APPENDIX Q

Modernization Alternative Feasibility Memorandum

DLR Group
Architecture Engineering Planning Interiors

700 South Flower St., 22nd Floor
Los Angeles, CA 90017

October 4, 2018

Mr. Nathaniel Holt
Chief Facilities Officer
Compton Unified School District
429 South Oleander Ave.
Compton, CA 90220

Sent via email

Project Name: Compton High School
DLR Group Project No.: 75-17219-00

Re: Campus Modernization Alternative

Dear Mr. Holt:

We provide the following analysis regarding the idea of modernizing existing campus buildings to accommodate the project objectives, stated in Section 2 of the draft Environmental Impact Report. We will address each of those objectives specifically.

- *Reconstruct the existing Compton High School campus to meet current CDE and Division of the State Architect design standards and building codes, including those related to structural integrity and seismic safety.*

  The current campus configuration presents several challenges to meeting the objectives of meeting current design standards and building codes.

  California Department of Education (CDE) standards: CDE has authority over building and site configuration regarding classroom size and other site considerations.

  We understand that the District plans to include several Career Technical Education (CTE) programs in the educational program. Several of these programs – Software and Systems Development, Television Production, Health, and Robotics, for example – are technology-driven. The infrastructure required for them consists of data and power conduit, cable, and systems, upgraded HVAC systems, and infrastructure for program-specific equipment and fixtures. It is difficult, and often cost-prohibitive, to insert into existing, aged spaces. The space required for the infrastructure eats in to the existing space and reduces the overall space available for instruction, which could affect CDE approval.

  Given these spatial and cost challenges, in our experience, it is not feasible to remodel the existing campus buildings to accommodate the District's intended educational program, while meeting CDE standards.

  Division of the State Architect (DSA): DSA is the authority that governs school construction in the State of California. They review structural safety, fire life safety, accessibility, energy and irrigation for building code compliance.

  1. Un-Certified Projects on Campus

     At the end of a construction project, after all inspections are complete and proper documents are filed, DSA will "certify" a project. DSA does not approve new work on campuses with un-certified projects. The Compton High School campus has ten projects, spanning from 1985 through 2014, that are not certified by DSA.

We do not know the nature of the items required for certification of these ten projects. Given the age and number of the un-certified projects, we can determine that the time and expense required to gather the documents would be substantial, and is likely not feasible, especially for some of the older projects.

Even if it were feasible to complete certification, the process would impact the schedule for any new work, delaying it by several years, at a minimum. Expenses would involve architects' and engineers' fees for reviewing built installations and filing documents, and inspection fees. Reviewing built installations may require removal of building components, such as ceilings and wall finishes, so that internal systems can be re-inspected and documented. If those inspections uncover installations that are not code-compliant, re-work may be necessary.

Please note that if a building or installation related to an un-certified project is demolished, certification of it is not required.

2. Seismic Safety

Most of the buildings on the campus were built under less stringent seismic and structural safety building codes and standards. Five of the existing buildings – H, M, M1, M2, and Q – have been found to have "deficiencies associated with a high potential" for collapse in the event of a significant earthquake. Preliminary Evaluation Reports, dated March 1, 2017, were generated by KNA Consulting Engineers, using information found in as-built drawings and documents.

We also note that drawings or other construction documentation for the existing Administration Building and Auditorium are not available. Any significant work on it would trigger a complete structural and seismic upgrade to the building – a DSA requirement. Most of the structural components are hidden (beams, columns, framing, and structural connections between them) or buried (foundations, concrete reinforcing), so a significant amount of destructive testing and building documentation would be necessary to determine what mitigation and repair measures are necessary to bring the building in to compliance with current building codes.

- *Create a modern, cohesive high school campus that utilizes a state-of-the-art design to support a free-flowing campus with flexible spaces for learning with modern technologies.*

Numerous additions over the years have resulted in a highly fragmented campus. The fragmentation makes wayfinding and supervision difficult. The perimeter entrances are porous and difficult to monitor. Gathering and social spaces are few, small and highly dispersed.

Our understanding is that Compton Unified School District has a vision for the future of Compton High School that will emphasize current learning and teaching methods such as Next Generation Learning and Career Technical Education. The configuration of the existing campus buildings do not support the technological and spatial requirements for these programs and learning methods.

Our understanding is that Compton Unified School District has a vision for the future of Compton High School that will emphasize Next Generation Learning teaching methods. A Next Generation Learning facility involves open, flexible, adaptable, and cohesive spaces that encourage students to "learn anywhere," and provide a variety of comfortable, safe learning environments. The current Compton High School campus has segregated, distinct buildings that isolate learning activities to specific rooms and areas that do not allow for the flexibility and interaction that define Next Generation Learning.

Career Technical Education (CTE) programs are also a fundamental component of the District's vision. CTE involves learning skills by hands-on learning. Please see further discussion of CTE, related to CDE requirements, above.

Most of the existing buildings are one-story, which creates an inefficient use of the space on the site. This arrangement does not allow space for expansion, nor for the planned gym and swimming pool.

- *Minimize ongoing and repeated maintenance costs.*

  Our understanding is that maintaining the equipment and infrastructure for utilities systems is a large concern on the campus. Various additions to the power, data, and hvac systems have used exposed conduit and ducts, which are highly vulnerable to damage from weather, vandalism, and general wear and tear. Re-working these exposed systems will affect classroom sizes, as discussed above. A related concern is that pathways for these interconnected systems are not clear, and disconnecting a cable at one building will likely affect systems at many other buildings.

  Related is the type of HVAC and lighting systems currently in use. These systems are older and less efficient than what is currently required by the California Energy Code. Updated systems will have lower operating costs.

Rough Order of Magnitude Cost to Modernize the Existing Campus

Rough order of magnitude (ROM) costs shown below are based on data gathered from recent bids in our office, as well as recent DLR Group projects estimated by C.P. O'Halloran and Rider Levett Bucknall. They take into account the combination of remodels, modernizations, and seismic upgrades.

Buildings				
	Building	Area	Cost per Square Foot	Total Cost
A	Administration & Auditorium	93,000	$450	$41,850,000
B	Cafeteria	14,000	$350	$4,900,000
D	Media Center	20,000	$350	$7,000,000
E	Social Arts	15,000	$350	$5,250,000
F	Home Economics	12,000	$350	$4,200,000
G	Business Ed	10,000	$350	$3,500,000
H	Classrooms	9,500	$400	$3,800,000
J	Classrooms	4,000	$350	$1,400,000
K	Music	7,000	$350	$2,450,000
M	Gym	53,000	$450	$23,850,000
M1	Boys' Locker	7,400	$450	$3,330,000
M2	Girls' Locker	5,000	$450	$2,250,000
Q	Shop	2,000	$450	$900,000
R	Classrooms	5,000	$350	$1,750,000
S	Wood Shop	6,500	$350	$2,275,000
W	Classrooms	2,500	$350	$875,000
X	Classrooms	9,000	$350	$3,150,000
Y	Classrooms	10,000	$350	$3,500,000
Z	Classrooms	6,000	$350	$2,100,000
	Subtotal	290,900		$118,330,000
Site				
	Site Utilities Repairs & Upgrades	1,744,000	$2	$3,488,000
	Accessible Path of Travel Repairs	1,744,000	$2	$3,488,000
	Parking - Repair & Re-Stripe	100,000	$5	$500,000
	Football / Track & Accessory Repairs	155,000	$20	$3,100,000
	Baseball & Softball Fields Repairs	380,000	$8	$3,040,000
	Hard Courts Repairs - each	14	$3,000	$42,000
				$13,658,000
Total, Site & Building				$131,988,000

We note that, per the California Education Code, if the cost to repair a facility is more than 50% of the replacement cost, the California Department of Education may recommend that the facility be abandoned and replaced. While this ROM cost is very preliminary, the exercise does indicate that modernization and remodel costs would exceed that threshold.

Benefits to Students, Faculty, Staff and Community

Benefits of new construction, vs. modernization,

- Facilities that support Next Generation Learning, and that are flexible enough to adapt to a variety of learning and teaching modalities.
- Facilities that comply with California Department of Education standards.
- A cohesive, well-organized campus that is easy to navigate and allows controlled entry.
- Durable, beautiful and efficient building components and systems that are easy to maintain.
- Buildings that comply with current building codes regarding seismic safety, fire and life safety, accessibility, and energy efficiency.
- A campus that supports a variety of activities, including those shared by the community such as sports and performing arts.
- A cost-effective use of District funds.

Please let us know if you have any questions regarding these observations.

Regards,

Karen MacIntyre, RA, LEED AP BD+C
Architect | Principal
kmacintyre@dlrgroup.com

***DLR Group** is an integrated design firm providing architecture, engineering, planning and interiors services. We are a nationally recognized expert in K-12 school facilities design and have completed over 2,000 school projects in the last 10 years. This totals 18 million square feet with a construction value to $6.5 Billion, including over 350 projects throughout California. DLR Group brings a collaborative experience to our clients rooted in our service approach: listen.DESIGN.deliver.*

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Recent California K-12 State Funded Projects

Anaheim ESD
Roosevelt Elementary School Reconstruction

Beaumont USD
Summerwind K-8 School

Beverly Hills USD
Beverly Hills High School Modernization
Hawthorne School Modernization

Chaffey JUHSD
Chaffey High School Math & Science Addition
Chaffey High School Security Fence
Gardiner W. Spring Auditorium Modernization

Chico USD
Chico High School New Classroom Building
Neal Dow Elementary School Modernization and Addition
Emma Wilson Elmentary School Kindergarten Addition

Coachella Valley USD
North Shore Elementary School

Escondido USD
Mission Middle School Modernization and New Construction

Irvine USD
Eastshore Elementary School Expansion
Venado Middle School Expansion

Long Beach USD
Millikan High School Track & Field Upgrade
Stanford Middle School HVAC Installation and Modernizations
Cubberley K-8 School HVAC Installation and Modernizations
Prisk Elementary School HVAC Installation and Modernizations
Burcham Elementary School HVAC Installation and Modernizations
Keller Middles School HVAC Installation and Modernizations

Los Angeles USD
Paseo Del Rey Sci-Magnet HVAC Replacement
Coldwater Canyon Elementary School HVAC Replacement
Jordan High School Campus Redevelopment
Kentar Canyon Elementary School Utilities Critical Repairs
Roosevelt High School Modernization Criteria Documents

Maywood Center for Enriched Studies
Dixie Canyon Community Charter School Classroom Building
Widney High School Lunch Shelter

Manhattan Beach USD
Grand View Elementary School Addition and Modernization
Preschool Modernization
Meadow Elementary School Modernization
Mira Costa High School Air Conditioning Project
Pacific Elementary School Modernization
Pennekamp Elementary School Modernization
Robinson Elementary School Modernization

Manteca USD
Golden West School Modernization

Natomas USD
Bannon Creek Elementary School Furniture Specification
Westlake Charter School

Norwalk La Mirada USD
La Mirada High School Gym Expansion and Locker Room Renovation
HVAC Addition and Multipurpose Room at Dulles Elementary School, Eastwood ES, El Camino High School, Escalona Elementary School, Foster Road ES, Gardenhill ES, Hutchinson MS, La Pluma ES, Los Coyotes MS

Ocean View SD
Marine View Middle School Modernization
Westmont Element School Modernization

Palm Springs USD
Raymond Cree Middle School Energy Upgrades

Roseville JUHSD
Antelope High School Modular Classroom Addition
Westpark Area High School

San Gabriel USD
Gabrielino High School, Music and Wrestling Dance Bldg

San Juan USD
Bella Vista High School Science Building Furniture Specification
El Camino High School Performing Arts Center
Facilities Master Plan and Educational Specifications
Rio Americano High School Performing Arts and Academic Center
Santa Maria Bonita SD
New Elementary School

Santa Monica Malibu USD
Lincoln Middle School Renovation & Addition
Cabrillo Elementary School Campus Wide Lighting Replacement
District Data Center
Malibu High School Campus Wide Lighting Replacement

Saugus USD
West Creek Academy New Classroom Building

Tahoe Truckee USD
Truckee Elementary School Modernization and Addition
Truckee High School Modernization and Addition

Travis USD
Scandia Elementary School Additions and Modernization
Vanden High School Library

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
School Campus:	Compton High School		
School Address:	601 S Acacia Ave, Compton, California 90220	Last Revision Date:	
Building Name/ID:	**Building H – Classroom**		
Project Tracking No.:	*73437-130*		Page 1 of 25

The purpose of this evaluation report is to establish eligibility for retrofit funding under Proposition 1D (AB 127, 2006). It is not the intent of this evaluation to provide a complete Life Safety evaluation. The evaluation is complete when eligibility has been determined.

Report Outline

1. Eligibility check summary
2. Evaluation process
3. Site and building description
4. Deficiency list
5. ASCE 31 Evaluation statements

Appendix A.1 Structural Calculations

Larry R. Kaprielian
No. 2795
Exp. 9-30-17

KNA Consulting Engineers, Inc.
SE Firm Name (Logo optional)
SE Address: 9931 Muirlands Blvd
Irvine, CA 92618
Phone: (949)-462-3200

Larry R. Kaprielian, S.E.
Name of SE whose stamp is above

1. Eligibility Check Summary

	YES	NO
1.1 Building Occupancy: The building's current or planned use involves regular occupancy by students and staff, as detailed in Section 3.2.	☒	☐
1.2 Structural System: The building's seismic force-resisting system includes at least one of the types listed in Section 3.5.	☒	☐
1.3 Collapse Potential: The building has deficiencies associated with a high potential for local or global collapse in the evaluation earthquake. See Sections 4 and 5 for a list of identified deficiencies. Among the identified deficiencies are the critical items checked in Section 1.3.3:	☒	☐

1.3.1 ☒ Collapse Potential Due to Ground Shaking: Ss = 1.680

1.3.2 Collapse Potential Due to One of the Following Geologic Hazards (CGS Approved Geologic Hazard Report Required):

☐ LIQUEFACTION ☐ SLOPE STABILITY FAILURE ☐ SURFACE FAULT RUPTURE

1.3.3 Identified Deficiencies:

☐ LOAD PATH
☐ WEAK STORY
☐ SOFT STORY
☐ VERTICAL DISCONTINUITIES
☐ MASS
☐ TORSION
☐ ADJACENT BUILDINGS
☐ MEZZANINES

☐ SHEAR STRESS CHECK (COLUMN)
☐ AXIAL STRESS CHECK
☐ FLAT SLAB FRAMES
☐ CAPTIVE COLUMNS
☐ BEAM BARS
☐ DEFLECTION COMPATIBILITY
☐ FLAT SLABS
☐ REDUNDANCY

☐ UNREINFORCED MASONRY BEARING WALLS
☐ SHEAR STRESS CHECK (SHEAR WALL OR INFILL)
☐ REDUNDANCY (SHEAR WALL)
☐ OPENINGS AT SHEAR WALLS
☐ TOPPING SLAB
☒ WALL ANCHORAGE
☐ OTHER *

2. Evaluation Process

2.1 Purpose and Scope

As described in DSA Procedure 08-03, the primary purpose of this evaluation is to confirm the subject building's eligibility for Proposition 1D (AB 127, 2006) retrofit funding.

As noted in DSA Procedure 08-03, the intent of this evaluation is to identify conditions that represent "a high potential for catastrophic collapse." As described further in Sections 2.2 through 2.4, the evaluation includes:

- Completion of a standardized checklist developed specially for this project (Section 2.2). As described in Section 2.2, once a critical deficiency is confirmed, the balance of the checklist need not be completed.
- A site visit (Section 2.3)
- Document review (Section 2.4)

It is not the intent of this evaluation to provide a complete Life Safety evaluation; earthquake safety hazards other than those listed in this report might exist. Further, it is not the intent of this evaluation to identify deficiencies with respect to post-earthquake use or recovery feasibility. In particular, except where specifically noted, the scope of this evaluation does not include:

- Material testing or destructive investigation
- Comprehensive condition assessment or verification of construction documents
- Assessment of code compliance, either at present or at the time of construction
- Assessment for load combinations not including earthquake effects
- Consideration of Life Safety hazards related to egress
- Consideration of Life Safety hazards related to hazardous materials
- Consideration of the effects of damage to nonstructural components or contents.

Building located on sites with geologic hazards (liquefaction, slope failure, faulting) may be eligible for the Proposition 1D funding if it can be demonstrated that the geologic hazard may cause the building to have a high potential for catastrophic collapse. In this case, a geologic hazard report shall be prepared and submitted to CGS for approval and a copy included with evaluation report. The geologic hazard report shall identify the resulting displacements that will be imposed on the structure so a structural analysis can be performed. If eligibility is being sought for a deficiency that is not related to geologic hazards, then a geologic hazard report does not need to be prepared for the purpose of this evaluation report.

With respect to DSA Procedure 08-03, this report fulfills the intent of its Section 1. The remaining sections of Procedure 08-03 are outside the scope of this evaluation and report:

2.2 Evaluation criteria: Modifications to ASCE 31

As noted in DSA Procedure 08-03, the evaluation applies ASCE 31[1], an engineering standard that allows the user to choose a performance level of either Life Safety or Immediate Occupancy. Procedure 08-03 suggests that Life Safety is the performance level of interest, but the Procedure also focuses on collapse, a lesser performance level not explicitly addressed by ASCE 31. For this evaluation, DSA has clarified that only collapse-prone conditions need to be identified. Further, because the focus of this evaluation is on checking eligibility for retrofit funding, as opposed to producing a comprehensive list of potential deficiencies, the full evaluation need not be completed once a critical deficiency is identified.

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[1] *Seismic Evaluation of Existing Buildings* (ASCE/SEI 31-03), American Society of Civil Engineers, 2003.

ASCE 31 involves three “tiers” of evaluation. Tier 1 uses a set of generic, mostly qualitative “evaluation statements” (also called checklists) to identify potential deficiencies. Tier 2 applies more quantitative checks to confirm or correct the Tier 1 findings. Tier 3 involves a more thorough structural analysis. For this evaluation, DSA has clarified that only Tier 1 is required for most issues, with Tier 2 evaluation for specific issues.

The criteria used for this evaluation therefore are based on the ASCE 31 Tier 1 checklists, with the following modifications:

- Basic Structural, Supplemental Structural, and Foundations checklists are considered.
- Nonstructural checklists are excluded. While some issues addressed by these checklists are relevant to nonstructural collapse potential, their completion is beyond the scope of this evaluation. While not considered for purposes of establishing funding eligibility, relevant deficiencies will be investigated and addressed during a retrofit design phase.
- Evaluation statements required by ASCE 31 for Immediate Occupancy only are excluded.
- Evaluation statements not associated with one of the eligible structure types are excluded.
- Certain evaluation statements related to “critical deficiencies” indicative of a high potential for structural collapse are identified. If a critical deficiency is confirmed, the balance of the evaluation need not be completed. The critical deficiencies are those listed in Section 1. They were selected by DSA for this project based in part on precedents set by the California Office of Statewide Health Planning and Development.[2]
- For Quick Checks and Tier 2 evaluations, the ASCE 31 criteria for Life Safety performance are used, except that *m* values, where needed, are increased by an additional factor of 1.33.
- The Tier 1 evaluation statements are modified to reflect emphasis on collapse-level performance:
    - Since the presence of an unreinforced masonry bearing wall system is deemed a critical deficiency, an evaluation statement to that effect is added, and detailed ASCE 31 evaluation statements specific to that system are omitted.
    - Condition of Materials: Evaluation statements are edited to focus less on presence of damage and more on significance of damage. Note that Masonry Lay-up and Foundation Performance evaluation statements are relocated to the Condition of Materials subsection of Section 5.
    - Except for cracks in certain concrete members, Condition of Materials evaluation statements related to existing cracks are omitted.
    - Beam Bars: The requirement for 25 percent of the joint bars to be continuous for the length of the member is removed.
    - Redundancy (Moment frame and Braced frame): The requirement for two bays per frame line is removed.
    - Stiffness of wall anchors: The limitation of 1/8-inch gap prior to anchor engagement is removed.
    - Overturning: This statement is removed.
    - In general, statements are modified for clarity and consistency with this DSA program.
- Tier 2 evaluation is required for any critical item (see Section 1) found to be non-compliant by Tier 1. The potential requirement for full-building Tier 2 evaluation found in ASCE 31 Table 3-3 is waived.

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[2] *2007 California Building Standards Administrative Code (California Code of Regulations, Title 24 Part 1)*, Chapter 6, “Seismic Evaluation Procedures for Hospital Buildings,” Section 1.4.5.1.2, October 23, 2008 Emergency Supplement.

2.3 Document review

The following documents were provided for use in completing the evaluation, in general compliance with ASCE 31, Section 2.2. The Set ID is used to identify the documents cited in Section 5 of this report.

SET ID	DATE	DESCRIPTION
A#19571	12/23/1959	Document: Compton Sr. High School Architect: Austin Field & Fry No. of Sheets: 70 Context: Original Construction Plans

2.4 Site visit

In general compliance with ASCE 31, Sections 2.2 and 2.3, a site visit shall be made to verify the building configuration and conditions and to assist in completing the evaluation.

Date of site visit: February 15, 2017
Visiting engineer(s) and staff: Tyler Poucher (KNA)
School district contact person: Alvin Jenkins, Senior Director of Facilities, Maintenance, Operations and Transportation, Compton USD
School campus representative (if different than above):

The scope of the site visit was based on our judgment, accessibility of certain areas, and convenience of the school on-site liaison. The purpose of the following list is merely to record the work that was done. The site visit included (check all applicable boxes):

☐ INTERVIEW W/ ON-SITE LIAISON
☒ GROUNDS, FOR OBSERVATION OF SOIL, SLOPES, DRAINAGE, GENERAL CONDITION
☒ EXTERIOR OBSERVATION TO VERIFY BASIC MASSING, CONFIGURATION, GENERAL CONDITION
☒ INTERIOR OBSERVATION TO VERIFY USE, WALL LINE CONFIGURATION, GENERAL CONDITION
☐ ROOF
☐ BASEMENT
☐ CEILING PLENUM
☐ UNFINISHED SPACES (MECHANICAL ROOMS, CLOSETS, CRAWL SPACES, ETC.)
☐ DETAILS OF STRUCTURE-ARCHITECTURE INTERACTION
☐ ROOF-TO-WALL CONNECTIONS
☐ GRAVITY SYSTEM FRAMING
☐ SEISMIC FORCE RESISTING SYSTEM ELEMENTS OR COMPONENTS
☐ ADJACENT BUILDINGS SUBJECT TO POUNDING
☐ OTHER:

The site visit confirmed that the existing structure generally conforms to the available drawings listed in Section 2.3.

3. Site and Building Description

3.1 Building description

General

Year originally built: 1959

DSA Application number A#19571 ☒ Original Construction ☐ Work done pursuant to the Garrison Act (Ed Code 17367)

Number of stories above grade: 1

Number of stories below grade: 0

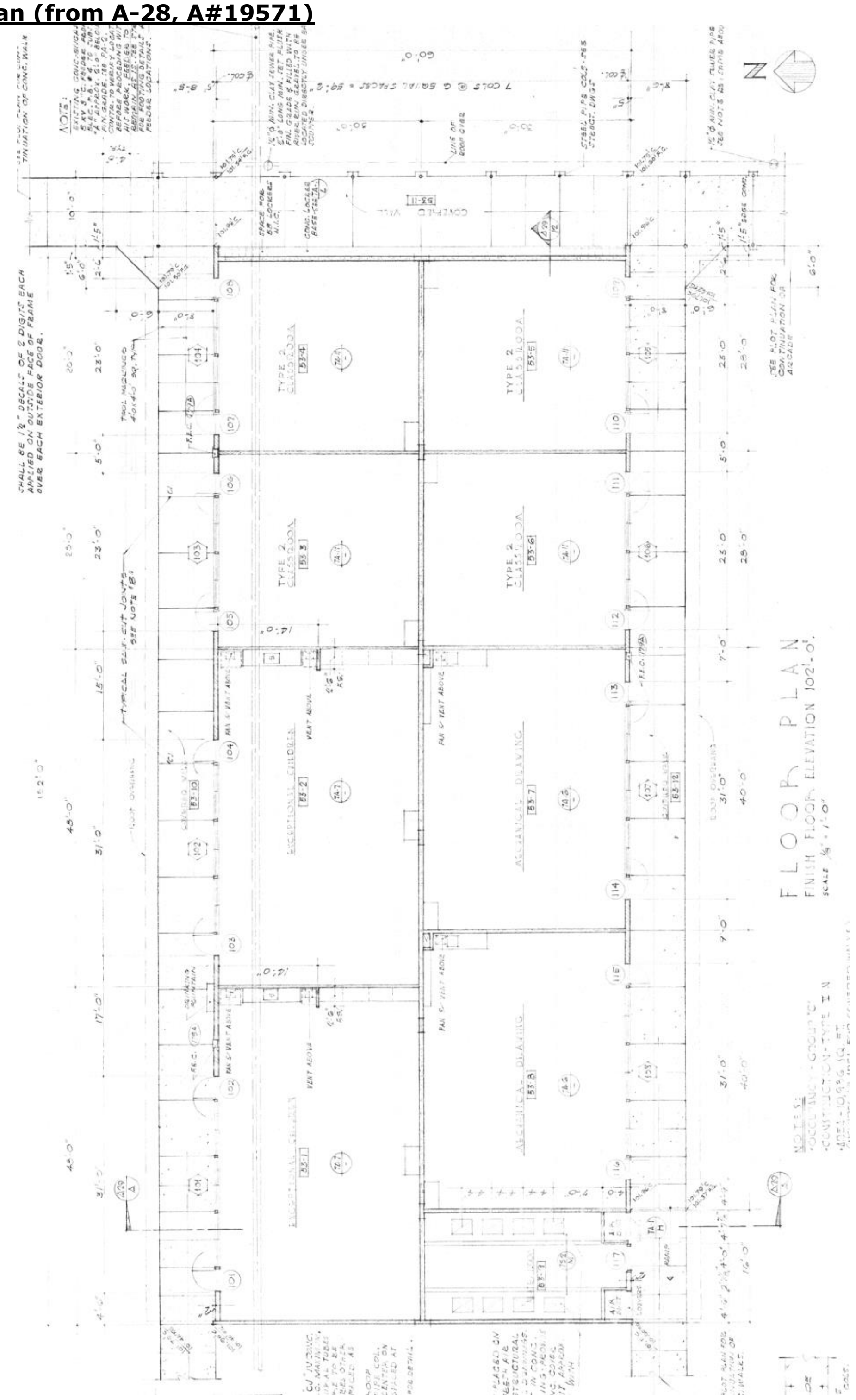
Total floor area (sq ft, approx): 9,100sq/ ft.

Other essentially identical buildings on this campus? ☐ Yes ☒ No

Photographs

Exterior south-west elevation photograph, looking north-east, taken February 15, 2017.

Ground Floor Plan (from A-28, A#19571)



3.2 Building Occupancy

Original, current, and planned uses of the building include those indicated here:

	ORIGINAL USE	CURRENT USE	PLANNED FUTURE USE
OFFICE / ADMINISTRATION	☐	☐	☐
CLASSROOMS / INSTRUCTION AREAS	☒	☒	☒
KITCHEN	☐	☐	☐
ASSEMBLY: DINING	☐	☐	☐
ASSEMBLY: AUDITORIUM	☐	☐	☐
ASSEMBLY: GYMNASIUM	☐	☐	☐
LOCKER ROOMS	☐	☐	☐
PATIO COVER / BUS SHELTER / WALKWAY COVER	☐	☐	☐
BLEACHERS / STADIUM STRUCTURE	☐	☐	☐
OTHER OCCUPIED:	☐	☐	☐
MECHANICAL / UTILITY ROOMS OR ENCLOSURES	☐	☐	☐
BULK STORAGE	☐	☐	☐
VACANT / UNUSED	☐	☐	☐
OTHER UNOCCUPIED:	☐	☐	☐

3.3 Seismicity

Latitude: 33.89094

Longitude: -118.22618

Site Class per ASCE 31, Section 3.5.2.3: D

Basis for Site Class determination: Default

Period [sec]	Mapped MCE values from ASCE 7-10 [g]	Site Coefficients from ASCE 31 Tables 3-5, 3-6	Design values per ASCE 31 section 3.5.2.3.1 [g]	S_a per ASCE 31 section 3.5.2.3.1, [g]
0.2	$S_S = 1.680$	$F_a = 1.0$	$S_{DS} = (2/3)\ S_S\ F_a = 1.120$	$S_{a,0.2} = S_{DS} = 1.120$
1.0	$S_1 = 0.613$	$F_v = 1.5$	$S_{D1} = (2/3)\ S_1\ F_v = 0.613$	$S_{a,1.0} = \min\ (S_{DS}\ ,\ S_{D1}/T) = 1.120$

3.4 Gravity System

Roof diaphragm and framing: Main roof composed of ½” plywood sheathing over 2x joists @ 24” o.c. spanning to concrete and brick bearing walls.

Typical floor diaphragm and framing: N.A.

Ground floor framing: 4-inch reinforced concrete slab on grade

Vertical load-bearing elements: Concrete and Brick Shear walls.

Basement walls: N.A.

Foundation: Continuous and pad concrete footings.

Snow load for use in load combinations involving earthquake: N.A.

3.5 Structural System per ASCE 31 Classifications (Category 2 Buildings Types per AB 300 Report)

		North-South	East-West
C1	Concrete Moment Frames	☐	☐
C1B*	Reinforced Concrete Cantilever Columns	☐	☐
C2A	Concrete Shear Walls, Flexible Diaphragm	☐	☐
C3A	Concrete Frame with Infill Masonry Shear Walls, Flexible Diaphragm	☐	☐
PC1	Precast/Tilt-up Concrete Shear Walls, Concrete Diaphragm	☐	☐
PC1A	Precast/Tilt-up Concrete Shear Walls, Flexible Diaphragm	☒	☐
PC2	Precast Concrete Frames with Shear Walls, Rigid Diaphragm	☐	☐
PC2A	Precast Concrete Frames without Shear Walls, Rigid Diaphragm	☐	☐
RM1	Reinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
S1B*	Steel Cantilever Columns	☐	☐
S3	Steel Light Frames	☐	☐
URM	Unreinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
URMA	Unreinforced Masonry Bearing Walls, Rigid Diaphragm	☐	☐
M*	Mixed Systems - construction containing at least one of the above lateral-force-resisting systems in at least one direction of seismic loading. -East-West system is mix of PC1A and RM1	☐	☒
None of the above		☐	☐

* These structural systems are a subset of the classification in ASCE 31 and are defined in the Category 2 building types in the AB 300 Seismic Safety Inventory of California Public Schools report (2002).

Horizontal system combinations	Main roof composed of ½” plywood sheathing over 2x joists @ 24” o.c. spanning to concrete and brick bearing walls.
Vertical system combinations	The SFRS are Reinforced Concrete and Brick Shear walls.
SFRS foundation	Continuous footings provided beneath all SFRS elements.
Gravity loading	Bearing Wall/Shear Wall system. SFRS Concrete and Brick walls perpendicular to the roof framing carries gravity load in addition to lateral loads.
System details	10” thick brick shear walls are anchored to 2x roof joists at 4’-0” on center by (2) 1/2” dia. thru-bolts. The thru-bolts attach to a steel angle, which is embedded to into the top of the brick wall with a ¾” dia. anchor bolt. See Detail A/S-11, A#19571
Original design code	1958 UBC (Assumed, not stated on As-Built drawings)
History of seismic retrofit or significant alteration	None.
Benchmark year check	No benchmark year given for SFRS types listed in Section 3.5 of this report.

4. Deficiency list

The following table summarizes the potential deficiencies identified in Section 5 of this report. Other deficiencies might exist. The evaluation was stopped once critical deficiencies were identified.

Non-compliant condition	Discussion	Additional evaluation recommended
Wall Anchorage	• Out-of-plane wall anchorage connection was found to be deficient. • Expected to cause local collapse of walls and roof framing.	None

Unknown condition	Discussion	Additional evaluation recommended

5. ASCE 31 Evaluation Statements

Evaluation statements provided in this section are from ASCE 31. They have been modified for this project with DSA approval as described in Section 2.2 of this report. References within the evaluation statements to other section numbers are generally to sections of ASCE 31.

C = Compliant
NC = Non-compliant
U = Unknown or not investigated
NA = Not applicable to this building

Items marked NC or U are summarized in Section 4 of this report.

CONDITION OF MATERIALS

C NC U NA DETERIORATION OF WOOD. There shall be no evidence of or reason to suspect structural capacity loss due to decay, shrinkage, splitting, fire damage, or sagging in wood members or deterioration, damage, or loosening in metal connection hardware.

Note: No weep screed provided at exterior walls adjacent to irrigated exterior grade. No destructive investigation performed.

C NC U NA DETERIORATION OF CONCRETE. There shall be no evidence of or reason to suspect structural capacity loss due to cracking of concrete or deterioration of concrete or reinforcing steel in gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA DETERIORATION OF STEEL. There shall be no evidence of or reason to suspect structural capacity loss due to rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA POST-TENSIONING ANCHORS. There shall be no evidence of or reason to suspect structural capacity loss due to corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used.

C NC U NA PRECAST CONCRETE WALLS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of concrete or reinforcing steel or distress, especially at connections.

C NC U NA MASONRY UNITS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of masonry units.

C NC U NA MASONRY JOINTS. The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no evidence of or reason to suspect structural capacity loss due to eroded mortar.

C NC U NA	MASONRY LAY-UP. Filled collar joints of multi-wythe masonry infill walls shall have negligible voids.
C NC U NA	FOUNDATION PERFORMANCE. There shall be no evidence of or reason to suspect existing foundation movement (due to settlement, heave, or other causes) that would affect the integrity or strength of the structure.

BUILDING CONFIGURATION

C NC U NA **Critical Item**	LOAD PATH. The structure shall contain a minimum of one complete load path for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.
C NC U NA **Critical Item**	WEAK STORY. The strength of the seismic force-resisting system in any story shall not be less than 80% of the strength in an adjacent story, above or below.
C NC U NA **Critical Item**	SOFT STORY. The stiffness of the seismic force-resisting system in any story shall not be less than 70% of the seismic force-resisting system stiffness in an adjacent story above or below, or less than 80% of the average seismic force-resisting system stiffness of the three stories above or below.
C NC U NA	GEOMETRY. There shall be no changes in horizontal dimension of the seismic force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.
C NC U NA **Critical Item**	VERTICAL DISCONTINUITIES. All vertical elements of the seismic force-resisting system shall be continuous to the foundation.
C NC U NA **Critical Item**	MASS. There shall be no change in effective mass more than 50% from one story to the next. Light roofs, penthouses and mezzanines need not be considered.
C NC U NA **Critical Item**	TORSION. The estimated distance between the story center of mass and the story center of rigidity shall be less than 20% of the building width in either plan dimension.
C NC U NA **Critical Item**	ADJACENT BUILDINGS. The clear distance between the building being evaluated and any adjacent building shall be greater than 4% of the height of the shorter building. Alternatively, if the 4% separation does not exist, the two buildings shall be configured such that pounding would not damage the columns of the subject building within the clear span of the columns.
C NC U NA **Critical Item**	MEZZANINES. Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the seismic force-resisting elements of the main structure.

MOMENT FRAMES

C NC U NA
Critical Item
SHEAR STRESS CHECK (Columns). The shear stress in concrete columns of the seismic force-resisting system, calculated using the Quick Check procedure of Section 3.5.3.2, shall be less than the greater of 100 psi or $2\sqrt{f'_c}$.

C NC U NA
Critical Item
AXIAL STRESS CHECK (Concrete columns). The axial stress due to gravity loads in columns subjected to seismic overturning forces shall be less than $0.10f'_c$. 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 $0.30f'_c$.

C NC U NA
AXIAL STRESS CHECK (Steel columns). The axial stress due to gravity loads in steel columns subjected to seismic overturning forces shall be less than $0.10F_y$. 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 $0.30F_y$.

C NC U NA
Critical Item
FLAT SLAB FRAMES. The seismic force-resisting system shall not be a frame consisting of columns and a flat slab/plate without beams.

C NC U NA
PRESTRESSED FRAME ELEMENTS. The seismic 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.

C NC U NA
Critical Item
CAPTIVE COLUMNS. There shall be no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level.

C NC U NA
NO SHEAR FAILURES. The shear capacity of frame members in the seismic force-resisting system shall be able to develop the moment capacity at the ends of the members.

C NC U NA
STRONG COLUMN/WEAK BEAM. The sum of the moment capacity of the columns shall be 20% greater than that of the beams at concrete frame joints.

C NC U NA
STRONG COLUMN/WEAK BEAM. The percent of strong column/weak beam joints in each story of each line of steel moment-resisting frames shall be greater than 50%. This check need not apply for 1-story structures.

C NC U NA
Critical Item
BEAM BARS. At least two longitudinal top and two longitudinal bottom bars shall extend continuously throughout the length of each frame beam.

C NC U NA
COLUMN BAR SPLICES. All column bar lap splice lengths shall be greater than $35d_b$, and shall be enclosed by ties spaced at or less than $8d_b$. 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.

C NC U NA 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.

C NC U NA COLUMN TIE SPACING. Frame columns shall have ties spaced at or less than d/4 throughout their length and at or less than $8d_b$ at all potential plastic hinge locations.

C NC U NA STIRRUP SPACING. All beams shall have stirrups spaced at or less than d/2 throughout their length. At potential plastic hinge locations stirrups shall be spaced at or less than the minimum of $8d_b$ or d/4.

C NC U NA JOINT REINFORCING. Beam-column joints shall have ties spaced at or less than $8d_b$.

C NC U NA COMPLETE FRAMES. Concrete frames that are not part of the seismic force-resisting system shall form a complete gravity load carrying system.

C NC U NA
Critical Item DEFLECTION COMPATIBILITY. Elements of concrete frames that are not part of the seismic force-resisting system shall have the shear capacity to develop the flexural strength of the components.

C NC U NA
Critical Item FLAT SLABS. Flat slabs/plates that are not part of the seismic force-resisting system shall have continuous bottom steel through the column joints.

C NC U NA
Critical Item REDUNDANCY (Moment frame). The number of lines of moment frames in each principal direction shall be greater than or equal to 2.

C NC U NA INTERFERING WALLS. All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements. (This evaluation statement does not apply to seismic force-resisting system type C3A or others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA PRECAST CONNECTION CHECK. The connections at joints of precast concrete frames shall have the capacity to resist the shear and moment demands calculated using the Quick Procedure of Section 3.5.3.5

C NC U NA PRECAST FRAMES. For buildings with concrete shear walls, precast concrete frame elements shall not be necessary as primary components for resisting seismic forces.

C NC U NA PRECAST CONNECTIONS. For buildings with concrete shear walls, the connections between precast frame elements such as chords, ties, and collectors in the seismic force-resisting system shall develop the capacity of the connected members.

C NC U NA 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.

C NC U NA MOMENT-RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.

C NC U NA 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.

C NC U NA COLUM SPLICES: All column splice details located in moment-resisting frames shall include connection of both flanges and the web.

C NC U NA COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Table I-9-1 of Seismic Provisions for Structural Steel Buildings (AISC, 1997).

SHEAR WALLS

C NC U NA
Critical Item UNREINFORCED MASONRY BEARING WALLS. The seismic force-resisting system in any direction shall not rely on or consist primarily of unreinforced masonry bearing walls.

C NC U NA
Critical Item SHEAR STRESS CHECK (Shear wall). 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 $2\sqrt{f'_c}$.

C NC U NA REINFORCING STEEL. In concrete or precast shear walls, 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. The spacing of reinforcing steel shall be equal to or less than 18 inches.

C NC U NA 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 135º or more.

C NC U NA
Critical Item REDUNDANCY (Shear wall). The number of lines of shear walls in each principal direction shall be greater than or equal to 2.

C NC U NA PROPORTIONS. The height-to-thickness ratio of masonry infill walls at each story shall be less than 9. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA SOLID WALLS. The masonry infill walls shall not be of cavity construction. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA INFILL WALLS. The infill walls shall be continuous to the soffits of the frame beams and to the columns to either side. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA
Critical Item SHEAR STRESS CHECK (Precast concrete shear walls). 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 $2\sqrt{f'_c}$.

C NC U NA WALL OPENINGS. The total width of openings along any perimeter wall line shall constitute less than 75% of the length of any perimeter shear wall, with the wall piers having height-to-width ratios of less than 2 to 1.

C NC U NA 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.

C NC U NA
Critical Item
SHEAR STRESS CHECK (Brick or hollow clay masonry infill). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units.

C NC U NA
Critical Item
SHEAR STRESS CHECK (Concrete block infill and reinforced masonry shear walls). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for concrete units.

C NC U NA
PROPORTIONS. The height-to-thickness ratio of unreinforced masonry infill shear walls shall be less than the following: Top story of multi-story building: 9, First story of multi-story building: 15, All other conditions: 13

C NC U NA
REINFORCING STEEL. In reinforced masonry shear walls, the total vertical and horizontal reinforcing steel ratio shall be greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel shall be less than 48"; and all vertical bars shall extend to the top of the walls.

BRACED FRAMES

C NC U NA
Critical Item
REDUNDANCY: The number of lines of braced frames in each principal direction shall be greater than or equal to 2.

C NC U NA
Critical Item
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 $0.50F_y$.

C NC U NA
SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression shall have Kl/r ratios less than 120.

C NC U NA
CONNECTION STRENGTH: All the brace connections shall develop the yield capacity of the diagonals.

C NC U NA
K-BRACING: The bracing system shall not include K-braced bays.

Note: Steel K-Frames configurations present at all frame locations. See Appendix A.1 & A.3.

DIAPHRAGMS

C NC U NA
DIAPHRAGM CONTINUITY. The diaphragm shall not be composed of split-level floors and shall not have expansion joints.

C NC U NA
CROSS TIES. There shall be continuous cross ties between diaphragm chords.

C NC U NA
ROOF CHORD CONTINUITY. All roof chord elements shall be continuous, regardless of changes in roof elevation.

C NC U NA
Critical Item
OPENINGS AT SHEAR WALLS. Diaphragm openings immediately adjacent to the shear walls shall be less than 25% of the wall length, and diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 ft long.

C NC U NA OPENINGS AT BRACED FRAMES. Diaphragm openings immediately adjacent to the braced frames shall extend less than 25% of the frame length.

C NC U NA OTHER DIAPHRAGMS. The diaphragm shall not consist of a system other than wood, metal deck, concrete or horizontal bracing.

C NC U NA
Critical Item TOPPING SLAB. Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab.

C NC U NA STRAIGHT SHEATHING. All straight sheathed diaphragms shall have aspect ratios less than 2 to 1 in the direction being considered.

C NC U NA SPANS. All wood diaphragms with spans greater than 24 ft shall consist of wood structural panels or diagonal sheathing.

C NC U NA UNBLOCKED DIAPHRAGMS. All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 ft and shall have aspect ratios less than or equal to 4 to 1.

Note: Diagonally sheathed diaphragm spans greater than 40-feet, from grid lines 1 to 2, and grid lines 2 to 3. See Section 3.1 of this report.

CONNECTIONS

C [✓ NC] U NA
Critical Item WALL ANCHORAGE. Exterior concrete or masonry walls shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps 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.

C NC U NA WOOD LEDGERS. The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers.

C NC U NA PRECAST PANEL CONNECTIONS. There shall be at least two anchors from each precast wall panel into the diaphragm elements.

C NC U NA 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 prior to engagement of the anchors, as needed for reliable bearing.

C NC U NA GIRDER/COLUMN CONNECTION. There shall be a positive connection utilizing plates, connection hardware, or straps between girders and their supporting columns. (This evaluation statement applies primarily to precast concrete and masonry systems.)

C NC U NA GIRDERS. Girders supported by walls or pilasters shall have at least two additional column ties securing the anchor bolts. (This evaluation statement applies primarily to precast concrete systems.)

C NC U NA CORBEL BEARING. If precast concrete frame girders bear on column corbels, the length of bearing shall be greater than 3”.

C NC U NA CORBEL CONNECTIONS. Precast concrete frame girders shall not be connected to corbels with welded elements.

C NC U NA TRANSFER TO SHEAR WALLS. Diaphragms shall be connected for transfer of loads to shear walls.

C NC U NA TRANSFER TO STEEL FRAMES. Diaphragms shall be connected for transfer of loads to the steel frames.

C NC U NA 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 shear wall or frame elements.

C NC U NA CONCRETE COLUMNS. All concrete columns shall be doweled into the foundation.

C NC U NA FOUNDATION DOWELS. Wall reinforcement shall be doweled into the foundation.

C NC U NA PRECAST WALL PANELS. Precast wall panels shall be connected to the foundation.

C NC U NA UPLIFT AT PILE CAPS. Pile caps shall have top reinforcement and piles shall be anchored to the pile caps.

C NC U NA STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the foundation.

C NC U NA ROOF PANELS: Metal, plastic, or cementitious roof panels shall be positively attached to the roof framing to resist seismic forces.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the framing to resist seismic forces.

FOUNDATION

C NC U NA POLE FOUNDATIONS. Pole foundations shall have a minimum embedment depth of 4 ft.

C NC U NA 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 in Site Class A, B, or C.

GEOLOGIC SITE HAZARDS

C NC U NA
Critical Item

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.

Note: Not investigated.

C NC U NA
Critical Item

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.

Note: Not Investigated.

C NC U NA
Critical Item

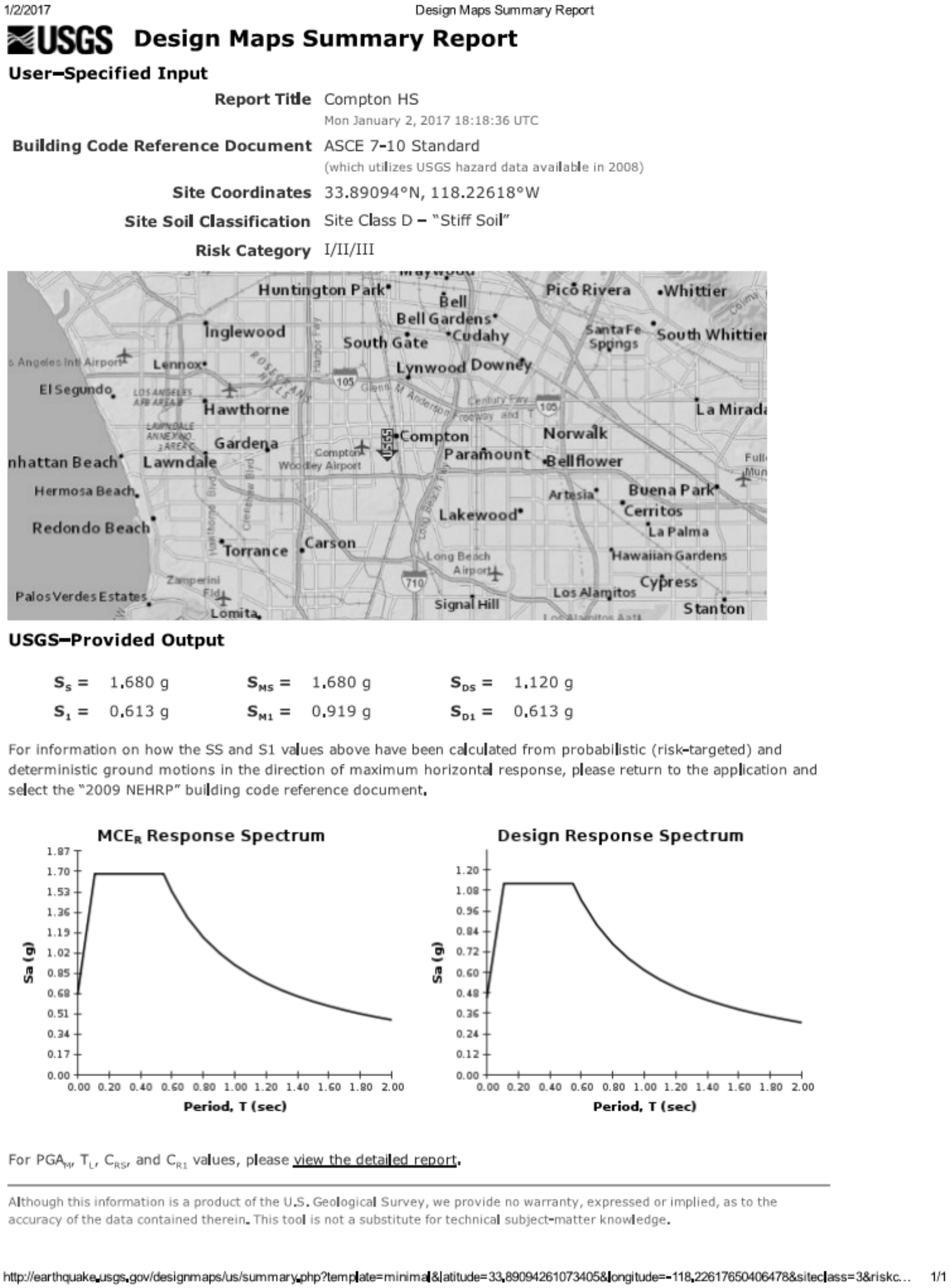
SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated.

Note: See Geo-Advantec Inc. reported cited in Section 2.3 of this report. Recently published maps by CGS indicate that the Duarte Branch of the Sierra Madre Fault traverses the school site. See also Appendix A.3.

Appendices

A.1 Structural calculations

APPENDIX A.1



1/2/2017 Design Maps Summary Report

USGS Design Maps Summary Report

User–Specified Input

Report Title	Compton HS Mon January 2, 2017 18:18:36 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.89094°N, 118.22618°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

$S_S =$ 1.680 g $S_{MS} =$ 1.680 g $S_{DS} =$ 1.120 g

$S_1 =$ 0.613 g $S_{M1} =$ 0.919 g $S_{D1} =$ 0.613 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

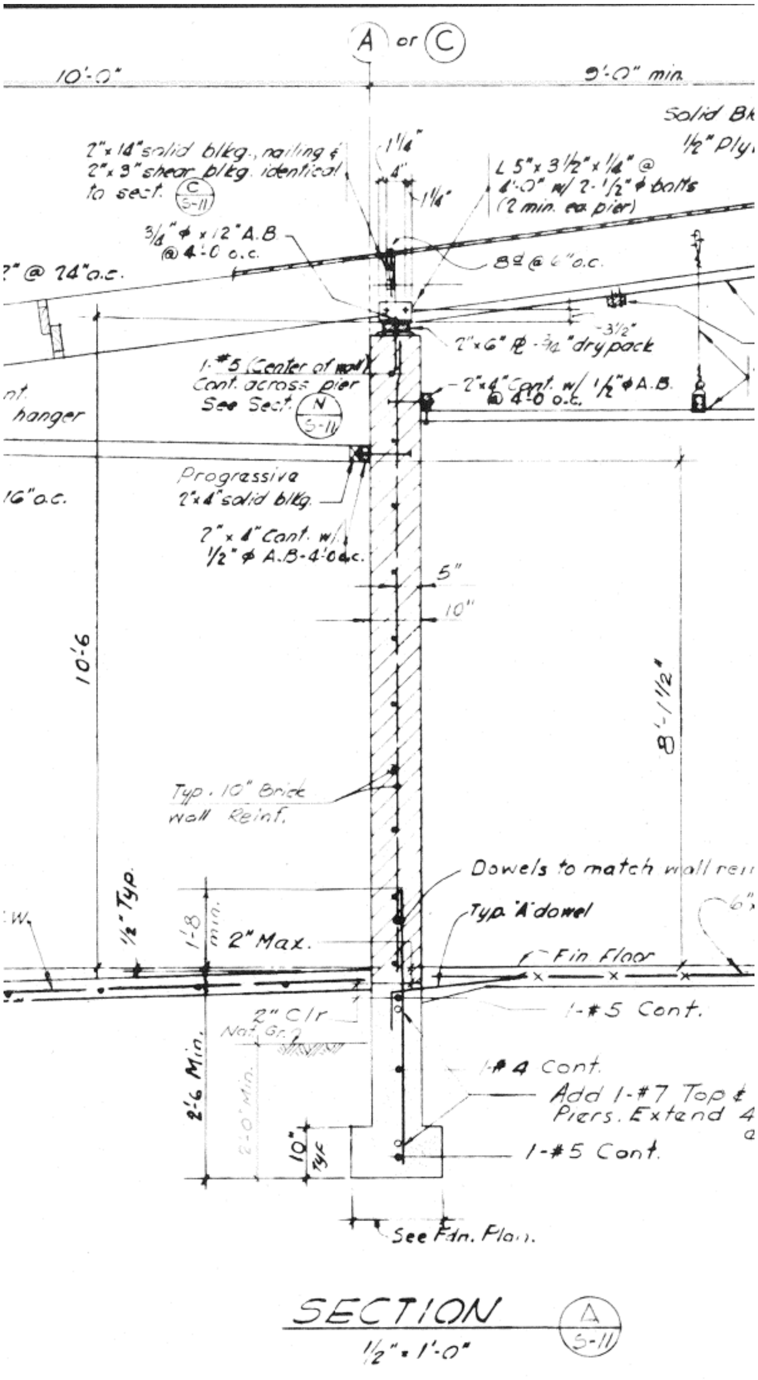
For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

http://earthquake.usgs.gov/designmaps/us/summary.php?template=minimal&latitude=33.89094261073405&longitude=-118.22617650406478&siteclass=3&riskc... 1/1

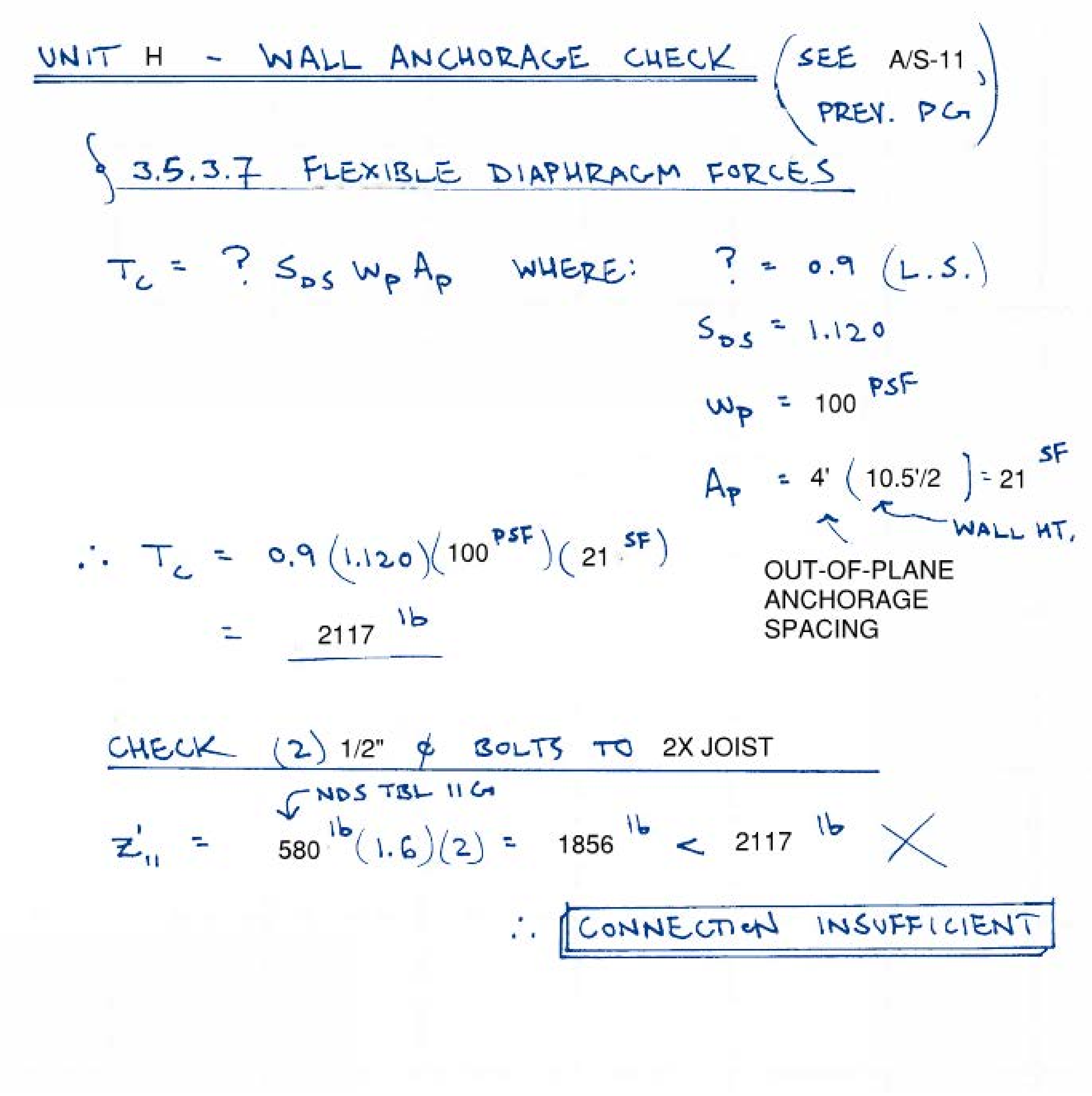
APPENDIX A.1 (cont.)

Structural Calculations
Detail A/S-11, A#19571



APPENDIX A.1 (cont.)

Structural Calculations



UNIT H - WALL ANCHORAGE CHECK (SEE A/S-11, PREV. PG)

§ 3.5.3.7 FLEXIBLE DIAPHRAGM FORCES

$T_c = ? S_{DS} W_p A_p$ WHERE: $? = 0.9$ (L.S.)

$S_{DS} = 1.120$

$W_p = 100^{PSF}$

$A_p = 4' (10.5'/2) = 21^{SF}$

OUT-OF-PLANE ANCHORAGE SPACING

WALL HT.

$\therefore T_c = 0.9 (1.120)(100^{PSF})(21^{SF})$

$= \underline{2117^{lb}}$

CHECK (2) 1/2" φ BOLTS TO 2X JOIST

NDS TBL 11G

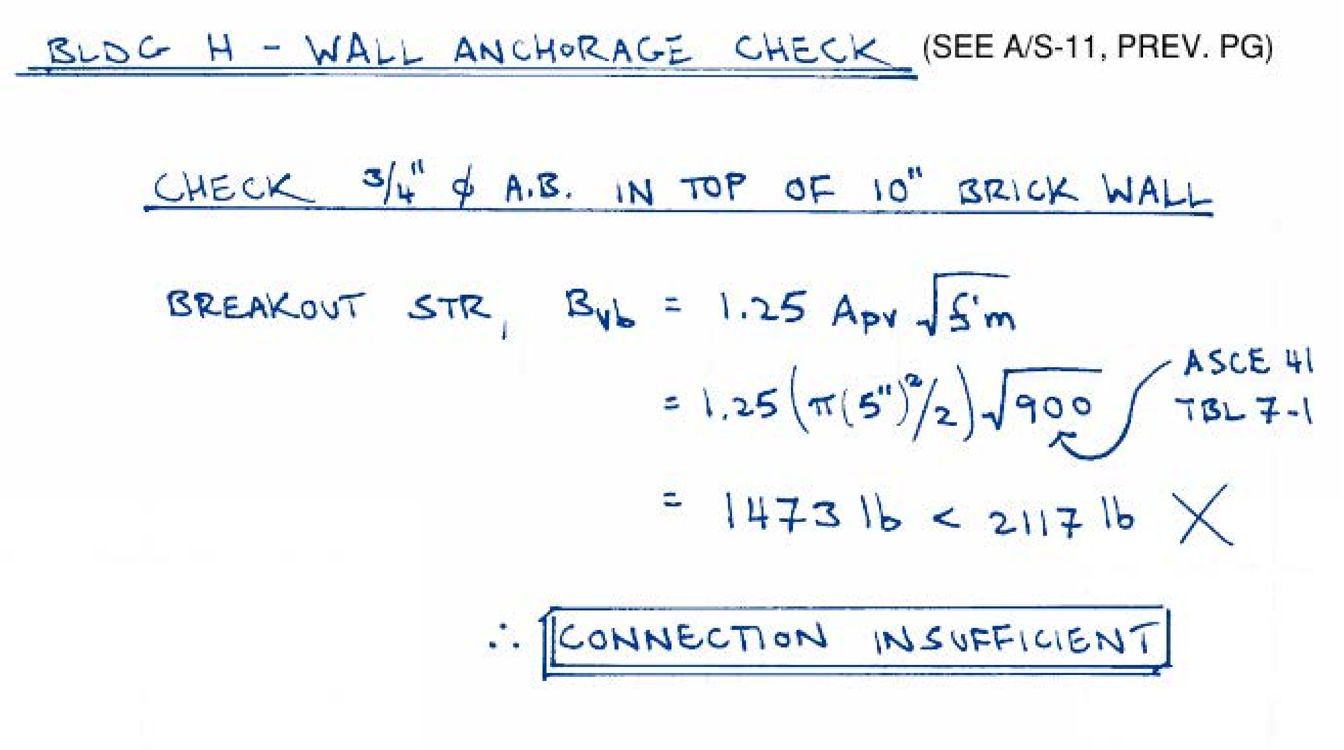
$Z'_{11} = 580^{lb}(1.6)(2) = 1856^{lb} < 2117^{lb}$ ✗

$\therefore$ $\boxed{\text{CONNECTION INSUFFICIENT}}$

→ THEREFORE, WALL ANCHORAGE DEFICIENCY

APPENDIX A.1 (cont.)

Structural Calculations



BLDG H - WALL ANCHORAGE CHECK (SEE A/S-11, PREV. PG)

CHECK 3/4" ϕ A.B. IN TOP OF 10" BRICK WALL

BREAKOUT STR, $B_{vb} = 1.25 \, A_{pv} \sqrt{f'_m}$

$= 1.25 \left(\pi (5")^2 / 2 \right) \sqrt{900}$ ASCE 41 TBL 7-1

$= 1473 \text{ lb} < 2117 \text{ lb}$ X

∴ $\boxed{\text{CONNECTION INSUFFICIENT}}$

→ THEREFORE, WALL ANCHORAGE DEFICIENCY

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
School Campus:	Compton High School		
School Address:	601 S Acacia Ave, Compton, California 90220	Last Revision Date:	
Building Name/ID:	**Building M - Gym**		
Project Tracking No.:	*73437-127*		Page 1 of 25

The purpose of this evaluation report is to establish eligibility for retrofit funding under Proposition 1D (AB 127, 2006). It is not the intent of this evaluation to provide a complete Life Safety evaluation. The evaluation is complete when eligibility has been determined.

Report Outline

1. Eligibility check summary
2. Evaluation process
3. Site and building description
4. Deficiency list
5. ASCE 31 Evaluation statements

Appendix A.1 Structural Calculations

REGISTERED PROFESSIONAL ENGINEER
LARRY R. KAPRIELIAN
No. 2795
Exp. 9-30-17
STRUCTURAL
STATE OF CALIFORNIA

LRKaprielian

KNA Consulting Engineers, Inc.
SE Firm Name (Logo optional)
SE Address: 9931 Muirlands Blvd
Irvine, CA 92618
Phone: (949)-462-3200

Larry R. Kaprielian, S.E.
Name of SE whose stamp is above

1. Eligibility Check Summary

	YES	NO
1.1 Building Occupancy: The building's current or planned use involves regular occupancy by students and staff, as detailed in Section 3.2.	☒	☐
1.2 Structural System: The building's seismic force-resisting system includes at least one of the types listed in Section 3.5.	☒	☐
1.3 Collapse Potential: The building has deficiencies associated with a high potential for local or global collapse in the evaluation earthquake. See Sections 4 and 5 for a list of identified deficiencies. Among the identified deficiencies are the critical items checked in Section 1.3.3:	☒	☐

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
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Building Name/ID:	**Building M - Gym**		
Project Tracking No.:	*73437-127*		Page 2 of 25

1.3.1 ☒ Collapse Potential Due to Ground Shaking: Ss = 1.680

1.3.2 Collapse Potential Due to One of the Following Geologic Hazards (CGS Approved Geologic Hazard Report Required):

☐ LIQUEFACTION
☐ SLOPE STABILITY FAILURE
☐ SURFACE FAULT RUPTURE

1.3.3 Identified Deficiencies:

☐ LOAD PATH
☐ WEAK STORY
☐ SOFT STORY
☐ VERTICAL DISCONTINUITIES
☐ MASS
☐ TORSION
☐ ADJACENT BUILDINGS
☐ MEZZANINES

☐ SHEAR STRESS CHECK (COLUMN)
☐ AXIAL STRESS CHECK
☐ FLAT SLAB FRAMES
☐ CAPTIVE COLUMNS
☐ BEAM BARS
☐ DEFLECTION COMPATIBILITY
☐ FLAT SLABS
☐ REDUNDANCY

☐ UNREINFORCED MASONRY BEARING WALLS
☐ SHEAR STRESS CHECK (SHEAR WALL OR INFILL)
☐ REDUNDANCY (SHEAR WALL)
☐ OPENINGS AT SHEAR WALLS
☐ TOPPING SLAB
☒ WALL ANCHORAGE
☐ OTHER *

SE Firm Name:	KNA Consulting Engineers, Inc.
SE Firm Address:	9931 Muirlands Blvd, Irvine, CA 92618
SE Firm Phone #:	(949)-462-3200

2. Evaluation Process

2.1 Purpose and Scope

As described in DSA Procedure 08-03, the primary purpose of this evaluation is to confirm the subject building's eligibility for Proposition 1D (AB 127, 2006) retrofit funding.

As noted in DSA Procedure 08-03, the intent of this evaluation is to identify conditions that represent "a high potential for catastrophic collapse." As described further in Sections 2.2 through 2.4, the evaluation includes:

- Completion of a standardized checklist developed specially for this project (Section 2.2). As described in Section 2.2, once a critical deficiency is confirmed, the balance of the checklist need not be completed.
- A site visit (Section 2.3)
- Document review (Section 2.4)

It is not the intent of this evaluation to provide a complete Life Safety evaluation; earthquake safety hazards other than those listed in this report might exist. Further, it is not the intent of this evaluation to identify deficiencies with respect to post-earthquake use or recovery feasibility. In particular, except where specifically noted, the scope of this evaluation does not include:

- Material testing or destructive investigation
- Comprehensive condition assessment or verification of construction documents
- Assessment of code compliance, either at present or at the time of construction
- Assessment for load combinations not including earthquake effects
- Consideration of Life Safety hazards related to egress
- Consideration of Life Safety hazards related to hazardous materials
- Consideration of the effects of damage to nonstructural components or contents.

Building located on sites with geologic hazards (liquefaction, slope failure, faulting) may be eligible for the Proposition 1D funding if it can be demonstrated that the geologic hazard may cause the building to have a high potential for catastrophic collapse. In this case, a geologic hazard report shall be prepared and submitted to CGS for approval and a copy included with evaluation report. The geologic hazard report shall identify the resulting displacements that will be imposed on the structure so a structural analysis can be performed. If eligibility is being sought for a deficiency that is not related to geologic hazards, then a geologic hazard report does not need to be prepared for the purpose of this evaluation report.

With respect to DSA Procedure 08-03, this report fulfills the intent of its Section 1. The remaining sections of Procedure 08-03 are outside the scope of this evaluation and report:

2.2 Evaluation criteria: Modifications to ASCE 31

As noted in DSA Procedure 08-03, the evaluation applies ASCE 31[1], an engineering standard that allows the user to choose a performance level of either Life Safety or Immediate Occupancy. Procedure 08-03 suggests that Life Safety is the performance level of interest, but the Procedure also focuses on collapse, a lesser performance level not explicitly addressed by ASCE 31. For this evaluation, DSA has clarified that only collapse-prone conditions need to be identified. Further, because the focus of this evaluation is on checking eligibility for retrofit funding, as opposed to producing a comprehensive list of potential deficiencies, the full evaluation need not be completed once a critical deficiency is identified.

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[1] *Seismic Evaluation of Existing Buildings* (ASCE/SEI 31-03), American Society of Civil Engineers, 2003.

ASCE 31 involves three "tiers" of evaluation. Tier 1 uses a set of generic, mostly qualitative "evaluation statements" (also called checklists) to identify potential deficiencies. Tier 2 applies more quantitative checks to confirm or correct the Tier 1 findings. Tier 3 involves a more thorough structural analysis. For this evaluation, DSA has clarified that only Tier 1 is required for most issues, with Tier 2 evaluation for specific issues.

The criteria used for this evaluation therefore are based on the ASCE 31 Tier 1 checklists, with the following modifications:

- Basic Structural, Supplemental Structural, and Foundations checklists are considered.
- Nonstructural checklists are excluded. While some issues addressed by these checklists are relevant to nonstructural collapse potential, their completion is beyond the scope of this evaluation. While not considered for purposes of establishing funding eligibility, relevant deficiencies will be investigated and addressed during a retrofit design phase.
- Evaluation statements required by ASCE 31 for Immediate Occupancy only are excluded.
- Evaluation statements not associated with one of the eligible structure types are excluded.
- Certain evaluation statements related to "critical deficiencies" indicative of a high potential for structural collapse are identified. If a critical deficiency is confirmed, the balance of the evaluation need not be completed. The critical deficiencies are those listed in Section 1. They were selected by DSA for this project based in part on precedents set by the California Office of Statewide Health Planning and Development.[2]
- For Quick Checks and Tier 2 evaluations, the ASCE 31 criteria for Life Safety performance are used, except that *m* values, where needed, are increased by an additional factor of 1.33.
- The Tier 1 evaluation statements are modified to reflect emphasis on collapse-level performance:
  - Since the presence of an unreinforced masonry bearing wall system is deemed a critical deficiency, an evaluation statement to that effect is added, and detailed ASCE 31 evaluation statements specific to that system are omitted.
  - Condition of Materials: Evaluation statements are edited to focus less on presence of damage and more on significance of damage. Note that Masonry Lay-up and Foundation Performance evaluation statements are relocated to the Condition of Materials subsection of Section 5.
  - Except for cracks in certain concrete members, Condition of Materials evaluation statements related to existing cracks are omitted.
  - Beam Bars: The requirement for 25 percent of the joint bars to be continuous for the length of the member is removed.
  - Redundancy (Moment frame and Braced frame): The requirement for two bays per frame line is removed.
  - Stiffness of wall anchors: The limitation of 1/8-inch gap prior to anchor engagement is removed.
  - Overturning: This statement is removed.
  - In general, statements are modified for clarity and consistency with this DSA program.
- Tier 2 evaluation is required for any critical item (see Section 1) found to be non-compliant by Tier 1. The potential requirement for full-building Tier 2 evaluation found in ASCE 31 Table 3-3 is waived.

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[2] *2007 California Building Standards Administrative Code (California Code of Regulations, Title 24 Part 1)*, Chapter 6, "Seismic Evaluation Procedures for Hospital Buildings," Section 1.4.5.1.2, October 23, 2008 Emergency Supplement.

2.3 Document review

The following documents were provided for use in completing the evaluation, in general compliance with ASCE 31, Section 2.2. The Set ID is used to identify the documents cited in Section 5 of this report.

SET ID	DATE	DESCRIPTION
A#19571	12/23/1959	Document: Compton Sr. High School Architect: Austin Field & Fry No. of Sheets: 70 Context: Original Construction Plans

2.4 Site visit

In general compliance with ASCE 31, Sections 2.2 and 2.3, a site visit shall be made to verify the building configuration and conditions and to assist in completing the evaluation.

Date of site visit: February 15, 2017
Visiting engineer(s) and staff: Tyler Poucher (KNA)
School district contact person: Alvin Jenkins, Senior Director of Facilities, Maintenance, Operations and Transportation, Compton USD
School campus representative (if different than above):

The scope of the site visit was based on our judgment, accessibility of certain areas, and convenience of the school on-site liaison. The purpose of the following list is merely to record the work that was done. The site visit included (check all applicable boxes):

☐ INTERVIEW W/ ON-SITE LIAISON
☒ GROUNDS, FOR OBSERVATION OF SOIL, SLOPES, DRAINAGE, GENERAL CONDITION
☒ EXTERIOR OBSERVATION TO VERIFY BASIC MASSING, CONFIGURATION, GENERAL CONDITION
☒ INTERIOR OBSERVATION TO VERIFY USE, WALL LINE CONFIGURATION, GENERAL CONDITION
☐ ROOF
☐ BASEMENT
☐ CEILING PLENUM
☐ UNFINISHED SPACES (MECHANICAL ROOMS, CLOSETS, CRAWL SPACES, ETC.)
☐ DETAILS OF STRUCTURE-ARCHITECTURE INTERACTION
☐ ROOF-TO-WALL CONNECTIONS
☐ GRAVITY SYSTEM FRAMING
☐ SEISMIC FORCE RESISTING SYSTEM ELEMENTS OR COMPONENTS
☐ ADJACENT BUILDINGS SUBJECT TO POUNDING
☐ OTHER:

The site visit confirmed that the existing structure generally conforms to the available drawings listed in Section 2.3.

3. Site and Building Description

3.1 Building description

General

Year originally built: 1959

DSA Application number A#19571 ☒ Original Construction ☐ Work done pursuant to the Garrison Act (Ed Code 17367)

Number of stories above grade: 1

Number of stories below grade: 0

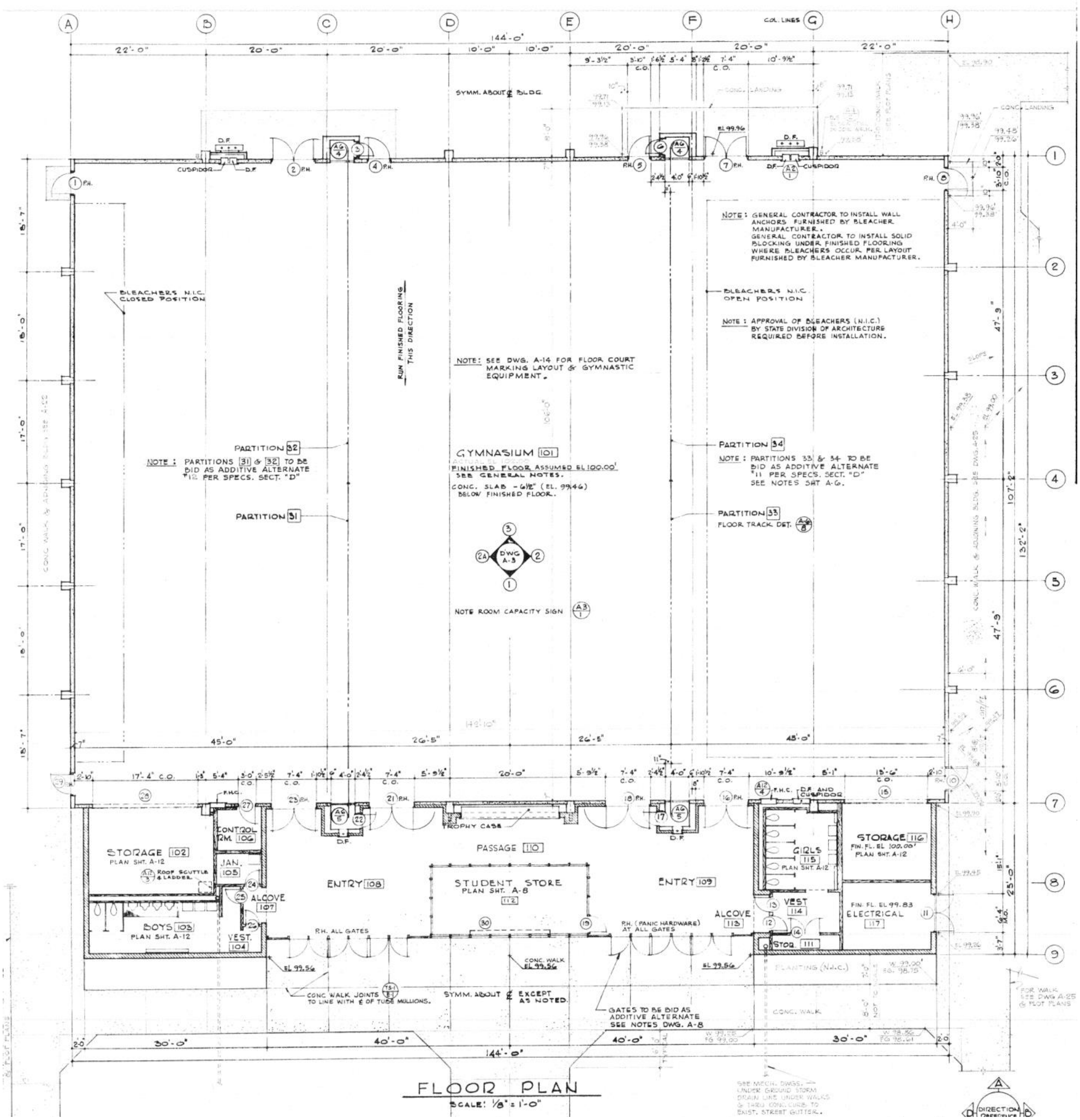
Total floor area (sq ft, approx): 19,000sq/ ft.

Other essentially identical buildings on this campus? ☐ Yes ☒ No

Photographs

Exterior east elevation photograph, looking west, taken February 15, 2017.

Ground Floor Plan (from A-1, A#19571)



3.2 Building Occupancy

Original, current, and planned uses of the building include those indicated here:

	Original Use	Current Use	Planned Future Use
Office / Administration	☐	☐	☐
Classrooms / Instruction Areas	☐	☐	☐
Kitchen	☐	☐	☐
Assembly: Dining	☐	☐	☐
Assembly: Auditorium	☐	☐	☐
Assembly: Gymnasium	☒	☒	☒
Locker rooms	☐	☐	☐
Patio cover / bus shelter / walkway cover	☐	☐	☐
Bleachers / stadium structure	☐	☐	☐
Other occupied:	☐	☐	☐
Mechanical / utility rooms or enclosures	☐	☐	☐
Bulk storage	☐	☐	☐
Vacant / unused	☐	☐	☐
Other unoccupied:	☐	☐	☐

3.3 Seismicity

Latitude: 33.89094

Longitude: -118.22618

Site Class per ASCE 31, Section 3.5.2.3: D

Basis for Site Class determination: Default

Period [sec]	Mapped MCE values from ASCE 7-10 [g]	Site Coefficients from ASCE 31 Tables 3-5, 3-6	Design values per ASCE 31 section 3.5.2.3.1 [g]	S_a per ASCE 31 section 3.5.2.3.1, [g]
0.2	$S_S = 1.680$	$F_a = 1.0$	$S_{DS} = (2/3)\ S_S\ F_a = 1.120$	$S_{a,0.2} = S_{DS} = 1.120$
1.0	$S_1 = 0.613$	$F_v = 1.5$	$S_{D1} = (2/3)\ S_1\ F_v = 0.613$	$S_{a,1.0} = \min(S_{DS}, S_{D1}/T) = 1.120$

3.4 Gravity System

Roof diaphragm and framing: Main roof composed of 3/8” plywood decking over 2x6 straight sheathing spanning to 4x and 6x Roof beams, spanning to Tapered Steel Girders and Concrete Bearing Walls

Typical floor diaphragm and framing: N.A.

Ground floor framing: 4-inch reinforced concrete slab on grade

Vertical load-bearing elements: Concrete columns and 7” thick reinforced Concrete Shear walls.

Basement walls: N.A.

Foundation: Concrete piles, continuous and pad concrete footings.

Snow load for use in load combinations involving earthquake: N.A.

3.5 Structural System per ASCE 31 Classifications (Category 2 Buildings Types per AB 300 Report)

		North-South	East-West
C1	Concrete Moment Frames	☐	☐
C1B*	Reinforced Concrete Cantilever Columns	☐	☐
C2A	Concrete Shear Walls, Flexible Diaphragm	☐	☐
C3A	Concrete Frame with Infill Masonry Shear Walls, Flexible Diaphragm	☐	☐
PC1	Precast/Tilt-up Concrete Shear Walls, Concrete Diaphragm	☐	☐
PC1A	Precast/Tilt-up Concrete Shear Walls, Flexible Diaphragm	☒	☒
PC2	Precast Concrete Frames with Shear Walls, Rigid Diaphragm	☐	☐
PC2A	Precast Concrete Frames without Shear Walls, Rigid Diaphragm	☐	☐
RM1	Reinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
S1B*	Steel Cantilever Columns	☐	☐
S3	Steel Light Frames	☐	☐
URM	Unreinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
URMA	Unreinforced Masonry Bearing Walls, Rigid Diaphragm	☐	☐
M*	Mixed Systems - construction containing at least one of the above lateral-force-resisting systems in at least one direction of seismic loading.	☐	☐
None of the above		☐	☐

* These structural systems are a subset of the classification in ASCE 31 and are defined in the Category 2 building types in the AB 300 Seismic Safety Inventory of California Public Schools report (2002).

Horizontal system combinations	Main roof composed of 3/8" plywood decking over 2x6 straight sheathing spanning to 4x and 6x Roof beams, spanning to Tapered Steel Girders and Concrete Bearing Walls.
Vertical system combinations	The SFRS are 7" Reinforced Concrete Shear walls.
SFRS foundation	Pile caps with piles provided at shear wall ends.
Gravity loading	Bearing Wall/Shear Wall system. SFRS Concrete walls perpendicular to the roof framing carries gravity load in addition to lateral loads.
System details	7" thick concrete shear walls are anchored to 6x roof purlins at 6'-0" on center by (2) 5/8" thru-bolts. The thru-bolts attach to a steel U-plate, which is embedded to concrete with ¾" dia. anchor bolts. See Detail F/S-3, A#19571
Original design code	1958 UBC (Assumed, not stated on As-Built drawings)
History of seismic retrofit or significant alteration	None.
Benchmark year check	No benchmark year given for SFRS types listed in Section 3.5 of this report.

4. Deficiency list

The following table summarizes the potential deficiencies identified in Section 5 of this report. Other deficiencies might exist. The evaluation was stopped once critical deficiencies were identified.

Non-compliant condition	Discussion	Additional evaluation recommended
Wall Anchorage	• Out-of-plane wall anchorage connection was found to be deficient. • Expected to cause local collapse of walls and roof framing.	None

Unknown condition	Discussion	Additional evaluation recommended

5. ASCE 31 Evaluation Statements

Evaluation statements provided in this section are from ASCE 31. They have been modified for this project with DSA approval as described in Section 2.2 of this report. References within the evaluation statements to other section numbers are generally to sections of ASCE 31.

C = Compliant
NC = Non-compliant
U = Unknown or not investigated
NA = Not applicable to this building

Items marked NC or U are summarized in Section 4 of this report.

CONDITION OF MATERIALS

C NC U NA DETERIORATION OF WOOD. There shall be no evidence of or reason to suspect structural capacity loss due to decay, shrinkage, splitting, fire damage, or sagging in wood members or deterioration, damage, or loosening in metal connection hardware.

Note: No weep screed provided at exterior walls adjacent to irrigated exterior grade. No destructive investigation performed.

C NC U NA DETERIORATION OF CONCRETE. There shall be no evidence of or reason to suspect structural capacity loss due to cracking of concrete or deterioration of concrete or reinforcing steel in gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA DETERIORATION OF STEEL. There shall be no evidence of or reason to suspect structural capacity loss due to rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA POST-TENSIONING ANCHORS. There shall be no evidence of or reason to suspect structural capacity loss due to corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used.

C NC U NA PRECAST CONCRETE WALLS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of concrete or reinforcing steel or distress, especially at connections.

C NC U NA MASONRY UNITS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of masonry units.

C NC U NA MASONRY JOINTS. The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no evidence of or reason to suspect structural capacity loss due to eroded mortar.

C NC U NA MASONRY LAY-UP. Filled collar joints of multi-wythe masonry infill walls shall have negligible voids.

C NC U NA FOUNDATION PERFORMANCE. There shall be no evidence of or reason to suspect existing foundation movement (due to settlement, heave, or other causes) that would affect the integrity or strength of the structure.

BUILDING CONFIGURATION

C NC U NA
Critical Item
LOAD PATH. The structure shall contain a minimum of one complete load path for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.

C NC U NA
Critical Item
WEAK STORY. The strength of the seismic force-resisting system in any story shall not be less than 80% of the strength in an adjacent story, above or below.

C NC U NA
Critical Item
SOFT STORY. The stiffness of the seismic force-resisting system in any story shall not be less than 70% of the seismic force-resisting system stiffness in an adjacent story above or below, or less than 80% of the average seismic force-resisting system stiffness of the three stories above or below.

C NC U NA GEOMETRY. There shall be no changes in horizontal dimension of the seismic force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.

C NC U NA
Critical Item
VERTICAL DISCONTINUITIES. All vertical elements of the seismic force-resisting system shall be continuous to the foundation.

C NC U NA
Critical Item
MASS. There shall be no change in effective mass more than 50% from one story to the next. Light roofs, penthouses and mezzanines need not be considered.

C NC U NA
Critical Item
TORSION. The estimated distance between the story center of mass and the story center of rigidity shall be less than 20% of the building width in either plan dimension.

C NC U NA
Critical Item
ADJACENT BUILDINGS. The clear distance between the building being evaluated and any adjacent building shall be greater than 4% of the height of the shorter building. Alternatively, if the 4% separation does not exist, the two buildings shall be configured such that pounding would not damage the columns of the subject building within the clear span of the columns.

C NC U NA
Critical Item
MEZZANINES. Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the seismic force-resisting elements of the main structure.

MOMENT FRAMES

C NC U NA
Critical Item
SHEAR STRESS CHECK (Columns). The shear stress in concrete columns of the seismic force-resisting system, calculated using the Quick Check procedure of Section 3.5.3.2, shall be less than the greater of 100 psi or $2\sqrt{f'_c}$.

C NC U NA
Critical Item
AXIAL STRESS CHECK (Concrete columns). The axial stress due to gravity loads in columns subjected to seismic overturning forces shall be less than $0.10f'_c$. 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 $0.30f'_c$.

C NC U NA
AXIAL STRESS CHECK (Steel columns). The axial stress due to gravity loads in steel columns subjected to seismic overturning forces shall be less than $0.10F_y$. 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 $0.30F_y$.

C NC U NA
Critical Item
FLAT SLAB FRAMES. The seismic force-resisting system shall not be a frame consisting of columns and a flat slab/plate without beams.

C NC U NA
PRESTRESSED FRAME ELEMENTS. The seismic 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.

C NC U NA
Critical Item
CAPTIVE COLUMNS. There shall be no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level.

C NC U NA
NO SHEAR FAILURES. The shear capacity of frame members in the seismic force-resisting system shall be able to develop the moment capacity at the ends of the members.

C NC U NA
STRONG COLUMN/WEAK BEAM. The sum of the moment capacity of the columns shall be 20% greater than that of the beams at concrete frame joints.

C NC U NA
STRONG COLUMN/WEAK BEAM. The percent of strong column/weak beam joints in each story of each line of steel moment-resisting frames shall be greater than 50%. This check need not apply for 1-story structures.

C NC U NA
Critical Item
BEAM BARS. At least two longitudinal top and two longitudinal bottom bars shall extend continuously throughout the length of each frame beam.

C NC U NA
COLUMN BAR SPLICES. All column bar lap splice lengths shall be greater than $35d_b$, and shall be enclosed by ties spaced at or less than $8d_b$. 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.

C NC U NA 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.

C NC U NA COLUMN TIE SPACING. Frame columns shall have ties spaced at or less than d/4 throughout their length and at or less than $8d_b$ at all potential plastic hinge locations.

C NC U NA STIRRUP SPACING. All beams shall have stirrups spaced at or less than d/2 throughout their length. At potential plastic hinge locations stirrups shall be spaced at or less than the minimum of $8d_b$ or d/4.

C NC U NA JOINT REINFORCING. Beam-column joints shall have ties spaced at or less than $8d_b$.

C NC U NA COMPLETE FRAMES. Concrete frames that are not part of the seismic force-resisting system shall form a complete gravity load carrying system.

C NC U NA
Critical Item DEFLECTION COMPATIBILITY. Elements of concrete frames that are not part of the seismic force-resisting system shall have the shear capacity to develop the flexural strength of the components.

C NC U NA
Critical Item FLAT SLABS. Flat slabs/plates that are not part of the seismic force-resisting system shall have continuous bottom steel through the column joints.

C NC U NA
Critical Item REDUNDANCY (Moment frame). The number of lines of moment frames in each principal direction shall be greater than or equal to 2.

C NC U NA INTERFERING WALLS. All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements. (This evaluation statement does not apply to seismic force-resisting system type C3A or others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA PRECAST CONNECTION CHECK. The connections at joints of precast concrete frames shall have the capacity to resist the shear and moment demands calculated using the Quick Procedure of Section 3.5.3.5

C NC U NA PRECAST FRAMES. For buildings with concrete shear walls, precast concrete frame elements shall not be necessary as primary components for resisting seismic forces.

C NC U NA PRECAST CONNECTIONS. For buildings with concrete shear walls, the connections between precast frame elements such as chords, ties, and collectors in the seismic force-resisting system shall develop the capacity of the connected members.

C NC U NA 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.

C NC U NA MOMENT-RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.

C NC U NA 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.

C NC U NA COLUM SPLICES: All column splice details located in moment-resisting frames shall include connection of both flanges and the web.

C NC U NA COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Table I-9-1 of Seismic Provisions for Structural Steel Buildings (AISC, 1997).

SHEAR WALLS

C NC U NA
Critical Item UNREINFORCED MASONRY BEARING WALLS. The seismic force-resisting system in any direction shall not rely on or consist primarily of unreinforced masonry bearing walls.

C NC U NA
Critical Item SHEAR STRESS CHECK (Shear wall). 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 $2\sqrt{f'_c}$.

C NC U NA REINFORCING STEEL. In concrete or precast shear walls, 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. The spacing of reinforcing steel shall be equal to or less than 18 inches.

C NC U NA 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 135º or more.

C NC U NA
Critical Item REDUNDANCY (Shear wall). The number of lines of shear walls in each principal direction shall be greater than or equal to 2.

C NC U NA PROPORTIONS. The height-to-thickness ratio of masonry infill walls at each story shall be less than 9. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA SOLID WALLS. The masonry infill walls shall not be of cavity construction. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA INFILL WALLS. The infill walls shall be continuous to the soffits of the frame beams and to the columns to either side. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA
Critical Item SHEAR STRESS CHECK (Precast concrete shear walls). 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 $2\sqrt{f'_c}$.

C NC U NA WALL OPENINGS. The total width of openings along any perimeter wall line shall constitute less than 75% of the length of any perimeter shear wall, with the wall piers having height-to-width ratios of less than 2 to 1.

C NC U NA 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.

C NC U NA
Critical Item
SHEAR STRESS CHECK (Brick or hollow clay masonry infill). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units.

C NC U NA
Critical Item
SHEAR STRESS CHECK (Concrete block infill and reinforced masonry shear walls). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for concrete units.

C NC U NA PROPORTIONS. The height-to-thickness ratio of unreinforced masonry infill shear walls shall be less than the following: Top story of multi-story building: 9, First story of multi-story building: 15, All other conditions: 13

C NC U NA REINFORCING STEEL. In reinforced masonry shear walls, the total vertical and horizontal reinforcing steel ratio shall be greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel shall be less than 48"; and all vertical bars shall extend to the top of the walls.

BRACED FRAMES

C NC U NA
Critical Item
REDUNDANCY: The number of lines of braced frames in each principal direction shall be greater than or equal to 2.

C NC U NA
Critical Item
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 $0.50F_y$.

C NC U NA SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression shall have Kl/r ratios less than 120.

C NC U NA CONNECTION STRENGTH: All the brace connections shall develop the yield capacity of the diagonals.

C NC U NA K-BRACING: The bracing system shall not include K-braced bays.

Note: Steel K-Frames configurations present at all frame locations. See Appendix A.1 & A.3.

DIAPHRAGMS

C NC U NA DIAPHRAGM CONTINUITY. The diaphragm shall not be composed of split-level floors and shall not have expansion joints.

C NC U NA CROSS TIES. There shall be continuous cross ties between diaphragm chords.

C NC U NA ROOF CHORD CONTINUITY. All roof chord elements shall be continuous, regardless of changes in roof elevation.

C NC U NA
Critical Item
OPENINGS AT SHEAR WALLS. Diaphragm openings immediately adjacent to the shear walls shall be less than 25% of the wall length, and diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 ft long.

C NC U NA OPENINGS AT BRACED FRAMES. Diaphragm openings immediately adjacent to the braced frames shall extend less than 25% of the frame length.

C NC U NA OTHER DIAPHRAGMS. The diaphragm shall not consist of a system other than wood, metal deck, concrete or horizontal bracing.

C NC U NA
Critical Item TOPPING SLAB. Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab.

C NC U NA STRAIGHT SHEATHING. All straight sheathed diaphragms shall have aspect ratios less than 2 to 1 in the direction being considered.

C NC U NA SPANS. All wood diaphragms with spans greater than 24 ft shall consist of wood structural panels or diagonal sheathing.

C NC U NA UNBLOCKED DIAPHRAGMS. All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 ft and shall have aspect ratios less than or equal to 4 to 1.

Note: Diagonally sheathed diaphragm spans greater than 40-feet, from grid lines 1 to 2, and grid lines 2 to 3. See Section 3.1 of this report.

CONNECTIONS

C [✓ NC] U NA
Critical Item WALL ANCHORAGE. Exterior concrete or masonry walls shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps 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.

C NC U NA WOOD LEDGERS. The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers.

C NC U NA PRECAST PANEL CONNECTIONS. There shall be at least two anchors from each precast wall panel into the diaphragm elements.

C NC U NA 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 prior to engagement of the anchors, as needed for reliable bearing.

C NC U NA GIRDER/COLUMN CONNECTION. There shall be a positive connection utilizing plates, connection hardware, or straps between girders and their supporting columns. (This evaluation statement applies primarily to precast concrete and masonry systems.)

C NC U NA GIRDERS. Girders supported by walls or pilasters shall have at least two additional column ties securing the anchor bolts. (This evaluation statement applies primarily to precast concrete systems.)

C NC U NA CORBEL BEARING. If precast concrete frame girders bear on column corbels, the length of bearing shall be greater than 3”.

C NC U NA CORBEL CONNECTIONS. Precast concrete frame girders shall not be connected to corbels with welded elements.

C NC U NA TRANSFER TO SHEAR WALLS. Diaphragms shall be connected for transfer of loads to shear walls.

C NC U NA TRANSFER TO STEEL FRAMES. Diaphragms shall be connected for transfer of loads to the steel frames.

C NC U NA 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 shear wall or frame elements.

C NC U NA CONCRETE COLUMNS. All concrete columns shall be doweled into the foundation.

C NC U NA FOUNDATION DOWELS. Wall reinforcement shall be doweled into the foundation.

C NC U NA PRECAST WALL PANELS. Precast wall panels shall be connected to the foundation.

C NC U NA UPLIFT AT PILE CAPS. Pile caps shall have top reinforcement and piles shall be anchored to the pile caps.

C NC U NA STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the foundation.

C NC U NA ROOF PANELS: Metal, plastic, or cementitious roof panels shall be positively attached to the roof framing to resist seismic forces.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the framing to resist seismic forces.

FOUNDATION

C NC U NA POLE FOUNDATIONS. Pole foundations shall have a minimum embedment depth of 4 ft.

C NC U NA 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 in Site Class A, B, or C.

GEOLOGIC SITE HAZARDS

C NC U NA
Critical Item

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.

Note: Not investigated.

C NC U NA
Critical Item

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.

Note: Not Investigated.

C NC U NA
Critical Item

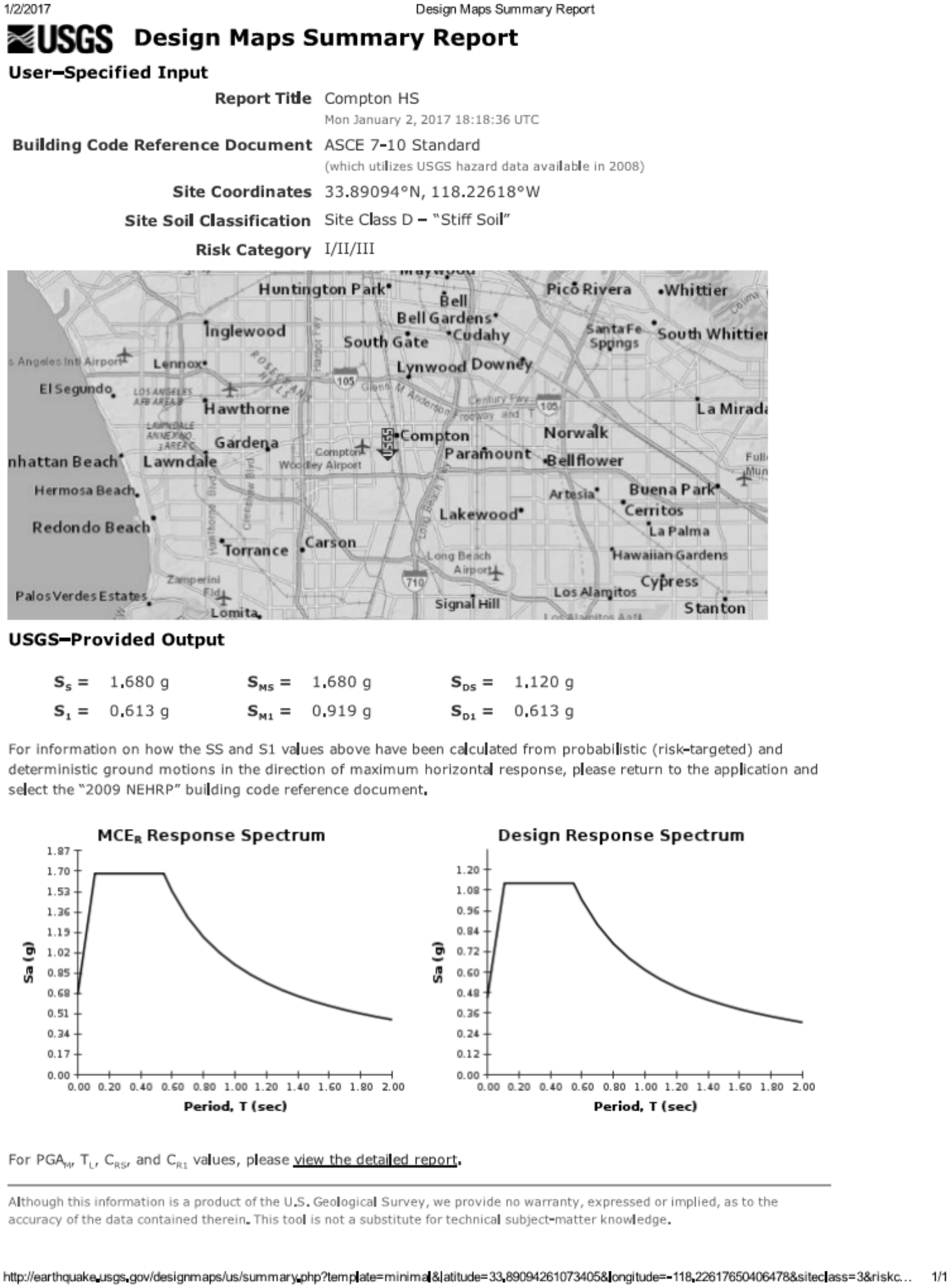
SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated.

Note: See Geo-Advantec Inc. reported cited in Section 2.3 of this report. Recently published maps by CGS indicate that the Duarte Branch of the Sierra Madre Fault traverses the school site. See also Appendix A.3.

Appendices

A.1 Structural calculations

APPENDIX A.1



1/2/2017 Design Maps Summary Report

USGS Design Maps Summary Report

User–Specified Input

Report Title	Compton HS Mon January 2, 2017 18:18:36 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.89094°N, 118.22618°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

$S_S =$ 1.680 g	$S_{MS} =$ 1.680 g	$S_{DS} =$ 1.120 g
$S_1 =$ 0.613 g	$S_{M1} =$ 0.919 g	$S_{D1} =$ 0.613 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

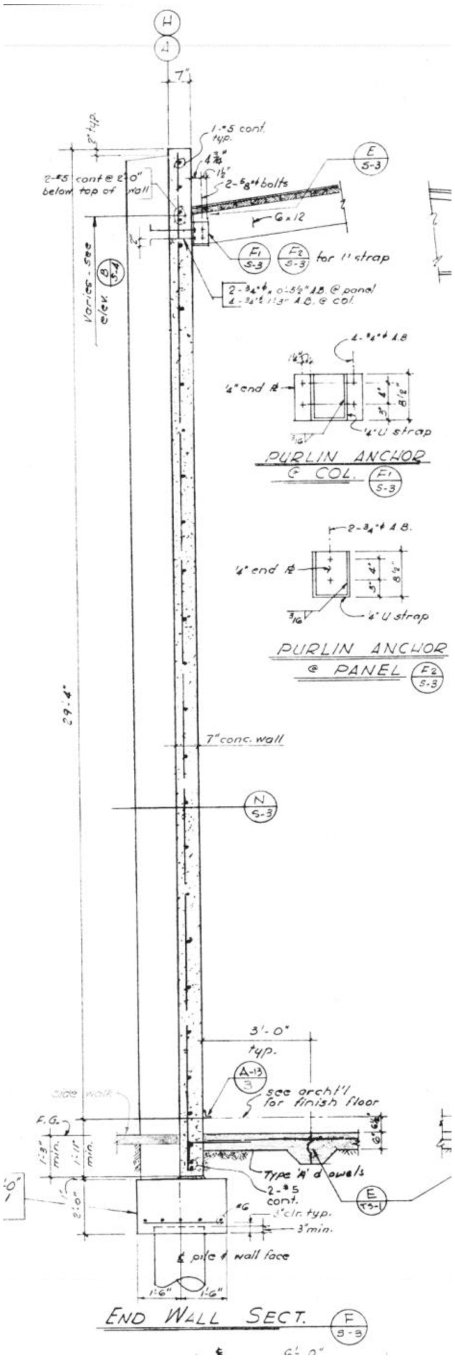
For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

http://earthquake.usgs.gov/designmaps/us/summary.php?template=minimal&latitude=33.89094261073405&longitude=-118.22617650406478&siteclass=3&riskc... 1/1

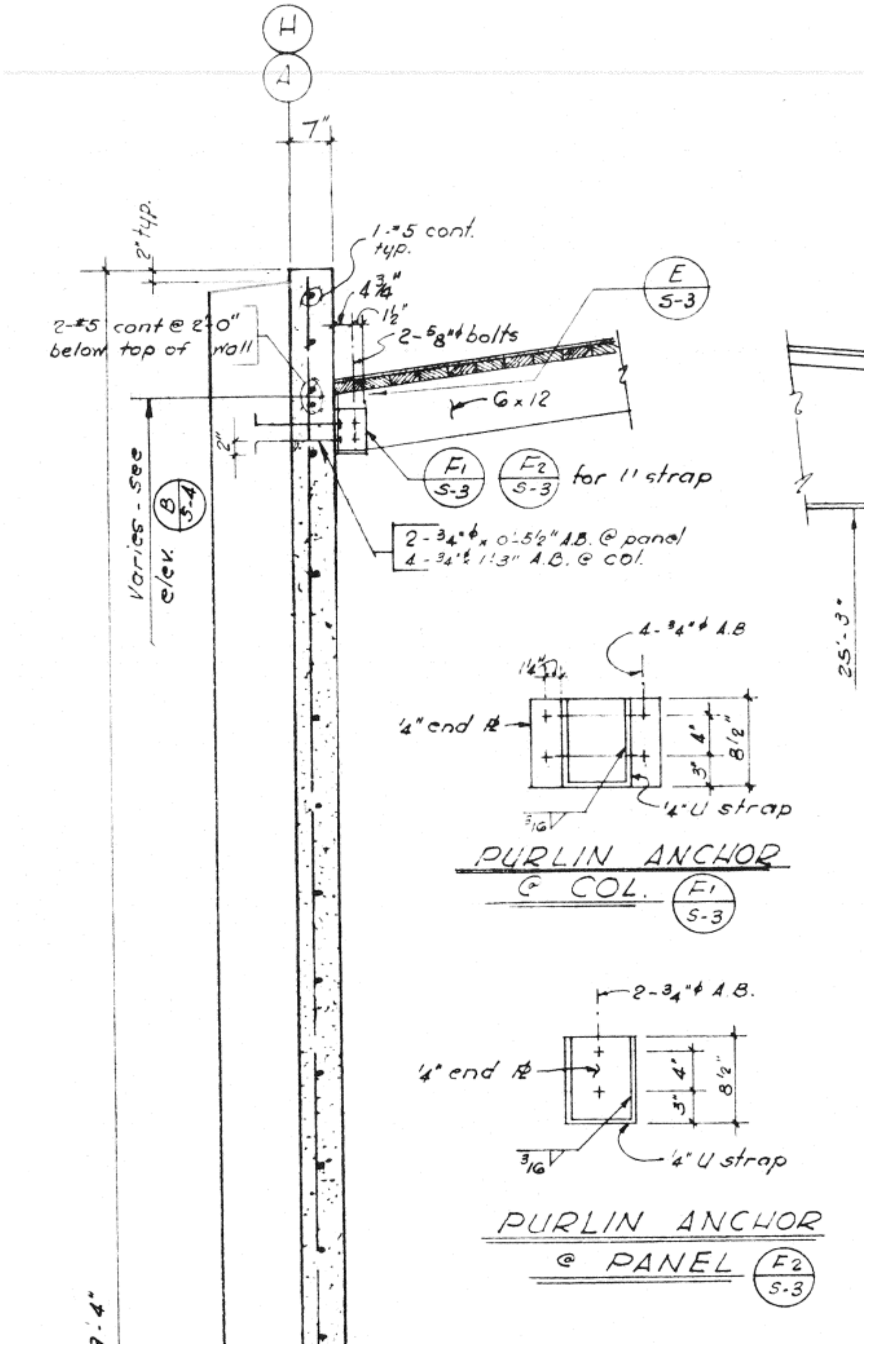
APPENDIX A.1 (cont.)

Structural Calculations
Detail F/S-3, A#19571



APPENDIX A.1 (cont.)

Structural Calculations
Detail F/S-3, A#19571



APPENDIX A.1 (cont.)

Structural Calculations

UNIT M - WALL ANCHORAGE CHECK (SEE F/S-3, PREV. PG)

§ 3.5.3.7 FLEXIBLE DIAPHRAGM FORCES

$T_c = ? \, S_{DS} W_p A_p$ WHERE: $? = 0.9$ (L.S.)

$S_{DS} = 1.120$

$W_p = 88^{PSF}$

$A_p = 6'(29'/2 + 1') = 93^{SF}$

PURLIN SPACING

WALL HT.

$\therefore T_c = 0.9(1.120)(88^{PSF})(93^{SF})$

$= \underline{8250^{lb}}$

CHECK (2) 5/8" ϕ BOLTS TO 6x PURLIN

NDS TBL 11G

$Z'_{11} = 2410^{lb}(1.6)(2) = 7712^{lb} < 8250^{lb}$ ✗

$\therefore$ $\boxed{\text{CONNECTION INSUFFICIENT}}$

→ THEREFORE, WALL ANCHORAGE DEFICIENCY

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
School Campus:	Compton High School		
School Address:	601 S Acacia Ave, Compton, California 90220	Last Revision Date:	
Building Name/ID:	**Building M1 – Boys Shower/Locker Room**		
Project Tracking No.:	*73437-128*		Page 1 of 25

The purpose of this evaluation report is to establish eligibility for retrofit funding under Proposition 1D (AB 127, 2006). It is not the intent of this evaluation to provide a complete Life Safety evaluation.
The evaluation is complete when eligibility has been determined.

Report Outline

1. Eligibility check summary
2. Evaluation process
3. Site and building description
4. Deficiency list
5. ASCE 31 Evaluation statements

Appendix A.1 Structural Calculations

LARRY R. KAPRIELIAN
No. 2795
Exp. 9-30-17

KNA Consulting Engineers, Inc.
SE Firm Name (Logo optional)
SE Address: 9931 Muirlands Blvd
Irvine, CA 92618
Phone: (949)-462-3200

Larry R. Kaprielian, S.E.
Name of SE whose stamp is above

1. Eligibility Check Summary

	YES	NO
1.1 Building Occupancy: The building's current or planned use involves regular occupancy by students and staff, as detailed in Section 3.2.	☒	☐
1.2 Structural System: The building's seismic force-resisting system includes at least one of the types listed in Section 3.5.	☒	☐
1.3 Collapse Potential: The building has deficiencies associated with a high potential for local or global collapse in the evaluation earthquake. See Sections 4 and 5 for a list of identified deficiencies. Among the identified deficiencies are the critical items checked in Section 1.3.3:	☒	☐

1.3.1 ☒ Collapse Potential Due to Ground Shaking: Ss = 1.680

1.3.2 Collapse Potential Due to One of the Following Geologic Hazards (CGS Approved Geologic Hazard Report Required):

☐ LIQUEFACTION ☐ SLOPE STABILITY FAILURE ☐ SURFACE FAULT RUPTURE

1.3.3 Identified Deficiencies:

☐ LOAD PATH
☐ WEAK STORY
☐ SOFT STORY
☐ VERTICAL DISCONTINUITIES
☐ MASS
☐ TORSION
☐ ADJACENT BUILDINGS
☐ MEZZANINES

☐ SHEAR STRESS CHECK (COLUMN)
☐ AXIAL STRESS CHECK
☐ FLAT SLAB FRAMES
☐ CAPTIVE COLUMNS
☐ BEAM BARS
☐ DEFLECTION COMPATIBILITY
☐ FLAT SLABS
☐ REDUNDANCY

☐ UNREINFORCED MASONRY BEARING WALLS
☐ SHEAR STRESS CHECK (SHEAR WALL OR INFILL)
☐ REDUNDANCY (SHEAR WALL)
☐ OPENINGS AT SHEAR WALLS
☐ TOPPING SLAB
☒ WALL ANCHORAGE
☐ OTHER *

2. Evaluation Process

2.1 Purpose and Scope

As described in DSA Procedure 08-03, the primary purpose of this evaluation is to confirm the subject building's eligibility for Proposition 1D (AB 127, 2006) retrofit funding.

As noted in DSA Procedure 08-03, the intent of this evaluation is to identify conditions that represent "a high potential for catastrophic collapse." As described further in Sections 2.2 through 2.4, the evaluation includes:

- Completion of a standardized checklist developed specially for this project (Section 2.2). As described in Section 2.2, once a critical deficiency is confirmed, the balance of the checklist need not be completed.
- A site visit (Section 2.3)
- Document review (Section 2.4)

It is not the intent of this evaluation to provide a complete Life Safety evaluation; earthquake safety hazards other than those listed in this report might exist. Further, it is not the intent of this evaluation to identify deficiencies with respect to post-earthquake use or recovery feasibility. In particular, except where specifically noted, the scope of this evaluation does not include:

- Material testing or destructive investigation
- Comprehensive condition assessment or verification of construction documents
- Assessment of code compliance, either at present or at the time of construction
- Assessment for load combinations not including earthquake effects
- Consideration of Life Safety hazards related to egress
- Consideration of Life Safety hazards related to hazardous materials
- Consideration of the effects of damage to nonstructural components or contents.

Building located on sites with geologic hazards (liquefaction, slope failure, faulting) may be eligible for the Proposition 1D funding if it can be demonstrated that the geologic hazard may cause the building to have a high potential for catastrophic collapse. In this case, a geologic hazard report shall be prepared and submitted to CGS for approval and a copy included with evaluation report. The geologic hazard report shall identify the resulting displacements that will be imposed on the structure so a structural analysis can be performed. If eligibility is being sought for a deficiency that is not related to geologic hazards, then a geologic hazard report does not need to be prepared for the purpose of this evaluation report.

With respect to DSA Procedure 08-03, this report fulfills the intent of its Section 1. The remaining sections of Procedure 08-03 are outside the scope of this evaluation and report:

2.2 Evaluation criteria: Modifications to ASCE 31

As noted in DSA Procedure 08-03, the evaluation applies ASCE 31[1], an engineering standard that allows the user to choose a performance level of either Life Safety or Immediate Occupancy. Procedure 08-03 suggests that Life Safety is the performance level of interest, but the Procedure also focuses on collapse, a lesser performance level not explicitly addressed by ASCE 31. For this evaluation, DSA has clarified that only collapse-prone conditions need to be identified. Further, because the focus of this evaluation is on checking eligibility for retrofit funding, as opposed to producing a comprehensive list of potential deficiencies, the full evaluation need not be completed once a critical deficiency is identified.

---

[1] *Seismic Evaluation of Existing Buildings* (ASCE/SEI 31-03), American Society of Civil Engineers, 2003.

ASCE 31 involves three "tiers" of evaluation. Tier 1 uses a set of generic, mostly qualitative "evaluation statements" (also called checklists) to identify potential deficiencies. Tier 2 applies more quantitative checks to confirm or correct the Tier 1 findings. Tier 3 involves a more thorough structural analysis. For this evaluation, DSA has clarified that only Tier 1 is required for most issues, with Tier 2 evaluation for specific issues.

The criteria used for this evaluation therefore are based on the ASCE 31 Tier 1 checklists, with the following modifications:

- Basic Structural, Supplemental Structural, and Foundations checklists are considered.
- Nonstructural checklists are excluded. While some issues addressed by these checklists are relevant to nonstructural collapse potential, their completion is beyond the scope of this evaluation. While not considered for purposes of establishing funding eligibility, relevant deficiencies will be investigated and addressed during a retrofit design phase.
- Evaluation statements required by ASCE 31 for Immediate Occupancy only are excluded.
- Evaluation statements not associated with one of the eligible structure types are excluded.
- Certain evaluation statements related to "critical deficiencies" indicative of a high potential for structural collapse are identified. If a critical deficiency is confirmed, the balance of the evaluation need not be completed. The critical deficiencies are those listed in Section 1. They were selected by DSA for this project based in part on precedents set by the California Office of Statewide Health Planning and Development.[2]
- For Quick Checks and Tier 2 evaluations, the ASCE 31 criteria for Life Safety performance are used, except that *m* values, where needed, are increased by an additional factor of 1.33.
- The Tier 1 evaluation statements are modified to reflect emphasis on collapse-level performance:
    - Since the presence of an unreinforced masonry bearing wall system is deemed a critical deficiency, an evaluation statement to that effect is added, and detailed ASCE 31 evaluation statements specific to that system are omitted.
    - Condition of Materials: Evaluation statements are edited to focus less on presence of damage and more on significance of damage. Note that Masonry Lay-up and Foundation Performance evaluation statements are relocated to the Condition of Materials subsection of Section 5.
    - Except for cracks in certain concrete members, Condition of Materials evaluation statements related to existing cracks are omitted.
    - Beam Bars: The requirement for 25 percent of the joint bars to be continuous for the length of the member is removed.
    - Redundancy (Moment frame and Braced frame): The requirement for two bays per frame line is removed.
    - Stiffness of wall anchors: The limitation of 1/8-inch gap prior to anchor engagement is removed.
    - Overturning: This statement is removed.
    - In general, statements are modified for clarity and consistency with this DSA program.
- Tier 2 evaluation is required for any critical item (see Section 1) found to be non-compliant by Tier 1. The potential requirement for full-building Tier 2 evaluation found in ASCE 31 Table 3-3 is waived.

---

[2] *2007 California Building Standards Administrative Code (California Code of Regulations, Title 24 Part 1)*, Chapter 6, "Seismic Evaluation Procedures for Hospital Buildings," Section 1.4.5.1.2, October 23, 2008 Emergency Supplement.

2.3 Document review

The following documents were provided for use in completing the evaluation, in general compliance with ASCE 31, Section 2.2. The Set ID is used to identify the documents cited in Section 5 of this report.

SET ID	DATE	DESCRIPTION
A#19571	12/23/1959	Document: Compton Sr. High School Architect: Austin Field & Fry No. of Sheets: 70 Context: Original Construction Plans

2.4 Site visit

In general compliance with ASCE 31, Sections 2.2 and 2.3, a site visit shall be made to verify the building configuration and conditions and to assist in completing the evaluation.

Date of site visit: February 15, 2017
Visiting engineer(s) and staff: Tyler Poucher (KNA)
School district contact person: Alvin Jenkins, Senior Director of Facilities, Maintenance, Operations and Transportation, Compton USD
School campus representative (if different than above):

The scope of the site visit was based on our judgment, accessibility of certain areas, and convenience of the school on-site liaison. The purpose of the following list is merely to record the work that was done. The site visit included (check all applicable boxes):

☐ INTERVIEW W/ ON-SITE LIAISON
☒ GROUNDS, FOR OBSERVATION OF SOIL, SLOPES, DRAINAGE, GENERAL CONDITION
☒ EXTERIOR OBSERVATION TO VERIFY BASIC MASSING, CONFIGURATION, GENERAL CONDITION
☒ INTERIOR OBSERVATION TO VERIFY USE, WALL LINE CONFIGURATION, GENERAL CONDITION
☐ ROOF
☐ BASEMENT
☐ CEILING PLENUM
☐ UNFINISHED SPACES (MECHANICAL ROOMS, CLOSETS, CRAWL SPACES, ETC.)
☐ DETAILS OF STRUCTURE-ARCHITECTURE INTERACTION
☐ ROOF-TO-WALL CONNECTIONS
☐ GRAVITY SYSTEM FRAMING
☐ SEISMIC FORCE RESISTING SYSTEM ELEMENTS OR COMPONENTS
☐ ADJACENT BUILDINGS SUBJECT TO POUNDING
☐ OTHER:

The site visit confirmed that the existing structure generally conforms to the available drawings listed in Section 2.3.

3. Site and Building Description

3.1 Building description

General

Year originally built: 1959

DSA Application number A#19571 ☒ Original Construction ☐ Work done pursuant to the Garrison Act (Ed Code 17367)

Number of stories above grade: 1

Number of stories below grade: 0

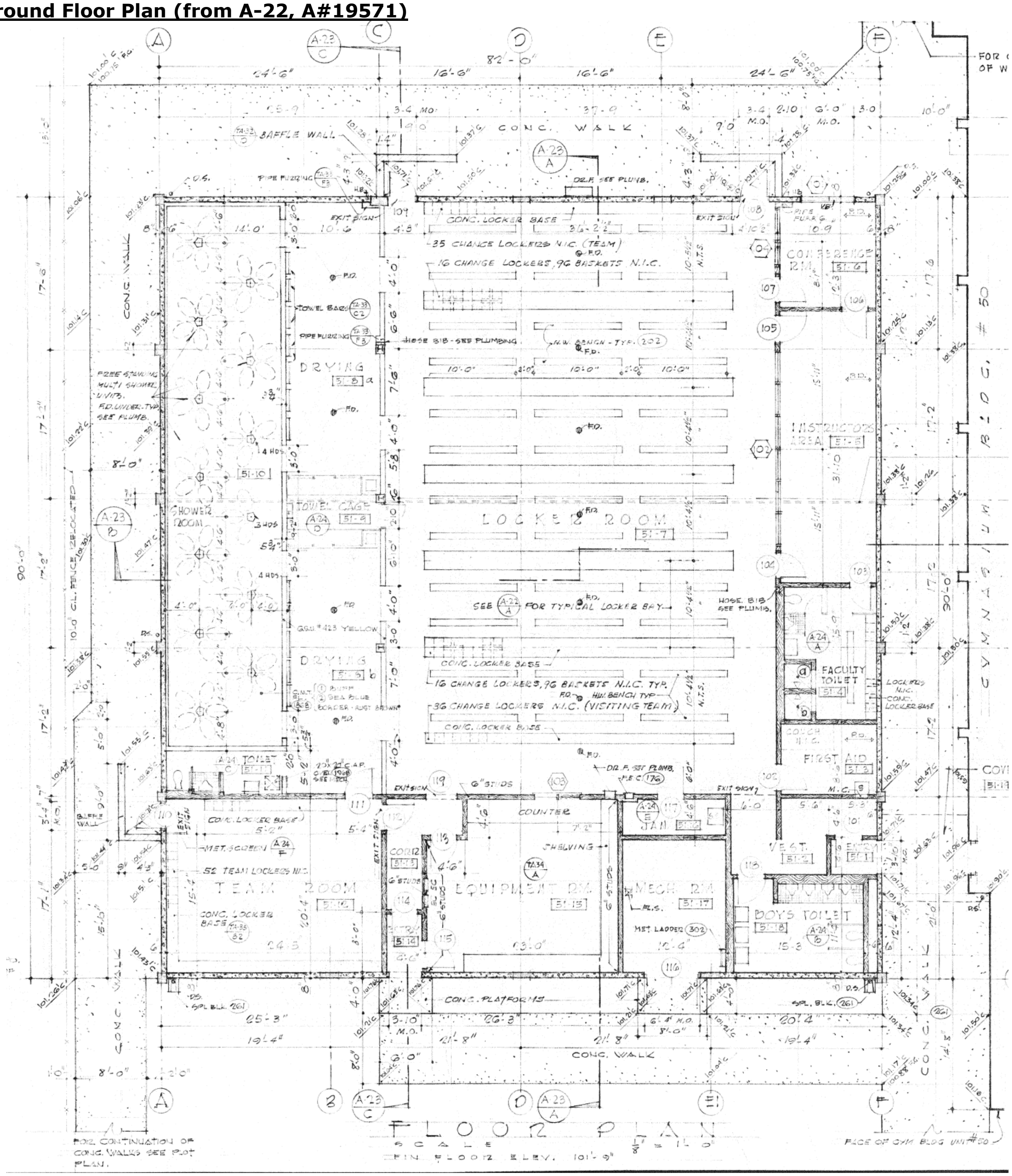
Total floor area (sq ft, approx): 7,400sq/ ft.

Other essentially identical buildings on this campus? ☐ Yes ☒ No

Photographs

Exterior east elevation photograph, looking west, taken February 15, 2017.

Ground Floor Plan (from A-22, A#19571)



3.2 Building Occupancy

Original, current, and planned uses of the building include those indicated here:

	ORIGINAL USE	CURRENT USE	PLANNED FUTURE USE
OFFICE / ADMINISTRATION	☐	☐	☐
CLASSROOMS / INSTRUCTION AREAS	☐	☐	☐
KITCHEN	☐	☐	☐
ASSEMBLY: DINING	☐	☐	☐
ASSEMBLY: AUDITORIUM	☐	☐	☐
ASSEMBLY: GYMNASIUM	☐	☐	☐
LOCKER ROOMS	☒	☒	☒
PATIO COVER / BUS SHELTER / WALKWAY COVER	☐	☐	☐
BLEACHERS / STADIUM STRUCTURE	☐	☐	☐
OTHER OCCUPIED:	☐	☐	☐
MECHANICAL / UTILITY ROOMS OR ENCLOSURES	☐	☐	☐
BULK STORAGE	☐	☐	☐
VACANT / UNUSED	☐	☐	☐
OTHER UNOCCUPIED:	☐	☐	☐

3.3 Seismicity

Latitude: 33.89094

Longitude: -118.22618

Site Class per ASCE 31, Section 3.5.2.3: D

Basis for Site Class determination: Default

Period [sec]	Mapped MCE values from ASCE 7-10 [g]	Site Coefficients from ASCE 31 Tables 3-5, 3-6	Design values per ASCE 31 section 3.5.2.3.1 [g]	S_a per ASCE 31 section 3.5.2.3.1, [g]
0.2	$S_S = 1.680$	$F_a = 1.0$	$S_{DS} = (2/3)\ S_S\ F_a = 1.120$	$S_{a,0.2} = S_{DS} = 1.120$
1.0	$S_1 = 0.613$	$F_v = 1.5$	$S_{D1} = (2/3)\ S_1\ F_v = 0.613$	$S_{a,1.0} = \min\ (S_{DS}\ ,\ S_{D1}/T) = 1.120$

3.4 Gravity System

Roof diaphragm and framing: Main roof composed of ½” plywood sheathing over 2x joists @ 24” o.c. spanning to steel beams and concrete bearing walls.

Typical floor diaphragm and framing: N.A.

Ground floor framing: 4-inch reinforced concrete slab on grade

Vertical load-bearing elements: Concrete columns, Steel columns, and reinforced Concrete Shear walls.

Basement walls: N.A.

Foundation: Continuous and pad concrete footings.

Snow load for use in load combinations involving earthquake: N.A.

3.5 Structural System per ASCE 31 Classifications (Category 2 Buildings Types per AB 300 Report)

		North-South	East-West
C1	Concrete Moment Frames	☐	☐
C1B*	Reinforced Concrete Cantilever Columns	☐	☐
C2A	Concrete Shear Walls, Flexible Diaphragm	☐	☐
C3A	Concrete Frame with Infill Masonry Shear Walls, Flexible Diaphragm	☐	☐
PC1	Precast/Tilt-up Concrete Shear Walls, Concrete Diaphragm	☐	☐
PC1A	Precast/Tilt-up Concrete Shear Walls, Flexible Diaphragm	☒	☒
PC2	Precast Concrete Frames with Shear Walls, Rigid Diaphragm	☐	☐
PC2A	Precast Concrete Frames without Shear Walls, Rigid Diaphragm	☐	☐
RM1	Reinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
S1B*	Steel Cantilever Columns	☐	☐
S3	Steel Light Frames	☐	☐
URM	Unreinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
URMA	Unreinforced Masonry Bearing Walls, Rigid Diaphragm	☐	☐
M*	Mixed Systems - construction containing at least one of the above lateral-force-resisting systems in at least one direction of seismic loading.	☐	☐
None of the above		☐	☐

* These structural systems are a subset of the classification in ASCE 31 and are defined in the Category 2 building types in the AB 300 Seismic Safety Inventory of California Public Schools report (2002).

Horizontal system combinations	Main roof composed of ½" plywood sheathing over 2x joists @ 24" o.c. spanning to steel beams and concrete bearing walls.
Vertical system combinations	The SFRS are Reinforced Concrete Shear walls.
SFRS foundation	Pad footings provided at shear wall ends.
Gravity loading	Bearing Wall/Shear Wall system. SFRS Concrete walls perpendicular to the roof framing carries gravity load in addition to lateral loads.
System details	8" thick concrete shear walls are anchored to 2x roof joists at 4'-0" on center by (2) 3/4" dia. thru-bolts. The thru-bolts attach to a steel angle, which is embedded to concrete with a ¾" dia. anchor bolt. See Detail D/S-9, A#19571
Original design code	1958 UBC (Assumed, not stated on As-Built drawings)
History of seismic retrofit or significant alteration	None.
Benchmark year check	No benchmark year given for SFRS types listed in Section 3.5 of this report.

4. Deficiency list

The following table summarizes the potential deficiencies identified in Section 5 of this report. Other deficiencies might exist. The evaluation was stopped once critical deficiencies were identified.

Non-compliant condition	Discussion	Additional evaluation recommended
Wall Anchorage	• Out-of-plane wall anchorage connection was found to be deficient. • Expected to cause local collapse of walls and roof framing.	None

Unknown condition	Discussion	Additional evaluation recommended

5. ASCE 31 Evaluation Statements

Evaluation statements provided in this section are from ASCE 31. They have been modified for this project with DSA approval as described in Section 2.2 of this report. References within the evaluation statements to other section numbers are generally to sections of ASCE 31.

C = Compliant
NC = Non-compliant
U = Unknown or not investigated
NA = Not applicable to this building

Items marked NC or U are summarized in Section 4 of this report.

CONDITION OF MATERIALS

C NC U NA DETERIORATION OF WOOD. There shall be no evidence of or reason to suspect structural capacity loss due to decay, shrinkage, splitting, fire damage, or sagging in wood members or deterioration, damage, or loosening in metal connection hardware.

Note: No weep screed provided at exterior walls adjacent to irrigated exterior grade. No destructive investigation performed.

C NC U NA DETERIORATION OF CONCRETE. There shall be no evidence of or reason to suspect structural capacity loss due to cracking of concrete or deterioration of concrete or reinforcing steel in gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA DETERIORATION OF STEEL. There shall be no evidence of or reason to suspect structural capacity loss due to rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA POST-TENSIONING ANCHORS. There shall be no evidence of or reason to suspect structural capacity loss due to corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used.

C NC U NA PRECAST CONCRETE WALLS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of concrete or reinforcing steel or distress, especially at connections.

C NC U NA MASONRY UNITS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of masonry units.

C NC U NA MASONRY JOINTS. The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no evidence of or reason to suspect structural capacity loss due to eroded mortar.

C NC U NA MASONRY LAY-UP. Filled collar joints of multi-wythe masonry infill walls shall have negligible voids.

C NC U NA FOUNDATION PERFORMANCE. There shall be no evidence of or reason to suspect existing foundation movement (due to settlement, heave, or other causes) that would affect the integrity or strength of the structure.

BUILDING CONFIGURATION

C NC U NA
Critical Item LOAD PATH. The structure shall contain a minimum of one complete load path for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.

C NC U NA
Critical Item WEAK STORY. The strength of the seismic force-resisting system in any story shall not be less than 80% of the strength in an adjacent story, above or below.

C NC U NA
Critical Item SOFT STORY. The stiffness of the seismic force-resisting system in any story shall not be less than 70% of the seismic force-resisting system stiffness in an adjacent story above or below, or less than 80% of the average seismic force-resisting system stiffness of the three stories above or below.

C NC U NA GEOMETRY. There shall be no changes in horizontal dimension of the seismic force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.

C NC U NA
Critical Item VERTICAL DISCONTINUITIES. All vertical elements of the seismic force-resisting system shall be continuous to the foundation.

C NC U NA
Critical Item MASS. There shall be no change in effective mass more than 50% from one story to the next. Light roofs, penthouses and mezzanines need not be considered.

C NC U NA
Critical Item TORSION. The estimated distance between the story center of mass and the story center of rigidity shall be less than 20% of the building width in either plan dimension.

C NC U NA
Critical Item ADJACENT BUILDINGS. The clear distance between the building being evaluated and any adjacent building shall be greater than 4% of the height of the shorter building. Alternatively, if the 4% separation does not exist, the two buildings shall be configured such that pounding would not damage the columns of the subject building within the clear span of the columns.

C NC U NA
Critical Item MEZZANINES. Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the seismic force-resisting elements of the main structure.

MOMENT FRAMES

C NC U NA **Critical Item**	SHEAR STRESS CHECK (Columns). The shear stress in concrete columns of the seismic force-resisting system, calculated using the Quick Check procedure of Section 3.5.3.2, shall be less than the greater of 100 psi or $2\sqrt{f'_c}$.
C NC U NA **Critical Item**	AXIAL STRESS CHECK (Concrete columns). The axial stress due to gravity loads in columns subjected to seismic overturning forces shall be less than $0.10f'_c$. 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 $0.30f'_c$.
C NC U NA	AXIAL STRESS CHECK (Steel columns). The axial stress due to gravity loads in steel columns subjected to seismic overturning forces shall be less than $0.10F_y$. 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 $0.30F_y$.
C NC U NA **Critical Item**	FLAT SLAB FRAMES. The seismic force-resisting system shall not be a frame consisting of columns and a flat slab/plate without beams.
C NC U NA	PRESTRESSED FRAME ELEMENTS. The seismic 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.
C NC U NA **Critical Item**	CAPTIVE COLUMNS. There shall be no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level.
C NC U NA	NO SHEAR FAILURES. The shear capacity of frame members in the seismic force-resisting system shall be able to develop the moment capacity at the ends of the members.
C NC U NA	STRONG COLUMN/WEAK BEAM. The sum of the moment capacity of the columns shall be 20% greater than that of the beams at concrete frame joints.
C NC U NA	STRONG COLUMN/WEAK BEAM. The percent of strong column/weak beam joints in each story of each line of steel moment-resisting frames shall be greater than 50%. This check need not apply for 1-story structures.
C NC U NA **Critical Item**	BEAM BARS. At least two longitudinal top and two longitudinal bottom bars shall extend continuously throughout the length of each frame beam.
C NC U NA	COLUMN BAR SPLICES. All column bar lap splice lengths shall be greater than $35d_b$, and shall be enclosed by ties spaced at or less than $8d_b$. 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.

C NC U NA 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.

C NC U NA COLUMN TIE SPACING. Frame columns shall have ties spaced at or less than d/4 throughout their length and at or less than $8d_b$ at all potential plastic hinge locations.

C NC U NA STIRRUP SPACING. All beams shall have stirrups spaced at or less than d/2 throughout their length. At potential plastic hinge locations stirrups shall be spaced at or less than the minimum of $8d_b$ or d/4.

C NC U NA JOINT REINFORCING. Beam-column joints shall have ties spaced at or less than $8d_b$.

C NC U NA COMPLETE FRAMES. Concrete frames that are not part of the seismic force-resisting system shall form a complete gravity load carrying system.

C NC U NA
Critical Item DEFLECTION COMPATIBILITY. Elements of concrete frames that are not part of the seismic force-resisting system shall have the shear capacity to develop the flexural strength of the components.

C NC U NA
Critical Item FLAT SLABS. Flat slabs/plates that are not part of the seismic force-resisting system shall have continuous bottom steel through the column joints.

C NC U NA
Critical Item REDUNDANCY (Moment frame). The number of lines of moment frames in each principal direction shall be greater than or equal to 2.

C NC U NA INTERFERING WALLS. All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements. (This evaluation statement does not apply to seismic force-resisting system type C3A or others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA PRECAST CONNECTION CHECK. The connections at joints of precast concrete frames shall have the capacity to resist the shear and moment demands calculated using the Quick Procedure of Section 3.5.3.5

C NC U NA PRECAST FRAMES. For buildings with concrete shear walls, precast concrete frame elements shall not be necessary as primary components for resisting seismic forces.

C NC U NA PRECAST CONNECTIONS. For buildings with concrete shear walls, the connections between precast frame elements such as chords, ties, and collectors in the seismic force-resisting system shall develop the capacity of the connected members.

C NC U NA 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.

C NC U NA MOMENT-RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.

C NC U NA 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.

C NC U NA COLUM SPLICES: All column splice details located in moment-resisting frames shall include connection of both flanges and the web.

C NC U NA COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Table I-9-1 of Seismic Provisions for Structural Steel Buildings (AISC, 1997).

SHEAR WALLS

C NC U NA
Critical Item UNREINFORCED MASONRY BEARING WALLS. The seismic force-resisting system in any direction shall not rely on or consist primarily of unreinforced masonry bearing walls.

C NC U NA
Critical Item SHEAR STRESS CHECK (Shear wall). 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 $2\sqrt{f'_c}$.

C NC U NA REINFORCING STEEL. In concrete or precast shear walls, 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. The spacing of reinforcing steel shall be equal to or less than 18 inches.

C NC U NA 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 135º or more.

C NC U NA
Critical Item REDUNDANCY (Shear wall). The number of lines of shear walls in each principal direction shall be greater than or equal to 2.

C NC U NA PROPORTIONS. The height-to-thickness ratio of masonry infill walls at each story shall be less than 9. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA SOLID WALLS. The masonry infill walls shall not be of cavity construction. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA INFILL WALLS. The infill walls shall be continuous to the soffits of the frame beams and to the columns to either side. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA
Critical Item SHEAR STRESS CHECK (Precast concrete shear walls). 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 $2\sqrt{f'_c}$.

C NC U NA WALL OPENINGS. The total width of openings along any perimeter wall line shall constitute less than 75% of the length of any perimeter shear wall, with the wall piers having height-to-width ratios of less than 2 to 1.

C NC U NA 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.

C NC U NA **Critical Item**	SHEAR STRESS CHECK (Brick or hollow clay masonry infill). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units.
C NC U NA **Critical Item**	SHEAR STRESS CHECK (Concrete block infill and reinforced masonry shear walls). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for concrete units.
C NC U NA	PROPORTIONS. The height-to-thickness ratio of unreinforced masonry infill shear walls shall be less than the following: Top story of multi-story building: 9, First story of multi-story building: 15, All other conditions: 13
C NC U NA	REINFORCING STEEL. In reinforced masonry shear walls, the total vertical and horizontal reinforcing steel ratio shall be greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel shall be less than 48”; and all vertical bars shall extend to the top of the walls.

BRACED FRAMES

C NC U NA **Critical Item**	REDUNDANCY: The number of lines of braced frames in each principal direction shall be greater than or equal to 2.
C NC U NA **Critical Item**	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 $0.50F_y$.
C NC U NA	SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression shall have Kl/r ratios less than 120.
C NC U NA	CONNECTION STRENGTH: All the brace connections shall develop the yield capacity of the diagonals.
C NC U NA	K-BRACING: The bracing system shall not include K-braced bays. Note: Steel K-Frames configurations present at all frame locations. See Appendix A.1 & A.3.

DIAPHRAGMS

C NC U NA	DIAPHRAGM CONTINUITY. The diaphragm shall not be composed of split-level floors and shall not have expansion joints.
C NC U NA	CROSS TIES. There shall be continuous cross ties between diaphragm chords.
C NC U NA	ROOF CHORD CONTINUITY. All roof chord elements shall be continuous, regardless of changes in roof elevation.
C NC U NA **Critical Item**	OPENINGS AT SHEAR WALLS. Diaphragm openings immediately adjacent to the shear walls shall be less than 25% of the wall length, and diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 ft long.

C NC U NA OPENINGS AT BRACED FRAMES. Diaphragm openings immediately adjacent to the braced frames shall extend less than 25% of the frame length.

C NC U NA OTHER DIAPHRAGMS. The diaphragm shall not consist of a system other than wood, metal deck, concrete or horizontal bracing.

C NC U NA
Critical Item TOPPING SLAB. Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab.

C NC U NA STRAIGHT SHEATHING. All straight sheathed diaphragms shall have aspect ratios less than 2 to 1 in the direction being considered.

C NC U NA SPANS. All wood diaphragms with spans greater than 24 ft shall consist of wood structural panels or diagonal sheathing.

C NC U NA UNBLOCKED DIAPHRAGMS. All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 ft and shall have aspect ratios less than or equal to 4 to 1.

Note: Diagonally sheathed diaphragm spans greater than 40-feet, from grid lines 1 to 2, and grid lines 2 to 3. See Section 3.1 of this report.

CONNECTIONS

C [✓ NC] U NA
Critical Item WALL ANCHORAGE. Exterior concrete or masonry walls shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps 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.

C NC U NA WOOD LEDGERS. The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers.

C NC U NA PRECAST PANEL CONNECTIONS. There shall be at least two anchors from each precast wall panel into the diaphragm elements.

C NC U NA 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 prior to engagement of the anchors, as needed for reliable bearing.

C NC U NA GIRDER/COLUMN CONNECTION. There shall be a positive connection utilizing plates, connection hardware, or straps between girders and their supporting columns. (This evaluation statement applies primarily to precast concrete and masonry systems.)

C NC U NA GIRDERS. Girders supported by walls or pilasters shall have at least two additional column ties securing the anchor bolts. (This evaluation statement applies primarily to precast concrete systems.)

C NC U NA CORBEL BEARING. If precast concrete frame girders bear on column corbels, the length of bearing shall be greater than 3”.

C NC U NA CORBEL CONNECTIONS. Precast concrete frame girders shall not be connected to corbels with welded elements.

C NC U NA TRANSFER TO SHEAR WALLS. Diaphragms shall be connected for transfer of loads to shear walls.

C NC U NA TRANSFER TO STEEL FRAMES. Diaphragms shall be connected for transfer of loads to the steel frames.

C NC U NA 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 shear wall or frame elements.

C NC U NA CONCRETE COLUMNS. All concrete columns shall be doweled into the foundation.

C NC U NA FOUNDATION DOWELS. Wall reinforcement shall be doweled into the foundation.

C NC U NA PRECAST WALL PANELS. Precast wall panels shall be connected to the foundation.

C NC U NA UPLIFT AT PILE CAPS. Pile caps shall have top reinforcement and piles shall be anchored to the pile caps.

C NC U NA STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the foundation.

C NC U NA ROOF PANELS: Metal, plastic, or cementitious roof panels shall be positively attached to the roof framing to resist seismic forces.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the framing to resist seismic forces.

FOUNDATION

C NC U NA POLE FOUNDATIONS. Pole foundations shall have a minimum embedment depth of 4 ft.

C NC U NA 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 in Site Class A, B, or C.

GEOLOGIC SITE HAZARDS

C NC U NA
Critical Item

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.

Note: Not investigated.

C NC U NA
Critical Item

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.

Note: Not Investigated.

C NC U NA
Critical Item

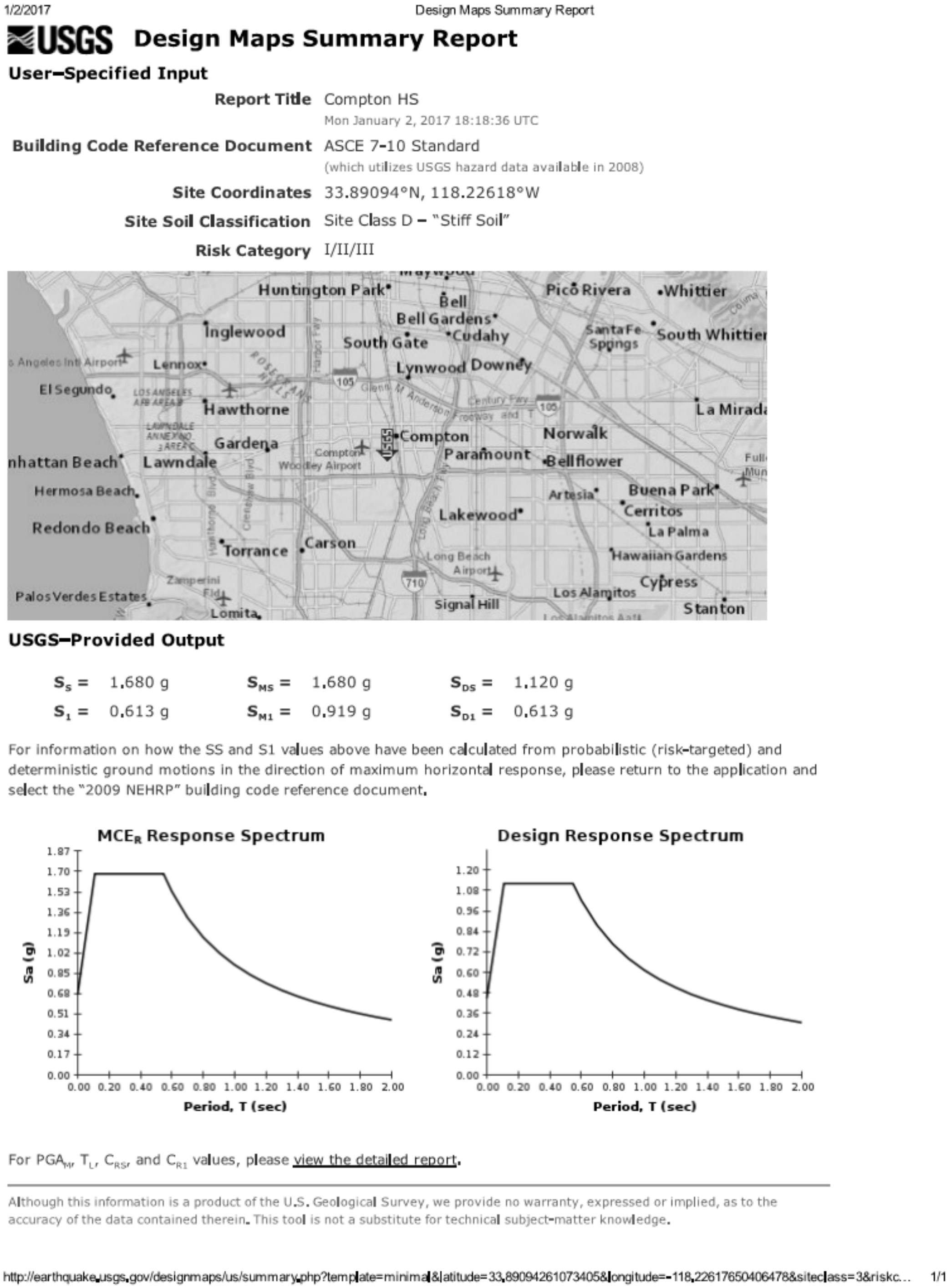
SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated.

Note: See Geo-Advantec Inc. reported cited in Section 2.3 of this report. Recently published maps by CGS indicate that the Duarte Branch of the Sierra Madre Fault traverses the school site. See also Appendix A.3.

Appendices

A.1 Structural calculations

APPENDIX A.1



1/2/2017 Design Maps Summary Report

USGS Design Maps Summary Report

User–Specified Input

Report Title	Compton HS Mon January 2, 2017 18:18:36 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.89094°N, 118.22618°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S = 1.680 g	S_{MS} = 1.680 g	S_{DS} = 1.120 g
S_1 = 0.613 g	S_{M1} = 0.919 g	S_{D1} = 0.613 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum **Design Response Spectrum**

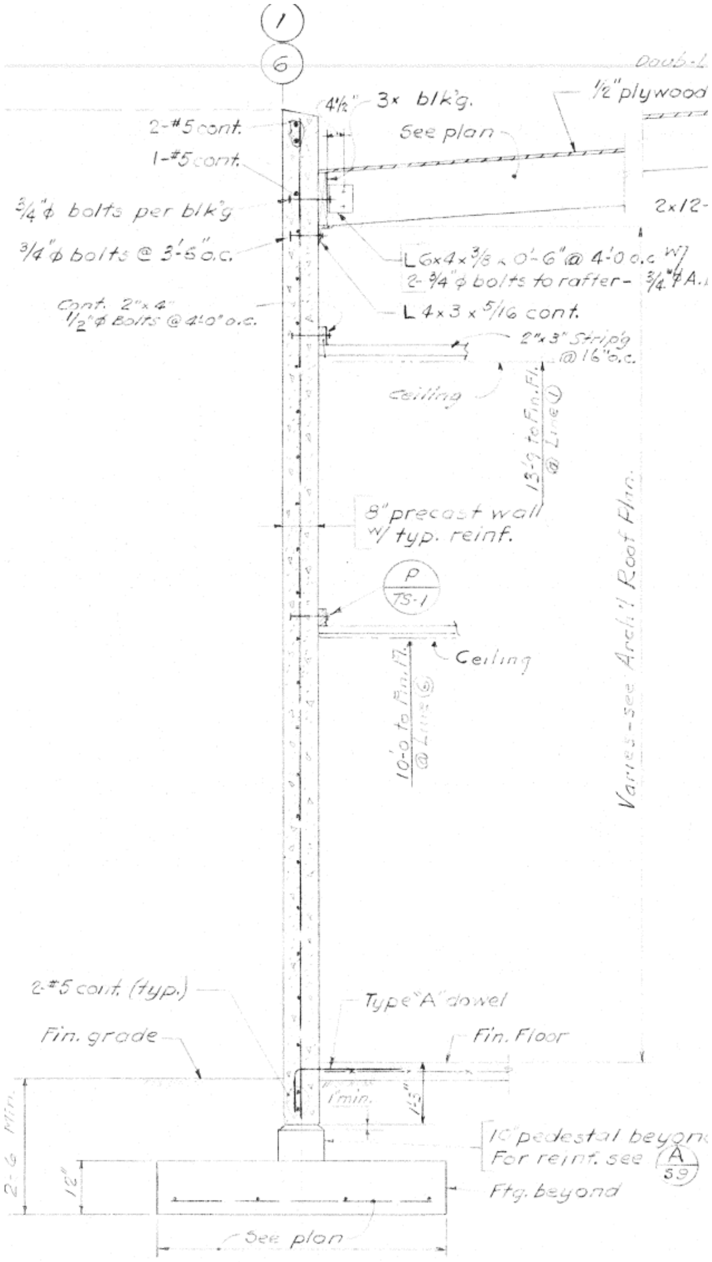
For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

http://earthquake.usgs.gov/designmaps/us/summary.php?template=minimal&latitude=33.89094261073405&longitude=-118.22617650406478&siteclass=3&riskc... 1/1

APPENDIX A.1 (cont.)

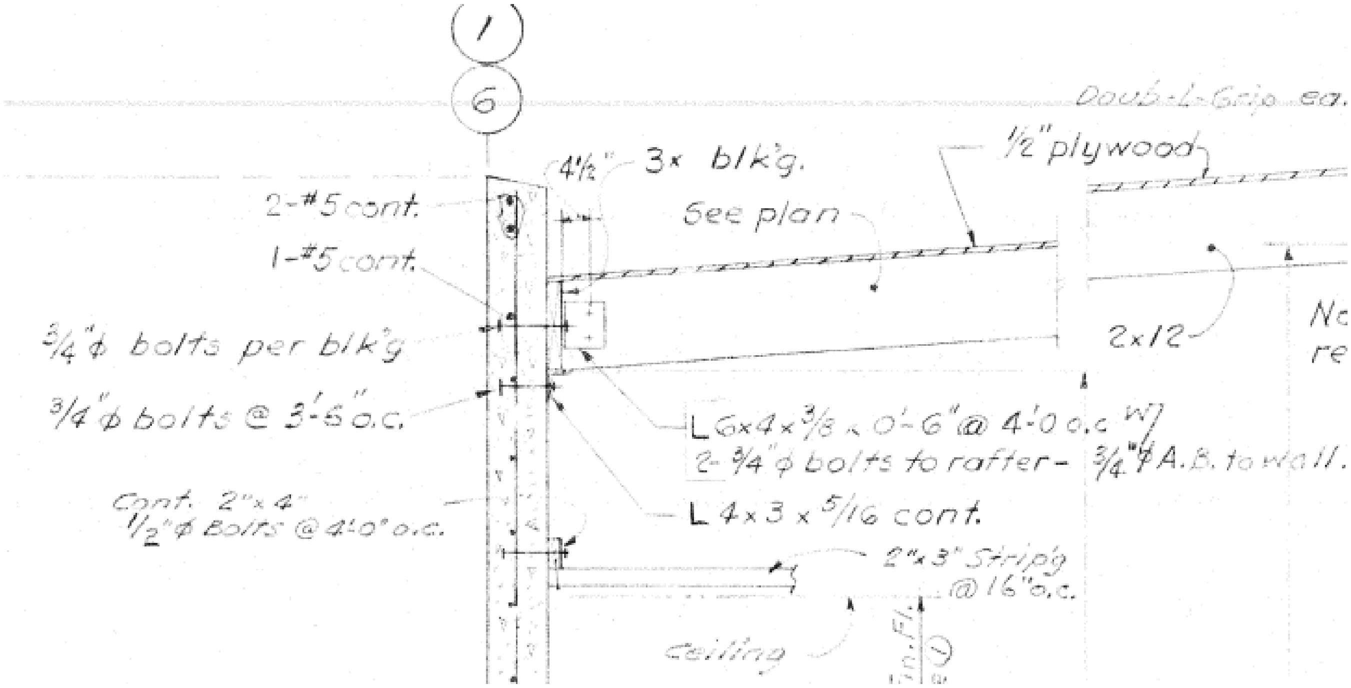
Structural Calculations
Detail D/S-9, A#19571



SECTION D/S-9
Scale ½"=1'-0"

APPENDIX A.1 (cont.)

Structural Calculations
Detail D/S-9, A#19571



Structural Calculations

UNIT M1 – WALL ANCHORAGE CHECK (SEE D/S-9, PREV. PG)

§ 3.5.3.7 FLEXIBLE DIAPHRAGM FORCES

$T_c = ? \, S_{DS} W_p A_p$ WHERE: $? = 0.9$ (L.S.)

$S_{DS} = 1.120$

$W_p = 100^{PSF}$

$A_p = 4' \left(17/2 + 1' \right) = 38^{SF}$

WALL HT.

OUT-OF-PLANE ANCHORAGE SPACING

$\therefore \; T_c = 0.9(1.120)(100^{PSF})(38^{SF})$

$= \underline{3830^{lb}}$

CHECK (2) 3/4" φ BOLTS TO 2X JOIST

NDS TBL 11G

$Z'_{11} = 870^{lb}(1.6)(2) = 2784^{lb} < 3830^{lb}$ ✗

$\therefore$ $\boxed{\text{CONNECTION INSUFFICIENT}}$

→ THEREFORE, WALL ANCHORAGE DEFICIENCY

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
School Campus:	Compton High School		
School Address:	601 S Acacia Ave, Compton, California 90220	Last Revision Date:	
Building Name/ID:	**Building M2 – Girls Shower/Locker Room**		
Project Tracking No.:	*73437-129*		Page 1 of 24

The purpose of this evaluation report is to establish eligibility for retrofit funding under Proposition 1D (AB 127, 2006). It is not the intent of this evaluation to provide a complete Life Safety evaluation. The evaluation is complete when eligibility has been determined.

Report Outline

1. Eligibility check summary
2. Evaluation process
3. Site and building description
4. Deficiency list
5. ASCE 31 Evaluation statements

Appendix A.1 Structural Calculations

REGISTERED PROFESSIONAL ENGINEER
LARRY R. KAPRIELIAN
No. 2795
Exp. 9-30-17
STRUCTURAL
STATE OF CALIFORNIA

KNA Consulting Engineers, Inc.
SE Firm Name (Logo optional)
SE Address: 9931 Muirlands Blvd
Irvine, CA 92618
Phone: (949)-462-3200

Larry R. Kaprielian, S.E.
Name of SE whose stamp is above

1. Eligibility Check Summary

	YES	NO
1.1 Building Occupancy: The building's current or planned use involves regular occupancy by students and staff, as detailed in Section 3.2.	☒	☐
1.2 Structural System: The building's seismic force-resisting system includes at least one of the types listed in Section 3.5.	☒	☐
1.3 Collapse Potential: The building has deficiencies associated with a high potential for local or global collapse in the evaluation earthquake. See Sections 4 and 5 for a list of identified deficiencies. Among the identified deficiencies are the critical items checked in Section 1.3.3:	☒	☐

1.3.1 ☒ Collapse Potential Due to Ground Shaking: Ss = 1.680

1.3.2 Collapse Potential Due to One of the Following Geologic Hazards (CGS Approved Geologic Hazard Report Required):

☐ LIQUEFACTION ☐ SLOPE STABILITY FAILURE ☐ SURFACE FAULT RUPTURE

1.3.3 Identified Deficiencies:

☐ LOAD PATH
☐ WEAK STORY
☐ SOFT STORY
☐ VERTICAL DISCONTINUITIES
☐ MASS
☐ TORSION
☐ ADJACENT BUILDINGS
☐ MEZZANINES
☐ SHEAR STRESS CHECK (COLUMN)
☐ AXIAL STRESS CHECK
☐ FLAT SLAB FRAMES
☐ CAPTIVE COLUMNS
☐ BEAM BARS
☐ DEFLECTION COMPATIBILITY
☐ FLAT SLABS
☐ REDUNDANCY
☐ UNREINFORCED MASONRY BEARING WALLS
☐ SHEAR STRESS CHECK (SHEAR WALL OR INFILL)
☐ REDUNDANCY (SHEAR WALL)
☐ OPENINGS AT SHEAR WALLS
☐ TOPPING SLAB
☒ WALL ANCHORAGE
☐ OTHER *

2. Evaluation Process

2.1 Purpose and Scope

As described in DSA Procedure 08-03, the primary purpose of this evaluation is to confirm the subject building's eligibility for Proposition 1D (AB 127, 2006) retrofit funding.

As noted in DSA Procedure 08-03, the intent of this evaluation is to identify conditions that represent "a high potential for catastrophic collapse." As described further in Sections 2.2 through 2.4, the evaluation includes:

- Completion of a standardized checklist developed specially for this project (Section 2.2). As described in Section 2.2, once a critical deficiency is confirmed, the balance of the checklist need not be completed.
- A site visit (Section 2.3)
- Document review (Section 2.4)

It is not the intent of this evaluation to provide a complete Life Safety evaluation; earthquake safety hazards other than those listed in this report might exist. Further, it is not the intent of this evaluation to identify deficiencies with respect to post-earthquake use or recovery feasibility. In particular, except where specifically noted, the scope of this evaluation does not include:

- Material testing or destructive investigation
- Comprehensive condition assessment or verification of construction documents
- Assessment of code compliance, either at present or at the time of construction
- Assessment for load combinations not including earthquake effects
- Consideration of Life Safety hazards related to egress
- Consideration of Life Safety hazards related to hazardous materials
- Consideration of the effects of damage to nonstructural components or contents.

Building located on sites with geologic hazards (liquefaction, slope failure, faulting) may be eligible for the Proposition 1D funding if it can be demonstrated that the geologic hazard may cause the building to have a high potential for catastrophic collapse. In this case, a geologic hazard report shall be prepared and submitted to CGS for approval and a copy included with evaluation report. The geologic hazard report shall identify the resulting displacements that will be imposed on the structure so a structural analysis can be performed. If eligibility is being sought for a deficiency that is not related to geologic hazards, then a geologic hazard report does not need to be prepared for the purpose of this evaluation report.

With respect to DSA Procedure 08-03, this report fulfills the intent of its Section 1. The remaining sections of Procedure 08-03 are outside the scope of this evaluation and report:

2.2 Evaluation criteria: Modifications to ASCE 31

As noted in DSA Procedure 08-03, the evaluation applies ASCE 31[1], an engineering standard that allows the user to choose a performance level of either Life Safety or Immediate Occupancy. Procedure 08-03 suggests that Life Safety is the performance level of interest, but the Procedure also focuses on collapse, a lesser performance level not explicitly addressed by ASCE 31. For this evaluation, DSA has clarified that only collapse-prone conditions need to be identified. Further, because the focus of this evaluation is on checking eligibility for retrofit funding, as opposed to producing a comprehensive list of potential deficiencies, the full evaluation need not be completed once a critical deficiency is identified.

---

[1] *Seismic Evaluation of Existing Buildings* (ASCE/SEI 31-03), American Society of Civil Engineers, 2003.

ASCE 31 involves three "tiers" of evaluation. Tier 1 uses a set of generic, mostly qualitative "evaluation statements" (also called checklists) to identify potential deficiencies. Tier 2 applies more quantitative checks to confirm or correct the Tier 1 findings. Tier 3 involves a more thorough structural analysis. For this evaluation, DSA has clarified that only Tier 1 is required for most issues, with Tier 2 evaluation for specific issues.

The criteria used for this evaluation therefore are based on the ASCE 31 Tier 1 checklists, with the following modifications:

- Basic Structural, Supplemental Structural, and Foundations checklists are considered.
- Nonstructural checklists are excluded. While some issues addressed by these checklists are relevant to nonstructural collapse potential, their completion is beyond the scope of this evaluation. While not considered for purposes of establishing funding eligibility, relevant deficiencies will be investigated and addressed during a retrofit design phase.
- Evaluation statements required by ASCE 31 for Immediate Occupancy only are excluded.
- Evaluation statements not associated with one of the eligible structure types are excluded.
- Certain evaluation statements related to "critical deficiencies" indicative of a high potential for structural collapse are identified. If a critical deficiency is confirmed, the balance of the evaluation need not be completed. The critical deficiencies are those listed in Section 1. They were selected by DSA for this project based in part on precedents set by the California Office of Statewide Health Planning and Development.[2]
- For Quick Checks and Tier 2 evaluations, the ASCE 31 criteria for Life Safety performance are used, except that *m* values, where needed, are increased by an additional factor of 1.33.
- The Tier 1 evaluation statements are modified to reflect emphasis on collapse-level performance:
  - Since the presence of an unreinforced masonry bearing wall system is deemed a critical deficiency, an evaluation statement to that effect is added, and detailed ASCE 31 evaluation statements specific to that system are omitted.
  - Condition of Materials: Evaluation statements are edited to focus less on presence of damage and more on significance of damage. Note that Masonry Lay-up and Foundation Performance evaluation statements are relocated to the Condition of Materials subsection of Section 5.
  - Except for cracks in certain concrete members, Condition of Materials evaluation statements related to existing cracks are omitted.
  - Beam Bars: The requirement for 25 percent of the joint bars to be continuous for the length of the member is removed.
  - Redundancy (Moment frame and Braced frame): The requirement for two bays per frame line is removed.
  - Stiffness of wall anchors: The limitation of 1/8-inch gap prior to anchor engagement is removed.
  - Overturning: This statement is removed.
  - In general, statements are modified for clarity and consistency with this DSA program.
- Tier 2 evaluation is required for any critical item (see Section 1) found to be non-compliant by Tier 1. The potential requirement for full-building Tier 2 evaluation found in ASCE 31 Table 3-3 is waived.

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[2] *2007 California Building Standards Administrative Code (California Code of Regulations, Title 24 Part 1)*, Chapter 6, "Seismic Evaluation Procedures for Hospital Buildings," Section 1.4.5.1.2, October 23, 2008 Emergency Supplement.

2.3 Document review

The following documents were provided for use in completing the evaluation, in general compliance with ASCE 31, Section 2.2. The Set ID is used to identify the documents cited in Section 5 of this report.

SET ID	DATE	DESCRIPTION
A#19571	12/23/1959	Document: Compton Sr. High School Architect: Austin Field & Fry No. of Sheets: 70 Context: Original Construction Plans

2.4 Site visit

In general compliance with ASCE 31, Sections 2.2 and 2.3, a site visit shall be made to verify the building configuration and conditions and to assist in completing the evaluation.

Date of site visit: February 15, 2017
Visiting engineer(s) and staff: Tyler Poucher (KNA)
School district contact person: Alvin Jenkins, Senior Director of Facilities, Maintenance, Operations and Transportation, Compton USD
School campus representative (if different than above):

The scope of the site visit was based on our judgment, accessibility of certain areas, and convenience of the school on-site liaison. The purpose of the following list is merely to record the work that was done. The site visit included (check all applicable boxes):

☐ INTERVIEW W/ ON-SITE LIAISON
☒ GROUNDS, FOR OBSERVATION OF SOIL, SLOPES, DRAINAGE, GENERAL CONDITION
☒ EXTERIOR OBSERVATION TO VERIFY BASIC MASSING, CONFIGURATION, GENERAL CONDITION
☒ INTERIOR OBSERVATION TO VERIFY USE, WALL LINE CONFIGURATION, GENERAL CONDITION
☐ ROOF
☐ BASEMENT
☐ CEILING PLENUM
☐ UNFINISHED SPACES (MECHANICAL ROOMS, CLOSETS, CRAWL SPACES, ETC.)
☐ DETAILS OF STRUCTURE-ARCHITECTURE INTERACTION
☐ ROOF-TO-WALL CONNECTIONS
☐ GRAVITY SYSTEM FRAMING
☐ SEISMIC FORCE RESISTING SYSTEM ELEMENTS OR COMPONENTS
☐ ADJACENT BUILDINGS SUBJECT TO POUNDING
☐ OTHER:

The site visit confirmed that the existing structure generally conforms to the available drawings listed in Section 2.3.

3. Site and Building Description

3.1 Building description

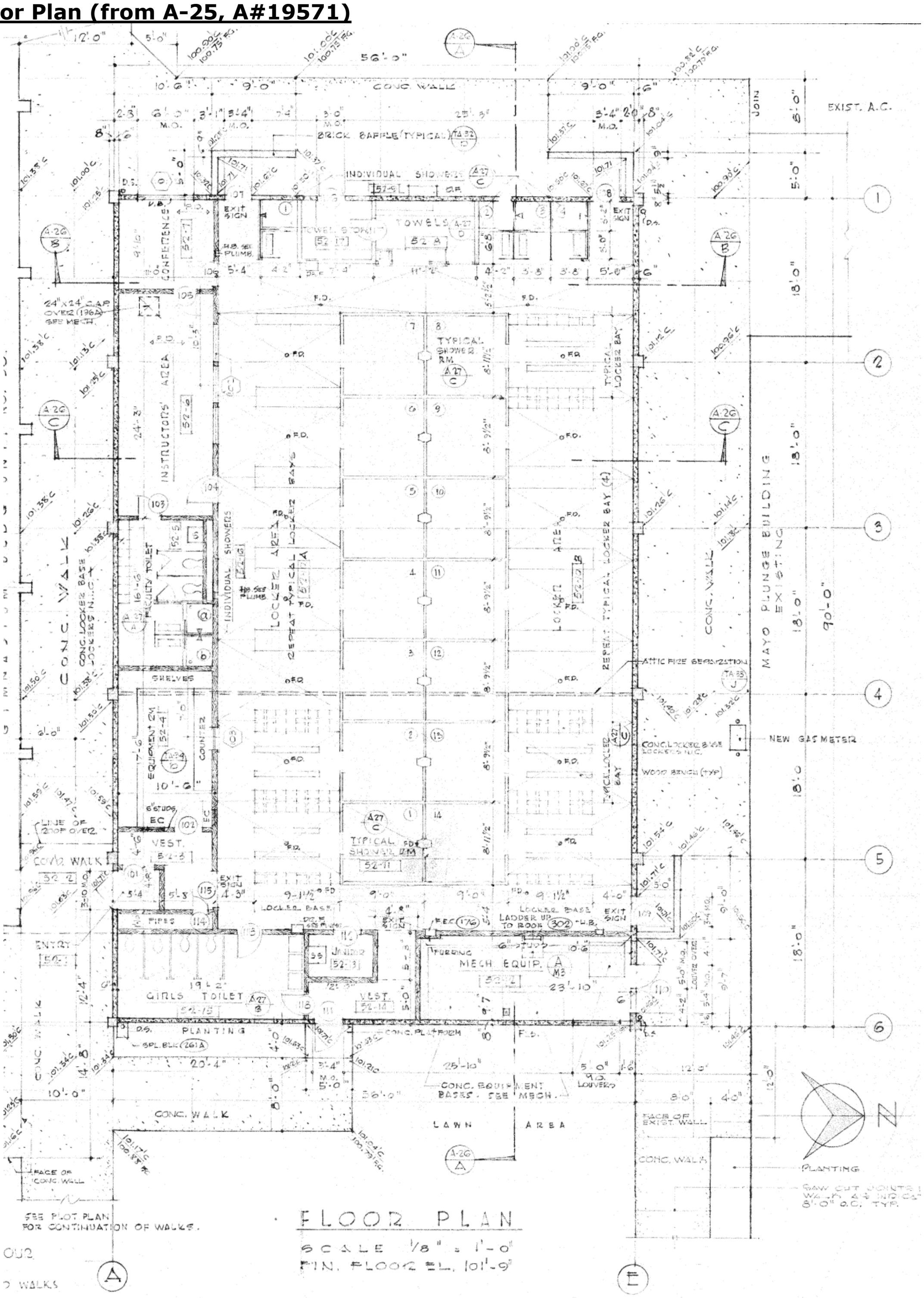
General

Year originally built: 1959
DSA Application number A#19571 ☒ Original Construction ☐ Work done pursuant to the Garrison Act (Ed Code 17367)
Number of stories above grade: 1
Number of stories below grade: 0
Total floor area (sq ft, approx): 5,000sq/ ft.
Other essentially identical buildings on this campus? ☐ Yes ☒ No

Photographs

Exterior east elevation photograph, looking west, taken February 15, 2017.

Ground Floor Plan (from A-25, A#19571)



3.2 Building Occupancy

Original, current, and planned uses of the building include those indicated here:

	ORIGINAL USE	CURRENT USE	PLANNED FUTURE USE
OFFICE / ADMINISTRATION	☐	☐	☐
CLASSROOMS / INSTRUCTION AREAS	☐	☐	☐
KITCHEN	☐	☐	☐
ASSEMBLY: DINING	☐	☐	☐
ASSEMBLY: AUDITORIUM	☐	☐	☐
ASSEMBLY: GYMNASIUM	☐	☐	☐
LOCKER ROOMS	☒	☒	☒
PATIO COVER / BUS SHELTER / WALKWAY COVER	☐	☐	☐
BLEACHERS / STADIUM STRUCTURE	☐	☐	☐
OTHER OCCUPIED:	☐	☐	☐
MECHANICAL / UTILITY ROOMS OR ENCLOSURES	☐	☐	☐
BULK STORAGE	☐	☐	☐
VACANT / UNUSED	☐	☐	☐
OTHER UNOCCUPIED:	☐	☐	☐

3.3 Seismicity

Latitude: 33.89094

Longitude: -118.22618

Site Class per ASCE 31, Section 3.5.2.3: D

Basis for Site Class determination: Default

Period [sec]	Mapped MCE values from ASCE 7-10 [g]	Site Coefficients from ASCE 31 Tables 3-5, 3-6	Design values per ASCE 31 section 3.5.2.3.1 [g]	S_a per ASCE 31 section 3.5.2.3.1, [g]
0.2	$S_S = 1.680$	$F_a = 1.0$	$S_{DS} = (2/3)\, S_S\, F_a = 1.120$	$S_{a,0.2} = S_{DS} = 1.120$
1.0	$S_1 = 0.613$	$F_v = 1.5$	$S_{D1} = (2/3)\, S_1\, F_v = 0.613$	$S_{a,1.0} = \min(S_{DS}, S_{D1}/T) = 1.120$

3.4 Gravity System

Roof diaphragm and framing: Main roof composed of ½" plywood sheathing over 2x joists @ 24" o.c. spanning to steel beams and concrete bearing walls.

Typical floor diaphragm and framing: N.A.

Ground floor framing: 4-inch reinforced concrete slab on grade

Vertical load-bearing elements: Concrete columns and reinforced Concrete Shear walls.

Basement walls: N.A.

Foundation: Continuous and pad concrete footings.

Snow load for use in load combinations involving earthquake: N.A.

3.5 Structural System per ASCE 31 Classifications (Category 2 Buildings Types per AB 300 Report)

		North-South	East-West
C1	Concrete Moment Frames	☐	☐
C1B*	Reinforced Concrete Cantilever Columns	☐	☐
C2A	Concrete Shear Walls, Flexible Diaphragm	☐	☐
C3A	Concrete Frame with Infill Masonry Shear Walls, Flexible Diaphragm	☐	☐
PC1	Precast/Tilt-up Concrete Shear Walls, Concrete Diaphragm	☐	☐
PC1A	Precast/Tilt-up Concrete Shear Walls, Flexible Diaphragm	☒	☒
PC2	Precast Concrete Frames with Shear Walls, Rigid Diaphragm	☐	☐
PC2A	Precast Concrete Frames without Shear Walls, Rigid Diaphragm	☐	☐
RM1	Reinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
S1B*	Steel Cantilever Columns	☐	☐
S3	Steel Light Frames	☐	☐
URM	Unreinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
URMA	Unreinforced Masonry Bearing Walls, Rigid Diaphragm	☐	☐
M*	Mixed Systems - construction containing at least one of the above lateral-force-resisting systems in at least one direction of seismic loading.	☐	☐
None of the above		☐	☐

* These structural systems are a subset of the classification in ASCE 31 and are defined in the Category 2 building types in the AB 300 Seismic Safety Inventory of California Public Schools report (2002).

Horizontal system combinations	Main roof composed of ½" plywood sheathing over 2x joists @ 24" o.c. spanning to steel beams and concrete bearing walls.
Vertical system combinations	The SFRS are Reinforced Concrete Shear walls.
SFRS foundation	Pad footings provided at all shear walls.
Gravity loading	Bearing Wall/Shear Wall system. SFRS Concrete walls perpendicular to the roof framing carries gravity load in addition to lateral loads.
System details	8" thick concrete shear walls are anchored to 2x roof joists at 4'-0" on center by (2) ¾" dia. dia. thru-bolts. The thru-bolts attach to a steel angle, which is embedded into concrete with a ¾" dia. anchor bolt. See Detail D/S-9, A#19571
Original design code	1958 UBC (Assumed, not stated on As-Built drawings)
History of seismic retrofit or significant alteration	None.
Benchmark year check	No benchmark year given for SFRS types listed in Section 3.5 of this report.

4. Deficiency list

The following table summarizes the potential deficiencies identified in Section 5 of this report. Other deficiencies might exist. The evaluation was stopped once critical deficiencies were identified.

Non-compliant condition	Discussion	Additional evaluation recommended
Wall Anchorage	• Out-of-plane wall anchorage connection was found to be deficient. • Expected to cause local collapse of walls and roof framing.	None

Unknown condition	Discussion	Additional evaluation recommended

5. ASCE 31 Evaluation Statements

Evaluation statements provided in this section are from ASCE 31. They have been modified for this project with DSA approval as described in Section 2.2 of this report. References within the evaluation statements to other section numbers are generally to sections of ASCE 31.

C = Compliant
NC = Non-compliant
U = Unknown or not investigated
NA = Not applicable to this building

Items marked NC or U are summarized in Section 4 of this report.

CONDITION OF MATERIALS

C NC U NA DETERIORATION OF WOOD. There shall be no evidence of or reason to suspect structural capacity loss due to decay, shrinkage, splitting, fire damage, or sagging in wood members or deterioration, damage, or loosening in metal connection hardware.

Note: No weep screed provided at exterior walls adjacent to irrigated exterior grade. No destructive investigation performed.

C NC U NA DETERIORATION OF CONCRETE. There shall be no evidence of or reason to suspect structural capacity loss due to cracking of concrete or deterioration of concrete or reinforcing steel in gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA DETERIORATION OF STEEL. There shall be no evidence of or reason to suspect structural capacity loss due to rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA POST-TENSIONING ANCHORS. There shall be no evidence of or reason to suspect structural capacity loss due to corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used.

C NC U NA PRECAST CONCRETE WALLS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of concrete or reinforcing steel or distress, especially at connections.

C NC U NA MASONRY UNITS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of masonry units.

C NC U NA MASONRY JOINTS. The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no evidence of or reason to suspect structural capacity loss due to eroded mortar.

C NC U NA MASONRY LAY-UP. Filled collar joints of multi-wythe masonry infill walls shall have negligible voids.

C NC U NA FOUNDATION PERFORMANCE. There shall be no evidence of or reason to suspect existing foundation movement (due to settlement, heave, or other causes) that would affect the integrity or strength of the structure.

BUILDING CONFIGURATION

C NC U NA
Critical Item LOAD PATH. The structure shall contain a minimum of one complete load path for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.

C NC U NA
Critical Item WEAK STORY. The strength of the seismic force-resisting system in any story shall not be less than 80% of the strength in an adjacent story, above or below.

C NC U NA
Critical Item SOFT STORY. The stiffness of the seismic force-resisting system in any story shall not be less than 70% of the seismic force-resisting system stiffness in an adjacent story above or below, or less than 80% of the average seismic force-resisting system stiffness of the three stories above or below.

C NC U NA GEOMETRY. There shall be no changes in horizontal dimension of the seismic force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.

C NC U NA
Critical Item VERTICAL DISCONTINUITIES. All vertical elements of the seismic force-resisting system shall be continuous to the foundation.

C NC U NA
Critical Item MASS. There shall be no change in effective mass more than 50% from one story to the next. Light roofs, penthouses and mezzanines need not be considered.

C NC U NA
Critical Item TORSION. The estimated distance between the story center of mass and the story center of rigidity shall be less than 20% of the building width in either plan dimension.

C NC U NA
Critical Item ADJACENT BUILDINGS. The clear distance between the building being evaluated and any adjacent building shall be greater than 4% of the height of the shorter building. Alternatively, if the 4% separation does not exist, the two buildings shall be configured such that pounding would not damage the columns of the subject building within the clear span of the columns.

C NC U NA
Critical Item MEZZANINES. Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the seismic force-resisting elements of the main structure.

MOMENT FRAMES

C NC U NA
Critical Item
SHEAR STRESS CHECK (Columns). The shear stress in concrete columns of the seismic force-resisting system, calculated using the Quick Check procedure of Section 3.5.3.2, shall be less than the greater of 100 psi or $2\sqrt{f'_c}$.

C NC U NA
Critical Item
AXIAL STRESS CHECK (Concrete columns). The axial stress due to gravity loads in columns subjected to seismic overturning forces shall be less than $0.10f'_c$. 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 $0.30f'_c$.

C NC U NA
AXIAL STRESS CHECK (Steel columns). The axial stress due to gravity loads in steel columns subjected to seismic overturning forces shall be less than $0.10F_y$. 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 $0.30F_y$.

C NC U NA
Critical Item
FLAT SLAB FRAMES. The seismic force-resisting system shall not be a frame consisting of columns and a flat slab/plate without beams.

C NC U NA
PRESTRESSED FRAME ELEMENTS. The seismic 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.

C NC U NA
Critical Item
CAPTIVE COLUMNS. There shall be no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level.

C NC U NA
NO SHEAR FAILURES. The shear capacity of frame members in the seismic force-resisting system shall be able to develop the moment capacity at the ends of the members.

C NC U NA
STRONG COLUMN/WEAK BEAM. The sum of the moment capacity of the columns shall be 20% greater than that of the beams at concrete frame joints.

C NC U NA
STRONG COLUMN/WEAK BEAM. The percent of strong column/weak beam joints in each story of each line of steel moment-resisting frames shall be greater than 50%. This check need not apply for 1-story structures.

C NC U NA
Critical Item
BEAM BARS. At least two longitudinal top and two longitudinal bottom bars shall extend continuously throughout the length of each frame beam.

C NC U NA
COLUMN BAR SPLICES. All column bar lap splice lengths shall be greater than $35d_b$, and shall be enclosed by ties spaced at or less than $8d_b$. 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.

C NC U NA 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.

C NC U NA COLUMN TIE SPACING. Frame columns shall have ties spaced at or less than d/4 throughout their length and at or less than $8d_b$ at all potential plastic hinge locations.

C NC U NA STIRRUP SPACING. All beams shall have stirrups spaced at or less than d/2 throughout their length. At potential plastic hinge locations stirrups shall be spaced at or less than the minimum of $8d_b$ or d/4.

C NC U NA JOINT REINFORCING. Beam-column joints shall have ties spaced at or less than $8d_b$.

C NC U NA COMPLETE FRAMES. Concrete frames that are not part of the seismic force-resisting system shall form a complete gravity load carrying system.

C NC U NA
Critical Item DEFLECTION COMPATIBILITY. Elements of concrete frames that are not part of the seismic force-resisting system shall have the shear capacity to develop the flexural strength of the components.

C NC U NA
Critical Item FLAT SLABS. Flat slabs/plates that are not part of the seismic force-resisting system shall have continuous bottom steel through the column joints.

C NC U NA
Critical Item REDUNDANCY (Moment frame). The number of lines of moment frames in each principal direction shall be greater than or equal to 2.

C NC U NA INTERFERING WALLS. All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements. (This evaluation statement does not apply to seismic force-resisting system type C3A or others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA PRECAST CONNECTION CHECK. The connections at joints of precast concrete frames shall have the capacity to resist the shear and moment demands calculated using the Quick Procedure of Section 3.5.3.5

C NC U NA PRECAST FRAMES. For buildings with concrete shear walls, precast concrete frame elements shall not be necessary as primary components for resisting seismic forces.

C NC U NA PRECAST CONNECTIONS. For buildings with concrete shear walls, the connections between precast frame elements such as chords, ties, and collectors in the seismic force-resisting system shall develop the capacity of the connected members.

C NC U NA 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.

C NC U NA MOMENT-RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.

C NC U NA 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.

C NC U NA COLUM SPLICES: All column splice details located in moment-resisting frames shall include connection of both flanges and the web.

C NC U NA COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Table I-9-1 of Seismic Provisions for Structural Steel Buildings (AISC, 1997).

SHEAR WALLS

C NC U NA
Critical Item UNREINFORCED MASONRY BEARING WALLS. The seismic force-resisting system in any direction shall not rely on or consist primarily of unreinforced masonry bearing walls.

C NC U NA
Critical Item SHEAR STRESS CHECK (Shear wall). 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 $2\sqrt{f'_c}$.

C NC U NA REINFORCING STEEL. In concrete or precast shear walls, 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. The spacing of reinforcing steel shall be equal to or less than 18 inches.

C NC U NA 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 135º or more.

C NC U NA
Critical Item REDUNDANCY (Shear wall). The number of lines of shear walls in each principal direction shall be greater than or equal to 2.

C NC U NA PROPORTIONS. The height-to-thickness ratio of masonry infill walls at each story shall be less than 9. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA SOLID WALLS. The masonry infill walls shall not be of cavity construction. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA INFILL WALLS. The infill walls shall be continuous to the soffits of the frame beams and to the columns to either side. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA
Critical Item SHEAR STRESS CHECK (Precast concrete shear walls). 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 $2\sqrt{f'_c}$.

C NC U NA WALL OPENINGS. The total width of openings along any perimeter wall line shall constitute less than 75% of the length of any perimeter shear wall, with the wall piers having height-to-width ratios of less than 2 to 1.

C NC U NA 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.

C NC U NA **Critical Item**	SHEAR STRESS CHECK (Brick or hollow clay masonry infill). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units.
C NC U NA **Critical Item**	SHEAR STRESS CHECK (Concrete block infill and reinforced masonry shear walls). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for concrete units.
C NC U NA	PROPORTIONS. The height-to-thickness ratio of unreinforced masonry infill shear walls shall be less than the following: Top story of multi-story building: 9, First story of multi-story building: 15, All other conditions: 13
C NC U NA	REINFORCING STEEL. In reinforced masonry shear walls, the total vertical and horizontal reinforcing steel ratio shall be greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel shall be less than 48”; and all vertical bars shall extend to the top of the walls.

BRACED FRAMES

C NC U NA **Critical Item**	REDUNDANCY: The number of lines of braced frames in each principal direction shall be greater than or equal to 2.
C NC U NA **Critical Item**	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 $0.50F_y$.
C NC U NA	SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression shall have Kl/r ratios less than 120.
C NC U NA	CONNECTION STRENGTH: All the brace connections shall develop the yield capacity of the diagonals.
C NC U NA	K-BRACING: The bracing system shall not include K-braced bays. Note: Steel K-Frames configurations present at all frame locations. See Appendix A.1 & A.3.

DIAPHRAGMS

C NC U NA	DIAPHRAGM CONTINUITY. The diaphragm shall not be composed of split-level floors and shall not have expansion joints.
C NC U NA	CROSS TIES. There shall be continuous cross ties between diaphragm chords.
C NC U NA	ROOF CHORD CONTINUITY. All roof chord elements shall be continuous, regardless of changes in roof elevation.
C NC U NA **Critical Item**	OPENINGS AT SHEAR WALLS. Diaphragm openings immediately adjacent to the shear walls shall be less than 25% of the wall length, and diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 ft long.

C NC U NA OPENINGS AT BRACED FRAMES. Diaphragm openings immediately adjacent to the braced frames shall extend less than 25% of the frame length.

C NC U NA OTHER DIAPHRAGMS. The diaphragm shall not consist of a system other than wood, metal deck, concrete or horizontal bracing.

C NC U NA
Critical Item TOPPING SLAB. Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab.

C NC U NA STRAIGHT SHEATHING. All straight sheathed diaphragms shall have aspect ratios less than 2 to 1 in the direction being considered.

C NC U NA SPANS. All wood diaphragms with spans greater than 24 ft shall consist of wood structural panels or diagonal sheathing.

C NC U NA UNBLOCKED DIAPHRAGMS. All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 ft and shall have aspect ratios less than or equal to 4 to 1.

Note: Diagonally sheathed diaphragm spans greater than 40-feet, from grid lines 1 to 2, and grid lines 2 to 3. See Section 3.1 of this report.

CONNECTIONS

C [✓ NC] U NA
Critical Item WALL ANCHORAGE. Exterior concrete or masonry walls shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps 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.

C NC U NA WOOD LEDGERS. The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers.

C NC U NA PRECAST PANEL CONNECTIONS. There shall be at least two anchors from each precast wall panel into the diaphragm elements.

C NC U NA 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 prior to engagement of the anchors, as needed for reliable bearing.

C NC U NA GIRDER/COLUMN CONNECTION. There shall be a positive connection utilizing plates, connection hardware, or straps between girders and their supporting columns. (This evaluation statement applies primarily to precast concrete and masonry systems.)

C NC U NA GIRDERS. Girders supported by walls or pilasters shall have at least two additional column ties securing the anchor bolts. (This evaluation statement applies primarily to precast concrete systems.)

C NC U NA CORBEL BEARING. If precast concrete frame girders bear on column corbels, the length of bearing shall be greater than 3”.

C NC U NA CORBEL CONNECTIONS. Precast concrete frame girders shall not be connected to corbels with welded elements.

C NC U NA TRANSFER TO SHEAR WALLS. Diaphragms shall be connected for transfer of loads to shear walls.

C NC U NA TRANSFER TO STEEL FRAMES. Diaphragms shall be connected for transfer of loads to the steel frames.

C NC U NA 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 shear wall or frame elements.

C NC U NA CONCRETE COLUMNS. All concrete columns shall be doweled into the foundation.

C NC U NA FOUNDATION DOWELS. Wall reinforcement shall be doweled into the foundation.

C NC U NA PRECAST WALL PANELS. Precast wall panels shall be connected to the foundation.

C NC U NA UPLIFT AT PILE CAPS. Pile caps shall have top reinforcement and piles shall be anchored to the pile caps.

C NC U NA STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the foundation.

C NC U NA ROOF PANELS: Metal, plastic, or cementitious roof panels shall be positively attached to the roof framing to resist seismic forces.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the framing to resist seismic forces.

FOUNDATION

C NC U NA POLE FOUNDATIONS. Pole foundations shall have a minimum embedment depth of 4 ft.

C NC U NA 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 in Site Class A, B, or C.

GEOLOGIC SITE HAZARDS

C NC U NA
Critical Item

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.

Note: Not investigated.

C NC U NA
Critical Item

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.

Note: Not Investigated.

C NC U NA
Critical Item

SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated.

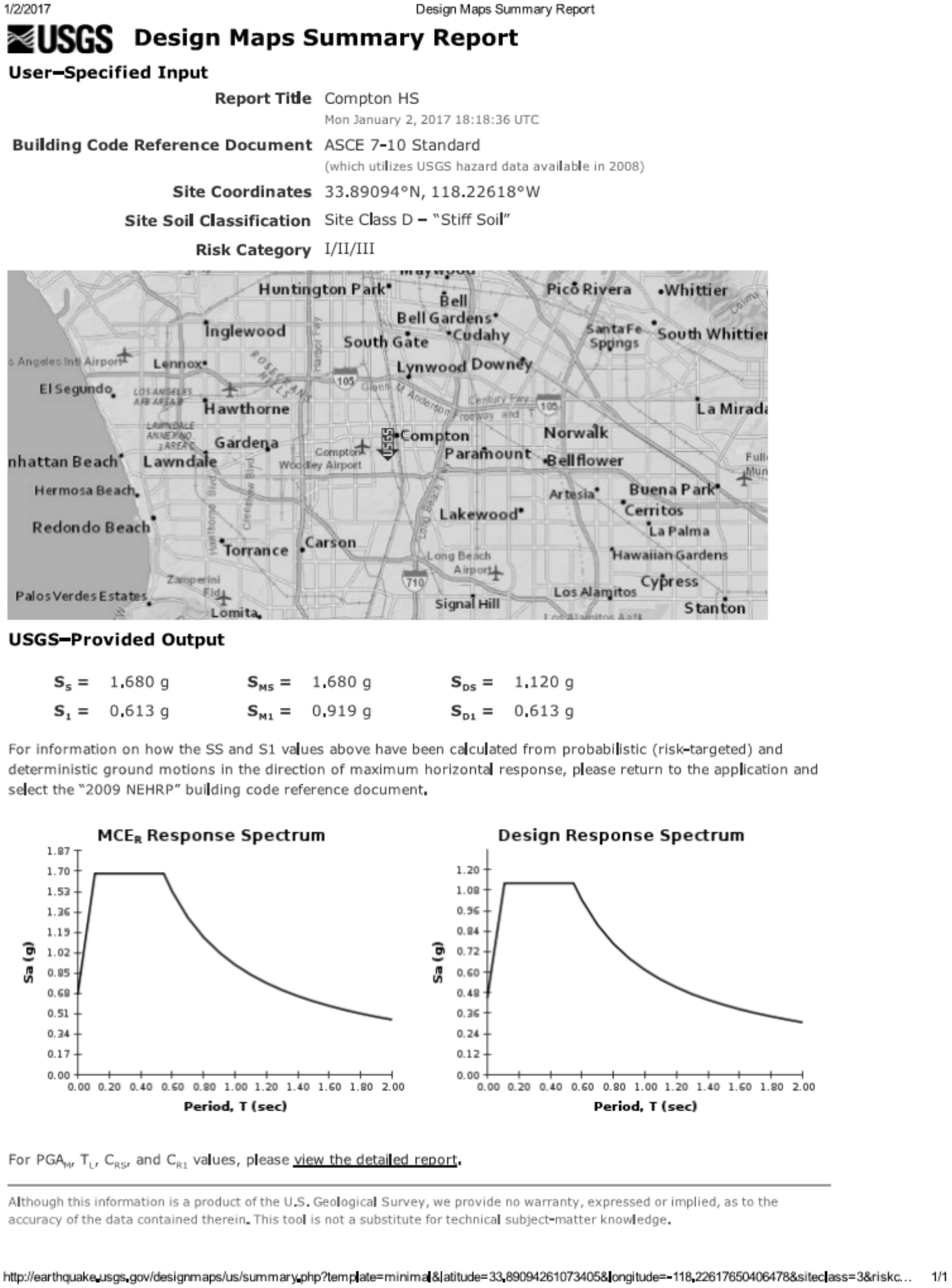
Note: See Geo-Advantec Inc. reported cited in Section 2.3 of this report. Recently published maps by CGS indicate that the Duarte Branch of the Sierra Madre Fault traverses the school site. See also Appendix A.3.

Appendices

A.1 Structural calculations

	Page	
USGS Hazard Information	22	of A.1
Tier 2 - Wall Anchorage Check	23 thru 25	of A.1

APPENDIX A.1



1/2/2017 Design Maps Summary Report

USGS Design Maps Summary Report

User–Specified Input

Report Title	Compton HS Mon January 2, 2017 18:18:36 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.89094°N, 118.22618°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

$S_S =$ 1.680 g	$S_{MS} =$ 1.680 g	$S_{DS} =$ 1.120 g
$S_1 =$ 0.613 g	$S_{M1} =$ 0.919 g	$S_{D1} =$ 0.613 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

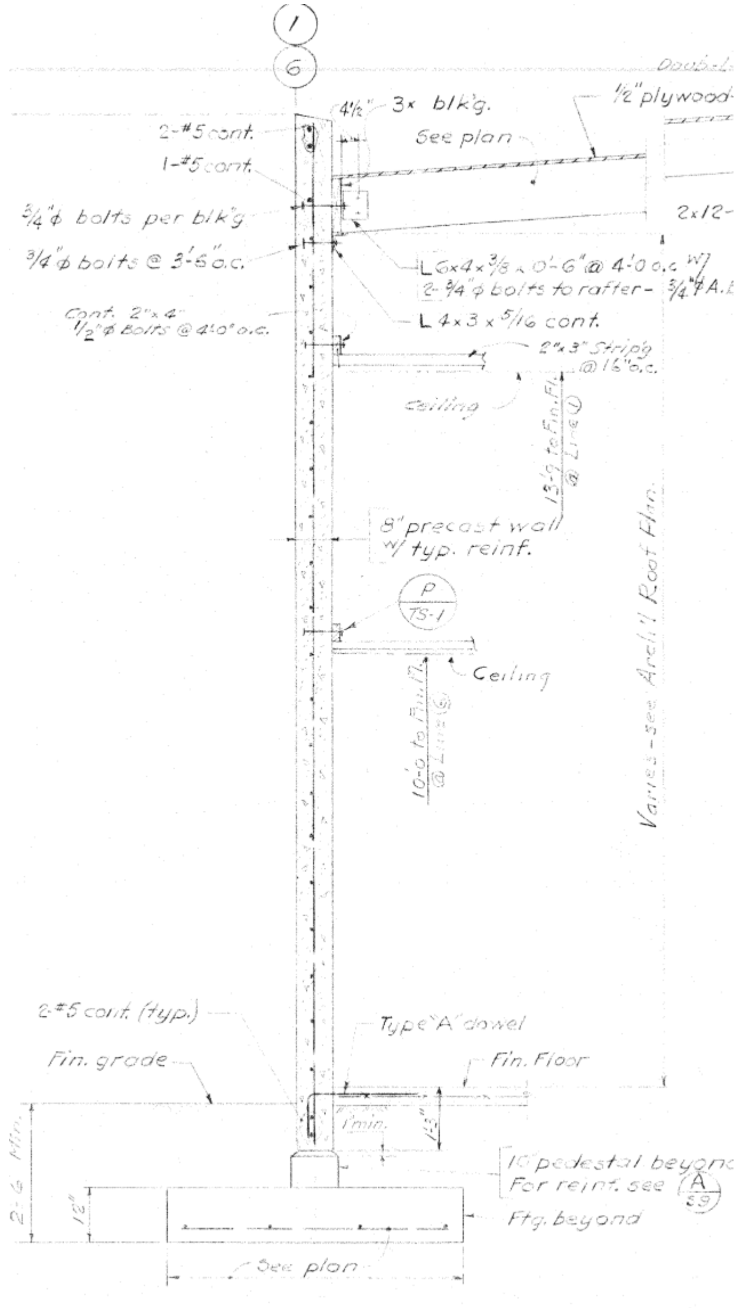
For PGA$_M$, T$_L$, C$_{RS}$, and C$_{R1}$ values, please view the detailed report.

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

http://earthquake.usgs.gov/designmaps/us/summary.php?template=minimal&latitude=33.89094261073405&longitude=-118.22617650406478&siteclass=3&riskc... 1/1

APPENDIX A.1 (cont.)

Structural Calculations
Detail D/S-9, A#19571



SECTION D S-9
Scale ½"=1'-0"

APPENDIX A.1 (cont.)

Structural Calculations

UNIT M2 – WALL ANCHORAGE CHECK (SEE D/S-9 PREV. PG)

§ 3.5.3.7 FLEXIBLE DIAPHRAGM FORCES

$T_c = ?\, S_{DS} W_p A_p$ WHERE: $? = 0.9$ (L.S.)

$S_{DS} = 1.120$

$W_p = 100^{PSF}$

$A_p = 4'\left(17/2 + 1'\right) = 38^{SF}$

↑ OUT-OF-PLANE ANCHORAGE SPACING

← WALL HT.

$\therefore T_c = 0.9(1.120)(100^{PSF})(38^{SF})$

$= \underline{3830^{lb}}$

CHECK (2) 3/4" ϕ BOLTS TO 2X JOIST

NDS TBL 11G

$Z'_{11} = 870^{lb}(1.6)(2) = 2784^{lb} < 3830^{lb}$ ✗

$\therefore$ $\boxed{\text{CONNECTION INSUFFICIENT}}$

→ THEREFORE, WALL ANCHORAGE DEFICIENCY

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
School Campus:	Compton High School		
School Address:	601 S Acacia Ave, Compton, California 90220	Last Revision Date:	
Building Name/ID:	**Building Q - Shop**		
Project Tracking No.:	*73437-131*		Page 1 of 25

The purpose of this evaluation report is to establish eligibility for retrofit funding under Proposition 1D (AB 127, 2006). It is not the intent of this evaluation to provide a complete Life Safety evaluation. The evaluation is complete when eligibility has been determined.

Report Outline

1. Eligibility check summary
2. Evaluation process
3. Site and building description
4. Deficiency list
5. ASCE 31 Evaluation statements

Appendix A.1 Structural Calculations

REGISTERED PROFESSIONAL ENGINEER
LARRY R. KAPRIELIAN
No. 2795
Exp. 9-30-17
STRUCTURAL
STATE OF CALIFORNIA

KNA Consulting Engineers, Inc.
SE Firm Name (Logo optional)

SE Address: 9931 Muirlands Blvd
Irvine, CA 92618

Phone: (949)-462-3200

Larry R. Kaprielian, S.E.
Name of SE whose stamp is above

1. Eligibility Check Summary

	YES	NO
1.1 Building Occupancy: The building's current or planned use involves regular occupancy by students and staff, as detailed in Section 3.2.	☒	☐
1.2 Structural System: The building's seismic force-resisting system includes at least one of the types listed in Section 3.5.	☒	☐
1.3 Collapse Potential: The building has deficiencies associated with a high potential for local or global collapse in the evaluation earthquake. See Sections 4 and 5 for a list of identified deficiehcies. Among the identified deficiencies are the critical items checked in Section 1.3.3:	☒	☐

ELIGIBILITY EVALUATION REPORT

School District:	Compton Unified School District	Original Report Date:	3/01/2017
School Campus:	Compton High School		
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Building Name/ID:	**Building Q - Shop**		
Project Tracking No.:	*73437-131*		Page 2 of 25

1.3.1 ☒ Collapse Potential Due to Ground Shaking: Ss = 1.680

1.3.2 Collapse Potential Due to One of the Following Geologic Hazards (CGS Approved Geologic Hazard Report Required):

☐ Liquefaction ☐ Slope Stability Failure ☐ Surface Fault Rupture

1.3.3 Identified Deficiencies:

- ☐ Load Path
- ☐ Weak Story
- ☐ Soft Story
- ☐ Vertical Discontinuities
- ☐ Mass
- ☐ Torsion
- ☐ Adjacent Buildings
- ☐ Mezzanines
- ☐ Shear Stress Check (Column)
- ☐ Axial Stress Check
- ☐ Flat Slab Frames
- ☐ Captive Columns
- ☐ Beam Bars
- ☐ Deflection Compatibility
- ☐ Flat Slabs
- ☐ Redundancy
- ☐ Unreinforced Masonry Bearing Walls
- ☐ Shear Stress Check (Shear wall or infill)
- ☐ Redundancy (Shear wall)
- ☐ Openings at Shear Walls
- ☐ Topping Slab
- ☒ Wall Anchorage
- ☐ Other *

2. Evaluation Process

2.1 Purpose and Scope

As described in DSA Procedure 08-03, the primary purpose of this evaluation is to confirm the subject building's eligibility for Proposition 1D (AB 127, 2006) retrofit funding.

As noted in DSA Procedure 08-03, the intent of this evaluation is to identify conditions that represent "a high potential for catastrophic collapse." As described further in Sections 2.2 through 2.4, the evaluation includes:

- Completion of a standardized checklist developed specially for this project (Section 2.2). As described in Section 2.2, once a critical deficiency is confirmed, the balance of the checklist need not be completed.
- A site visit (Section 2.3)
- Document review (Section 2.4)

It is not the intent of this evaluation to provide a complete Life Safety evaluation; earthquake safety hazards other than those listed in this report might exist. Further, it is not the intent of this evaluation to identify deficiencies with respect to post-earthquake use or recovery feasibility. In particular, except where specifically noted, the scope of this evaluation does not include:

- Material testing or destructive investigation
- Comprehensive condition assessment or verification of construction documents
- Assessment of code compliance, either at present or at the time of construction
- Assessment for load combinations not including earthquake effects
- Consideration of Life Safety hazards related to egress
- Consideration of Life Safety hazards related to hazardous materials
- Consideration of the effects of damage to nonstructural components or contents.

Building located on sites with geologic hazards (liquefaction, slope failure, faulting) may be eligible for the Proposition 1D funding if it can be demonstrated that the geologic hazard may cause the building to have a high potential for catastrophic collapse. In this case, a geologic hazard report shall be prepared and submitted to CGS for approval and a copy included with evaluation report. The geologic hazard report shall identify the resulting displacements that will be imposed on the structure so a structural analysis can be performed. If eligibility is being sought for a deficiency that is not related to geologic hazards, then a geologic hazard report does not need to be prepared for the purpose of this evaluation report.

With respect to DSA Procedure 08-03, this report fulfills the intent of its Section 1. The remaining sections of Procedure 08-03 are outside the scope of this evaluation and report:

2.2 Evaluation criteria: Modifications to ASCE 31

As noted in DSA Procedure 08-03, the evaluation applies ASCE 31[1], an engineering standard that allows the user to choose a performance level of either Life Safety or Immediate Occupancy. Procedure 08-03 suggests that Life Safety is the performance level of interest, but the Procedure also focuses on collapse, a lesser performance level not explicitly addressed by ASCE 31. For this evaluation, DSA has clarified that only collapse-prone conditions need to be identified. Further, because the focus of this evaluation is on checking eligibility for retrofit funding, as opposed to producing a comprehensive list of potential deficiencies, the full evaluation need not be completed once a critical deficiency is identified.

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[1] *Seismic Evaluation of Existing Buildings* (ASCE/SEI 31-03), American Society of Civil Engineers, 2003.

ASCE 31 involves three "tiers" of evaluation. Tier 1 uses a set of generic, mostly qualitative "evaluation statements" (also called checklists) to identify potential deficiencies. Tier 2 applies more quantitative checks to confirm or correct the Tier 1 findings. Tier 3 involves a more thorough structural analysis. For this evaluation, DSA has clarified that only Tier 1 is required for most issues, with Tier 2 evaluation for specific issues.

The criteria used for this evaluation therefore are based on the ASCE 31 Tier 1 checklists, with the following modifications:

- Basic Structural, Supplemental Structural, and Foundations checklists are considered.
- Nonstructural checklists are excluded. While some issues addressed by these checklists are relevant to nonstructural collapse potential, their completion is beyond the scope of this evaluation. While not considered for purposes of establishing funding eligibility, relevant deficiencies will be investigated and addressed during a retrofit design phase.
- Evaluation statements required by ASCE 31 for Immediate Occupancy only are excluded.
- Evaluation statements not associated with one of the eligible structure types are excluded.
- Certain evaluation statements related to "critical deficiencies" indicative of a high potential for structural collapse are identified. If a critical deficiency is confirmed, the balance of the evaluation need not be completed. The critical deficiencies are those listed in Section 1. They were selected by DSA for this project based in part on precedents set by the California Office of Statewide Health Planning and Development.[2]
- For Quick Checks and Tier 2 evaluations, the ASCE 31 criteria for Life Safety performance are used, except that *m* values, where needed, are increased by an additional factor of 1.33.
- The Tier 1 evaluation statements are modified to reflect emphasis on collapse-level performance:
    - Since the presence of an unreinforced masonry bearing wall system is deemed a critical deficiency, an evaluation statement to that effect is added, and detailed ASCE 31 evaluation statements specific to that system are omitted.
    - Condition of Materials: Evaluation statements are edited to focus less on presence of damage and more on significance of damage. Note that Masonry Lay-up and Foundation Performance evaluation statements are relocated to the Condition of Materials subsection of Section 5.
    - Except for cracks in certain concrete members, Condition of Materials evaluation statements related to existing cracks are omitted.
    - Beam Bars: The requirement for 25 percent of the joint bars to be continuous for the length of the member is removed.
    - Redundancy (Moment frame and Braced frame): The requirement for two bays per frame line is removed.
    - Stiffness of wall anchors: The limitation of 1/8-inch gap prior to anchor engagement is removed.
    - Overturning: This statement is removed.
    - In general, statements are modified for clarity and consistency with this DSA program.
- Tier 2 evaluation is required for any critical item (see Section 1) found to be non-compliant by Tier 1. The potential requirement for full-building Tier 2 evaluation found in ASCE 31 Table 3-3 is waived.

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[2] *2007 California Building Standards Administrative Code (California Code of Regulations, Title 24 Part 1)*, Chapter 6, "Seismic Evaluation Procedures for Hospital Buildings," Section 1.4.5.1.2, October 23, 2008 Emergency Supplement.

2.3 Document review

The following documents were provided for use in completing the evaluation, in general compliance with ASCE 31, Section 2.2. The Set ID is used to identify the documents cited in Section 5 of this report.

SET ID	DATE	DESCRIPTION
A#2802	2/2/1939	Document: Compton Sr. High School Architect: John C Austin No. of Sheets: 4 Context: Original Construction Plans

2.4 Site visit

In general compliance with ASCE 31, Sections 2.2 and 2.3, a site visit shall be made to verify the building configuration and conditions and to assist in completing the evaluation.

Date of site visit: February 15, 2017
Visiting engineer(s) and staff: Tyler Poucher (KNA)
School district contact person: Alvin Jenkins, Senior Director of Facilities, Maintenance, Operations and Transportation, Compton USD
School campus representative (if different than above):

The scope of the site visit was based on our judgment, accessibility of certain areas, and convenience of the school on-site liaison. The purpose of the following list is merely to record the work that was done. The site visit included (check all applicable boxes):

☐ INTERVIEW W/ ON-SITE LIAISON
☒ GROUNDS, FOR OBSERVATION OF SOIL, SLOPES, DRAINAGE, GENERAL CONDITION
☒ EXTERIOR OBSERVATION TO VERIFY BASIC MASSING, CONFIGURATION, GENERAL CONDITION
☒ INTERIOR OBSERVATION TO VERIFY USE, WALL LINE CONFIGURATION, GENERAL CONDITION
☐ ROOF
☐ BASEMENT
☐ CEILING PLENUM
☐ UNFINISHED SPACES (MECHANICAL ROOMS, CLOSETS, CRAWL SPACES, ETC.)
☐ DETAILS OF STRUCTURE-ARCHITECTURE INTERACTION
☐ ROOF-TO-WALL CONNECTIONS
☐ GRAVITY SYSTEM FRAMING
☐ SEISMIC FORCE RESISTING SYSTEM ELEMENTS OR COMPONENTS
☐ ADJACENT BUILDINGS SUBJECT TO POUNDING
☐ OTHER:

The site visit confirmed that the existing structure generally conforms to the available drawings listed in Section 2.3.

3. Site and Building Description

3.1 Building description

General

Year originally built: 1939

DSA Application number A#2802 ☒ Original Construction ☐ Work done pursuant to the Garrison Act (Ed Code 17367)

Number of stories above grade: 1

Number of stories below grade: 0

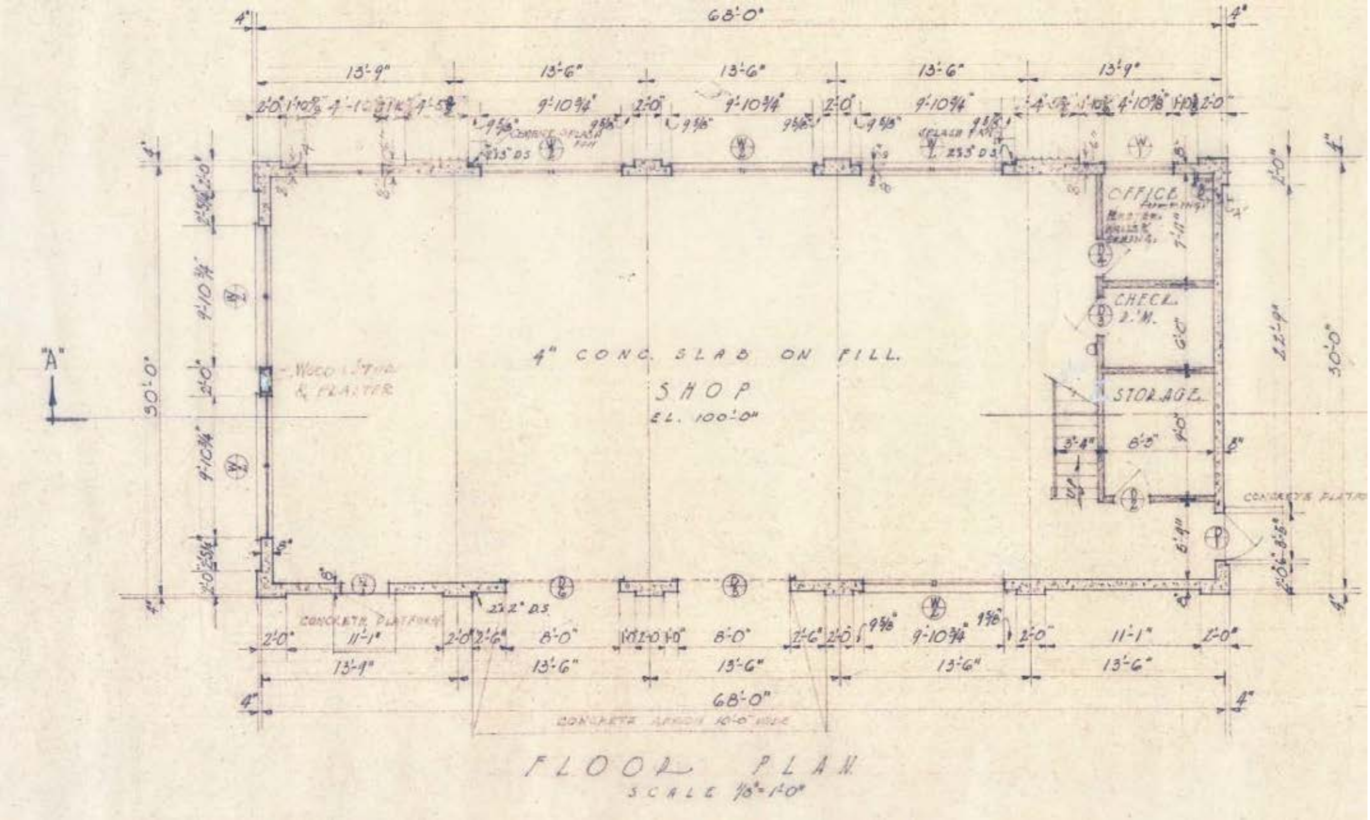
Total floor area (sq ft, approx): 2,000sq/ ft.

Other essentially identical buildings on this campus? ☐ Yes ☒ No

Photographs

Exterior north-east elevation photograph, looking south-west, taken February 15, 2017.

Ground Floor Plan (from Sheet 1, A#2802)



3.2 Building Occupancy

Original, current, and planned uses of the building include those indicated here:

	Original Use	Current Use	Planned Future Use
Office / Administration	☐	☒	☒
Classrooms / Instruction Areas	☒	☐	☐
Kitchen	☐	☐	☐
Assembly: Dining	☐	☐	☐
Assembly: Auditorium	☐	☐	☐
Assembly: Gymnasium	☐	☐	☐
Locker rooms	☐	☐	☐
Patio cover / bus shelter / walkway cover	☐	☐	☐
Bleachers / stadium structure	☐	☐	☐
Other occupied:	☐	☐	☐
Mechanical / utility rooms or enclosures	☐	☐	☐
Bulk storage	☐	☐	☐
Vacant / unused	☐	☐	☐
Other unoccupied:	☐	☐	☐

3.3 Seismicity

Latitude: 33.89094

Longitude: -118.22618

Site Class per ASCE 31, Section 3.5.2.3: D

Basis for Site Class determination: Default

Period [sec]	Mapped MCE values from ASCE 7-10 [g]	Site Coefficients from ASCE 31 Tables 3-5, 3-6	Design values per ASCE 31 section 3.5.2.3.1 [g]	S_a per ASCE 31 section 3.5.2.3.1, [g]
0.2	$S_S = 1.680$	$F_a = 1.0$	$S_{DS} = (2/3)\ S_S\ F_a = 1.120$	$S_{a,0.2} = S_{DS} = 1.120$
1.0	$S_1 = 0.613$	$F_v = 1.5$	$S_{D1} = (2/3)\ S_1\ F_v = 0.613$	$S_{a,1.0} = \min\ (S_{DS}\ ,\ S_{D1}/T) = 1.120$

3.4 Gravity System

Roof diaphragm and framing: Main roof composed of 1x6 sheathing over 2x joists @ 24” o.c. spanning to wood trusses and concrete bearing walls.

Typical floor diaphragm and framing: N.A.

Ground floor framing: 4-inch reinforced concrete slab on grade

Vertical load-bearing elements: Concrete pilasters and reinforced Concrete Shear walls.

Basement walls: N.A.

Foundation: Continuous concrete footings.

Snow load for use in load combinations involving earthquake: N.A.

3.5 Structural System per ASCE 31 Classifications (Category 2 Buildings Types per AB 300 Report)

		North-South	East-West
C1	Concrete Moment Frames	☐	☐
C1B*	Reinforced Concrete Cantilever Columns	☐	☐
C2A	Concrete Shear Walls, Flexible Diaphragm	☒	☒
C3A	Concrete Frame with Infill Masonry Shear Walls, Flexible Diaphragm	☐	☐
PC1	Precast/Tilt-up Concrete Shear Walls, Concrete Diaphragm	☐	☐
PC1A	Precast/Tilt-up Concrete Shear Walls, Flexible Diaphragm	☐	☐
PC2	Precast Concrete Frames with Shear Walls, Rigid Diaphragm	☐	☐
PC2A	Precast Concrete Frames without Shear Walls, Rigid Diaphragm	☐	☐
RM1	Reinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
S1B*	Steel Cantilever Columns	☐	☐
S3	Steel Light Frames	☐	☐
URM	Unreinforced Masonry Bearing Walls, Flexible Diaphragm	☐	☐
URMA	Unreinforced Masonry Bearing Walls, Rigid Diaphragm	☐	☐
M*	Mixed Systems - construction containing at least one of the above lateral-force-resisting systems in at least one direction of seismic loading.	☐	☐
None of the above		☐	☐

* These structural systems are a subset of the classification in ASCE 31 and are defined in the Category 2 building types in the AB 300 Seismic Safety Inventory of California Public Schools report (2002).

Horizontal system combinations	Main roof composed of 1x6 sheathing over 2x joists @ 24" o.c. spanning to wood trusses and concrete bearing walls.
Vertical system combinations	The SFRS are Reinforced Concrete Shear walls.
SFRS foundation	Continuous footings provided at all shear walls.
Gravity loading	Bearing Wall/Shear Wall system. SFRS Concrete walls perpendicular to the roof framing carries gravity load in addition to lateral loads.
System details	8" thick concrete shear walls are anchored to 2x roof joists at 4'-0" on center by a 1/4" dia. thru-bolt. The thru-bolt attaches to a steel plate, which is embedded into the concrete wall. See Section B1-B1, A#2802
Original design code	1937 UBC (Assumed, not stated on As-Built drawings)
History of seismic retrofit or significant alteration	None.
Benchmark year check	No benchmark year given for SFRS types listed in Section 3.5 of this report.

4. Deficiency list

The following table summarizes the potential deficiencies identified in Section 5 of this report. Other deficiencies might exist. The evaluation was stopped once critical deficiencies were identified.

Non-compliant condition	Discussion	Additional evaluation recommended
Wall Anchorage	• Out-of-plane wall anchorage connection was found to be deficient. • Expected to cause local collapse of walls and roof framing.	None

Unknown condition	Discussion	Additional evaluation recommended

5. ASCE 31 Evaluation Statements

Evaluation statements provided in this section are from ASCE 31. They have been modified for this project with DSA approval as described in Section 2.2 of this report. References within the evaluation statements to other section numbers are generally to sections of ASCE 31.

C = Compliant
NC = Non-compliant
U = Unknown or not investigated
NA = Not applicable to this building

Items marked NC or U are summarized in Section 4 of this report.

CONDITION OF MATERIALS

C NC U NA DETERIORATION OF WOOD. There shall be no evidence of or reason to suspect structural capacity loss due to decay, shrinkage, splitting, fire damage, or sagging in wood members or deterioration, damage, or loosening in metal connection hardware.

Note: No weep screed provided at exterior walls adjacent to irrigated exterior grade. No destructive investigation performed.

C NC U NA DETERIORATION OF CONCRETE. There shall be no evidence of or reason to suspect structural capacity loss due to cracking of concrete or deterioration of concrete or reinforcing steel in gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA DETERIORATION OF STEEL. There shall be no evidence of or reason to suspect structural capacity loss due to rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the gravity or seismic force-resisting elements.

Note: Not investigated.

C NC U NA POST-TENSIONING ANCHORS. There shall be no evidence of or reason to suspect structural capacity loss due to corrosion or spalling in the vicinity of post-tensioning or end fittings. Coil anchors shall not have been used.

C NC U NA PRECAST CONCRETE WALLS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of concrete or reinforcing steel or distress, especially at connections.

C NC U NA MASONRY UNITS. There shall be no evidence of or reason to suspect structural capacity loss due to deterioration of masonry units.

C NC U NA MASONRY JOINTS. The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no evidence of or reason to suspect structural capacity loss due to eroded mortar.

C NC U NA MASONRY LAY-UP. Filled collar joints of multi-wythe masonry infill walls shall have negligible voids.

C NC U NA FOUNDATION PERFORMANCE. There shall be no evidence of or reason to suspect existing foundation movement (due to settlement, heave, or other causes) that would affect the integrity or strength of the structure.

BUILDING CONFIGURATION

C NC U NA
Critical Item LOAD PATH. The structure shall contain a minimum of one complete load path for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation.

C NC U NA
Critical Item WEAK STORY. The strength of the seismic force-resisting system in any story shall not be less than 80% of the strength in an adjacent story, above or below.

C NC U NA
Critical Item SOFT STORY. The stiffness of the seismic force-resisting system in any story shall not be less than 70% of the seismic force-resisting system stiffness in an adjacent story above or below, or less than 80% of the average seismic force-resisting system stiffness of the three stories above or below.

C NC U NA GEOMETRY. There shall be no changes in horizontal dimension of the seismic force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.

C NC U NA
Critical Item VERTICAL DISCONTINUITIES. All vertical elements of the seismic force-resisting system shall be continuous to the foundation.

C NC U NA
Critical Item MASS. There shall be no change in effective mass more than 50% from one story to the next. Light roofs, penthouses and mezzanines need not be considered.

C NC U NA
Critical Item TORSION. The estimated distance between the story center of mass and the story center of rigidity shall be less than 20% of the building width in either plan dimension.

C NC U NA
Critical Item ADJACENT BUILDINGS. The clear distance between the building being evaluated and any adjacent building shall be greater than 4% of the height of the shorter building. Alternatively, if the 4% separation does not exist, the two buildings shall be configured such that pounding would not damage the columns of the subject building within the clear span of the columns.

C NC U NA
Critical Item MEZZANINES. Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the seismic force-resisting elements of the main structure.

MOMENT FRAMES

C NC U NA **Critical Item**	SHEAR STRESS CHECK (Columns). The shear stress in concrete columns of the seismic force-resisting system, calculated using the Quick Check procedure of Section 3.5.3.2, shall be less than the greater of 100 psi or $2\sqrt{f'_c}$.
C NC U NA **Critical Item**	AXIAL STRESS CHECK (Concrete columns). The axial stress due to gravity loads in columns subjected to seismic overturning forces shall be less than $0.10f'_c$. 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 $0.30f'_c$.
C NC U NA	AXIAL STRESS CHECK (Steel columns). The axial stress due to gravity loads in steel columns subjected to seismic overturning forces shall be less than $0.10F_y$. 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 $0.30F_y$.
C NC U NA **Critical Item**	FLAT SLAB FRAMES. The seismic force-resisting system shall not be a frame consisting of columns and a flat slab/plate without beams.
C NC U NA	PRESTRESSED FRAME ELEMENTS. The seismic 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.
C NC U NA **Critical Item**	CAPTIVE COLUMNS. There shall be no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level.
C NC U NA	NO SHEAR FAILURES. The shear capacity of frame members in the seismic force-resisting system shall be able to develop the moment capacity at the ends of the members.
C NC U NA	STRONG COLUMN/WEAK BEAM. The sum of the moment capacity of the columns shall be 20% greater than that of the beams at concrete frame joints.
C NC U NA	STRONG COLUMN/WEAK BEAM. The percent of strong column/weak beam joints in each story of each line of steel moment-resisting frames shall be greater than 50%. This check need not apply for 1-story structures.
C NC U NA **Critical Item**	BEAM BARS. At least two longitudinal top and two longitudinal bottom bars shall extend continuously throughout the length of each frame beam.
C NC U NA	COLUMN BAR SPLICES. All column bar lap splice lengths shall be greater than $35d_b$, and shall be enclosed by ties spaced at or less than $8d_b$. 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.

C NC U NA 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.

C NC U NA COLUMN TIE SPACING. Frame columns shall have ties spaced at or less than d/4 throughout their length and at or less than $8d_b$ at all potential plastic hinge locations.

C NC U NA STIRRUP SPACING. All beams shall have stirrups spaced at or less than d/2 throughout their length. At potential plastic hinge locations stirrups shall be spaced at or less than the minimum of $8d_b$ or d/4.

C NC U NA JOINT REINFORCING. Beam-column joints shall have ties spaced at or less than $8d_b$.

C NC U NA COMPLETE FRAMES. Concrete frames that are not part of the seismic force-resisting system shall form a complete gravity load carrying system.

C NC U NA
Critical Item DEFLECTION COMPATIBILITY. Elements of concrete frames that are not part of the seismic force-resisting system shall have the shear capacity to develop the flexural strength of the components.

C NC U NA
Critical Item FLAT SLABS. Flat slabs/plates that are not part of the seismic force-resisting system shall have continuous bottom steel through the column joints.

C NC U NA
Critical Item REDUNDANCY (Moment frame). The number of lines of moment frames in each principal direction shall be greater than or equal to 2.

C NC U NA INTERFERING WALLS. All concrete and masonry infill walls placed in moment frames shall be isolated from structural elements. (This evaluation statement does not apply to seismic force-resisting system type C3A or others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA PRECAST CONNECTION CHECK. The connections at joints of precast concrete frames shall have the capacity to resist the shear and moment demands calculated using the Quick Procedure of Section 3.5.3.5

C NC U NA PRECAST FRAMES. For buildings with concrete shear walls, precast concrete frame elements shall not be necessary as primary components for resisting seismic forces.

C NC U NA PRECAST CONNECTIONS. For buildings with concrete shear walls, the connections between precast frame elements such as chords, ties, and collectors in the seismic force-resisting system shall develop the capacity of the connected members.

C NC U NA 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.

C NC U NA MOMENT-RESISTING CONNECTIONS: All moment connections shall be able to develop the strength of the adjoining members or panel zones.

C NC U NA 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.

C NC U NA COLUM SPLICES: All column splice details located in moment-resisting frames shall include connection of both flanges and the web.

C NC U NA COMPACT MEMBERS: All frame elements shall meet section requirements set forth by Table I-9-1 of Seismic Provisions for Structural Steel Buildings (AISC, 1997).

SHEAR WALLS

C NC U NA
Critical Item UNREINFORCED MASONRY BEARING WALLS. The seismic force-resisting system in any direction shall not rely on or consist primarily of unreinforced masonry bearing walls.

C NC U NA
Critical Item SHEAR STRESS CHECK (Shear wall). 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 $2\sqrt{f'_c}$.

C NC U NA REINFORCING STEEL. In concrete or precast shear walls, 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. The spacing of reinforcing steel shall be equal to or less than 18 inches.

C NC U NA 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 135º or more.

C NC U NA
Critical Item REDUNDANCY (Shear wall). The number of lines of shear walls in each principal direction shall be greater than or equal to 2.

C NC U NA PROPORTIONS. The height-to-thickness ratio of masonry infill walls at each story shall be less than 9. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA SOLID WALLS. The masonry infill walls shall not be of cavity construction. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA INFILL WALLS. The infill walls shall be continuous to the soffits of the frame beams and to the columns to either side. (This evaluation statement applies only to seismic force-resisting system type C3A and others where the infill is being evaluated as a shear wall or force-resisting element.)

C NC U NA
Critical Item SHEAR STRESS CHECK (Precast concrete shear walls). 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 $2\sqrt{f'_c}$.

C NC U NA WALL OPENINGS. The total width of openings along any perimeter wall line shall constitute less than 75% of the length of any perimeter shear wall, with the wall piers having height-to-width ratios of less than 2 to 1.

C NC U NA 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.

C NC U NA
Critical Item
SHEAR STRESS CHECK (Brick or hollow clay masonry infill). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 30 psi for clay units.

C NC U NA
Critical Item
SHEAR STRESS CHECK (Concrete block infill and reinforced masonry shear walls). The shear stress in the masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for concrete units.

C NC U NA
PROPORTIONS. The height-to-thickness ratio of unreinforced masonry infill shear walls shall be less than the following: Top story of multi-story building: 9, First story of multi-story building: 15, All other conditions: 13

C NC U NA
REINFORCING STEEL. In reinforced masonry shear walls, the total vertical and horizontal reinforcing steel ratio shall be greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel shall be less than 48"; and all vertical bars shall extend to the top of the walls.

BRACED FRAMES

C NC U NA
Critical Item
REDUNDANCY: The number of lines of braced frames in each principal direction shall be greater than or equal to 2.

C NC U NA
Critical Item
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 $0.50F_y$.

C NC U NA
SLENDERNESS OF DIAGONALS: All diagonal elements required to carry compression shall have Kl/r ratios less than 120.

C NC U NA
CONNECTION STRENGTH: All the brace connections shall develop the yield capacity of the diagonals.

C NC U NA
K-BRACING: The bracing system shall not include K-braced bays.

Note: Steel K-Frames configurations present at all frame locations. See Appendix A.1 & A.3.

DIAPHRAGMS

C NC U NA
DIAPHRAGM CONTINUITY. The diaphragm shall not be composed of split-level floors and shall not have expansion joints.

C NC U NA
CROSS TIES. There shall be continuous cross ties between diaphragm chords.

C NC U NA
ROOF CHORD CONTINUITY. All roof chord elements shall be continuous, regardless of changes in roof elevation.

C NC U NA
Critical Item
OPENINGS AT SHEAR WALLS. Diaphragm openings immediately adjacent to the shear walls shall be less than 25% of the wall length, and diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 ft long.

C NC U NA OPENINGS AT BRACED FRAMES. Diaphragm openings immediately adjacent to the braced frames shall extend less than 25% of the frame length.

C NC U NA OTHER DIAPHRAGMS. The diaphragm shall not consist of a system other than wood, metal deck, concrete or horizontal bracing.

C NC U NA
Critical Item
TOPPING SLAB. Precast concrete diaphragm elements shall be interconnected by a continuous reinforced concrete topping slab.

C NC U NA STRAIGHT SHEATHING. All straight sheathed diaphragms shall have aspect ratios less than 2 to 1 in the direction being considered.

C NC U NA SPANS. All wood diaphragms with spans greater than 24 ft shall consist of wood structural panels or diagonal sheathing.

C NC U NA UNBLOCKED DIAPHRAGMS. All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 ft and shall have aspect ratios less than or equal to 4 to 1.

Note: Diagonally sheathed diaphragm spans greater than 40-feet, from grid lines 1 to 2, and grid lines 2 to 3. See Section 3.1 of this report.

CONNECTIONS

C [✓ NC] U NA
Critical Item
WALL ANCHORAGE. Exterior concrete or masonry walls shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps 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.

C NC U NA WOOD LEDGERS. The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers.

C NC U NA PRECAST PANEL CONNECTIONS. There shall be at least two anchors from each precast wall panel into the diaphragm elements.

C NC U NA 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 prior to engagement of the anchors, as needed for reliable bearing.

C NC U NA GIRDER/COLUMN CONNECTION. There shall be a positive connection utilizing plates, connection hardware, or straps between girders and their supporting columns. (This evaluation statement applies primarily to precast concrete and masonry systems.)

C NC U NA GIRDERS. Girders supported by walls or pilasters shall have at least two additional column ties securing the anchor bolts. (This evaluation statement applies primarily to precast concrete systems.)

C NC U NA CORBEL BEARING. If precast concrete frame girders bear on column corbels, the length of bearing shall be greater than 3".

C NC U NA CORBEL CONNECTIONS. Precast concrete frame girders shall not be connected to corbels with welded elements.

C NC U NA TRANSFER TO SHEAR WALLS. Diaphragms shall be connected for transfer of loads to shear walls.

C NC U NA TRANSFER TO STEEL FRAMES. Diaphragms shall be connected for transfer of loads to the steel frames.

C NC U NA 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 shear wall or frame elements.

C NC U NA CONCRETE COLUMNS. All concrete columns shall be doweled into the foundation.

C NC U NA FOUNDATION DOWELS. Wall reinforcement shall be doweled into the foundation.

C NC U NA PRECAST WALL PANELS. Precast wall panels shall be connected to the foundation.

C NC U NA UPLIFT AT PILE CAPS. Pile caps shall have top reinforcement and piles shall be anchored to the pile caps.

C NC U NA STEEL COLUMNS: The columns in lateral-force-resisting frames shall be anchored to the building foundation.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the foundation.

C NC U NA ROOF PANELS: Metal, plastic, or cementitious roof panels shall be positively attached to the roof framing to resist seismic forces.

C NC U NA WALL PANELS: Metal, fiberglass or cementitious wall panels shall be positively attached to the framing to resist seismic forces.

FOUNDATION

C NC U NA POLE FOUNDATIONS. Pole foundations shall have a minimum embedment depth of 4 ft.

C NC U NA 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 in Site Class A, B, or C.

GEOLOGIC SITE HAZARDS

C NC U NA
Critical Item

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.

Note: Not investigated.

C NC U NA
Critical Item

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.

Note: Not Investigated.

C NC U NA
Critical Item

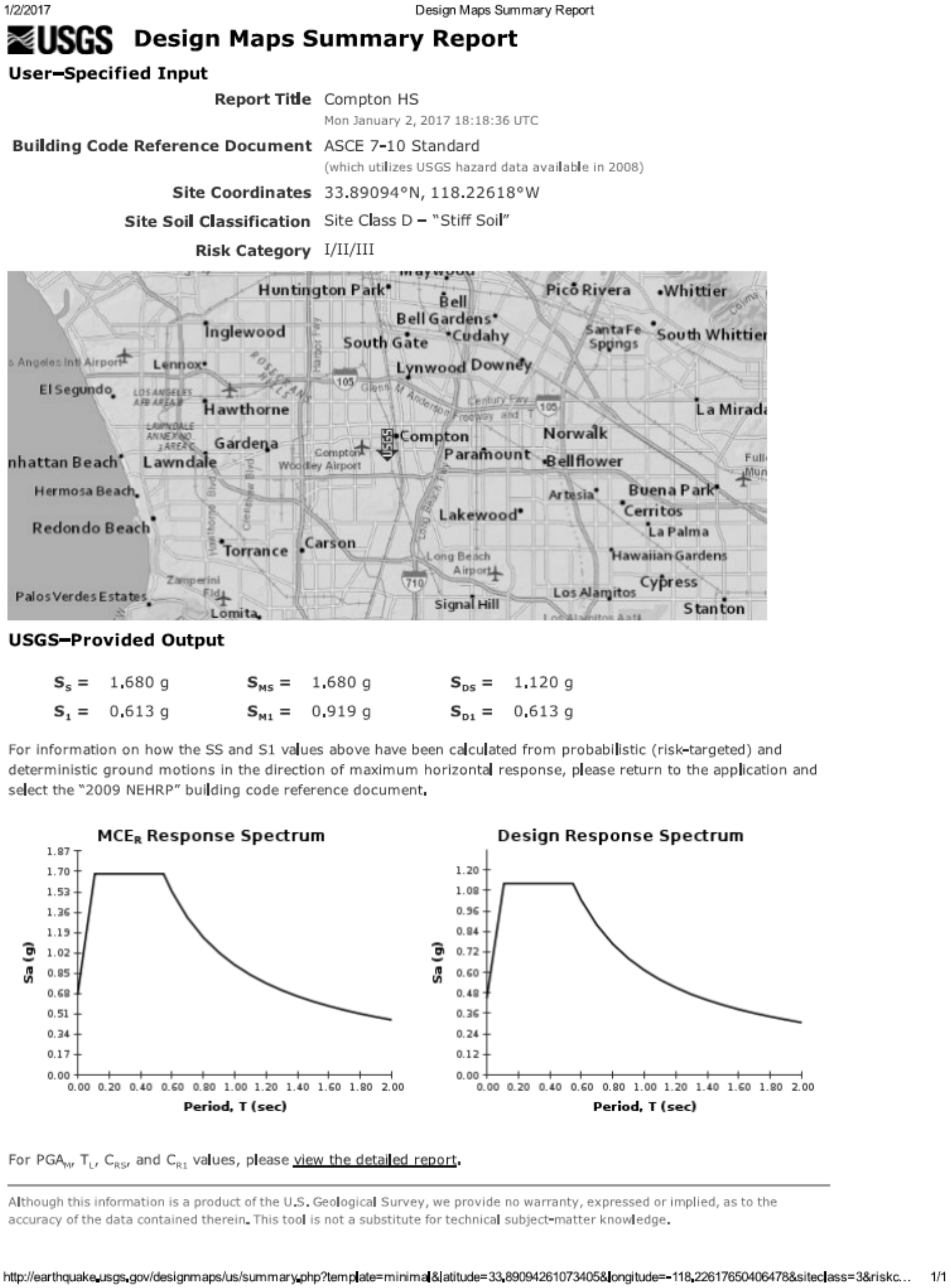
SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated.

Note: See Geo-Advantec Inc. reported cited in Section 2.3 of this report. Recently published maps by CGS indicate that the Duarte Branch of the Sierra Madre Fault traverses the school site. See also Appendix A.3.

Appendices

A.1 Structural calculations

APPENDIX A.1



1/2/2017 Design Maps Summary Report

USGS Design Maps Summary Report

User–Specified Input

Report Title Compton HS
Mon January 2, 2017 18:18:36 UTC

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 33.89094°N, 118.22618°W

Site Soil Classification Site Class D – "Stiff Soil"

Risk Category I/II/III

USGS–Provided Output

S_S = 1.680 g	S_{MS} = 1.680 g	S_{DS} = 1.120 g
S_1 = 0.613 g	S_{M1} = 0.919 g	S_{D1} = 0.613 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

For PGA$_M$, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

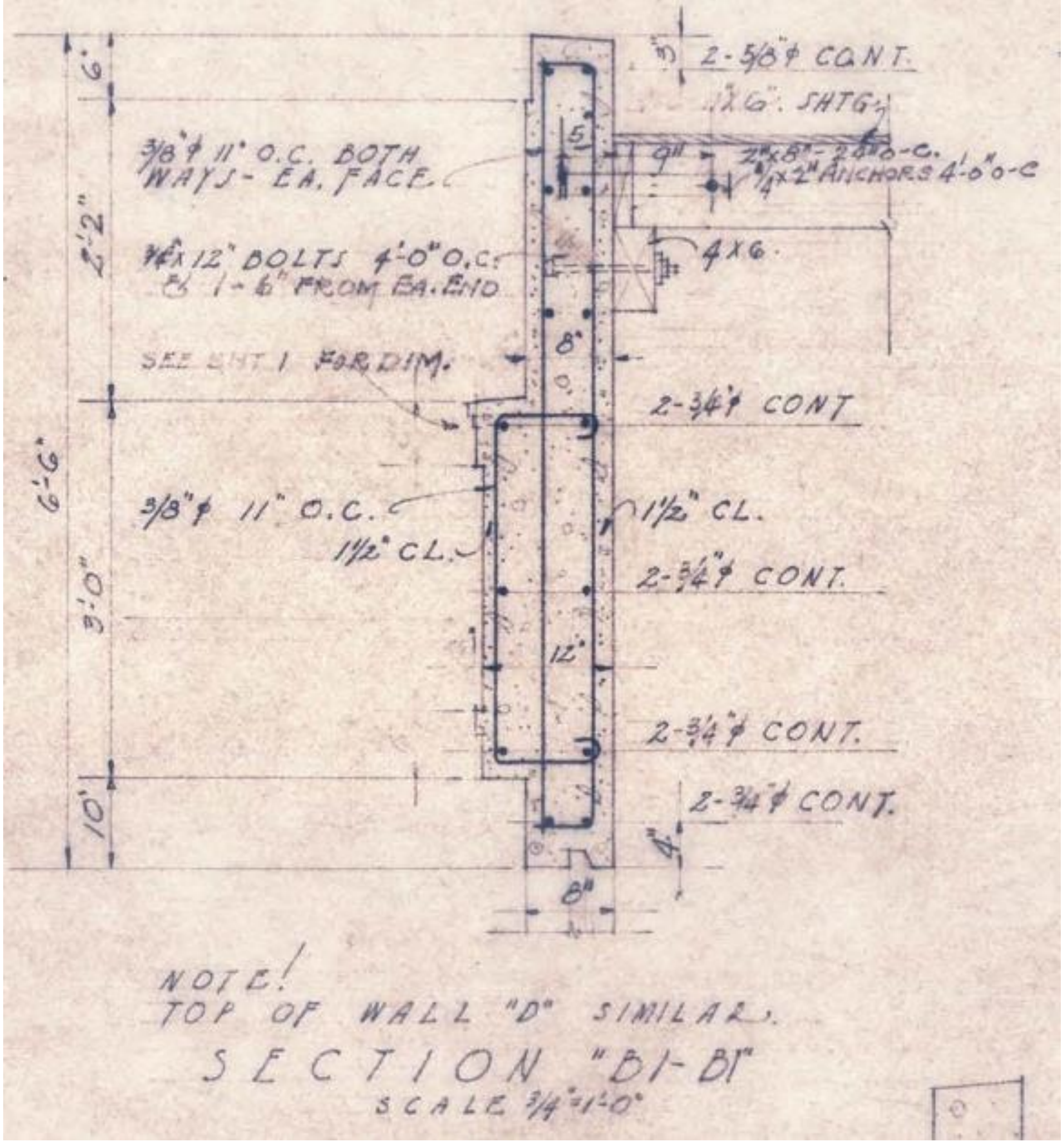
Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

http://earthquake.usgs.gov/designmaps/us/summary.php?template=minimal&latitude=33.89094261073405&longitude=-118.22617650406478&siteclass=3&riskc... 1/1

APPENDIX A.1 (cont.)

Structural Calculations

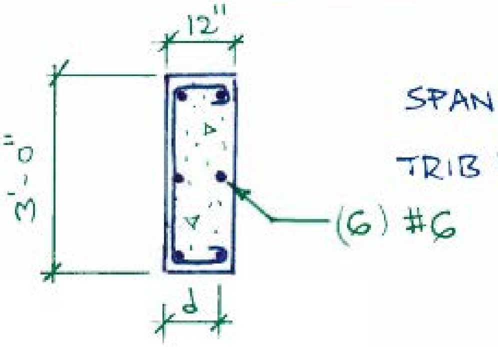
Section B1-B1, Sheet S-1, A#2802



APPENDIX A.1 (cont.)

Structural Calculations

CHECK 1' × 3' CONCRETE "BEAM" TO SPAN OUT-OF-PLANE HORIZONTALLY — WALL D (SEC. B1-B1, SHEET S-1)



SPAN = 30' O.O.P.

$$\text{TRIB WALL} = 16.5'/2 + 3.42'/2 = 9.96'$$

$$d = 12" - 1\tfrac{1}{2}" - \tfrac{3}{8}" - \tfrac{6}{8}"(\tfrac{1}{2}) = 9.75"$$

DEMAND

$$W_{OOP} = \overbrace{0.4(1.12)(1.25)}^{F_p}(150^{PCF})\left[\overset{\text{TRIB. WALL}}{(8/12)(9.96')} + \overset{\text{SELF WT.}}{(4/12)(3')}\right] = 642^{PLF}$$

$$M_{MAX} = 642^{PLF}(30')^2/8 = 72{,}225^{lb\text{-}ft} = 72.2^{k\text{-}ft}$$

CAPACITY

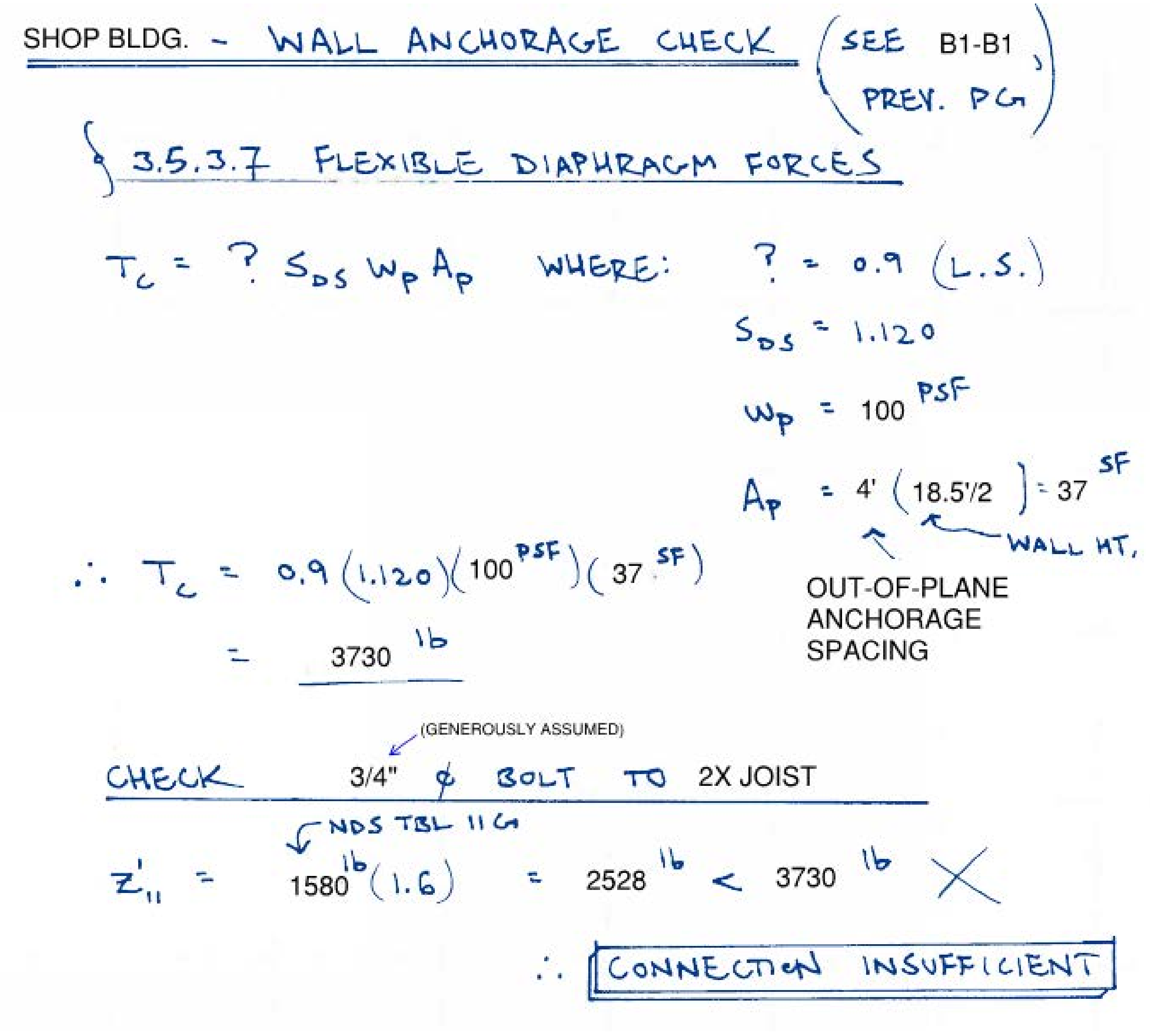
$$\phi M_N = 0.9\left(\overset{(3)\#6}{1.32^{in^2}}\right)\left(\overset{\text{INT. STEEL}}{40^{KSI}}\right)\left(9.75" - 1.32^{in^2}(40^{KSI})/\left(0.85\left(\overset{f'_c}{2^{KSI}}\right)(36")(2)\right)\right)$$

$$= 442.8^{k\text{-}in} = \underline{36.9^{k\text{-}ft} < 72.2^{k\text{-}ft}} \quad \times \text{ NO GOOD}$$

$$\boxed{\therefore \text{ WALL MUST SPAN VERTICALLY TO ROOF}}$$

APPENDIX A.1 (cont.)

Structural Calculations



SHOP BLDG. – WALL ANCHORAGE CHECK (SEE B1-B1, PREV. PG)

§ 3.5.3.7 FLEXIBLE DIAPHRAGM FORCES

$T_c = ? S_{DS} W_p A_p$ WHERE: $? = 0.9$ (L.S.)

$S_{DS} = 1.120$

$W_p = 100^{PSF}$

$A_p = 4' \left(18.5'/2\right) = 37^{SF}$

WALL HT.

OUT-OF-PLANE ANCHORAGE SPACING

$\therefore T_c = 0.9(1.120)(100^{PSF})(37^{SF})$

$= \underline{3730^{lb}}$

(GENEROUSLY ASSUMED)

CHECK 3/4" ϕ BOLT TO 2X JOIST

NDS TBL 11G

$Z'_{\parallel} = 1580^{lb}(1.6) = 2528^{lb} < 3730^{lb}$ ✗

$\therefore$ $\boxed{\text{CONNECTION INSUFFICIENT}}$

→ THEREFORE, WALL ANCHORAGE DEFICIENCY

9/25/18

*

03-117583	CLINTON ELEMENTARY SCHOOL	Construction of 4-Solar Panel Structures per PC 04-113425, and related site work.			DSA 301P Notification of Requirement for Certification	12/8/2017
03-103695	COMPTON HIGH SCHOOL	Alteration to 5 C.R. BLDGS,, SHOP BLDG, MUSIC BLDG		School is going to be demolished 2019	#3-Close of File w/o Certification - Exceptions	4/17/2008
55581	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	4/28/1994
03-112761	COMPTON HIGH SCHOOL	Alterations to 1-Entire Campus (Fire Alarm upgrade)(#368, #428, #2802, #2999, #3139, #10301, #14277, #19571, #28087, #31107, #41821, #46809, #104095, #111989)		School is going to be demolished 2019	#3-Close of File w/o Certification - Exceptions	3/26/2014
03-103658	COMPTON HIGH SCHOOL	CONSTRUCTION OF F/A SYSTEM		School is going to be demolished 2019	#3-Close of File w/o Certification - Exceptions	1/15/2008
62303	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	3/25/2010
64175	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	9/6/2000
46809	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	6/29/1993
46930	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	7/1/1993
44751	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	5/30/1985
50109	COMPTON HIGH SCHOOL			School is going to be demolished 2019	3	3/3/2008
03-103592	DICKISON ELEMENTARY SCHOOL	Alteration to MULTI USE BLDG./ADMIN/KIND./2 C.R. BLDGS. & 2 TOILET RM. BLDGS.			#3-Close of File w/o Certification - Exceptions	4/28/2008
03-112760	DICKISON ELEMENTARY SCHOOL	Alterations to 1-Entire Campus (Fire Alarm upgrade)(#27028)			#3-Close of File w/o Certification - Exceptions	3/19/2014
48078	DISTRICT ADMIN. COMPLEX	Alterations to bldg C			3	3/14/1993
45927	DOMINGUEZ HIGH	Alterations to two CR bldgs (relocation)			3	11/2/1987
60429	DOMINGUEZ HIGH	Alteration to CR bldg (H); reconstruction of shower/ locker bldg (D), CR bldg (H)			3	6/18/1997
03-107753	DOMINGUEZ HIGH	Construction of Entire Campus Fire alarm			#3-Close of File w/o Certification - Exceptions	1/28/2008

* Compton HS Non-cert DSA -