Rating form completed by:

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Text in green is to be part of UCSF building database and may be part of UCOP database

4-8-2019

REGISTERED PROFESSIONAL ENGINEER
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EXP. 6/30/20
STRUCTURAL
STATE OF CALIFORNIA

4/8/2020

UCSF Building Seismic Ratings

1478-80 5TH AVENUE

CAAN #2028
1478-80 5th AVENUE, SAN FRANCISCO, CA 94122
UCSF Campus: Parnassus

Plan

West Elevation

Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	V	Findings based on drawing review and ASCE 41-17 Tier 1 evaluation[1]
Rating basis	Tier 1	ASCE 41-17
Date of rating	2020	
Recommended UCSF priority category for retrofit	Priority B	Priority A = Retrofit ASAP Priority B=Retrofit at next permit application for modification
Ballpark total project cost to retrofit to IV rating	High	See recommendations on further evaluation and retrofit.
Is 2018-2019 rating required by UCOP?	Yes	
Further evaluation recommended?	No	

[1] The evaluations at UCSF translate the Tier 1 evaluation to a Seismic Performance Level rating using professional judgment discussed among the Seismic Review Committee. Non-compliant items in the Tier 1 evaluation do not automatically put a building into a particular rating category, but such items are evaluated along with the combination of building features and potential deficiencies, focused on the potential for collapse or serious damage to the gravity supporting structure that may threaten occupant safety.

Building information used in this evaluation

- Architectural Floor Plans by Edward L. Muffeny & Associates, "1474/80 5th Avenue San Francisco, CA," dated 16 January 1987 (3 sheets)
- Architectural Drawings by Mathau / Roche Design Group, "1478/80 5th Avenue Alterations," dated 28 February 1992 (13 sheets)
- Structural Drawings by Thad Povey, "1478/80 5th Avenue Alterations," dated 28 February 1992 (5 sheets) (Note to our knowledge, this work was not completed)
- Architectural Drawings by Gary Nelson, "Internal Modifications & General Repairs to 1472, 1474, 1478, & 1480 5th Avenue," dated 13 May 1994 (14 sheets)
- Structural Drawings by Butzbach Structural Engineering, "Internal Modifications & General Repairs to 1472, 1474, 1478, & 1480 5th Avenue," dated 13 May 1994 (2 sheets)

Scope for completing this form

Architectural drawings were reviewed and an ASCE 41-17 Tier 1 evaluation was performed. A site visit was made on December 12, 2019 where the building exterior and basement were observed.

Brief description of structure

The building functions as graduate student housing and facilities storage. It was reportedly built in 1922 as a duplex home. There are two apartments over a basement with garage. The main floor plate is approximately 32 ft north-south by 53 ft east-west. A voluntary seismic retrofit of the ground floor was completed based on the 1994 design according to a conversation with the engineer of record, Tom Butzbach, on December 13, 2019.

Identification of Levels: Levels are identified on plan as Basement, First Floor, Second Floor, and Roof. The site slopes downward toward the northwest. The basement (approximately 10'-0") consists of a two-car garage, furnace room, laundry room, and storage. The first floor (approximately 9'-0") (1480 5th Avenue) consists of a three-bedroom, two-bath apartment with a kitchen and living room. The second floor (approximately 11'-0") (1478 5th Avenue) consists of a three-bedroom, two-bath apartment with a kitchen and living room. The roof is flat. The basement is at grade/street level and is used as the base of the building for this evaluation.

Foundation system: Existing foundation drawings are not available. It is presumed there are continuous footings below bearing walls. During the site visit on December 12, 2019 continuous concrete stem wall footings were observed around the basement level. Posts beared on concrete pedestals that likely extend to isolated footings below the slab. New grade beams were installed under new transverse shear walls at the basement.

Structural system for vertical (gravity) load: Drawings showing the existing framing are not available. It is presumed based on the age of the building that wood joists span to load bearing wood framed walls.

Structural system for lateral forces: Drawings showing the existing framing are not available. It is presumed based on the age of the building that a sheathed diaphragm distributes load to the interior and exterior wood framed walls sheathed with gypsum board and/or plaster. The first floor sheathing was not visible. The basement walls are all sheathed on both sides. It our understanding the 1994 retrofit design was completed and the 1992 design was not. Structural work was only done at the basement. Work consisted of installing new plywood sheathing, anchor bolts, and sill blocking to much of the basement walls. Additionally, a new steel moment frame was installed over the southern parking space in the transverse direction. Gyp board was installed over all plywood sheathing, so plywood sheathing could not be observed or confirmed. The structural drawings call for 15/32" CDX with 10d nails at 4" on center edge nailing and 10d nails at 12" on center at intermediate supports.

Building Code: The building was reportedly constructed in 1923, prior to a building code being enacted. However, no documentation was available to confirm the construction date. The 1994 retrofit was per the 1988 Uniform Building Code.

Building Condition: What could be observed of the structure of the building appeared to be in fair condition; however, much of the structure was concealed behind finishes. The concrete slab in the basement was in good condition. No cracks in the exterior stucco were found.

Building response in 1989 Loma Prieta Earthquake: There is no record of building performance during this earthquake. The report titled "Performance of UCSF Buildings During the October 17, 1989 Loma Prieta Earthquake" by Impell Corporation did not list this build as one inspected.

Brief description of seismic deficiencies and expected seismic performance including structural behavior modes

- The building relies on interior and exterior walls for shear resistance. There is not enough wall present to pass the Tier 1 quick check at the first or second floor in either direction. The ground floor passes the Tier 1 quick check in both directions.
- Based on the age of construction, the walls between levels are not expected to be detailed to transfer shear and overturning forces between levels.
- The building is located on a sloped site. However, there is a significant length of wall on the downhill side of the building.
- The building is built very close to the property line, with only approximately 2-1/2" and 2" between it and the building to the north and south, respectively.
- Because the basement has been retrofitted, it is expected to have good seismic performance.

Structural deficiency	Affects rating?	Structural deficiency	Affects rating?
Lateral system stress check (wall shear, column shear or flexure, or brace axial as applicable)	Y	Openings at shear walls (concrete or masonry)	N
Load path	Y	Liquefaction	N
Adjacent buildings	Y	Slope failure	N
Weak story	N	Surface fault rupture	N
Soft story	N	Masonry or concrete wall anchorage at flexible diaphragm	N
Geometry (vertical irregularities)	N	URM wall height-to-thickness ratio	N
Torsion	N	URM parapets or cornices	N
Mass – vertical irregularity	N	URM chimney	N
Cripple walls	N	Heavy partitions braced by ceilings	N
Wood sills (bolting)	N	Appendages	N
Diaphragm continuity	N		

Summary of review of non-structural life-safety concerns, including at exit routes. [2]

There are fireplaces on the first and second floor, but it is assumed they have been closed off, like other buildings. No chimney could be seen.

The water heaters were restrained.

UCOP non-structural checklist item	Life safety hazard?	UCOP non-structural checklist item	Life safety hazard?
Heavy ceilings, feature or ornamentation above large lecture halls, auditoriums, lobbies or other areas where large numbers of people congregate	None Observed	Unrestrained hazardous materials storage	None Observed
Heavy masonry or stone veneer above exit ways and public access areas	None Observed	Masonry chimneys	None Observed
Unbraced masonry parapets, cornices or other ornamentation above exit ways and public access areas	None Observed	Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.	None Observed

[2] For these Tier 1 evaluations, we do not visit all spaces of the building; we rely on campus staff to report to us their understanding of if and where non-structural hazards may occur.

Basis of Seismic Performance Level Rating

The length of wall in the subject building is below the amount required by the ASCE 41 Tier 1 quick check at the first and second floors in both directions. The building is listed as Priority B because there is a relatively low risk to occupant life-safety posed by conventional wood-framed construction.

Recommendations for further evaluation or retrofit

No further evaluation of this building is recommended. There is relatively low risk to occupant life-safety posed by this type of building based on historical performance of similar building types. It is recommended that work to improve the seismic performance of the upper floors be included with any future renovation requiring a building permit.

Peer review comments on rating

The structural members of the UCSF Seismic Review Committee (SRC) reviewed the evaluation on January 8, 2020 and are unanimous that the rating is V.

Additional building data	Entry	Notes
Latitude	37.76094	
Longitude	-122.46166	
Are there other structures besides this one under the same CAAN#	No	
Number of stories above lowest perimeter grade	3	
Number of stories (basements) below lowest perimeter grade	0	
Building occupiable area (OGSF)	4,537	
Risk Category per 2016 CBC 1604.5	II	
Building structural height, h_n	30 ft	Structural height defined per ASCE 7-16 Section 11.2
Coefficient for period, C_t	0.02	Per ASCE 41-17 equation 4-4
Coefficient for period, β	0.75	Per ASCE 41-17 equation 4-4
Estimated fundamental period	0.256 sec	Per ASCE 41-17 equation 4-4
Site data		
975 yr hazard parameters S_s, S_1	1.565, 0.618	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Site class	C	
Site class basis	Geotech Parameters	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Site parameters F_a, F_v	1.200, 1.400	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Ground motion parameters S_{cs}, S_{c1}	1.878, 0.865	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
S_a at building period	1.878	
Site V_{s30}	440 m/s	
V_{s30} basis	Geotech Parameters	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)

Liquefaction potential/basis	No	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Landslide potential/basis	No	UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)
Active fault-rupture hazard identified at site?	No	
Site-specific ground motion study?	No	
Applicable code		
Applicable code or approx. date of original construction	Built: 1923	Reported date, not confirmed
Applicable code for partial retrofit	1988 UBC	Partial Retrofit
Applicable code for full retrofit	None	No full retrofit known
Model building data		
Model building type North-South	W1 : Wood Light Frames	Partial retrofit included addition of steel moment frame in the basement level at the garage door S1a: Steel Moment Frame Flexible Diaphragm (checklist not included since rating is based on W1 deficiencies)
Model building type East-West	W1: Wood Light Frames	
FEMA P-154 score	N/A	Not included here because an ASCE 41 Tier 1 evaluation was performed.
Previous ratings		
Most recent rating	V	2013 Report
Date of most recent rating	10/7/2013	Basis: Qualitative assessment based on drawing reviewed
2nd most recent rating	-	
Date of 2nd most recent rating	-	
3rd most recent rating	-	
Date of 3rd most recent rating	-	
Appendices		
ASCE 41 Tier 1 checklist included here?	Yes	Refer to attached checklist file

Appendix A

Additional Images

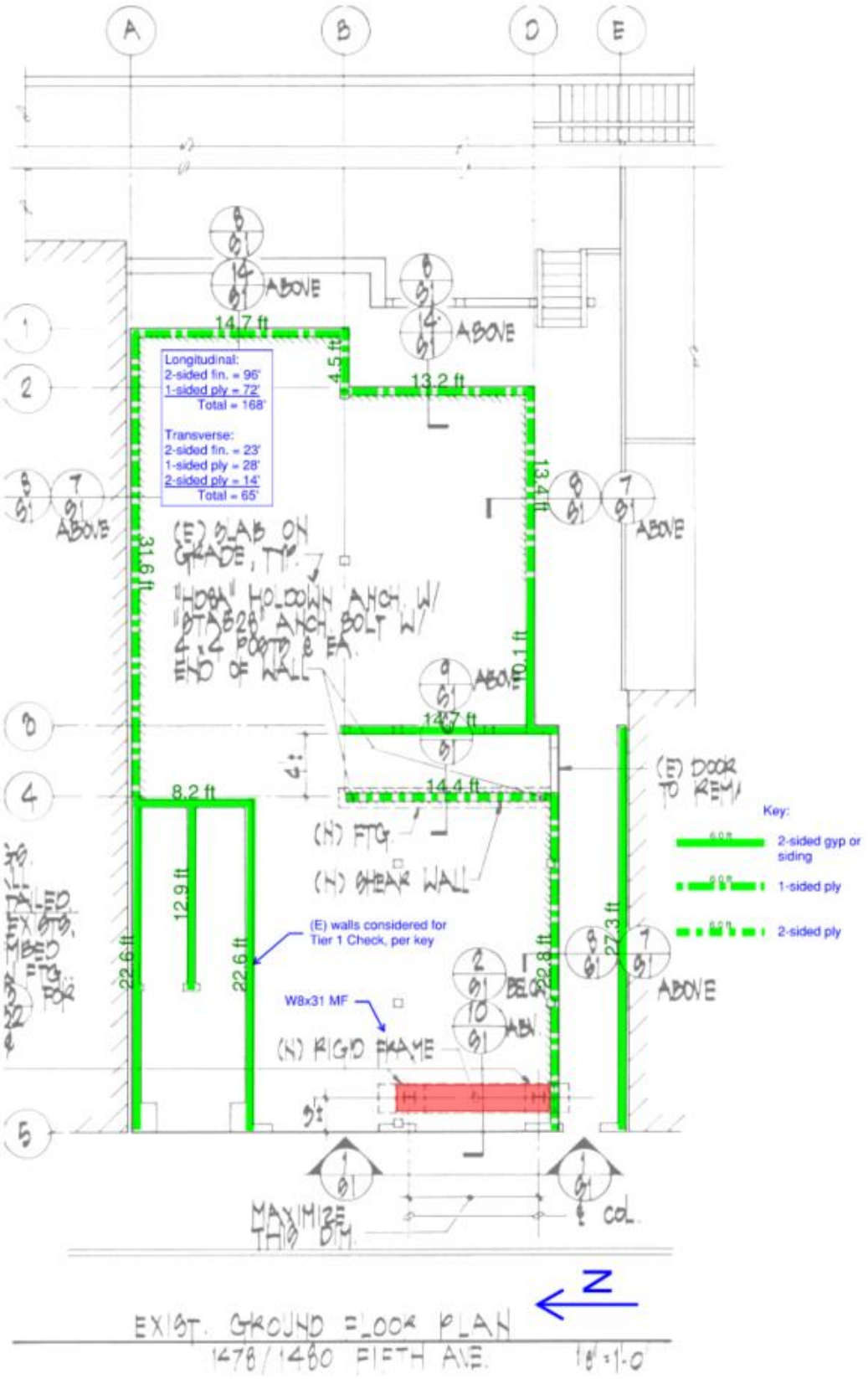

Figure 1 - Basement/Garage Floor Plan

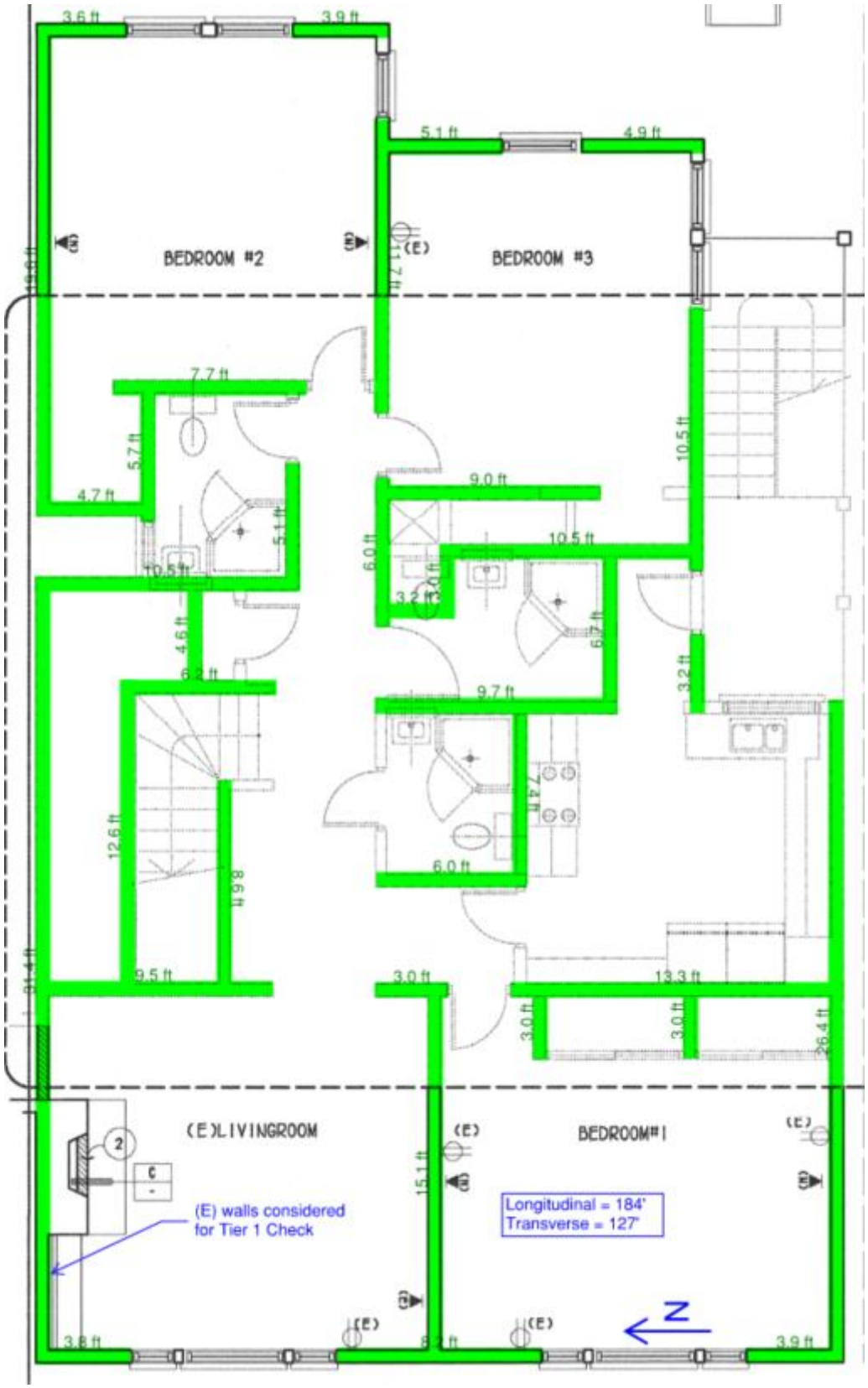

Figure 2 - First Floor Plan

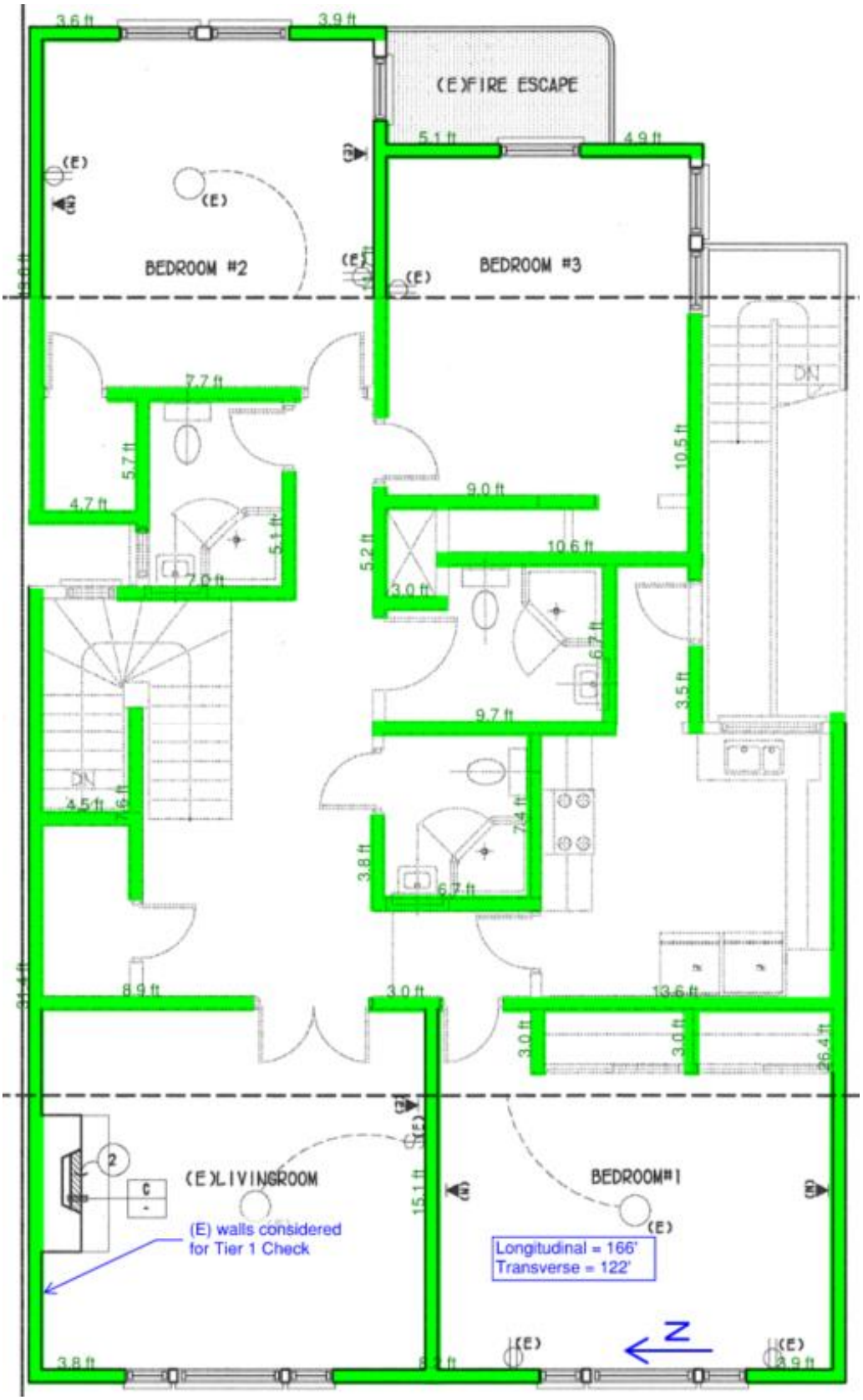

Figure 3 - Second Floor Plan

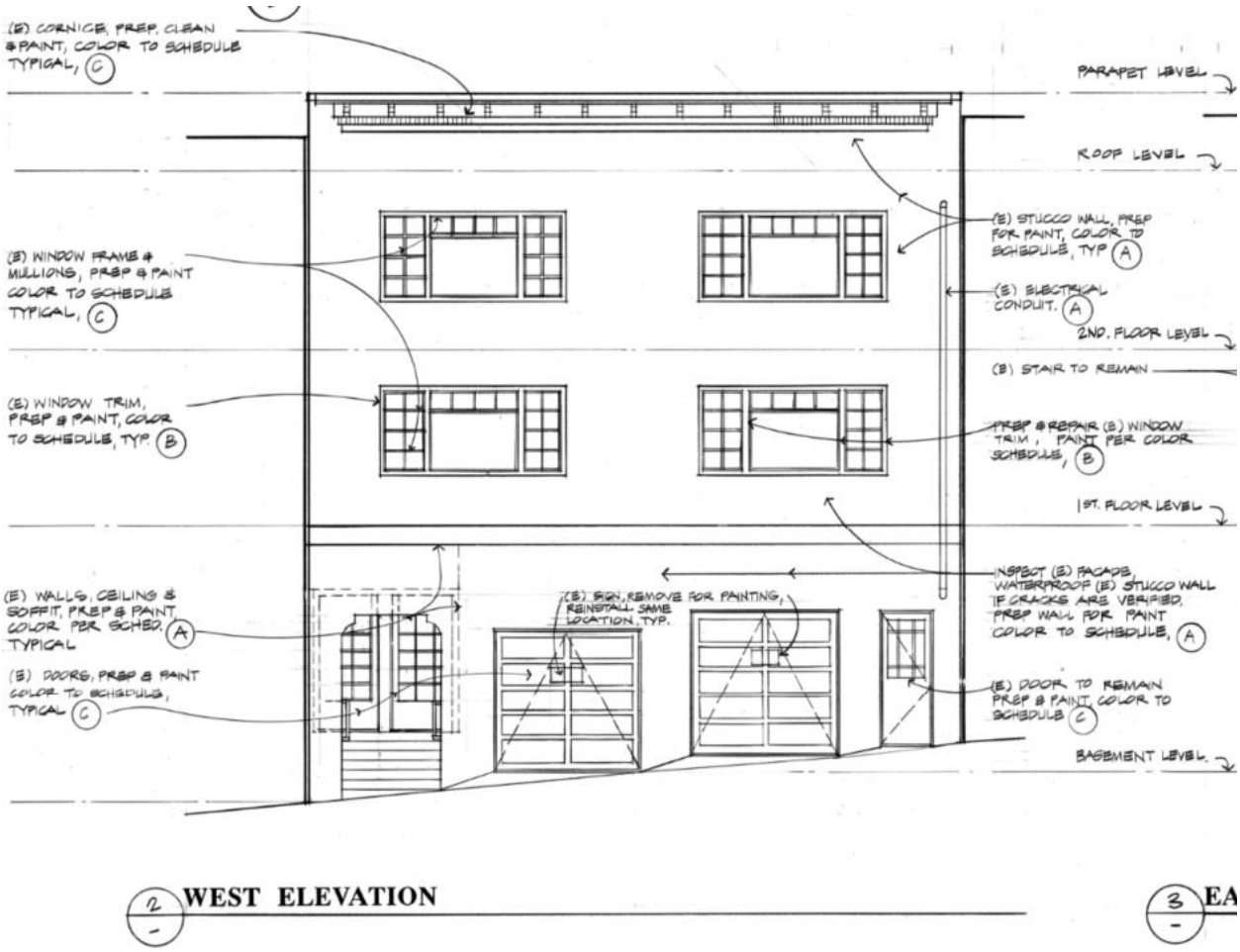

Figure 4 - Exterior Elevation (West Elevation)

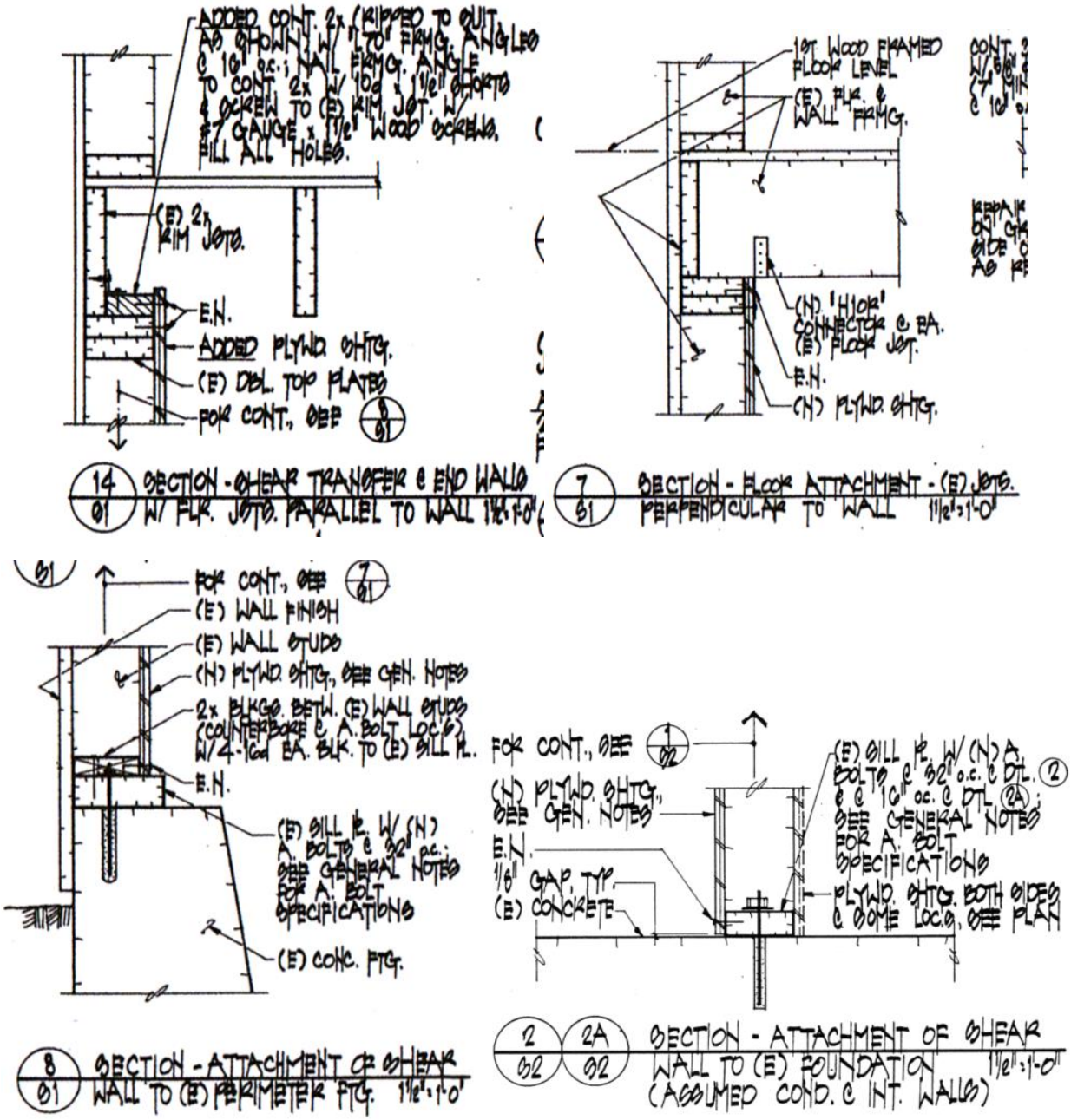

Figure 5 – Selected Structural Retrofit Details (1994 drawings)

Figure 6 - Building Separation to the North (Left) and South (Right)

Figure 7 – New Transverse Plywood Shearwall

Figure 8 – New Transverse Plywood Shearwall Holdown Hardware

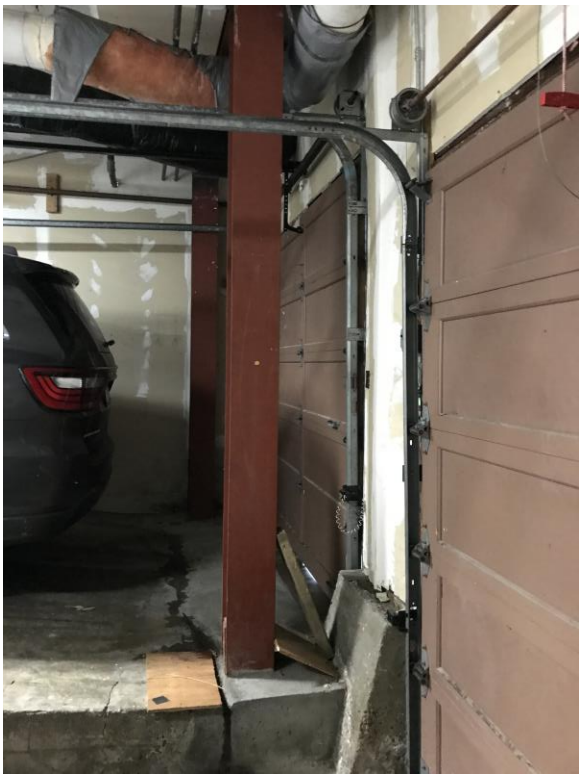

Figure 9 - New Transverse Moment Frame at South Parking Space

Figure 10 – Typical Interior Basement Post Without Connectors

Figure 11 – Braced Water Heaters

Figure 6 – Laundry and Storage Area

Appendix B

ASCE 41- 17 Tier 1 Checklists (Structural)

UC Campus:	San Francisco			Date:	1/5/2020		
Building CAAN:	2028	Auxiliary CAAN:		By Firm:	Estructure		
Building Name:	1478-80 5th Avenue			Initials:	*AJS*	Checked:	*MTP*
Building Address:	1478-80 5th Avenue, San Francisco, CA 94122			Page:	1	of	3

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

LOW SEISMICITY

BUILDING SYSTEMS - *GENERAL*

C	NC	N/A	U	Description
○	●	○	○	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation. (Commentary: Sec. A.2.1.1. Tier 2: Sec. 5.4.1.1) **Comments:** Based on the age of construction, it is presumed detailing does not provide transfer of forces between walls and levels of the building.
○	●	○	○	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.25% of the height of the shorter building in low seismicity, 0.5% in moderate seismicity, and 1.5% in high seismicity. (Commentary: Sec. A.2.1.2. Tier 2: Sec. 5.4.1.2) **Comments:** Buildings on both sides are built close to the property line, with only about 2-1/2" and 2" to the north and south, respectively. The required distance is 1.5% of 30 ft or 5.4".
○	○	●	○	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure. (Commentary: Sec. A.2.1.3. Tier 2: Sec. 5.4.1.3) **Comments:**

BUILDING SYSTEMS - *BUILDING CONFIGURATION*

C	NC	N/A	U	Description
●	○	○	○	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above. (Commentary: Sec. A2.2.2. Tier 2: Sec. 5.4.2.1) **Comments:**
○	○	○	●	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above. (Commentary: Sec. A.2.2.3. Tier 2: Sec. 5.4.2.2) **Comments:**

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ASCE 41-17
Collapse Prevention Basic Configuration Checklist

C	NC	N/A	U	
○	●	○	○	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation. (Commentary: Sec. A.2.2.4. Tier 2: Sec. 5.4.2.3) **Comments:** Some walls are discontinuous between the ground and first story.
●	○	○	○	GEOMETRY: There are no changes in the net 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. (Commentary: Sec. A.2.2.5. Tier 2: Sec. 5.4.2.4) **Comments:**
●	○	○	○	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered. (Commentary: Sec. A.2.2.6. Tier 2: Sec. 5.4.2.5) **Comments:**
●	○	○	○	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension. (Commentary: Sec. A.2.2.7. Tier 2: Sec. 5.4.2.6) **Comments:**

MODERATE SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN addition TO THE ITEMS FOR LOW SEISMICITY)

GEOLOGIC SITE HAZARD

				Description
C	NC	N/A	U	
●	○	○	○	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2m) under the building. (Commentary: Sec. A.6.1.1. Tier 2: 5.4.3.1) **Comments:**
●	○	○	○	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure. (Commentary: Sec. A.6.1.2. Tier 2: 5.4.3.1) **Comments:**

Note: **C =** Compliant **NC =** Noncompliant **N/A =** Not Applicable **U =** Unknown

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ASCE 41-17
Collapse Prevention Basic Configuration Checklist

MODERATE SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN addition TO THE ITEMS FOR LOW SEISMICITY)

GEOLOGIC SITE HAZARD

C	NC	N/A	U	
◉	○	○	○	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated. (Commentary: Sec. A.6.1.3. Tier 2: 5.4.3.1) **Comments:**

HIGH SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN ADDITION TO THE ITEMS FOR MODERATE SEISMICITY)

FOUNDATION CONFIGURATION

				Description
C	NC	N/A	U	
○	◉	○	○	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$. (Commentary: Sec. A.6.2.1. Tier 2: Sec. 5.4.3.3) **Comments:** 0.6 Sa = 0.6 * 1.878 = 1.127 Base = 32 ft; height = 30 ft Base/Height = 1.067 < 1.127
C	NC	N/A	U	
○	○	◉	○	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C. (Commentary: Sec. A.6.2.2. Tier 2: Sec. 5.4.3.4) **Comments:** Site class C.

Note: **C =** Compliant **NC =** Noncompliant **N/A =** Not Applicable **U =** Unknown

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ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

LOW AND MODERATE SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

C	NC	N/A	U	Description
●	○	○	○	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.2.1.1. Tier 2: Sec. 5.5.1.1) **Comments:**
○	●	○	○	SHEAR STRESS CHECK: The shear stress in the shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the following values: (Commentary: Sec. A.3.2.7.1. Tier 2: Sec. 5.5.3.1.1) Structural panel sheathing: 1,000 lb/ft (14.6 kN/m) Diagonal sheathing: 700 lb/ft (10.2 kN/m) Straight sheathing: 100 lb/ft (1.5 kN/m) All other conditions: 100 lb/ft (1.5 kN/m) **Comments:** Walls at the first and second floors do not pass the quick check in either direction. At the first floor, the wall stresses in the quick check are 410 plf in the east-west direction and 835 plf in the north-south direction compared with the allowable 200 plf. Note the ground floor capacity is based on the weighted average of wall capacities per the attached calculations. Where sheathing occurs on both sides, capacities are doubled.
○	●	○	○	STUCCO (EXTERIOR PLASTER) SHEAR WALLS: Multi-story buildings do not rely on exterior stucco walls as the primary seismic-force-resisting system. (Commentary: Sec. A.3.2.7.2. Tier 2: Sec. 5.5.3.6.1) **Comments:** The front wall is stucco and was considered in the quick check calculation.
○	●	○	○	GYPSUM WALLBOARD OR PLASTER SHEAR WALLS: Interior plaster or gypsum wallboard is not used for shear walls on buildings more than one story high with the exception of the uppermost level of a multi-story building. (Commentary: Sec. A.3.2.7.3. Tier 2: Sec. 5.5.3.6.1) **Comments:** Interior walls provide much of the shear resistance, particularly in the transverse (north-south) direction.
○	●	○	○	NARROW WOOD SHEAR WALLS: Narrow wood shear walls with an aspect ratio greater than 2-to-1 are not used to resist seismic forces. (Commentary: Sec. A.3.2.7.4. Tier 2: Sec. 5.5.3.6.1) **Comments:** Some of the walls considered for the quick check have an aspect ratio greater than 2 to 1.

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

C	NC	N/A	U	
○	●	○	○	WALLS CONNECTED THROUGH FLOORS: Shear walls have an interconnection between stories to transfer overturning and shear forces through the floor. (Commentary: Sec. A.3.2.7.5. Tier 2: Sec. 5.5.3.6.2) **Comments:** Existing drawings showing wall details are not provided but it is presumed there are no ties between floors to transfer load between floors at the upper floors.
●	○	○	○	HILLSIDE SITE: For structures that are taller on at least one side by more than one-half story because of a sloping site, all shear walls on the downhill slope have an aspect ratio less than 1-to-1. (Commentary: Sec. A.3.2.7.6. Tier 2: Sec. 5.5.3.6.3) **Comments:** While the site slopes down to the northwest, it does not appear the change in elevation across the transverse direction of the building is greater than one-half story.
●	○	○	○	CRIPPLE WALLS: Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels. (Commentary: Sec. A.3.2.7.7. Tier 2: Sec. 5.5.3.6.4) **Comments:** Although not visible, it is our understanding that the basement cripple walls were sheathed with wood structural panels based on the 1994 drawings and confirmed by the engineer of record, Tom Butzback.
○	○	●	○	OPENINGS: Walls with openings greater than 80% of the length are braced with wood structural panel shear walls with aspect ratios of not more than 1.5-to-1 or are supported by adjacent construction through positive ties capable of transferring the seismic forces. (Commentary: Sec. A.3.2.7.8. Tier 2: Sec. 5.5.3.6.5) **Comments:** The garage openings exceed 80% of the length of the front wall. However, a moment frame is providing lateral resistance to this line.

CONNECTIONS

C	NC	N/A	U	Description
○	○	○	●	WOOD POSTS: There is a positive connection of wood posts to the foundation. (Commentary: Sec. A.5.3.3. Tier 2: Sec. 5.7.3.3) **Comments:** All posts were concealed by finishes.
●	○	○	○	WOOD SILLS: All wood sills are bolted to the foundation. (Commentary: Sec. A.5.3.4. Tier 2: Sec. 5.7.3.3) **Comments:** All wood sills in the basement space were concealed. However, anchor bolts were to be added per the 1994 retrofit.
○	○	○	●	GIRDER-COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support. (Commentary: Sec. A.5.4.1. Tier 2: Sec. 5.7.4.1) **Comments:** All posts were concealed by finishes.

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

HIGH SEISMICITY (COMPLETE THE FOLLOWING ITEMS IN ADDITION TO THE ITEMS FOR LOW AND MODERATE SEISMICITY)

CONNECTIONS

C	NC	N/A	U	Description
●	○	○	○	WOOD SILL BOLTS: Sill bolts are spaced at 6 ft or less with acceptable edge and end distance provided for wood and concrete. (Commentary: Sec. A.5.3.7. Tier 2: Sec. 5.7.3.3) **Comments:** All wood sills in the basement space were concealed. However, anchor bolts were to be added per the 1994 retrofit.

DIAPHRAGMS

C	NC	N/A	U	Description
●	○	○	○	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints. (Commentary: Sec. A.4.1.1. Tier 2: Sec. 5.6.1.1) **Comments** No split levels or expansion joints.
○	○	○	●	ROOF CHORD CONTINUITY: All chord elements are continuous, regardless of changes in roof elevation. (Commentary: Sec. A.4.1.3. Tier 2: Sec. 5.6.1.1) **Comments:** Chords are at one elevation. However, existing drawings showing splice details are not available.
●	○	○	○	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered. (Commentary: Sec. A.4.2.1. Tier 2: Sec. 5.6.2) **Comments:** First floor sheathing type is unknown, although walls are distributed throughout such that diaphragms have aspect ratios below 2-to-1.
●	○	○	○	SPANS: All wood diaphragms with spans greater than 24 ft (7.3 m) consist of wood structural panels or diagonal sheathing. (Commentary: Sec. A.4.2.2. Tier 2: Sec. 5.6.2) **Comments:** First floor sheathing type is unknown, but no spans are greater than 24 ft.
●	○	○	○	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft (12 m) and have aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2) **Comments:** All diaphragms span less than 40 ft.

UC Campus:	San Francisco			Date:	1/5/2020		
Building CAAN:	2028	Auxiliary CAAN:		By Firm:	Estructure		
Building Name:	1478-80 5th Avenue			Initials:	*AJS*	Checked:	*MTP*
Building Address:	1478-80 5th Avenue, San Francisco, CA 94122			Page:	4	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type W1-W1A

C	NC	N/A	U	
○	○	◉	○	OTHER DIAPHRAGMS: The diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Commentary: Sec. A.4.7.1. Tier 2: Sec. 5.6.5) **Comments:**

Appendix C

UCOP Seismic Safety policy Falling Hazards Assessment Summary

UC Campus:	San Francisco			Date:	1/5/2020		
Building CAAN:	2028	Auxiliary CAAN:		By Firm:	Estructure		
Building Name:	1482-80 5th Avenue			Initials:	*AJS*	Checked:	*MTP*
Building Address:	1482-80 5th Avenue, San Francisco, CA 94122			Page:	1	of	1

UCOP SEISMIC SAFETY POLICY
Falling Hazard Assessment Summary

	Description
P ☐ N/A ☒	**Heavy ceilings, features or ornamentation above large lecture halls, auditoriums, lobbies, or other areas where large numbers of people congregate (50 ppl or more)** **Comments:**
P ☐ N/A ☒	**Heavy masonry or stone veneer above exit ways or public access areas** **Comments:**
P ☐ N/A ☒	**Unbraced masonry parapets, cornices, or other ornamentation above exit ways or public access areas** **Comments:**
P ☐ N/A ☒	**Unrestrained hazardous material storage** **Comments:**
P ☐ N/A ☒	**Masonry chimneys** **Comments:** No chimney could be seen.
P ☐ N/A ☒	**Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.** **Comments:** The water heaters were restrained.
P ☐ N/A ☐	**Other:** **Comments:**
P ☐ N/A ☐	**Other:** **Comments:**
P ☐ N/A ☐	**Other:** **Comments:**

Falling Hazards Risk: *Low*

Note: P= Present, N/A = Not Applicable; Falling Hazards Risk: Low, Moderate, or High

Appendix D

Quick Check Calculations

Dead loads & Seismic Weight Calculation				
Roof Assembly				
Roofing		3	*psf*	*Estimate, Assume Asphalt Shingles*
Sheathing		3	*psf*	*Estimate, Assumed 1x Sheathing*
Roof Joists		6	*psf*	*Estimate, Assumed 2x10 @16*
Ceiling		9	*psf*	
MEP		0.5	*psf*	
Misc		0.5	*psf*	
Walls		5	*psf*	
Total	∑	**27**	**psf**	*Flat Roof*
Floor Assembly				
Flooring		2	*psf*	*Estimate, Assume Carpet*
Sheathing		3	*psf*	*Estimate, Assumed 1x Sheathing*
Wood Framing		6	*psf*	*Estimate, Assumed 2x10 @16*
Ceilings		2.25	*psf*	*Estimate, 5/8" Gyp Board*
MEP		0.5	*psf*	
Misc		0.5	*psf*	
Partitions		*10*	*psf*	
Total	∑	**24**	**psf**	
Deck Assembly				
Decking		5	*psf*	*2x*
Framing		6	*psf*	*Estimate, Assumed 2x10 @16*
Guardrails and Misc		2	*psf*	
Total	∑	**13**	**psf**	
Exterior Wall Assembly - Wood Siding				
Finish		2	*psf*	*Estimate, Wood Siding*
Sheathing		3	*psf*	*Estimate, Assumed 1x Sheathing*
Wood Framing		1.5	*psf*	*Estimate, Assumed 2x6 @16*
Insulation		0.5	*psf*	
Interior Finish		2.25	*psf*	*Estimate, 5/8" Gyp Board*
MEP		0.5	*psf*	
Misc		0.5	*psf*	
Total	∑	**10**	**psf**	
Exterior Wall Finish - Stucco				
Finish		10	*psf*	*Estimate, Stucco, less wood siding*
		-2	*psf*	*Less wood siding*
Total	∑	**8**	**psf**	Add to typical ext. wall assembly, where occurs

Level 3 (Roof)				
Roof Assembly	p	27	*psf*	
	A	1,500	*ft²*	
	Wt	**40.50**	***kips***	
Exterior Wall - Wood	p	10	*psf*	
	h_{trib}	7	*ft*	*Half approximate floor height + 2' parapet*
	L	180	*ft*	
	Wt	**12.92**	***kips***	
Exterior Wall - Stucco	p	8	*psf*	
	h_{trib}	7	*ft*	*Half approximate floor height + 2' parapet*
	L	32	*ft*	*Along front wall only*
	Wt	**1.79**	***kips***	
Seismic Weight	ΣW_{typ}	**55**	**kips**	

Level 2				
Floor Assembly	p	24	*psf*	
	A	1,500	*ft²*	
	Wt	**36.38**	***kips***	
Deck Assembly	p	13	*psf*	
	A	1	*ft*	*Approximate floor height*
	Wt	**0.01**	***kips***	
Exterior Wall - Wood	p	10	*psf*	
	h_{trib}	10	*ft*	*Approximate floor height*
	L	180	*ft*	
	Wt	**18.46**	***kips***	
Exterior Wall - Stucco	p	8	*psf*	
	h_{trib}	10	*ft*	*Approximate floor height*
	L	32	*ft*	*Along front wall only*
	Wt	**2.56**	***kips***	
Seismic Weight	ΣW_{typ}	**57**	**kips**	

Level 1				
Floor Assembly	p	24	*psf*	
	A	1,500	*ft²*	
	Wt	**36.38**	***kips***	
Exterior Wall - Wood	p	10	*psf*	
	h_{trib}	10	*ft*	*Approximate floor height*
	L	180	*ft*	
	Wt	**18.46**	***kips***	
Exterior Wall - Stucco	p	8	*psf*	
	h_{trib}	5	*ft*	*Half approximate floor height*
	L	32	*ft*	*Along front wall only*
	Wt	**1.28**	***kips***	
Seismic Weight	ΣW_{typ}	**56**	**kips**	

Earthquake	Site Parameters - UCSF Group 3 Buildings – Tier 1 Geotechnical Assessment, Egan (2019)		
BSE-C	S_s = 1.565	F_a = 1.2	S_{Cs} = 1.878
	S_1 = 0.618	F_v = 1.4	S_{C1} = 0.865

Building Period				
Empirical factor	C_t	0.02		*ASCE 41-17 Sec. 4.4.2.4*
Roof level height	h	30	ft	*ASCE 7-18, 11.2*
Empirical factor	β	0.75		*ASCE 41-17 Sec. 4.4.2.4*
Fundamental period, $T= C_t h_n^{\beta}$ =		0.256	sec	*ASCE 41-17 Sec. 4.4.2.4 eqn. 4-4*

Calculate Base Shear				
Spectral Acceleration	$S_a = S_{X1} / T$ =	3.37		*ASCE 41-17, 4.4.2.3*
	$S_{a,max} = S_{XS}$ =	1.878	*governs*	*ASCE 41-17, 4.4.2.3*
Modification Factor	C =	1.00		*ASCE 41-17, Table 4-7*
Pseudo Seismic Force	$V = S_a \times C \times W$ =	1.88 x W		*ASCE 41-17, Eqn. 4-1*
	V =	**317**	**kips**	

Seismic Force Vertical Distribution						
Level	Weight (kips)	Height (ft)	$w_x h_x$ (kip_ft)	$C_{vx} = w_x h_x / \sum w_x h_x$	$F_x = C_{vx} V$	Story Shear, V
3rd	55	30.00	1656	0.50	159	159
2nd	57	19.00	1091	0.33	104	263
1st	56	10.00	561	0.17	54	317
∑	*169*	∑	*3308*	*1.00*	*317*	

Longitudinal Direction (East-West)							
Story	Story Shear (kips)	Length of Wall (ft)	M_s Factor (ASCE 41-17, Table 4-8)	Average Story Shear Stress (plf)	Quick Check Shear Capacity[1] (plf)	Pass? (Y/N)	Lvl N Strength / Lvl N+1 Strength
2	159	166	4.5	212	200	N	--
1	263	184	4.5	318	200	N	111%
Ground	317	168	4.5	419	543 [2]	Y	248%

Transverse Direction (North-South)							
Story	Story Shear (kips)	Length of Wall (ft)	M_s Factor (ASCE 41-17, Table 4-8)	Average Story Shear Stress (plf)	Quick Check Shear Capacity[1] (plf)	Pass? (Y/N)	Lvl N Strength / Lvl N+1 Strength
2	159	122	4.5	289	200	N	--
1	263	127	4.5	460	200	N	104%
Ground	250 [3]	65	4.5	854	862 [2]	Y	220%

Notes:

1. Shear capacity is doubled where walls are covered on both sides.

2. Weighted Ground Floor Capacity, Longitudinal

Assembly	Capacity (plf)		Length (ft)	Capacity (lbs)
2-sided fin.	200		96	19,200
1-sided ply	1,000		72	72,000
		Σ	168	91,200
			ΣCapacity / ΣLength =	543 plf

Weighted Ground Floor Capacity, Transverse

Assembly	Capacity (plf)		Length (ft)	Capacity (lbs)
2-sided fin.	200		23	4,600
1-sided ply	1,000		28	28,000
2-sided ply	2,000		14	28,000
		Σ	65	56,000
			ΣCapacity / ΣLength =	862 plf

3. Story shear is shared with the moment frame per ASCE 41-17 Section 3.4.1.2.2.1.

Steel Moment Frame (Flexible Diaphragm, S1a) Quick Check				
Total Long. Bldg Length	L =	54	*ft*	
Tributary Area	L_{trib} =	11.5	ft	
Total Story Shear	V =	317	*k*	
Tributary Shear	V_j =	67	*k*	
System Mod. Factor	M_s =	9		*Collapse Prevention*
No. Frame Columns	n_c =	2		
No. Frames	n_f =	1		
Story Height	h =	120	*in*	
Column Plastic Modulus	Z_c =	30.4	in^3	*W8x31*
Beam Plastic Modulus	Z_b =	30.4	in^3	*W8x31*
	ΣZ_c =	60.8	in^3	
	ΣZ_b =	60.8	in^3	
Flex. Stress in Frame	$f_j^{avg} = Vj\frac{1}{M_s}\left(\frac{n_c}{n_c - nf}\right)\left(\frac{h}{2}\right)\frac{1}{Z}$			*ASCE 41-17, Eqn. 4-14*
Column	f_j^{avg} =	14.7	*ksi*	
Beam	f_j^{avg} =	14.7	*ksi*	
Steel yield stress	f_y =	49	*ksi*	*ASTM A36, ASCE 41-17, Table 4-1*
		OK		