Campus: UC Berkeley
Building Name: 2150 Shattuck
CAAN ID: 1950
Auxiliary Building ID: N/A

UNIVERSITY OF CALIFORNIA

Date: 4/23/2019

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☐ **UC-Designed & Constructed Facility**
☒ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: 2150 Shattuck
Address: 2150 Shattuck Avenue, Berkeley, CA 94704
Site location coordinates: Latitude 37.8700 Longitudinal -122.2683

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): IV

ASCE 41-17 Model Building Type:
a. Longitudinal Direction: C2: Concrete Shear Walls (with Stiff Diaphragms)
b. Transverse Direction: C2: Concrete Shear Walls (with Stiff Diaphragms)

Gross Square Footage: 156,770 sq. ft. (50,207 sq. ft. occupied by UC Berkeley)
Number of stories *above* grade: 13
Number of basement stories *below* grade: 1

Year Original Building was Constructed: 1968
Original Building Design Code & Year: UBC (1964 UBC assumed)
Retrofit Building Design Code & Year (if applicable): 1997 UBC

SITE INFORMATION
Site Class: D Basis: Default Assumption (not defined in geotechnical investigation)
Geologic Hazards:
Fault Rupture: Unlikely Basis: Geotechnical Investigation prepared by Subsurface Consultants, Inc (SCI) on April 12, 2000
Liquefaction: Low Basis: Geotechnical Investigation prepared by SCI on April 12, 2000
Landslide: Unlikely Basis: Geotechnical Investigation prepared by SCI on April 12, 2000

ATTACHMENT
Retrofit Structural Drawings: Seismic Upgrade 2150 Shattuck Avenue, Berkeley, CA 94704, Tipping Mar, 2/21/2001, S1.2 Structural Notes

CERTIFICATION & PRESUMPTIVE RATING VERIFICATION STATEMENT

I, Leo Panian, a California-licensed structural engineer, am responsible for the completion of this certificate, and I have no ownership interest in the property identified above. My scope of review to support the completion of this certificate included both of the following ("No" responses must include an explanation):

a) the review of structural drawings indicating that they are as-built or record drawings, or that they otherwise are the basis for the construction of the building: ☑ Yes ☐ No
b) visiting the building to verify the observable existing conditions are reasonably consistent with those shown on the structural drawings: ☑ Yes ☐ No

Based on my review, I have verified that the UCOP Seismic Performance Level (SPL) is presumptively permitted by the following UC Seismic Program Guidebook provision (choose one of the following):

☐ 1) Contract documents indicate that the original design and construction of the aforementioned building is in accordance with the benchmark design code year (or later) building code seismic design provisions for UBC or IBC listed in Table 1 below.

☐ 2) The existing SPL rating is based on an acceptable basis of seismic evaluation completed in 2006 or later.

☑ 3) Contract documents indicate that a comprehensive[1] building seismic retrofit design was fully-constructed with an engineered design based on the 1997 UBC/1998 ***or later*** CBC, and (choose one of the following):

☐ the retrofit project was completed by the UC campus. Further, the design was based on ground motion parameters, at a minimum, corresponding to BSE-1E (or BSE-R) and BSE-2E (or BSE-C) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 CBC ***or later*** for EXISTING buildings, and is presumptively assigned an SPL rating of IV.
☐ the retrofit project was completed by the UC campus. Further, the design was based on ground motion parameters, at a minimum, corresponding to BSE-1 (or BSE-1N) and BSE-2 (or BSE-2N) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 ***or later*** CBC for NEW buildings, and is presumptively assigned an SPL rating of III.
☒ the retrofit project was not completed by the UC campus following UC policies, and is presumptively assigned an SPL rating of IV.

[1] A comprehensive retrofit addresses the entire building structural system as indicated by the associated seismic evaluation, as opposed to addressing selective portions of the structural system.

CERTIFICATION SIGNATURE

AFFIX SEAL HERE

Leo	Panian
Print Name	Title
S4526 (California SE)	6/30/2019
CA Professional Registration No.	License Expiration Date
Signature	4/23/2019
	Date

Tipping Structural Engineers, 510-549-1906, 1906 Shattuck Ave, Berkeley, CA 94704

Firm Name, Phone Number, and Address

Table 1: Benchmark Building Codes and Standards

Building Type[a,b]	Building Seismic Design Provisions	
	UBC	IBC
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

Note: UBC = *Uniform Building Code*. IBC = *International Building Code*.

[a] Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.

[b] Buildings on hillside sites shall not be considered Benchmark Buildings.

[c] not used

[d] not used

[e] not used

[f] No benchmark year; buildings shall be evaluated in accordance with Section III.J.

[g] Steel eccentrically braced frames with links adjacent to columns shall comply with the 1994 UBC Emergency Provisions, published September/October 1994, or subsequent requirements.

[h] Cold-formed steel shear walls with wood structural panels only.

[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

STRUCTURAL NOTES

1. GENERAL

1. These notes apply to all drawings and govern unless otherwise noted or specified. All work shall conform to the 1997 Uniform Building Code, as modified by state and local jurisdiction.

2. Verify all existing conditions and proposed dimensions at the job site. Compare structural drawings with architecturol, mechanical, and electrical Drawings before commencing work. Notify Architect of any discrepancies and do not proceed with affected work until they are resolved. Do not scale drawings.

3. Unless otherwise shown or noted, all typical details shall be used where applicable. All details shall be considered typical ot similar conditions.

4. Unless otherwise shown or noted, follow Manufacturer's recommendations for all structural products used on this project.

5. The Contractor and Special Inspector shall contact the Structural Engineer regarding any questions of interpretation of these specifications and drawings.

6. Shop drawings, designs and product literature shall be submitted and reviewed by the Architect, before fabrication. All submittals shall have a clear 3.5"x7" space reserved for shop drawing stamps by both the Architect and Engineer. If the submitted sheets do not have sufficient room, a cover sheet with a table of contents and sufficient space for stamps may be submitted. Each shop drawing submittal shall consist of one reproducible copy, to be returned, and one copy on bond for the Engineer to keep. Additional copies may be required by the Architect and General Contractor. Submit shop drawings well in advance of fabrication; allow at least two weeks for engineering review, and additional time for review and forwarding by the Architect and General Contractor, and for revisions and re-submittol, if required. Shop drawings and WPS submittals shall be dated, and each update shall be identified with a revision number. All items on the shop drawings that vary from the Structural Drawings, alter structural details, or extrapolate from similar details, shall be circled by a cloud with the note "Engineer Verify". The following items, when applicable shall be submitted:

   1. Survey of existing column centerlines, wall lines and floor elevations, as required for dimensional control of new construction.
   2. Concrete mix designs (submit to testing lab for approval, copy to Structural Engineer).
   3. Tie down anchors & pile foundations (include drilling, grouting & splicing procedures & shop drawings).
   4. Concrete slab construction joint and control joint layout.
   5. Concrete and shotcrete curing procedures and products.
   6. Product literature for Structural Epoxies and Grouts.
   7. Reinforcing bar mill certificates.
   8. Rebar shop drawings.
   9. Product literature for Mechanical Couplers.
   10. Structural steel & connections shop drawings.
   11. Written Weld Procedure Specifications (WPS) and manufacturer's electrode data sheets (submit to testing lab for approval, copy to Structural Engineer).
   12. Slip-critical full-pretension bolting procedures.
   13. Shop drawings & structural calculations for secondary froming for precast panels, store fronts, facades and curtain walls.
   14. Shop drawings and structural calculations for lateral and vertical support of any equipment exceeding 400 pounds.
   15. Penetration plans, using structural drawings as backgrounds, showing the size and location of all slab openings, sleeves, cores and penetrations, including HVAC, electrical, telephone, fire sprinkler, plumbing and ony other utilities.

7. Safety Measures: At all times, the Contractor shall be solely and completely responsible for the conditions of the job site including safety of people and property, and for all necessary independent engineering reviews of these conditions. Shoring and bracing of the soil, and the existing and new structures, shall be installed where necessary to adequately support the imposed vertical and lateral loads, and shall be maintained until the new structure can support the anticipated loads. Underpinning and/or shoring is required at all excavations adjacent to, and to elevations below, existing foundations, and where portiol removal of existing foundations is coiled for on the drawings per Geotechnical Engineer's recommendations. The Engineer's job site visits are not intended to include review of the adequacy of the Contractor's safety measures.

8. Any openings, holes, cuts or discontinuities not shown on the structural drawings and extending into or through structural elements require the prior approval of the Structural Engineer, and may require special structural detailing. Existing concrete slab reinforcing outside of areas specifically called for demolition may not be cut without prior approval of the Structural Engineer.

9. Survey of Existing Structure: Before preparing steel shop drawings, Contractor shall survey the existing building to locate all existing floor elevations, column centerlines, and interior and exterior face of wall, in order to locate new column centerlines and steel base elevations.

2. TESTS & SPECIAL INSPECTIONS

1. Provide tests and inspections for all items as required by the 1997 Uniform Building Code and all applicable local ordinances.

2. The Owner shall retain an independent testing lab to perform all required testing and inspections.

3. The Contractor shall provide the testing lab with construction schedules to ensure proper coordination of work.

4. The following specific items, when applicable, shall be inspected and/or tested by the testing lab:

   1. Placement of reinforcing steel (long enough prior to pour to make any required corrections.)
   2. Placement of concrete and shotcrete.
   3. Concrete compressive strength.
   4. Tie down anchors and pile foundations (inspected and tested per Geotechnical Report).
   5. Reinforcing bars and threaded rods epoxy-grouted into existing concrete or brick. See section entitled "EPOXY DOWELS" for testing requirements.
   6. Mechanical couplers, torque tested to verify installation to Manufacturer's recommended torque values.
   7. All structural welding. All complete penetration welds shall be non-destructively tested by ultrasonic or radiographic methods unless otherwise noted in drawings.
   8. Headed stud placement and welding.
   9. All bolted connections, including special requirements for high strength bolting.
   10. All welding of metal deck.
   11. Foundation excavations (review by Geotechnical Engineer).
   12. Fiber reinforced epoxy composite materials (Fiber wrap); continuous inspection.

5. Structural Observation by Structurol Engineer
   1. In addition to inspection by the Special Inspector, the Structural Engineer will review the following items for general conformance with the Structural Drawings. The Contractor shall notify the Structural Engineer at least five working days prior to the following structural observation visits:
      1. All reinforcement, post tensioning tendons, and embedded items, prior to concrete placement.
      2. Structural framing and panel shear walls, prior to concealment by finish surfaces.

3. DESIGN BASIS

1. Construct in conformance with the 1997 edition of the Uniform Building Code and all applicable local ordinances.

2. Design lateral loads are based on the following criteria:

   Seismic: Site specific seismologic hazard studies.

4. SITE PREPARATION

1. Sitework shall be carried out as recommended in the Soil Report.

5. FOUNDATIONS

1. The foundation design is based on a Geotechnical Report prepared by Subsurface Consultants, Inc., dated 4/12/2000. A copy of this report may be obtained from the Geotechnical Engineer.

2. Except where otherwise shown, excavations shall be made as near as possible to the neat lines required by the size and shape of the structure. All foundations shall be poured without the use of side forms wherever possible. If the trenches cannot stand, fully form sides to dimensions shown.

3. Do not allow water to stand in trenches. If bottoms of trenches become softened due to rain or other water before concrete is cast, excavate softened material and replace with properly compacted backfill ar concrete at na cost to the owner.

4. All excavations are to inspected by the Geotechnical Engineer prior to placing rebor. Forms and reinforcing are to be inspected by Special Inspector prior to placing concrete.

5. Refer to Plans for additionol specific requirements regarding the construction of piles.

6. NONSHRINK GROUT

Where called for on the Structural Drawings, grout used under column base plates shall be non-shrink, non-metallic grout meeting ASTM Standard C1107, and shall attain a minimum 28 day compressive strength of 8000 psi.

7. EPOXY DOWELS

1. Where epoxy dowels (reinforcing bars, HRC upset head bars, or all-threaded rods) are called for in the Structural Drawings, the epoxy grout used shall conform to ASTM C881, Type IV, except that tensile strength shall be greater than 5,000 psi. Submit Manufacturer's literature to Architect for review and approval. Pre-measured epoxies in disposoble two part cortridges dispensed through proprietory mixing nozzles are acceptable. Polyester resins shall not be substituted for epoxy.

   Install dowels in existing concrete or brick as follows:

   1. Drill hole to depth shown on drawings. If not shown on the drawings, hole depth shall be ot least 12 diameters. Hole size shall be 1/8" greater than nominal bar diameter. Do not use hammer drills in brick (possens the brick & mar).
   2. Clean hole with wire bottle-type brush and blow out with oil-free compressed air. Inspection is required before the next step.
   3. After inspection, place measured amount of epoxy in hole with applicator equipped with an extension nozzle.
   4. Insert dowel slowly while rotating about 90 degrees. Secure it in the center of the hole.
   5. Remove excess grout from around hale before it hardens.

2. Testing: Epoxy dowels in concrete shall be inspected and tested by the Testing Agent as follows:

   1. The diameter, depth and cleonliness of the drilled holes shall be verified.
   2. Test 25% of the first 500 dowels installed in direct tension to the following values:

1.	#4 bar	9,000 #	1/2" Thrd. Rod	4,000 #
2.	#5 bar	14,000 #	5/8" Thrd. Rod	6,000 #
3.	#6 bar	20,000 #	3/4" Thrd. Rod	8,000 #
4.	#7 bar	27,000 #	7/8" Thrd. Rod	12,000 #
5.	#8 bar	36,000 #	1 " Thrd. Rod	15,000 #

   3. If testing of the first 500 dowels results in a "pass" rate of 95% or better, sampling may be reduced to 10% of the remaining work.

4. All contact surfaces between new concrete or shotcrete and existing masonry, or between new block masonry and existing masonry or concrete, shall be connected by epoxy grouted dowels. If dowels are not shown on the drawings for typical or similor conditions, then dowels shall be no less than the following:

   1. New concrete/shotcrete walls intersecting existing brick walls at a perpendicular angle: area of dowels to match area of horizontal wall steel.
   2. Exception: oll contact areas that indicate a dimensioned gap or compressible material at the interface shall not be dowelled.

8. CONCRETE

1. Concrete cement shall conform to 1997 ASTM C-150 & C-595, and shall be Type II. Type I cement may be used in areas not in contact with earth. Cement shall contain not less thon 15%, nor more than 60%, fly ash by weight (Exception: cement for elevated post-tensioned slabs need not contain fly ash, and shall contain no more than 15% fly ash by weight). Aggregate shall be free of alkali-reactivity. Water/cement ratio shall not exceed 55%. Shrinkage strain, as measured by ASTM C-157 at 56 days, shall not exceed .045% for normol weight concrete, .020% for "nonshrink concrete" and .055% for lightweight concrete fill on metal deck. Acid soluble chloride content shall not exceed 0.2 percent of cement weight. Chloride-free admixtures and plasticizers for workability may be used if approved by the testing laboratory and Structural Engineer. Because excess water reduces concrete strength, adding water at the site is discouraged and shall not exceed one gallon per cubic yard.

2. Reinforce oil concrete. Concrete construction tolerances shall comply with ACI 117. Install oil inserts, bolts, anchors, and reinforcing bars and securely tie prior to placing concrete.

3. Concrete shall obtain the following minimum ultimate compressive strength at 28 days (unless otherwise noted on the drawings).

Location	Strength	Aggregate
Fdns/slabs-on-grade	4000 psi	hardrock, 3/4" min, 1-1/2" max
Walls	4000 psi	hardrock, 3/4" min, 1-1/2" max

4. Concrete shall be placed in a continuous operotion between predetermined construction joints.

5. Concrete shall be continuously cured for 7 days after placement in ony approved manner. Footings are excepted from this requirement.

6. Contractor shall submit to the Architect & Engineer, for review and approval, drawings locating and detailing all proposed construction/control joints in concrete and shotcrete prior to commencing work. Construction joints shall be roughened, exposing clean aggregate to 1/4" depth, solidly embedded in mortar matrix, and shall include shear keys and dowels as required by the Engineer.

7. The locotion and protection of existing utilities is the responsibility of the Contractor. The Contractor shall notify the Structural Engineer if utility pipes run through, or within 24" below, any new concrete canstruction. The Structural Engineer will provide the Contractor with design details under such circumstances.

8. Patching of concrete: All insert holes, and other imperfections on the surfaces of the concrete shall be filled with grout, brushed, and sacked to a uniform finish. All holes through to the outside of the building must be made watertight.

9. Chamfer all corners 3/4", except top edges of slabs and beams, unless otherwise noted.

9. SHOTCRETE

1. Shotcrete may be of dry-mix or wet-mix type, with properties and constituents as specified in the preceding "CONCRETE" section, except aggregate size may be 3/8". Shotcrete materials and procedures shall also comply with ACI 506 "Guide to Shotcrete" and ACI 506.2 "Specification to Shotcrete." Nozzlemen shall be certified according to ACI 506.3 "Guide to Certification of Shotcrete Nozzlemen," and pre-qualified with test panels representing the most heavily congested areas per ACI 506.2 (Grade 2.5 or better).

2. Sample panels, 12x12 inches (18x18 if aggregate size exceeds 3/8"), shall be shot at least once per shift, and field cured in a manner similar to the work it represents.

3. Preconstruction Testing: If the shotcrete is reinforced with bars larger than #5 or spaced more closely than 9 inches on center, a preconstruction test ponel shall be shot by each Nozzleman on the project. Test panels shall be at leost 3 feet by 3 feet, oriented vertically, and reinforced to represent the most congested oreas of the work. Test panels shall be cored, sown or disossembled to ensure that proper rebor encasement and nozzling techniques have been achieved.

4. Concrete, masonry and plaster surfaces shall be thoroughly cleoned, and loose and unsound material shall be removed by chipping or wire brushing. Thoroughly moisten porous surfaces for several hours prior to shotcrete application. Shotcrete shall be applied against dampened surfaces, free of standing water. Provide alignment wires to establish wall thickness and plane surface. Ensure that wires are tight and true to line.

5. Ensure thorough mixing of materiols. Dry-mix shall stand no more than 30 minutes before application, wet-mix no more than 60 minutes. Mix shall be plastic enough to give good compaction and low percentage of rebound, but stiff enough not to sag.

6. Apply shotcrete in monner that completely encases reinforcement, using maximum layer thickness, and build up layers by making several passes of the nozzle over the work area. Ensure material does not sag, and remove material outside of forms and alignment wires. Contrary to ACI 506R, Section 8.6.2, shotcrete finishing coats shall be applied within thirty minutes after screeding. After initial set, but before final set, remove alignment wires.

7. Keep rebound and other loose or porous material out of the new construction. Remove laitance after initial set but prior to final set by scraping or brooming. Laitance which has token final set must be removed by sand-blasting or other abrasive process. Where voids are suspected, Special Inspector shall sound work with hammer. Cut out and replace unsound areas with a pre-approved structural repair grout and bonding agent.

8. Provide construction joint roughening, doweling and sheor keys as previously submitted & approved by the Engineer

9. Provide finish surface as specified by the Architect.

10. Moist cure for seven days using fog spray or opproved curing membrane.

10. REINFORCING STEEL

1. All reinforcing steel bors shall conform with the Standard Specifications for Deformed Billet-steel for Concrete Reinforcement, ASTM designotion A706 low alloy, unless otherwise noted. ASTM A615, Grade 60 ksi (grade 420 MPa), may only be used if mill certificates are submitted to the Special Inspector and Engineer demonstrating that the actual Fy (yield stress) does not exceed the specified yield stress by more than 18 ksi (125 MPa), and that fu/Fy (ratio of ultimate-to-yield stress) exceeds 1.25. All welded rebar shall be low alloy A706. Welding rebar is not permitted except where shown on the drawings.

2. Special reinforcements called for on the drawings:

   1. "150 ksi Threadbar" refers to Dywidag (Long Beach, CA, Ph: 310-531-6161) or Williams (Portland, OR, Ph: 503-285-4548 or San Diego, CA, Ph: 619-578-4376) threadbar reinforcing, meeting ASTM A722, Grade 150 requirements with deformations conforming to the requirements of ASTM A615. Couplers shall be installed for full tension and compression values per manufacturers specifications, and shall have center threadbar stops. Hex nuts shall be installed at each side of couplers unless: (a) bare ends are cut square, and (b) bars are fully torqued into coupler.

   2. "60 ksi Threadbar" refers to Dywidag (Long Beach, CA, Ph: 310-531-6161) or Williams (Portland, OR, Ph: 503-285-4548 or San Diego, CA, Ph: 619-578-4376) threadbar reinforcing, meeting ASTM A722, Grade 150 requirements with deformations conforming to the requirements of ASTM A615. Couplers shall be installed for full tension and compression values per manufacturers specifications, and shall have center threadbar stops. Hex nuts shall be installed at each side of couplers unless: (a) bare ends are cut square, and (b) bars are fully torqued into coupler.

   3. "D2L" refers to TRW Nelson (Ph: 800-635-9353) deformed bar concrete anchors with complete penetration welds using Nelson proprietary welding equipment. Lengths specified, if not within one inch af standard size, will require special order.

   4. "T-heads" shall be either:
      1. HRC headed reinforcement (either 100 or 200 series at Contractor's option; HRC Ph: 1-800-HRC-6775)
      2. Dayton/Richmond End Anchorage D-158 series (Ph: 1-800-745-3700, available through South Coast Steel Service, Ph: 714-575-1590).
      3. Erico/Lenton Terminators may NOT be used where "T-Head" is called for on the drawings.

   5. "Terminators" shall be:
      1. Erico/Lenton Terminator Embedment Anchors (Ph: 1-800-248-2677)
      2. HRC T-heads or Dayton/Richmond D-158 End Anchoroges MAY be used where "Terminator" is called for on the drawings.

3. Type 2 mechanical couplers shall develop 1.60 times the specified yield strength Fy of the bar, and Type 1 mechanical couplers shall develop 1.25 times the specified yield strength of the bar. Unless otherwise noted on the drawings, all mechanical couplers shall be Type 2.

4. Wire mesh shall conform with ASTM A185. Wire mesh shall be lap spliced a minimum of 8 inches unless otherwise noted.

5. Suitable devices of some standard manufacture shall be used to hold reinforcement in its true horizontol and vertical positions. These devices shall be sufficiently rigid and numerous to prevent displacement of the reinforcement during placing of concrete. All such devices shall have prior approval from the Architect.

6. Lap splice all bars o minimum of 50 bar diameters, unless otherwise shown on the Plans. Lap splices are only allowed where shown on the drawings or specifically permitted by the Engineer.

7. Lap splice all bars as shown in the Typical Lap Splices detail, unless otherwise shown on the drawings.

8. Unless otherwise noted, maintain coverage to face of reinforcing bars as follows: (see section PRESTRESS NOTES for tendon coverage)

Location	Minimum Clear Cover
Cast against earth:	3 in
Exposed to earth or weather:	
Non-PT slabs, Walls	2 in (1-1/2" for #5 & smaller)
Beam ties	1-1/2 in
Beam primary reinf.	1-1/2 in
Not exposed to earth or weather:	
Slabs, Walls, Joists	3/4 in
Beam & Column ties	1-1/2 in (1" in PT beams)
Beam & Column primary reinf.	1-1/2 in

11. STRUCTURAL STEEL AND MISCELLANEOUS IRON

1. Structural steel wide-flange shapes shall conform with ASTM A572, Grade 50, unless otherwise noted.

2. Structural steel channels, angles, plates, bars and miscellaneous iron shall conform with ASTM A572, Grade 50, unless otherwise noted.

3. Steel pipe shall conform with ASTM A501, or ASTM A53, Grade B. (Fy = 35 ksi).

4. Structural tubing shall conform with ASTM A500 (Fy = 46 ksi).

5. All bolts shall conform with ASTM A325N, unless otherwise noted on the drawings. Bolts shall be fully pre-tensioned to satisfy slip critical requirements, unless otherwise noted on the drawings. Full pre-tensioning shall be attained by "turn-of-the-nut" or other method opproved by the Structural Engineer.

6. Headed studs: ASTM A108, Grade 1010-1020, Type B. (Fu=60 ksi, Fy=50 ksi, 20% elongation in 2"). Stud welding through metal deck and all other configurations shall be qualified through tests per AWS D1.1, Section 7.6-7.8.

7. Paint steel with one coat of shop primer or equal, except surfaces to receive welds, shear studs, fully-pretensioned bolts, concrete encasement or spray fireproofing. Any steel or steel fasteners exposed to weather shall be hot-dip galvanized, or weatherproofed by an opproved equal.

8. All work shall be performed in accordance with AISC "Specification for Structural Steel Buildings" and AISC "Code of Standard Practice for Steel Buildings and Bridges" (as revised by the project specifications).

9. Welding shall conform with the latest edition of the AWS D1.1 specifications and shall be done by certified welders. All electrodes shall be E7x (70 ksi) unless otherwise noted on the drawings. Electrodes and fluxes shall be kept clean and dry per AWS D1.1 and the following additional requirements. FCAW (wire) electrodes shall be consumed within two weeks of opening their original packaging. Rusted electrodes shall be discarded. SMAW (stick) electrodes shall be low hydrogen type, shall have moisture-resistant coatings, and shall be used within 8 hours of opening unless kept in hermetically-sealed containers, or shall be redried per AWS D1.1, Section 4.5.2. SAW flux shall be kept clean and dry per AWS D1.1, Section 4.8.3. SAW flux open to air for more than two days shall be re-dried for at least two hours at between 500 and 900 degrees Fahrenheit. Wet flux shall be discarded.

10. All welding shall be performed in strict adherence to a written welding procedure specification (WPS) per AWS D1.1, Section 6.5.2. For each type of weld, a WPS shall be submitted to the testing laboratory for approval on AWS Form E-1 (see Appendix E of AWS D1.1 Supporting Procedure Qualification Records (PQR) shall be submitted for welds not pre-qualified by AWS D1.1. The WPS shall list both the AWS and Manufacturer's electrode designations. The Manufacturer's Electrode Data Sheets shall be submitted along with the WPS, and all welding parameters shall be within the electrode Manufacturer's Recommendotions. Copies of the WPS shall be on site and available to all Welders and the Special Inspector.

11. Seismically-loaded or dynamically-loaded welded connections, including all complete penetration welds, and all welded connections for braced frames, moment frames, collectors, chords, elevator machine room floor and suspended pit framing, and any welds noted on the structural drawings as "CVN tough":

    1. Preheat shall be 50 to 75 degrees above minimum preheat specified by AWS D1.1.
    2. E7XT-2, 3, 4, 7, 10 or 11 electrodes (such as Lincoln NS-3M or equivalent by other manufacturers) shall not be used.
    3. Electrodes shall have a Charpy V-Notch (CVN) impact toughness of at least 20 ft-lbs at 0 degrees Fahrenheit. Welds with CVN impact toughness shall be indicated on the shop drawings, with the tail note for each full-pen or seismically/dynamically-loaded weld indicating the appropriate AWS designation for CVN-toughness (such as E7XT-1, 5, 6, 8, 9 or 12).
    4. Field welds may not be applied over shop welds unless the same type of electrode is used in both the shop and the field.

12. Retrofit Work: Existing structural steel or rebar shall be nominally preheoted to at least 100 degrees Fahrenheit before welding to it. Samples of existing structural steel and rebar shall be tested for weldability to verify that higher preheat is not required. Existing structural steel shall be shored &/or braced as needed before applying pre-heat.

13. Special plate materials called out on these drawings:
    4. "A633, Gr. C" refers to ASTM A633, Gr. C plate, with a CVN impact toughness of at least 30 ft-lbs at 70 degrees Fahrenheit.
    5. "T-Stor" refers to a special ASTM A36 plate with a CVN toughness of at least 150 ft-lbs at 0 degrees Fahrenheit (special order from Bethlehem Steel, attn: John Scott, 1-800-543-2127).
    6. "Y-Stor" refers to a special ASTM A572, Gr. 50 plate with a CVN impact toughness of at least 125 ft-lbs at 0 degrees Fahrenheit (standard order from Bethlehem Steel, Ph: 1-800-543-2127).

12. METAL DECKING

1. All metal decking shall be formed from steel sheets conforming to ASTM A653, sq Grade 33. The steel shall have a metal protective coating of zinc conforming to ASTM A653, G60. Provide slots for drop through hangers as required.

2. All welding shall be done by Certified Welders.

3. Metal decking shall be have the following minimum section properties:

Type	I (in4/ft)	S(in3/ft)
1-1/2"-20 gauge	0.233	0.252
2"-20 gauge	0.419	0.361
2"-18 gauge	0.555	0.510
3"-18 gauge	1.146	0.664

4. Unless heavier reinforcing is called for on the drawings, all decks shall be reinforced with 6x6 W2.9xW2.9 installed 3/4" below top of slab, or with polypropylene or steel fibers per manufacturer's specifications.

5. Venting: Roof deck covered by insulating concrete shall be positive vented or slotted/perforated, min 1.5%, max 3% open area.

13. STRUCTURAL METAL STUDS

1. All material and workmanship shall conform to A.I.S.I. "Specification for the Design of Cold Formed Steel Structural Members," latest edition. Metal stud, joist and track sizes and section properties shall be per MSWA (Metal Stud Manufacturer's Association, ICBO ER No. 4943).

2. Metal studs, tracks, etc., shall be formed from steel that meet the following requirements:

    1. 14 and 16 gage (painted): ASTM A570, 50,000 psi.
    2. 14 and 16 gage (galvanized): ASTM A446, 50,000 psi.
    3. 18 and 20 gage (painted): ASTM A611, 33,000 psi.
    4. 18 and 20 gage (galvanized): ASTM A446, 33,000 psi.

3. All welds shall be fillet, plug, butt or seam and shall be made according to AWS D.1.3 Structural Welding Code - Steel Sheet. Electrodes for light gage metal (14 go or thinner) shall be either E6x or E7x unless otherwise noted on the drawings.

4. All members shall be galvanized or primed with a rust-inhibitive paint; field abrasions and welds shall be touched up in the field after erection.

5. All members shall be cut to be fitted and seated properly to abutting members. Splices in studs shall not be permitted. Butt joints in tracks shall be fully butt welded at track legs and web.

6. Runner tracks shall be attached to non-prestressed concrete with .177 inch shank diameter powder driven fastener pins at 12 inches on center, unless otherwise noted.

7. Provide bridging for studs as follows, unless otherwise noted on plans:
    1. Walls subjected to wind loads only:
        1. Up to 10 feet height: one row of bridging at midheight.
        2. Over 10 feet height: bridging rows spaced at 4 feet maximum on center.
    2. Walls supporting vertical (axial) load:
        1. Up to 10 feet height: two rows of bridging, equally spaced.
        2. Over 10 feet height: bridging rows spaced 4 feet maximum on center.
    3. Stud bridging shall brace both flanges (see drawings for typical detail).

8. Each stud shall be welded to top and bottom tracks with 1/8 inch fillet welds each side for full length of stud flange or each stud shall be screwed to top and bottom tracks with sheet metal screws on both sides.

9. At each end of wall provide two 2 inch x 16 go. diagonal bracing straps (one at each face placed at 45 degrees and in opposite directions) with 1/8 inch fillet welds to each stud and top and bottom tracks.

14. EXPANSION BOLTS

1. Expansion bolts shall be of the diameter shown on the drawings. The following products are acceptable:

Type	ICBO Report
ITW Ramset/Red Head Trubolt Wedge Anchor	ER-1372
Hilti Kwik Bolt-II	ER-4627
Hilti HSL Heavy Duty Sleeve Anchor	ER-3987
Hilti HUC Undercut Anchor	

2. Holes for expansion bolts shall be drilled to the embedment depth indicated on the drawings, as a minimum. Bolts shall be torqued as recommended by the Manufacturer. Expansion anchors (except Hilti HSL and Hilti HUC) shall be re-tightened after 24 hours or more, to compensate for initial relaxation. All Manufacturer installation instructions shall be followed.

3. Contractor shall submit to the Architect for review technical information describing the product intended for use. Products other than those indicated above may be used if opproved in advance by the Architect and Structural Engineer.

15. DESIGN-BUILD CLADDING SYSTEMS (pre-cast concrete, GFRC, FRP or EIFS facades and cornices; glass & aluminum curtain walls and storefronts)

1. Cladding system structural framework shall conform to all applicable Building Codes. Drawings and calculations, stamped and signed by a California Licensed Civil or Structural Engineer, shall be submitted to the Architect.

2. The design shall resist all Code-mandated loads, including wind and seismic forces, and shall accommodate interstory seismic drifts of at least 1.2 percent without substantiol damage.

3. Design-build metal stud and joist deflections shall not exceed L/240 for interior walls and exterior facades under Code loads.

16. EQUIPMENT, PIPE, AND DUCT SUPPORT

1. The Contractor is responsible for the vertical and lateral support of all HVAC and other equipment. Shop drawings shall be submitted for the support of all HVAC equipment over 400 pounds, stamped and signed by a California-Licensed Civil or Structural Engineer. Equipment and anchorage shall be designed to resist lateral seismic forces per 1997 UBC Section 1632.2. Lateral seismic design forces on all life safety equipment shall be increased by a foctor of 1.50.

2. Conduits, pipes and ducts shall be braced to resist seismic hazard B (ZICp = 0.30) per the "SMACNA Seismic Restraint Manual: Guidelines for Mechanical Systems" (1991 edition), except that the components of life safety systems shall be braced to resist seismic hazard level A (ZICp = 0.45).

3. Sprinkler pipe bracing shall comply with the 1997 UBC Standard 9-1, "Installation of Sprinkler Systems" (based on NFPA 13-1991).

4. Fasteners to the underside of concrete slabs shall be reduced by 50% for all fasteners in the tension zone of the slab, i.e., all fasteners located more than five feet from the nearest column.

17. FIBER REINFORCED EPOXY COMPOSITE MATERIAL (FIBER WRAP)

1. Where fiber wrap is noted on plans it shall consist of woven sheets of continuous corbon fiber reinforced composite material in an epoxy matrix. Fabric sheets shall be fully bonded to the surface onto which they are applied ensuring a void free interface. Sufficient laps between discontinuous sheets shall be provided to develop their strength. Fibers shall be oriented unidirectionally.

2. The design number of layers is determined using a layer thickness of .04" and a design composite strain of .004 with a composite modulus of 10,000 ksi. Systems using different material design properties shall demonstrate equivalency. All materials shall be handled per manufacturer's recommendations

3. Wall surfaces shall be prepared for bonding by means of abrasive blasting or grinding to achieve a 1/16" min. amplitude. Concrete surfaces to which composite fabric is applied shall be free from fins, sharp edges, or other protrusions which would result in interface voids or damage to the fabric. Existing uneven surfaces shall be filled with an approved epoxy filler. Contact surfaces shall have no free moisture at the time of application. A thin coat of epoxy resin shall be applied to surface prior to application of fabric. Corners over which composite fabric is applied shall be rounded to a minimum 1.5" radius.

4. Contractor's submittals shall include:
    1. Manufacturer's product data, specifications, recommended application procedures showing compliance with the project requirements, and certification from the system manufacturer of the material and section properties for the supplied material.
    2. Complete shop drawings containing details on the number and thickness of layers and joint and end anchorage details.

5. Representative samples of the finol lay-up shall constructed and submitted for testing to verify ultimate tensile strength, tensile modulus, and elongation. Samples shall be taken each workday and shall consist of 12"x12" panels with 2 layers of material. Samples shall be cured per manufacturers recommendations.

6. Contractor shall demonstrate a minimum of 2 years of experience with fiber wrap opplications on similar projects, and shall submit qualifications for approval.

SRM Associates

1125 Atlantic Ave., Suite 102
Alameda, CA 94501

Seismic Upgrade
2150 Shattuck Avenue
Berkeley, CA 94704

TIPPING · MAR + associates
structural engineers
1906 Shattuck Avenue
Berkeley California 94704
(510) 549-1906
Fax (510) 549-1912

REGISTERED PROFESSIONAL ENGINEER
STEVEN B. TIPPING
No. 2257
Exp.12-31-01
STRUCTURAL
STATE OF CALIFORNIA

IBSEN / SENTY
ARCHITECTURE
1150 55TH ST. #E
EMERYVILLE
CALIFORNIA 94608
510/595/1851
FAX: 595/1853

Issues	Date
1. BUILDING PERMIT SET	3/10/2000
2. CONSTRUCTION SET	3/20/2000
3. CONST. UPDATE SET 1	3/28/2000
4. CONST. UPDATE SET 2	4/11/2000
5. ISSUE FOR BID	5/19/2000
6. REVISED ISSUE FOR BID	9/15/2000
7. CONSTRUCTION ADDENDUM	2/21/2001

Sheet Title
STRUCTURAL NOTES

Project No.	99011.01
Scale	NONE
Drawn	J.L.
Checked	L.P.

Sheet No.
S1.2

J.L. 2-11-00

11S1--2.DWG

24x36