only two of the past ten years. Redevelopment Agency funding was not applicable for this project as it is not within the redevelopment area. One competitive grant application was made unsuccessfully to the federal Economic Development Administration. Efforts will continue to identify additional alternatives for funding.

The completed contract with the Board of Trustees was not implemented. The anticipated work under that agreement included fundraising for the building's repair. Staff has not been advised of any progress by the veterans groups or the Board of Trustees in organizing a fundraising effort.

County staff in Public Works-Real Property and Parks researched other locations for possible relocation of the veterans' functions. Their work included preliminary review of over 50 commercial or government owned sites. However, in view of the many unique attributes offered by the closed building and the County's obligation to provide substantially the same facility, the other locations either did not meet these requirements for permanent relocation or were not financially feasible.

County staff is proposing that Certificates of Participation be issued for this project. We have determined that fulfilling the necessary legal steps for such a financing instrument would take between 60-90 days. In response to Supervisor Pirie's request for information on financing of the building repairs the County Administrative Office has contacted the County's financial advisor who has provided the following information: based on an estimated repair cost of $3,500,000 and a maturity of 25 years, the annual debt service would be approximately $300,000. The interest rate used for these estimates is 5.94%. The first payment would be made from the General Fund in FY 2012-13. Costs of issuing the Certificates of Participation, including bond counsel, financial consultant, rating agency fees, title insurance, and Official Statement preparation would be approximately $113,000 for the Veterans Building.

Summary

The Santa Cruz Veterans Memorial Building is a historical and valued asset in the County's real property inventory. The facility serves multiple purposes, including housing the veteran's services offices, various veterans groups office and meeting spaces, private rentals of space by numerous independent contractors, as well as providing a significant venue for both performance and community events. Due to its many unique attributes and community benefits, and the County's obligation to provide substantially the same facility, staff have concluded that repair of the Santa Cruz Veterans Memorial Building is the best and most cost effective option.

It is therefore RECOMMENDED that your Board accept this letter on the Santa Cruz Veterans Memorial Building repair project and associated financing.

Very truly yours,

Nancy Gordon
General Services Director

RECOMMENDED:

SUSAN A. MAURIELLO
County Administrative Officer

Santa Cruz County
General Services Department

REPAIR PROJECT REPORT






Veterans Memorial Building
Repair Project Report
Pre-design Phase

June 23, 2011

VANIR

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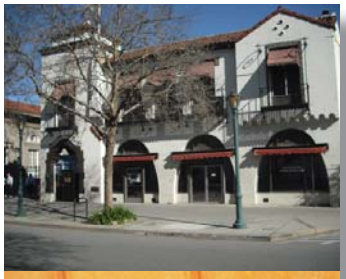

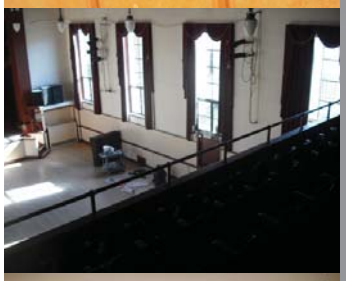


Repair Project Report

VANIR

07/23/11

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Appendices

REPAIR PROJECT REPORT

BACKGROUND

Prior to the selection of Vanir CM to conduct this report, a seismic evaluation report was conducted by Streeter Group, in collaboration with William Fischer Architecture, and Bauldry Engineering. See Appendix A.

Vanir CM, Inc. was contracted by Santa Cruz County to:

- Review Streeter Group design and comment.
- Coordinate the concrete and rebar materials strength testing to determine materials properties.
- Coordinate the geotechnical testing and investigations necessary to proceed with the seismic/structural upgrade.
- Coordinate the results of testing with Streeter Group to validate their preliminary assumptions and proposed design solutions.
- Review the County's existing drawings and correlate them to the as-built conditions of the building and site.
- Examine and summarize any building issues that may impact the seismic repair and timeline, i.e. finishes, electrical, HVAC, plumbing, HAZMAT, exiting, fire systems.
- Determine the physical condition and life expectancy of the boiler heating system.
- Meet with regulatory agencies that have jurisdiction to solicit any of their concerns, i.e., building department, police, and fire district.
- Determine any other impacts that the repair work may have on the community and prepare mitigation plan, i.e., staging area, shoring, scaffolding, sidewalk/street closure.
- Prepare a final project report and work plan.
- Prepare a cost estimate for the project work plan.
- Prepare a cash flow projection matrix.
- Prepare a project schedule for the project work plan.

BUILDING DESCRIPTION

The Veterans Memorial Hall located in Santa Cruz was originally erected by a special tax voted by citizens of the county at a cost of $52,000 in 1932. Floors in the main entry are in imitation of the tile floors of early California missions. On the 1st floor is the auditorium, and office space along Front Street. The top floor contains lodge rooms, civic rooms for multiple uses such as music, dance, meeting, and social events. Veteran's organizations and auxiliaries, as well as kitchen and dining rooms and a clubroom which extends the entire width of the building are located on the lower basement level. The lower level opens to a courtyard in the rear of the building. Other information about the building, are:

1. Address: 842 - 846 Front Street, Santa Cruz, Ca 95060
2. Assessor Parcel Number: 005-052-25
3. Building Square Footage: 18,990 GSF
    a. Basement: 6,814 GSF
    b. 1st Floor: 7,315 GSF
    c. 2nd Floor: 4,861 GSF
4. Number of Stories: 2 stories plus basement
5. Approximate site size: 9,583 GSF or .22 Ac.
6. Percent of site open: 24%
7. Uses: assembly, civic and community meeting rooms, office spaces
8. Building maximum occupancy load: 850 persons
    a. Banquet Room (basement): 180 persons
    b. Auditorium (1st floor): 400 persons
    c. Auditorium Balcony (2nd floor): 84 persons
    d. Bill Motto Room (2nd floor): 89 persons
    e. Pogonip Room (2nd floor): 49 persons
    f. Redwood Room (2nd floor): 20 persons
    g. All other Rooms (all floors): 28 persons
9. Historical Status: National Registry of Historic Places; Recorded April 23, 1992; Architecture/Engineering Event; Mission/Spanish Revival; NRIS Item # 9200423, Record #417985
10. Construction Type:
    a. Basement - cast in-place concrete exterior walls
    b. Upper floors – cast in-place reinforced concrete exterior walls
    c. Upper floors - lath & cement plaster over interior wood framing
11. Heating System: boiler & radiator (basement has heat exchanger w/blower)
12. Electrical Service: 400-amp
13. Air Conditioning: none (a few rooms contain a split system)
14. Plumbing:
    a. galvanized water supply
    b. cast iron drainage system
    c. sump pump in electrical room
15. Fire Sprinkler: none
16. Fire Alarm: none
17. Elevator: yes (three stops)
18. Roofing: single-ply membrane roofing (new)
19. Insulation: none

20. ADA Accessibility: an retrofit of the entire building was completed
21. Building Adjacencies:
    a. U.S. Post Office (north-adjacent)
    b. Comerica Bank (south-adjacent)
    c. Business Office Building (behind-adjacent)
    d. Santa Cruz Square (corner-north)
    e. Mix-use Buildings (across street-west)
22. Floor Plans and Elevations (See Appendix E):
    a. A101 – Basement Floor Plan
    b. A102 – 1st Floor Plan
    c. A103 – 2nd Floor Plan
    d. A104 – East & West Elevations
    e. A105 – South Elevation
    f. A106 – North Elevation

PREVIOUS BUILDING MODIFICATIONS

A number of modifications have been noted that have occurred after the building was construction in 1933. They are listed here not in order of installation:

1. Replacement of the boiler (about 1965)
2. New electrical service panel in relocated space
3. Asbestos removal (over the years)
4. Room modifications in basement
5. Street level office modifications along Front Street
6. Storefront modifications along Front Street
7. Split system HVAC to several rooms
8. Additional electrical distribution wiring and sub-panels throughout
9. Stage addition in auditorium
10. Ceiling fans in auditorium
11. Stage lighting in auditorium
12. Ceiling secure anchors in auditorium
13. Ceiling stenciling in auditorium
14. Vinyl tile flooring in basement
15. ADA bathroom modifications and piping
16. ADA lift in courtyard
17. Elevator
18. Modification of exit staircase surrounding elevator
19. New roof
20. CCTV security system
21. Burglar alarm system

CALIFORNIA HISTORIC BUILDING CODE

Because the Veterans Memorial Building is registered on the "National Registry of Historic Places", the California Historic Building Code (CHBC) primarily prevails over the regular code. The regular code refers to the California Building Code (CBC) that applies to all non-historic buildings, with some exceptions.

The intent of the California Historical Building Code (CHBC) section is to facilitate the preservation and continuing use of **qualified** historical buildings or properties, while providing reasonable safety for the building occupants and access for persons with disabilities (CHBC, Part 8; Title 24). The CHBC gives alternatives to many aspects of the regular code, however, **defers to the regular code in certain life safety circumstances.**

> **8-102.1.5 Unsafe buildings or properties.** When a qualified historical building or property is determined to be unsafe as defined in the regular code, the requirements of the CHBC are applicable to the work necessary to correct the unsafe conditions. Work to remediate the buildings or properties need only address the correction of the unsafe conditions, and it shall not be required to bring the entire qualified historical building or property into compliance with the regular code.

The CHBC may be used in conjunction with the regular code to provide solutions to facilitate the preservation of historic buildings or structures. The owner of the property may elect to make repairs at anytime.

> "The state or local enforcing agency shall apply the provisions of the CHBC in permitting repairs, alterations and additions necessary for the preservation, restoration, reconstruction, rehabilitation, relocation or continued use of a qualified historical building or property when so elected by the private property owner."

See Appendix B.

VANIR TASK 1: Review Streeter Group design and comment; Coordinate the concrete and rebar materials strength testing to determine materials properties; Coordinate the geotechnical testing and investigations necessary to proceed with the seismic/ structural upgrade; Coordinate the results of testing with Streeter Group to validate their preliminary assumptions and proposed design solutions.

A preliminary structural evaluation was performed by the Streeter Group, Architecture, Structural Engineering, to evaluate the primary lateral force resisting system and some selected non-structural elements of the Veterans Memorial Building. (Streeter Group, Inc. report dated April 9, 2010 to General Services Agency, County of Santa Cruz. See Appendix A.

Engeo Inc. was selected to conduct full geotechnical engineering analysis of the sub-surface soils. After preliminary an analysis report was produced, it was determined that sub-soil conditions were worse than originally realized. Engeo, Streeter Group, and Vanir staff discussed soils testing results, differential settlement due to liquefaction, and structural design scenarios to respond to public safety, expeditiously and economically. See Appendix D.

The Streeter Group evaluated the building's structural system utilizing the 2010 edition of the California Historical Building Code (CHBC) provisions (see Appendix B), and used the comprehensive structural checklists contained in the American Society of Civil Engineers (ASCE) publication 31, a comprehensive evaluation tool for assessing existing buildings and identifying building deficiencies to resist seismic forces as a guide to identifying the structural deficiencies.

> The CHBC, Section 8-703.1 Scope, says "…The survey shall evaluate deterioration or signs of distress. The survey shall determine the details of the structural framing and the system for resistance of gravity and lateral loads. Details, reinforcement and anchorage of structural systems and veneers shall be determined and documented where these members are relied on for seismic resistance".

Finding

Based on site observations, review of the original construction documents, limited material and soil testing, and an analysis of the existing lateral force resisting system of the building, it was determined that, in the event of a significant seismic event, the as-built physical condition of the building does not meet the minimum life safety requirements.

Discussion

Connections -The most important structural requirement for a structure to resist a lateral load, i.e., earthquake or wind, is that the structure be connected so that it provides a complete and direct load path from roof to foundation. Streeter Group identified deficiencies in the roof diaphragm connection to the perimeter walls, concrete deterioration due to corrosion of the reinforcing bars, weak story and vertical discontinuities.

Liquefaction –The building's foundation system is not constructed to effectively resist vertical differential settlement due to liquefaction that may occur during an earthquake. A geotechnical investigation was subsequently conducted by ENGEO Inc. and that report (Appendix C) confirms the findings by Streeter. The geotechnical report requires, among other things, that the foundation be stiffened and tied together.

Note: Although liquefaction is not specifically addressed in the California Historical Building Code, liquefaction only occurs during earthquakes. It is therefore implied that, where the probability exists, the effects of liquefaction on a structure must be considered as a condition to be addressed.

Materials Testing – ENGEO Inc. performed a building envelope materials evaluation, which included compressive strength testing of the concrete core samples from the perimeter walls, surveys at selected locations to verify reinforcing steel placement and patterns. Concrete and steel testing results are consistent with the assumptions by the Streeter Group, Structural Engineers, in their evaluation of the structure. See Appendix C.

Soils Testing - On June 13, 2010 submitted a draft (See Appendix D) comprehensive soils report to Santa Cruz County. The report was based on field explorations, borings, test pits, and cone penetration tests. The analysis that resulted identified the geology, seismicity and faulting, surface conditions, sub-surface conditions, groundwater conditions, and liquefaction of the site, in order to determine the necessary seismic consideration. They are:

a. Shallow foundation improvement
b. Deep foundations
c. Ground improvement

Retrofit Plans – The minimum life safety retrofit recommended by the Streeter Group addresses the lack of an adequate load path to transfer seismic load to the foundation, and the potential building settlement due to liquefiable soil conditions. This work includes:

a. Connections between the roof diaphragm and the concrete walls
b. Diaphragm continuity
c. Collectors
d. Weak story shear
e. Structural additions to the foundations to stiffen and tie the foundations together.

Vanir CM is in agreement with these recommendations presented by the Streeter Group.

VANIR TASK 2: Review the County's existing drawings and correlate them to the as-built conditions of the building and site.

1. Vanir staff accompanied by Santa Cruz County staff walked through the existing Veterans Memorial Building on multiple occasions and compared actual space conditions to the original drawings and prepared new drawings depicting as-built floor plans. The revised floor plans are used by Vanir to describe current building layout, room uses, sizes, limits of building repair, and building egress. See Appendix E.
    a. A101 – Basement Floor Plan
    b. A102 – 1st Floor Plan
    c. A103 – 2nd Floor Plan
    d. A104 – East & West Elevations
    e. A105 – South Elevation
    f. A106 – North Elevation
2. Vanir also laid out the limits of work contained in the Streeter Group report on the newly developed as-built drawings to determine which rooms that are affected with the repair work, so to allow better calculation of the costs for demolition and restoration. See Appendix F.

VANIR TASK 3: Determine the physical condition and life expectancy of the boiler heating system; Examine and summarize any building issues that may impact the seismic repair and timeline, i.e. finishes, electrical, HVAC, plumbing, HASMAT, exiting, fire systems.

Vanir conducted a condition assessment in the repair areas to determine if the removal of any material and/or system will have an impact on project. To do this Vanir incorporated the limits of Streeter Group's seismic repair work onto the as-built drawings showing rooms and equipment. As seen on the drawings, considerable demolition to the basement is apparent. The floors, walls, plumbing and electrical systems, fixtures, and equipment in the shaded areas will be removed during demolition and seismic repair. The boiler will need to be dismantled to fit though the small door width.

When these systems that were removed are replaced, some will need to meet the regular code, such as electrical and other life safety systems. The following comments represent a review or assessment of the Veterans Memorial Building materials and systems.

A. FIRE PROTECTION

1. Fire Alarm System - The facility does not have a fire alarm system installed throughout the building. Minimal system elements are in place and consist of:
    a. Battery operated smoke detectors are located in some corridor ceiling locations however they are not operational as they either do not have batteries or have expired batteries.
    b. Basement floor elevator lobby has magnetic door holders at its double doors which release upon activation of a ceiling mounted smoke detector.
    c. An emergency phone is located in the first floor lobby however the County Maintenance Technician is unaware if it is monitored or where it reports to in case of an emergency.
2. Fire Sprinkler System – Building does not have a fire sprinkler system. Building has been continuously occupancy since 1933 and is considered to be 'Grandfathered' or exempt from regular codes in place.
3. Fire Protection – Fire extinguishers were observed throughout facility however they were unsecured within available cabinets which in addition were not clearly identified or were discovered at various obscure floor locations which did not appear to be readable accessible.
4. Kitchen hood fire suppression – The kitchen hood contains a fire suppression system which was reported to have to regular maintenance and in good condition for its operation however it does not appear to conform to current UL 300 Standards.

B. MEANS OF EGRESS

1. Emergency and Egress Lighting – Exit signs with emergency light sets are located throughout building and are in working condition however the exiting pattern for the building needs to be addressed for its occupancy which will require additional lighting. Panel circuits controlling power to the lighting do not have lock on devices to prevent accidental shut-offs of the circuit which occurs frequently due to the remote locations of panels.
2. An exiting plan was prepared by Vanir to determine occupant loads of each room

and the available exits and width of openings required by the regular code. From the plan it is possible to exit all occupants form the building utilizing existing corridors and doors. See Appendix G.

C. ACCESSIBILITY

1. ADA or Accessibilities standards for the public are a matter of law, as opposed to codes and standards. The Veterans Memorial Building must comply to the accessibility laws, and from Vanir's observation, a significant ADA retrofit was embarked on about 10-15 years ago. Bathrooms were remodeled, doors were modified and an elevator allows access to the basement and second floor. A wheelchair lift was installed at the exterior to courtyard. Vanir noted only minor items that should be addressed, such as:

    a. Power operator at front door

    b. Paper towel dispensers exceed forward and side reach in some bathrooms

    c. Soap dispensers forward and side reach in some bathrooms

    d. Some thresholds at door exceed tolerances

    e. Elevator lacks auditable signaling device

D. STRUCTURAL

1. Streeter Group report and findings

2. Engeo report and findings

E. MECHANICAL/PLUMBING/ELECTRICAL

1. Mechanical - Heating and Ventilation System:

    a. Gas Heater (Peerless Steam Boiler - Model #170)

    - 1961-1965 manufactured
    - 30 year life expectancy w/ regular maintenance
    - maintenance log (early 1980 - late 2009)
    - no other records found
    - Approximate age +48 years
    - beyond its useful life
    - boiler pump & flue around same age

The current in-place boiler and extends up interior of the building through the roof. Boiler combustion air is through fixed wall louver to exterior enclosed well. The gas service to the boiler unit is through an under floor riser which does not have a seismic shut-off valve. The location of the meter was not found within the building and is assumed to be exterior to the building at a location yet to be determined. Steam heat from the boiler is distributed to the spaces through either floor mounted radiators or ceiling and floor mounted ventilators which are controlled through manual shut-off valves or hand levers that control vents within ventilators.

Ventilators - The unit ventilators draw fresh air from the exterior through wall air intakes. Unit ventilators do not appear to have any means to filter air. Lack of filtration allows the ventilator to capture and distribute normally occurring outdoor air pollutants into the building.

Radiators - The floor mounted radiators and unit ventilators all appear to be a part of the original installation in 1933 with some modifications. Further investigation would be required to determine if existing units can be retrofitted for future operation.

A large portion of the steam piping and insulation suspended from the ceiling in the basement is enclosed with a jacketed PVC cover system with a gloss white finish. The balance of exposed piping with insulation is painted to match surfaces.

Asbestos - An asbestos report was unavailable to the assessor at the time of site visit. The location of the boiler, pumps and associated piping within the basement boiler room is directly impacted by the proposed seismic retrofit within the space which mandates that the complete system be removed to facilitate its construction. Note: a hazardous material letter was provided by the County outlining the steps the County has taken to eradicate asbestos from the building. Remaining asbestos remains encapsulated and non-friable. See Appendix H.

2. **Fresh Cool Air Louvers/Intake** – Below grade portions of the west end basement building are provided fresh cool outside air through an air handling unit located in the basement electrical room. The balance of the building is provided fresh outside cool air through low wall mounted screened intakes direct to exterior of the building which appears to drawn through the basement air handler. No plans which would provide description of existing system were available for review. This system is original to the building construction and appears to be in fair to poor condition as vents are rusted, blocked by accumulated debris or compromised by damages sustained through wear and tear. Supplemental ceiling mounted blade fans provide additional air movement in the auditorium and appear to be approximately 5-10 years old and were reported to be in good operation by maintenance personnel.
3. **Exhaust** – Restrooms have ceiling mounted exhaust fans operated through the local switch control for room lights and have been installed in conjunction to restroom upgrades completed within the past 3-10 years. Working operation of exhaust fans appear to be in good condition although vents were observed to be dirty. Operable windows, most without screens, provide additional ventilation to spaces.
4. **Air Conditioning** – The Veteran Service offices located on the 1st floor west end of building are served by two split system units that are ceiling and roof mounted which are controlled through local thermostats and distribute HVAC through ceiling mounted diffusers. Size of the system was not determined as the units were not readily accessible during minimal time frame of the site visit. Age of the system could not be accurately determined but is approximated to be 5-10 years old and confirmed to be in good working operation by maintenance personnel.
5. **Mechanical Controls** – Building energy management system was not observed to be present in the building. Control for equipment is through manual valves, levers, restroom light switches or local thermostat control.

F. PLUMBING SYSTEMS

1. Plumbing Fixtures - Plumbing fixtures in the restrooms have been upgraded throughout the building with ADA compliant fixtures with ages ranging within approximately 3-10 years. Basement fixtures appear to be older and in good condition however require cleaning and repairs to the seats, faucets and trim. Single drinking fountain located in 1st floor corridor wall alcove is not ADA accessible.

2. **Kitchen Equipment** - Kitchen sink fixtures are of commercial quality and appear to be in good condition. The floor mounted grease trap is original to the building and is reported to be inadequate for kitchen use and is not in an ideal location for cleaning and is therefore evaluated to be in poor condition. A single raised floor sink is located below the 3-compartment sink and does not appear to be sufficient in preventing overflow from flooding the kitchen floor which does not appear to have a flush floor drain or sink. Gas range and cook top is a commercial unit in fair to poor condition of an unknown age.

3. **Drainage** - Roof was not accessed during this site visit to assess the condition of roof drains however exterior observation of the drainage piping which conveys the drainage appears to be in poor condition. Exterior wall mounted PVC drainage pipe hung by plumbers tape was installed to bypass apparently plugged interior building piping which spills into adjacent parking lot culvert.

4. **Hot Water Heater** - Domestic hot water to the building is supplied through two gas water heaters which appear to be in fair to good condition with an approximate age within 10-15 years of a total considered life expectancy of 20 years. The location of the water heaters in the basement boiler room is directly impacted by the proposed seismic retrofit within the space which mandates that they be removed to facilitate its construction.

5. **Sewage** - Building sewage is pumped through basement floor mounted pumps in the electrical room of an undetermined age and appears to be in fair to poor condition. The pumps were reported to have failed or inadequate to serve the load experienced during recent rain storms which resulted in a back-up of sewage within multiple rooms located at the west end of the basement. Based on this recent issue, it can be ascertained that system lacks needed capacity or backflow prevention.

6. **Historic Piping** - The majority of the plumbing water, sewer and gas piping appears to be original to the building construction and should be considered near the end of its life expectancy which is typically averaged at 30 years with a maximum effective life of 40 to 50 years. Observation of piping through test holes in wall reveal galvanized and cast iron piping in use. Standing water in water closets was observed to be clouded brown with rust. The adequacy of the existing water pressure is not known but should be considered compromised from accumulation of scaling and rust deposits. Faucets were turned on and observed to run with rusted water as well. Copper piping is observed in open surface wall locations which appear to have been installed within the past 15 years in conjunction with plumbing system modifications.

G. ELECTRICAL SYSTEMS

1. **Main Electrical Service** - PG&E metered service is rated at 400 amps 208/120 volts 3-phase 4 wires and is located in a basement room located at the northwest corner of the building. Service is not original and appears to have been updated in early 1990's. The location of the PG&E utility service transformer was not found within building nor found at the exterior of the building. Its location will have to be determined through coordination with the utility company. Electrical service shares space with floor mounted sewage pumps; wall mount ducted air handling system and exposed plumbing piping which present hazards to the system operation. The location of the electrical service in the basement is directly impacted by the proposed seismic retrofit within the space which mandates that it be removed to facilitate its construction.

Service entrance is not served through a main switchboard but through a 400-amp main circuit breaker which feeds a 400-amp gutter that in turn is tapped to serve the following building loads:

a. A 100-amp 3-pole disconnect switch, which is not shunt trip rated, serves the elevator.

b. A 300-amp 3-pole disconnect switch serves the 400-amp main lug only distribution panel located in the boiler room.

c. The elevator disconnect feeder appears to be tapped and provides power to the two sewage pumps that are floor mounted within the same room which defies code requirement for a dedicated power source to elevator.

2. **Grounding** - No service ground bus was found to be present within the electrical service room to establish if the electrical system has a connection to a ground electrode system. A single ground wire was observed to be bonded to the service entrance prior to the meter but does not appear to be connected to any other piece of equipment, building steel or piping within room. Electrical panels and feeder raceways were not accessed to determine if a separate ground wire is installed or terminated. Receptacle plates were removed to observe wire terminations and no ground wire was found to be present.
3. **Electrical Power Distribution** – 300-amp main lugs only distribution panel in boiler room has a manufacturer date of 1991. It contains five 70a/3p and two 100a/3p circuit breakers which serve sub-panels throughout the building. Directory appears incomplete and does not describe all loads. The majority of the sub-panels within building were added or replaced within the past 20 years and are in good condition. Several small panels located on the basement floor that serves lighting and receptacle loads are approximately 40 years old and are in fair condition. No plans were available for review to determine routing and adequate feeder sizes. Feeder sizes and loads were not identified but are suspected to be imbalanced or overloaded across phases due to unplanned expansions of the service.
4. **Emergency Power** – No emergency back-up power source exists within building other than self-contained batteries at emergency light sets.
5. **Interior Lighting System** – Basement floor lighting predominately consists of surface mounted three lamp fluorescent wraparound fixtures controlled through local room switches which appear to be in good condition. The majority of the first and second floor fixtures in places of assembly and corridors are original lights that were retrofitted for fluorescent lamp source sometime within the mid 1980's. These fixtures appear to be in good condition however it is not known if they are properly supported for seismic conditions. Light levels appear to be low and will need to be assessed on a room by room basis for their projected occupancies. The auditorium appears to lack dimmable house lighting and the upper fixed seating area lacks low level aisle lighting. Fixtures in restrooms, support spaces and offices are either surface or recess mounted and appear to be in good condition and installed within the past 3–15 years. Control of fixtures is through local wall switches which lack bi-level, occupancy, or building control.
6. **Exterior Lighting System** – Lighting at front and sides of building appears to be provided by street lights or adjacent tenant parking or building mounted fixtures. Adequacy of light levels was not assessed during night time operation. Rear building

lighting at courtyard appears unsightly and is in fair to poor condition. Lighting control is through circuit breakers located in older panel in an obscure location off of the boiler corridor.

7. **Auditorium Stage Lighting and Sound System** – Stage lighting is powered through a 100-amp dimmer panel which appears to be in good condition. Stage lights within the auditorium are clamp mounted to a side wall mounted pipe. Cables are haphazardly laid over window covering without adequate supports to the stage. Sound system equipment is not fixed mounted and is stored in a locked room at the rear of the room. Working operation and adequacy of equipment was not assessed during site visit.
8. **Convenience Power** – The majority of the convenience receptacles within building are surface mounted served by surface mounted conduit or wire-mold raceway. Receptacle devices are three prong outlets however multiple devices were inspected and found to be wired with a two-wire circuit consisting of a phase and neutral wire with NO ground wire present.
9. **Telecommunications and Signal Systems** – Utility Telephone Service point to building was not found although a minimal number of phone/data outlets were observed to be present, their working condition was not assessed during this site visit. It is not know if the service is adequate for building usage. A Comcast cable was observed to be routed to building through a wall vent from the exterior pedestal POC located at the southwest corner of building. Radio antennas were observed to be located on the roof for the Veteran's radio room equipment located on the second floor. Radio room was locked and unavailable for assessment.
10. **Security System** – A monitored system was installed by the Veteran's through a local service provider which consists of motion detectors at main passageways and front door alarming. System is in good working condition with no described deficiencies.
11. **Hazardous Materials (HAZMAT)** - Vanir asked the County if any steps were taken over the years to mitigate and known or suspected hazardous materials, such as lead, asbestos, and PCB's (PCB's typically found in historic light ballasts). A report was submitted to Vanir outlining the steps to mitigate any known or suspected HAZMAT. Significant steps to abate asbestos from 1988 to present were undertaken, however lead in paint materials or PCB's were not tested, primarily because they were non-friable. See Appendix H.

    As the construction repairs proceeds, MAZMAT testing and analysis will need to be conducted and abated prior to work.

VANIR TAKS 4: Meet with regulatory agencies that have jurisdiction to solicit any of their concerns, i.e., building department, police, and fire district.

Vanir has met or conferred with the following individuals during the course of this report:

1. Nancy Gordon, General Services Director
2. Bill Kersten, Building and Grounds Manager
3. Grant Parker, Deputy Faire Marshall, City of Santa Cruz Fire Department
4. Mark Ramos; Division Chief, Santa Cruz City Fire Department
5. Josh Reilly, County of Santa Cruz Safety Officer
6. Tony Loero, Facilities Superintendent
7. Aaron Jones, Santa Cruz Post Master

CODE ENFORCEMENT CONCERNS

On June 1, 2011, Vanir conducted a walk through of the Veterans Memorial Building with code officials and in response to that walk through, Mark Ramos, Division Chief of the Santa Cruz City Fire Department responded with the following:

Required: (these items would be required at the Veterans Memorial Building)

1. All electrical would be to code and safe
2. Electrical panels shall be grounded and not in area that is susceptible to flooding (Installed to appropriate code)
3. Fire Alarm system would be required
4. Occupant loads to be posted

The following is not required of the project:

Not required: (these items would not be required at the Veterans Memorial Building)

1. Fire Sprinklers
2. Changes in exiting (current exiting is to code).
3. Anything removed during construction shall be replaced, such as exit signage.

VANIR TASK 5: Prepare a final project report and work plan.

REPAIR WORK RECOMMENDATIONS

The project report culminates with a set of recommendations that responds safety and welfare of the occupants of the Veterans Memorial Building. Vanir recommends that the following minimum repair work be undertaken is as specified by the Streeter Group and the local Fire Marshal and shall be referred to as the "Base Project":

STREETER GROUP (STRUCTURAL SAFETY):

- Connections between the roof diaphragm and the concrete walls
- Diaphragm continuity
- Collectors
- Weak story shear
- Structural additions to the foundations to stiffen and tie the foundations together

FIRE MARSHAL (BUILDING SYSTEMS SAFETY):

- All electrical would be to code and safe
- Electrical panels shall be grounded and not in area that is susceptible to flooding (Installed to appropriate code)
- Fire Alarm system would be required
- Occupant loads to be posted

SYSTEMS UPGRADE REPAIRS

Vanir's condition assessment (outlined in this report) has identified other building systems that have come to the end of their useful life and are in need of modernization or updating. These systems may not be deemed critical to the public safety; however they may need to be addressed at some point for the continued future use of the building and shall be referred to a "Modernization Project". They are:

- Fire sprinklers
- Plumbing piping
- Energy management system
- HVAC
- Electrical fixtures, outlets, and communications

WORK SEQUENCE (SAFETY PROJECTS)

Work Sequence for the "Base Project":

1. County to determine "scope of work" and "project budget" based on consultants reports
2. Secure funding
3. Secure consultant services: Designer, CM, Inspectors
4. Kick-off design sessions
5. Design project to "scope and budget"
6. Prepare site access plan and obtain approvals; city/post office/bank
7. Obtain other approvals/permits, BOS, Vets, Fire, Building Inspection and Planning

8. Prepare bid documents
9. Bid project
10. Award contract to qualified low bidder
11. Contractor documents, bonds, insurance, submittals, schedule, agreement
12. Issue notice to proceed
13. Construction Phase
14. HAZMAT remediation
15. Equipment startup and testing
16. Punch list inspection
17. Final inspection
18. File notice of completion

Also see anticipated project schedule in Appendix K.

VANIR TASK 6: Determine any other impacts that the repair work may have on the community and prepare mitigation plan, i.e., staging area, shoring, scaffolding, sidewalk/street closure.

1. Repair Work; The repair work will have a significant impact on the building and surrounding area. It is not possible to occupy the building during the repair work. Electricity to the building will be disconnected at the transformer to avoid electrical hazards when cutting into the slab and footings. The contractor will provide their own power generator. Below is a description of the repair work per floor. See Appendix I.

    a. Basement - one-half of the basement floors, finishes, walls, equipment and fixtures will be removed to accommodate the foundation work. This also extends to the back courtyard.

    b. First Floor – two shear walls extend from the basement through the first floor. Columns are to be fiber-wrapped.

    c. Second Floor – two shear walls extend through the second floor to the underside of the roof. Columns are to be fiber-wrapped.

    d. Roof – the entire flat roof is removed, new shear paneling is installed over the diagonal sheathing and another new roof is installed.

2. **Access to Site**: There appears to be only one primary access point to the site, which is through the front of the building. The sidewalk will need to be closed to pedestrian traffic and re-routed to the adjacent crosswalks. Scaffolding would be installed for a second story and roof access. Other considerations are:
    a. Concrete and earth debris removal - Most demolition debris will be from the basement. It will need to be hauled to the back courtyard and into a dumpster. The dumpster would have to be lifted from the courtyard, place on a truck and coordinated from the Post Office property.

    b. Other debris removal – a chute from the roof and second floor to a dumpster in front of the building will allow other debris to be removed from the building and site.

3. **Contractor Staging**; The front sidewalk, right-away on the south-west side of the building are the two primary areas to store materials for construction. Fencing would need to be installed and permission obtained from the City.
4. **Contractor Parking:** There are a few car spaces on the street that would need to be reserved for the contractor crews. Lost revenues may need to be paid to by the Contractor.

VANIR TASK 7: Prepare a cost estimate for the project work plan. Prepare a cash flow projection matrix.

The conceptual estimate of costs to bring the building up to date has been calculated. A detailed is included in Appendix J. The costs represented below include all contractor markups, design contingency and soft costs (architect, construction manager, permits, advertising, etc.)

BASE REPAIR PROJECT

Base Project - includes cost to systems which are directly impacted by the seismic retrofit such as finishes, the boiler and electrical service along with minor ADA work. Also due to the age of the building and HAZMAT report, it would indicate the possibility of materials currently classified as hazardous being discovered during construction. The estimate includes an allowance for remediation of hazardous materials. Items most likely to require abatement for access to structural work include boiler jacket insulation, plaster walls & ceilings, VAT flooring and lead paint. The final cost may need to be adjusted based on survey results performed by a HAZMAT consultant. Also includes fire alarm, fire extinguishers and emergency and exit lighting. $3,566,338

Total Base Repair Project **$3,566,338**

UPGRADE ITEMS

Item 1 – includes fire sprinklers $210,740

Item 2 – includes: non ADA plumbing upgrades $238,003

Item 3 – includes: Energy Management System. $103,211

Item 4 – Includes miscellaneous items near end of lifecycle, i.e., electrical not in item #1, HVAC, insulation, exterior drainage $1,016,692

Total Modernization Items (1-4) $1,568,646

Total Base plus Modernization Items 1 - 4 **$5,134,984**

VANIR TASK 8: Prepare a project schedule for the project work plan.

The project is estimate to take 20 months to complete. This allows 5 months for design and 10 months for construction. The other 5 months will be taken up with contracting, bidding, approvals, and inspections. Because a lot of the work will involve hand work involving laborers and wheel barrels on a constrained site, additional time is included in the construction phase. As the County proceeds through the design phase, it will be clearer as to the actual limits of work and details required to complete the job so that a more accurate schedule can be prepared. See Appendix K

APPENDIX A

Streeter Group, Inc.
Architecture, Structural Engineering

SEISMIC EVALUATION REPORT

FOR THE EXISTING

VETERANS MEMORAL BUILDING

LOCATED AT

846 Front Street, Santa Cruz, CA

Prepared At The Request Of

Santa Cruz County

General Services Department

Prepared by

STREETER GROUP, INC.

April 9, 2010

(SGI Job No 10002)

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2571 Main Street, Suite C, Soquel, CA 95073 Phone: (831) 477-1781 Fax: (831) 477-1751 WWW.STREETERGROUP.COM

Executive Summary:

This report was prepared in order to form a professional opinion as to whether or not the Veterans Memorial building located at 846 Front Street, Santa Cruz, California is safe to occupy during a significant earthquake. Our opinion is based on site observations, review of original construction documents, limited material and soil testing and analysis of the existing lateral force resisting system of the building. Our analysis is per the American Society of Civil Engineers (ASCE) publication 31-03 titled "Seismic Evaluation of Existing Buildings" with a minimum Life Safety design performance level.

It is our opinion that the existing, as-built condition does not meet the minimum Life Safety seismic design requirements per ASCE 31. As such, the building currently presents increased risk of life or injury to the occupants of the building in the event of a significant earthquake.

The existing building was constructed prior to 1932 and has a building footprint of approximately 140 feet by 60 feet in plan. The front half of the building consists of two floors over a basement and the rear half consists of an auditorium over basement. The exterior building walls are construction of concrete which show signs of distress. Distress includes spalling of concrete in numerous locations due to corrosion of reinforcing steel within the concrete.

On January 18th we were invited to visit the Veterans Memorial Building to observe cracking and spalling of concrete in the existing concrete pilasters and columns of the auditorium and stage addition. Based on our visual observations we formed a professional opinion that the observed distress represented a risk of life or injury to the occupants of the building should a significant seismic event occur. The County of Santa Cruz subsequently closed the building.

Since the building has been closed we have performed a structural evaluation of the building per ASCE 31. The results of this evaluation have identified structural deficiencies which do not meet the minimum Life Safety performance standards. Of particular importance is the requirement that the lateral force resisting system have a complete load path to resist seismic loads. A complete load path means that every element which resists seismic loads from the roof down all the way down to the foundation level is adequately fasten together.

Another item of structural concern is that the building appears to be situated on liquefiable soils. The existing building foundation system is not constructed in a way to resist differential settlement due to the liquefiable soils which could result in damage to the building.

We have prepared conceptual plans for what would be required to bring the building up to a minimum Life Safety performance standard. This work includes repairing the existing distressed concrete, providing complete lateral load resisting load paths to resist seismic loads where required, strengthening some existing elements, and modifications to the existing foundation system. Base on this work and associated soft cost to prepare construction documents we have estimated the probable opinion of construction cost to be approximately $1,400,000.

The Veterans have obtained a second opinion of the observed distressed by Mr. Paul Cox. Mr. Cox has prepared a letter dated March 4, 2010 in which he explains that the deterioration of the concrete is "related simply to the age of the building and deferred maintenance". He further explains that the California Historical Building Code (CHBC)

requires correction of the unsafe condition only. Although, in another sentence states that the CHBC "requires that the structure's ability to resist wind and seismic loads be evaluated, and that unsafe conditions in the lateral-load resisting system be corrected to meet certain minimum strength". This is precisely what we have done with the evaluation of the lateral forces resisting system per ASCE 31 standards based on a minimum Life Safety performance level.

Mr. Cox and we apparently disagree with what constitutes a dangerous condition. Our initial impression of the building was that we saw an older building with structural elements which most likely do not meet current code given the age of the building. We further saw deterioration in the reinforcing steel of these elements which reduces the strength of these elements to resist seismic or laterally imposed loads to a level which appeared structurally unacceptable. This presents a dangerous condition in our opinion. Our initial opinion has been substantiated with the evaluation of the building per ASCE 31 which has confirmed structural deficiencies in the lateral force resisting system.

The building codes and standards provide a minimum standard of care for professional engineers. If the building does not meet these standards and a dangerous condition exists than it is the professional engineer's responsibility to inform the building official or building owner of the dangerous condition. To accept a lesser standard is to expose oneself to potential liability or negligence. This building is potentially used by hundreds of people at a single time and a structural failure during an earthquake would be catastrophic in terms of injury or death.

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Appendix:

A. Conceptual Repair Plans
B. Photos
C. Screening Checklist Phase (Tier 1)
   - 3.7.9A Basic Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms
   - 3.7.9AS Supplemental Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms.
   - 3.7.16 General Basic Structural Checklist
   - 3.8 Geologic site Hazards and Foundation Checklist
   - 3.9.1 Basic Nonstructural Component Checklist
   - 3.9.2 Intermediate Nonstructural Component Checklist
D. Preliminary Geotechnical Assessment Letter dated March 30, 2010 Prepared by Bauldry Engineering, Inc.
E. Mr. Paul Cox Letter dated March 4, 2010 with commentary

Scope and Intent:

The scope and intent of this report is to present our initial structural findings of our seismic evaluation of the Veterans Memorial Building per a Life Safety standard.

On January 18, 2010 we were invited to visit the Veterans Memorial Building located at 846 Front Street in Santa Cruz to observe cracking and spalling of concrete in the existing concrete pilasters and columns of the auditorium and stage addition. Based on our visual observation we prepared a letter stating it was our professional opinion that the observed distress represented a risk of injury to the occupants of the building should a significant seismic event occur. The County of Santa Cruz subsequently closed the building and retained the services of a team of consultants consisting of William Fisher Architecture, Streeter Group Inc., Bauldry Engineering Inc., and BEAR Testing Laboratory to perform a seismic evaluation of the building.

This report presents the findings of the project team based upon the American Society of Civil Engineers (ASCE) publication 31-03 titled "Seismic Evaluation of Existing Buildings". The report includes noted structural deficiencies, structural repair concepts and estimated cost of repairs for use in preliminary planning purposes only.

Final repair plans will be based upon final structural analysis and additional geotechnical investigation.

General Building Description:

The Veterans Memorial building is a landmark building located in downtown Santa Cruz, California. The building was constructed in the early 1930's and dedicated in 1932 to honor those who served in the war. The building has a footprint of approximately 140 feet x 60 feet. The front portion of the building consists of two floors and a basement while the rear portion consists of a large ballroom / auditorium over the basement below. Spaces within the building are rented for different functions such as dance and yoga studios, weddings and other special events. The basement is used as a gathering place for the Veterans. The basement includes a full commercial kitchen, pool tables and exterior patios.

Two additions / structural remodels have been added to the building. The first one we estimate occurred sometime between 1945 and 1960 which consisted of the construction of a stage addition to the rear of the building. A portion of the existing rear concrete wall was removed to accommodate this work. The next addition occurred in 1965 and consisted of removing and rebuilding the stairway located on the north side of the building along with the addition of a new elevator.

The building is constructed with non-ductile reinforced concrete, wood framing and steel beams. Building elements constructed of non-ductile concrete consist of the exterior perimeter walls, interior concrete columns and concrete spandrel beams which support the second and third floor framing of the front portion of the building. The roof is typically framed with straight 1x sheathing supported by wood trusses and rafters. The spacing of the roof trussed varies throughout the building. The first and second floors of the front portion of the building are framed with 2x12 joists supported by the concrete spandrel beams. The foundation system consists of shallow concrete footings with an interior concrete slab on grade. Concrete retaining walls form the basement perimeter walls. The front retaining wall of the basement existed prior to the construction of the building.

This wall is unreinforced and pieces of crockery and glass are visible within the face of the wall.

Original construction documents of the building and construction documents of the stairway and elevator addition were available for review. No construction documents of the stage addition have been found at this time.

Comparison of ASCE 31 Design Standard with California Historical Building Code:

ASCE 31 standard is intended to serve as a national standard and was developed from and intended to replace federal government publication FEMA 310. ASCE 31 is a comprehensive evaluation tool for assessing existing buildings and identifying building deficiencies to resist imposed seismic forces. The standard includes a three-tiered process for seismic evaluation. Findings of the first tier will dictate whether subsequent tier analysis will be required. ASCE 41 "Seismic Rehabilitation of Existing Buildings" or other design standards would be used for final structural analysis and preparation of rehabilitation plans for construction of building repairs.

ASCE 31 is based on a performance standard analysis. This differs from conventional code analysis in that factor of safeties or reductions are applied to the capacity side of the equations instead of reduction of the seismic demand per conventional code methods. Either method should produce similar results with regards to building performance.

ASCE 31 provides for two design performance levels, Life Safety or Immediate Occupancy. The intent of the Life Safety standard is to provide for a minimum standard to reduce risk of life from a design earthquake and not necessarily damage control. One could expect major structural and non-structural damage to a building engineered to a Life Safety standard after a significant seismic event. Immediate Occupancy includes a higher standard which would allow occupancy of the building immediately after a seismic event. Traditionally building codes have based their performance levels on historical performance of buildings and with the recognition that new buildings can be engineered to a higher seismic demand with relatively little extra cost of construction to provide for some damage control beyond the minimum Life Safety standard.

The California Historical Building Code (CHBC) is included as part 8 of the California Building Code. The CHBC provides terms such as "imminent treat" or "distinct hazard" to help clarify when an unsafe condition exists but does not limit a building to be determined unsafe as defined in the regular code.

Structural evaluation of the building per the CHBC is to be in accordance to the 1995 edition of the California Building Code (CBC) with a 0.75 times reduction in required seismic forces. This reduction allows for lower seismic design standard to allow preservation of historical buildings when compared to current seismic code requirements. This reduction represents a minimum Life Safety performance level, similar to ASCE 31 design performance.

It is our opinion that either ASCE 31 or the CHBC could be used for the seismic evaluation of the Veterans Memorial building. Both standards provide for a minimum Life Safety performance level. The method of analysis is somewhat different but the end result is the same. Both methods require a complete load path to resist seismic forces which is of utter importance for building performance. ASCE 31 provides comprehensive

structural check lists specifically developed for evaluation of existing buildings whereas CHBC refers to regular code provisions. Both standards encourage the professional judgment of the engineer when evaluating existing buildings due to their use of historical materials and building systems.

Basis of Review:

Our analysis was based on the following information:

- Review of original construction documents. These documents consisted of:

  Original Architectural and Structural plans prepared by Davis-Pearce Co. consisting of sheets A-1 through A-10 and S1 through S4. The documents have no legible date with the exception of the County surveyor map dated November 1927

- Review of original construction documents for the new concrete stair and elevator to replace an existing wood framed stairs. These documents were prepared by Mr. Richard Huyck & Associates Engineers and consists of 10 sheets dated 12-28-65
- Several site observations to document existing conditions.
- Geotechnical review conducted by Bauldry Engineering Inc.
- Selected material testing and rebar surveys conducted by BEAR Testing Laboratory.

Region of Seismicity:

This building is located in a highly seismically active region.

Mapped active or potentially active faults that may significantly affect the site are:

- San Gregorio Fault, type A fault, 16 kilometers from the building.
- San Andreas Fault, type A, 17.5 kilometers from the building
- Tularcitos Fault, type B fault, less than 10 kilometer from the building.
- Zayante-Vergeles Fault, type B, 12.5 kilometers from the building.

The faults noted above are based on review of the document titled "Maps Of Known Active Faults Near-Source Zones in California And Adjacent Portions Of Nevada" prepared by the California Department of Conservation Division of Mines and Geology and published February 1998.

The proximity of the building to these faults implies that one can expect a significant earthquake will occur during the lifetime of the building with a 10 percent chance of exceedance in 50 years. The above reference notes the San Andreas fault as having a maximum earthquake with a magnitude capability of 7.9 and a slip rate of 24 mm/yr.

Discussion of Structural Building Deficiencies:

The noted structural deficiencies are based on ASCE 31 tier one analysis and additional tier two analysis as required. See appendix A for conceptual repair plans with grid line references and appendix B for photos.

Building Systems – General

- Lateral Load Path: The single most important structural requirement in any structure that resist lateral loads is that the structural elements be connected together in a manner to provide a complete seismic load path from the roof to the supporting soils below. A complete load path includes that the building elements which generate seismic forces are properly connected to horizontal diaphragms which in turn are connected to vertical resisting elements, i.e. shear walls and moment frames, which then transfer the seismic loads down to the building foundation and finally into the supporting soil.

  Load path deficiencies of the Veterans Memorial building include:

  - Roof diaphragm connection to the perimeter concrete shear walls. Visible gaps with no connection are visible between perimeter roof rafter / ledger and concrete walls. See photos one and two.
  - Lack of connection of roof diaphragm to shear wall along grid six.
  - Lack of positive connection between shear walls as load is transferred through floor framing along grid 6.

- Deterioration of Concrete: Exterior skin of the concrete has spalled in several locations due to corrosion of reinforcing steel. See photos three through eight, eleven and twelve.

Building Systems - Configuration:

- Weak Story: This provision requires that the lateral strength of the lateral force resisting elements in the story located either above and below are not less than 80 percent of the strength of the lateral force elements in the given story being considered. The intent of this provision is to control inelastic deformation in a weak story which might lead to partial or total collapse of the story. The existing steel frame along grid 6 and the existing concrete columns at the ground level of grid 8 are weak elements compared to the solid walls above. Additional structural strengthening of these elements will be required.
- Vertical Discontinuities: Shear walls along grids 6 and 8 are discontinuous at the bottom stories due to change from shear walls to either moment steel or concrete frame. This potentially results in a weak or soft story. Additional strengthening will be required at these locations to resist the required imposed seismic loads.

Lateral-Force Resisting System:

- Reinforcing Steel: Based on review of original construction documents the concrete shear walls do not appear to meet minimum reinforcing steel requirements. If walls do not have sufficient reinforcing steel, they will have a limited capacity in resisting seismic forces. The wall also will behave in a non-ductile manner for inelastic forces. Additional analysis will be performed once final rebar investigation work has been completed. Compliance with this requirement will be based on engineering judgment once final analysis has been completed.

- Steel Moment Frames: Existing steel frame located at the basement level of grid six does not appear to be adequate to support required imposed lateral loads. Additional analysis is required for rehabilitation.
- Concrete Moment Frames: Shear Stress Check: The shear stress in the existing concrete frames along grids 3, 5 and grid 8 is greater than what is allowed for a Life Safety performance level. Additional analysis is required for rehabilitation.
- Walls in Wood-Framed Buildings – Shear Stress Check: Shear stress of existing shear walls of grid 6 is greater than the allowable given shear values by a considerable amount. Additional analysis is required for rehabilitation.
- Walls in Wood-Framed Buildings – Plaster Shear Walls: Plaster shear walls shall not be used except at the top story of multiple story building. Existing lath and plaster shear wall at grid 6 at the main story is non-compliant. . Additional analysis is required for rehabilitation.
- Walls in Wood-Framed Buildings – Walls Connected Through Floors: Existing lateral connections through floor of shear walls along grid 6 are inadequate.

Connections:

- Transfer to Shear Walls: No positive connection observed between the roof diaphragm and the exterior concrete shear walls. Additional investigation required for floor diaphragm to wall connection. See photos one and two.

Diaphragms:

- Diaphragm Continuity: Roof diaphragm steps in elevation at grids three and six. Diaphragm shear transfer not observed at these locations. See photos nine and ten of stepped roof condition.
- Cross Ties: In general the original engineer of the building appears to have attempted to tie the building together rather well with the following exception. No exterior wall to roof connection tie is noted on the plans along grid A. Additional inspection required.
- Spans: Existing roof diaphragm consists of straight sheathing. Straight-sheathed diaphragms are flexible and weak relative to other types of diaphragms. Tier two analysis indicates that the existing roof diaphragm is inadequate.

Foundations:

- Based on research by Bauldry Engineering Inc. this site is located on liquefiable soils. Liquefiable soils may result in excessive differential settlement of the building during a significant seismic event. Building foundations located on liquefiable soils typically consist of either deep foundations, concrete matt foundations or a rigid grid to mitigate differential settlement.

  The existing building foundation consists of shallow perimeter concrete footings and isolated interior concrete footings. This foundation system is potentially subject to excessive differential settlement which presents risk of building failure. Structural repairs would include the addition of additional shallow foundations located between the existing isolated footings to create a rigid grid foundation.

- See Appendix D for Preliminary Geotechnical Assessment letter by Bauldry Engineering, Inc. dated March 30, 2010 for description of underlying soil conditions and additional information.
- The front retaining wall adjacent to Front Street was pre-existing prior to the construction of the Veterans Memorial building. Rebar survey indicates that this wall is unreinforced. Pieces of crockery and glass are visible within the face of the wall. We suspect that this wall was constructed with a lime-sand mortar instead of cement which was common in early concrete construction. At this time we anticipate that strengthening of the wall will be required. Proposed strengthening consists of shotcreting the face of the existing wall along with foundation strengthening. See attached repair sketches, appendix A.

Discussion of Non-Structural Building Deficiencies:

Evaluation of non-structural items is part of ASCE 31. Results of the evaluation of non-structural items are noted below but not included as part of the proposed scope of structural repairs.

Basic Nonstructural Component Checklist:

Partitions:

- There are 2 unreinforced clay tile masonry walls in the boiler room in the basement. These walls present a risk of failure during a seismic event. One of the walls has a large diagonal crack.

Ceiling Systems:

- The interior wall partitions in the Veterans services area in the southwest corner of the first floor stop just above the suspended ceiling and are not braced to the floor above or other portion of the structure.

Light Fixtures:

- One emergency light fixture in the basement is suspended by electrical conductors from the ceiling.

Parapets, Cornices, Ornamentation, and Appendages:

- Anchors attaching the ornamental metal balconies show signs of deterioration and/or rusting.

Building Contents and Furnishing:

- There were many tall narrow book cases and displaces cases throughout the structure, most but not all, were not anchored to the adjacent wall.

Mechanical and Electrical Equipment::

Attached Equipment:

- The ceiling mounted mechanical equipment in the basement is not laterally braced.
- Lights in the auditorium, Club Room and basement bathroom are chain or pendent hung and not braced.
- Some anchors supporting mechanical equipment are not attached properly.

- Some attachments of electrical equipment are not attached properly.

Piping:

Flexible Coupling:

- All utilities enter the building from underground. No flexible coupling between the building and the street utilities was found.

Hazardous Materials Storage and Distribution:

- Large quantities of cleaners and paints were stored in the basement. None of these materials were restrained.

Masonry Chimneys

- The clay tile flue from the fireplace at the Club Room on the 2nd floor did not appear to be braced to the roof framing or diaphragm.

Opinion of Construction Cost of Structural Repairs:

Based upon our structural findings we have prepared the attached conceptual repair plans, see appendix A. Mr. Keith Henderson and Mr. Shawn Williams of Barry Swenson Builder have graciously met with us to discuss the scope of repair work and assist in the preparation of a preliminary opinion of construction costs. Barry Swenson Builder has extensive experience with this type of project.

In addition to construction costs we have estimated soft costs for the final preparation of repair plans.

Architectural and Structural Engineering Service: (Includes electrical and mechanical services if needed)	$ 160,000
Additional Geotechnical Engineering and Geology Service:	$ 35,000
Design Contingencies:	$ 35,000
Subtotal of Soft Costs:	$ 230,000
Opinion of Construction Costs:	$1,170,000
Total Project Estimated Repair Costs:	$1,400,000

Construction costs noted above do not include any permitting costs or construction administration costs. Estimated costs are for planning purposes only.

Temporary Shoring Feasibility:

We have studied the feasibility of shoring the building with the intent that the building could be occupied until final repairs can be completed. Based on site constraints, difficulties of bracing the building, and potential liquefiable soils it is our opinion that it is not economically feasible to temporally brace this building.

Conclusions:

It is our opinion that the Veterans Memorial building as constructed presents a risk of life or injury to the occupants of the building during a significant seismic event.

The results of this evaluation phase have confirmed our original opinions that this building presents a risk to the occupants of the building during a seismic event. Based on analysis we have found that the auditorium concrete pilasters are stronger than anticipated given the amount of deterioration observed. On the other hand the calculated strength of the concrete piers supporting the rear wall of the stage are weaker than anticipated and can be classified as a dangerous condition based on the definition of a dangerous building per the 1997 "Uniform Code of the Abatement of Dangerous Buildings".

At this stage our evaluation is based on review of original construction documents, assistance of Bauldry Engineering Inc. and limited rebar surveys. Material testing has not been completed at this time and is required to verify the assumed strength of materials we have used. We do not anticipate results of material testing to change the proposed scope of the repair plans.

The use of the California Historical Building Code (CHBC) is applicable to protect the historical significance of the buildings. It is our opinion that the CHBC is not the only authority to classify the building as a dangerous condition. We could argue the meaning of "imminent threat" per the CHBC with regards to a seismic event but given the use of the building and the consequences of a structural collapse it is a mute point in our opinion. Building occupants would not have time to escape given a seismic event. We have identified structural deficiencies in the primary lateral load paths and as such do not recommend use of the building until these deficiencies have been repaired.

The building has some fundamental structural deficiencies which limit its ability to resist seismic loads. Of particular concern are the concrete columns under the rear wall of the stage, the lack of an adequate load path to transfer seismic loads, and the potential building settlement given the liquefiable soil conditions. These are all fixable items and once fixed the building should provide the desired performance level to protect life safety.

We have heard many times that the building withstood the Loma Preita earthquake in 1989 without any damage. We should note that the Loma Preita earthquake was not a design earthquake. The period of the strong ground motion of the Loma Preita earthquake lasted for only about seven to ten seconds which was about half of what was expected for an earthquake of that size. A design earthquake is expected to have approximately ten times the amount of ground motion, a much longer duration and about thirty times more energy. Buildings which withstood the Loma Preita earthquake will not necessarily withstand a design earthquake with a Richter scale magnitude of 7.9 or greater.

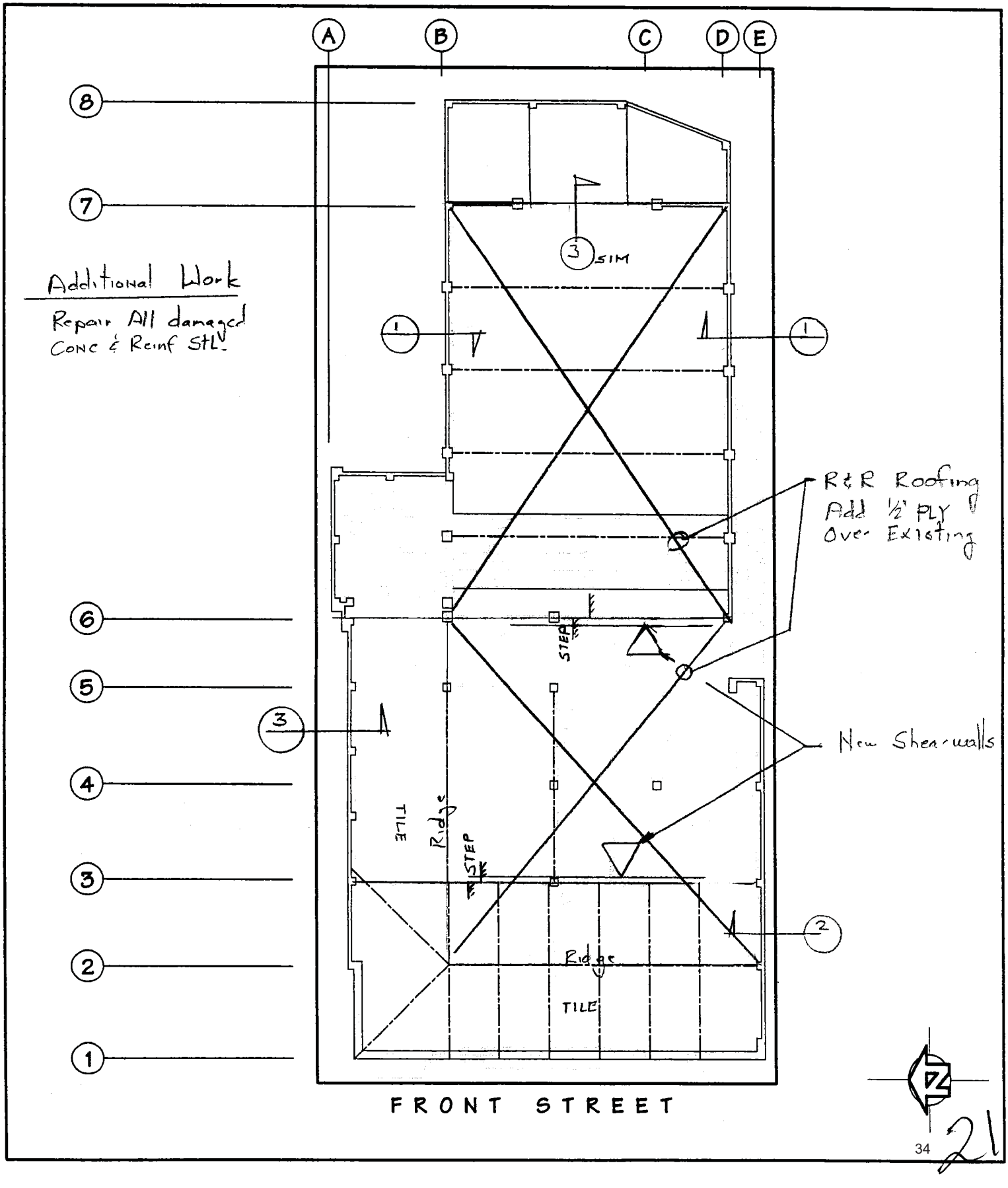
We suspect that some of the observe cracking in the concrete pilasters and columns may of been a result of the Loma Preita earthquake. Some of the cracking in the top of the concrete columns and mid-span of the concrete pilasters is located were we would suspect earthquake damage to occur. It appears that some of the areas where the concrete is spalling away may have been previously patched. This cracking could have contributed to allowing moisture into the concrete and resulted in corrosion of the reinforcing steel.

APPENDIX A

CONCEPTUAL REPAIR PLANS

Streeter Group, Inc.
Architecture, Structural Engineering
2571 Main Street, Suite C, Soquel, CA 95073
Phone: (831) 477-1781 www.streetergroup.com

JOB 10002 - Veterans Hall
SHEET NO. Partial Roof Framing Plan
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____



Streeter Group, Inc.
Architecture, Structural Engineering
2571 Main Street, Suite C, Soquel, CA 95073
Phone: (831) 477-1781 www.streetergroup.com

JOB 10002 - Veterans Hall
SHEET NO. Partial 2nd Floor Framing Plan
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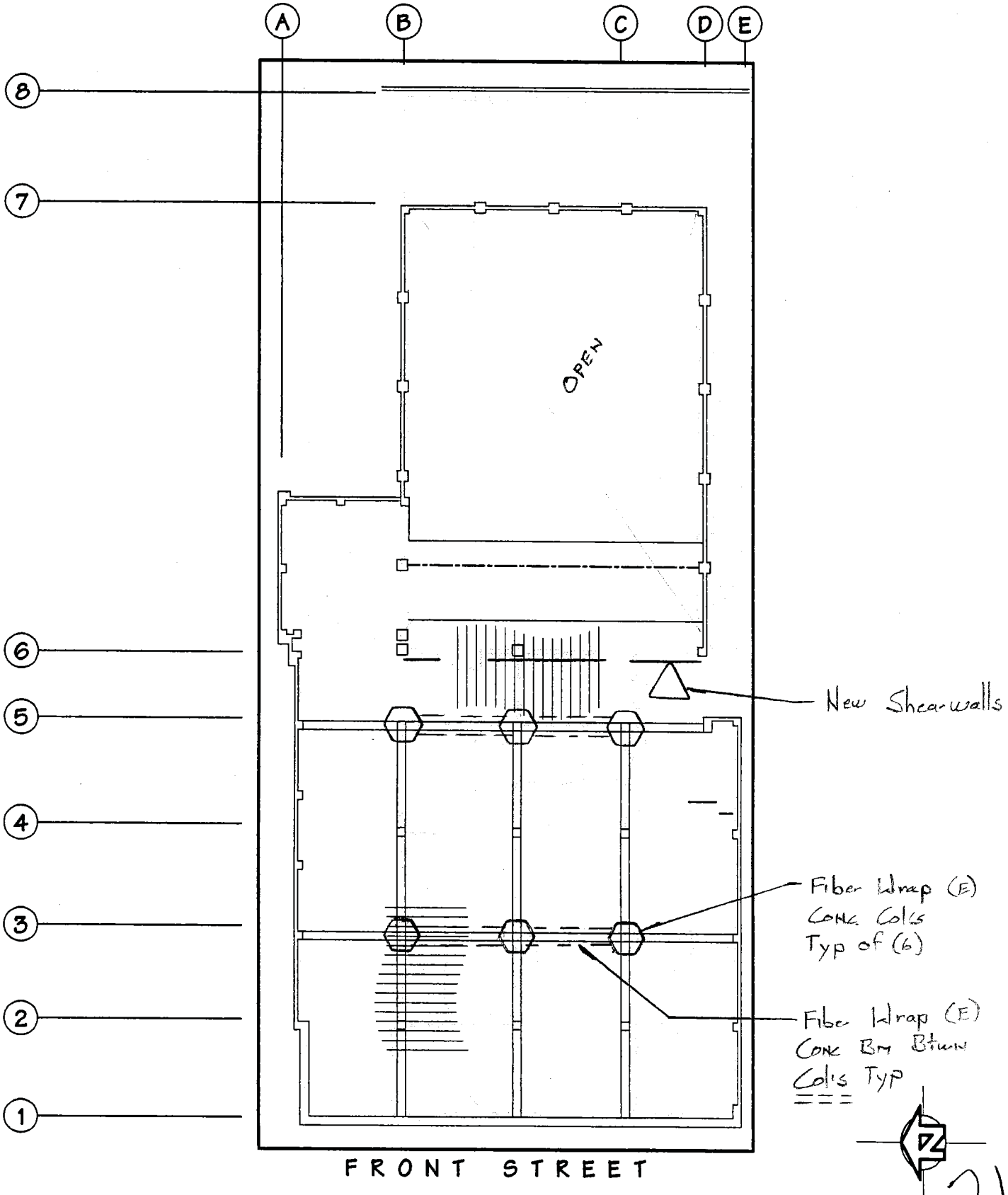

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Streeter Group, Inc.
Architecture, Structural Engineering
2571 Main Street, Suite C, Soquel, CA 95073
Phone: (831) 477-1781 www.streetergroup.com

JOB 10002 - Veterans Hall
SHEET NO. Partial 1st Floor Framing Plan
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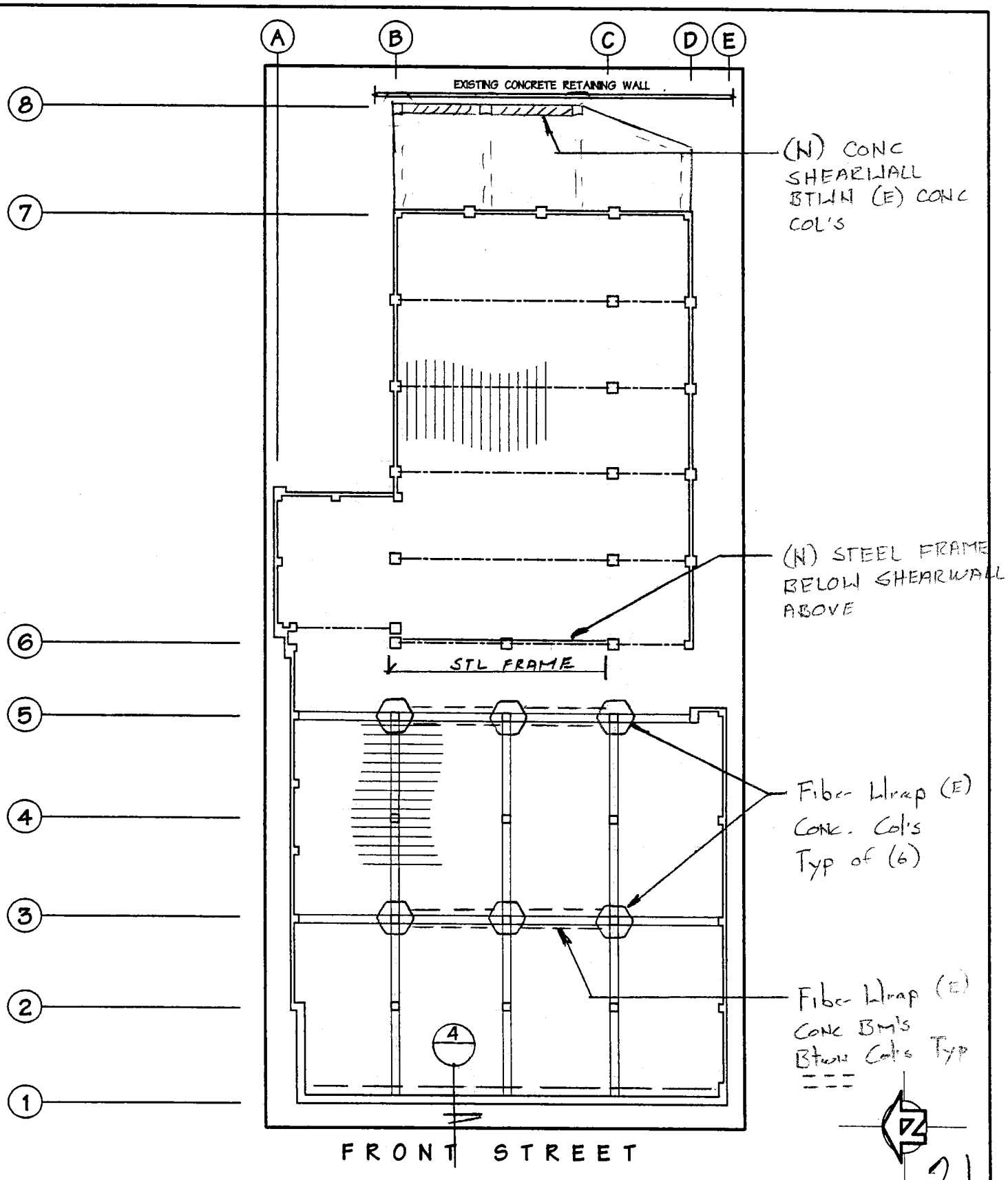
SCALE _____



Streeter Group, Inc.
Architecture, Structural Engineering
2571 Main Street, Suite C, Soquel, CA 95073
Phone: (831) 477-1781 www.streetergroup.com

JOB 10002 - Veterans Hall
SHEET NO. Partial Foundation Plan
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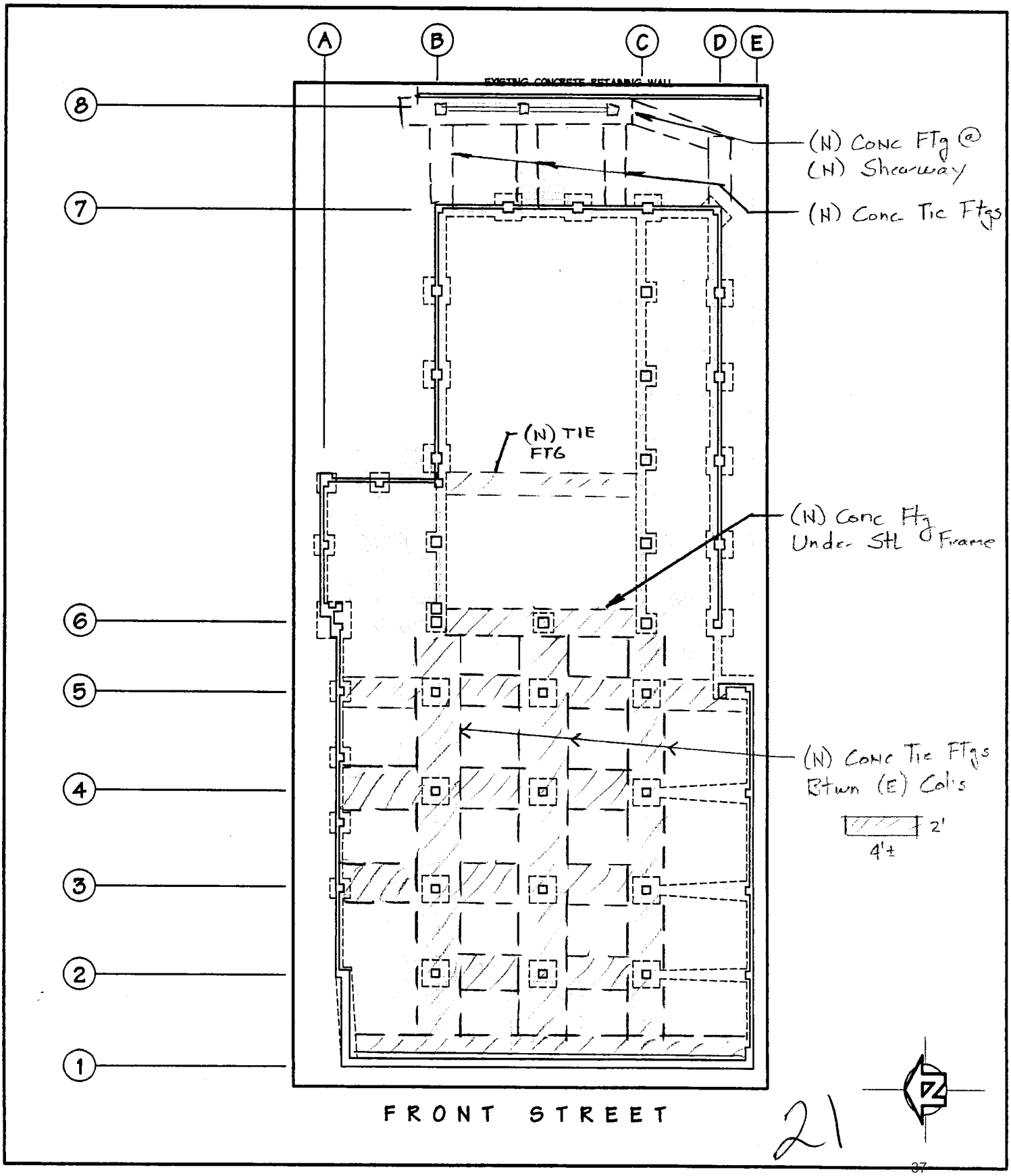
CHECKED BY _____ DATE _____
SCALE _____



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Streeter Group, Inc.
Architecture, Structural Engineering
2571 Main Street Suite C
Soquel, California 95073
(831) 477-1781

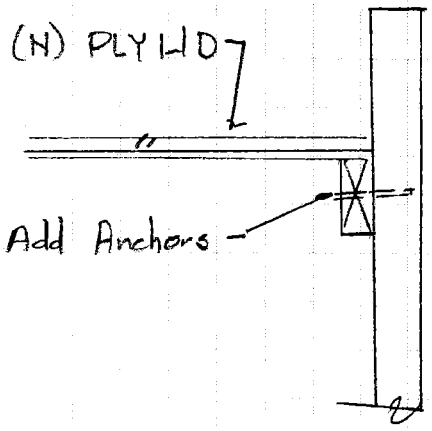
JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____



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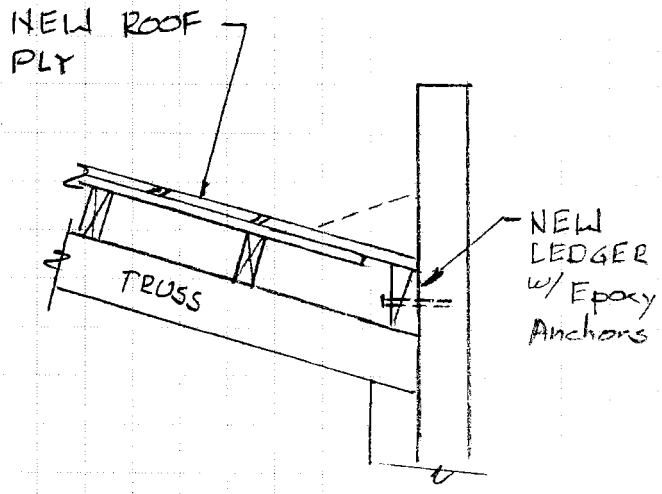

Roof Connection

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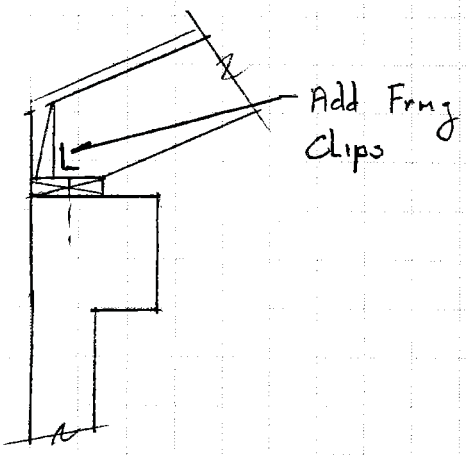

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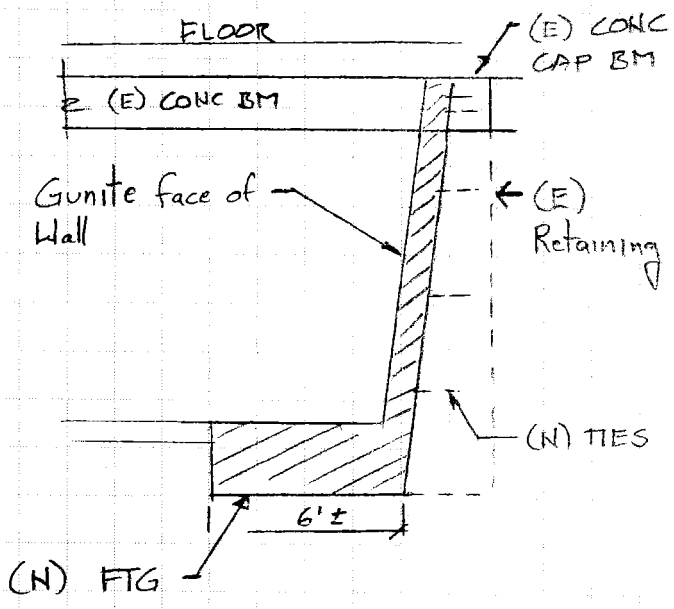

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APPENDIX B

PHOTOS

Cricket ledger no connection noted to wall

Main roof diaphragm no connection to wall

Exterior concrete wall

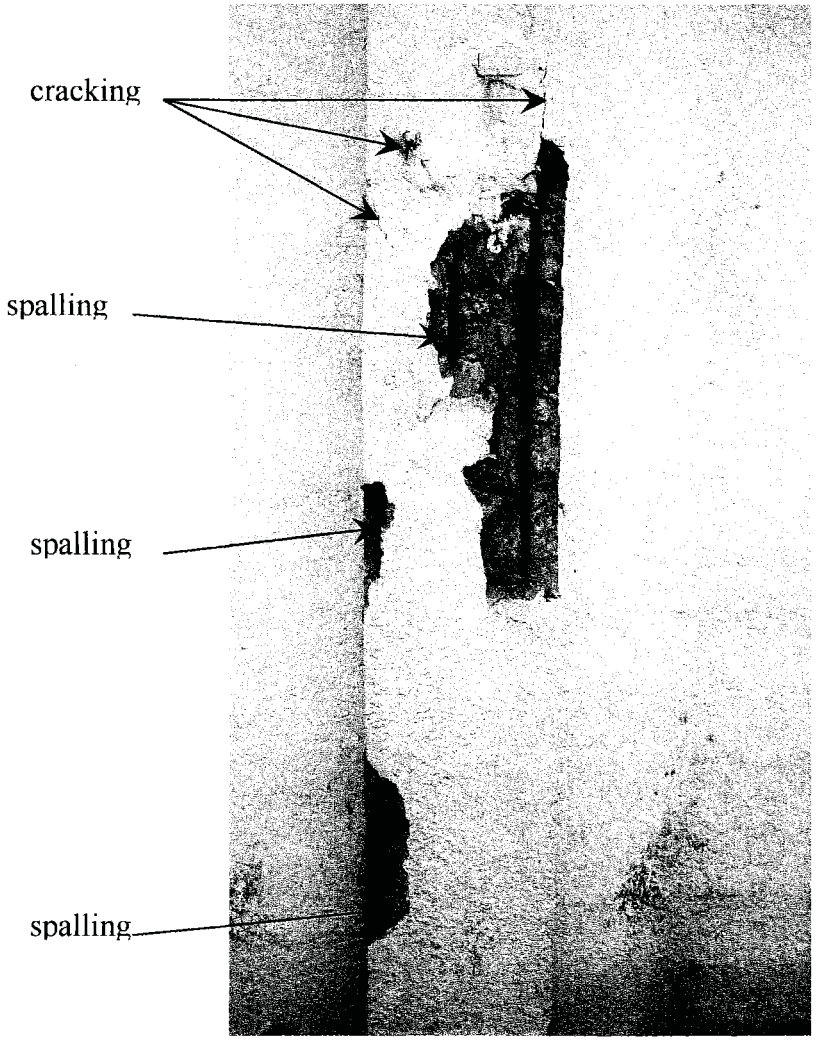
DISCONTINUNITY at ROOF to WALL CONNECTION
Photo 1

Cricket ledger no connection noted to wall

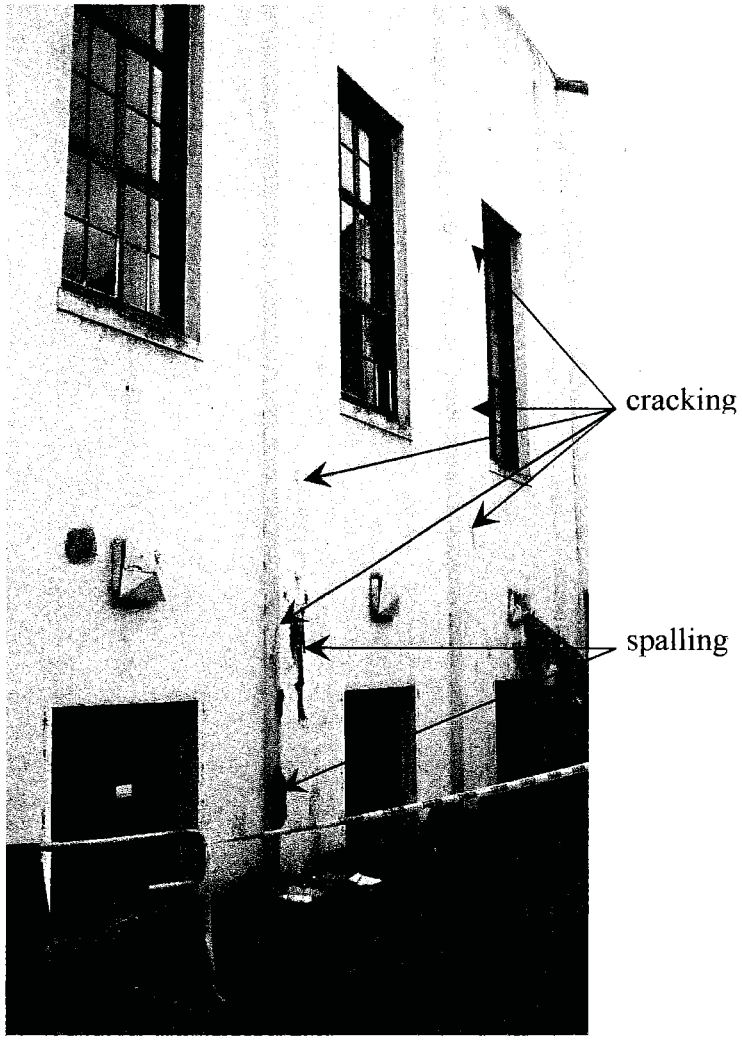
Main roof diaphragm no connection to wall

Exterior concrete wall

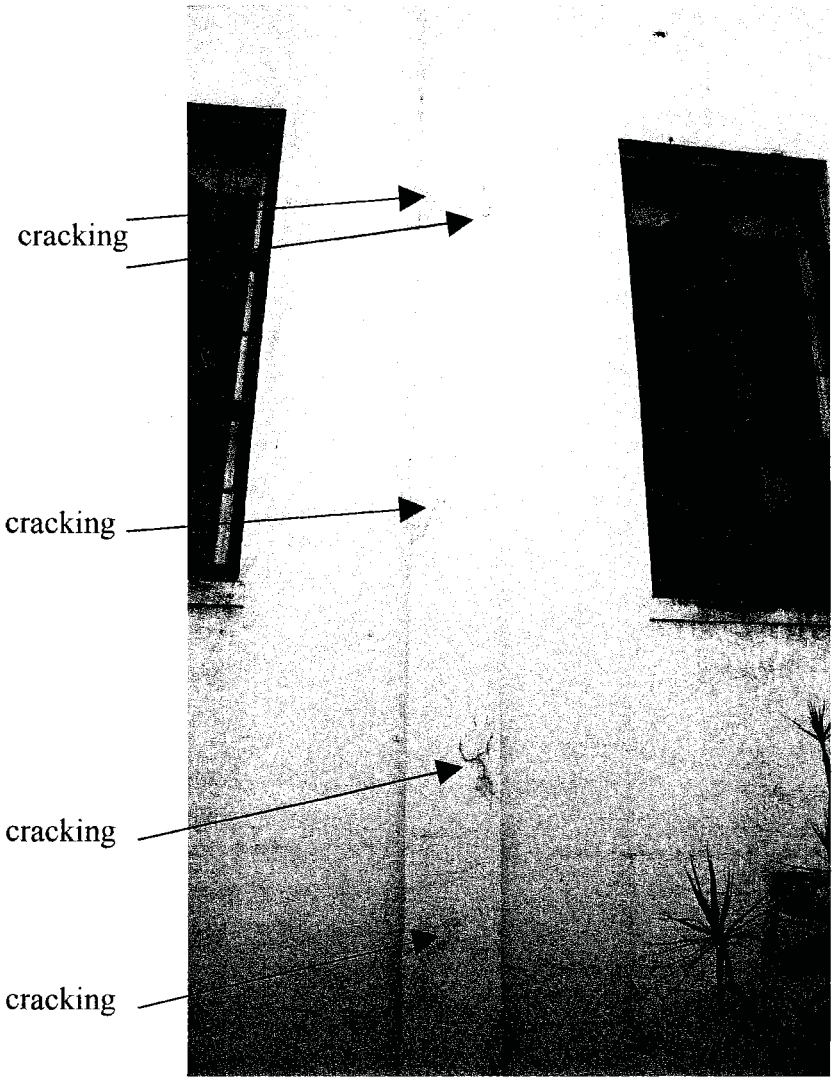
DISCONTINUNITY at ROOF to WALL CONNECTION
Photo 2



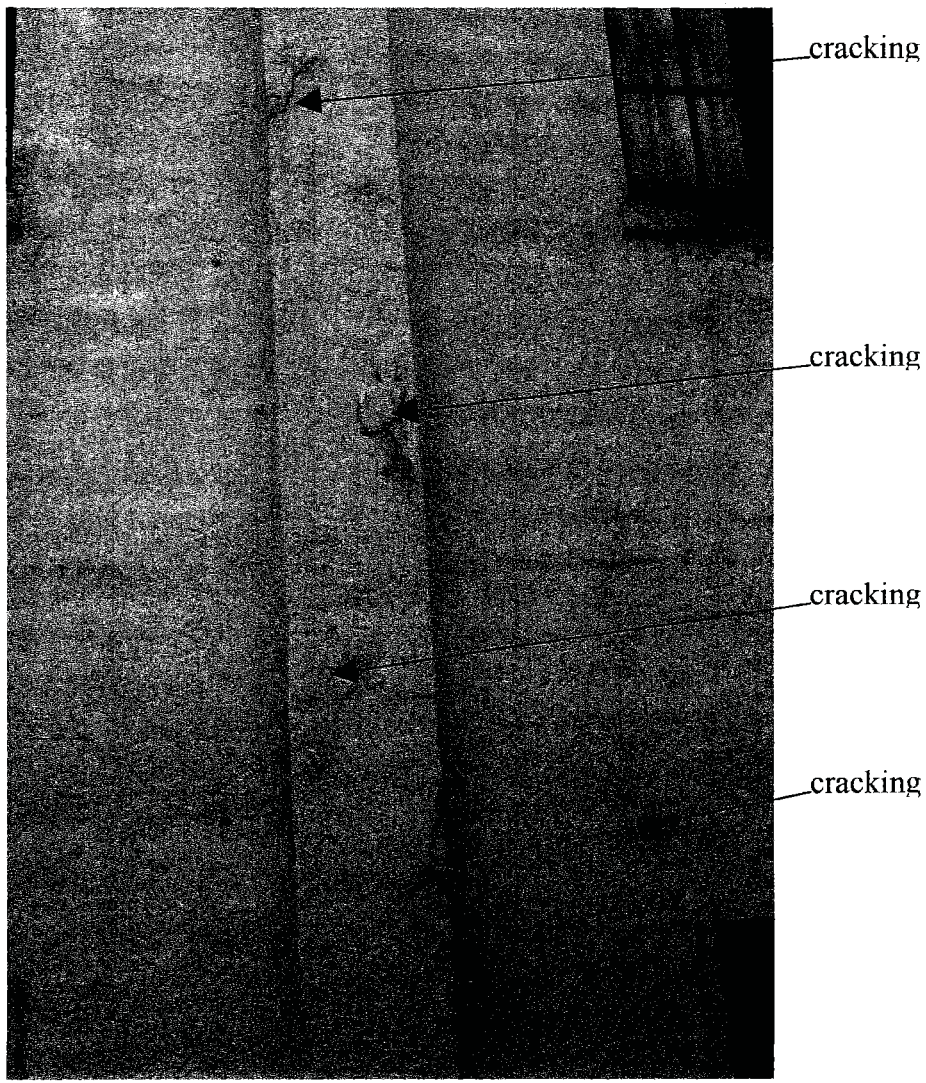
SPALLING OF CONCRETE AT PILASTER
Photo 3



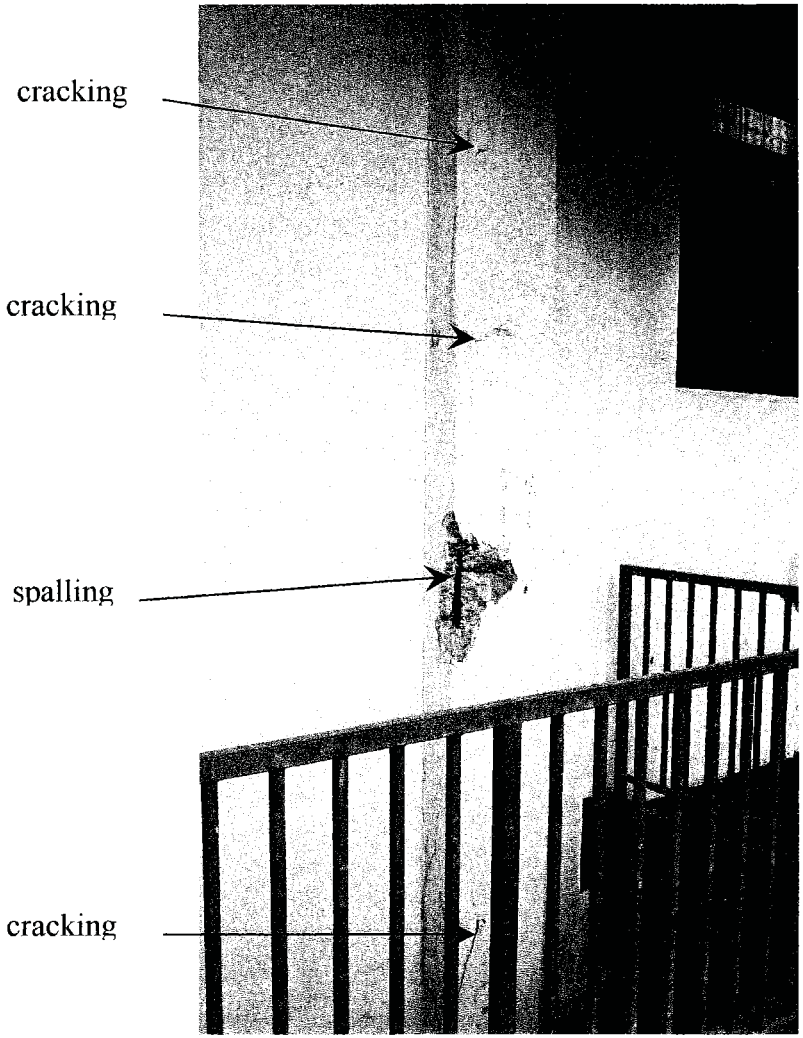
SPALLING OF CONCRETE AT PILASTER
Photo 4



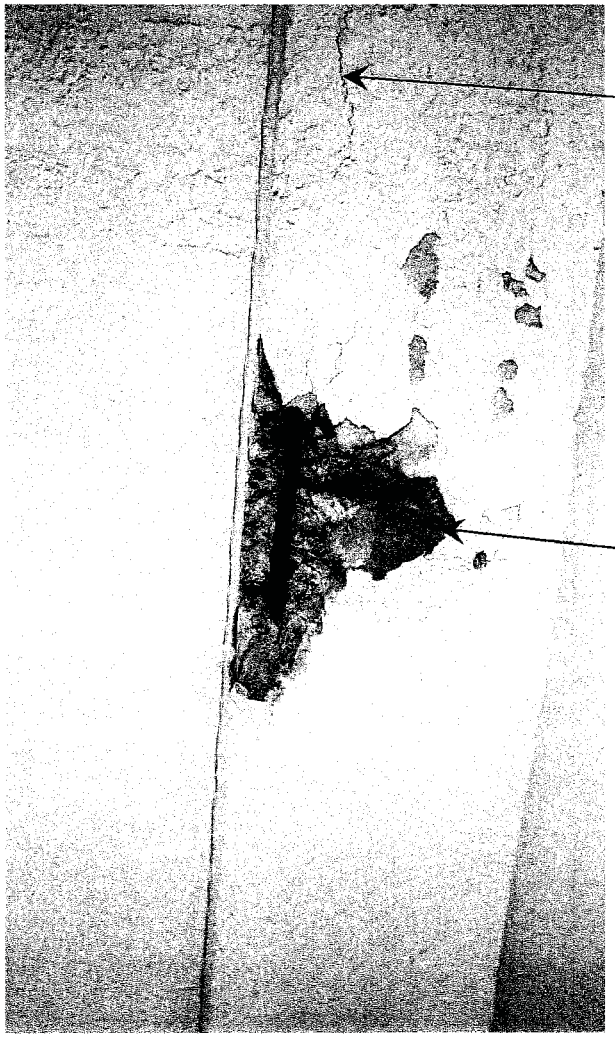
CRACKING OF CONCRETE AT PILASTER
Photo 5



CRACKING OF CONCRETE AT PILASTER
Photo 6

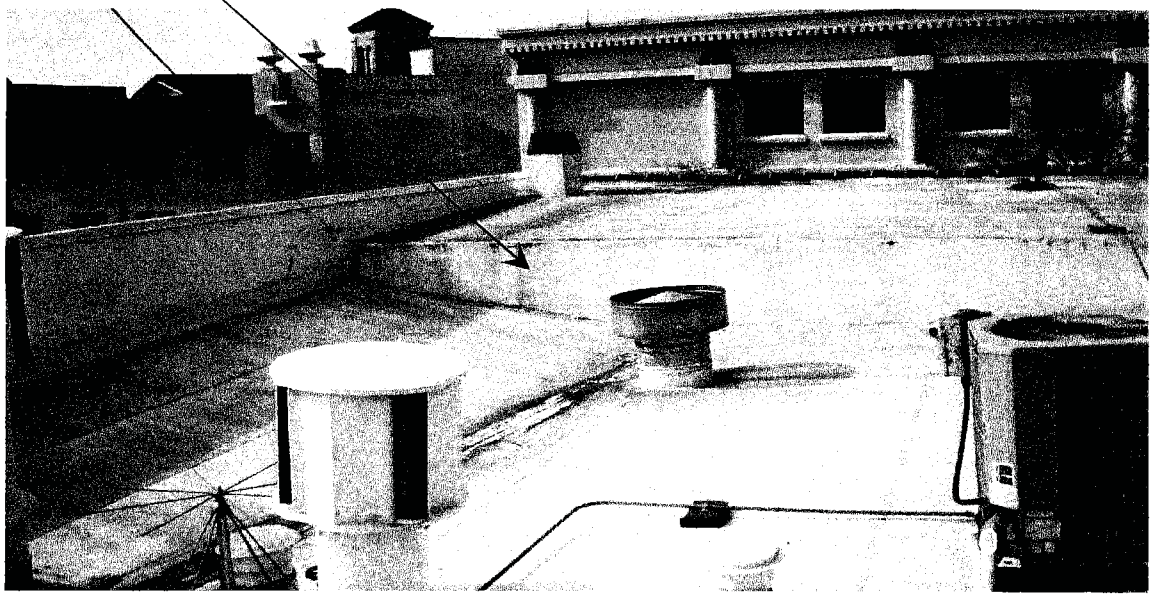


SPALLING OF CONCRETE AT PILASTER
Photo 7

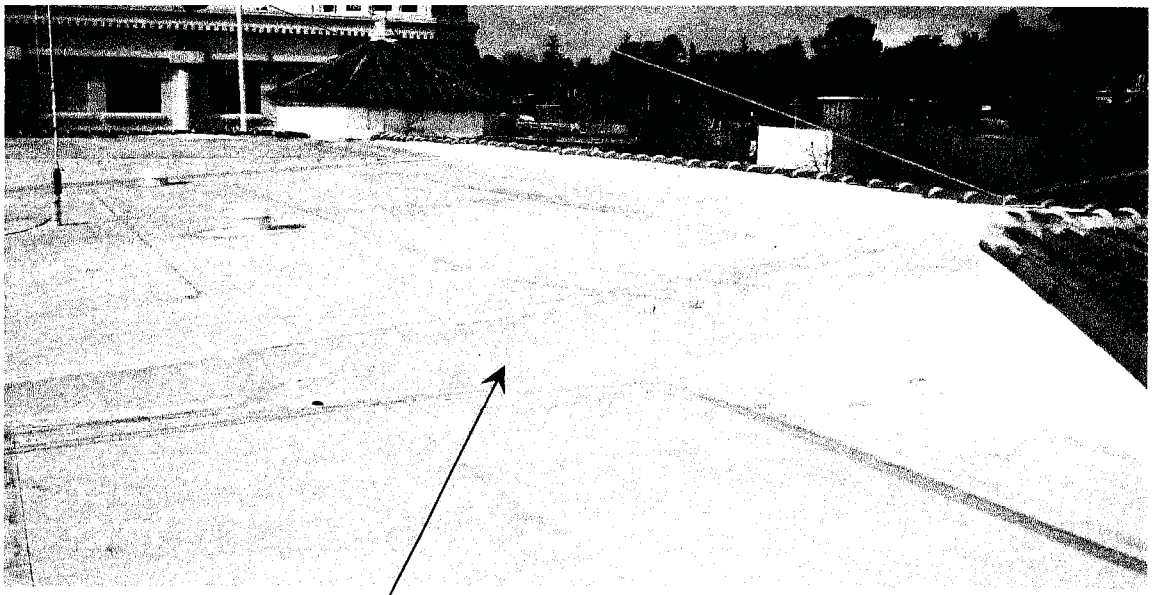


SPALLING OF CONCRETE AT PILASTER
Photo 8

Step in roof diaphragm
at Grid 3



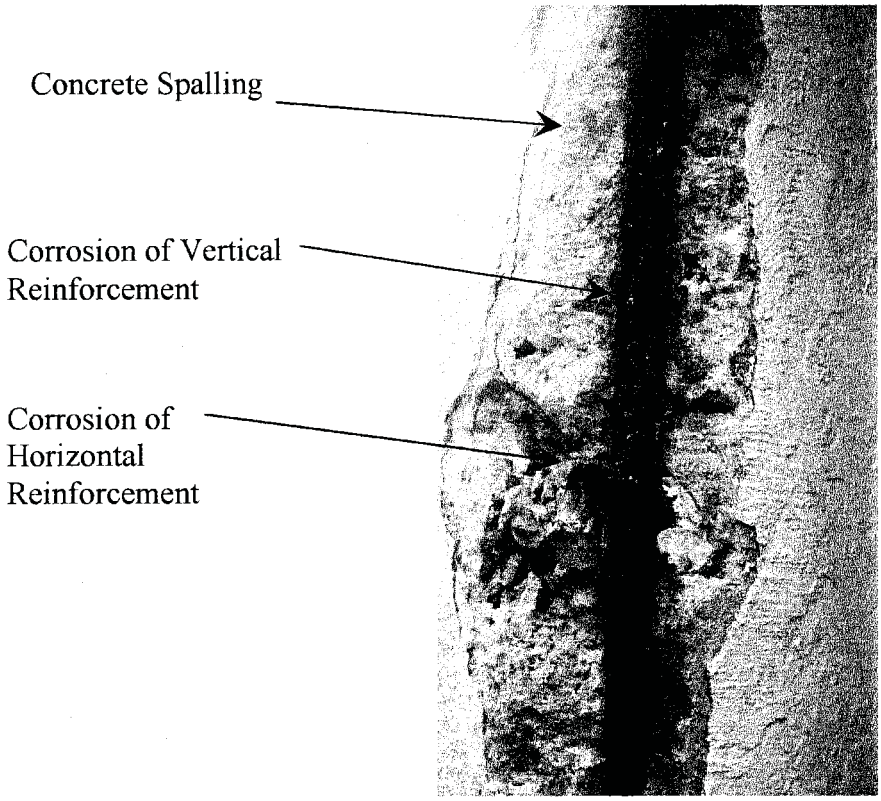
STEP IN ROOF DIAPHRAGM
Photo 9



Step in roof diaphragm
at Grid 6

STEP IN ROOF DIAPHRAGM
Photo 10

STAGE ADDITION CONCRETE COLUMN SPALLING
Photo 11



STAGE ADDITION CONCRETE COLUMN
SPALLING AND REINFORCEMENT CORROSION
Photo 12

APPENDIX C

SCREENING CHECKLIST PHASE (Tier 1)

- 3.7.9A Basic Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms
- 3.7.9A5 Supplemental Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms
- 3.7.16 General Basic Structural Checklist
- 3.8 Geologic site Hazards and Foundation Checklist
- 3.9.1 Basic Nonstructural Component Checklist
- 3.9.2 Intermediate Nonstructural Component Checklist

3.7.9A Basic Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.9A Basic Structural Checklist for Building Type C2A

These buildings have floor and roof framing that consists of wood sheathing on wood framing and concrete beams. Floors are supported on concrete columns or bearing walls. Lateral forces are resisted by cast-in-place concrete shear walls. In older construction, shear walls are lightly reinforced but often extend throughout the building. In more recent construction, shear walls occur in isolated locations and are more heavily reinforced with boundary elements and closely spaced ties to provide ductile performance. The diaphragms consist of wood sheathing or have large aspect ratios and are flexible relative to the walls. Foundations consist of concrete spread footings or deep pile foundations.

Building System

C (NC) N/A — 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. (Tier 2: Sec. 4.3.1.1)

(C) NC N/A — 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. (Tier 2: Sec. 4.3.1.2)

(C) NC 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. (Tier 2: Sec. 4.3.1.3)

(C) NC 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. (Tier 2: Sec. 4.3.2.1)

(C) NC 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. (Tier 2: Sec. 4.3.2.2)

(C) NC 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. (Tier 2: Sec. 4.3.2.3)

(C) NC N/A — VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

(C) NC 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. (Tier 2: Sec. 4.3.2.5)

(C) NC N/A 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. (Tier 2: Sec. 4.3.3.1)

C (NC) N/A DETERIORATION OF CONCRETE: There shall be no visible deterioration of concrete or reinforcing steel in any of the vertical- or lateral-force-resisting elements. (Tier 2: Sec. 4.3.3.4)

C NC (N/A) POST-TENSIONING ANCHORS: There shall be no evidence of corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used. (Tier 2: Sec. 4.3.3.5)

(C) NC N/A CONCRETE WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.9)

Lateral-Force-Resisting System

(C) NC N/A REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

(C) NC N/A SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than the greater of 100 psi or $2\sqrt{f'c}$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.1)

C (NC) N/A REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area shall be not less than 0.0015 in the vertical direction and 0.0025 in the horizontal direction for Life Safety and Immediate Occupancy. The spacing of reinforcing steel shall be equal to or less than 18 inches for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.2) p4-72

Need to verify spacing w/ Field results

Connections

(C) NC N/A WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections shall have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

C (NC) N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2 Sec. 4.6.2.1)

(C) NC N/A FOUNDATION DOWELS: Wall reinforcement shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the lesser of the strength of the walls or the uplift capacity of the foundation for Immediate Occupancy. (Tier 2: Sec. 4.6.3.5)

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3.7.9AS Supplemental Structural Checklist for Building Type C2A: Concrete Shear Walls with Flexible Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C (NC) N/A — COUPLING BEAMS: The stirrups in coupling beams over means of egress shall be spaced at or less than $d/2$ and shall be anchored into the confined core of the beam with hooks of 135° or more for Life Safety. All coupling beams shall comply with the requirements above and shall have the capacity in shear to develop the uplift capacity of the adjacent wall for Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.3)

C NC (N/A) — OVERTURNING: All shear walls shall have aspect ratios less than 4-to-1. Wall piers need not be considered. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.4)

C NC (N/A) — CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements shall be confined with spirals or ties with spacing less than $8d_b$. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.5)

C NC (N/A) — REINFORCING AT OPENINGS: There shall be added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.6)

C NC (N/A) — WALL THICKNESS: Thickness of bearing walls shall not be less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 inches. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.7)

Diaphragms

C (NC) N/A — DIAPHRAGM CONTINUITY: The diaphragms shall not be composed of split-level floors and shall not have expansion joints. (Tier 2: Sec. 4.5.1.1)

C (NC) N/A — CROSS TIES: There shall be continuous cross ties between diaphragm chords. (Tier 2: Sec. 4.5.1.2)

(C) NC N/A — OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

C NC (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. (Tier 2: Sec. 4.5.1.7)

C NC (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. (Tier 2: Sec. 4.5.1.8)

(C) NC N/A — 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. (Tier 2: Sec. 4.5.2.1)

C (NC) N/A 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. (Tier 2: Sec. 4.5.2.2)

C NC (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. (Tier 2: Sec. 4.5.2.3)

C NC (N/A) NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans of 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. (Tier 2: Sec. 4.5.3.1)

(C) NC N/A OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 4.5.7.1)

Connections

C NC (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. (Tier 2: Sec. 4.6.3.10)

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TRANSVERSE DIRECTION

3.7.16 General Basic Structural Checklist

This General Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

BUILDING SYSTEM

General

C (NC) N/A — 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. (Tier 2: Sec. 4.3.1.1)

(C) NC N/A — 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. (Tier 2: Sec. 4.3.1.2)

(C) NC 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. (Tier 2: Sec. 4.3.1.3) Compliant if Grid 6 wood shearwall with steel moment frame below is an adequate LFR System.

Configuration

C (NC) 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. (Tier 2: Sec. 4.3.2.1) Grid 6 - Steel MRF Grid 8 - Concrete MRF ⇒ By observation

C (NC) 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. (Tier 2: Sec. 4.3.2.2)

(C) NC 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. (Tier 2: Sec. 4.3.2.3) Grid 6 & 8, Similar to Weak Story

C (NC) N/A — VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

(C) NC 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. (Tier 2: Sec. 4.3.2.5) Grid 6 & 8 - Shearwalls are discontinuous

C NC (N/A) — TORSION: The estimated distance between the story center of mass and the story center of rigidity shall be less than 20 percent of the building width in either plan dimension for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.6) Flexible Diaphragms

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Condition of Materials

(C) NC N/A — 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. (Tier 2: Sec. 4.3.3.1) No deterioration observed

C NC (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. (Tier 2: Sec. 4.3.3.2)

(C) NC N/A — 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. (Tier 2: Sec. 4.3.3.3) No deterioration observed, mostly concealed

C (NC) N/A — DETERIORATION OF CONCRETE: There shall be no visible deterioration of concrete or reinforcing steel in any of the vertical- or lateral-force-resisting elements. (Tier 2: Sec. 4.3.3.4)
Multiple cracks, spalling, and exposed rebar → See photos

C NC (N/A) — POST-TENSIONING ANCHORS: There shall be no evidence of corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used. (Tier 2: Sec. 4.3.3.5)

C NC (N/A) — PRECAST CONCRETE WALLS: There shall be no visible deterioration of concrete or reinforcing steel or evidence of distress, especially at the connections. (Tier 2: Sec. 4.3.3.6)

(C) NC N/A — MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7) No deterioration noted

(C) NC N/A — MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

(C) NC N/A — CONCRETE WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.9)
Some single diagonal cracks, < 1/8"

(C) NC N/A — REINFORCED MASONRY WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.10)
None observed

C NC (N/A) — UNREINFORCED MASONRY WALL CRACKS: There shall be no existing diagonal cracks in wall elements greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy or out-of-plane offsets in the bed joint greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.11)

C NC (N/A) — CRACKS IN INFILL WALLS: There shall be no existing diagonal cracks in the infilled walls that extend throughout a panel greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, or out-of-plane offsets in the bed joint greater than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy. (Tier 2: Sec. 4.3.3.12)

C NC (N/A) — CRACKS IN BOUNDARY COLUMNS: There shall be no existing diagonal cracks wider than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy in concrete columns that encase masonry infills. (Tier 2: Sec. 4.3.3.13)

LATERAL-FORCE-RESISTING SYSTEM

Moment Frames ⇒ GRID 3 - Concrete MRF
GRID 6 - Steel MRF
GRID 8 - Concrete MRF

General

(C) NC N/A — 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. (Tier 2: Sec. 4.4.1.1.1) At least 2 bays in MRF's

Moment Frames with Infill Walls

C NC (N/A) — INTERFERING WALLS: All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements. (Tier 2: Sec. 4.4.1.2.1)

Steel Moment Frames – GRID 6 - Below Wood Shearwalls

C NC N/A T.B.D. — 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. (Tier 2: Sec. 4.4.1.3.1)

C NC N/A T.B.D. — AXIAL STRESS CHECK: The axial stress due to gravity loads in columns subjected to overturning forces shall be less than $0.10F_y$ 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 $0.30F_y$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.3.2)

Concrete Moment Frames – GRID 3
GRID 8 - Below Stage

C (NC) N/A — SHEAR STRESS CHECK: The shear stress in the concrete columns, calculated using the Quick Check procedure of Section 3.5.3.2, shall be less than the greater of 100 psi or $2\sqrt{f'_c}$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.4.1)

C NC N/A T.B.D. — AXIAL STRESS CHECK: The axial stress due to gravity loads in columns subjected to overturning forces shall be less than $0.10f'_c$ for Life Safety and Immediate Occupancy. Alternatively, the axial stresses due to overturning forces alone, calculated using the Quick Check procedure of Section 3.5.3.6, shall be less than $0.30f'_c$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.4.2)

Precast Concrete Moment Frames N/A

C NC (N/A) — PRECAST CONNECTION CHECK: The precast connections at frame joints shall have the capacity to resist the shear and moment demands calculated using the Quick Check procedure of Section 3.5.3.5. (Tier 2: Sec. 4.4.1.5.1)

Frames Not Part of the Lateral-Force-Resisting System

(C) NC N/A — COMPLETE FRAMES: Steel or concrete frames classified as secondary components shall form a complete vertical-load-carrying system. (Tier 2: Sec. 4.4.1.6.1)
Concrete columns and beams in both directions

Shear Walls

General

(C) NC N/A — REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

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Concrete Shear Walls

(C) NC N/A — SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than the greater of 100 psi or $2\sqrt{f'c}$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.1)

C (NC) N/A — REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area shall be not less than 0.0015 in the vertical direction and 0.0025 in the horizontal direction for Life Safety and Immediate Occupancy. The spacing of reinforcing steel shall be equal to or less than 18 inches for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.2)

C NC (N/A) — COLUMN SPLICES: Steel columns encased in shear-wall-boundary elements shall have splices that develop the tensile strength of the column. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.9)

Precast Concrete Shear Walls N/A

C NC (N/A) — SHEAR STRESS CHECK: The shear stress in the precast panels, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than the greater of 100 psi or $2\sqrt{f'c}$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.3.1)

C NC (N/A) — REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area shall be not less than 0.0015 in the vertical direction and 0.0025 in the horizontal direction for Life Safety and Immediate Occupancy. The spacing of reinforcing steel shall be equal to or less than 18 inches for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.3.2)

Reinforced Masonry Shear Walls — At Elevator Shaft 1965 Remodel

C NC N/A T.B.D. — SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.4.1)

(C) NC N/A — REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls shall be greater than 0.002 for Life Safety and Immediate Occupancy of the wall with the minimum of 0.0007 for Life Safety and Immediate Occupancy in either of the two directions; the spacing of reinforcing steel shall be less than 48 inches for Life Safety and Immediate Occupancy; and all vertical bars shall extend to the top of the walls. (Tier 2: Sec. 4.4.2.4.2)

Unreinforced Masonry Shear Walls N/A

C NC (N/A) — SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units and 70 psi for concrete units for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.5.1)

Infill Walls in Frames N/A

C NC (N/A) — WALL CONNECTIONS: Masonry shall be in full contact with frame for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.6.1)

Walls in Wood-Frame Buildings – GRID 6, 1st & 2nd Story

C (NC) N/A 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 (Tier 2: Sec. 4.4.2.7.1):

Structural panel sheathing:	1,000 plf
Diagonal sheathing:	700 plf
→ Straight sheathing:	100 plf
→ All other conditions: PLASTER	100 plf

(C) NC N/A STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings shall not rely on exterior stucco walls as the primary lateral-force-resisting system. (Tier 2: Sec. 4.4.2.7.2)

All exterior walls are concrete

C (NC) 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. (Tier 2: Sec. 4.4.2.7.3)

Grid 6 shear wall is metal lath and plaster

(C) NC N/A 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. (Tier 2: Sec. 4.4.2.7.4)

C (NC) N/A WALLS CONNECTED THROUGH FLOORS: Shear walls shall have interconnection between stories to transfer overturning and shear forces through the floor. (Tier 2: Sec. 4.4.2.7.5)

C NC (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. (Tier 2: Sec. 4.4.2.7.6)

C NC (N/A) CRIPPLE WALLS: Cripple walls below first-floor-level shear walls shall be braced to the foundation with wood structural panels. (Tier 2: Sec. 4.4.2.7.7)

C NC (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. (Tier 2: Sec. 4.4.2.7.8)

Braced Frames N/A

General

C NC (N/A) REDUNDANCY: The number of lines of braced frames in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. The number of braced bays in each line shall be greater than 2 for Life Safety and 3 for Immediate Occupancy. (Tier 2: Sec. 4.4.3.1.1)

C NC (N/A) AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 3.5.3.4, shall be less than $0.50F_y$ for Life Safety and for Immediate Occupancy. (Tier 2: Sec. 4.4.3.1.2)

C NC (N/A) COLUMN SPLICES: All column splice details located in braced frames shall develop the tensile strength of the column. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.3.1.3)

DIAPHRAGMS

Precast Concrete Diaphragms N/A

C NC (N/A) TOPPING SLAB: Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab. (Tier 2: Sec. 4.5.5.1)

CONNECTIONS

Anchorage for Normal Forces

(C) NC N/A WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections shall have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

(C) NC N/A WOOD LEDGERS: The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers. (Tier 2: Sec. 4.6.1.2)

Shear Transfer

C (NC) N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2 Sec. 4.6.2.1)

C NC N/A 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. (Tier 2: Sec. 4.6.2.2)

C NC (N/A) TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements shall be doweled for transfer of forces into the shear wall or frame elements for Life Safety, and the dowels shall be able to develop the lesser of the shear strength of the walls, frames, or slabs for Immediate Occupancy. (Tier 2: Sec. 4.6.2.3)

Vertical Components

(C) NC N/A 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. (Tier 2: Sec. 4.6.3.1)

(C) NC N/A CONCRETE COLUMNS: All concrete columns shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the tensile capacity of reinforcement in columns of lateral-force-resisting system for Immediate Occupancy. (Tier 2: Sec. 4.6.3.2)

C NC (N/A) WOOD POSTS: There shall be a positive connection of wood posts to the foundation. (Tier 2: Sec. 4.6.3.3)

(C) NC N/A WOOD SILLS: All wood sills shall be bolted to the foundation. (Tier 2: Sec. 4.6.3.4)

(C) NC N/A FOUNDATION DOWELS: Wall reinforcement shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the lesser of the strength of the walls or the uplift capacity of the foundation for Immediate Occupancy. (Tier 2: Sec. 4.6.3.5)

(C) NC N/A SHEAR-WALL-BOUNDARY COLUMNS: The shear-wall-boundary columns shall be anchored to the building foundation for Life Safety, and the anchorage shall be able to develop the tensile capacity of the column for Immediate Occupancy. (Tier 2: Sec. 4.6.3.6)

C NC (N/A) PRECAST WALL PANELS: Precast wall panels shall be connected to the foundation for Life Safety and the connections shall be able to develop the strength of the walls for Immediate Occupancy. (Tier 2: Sec. 4.6.3.7)

C NC (N/A) WALL PANELS: Metal, fiberglass, or cementitious wall panels shall be positively attached to the foundation for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.6.3.8)

Interconnection of Elements

(C) NC N/A GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)

Panel Connections

C NC (N/A) ROOF PANELS: Metal, plastic, or cementitious roof panels shall be positively attached to the roof framing to resist seismic forces for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.6.5.1)

C NC (N/A) WALL PANELS: Metal, fiberglass, or cementitious wall panels shall be positively attached to the framing to resist seismic forces for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.6.5.2)

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3.7.16S General Supplemental Structural Checklist

This General Supplemental Structural Checklist shall be completed where required by Table 3-2. The General Basic Structural Checklist shall be completed prior to completing this General Supplemental Structural Checklist.

LATERAL-FORCE-RESISTING SYSTEM

Moment Frames

Steel Moment Frames

C NC N/A TBD. MOMENT-RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones. (Tier 2: Sec. 4.4.1.3.3)

C NC N/A TBD 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. (Tier 2: Sec. 4.4.1.3.4)

C NC (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. (Tier 2: Sec. 4.4.1.3.5) No Splices

C NC N/A TBD 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. (Tier 2: Sec. 4.4.1.3.6)

C NC N/A TBD COMPACT MEMBERS: All frame elements shall meet section requirements set forth by *Seismic Provisions for Structural Steel Buildings* Table I-9-1 (AISC, 1997). (Tier 2: Sec. 4.4.1.3.7)

C NC (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. (Tier 2: Sec. 4.4.1.3.8)

C NC (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. (Tier 2: Sec. 4.4.1.3.9)

C NC (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. (Tier 2: Sec. 4.4.1.3.10

C NC (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. (Tier 2: Sec. 4.4.1.3.11)

Concrete Moment Frames

C NC (N/A) FLAT SLAB FRAMES: The lateral-force-resisting system shall not be a frame consisting of columns and a flat slab/plate without beams. (Tier 2: Sec. 4.4.1.4.3)

C NC (N/A) PRESTRESSED FRAME ELEMENTS: The lateral-force-resisting frames shall not include any prestressed or post-tensioned elements where the average prestress exceeds the lesser of 700 psi or $f'_c/6$ at potential hinge locations. The average prestress shall be calculated in accordance with the Quick Check procedure of Section 3.5.3.8. (Tier 2: Sec. 4.4.1.4.4)

(C) NC N/A CAPTIVE COLUMNS: There shall be no columns at a level with height/depth ratios less than 50 percent of the nominal height/depth ratio of the typical columns at that level for Life Safety and 75 percent for Immediate Occupancy. (Tier 2: Sec. 4.4.1.4.5)

C NC N/A TBD — NO SHEAR FAILURES: The shear capacity of frame members shall be able to develop the moment capacity at the ends of the members. (Tier 2: Sec. 4.4.1.4.6)

C NC N/A " — STRONG COLUMN/WEAK BEAM: The sum of the moment capacity of the columns shall be 20 percent greater than that of the beams at frame joints. (Tier 2: Sec. 4.4.1.4.7)

C NC N/A Need Test Results — BEAM BARS: At least two longitudinal top and two longitudinal bottom bars shall extend continuously throughout the length of each frame beam. At least 25 percent of the longitudinal bars provided at the joints for either positive or negative moment shall be continuous throughout the length of the members for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.4.8)

C NC N/A TBD — COLUMN-BAR SPLICES: All column bar lap splice lengths shall be greater than $35d_b$ for Life Safety and $50d_b$ for Immediate Occupancy, and shall be enclosed by ties spaced at or less than $8d_b$ for Life Safety and Immediate Occupancy. Alternatively, column bars shall be spliced with mechanical couplers with a capacity of at least 1.25 times the nominal yield strength of the spliced bar. (Tier 2: Sec. 4.4.1.4.9)

C NC N/A Unknown — BEAM-BAR SPLICES: The lap splices or mechanical couplers for longitudinal beam reinforcing shall not be located within $l_b/4$ of the joints and shall not be located in the vicinity of potential plastic hinge locations. (Tier 2: Sec. 4.4.1.4.10)

C NC N/A Need Test Result — COLUMN-TIE SPACING: Frame columns shall have ties spaced at or less than $d/4$ for Life Safety and Immediate Occupancy throughout their length and at or less than $8d_b$ for Life Safety and Immediate Occupancy at all potential plastic hinge locations. (Tier 2: Sec. 4.4.1.4.11)

C NC N/A Need Test Results — STIRRUP SPACING: All beams shall have stirrups spaced at or less than $d/2$ for Life Safety and Immediate Occupancy throughout their length. At potential plastic hinge locations, stirrups shall be spaced at or less than the minimum of $8d_b$ or $d/4$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.4.12)

C NC N/A Need Test Results — JOINT REINFORCING: Beam-column joints shall have ties spaced at or less than $8d_b$ for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.4.13)

C NC (N/A) — JOINT ECCENTRICITY: There shall be no eccentricities larger than 20 percent of the smallest column plan dimension between girder and column centerlines. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.1.4.14)

C NC (N/A) — STIRRUP AND TIE HOOKS: The beam stirrups and column ties shall be anchored into the member cores with hooks of 135° or more. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.1.4.15)

Precast Concrete Moment Frames

C NC (N/A) — PRECAST FRAMES: For buildings with concrete shear walls, precast concrete frame elements shall not be considered as primary components for resisting lateral forces. (Tier 2: Sec. 4.4.1.5.2)

C NC (N/A) — PRECAST CONNECTIONS: For buildings with concrete shear walls, the connection between precast frame elements such as chords, ties, and collectors in the lateral-force-resisting system shall develop the capacity of the connected members. (Tier 2: Sec. 4.4.1.5.3)

Frames Not Part of the Lateral-Force-Resisting System

C NC N/A TBD — DEFLECTION COMPATIBILITY: Secondary components shall have the shear capacity to develop the flexural strength of the components for Life Safety and shall meet the requirements of Sections 4.4.1.4.9, 4.4.1.4.10, 4.4.1.4.11, 4.4.1.4.12 and 4.4.1.4.15 for Immediate Occupancy. (Tier 2: Sec. 4.4.1.6.2)

C NC (N/A) FLAT SLABS: Flat slabs/plates not part of lateral-force-resisting system shall have continuous bottom steel through the column joints for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.1.6.3)

Shear Walls

Concrete Shear Walls

C NC (N/A) COUPLING BEAMS: The stirrups in coupling beams over means of egress shall be spaced at or less than $d/2$ and shall be anchored into the confined core of the beam with hooks of 135° or more for Life Safety. All coupling beams shall comply with the requirements above and shall have the capacity in shear to develop the uplift capacity of the adjacent wall for Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.3)

C NC (N/A) OVERTURNING: All shear walls shall have aspect ratios less than 4-to-1. Wall piers need not be considered. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.4)

C NC (N/A) CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements shall be confined with spirals or ties with spacing less than $8d_b$. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.5)

C NC (N/A) REINFORCING AT OPENINGS: There shall be added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.6)

C NC (N/A) WALL THICKNESS: Thickness of bearing walls shall not be less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 inches. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.2.7)

(C) NC N/A WALL CONNECTIONS: There shall be a positive connection between the shear walls and the steel beams and columns for Life Safety and the connection shall be able to develop the strength of the walls for Immediate Occupancy. (Tier 2: Sec. 4.4.2.2.8)

Precast Concrete Shear Walls N/A

C NC (N/A) WALL OPENINGS: The total width of openings along any perimeter wall line shall constitute less than 75 percent of the length of any perimeter wall for Life Safety and 50 percent for Immediate Occupancy with the wall piers having aspect ratios of less than 2-to-1 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.3.3)

C NC (N/A) CORNER OPENINGS: Walls with openings at a building corner larger than the width of a typical panel shall be connected to the remainder of the wall with collector reinforcing. (Tier 2: Sec. 4.4.2.3.4)

C NC (N/A) PANEL-TO-PANEL CONNECTIONS: Adjacent wall panels shall be interconnected to transfer overturning forces between panels by methods other than welded steel inserts. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.3.5)

C NC (N/A) WALL THICKNESS: Thickness of bearing walls shall not be less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 inches. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.3.6)

Reinforced Masonry Shear Walls

C NC (N/A) REINFORCING AT OPENINGS: All wall openings that interrupt rebar shall have trim reinforcing on all sides. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.3)

C NC (N/A) PROPORTIONS: The height-to-thickness ratio of the shear walls at each story shall be less than 30. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.4)

Unreinforced Masonry Shear Walls N/A

C NC (N/A) PROPORTIONS: The height-to-thickness ratio of the shear walls at each story shall be less than the following for Life Safety and Immediate Occupancy (Tier 2: Sec. 4.4.2.5.2):

Top story of multi-story building:	9
First story of multi-story building:	15
All other conditions:	13

C NC (N/A) MASONRY LAY-UP: Filled collar joints of multi-wythe masonry walls shall have negligible voids. (Tier 2: Sec. 4.4.2.5.3)

Infill Walls in Frames N/A

C NC (N/A) PROPORTIONS: The height-to-thickness ratio of the infill walls at each story shall be less than 9 for Life Safety in levels of high seismicity, 13 for Immediate Occupancy in levels of moderate seismicity, and 8 for Immediate Occupancy in levels of high seismicity. (Tier 2: Sec. 4.4.2.6.2)

C NC (N/A) SOLID WALLS: The infill walls shall not be of cavity construction. (Tier 2: Sec. 4.4.2.6.3)

C NC (N/A) INFILL WALLS: The infill walls shall be continuous to the soffits of the frame beams and to the columns to either side. (Tier 2: Sec. 4.4.2.6.4)

Walls in Wood-Frame Buildings

C NC (N/A) HOLD-DOWN ANCHORS: All shear walls shall have hold-down anchors constructed per acceptable construction practices, attached to the end studs. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.7.9)

Braced Frames N/A

General

C NC (N/A) SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression shall have Kl/r ratios less than 120. (Tier 2: Sec. 4.4.3.1.4)

C NC (N/A) CONNECTION STRENGTH: All the brace connections shall develop the yield capacity of the diagonals. (Tier 2: Sec. 4.4.3.1.5)

C NC (N/A) OUT-OF-PLANE BRACING: Braced frame connections attached to beam bottom flanges located away from beam-column joints shall be braced out-of-plane at the bottom flange of the beams. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.3.1.6)

Concentrically Braced Frames N/A

C NC (N/A) K-BRACING: The bracing system shall not include K-braced bays. (Tier 2: Sec. 4.4.3.2.1)

C NC (N/A) TENSION-ONLY BRACES: Tension-only braces shall not comprise more than 70 percent of the total lateral-force-resisting capacity in structures over two stories in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.3.2.2)

C NC (N/A) CHEVRON BRACING: The bracing system shall not include chevron, or V-braced, bays. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.3.2.3)

C NC (N/A) CONCENTRICALLY BRACED FRAME JOINTS: All the diagonal braces shall frame into the beam-column joints concentrically. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.3.2.4)

DIAPHRAGMS

General

C (NC) N/A DIAPHRAGM CONTINUITY: The diaphragms shall not be composed of split-level floors and shall not have expansion joints. (Tier 2: Sec. 4.5.1.1)

(C) NC N/A CROSS TIES: There shall be continuous cross ties between diaphragm chords. (Tier 2: Sec. 4.5.1.2)

(C) NC N/A ROOF CHORD CONTINUITY: All chord elements shall be continuous, regardless of changes in roof elevation. (Tier 2: Sec. 4.5.1.3)

(C) NC N/A OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

C NC (N/A) OPENINGS AT BRACED FRAMES: Diaphragm openings immediately adjacent to the braced frames shall extend less than 25 percent of the frame length for Life Safety and 15 percent of the frame length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.5)

C NC (N/A) OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 feet long for Life Safety and 4 feet long for Immediate Occupancy. (Tier 2: Sec. 4.5.1.6)

C NC (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. (Tier 2: Sec. 4.5.1.7)

C NC (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. (Tier 2: Sec. 4.5.1.8)

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Wood Diaphragms

C NC N/A — 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. (Tier 2: Sec. 4.5.2.1)

C NC N/A — 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. (Tier 2: Sec. 4.5.2.2)

C NC 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. (Tier 2: Sec. 4.5.2.3)

Metal Deck Diaphragms N/A

C NC N/A — NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans of 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. (Tier 2: Sec. 4.5.3.1)

Other Diaphragms N/A

C NC N/A — OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 4.5.7.1)

CONNECTIONS

Anchorage For Normal Forces

C NC N/A — PRECAST PANEL CONNECTIONS: There shall be at least two anchors from each precast wall panel into the diaphragm elements for Life Safety and the anchors shall be able to develop the strength of the panels for Immediate Occupancy. (Tier 2: Sec. 4.6.1.3)

C NC N/A — STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements shall be installed taut and shall be stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 inch prior to engagement of the anchors. (Tier 2: Sec. 4.6.1.4)

Vertical Components

C NC N/A — 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. (Tier 2: Sec. 4.6.3.9)

C NC 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. (Tier 2: Sec. 4.6.3.10)

Interconnection Of Elements

C NC (N/A) GIRDERS: Girders supported by walls or pilasters shall have at least two ties securing the anchor bolts for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.6.4.2)

C NC (N/A) CORBEL BEARING: If the frame girders bear on column corbels, the length of bearing shall be greater than 3 inches for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.6.4.3)

C NC (N/A) CORBEL CONNECTIONS: The frame girders shall not be connected to corbels with welded elements. (Tier 2: Sec. 4.6.4.4)

C NC (N/A) BEAM, GIRDER, AND TRUSS SUPPORTS: Beams, girders, and trusses supported by unreinforced masonry walls or pilasters shall have independent secondary columns for support of vertical loads. (Tier 2: Sec. 4.6.4.5)

Panel Connections

C NC (N/A) ROOF PANEL CONNECTIONS: Roof panel connections shall be spaced at or less than 12 inches for Life Safety and 8 inches for Immediate Occupancy. (Tier 2: Sec. 4.6.5.3)

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3.8 Geologic Site Hazards and Foundations Checklist

This Geologic Site Hazards and Foundations Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Geologic Site Hazards

The following statements shall be completed for buildings in levels of high or moderate seismicity.

C (NC) N/A — 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. (Tier 2: Sec. 4.7.1.1)

C NC (N/A) — 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. (Tier 2: Sec. 4.7.1.2)

(C) NC N/A — SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)

Condition of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C (NC) N/A — 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. (Tier 2: Sec. 4.7.2.1)

The following statement shall be completed for buildings in levels of high or moderate seismicity being evaluated to the Immediate Occupancy Performance Level.

C NC (N/A) — 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. (Tier 2: Sec. 4.7.2.2)

Capacity of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC (N/A) — POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)

The following statements shall be completed for buildings in levels of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and for buildings in levels of high seismicity.

(C) NC 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 $0.6S_a$. (Tier 2: Sec. 4.7.3.2)

$(0.6)(0.96) = 0.576$

C (NC) 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. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)

C NC (N/A) DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)

C NC (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. (Tier 2: Sec. 4.7.3.5)

3.9.1 Basic Nonstructural Component Checklist

This Basic Nonstructural Component Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Partitions

C (NC) 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. (Tier 2: Sec. 4.8.1.1) URM clay tile in Boiler Rm.

Ceiling Systems

C (NC) 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.~~ (Tier 2: Sec. 4.8.2.1) Suspended CLG in basement Men's Rm NC. Suspended CLG in Main Floor Bathrooms Vert Wires Diag. Wires incidental

Light Fixtures

C (NC) N/A — EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake. (Tier 2: Sec. 4.8.3.1)

Cladding and Glazing

C NC (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.~~ (Tier 2: Sec. 4.8.4.1)

C NC (N/A) — DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.4.2)

C NC (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. (T~~ier 2: Sec. 4.8.4.3)

C NC (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.~~ (Tier 2: Sec. 4.8.4.4)

C NC (N/A) — BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel. (Tier 2: Sec. 4.8.4.5)

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C NC (N/A) INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)

C NC (N/A) PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane 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.~~ (Tier 2: Sec. 4.8.4.7)

Masonry Veneer

C NC (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. (Tier 2: Sec. 4.8.5.1)

C NC (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.~~ (Tier 2: Sec. 4.8.5.2)

C NC (N/A) WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)

C NC (N/A) DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)

Parapets, Cornices, Ornamentation, and Appendages

C NC (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.~~ (Tier 2: Sec. 4.8.8.1)

C (NC) 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.~~ (Tier 2: Sec. 4.8.8.2)

Exterior Balcony Anchors show signs of rust.

Masonry Chimneys

C NC (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.~~ (Tier 2: Sec. 4.8.9.1)

Stairs

C NC (N/A) URM WALLS: Walls around 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.~~ (Tier 2: Sec. 4.8.10.1)

C NC (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. (Tier 2: Sec. 4.8.10.2)

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Building Contents and Furnishing

C (NC) 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.~~ (Tier 2: Sec. 4.8.11.1)

Many tall narrow bookcases & displays not anchored.

Mechanical and Electrical Equipment

C NC (N/A) — EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)

C NC (N/A) — HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2)

C (NC) N/A — DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)

C (NC) N/A — 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. (Tier 2: Sec. 4.8.12.4)

Hung but not braced

Piping

C NC (N/A) — FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2: Sec. 4.8.13.1)

C (NC) N/A — FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2) Not found

Hazardous Materials Storage and Distribution

C NC (N/A) — TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)

Cleaning Supplies in Janitor's Rm.
Paint in Closet.

3.9.2 Intermediate Nonstructural Component Checklist

This Intermediate Nonstructural Component Checklist shall be completed where required by Table 3-2. The Basic Nonstructural Component Checklist shall be completed prior to completing this Intermediate Nonstructural Component Checklist.

Ceiling Systems

C NC (N/A) LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips. (Tier 2: Sec. 4.8.2.2)

C NC (N/A) 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 wires or rigid members attached to the structure above at a spacing equal to or less than 12 feet. (Tier 2: Sec. 4.8.2.3)

C NC (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. (Tier 2: Sec. 4.8.2.4)

Light Fixtures

(C) NC N/A 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. (Tier 2: Sec. 4.8.3.2)

Cladding and Glazing

C NC (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. (Tier 2: Sec. 4.8.4.8)

Parapets, Cornices, Ornamentation, and Appendages

(C) NC N/A CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement. (Tier 2: Sec. 4.8.8.3)

C (NC) 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. (Tier 2: Sec. 4.8.8.4)

Masonry Chimneys

C (NC) N/A ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof. (Tier 2: Sec. 4.8.9.2)

Mechanical and Electrical Equipment

C NC (N/A) VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers. (Tier 2: Sec. 4.8.12.5)

Ducts

C NC (N/A) STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints. (Tier 2: Sec. 4.8.14.1)

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APPENDIX D

PRELIMINARY GEOTECHNICAL ASSESSMENT LETTER

- Preliminary Geotechnical Assessment Letter dated March 30,2010
  Prepared by Bauldry Engineering Inc.

Bauldry Engineering, Inc.
CONSULTING GEOTECHNICAL ENGINEERS
718 SOQUEL AVENUE, SANTA CRUZ, CA 95062 (831) 457-1223 FAX (831) 457-1225

1014-SZ972-D63
March 30, 2010

County of Santa Cruz
c/o Streeter Group
2571 Main Street, Suite C
Soquel, CA 95073

Subject: Preliminary Geotechnical Assessment
The Veterans Memorial Building
846 Front Street
Santa Cruz, California

Dear Mr. Streeter,

The Veterans Memorial Building has been temporarily closed for potential safety reasons pending the outcome of the Structural Engineer's assessment. It is our understanding that the assessment is being performed in accordance with the guidelines outlined in ASCE-31, *Seismic Evaluation of Existing Buildings*, and ASCE-41, *Seismic Rehabilitation of Existing Buildings*.

Our geotechnical engineering services are being provided in a phased approach. The first phase, which consisted of a review of available geologic maps, a review of the geotechnical reports from nearby sites, a floor level survey and a hand augered exploratory boring to compare the soils and groundwater conditions encountered at the site with those mapped or depicted in the neighboring sites, has been completed. The findings and results of our Phase 1 geotechnical assessment are provided below.

LIQUEFACTION POTENTIAL

Liquefaction tends to occur typically in soils composed of loose sands and non-cohesive silts of restricted permeability. In order for liquefaction to occur there must be the proper soil type, soil saturation, and cyclic accelerations of sufficient magnitude to progressively increase the water pressures within the soil mass. Non-cohesive soil shear strength is developed by the point to point contact of the soil grains. As the water pressures increase in the void spaces surrounding the soil grains, the soil particles become supported more by the water than the point to point contact. When the water pressures increase sufficiently, the soil grains begin to lose contact with each other, resulting in the loss of shear strength and continuous deformation of the soil where the soil appears to liquefy.

The site has been mapped on the USGS "Map Showing Liquefaction Potential of Quaternary Deposits in Santa Cruz County" (Dupré 1989) as having a high potential for liquefaction.

The project site is mapped on the USGS Geologic Map of Santa Cruz County (Brabb 1989) as being underlain Alluvial Deposits (Qal; Holocene) typically consisting of unconsolidated heterogeneous moderately sorted silt and sand containing discontinuous lenses of clay and silty clay. Locally includes large amounts of gravel.

One hand augered exploratory boring was advanced in the courtyard off the north side of the Veterans Hall. The soils encountered consisted of approximately 40 inches of fill generally comprised of silty sand with gravel. The native soil encountered beneath the fill consisted of fine to coarse grained sand with scattered gravel and only a trace of silt and clay fines. The gravels were rounded to subrounded and up to 4 inches in diameter. Groundwater was encountered at a depth of approximately 8 feet below the ground surface, which equates to approximately 4½ feet below the top of the basement slab floor. The boring was terminated at a depth of 8 feet due to caving of the cohesionless sands.

Results of Review of Soils Reports Prepared for Nearby Sites

Location	Soil Type	Reported Liquefaction Potential
Flat Iron Building 1538 Pacific Avenue	Alluvial Sand and Gravel	Little Likelihood(1)
1537 Pacific Avenue	Alluvial Sand and Gravel	Moderately High
St. George Hotel 833 Front Street	Alluvial Sand and Gravel	High
1405 Pacific Avenue	Alluvial Sand and Gravel	High

(1) Based on our review of the test borings presented in the 1996 Soils Report, it is our opinion that under current liquefaction assessment procedures the soils underlying the Flat Iron site may be classified as liquefiable.

Our initial screening analysis of this site including the nature of the subsurface soil, the location of the ground water table, the estimated ground accelerations and a review of the Soils Reports for neighboring projects leads to the conclusion that the liquefaction potential at the Veterans Memorial Building site is high. This initial conclusion could be verified and the potential effects of liquefaction could be assessed by a detailed subsurface investigation during Phase 2.

SEISMIC SHAKING AND CBC DESIGN PARAMETERS

The following peak ground accelerations (PGA) were obtained for the project site from the USGS Seismic Hazards Program online probabilistic assessment tool.

Probability of Exceedance	PGA
2% in 50 years	0.634g
5% in 50 years	0.504g
10% in 50 years	0.410g

The soil at the soil is a Type F soil. For Tier 1 evaluation purposes we are providing the following seismic design parameters for a Type E. soil.

2007 CBC Seismic Design Parameters for Tier 1 Purposes

Site Class	E – Soft Soil Profile	
Mapped Spectral Response Accelerations	S_S = 1.500g	(T = 0.2 sec.)
	S_1 = 0.600g	(T = 1.0 sec.)
Site Coefficients	F_a = 0.9	(T = 0.2 sec.)
	F_v = 2.4	(T = 1.0 sec.)
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameters	S_{MS} = 1.350g	(T = 0.2 sec.)
	S_{M1} = 1,440g	(T = 1.0 sec.)
Design Spectral Response Acceleration Parameters	S_{DS} = 0.900g	(T = 0.2 sec.)
	S_{D1} = 0.960g	(T = 1.0 sec.)

FLOOR LEVEL SURVEY

Our field work for the floor level survey has been completed. Our preliminary assessment of the data indicates that differential settlement has occurred throughout the building. The building in general appears to have settled towards the north. The greatest magnitude of settlement has occurred in the area of the elevator in the central section of the north side. The floor along central area of the northern perimeter is on the order of 2½ to 3 inches lower than floor along central area of the southern perimeter. The 2nd and 3rd floors have similar settlement towards the elevator in the central area of the northern perimeter.

LANDSLIDING

The project site and surrounding areas are essentially flat. There are no significant slopes in the vicinity of the site. Landsliding is not a hazard associated with the project site.

FOUNDATION UPGRADE

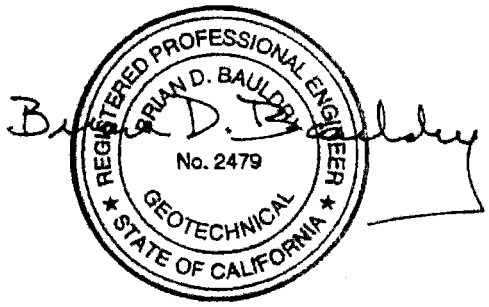
If a foundation upgrade is required to satisfy the Life and Safety level of performance, our preliminary thoughts are to tie the existing footings together with tie-beams to form a structurally integrated rigid grid. A rigid grid would help mitigate future differential settlement due to liquefaction.

Underpinning the existing foundation to a depth below the liquefaction soils would be difficult due to a high ground water table, caving soils and limited access. A detailed geotechnical investigation would be required to provide detailed underpinning design and construction recommendations, if required.

Other solutions such as ground modification could be feasible but may have limited application and would require a detailed subsurface investigation.
If you have any questions concerning the data, conclusions, or recommendations presented in this report, please call our office.

Very truly yours,

Bauldry Engineering, Inc.



Brian D. Bauldry
Principal Engineer
G. E. 2479
Exp. 12/31/10

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E-Copies: Streeter Group

APPENDIX E

MR. PAUL COX LETTER DATED MARCH 4, 2010 WITH COMMENTARY

Commentary Regarding Mr. Cox's Letter:

Mr. Cox's letter dated March 4, 2010 provided a description of the building, possible explanation as to the cause of deterioration, noted observed distress and recommended action for occupancy. We agree with some of Mr. Cox's opinions but have a difference in opinion with regards to what constitutes a dangerous condition and therefore whether the building should be occupied or not.

Mr. Cox explains the observed spalling concrete is a result of the concrete loosing its ability to protect the reinforcing steel over time due to the age of the building. We agree with this statement but do not rule out the possibility that some of the damage may have been the result of an earthquake. The observed location of some of the concrete distress coincides with where we would expect earthquake damage to occur. Earthquake induced cracks in the concrete could have provided a path for water intrusion into the concrete. We do not have any observed reports of the building after the Loma Preita earthquake but we do see evidence of previous attempts to patch damaged concrete.

Mr. Cox and we apparently disagree with what constitutes a dangerous condition. Mr. Cox points out the definition of dangerous terms such as "Imminent Treat" and "Distinct Hazard" and thinks they do not apply to this situation. In our opinion these definitions can be applied to the existing conditions such as the concrete columns supporting the stage addition which are structurally overstressed and distressed due to concrete damage. This condition does present a "Distinct Hazard" to the occupants of the building. It is an immediate danger should a seismic event occur.

Mr. Cox noted that we did not call for the building to be closed. The standard of care for professional engineers is to notify the building owner or local building official of the dangerous condition. We could have stated that the building should be closed but felt our letter clearly presented the danger of the building and stating that it be closed was not necessary.

We disagree with Mr. Cox that the building can be occupied during any evaluation or repair of the building. If the extent of the damage was minor and the building had a complete lateral load path system then possible one could accept some additional risk. But given the current condition of the building and given deficiencies in the lateral structural support system this building presents a dangerous condition.

Mr. Cox does state that the "building capacity should be carefully evaluated". He also states that "some level of seismic upgrade will likely be warranted". His statements are correct for we have identified several structural deficiencies in the lateral structural support of the building. Our findings further support our initial opinion of the building.

PAUL COX
890 Camelia Street
Berkeley, California 94710-1436
510-528-1975

Copy

March 4, 2010

Robert Patton, Commander
Veterans of Foreign Wars
Bill Motto Post 5888
846 Front Street
Santa Cruz, California 95060

Re: Santa Cruz Veterans Memorial Building

Dear Commander Patton,

This letter is to provide my observations and opinions on the condition of, and structural issues surrounding, the Santa Cruz Veterans Memorial Building that was suddenly closed by the County on January 21, 2010, due to County of Santa Cruz concerns over its structural safety. This letter is based on my site visit, my review of the January 21 letter by County staff, the January 18 letter by William Fisher Architecture, and the January 18 letter by the Streeter Group.

I am a California State licensed civil engineer and a 24-year member of the VFW Post 5888. I have 25 years experience across the United States specializing in investigation of existing buildings, including issues related to seismic loads, wind loads, overloads, fire, aging, historic preservation, repair design, and retrofit design.

On January 27, I visited the Santa Cruz Veterans Memorial Building at the request of VFW Post 5888, of which I am a member. I was escorted by Anthony Loero of Santa Cruz County General Services Department, William Fisher of William Fisher Architecture, Inc., and Hugh Zike of Streeter Group, Inc. These gentlemen graciously showed me around the building, pointed out the areas of concern and described their approach to the structural issues. Our inspection included the attic space over the auditorium, the roof, the auditorium, and the exterior walls on both sides and the rear of the building. I briefly looked at the original 1930s-era building drawings Mr. Fisher had with him. We did not inspect the basement or the front portion of the building as it was represented to me that these areas do not exhibit any visible damage conditions.

Other than removing a few pieces of loose concrete from exterior pilasters, I did not remove finishes to expose underlying conditions or perform destructive or non-destructive tests. I have not performed a mathematical analysis of the building. Other than as mentioned above I have not had the opportunity to review existing drawings or other documents related to the building. I base my opinions on 25 years' experience investigating and designing repairs to—and mitigations of—existing structures of all types, including many building of similar vintage and condition to the Veterans Building. The above caveats notwithstanding, I spent sufficient time at the building to form a firm and clear opinion as to its condition.

OBSERVATIONS

Building Description: All the building exterior walls and columns are steel-reinforced concrete, and it is likely that certain of the interior partitions are also. The floor, ceiling, and roof framing throughout the building are wood with heavy timber roof trusses and major beams. The building was constructed in the early

1930s except for the concrete stage structure at the back of the auditorium. Mr. Fisher believes the stage may have been added in the 1950s, but had not at the time of my visit found documentation to confirm it. The stage addition is about 15 feet deep. The original back wall of the auditorium was solid concrete, or nearly so, but about half the wall width has been removed to create the proscenium arch for the stage. The original concrete wall is intact above the proscenium arch, and is functionally now a deep beam, perhaps 8 feet tall. The nature of the reinforcement within this unintended beam is not known. The new back wall of the stage was erected over four short concrete columns. The nature of the stage's horizontal framing could not be determined during our visual survey. The auditorium sits over an equal-sized banquet room known as the bunker that is partially below grade. The side walls of the auditorium/bunker are concrete with windows. The four timber floor beams and four roof trusses that span the auditorium bear on four reinforced-concrete pilasters built into each side wall.

Roof Trusses: From our cursory inspection of the attic spaces, the heavy timber roof trusses and secondary lumber framing appear sound, with no indications of sag, decay, member splits, misalignment, or overloading damage. At least two of the trusses have steel brackets connecting the truss bearing points to the pilasters and side walls that appear to be retrofitted. We speculated that this work was installed at the time that trapeze anchors were installed on the trusses for the use by a community group in the auditorium. Messrs. Fisher and Zike had not identified any damage in the attic areas of the building.

County Observed Damage: As the letters from William Fisher Architecture and Streeter Group indicated, they have identified loose pieces of concrete on some of the eight pilasters along the north and south walls of the auditorium; loose concrete on some of the short columns under the back (west) wall of the stage; and corrosion to steel reinforcement under the loose concrete. They indicated that they had not found any other damage in the building that caused them concern, nor did I observe any other damage.

Spalling Concrete: I, too, observed loose concrete and corroded steel. Known as spalling, such loose concrete is not damage from overloading, or damage from seismic events, or poor quality concrete, or inadequate design, or poor construction. Instead, it is a deterioration process related simply to the age of the building and deferred maintenance.

The exposed concrete material itself appears to be in good condition; and it appears hard an properly colored, and the cracks split some of the aggregate, indicating that the cement paste and aggregate are sound.

Stirrups: Also in the pilasters, we observed some exposed horizontal steel stirrups that wrap around the vertical steel. These stirrups are open loops spaced about 24 inches apart in the areas we could see, and are typically 1/4-inch diameter smooth "pencil rods." One of these exposed rods has corroded through. I assume in his letter Mr. Streeter was referring to this rod that had "deteriorated completely in some locations."

Historic Building Code: Since the Santa Cruz Veterans Memorial Building is on the National Register of Historic Places, it is regulated by the 2007 California Historic Building Code, Part 8 of Title 24 (CHBC), for purposes of "preservation, restoration, rehabilitation…or reconstruction…" The intent of the CHBC is to "facilitate the preservation and continuing use of qualified historical buildings…" [my emphasis] Among other things, this code controls the terms under which this building can be declared hazardous. The CHBC defines terms pertinent to this discussion, as follows:

- "Life Safety Hazard: See Distinct Hazard"
- "Distinct Hazard: Any clear and evident condition that exists as an immediate danger to the safety of the occupants or public right of way. Conditions that do no meet the requirements of current regular codes and ordinances *do not*, of themselves, constitute a distinct hazard." [italics in original]

- "Imminent Threat: Any condition within or affecting a qualified historical building or property which, in the opinion of the authority having jurisdiction, would qualify a building or property as dangerous to the extent that the life, health, property or safety of the public, its occupants or those performing necessary repair, stabilization or shoring work are in immediate peril due to conditions affecting the building or property. Potential hazards to persons using, or improvements within, the right-of-way may not be construed to be "imminent threats" solely for that reason if the hazard can be mitigated by shoring, stabilization, barricades, or temporary fences."

In addition, Section 8-102.5 Unsafe buildings or Properties states, "When a qualified historical building…is determined to be unsafe as defined in the regular code, the requirements of the CHBC are applicable to the work necessary to correct the unsafe conditions. Work to remediate the buildings…need only address the correction of the unsafe conditions, and it shall not be required to bring the entire qualified historical building…into compliance with regular code."

For vertical loads, the CHBC structural section requires that, "The capacity of the structure to resist gravity loads shall be evaluated and the structure strengthened as necessary. The evaluation shall include all parts of the load path. Where no distress is evident, and a complete load path is present, the structure may be assumed adequate by having withstood the test of time…"

For seismic loads, the CHBC requires that the structure's ability to resist wind and seismic loads be evaluated, and that unsafe conditions in the lateral-load-resisting system be corrected to meet certain minimum strengths.

DISCUSSION

Spalling Mechanism: New concrete is extremely alkaline, and where concrete surrounds the reinforcing steel, the steel will be protected from corrosion. However, as reinforced concrete buildings age, there are gradual changes to the chemistry of the cement paste that have no effect on the concrete material strength but do reduce its alkalinity—eventually to the point that it no longer protects the steel. If oxygen and moisture are present, steel can then begin to corrode. When steel corrodes, the rust products swell to about six times the volume of the original steel. Concrete is strong in compression, but it is very weak in tension; so the internal tension forces from corrosion swelling soon overcome the concrete's tensile strength and cause it to crack (spall). This deterioration process accelerates after the concrete has cracked because it provides a channel for even more water and oxygen to reach the steel.

Eventually, chunks of concrete can be dislodged and fall from the building, exposing the underlying corroded steel. While this is a disturbing sight—and the public must be protected from falling debris—spalling is not, in itself, an indication that the building has become unsafe. It requires very little corrosion on the surface of steel reinforcement to blow off the overlying concrete. Typically the remaining cross-sectional area—and load-bearing capacity—of large bars is not significantly compromised simply because they have corroded enough to crack the concrete cover. My observation of the exposed vertical steel bars in the pilasters and columns at the Veterans Building is consistent with my past experience in that regard: the bars have destroyed the concrete cover in a few areas, but the bars themselves do not appear to have lost significant cross-sectional area. The very limited quantity of the obvious damage supports that contention. That is, by the time some of the bars have corroded enough to become compromised, the extent of the corrosion is normally exhibited over large areas, not just small corner spalls such as those present on the Veterans Building.

Additionally, when the strength of a reinforced column or beam is analyzed by engineers, the concrete cover to the outboard side of the reinforcement is neglected in the tension region. Thus, for the critical tension case,

the cover does not count structurally. The function of the concrete cover is to protect the steel from the weather, which is a serviceability issue, not a structural one.

The four columns and beams supporting the back wall of the stage are in the same condition as the pilasters: they have superficial spalling of the concrete cover due to corrosion of the underlying steel. Despite Mr. Fisher's assertion, there is no reason to replace any of the columns or beams.

It should be noted that if the concrete has is not cracked, there can be little corrosion of the underlying steel. Thus, in the areas of the building that are away from the existing spalls and are not cracked, the steel is likely to be in good condition.

Stirrups: Obviously, a small-diameter steel rod will corrode through much more quickly than a large-diameter one. However, to say that the complete corrosion of a small rod on a column is a significant structural matter is a significant overstatement. While modern ductile reinforced concrete design in seismic zones requires columns to have careful detailing and closely-spaced continuous-spiral stirrups, the need for such detailing was not understood when this building was designed. At that time, the sole purpose of an occasional loop of pencil rod was to hold the vertical steel in alignment within the forms until the concrete could be placed. Once the concrete was cured, the pencil rods were not expected to have any function whatsoever; and, in fact, because of their wide spacing, small diameter, discontinuity, and inability to provide confinement for the concrete, they contribute nothing to the serviceability, strength, or ductility of an in-service column. Thus, if one or a few of these rods are corroded through, it will have no influence whatsoever on the behavior of the column during the cyclic loads imposed by an earthquake.

Building Code Requirements: Mr. Streeter described "significant cracking" and "significant risk of injury or death...should a seismic event occur, " but he did not call for the building to be closed. Mr. Fisher called the pilaster damage "extremely significant," described "extreme danger" for the public if an earthquake occurs, and called for the auditorium to be closed. While neither Mr. Fisher nor Mr. Streeter used any of the three CHBC hazard terms listed above in their letters, they clearly intended to raise the alarm as to the seismic capacity of the building, but they did not identify an "imminent threat...due to conditions affecting the building." That is, they did not indicate that they thought the building could collapse under its own weight or normal live loads. As described above, it is my opinion that, while there is minor spalling at the pilasters, this does not constitute distress due to loading, nor does it affect gravity load-carrying capacity.

As for the seismic capacity, it is clear from its age, its design, and its condition that the building does not meet current code requirements for seismic capacity. For any building professional to suggest that it be investigated and upgraded is simply prudence. But, as defined by the CHBC, "distinct hazard" cannot exist merely because the building does not meet current regular codes. Similarly, "imminent threat" cannot exist if the hazard "can be mitigated by...stabilization [or] barricades."

Unoccupied Building Costs: As a practical matter, the County should keep in mind that uninhabited buildings often experience accelerated deterioration through a variety of mechanisms. Undetected leaks, vandalism, maintenance neglect, stagnant plumbing, rusted mechanical systems, condensation and mildew in unheated spaces, varmints, and other insults can result in much higher costs when the time comes to reoccupy a facility.

CONCLUSIONS

Instead of characterizing the observed damage to the steel and spalling concrete as "extremely significant," as Mr. Fisher did in his letter, I would characterize it as insignificant structurally, but a significant maintenance

issue that could—if left unrepaired—become significant structurally in years to come. Similarly, instead of indicating that the "deterioration observed presents a significant risk of injury or death to the occupants of the auditorium should a seismic event occur," as Mr. Streeter did in his letter, I would characterized the observed deterioration as an indication that the County should immediately move to protect the public from falling concrete by preventing people from leaning against the pilasters—which has already been accomplished by the judicious application of yellow tape. The observed deterioration itself in no other way presents significant risk. The building likely has seismic deficiencies; but these deficiencies are completely unrelated to the spalling, and the County should not conflate the two issues.

For existing vertical loads on the structure, it is my opinion that the observed damage to the concrete pilasters, walls, and columns is not significant, and in no way justifies closure of the building. In addition, the California Historic Building Code forbids its closure because neither a distinct hazard nor an imminent threat exist.

For potential seismic loads on the structure, I concur that the building capacity should be carefully evaluated. Given the archaic nature of the existing construction, some level of seismic upgrade will likely be warranted, but is not mandated by any code requirements. However, the mere existence of seismic-response deficiencies does not constitute a distinct hazard or an imminent threat as defined by the CHBC, because these deficiencies represent only potential hazards. While it may be necessary to empty the building during the construction of a seismic retrofit, it is my opinion that there is no justification for its closure based on the current condition of the building, nor will it be necessary to close the building during the evaluation or retrofit design phases.

Lastly, due diligence requires the County to let a contract on a non-emergency basis to repair the spalling concrete as part of a maintenance program—an easy, effective, and essentially permanent repair if properly conceived and installed. Again, this can be accomplished without closing the building.

I hope this letter has helped to clarify for you the condition of the Veterans' Building, and assists you in getting it reopened immediately.

Sincerely,

Paul Cox, C.E. 45152

attachment 2

PAUL COX
890 Camelia Street
Berkeley, California 94710-1436
510-528-1975

COPY

March 4, 2010

Robert Patton, Commander
Veterans of Foreign Wars
Bill Motto Post 5888
846 Front Street
Santa Cruz, California 95060

Re: Santa Cruz Veterans Memorial Building

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DISCUSSION

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Eventually, chunks of concrete can be dislodged and fall from the building, exposing the underlying corroded steel. While this is a disturbing sight—and the public must be protected from falling debris—spalling is not, in itself, an indication that the building has become unsafe. It requires very little corrosion on the surface of steel reinforcement to blow off the overlying concrete. Typically the remaining cross-sectional area—and load-bearing capacity—of large bars is not significantly compromised simply because they have corroded enough to crack the concrete cover. My observation of the exposed vertical steel bars in the pilasters and columns at the Veterans Building is consistent with my past experience in that regard: the bars have destroyed the concrete cover in a few areas, but the bars themselves do not appear to have lost significant cross-sectional area. The very limited quantity of the obvious damage supports that contention. That is, by the time some of the bars have corroded enough to become compromised, the extent of the corrosion is normally exhibited over large areas, not just small corner spalls such as those present on the Veterans Building.

Additionally, when the strength of a reinforced column or beam is analyzed by engineers, the concrete cover to the outboard side of the reinforcement is neglected in the tension region. Thus, for the critical tension case,

the cover does not count structurally. The function of the concrete cover is to protect the steel from the weather, which is a serviceability issue, not a structural one.

The four columns and beams supporting the back wall of the stage are in the same condition as the pilasters: they have superficial spalling of the concrete cover due to corrosion of the underlying steel. Despite Mr. Fisher's assertion, there is no reason to replace any of the columns or beams.

It should be noted that if the concrete has is not cracked, there can be little corrosion of the underlying steel. Thus, in the areas of the building that are away from the existing spalls and are not cracked, the steel is likely to be in good condition.

Stirrups: Obviously, a small-diameter steel rod will corrode through much more quickly than a large-diameter one. However, to say that the complete corrosion of a small rod on a column is a significant structural matter is a significant overstatement. While modern ductile reinforced concrete design in seismic zones requires columns to have careful detailing and closely-spaced continuous-spiral stirrups, the need for such detailing was not understood when this building was designed. At that time, the sole purpose of an occasional loop of pencil rod was to hold the vertical steel in alignment within the forms until the concrete could be placed. Once the concrete was cured, the pencil rods were not expected to have any function whatsoever; and, in fact, because of their wide spacing, small diameter, discontinuity, and inability to provide confinement for the concrete, they contribute nothing to the serviceability, strength, or ductility of an in-service column. Thus, if one or a few of these rods are corroded through, it will have no influence whatsoever on the behavior of the column during the cyclic loads imposed by an earthquake.

Building Code Requirements: Mr. Streeter described "significant cracking" and "significant risk of injury or death...should a seismic event occur, " but he did not call for the building to be closed. Mr. Fisher called the pilaster damage "extremely significant," described "extreme danger" for the public if an earthquake occurs, and called for the auditorium to be closed. While neither Mr. Fisher nor Mr. Streeter used any of the three CHBC hazard terms listed above in their letters, they clearly intended to raise the alarm as to the seismic capacity of the building, but they did not identify an "imminent threat...due to conditions affecting the building." That is, they did not indicate that they thought the building could collapse under its own weight or normal live loads. As described above, it is my opinion that, while there is minor spalling at the pilasters, this does not constitute distress due to loading, nor does it affect gravity load-carrying capacity.

As for the seismic capacity, it is clear from its age, its design, and its condition that the building does not meet current code requirements for seismic capacity. For any building professional to suggest that it be investigated and upgraded is simply prudence. But, as defined by the CHBC, "distinct hazard" cannot exist merely because the building does not meet current regular codes. Similarly, "imminent threat" cannot exist if the hazard "can be mitigated by...stabilization [or] barricades."

Unoccupied Building Costs: As a practical matter, the County should keep in mind that uninhabited buildings often experience accelerated deterioration through a variety of mechanisms. Undetected leaks, vandalism, maintenance neglect, stagnant plumbing, rusted mechanical systems, condensation and mildew in unheated spaces, varmints, and other insults can result in much higher costs when the time comes to reoccupy a facility.

CONCLUSIONS

Instead of characterizing the observed damage to the steel and spalling concrete as "extremely significant," as Mr. Fisher did in his letter, I would characterize it as insignificant structurally, but a significant maintenance

issue that could—if left unrepaired—become significant structurally in years to come. Similarly, instead of indicating that the "deterioration observed presents a significant risk of injury or death to the occupants of the auditorium should a seismic event occur," as Mr. Streeter did in his letter, I would characterized the observed deterioration as an indication that the County should immediately move to protect the public from falling concrete by preventing people from leaning against the pilasters—which has already been accomplished by the judicious application of yellow tape. The observed deterioration itself in no other way presents significant risk. The building likely has seismic deficiencies; but these deficiencies are completely unrelated to the spalling, and the County should not conflate the two issues.

For existing vertical loads on the structure, it is my opinion that the observed damage to the concrete pilasters, walls, and columns is not significant, and in no way justifies closure of the building. In addition, the California Historic Building Code forbids its closure because neither a distinct hazard nor an imminent threat exist.

For potential seismic loads on the structure, I concur that the building capacity should be carefully evaluated. Given the archaic nature of the existing construction, some level of seismic upgrade will likely be warranted, but is not mandated by any code requirements. However, the mere existence of seismic-response deficiencies does not constitute a distinct hazard or an imminent threat as defined by the CHBC, because these deficiencies represent only potential hazards. While it may be necessary to empty the building during the construction of a seismic retrofit, it is my opinion that there is no justification for its closure based on the current condition of the building, nor will it be necessary to close the building during the evaluation or retrofit design phases.

Lastly, due diligence requires the County to let a contract on a non-emergency basis to repair the spalling concrete as part of a maintenance program—an easy, effective, and essentially permanent repair if properly conceived and installed. Again, this can be accomplished without closing the building.

I hope this letter has helped to clarify for you the condition of the Veterans' Building, and assists you in getting it reopened immediately.

Sincerely,

Paul Cox, C.E. 45152

THE AMERICAN LEGION
DISTRICT 28
SANTA CRUZ POST # 64
POST OFFICE BOX 418
SANTA CRUZ, CA. 95061

28 March 2010

To: Board of Supervisor
Santa Cruz County

From: Edwill A. Butler, Commander
The American Legion, District 28, Santa Cruz Post #64
Post Office Box 418
Santa Cruz, CA 95061

Subject: Memorial Building

Approximately two months ago you folks closed the Veterans Building on Front Street with very, very short notice! I know that you folks are very busy but really, that was atrocious. Quite frankly, as my grandmother would say, "Something is rotten in Denmark!" I found out about this in the Santa Cruz Sentinel. The paper stated that you closed it because it is not earthquake safe. The American Legion Post 64 of Santa Cruz have not in the past nor present and in the future intend to vacate the Memorial building which is a representation of the sacrifice we Veterans have made so that among other ideas and goals, you people can be Supervisors and represent all the people of the County of Santa Cruz.

Respectfully submitted,

Edwill A. Butler, Commander
The American Legion
District 28
Santa Cruz Post 64

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APPENDIX B

2010 CALIFORNIA HISTORICAL BUILDING CODE

California Code of Regulations
Title 24, Part 8

California Building Standards Commission

Effective Date: January 1, 2011
(For Errata and Supplements, see History Note Appendix)

2010 California Historical Building Code
California Code of Regulations, Title 24, Part 8

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PREFACE

This document is the 8th of 12 parts of the official triennial compilation and publication of the adoptions, amendments and repeal of administrative regulations to *California Code of Regulations, Title 24,* also referred to as the *California Building Standards Code*. This part is known as the *California Historical Building Code*.

The *California Building Standards Code* is published in its entirety every three years by order of the California legislature, with supplements published in intervening years. The California legislature delegated authority to various state agencies, boards, commissions and departments to create building regulations to implement the State's statutes. These building regulations, or standards, have the same force of law, and take effect 180 days after their publication unless otherwise stipulated. The *California Building Standards Code* applies to occupancies in the State of California as annotated.

A city, county, or city and county may establish more restrictive building standards reasonably necessary because of local climatic, geological or topographical conditions. Findings of the local condition(s) and the adopted local building standard(s) must be filed with the California Building Standards Commission to become effective and may not be effective sooner than the effective date of this edition of the *California Building Standards Code*. Local building standards that were adopted and applicable to previous editions of the *California Building Standards Code* do not apply to this edition without appropriate adoption and the required filing.

Should you find publication (e.g., typographical) errors or inconsistencies in this code or wish to offer comments toward improving its format, please address your comments to:

California Building Standards Commission
2525 Natomas Park Drive, Suite 130
Sacramento, CA 95833–2936

Phone: (916) 263–0916
Fax: (916) 263–0959

Web Page: www.bsc.ca.gov

For questions on California state agency amendments, please refer to the contact list on page vii.

PART 8 CONTAINS ALTERNATIVE REGULATIONS FOR QUALIFIED HISTORICAL BUILDINGS

The *California Historical Building Code* (CHBC) is unique among state regulations. The authoring of the original CHBC required state agencies promulgating regulations for building construction to work in harmony with representatives of other design and construction disciplines. The result was a totally new approach to building codes for historical structures, which maintains currently acceptable life–safety standards.

These regulations are also unique in that they are performance oriented rather than prescriptive. The provisions of the CHBC are to be applied by the enforcing authority of every city, county, city and county, or state agency in permitting repairs, alterations and additions necessary for the preservation, rehabilitation, relocation, related construction, change of use or continued use of a qualified historical building.

The authority for use of the CHBC is vested in Sections 18950 through 18961 of the Health and Safety Code. Section 18954 states, "The building department of every city or county shall apply the provisions of alternative building standards and building regulations adopted by the CHBC Board pursuant to Section 18959.5 in permitting repairs, alterations and additions necessary for the preservation, restoration, rehabilitation, moving or continued use of an historical building or structure. A state agency shall apply the alternative building regulations adopted by the CHBC Board pursuant to Section 18959.5 in permitting repairs, alterations and additions necessary for the preservation, restoration, rehabilitation, moving or continued use of an historical building or structure."

However, be aware that in order to use the CHBC, the structure under consideration must be qualified by being designated as an historical building or structure. Section 18955 states, "For the purposes of this part, a qualified historical building or structure is any structure or collection of structures, and their associated sites deemed of importance to the history, architecture or culture of an area by an appropriate local or state governmental jurisdiction. This shall include structures on existing or future national, state or local historical registers or official inventories, such as the National Register of Historic Places, State Historical Landmarks, State Points of Historical Interest, and city or county registers or inventories of historical or architecturally significant sites, places, historic districts or landmarks."

The regulations of the CHBC have the same authority as state law and are to be considered as such. Liability is the same as for prevailing law.

The intent of the CHBC is to save California's architectural heritage by recognizing the unique construction problems inherent in historical buildings and by providing a code to deal with these problems.

HISTORICAL PREFACE

The background of the *California Historical Building Code* can be traced to December 1973, when the State Department of Parks and Recreation published the California History Plan, Volume I, in which Recommendation No. 11 was proposed by the then California Landmarks Advisory Committee (later to become The State Historical Resources Commission). This proposal expressed a need for a new building code to meet the intent of protecting the public health and safety and also retain "enough flexibility to allow restoration of a Historic feature while still retaining its Historic integrity." No. 11 of this History Plan supported this need by stating that ". . . restoration . . . is frequently made difficult by unnecessarily rigid interpretation of building . . . codes."

In March of 1974, the Landmarks Committee by resolution recommended that the Director of the State Department of Parks and Recreation and the State Architect initiate a study to develop this needed code. These two officials accepted this concept and jointly called a statewide meeting in Sacramento on May 14th of that year. Attending were representatives from both the public and private sectors, such as members of the building industry, design professions, local and state building officials, and others interested in this problem.

Out of this open conference, a steering committee was formed to explore in depth the ways and means of implementing the new historical building code concept. This ad hoc committee was chaired by a representative from the California Council, American Institute of Architects and composed of a comprehensive cross section of the professional organizations and government agencies concerned with design and code enforcement.

Meetings began late in 1974 and continued into early 1975. By April of that year, a legislative subcommittee of the ad hoc group drafted a sample bill for the proposed code and requested that it be carried by Senator James R. Mills, President Pro Tempore of the Senate. After further development and refinement, the enacting legislation to create the authority for the code and an advisory board to prepare regulations to implement it (SB 927, Mills) was supported by both the legislature and the public. It was signed by the governor in September 1975, and became effective January 1, 1976.

The members of the advisory board, which were required by law to include local and state building officials, individuals from the building industry and design professions, as well as representatives from city and county governments, were appointed and held their first session in Sacramento, February 24, 1976. This Board's duties included the preparation of code regulations and the review of specific historic building cases, when officially requested by governing bodies.

Several of the Board's members were a part of the original ad hoc steering committee and thus provided a continuity and smooth transition from the inception of the code's philosophy to its pragmatic implementation in these performance–oriented regulations.

The first comprehensive regulations were codified in August and October 1979, after years of careful deliberation. Those regulations allowed all jurisdictions to utilize them at their discretion in replacing or modifying details of prevailing prescriptive codes.

Changes made in law in 1984 and 1991, and to the code, make the application of the *California Historical Building Code* statutes and regulations applicable for all agencies and at the discretion of the owner for local jurisdictions when dealing with qualified historical buildings.

These current performance regulations were adopted by the Board on June 23, 1998, and approved by the California Building Standards Commission on January 29, 2007.

CALIFORNIA CODE OF REGULATIONS, TITLE 24

California Agency Information Contact List

California Energy Commission

Energy Hotline. . . . . (800) 772-3300
. . . . . or (916) 654-5106
Building Efficiency Standards
Appliance Efficiency Standards
Compliance Manual/Forms

California State Lands Commission

Marine Oil Terminals . . . . . (562) 499-6317

California State Library

Resources and Information . . . . . (916) 654-0261
Government Publication Section. . . . . (916) 654-0069

Corrections Standards Authority

Local Adult Jail Standards . . . . . (916) 324-1914
Local Juvenile Facility Standards . . . . . (916) 324-1914

Department of Consumer Affairs – Acupuncture Board

Office Standards . . . . . (916) 445-3021

Department of Consumer Affairs – Board of Pharmacy

Pharmacy Standards . . . . . (916) 574-7900

Department of Consumer Affairs – Bureau of Barbering And Cosmetology

Barber and Beauty Shop and
College Standards . . . . . (916) 574-7570
. . . . . (800) 952-5210

Department of Consumer Affairs – Bureau of Home Furnishings and Thermal Insulation

Insulation Testing Standards . . . . . (916) 574-2041

Department of Consumer Affairs – Structural Pest Control Board

Structural Standards . . . . . (800) 737-8188
. . . . . (916) 561-8708

Department of Consumer Affairs – Veterinary Medical Board

Veterinary Hospital Standard . . . . . (916) 263-2610

Department of Food and Agriculture

Meat and Poultry Packing Plant
Standards. . . . . (916) 654-1447
Dairy Standards. . . . . (916) 654-1447

Department of Public Health

Organized Camps Standards. . . . . (916) 449-5661
Public Swimming Pools Standards . . . . . (916) 449-5693
Asbestos Standards . . . . . (510) 620-2874

Department of Housing and Community Development

Residential – Hotels, Motels, Apartments,
Single-Family Dwellings . . . . . (916) 445-9471
Permanent Structures in Mobilehome and
Special Occupancy Parks. . . . . (916) 445-9471
Factory-Built Housing, Manufactured
Housing and Commercial Modular . . . . . (916) 445-3338
Mobilehomes – Permits and Inspections
Northern Region. . . . . (916) 225-2501
Southern Region. . . . . (951) 782-4420
Employee Housing Standards . . . . . (916) 445-9471

Department of Water Resources

Gray Water Installations Standards . . . . . (916) 651-9667

Division of the State Architect – Access Compliance

Access Compliance Standards. . . . . (916) 445-8100

Division of the State Architect – Structural Safety

Public Schools Standards . . . . . (916) 445-8100
Essential Services Building Standards . . . . . (916) 445-8100
Community College Standards . . . . . (916) 445-8100

Division of the State Architect – State Historical Building Safety Board

Alternative Building Standards . . . . . (916) 445-8100

Office of Statewide Health Planning and Development

Hospital Standards . . . . . (916) 440-8409
Skilled Nursing Facility Standards . . . . . (916) 440-8409
Clinic Standards . . . . . (916) 440-8409
Permits. . . . . (916) 440-8409

Office of the State Fire Marshal

Code Development and Analysis . . . . . (916) 445-8200
Fire Safety Standards. . . . . (916) 445-8200
Fireplace Standards . . . . . (916) 445-8200
Day-Care Centers Standards. . . . . (916) 445-8200
Exit Standards . . . . . (916) 445-8200

HOW TO DETERMINE WHERE CHANGES HAVE BEEN MADE

Symbols in the margins indicate where changes have been made or language has been deleted.

| This symbol indicates that a change has been made.

> This symbol indicates deletion of language.

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CHAPTER 8-1
ADMINISTRATION

Note: The *California Historical Building Code*, Part 8 of Title 24, governs for all qualified historical buildings or properties in the State of California.

SECTION 8-101
TITLE, PURPOSE AND INTENT

8-101.1 Title. These regulations shall be known as the *California Historical Building Code* and will be referred to herein as "the CHBC."

8-101.2 Purpose. The purpose of the CHBC is to provide regulations for the preservation, restoration, rehabilitation, relocation or reconstruction of buildings or properties designated as qualified historical buildings or properties (Chapter 8-2). The CHBC is intended to provide solutions for the preservation of qualified historical buildings or properties, to promote sustainability, to provide access for persons with disabilities, to provide a cost-effective approach to preservation, and to provide for the reasonable safety of the occupants or users. The CHBC requires enforcing agencies to accept solutions that are reasonably equivalent to the regular code (as defined in Chapter 8-2) when dealing with qualified historical buildings or properties.

8-101.3 Intent. The intent of the CHBC is to facilitate the preservation and continuing use of qualified historical buildings or properties while providing reasonable safety for the building occupants and access for persons with disabilities.

SECTION 8-102
APPLICATION

8-102.1 Application. The CHBC is applicable to all issues regarding code compliance for qualified historical buildings or properties. The CHBC may be used in conjunction with the regular code to provide solutions to facilitate the preservation of qualified historical buildings or properties. The CHBC shall be used by any agency with jurisdiction and whenever compliance with the code is required for qualified historical buildings or properties.

1. The state or local enforcing agency shall apply the provisions of the CHBC in permitting repairs, alterations and additions necessary for the preservation, restoration, reconstruction, rehabilitation, relocation or continued use of a qualified historical building or property when so elected by the private property owner.
2. **State agencies.** All state agencies shall apply the provisions of the CHBC in permitting repairs, alterations and additions necessary for the preservation, restoration, rehabilitation, safety, relocation, reconstruction or continued use of qualified historical buildings or properties.

8-102.1.1 Additions, alterations and repairs. It is the intent of the CHBC to allow nonhistorical expansion or addition to a qualified historical building or property, provided nonhistorical additions shall conform to the requirements of the regular code. See Chapter 8-2.

8-102.1.2 Relocation. Relocated qualified historical buildings or properties shall be sited to comply with the regular code or with the solutions listed in the CHBC. Nonhistorical new construction related to relocation shall comply with the regular code. Reconstruction and restoration related to relocation is permitted to comply with the provisions in the CHBC.

8-102.1.3 Change of occupancy. For change of use or occupancy, see Chapter 8-3, Use and Occupancy.

8-102.1.4 Continued use. Qualified historical buildings or properties may have their existing use or occupancy continued if such use or occupancy conformed to the code or to the standards of construction in effect at the time of construction, and such use or occupancty does not constitute a distinct hazard to life safety as defined in the CHBC.

8-102.1.5 Unsafe buildings or properties. When a qualified historical building or property is determined to be unsafe as defined in the regular code, the requirements of the CHBC are applicable to the work necessary to correct the unsafe conditions. Work to remediate the buildings or properties need only address the correction of the unsafe conditions, and it shall not be required to bring the entire qualified historical building or property into compliance with regular code.

8-102.1.6 Additional work. Qualified historical buildings or properties shall not be subject to additional work required by the regular code, regulation or ordinance beyond that required to complete the work undertaken. Certain exceptions for accessibility and for distinct hazards exist by mandate and may require specific action, within the parameters of the CHBC.

SECTION 8-103
ORGANIZATION AND ENFORCEMENT

8-103.1 Authority. The state or local enforcing agency, pursuant to authority provided under Section 18954 of the Health and Safety Code, shall administer and enforce the provisions of the CHBC in permitting repairs, alterations and additions necessary for the preservation, restoration, reconstruction, rehabilitation, relocation or continued use of a qualified historical building or property.

8-103.2 State enforcement. All state agencies pursuant to authority provided under Section 18954 and Section 18961 of the Health and Safety Code shall administer and enforce the CHBC with respect to qualified historical buildings or properties under their respective jurisdiction.

8-103.3 Liability. Prevailing law regarding immunity of building officials is unaffected by the use and enforcement of the CHBC.

SECTION 8-104
REVIEW AND APPEALS

8-104.1 State Historical Building Safety Board (SHBSB). In order to provide for interpretation of the provisions of the CHBC and to hear appeals, the SHBSB shall act as an appeal and review body to state and local agencies or any affected party.

8-104.2 SHBSB review. When a proposed design, material or method of construction is being considered by the enforcing agency, the agency chief, the building official or the local board of appeals may file a written request for opinion to the SHBSB for its consideration, advice or findings. In considering such request, the SHBSB may seek the advice of other appropriate private or public boards, individuals, or state or local agencies. The SHBSB shall, after considering all of the facts presented, including any recommendation of other appropriate boards, agencies or other parties, determine if, for the purpose intended, the proposal is reasonably equivalent to that allowed by these regulations in proposed design, material or method of construction, and it shall transmit such findings and its decision to the enforcing agency for its application. The Board may recover the costs of such reviews and shall report the decision in printed form, copied to the California Building Standards Commission.

8-104.2.1 State agencies. All state agencies with ownership of, or that act on behalf of state agency owners of, qualified historical buildings or properties, shall consult and obtain SHBSB review prior to taking action or making decisions or appeals that affect qualified historical buildings or properties, per Section 18961 of the Health and Safety Code.

8-104.2.2 Imminent threat. Where an emergency is declared and a qualified historical building or property is declared an imminent threat to life and safety, the state agency assessing such a threat shall consult with the SHBSB before any demolition is undertaken, per Section 18961 of the Health and Safety Code.

8-104.3 SHBC appeals. If any local agency administering and enforcing the CHBC or any person adversely affected by any regulation, rule, omission, interpretation, decision or practice of the agency enforcing the CHBC wishes to appeal the issue for resolution to the SHBSB, either of these parties may appeal directly to the Board. The Board may accept the appeal only if it determines that issues involved are of statewide significance. The Board may recover the costs of such reviews and shall make available copies of decisions in printed form at cost, copied to the California Building Standards Commission.

8-104.4 Local agency fees. Local agencies, when actively involved in the appeal, may also charge affected persons reasonable fees not to exceed the cost of obtaining reviews and appeals from the Board.

SECTION 8-105
CONSTRUCTION METHODS AND MATERIALS

8-105.1 Repairs. Repairs to any portion of a qualified historical building or property may be made in-kind with historical materials and the use of original or existing historical methods of construction, subject to conditions of the CHBC. (See Chapter 8-8.)

8-105.2 Solutions to the *California Historical Building Code*. Solutions provided in the CHBC, or any other acceptable regulation or methodology of design or construction and used in whole or in part, with the regular code, or with any combination of the regular code and the CHBC, shall be allowed. The CHBC does not preclude the use of any proposed alternative or method of design or construction not specifically prescribed or otherwise allowed by these regulations. Any alternative may be submitted for evaluation to the appropriate enforcing agency for review and acceptance. The enforcing agency may request that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding such solutions. Any alternative offered in lieu of that prescribed or allowed in the CHBC shall be reasonably equivalent in quality, strength, effectiveness, durability and safety to that of the CHBC.

SECTION 8-106
SHBSB RULINGS

8-106.1 General. Rulings of the SHBSB (i.e., formal appeals, case decisions, code interpretations and administrative resolutions, etc.) that are issues of statewide application are required to be submitted to the California Building Standards Commission in printed form. These rulings may be used to provide guidance for similar cases or issues.

CHAPTER 8-2
DEFINITIONS

SECTION 8-201
DEFINITIONS

For the purpose of the CHBC, certain terms and phrases, words and their derivatives shall be construed as specified in this chapter. Additional definitions and/or terms may appear in the various other chapters relative to terms or phrases primarily applicable thereto. Any reference to "authority having jurisdiction" does not necessarily preclude the appellate process of Section 8-104.3.

ADDITION. A nonhistorical extension or increase in floor area or height of a building or property.

ALTERATION. A modification to a qualified historical building or property that affects the usability of the building or property, or part thereof. Alterations include, but are not limited to, remodeling, renovation, rehabilitation, reconstruction, historical restoration, changes or rearrangement of the structural parts or elements, and changes or rearrangements in the plan configuration of walls and full-height partitions.

BUILDING STANDARD. Any guideline, regulation or code that may be applied to a qualified historical building or property.

CHARACTER-DEFINING FEATURE. Those visual aspects and physical elements that comprise the appearance of a historical building or property, and that are significant to its historical, architectural and cultural values, including the overall shape of the historical building or property, its materials, craftsmanship, decorative details, interior spaces and features, as well as the various aspects of its site and environment.

CULTURAL RESOURCE. Building, site, property, object or district evaluated as having significance in prehistory or history.

DISTINCT HAZARD. Any clear and evident condition that exists as an immediate danger to the safety of the occupants or public right of way. Conditions that do not meet the requirements of current regular codes and ordinances do *not,* of themselves, constitute a distinct hazard. Section 8-104.3, SHBC appeals, remains applicable.

ENFORCING AGENCY, Authority Having Jurisdiction, Local Agency with Jurisdiction. An entity with the responsibility for regulating, enforcing, reviewing or otherwise that exerts control of or administration over the process of gaining permits, approvals, decisions, variances, appeals for qualified historical buildings or properties.

EXIT LADDER DEVICE. An exit ladder device is a permanently installed, fixed, folding, retractable or hinged ladder intended for use as a means of emergency egress from areas of the second or third stories. Unless approved specifically for a longer length, the ladder shall be limited to 25 feet (7620 mm) in length. Exit ladders are permitted where the area served by the ladder has an occupant load less than 10 persons.

FIRE HAZARD. Any condition which increases or may contribute to an increase in the hazard or menace of fire to a greater degree than customarily recognized by the authority having jurisdiction, or any condition or act which could obstruct, delay, hinder or interfere with the operations of firefighting personnel or the egress of occupants in the event of fire. Section 8-104.3, SHBC appeals, remains applicable.

HISTORICAL FABRIC OR MATERIALS. Original and later-added historically significant construction materials, architectural finishes or elements in a particular pattern or configuration which form a qualified historical property, as determined by the authority having jurisdiction.

HISTORICAL SIGNIFICANCE. Importance for which a property has been evaluated and found to be historical, as determined by the authority having jurisdiction.

IMMINENT THREAT. Any condition within or affecting a qualified historical building or property which, in the opinion of the authority having jurisdiction, would qualify a building or property as dangerous to the extent that the life, health, property or safety of the public, its occupants or those performing necessary repair, stabilization or shoring work are in immediate peril due to conditions affecting the building or property. Potential hazards to persons using, or improvements within, the right-of-way may not be construed to be "imminent threats" solely for that reason if the hazard can be mitigated by shoring, stabilization, barricades or temporary fences.

INTEGRITY. Authenticity of a building or property's historical identity, evidenced by the survival of physical characteristics that existed during the property's historical or prehistorical period of significance.

LIFE-SAFETY EVALUATION. An evaluation of the life-safety hazards of a qualified historical building or property based on procedures similar to those contained in NFPA 909, *Standard for the Protection of Cultural Resources, Appendix B, Fire Risk Assessment in Heritage Premises.*

LIFE SAFETY HAZARD. See Distinct Hazard.

PERIOD OF SIGNIFICANCE. The period of time when a qualified historical building or property was associated with important events, activities or persons, or attained the characteristics for its listing or registration.

PRESERVATION. The act or process of applying measures necessary to sustain the existing form, integrity and materials of a qualified historical building or property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-related work to make properties functional is appropriate within a preservation project.

QUALIFIED HISTORICAL BUILDING OR PROPERTY. As defined in Health and Safety Code Section 18955 as "Qualified Historical Building or Property." Any building, site, object, place, location, district or collection of structures, and their associated sites, deemed of importance to the history, architecture or culture of an area by an appropriate local, state or federal governmental jurisdiction. This shall include historical buildings or properties on, or determined eligible for, national, state or local historical registers or inventories, such as the National Register of Historic Places, California Register of Historical Resources, State Historical Landmarks, State Points of Historical Interest, and city or county registers, inventories or surveys of historical or architecturally significant sites, places or landmarks.

RECONSTRUCTION. The act or process of depicting, by means of new construction, the form, features and detailing of a nonsurviving site, landscape, building, property or object for the purpose of replicating its appearance at a specific period of time.

REGULAR CODE. The adopted regulations that govern the design and construction or alteration of nonhistorical buildings and properties within the jurisdiction of the enforcing agency.

REHABILITATION. The act or process of making possible a compatible use for qualified historical building or property through repair, alterations and additions while preserving those portions or features which convey its qualified historical, cultural or architectural values.

RELOCATION. The act or process of moving any qualified historical building or property or a portion of a qualified historical building or property to a new site, or a different location on the same site.

REPAIR. Renewal, reconstruction or renovation of any portion of an existing property, site or building for the purpose of its continued use.

RESTORATION. The act or process of accurately depicting the form, features and character of a qualified building or property as it appeared at a particular period of time by the means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

STRUCTURE. That which is built or constructed, an edifice or a building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

TREATMENT. An act of work to carry out preservation, restoration, stabilization, rehabilitation or reconstruction.

CHAPTER 8-3
USE AND OCCUPANCY

SECTION 8-301
PURPOSE AND SCOPE

8-301.1 Purpose. The purpose of the CHBC is to provide regulations for the determination of occupancy classifications and conditions of use for qualified historical buildings or properties.

8-301.2 Scope. Every qualified historical building or property for which a permit or approval has been requested shall be classified prior to permit issuance according to its use or the character of its occupancy in accordance with the regular code and applicable provisions of this chapter.

SECTION 8-302
GENERAL

8-302.1 Existing use. The use or character of occupancy of a qualified historical building or property, or portion thereof, shall be permitted to continue in use regardless of any period of time in which it may have remained unoccupied or in other uses, provided such building or property otherwise conforms to all applicable requirements of the CHBC.

8-302.2 Change in occupancy. The use or character of the occupancy of a qualified historical building or property may be changed from or returned to its historical use or character, provided the qualified historical building or property conforms to the requirements applicable to the new use or character of occupancy as set forth in the CHBC. Such change in occupancy shall not mandate conformance with new construction requirements as set forth in regular code.

8-302.3 Occupancy separations. Required occupancy separations of more than one hour may be reduced to one-hour fire-resistive construction with all openings protected by not less than three-fourths-hour fire-resistive assemblies of the self-closing or automatic-closing type when the building is provided with an automatic sprinkler system throughout the entire building in accordance with Section 8-410.4. Doors equipped with automatic-closing devices shall be of a type which will function upon activation of a device which responds to products of combustion other than heat.

Required occupancy separations of one hour may be omitted when the building is provided with an automatic sprinkler system throughout.

8-302.4 Maximum floor area. Regardless of the use or character of occupancy, the area of a one-story qualified historical building or property may have, but shall not exceed, a floor area of 15,000 square feet (1393.5 m^2) unless such an increase is otherwise permitted in regular code. Multistory qualified historical buildings (including basements and cellars) shall be in accordance with regular code requirements.

Exception: Historical buildings may be unlimited in floor area without fire-resistive area separation walls:

1. When provided with an automatic sprinkler, or
2. Residential occupancies of two stories or less when provided with a complete fire alarm and annunciation system and where the exiting system conforms to regular code.

8-302.5 Maximum height. The maximum height and number of stories of a qualified historical building or property shall not be limited because of construction type, provided such height or number of stories does not exceed that of its historical design.

8-302.5.1 High-rise buildings. Occupancies B, F-1, F-2 or S in high-rise buildings with floors located more than 75 feet above the lowest floor level having building access may be permitted with only the stories over 75 feet provided with an automatic fire sprinkler system if:

1. The building construction type and the exits conform to regular code, and
2. A complete building fire alarm and annunciation system is installed, and
3. A fire barrier is provided between the sprinklered and nonsprinklered floors.

8-302.6 Fire-resistive construction. See Chapter 8-4.

8-302.7 Light and ventilation. Existing provisions for light and ventilation which do not, in the opinion of the enforcing agency, constitute a safety hazard may remain. See Section 8-303.6 for residential requirements. See Section 8-503 for Escape or Rescue Windows and Doors.

SECTION 8-303
RESIDENTIAL OCCUPANCIES

8-303.1 Purpose. The purpose of this section is to provide regulations for those buildings designated as qualified historical buildings or properties and classified as occupancies. The CHBC requires enforcing agencies to accept any reasonably equivalent to the regular code when dealing with qualified historical buildings and properties.

8-303.2 Intent. The intent of the CHBC is to preserve the integrity of qualified historical buildings and properties while maintaining a reasonable degree of protection of life, health and safety for the occupants.

8-303.3 Application and scope. The provisions of this section shall apply to all qualified historical buildings used for human habitation. Those dwelling units intended only for display, or public use with no residential use involved, need not comply with the requirements of this section.

8-303.4 Fire escapes. See Chapter 8-5.

8-303.5 Room dimensions. Rooms used for sleeping purposes may contain a minimum of 50 square feet (4.6 m^2) floor area, provided there is maintained an average ceiling height of 7 feet (2134 mm). Other habitable rooms need only be of adequate size to be functional for the purpose intended.

8-303.6 Light and ventilation. Windows in habitable rooms shall have an area of 6 percent of the floor area, or 6 square feet (0.56 m^2), whichever is greater. Windows in sleeping rooms shall be openable (see Section 8-503). Residential occupancies need not be provided with electrical lighting.

8-303.7 Alteration and repair. The alteration and repair of qualified historical buildings or properties may permit the replacement, retention and extension of original materials and the continued use of original methods of construction, provided a life-safety hazard is not created or continued. Alterations and repairs shall be consistent with the CHBC.

The amount of alterations and repairs is not limited, provided there is no nonhistorical increase in floor area, volume or size of the building or property.

8-303.8 Exiting. See Chapter 8-5.

CHAPTER 8-4
FIRE PROTECTION

SECTION 8-401
PURPOSE, INTENT AND SCOPE

8-401.1 Purpose. The purpose of this chapter is to provide for fire protection of qualified historical buildings or properties. The CHBC requires enforcing agencies to accept any reasonably equivalent to the regular code when dealing with qualified historical buildings or properties.

8-401.2 Intent. The intent of the CHBC is to preserve the integrity of qualified historical buildings or properties while maintaining a reasonable degree of fire protection based primarily on the life safety of the occupants and firefighting personnel.

8-401.3 Scope. This chapter shall apply when required by the provisions of Section 8-102.

SECTION 8-402
FIRE-RESISTIVE CONSTRUCTION

8-402.1 Exterior wall construction. The fire-resistance requirement for existing exterior walls and existing opening protection may be satisfied when an automatic sprinkler system designed for exposure protection is installed per the CHBC. The automatic sprinklers may be installed on the exterior with at least one sprinkler located over each opening required to be protected. Additional sprinklers shall also be distributed along combustible walls under the roof lines that do not meet the fire-resistive requirement due to relationship to property lines as required by regular code. Such sprinkler systems may be connected to the domestic water supply on the supply-main side of the building shut-off valve. A shut-off valve may be installed for the sprinkler system, provided it is locked in an open position.

8-402.2 One-hour construction. Upgrading an existing qualified historical building or property to one-hour fire-resistive construction and one-hour fire-resistive corridors shall not be required regardless of construction or occupancy when one of the following is provided:

1. An automatic sprinkler system throughout. See Section 8-410.2 for automatic sprinkler systems.
2. An approved life-safety evaluation.
3. Other alternative measures as approved by the enforcing agency.

8-402.3 Openings in fire-rated systems. Historical glazing materials and solid wood unrated doors in interior walls required to have one-hour fire rating may be approved when operable windows and doors are provided with appropriate smoke seals and when the area affected is provided with an automatic sprinkler system. See Section 8-410 for automatic sprinkler systems.

SECTION 8-403
INTERIOR FINISH MATERIALS

New nonhistorical interior wall and ceiling finish shall conform to the provisions of the regular code. Existing nonconforming materials used for wood lath and plaster walls, see Section 8-404.

Exception: When an automatic sprinkler system is provided throughout the building, existing finishes shall be approved.

SECTION 8-404
WOOD LATH AND PLASTER

Wood lath and plaster walls may be considered in accordance with codes, standards and listings published prior to 1943 whereby a wood stud wall assembly with gypsum or lime plaster on hand split or sawn wooden lath obtains a one-half-hour fire-resistive rating. This rating may be increased for interior walls to as much as one hour by filling the wall with mineral fiber or glass fiber.

SECTION 8-405
OCCUPANCY SEPARATION

See Chapter 8-3.

SECTION 8-406
MAXIMUM FLOOR AREA

See Chapter 8-3.

SECTION 8-407
VERTICAL SHAFTS

Vertical shafts need not be enclosed when such shafts are blocked at every floor level by the installation of not less than 2 full inches (51 mm) of solid wood or equivalent construction installed so as to prevent the initial passage of smoke and flame. Automatic sprinkler systems or other solutions may be considered on a case-by-case basis, in lieu of enclosure of vertical shafts and stairwells.

SECTION 8-408
ROOF COVERING

Existing or original roofing materials may be repaired or reconstructed subject to the following requirements:

1. The original or historical roofing system shall be detailed or modified as necessary in order to be capable of providing shelter while preserving the historical materials and appearance of the roof.
2. Wooden roof materials may be utilized where fire resistance is required, provided they are treated with

fire-retardant treatments to achieve a Class "B" roof covering rating. Wood roofing in state designated Urban Wildland and High Fire Zones shall be permitted when installed in class "A" assemblies.

3. Jurisdictions that prohibit wood roofing materials for application as roof coverings and roof assemblies shall submit documentation for the adoption. Express Terms, statement of reasons and minutes of the action by the adopting authority Health and Safety Code, Section 18959(f).

SECTION 8-409
FIRE ALARM SYSTEMS

Every qualified historical building or property shall be provided with fire alarm systems as required for the use or occupancy by the regular code or other approved alternative.

SECTION 8-410
AUTOMATIC SPRINKLER SYSTEMS

8-410.1 Every qualified historical building or property which cannot be made to conform to the construction requirements specified in the regular code for the occupancy or use, and which constitutes a distinct fire hazard (for definition of "distinct hazard," see Chapter 8-2), shall be deemed to be in compliance if provided with an automatic sprinkler system or a life-safety system or other technologies as approved by the enforcing agency. ("Automatic" is defined in the regular code. Sprinkler System is defined in this section.)

8-410.2 When required by the CHBC, an automatic sprinkler systems is defined by the following standards (for nonhazardous occupancies).

1. Buildings of four stories or less: NFPA 13R, 2002 edition.
2. For floors above the fourth, NFPA 13, 2002, SFM amended edition.
3. Buildings with floors above 75 feet, NFPA 13, 2002 edition.
4. When the building is free standing or with property line separation, two floors and 1500 sf per floor or less, NFPA 13D, 2002 Edition.
5. For exterior wall and opening protection. As required by this section.

   Exception: When the automatic sprinkler systems are used to reach compliance using this code, in three or more occasions, the system shall be NFPA standard 13D shall be increased to NFPA 13R Standard, or NFPA 13R standard shall be increased to a NFPA 13 standard.

8-410.3 Automatic sprinkler systems shall not be used to substitute for or act as an alternate to the required number of exits from any facility. (See Chapter 8-5 for exiting requirements.)

8-410.4 An automatic sprinkler system shall be provided in all detention facilities.

SECTION 8-411
OTHER TECHNOLOGIES

Fire alarm systems, smoke and heat detection systems, occupant notification and annunciation systems, smoke control systems and fire modeling, times egress analysis and modeling, as well as other engineering methods and technologies may be accepted by the enforcing agency to address areas of nonconformance.

SECTION 8-412
HIGH-RISE BUILDINGS

Qualified historical buildings having floors for human occupancy located more than 75 feet above the lowest floor level having building access shall conform to the provisions of the regular code for existing high-rise buildings as amended by the CHBC.

CHAPTER 8-5
MEANS OF EGRESS

SECTION 8-501
PURPOSE, INTENT AND SCOPE

8-501.1 Purpose. The purpose of this chapter is to establish minimum means of egress regulations for qualified historical buildings or properties. The CHBC requires enforcing agencies to accept reasonably equivalent alternatives to the means of egress requirements in the regular code.

8-501.2 Intent. The intent of these regulations is to provide an adequate means of egress.

8-501.3 Scope. Every qualified historical building or portion thereof shall be provided with exits as required by the CHBC when required by the provisions of Section 8-102.

SECTION 8-502
GENERAL

8-502.1 General. The enforcing agency shall grant reasonable exceptions to the specific provisions of applicable egress regulations where such exceptions will not adversely affect life safety.

8-502.2. Existing door openings and corridor widths of less than dimensions required by regular code shall be permitted where there is sufficient width and height for the occupants to pass through the opening or traverse the exit.

8-502.3 Stairs. Existing stairs having risers and treads or width at variance with the regular code are allowed if determined by the enforcing agency to not constitute a distinct hazard. Handrails with nonconforming grip size or extensions are allowed if determined by the enforcing agency to not constitute a distinct hazard.

8-502.4 Main entry doors. The front or main entry doors need not be rehung to swing in the direction of exit travel, provided other means or conditions of exiting, as necessary to serve the total occupant load, are provided.

8-502.5 Existing fire escapes. Existing previously approved fire escapes and fire escape ladders shall be acceptable as one of the required means of egress, provided they extend to the ground and are easily negotiated, adequately signed and in good working order. Access shall be by an opening having a minimum width of 29 inches (737mm) when open with a sill no more than 30 inches (762mm) above the adjacent floor, landing or approved step.

8-502.6 New fire escapes and fire escape ladders. New fire escapes and fire escape ladders which comply with this section shall be acceptable as one of the required means of egress. New fire escapes and new fire escape ladders shall comply with the following:

1. Access from a corridor shall not be through an intervening room.
2. All openings within 10 feet (3048 mm) shall be protected by three-fourths-hour fire assemblies. When located within a recess or vestibule, adjacent enclosure walls shall be of not less than one-hour fire-resistive construction.
3. Egress from the building shall be by a clear opening having a minimum dimension of not less than 29 inches (737 mm). Such openings shall be openable from the inside without the use of a key or special knowledge or effort. The sill of an opening giving access shall not be more than 30 inches (737 mm) above the floor, step or landing of the building or balcony.
4. Fire escape stairways and balconies shall support the dead load plus a live load of not less than 100 pounds per square foot (4.79 kN/m^2) and shall be provided with a top and intermediate handrail on each side. The pitch of the stairway shall not exceed 72 degrees with a minimum width of 18 inches (457 mm). Treads shall not be less than 4 inches (102 mm) in width, and the rise between treads shall not exceed 10 inches (254 mm). All stair and balcony railings shall support a horizontal force of not less than 50 pounds per lineal foot (729.5 N/m^2) of railing.
5. Balconies shall not be less than 44 inches (1118 mm) in width with no floor opening other than the stairway opening greater than $^5/_8$ inch (15.9 mm) in width. Stairway openings in such balconies shall not be less than 22 inches by 44 inches (559 by 1118 mm). The balustrade of each balcony shall not be less than 36 inches (914 mm) high with not more than 9 inches (287 mm) between balusters.
6. Fire escapes shall extend to the roof or provide an approved gooseneck ladder between the top floor landing and the roof when serving buildings four or more stories in height having roofs with less than 4 units vertical in 12 units horizontal (33.3 percent slope). Fire escape ladders shall be designed and connected to the building to withstand a horizontal force of 100 pounds (445 N) placed anywhere on the rung. All ladders shall be at least 15 inches (381 mm) wide, located within 12 inches (305 mm) of the building. Ladder rungs shall be $^3/_4$ inch (19.1 mm) in diameter and shall be located 12 inches (305 mm) on center. Openings for roof access ladders through cornices and similar projections shall have minimum dimensions of 30 inches by 33 inches (762 by 838 mm).

   The length of fire escapes and exit ladder devices shall be limited to that approved by the building official based on products listed by a recognized testing laboratory.
7. The lowest balcony shall not be more than 18 feet (5486 mm) from the ground. Fire escapes shall extend to the ground or be provided with counterbalanced stairs reaching to the ground.

8. Fire escapes shall not take the place of stairways required by the codes under which the building was constructed.
9. Fire escapes shall be kept clear and unobstructed at all times and maintained in good working order.

SECTION 8-503
ESCAPE OR RESCUE WINDOWS AND DOORS

Basements in dwelling units and every sleeping room below the fourth floor shall have at least one openable window or door approved for emergency escape which shall open directly into a public street, public way, yard or exit court. Escape or rescue windows or doors shall have a minimum clear area of 3.3 square feet (0.31 m^2) and a minimum width or height dimension of 18 inches (457 mm) and be operable from the inside to provide a full, clear opening without the use of special tools.

SECTION 8-504
RAILINGS AND GUARDRAILS

The height of railings and guard railings and the spacing of balusters may continue in their historical height and spacing unless a distinct hazard has been identified or created by a change in use or occupancy.

CHAPTER 8-6
ACCESSIBILITY

SECTION 8-601
PURPOSE, INTENT AND SCOPE

8-601.1 Purpose. The purpose of the CHBC is to provide alternative regulations to facilitate access and use by persons with disabilities to and throughout facilities designated as qualified historical buildings or properties. These regulations require enforcing agencies to accept alternatives to regular code when dealing with qualified historical buildings or properties.

8-601.2 Intent. The intent of this chapter is to preserve the integrity of qualified historical buildings and properties while providing access to and use by persons with disabilities.

8-601.3 Scope. The CHBC shall apply to every qualified historical building or property that is required to provide access to persons with disabilities.

1. Provisions of this chapter do not apply to new construction or reconstruction/replicas of historical buildings.
2. Where provisions of this chapter apply to alteration of qualified historical buildings or properties, alteration is defined in *California Building Code* (CBC), Chapter 2, Definitions and Abbreviations. 202 – A. Alter or Alteration.

8-601.4 General application. The provisions in the CHBC apply to local, state and federal governments (Title II entities); alteration of commercial facilities and places of public accommodation (Title III entities); and barrier removal in commercial facilities and places of public accommodation (Title III entities). Except as noted in this chapter.

SECTION 8-602
BASIC PROVISIONS

8-602.1 Regular code. The regular code for access for people with disabilities (Title 24, Part 2, Vol. 1, Chapter 11B) shall be applied to qualified historical buildings or properties unless strict compliance with the regular code will threaten or destroy the historical significance or character-defining features of the building or property.

8-602.2 Alternative provisions. If the historical significance or character-defining features are threatened, alternative provisions for access may be applied pursuant to this chapter, provided the following conditions are met:

1. These provisions shall be applied only on an item-by-item or a case-by-case basis.
2. Documentation is provided, including meeting minutes or letters, stating the reasons for the application of the alternative provisions. Such documentation shall be retained in the permanent file of the enforcing agency.

SECTION 8-603
ALTERNATIVES

8-603.1 Alternative minimum standards. The alternative minimum standards for alterations of qualified historical buildings or facilities are contained in Section 4.1.7(3) of ADA Standards for Accessible Design, as incorporated and set forth in federal regulation 28 C.F.R. Pt. 36.

8-603.2 Entry. These alternatives do not allow exceptions for the requirement of level landings in front of doors, except as provided in Section 8-603.4.

1. Access to any entrance used by the general public and no further than 200 feet (60 960 mm) from the primary entrance.
2. Access at any entrance not used by the general public but open and unlocked with directional signs at the primary entrance and as close as possible to, but no further than 200 feet (60 960 mm) from, the primary entrance.
3. The accessible entrance shall have a notification system. Where security is a problem, remote monitoring may be used.

8-603.3 Doors. Alternatives listed in order of priority are:

1. Single-leaf door which provides a minimum 30 inches (762 mm) of clear opening.
2. Single-leaf door which provides a minimum $29^{1}/_{2}$ inches (749 mm) clear opening
3. Double door, one leaf of which provides a minimum $29^{1}/_{2}$ inches (749 mm) clear opening.
4. Double doors operable with a power-assist device to provide a minimum $29^{1}/_{2}$ inches (749 mm) clear opening when both doors are in the open position.

8-603.4 Power-assisted doors. Power-assisted door or doors may be considered an equivalent alternative to level landings, strikeside clearance and door-opening forces required by the regular code.

8-603.5 Toilet rooms. In lieu of separate-gender toilet facilities as required in the regular code, an accessible unisex toilet facility may be designated.

8-603.6 Exterior and interior ramps and lifts. Alternatives listed in order of priority are:

1. A lift or a ramp of greater than standard slope but no greater than 1:10, for horizontal distances not to exceed 5 feet (1525 mm). Signs shall be posted at upper and lower levels to indicate steepness of the slope.
2. Access by ramps of 1:6 slope for horizontal distance not to exceed 13 inches (330 mm). Signs shall be posted at upper and lower levels to indicate steepness of the slope.

SECTION 8-604
EQUIVALENT FACILITATION

Use of other designs and technologies, or deviation from particular technical and scoping requirements, are permitted if the application of the alternative provisions contained in Section 8-603 would threaten or destroy the historical significance or character-defining features of the historical building or property.

1. Such alternatives shall be applied only on an item-by-item or a case-by-case basis.
2. Access provided by experiences, services, functions, materials and resources through methods including, but not limited to, maps, plans, videos, virtual reality and related equipment, at accessible levels. The alternative design and/or technologies used will provide substantially equivalent or greater accessibility to, and usability of, the facility.
3. The official charged with the enforcement of the standards shall document the reasons for the application of the design and/or technologies and their effect on the historical significance or character-defining features. Such documentation shall be in accordance with Section 8-602.2, Item 2, and shall include the opinion and comments of state or local accessibility officials, and the opinion and comments of representative local groups of people with disabilities. Such documentation shall be retained in the permanent file of the enforcing agency. Copies of the required documentation should be available at the facility upon request.

   Note: For commercial facilities and places of public accommodation (Title III entities).

Equivalent facilitation for an element of a building or property when applied as a waiver of an ADA accessibility requirement will not be entitled to the Federal Department of Justice certification of this code as rebuttable evidence of compliance for that element.

CHAPTER 8-7
STRUCTURAL REGULATIONS

SECTION 8-701
PURPOSE, INTENT AND SCOPE

8-701.1 Purpose. The purpose of the CHBC is to provide alternative regulations for the structural safety of buildings designated as qualified historical buildings or properties. The CHBC requires enforcing agencies to accept any reasonably equivalent alternatives to the regular code when dealing with qualified historical buildings or properties.

8-701.2 Intent. The intent of the CHBC is to encourage the preservation of qualified historical buildings or properties while providing a reasonable level of structural safety for occupants and the public at large through the application of the CHBC.

8-701.3 Application. The alternative structural regulations provided by Section 8-705 are to be applied in conjunction with the regular code whenever a structural upgrade or reconstruction is undertaken for qualified historical buildings or properties.

SECTION 8-702
GENERAL

8-702.1 The CHBC shall not be construed to allow the enforcing agency to approve or permit a lower level of safety of structural design and construction than that which is reasonably equivalent to the regular code provisions in occupancies which are critical to the safety and welfare of the public at large, including, but not limited to, public and private schools, hospitals, municipal police and fire stations and essential services facilities.

8-702.2 Nothing in these regulations shall prevent voluntary and partial seismic upgrades when it is demonstrated that such upgrades will improve life safety and when a full upgrade would not otherwise be required.

SECTION 8-703
STRUCTURAL SURVEY

8-703.1 Scope. When a structure or portion of a structure is to be evaluated for structural capacity under the CHBC, it shall be surveyed for structural conditions by an architect or engineer knowledgeable in historical structures. The survey shall evaluate deterioration or signs of distress. The survey shall determine the details of the structural framing and the system for resistance of gravity and lateral loads. Details, reinforcement and anchorage of structural systems and veneers shall be determined and documented where these members are relied on for seismic resistance.

8-703.2 The results of the survey shall be utilized for evaluating the structural capacity and for designing modifications to the structural system to reach compliance with this code.

8-703.3 Historical records. Past historical records of the structure or similar structures may be used in the evaluation, including the effects of subsequent alterations.

SECTION 8-704
NONHISTORICAL ADDITIONS AND NONHISTORICAL ALTERATIONS

8-704.1 New nonhistorical additions and nonhistorical alterations which are structurally separated from an existing historical structure shall comply with regular code requirements.

8-704.2 New nonhistorical additions which impose vertical or lateral loads on an existing structure shall not be permitted unless the affected part of the supporting structure is evaluated and strengthened, if necessary, to meet regular code requirements.

Note: For use of archaic materials, see Chapter 8-8.

SECTION 8-705
STRUCTURAL REGULATIONS

8-705.1 Gravity loads. The capacity of the structure to resist gravity loads shall be evaluated and the structure strengthened as necessary. The evaluation shall include all parts of the load path. Where no distress is evident, and a complete load path is present, the structure may be assumed adequate by having withstood the test of time if anticipated dead and live loads will not exceed those historically present.

8-705.2 Wind and seismic loads. The ability of the structure to resist wind and seismic loads shall be evaluated. The evaluation shall be based on the requirements of Section 8-706.

8.705.2.1 Any unsafe conditions in the lateral-load-resisting system shall be corrected, or alternative resistance shall be provided. Additional resistance shall be provided to meet the minimum requirements of this code.

8.705.2.2 The architect or engineer shall consider additional measures with minimal loss of, and impact to, historical materials which will reduce damage and needed repairs in future earthquakes to better preserve the historical structure in perpetuity. These additional measures shall be presented to the owner for consideration as part of the rehabilitation or restoration.

SECTION 8-706
LATERAL LOAD REGULATIONS

8-706.1 Lateral loads. The forces used to evaluate the structure for resistance to wind and seismic loads need not exceed 0.75 times the seismic forces prescribed by the 1995 edition of the *California Building Code* (CBC). The seismic forces may be computed based on the *Rw* values tabulated in the regular code for similar lateral-force-resisting systems. All deviations

of the detailing provisions of the lateral-force-resisting systems shall be evaluated for stability and the ability to maintain load-carrying capacity at increased lateral loads.

Unreinforced masonry bearing wall buildings shall comply with Appendix Chapter 1 of the *Uniform Code for Building Conservation*™ (UCBC™), 1994 edition, and as modified by this code. Reasonably equivalent standards may be used on a case-by-case basis when approved by the authority having jurisdiction.

8-706.2 Existing building performance. The seismic resistance may be based upon the ultimate capacity of the structure to perform, giving due consideration to ductility and reserve strength of the lateral-force-resisting system and materials while maintaining a reasonable factor of safety. Broad judgment may be exercised regarding the strength and performance of materials not recognized by regular code requirements. (See Chapter 8-8, Archaic Materials and Methods of Construction.)

8-706.2.1 All structural materials or members that do not comply with detailing and proportioning requirements of the regular code shall be evaluated for potential seismic performance and the consequence of noncompliance. All members which might fail and lead to possible collapse, or threaten life safety, when subjected to seismic demands in excess of those prescribed in Section 8-706.1, shall be judged unacceptable, and appropriate structural strengthening shall be developed. Anchorages for veneers and decorative ornamentation shall be included in this evaluation.

8-706.3 Load path. A complete and continuous load path, including connections, from every part or portion of the structure to the ground shall be provided for the required forces. It shall be verified that the structure is adequately tied together to perform as a unit when subjected to earthquake forces.

8-706.4 Parapets. Parapets and exterior decoration shall be investigated for conformance with regular code requirements for anchorage and ability to resist prescribed seismic forces.

An exception to regular code requirements shall be permitted for those parapets and decorations which are judged not to be a hazard to life safety.

8-706.5 Nonstructural features. Nonstructural features of historical structure, such as exterior veneer, cornices and decorations, which might fall and create a life-safety hazard in an earthquake, shall be investigated. Their ability to resist seismic forces shall be verified, or the feature shall be strengthened.

8-706.5.1 Partitions and ceilings of corridors and stairways serving an occupant load of 30 or more shall be investigated to determine their ability to remain in place when the building is subjected to earthquake forces.

CHAPTER 8-8
ARCHAIC MATERIALS AND METHODS OF CONSTRUCTION

SECTION 8-801
PURPOSE, INTENT AND SCOPE

8-801.1 Purpose. The purpose of the CHBC is to provide regulations for the use of historical methods and materials of construction that are at variance with regular code requirements or are not otherwise codified, in buildings or structures designated as qualified historical buildings or properties. The CHBC require enforcing agencies to accept any reasonably equivalent alternatives to the regular code when dealing with qualified historical buildings or properties.

8-801.2 Intent. It is the intent of the CHBC to provide for the use of historical methods and materials of construction that are at variance with specific code requirements or are not otherwise codified.

8-801.3 Scope. Any construction type or material that is, or was, part of the historical fabric of a structure is covered by this chapter. Archaic materials and methods of construction present in a historical structure may remain or be reinstalled or be installed with new materials of the same class to match existing conditions.

SECTION 8-802
GENERAL ENGINEERING APPROACHES

Allowable stresses or ultimate strengths for archaic materials shall be assigned based upon similar conventional codified materials, or on tests as hereinafter indicated. The archaic materials and methods of construction shall be thoroughly investigated for their details of construction in accordance with Section 8-703. Testing shall be performed when applicable to evaluate existing conditions. The architect or structural engineer in responsible charge of the project shall assign allowable stresses or ultimate strength values to archaic materials. Such assigned allowable stresses, or ultimate strength values, shall not be greater than those provided for in the following sections without adequate testing, and shall be subject to the concurrence of the enforcing agency.

SECTION 8-803
NONSTRUCTURAL ARCHAIC MATERIALS

Where nonstructural historical materials exist in uses which do not meet the requirements of the regular code, their continued use is allowed by this code, provided that any public health and life-safety hazards are mitigated subject to the concurrence of the enforcing agency.

SECTION 8-804
ALLOWABLE CONDITIONS FOR SPECIFIC MATERIALS

Archaic materials which exist and are to remain in historical structures shall be evaluated for their condition and for loads required by this code. The structural survey required in Section 8-703 of this code shall document existing conditions, reinforcement, anchorage, deterioration and other factors pertinent to establishing allowable stresses and adequacy of the archaic materials. The remaining portion of this chapter provides additional specific requirements for commonly encountered archaic materials.

SECTION 8-805
MASONRY

For adobe, see Section 8-806.

8-805.1 Existing solid masonry. Existing solid masonry walls of any type, except adobe, may be allowed, without testing, a maximum value of nine pounds per square inch (62.1 kPa) in shear where there is a qualifying statement by the architect or engineer that an inspection has been made, that mortar joints are filled and that both brick and mortar are reasonably good. The allowable shear stress above applies to unreinforced masonry, except adobe, where the maximum ratio of unsupported height or length to thickness does not exceed 12, and where minimum quality mortar is used or exists. Wall height or length is measured to supporting or resisting elements that are at least twice as stiff as the tributary wall. Stiffness is based on the gross section. Allowable shear stress may be increased by the addition of 10 percent of the axial direct stress due to the weight of the wall directly above. Higher-quality mortar may provide a greater shear value and shall be tested in accordance with UBC Standard 21-6.

8-805.2 Stone masonry.

8-805.2.1 Solid-backed stone masonry. Stone masonry solidly backed with brick masonry shall be treated as solid brick masonry as described in Section 8-805.1 and in the UCBC, provided representative testing and inspection verifies solid collar joints between stone and brick and that a reasonable number of stones lap with the brick wythes as headers or that steel anchors are present. Solid stone masonry where the wythes of stone effectively overlap to provide the equivalent header courses may also be treated as solid brick masonry.

8-805.2.2 Independent wythe stone masonry. Stone masonry with independent face wythes may be treated as solid brick masonry as described in Section 8-805.1 and the UCBC, provided representative testing and inspection verify that the core is essentially solid in the masonry wall and that steel ties are epoxied in drilled holes between outer stone wythes at floors, roof and not to exceed 4 feet (1219 mm) on center in each direction, between floors and roof.

8-805.2.3 Testing of stone masonry. Testing of stone masonry shall be similar to UBC Standard 21-6, except that representative stones which are not interlocked shall be

pulled outward from the wall and shear area appropriately calculated after the test.

8-805.3 Reconstructed walls. Totally reconstructed walls utilizing original brick or masonry, constructed similar to original, shall be constructed in accordance with the regular code. Repairs or infills may be constructed in a similar manner to the original walls without conforming to the regular code.

SECTION 8-806
ADOBE

8-806.1 General. Unburned clay masonry may be constructed, reconstructed, stabilized or rehabilitated subject to this chapter. Alternative approaches which provide an equivalent or greater level of safety may be used, subject to the concurrence of the enforcing agency.

8-806.2 Protection. Provisions shall be made to protect adobe structures from moisture and deterioration. The unreinforced adobe shall be maintained in reasonably good condition. Particular attention shall be given to moisture content of adobe walls. Unmaintained or unstabilized walls or ruins shall be evaluated for safety based on their condition and stability. Additional safety measures may be required subject to the concurrence of the enforcing agency.

8-806.3 Requirements. Unreinforced new or existing adobe walls shall meet the following requirements. Existing sod or rammed earth walls shall be considered similar to the extent these provisions apply. Where existing dimensions do not meet these conditions, additional strengthening measures may be required.

1. One-story adobe load-bearing walls shall not exceed a height-to-thickness ratio of 6.
2. Two-story adobe buildings or structures' height-to-thickness wall ratio shall not exceed 5 at the ground floor and 6 at the second floor, and shall be measured at floor-to-floor height when the second floor and attic ceiling/roof are connected to the wall as described below.
3. Nonload-bearing adobe partitions and gable end walls shall be evaluated for stability and anchored against out-of-plane failure.
4. A bond beam or equivalent structural element shall be provided at the top of all adobe walls, and for two-story buildings at the second floor. The size and configuration of the bond beam shall be designed in each case to meet the requirements of the existing conditions and provide an effective brace for the wall, to tie the building together and connect the wall to the floor or roof.

8-806.4 Repair or reconstruction. Repair or reconstruction of wall area may utilize unstabilized brick or adobe masonry designed to be compatible with the constituents of the existing adobe materials.

8-806.5 Shear values. Existing adobe may be allowed a maximum value of four pounds per square inch (27.6 kPa) for shear, with no increase for lateral forces.

8-806.6 Mortar. Mortar may be of the same soil composition as that used in the existing wall, or in new walls as necessary to be compatible with the adobe brick.

SECTION 8-807
WOOD

8-807.1 Existing wood diaphragms or walls. Existing wood diaphragms or walls of straight or diagonal sheathing shall be assigned shear resistance values appropriate with the fasteners and materials functioning in conjunction with the sheathing. The structural survey shall determine fastener details and spacings and verify a load path through floor construction. Shear values of Tables 8-8-A and 8-8-B.

8-807.2 Wood lath and plaster. Wood lath and plaster walls and ceilings may be utilized using the shear values referenced in Section 8-807.1.

8-807.3 Existing wood framing. Existing wood framing members may be assigned allowable stresses consistent with codes in effect at the time of construction. Existing or new replacement wood framing may be of archaic types originally used if properly researched, such as balloon and single wall. Wood joints such as dovetail and mortise and tenon types may be used structurally, provided they are well made. Lumber selected for use and type need not bear grade marks, and greater or lesser species such as low-level pine and fir, boxwood and indigenous hardwoods and other variations may be used for specific conditions where they were or would have been used.

Wood fasteners such as square or cut nails may be used with a maximum increase of 50 percent over wire nails for shear.

SECTION 8-808
CONCRETE

8-808.1 Materials. Natural cement concrete, unreinforced rubble concrete and similar materials may be utilized wherever that material is used historically. Concrete of low strength and with less reinforcement than required by the regular code may remain in place. The architect or engineer shall assign appropriate values of strength based on testing of samples of the materials. Bond and development lengths shall be determined based on historical information or tests.

8-808.2 Detailing. The architect or engineer shall carefully evaluate all detailing provisions of the regular code which are not met and shall consider the implications of these variations on the ultimate performance of the structure, giving due consideration to ductility and reserve strength.

SECTION 8-809
STEEL AND IRON

The hand-built, untested use of wrought or black iron, the use of cast iron or grey iron, and the myriad of joining methods that are not specifically allowed by code may be used wherever applicable and wherever they have proven their worth under the considerable span of years involved with most qualified historical structures. Uplift capacity should be evaluated and

strengthened where necessary. Fixed conditions or midheight lateral loads on cast iron columns that could cause failure should be taken into account. Existing structural wrought, forged steel or grey iron may be assigned the maximum working stress prevalent at the time of original construction.

SECTION 8-810
HOLLOW CLAY TILE

The historical performance of hollow clay tile in past earthquakes shall be carefully considered in evaluating walls of hollow clay tile construction. Hollow clay tile bearing walls shall be evaluated and strengthened as appropriate for lateral loads and their ability to maintain support of gravity loads. Suitable protective measures shall be provided to prevent blockage of exit stairways, stairway enclosures, exit ways and public ways as a result of an earthquake.

SECTION 8-811
VENEERS

8-811.1 Terra cotta and stone. Terra cotta, cast stone and natural stone veneers shall be investigated for the presence of suitable anchorage. Steel anchors shall be investigated for deterioration or corrosion. New or supplemental anchorage shall be provided as appropriate.

8-811.2 Anchorage. Brick veneer with mechanical anchorage at spacings greater than required by the regular code may remain, provided the anchorages have not corroded. Nail strength in withdrawal in wood sheathing may be utilized to its capacity in accordance with code values.

SECTION 8-812
GLASS AND GLAZING

8-812.1 Glazing subject to human impact. Historical glazing material located in areas subject to human impact may be approved subject to the concurrence of the enforcing agency when alternative protective measures are provided. These measures may include, but not be limited to, additional glazing panels, protective film, protective guards or systems, and devices or signs which would provide adequate public safety.

8-812.2 Glazing in fire-rated systems. See Section 8-402.3.

TABLE8-8A
ALLOWABLE VALUES FOR EXISTING MATERIALS

EXISTING MATERIALS OR CONFIGURATIONS OF MATERIALS[1]	ALLOWABLE VALUES x14.594 for N/m
1. Horizontal diaphragms[2]	
1.1 Roofs with straight sheathing and roofing applied directly to the sheathing	100 lbs per foot for seismic shear
1.2 Roofs with diagonal sheathing and roofing applied directly to the sheathing	250 lbs per foot for seismic shear
1.3 Floors with straight tongue-and-groove sheathing	100 lbs per foot for seismic shear
1.4 Floors with straight sheathing and finished wood flooring with board edges offset or perpendicular	500 lbs per foot for seismic shear
1.5 Floors with diagonal sheathing and finished	600 lbs per foot for seismic shear
2. Crosswalls[2,3]	
2.1 Plaster on wood or metal lath	Per side: 200 lbs per foot for seismic shear
2.2 Plaster on gypsum lath	175 lbs per foot for seismic shear
2.3 Gypsum wallboard, unblocked edges	75 lbs per foot for seismic shear
2.4 Gypsum wallboard, blocked edges	125 lbs per foot for seismic shear
Existing footings, wood framing, structural steel and reinforced steel	
3.1 Plain concrete footings	f'_c = 1,500 psi (10.34 MPa) unless otherwise shown by tests[4]
3.2 Douglas fir wood	Allowable stress same as D.F. No. 1[4]
3.3 Reinforcing steel	f_t = 18,000 lbs per square inch (124.1 N/mm^2) maximum
3.4 Structural steel	f_t = 200,00 lbs per square inch (137.9 N/mm^2) maximum

[1]Material must be sound and in good condition.
[2]A one-third increase in allowable stress is not allowed.
[3]Shear values of these materials may be combined, except the total combined value shall not exceed 300 pounds per foot (4380 N/m).
[4]Stresses given may be increased for combinations of loads as specified in the regular code.

TABLE 8-8B
ALLOWABLE VALUES OF NEW MATERIALS USED IN CONNECTION WITH EXISTING CONSTRUCTION

NEW MATERIALS OR CONFIGURATIONS OF MATERIALS	ALLOWABLE VALUES[1]
1. Horizontal diaphragms[2]	
1.1 Plywood sheathing nailed directly over existing straight sheathing with ends of plywood sheets bearing on joists or rafters and edges of plywood located on center of individual sheathing boards	225 lbs per foot (3283 N/m)
1.2 Plywood sheathing nailed directly over existing diagonal sheathing with ends of plywood sheets bearing on joists or rafters	375 lbs per foot (5473 N/m)
1.3 Plywood sheathing nailed directly over existing straight or diagonal sheathing with ends of plywood sheets bearing on joists or rafters with edges of plywood located over new blocking and nailed to provide a minimum nail penetration into framing and blocking of $1^5/_8$ inch (41 mm)	75 percent of the values specified in the regular code
2. Shear walls: (general procedure) Plywood sheathing applied directly over wood studs. No value shall be given to plywood applied over existing plaster or wood sheathing	100 percent of the value specified in the regular code for shear walls
3. Crosswalls: (special procedure only)	
3.1 Plywood sheathing applied directly over wood studs. No value shall be given to plywood applied over existing plaster or wood sheathing	133 percent of the value specified in the regular code for shear walls
3.2 Drywall or plaster applied directly over wood studs	100 percent of the values in the regular code
3.3 Drywall or plaster applied to sheathing over existing wood studs	The values specified in the regular code reduced as noted.[3] (UBC Table 25-I, Footnote 1)
4. Tension bolts	
4.1 Bolts extending entirely through unreinforced masonry walls secured with bearing plates on far side of a three-wythe-minimum wall with at least 30 square inches (19 350 mm^2) of area[4,5]	1,800 lbs (8006 N) per bolt[6] 900 lbs (4003 N) per bolt for two-wythe walls[6]
4.2 Bolts extending to the exterior face of the wall with a 2½-inch (63.5 mm) round plate under the head and drilled at an angle of 22½ degrees to the horizontal, installed as specified for shear bolts[4,5,7]	1,200 lbs (5338 N) per bolt
5. Shear bolts Bolts embedded a minimum of 8 inches (203 mm) into unreinforced masonry walls and centered in a $2^1/_2$-inch-diameter (63.5 mm) hole filled with dry-pack or nonshrink grout. Through bolts with first 8 inches (203 mm) as noted above and embedded bolts as noted in Item 4.2[5,7]	$^1/_2$ inch (12.7 mm) diameter = 350 lbs (1557 N)[6] $^5/_8$ inch (15.9 mm) diameter = 500 lbs (2224 N)[6] $^3/_4$ inch (19 mm) diameter = 750 lbs (3336 N)[6]
6. Infilled walls Reinforced masonry infilled openings in existing unreinforced masonry walls. Provide keys or dowels to match reinforcing.	Same as values specified for unreinforced masonry walls
7. Reinforced masonry Masonry piers and walls reinforced per the regular code	Same as values specified in the regular code[8]
8. Reinforced concrete Concrete footings, walls and piers reinforced as specified in the regular code and designed for tributary loads	Same values as specified in the regular code[8]

[1]A one-third increase in allowable stress is not allowed, except as noted.
[2]Values and limitations are for nailed plywood. Higher values may be used for other fastening systems such as wood screws or staples when approved by the enforcing authority.
[3]In addition to existing sheathing value.
[4]Bolts to be $^1/_2$-inch (12.7 mm) minimum diameter.
[5]Drilling for bolts and dowels shall be done with an electric rotary drill. Impact tools shall not be used for drilling holes or tightening anchors and shear bolt nuts.
[6]Other bolt sizes, values and installation methods may be used, provided a testing program is conducted in accordance with regular code standards. Bolt spacing shall not exceed 6 feet (1830 mm) on center and shall not be less than 12 inches (305) mm) on center.
[7]Embedded bolts to be tested as specified in regular code standards.
[8]Stresses given may be increased for combinations of loads as specified in the regular code.

CHAPTER 8-9
MECHANICAL, PLUMBING AND ELECTRICAL REQUIREMENTS

SECTION 8-901
PURPOSE, INTENT AND SCOPE

8-901.1 Purpose. The purpose of the CHBC is to provide regulations for the mechanical, plumbing and electrical systems of buildings designated as qualified historical buildings or properties. The CHBC requires enforcing agencies to accept any reasonable equivalent solutions to the regular code when dealing with qualified historical buildings or properties.

8-901.2 Intent. The intent of the CHBC is to preserve the integrity of qualified historical buildings or properties while providing a reasonable level of protection from fire, health and life-safety hazards (hereinafter referred to as safety hazards) for the building occupants.

8-901.3 Scope. The CHBC shall be applied in conjunction with the regular code whenever compliance with the regular code is required for qualified historical buildings or properties.

8-901.4 Safety hazard. No person shall permit any safety hazard to exist on premises under their control, or fail to take immediate action to abate such hazard. Existing systems which constitute a safety hazard when operational may remain in place, provided they are completely and permanently rendered inoperative. Safety hazards created by inoperative systems shall not be permitted to exist. Requirements of the regular code concerning general regulations shall be complied with, except that the enforcing agency shall accept solutions which do not cause a safety hazard.

8-901.5 Energy conservation. Qualified historical buildings or properties covered by this part are exempted from compliance with energy conservation standards. When new nonhistorical lighting and space conditioning system components, devices, appliances and equipment are installed, they shall comply with the requirements of Title 24, Part 6, *The California Energy Code*, except where the historical significance or character-defining features are threatened.

SECTION 8-902
MECHANICAL

8-902.1 General. Mechanical systems shall comply with the regular code unless otherwise modified by this chapter.

8-902.1.1 The provisions of the CHBC shall apply to the acceptance, location, installation, alteration, repair, relocation, replacement or addition of any heating, ventilating, air conditioning, domestic incinerators, kilns or miscellaneous heat-producing appliances or equipment within or attached to a historical building.

8-902.1.2 Existing systems which do not, in the opinion of the enforcing agency, constitute a safety hazard may remain in use.

8-902.1.3 The enforcing agency may approve any alternative to the CHBC which would achieve equivalent life safety.

8-902.2 Heating facilities. All dwelling-type occupancies covered under this chapter shall be provided with heating facilities. Wood-burning or pellet stoves or fireplaces may be acceptable as heating facilities.

8-902.3 Fuel oil piping and tanks. Fuel oil piping and tanks shall comply with regular code requirements except that the enforcing agency may waive such requirements where the lack of compliance does not create a safety or environmental hazard.

8-902.4 Heat-producing and cooling equipment. Heat-producing and cooling equipment shall comply with the regular code requirements governing equipment safety, except that the enforcing agency may accept alternatives which do not create a safety hazard.

8-902.5 Combustion air.

8-902.5.1 All fuel-burning appliances and equipment shall be provided a sufficient supply of air for proper fuel combustion, ventilation and draft hood dilution.

8-902.5.2 The enforcing agency may require operational tests for combustion air systems which do not comply with applicable requirements of the regular code.

8-902.6 Venting of appliances.

8-902.6.1 Every appliance required to be vented shall be connected to an approved venting system. Venting systems shall develop a positive flow adequate to convey all combustion products to the outside atmosphere.

8-902.6.2 Masonry chimneys in structurally sound condition may remain in use for all fuel-burning appliances, provided the flue is evaluated and documentation provided that the masonry and grout are in good condition. Terra cotta chimneys and Type C metallic vents installed in concealed spaces shall not remain in use unless otherwise mitigated and approved on a case-by-case basis.

8-902.6.3 The enforcing agency may require operational tests for venting systems which do not comply with applicable requirements of the regular code.

8-902.7 Ducts.

8-902.7.1 New ducts shall be constructed and installed in accordance with applicable requirements of the regular code.

8-902.7.2 Existing duct systems which do not comply with applicable requirements of the regular code and do not, in the opinion of the enforcing agency, constitute a safety or health hazard may remain in use.

8-902.8 Ventilating systems.

8-902.8.1 Ventilating systems shall be installed so that no safety hazard is created.

8-902.8.2 Grease hoods and grease hood exhaust systems shall be furnished and installed in accordance with applicable requirements of the regular code. Existing systems which are altered shall comply with the regular code.

8-902.9 Miscellaneous equipment requirements.

8-902.9.1 The following appliances and equipment shall be installed so that no safety hazard is created: warm air furnaces, space heating equipment, vented decorative appliances, floor furnaces, vented wall furnaces, unit heaters, room heaters, absorption units, refrigeration equipment, duct furnaces, infrared radiant heaters, domestic incinerators, miscellaneous heat-producing appliances and water heaters.

8-902.9.2 Storage-type water heaters shall be equipped with a temperature- and pressure-relief valve in accordance with applicable requirements of the regular code.

SECTION 8-903
PLUMBING

8-903.1 General. Plumbing systems shall comply with the regular code unless otherwise noted.

8-903.1.1 The provisions of the CHBC shall apply to the acceptance, location, installation, alteration, repair, relocation, replacement or addition of any plumbing system or equipment within or attached to a historical building.

8-903.1.2 Existing systems which do not, in the opinion of the enforcing agency, constitute a safety hazard may remain in use.

8-903.1.3 The enforcing agency may approve any alternative to these regulations which achieves reasonably equivalent life safety.

8-903.2 Residential occupancies.

8-903.2.1 Where toilet facilities are provided, alternative sewage disposal methods may be acceptable if approved by the local health department. In hotels, where private facilities are not provided, water closets at the ratio of one for each 15 rooms may be acceptable.

8-903.2.2 Toilet facilities are not required to be on the same floor or in the same building as sleeping rooms. Water-flush toilets may be located in a building immediately adjacent to the sleeping rooms. When alternative sewage disposal methods are utilized, they shall be located a minimum distance from the sleeping rooms or other locations as approved by the local health department.

8-903.2.3 Kitchen sinks shall be provided in all kitchens. The sink and countertop may be of any smooth nonabsorbent finish which can be maintained in a sanitary condition.

8-903.2.4 Hand washing facilities shall be provided for each dwelling unit and each hotel guest room. A basin and pitcher may be acceptable as adequate hand washing facilities.

8-903.2.5 Hot or cold running water is not required for each plumbing fixture, provided a sufficient amount of water is supplied to permit the fixture's normal operation.

8-903.2.6 Bathtubs and lavatories with filler spouts less than 1 inch (25.4 mm) above the fixture rim may remain in use, provided there is an acceptable overflow below the rim.

8-903.2.7 Original or salvage water closets, urinals and flushometer valves shall be permitted in qualified historical buildings or properties. Historically accurate reproduction, nonlow-consumption water closets, urinals and flushometer valves shall be permitted except where historically accurate fixtures that comply with the regular code are available.

8-903.3 Materials. New nonhistorical materials shall comply with the regular code requirements. The enforcing agency shall accept alternative materials which do not create a safety hazard where their use is necessary to maintain the historical integrity of the building.

8-903.4 Drainage and vent systems. Plumbing fixtures shall be connected to an adequate drainage and vent system. The enforcing agency may require operational tests for drainage and vent systems which do not comply with applicable requirements of the regular code. Vent terminations may be installed in any location which, in the opinion of the enforcing agency, does not create a safety hazard.

8-903.5 Indirect and special wastes. Indirect and special waste systems shall be installed so that no safety hazard is created. Chemical or industrial liquid wastes which may detrimentally affect the sanitary sewer system shall be pretreated to render them safe prior to discharge.

8-903.6 Traps and interceptors. Traps and interceptors shall comply with the regular code requirements except that the enforcing agency shall accept solutions which do not increase the safety hazard. Properly maintained "S" and drum traps may remain in use.

8-903.7 Joints and connections.

8-903.7.1 Joints and connections in new plumbing systems shall comply with applicable requirements of the regular code.

8-903.7.2 Joints and connections in existing or restored systems may be of any type that does not create a safety hazard.

8-903.8 Water distribution. Plumbing fixtures shall be connected to an adequate water distribution system. The enforcing agency may require operational tests for water distribution systems which do not comply with applicable requirements of regular code. Prohibited (unlawful) connections and cross connections shall not be permitted.

8-903.9 Building sewers and private sewage disposal systems. New building sewers and new private sewage disposal systems shall comply with applicable requirements of the regular code.

8-903.10 Fuel-gas piping. Fuel-gas piping shall comply with the regular code requirements except that the enforcing agency shall accept solutions which do not increase the safety hazard.

SECTION 8-904
ELECTRICAL

8-904.1 General. Electrical systems shall comply with the regular code unless otherwise permitted by this code, or approved by the authority having jurisdiction.

8-904.1.1 The provisions of the CHBC shall apply to the acceptance, location, installation, alteration, repair, relocation, replacement or addition of any electrical system or portion thereof, the premise wiring, or equipment fixed in place as related to restoration within or attached to a qualified historical building or property.

8-904.1.2 Existing systems, wiring methods and electrical equipment which do not, in the opinion of the enforcing agency, constitute a safety hazard may remain in use.

8-904.1.3 The enforcing agency may approve any alternative to the CHBC which achieves equivalent safety.

8-904.1.4 Archaic methods that do not appear in present codes may remain and may be extended if, in the opinion of the enforcing agency, they constitute a safe installation.

8-904.2 Wiring methods.

8-904.2.1 Where existing branch circuits do not include an equipment grounding conductor and, in the opinion of the enforcing agency, it is impracticable to connect an equipment grounding conductor to the grounding electrode system, receptacle convenience outlets may remain the nongrounding type.

8-904.2.2 Ground fault circuit interrupter (GFCI) protected receptacles shall be installed where replacements are made at receptacle outlets that are required to be so protected by the regular code in effect at the time of replacement. Metallic face plates shall either be grounded to the grounded metal outlet box or be grounded to the grounding-type device when used with devices supplied by branch circuits without equipment grounding conductors.

8-904.2.3 Grounding-type receptacles shall not be used without a grounding means in an existing receptacle outlet unless GFCI protected. Existing nongrounding receptacles shall be permitted to be replaced with nongrounding or grounding-type receptacles where supplied through a ground fault circuit interrupter.

8-904.2.4 Extensions of existing branch circuits without equipment-grounding conductors shall be permitted to supply grounding-type devices only when the equipment grounding conductor of the new extension is grounded to any accessible point on the grounding electrode system.

8-904.2.5 Receptacle outlet spacing and other related distance requirements shall be waived or modified if determined to be impracticable by the enforcing agency.

8-904.2.6 For the replacement of lighting fixtures on an existing nongrounded lighting outlet, or when extending an existing nongrounding lighting outlet, the following shall apply:

1. The exposed conductive parts of lighting fixtures shall be connected to any acceptable point on the grounding electrode system, or
2. The lighting fixtures shall be made of insulating material and shall have no exposed conductive parts.

   Exception: Lighting fixtures mounted on electrically nonconductive ceilings or walls where located not less than either 8 feet (2438 mm) vertically or 5 feet (1524 mm) horizontally from grounded surfaces.

8-904.2.7 Lighting load calculations for services and feeders may be based on actual loads as installed in lieu of the "watts per square foot" method.

8-904.2.8 Determination of existing loads may be based on maximum demand recordings in lieu of calculations, provided all of the following are met:

1. Recordings are provided by the serving agency.
2. The maximum demand data is available for a one-year period.

   Exception: If maximum demand data for a one-year period is not available, the maximum demand data shall be permitted to be based on the actual amperes continuously recorded over a minimum 30-day period by a recording ammeter connected to the highest loaded phase of the feeder or service. The recording should reflect the maximum demand when the building or space is occupied and include the measured or calculated load at the peak time of the year, including the larger of the heating or cooling equipment load.
3. There has been no change in occupancy or character of load during the previous 12 months.
4. The anticipated load will not change, or the existing demand load at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service.

CHAPTER 8-10
QUALIFIED HISTORICAL DISTRICTS, SITES AND OPEN SPACES

SECTION 8-1001
PURPOSE AND SCOPE

8-1001.1 Purpose. The purpose of this chapter is to provide regulations for the preservation, rehabilitation, restoration and reconstruction of associated historical features of qualified historical buildings, properties or districts (as defined in Chapter 8-2), and for which Chapters 8-3 through 8-9 of the CHBC may not apply.

8-1001.2 Scope. This chapter applies to the associated historical features of qualified historical buildings or properties such as historical districts that are beyond the buildings themselves which include, but are not limited to, natural features and designed site and landscape plans with natural and man-made landscape elements that support their function and aesthetics. This may include, but will not be limited to:

1. Site plan layout configurations and relationships (pedestrian, equestrian and vehicular site circulation, topographical grades and drainage, and use areas).
2. Landscape elements (plant materials, site structures other than the qualified historical building, bridges and their associated structures, lighting, water features, art ornamentation, and pedestrian, equestrian and vehicular surfaces).
3. Functional elements (utility placement, erosion control and environmental mitigation measures).

SECTION 8-1002
APPLICATION

8-1002.1 The CHBC shall apply to all sites and districts and their features associated with qualified historical buildings or qualified historical districts as outlined in 8-1001.2 Scope.

8-1002.2 Where the application of regular code may impact the associated features of qualified historical properties beyond their footprints, by work performed secondarily, those impacts shall also be covered by the CHBC.

8-1002.3 This chapter shall be applied for all issues regarding code compliance or other standard or regulation as they affect the purpose of this chapter.

8-1002.4 The application of any code or building standard shall not unduly restrict the use of a qualified historical building or property that is otherwise permitted pursuant to Chapter 8-3 and the intent of the *State Historical Building Code*, Section 18956.

SECTION 8-1003
SITE RELATIONS

The relationship between a building or property and its site, or the associated features of a district (including qualified historical landscape), site, objects and their features are critical components that may be one of the criteria for these buildings and properties to be qualified under the CHBC. The CHBC recognizes the importance of these relationships. This chapter shall be used to provide context sensitive solutions for treatment of qualified historical buildings, properties, district or their associated historical features, or when work to be performed secondarily impacts the associated historical features of a qualified historical building or property.

APPENDIX A

CHAPTER 8-1

When modification must be made to qualified historical buildings and properties, the CHBC is intended to work in conjunction with the United States Secretary of Interior Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings and the Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.

CHAPTER 8-6

TABLE 1—PROVISION APPLICABILITY

	Title II Public Entities	Title III Private Entities	Title III Barrier Removal
SECTION 8-601 PURPOSE, INTENT, SCOPE **8-601.1 Purpose.** The purpose of the CHBC is to provide alternative regulations to facilitate access and use by persons with disabilities to and throughout facilities designated as qualified historical buildings or properties. These regulations require enforcing agencies to accept alternatives to regular code when dealing with qualified historical buildings or properties. **8-601.2 Intent.** The intent of this chapter is to preserve the integrity of qualified historical buildings and properties while providing access to and use by people with disabilities. **8-601.3 Scope.** The CHBC shall apply to every qualified historical building or property that is required to provide access to people with disabilities. 1. Provisions of this chapter do not apply to new construction or reconstruction/replicas of historical buildings. 2. Where provisions of this chapter apply to alteration of qualified historical buildings or properties, alteration is defined in *California Building Code* (CBC), Chapter 2, Definitions and Abbreviations. 202 – A. Alter or Alteration. **8-601.4 General application.** The provisions in the CHBC apply to local, state and federal governments (Title II entities); alteration of commercial facilities and places of public accommodation (Title III entities); and barrier removal in commercial facilities and places of public accommodation (Title III entities). Except as noted in this chapter.	Applies	Applies	Applies
SECTION 8-602 — BASIC PROVISIONS **8-602.1 Regular code.** The regular code for access for people with disabilities (Title 24, Part 2, Vol.1, Chapter 11B) shall be applied to qualified historical buildings or properties unless strict compliance with the regular code will threaten or destroy the historical significance or character-defining features of the building or property. **8-602.2 Alternative provisions.** If the historical significance or character-defining features are threatened, alternative provisions for access may be applied pursuant to this chapter, provided the following conditions are met: 1. These provisions shall be applied only on an item-by-item or case-by-case basis. 2. Documentation is provided, including meeting minutes or letters, stating the reasons for the application of the alternative provisions. Such documentation shall be retained in the permanent file of the enforcing agency.	Applies	Applies	Applies

(continued)

TABLE 1—PROVISION APPLICABILITY—continued

	Title II Public Entities	Title III Private Entities	Title III Barrier Removal
SECTION 8-603 — ALTERNATIVES			
8-603.1 Alternative minimum standards. The alternative minimum standards for alterations of qualified historical buildings or facilities are contained in Section 4.1.7(3) of ADA Standards for Accessible Design, as incorporated and set forth in federal regulation 28 C.F.R. Pt. 36.	Applies	Applies	Applies
8-603.2 Entry. These alternatives do not allow exceptions for the requirement of level landings in front of doors, except as provided in Section 8-603.4. 1. Access to any entrance used by the general public and no further than 200 feet (60 960 mm) from the primary entrance. 2. Access at any entrance not used by general public but open and unlocked with directional signs at the primary entrance and as close as possible to, but no further than 200 feet (60 960 mm) from, the primary entrance. 3. The accessible entrance shall have a notification system. Where security is a problem, remote monitoring may be used.	Applies	Applies	Applies
8-603.3 Doors. Alternatives listed in order of priority are: 1. Single-leaf door which provides a minimum 30 inches (762 mm) of clear opening. 2. Single-leaf door which provides a minimum $29^{1}/_{2}$ inches (749 mm) clear opening. 3. Double door, one leaf of which provides a minimum $29^{1}/_{2}$ inches (749 mm) clear opening. 4. Double doors operable with a power-assist device to provide a minimum $29^{1}/_{2}$ inches (749 mm) clear opening when both doors are in the open position. **Exception:** Alternatives in this section do not apply to alteration of commercial facilities and places of public accommodation (Title III entities).	Does not apply	Does not apply	Applies
8-603.4 Power-assisted doors. Power-assisted door or doors may be considered an equivalent alternative to level landings, strikeside clearance and door-opening forces required by regular code.	Applies	Applies	Applies
8-603.5 Toilet rooms. In lieu of separate-gender toilet facilities as required in the regular code, an accessible unisex toilet may be designated.	Applies	Applies	Applies
8-603.6 Exterior and interior ramps and lifts. Alternatives listed in order of priority are: 1. A lift or a ramp of greater than standard slope but no greater than 1:10, for horizontal distances not to exceed 5 feet (1525 mm). Signs shall be posted at upper and lower levels to indicate steepness of the slope. 2. Access by ramps of 1:6 slope for horizontal distance not to exceed 13 inches (330 mm). Signs shall be posted at upper and lower levels to indicate steepness of the slope.	Applies	Applies	Applies

(continued)

TABLE 1—PROVISION APPLICABILITY—continued

	Title II Public Entities	Title III Private Entities	Title III Barrier Removal
SECTION 8-604 — EQUIVALENT FACILITATION Use of other designs and technologies, or deviation from particular technical and scoping requirements, are permitted if the application of the alternative provisions contained in Section 8-603 would threaten or destroy the historical significance or character-defining features of the qualified historical building or property. 1. Such alternatives shall be applied only on an item-by-item or case-by-case basis. 2. Access provided by experiences, services, functions, materials and resources through methods including, but not limited to, maps, plans, videos, virtual reality and related equipment, at accessible levels. The alternative design and/or technologies used will provide substantially equivalent or greater accessibility to, and usability of, the facility. 3. The official charged with the enforcement of the standards shall document the reasons for the application of the design and/or technologies and their effect on the historical significance or character-defining features. Such documentation shall be in accordance with Section 8-602.2, Item 2, and shall include the opinion and comments of state or local accessibility officials, and the opinion and comments of representative local groups of people with disabilities. Such documentation shall be retained in the permanent file of the enforcing agency. Copies of the required documentation should be available at the facility upon request. **Note:** For commercial facilities and places of public accommodation (Title III entities). Equivalent facilitation for an element of a building or property when applied as a waiver of an ADA accessibility requirement will not be entitled to the Federal Department of Justice certification of this code as rebuttable evidence of compliance for that element.	Applies	**Waivers** If a builder applies for a waiver of an ADA accessibility requirement for an element of a building, he or she will not be entitled to certification's rebuttable evidence of compliance for that element. This limitation on the certification determination should be noted in any publication of Chapter 8-6 if certification is granted.	Applies

Notes: The regular code for Chapter 8-6 is contained in Title 24, Part 2, Vol.1, Chapter 11, which contain standards for new construction. Provisions of this chapter may be used in conjunction with all other provisions of the regular code and ADA regulations.

HISTORY NOTE APPENDIX

CALIFORNIA HISTORICAL BUILDING CODE

(Title 24, Part 8, California Code of Regulations)

For prior history, see History Note Appendix to the *California Historical Building Code,* 2001 Triennial Edition, effective November 1, 2002.

1. The 2007 Triennial Edition, *California Historical Building Code,* was approved by the California Building Standards Commission on January 29, 2007. The California Building Standards Commission established January 1, 2008, as the effective date.

2. Editorial correction to Chapter 8-8, Section 8-812, Tables 8-8A and 8-8B. Include missing tables in 2007 annual code adoption supplement.

APPENDIX C

BUILDING ENVELOPE MATERIALS EVALUATION

VETERANS MEMORIAL BUILDING
SANTA CRUZ, CALIFORNIA

Submitted to:

Ms. Nancy Gordon, Director
General Services Department
County of Santa Cruz
701 Ocean Street, Room 330
Santa Cruz, CA 95060

Prepared by:
ENGEO Incorporated

February 18, 2011
Project No. 9185.000.000

- Expect Excellence -

Project No.
9185.000.000

February 18, 2011

Ms. Nancy Gordon, Director
General Services Department
County of Santa Cruz
701 Ocean Street, Room 330
Santa Cruz, CA 95060

Subject: Veterans Memorial Building
846 Front Street
Santa Cruz, California

BUILDING ENVELOPE MATERIALS EVALUATION

Dear Ms. Gordon:

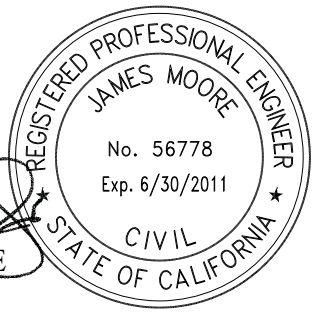
With your authorization, ENGEO performed a building envelope materials evaluation as well as visual surveys of the existing Veterans Memorial Building facility located at 846 Front Street in Santa Cruz, California. The building envelope materials evaluation included coring of the existing concrete walls to obtain samples, compressive strength testing of the concrete core samples, pachometer surveys at selected locations to verify reinforcing steel placement and patterns, as well as visual inspection of the existing reinforcing steel at selected locations. This report presents our activities and findings.

We appreciate the opportunity to have been of service to you on this phase of your project. Please see Section 5.0 of this report for additional services that ENGEO provides and that may be appropriate for future phases of this project. If you should have any questions or comments, please contact us at your convenience.

Sincerely,

ENGEO Incorporated

Riley Gerbrandt, PE



James E. Moore, Jr., PE

rcg/jem/jf:eval

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this evaluation was to inspect and observe the existing structural materials and conditions of the Veterans Memorial Building and to obtain material strength data from selected samples. It is our understanding that this information will be utilized by others during the development of a retrofit plan for the subject building. The County of Santa Cruz authorized ENGEO to conduct the proposed scope of services, which included the following:

- Removal of concrete core samples for compressive strength testing.
- Removal of reinforcing steel samples for tensile strength testing.*
- Survey of in-place reinforcing steel to verify placement and to determine spacing patterns.
- Exposure of existing reinforcing steel for inspection of steel size, type, and condition, as well as for inspection of concrete cover.
- Repair of sample holes using grout.
- Visual survey of the building exterior.
- Preparation of a written report that details our observations and test results.

*Tensile strength test data for the existing reinforcing steel was made available to us (Gordon, 2011; Streeter, 2011); therefore, we did not conduct tensile strength testing or sample the reinforcing steel.

For our use, we received the following:

- A seismic evaluation report (Streeter Group, Inc., 2010), which includes Conceptual Repair Plans in Appendix A.
- Reinforcing steel tensile strength test data (Streeter, 2011), which was conducted by BEAR Testing Laboratory of Mountain View, California.
- Construction architectural plan and structural plan documents (Davis-Pearce Co., undated).

This report was prepared for the exclusive use of our client and their consultants for design of this project. In the event that any changes are made in the character, design or layout of the development, we must be contacted to review the conclusions and recommendations contained in this report to determine whether modifications are necessary. This document may not be

reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 SITE LOCATION AND DESCRIPTION

The Veterans Memorial Building is located at 846 Front Street in Santa Cruz, California at approximately 36.976535 degrees north latitude and approximately 122.026176 west longitude. This location is indicated on Figure 1, Vicinity Map. 846 Front Street is located in the downtown of Santa Cruz, California. The site is approximately 180 feet southeast of the intersection of Water Street and Front Street, and is adjacent to the United States Post Office to the northwest, the existing Comerica Bank building to the southeast, and an existing office building to the east. The existing Flatiron Building is located to the west of the site across Front Street.

The Veterans Memorial Building is located at the project site. The building was constructed in the early 1930s and dedicated in 1932 to United States veterans (Streeter Group, Inc., p. 1, 2010). The building footprint is approximately 60 feet by 140 feet and consists of a basement level, a first floor, and a second floor (Streeter Group, Inc., p. 1, 2010). Two additions and/or structural remodels have previously been completed on the building (Streeter Group, Inc., p. 1, 2010).

Members of our field staff met with Mr. William "Bill" Kersten of the County of Santa Cruz at the Veterans Memorial Building on January 20, 2011, for a walkthrough and to discuss the project requirements. Authorization to proceed with the work was received on January 24, 2011, and our field services commenced on February 2, 2011.

2.0 FIELD SERVICES

2.1 CONCRETE CORING OPERATIONS

Our field crew removed twelve approximately 4-inch-diameter samples at exposed and accessible locations, as presented in the floor plans in Figures 2 through 4; the base figures for the floor plans were obtained from Appendix A of the seismic evaluation report (Streeter Group, Inc., 2010). The core locations are listed below.

a. Two core samples at ground level along the south side of the building (facing the bank).

b. Two core samples at different elevations from the exterior stair on the south wall.

c. Three core samples at ground level along the north side of the building (facing the post office).

d. Three core samples at the first floor level along the east exterior wall of the stage addition.

e. The Front Street basement retaining wall (in the electrical/septic pump room) was cored for visual assessment and to determine the wall thickness: One core sample in the upper wall elevation and one core sample in the lower wall elevation.

The core samples in items a. through d. were transported to our laboratory to be tested for compressive strength in accordance with ASTM C42-04. Core samples in two locations (Cores 1 and 8) hit reinforcing steel and were therefore excluded from compression testing. A second core was obtained from each of these locations for compressive strength testing. Test results are presented in Section 4.0 of this report on Table 1, Concrete Core Compression Test Results. Sample locations and compression test strength results are also presented on Figures 2, 3, and 4, which are Basement Level Plan, First Floor Plan, and Second Floor Plan, respectively.

2.2 REINFORCING STEEL SURVEYS

Pachometer surveys were performed to verify the placement of reinforcing steel in the concrete as well as to determine the general spacing pattern between the embedded reinforcing steel. The reinforcing steel survey was performed by scanning the exposed concrete surface at representative test areas with a Fisher M-Scope pachometer. The areas surveyed included the following.

a. South wall above and below existing exterior stair between and including pilasters on each side.

b. South wall at ground level in the solid wall section located closer to Front Street.

c. One concrete column at the east (rear) end of the building under the stage addition.

d. Concrete beam above and between the concrete columns on the east (rear) end of the building.

e. East exterior solid wall at the rear of the stage.

f. Front Street basement wall (in the electrical/septic pump room).

g. One concrete arch column at street level on the west side of the building.

In addition to pachometer surveys, our field crew performed direct visual observation of exposed reinforcing steel in several areas. Reinforcing steel was observed by coring or chipping concrete in pachometer survey locations to expose the embedded reinforcing steel. In other instances, reinforcing steel was observed in areas where cracking and spalling of the concrete had occurred. The reinforcing steel size, type, and condition were observed; the thickness of the concrete cover was also observed and recorded.

2.3 REINFORCING STEEL SAMPLING

One reinforcing steel sample was previously removed from the south exterior stair wall on Level 1 by BEAR Testing of Mountain View, California. BEAR Testing also removed one sample from the east exterior wall at the stage level of the stage addition. Tensile tests were performed by Bear Testing and provided to ENGEO by Streeter Group, Inc. (Streeter, 2011) as authorized by the County of Santa Cruz (Gordon, 2011). These test results are presented in Table 2, Reinforcing Steel Tensile Test Results.

2.4 CONCRETE REPAIRS

Our concrete core holes were repaired by patching with a non-shrink grout concrete repair material in accordance with the structural engineer's recommendations. In addition to the areas cored by ENGEO, our crews also repaired several areas that were cored by others. Cored areas were not typically accessible from both sides of the core location due to the exterior height of the wall or false walls at the interior of the building. In these areas, we patched the cores by affixing a temporary cardboard or sheet metal form to the rear of the core holes with wire. The temporary forms retained the placed grout so that the repaired core holes were completely filled with grout. Areas where concrete was chipped to expose the reinforcing steel were also repaired with non-shrink grout.

In addition to core hole and chipped locations, two samples of reinforcing steel were collected by BEAR Testing for tensile strength testing. After coupling new reinforcing steel to splice the gap made by the sampling, the areas were also patched with the non-shrink grout concrete repair material.

2.5 REINFORCING STEEL REPAIRS

Two samples of reinforcing steel were collected by BEAR Testing for tensile strength testing. Our personnel repaired these areas by splicing the cut ends of the existing $^{3}/_{8}$-inch-square reinforcing steel with Bar Lock L-Series, Type 2 couplers. A piece of Grade 60, No. 4 reinforcing steel was placed to span the gap of the removed reinforcing steel; the ends of this splice were also connected to the reinforcing steel couplers to form a continuous member. This coupler procedure/method was previously approved by the structural engineer.

3.0 OBSERVATIONS

3.1 PACHOMETER SURVEYS, REINFORCING STEEL INSPECTION, AND VISUAL SURVEY

Pachometer scans and inspection of the existing reinforcing steel were performed in designated areas at walls, at columns, and at the soft story horizontal beam. Locations of pachometer scans and reinforcing steel inspections are presented on the floor plans in Figures 2 through 4 as "Notes." Photographs of selected locations were also obtained, and these are included in Figures

2 through 4 as indicated. A visual survey was also conducted. In general, the reinforcing steel size and location appear to be in general conformance to the construction plans (Davis-Pearce Co., Undated). General notes are presented below.

3.1.1 Basement Beams and Columns – Soft Story

A basement level column at the east end of the building (supporting the cantilevered stage) featured a total of four approximately $^{7}/_{8}$-inch-square vertical reinforcing steel (one at each corner) with approximately $^{3}/_{8}$-inch-square stirrup reinforcing steel spaced at approximately 12 inches on-center (o.c.). The exposed reinforcing steel stirrups have a minimum concrete cover of approximately one inch.

The observed beam at this location contains a total of six approximately $^{7}/_{8}$-inch-square horizontal reinforcing steel (three at each face, top and bottom) with approximately $^{1}/_{4}$-inch-square reinforcing steel stirrups spaced at approximately four inches o.c. The exposed reinforcing steel stirrups have a minimum concrete cover of approximately 1½ inches.

3.1.2 Basement Column

A basement level column at the North Wall featured a total of six approximately $^{7}/_{8}$-inch-square vertical reinforcing steel (three at each face) with approximately ¼-inch-square reinforcing steel stirrups at approximately eight inches o.c. The exposed reinforcing steel stirrups have a minimum concrete cover of approximately one inch.

3.1.3 Basement Walls

With exception of the unreinforced west basement retaining wall along Front Street, the observed building perimeter walls at the basement level contain $^{3}/_{8}$-inch-square reinforcing steel each way, with spacing and concrete cover as indicated below:

- The basement North Wall has reinforcing steel with approximately 12-inch o.c. horizontal spacing and approximately 16-inch o.c. vertical spacing and with a minimum concrete cover of approximately 3 inches.

- The basement wall segment on Line 6.4, A-B features spacing at 16 inches o.c. each way with a minimum concrete cover of approximately 3 inches.

- The basement West Wall (Retaining Wall at Front Street) was cored within the septic pump room with a six-inch-diameter barrel in two locations to assess the wall thickness. The north portion of the wall was cored at approximately seven feet above finished floor (FF), and the south portion of the wall was cored at approximately two feet above FF. The wall was observed to be 24 inches thick. This wall does not contain reinforcing steel and has a rough finish with several visible surface voids (rock pockets). In addition to consolidation issues,

the wall contains a hodgepodge of various materials within the concrete matrix, such as brick and glass.

3.1.4 First Level Columns

A first level column at the South Wall on Line D includes a total of six approximately $^{7}/_{8}$-inch-square vertical reinforcing steel (three at each face) with approximately $^{3}/_{8}$-inch-square reinforcing steel stirrups at approximately 12 inches o.c. The exposed reinforcing steel stirrups have a minimum concrete cover of approximately two inches.

A first level column at the South Wall on Line E includes a total of four approximately $^{7}/_{8}$-inch-square vertical reinforcing steel (one at each corner) with approximately $^{1}/_{4}$-inch-square reinforcing steel stirrups at approximately nine inches o.c. The exposed reinforcing steel stirrups have a minimum concrete cover of approximately two inches.

3.1.5 First Level Walls

The observed building perimeter walls at the first level contain $^{3}/_{8}$-inch-square reinforcing steel each way, with the following spacing and concrete cover:

- The East Wall (stage area) has reinforcing steel spaced at approximately 12 inches o.c. horizontal and approximately 18 inches o.c. vertical. The reinforcing steel has a minimum concrete cover of approximately two inches.

- The West Wall (Front Street) has reinforcing steel spaced at approximately 14 inches o.c. horizontal and at approximately 16 inches o.c. vertical. The reinforcing steel has a minimum concrete cover of approximately 4 inches.

- The South Wall (facing Bank) was scanned in two locations: Lines D and E. These walls have reinforcing steel spaced at approximately 12 inches o.c. horizontal and at approximately 16 inches o.c. vertical. The reinforcing steel has a minimum concrete cover of approximately 3 to 3½ inches.

3.1.6 Second Level Walls

The observed building perimeter wall at the second level contains $^{3}/_{8}$-inch-square reinforcing steel each way, with the following spacing and concrete cover:

- The South Wall (facing bank) has reinforcing steel spaced at approximately 12 inches o.c. horizontal and at approximately 16 inches o.c. vertical. The reinforcing steel has a minimum concrete cover of approximately 4 inches.

3.1.7 Visual Survey

In addition to pachometer surveys, a visual survey of the building exterior was performed to assess the presence and spacing of reinforcing steel at locations designated by the Structural Engineer. Several photographs were taken during the visual survey. These are included, and their locations are indicated in the appropriate floor plans, in Figures 2 through 4.

4.0 LABORATORY TEST RESULTS

4.1 CONCRETE COMPRESSION TEST RESULTS

Concrete core samples that were obtained from the project site were transported to our laboratory and tested in accordance with ASTM C42-04. Perimeter walls at all levels were noted to be approximately 6 inches thick. All tested cores had diameters varying from 4.00 to 4.08 inches. After trimming and capping, sample height/diameter ratios (H/D) varied from 1.45 to 1.59, requiring strength corrections in accordance with ASTM C42. General test locations and corrected compressive strength test results are presented in Table 1, Concrete Core Compression Test Results. These test results and locations are also graphically presented in the floor plans in Figures 2 through 4.

TABLE 1
Concrete Core Compression Test Results

Core Sample Number	General Location	Compressive Strength (psi)
1	Basement Level, North Wall Rear	2,870
2	Basement Level, North Wall Center	5,760
3	Basement Level, North Wall Front	5,770
4	Basement Level, Lower West Retaining Wall	N/A*
5	Basement Level, Upper West Retaining Wall	N/A*
6	First Level, South Wall Front	4,210
7	Second Level, South Wall Center	3,410
8	First Level, South Wall Center	5,020
9	First Level, South Wall Rear	4,700
10	First Level, East Stage Wall, South	4,960
11	First Level, East Stage Wall, Center	4,510
12	First Level, East Stage Wall, North	5,870

* Sample for Visual Assessment Only

4.2 REINFORCING STEEL TENSILE TEST RESULTS

BEAR Testing Laboratory obtained two reinforcing steel samples and performed tensile strength tests. Samples were removed from the South Wall and the Stage East Wall, as indicated on Figure 3. Both reinforcing steel samples were $^{3}/_{8}$-inch-square bars with deformations. The sample removed from the South Wall was a vertical bar, whereas the sample removed from the Stage East Wall was a horizontal bar. Tensile strength test results, which were provided to ENGEO (Streeter, 2011) as authorized by the County of Santa Cruz (Gordon, 2011) are presented in Table 2, Reinforcing Steel Tensile Test Results.

TABLE 2
Reinforcing Steel Tensile Test Results

Reinforcing Steel Samples – Tensile Tests								
Reinforcing Steel Sample No.	Sample Location	Size	Cross-Sectional Area sq. inches	Yield Point, Pounds	Ultimate Tensile Load, pounds	Tensile Test Results		
						Yield Strength, psi	Tensile Strength psi	Elongation in 8-inch Gauge length percent
1	South Wall	$^{3}/_{8}$-inch square	0.142	7,376	10,680	51,900	75,200	21.4
2	East Stage Wall	$^{3}/_{8}$-inch square	0.146	7,363	10,850	50,400	74,300	20.6

According to research provided by BEAR Testing Laboratory, when the Veterans Memorial Building was constructed, the reinforcing steel standard was ASTM A15, Standard Specification for Billet-Steel Bars for Construction Reinforcement (Streeter, 2011). Both reinforcing steel samples meet the tensile test requirements for ASTM A15, Intermediate Grade (Streeter, 2011). The test results also meet today's recognized standard, ASTM A615, for Grade 40 reinforcing steel (Streeter, 2011).

5.0 ADDITIONAL SERVICES

ENGEO is available to provide additional services during future phases of this project. These services would be in addition to the scope of services authorized to ENGEO at this time and may include, but are not limited to, the following items:

1. Geotechnical and geological services during design of the proposed retrofit of the existing building. These services may include a geotechnical field exploration and a geotechnical report that discusses the potential geotechnical hazards at the project site and that provides recommendations for design.

2. Stormwater management services prior to and during the work to develop the subject property; these services may include, but are not limited to, preparation of a Stormwater Pollution Protection Plan, a Stormwater Management Plan, and/or stormwater monitoring.

3. Testing and observation services during the work to retrofit the subject property.

4. Special inspection services during the work to retrofit the subject property.

5. Consultation with you, the property owners, and others as designated by you and/or owners, including attendance at meetings.

These services are offered for your convenience in order to provide design recommendations, satisfy regulatory agencies, to evaluate plan compliance with engineering recommendations, and to make adjustments to design concepts, as appropriate, during actual site development. Please contact ENGEO regarding these additional services at your convenience.

6.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents the results of our Building Envelope Materials Evaluation for the existing Veterans Memorial Building in Santa Cruz, California. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including, but not limited to, developers, owners, buyers, architects, engineers, and designers. The conclusions and recommendations contained in this report are solely materials testing evaluations.

We strived to perform our professional services in accordance with generally accepted engineering principles and practices currently employed in the area; no warranty is expressed or implied. If unexpected conditions are encountered, notify ENGEO immediately to review these conditions.

This document must not be subject to unauthorized reuse; that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

REFERENCES

Davis-Pearce Co. *Veterans Memorial Building, Santa Cruz, California.* Project plans. Sheets A-1 through A-10 and S-1 through S-4. Undated.

Gordon, Nancy. "RE: Vet's Hall Progress". Email to the author. February 2, 2011.

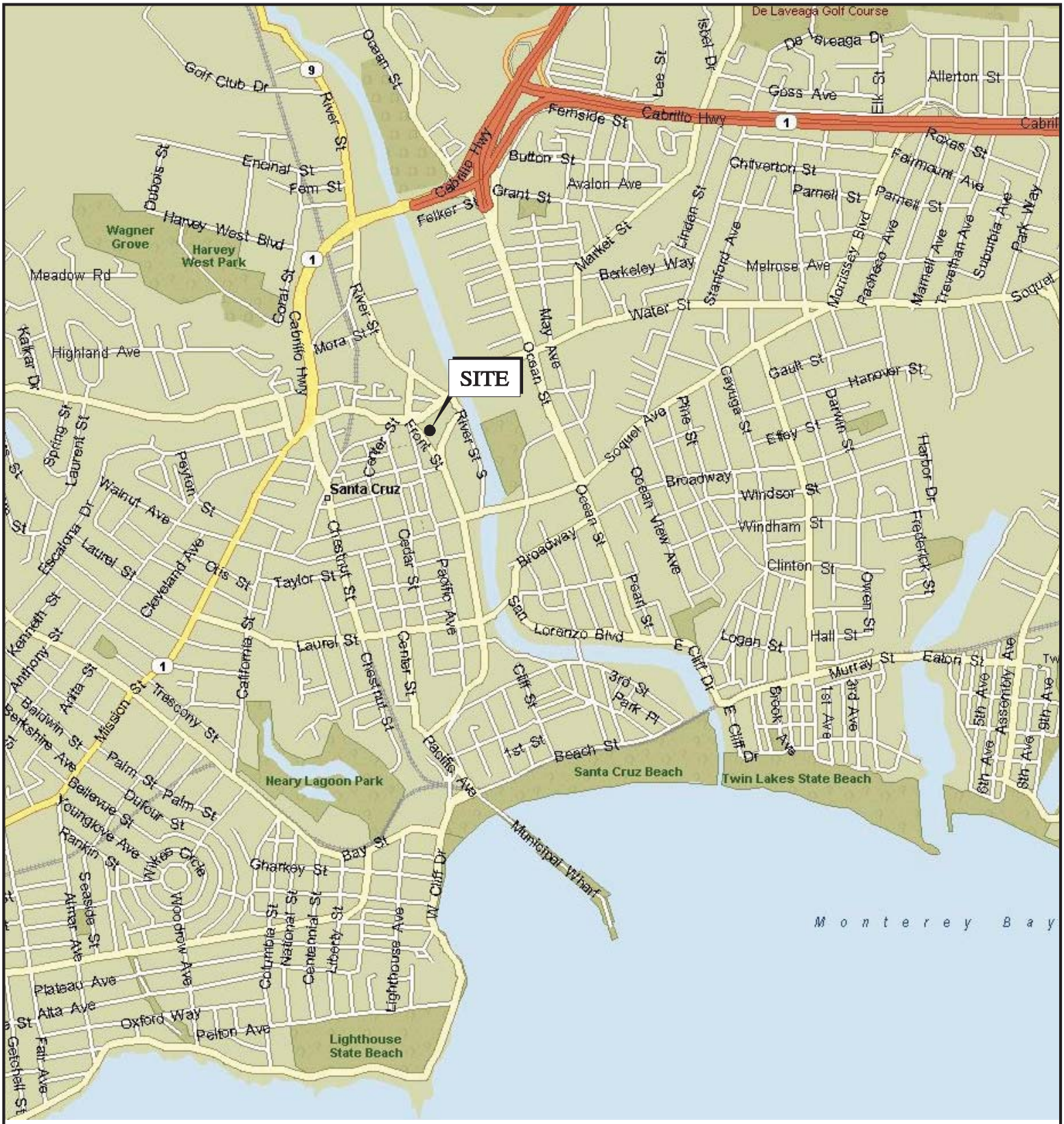
Kersten, William. "SC Veterans Building Testing Services". Email to the author. January 18, 2011.

Streeter, Brad. "RE: Veterans Memorial Building, 846 Front Street, Santa Cruz - Preliminary Test Results". Email to the author. February 2, 2011.

Streeter Group, Inc. *Seismic Evaluation Report for the Existing Veterans Memorial Building Located at 846 Front Street, Santa Cruz, CA*. SGI Job No: 10002. April 9, 2010.

FIGURES

LIST OF FIGURES



BASE MAP SOURCE: MS STREETS AND TRIPS

ENGEO Expect Excellence

VICINITY MAP

SANTA CRUZ VETERANS BUILDING REPAIR

SANTA CRUZ, CALIFORNIA

PROJECT NO.: 9185.000.000		FIGURE NO. 1
SCALE: AS SHOWN 141		
DRAWN BY: DLB	CHECKED BY: CM	

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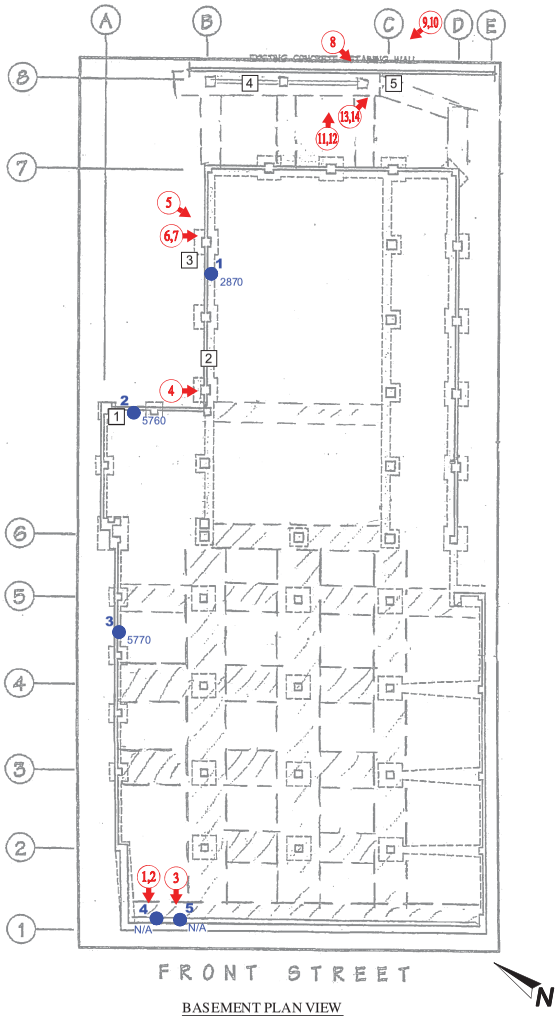

BASEMENT PLAN VIEW
NO SCALE

EXPLANATION

2 → APPROXIMATE LOCATION OF PHOTO SHOWING DIRECTION

3 / 5770 APPROXIMATE LOCATION OF CORING SHOWNING COMPRESSIVE STRENGTH (psi)

NOTES:

1. WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 16 INCHES O.C. HORIZONTAL AND VERTICAL WITH 3 INCHES OF CONCRETE COVER.
2. WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 12 INCHES O.C. HORIZONTAL AND 3/8 INCH SQUARE STEEL BARS AT 16 INCHES O.C. VERTICAL WITH 3 INCHES OF CONCRETE COVER.
3. COLUMN REINFORCING OBSERVED TO BE SIX 7/8 INCH SQUARE STEEL VERTICAL BARS, THREE AT EACH FACE, WITH 1/4 INCH SQUARE STEEL STIRRUP BARS AT 8 INCHES O.C. WITH 1 INCH OF CONCRETE COVER.
4. BEAM REINFORCING OBSERVED TO BE SIX 7/8 INCH SQUARE STEEL BARS HORIZONTAL, THREE AT THE TOP AND THREE AT THE BOTTOM, WITH 1/4 INCH SQUARE STEEL STIRRUP BARS AT 4 INCHES O.C. HORIZONTAL WITH 1 ½ INCHES OF CONCRETE COVER.
5. COLUMN REINFORCING OBSERVED TO BE FOUR 7/8 INCH SQUARE STEEL VERTICAL BARS, ONE AT EACH CORNER, WITH 1/4 INCH SQUARE STEEL BARS STIRRUP AT 12 INCHES O.C. WITH 2 INCHES OF CONCRETE COVER ON THE INTERIOR AND WITH 1 INCH OF CONCRETE COVER ON THE EXTERIOR.

WEST BASEMENT WALL CORES, 7 FT ABOVE FF

WEST BASEMENT WALL WITH INCORPORATED DEBRIS

WEST BASEMENT WALL CORES

NORTH BASEMENT LEVEL
PILASTER SPALL AT B-6.4

NORTH BASEMENT LEVEL
PILASTER AT B-6.8

NORTH BASEMENT LEVEL
PILASTER AT B-6.8 ZOOM

NORTH BASEMENT LEVEL PILASTER AT B-6.8 CLOSEUP

EAST EXTERIOR BASEMENT
COLUMN AT B.8-8

EAST EXTERIOR BASEMENT COLUMN-BEAM AT B.8-8

EAST EXTERIOR BASEMENT BEAM CLOSEUP AT B.8-8

EAST EXTERIOR BASEMENT BEAM ON LINE 8 AT B.6

EAST EXTERIOR BASEMENT BEAM ON LINE 8
AT B.6 CLOSEUP

EAST EXTERIOR BASEMENT COLUMN AT B.8-8

EAST EXTERIOR BASEMENT COLUMN AT B.8-8 CLOSEUP

BASE PLAN SOURCE: STREETER GROUP, 2010

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BASEMENT LEVEL PLAN
SANTA CRUZ VETERANS BUILDING REPAIR
SANTA CRUZ, CALIFORNIA

PROJECT NO: 9185.000.000
SCALE: AS SHOWN
DRAWN BY: DLB
CHECKED BY: CM

FIGURE NO. 2

ORIGINAL FIGURE PRINTED IN COLOR

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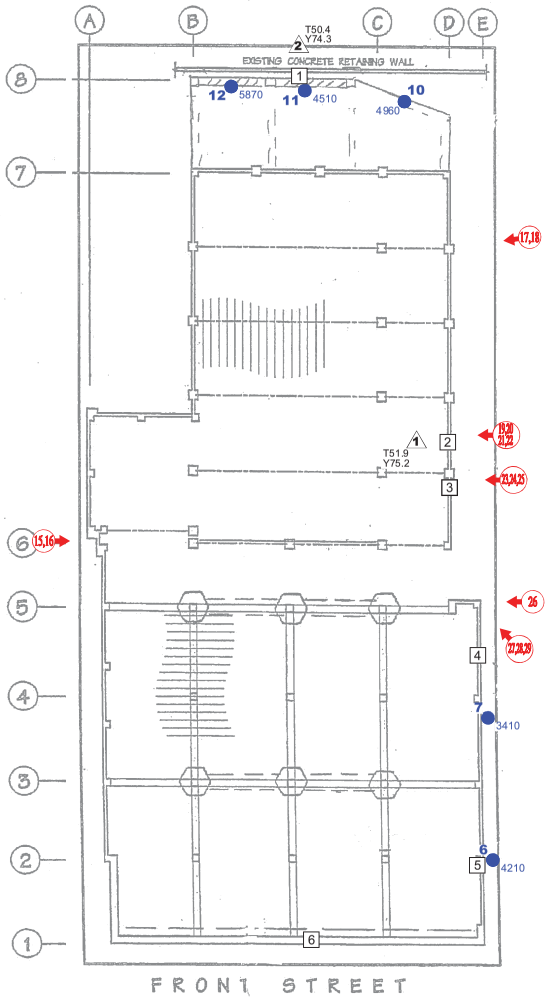


FIRST FLOOR PLAN VIEW
NO SCALE

N

EXPLANATION

- (2) → APPROXIMATE LOCATION OF PHOTO SHOWING DIRECTION
- 3 / 5770 — APPROXIMATE LOCATION OF CORING SHOWNING COMPRESSIVE STRENGTH (psi)
- 2 / T50.4 Y74.3 — APPROXIMATE LOCATION OF ATTACHED STEEL REINFORCING SAMPLE SHOWN TENSILE STRENGTH-T (ksi) AND YIELD STRENGTH-Y(ksi)

NOTES:

1. WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 12 INCHES O.C. HORIZONTAL AND 3/8 INCH SQUARE STEEL BARS AT 18 INCHES O.C. VERTICAL WITH 2 INCHES OF CONCRETE COVER.
2. WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 12 INCHES O.C. HORIZONTAL AND 3/8 INCH SQUARE STEEL BARS AT 16 INCHES O.C. VERTICAL WITH 3 ½ INCHES OF CONCRETE COVER.
3. COLUMN REINFORCING OBSERVED TO BE SIX 7/8 INCH SQUARE STEEL VERTICAL BARS, THREE EACH FACE, WITH 3/8 INCH SQUARE STEEL STIRRUP BARS AT 12 INCHES O.C. WITH 2 INCHES OF CONCRETE COVER.
4. WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 12 INCHES O.C. HORIZONTAL AND 3/8 INCH SQUARE STEEL BARS AT 16 INCHES O.C. VERTICAL WITH 3 INCHES OF CONCRETE COVER.
5. COLUMN REINFORCING OBSERVED TO BE FOUR 7/8 INCH SQUARE STEEL VERTICAL BARS, ONE AT EACH CORNER, WITH ¼ INCH SQUARE STEEL STIRRUP BARS AT 9 INCHES O.C. WITH 2 INCHES OF CONCRETE COVER.
6. WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 14 INCHES O.C. HORIZONTAL AND 3/8 INCH SQUARE STEEL BARS AT 16 INCHES O.C. VERTICAL WITH 4 INCHES OF CONCRETE COVER.

NORTH WALL, 1ST LEVEL SPALL AT A-6

NORTH WALL, 1ST LEVEL SPALL AT A-6 CLOSEUP

SOUTH WALL, 1ST LEVEL PILASTER AT D-6.8

SOUTH WALL, 1ST LEVEL PILASTER AT D-6.8 PILASTER

SOUTH WALL, 1ST LEVEL AT D-6.3 REPAIR

SOUTH WALL, 1ST LEVEL AT D-6.3 REPAIR CLOSEUP

SOUTH WALL, 1ST LEVEL AT D-6.3

SOUTH WALL, 1ST LEVEL AT D-6.3 CLOSEUP

SOUTH WALL, 1ST LEVEL PILASTER AT D-6.2

SOUTH WALL, 1ST LEVEL PILASTER AT D-6.2 CLOSEUP A

SOUTH WALL, 1ST LEVEL PILASTER AT D-6.2 CLOSEUP B

SOUTH WALL, 1ST LEVEL AT E-5

SOUTH WALL, 1ST LEVEL AT E-5 CLOSEUP A

SOUTH WALL, 1ST LEVEL AT E-5 CLOSEUP B

SOUTH WALL, 1ST LEVEL AT E-5 CLOSEUP C

BASE PLAN SOURCE: STREETER GROUP, 2010

ENGEO Expect Excellence

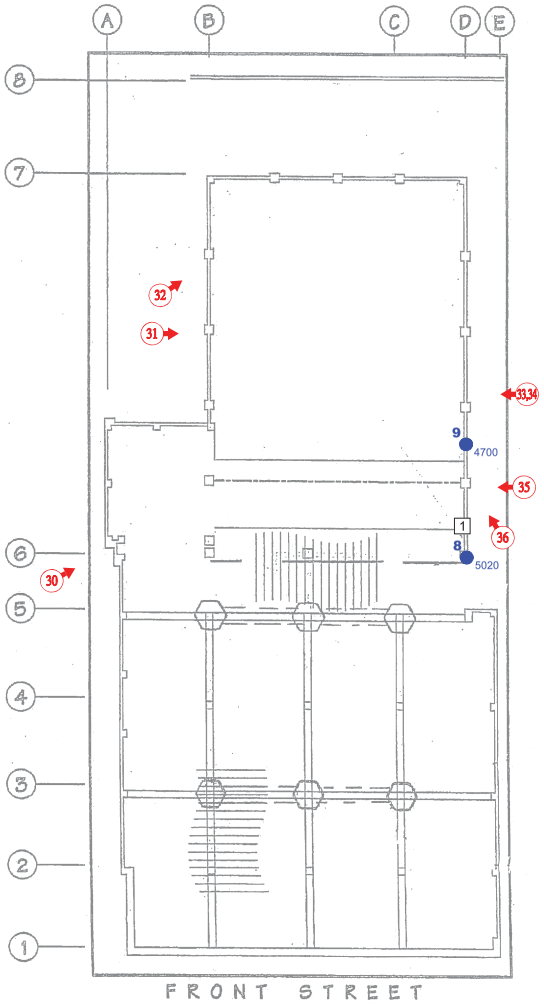
FIRST FLOOR PLAN
SANTA CRUZ VETERANS BUILDING REPAIR
SANTA CRUZ, CALIFORNIA

PROJECT NO.:	9185.000.000
SCALE:	AS SHOWN
DRAWN BY:	DLB
CHECKED BY:	CM

FIGURE NO. 3

ORIGINAL FIGURE PRINTED IN COLOR

G:\Drafting\DRAFTING2_Dwg\9185\000\SI\9185000000-SI-2-4PlanView-0211.dwg Plot Date: 2-17-11 dborde



SECOND FLOOR PLAN VIEW
NO SCALE

N

EXPLANATION

2 APPROXIMATE LOCATION OF PHOTO SHOWING DIRECTION

3 5770 APPROXIMATE LOCATION OF CORING SHOWNING COMPRESSIVE STRENGTH (psi)

NOTE:

1 WALL REINFORCING OBSERVED TO BE 3/8 INCH SQUARE STEEL BARS AT 12 INCHES O.C. HORIZONTAL AND 3/8 INCH SQUARE STEEL BARS AT 16 INCHES O.C. VERTICAL WITH 4 INCHES OF CONCRETE COVER.

NORTH WALL, 2ND LEVEL FLASHING SPALL AT A-6

NORTH WALL, 2ND LEVEL PILASTER CRACKS AT B-6.6

NORTH WALL, 2ND LEVEL PILASTER SPALL AT B-6.8

SOUTH WALL, 2ND LEVEL CORES AT D-6.3

SOUTH WALL, 2ND LEVEL CORES AT D-6.3 CLOSEUP

SOUTH WALL, 2ND LEVEL
PILASTER SPALLS AT D-6.2

SOUTH WALL, 2ND LEVEL FACING
EAST FROM E-6

BASE PLAN SOURCE: STREETER GROUP, 2010

ENGEO Expect Excellence

SECOND FLOOR PLAN
SANTA CRUZ VETERANS BUILDING REPAIR
SANTA CRUZ, CALIFORNIA

PROJECT NO: 9185.000.000
SCALE: AS SHOWN
DRAWN BY: DLB
CHECKED BY: CM

FIGURE NO. 4

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX D

GEOTECHNICAL EXPLORATION REPORT

VETERANS MEMORIAL HALL BUILDING
SEISMIC RETROFIT
SANTA CRUZ, CALIFORNIA

Submitted to:

Ms. Nancy Gordon, Director
General Services Department
County of Santa Cruz
701 Ocean Street, Room 330
Santa Cruz, CA 95060

Prepared by:
ENGEO Incorporated

June 13, 2011
Project No. 9185.000.000

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- Expect Excellence -

Project No.
9185.000.000
Phase **002**

June 13, 2011

Ms. Nancy Gordon, Director
General Services Department
County of Santa Cruz
701 Ocean Street, Room 330
Santa Cruz, CA 95060

Subject: Veterans Memorial Hall Building, Seismic Retrofit
846 Front Street
Santa Cruz, California

GEOTECHNICAL EXPLORATION REPORT

Dear Ms. Gordon:

ENGEO prepared this geotechnical exploration report for seismic retrofit of the Veterans Memorial Hall building located at 846 Front Street in Santa Cruz, California as outlined in our agreement dated March 11, 2011. We characterized the subsurface conditions at the site to provide the enclosed geotechnical recommendations for design purposes.

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to review the project plans and specifications and provide geotechnical observation and testing services during construction. Please let us know when working drawings are nearing completion, and we will be glad to discuss these additional services with you.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Riley C. Gerbrandt, PE
rcg/jaf/jf:gex

Jeff A. Fippin, GE

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FIGURES

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

ENGEO prepared this geotechnical exploration report for the seismic retrofit of the Veterans Memorial Hall building in Santa Cruz, California. We prepared this report as outlined in our agreement dated March 11, 2011. The purpose of this report is to evaluate the subsurface conditions and geologic hazards as well as provide geotechnical recommendations for seismic retrofit of the existing building. The County of Santa Cruz Board of Supervisors authorized ENGEO to conduct the proposed scope of services, which included the following:

- Subsurface field exploration
- Soil laboratory testing
- Data analysis and conclusions
- Report preparation

For our use, we received the following reports:

- Seismic Evaluation of the Veterans Memorial Building at 846 Front Street, Santa Cruz, CA, April 9, 2010, by Streeter Group, Inc., which includes Conceptual Repair Plans.

- Preliminary Geotechnical Assessment, The Veterans Memorial Building, 846 Front Street, Santa Cruz, California, March 30, 2010, by Bauldry Engineering, Inc.

- Reinforcing steel tensile strength test data conducted by BEAR Testing Laboratory of Mountain View, California; release of this data was authorized to ENGEO during previous work performed at the subject site.

- Veterans Memorial Building, Santa Cruz, California, construction architectural plan and structural plan documents by Davis-Pearce Co., undated.

ENGEO previously performed a building envelope materials evaluation of the building at the subject site in order to inspect and observe the existing structural materials and conditions of the Veterans Memorial Hall building and to obtain material strength data from selected samples. The work for this evaluation included coring the concrete walls, compressive strength testing of the concrete core samples, pachometer surveys at selected locations to verify reinforcing steel location and patterns, as well as visual inspection of the in-place reinforcing steel at selected locations. We presented our activities and findings in a report dated February 18, 2011.

This geotechnical report was prepared for the exclusive use of the County of Santa Cruz and their design team consultants for the project described in this report. In the event that any changes are made in the character, design or elements of the project, we must be contacted to review the conclusions and recommendations contained in this report to determine whether modifications are necessary. This document may not be reproduced in whole or in part by any

means whatsoever, nor may it be quoted or excerpted without our express written consent of ENGEO.

1.2 PROJECT LOCATION

The Veterans Memorial Hall building is located at 846 Front Street in Santa Cruz, California at approximately 36.976535 degrees north latitude and approximately 122.026176 degrees west longitude. This property will hereafter be referred to as the Project Site. The location of the Project Site is indicated on Figure 1, Vicinity Map. Figure 2, Site Plan shows site boundaries, the existing building, and our exploratory locations. 846 Front Street is located in the downtown area of Santa Cruz, California. The Project Site is approximately 180 feet southeast of the intersection of Water Street and Front Street. It is adjacent to the United States Post Office to the northwest, the existing Comerica Bank building to the southeast, and an existing office building to the east. The existing Flatiron Building is located to the west of the Project Site across Front Street, and the San Lorenzo River is located approximately 600 feet to the west.

1.3 PROJECT DESCRIPTION

The Veterans Memorial Hall building is located at the Project Site. The reinforced concrete building was constructed in the early 1930s and dedicated in 1932 to United States veterans. The building footprint is approximately 60 feet by 140 feet and consists of a basement level, a first floor, and a second floor. The building foundation consists of a perimeter footing and interior isolated spread footings. In 2010, the Streeter Group performed a seismic evaluation of the building and indicated in the referenced report that it is unsuitable for its current use. The Veterans Memorial Hall building was subsequently closed, and an analysis and the design for a seismic retrofit of the building is under way.

2.0 FINDINGS

2.1 FIELD EXPLORATION

Our field exploration included drilling one boring and advancing three Cone Penetration Test (CPT) soundings at various locations outside the perimeter of the Project Site. Additionally, we excavated two test pits inside the building to evaluate the existing foundation. We performed our field exploration between May 7 and May 11, 2011. Our exploration locations are shown on Figure 2, Site Plan.

The locations of our explorations were recorded by recreational grade GPS and were estimated relative to the existing building; they should be considered accurate only to the degree implied by the method used.

2.1.1 Borings

An ENGEO representative observed the drilling and logged the subsurface conditions of Boring 1-B1. We retained a CME-75 drill rig and crew to advance the boring using

$4^{7}/_{8}$-inch-diameter rotary wash drilling methods and an automatic hammer. Boring 1-B1 was advanced to a depth of approximately 75½ feet below existing grade. We backfilled the boring with neat cement grout.

We obtained soil samples at various intervals in the boring using standard penetration tests (2.5-inch O.D. split-spoon sampler) and a Modified California sampler (3-inch O.D. split-spoon sampler with brass liners). The sampler for the standard penetration tests was designed to accommodate liners, but was used without liners installed.

Blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The samplers were driven 18 inches and the number of blows was recorded for each 6 inches of penetration. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows required to drive the last 1 foot of penetration; the blow counts have not been converted using any correction factors.

We used the field logs to develop the report logs in Appendix A. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.1.2 Test Pits

We observed the excavation of two test pits within the building at the locations shown on Figure 2, Site Plan. The test pits were excavated by hand to a maximum depth of approximately 30 inches in order to expose and inspect both the existing footings and the bearing soils of these footings. An ENGEO representative supervised the test pit excavations and logged the subsurface conditions as well as foundation dimensions at each location.

We obtained soil samples from the test pits using hand-sampling techniques. The test pit logs graphically depict the foundation dimensions and describe the subsurface conditions encountered. The test pit logs are depicted in Figure 3, Interpreted Subsurface Conditions.

We used the field logs to develop the report logs. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time. The test pits were backfilled with native soil and compacted using manual compaction equipment; deformed reinforcing steel rods were epoxied into holes drilled into the existing slab, and concrete patch was poured to match the existing slab.

We used the field test pit logs to develop the report test pit logs presented in Figure 3, Interpreted Subsurface Conditions. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.1.3 Cone Penetration Tests

We retained a CPT rig to push the cone penetrometer to a maximum depth of about 77 feet in three locations. The CPT testing was performed using a cone with a 10-square-centimeter (cm^2)

base area, an apex angle of 60 degrees, and a friction sleeve with a surface area of 150 cm^2. The cone was pushed into the ground and recordings were taken at regular intervals in general accordance with ASTM D-3441. Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and pore pressure (U). CPT logs are depicted in Figure 3, Interpreted Subsurface Conditions, and presented in Appendix A.

2.2 GEOLOGY

The Project Site is located in the Santa Cruz coastal region, on the western side of the California Coast Ranges geomorphic province. The Coast Ranges are a complex series of linear mountain ranges that lie roughly parallel to the coast and to the San Andreas Fault System. The Coast Ranges are composed primarily of Tertiary to Jurassic-age bedrock that accumulated on the sea floor that was later scraped off and deposited when the oceanic plate, on which the bedrock materials originated, subducted beneath the North American plate. These rocks include a mix of altered sedimentary, volcanic, and plutonic rocks. While bedrock is exposed in the hills and cliffs around Santa Cruz, the flanks of the hills are blanketed with thin to thick layers of colluvium and alluvium (weathered material washed downslope from the bedrock exposures). Valleys are filled with water-laid alluvial stream deposits.

The soils at the Project Site are mapped as undifferentiated Holocene alluvial deposits, Qal, in the Geologic Map of Santa Cruz County, California compiled by Earl E. Brab and published in 1997. These deposits are described as unconsolidated, heterogeneous, moderately sorted silt and sand-containing discontinuous lenses of clay. In some locations, these deposits can contain large amounts of gravel. The deposit thickness is highly variable and can be over 100 feet thick near the coast.

2.3 SEISMICITY AND FAULTING

The Santa Cruz area contains numerous active earthquake faults and is a seismically active region. It should be expected that the Project Site will experience strong ground shaking during the design life of the building. An active fault has been defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 11,000 years) as described in Fault-Rupture Hazard Zones in California published in 1997 by Hart. Figure 4, Regional Faulting and Seismicity Map, shows the approximate locations of these faults and significant historic earthquakes recorded within the region.

The southern end of the Ben Lomond Fault is mapped just west of the Project Site; however, this fault is mapped as Late Quaternary and is not considered active (Holocene). The Project Site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of Holocene active faults is believed to exist within the Project Site. The two nearest earthquake faults zoned as active by the State of California Geological Survey (CGC) are the Monterey Bay-Tularcitos fault, located about 6.5 miles to the south of the Project Site, and the Zayante-Vergeles fault, located about 7.8 miles to the east of the Project Site. Fault rupture through the Project Site, therefore, is not anticipated.

According to a search using the software program EQFAULT Version 3.00b developed in 2000 by T.F. Blake and a database of known faults updated April 1, 2005, the nearest active faults and moment magnitude of earthquakes are listed in the following table:

TABLE 2.3-1
Regional Faults and Seismicity

Abbreviated Fault Name	Distance (miles)	Maximum Moment Magnitude (M_w)
Monterey Bay - Tularcitos	6.5	7.3
Zayante-Vergeles	7.8	7
San Gregorio (SGN)	9.9	7.2
San Gregorio (SGS+SGN)	9.9	7.4
San Gregorio (FLOATING)	9.9	6.9
San Andreas (SAS+SAP)	11	7.4
San Andreas (SAS)	11	7
San Andreas (SAS+SAP+SAN+SAO)	11	7.9
San Andreas (SAS+SAP+SAN)	11	7.8
San Andreas (FLOATING)	11	6.9
San Gregorio (SGS)	11.1	7
San Andreas (SAP+SAN)	13.9	7.7
San Andreas (SAP)	13.9	7.2
San Andreas (SAP+SAN+SAO)	13.9	7.8
Monte Vista - Shannon	14.9	6.7
Rinconada	25.6	7.5

Numerous small earthquakes occur every year in the Monterey Bay Area and the greater San Francisco Bay Region, and larger earthquakes have been recorded and can be expected to occur in the future. In April 2008, the 2007 Working Group on California Earthquake Probabilities (2007 WGCEP) released The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2). UCERF 2 evaluated probability of a magnitude 6.7 or greater earthquake occurring on the known active fault systems in the Bay Area within the next 30 years. UCERF 2 estimates that within 30 years of the publish date (2007 – 2037) there is a 0.6, 0.1, and 7 percent probability that a magnitude M_w = 6.7 or greater earthquake will occur on the Monterey Bay-Tularcitos, Zayante-Vergeles and San Gregorio faults, respectively. Likewise, UCERF 2 estimates a 63 percent probability of a similar sized earthquake in the San Francisco Bay Area, as a whole, in the same timeframe.

2.4 SURFACE CONDITIONS

The Project Site is located within an existing development neighboring commercial and office buildings. It is our understanding that the Veterans Memorial Hall building was constructed prior to the placement of thick fills that currently surround the Project Site. It is our understanding that the soils used for the creation of these thick fills were generated from the dredging of the nearby San Lorenzo River during construction of the existing levees for the same river. It is our understanding that the retaining walls that currently bound the Project Site to the north, east, and west were constructed to retain these thick fills.

Asphaltic concrete pavement and flatwork generally surround the Veterans Memorial Hall building. On properties immediately adjacent to the Project Site, the ground surfaces outside the building are approximately 12 to 15 feet above the Veterans Memorial Hall building foundations. Site topography in the vicinity of the Project Site gently slopes eastward.

2.5 SUBSURFACE CONDITIONS

The soil encountered in our explorations generally consisted of alluvium primarily composed of interbedded sand, silty sand, sand with silt, and gravel over mudstone bedrock. The alluvial soil thickness ranged from approximately 63 to 77 feet. Soil densities generally ranged from loose to medium dense in the upper 30 feet and medium dense to dense below 30 feet. The CPT results generally correlate well with our Boring 1-B1.

Our test pits within the building encountered a 4- to 5-inch-thick unreinforced concrete slab over fine sand with cobble. The portions of the concrete spread footings encountered were approximately 12 inches thick; the top of the footing was about 8 to 15 inches below the slab.

Consult Figure 2, Site Plan, the exploratory boring logs, the CPT logs, and Figure 3, Interpreted Subsurface Conditions, for specific subsurface conditions at each location. We include our logs of the exploration boring and CPTs in Appendix A. The log of boring contains the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The logs graphically depict the subsurface conditions encountered at the time of the exploration.

2.6 GROUNDWATER CONDITIONS

We observed static groundwater in our boring at approximately 15 to 16 feet below the ground surface outside the building. Additionally, during CPT testing, we performed pore pressure dissipation testing that indicated the groundwater was between 17 and 18 feet below the ground surface at the locations of the CPTs at the time of testing. Based on the above average precipitation this past winter and spring, we assume that the groundwater level is approximately 15 feet below the ground surface at the location of Boring 1-B1 for the purposes of this report.

Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, and other factors not evident at the time measurements were made.

2.7 LABORATORY TESTING

We performed laboratory tests on selected soil samples to determine their engineering properties. For this project, we performed moisture content, dry density, plasticity index, and sieve analysis. The laboratory test results are included on the log of Boring 1-B1 in Appendix A. Individual test results are presented in Appendix B.

2.8 LIQUEFACTION ANALYSES

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine sands below the groundwater table. Empirical evidence indicates that loose silty sands as well as lean silts and clays are also potentially liquefiable. When seismic ground shaking occurs, the soil is subjected to cyclic shear stresses that can cause excess hydrostatic pressures to develop. If excess hydrostatic pressures exceed the effective confining stress of the soil, it is said to have liquefied, and if the sand consolidates or vents to the surface during and following liquefaction, ground settlement and surface deformation may occur. In some cases, settlements of approximately 2 to 4 percent of the thickness of the liquefiable layer have been measured. In some cases, observed settlement has been amplified directly beneath a building, due to the cyclic rocking of the building foundation, as compared to the surrounding ground surface. This has been referred to as the "ratcheting" effect and is thought to be caused by the interaction of the building foundation and the surrounding soil during seismic shaking.

We advanced one boring using mud rotary drilling methods and three CPTs. As described in Section 2.5, Subsurface Conditions we encountered significant layers of loose to medium dense sand and silty sand below groundwater.

We performed analyses of liquefaction potential using on our CPT, boring, and laboratory data. In performing this analysis, we utilized the methodology presented in by Seed et al. (2003), Youd (2001), and Idriss and Boulanger (2008). CPT analysis was performed using the computer program CLiq Version 1.4.1.22 developed by GeoLogismiki. The procedure used in this software is based on the procedure introduced by the 1998 NCEER/NSF Workshops and summarized by Youd et al. (2001).

We performed these analyses using the 2010 California Building Code seismic design criteria for a seismic event, a peak ground acceleration (PGA) of 0.40g, and a moment magnitude scale (M_w) 8.0. The PGA and M_w are consistent with the methods described in the 2010 California Building Code. The results indicate the majority of the alluvial soil below the groundwater at the Project Site is potentially liquefiable. Liquefaction analysis of the CPT data is included in Appendix C.

3.0 CONCLUSIONS

The primary geotechnical concerns that could affect the building retrofit are liquefaction-related settlement and strong ground shaking. We summarize our conclusions below.

3.1 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking and ground lurching. The following sections present a discussion of these hazards as they apply to the Project Site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, lateral spreading, and landsliding is considered low to negligible at the Project Site.

3.1.1 Liquefaction

We evaluated the liquefaction potential of the subsurface soils at the Project Site by collecting CPT data, by drilling one mud rotary boring, and by collecting soils samples using standard geotechnical sampling equipment. As described in Section 2.5 above, the soils encountered in our explorations generally consisted of alluvium that is primarily composed of interbedded sand, silty sand, sand with silt, and gravel to depths of approximately 63 to 77 feet below the ground surface at the exploration locations.

Based on our analyses described in Section 2.8, we estimated the factor of safeties against liquefaction for the subsurface soils at the Project Site. Using the appropriate procedures developed by Zhang et al. (2002) or the method described in Evaluation of Settlements in Sand Deposits Following Liquefaction of Sand Under Cyclic Stresses published in 1993 by Ishihara and Yoshimme to estimate post-liquefaction volumetric strain as a function of the factor of safety against liquefaction and relative density, we estimated liquefaction-induced total settlements of approximately ½ to 2 feet may occur at the Project Site as a result of a large seismic event.

Due to the variability in calculated settlement in our explorations around the building perimeter, we estimate liquefaction-induced ground settlement could result in as much as 1.5 feet of differential settlement across the building footprint of the Veterans Memorial Hall building.

If liquefaction occurs, soil could vent to the surface causing sand boils to develop outside and possibly inside the building. Sand boils will not likely affect structural elements such as footings and grade beams, which can be designed to span the local voids caused by sand boils. However, it is possible that sand could boil up through the unreinforced floor slab.

3.1.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the region could cause considerable ground shaking at the Project Site, similar to that which has occurred in the past. To mitigate the shaking effects, the building should be designed using sound engineering judgment

and the appropriate requirements indicated in the 2010 California Building Code (CBC), as a minimum.

Section 3405.2.3 of the 2010 CBC specifies that for seismic rehabilitation of damaged existing buildings, earthquake design loads should be equivalent to those required for the original design of the building, but they should be no less than 75 percent of those required by the 2010 CBC. For qualified historical buildings, Section 8-706.1 of the 2010 California Historical Building Code stipulates that the forces utilized to evaluate structures for seismic loads "need not exceed 0.75 times the seismic forces prescribed by the 1995 edition of the California Building Code." ENGEO does not intend to recommend which of the above-described particular methods the Structural Engineer use to design the seismic retrofit for the Veterans Memorial Hall building; however, such design should be conducted using sound engineering judgment and appropriate methods as described above.

Seismic design provisions of current and existing building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, the structure should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake, as described in the Recommended Lateral Force Requirements and Tentative Commentary published in 1996 by the Structural Engineers Association of California.

3.1.3 Tsunami

Tsunamis are long sea waves, generated by displacements associated with earthquakes. These waves can reach great heights when they encounter shallow water. The Tsunami Inundation Map for Emergency Planning for the Santa Cruz Quadrangle, 2009, indicates that the Project Site is just outside the Tsunami Inundation Zone. Based on this map, it is our opinion that tsunami inundation is unlikely at the Project Site.

3.1.4 Ground Rupture

Since there are no known active faults crossing the property and the Project Site is not located within an Earthquake Fault Special Study Zone, it is our opinion that ground rupture is unlikely at the Project Site.

3.1.5 Ground Lurching

Ground lurching is a result of the rolling motion imparted to the ground surface during energy released by an earthquake. Such rolling motion can cause ground cracks to form in weaker soils. The potential for the formation of these cracks is considered greater at contacts between deep alluvium and bedrock. Such an occurrence is possible at the Project Site as in other locations in the region, but based on the location of the Project Site and on the consistent depth of alluvium across the footprint of the Project Site, it is our opinion that the offset is expected to be very minor.

3.1.6 Flooding

Based on site elevation and distance from water sources, flooding is not expected at the Project Site; however, the Civil Engineer should review pertinent information relating to possible flood levels for the Project Site based on final pad elevations and provide appropriate design measures for development of the project, if necessary.

3.2 CBC SEISMIC DESIGN PARAMETERS

Since Section 3405.2.3 of the 2010 CBC and Section 8-706.1 of the 2010 California Historical Building Code indicate that the seismic design parameters of the 2010 CBC or of the 1995 CBC may be used as the basis for the design of the seismic retrofit of the Veterans Memorial Hall building at the Project Site, we provide the 2010 CBC seismic parameters in Table 3.2-1 and the 1995 CBC seismic parameters in Table 3.2-2, below.

Although the subsurface soils at Project Site can be classified as Site Class F using the criteria set forth in Section 1613.5.2 of the 2010 CBC, Section 20.3.1 of the Minimum Design Loads for Buildings and Other Structures, ASCE/SEI Publication 7-05 originally published in 2005 by the American Society of Civil Engineers (ASCE) indicates that a Site Class A, B, C, or D may be used for a site in accordance with Section 20.3 of ASCE 7-05 for structures having fundamental periods of vibration less than 0.5 seconds. Based on the existing building construction of the Veterans Memorial Hall, we estimate that the fundamental period of vibration for the Veterans Memorial Hall is less than 0.5 seconds. Therefore, since the average standard penetration resistance of the subsurface soils at the Project Site observed during our field investigation is approximately greater than 15 but less than 50, we have evaluated the subsurface soils at the Project Site utilizing Site Class D.

TABLE 3.2-1
2010 CBC Seismic Design Parameters

Parameter	Design Value
Site Class	D
0.2 second Spectral Response Acceleration, S_S	1.50
1.0 second Spectral Response Acceleration, S_1	0.60
Site Coefficient, F_A	1.00
Site Coefficient, F_V	1.50
Maximum considered earthquake spectral response accelerations for short periods, S_{MS}	1.50
Maximum considered earthquake spectral response accelerations for 1-second periods, S_{M1}	0.90
Design spectral response acceleration at short periods, S_{DS}	1.00
Design spectral response acceleration at 1-second periods, S_{D1}	0.60
Long period transition-period, T_L	12

In conformance with Section 1629 of the 1995 CBC, we provide the seismic parameters in Table 3.2-2, below.

TABLE 3.2-2
1995 CBC Seismic Design Parameters

Parameter	Design Value
Seismic Zone	4
Seismic Zone Factor, Z	0.40
Soil Profile Type	S_D
Seismic Coefficient, Ca	0.44Na
Seismic Coefficient, Cv	0.64Nv
Approximate Distance from a B-type Source	12.56 km
Approximate Distance from an A-type Source	15.88 km
Near-Source Factor, Na	1.0
Near-Source Factor, Nv	1.0

Section 21 of ASCE 7-05 describes procedures for developing site-specific ground motions for seismic design. As mentioned above, we have provided seismic design parameters from the 2010 CBC and the 1995 CBC based on Section 20.3 of ASCE 7-05 and an assumed fundamental period of vibration of less than 0.5 seconds for the Veterans Memorial Hall building. If site-specific ground motions for seismic design are required for the proposed seismic

rehabilitation of the Veterans Memorial Hall building, ENGEO can provide these services as an additional scope of work, since these services are not covered under the scope of work authorized to ENGEO at the time of the publication of this report.

4.0 CONSTRUCTION MONITORING

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to:

1. Review the final foundation plans and specifications prior to construction to determine whether our recommendations have been implemented, and to provide additional or modified recommendations, if necessary. This also allows us to check if any changes have occurred in the nature, design or location of the proposed improvements and provides the opportunity to prepare a written response with updated recommendations.

2. Perform construction monitoring to check the validity of the assumptions we made to prepare this report. Sufficient notification to us prior to construction is essential.

If we are not retained to perform the services described above, then we are not responsible for any party's interpretation of our report (and subsequent addenda, letters, and verbal discussions).

5.0 RECOMMENDATIONS

Our recommendations include design parameters and discussion for various alternatives that may be considered for seismic retrofit of the subject building.

5.1 SHALLOW FOUNDATION IMPROVEMENT

Shallow foundation retrofit may consist of reinforced concrete grade beams or a structural mat spanning between existing footings creating a rigid foundation system to resist damage that may be caused by a seismic event. Shallow foundation improvements will not prevent building settlement if liquefaction occurs. However, at a minimum, shallow foundation improvements should be incorporated into the seismic rehabilitation design to prevent building collapse. In the event that settlement of the building occurs as a result of a seismic event, the owner should be aware that repair of the utility connections, building entrances, and non-structural elements of the building may be necessary. If the building is designed to allow for settlement during a seismic event, consideration should be given to installing flexible utility connections for any life-line utilities. Due to the magnitude of theoretical settlement, releveling of the building may be necessary after a design level earthquake event to return the building to service.

In order to provide foundation design parameters for conditions that are anticipated to occur during a design seismic event, we evaluated the residual shear strength of the subsurface soils near the existing foundations at the Project Site using the CPT data. Utilizing the methods for strength loss calculation developed by Olsen and Stark (2002), we estimated that the residual

undrained shear strength of the soils underlying the existing foundations to be approximately 215 to 550 psf.

Therefore, although new foundations could be designed for a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for dead plus live loads under static conditions, we recommend that **new foundations be designed for a lower-bound maximum allowable bearing pressure of 700 psf** due to the estimated residual shear strength of the bearing soils during a design seismic event. This bearing capacity may be increased by one-third for the short-term effects of wind loading; however, it should not be increased for seismic loading.

All new foundations should be constructed in approved engineered fill, as described in Section 5.4 of this report.

A modulus of subgrade reaction, k, of 20 pounds per cubic inch may be used for design of the foundation improvements.

Due to the effects of ground displacement during a design seismic event, the grade beam system or structural slab should be designed to span loads across a minimum distance of 15 feet in which no support is provided by the subgrade soils.

Lateral loads may be resisted by friction along the base and by passive pressure along the sides of building foundation. The passive pressure is based on an equivalent fluid pressure in pounds per cubic foot (pcf). We recommend the following allowable values for design:

- Passive Lateral Pressure: 150 pcf
- Coefficient of Friction: 0.30

5.2 DEEP FOUNDATIONS

Deep foundations may be considered to mitigate liquefaction-induced settlement. The access constraints of the existing building will need to be considered when evaluating this alternative. Deep foundations would need to be installed through the existing basement floor and/or around the existing perimeter foundations. To mitigate the affects of seismically induced liquefaction settlements, these foundations should extend through the alluvial soil and be embedded a minimum of 5 feet into the underlying mudstone. Applicable deep foundation systems would likely consist of micropiles.

Micropiles, for the purposes of this report, are drilled foundation elements ranging from 7 to 12 inches in diameter. Micropiles will gain their support primarily from skin friction and end bearing in the mudstone under the alluvial soil. The piles will consist of a central reinforcing element of a high strength reinforcing steel bar surrounded by cement grout. The grout can be placed by gravity only (Type A construction per FWHA-SA-97-070) or the grout can be injected under pressure and/or the pile can be "post grouted" to increase the capacity (Types B, C, or D construction in accordance with FWHA-SA-97-070). The upper portion of the pile may include a steel casing to increase the structural capacity.

In order to allow for flexibility in the contractor's means and methods, micropiles are generally procured through a design-build process. The contractor is required to submit a detailed design and to demonstrate that the design meets the project design criteria through field testing.

Because of the liquefiable soil at the Project Site, foundations that penetrate through the alluvium into the underlying rock will need to be designed to accommodate for downdrag from the settling soil. For preliminary purposes, a nominal grout-to-ground bond stress of 4,000 psf may be assumed for the mudstone. For preliminary design purposes, the drawdown loading should be assumed to be 1,000 psf assuming Type A construction. The contractor should consider that post-grouting techniques (Types B, C, or D) will result in increased downdrag loading in the alluvial soil. Grade beams installed to interconnect micropiles can be designed using the recommendations of Section 5.1 of this report.

5.3 GROUND IMPROVEMENT

Ground improvement techniques may be another possible method to mitigate liquefaction-induced settlement. Due to the access constraints of the existing building, ground improvement would likely be limited to grouting techniques. Grouting techniques would likely include pressure grouting or jet grouting of the alluvial soil likely to a depth of approximately 60 feet below the basement level. Grouting could have the additional benefit of reducing theoretical liquefaction by increasing the stiffness of the subsurface soils at the Project Site. As with micropiles, significant variability exists in contractor means and methods for grouting; to allow for flexibility in the contractor's means and methods, ground improvement is generally procured through a design-build process. The contractor is required to submit a detailed design and to demonstrate that the design meets the project design criteria through field verification of construction.

5.4 FILL COMPACTION

After the locations of the proposed new foundations have been properly cleared and necessary excavations have been made, excavated portions of the Project Site should be scarified 6 inches, moisture conditioned to 1 percentage point above optimum moisture content, and compacted to a minimum relative compaction of 95 percent.

It is important that all site preparation, including demolition and stripping, be done under the observation of ENGEO and be carried out according to the requirements contained herein. ENGEO should be contacted to provide recommendations for placement of fills in any other portion of the Project Site prior to the start of such work.

5.5 EXCAVATIONS AND EARTHWORK

If any excavations or other earthwork other than described in Section 5.4 above, is proposed as part of the proposed development for the Project Site, ENGEO should be contacted to provide recommendations for such earthwork prior to the start of such activities.

6.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents geotechnical recommendations for design of the improvements discussed in Section 1.3 for the subject project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers. The conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted geotechnical engineering principles and practices currently employed in the area; no warranty is expressed or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks or provide insurance; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data is representative of the actual subsurface conditions across the Project Site. Considering possible underground variability of soil, rock, stockpiled material, and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, notify ENGEO immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

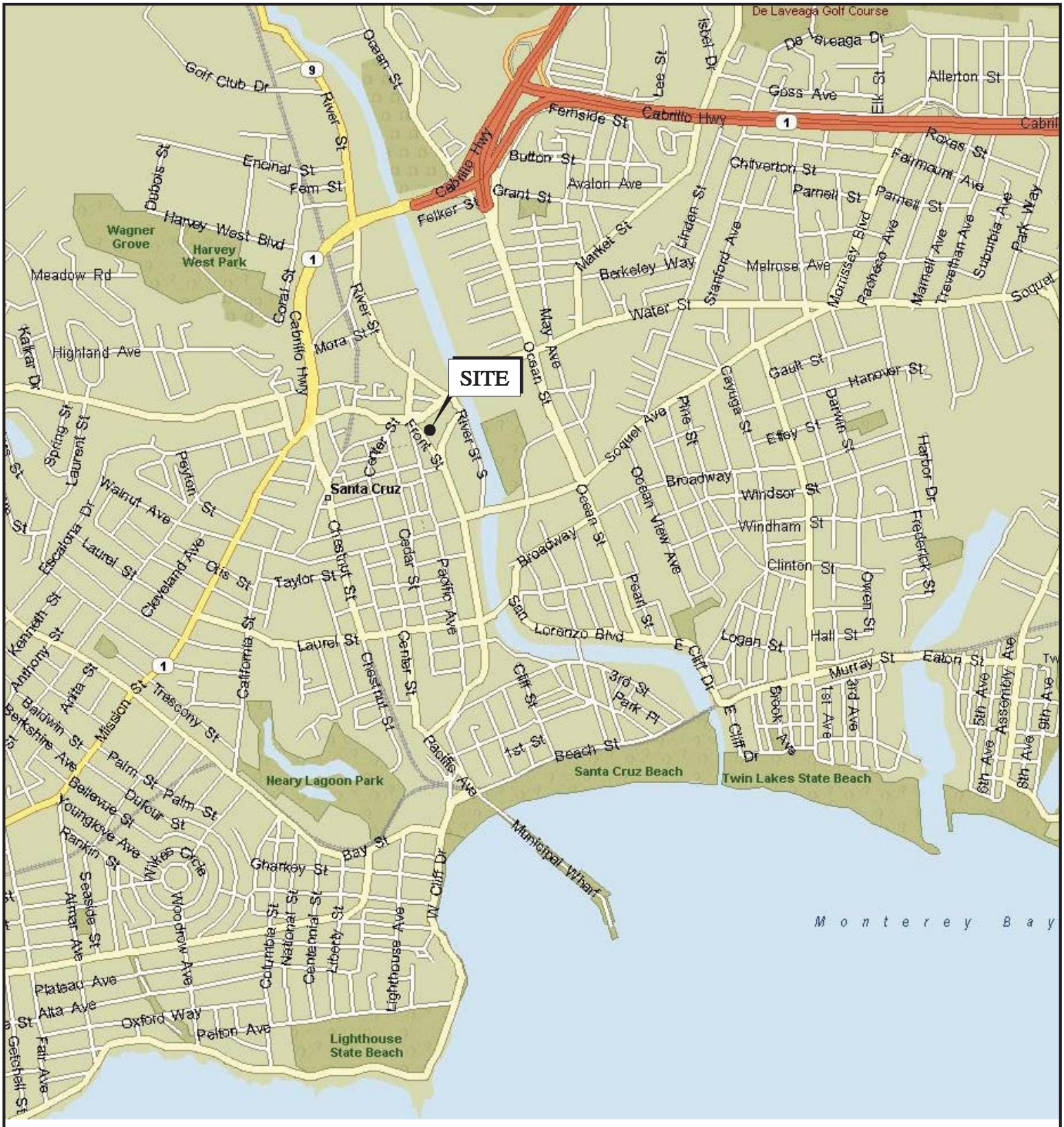
Our services did not include excavation sloping or shoring, soil volume change factors, flood potential, or a geohazard exploration. In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, then notify the proper regulatory officials immediately.

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to ENGEO's documents. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If ENGEO's scope of services does not include onsite construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

We determined the lines designating the interface between layers on the exploration logs using visual observations. The transition between the materials may be abrupt or gradual. The exploration logs contain information concerning samples recovered, indications of the presence of various materials such as clay, sand, silt, rock, existing fill, etc., and observations of groundwater encountered. The field logs also contain our interpretation of the subsurface conditions between sample locations; therefore, the logs contain both factual and interpretative information. Our recommendations are based on the contents of the final logs, which represent our interpretation of the field logs.

FIGURES



BASE MAP SOURCE: MS STREETS AND TRIPS

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VICINITY MAP

SANTA CRUZ VETERANS BUILDING SEISMIC RETROFIT

SANTA CRUZ, CALIFORNIA

PROJECT NO.: 9185.000.000	FIGURE NO. 1
SCALE: AS SHOWN	
DRAWN BY: DLB	CHECKED BY: DEB

G:\Drafting\DRAFTING2_Dwg\9185\000\9185000000-1-VicMap-0611.dwg Plot Date: 6-13-11 dborde

ORIGINAL FIGURE PRINTED IN COLOR

EXPLANATION

1-B1 APPROXIMATE LOCATION OF BORING

CPT-2 APPROXIMATE LOCATION OF CONE PENETRATION TEST

T-2 APPROXIMATE LOCATION OF TEST PIT (INSIDE BUILDING)

A A' APPROXIMATE LOCATION OF CROSS SECTION (SEE FIG. 3)

N

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SITE PLAN

SANTA CRUZ VETERANS BUILDING SEISMIC RETROFIT

SANTA CRUZ, CALIFORNIA

PROJECT NO.: 9185.000.000

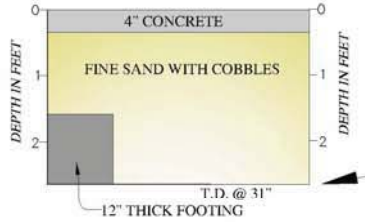
SCALE: NO SCALE

DRAWN BY: SRP CHECKED BY: DEB

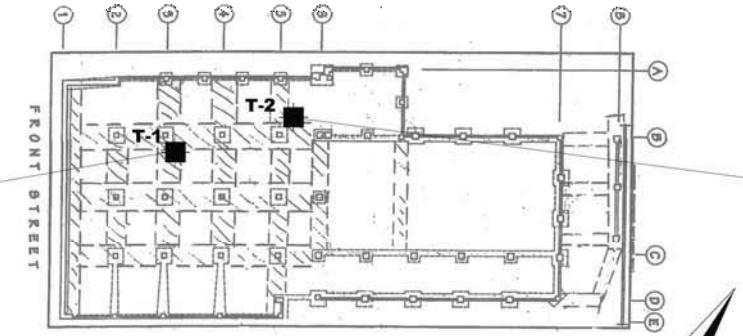
FIGURE NO. 2

G:\Drafting\DRAFTING2_Dwg\9185\000\9185000000-2-SitePlan-0611.dwg Plot Date: 6-13-11 dborde

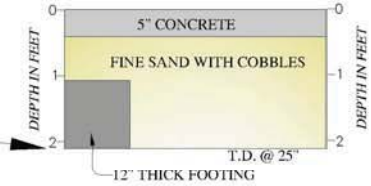
ORIGINAL FIGURE PRINTED IN COLOR



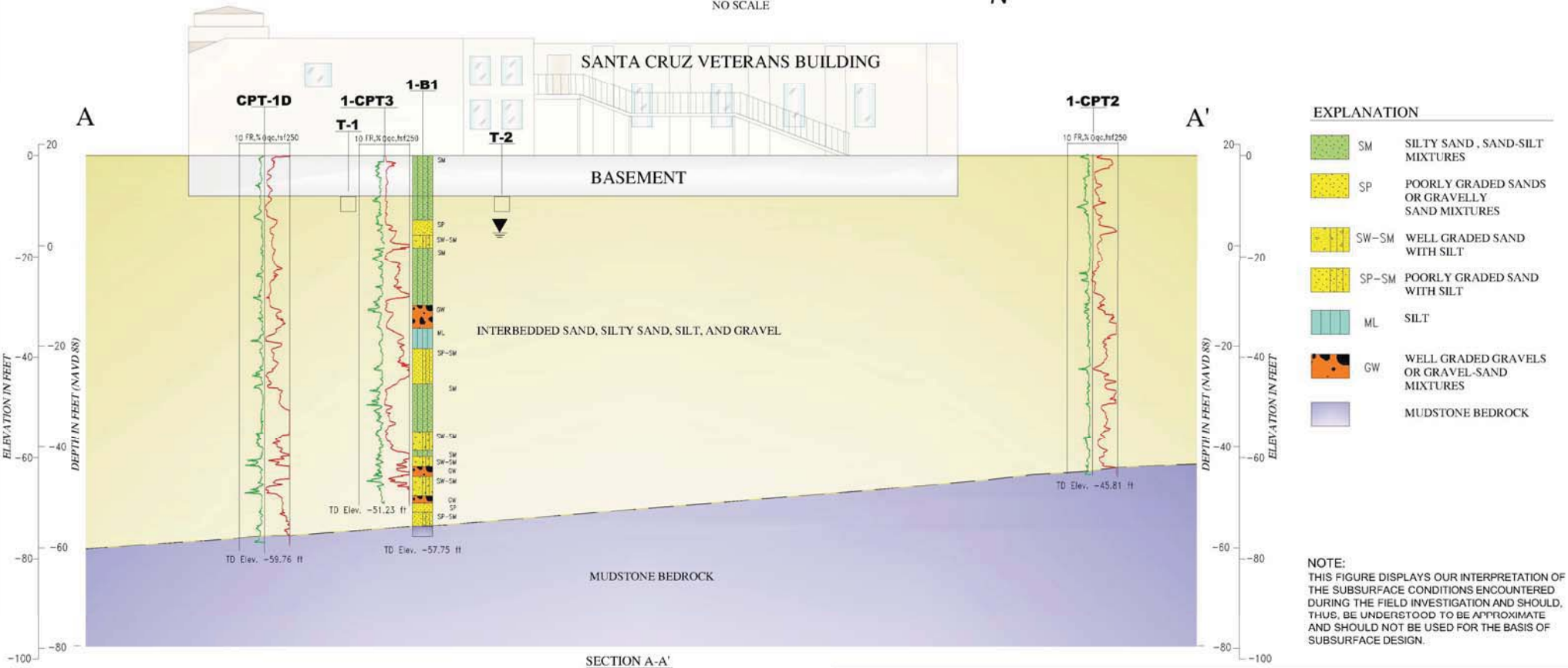
TEST PIT T-1 LOG
1"=2'



BASEMENT PLAN VIEW
NO SCALE



TEST PIT T-2 LOG
1"=2'



SECTION A-A'
1"=20' H:V

NOTE:
THIS FIGURE DISPLAYS OUR INTERPRETATION OF THE SUBSURFACE CONDITIONS ENCOUNTERED DURING THE FIELD INVESTIGATION AND SHOULD, THUS, BE UNDERSTOOD TO BE APPROXIMATE AND SHOULD NOT BE USED FOR THE BASIS OF SUBSURFACE DESIGN.

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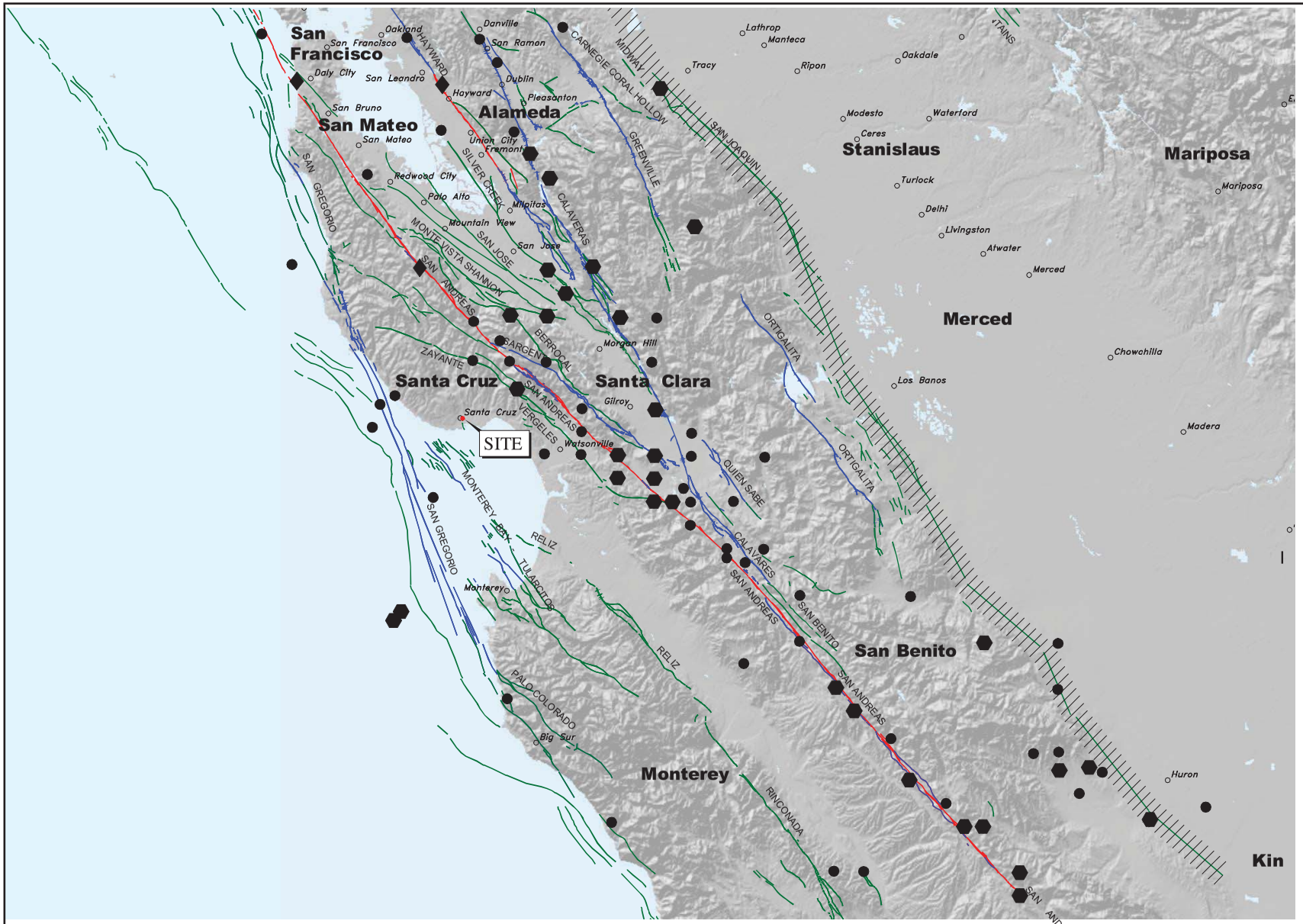
INTERPRETED SUBSURFACE CONDITIONS
SANTA CRUZ VETERANS BUILDING SEISMIC RETROFIT
SANTA CRUZ, CALIFORNIA

PROJECT NO.: 9185.000.000
SCALE: AS SHOWN
DRAWN BY: SRP CHECKED BY: DEB
FIGURE NO. 3

ORIGINAL FIGURE PRINTED IN COLOR



BASE MAP SOURCE:
U.S.G.S. 1-ARC SECOND S.R.T.M. DATABASE
U.S.G.S. QUATERNARY FAULT DATABASE, MARCH, 2006
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800-2000)

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REGIONAL FAULTING AND SEISMICITY
SANTA CRUZ VETERANS BUILDING SEISMIC RETROFIT
SANTA CRUZ, CALIFORNIA

PROJECT NO.: 9185.000.000
SCALE: AS SHOWN
DRAWN BY: SRP CHECKED BY: DEB

FIGURE NO. 4

ORIGINAL FIGURE PRINTED IN COLOR

G:\Drafting\DRAFTING2_Dwg\9185\000\9185000000-4-FaultMap-0611.dwg Plot Date: 6-13-11 dborde

APPENDIX A

Key to Boring Logs
Logs of Boring and CPTs

KEY TO BORING LOGS

MAJOR TYPES			DESCRIPTION
COARSE-GRAINED SOILS MORE THAN HALF OF MAT'L LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW - Well graded gravels or gravel-sand mixtures GP - Poorly graded gravels or gravel-sand mixtures
		GRAVELS WITH OVER 12 % FINES	GM - Silty gravels, gravel-sand and silt mixtures GC - Clayey gravels, gravel-sand and clay mixtures
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	SW - Well graded sands, or gravelly sand mixtures SP - Poorly graded sands or gravelly sand mixtures
		SANDS WITH OVER 12 % FINES	SM - Silty sand, sand-silt mixtures SC - Clayey sand, sand-clay mixtures
FINE-GRAINED SOILS MORE THAN HALF OF MAT'L SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50 % OR LESS		ML - Inorganic silt with low to medium plasticity CL - Inorganic clay with low to medium plasticity OL - Low plasticity organic silts and clays
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 %		MH - Elastic silt with high plasticity CH - Fat clay with high plasticity OH - Highly plastic organic silts and clays
	HIGHLY ORGANIC SOILS		PT - Peat and other highly organic soils

For fine-grained soils with 15 to 29% retained on the #200 sieve, the words "with sand" or "with gravel" (whichever is predominant) are added to the group name.

For fine-grained soil with >30% retained on the #200 sieve, the words "sandy" or "gravelly" (whichever is predominant) are added to the group name.

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4 "	3"	12"	
SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS AND GRAVELS	BLOWS/FOOT (S.P.T.)
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

CONSISTENCY

SILTS AND CLAYS	STRENGTH*
VERY SOFT	0-1/4
SOFT	1/4-1/2
MEDIUM STIFF	1/2-1
STIFF	1-2
VERY STIFF	2-4
HARD	OVER 4

SAMPLER SYMBOLS

- Modified California (3" O.D.) sampler
- California (2.5" O.D.) sampler
- S.P.T. - Split spoon sampler
- Shelby Tube
- Continuous Core
- Bag Samples
- Grab Samples
- NR No Recovery

MOISTURE CONDITION

DRY	Dusty, dry to touch
MOIST	Damp but no visible water
WET	Visible freewater

LINE TYPES

- ———— Solid - Layer Break
- – – – – – Dashed - Gradational or approximate layer break

GROUND-WATER SYMBOLS

- Groundwater level during drilling
- Stabilized groundwater level

(S.P.T.) Number of blows of 140 lb. hammer falling 30" to drive a 2-inch O.D. (1-3/8 inch I.D.) sampler

* Unconfined compressive strength in tons/sq. ft., asterisk on log means determined by pocket penetrometer

ENGEO INCORPORATED

Log of Boring 1-B1

ENGEO Expect Excellence

Veterans Memorial Building
846 Front Street
Santa Cruz, California
Project Number 9185.000.000

Date Drilled	: May 10, 2011	Logged/Reviewed By:	R. Gerbrandt/D. Haynosch
Hole Depth (feet)	: 75' 9"	Drilling Contractor	: Precision Sampling
Surface Elev (ft-msl)	: Approximately 18	Drilling Method	: HSA/Mud Rotary
Approx. Latitude	:	Hammer Type	: Auto Trip Hammer
Approx. Longitude	:	Hole Diameter (in)	: 8"

Depth (ft)	Surf. Elev.	GRAPHIC	USCS	Sample	Blow Count / Foot	DESCRIPTION	Water Level	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) * field approx.	Percent Passing #200 Sieve	Plasticity Index
0	0		AC			2 Inches of asphalt concrete						
1	-1		SM			SILTY SAND (SM), yellowish-brown, moist, 75% fine to coarse sand, less than 15% fines, 10% subangular to subrounded gravels up to 3/4 inch.						
2	-2					Changes to dark brown						
3	-3											
4	-4											
5	-5											
6	-6											
7	-7											
8	-8											
9	-9											
10	-10				6	Brown, loose				14.3	19.2	
11	-11											
12	-12											
13	-13		SP			Poorly Graded SAND (SP), grayish-brown, medium dense, moist, 90% fine to coarse sand, trace fines, 10% sunrounded gravel up to 3 inches						
14	-14											
15	-15				18		▼				1.6	
16	-16		SW-SM		7	Well Graded SAND with SILT (SW-SM), brown, medium dense, saturated, 80% fine- to medium sand, 10% fines, 10% subrounded gravels up to 1 inch						
17	-17											
18	-18				12							
19	-19		SM		4	SILTY SAND (SM), dark grey, saturated, loose, 80% fine- to medium sand, 20% fines, trace gravel						
20												

Log of Boring 1-B1

ENGEO Expect Excellence

Veterans Memorial Building
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Santa Cruz, California
Project Number 9185.000.000

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Depth (ft)	Surf. Elev.	GRAPHIC	USCS	Sample	Blow Count / Foot	DESCRIPTION	Water Level	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) * field approx.	Percent Passing #200 Sieve	Plasticity Index
20	-20				12					23.8	17.9	
21	-21											
22	-22				10	Medium dense, trace fine subrounded gravel						
23	-23											
24	-24											
25	-25		SM									
26	-26				12	75% fine- to medium sand, 25% fines				31.9		
27	-27				9	Loose					20.4	NP
28	-28											
29	-29											
30	-30				41	Well Graded GRAVEL (GW), gray, saturated, medium dense to dense, 85% fine subangular to subrounded gravel, 10% coarse sand, less than 5% fines.						
31	-31											
32	-32		GW		14					15.2	4.2	
33	-33											
34	-34											
35	-35				11	SILT (ML), dark grey, dense, saturated						
36	-36		ML									
37	-37											
38	-38				5					31.8	88.4	
39	-39		SP-SM		16	Poorly Graded SAND with SILT (SP-SM), gray, medium dense, saturated, 90% fine sand, 10% fines					9.6	
40												

Log of Boring 1-B1

Expect Excellence

Veterans Memorial Building
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Santa Cruz, California
Project Number 9185.000.000

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Approx. Latitude	:	Hammer Type	: Auto Trip Hammer
Approx. Longitude	:	Hole Diameter (in)	: 8"

Depth (ft)	Surf. Elev.	GRAPHIC	USCS	Sample	Blow Count / Foot	DESCRIPTION	Water Level	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) * field approx.	Percent Passing #200 Sieve	Plasticity Index
40	-40		SP-SM									
41	-41											
42	-42											
43	-43											
44	-44											
45	-45											
46	-46		SM		35	SILTY SAND (SM), dark grey, dense, saturated, 85% fine to coarse sand, 15% fines				18.7	9.0	NP
47	-47				24							
48	-48											
49	-49											
50	-50											
51	-51				35					21.1	13.6	
52	-52											
53	-53											
54	-54											
55	-55		SW-SM		38	Well Graded SAND with SILT (SW-SM), dark grey, medium dense, saturated, 90% fine- to medium sand, 10% fines				12.9	9.2	NP
56	-56											
57	-57				14					17.4	9.7	NP
58	-58									16.4	10.5	
59	-59		SM		40	SILTY SAND (SM), dark grey, medium dense, saturated, 85% fine to coarse sand, 15% fines				19.1	14.8	
60					16							

Log of Boring 1-B1

ENGEO Expect Excellence

Veterans Memorial Building
846 Front Street
Santa Cruz, California
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Approx. Longitude	:	Hole Diameter (in)	: 8"

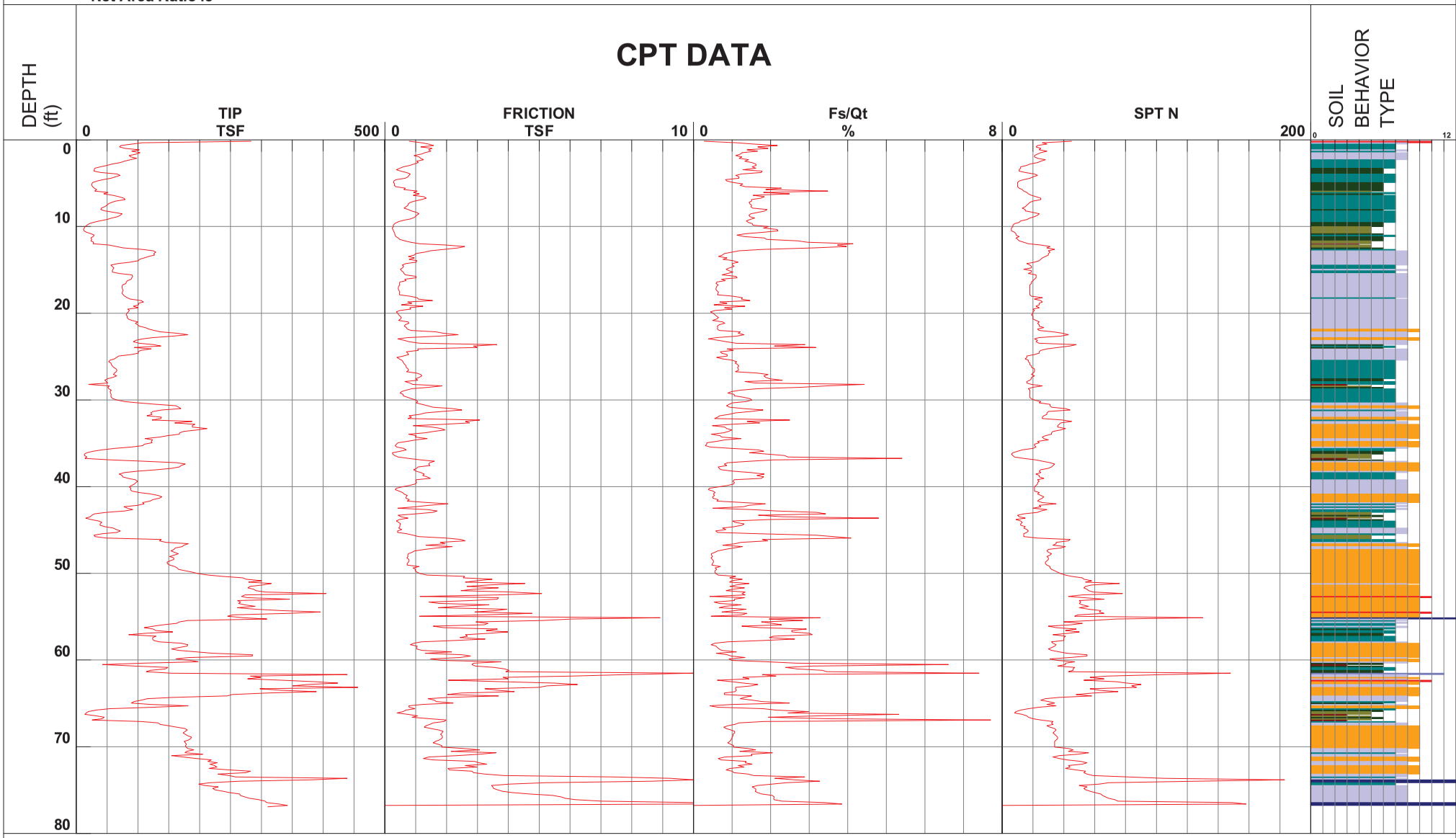
Depth (ft)	Surf. Elev.	GRAPHIC	USCS	Sample	Blow Count / Foot	DESCRIPTION	Water Level	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) * field approx.	Percent Passing #200 Sieve	Plasticity Index
60	-60		SW-SM		16	Well Graded SAND with SILT (SW-SM), dark grey, medium dense, saturated, 90% fine- to medium sand, 10% fines					10.0	
61	-61											
62	-62		GW			Well Graded GRAVEL (GW), gray, dense, saturated, 60% subangular fine to coarse gravel, 35% fine to coarse sand, 5% fines						
63	-63											
64	-64		SW-SM		42	Well Graded SAND with SILT (SW-SM), brownish-gray, dense, saturated, 90% fine to coarse sand, 10% fines, trace fine gravel						
65	-65											
66	-66				15	Dark grey, medium dense, 85% fine to coarse sand, 5% subangular to subrounded gravel					7.8	
67	-67											
68	-68		GW		68	Well Graded GRAVEL (GW), dark grey, very dense, saturated, 60% gravel, 35% sand, trace fines						
69	-69											
70	-70		SP		19	Poorly Graded SAND (SP), dark grey, very dense, saturated, 95% fine- to medium sand, 5% fines						
71	-71											
72	-72		SP-SM		48	Poorly Graded SAND with SILT (SP-SM), dark grey, very dense, saturated, 80% fine to coarse sand, 10% fines, 10% fine to coarse gravel				15.1	8.9	
73	-73				69/10"							
74	-74		MS			MUDSTONE, very dark brown, hard, moist						
75	-75				50/3"							
76	-76					Boring Terminated at 75' 9". Groundwater encountered durign drilling at 15 1/2 feet. Boring backfilled with grout.						
77	-77											
78	-78											
79	-79											
80												

Engeo

Project	Veterans Memorial Hall	Operator	DM-RB	Filename	SDF(278).cpt
Job Number	9185000000	Cone Number	DSG1023	GPS	
Hole Number	CPT-01D	Date and Time	5/7/2011 1:06:31 PM	Maximum Depth	76.93 ft
Water Table Depth		17.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

177

Cone Size 10cm squared

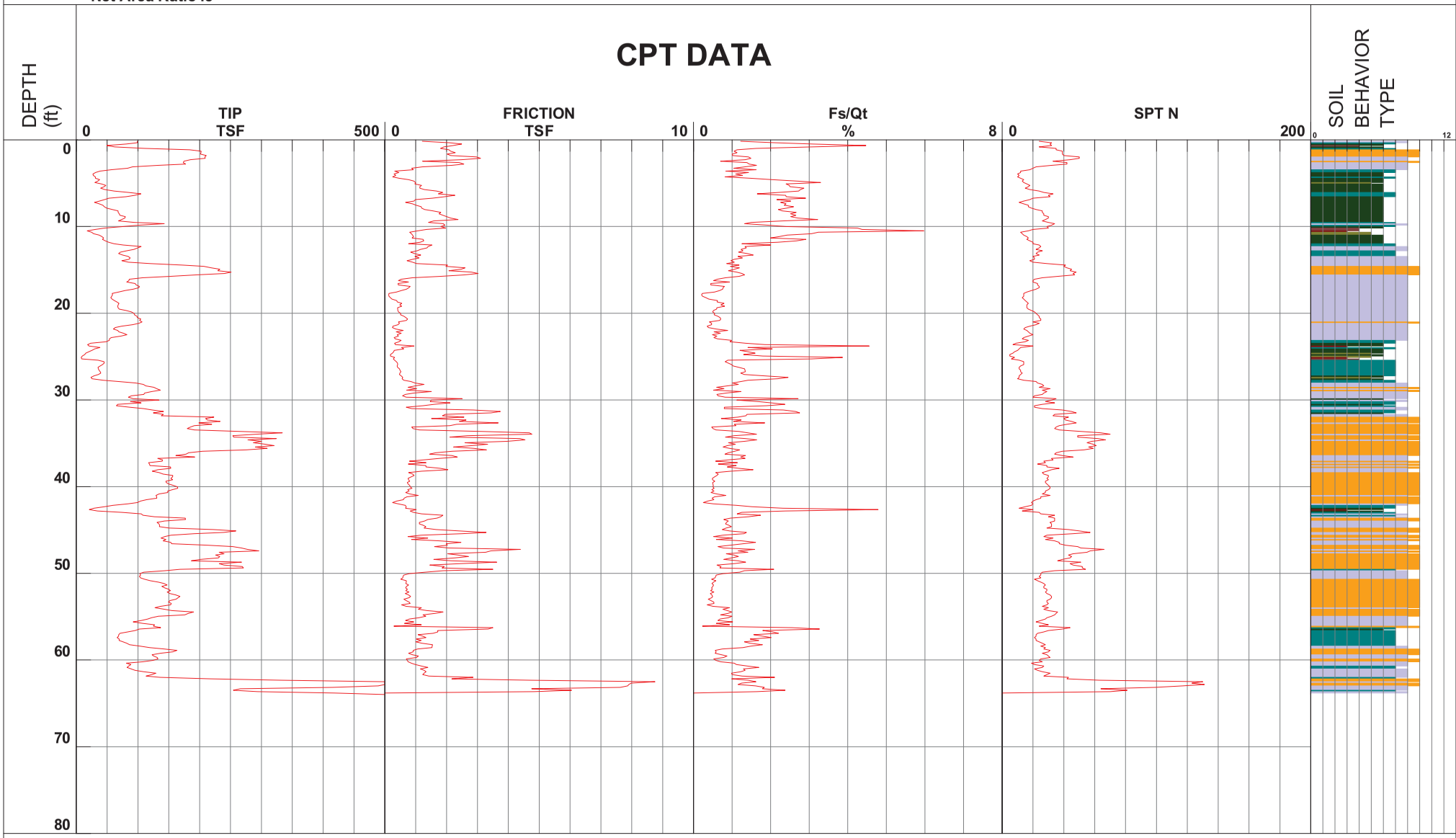
*Soil behavior type and SPT based on data from UBC-1983

Engeo

Project	Veterans Memorial Hall	Operator	DM-RB	Filename	SDF(276).cpt
Job Number	9185000000	Cone Number	DSG1023	GPS	
Hole Number	CPT-02	Date and Time	5/7/2011 8:59:44 AM	Maximum Depth	63.98 ft
Water Table Depth		17.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

*Soil behavior type and SPT based on data from UBC-1983

PRESSURE

Engeo

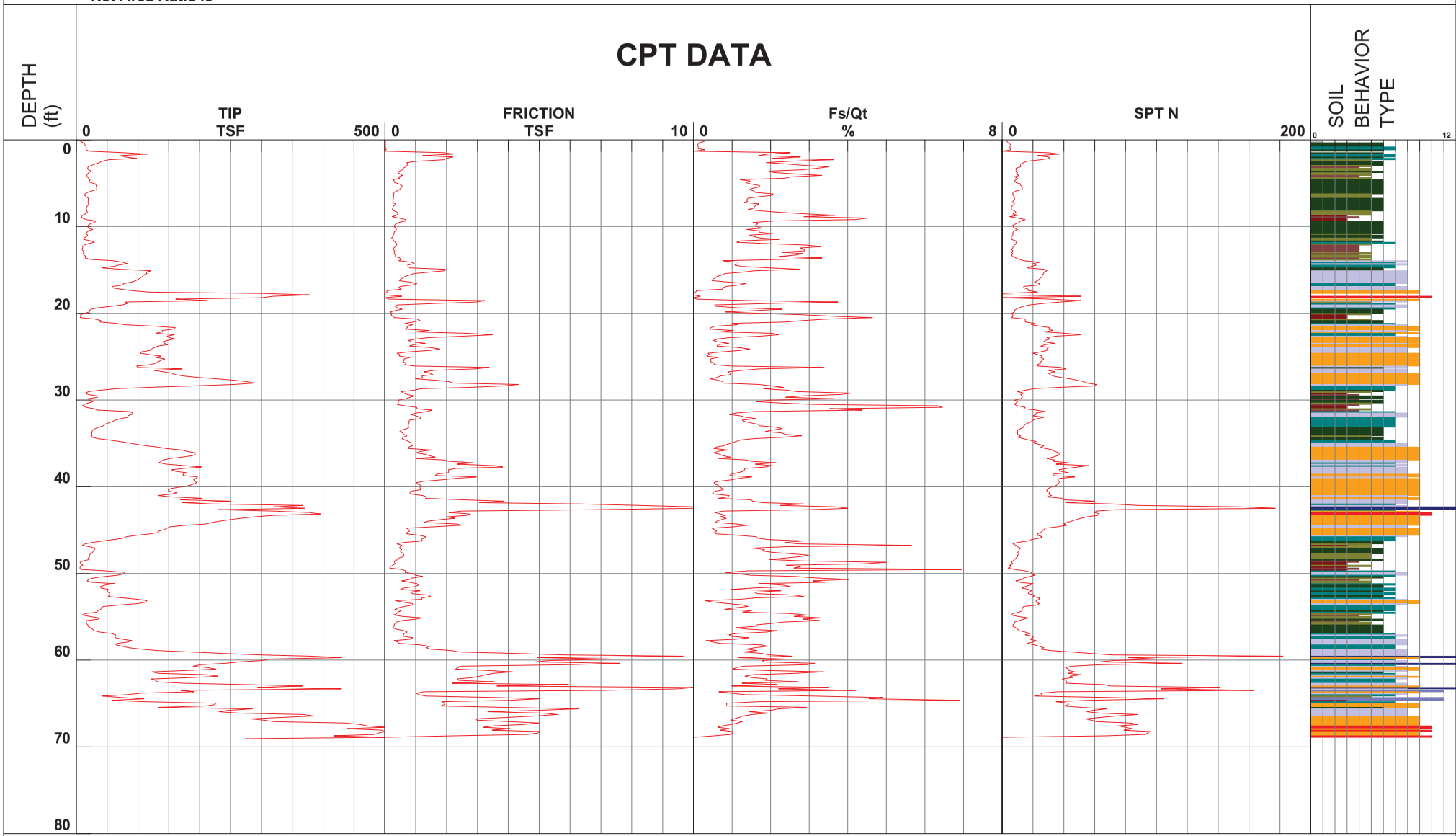
Location	Veterans Memorial Hall	Operator	DM-RB	
Job Number	9185000000	Cone Number	DSG1023	GPS
Hole Number	CPT-02	Date and Time	5/7/2011 8:59:44 AM	
Equilized Pressure	6.3	Ground Water Depth	17.2	

Engeo

Project	Veterans Memorial Hall	Operator	DM-RB	Filename	SDF(277).cpt
Job Number	9185000000	Cone Number	DSG1023	GPS	
Hole Number	CPT-03	Date and Time	5/7/2011 11:34:29 AM	Maximum Depth	69.06 ft
Water Table Depth		17.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

*Soil behavior type and SPT based on data from UBC-1983

PRESSURE

Engeo

Location	Veterans Memorial Hall	Operator	DM-RB	
Job Number	9185000000	Cone Number	DSG1023	GPS
Hole Number	CPT-03	Date and Time	5/7/2011 11:34:29 AM	
Equilized Pressure	8.6	Ground Water Depth	17.5	

APPENDIX B

Laboratory Test Results

ENGEO INCORPORATED

MOISTURE-DENSITY TESTS

PROJECT NAME: Veterans Memorial Hall

REPORT DATE: 5-20-10

PROJECT NO.: 9185.000.000/002

TESTED BY: DB

SAMPLE NO.	1-B1	1-B1	1-B1	1-B1	1-B1	1-B1	1-B1	1-B1
DEPTH (FT.)	10.5	21	26	32.5	38	45.5	51	56
DENSITY FACTOR (F)		0.8282	0.8282			0.8282	0.8214	0.8282
SAMPLE HEIGHT (IN.)		5.47	4.79			5.72	5.78	5.33
TARE NO.	star	cub	e	u	sf	y	r	x
WET WT. + TARE (GM.)	725.4	906.9	775.3	1148.6	937.0	595.0	971.9	977.9
DRY WT. + TARE (GM.)	645.1	749.0	608.8	1008.6	731.6	514.9	817.6	875.9
TARE WT. (GM)	85.5	84.4	86.5	86.0	85.2	85.9	86.8	85.4
WT. OF WATER (GM.)	80.3	157.9	166.5	140.0	205.4	80.1	154.3	102.0
WT. OF DRY SOIL, (GM.)	559.6	664.6	522.3	922.6	646.4	429.0	730.8	790.5
WATER CONTENT (%)	14.3	23.8	31.9	15.2	31.8	18.7	21.1	12.9
DRY DENSITY (PCF)	#DIV/0!	100.6	90.3	#DIV/0!	#DIV/0!	62.1	103.9	122.8

ENGEO INCORPORATED

MOISTURE-DENSITY TESTS

PROJECT NAME: Veterans Memorial Hall

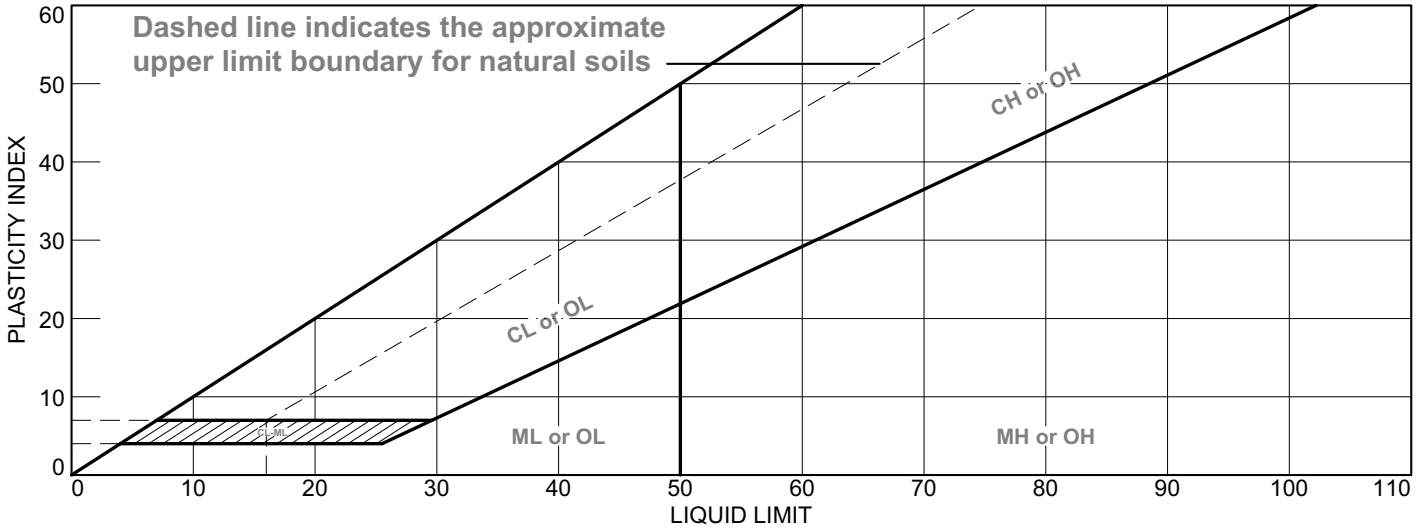
REPORT DATE: 5-20-10

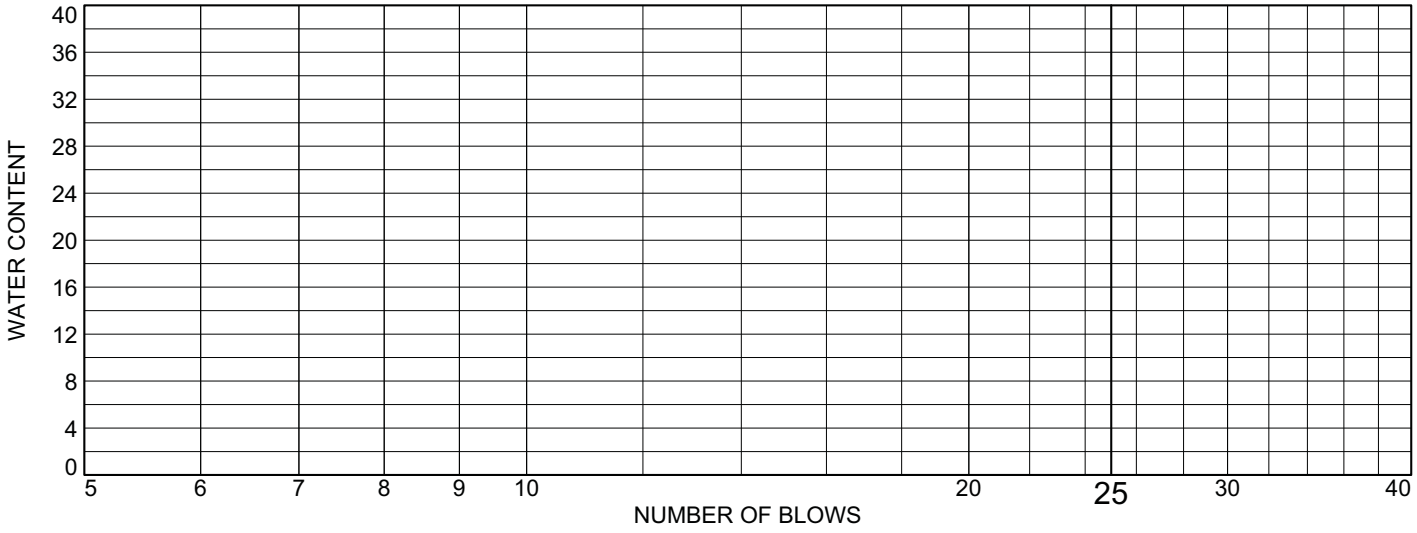
PROJECT NO.: 9185.000.000/002

TESTED BY: DB

SAMPLE NO.	1-B1	1-B1	1-B1	1-B1				
DEPTH (FT.)	57.5	58.5	59	72				
DENSITY FACTOR (F)		0.8282	0.8282	0.8282				
SAMPLE HEIGHT (IN.)		5.53	5.50	5.70				
TARE NO.	f	aa	hh	ll				
WET WT. + TARE (GM.)	586.9	991.0	963.9	1013.8				
DRY WT. + TARE (GM.)	512.8	863.6	823.9	891.7				
TARE WT. (GM)	88.1	85.0	92.5	81.9				
WT. OF WATER (GM.)	74.1	127.4	140.0	122.1	0.0	0.0	0.0	0.0
WT. OF DRY SOIL, (GM.)	424.8	778.6	731.4	809.8	0.0	0.0	0.0	#VALUE!
WATER CONTENT (%)	17.4	16.4	19.1	15.1	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!
DRY DENSITY (PCF)	#DIV/0!	116.6	110.1	117.7	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See boring logs	NV	NP	NP		9.0	
■	See boring logs	NV	NP	NP		20.4	
▲	See boring logs	NV	NP	NP		9.2	
◆	See boring logs	NV	NP	NP		9.7	

Project No. 9185.000.000 **Client:**

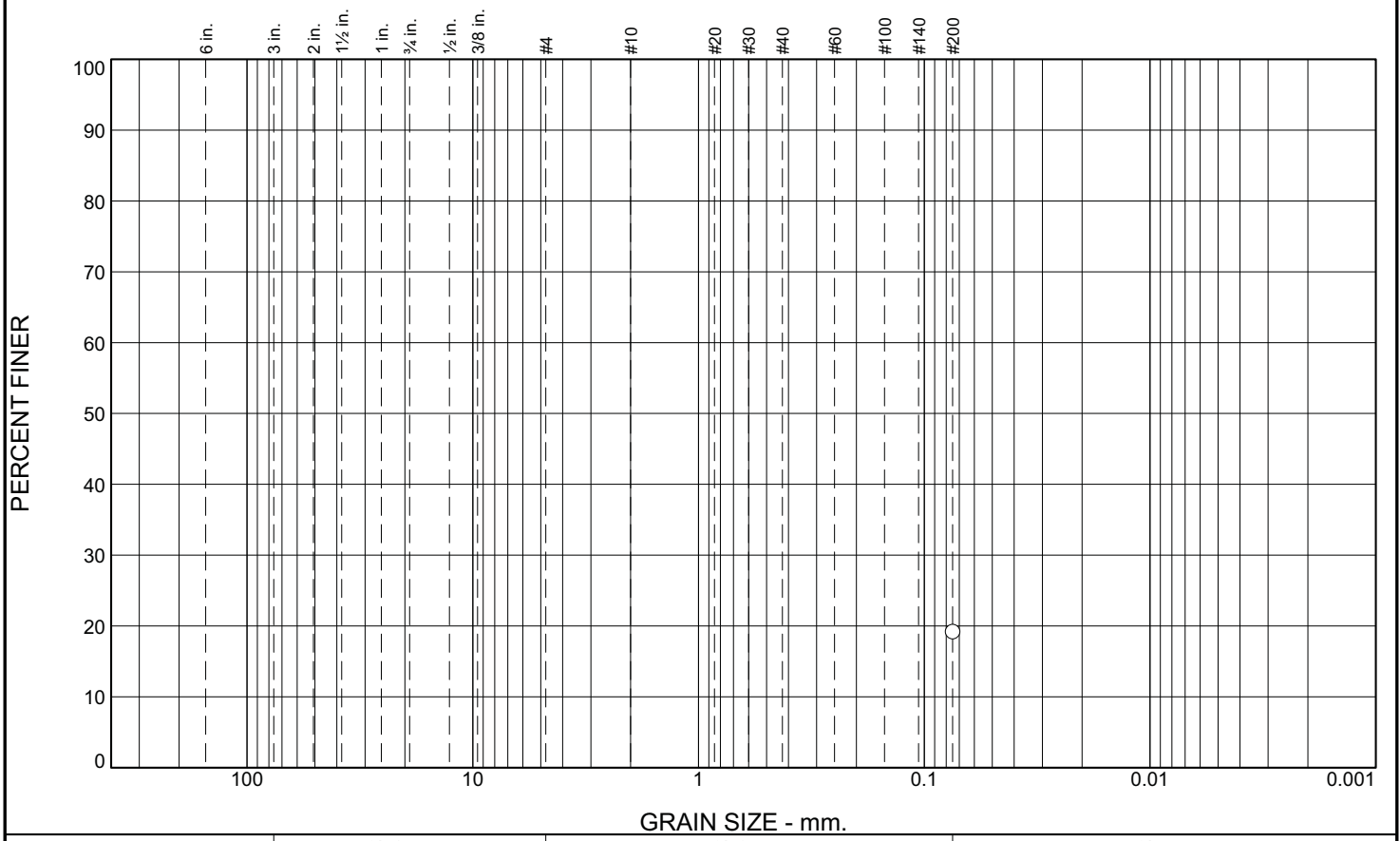
Project: Veterans Memorial Hall - Santa Cruz, CA

● **Sample Number:** 1-B1 @ 45.5
■ **Sample Number:** 1-B1 @ 27.5
▲ **Sample Number:** 1-B1 @ 56
◆ **Sample Number:** 1-B1 @ 57.5

Remarks:
- ● Liquid limit could not be determined.
- ■ Liquid limit could not be determined.
- ▲ Liquid limit could not be determined.
- ◆ Liquid limit could not be determined.

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						19.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	19.2		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 11%

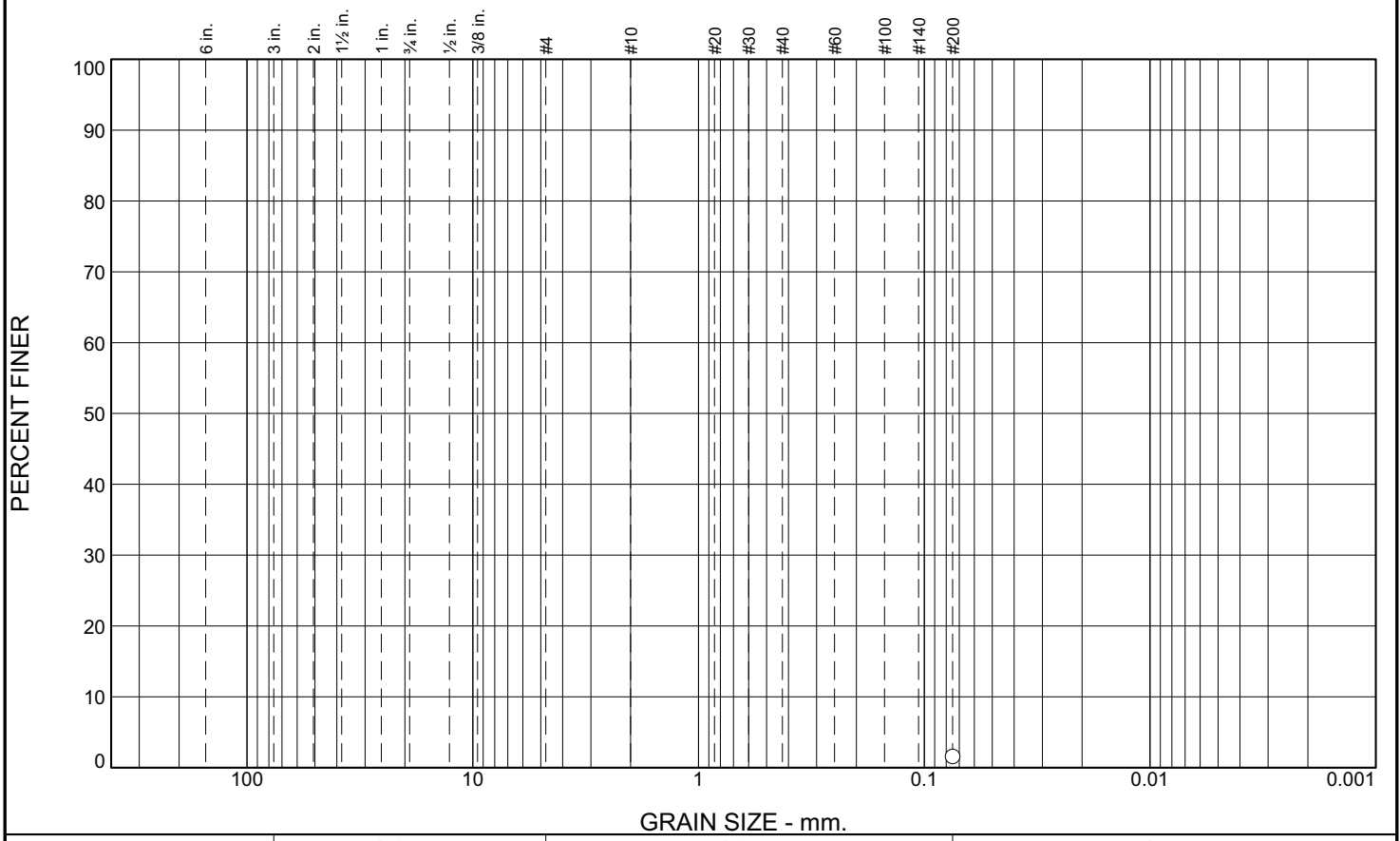
Sample Number: 1-B1 @ 10.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	1.6		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 16.1%

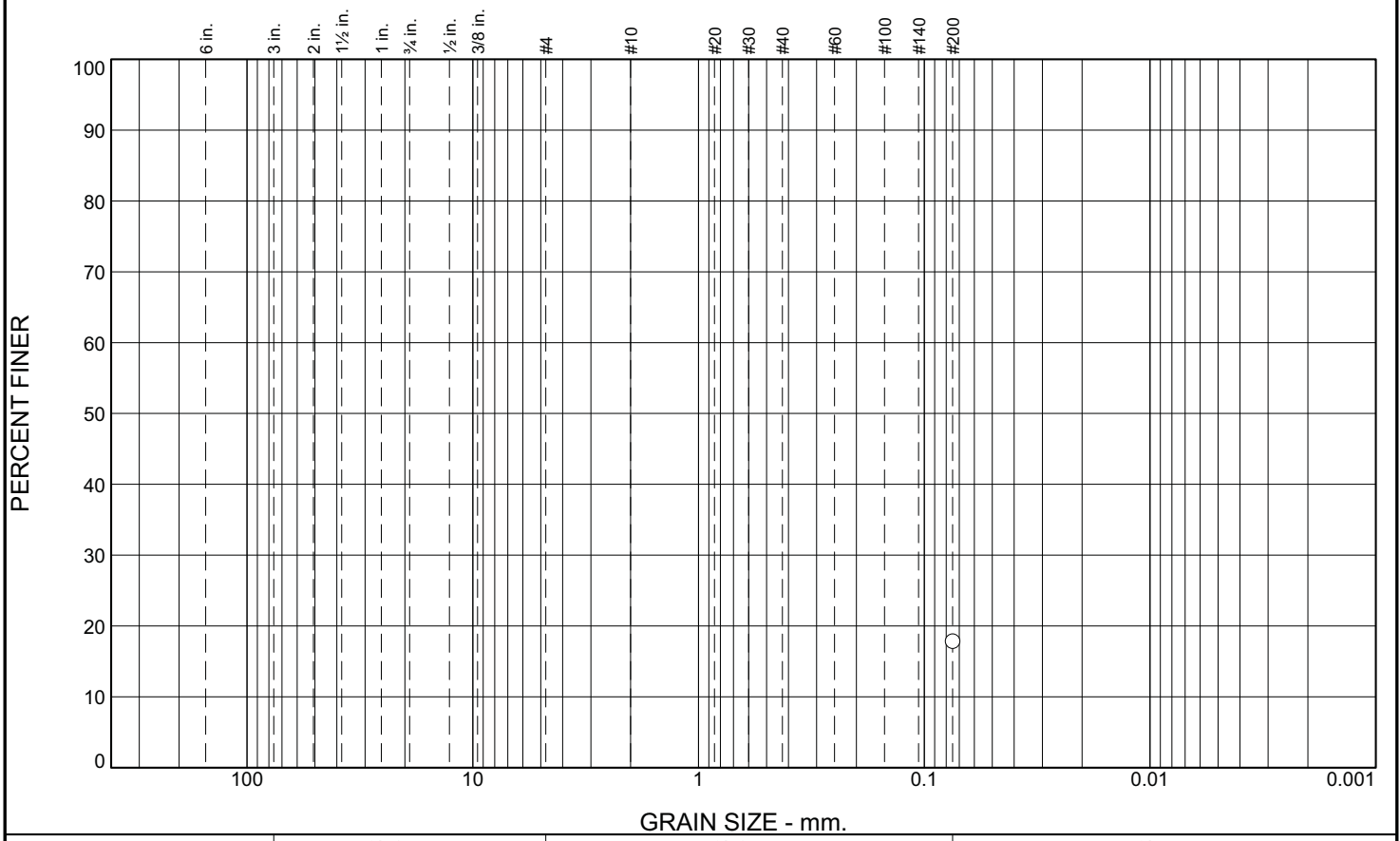
Sample Number: 1-B1 @ 15 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						17.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	17.9		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

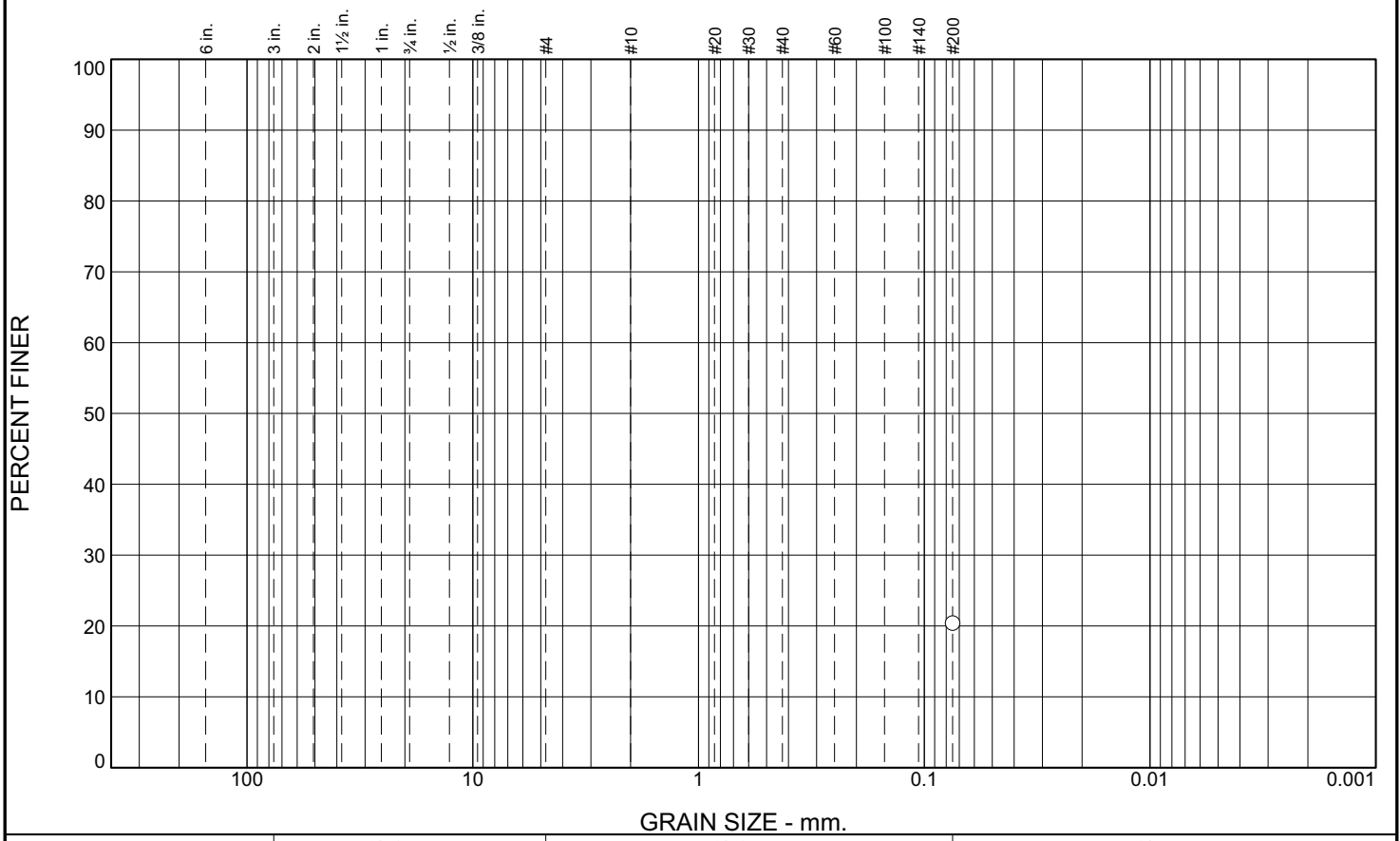
Sample Number: 1-B1 @ 21 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						20.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	20.4		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

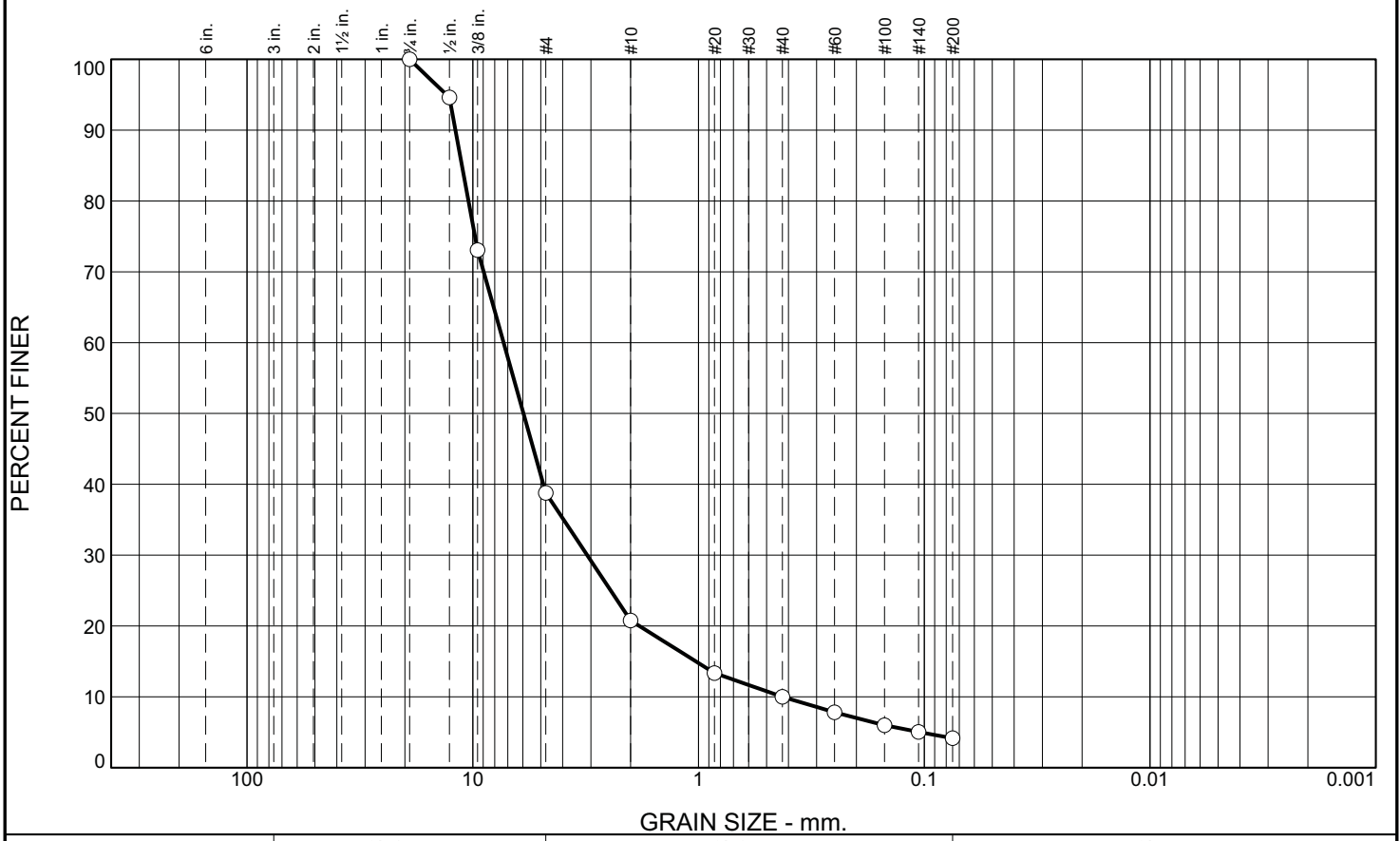
Sample Number: 1-B1 @ 27.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	61.2	18.0	10.8	5.8	4.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	94.6		
3/8	73.1		
#4	38.8		
#10	20.8		
#20	13.4		
#40	10.0		
#60	7.8		
#100	6.0		
#140	5.0		
#200	4.2		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 11.1690 D_{60}= 7.3056 D_{50}= 5.9638
D_{30}= 3.1151 D_{15}= 1.0280 D_{10}= 0.4252
C_u= 17.18 C_c= 3.12

Classification

USCS= GP AASHTO=

Remarks

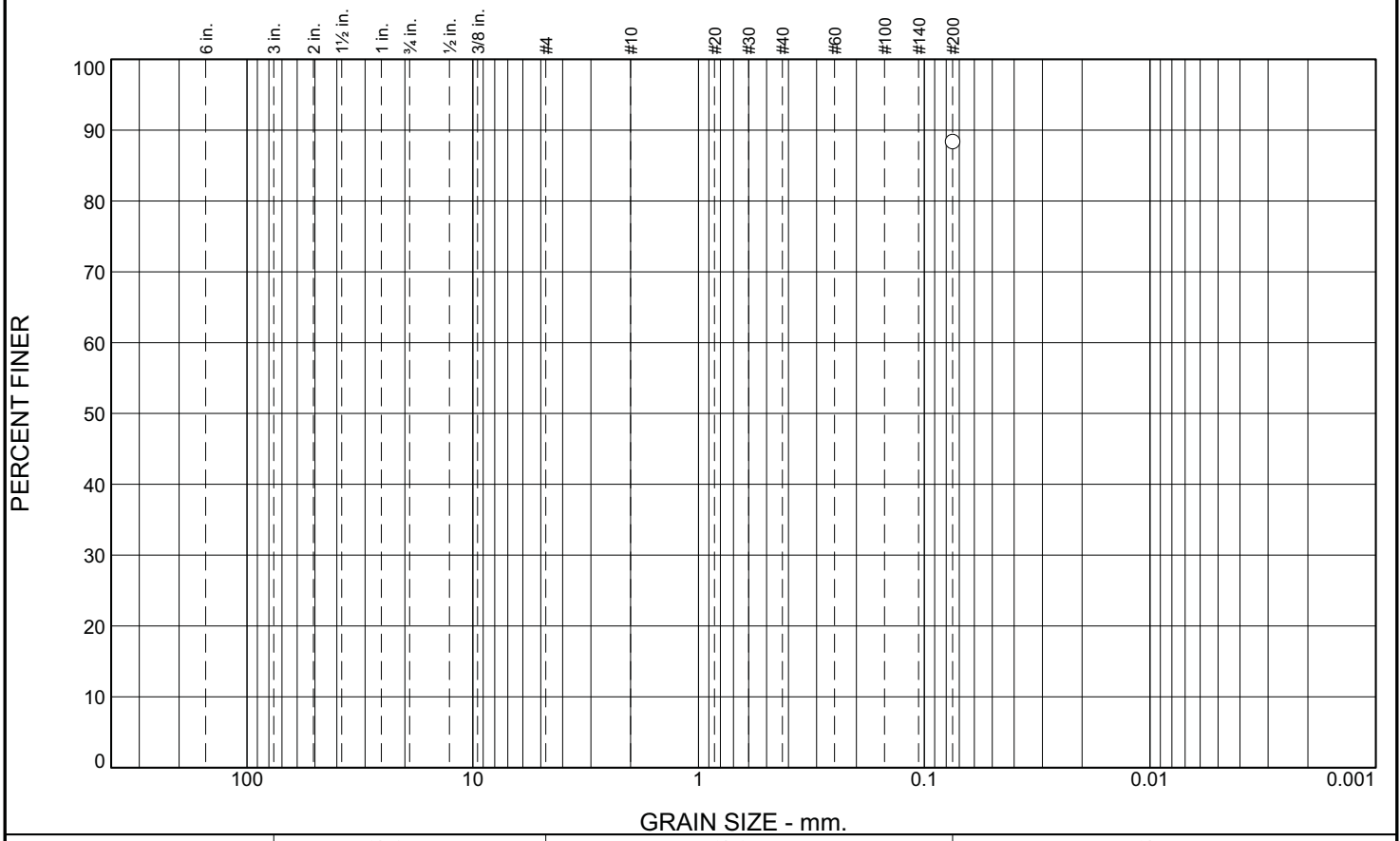
Sample Number: 1-B1 @ 32.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						88.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	88.4		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

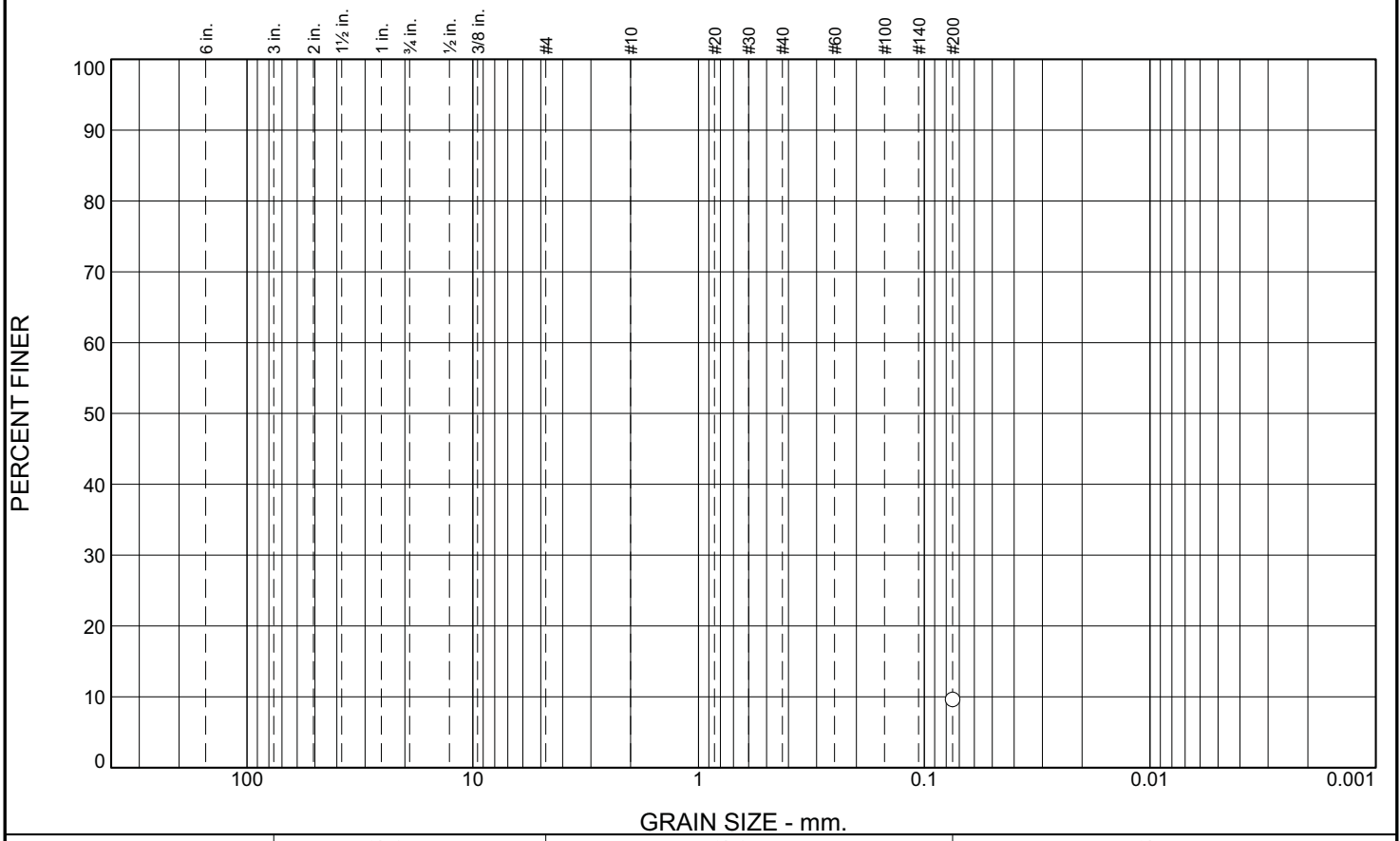
Sample Number: 1-B1 @ 38 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						9.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	9.6		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 4.5%

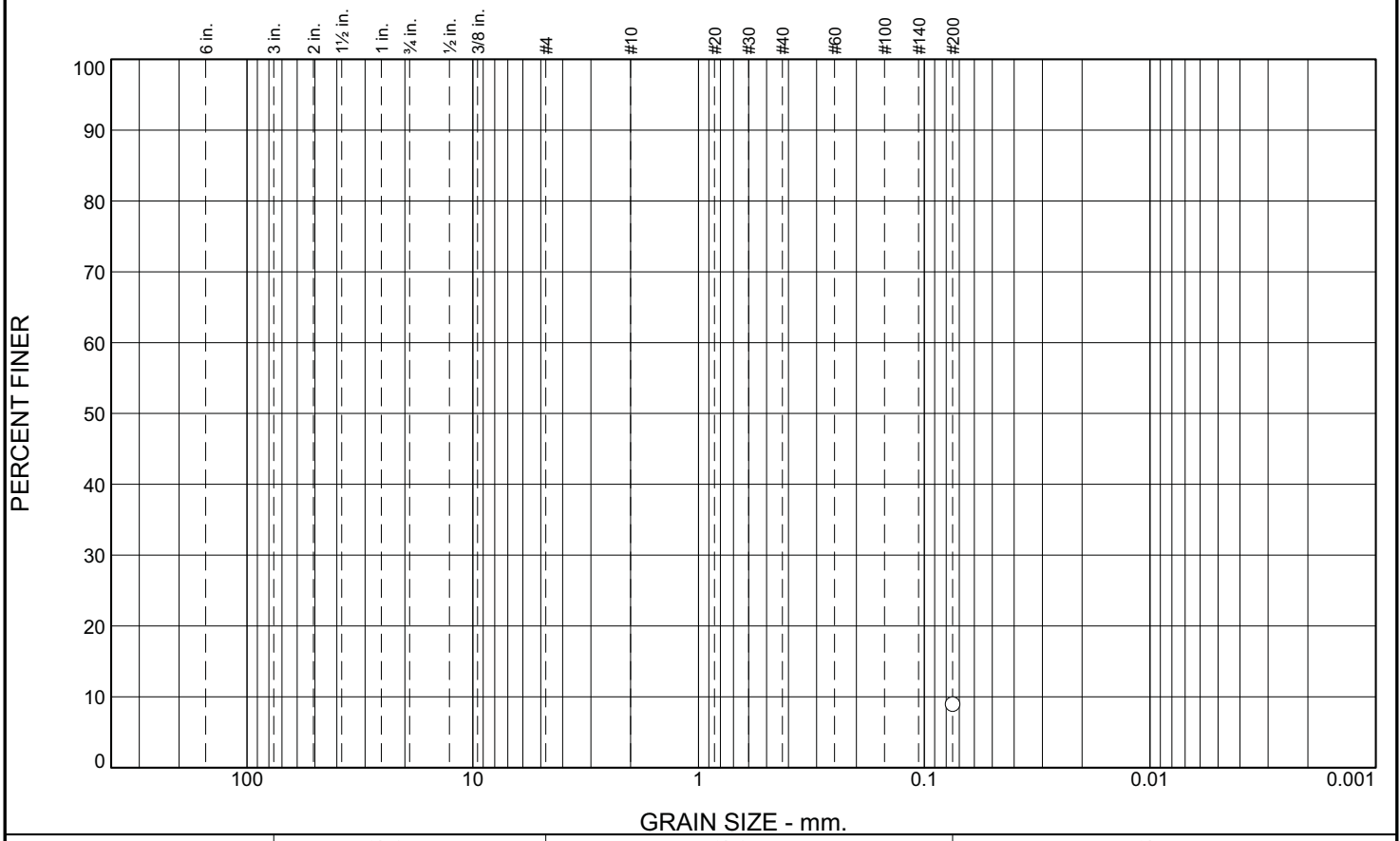
Sample Number: 1-B1 @ 39.75 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						9.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	9.0		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 15%

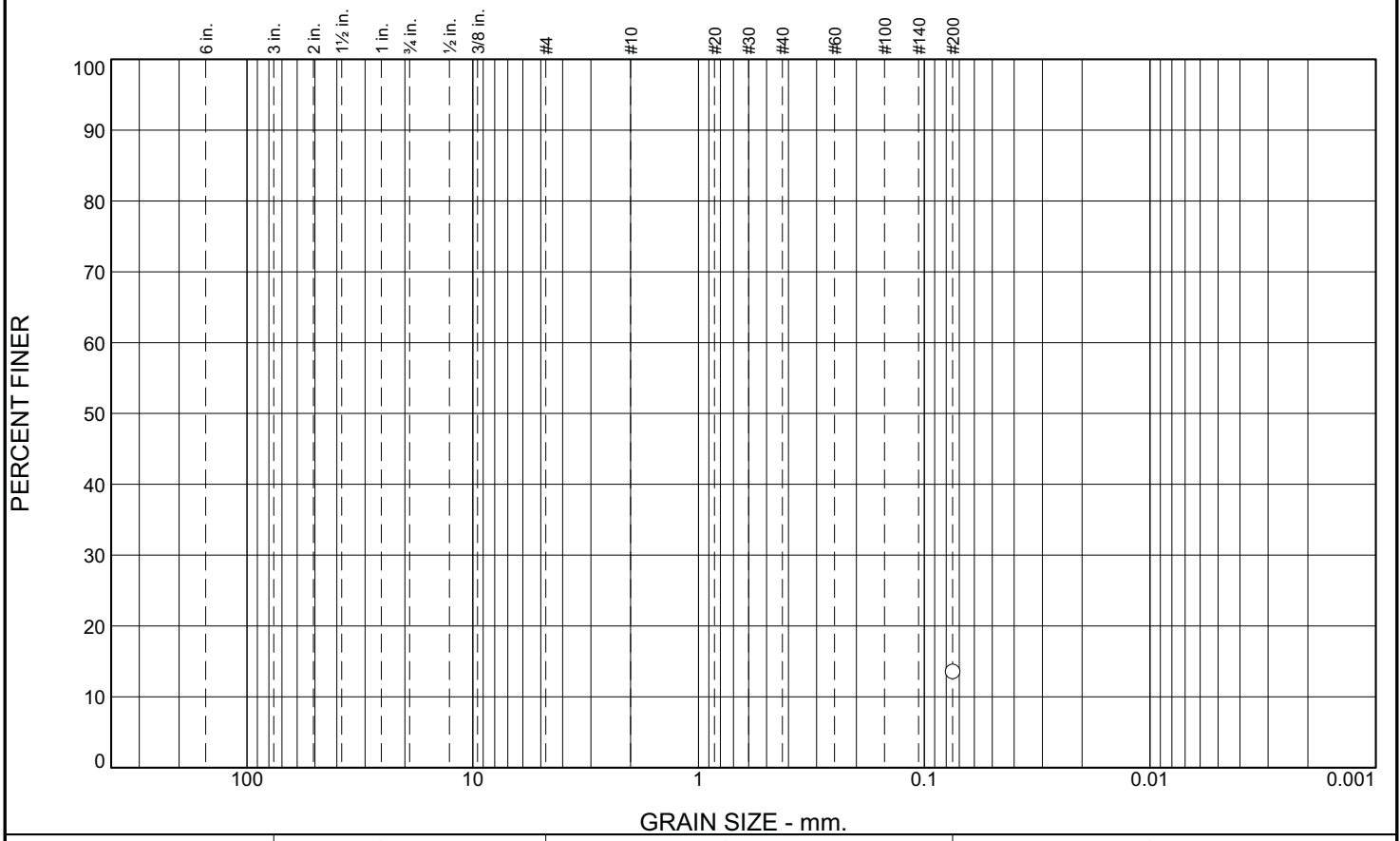
Sample Number: 1-B1 @ 45.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						13.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	13.6		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 11.7%

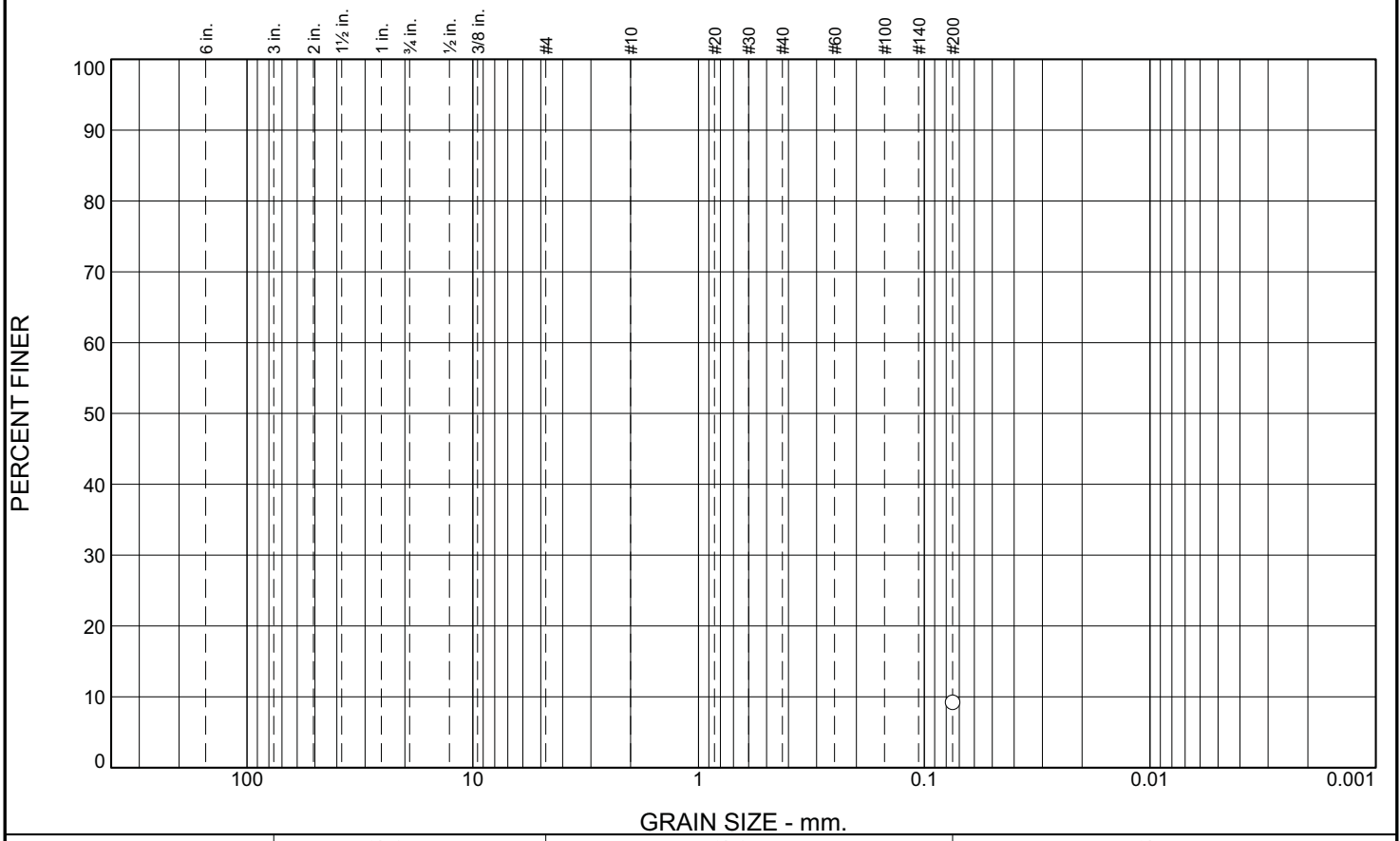
Sample Number: 1-B1 @ 51 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						9.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	9.2		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 12.3%

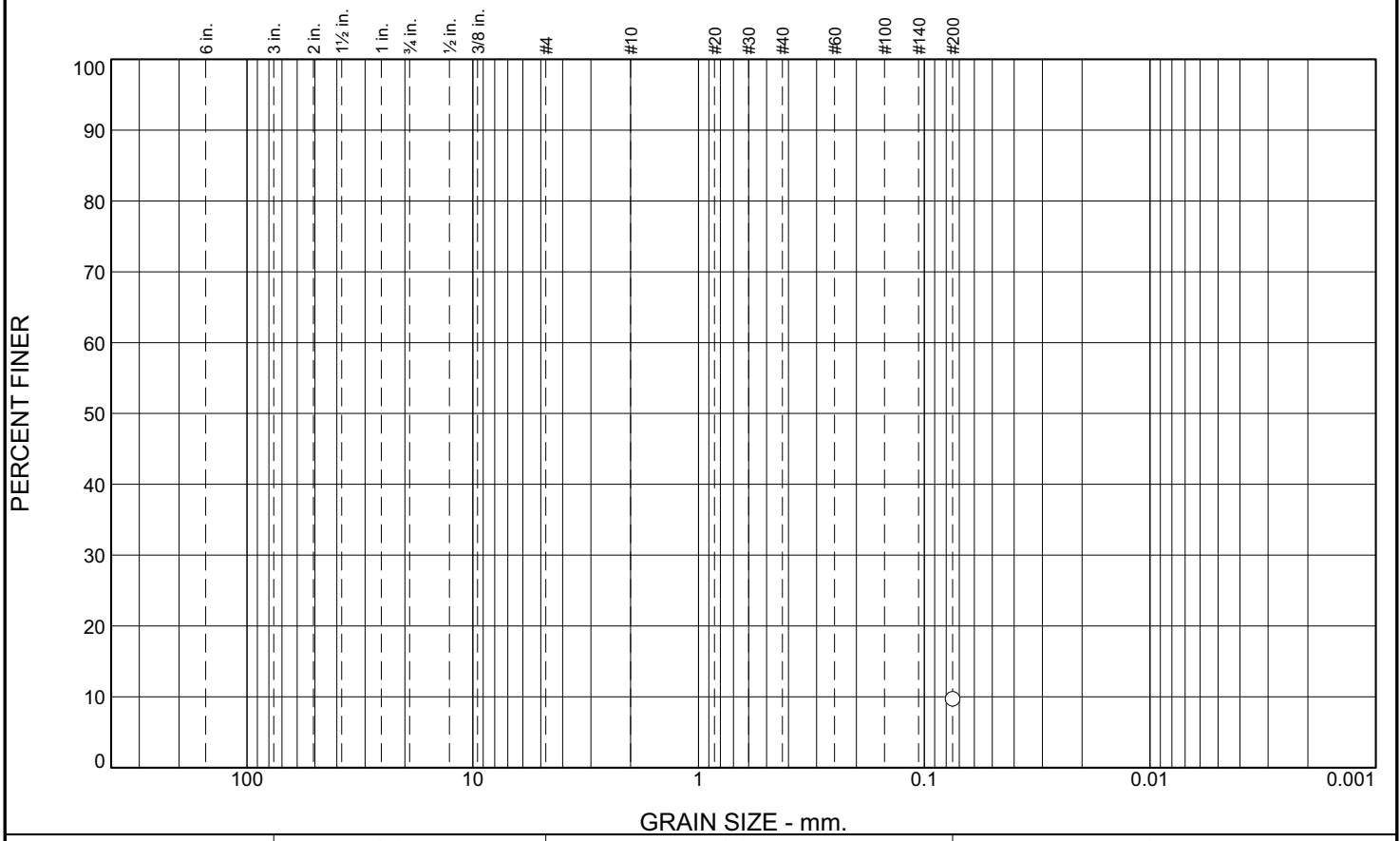
Sample Number: 1-B1 @ 56 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						9.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	9.7		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 22.4

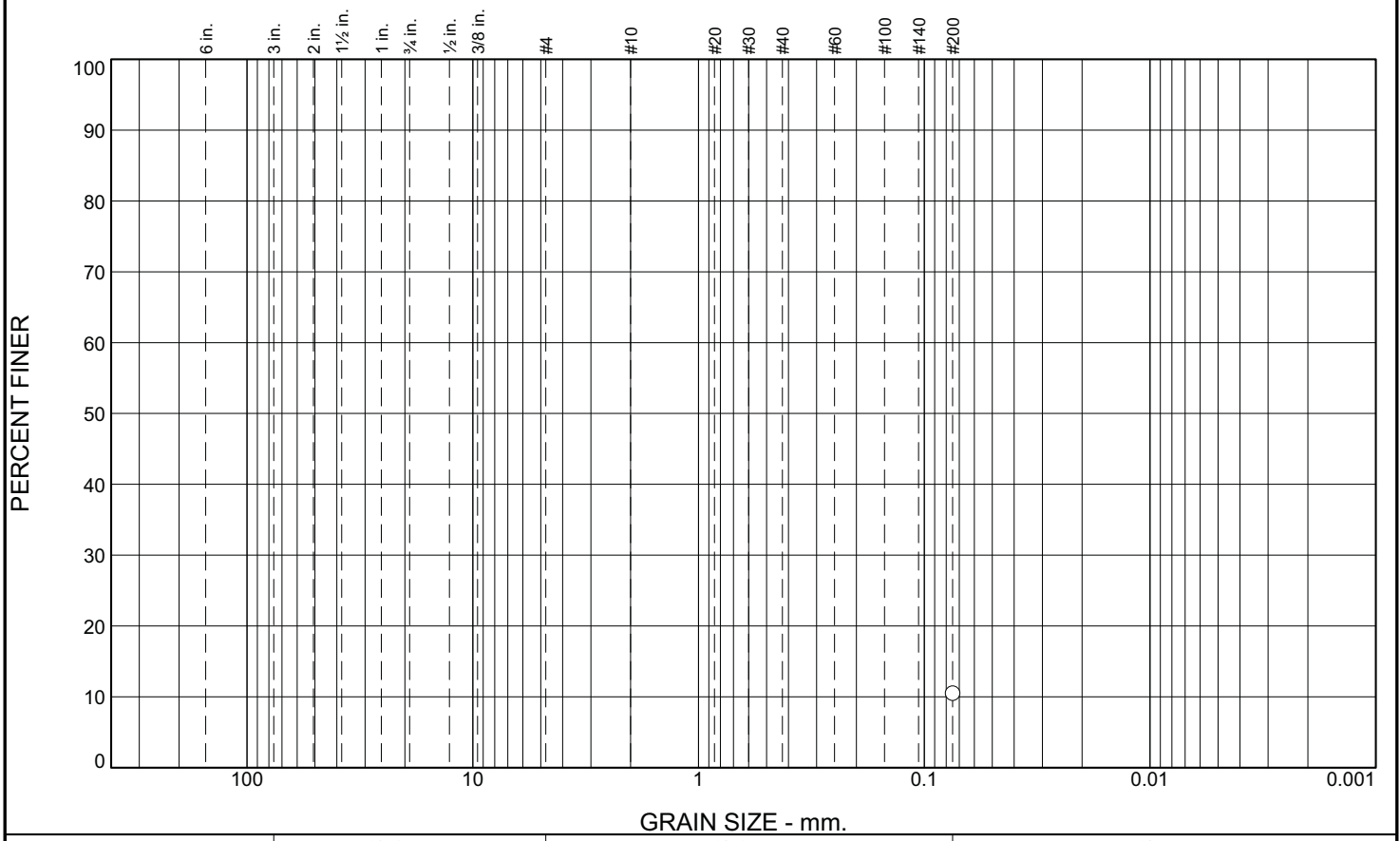
Sample Number: 1-B1 @ 57.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						10.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	10.5		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 23.8%

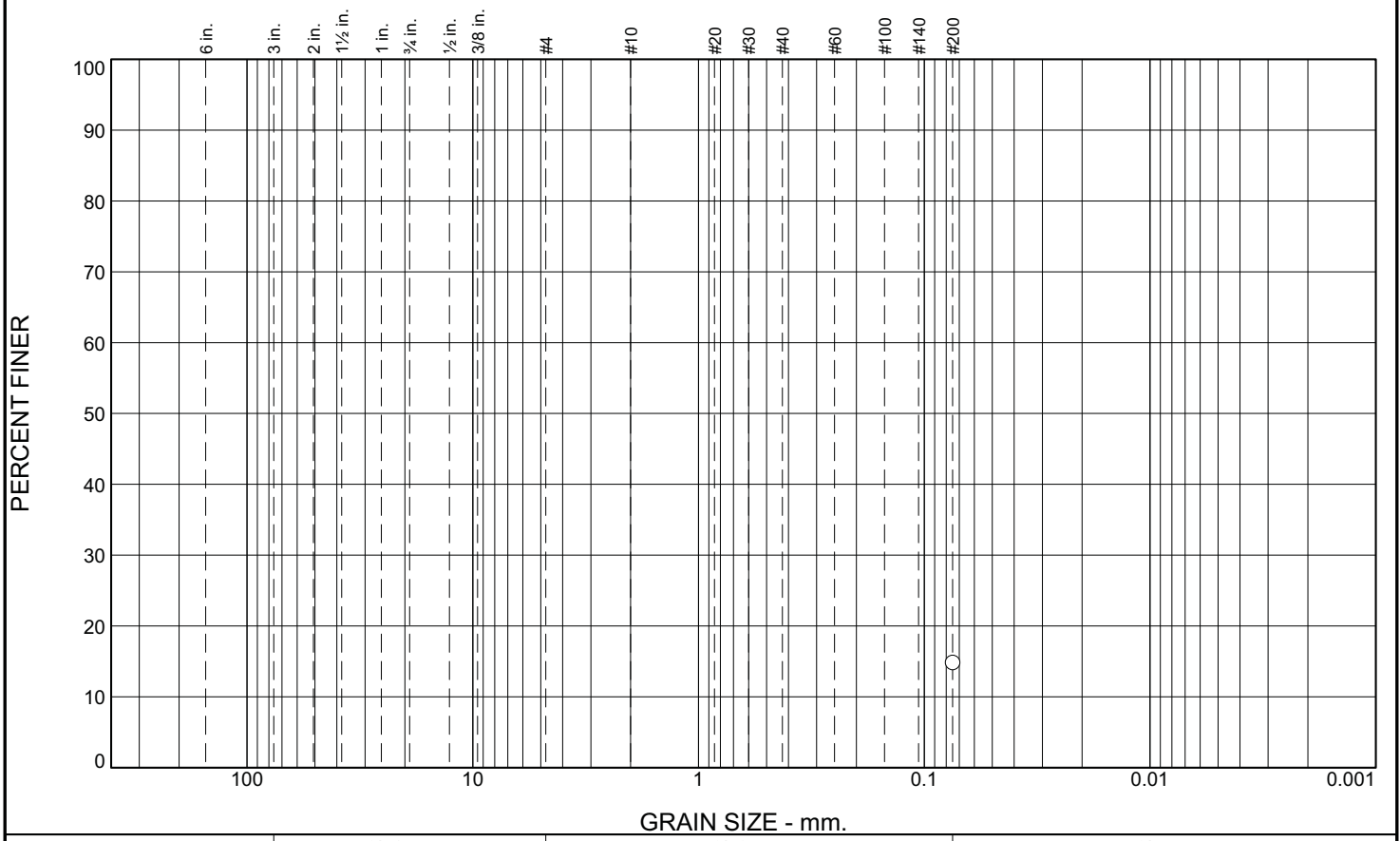
Sample Number: 1-B1 @ 58.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						14.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	14.8		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 6.5%

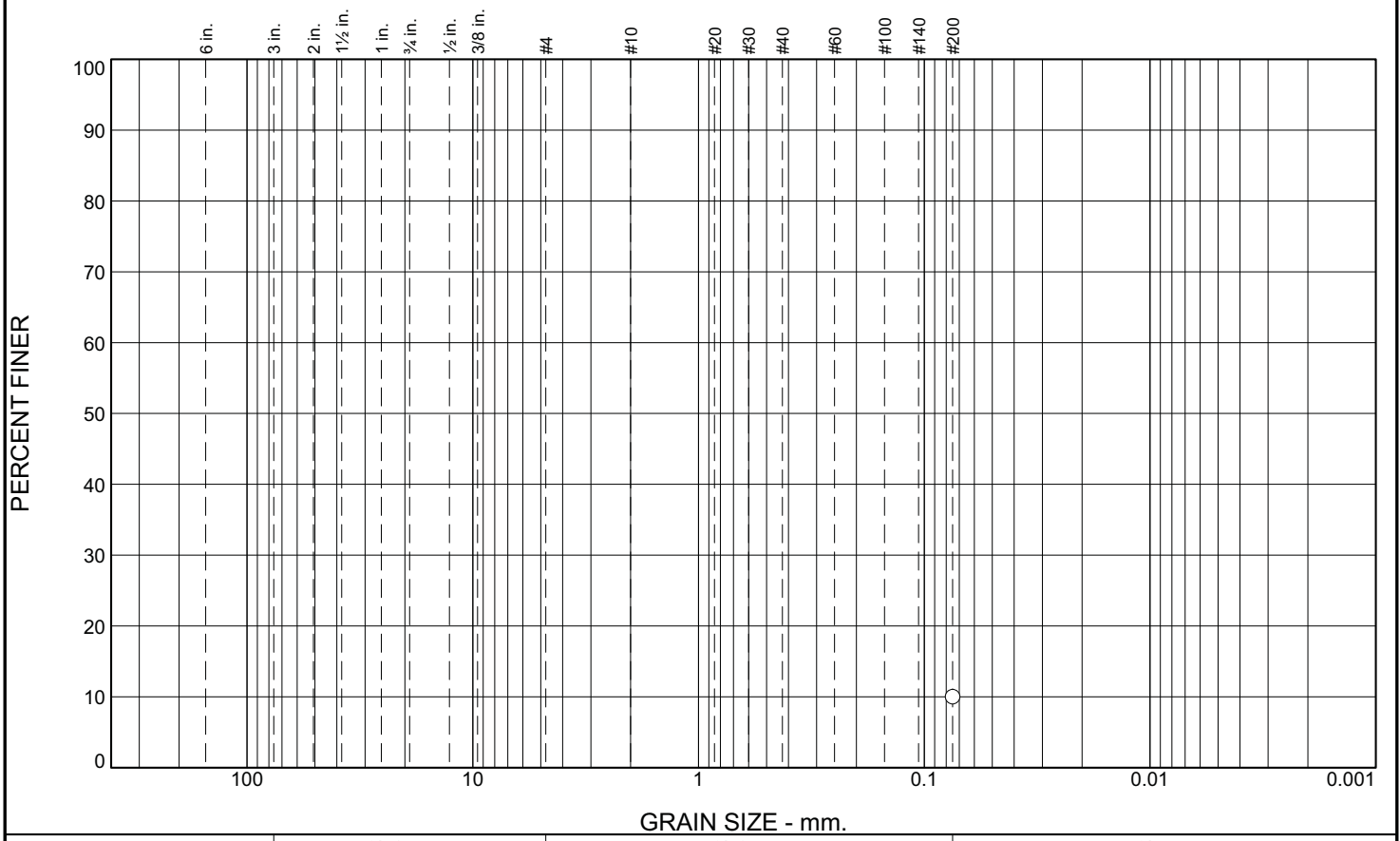
Sample Number: 1-B1 @ 59 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	10.0		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 24.3%

Sample Number: 1-B1 @ 60.5 **Date:** 5-20-11

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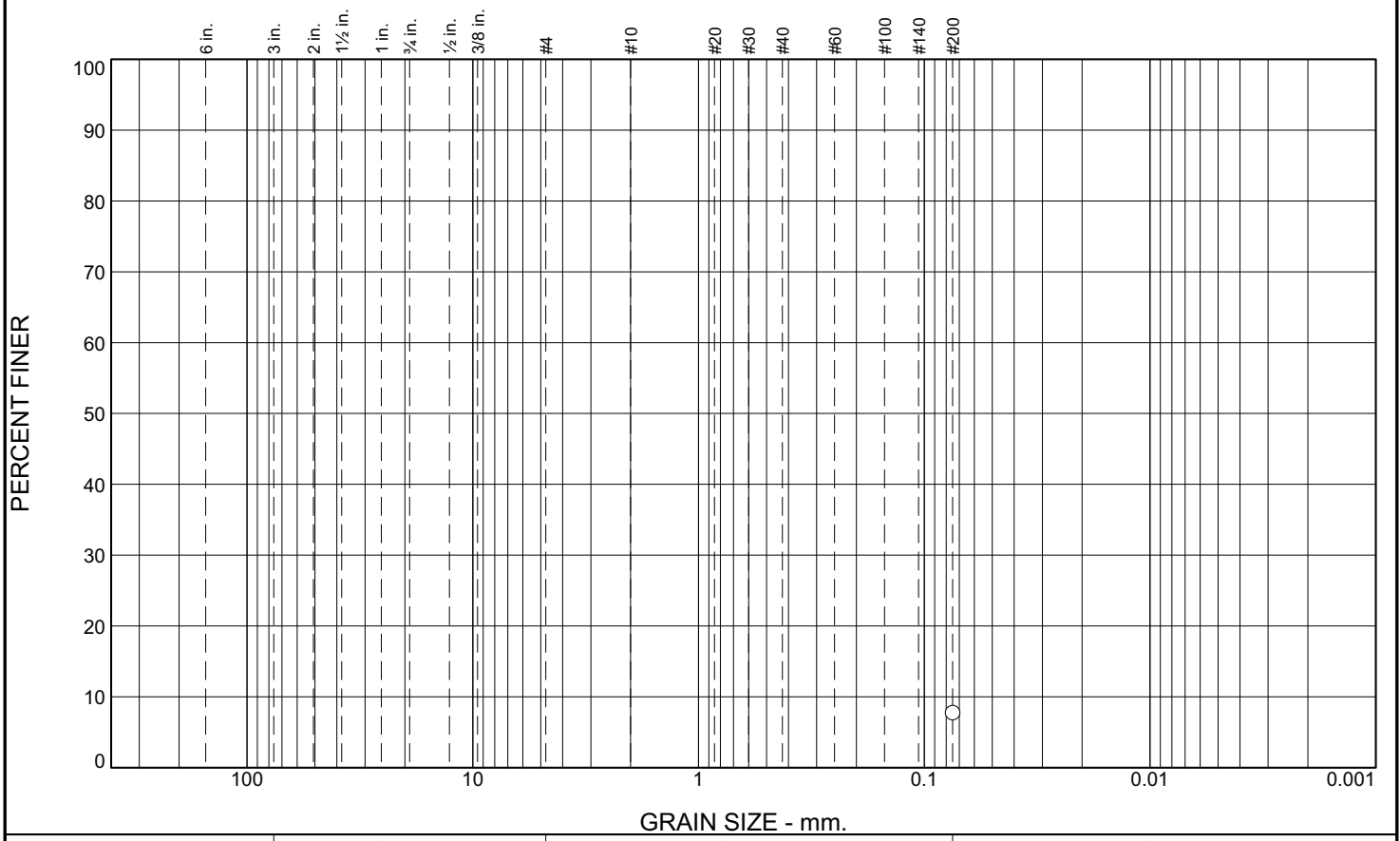
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						7.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	7.8		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 31.9

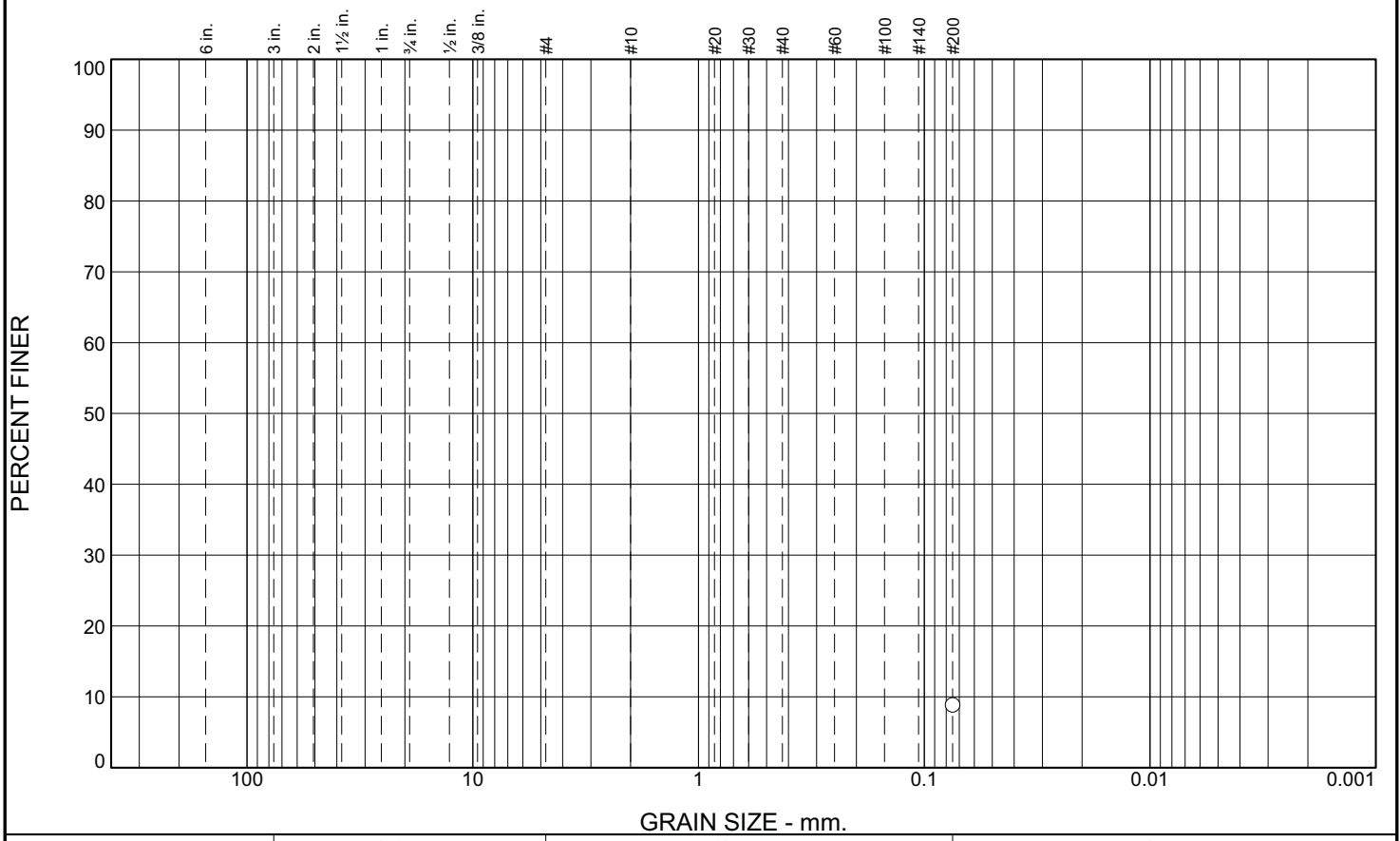
Sample Number: 1-B1 @ 66.5 **Date:** 5-22-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						8.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	8.9		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material Retained on #4 is 15.9%

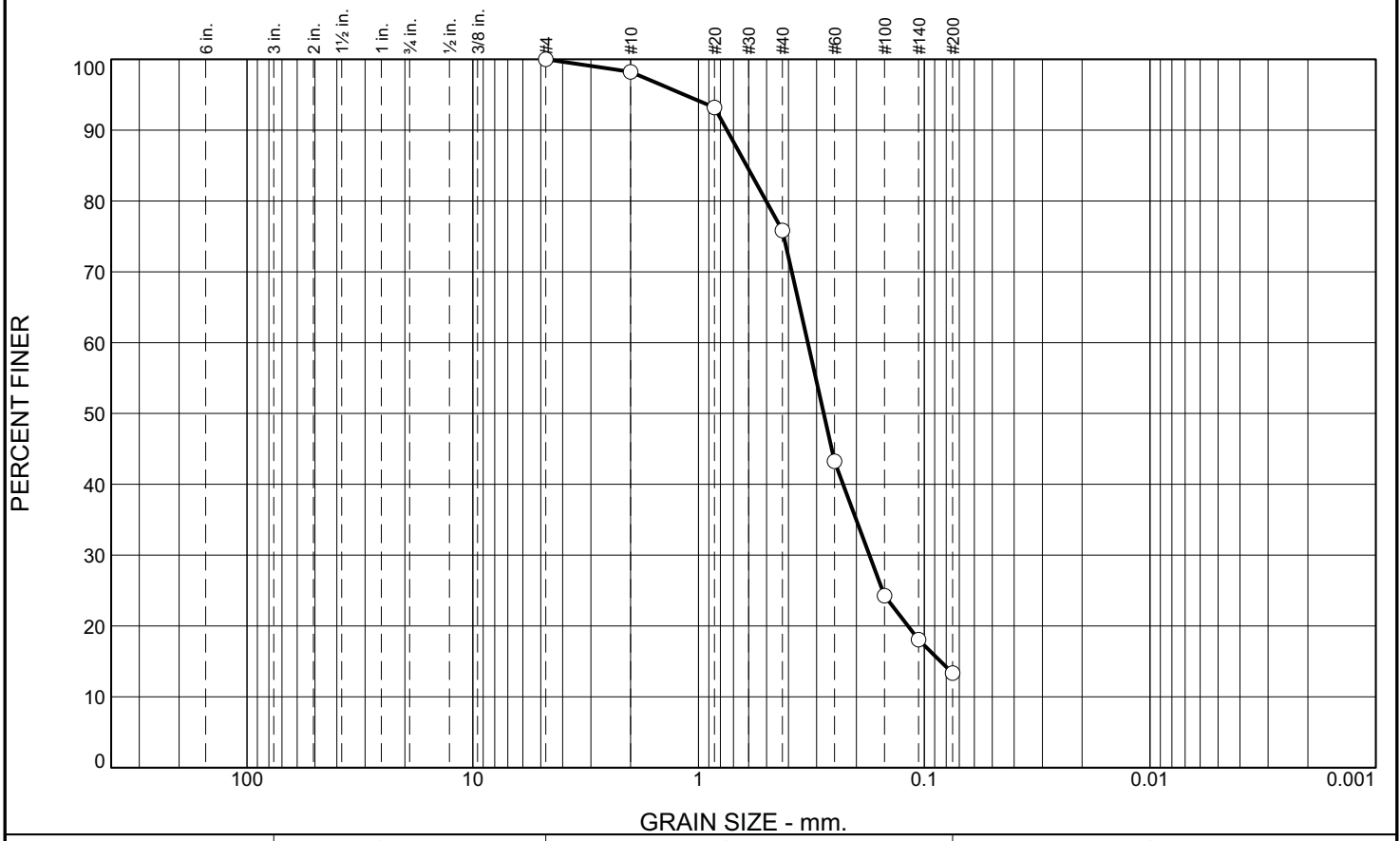
Sample Number: 1-B1 @ 72 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

Particle Size Distribution Report



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.8	22.4	62.5	13.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.2		
#20	93.2		
#40	75.8		
#60	43.3		
#100	24.3		
#140	18.1		
#200	13.3		

* (no specification provided)

Material Description

See boring logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.6129 D_{60}= 0.3284 D_{50}= 0.2790
D_{30}= 0.1750 D_{15}= 0.0847 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: T-1 @ 1.5 **Date:** 5-20-11

ENGEO INCORPORATED
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Client:
Project: Veterans Memorial Hall - Santa Cruz, CA
Project No: 9185.000.000

Tested By: DB

APPENDIX C

Results of Liquefaction Analyses

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Geotechnical Engineers
P.O. Box 33539
621 25 - Serrai - GREECE

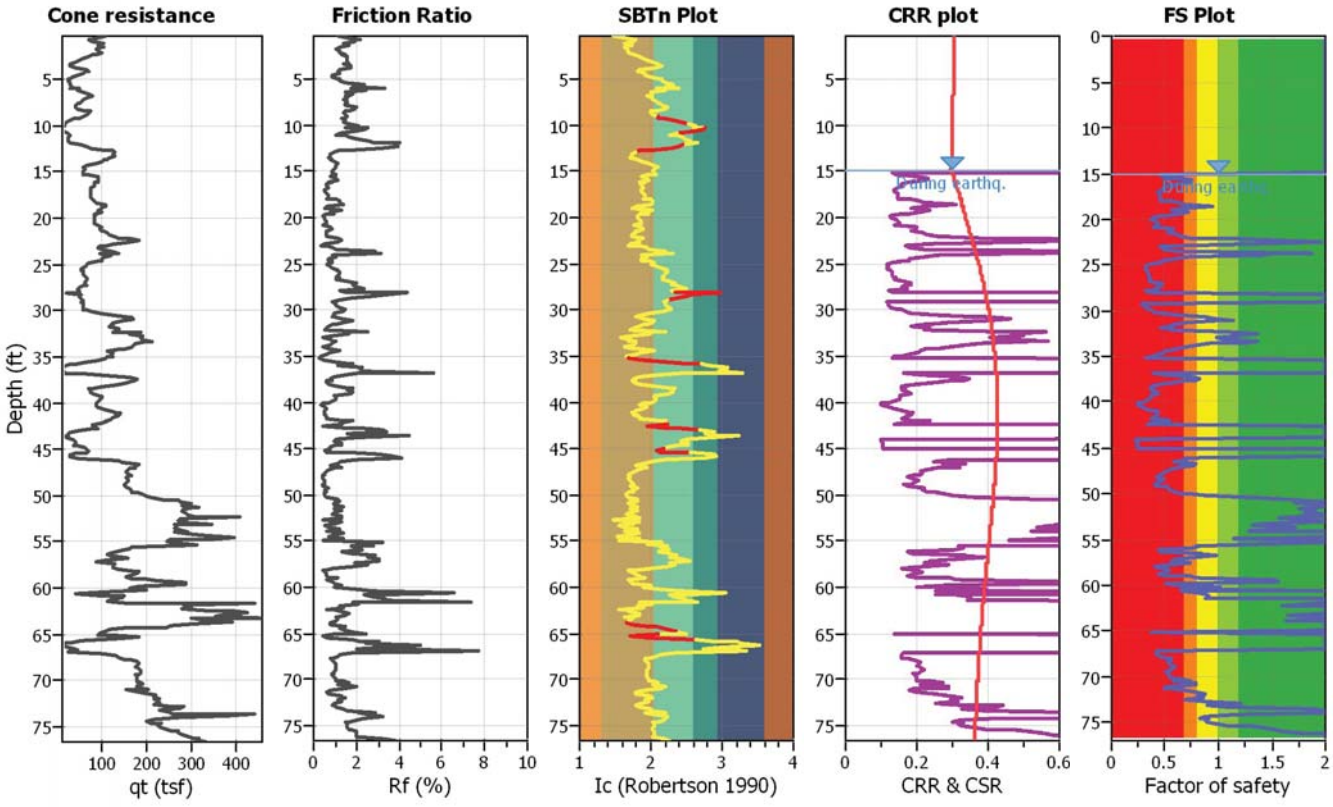
LIQUEFACTION ANALYSIS REPORT

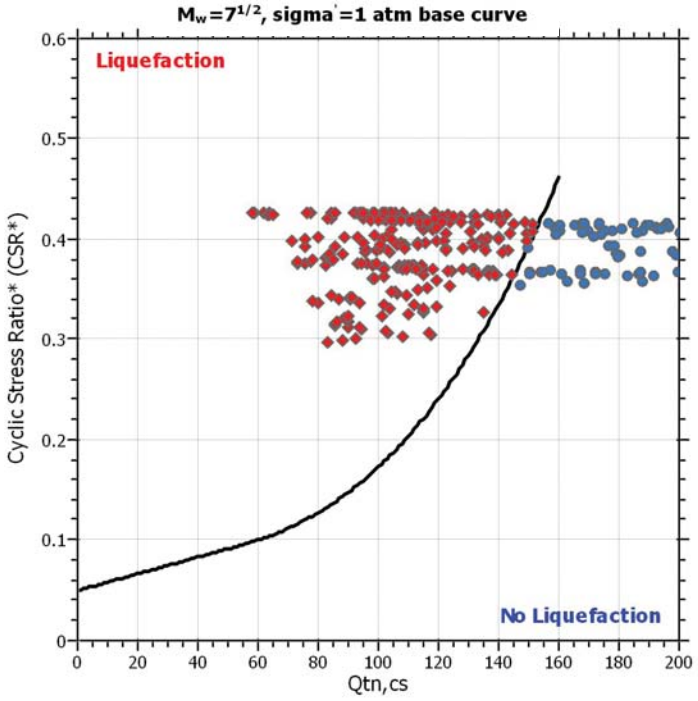
Project title : **Location :**

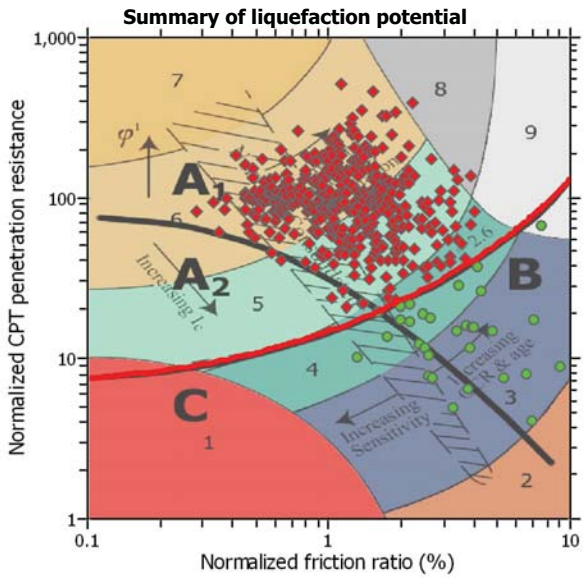
CPT file : 1-CPT1

Input parameters and analysis data

Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Robertson & Wride	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	8.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes		
Peak ground acceleration:	0.40	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

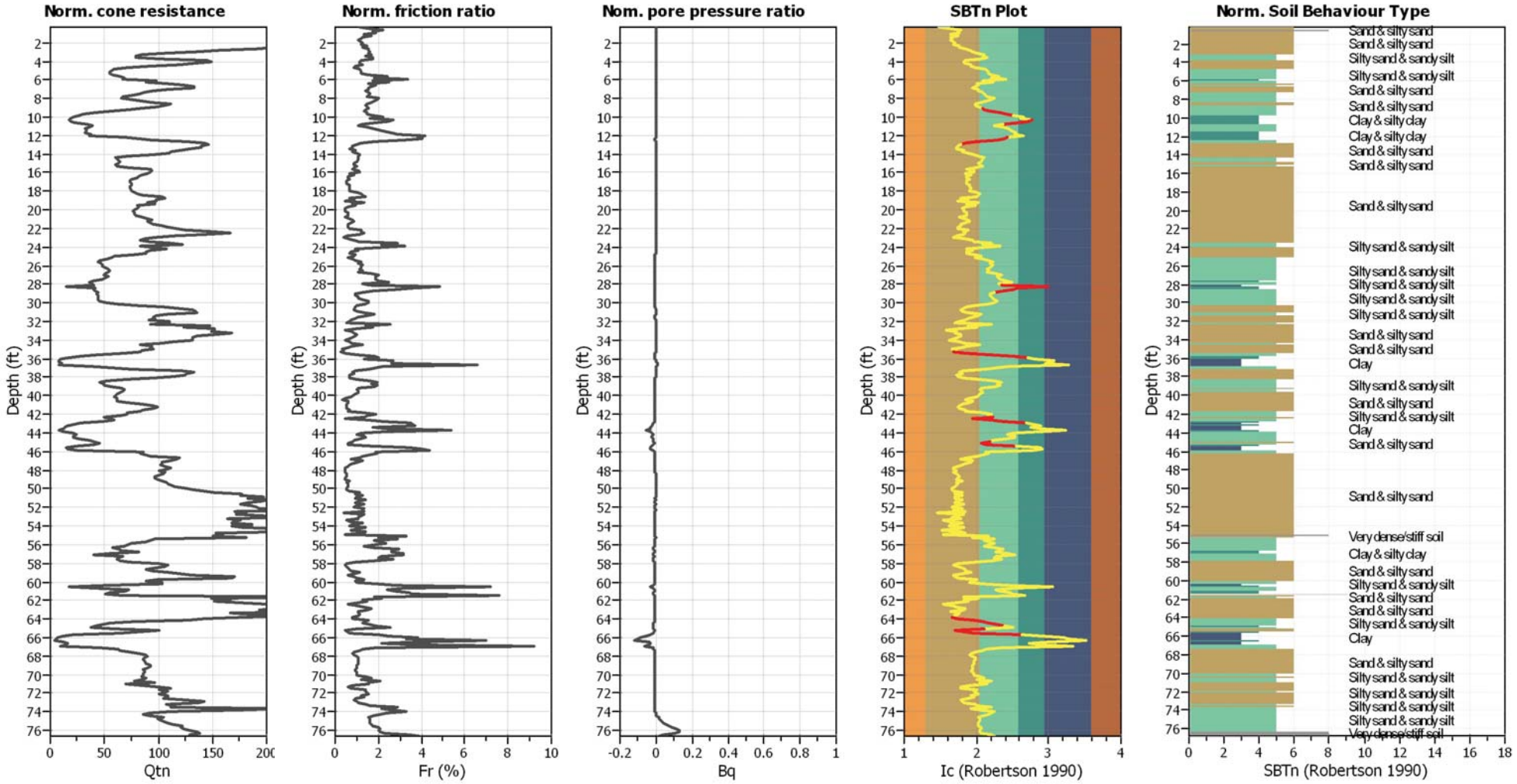






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



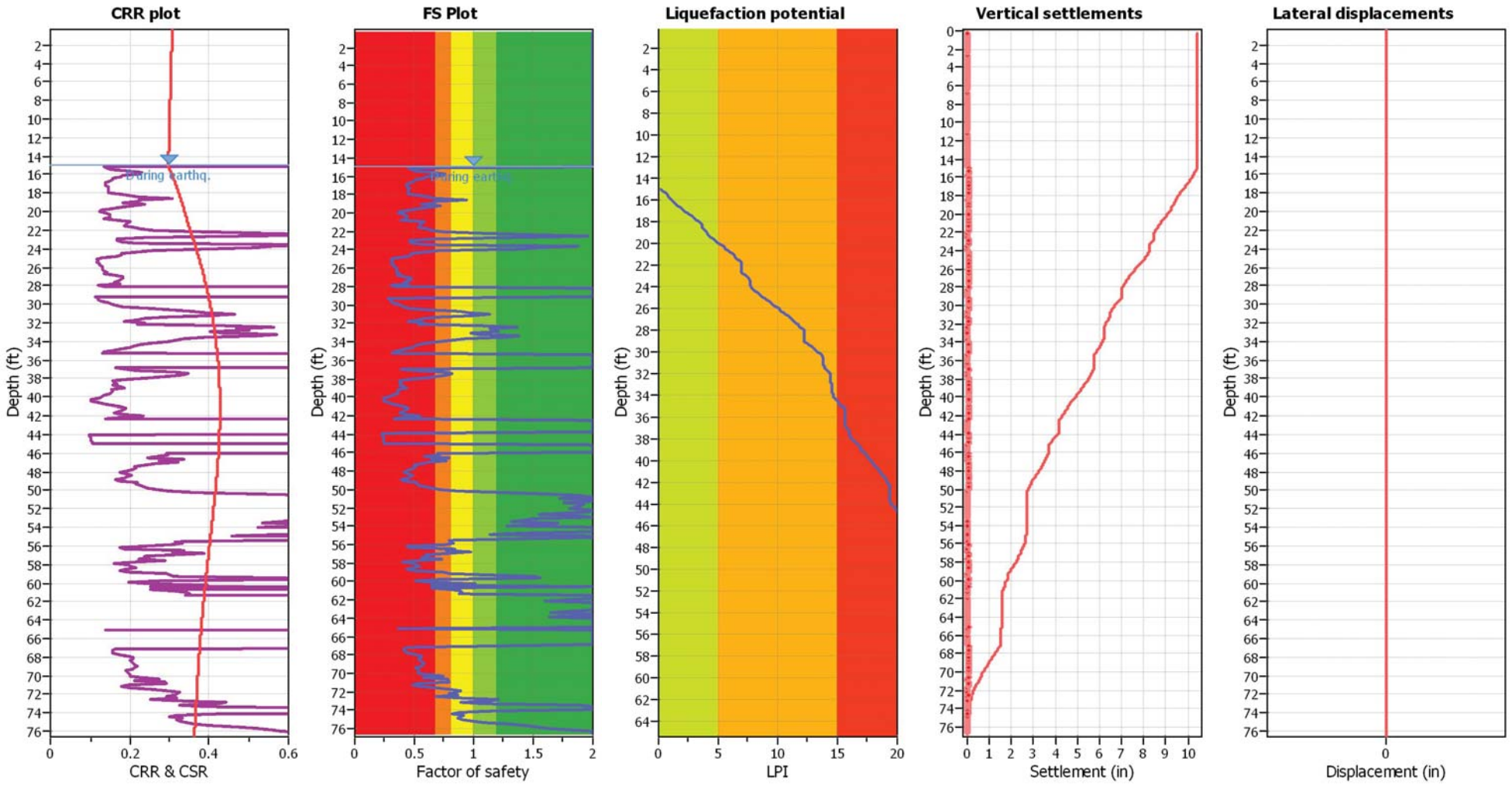
Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

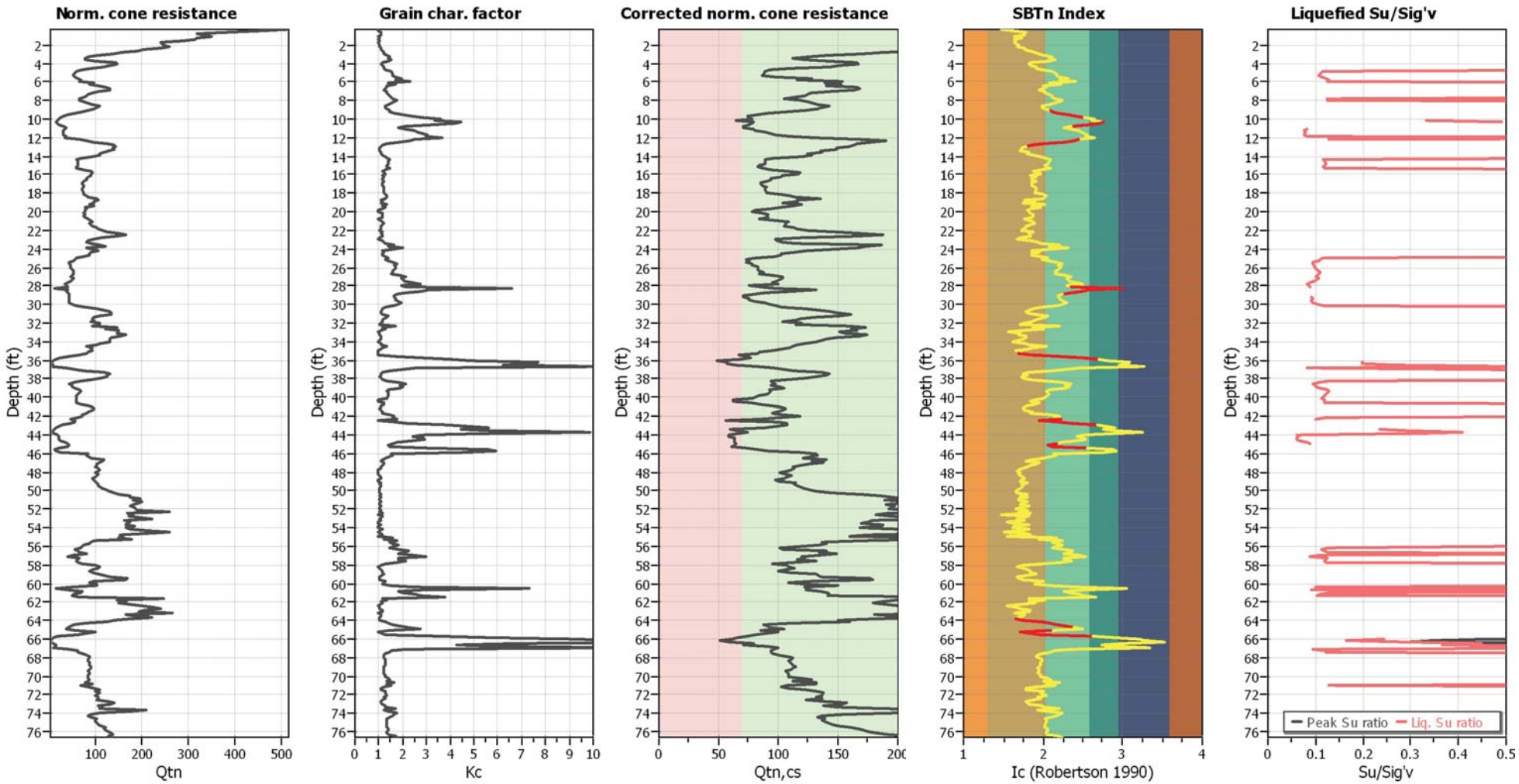
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liquefaction are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

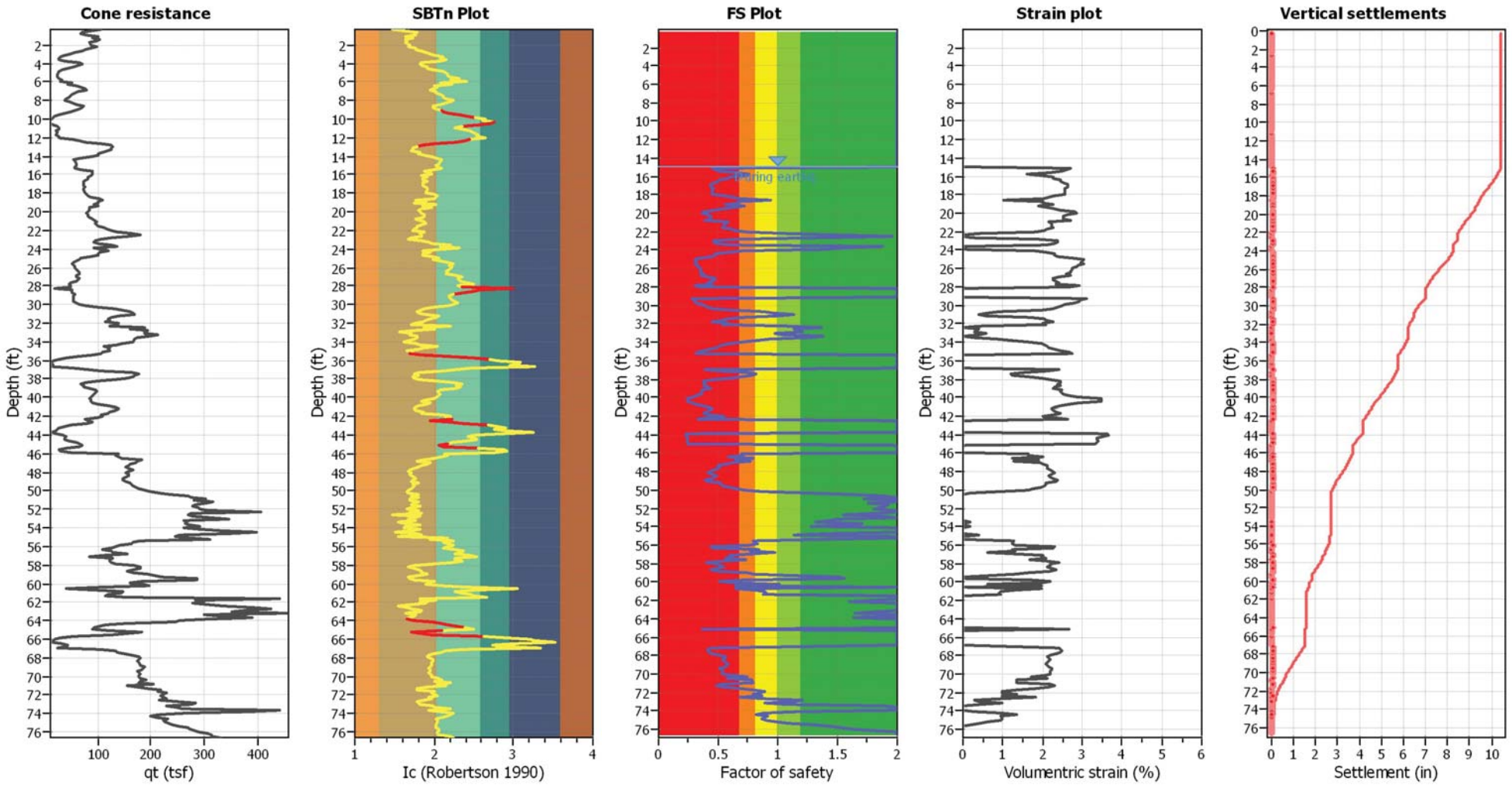
Check for strength loss plots (Olsen & Stark (2002))



Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

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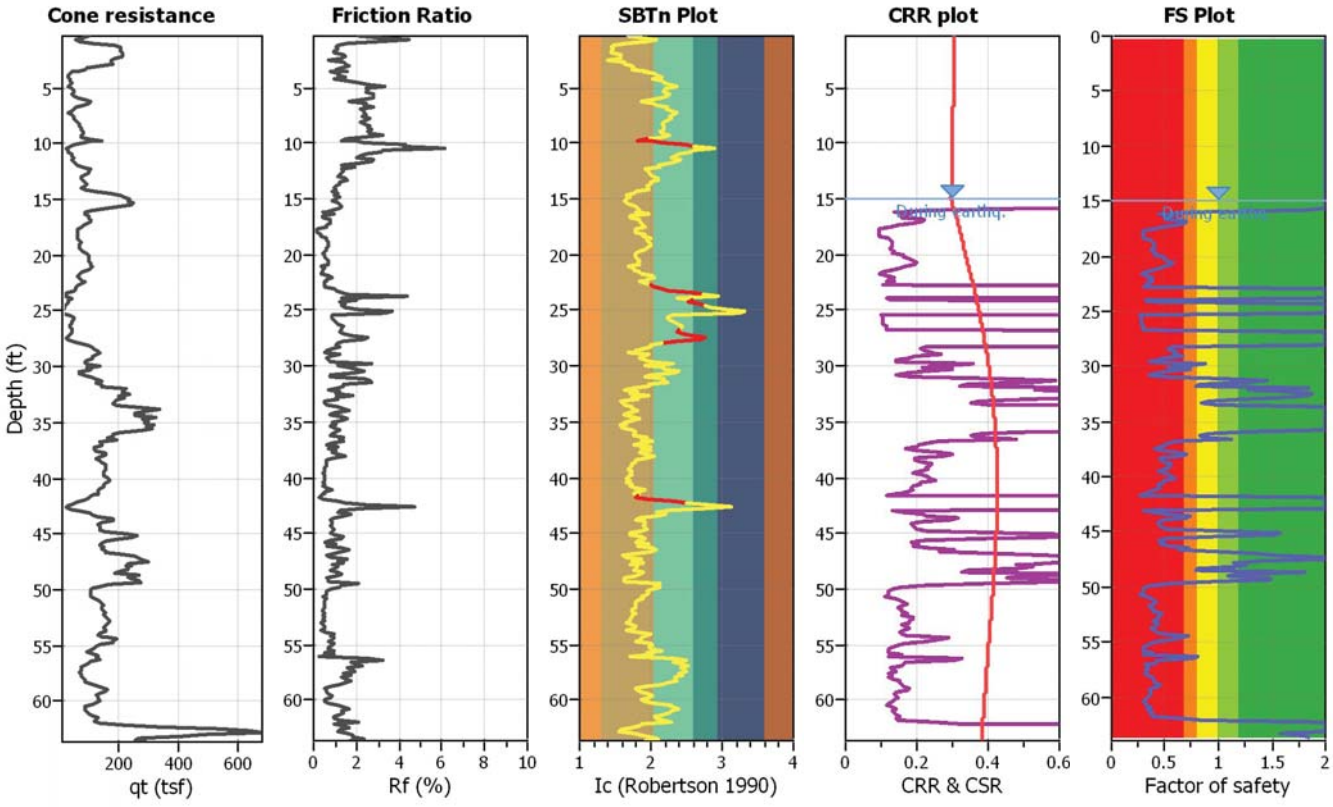
LIQUEFACTION ANALYSIS REPORT

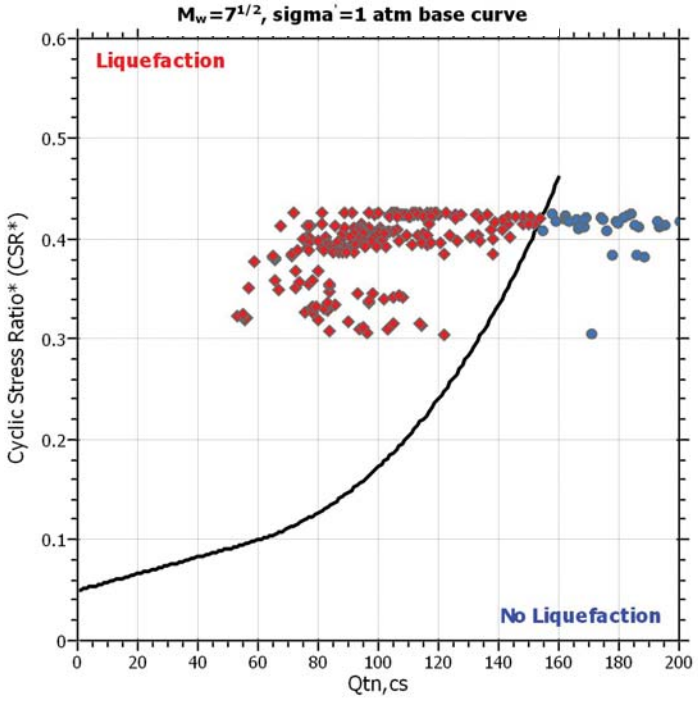
Project title : **Location :**

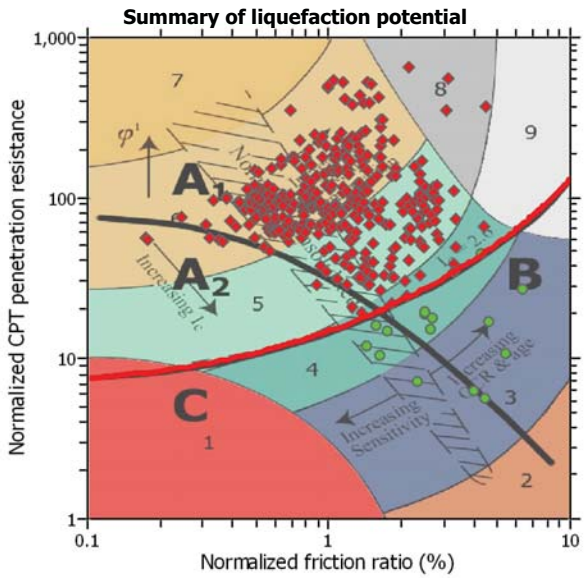
CPT file : 1-CPT2

Input parameters and analysis data

Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Robertson & Wride	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	8.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes		
Peak ground acceleration:	0.40	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

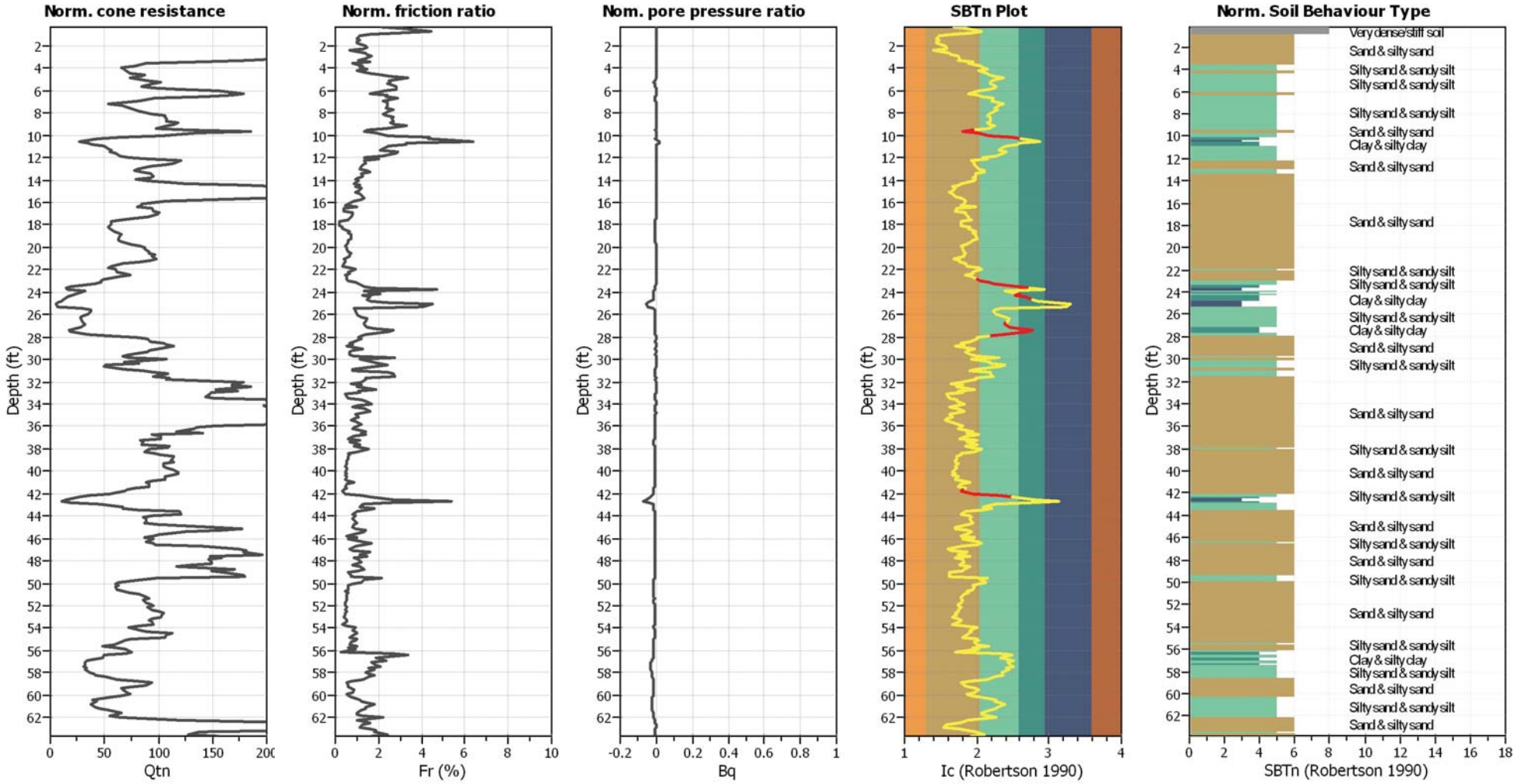






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



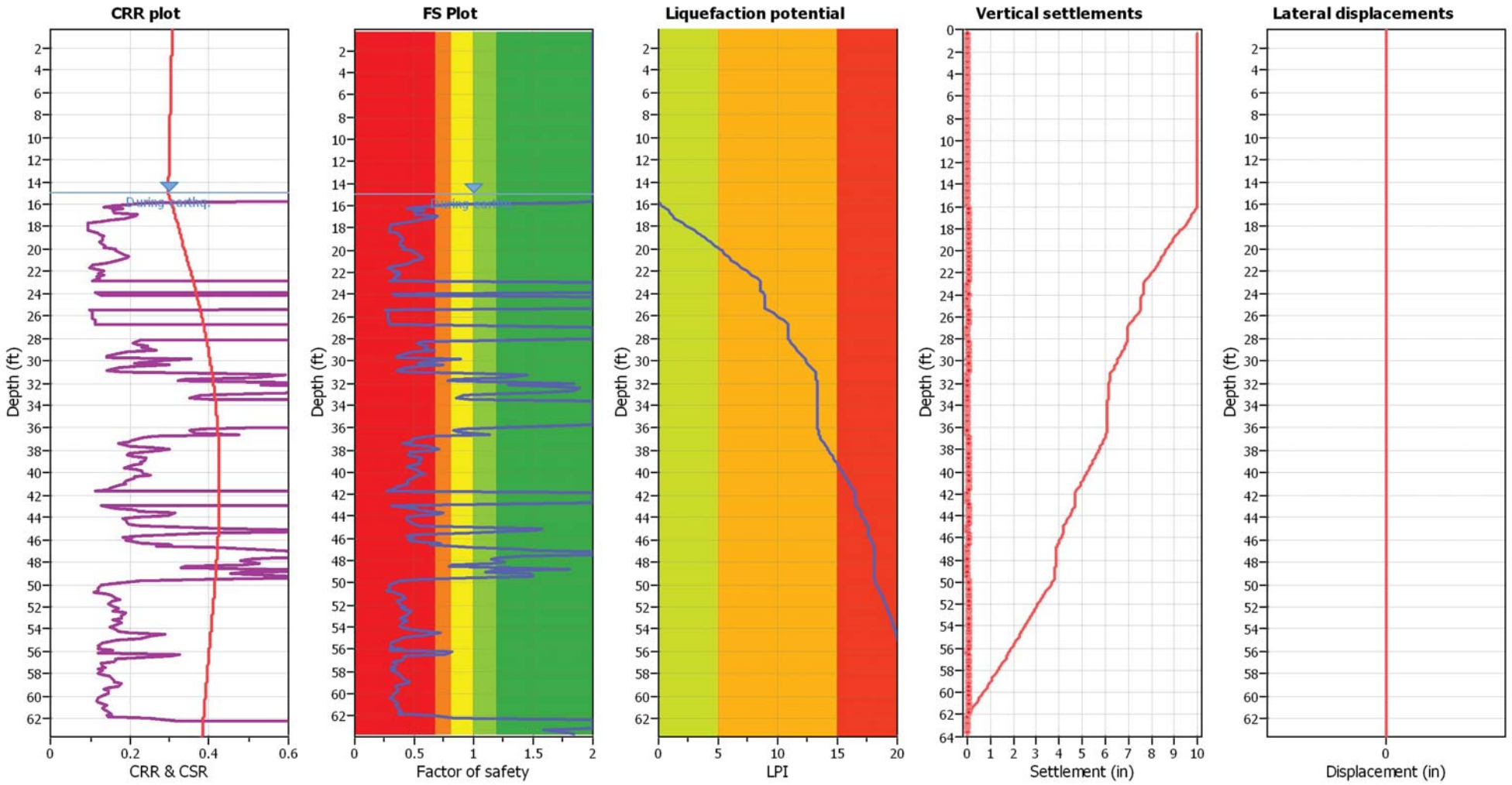
Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

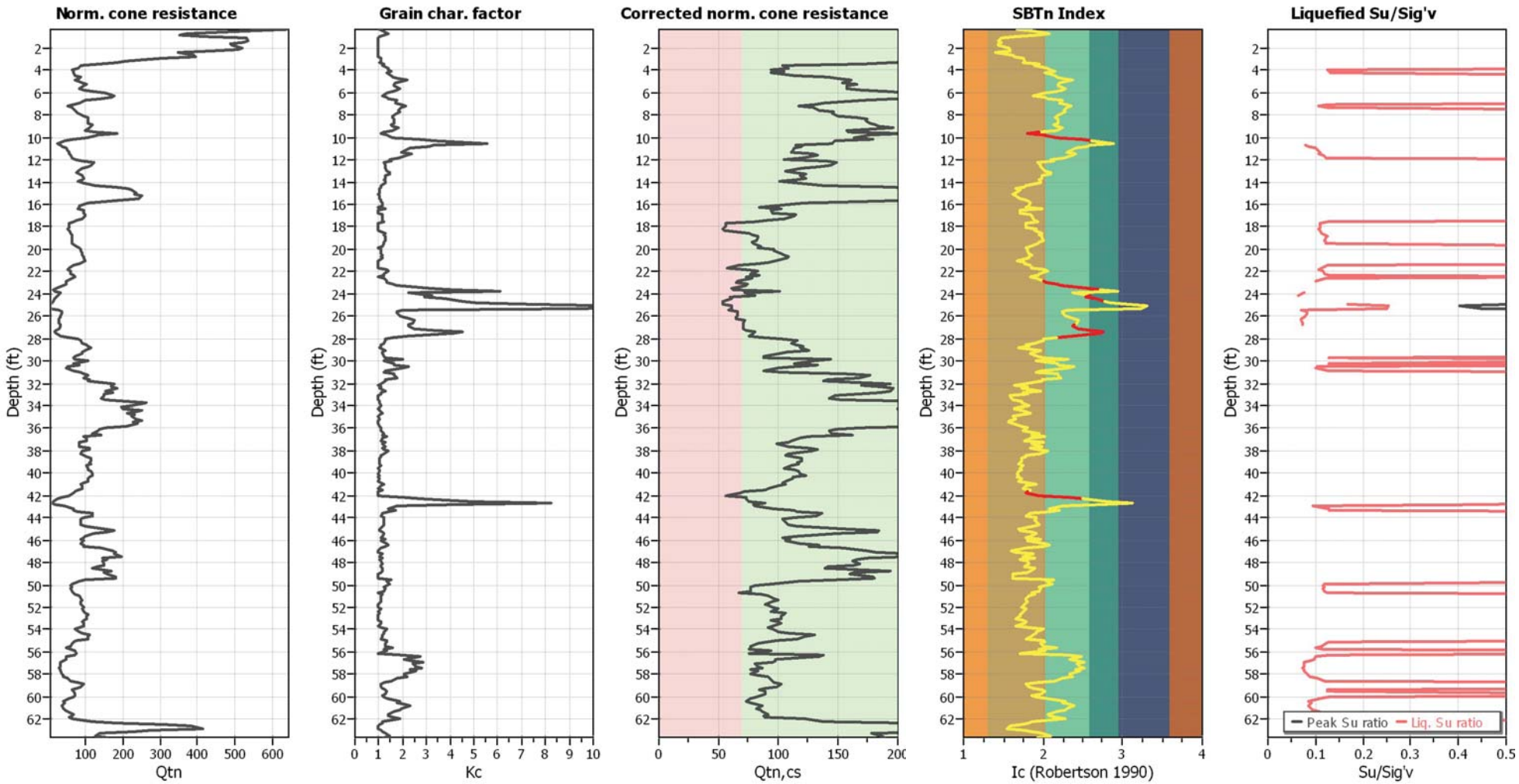
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liquefaction are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

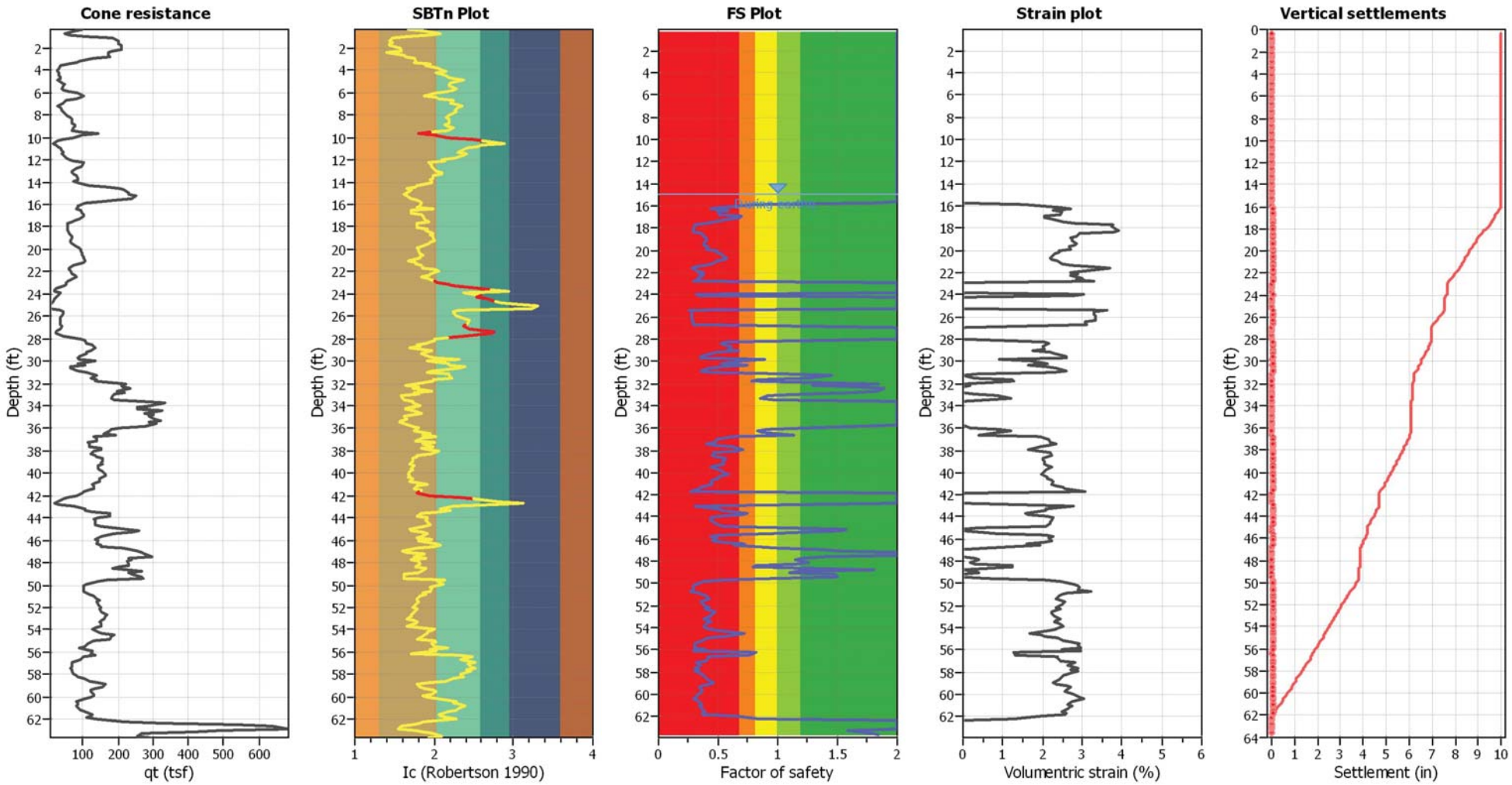
Check for strength loss plots (Olsen & Stark (2002))



Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

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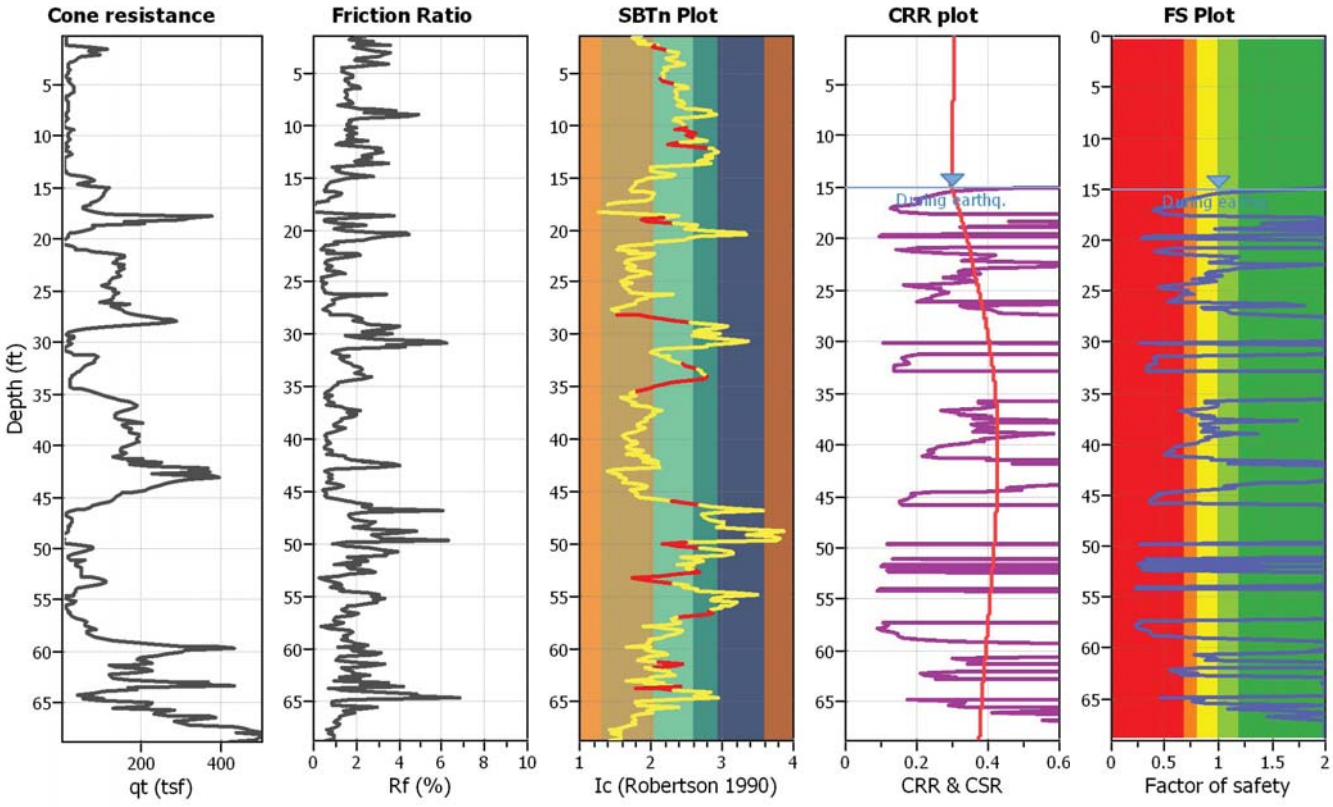
LIQUEFACTION ANALYSIS REPORT

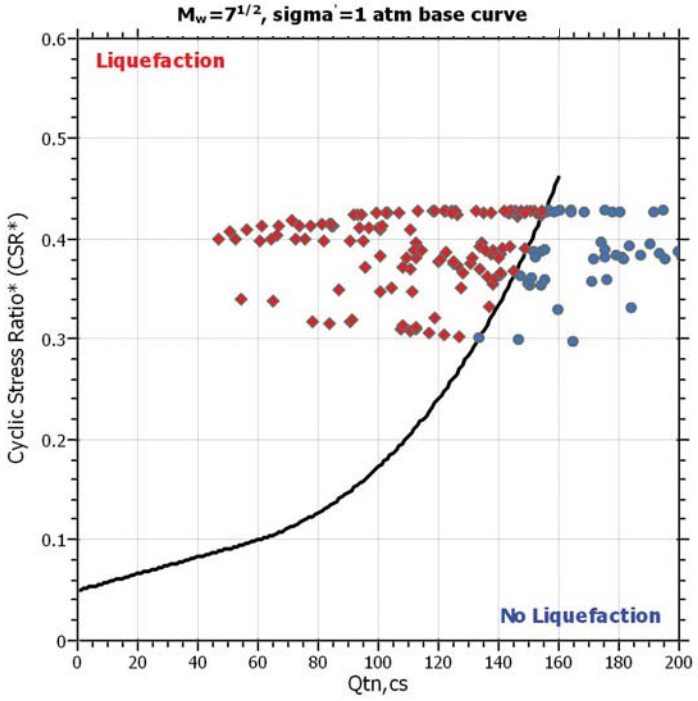
Project title : **Location :**

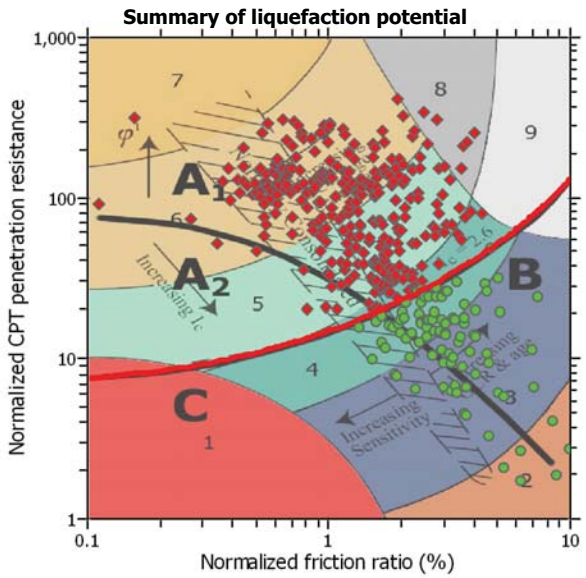
CPT file : 1-CPT3

Input parameters and analysis data

Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Robertson & Wride	G.W.T. (earthq.):	15.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	1	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	8.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes		
Peak ground acceleration:	0.40	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

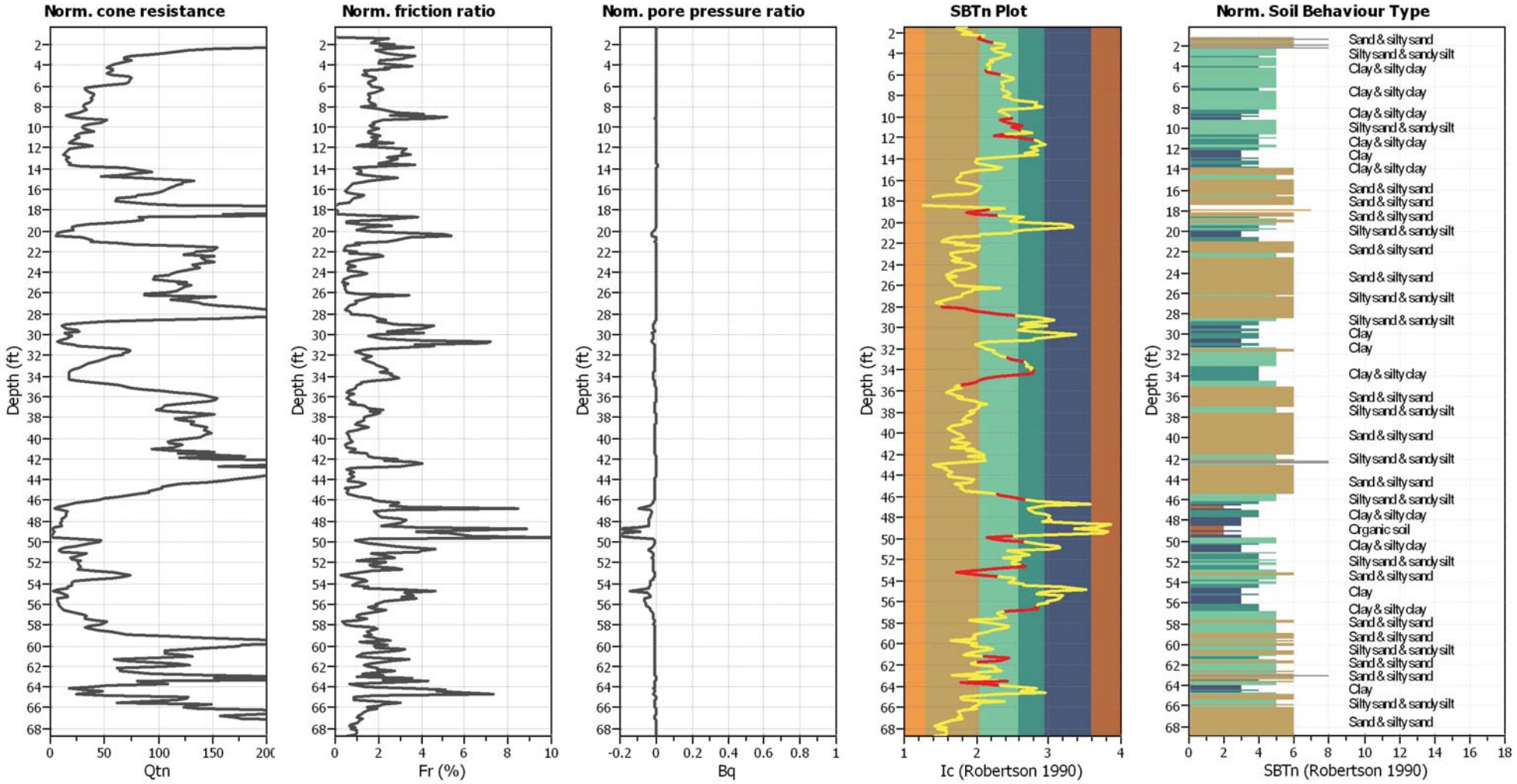






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



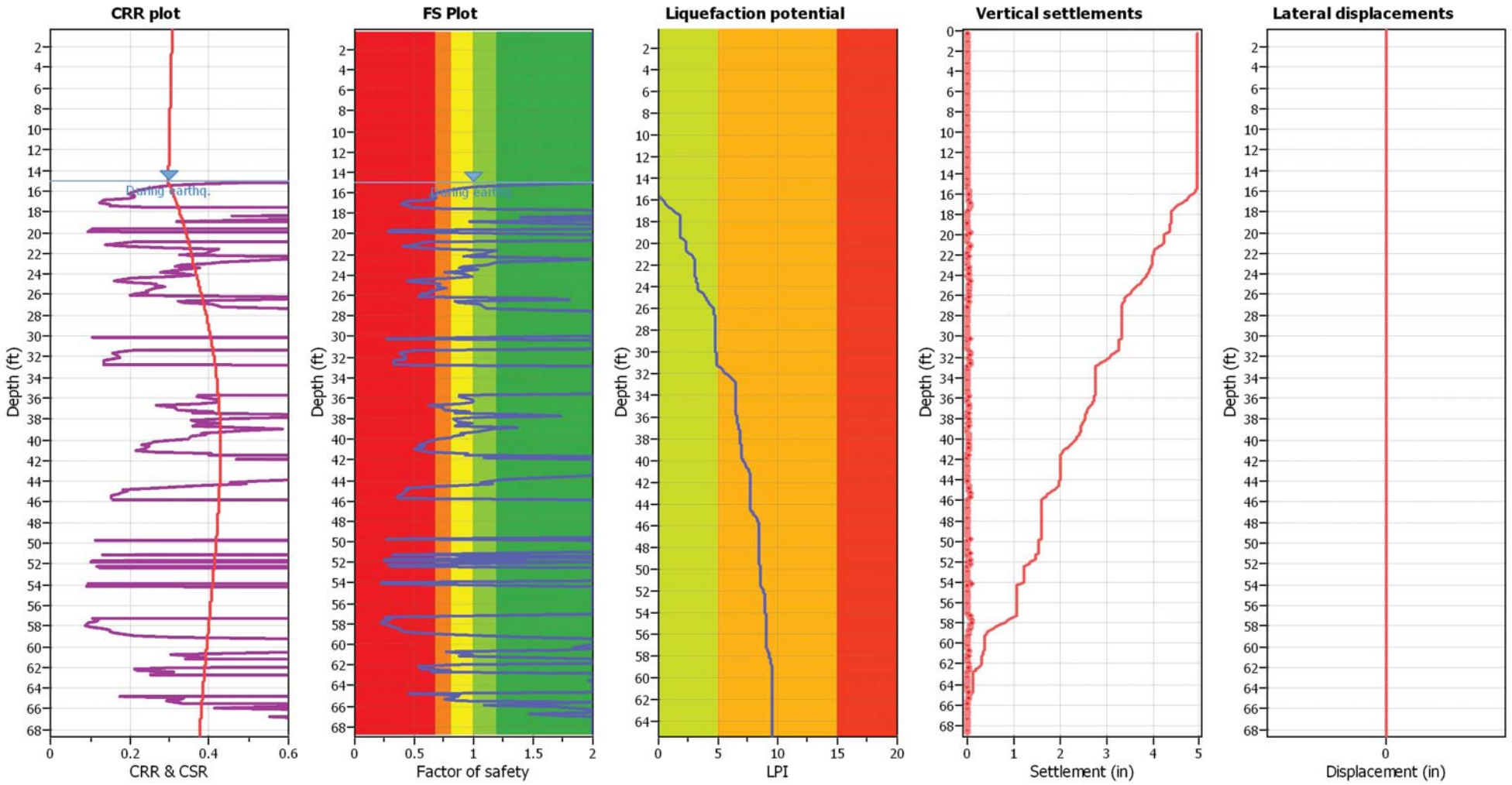
Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

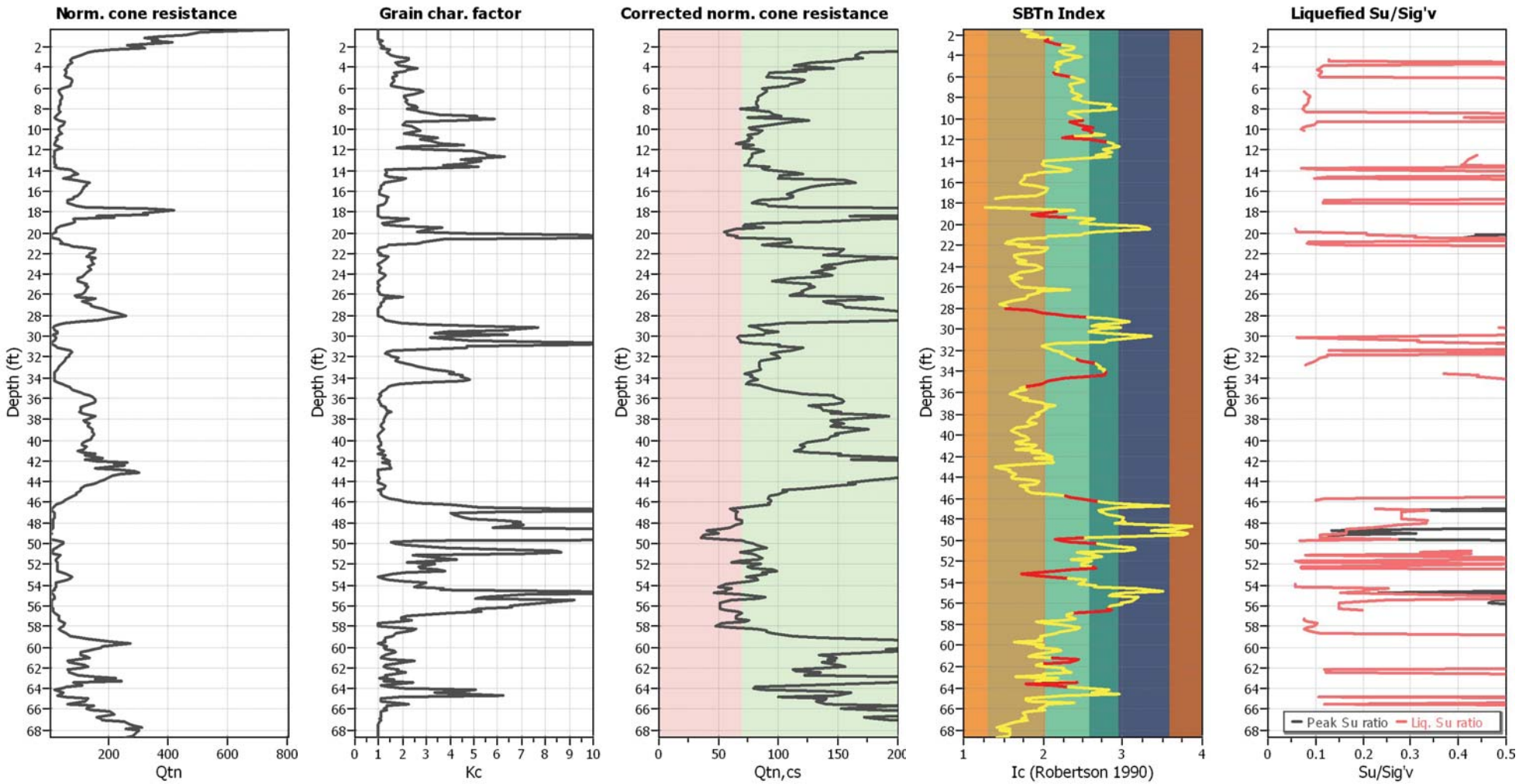
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liquefaction are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

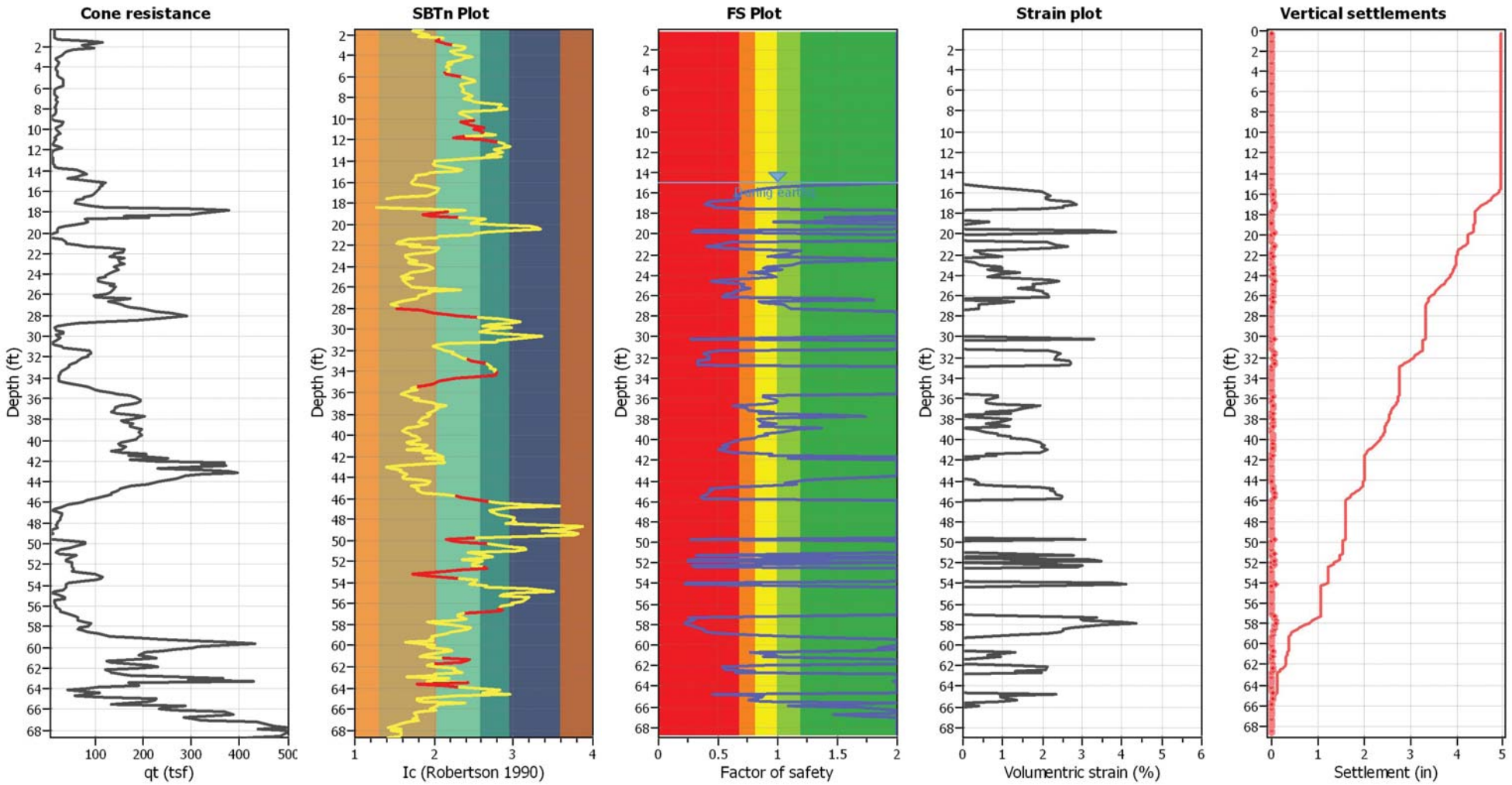
Check for strength loss plots (Olsen & Stark (2002))



Input parameters and analysis data

Analysis method:	NCEER 1998	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	Robertson & Wride	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	8.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.40	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



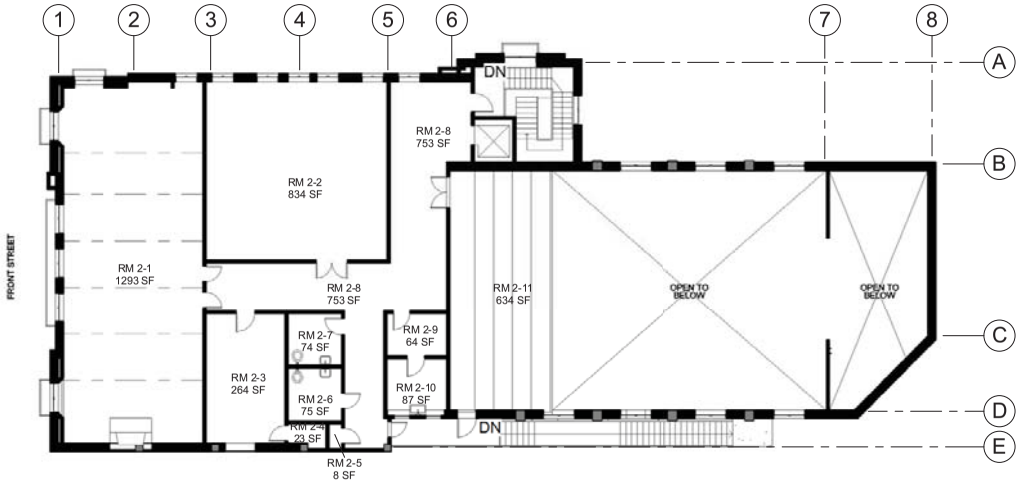
Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

APPENDIX E

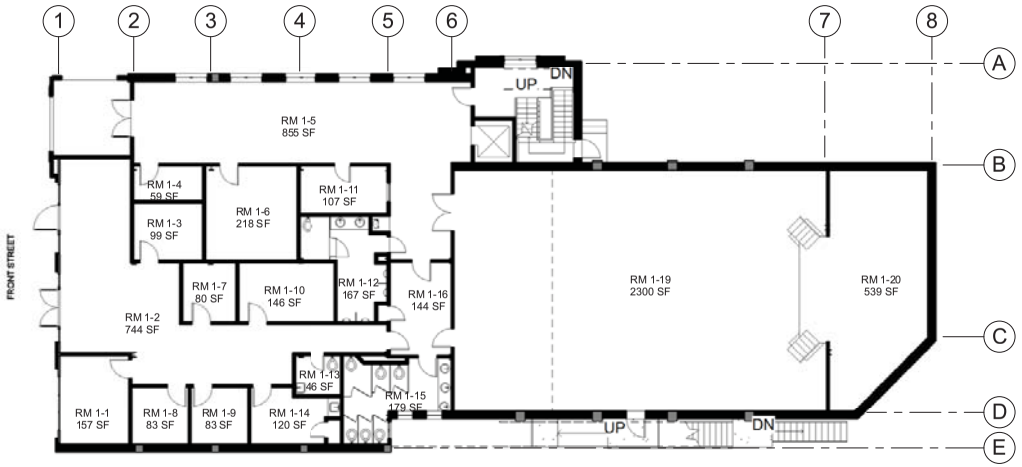
Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **A1.01**
Floor Plans



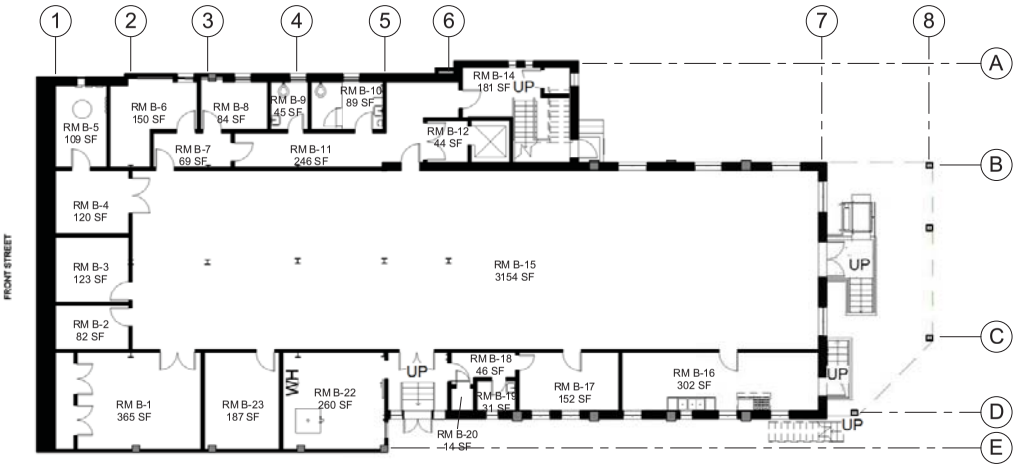
GROSS AREA
4,861 SF

2 2nd Floor
1" = 20'-0"



GROSS AREA
7,315 SF

1 1st Floor
1" = 20'-0"



GROSS AREA
6,814 SF

3 Basement
1" = 20'-0"

SCALE
0 20 40 60

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

Floor Plans

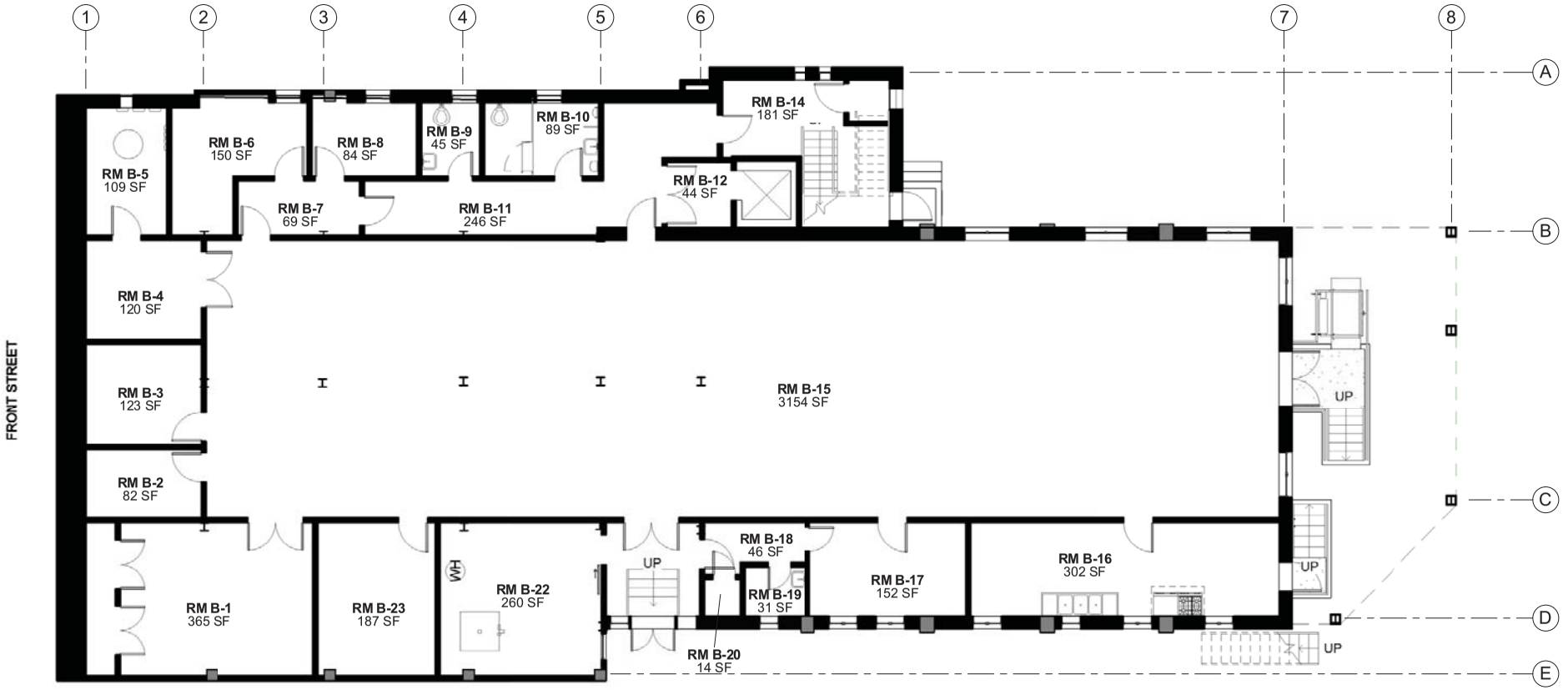
VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **A101**

Basement Floor Plan



GROSS AREA
6,814 SF

SCALE

0 10 20 30 40

1 Basement
3/32" = 1'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

Basement Floor Plan

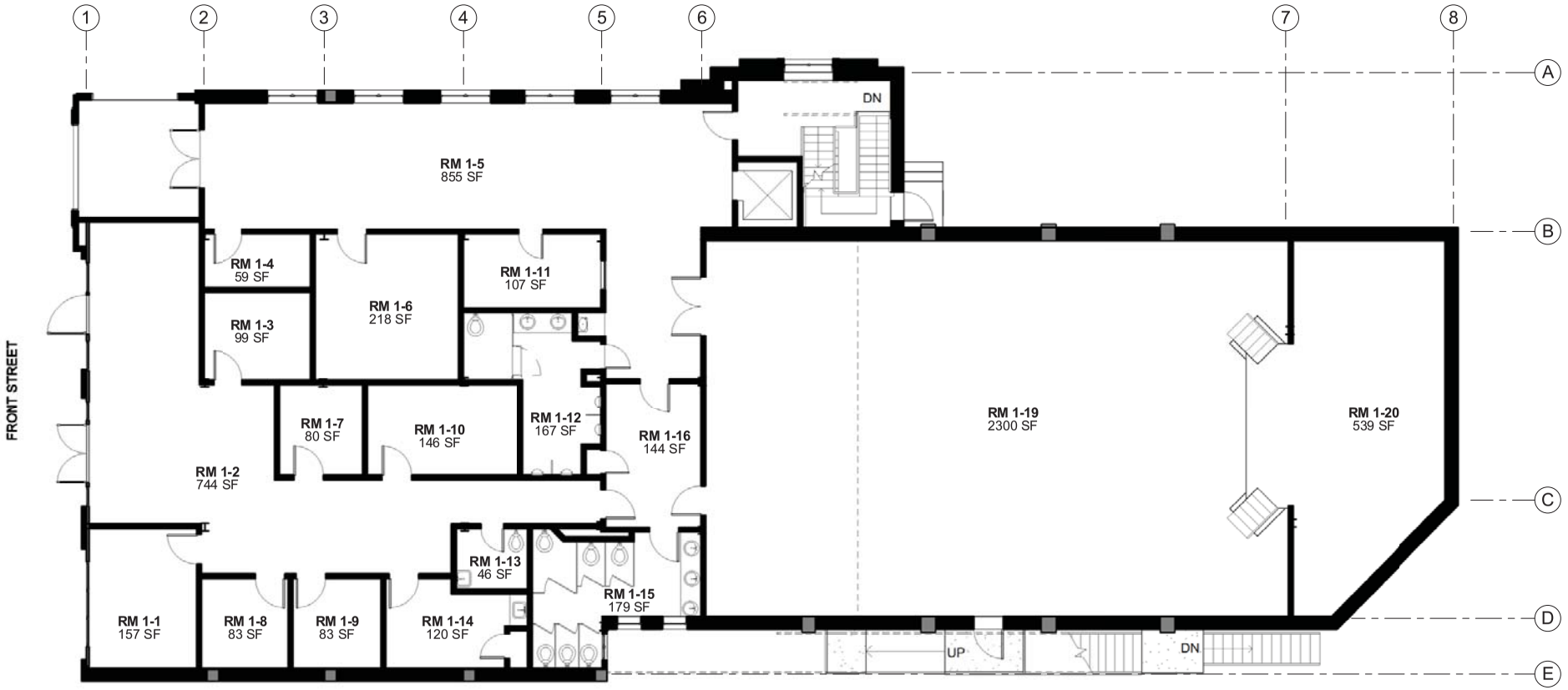
VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **A102**

First Floor Plan



GROSS AREA
7,315 SF

SCALE

0 10 20 30 40

1 1st Floor
3/32" = 1'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

First Floor Plan

VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

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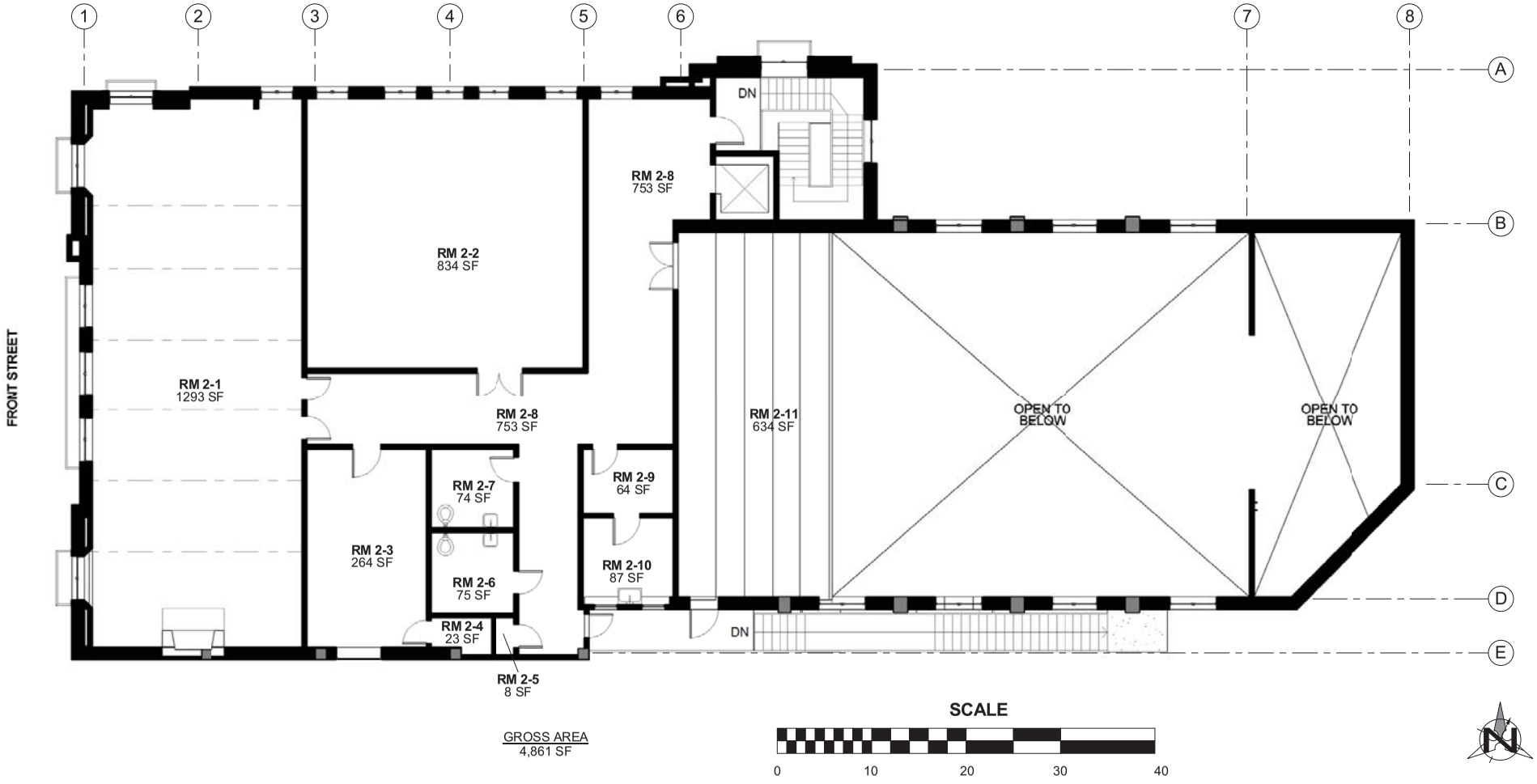
Sheet No. **A103**

Second Floor Plan



1 2nd Floor
3/32" = 1'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

Second Floor Plan

VANIR Construction Management, Inc.

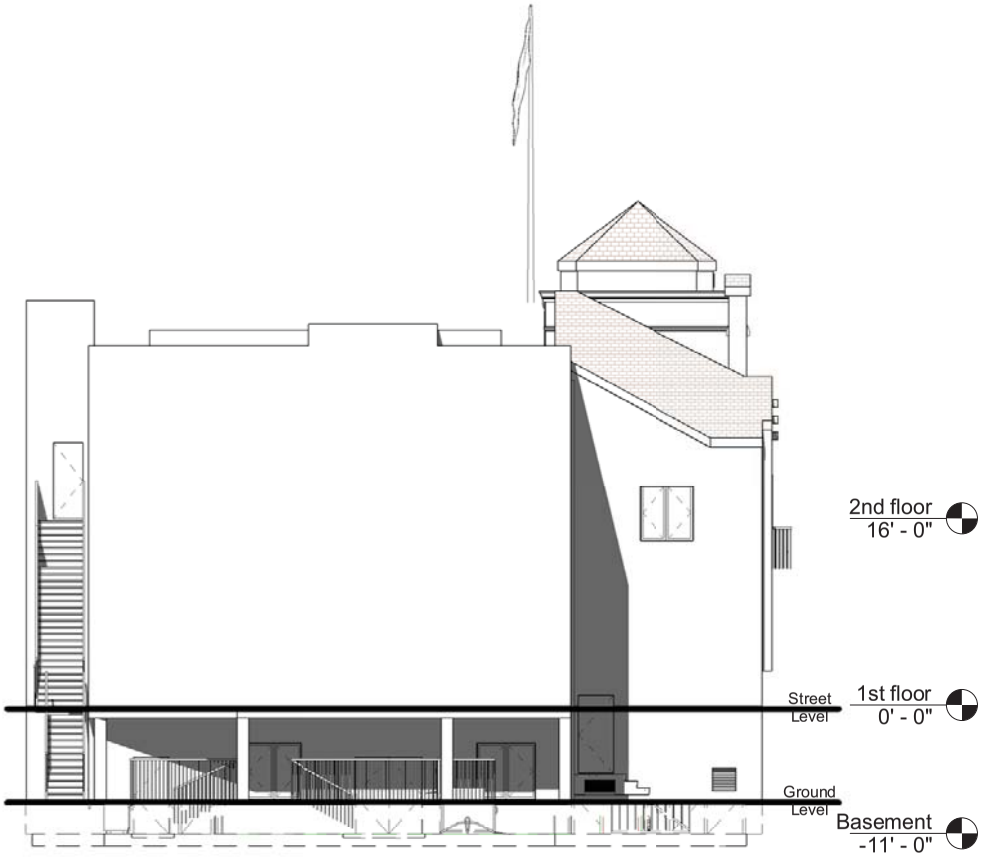
4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **A104**

West & East Elevation

1 West
3/32" = 1'-0"



2 East
3/32" = 1'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

West & East Elevation

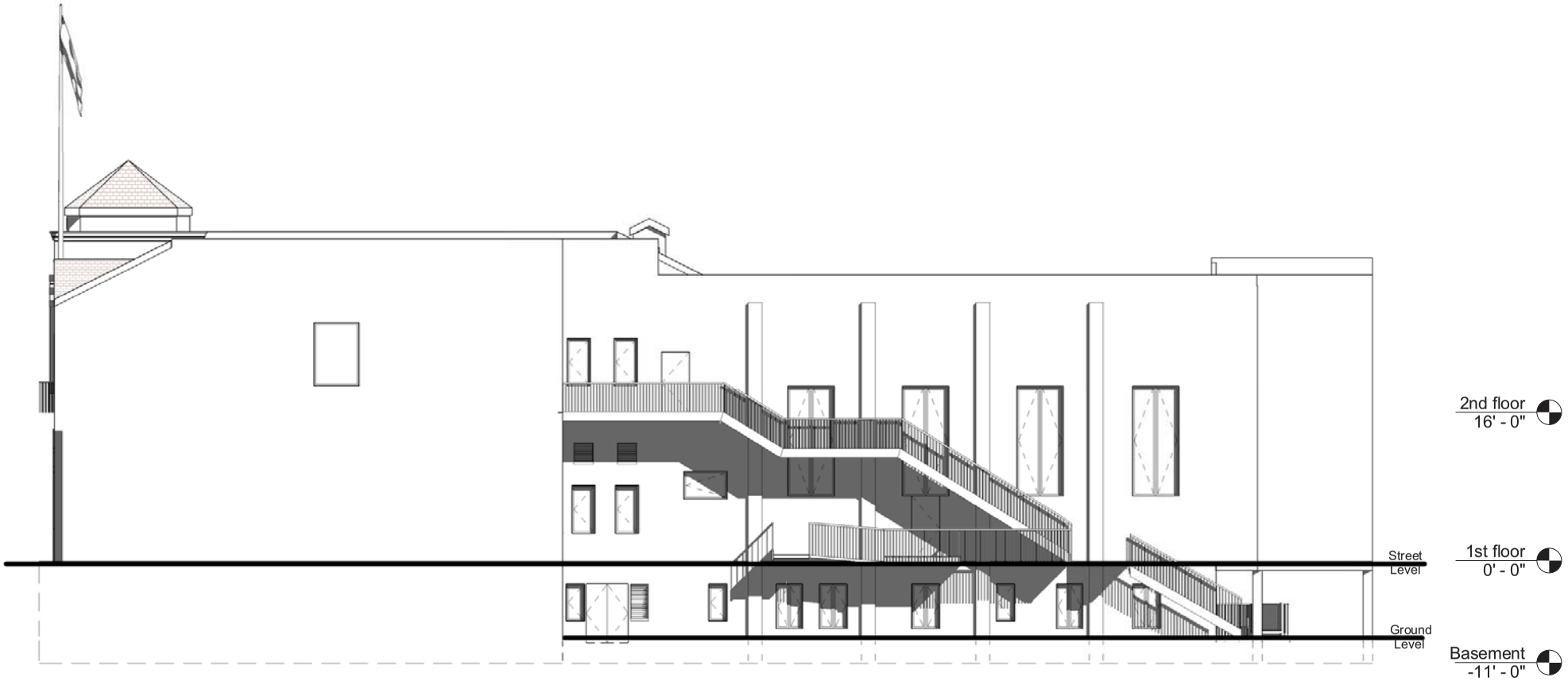
VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **A105**

South Elevation



1 South
3/32" = 1'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

South Elevation

VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **A106**

North Elevation

1 North
3/32" = 1'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

North Elevation

VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

APPENDIX F

LEGEND

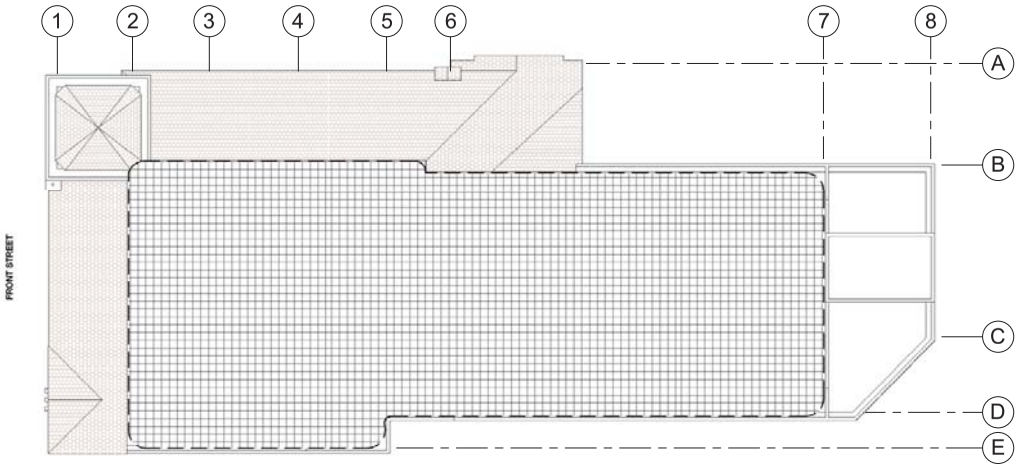
- FIRE WRAP (E) CONCRETE COLUMNS & BEAMS
- (N) STEEL FRAME BELOW SHEARWALL ABOVE
- AREA OF STRUCTURAL DEMOLITION INCLUDES: SLAB REMOVAL, EARTH TRENCHING
- REMOVE & REPLACE ROOFING ADD 1/2" PLYWOOD OVER EXISTING
- (N) SHEARWALLS
- (N) CONCRETE SHEARWALL BETWEEN (E) CONCRETE COLUMNS

General Note:
The limits of structural work overlaid on these drawings are taken from the Streeter Group, Inc. Report dated April 9, 2010.

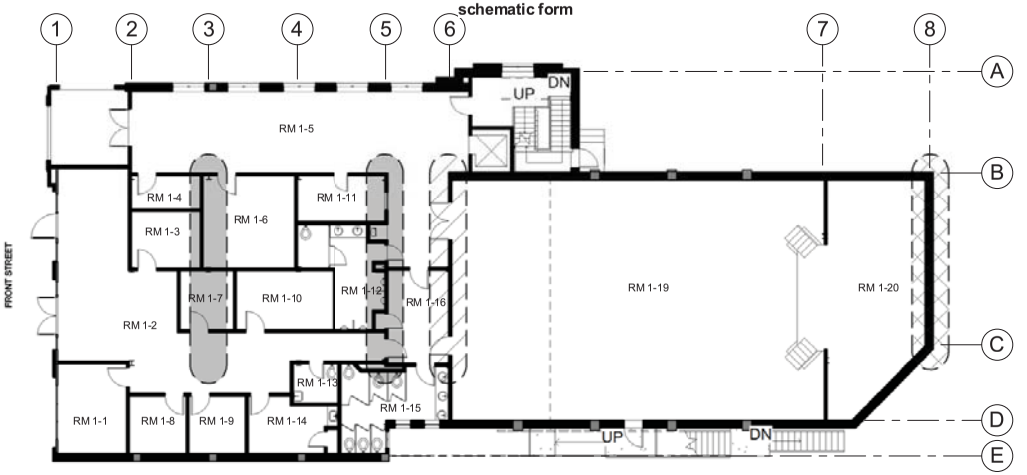
Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date. Some detail building features are represented in schematic form

Sheet No. **SR100**

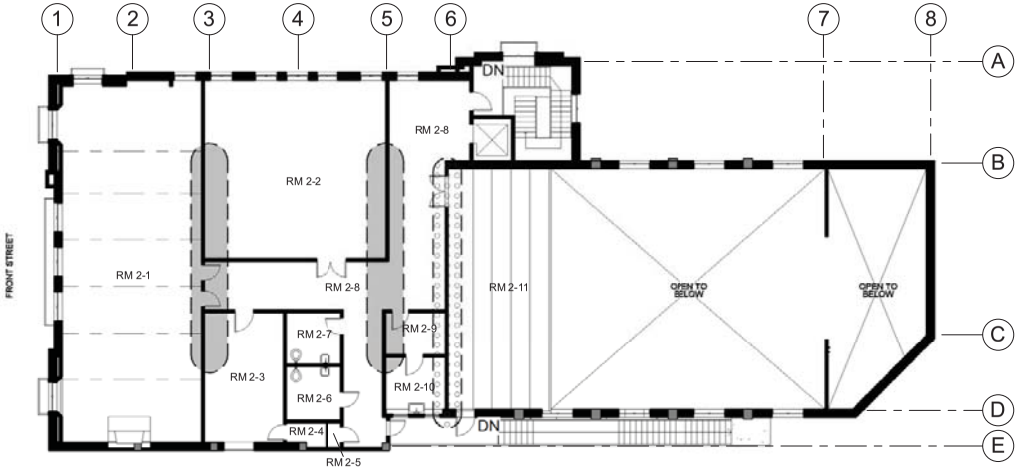
Building Repair Project



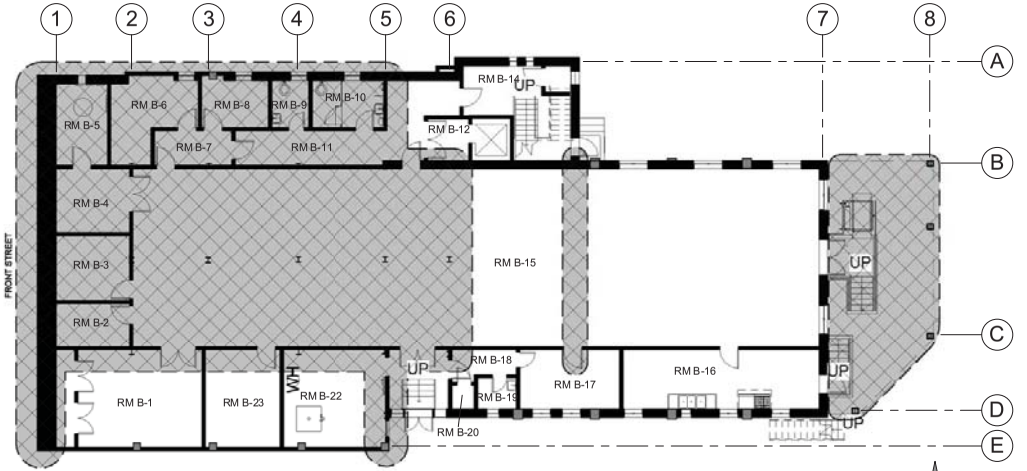
4 Roof
1" = 20'-0"



2 1st Floor
1" = 20'-0"



3 2nd Floor
1" = 20'-0"



1 Basement
1" = 20'-0"

SCALE
0 20 40 60

N

Veterans Memorial Building - Santa Cruz
County of Santa Cruz

Building Repair Project

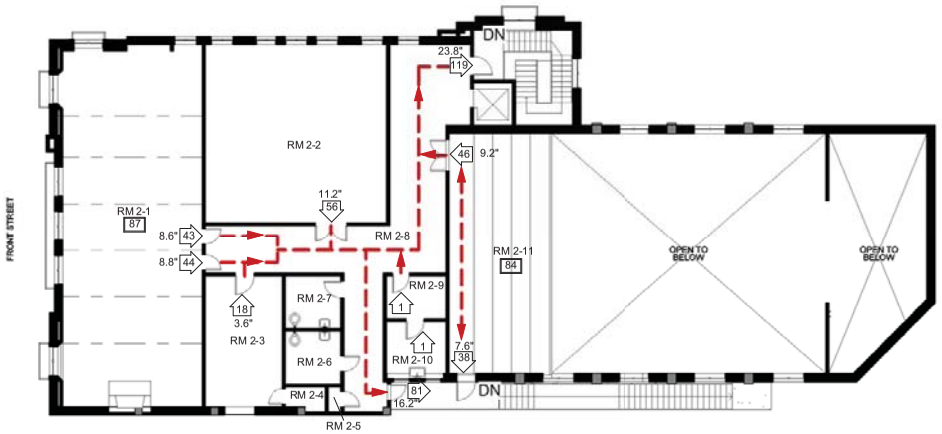
VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

APPENDIX G

Drawings taken from 1933 original documents. May not reflect actual modifications installed after original Construction date.

Sheet No. **A100**
Exiting Plan



2 2nd Floor-Exiting Plan
1" = 20'-0"

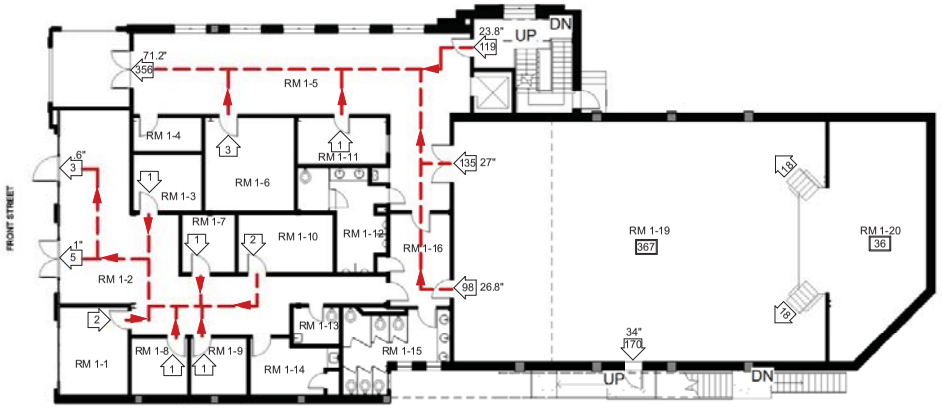
Exiting Legend

*2010 California Building Code (CBC)

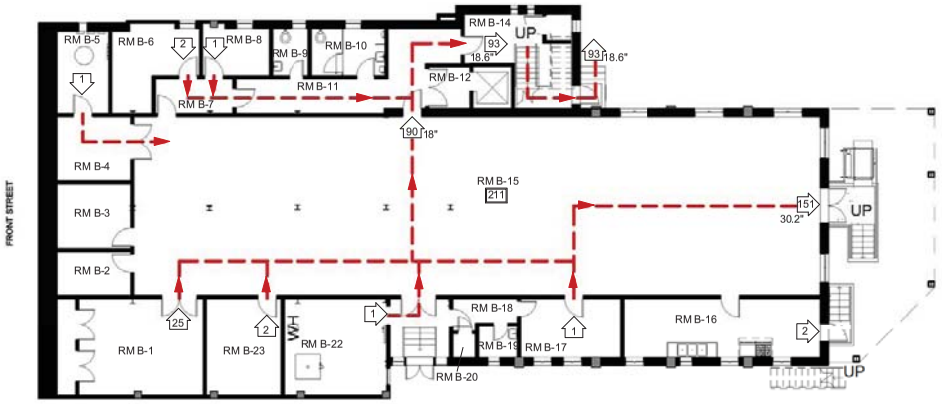
100 NUMBER OF OCCUPANTS (Per CBC* Table 1004.1.1)

1 OCCUPANTS AT DOORWAY
.2" EGRESS WIDTH (Per CBC* 1005.1)

EGRESS PATH & DIRECTION



1 1st Floor-Exiting plan
1" = 20'-0"



3 Basement-Exiting Plan
1" = 20'-0"

Veterans Memorial Building - Santa Cruz

County of Santa Cruz

Exiting Plan
(850 Occupants)

VANIR Construction Management, Inc.

4540 Duckhorn Drive, Suite 300
Sacramento, CA 95834
TEL 916-575-8888
FAX 916-575-8887

APPENDIX H

mailed 5/9/2011

County of Santa Cruz

GENERAL SERVICES DEPARTMENT
701 OCEAN STREET, SUITE 330, SANTA CRUZ, CA 95060-4073
(831) 454-2210 FAX: (831) 454-2710 TDD: (831) 454-2123
NANCY GORDON, DIRECTOR

James Aboytes
Vanir Construction Management
4540 Duckhorn Drive, Suite 300
Sacramento CA 95834

Re: County of Santa Cruz Veteran's Hall project

In response to your phone call I have completed a search of County environmental records for the Veteran's Hall on 842 Front Street. I also did a walkthrough inspection on Friday, April 29, 2011. This is what we can report:

Lead - We do not have any records regarding the lead status of any building components. All paints in the building at this time are intact and non-friable. Renovation activities may change these conditions, however.

Asbestos – I have included sampling dates and locations. Except where indicated, I was not able to determine whether and to what extent, the asbestos-containing material had been abated. This suggests that additional survey work may be required.

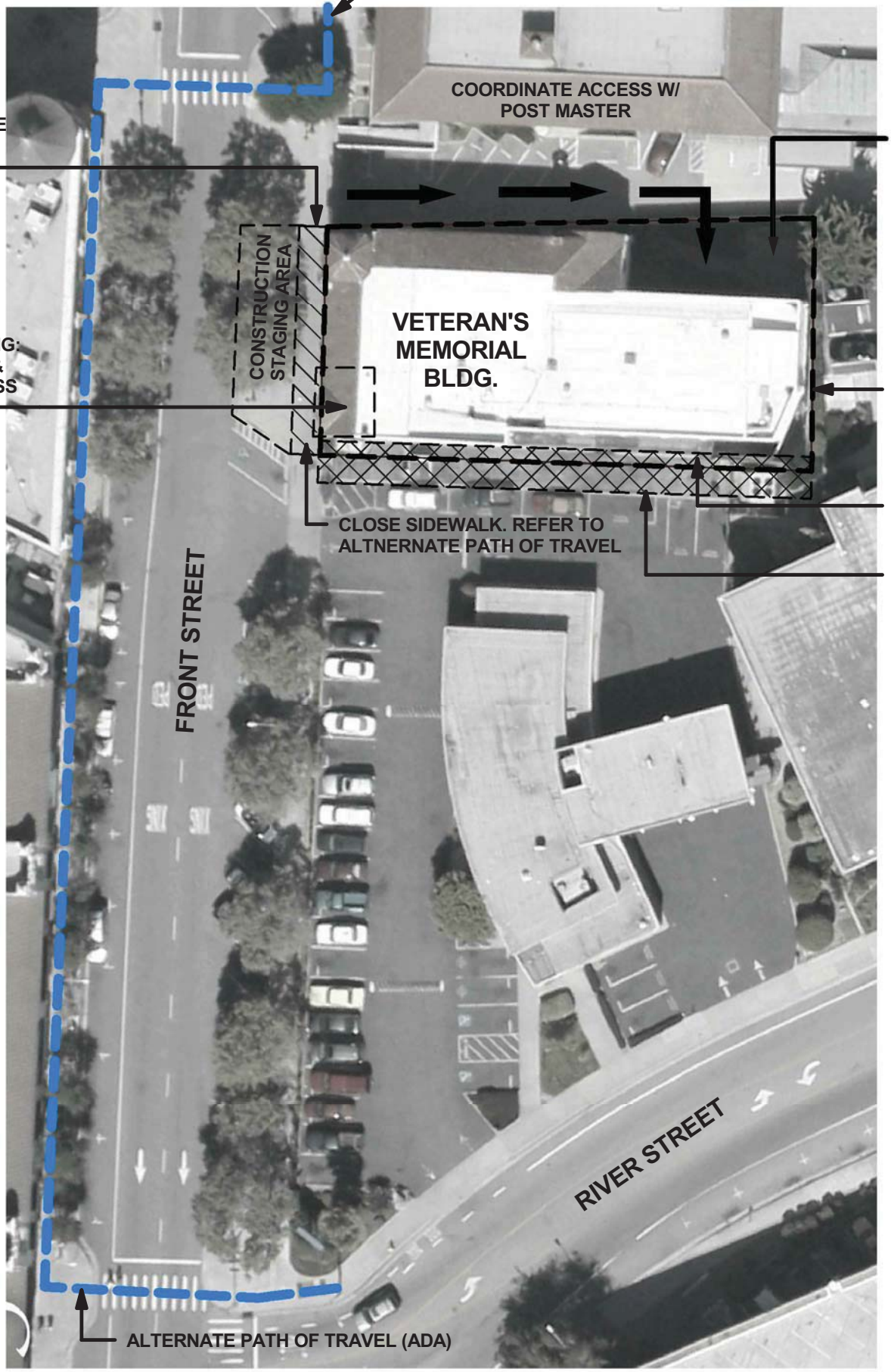
- 1988 - Asbestos found in pipe insulation in the basement of the building. This material was abated in December 1989. Floor tiles adjacent to the first floor restroom were abated at the same time.
- 1989 - A survey found asbestos in spalling plaster in the interior walls on all 3 floors. This was after the 1989 Loma Prieta Earthquake.
- 1990 - A survey found Aircell pipe insulation in the attic positive for asbestos; transite pipe insulation in the attic was positive but non-friable; 9x9 floor tiles in the basement and first floor were assumed to contain asbestos and were non-friable
- 1992 - Samples of 9x9 floor tiles in the front office area were negative for asbestos.
- 1994 - Samples of 12x12 brown tile in the main room in the basement were negative; the black mastic under the tiles had 1 - 5% asbestos. Tiles and mastic in the kitchen, in the basement were negative.
- 1995 – Samples from the following locations were negative – 2nd floor restroom floor tile; interior plaster and lathe, south wall of stage area in the auditorium; basement kitchen stove fume hood insulation; basement boiler room ceiling plaster.
- 2005 – A sample of the Celotex fiberboard from the auditorium ceiling was negative.
- 2010 – Samples from the exterior plaster, basement level, north side and south side, were negative.

I hope this information is helpful,

Josh Reilly
County Safety Officer
County of Santa Cruz
701 Ocean St. Room 330
Santa Cruz, CA 95060
831-454-4820 office
831-454-4708 fax

JAR/jar
Cc: Nancy Gordon

APPENDIX I



Site Mitigation Plan

APPENDIX J

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Base Project

Date: April 8, 2011 & revised on June 16, 2011

CSI	Description		Item 1	Cost/sf
2	Existing Conditions		$124,293	$6.55
3	Concrete		$541,451	$28.51
4	Masonry		$169,040	$8.90
5	Metals		$13,608	$0.72
6	Wood, Plastics & Composites		$66,242	$3.49
7	Thermal & Moisture Protection		$82,000	$4.32
8	Openings		$50,837	$2.68
9	Finishes		$251,508	$13.24
10	Specialties		$13,155	$0.69
11	Equipment		$0	$0.00
12	Furnishings		$0	$0.00
13	Special Construction		$0	$0.00
14	Conveying Systems		$35,000	$1.84
21	Fire Suppression		$5,979	$0.31
22	Plumbing		$249,191	$13.12
23	HVAC		$152,788	$8.05
25	Integrated Automation		$0	$0.00
26	Electrical		$135,406	$7.13
27	Communications		$18,990	$1.00
28	Electronic Safety and Security		$66,465	$3.50
31	Earthwork		$0	$0.00
32	Exterior Improvements		$0	$0.00
33	Utilities		$0	$0.00
34	Transportation		$0	$0.00
	Subtotal		**$1,975,952**	**$104.05**
	General Contractor Job Overhead	7.50%	$148,196	$7.80
	General Contractor Markup	5.00%	$106,207	$5.59
	General Contractor Bond	2.50%	$55,759	$2.94
	Design Contingency	20.00%	$457,223	$24.08
	Market Factor	0.00%	$0	$0.00
	Construction Cost -- April 2011		**$2,743,337**	**$144.46**
	Soft Costs	30.00%	$823,001	$43.34
	Total Construction Cost		**$3,566,338**	**$187.80**

Estimate Notes:

1) The age of the building would indicate the possibility of materials currently classified as hazardous being used during construction. The estimate includes an allowance for remediation of hazardous materials. Items most likely to require abatement for access to structural work include steam pipe insulation, plaster walls & ceilings, VAT flooring and lead paint. The final cost may need to be adjusted based on survey results performed by a hazmat consultant.

2) Base Project includes cost to systems which are directly impacted by the seismic retrofit such as finishes, the boiler plant and electrical service along with ADA upgrades. Also includes adding Fire Alarm, fire extinguishers, emergency and exit lighting.

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Base Project

Date: April 8, 2011 & revised on June 16, 2011

TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
02 41 00	**DEMOLITION**				
02 41 00	***Structural Demolition***			$0.00	$0
02 41 00	Sawcut Basement Concrete Slab	200	LF	$8.00	$1,600
02 41 00	Demo Basement Concrete Slab	151	CY	$230.74	$34,795
02 41 00	Demo unreinforced HCT Walls	600	SF	$2.41	$1,448
02 41 00	Demo Plaster Walls	5,400	SF	$1.94	$10,478
02 41 00	Remove (e) Stairs	1	LS	$1,990.40	$1,990
02 41 00	Remove straight sheathing for new ledger	300	LF	$3.52	$1,056
02 41 00	Remove False framing @ roof for plywood	1,300	SF	$3.00	$3,900
02 41 00				$0.00	$0
02 41 00	***Non Structural Demo***			$0.00	$0
02 41 00	Demo Single-Ply Roof for (n) plywood	6,000	SF	$0.75	$4,500
02 41 00	Remove and Salvage Tile Roof	1,700	SF	$4.82	$8,201
02 41 00	Remove VCT flooring in basement	1,800	SF	$0.75	$1,350
02 41 00	misc demo	18,990	GSF	$1.00	$18,990
02 41 00				$0.00	$0
02 41 00	Disposal	1	LS	$7,500.00	$7,500
02 41 00					
02 41 00	**ASBESTOS CONSULTANT**	**18,990**	**GSF**	**$5.05**	**$95,808**
02 80 00	**FACILITY REMEDIATION**				
02 80 00	Hazmat Abatement - Allowance	18,990	GSF	$1.50	$28,485
02 80 00				$0.00	$0
02 80 00					
02 80 00	**FACILITY REMEDIATION**	**18,990**	**GSF**	**$1.50**	**$28,485**
03 30 00	**CONCRETE**				
03 30 00				$0.00	$0
03 30 00	***Mat Foundation, 18" thick***			$0.00	$0
03 30 00	Excavation	410	CY	$47.24	$19,368
03 30 00	Formwork	500	LF	$15.15	$7,574
03 30 00	Dowel into (e) footings	1,028	EA	$28.26	$29,050
03 30 00	Through Dowel @ (e) footings	206	EA	$75.74	$15,603
03 30 00	Pour Concrete	410	CY	$179.15	$73,450
03 30 00	Rebar - 300# per cy	123,000	LBS	$1.59	$195,505
03 30 00	Finish Concrete	5,800	SF	$0.42	$2,428
03 30 00	Remove spoils	410	CY	$62.24	$25,518
03 30 00				$0.00	$0
03 30 00	***Slab on Grade Replacement***			$0.00	$0
03 30 00	Formwork	250	LF	$1.82	$455
03 30 00	Dowel into (e) Slab	500	EA	$28.26	$14,130
03 30 00	Pour Concrete	107	CY	$179.15	$19,242
03 30 00	Rebar -1# per SF	5,800	LBS	$1.59	$9,219
03 30 00	Finish Concrete	5,800	SF	$0.69	$4,024
03 30 00				$0.00	$0
03 30 00	***Shotcrete Basement Walls***			$0.00	$0
03 30 00	Prep (e) concrete along CL 1	700	SF	$3.51	$2,458

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Base Project

Date: April 8, 2011 & revised on June 16, 2011

TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
03 30 00	Formwork - One side along CL8	320	SF	$12.02	$3,847
03 30 00	Dowel into (e) concrete wall - line 1	175	EA	$28.26	$4,945
03 30 00	Shotcrete Basement Walls	40	CY	$886.92	$35,477
03 30 00	Rebar - 350# per cy	14,000	LBS	$1.59	$22,253
03 30 00				$0.00	$0
03 30 00	***Fiberwrap***			$0.00	$0
03 30 00	Fiberwrap columns (6 ea, assume 18" square)	900	SF	$30.00	$27,000
03 30 00	Fiberwrap beams	480	SF	$30.00	$14,400
03 30 00				$0.00	$0
03 30 00	***Miscellaneous Concrete***			$0.00	$0
03 30 00	Allowance to repair spalled concrete	1	LS	$10,593.75	$10,594
03 30 00	Allowance to repair damaged re-inforcing	1	LS	$4,912.48	$4,912
03 30 00				$0.00	$0
03 30 00				$0.00	$0
03 30 00					
03 30 00	**CONCRETE**	**18,990**	**GSF**	**$28.51**	**$541,451**
04 20 00	**MASONRY**				
04 20 00	New CMU walls to replace HCT	5,400	SF	$25.00	$135,000
04 20 00	New CMU Shearwalls	1,000	SF	$30.00	$30,000
04 20 00	Epoxy anchors into (e) concrete	80	EA	$50.50	$4,040
04 20 00				$0.00	$0
04 20 00				$0.00	$0
04 20 00					
04 20 00	**MASONRY**	**6,400**	**WLSF**	**$8.90**	**$169,040**
05 12 00	**STRUCTURAL STEEL**				
05 12 00	***Basement Steel Frame***			$0.00	$0
05 12 00	TS Frame - Assume HSS8x4x½	2,900	LBS	$4.05	$11,739
05 12 00	Epoxy anchors into (e) concrete	37	EA	$50.50	$1,868
05 12 00				$0.00	$0
05 12 00				$0.00	$0
05 12 00					
05 12 00	**STRUCTURAL STEEL**		**LBS**	**$0.72**	**$13,608**
06 10 00	**ROUGH CARPENTRY**				
06 10 00	***Detail 1***			$0.00	$0
06 10 00	Install (n) ledger	100	LF	$13.23	$1,323
06 10 00	Drill and epoxy new anchor into (e) concrete	50	EA	$50.50	$2,525
06 10 00				$0.00	$0
06 10 00	***Detail 2***			$0.00	$0
06 10 00	Drill and epoxy new anchor into (e) concrete	30	EA	$50.50	$1,515
06 10 00				$0.00	$0
06 10 00	***Detail 3***			$0.00	$0
06 10 00	Add Framing Clip	75	EA	$5.05	$379
06 10 00				$0.00	$0
06 10 00	***New Plywood Roof Sheeting***			$0.00	$0
06 10 00	½" plywood	7,500	SF	$2.74	$20,569

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Base Project

Date: April 8, 2011 & revised on June 16, 2011

TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
06 10 00				$0.00	$0
06 10 00	***Miscellaneous***			$0.00	$0
06 10 00	Construct new Stairs	1	LS	$12,239.48	$12,239
06 10 00	Replace False framing at roof	1,300	SF	$7.46	$9,696
06 10 00	Replace (e) straight sheathing removed for clips and ledger	300	LF	$8.18	$2,453
06 10 00				$0.00	$0
06 10 00					
06 10 00	**ROUGH CARPENTRY**	**18,990**	**GSF**	**$2.67**	**$50,699**
06 20 00	**FINISH CARPENTRY**				
06 20 00	Miscellaneous Millwork and Finish Carp	18,990	GSF	$0.50	$9,495
06 20 00	Includes railing at stairs			$0.00	$0
06 20 00					
06 20 00	**FINISH CARPENTRY**		**GSF**	**$0.50**	**$9,495**
06 41 00	**CASEWORK**				
06 41 00	R/R Cabinets	1	LS	$6,048.43	$6,048
06 41 00				$0.00	$0
06 41 00					
06 41 00	**CASEWORK**		**GSF**	**$0.32**	**$6,048**
07 21 00	**INSULATION**				
07 21 00	Replace removed insulation - Allowance	1	LS	$250.00	$250
07 21 00				$0.00	$0
07 21 00				$0.00	$0
07 21 00					
07 21 00	**INSULATION**		**SF**	**$0.01**	**$250**
07 31 00	**ROOFING**				
07 31 00	New Single-ply roofing, including flashing and SM	6,000	SF	$9.00	$54,000
07 31 00	Re-install Tile roof, assume 50% new tiles	1,700	SF	$14.09	$23,952
07 31 00				$0.00	$0
07 31 00				$0.00	$0
07 31 00					
07 31 00	**ROOFING**	**7,700**	**SF**	**$4.10**	**$77,952**
07 92 00	**SEALANTS**				
07 92 00	Caulking and Sealants	18,990	GSF	$0.20	$3,798
07 92 00				$0.00	$0
07 92 00					
07 92 00	**SEALANTS**		**GSF**	**$0.20**	**$3,798**
08 10 00	**HM/WD DOORS / FRAMES / HRDWR**				
08 10 00	R/R doors - single	21	EA	$1,107.21	$23,251
08 10 00	R/R doors - pair	5	EA	$2,017.07	$10,085
08 10 00	allowance for historical	1	LS	$10,000.00	$10,000
08 10 00	R/R doors and/or hardware - ADA compliance	1	LS	$7,500.00	$7,500
08 10 00					
08 10 00	**HM/WD DOORS / FRAMES / HRDWR**		**LFS**	**$2.68**	**$50,837**
08 51 13	**WINDOWS**				
08 51 13				$0.00	$0

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Base Project

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TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
08 51 13				$0.00	$0
08 51 13					
08 51 13	**WINDOWS**		**SF**	**$0.00**	**$0**
08 90 00	**LOUVERS AND VENTS**		**DRS**	**$0.00**	**$0**
09 20 00	**MTL STUDS / DRYWALL**				
09 20 00	Replace Interior Walls	6,000	SF	$12.00	$72,000
09 20 00				$0.00	$0
09 20 00				$0.00	$0
09 20 00					
09 20 00	**MTL STUDS / DRYWALL**		**SF**	**$3.79**	**$72,000**
09 20 00	**PLASTER**				
09 20 00	Patch plaster walls - allowance	1	LS	$9,797.79	$9,798
09 20 00				$0.00	$0
09 20 00					
09 20 00	**PLASTER**		**SF**	**$0.52**	**$9,798**
09 30 00	**TILE & STONE WORK**				
09 30 00	Restroom Floors - R/R Tile	480	SF	$18.00	$8,640
09 30 00	Restroom Walls - R/R Tile	1,110	SF	$15.00	$16,650
09 30 00				$0.00	$0
09 30 00					
09 30 00	**TILE & STONE WORK**		**FLSF**	**$1.33**	**$25,290**
09 51 00	**CEILING WORK**				
09 51 00	R/R Ceiling as required (Structural)	18,990	GSF	$1.50	$28,485
09 51 00				$0.00	$0
09 51 00					
09 51 00	**CEILING WORK**		**SF**	**$1.50**	**$28,485**
09 64 00	**WOOD FLOORING**		**SF**	**$0.00**	**$0**
09 65 00	**RESILIENT FLOORING**				
09 65 00	Replace VCT flooring @ basement	5,900	SF	$3.25	$19,175
09 65 00	Flooring Replacement on upper floors	5,200	SF	$4.00	$20,800
09 65 00				$0.00	$0
09 65 00				$0.00	$0
09 65 00					
09 65 00	**RESILIENT FLOORING**	**18,990**	**GSF**	**$2.11**	**$39,975**
09 90 00	**PAINTING AND WALLCOVERING**				
09 90 00	Interior and exterior painting	18,990	GSF	$4.00	$75,960
09 90 00				$0.00	$0
09 90 00				$0.00	$0
09 90 00					
09 90 00	**PAINTING AND WALLCOVERING**		**GSF**	**$4.00**	**$75,960**
09 97 00	**MISC FINISHES**		**SF**	**$0.00**	**$0**
10 10 00	**SIGNAGE**				
10 10 00	New Code Compliant Signage	18,990	GSF	$0.30	$5,697
10 10 00				$0.00	$0
10 10 00				$0.00	$0

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TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
10 10 00					
10 10 00	**SIGNAGE**		**SF**	**$0.30**	**$5,697**
10 20 00	**INTERIOR SPECIALTIES**				
10 20 00	Fire Extinguisher cabinet w/extinguisher	8	ea	$394.70	$3,158
10 20 00	Toilet Partitions	1	LS	$3,500.00	$3,500
10 20 00	Toilet Accessories	1	LS	$800.00	$800
10 20 00				$0.00	$0
10 20 00					
10 20 00	**INTERIOR SPECIALTIES**		**SF**	**$0.39**	**$7,458**
12 40 00	**FURNISHINGS AND ACCESSORIES**		**GSF**	**$0.00**	**$0**
12 21 00	**WINDOW TREATMENTS**		**SF**	**$0.00**	**$0**
12 21 00	**MULTIPLE SEATING**		**SF**	**$0.00**	**$0**
14 20 22	**ELEVATORS**				
14 20 22	Update Elevator Controls	1	LS	$10,000.00	$10,000
14 20 22	New Chair Lift (incl structural & electrical	1	LS	$25,000.00	$25,000
14 20 22				$0.00	$0
14 20 22					
14 20 22	**ELEVATORS**		**STOP**	**$1.84**	**$35,000**
21 10 00	**WATER-BASED FIRE SUPPRESSION SYSTEMS**				
21 10 00	R/R Kitchen Hood Fire suppression system compliant to UL-3	1	LS	$5,978.50	$5,979
21 10 00				$0.00	$0
21 10 00					
21 10 00	**WATER-BASED FIRE SUPPRESSION SYSTEMS**	**18,990**	**GSF**	**$0.31**	**$5,979**
22 10 00	**PLUMBING**				
22 10 00	Base - R/R Systems Associated with Seismic Retrofit			$0.00	$0
22 10 00	R/R Gas Service w-Seismic valve in boiler room	1	LS	$11,825.01	$11,825
22 10 00	R/R Gas domestic water heaters	1	LS	$5,706.95	$5,707
22 10 00	R/R Sewage pumps	1	LS	$34,299.39	$34,299
22 10 00	R/R Kitchen fixtures incld. Grease trap,Flr sinks, piping	324	sf	$80.00	$25,920
22 10 00	Provide ADA drinking fountain	1	ea	$6,500.00	$6,500
22 10 00	R/R plumbing fixtures, complete	12	ea	$4,250.00	$51,000
22 10 00	R/R compromised plumbing piping in building	18,990	sf	$6.00	$113,940
22 10 00				$0.00	$0
22 10 00					
22 10 00	**PLUMBING**		**SF**	**$13.12**	**$249,191**
23 10 00	**HVAC**				
23 10 00	Base - R/R Systems Associated with Seismic Retrofit			$0.00	$0
23 10 00	R/R 1500 mbh Steam Boiler, pumps, flue & Accessories	1	LS	$89,245.60	$89,246
23 10 00	R/R Piping along CL 1 for Shotcrete wall	1	LS	$29,232.54	$29,233
23 10 00	Replace Exhaust System in Bldg	18,990	sf	$0.60	$11,437
23 10 00	Provide Minimal Energy Mgmt Controls	18,990	sf	$1.20	$22,873
23 10 00				$0.00	$0
23 10 00					
23 10 00	**HVAC**		**SF**	**$8.05**	**$152,788**
26 00 00	**ELECTRICAL**				

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TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
26 00 00	Base - R/R Systems Associated with Seismic Retrofit			$0.00	$0
26 00 00	Electrical Service - R/R service to dedicated room	1	LS	$45,203.45	$45,203
26 00 00	Provide additional exit/egress ltg & improve branch circuit distribution	18,990	sf	$0.75	$14,243
26 00 00	Replace older panels and feeders	18,990	sf	$4.00	$75,960
26 00 00					
26 00 00	**ELECTRICAL**	**18,990**	**GSF**	**$7.13**	**$135,406**
27 30 00	**LOW VOLTAGE SYSTEM**				
27 30 00	Emergency and Exit Lighting	18,990	sf	$1.00	$18,990
27 30 00					
27 30 00	**LOW VOLTAGE SYSTEM**		**OPNG**	**$1.00**	**$18,990**
28 30 00	**FIRE ALARM SYSTEM**				
28 30 00	Install addressable fire alarm system	18,990	sf	$3.50	$66,465
28 30 00				$0.00	$0
28 30 00					
28 30 00	**FIRE ALARM SYSTEM**	**18,990**	**GSF**	**$3.50**	**$66,465**
Grand Total	**Subtotal subcontractor cost**			**$104.05**	**$1,975,952**
	General contractor job overhead	7.50%		$7.80	$148,196
	General contractor markup	5.00%		$5.59	$106,207
	General contractor bond	2.50%		$2.94	$55,759
	Design Contingency	20.00%		$24.08	$457,223
	Market Factor	0.00%		$0.00	$0
	Current Construction Cost			**$144.46**	**$2,743,337**

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TRADE	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB
2	Existing Conditions			$6.55	$124,293
3	Concrete			$28.51	$541,451
4	Masonry			$8.90	$169,040
5	Metals			$0.72	$13,608
6	Wood, Plastics & Composites			$3.49	$66,242
7	Thermal & Moisture Protection			$4.32	$82,000
8	Openings			$2.68	$50,837
9	Finishes			$13.24	$251,508
10	Specialties			$0.69	$13,155
11	Equipment			$0.00	$0
12	Furnishings			$0.00	$0
13	Special Construction			$0.00	$0
14	Conveying Systems			$1.84	$35,000
21	Fire Suppression			$0.31	$5,979
22	Plumbing			$13.12	$249,191
23	HVAC			$8.05	$152,788
25	Integrated Automation			$0.00	$0
26	Electrical			$7.13	$135,406
27	Communications			$1.00	$18,990
28	Electronic Safety and Security			$3.50	$66,465
31	Earthwork			$0.00	$0
32	Exterior Improvements			$0.00	$0
33	Utilities			$0.00	$0
34	Transportation			$0.00	$0
	Subtotal			**$104.05**	**$1,975,952**
	General Contractor Job Overhead	7.5%		$7.80	$148,196
	General Contractor Markup	5.0%		$5.59	$106,207
	General Contractor Bond	2.5%		$2.94	$55,759
	Design Contingency	20.0%		$24.08	$457,223
	Market Factor	0.0%		$0.00	$0
	Current Construction Cost			**$144.46**	**$2,743,337**

For estimate notes and qualifications see Summary.

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Modernization Items

Date: April 8, 2011 & revised on June 16, 2011

CSI	Description		Item 1	Item 2	Item 3	Item 4	TOTAL
2	Existing Conditions		$0	$0	$0	$28,485	$28,485
3	Concrete		$0	$0	$0	$0	$0
4	Masonry		$0	$0	$0	$0	$0
5	Metals		$0	$0	$0	$0	$0
6	Wood, Plastics & Composites		$0	$0	$0	$25,038	$25,038
7	Thermal & Moisture Protection		$950	$0	$0	$1,899	$2,849
8	Openings		$0	$0	$0	$28,125	$28,125
9	Finishes		$33,233	$0	$0	$68,341	$101,574
10	Specialties		$0	$0	$0	$4,000	$4,000
11	Equipment		$0	$0	$0	$0	$0
12	Furnishings		$0	$0	$0	$6,000	$6,000
13	Special Construction		$0	$0	$0	$0	$0
14	Conveying Systems		$0	$0	$0	$0	$0
21	Fire Suppression		$82,580	$0	$0	$0	$82,580
22	Plumbing		$0	$17,500	$0	$0	$17,500
23	HVAC		$0	$114,367	$57,184	$194,424	$365,975
25	Integrated Automation		$0	$0	$0	$0	$0
26	Electrical		$0	$0	$0	$164,264	$164,264
27	Communications		$0	$0	$0	$42,728	$42,728
28	Electronic Safety and Security		$0	$0	$0	$0	$0
31	Earthwork		$0	$0	$0	$0	$0
32	Exterior Improvements		$0	$0	$0	$0	$0
33	Utilities		$0	$0	$0	$0	$0
34	Transportation		$0	$0	$0	$0	$0
	Subtotal		**$116,762**	**$131,867**	**$57,184**	**$563,304**	**$869,117**
	General Contractor Job Overhead	7.50%	$8,757	$9,890	$4,289	$42,248	$65,184
	General Contractor Markup	5.00%	$6,276	$7,088	$3,074	$30,278	$46,716
	General Contractor Bond	2.50%	$3,295	$3,721	$1,614	$15,896	$24,526
	Design Contingency	20.00%	$27,018	$30,513	$13,232	$130,345	$201,108
	Market Factor	0.00%	$0	$0	$0	$0	$0
	Construction Cost -- April 2011		**$162,108**	**$183,079**	**$79,393**	**$782,071**	**$1,206,651**
	Soft Costs	30.00%	$48,632	$54,924	$23,818	$234,621	$361,995
	Total Construction Cost		**$210,740**	**$238,003**	**$103,211**	**$1,016,692**	**$1,568,646**

Estimate Notes:

1) The age of the building would indicate the possibility of materials currently classified as hazardous being used during construction. The estimate includes an allowance for remediation of hazardous materials. Items most likely to require abatement for access to work include steam pipe insulation, plaster walls & ceilings, VAT flooring and lead paint. The final cost may need to be adjusted based on survey results performed by a hazmat consultant.

2) Item 1 includes new fire sprinklers system.

3) Item 2 includes Non ADA plumbing upgrades.

4) Item 3 includes: Energy Management System.

5) Item 4: Includes miscellaneous items near end of lifecycle.

5) While the cost for performing each item is complete cost, it is also based on all work completed in one phase. Performing the work of each item as stand alone work, could have additional cost impact.

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TRADE	SYSTEM	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB	Item 1	Item 2	Item 3	Item 4
02 41 00		**DEMOLITION**								
02 41 00					$0.00	$0	$0	$0	$0	$0
02 41 00										
02 41 00	**1.0**	**DEMOLITION**	**18,990**	**GSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
02 80 00		**FACILITY REMEDIATION**								
02 80 00	**Item 4**	Hazmat Abatement - Allowance	18,990	GSF	$1.50	$28,485	$0	$0	$0	$28,485
02 80 00					$0.00	$0	$0	$0	$0	$0
02 80 00										
02 80 00	**1.0**	**FACILITY REMEDIATION**	**18,990**	**GSF**	**$1.50**	**$28,485**	**$0**	**$0**	**$0**	**$28,485**
03 30 00	**1.0**	**CONCRETE**	**18,990**	**GSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
04 20 00	**3.1**	**MASONRY**	**0**	**WLSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
05 12 00	**2.3**	**STRUCTURAL STEEL**		**LBS**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
06 10 00	**2.3**	**ROUGH CARPENTRY**	**18,990**	**GSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
06 20 00		**FINISH CARPENTRY**								
06 20 00	**Item 4**	Miscellaneous Millwork and Finish Carp	18,990	GSF	$1.00	$18,990	$0	$0	$0	$18,990
06 20 00					$0.00	$0	$0	$0	$0	$0
06 20 00										
06 20 00	**8.0**	**FINISH CARPENTRY**		**GSF**	**$1.00**	**$18,990**	**$0**	**$0**	**$0**	**$18,990**
06 41 00		**CASEWORK**								
06 41 00	**Item 4**	R/R Cabinets	1	LS	$6,048.43	$6,048	$0	$0	$0	$6,048
06 41 00					$0.00	$0	$0	$0	$0	$0
06 41 00										
06 41 00	**5.0**	**CASEWORK**		**GSF**	**$0.32**	**$6,048**	**$0**	**$0**	**$0**	**$6,048**
07 21 00	**3.1**	**INSULATION**		**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
07 31 00	**3.2**	**ROOFING**	**0**	**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
07 92 00		**SEALANTS**								
07 92 00	**Item 1**	Caulking and Sealants	18,990	GSF	$0.05	$950	$950	$0	$0	$0
07 92 00	**Item 4**	Caulking and Sealants	18,990	GSF	$0.10	$1,899	$0	$0	$0	$1,899
07 92 00					$0.00	$0	$0	$0	$0	$0
07 92 00										
07 92 00	**8.0**	**SEALANTS**		**GSF**	**$0.15**	**$2,849**	**$950**	**$0**	**$0**	**$1,899**
08 10 00	**3.4**	**HM/WD DOORS / FRAMES / HRDWR**		**LFS**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
08 51 13		**WINDOWS**								
08 51 13	**Item 4**	Window replacement - 25%	375	SF	$75.00	$28,125	$0	$0	$0	$28,125
08 51 13					$0.00	$0	$0	$0	$0	$0
08 51 13					$0.00	$0	$0	$0	$0	$0
08 51 13										
08 51 13	**4.1**	**WINDOWS**		**SF**	**$1.48**	**$28,125**	**$0**	**$0**	**$0**	**$28,125**
08 90 00	**8.0**	**LOUVERS AND VENTS**		**DRS**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
09 20 00	**3.1**	**MTL STUDS / DRYWALL**		**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
09 20 00	**3.1**	**PLASTER**		**SF**	**$0.26**	**$4,899**	**$0**	**$0**	**$0**	**$4,899**
09 30 00		**TILE & STONE WORK**								

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TRADE	SYSTEM	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB	Item 1	Item 2	Item 3	Item 4
09 30 00	Item 4	Restroom Floors - R/R Tile	400	SF	$18.00	$7,200	$0	$0	$0	$7,200
09 30 00	Item 4	Restroom Walls - R/R Tile	1,200	SF	$15.00	$18,000	$0	$0	$0	$18,000
09 30 00					$0.00	$0	$0	$0	$0	$0
09 30 00										
09 30 00	**4.2**	**TILE & STONE WORK**		**FLSF**	**$1.33**	**$25,200**	**$0**	**$0**	**$0**	**$25,200**
09 51 00		**CEILING WORK**								
09 51 00	Item 1	R/R Ceiling as required (mainly for fire sprinklers)	18,990	GSF	$1.75	$33,233	$33,233	$0	$0	$0
09 51 00	Item 4	R/R Ceiling as required (misc items)	18,990	GSF	$0.75	$14,243	$0	$0	$0	$14,243
09 51 00					$0.00	$0	$0	$0	$0	$0
09 51 00										
09 51 00	**4.3**	**CEILING WORK**		**SF**	**$2.50**	**$47,475**	**$33,233**	**$0**	**$0**	**$14,243**
09 64 00	**4.2**	**WOOD FLOORING**		**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
09 65 00		**RESILIENT FLOORING**								
09 65 00	Item 4	Flooring Replacement on upper floors	6,000	SF	$4.00	$24,000	$0	$0	$0	$24,000
09 65 00					$0.00	$0	$0	$0	$0	$0
09 65 00					$0.00	$0	$0	$0	$0	$0
09 65 00										
09 65 00	**4.2**	**RESILIENT FLOORING**	**18,990**	**GSF**	**$1.26**	**$24,000**	**$0**	**$0**	**$0**	**$24,000**
09 90 00	**8.0**	**PAINTING AND WALLCOVERING**		**GSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
09 97 00	**8.0**	**MISC FINISHES**		**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
10 10 00	**5.0**	**SIGNAGE**		**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
10 20 00		**INTERIOR SPECIALTIES**								
10 20 00	Item 4	Toilet Partitions	1	LS	$3,000.00	$3,000	$0	$0	$0	$3,000
10 20 00	Item 4	Toilet Accessories	1	LS	$1,000.00	$1,000	$0	$0	$0	$1,000
10 20 00					$0.00	$0	$0	$0	$0	$0
10 20 00										
10 20 00	**5.0**	**INTERIOR SPECIALTIES**		**SF**	**$0.21**	**$4,000**	**$0**	**$0**	**$0**	**$4,000**
12 40 00	**8.0**	**FURNISHINGS AND ACCESSORIES**		**GSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
12 21 00		**WINDOW TREATMENTS**								
12 21 00	Item 4	Allowance	1,500		$4.00	$6,000	$0	$0	$0	$6,000
12 21 00					$0.00	$0	$0	$0	$0	$0
12 21 00					$0.00	$0	$0	$0	$0	$0
12 21 00										
12 21 00	**8.0**	**WINDOW TREATMENTS**		**SF**	**$0.32**	**$6,000**	**$0**	**$0**	**$0**	**$6,000**
12 21 00	**8.0**	**MULTIPLE SEATING**		**SF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
14 20 22	**7.0**	**ELEVATORS**		**STOP**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
21 10 00		**WATER-BASED FIRE SUPPRESSION SYSTEMS**								
21 10 00	Item 1	Wet Pipe System (Heads, including branch piping) ordinary hazard - Designed and installed	18,990	sf	$4.35	$82,580	$82,580	$0	$0	$0
21 10 00					$0.00	$0	$0	$0	$0	$0
21 10 00										
21 10 00	**9.2**	**WATER-BASED FIRE SUPPRESSION SYSTEMS**	**18,990**	**GSF**	**$4.35**	**$82,580**	**$82,580**	**$0**	**$0**	**$0**

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Modernization Items

Date: April 8, 2011 & revised on June 16, 2011

TRADE	SYSTEM	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB	Item 1	Item 2	Item 3	Item 4
22 10 00		**PLUMBING**								
22 10 00	**Item 2**	Clean/Repair older plumbing fixtures	1	ls	$7,500.00	$7,500	$0	$7,500	$0	$0
22 10 00	**Item 2**	Add automatic flush valves/sensors at fixtures	1	ls	$10,000.00	$10,000	$0	$10,000	$0	$0
22 10 00					$0.00	$0	$0	$0	$0	$0
22 10 00										
22 10 00	**9.1**	**PLUMBING**		**SF**	**$0.92**	**$17,500**	**$0**	**$17,500**	**$0**	**$0**
23 10 00		**HVAC**								
23 10 00	**Item 4**	Replace/Retrofit Heating and Ventilation System in Bldg	18,990	sf	$10.24	$194,424	$0	$0	$0	$194,424
23 10 00	**Item 2**	R/R Steam/Condensate Piping/Insulation/Supports	18,990	sf	$6.02	$114,367	$0	$114,367	$0	$0
23 10 00	**Item 3**	Provide Complete Energy Mgmt Controls	18,990	sf	$3.01	$57,184	$0	$0	$57,184	$0
23 10 00					$0.00	$0	$0	$0	$0	$0
23 10 00										
23 10 00	**9.3**	**HVAC**		**SF**	**$19.27**	**$365,975**	**$0**	**$114,367**	**$57,184**	**$194,424**
26 00 00		**ELECTRICAL**								
26 00 00	**Item 4**	Replace convenience receptacles and branch cktry	18,990	sf	$2.50	$47,475	$0	$0	$0	$47,475
26 00 00	**Item 4**	Improve lighting levels, fixture support, light switches and branch cktry	18,990	sf	$3.00	$56,970	$0	$0	$0	$56,970
26 00 00	**Item 4**	Improve exterior lighting levels, control and branch cktry	18,990	sf	$0.75	$14,243	$0	$0	$0	$14,243
26 00 00	**Item 4**	Retrofit historic light fixtures	18,990	sf	$2.00	$37,980	$0	$0	$0	$37,980
26 00 00	**Item 4**	Building light control panel	18,990	sf	$0.40	$7,596	$0	$0	$0	$7,596
26 00 00										
26 00 00	**10.0**	**ELECTRICAL**	**18,990**	**GSF**	**$8.65**	**$164,264**	**$0**	**$0**	**$0**	**$164,264**
27 30 00		**LOW VOLTAGE SYSTEM**								
27 30 00	**Item 4**	Improve telecommunication and signal systems service and distribution	18,990	sf	$1.50	$28,485	$0	$0	$0	$28,485
27 30 00	**Item 4**	Improve security system	18,990	sf	$0.75	$14,243	$0	$0	$0	$14,243
27 30 00										
27 30 00	**11.0**	**LOW VOLTAGE SYSTEM**		**OPNG**	**$2.25**	**$42,728**	**$0**	**$0**	**$0**	**$42,728**
28 30 00	**11.0**	**FIRE ALARM SYSTEM**	**18,990**	**GSF**	**$0.00**	**$0**	**$0**	**$0**	**$0**	**$0**
Grand Total		**Subtotal subcontractor cost**			**$45.77**	**$869,117**	**$116,762**	**$131,867**	**$57,184**	**$563,304**
		General contractor job overhead	7.50%		$3.43	$65,184	$8,757	$9,890	$4,289	$42,248
		General contractor markup	5.00%		$2.46	$46,715	$6,276	$7,088	$3,074	$30,278
		General contractor bond	2.50%		$1.29	$24,525	$3,295	$3,721	$1,614	$15,896
		Design Contingency	20.00%		$10.59	$201,108	$27,018	$30,513	$13,232	$130,345
		Market Factor	0.00%		$0.00	$0	$0	$0	$0	$0
		Current Construction Cost			**$63.54**	**$1,206,649**	$162,108	$183,079	$79,393	$782,071

Project: Santa Cruz Veterans Memorial Building

Title: Condition Assessment - Conceptual Cost Estimate - Modernization Items

Date: April 8, 2011 & revised on June 16, 2011

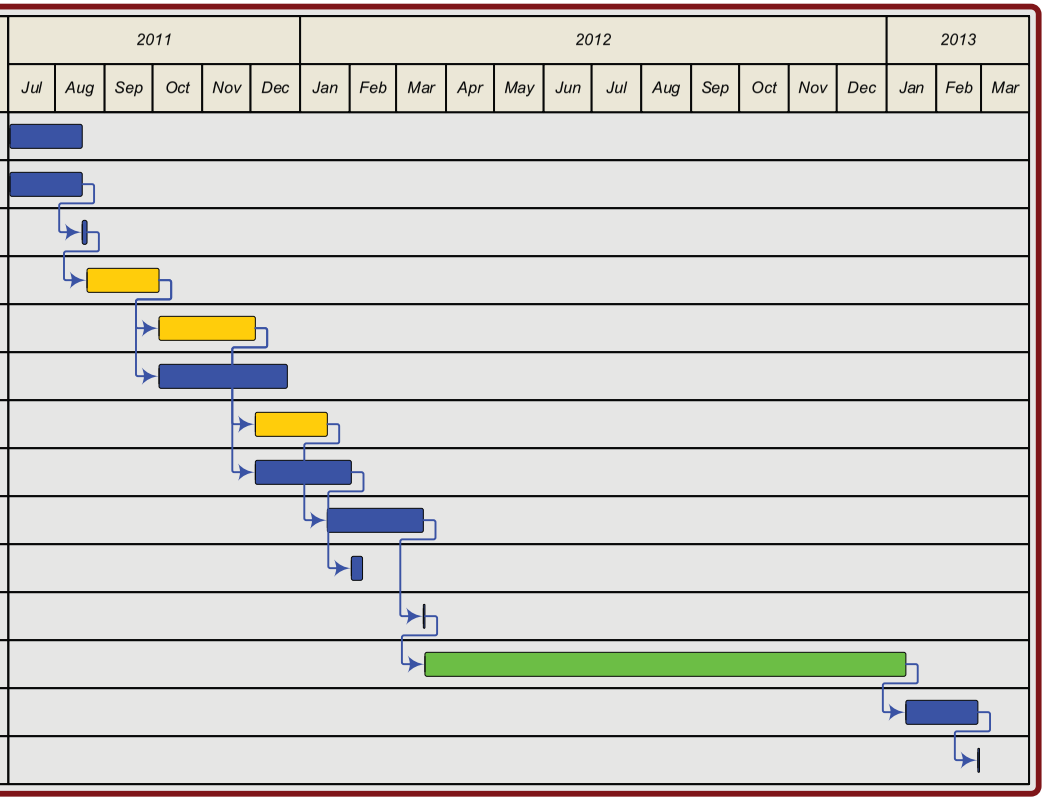
TRADE	SYSTEM	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST - SUB	Item 1	Item 2	Item 3	Item 4
2		Existing Conditions			$1.50	$28,485	$0	$0	$0	$28,485
3		Concrete			$0.00	$0	$0	$0	$0	$0
4		Masonry			$0.00	$0	$0	$0	$0	$0
5		Metals			$0.00	$0	$0	$0	$0	$0
6		Wood, Plastics & Composites			$1.32	$25,038	$0	$0	$0	$25,038
7		Thermal & Moisture Protection			$0.15	$2,849	$950	$0	$0	$1,899
8		Openings			$1.48	$28,125	$0	$0	$0	$28,125
9		Finishes			$5.35	$101,574	$33,233	$0	$0	$68,341
10		Specialties			$0.21	$4,000	$0	$0	$0	$4,000
11		Equipment			$0.00	$0	$0	$0	$0	$0
12		Furnishings			$0.32	$6,000	$0	$0	$0	$6,000
13		Special Construction			$0.00	$0	$0	$0	$0	$0
14		Conveying Systems			$0.00	$0	$0	$0	$0	$0
21		Fire Suppression			$4.35	$82,580	$82,580	$0	$0	$0
22		Plumbing			$0.92	$17,500	$0	$17,500	$0	$0
23		HVAC			$19.27	$365,975	$0	$114,367	$57,184	$194,424
25		Integrated Automation			$0.00	$0	$0	$0	$0	$0
26		Electrical			$8.65	$164,264	$0	$0	$0	$164,264
27		Communications			$2.25	$42,728	$0	$0	$0	$42,728
28		Electronic Safety and Security			$0.00	$0	$0	$0	$0	$0
31		Earthwork			$0.00	$0	$0	$0	$0	$0
32		Exterior Improvements			$0.00	$0	$0	$0	$0	$0
33		Utilities			$0.00	$0	$0	$0	$0	$0
34		Transportation			$0.00	$0	$0	$0	$0	$0
		Subtotal			**$45.77**	**$869,117**	**$116,762**	**$131,867**	**$57,184**	**$563,304**
		General Contractor Job Overhead	7.5%		$3.43	$65,184	$8,757	$9,890	$4,289	$42,248
		General Contractor Markup	5.0%		$2.46	$46,715	$6,276	$7,088	$3,074	$30,278
		General Contractor Bond	2.5%		$1.29	$24,525	$3,295	$3,721	$1,614	$15,896
		Design Contingency	20.0%		$10.59	$201,108	$27,018	$30,513	$13,232	$130,345
		Market Factor	0.0%		$0.00	$0	$0	$0	$0	$0
		Current Construction Cost			**$63.54**	**$1,206,649**	**$162,108**	**$183,079**	**$79,393**	**$782,071**

For estimate notes and qualifications see Summary.

APPENDIX K

Santa Cruz County
Veterans Memorial Building Repair Project
Anticipated Project Schedule

ID	Task Name	Start	Finish	Duration
1	CM Selection, Negotiation, NTP	7/4/2011	8/17/2011	45d
2	Designer Selection, Negotiation, NTP	7/4/2011	8/17/2011	45d
3	Design Charettee	8/18/2011	8/20/2011	3d
4	35% Design Review	8/21/2011	10/4/2011	45d
5	85% Design Review	10/5/2011	12/3/2011	60d
6	Prepare Bid Documents	10/5/2011	12/23/2011	80d
7	100% Design Review	12/4/2011	1/17/2012	45d
8	Plan Review and Permitting	12/4/2011	2/1/2012	60d
9	Bid Phase & Contracting	1/18/2012	3/17/2012	60d
10	Clear construction area of personal property	2/2/2012	2/8/2012	7d
11	Issue Notice to Proceed	3/18/2012	3/18/2012	1d
12	Construction Phase	3/19/2012	1/12/2013	300d
13	Inspection & Notice of Completion	1/13/2013	2/26/2013	45d
14	Occupancy	2/27/2013	2/27/2013	1d



APPENDIX L

EXTERIOR RENDERINGS

Northwest view

Northeast view

Southwest view

EXTERIOR VIEWS

Front view

Main entry

Southwest view

East view

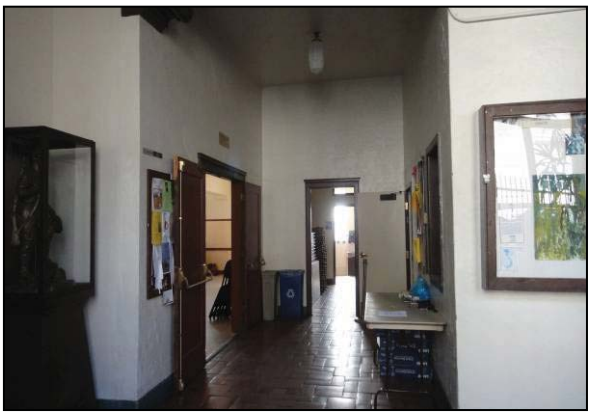
Northeast view

Northwest view

INTERIOR VIEWS

First floor entry

First floor entry



Theater entry

Theater balcony

Stage

Theater lighting

INTERIOR VIEWS

Theater view from balcony

Theater ceiling

Bill Motto fireplace

Banquet room

Room B-8

Room B-6

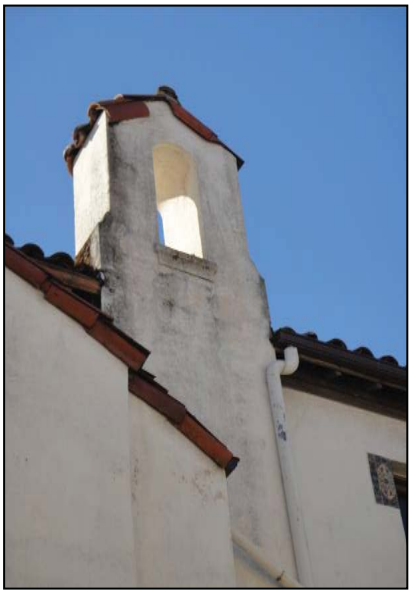
BUILDING FEATURES / DETAILS

Dedication plaque

Exterior seal

Weather vane

Balcony



Bell tower

Window valance

BUILDING FEATURES / DETAILS

Balcony detail

Theater beam detail

Theater ceiling detail

Bill Motto ceiling framing detail

SPALLING AREAS

Interior spalling

Interior spalling & stain ceiling

Exterior spalling

Exterior spalling

PLUMBING

1st floor women's room

1st floor women's room

PLUMBING

1st floor men's room

1st floor men's room

1st floor men's room

Basement men's room

Basement men's room

Basement women's room

PLUMBING

Sump pump

Drinking fountain

ELECTRICAL

Electrical panels

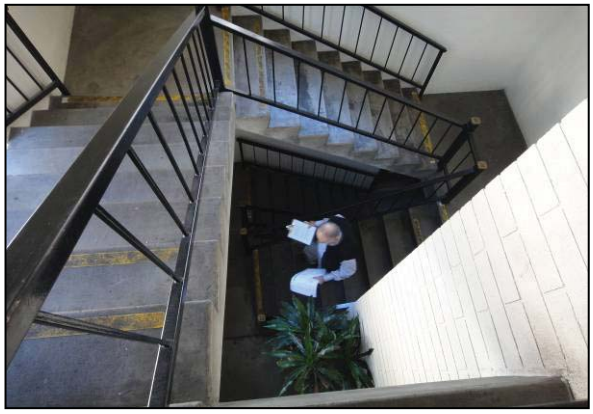
Loose wiring

HEATING

Boiler

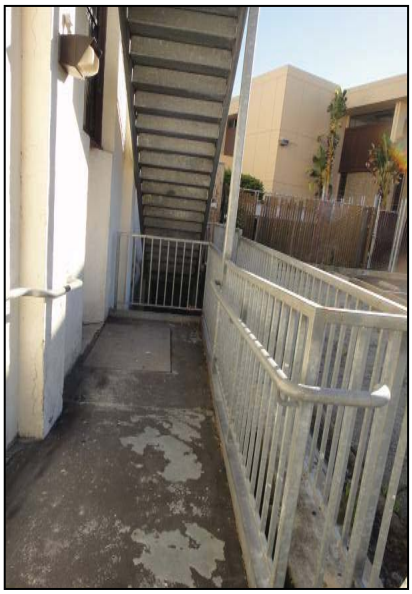
Radiator

STAIRS, RAMPS & ELEVATOR



Interior stairwell

Fire escape stairs



Side ramp

Elevator

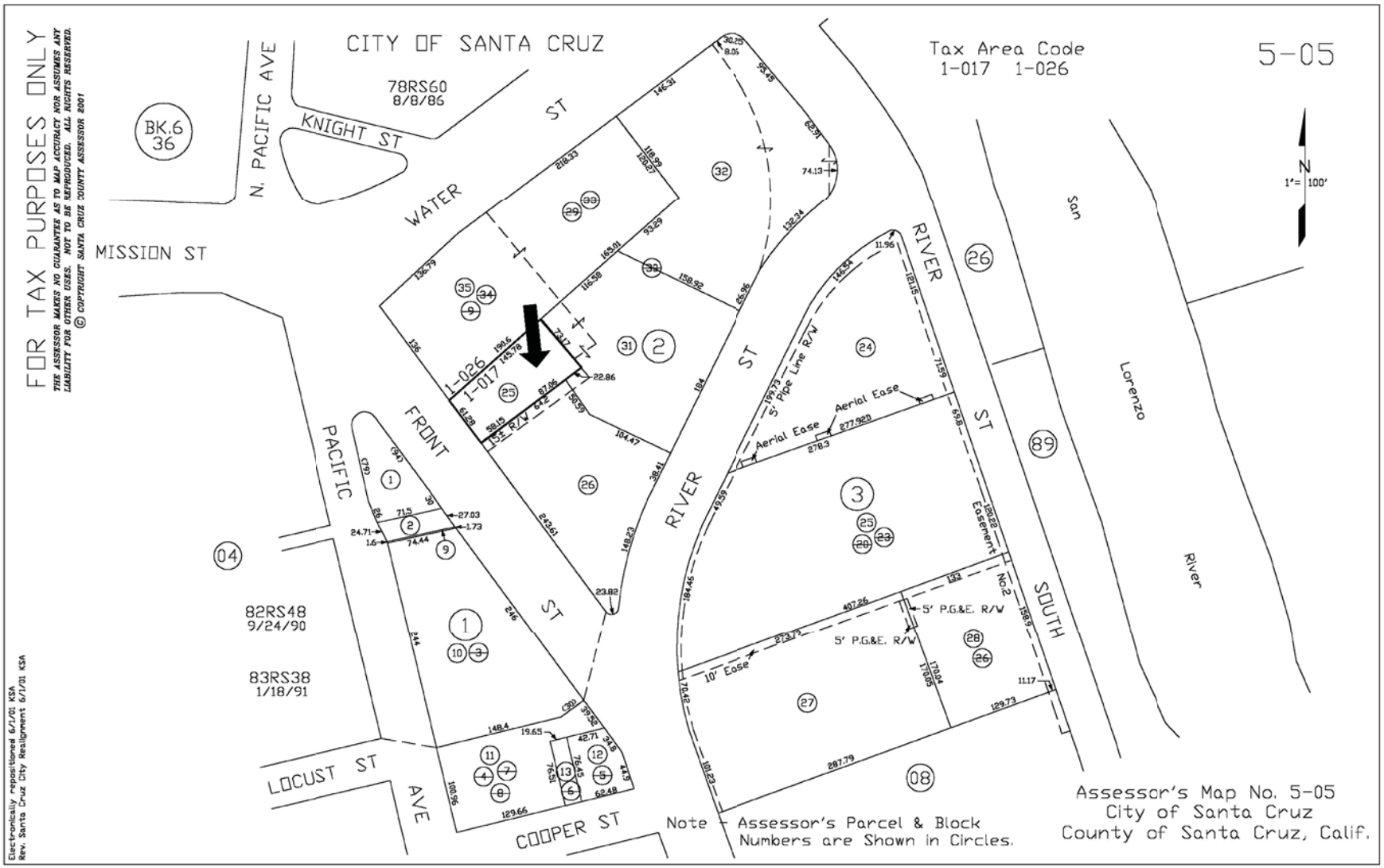
MISCELLANEOUS

Kitchen stove & cook top

Wheelchair lift

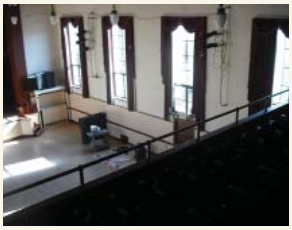
APPENDIX M

A.P.N. 005-052-25







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