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

Date: 2020-11-03

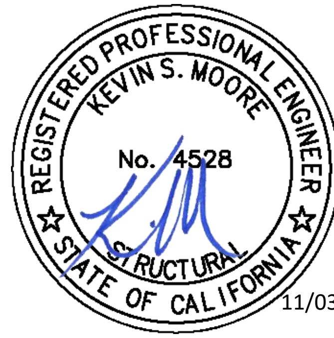
UCSF Building Seismic Ratings

Millberry Union, Parnassus Avenue

CAAN# *2212.2*

500 Parnassus Avenue, San Francisco, CA 94131

UCSF Campus Site: *Parnassus*



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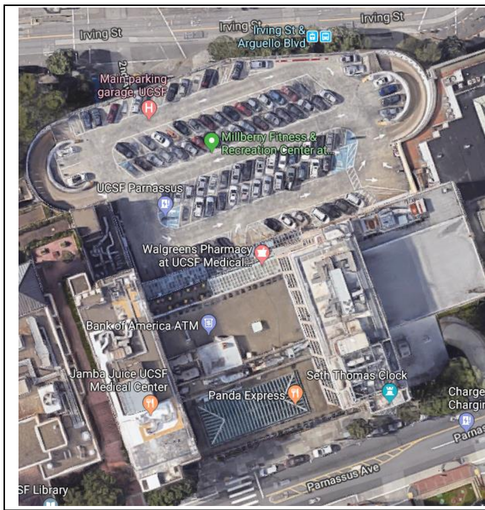
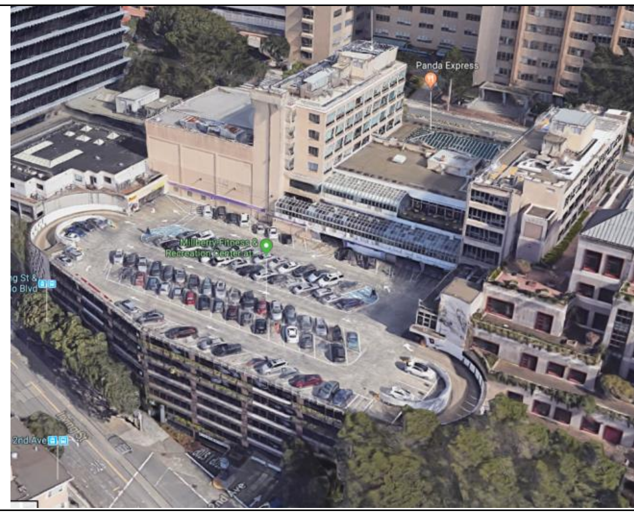




Rating summary	Entry	Notes
UC Seismic Performance Level (rating)	V	Findings based on drawing review and ASCE 41-17 Tier 1 evaluation[1]
Rating basis	Tier 1	ASCE 41-17
Date of rating	2019	
Recommended UCSF priority category for retrofit	Priority A	Priority A=Retrofit ASAP Priority B=Retrofit at next permit application for modification
Ballpark total project cost to retrofit to IV rating	Medium ($50 - $200/sf)	See recommendations on further evaluation and retrofit.
Is 2018-2019 rating required by UCOP?	Yes	Building previously rated IV but does not have a fully documented previous review
Further evaluation recommended?	Tier 2	If desired, further evaluation of framing is warranted

[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

- "Combined Structure – Unit No. 1 (Quarter of nurses, interns, and resident staff; student union, including physical education and recreation facilities; and parking garage)" structural drawings, Milton T. Pflueger (Architect) and Huber & Knapik (Civil Engineers), dated 14 July 1955.
- "Combined Structure – Unit No. 2" structural drawings, Milton T. Pflueger (Architect) and Huber & Knapik (Civil Engineers), dated 21 May 1958.
- "Student Residence (Combined Structure – Unit #3)" structural drawings, Milton T. Pflueger (Architect) and Huber & Knapik (Civil Engineers), dated 17 January 1958.
- *Performance of UCSF Buildings During the October 17, 1989 Loma Prieta Earthquake*, Impell Corporation, dated 17 November 1989.

Scope for completing this form

Reviewed original structural construction drawings and performed an ASCE 41-17 Tier 1 evaluation. Made a brief site visit of building exterior. Did not evaluate nonstructural life-safety hazards inside the building.

Brief description of structure

The building comprises about half of the 400,000 sq ft Millberry combined structure. The structure was constructed in phases described as Units No. 1, 2, and 3 in the original structural drawings.

- Units No. 1 and No. 3 encompass the student union building. The main building is five stories (Level C to Level 2). A tower on the west side of the building extends up three additional stories while the tower on the east side extends up four additional stories. The top two levels of the east tower (Level 5 and Roof) were constructed as the later Unit No. 3. The remainder of the Union building was included in the original Unit No. 1 construction.
- Unit No.2 is the seven-story (Level H to Level A) parking garage located north of the Union building.

The focus of this report is the Millberry Union building (Units No. 1 and No. 3). The majority of the building was designed and constructed circa 1955 as part of Unit No. 1. The additional stories at the east tower were constructed approximately three years later (circa 1958) as Unit No. 3. The steel columns at Unit No. 3 were welded to existing Unit No. 1 column top plates, providing a continuous vertical and lateral system.

There is no joint between the Garage and Union buildings. The Garage's slab reinforcing was welded to existing dowels extended from the Union's slabs at Levels A and B. Additionally, during the Garage's construction, a shared retaining wall was constructed from Level E to Level C and keyed into the existing Union's caisson foundations.

<u>Identification of Levels:</u> The building occurs on a sloping site. The levels are identified in the structural drawings as follows:

- Level C: EL 350 ft-0 in.
- Level B: EL 359 ft-6 in.
- Level A: EL 369 ft-6 in.
- Ground Floor: EL. 380 ft-0 in.
- Level 1: 396 ft-0 in.
- Level 2 and Low Roof: 409 ft-4 in.
- Level 3: 420 ft-4 in.

- Level 4: 431 ft-4 in.
- Level 5 and Roof (West Tower): 442 ft-4 in.
- Roof (East Tower): 454 ft-7 in.

The Union's Levels C through A are roughly aligned with the adjacent Garage's Level C through A.

Grade at the south side of the structure along Parnassus Avenue is at approximately EL. 393 ft, roughly aligned with the Union building's Level 1. (Note: Driveways slope down from Parnassus Avenue to reach the "Ground Floor" level.) Grade at the north side of the structure along Irving Street is at approximately EL. 307 ft-6 in., roughly aligned with the Garage building's Level H, five stories below the Union's lowest level.

Foundation System: The foundations for Units No. 1 and No. 3 are generally belled caissons below structural steel columns and shallow reinforced concrete foundation beams below reinforced concrete walls.

Structural System for Vertical (Gravity) Load: Columns located along the north building elevation are rectangular with #4 hoops and #3 cross-ties engaging all vertical bars. Hooks and ties are detailed with both 135-degree or 180-degree hooks. Hoop and tie spacing is identified as 3 in. at the top and bottom foot of the columns with the balance of hoops and ties spaced at 12 in. o.c.

Units No. 1 and No. 3 are similarly designed with typical floor framing comprising cast-in-place pan joists supported on steel wide-flange beams connected to steel wide-flange columns. The beams and columns are encased in concrete. Several areas of the structure utilize a one-way slab in lieu of pan joists. Four reinforced concrete stair towers are generally located at each corner of the building. The stair towers comprise reinforced concrete slabs supported on reinforced concrete walls on all four sides. A pool and gymnasium are located on the east side of Unit No. 1 and are surrounded by full-height perimeter reinforced concrete walls on three sides; the west (interior) side is open to the adjacent space. Steel wide-flange columns are embedded in pilasters that are part of the concrete walls.

Structural System for Lateral Loads: Buildings that comprise Units No. 1 and No. 3 have a structural steel moment frame lateral force resisting system. All beam to column connections are bolted flange/web plate connections. Where beams frame into column flanges, the flange connections comprise a "T" cut from a wide-flange shape that is bolted to both beam and column flanges. Where beams frame into column webs, the bottom beam flange sits on a steel haunch that is welded to the column web and bolted to the beam bottom flange. The top beam flange is bolted to a plate that is welded to the column web. In addition to the steel moment frames, several concrete walls will resist lateral load. Walls that are part of the stair towers and retaining walls at levels below grade will also contribute to the lateral force resistance of the buildings.

Brief description of seismic deficiencies and expected seismic performance

Identified seismic deficiencies of the building include the following:

- The buildings fail the drift check for steel moment frames.
- The buildings fail the column axial stress check.
- The buildings rely upon both frames and concrete walls, creating a situation where walls may interfere with the efficacy of concrete frames (or vice versa).
- The moment resisting connections in the buildings cannot develop the strength of adjoining members or panel zones.

- The steel frame panel zones are weak.
- A significant number of joints do not pass strong column-weak beam checks at the upper stories.

The items listed above will collectively affect the seismic performance of the building such that local failures may occur and negatively affect the global building performance. The complicated interaction between the three different Units, the varied structural materials and systems and the complicated and unbalanced load paths will all contribute to the buildings' vulnerability.

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	N	Liquefaction	N
Adjacent buildings	N	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 nonstructural life-safety concerns, including at exit routes.

An assessment of the nonstructural systems inside the building has not been performed, but could be performed as part of the Tier 2 evaluation.

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	Not visited	Unrestrained hazardous materials storage	Not visited
Heavy masonry or stone veneer above exit ways and public access areas	Not visited	Masonry chimneys	Not visited
Unbraced masonry parapets, cornices or other ornamentation above exit ways and public access areas	Not visited	Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.	Not visited

Basis of seismic performance level rating

The building rating of V can be attributed to the identified deficiencies.

Recommendations for further evaluation or retrofit:

The building is composed of structural systems that are known to have certain deficiencies that may be evaluated for contribution to undesirable behavior when subjected to seismic forces. The building shares a wall with the Millberry Garage, but this coincident structural element will likely not influence the seismic behavior of either building. Some level of strengthening may be required for the steel moment frame.

Peer review comments on rating

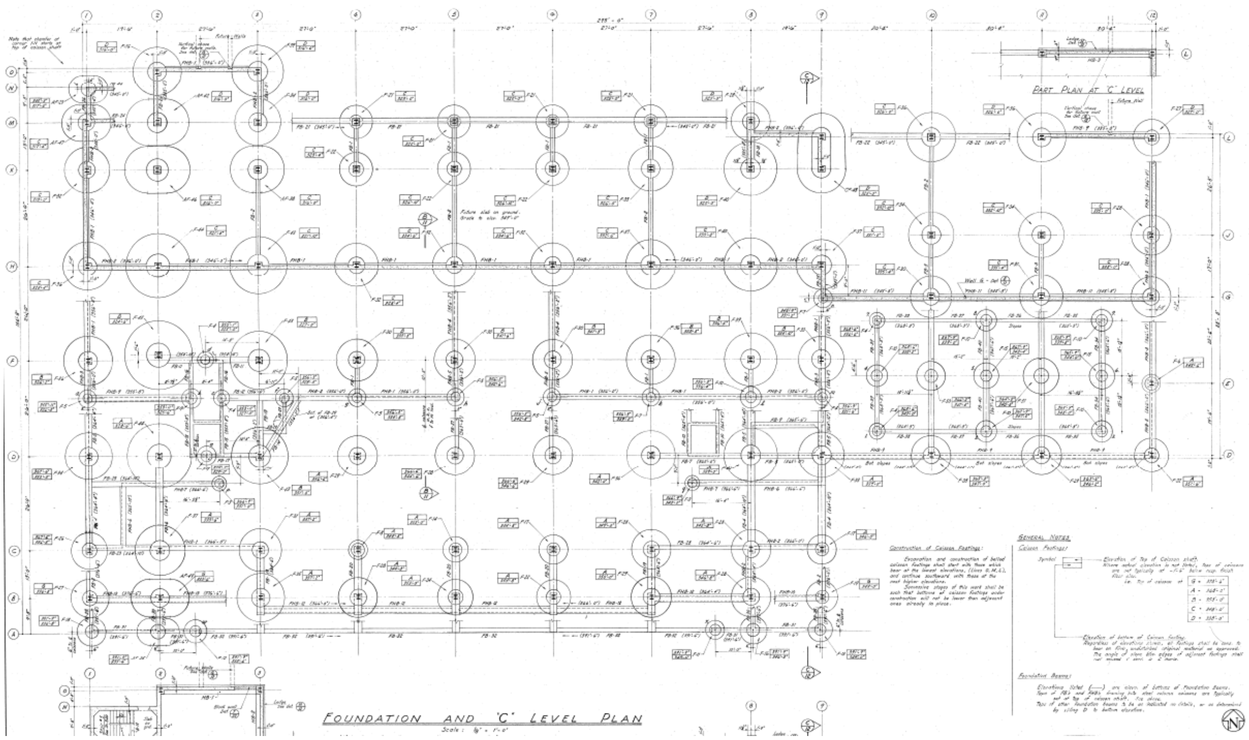
The structural members of the UCSF Seismic Review Committee (SRC) reviewed the evaluation on 25 June 2019 and agree with the rating of V.

Additional building data	Entry	Notes
Latitude	37.76365°	
Longitude	-122.45855°	
Are there other structures besides this one under the same CAAN#	No	
Number of stories above lowest perimeter grade	9	Top of building is 5 levels above grade at south side of building, 9 levels above grade at north side of building
Number of stories (basements) below lowest perimeter grade	0	Base of building is at grade at the north side, 4 levels below grade at the south side
Building occupiable area (OGSF)	170,000	Estimated from drawings
Risk Category per 2016 CBC 1604.5	III	Occupant load > 500 and contains educational occupancy above 12th grade.
Building structural height, h_n	104 ft	As defined per ASCE 7-16 Section 11.2
Coefficient for period, C_t	0.02	ASCE 41-17 equation 4-4 and 7-18
Coefficient for period, ⍰	0.8	ASCE 41-17 equation 4-4 and 7-18
Estimated fundamental period	1.44 sec	ASCE 41-17 equation 4-4 and 7-18
Site data		
975 yr hazard parameters S_s, S_1	1.543, 0.608	https://hazards.atcouncil.org/
Site class	D	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
Site class basis	Estimated	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
Site parameters F_a, F_v	1.0, 1.7	https://hazards.atcouncil.org/ describes *null for F_v (estimated)
Ground motion parameters S_{cs}, S_{c1}	1.543, 1.034	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
S_a at building period	0.716	Calculated
Site V_{s30}	305 m/s	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
V_{s30} basis	Estimated	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
Liquefaction potential	No	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)

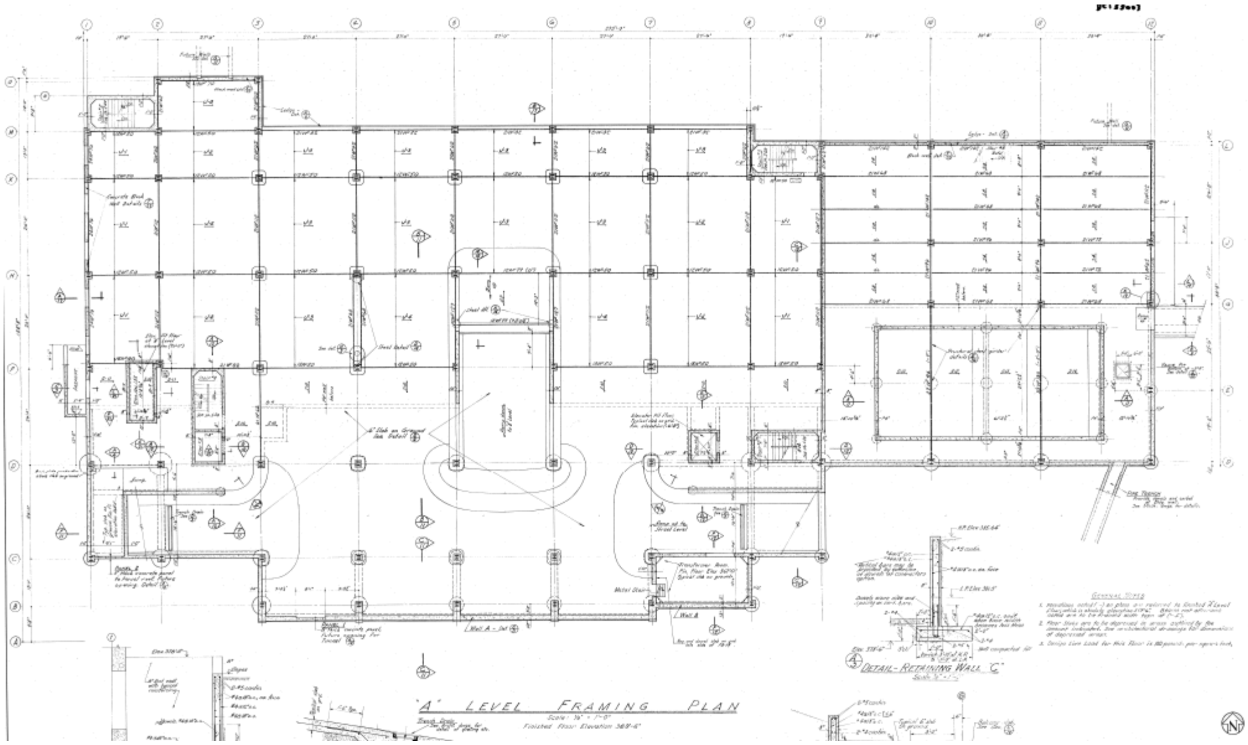
Additional building data	Entry	Notes
Liquefaction assessment basis	Estimated	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
Landslide potential	No	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
Landslide assessment basis	Sloping Site	Rutherford + Chekene Study, 2006
Active fault-rupture hazard identified at site?	No	UCSF Group 2 Buildings, Geotechnical Characteristics and Geohazards, Egan (2019)
Site-specific ground motion study?	No	
Applicable code		
Applicable code or approx. date of original construction	Unit No. 1 Drawings Dated 1955; Unit No. 3 Drawings Dated 1958	
Applicable code for partial retrofit	None	No partial retrofit known
Applicable code for full retrofit	None	No full retrofit known
Model building data		
Model building type North-South	S1	
Model building type East-West	S1	
FEMA P-154 score	N/A	Not included here because we performed ASCE 41 Tier 1 evaluation.
Previous ratings		
Most recent rating	IV	In spreadsheet. Basis for rating is unknown
Date of most recent rating	-	Rating date is unknown
Appendices		
ASCE 41 Tier 1 checklist included here?	Yes	Refer to attached checklist file

Appendix A

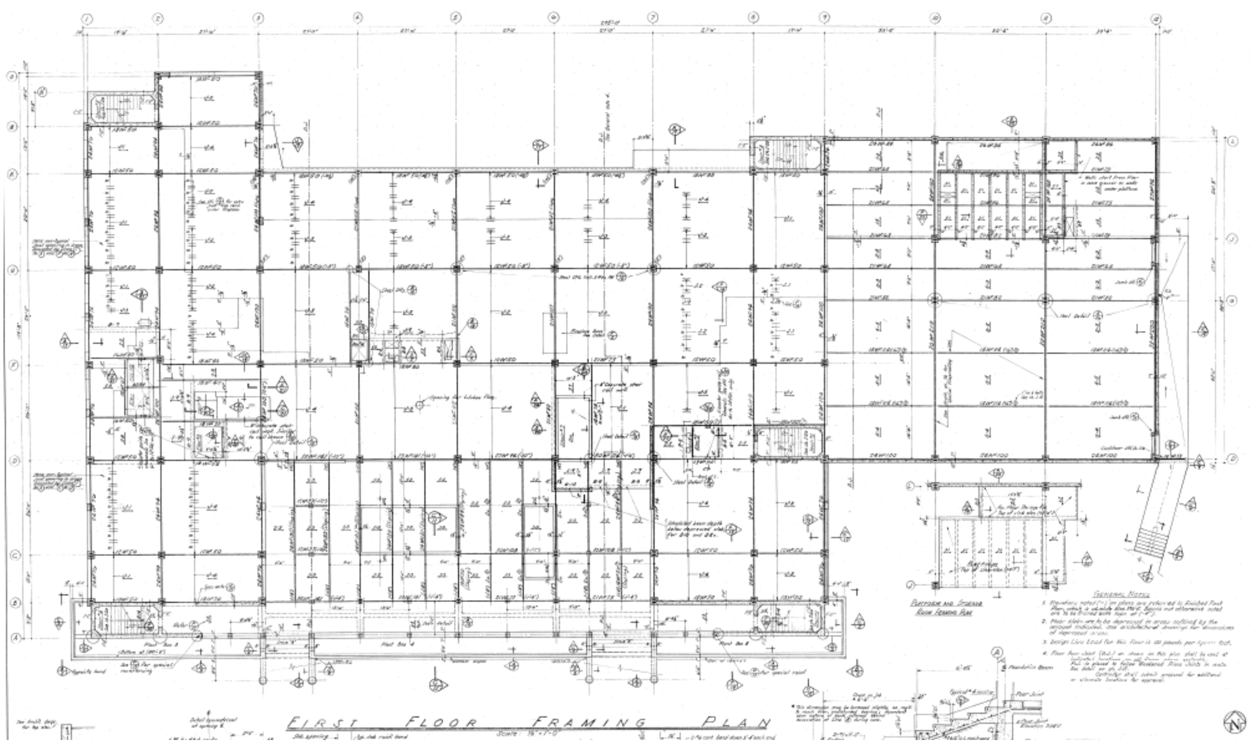
Drawing Images

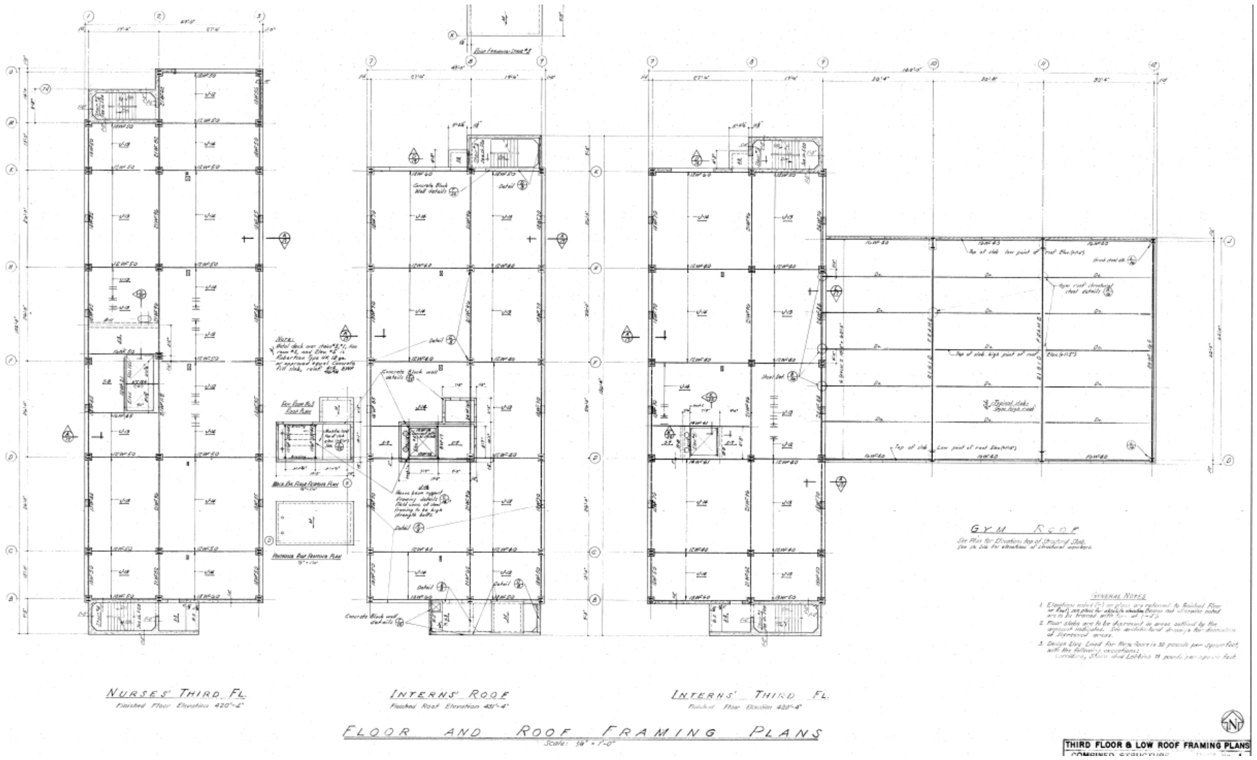


Building Foundation Plan

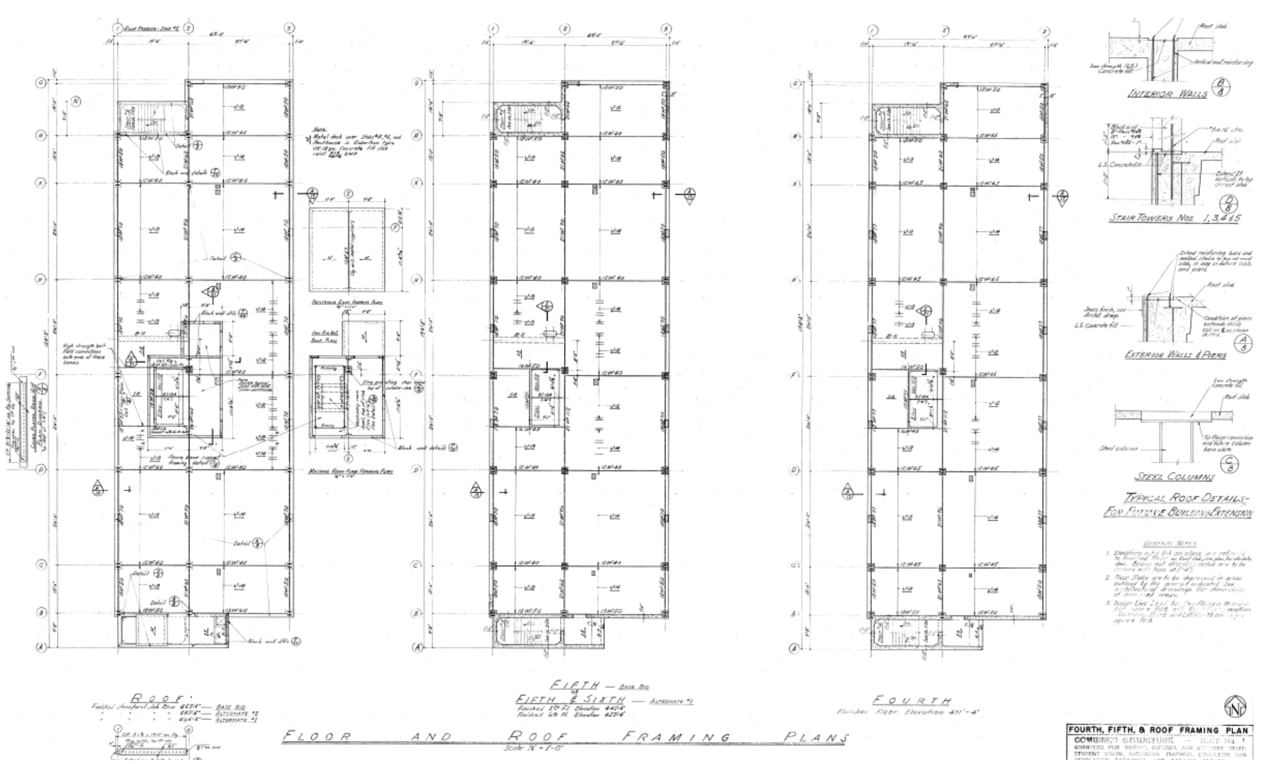


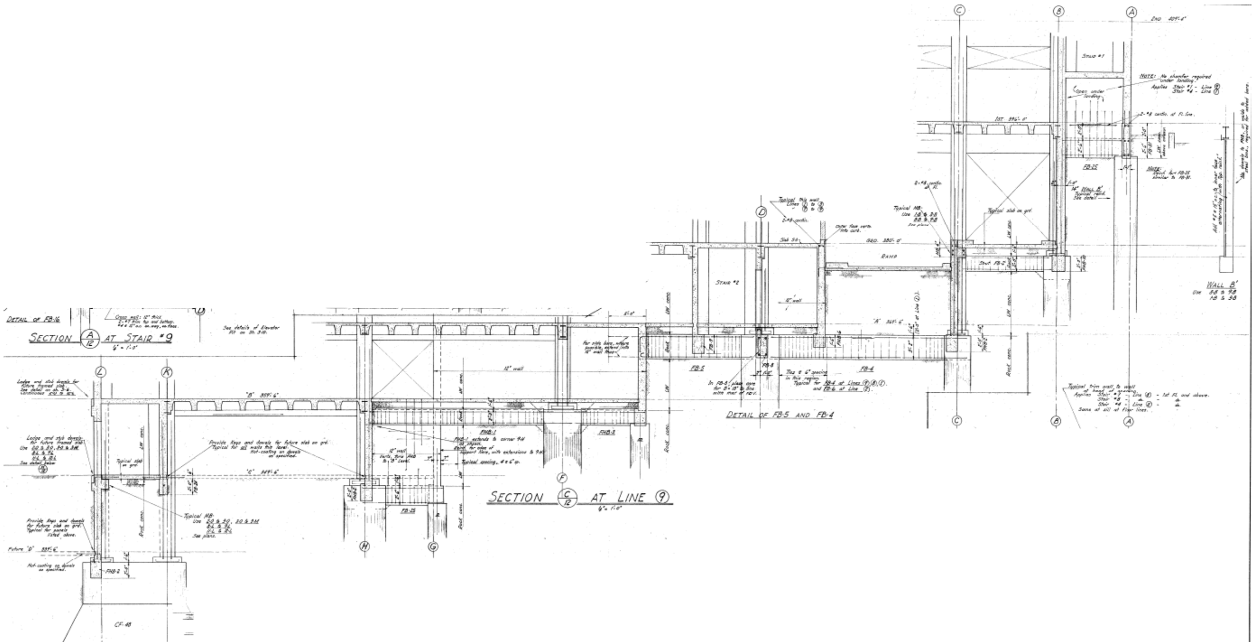
Building Plans



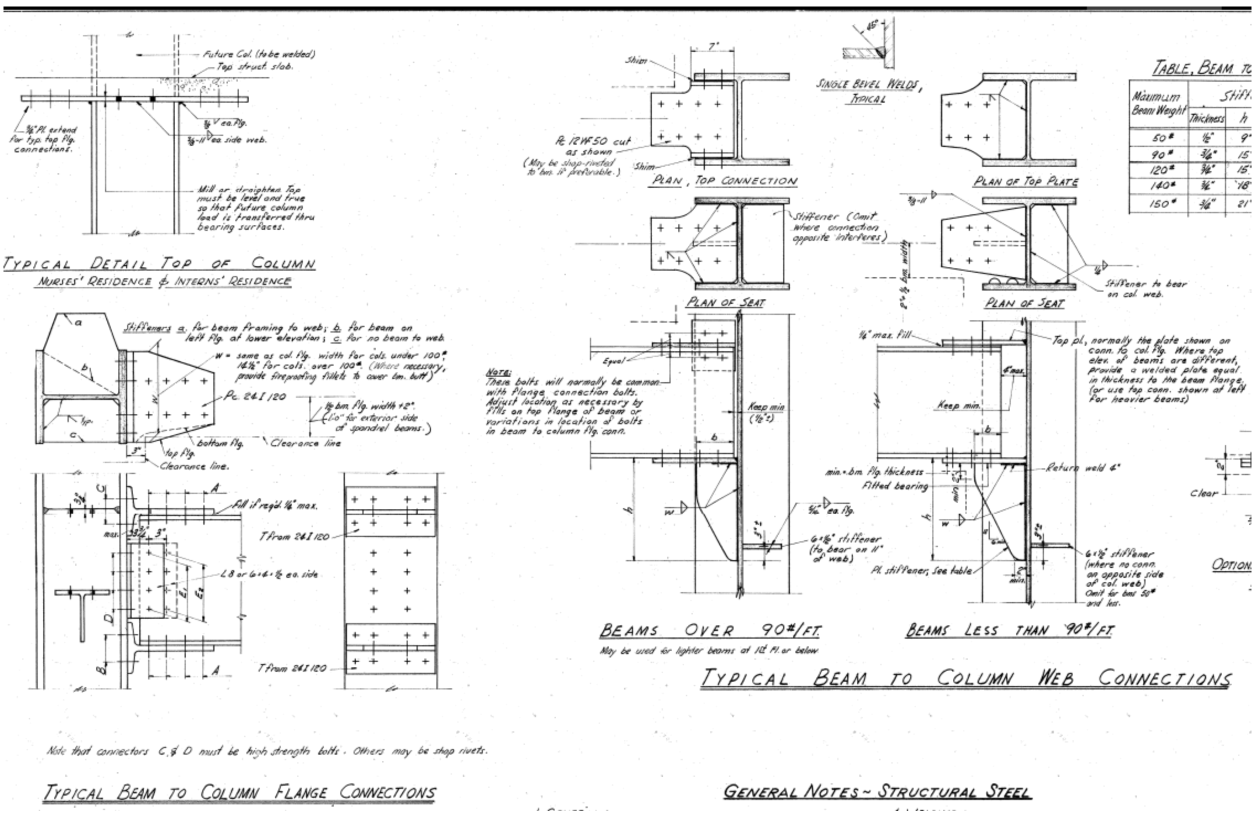


Building Plans

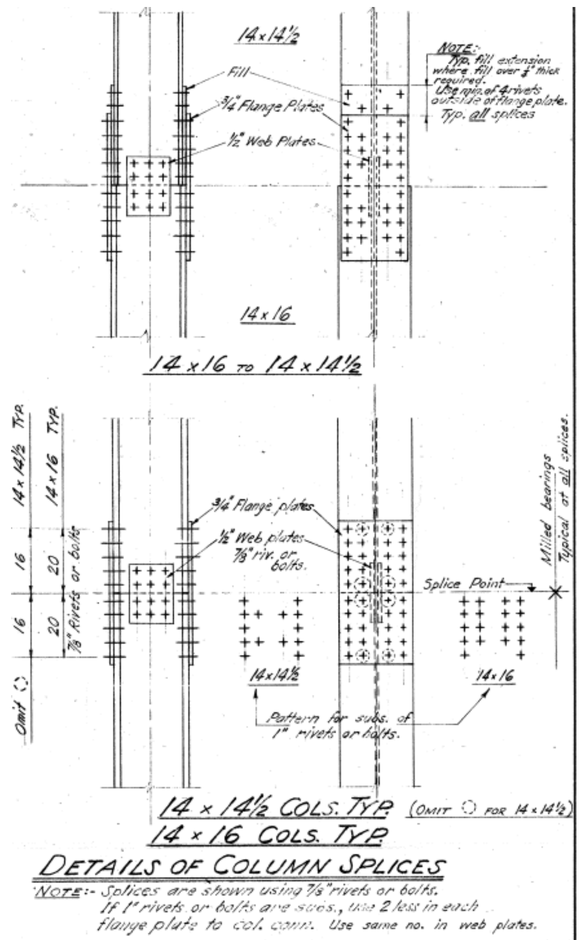




Building Section



Building Moment Frame Detail



Building Moment Frame Column Splice

Appendix B

Checklists

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

LOW SEISMICITY

BUILDING SYSTEMS - *GENERAL*

C NC N/A U	Description
C (selected)	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: Concrete diaphragms transfer load to steel moment frames which occur on most lines. Columns are anchored to caisson foundations.**
NC (selected)	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: Adjacent Garage building is tied to the Union building along Grids M and O with slab dowels (at Levels A & B) and a shared retaining wall (spanning between Level C to E).**
N/A (selected)	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
C (selected)	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: Columns decrease in size every two stories ascending up the building. Beams at a given floor are generally the same size or larger than the beams at the floor above.**
C (selected)	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: Columns decrease in size every two stories ascending up the building. Beams at a given floor are generally the same size or larger than the beams at the floor above.**

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

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

C NC N/A U	
(C selected)	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: Moment frames are continuous to the foundation.**
(NC selected)	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: The two towers above the second floor encompass approximately half of the floor area of the levels below. The floor approximately doubles in size at Levels A and B due to the sloping grade.**
(NC selected)	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: The two towers above second floor encompass approximately half of the floor area of the levels below. The floor approximately doubles in size at Levels A and B due to the sloping grade.**
(C selected)	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: Because of the sloping grade, three bays in the E-W direction on the north side of the building are two stories taller than those on the south side resulting in a center of rigidity that is offset from the center of mass. However, it is probably less than 20% of the building width.**

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

GEOLOGIC SITE HAZARD

	Description
C NC N/A U (C selected)	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: Liquefaction potential is negligible per Egan (2019).**

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

UC Campus:	San Francisco		Date:	06/12/2020		
Building CAAN:	2212.2	Auxiliary CAAN:	By Firm:	Simpson Gumpertz & Heger		
Building Name:	Millberry Union		Initials:	*KDP*	Checked:	*KSM*
Building Address:	500 Parnassus Avenue		Page:	3	of	3

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	
(•) C ( ) NC ( ) N/A ( ) U	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: Slope failure is unlikely per Egan (2019).**
(•) 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: Faults are adequately distant and do not pose a risk at this site per Egan (2019).**

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: The calculation shows noncompliance for this building; further analysis is required to assess the contribution from the retained soil and the interaction of foundation and influence from overburden**
(•) 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: Most, but not all, caissons are connected with grade beams.**

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

UC Campus:	San Francisco			Date:	06/12/2020		
Building CAAN:	2212.2	Auxiliary CAAN:		By Firm:	Simpson Gumpertz & Heger		
Building Name:	Millberry Union			Initials:	*CAO*	Checked:	*KDP*
Building Address:	500 Parnassus Avenue			Page:	1	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type S1-S1A

LOW SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

	Description
C NC N/A U (C selected)	REDUNDANCY: The number of lines of moment frames in each principal direction is greater than or equal to 2. (Commentary: Sec. A.3.1.1.1. Tier 2: Sec. 5.5.1.1) **Comments: At least 2 lines of frames are provided in each direction.**
C NC N/A U (NC selected)	DRIFT CHECK: The drift ratio of the steel moment frames, calculated using the Quick Check procedure of Section 4.4.3.1, is less than 0.030. (Commentary: Sec. A.3.1.3.1. Tier 2: Sec. 5.5.2.1.2) **Comments: Drift check exceeds the 3% limit in the east-west direction (greater than 10% drift using quick check procedures). In this direction, all columns are oriented in the weak direction and relatively small, flexible beams are provided (12WF40 or 12WF50 typically).**
C NC N/A U (NC selected)	COLUMN AXIAL STRESS CHECK: The axial stress caused by gravity loads in columns subjected to overturning forces is less than $0.10F_y$. Alternatively, the axial stress caused by overturning forces alone, calculated using the Quick Check procedure of Section 4.4.3.6, is less than $0.30F_y$. (Commentary: Sec. A.3.1.3.2. Tier 2: Sec. 5.5.2.1.3) **Comments: Most of the columns do not pass when gravity load axial stress is checked, gravity stress ranges from 0.1Fy to 0.5Fy compared to the acceptable 0.1Fy.**
C NC N/A U (C selected)	FLEXURAL STRESS CHECK: The average flexural stress in the moment frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y. Columns need not be checked if the strong column–weak beam checklist item is compliant. (Commentary: Sec. A.3.1.3.3. Tier 2: Sec. 5.5.2.1.2) **Comments: The frames pass the quick check procedure, average flexural stresses are range up to 1.0Fy (stresses at most levels are below 0.5Fy on average compared to the acceptable 1.0Fy).**

CONNECTIONS

	Description
C NC N/A U (C selected)	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel frames. (Commentary: Sec. A.5.2.2. Tier 2: Sec. 5.7.2) **Comments: Diaphragm is a concrete pan-joist/slab system that fully encases the steel beams.**

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Building Name:	Millberry Union			Initials:	CAO	Checked:	KDP
Building Address:	500 Parnassus Avenue			Page:	2	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type S1-S1A

LOW SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

C NC N/A U	
(•) C ( ) NC ( ) N/A ( ) U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation. (Commentary: Sec. A.5.3.1. Tier 2: Sec. 5.7.3.1) **Comments: Columns are anchored to the concrete foundation elements.**

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

SEISMIC-FORCE-RESISTING SYSTEM

	Description
(•) C ( ) NC ( ) N/A ( ) U	REDUNDANCY: The number of bays of moment frames in each line is greater than or equal to 2. (Commentary: Sec. A.3.1.1.1. Tier 2: Sec. 5.5.1.1) **Comments: Number of bays in each direction is 2 or greater.**
( ) C (•) NC ( ) N/A ( ) U	INTERFERING WALLS: All concrete and masonry infill walls placed in moment frames are isolated from structural elements. (Commentary: Sec. A.3.1.2.1. Tier 2: Sec. 5.5.2.1.1) **Comments: There are concrete walls around the stairs and the gymnasium in which concrete beams and columns are cast.**
( ) C (•) NC ( ) N/A ( ) U	MOMENT-RESISTING CONNECTIONS: All moment connections can develop the strength of the adjoining members based on the specified minimum yield stress of steel. (Commentary: Sec. A.3.1.3.4. Tier 2: Sec. 5.5.2.2.1). **Comments: The majority of the bolted flange tees yield in tension and bolts between the tees and beam flange fail in shear before developing the expected flexural strength of the beam.**

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ASCE 41-17
Collapse Prevention Structural Checklist For Building Type S1-S1A

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

SEISMIC-FORCE-RESISTING SYSTEM

C NC N/A U	Description
NC (selected)	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones based on 110% of the expected yield stress of the steel in accordance with AISC 341, Section A3.2. (Commentary: Sec. A.3.1.3.4. Tier 2: Sec. 5.5.2.2.1) **Comments: The majority of the bolted flange tees yield in tension and bolts between the tees and beam flange fail in shear before developing 110% of the expected flexural strength of the beam.**
NC (selected)	PANEL ZONES: All panel zones 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. (Commentary: Sec. A.3.1.3.5. Tier 2: Sec. 5.5.2.2.2) **Comments: Very few of the columns pass this check.**
C (selected)	COLUMN SPLICES: All column splice details located in moment-resisting frames include connection of both flanges and the web. (Commentary: Sec. A.3.1.3.6. Tier 2: Sec. 5.5.2.2.3) **Comments: Webs and flanges are spliced with bolted plates.**
NC (selected)	STRONG COLUMN—WEAK BEAM: The percentage of strong column–weak beam joints in each story of each line of moment frames is greater than 50%. (Commentary: Sec. A.3.1.3.7. Tier 2: Sec. 5.5.2.1.5) **Comments: Many columns at the east tower do not pass this check.**
NC (selected)	COMPACT MEMBERS: All frame elements meet section requirements in accordance with AISC 341, Table D1.1, for moderately ductile members. (Commentary: Sec. A.3.1.3.8. Tier 2: Sec. 5.5.2.2.4) **Comments: About 15% of the frame members do not pass this check.**

DIAPHRAGMS (STIFF OR FLEXIBLE)

C NC N/A U	Description
C (selected)	OPENINGS AT FRAMES: Diaphragm openings immediately adjacent to the moment frames extend less than 25% of the total frame length. (Commentary: Sec. A.4.1.5. Tier 2: Sec. 5.6.1.3) **Comments: No significant openings are present along frame lines.**

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

UC Campus:	San Francisco			Date:	06/12/2020		
Building CAAN:	2212.2	Auxiliary CAAN:		By Firm:	Simpson Gumpertz & Heger		
Building Name:	Millberry Union			Initials:	CAO	Checked:	KDP
Building Address:	500 Parnassus Avenue			Page:	4	of	4

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Collapse Prevention Structural Checklist For Building Type S1-S1A

FLEXIBLE DIAPHRAGMS

C NC N/A U	Description
C ○ NC ○ N/A ● U ○	CROSS TIES: There are continuous cross ties between diaphragm chords. (Commentary: Sec. A.4.1.2. Tier 2: Sec. 5.6.1.2) **Comments:**
C ○ NC ○ N/A ● U ○	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:**
C ○ NC ○ N/A ● U ○	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:**
C ○ NC ○ N/A ● U ○	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft (12.2 m) and aspect ratios less than or equal to 4-to-1. (Commentary: Sec. A.4.2.3. Tier 2: Sec. 5.6.2) **Comments:**
C ● NC ○ N/A ○ U ○	OTHER DIAPHRAGMS: 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: Diaphragms are cast-in-place concrete slab/pan-joists**

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

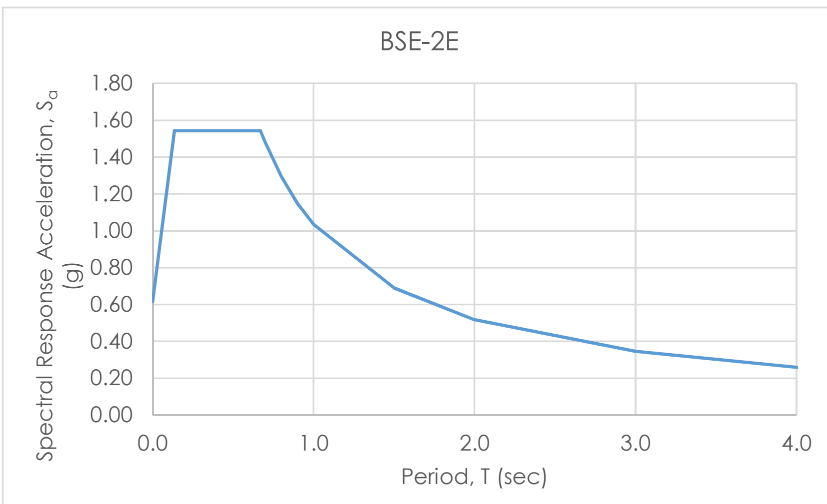
Appendix C

Tier 1 Calculations

Hazard Level BSE-2E

MCE_R ground motion (period=0.2s)	S_S	1.543 g
MCE_R ground motion (period=1.0s)	S_1	0.608 g
Site amplification factor at 0.2s	F_a	1.0
Site amplification factor at 1.0s	F_v	1.7
Site modified spectral response (0.2s)	S_{XS}	1.543 g
Site modified spectral response (1.0s)	S_{X1}	1.034 g
Long-period transition period (s)	T_L	12 sec
	T_0	0.134 sec
	T_S	0.670 sec

T	S_a
sec	g
0.0	0.617
0.134	1.543
0.670	1.543
0.70	1.477
0.80	1.292
0.90	1.148
1.0	1.034
1.5	0.689
2.0	0.517
3.0	0.345
4.0	0.258
6.0	0.172
8.0	0.129
10.0	0.103
12.0	0.086



Flat Loads

Typical Lower Floors — Level B to Level 1

Material	Self-Weight (psf)	SDL (psf)	Gravity (psf)	Seismic (psf)	Remarks
4" Concrete Slab	50.0	-	50.0	50.0	
7.5"x18" Joists @ 37.5"	35.0	-	35.0	35.0	
Steel Framing	*	-	*	*	*Actual beam weights taken from dwgs*
Steel Columns	*	-	*	*	*Actual column weights taken from dwgs*
Fireproofing Concrete	-	28.5	28.5	28.5	
Ceiling	-	5.0	5.0	5.0	
Floor Finish	-	25.0	25.0	25.0	
Partitions	-	0.0	0.0	10.0	
MEP/Sprinkler/Miscellaneous	-	5.0	5.0	5.0	
Sum of Dead Loads	**85.0**	**63.5**	**148.5**	**158.5**	
Sum of Live Loads	**-**	**-**	**100.0**	**-**	(Includes partition gravity load)
Sum of Dead Plus Live Loads	**-**	**-**	**248.5**	**158.5**	
Exterior Wall Loads			**15.0**	**15.0**	*On vertical wall face*

Typical Upper Floors — Level 2 to Roof

Material	Self-Weight (psf)	SDL (psf)	Gravity (psf)	Seismic (psf)	Remarks
3" Concrete Slab	37.5	-	37.5	37.5	
6"x17" Joists @ 36"	29.5	-	29.5	29.5	
Steel Framing	*	-	*	*	*Actual beam weights taken from dwgs*
Steel Columns	*	-	*	*	*Actual column weights taken from dwgs*
Fireproofing Concrete	-	30.5	30.5	30.5	
Ceiling	-	5.0	5.0	5.0	
Floor Finish	-	1.0	1.0	1.0	
Partitions	-	20.0	20.0	10.0	
MEP/Sprinkler/Miscellaneous	-	5.0	5.0	5.0	
Sum of Dead Loads	**67.0**	**61.5**	**128.5**	**118.5**	
Sum of Live Loads	**-**	**-**	**50.0**	**-**	
Sum of Dead Plus Live Loads	**-**	**-**	**178.5**	**118.5**	
Exterior Wall Loads			**15.0**	**15.0**	*On vertical wall face*

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SUBJECT Tier 1 - Quick Checks - Millberry Union

SHEET NO. 3

PROJECT NO. 197042.00

DATE 12 June 2020

BY CAO/LZ

CHECKED KDP

Seismic Mass

West Tower (Gridlines 1 to 3)

	[ft]	[ft^2]	[ft]	[lb]	[lb]	[lb]	[lb]	[lb]	[plf]	[lb]	[kip]
Floor	H_{story}	A_{floor}	$L_{cladding}$	$W_{cladding}$	$W_{steelbeam}$	W_{slab}	W_{other}	W_{joist}	W_{column}		W_{total}
W.Roof	11.00	6495	407	33605	51119	243563	334493	191603	2733	15032	869
4	11.00	6495	407	67210	49849	243563	334493	191603	3517	34375	921
3	11.00	6495	407	67210	53933	243563	334493	191603	3517	38687	929
2	Level 2 Considered as Base for Tower										

Pseudo Seismic Force

West Tower (Gridlines 1 to 3)

Floor	W_i [kip]	h_i [ft]	$(h_i)^k$ [ft]	$W_i(h_i)^k$ [kip-ft]	C_{vi}	F_i [kip]	V_i [kip]
W.Roof	869	33.0	37.6	32651	0.491	2059	2059
4	921	22.0	24.7	22718	0.341	1433	3492
3	929	11.0	12.0	11172	0.168	705	4197
2	Level 2 Considered as Base for Tower						
	2720			66541	1.00	4197	

T	0.574	sec
k	1.04	
W	2720	kip
C	1.0	[Modification factor, buildings 4 stories or greater]
S_a	1.543	g
V	4197	kip

Approximate Period of Structure

System // Moment-resisting frame systems of steel

h_n	33.00	ft
β	0.8	[Moment-resisting frame systems of steel]
C_t	0.035	[Moment-resisting frame systems of steel]

T	0.574	sec
S_a	1.543	g

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Seismic Mass

East Tower (Gridlines 7 to 9)

	[ft]	[ft^2]	[ft]	[lb]	[lb]	[lb]	[lb]	[lb]	[plf]	[lb]	[kip]
Floor	H_{story}	A_{floor}	$L_{cladding}$	$W_{cladding}$	$W_{steelbeam}$	W_{slab}	W_{other}	W_{joist}	W_{column}		W_{total}
E.Roof	11.00	5499	371	30580	39108	206213	283199	162221	1197	6584	728
5	11.00	5499	371	61160	41675	206213	283199	162221	1197	13167	768
4	11.00	5499	371	61160	46889	206213	283199	162221	1942	17265	777
3	11.00	10959	553	76175	103645	410963	564389	323291	2541	24656	1503
2	Level 2 Considered as Base for Tower										

Pseudo Seismic Force

East Tower (Gridlines 7 to 9)

Floor	W_i [kip]	h_i [ft]	$(h_i)^k$ [ft]	$W_i(h_i)^k$ [kip-ft]	C_{vi}	F_i [kip]	V_i [kip]
E.Roof	728	44.0	67.0	48792	0.370	1999	1999
5	768	33.0	48.7	37376	0.283	1531	3530
4	777	22.0	31.0	24107	0.183	987	4517
3	1503	11.0	14.4	21589	0.164	884	5401
2	Level 2 Considered as Base for Tower						
	3776			131864	1.00	5401	

T 0.722 sec
k 1.11

W 3776 kip
C 1.0 [Modification factor, buildings 4 stories or greater]
S_a 1.431 g
V 5401 kip

Approximate Period of Structure

System // Moment-resisting frame systems of steel

h_n 44.00 ft
β 0.8 [Moment-resisting frame systems of steel]
C_t 0.035 [Moment-resisting frame systems of steel]

T 0.722 sec
S_a 1.431 g

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SHEET NO. 7
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Seismic Mass

Full Building

	[ft]	[ft^2]	[ft]	[lb]	[lb]	[lb]	[lb]	[lb]	[plf]	[lb]	[kip]
Floor	H_{story}	A_{floor}	$L_{cladding}$	$W_{cladding}$	$W_{steelbeam}$	W_{slab}	W_{other}	W_{joist}	W_{column}		W_{total}
E.Roof	11.00	5499	371	30580	39108	206213	283199	162221	1197	6584	728
5/W.Roof	11.00	11994	778	94765	92794	449775	617691	353823	3930	28199	1637
4	11.00	11994	778	128370	96738	449775	617691	353823	5459	51640	1698
3	11.00	17454	960	143385	157578	654525	898881	514893	6058	63343	2433
2	13.33	21441		198000	217338	804025	1104194	632500	5277	68499	2792
1	16.00	32517		0	349466	1625833	2389975	1138083	7260	93260	5584
Ground	10.50	25285		0	261204	1264244	1858438	884971	7260	96195	4364
A	10.00	16983		0	179428	849158	1248263	594411	7588	76055	2957
B	10.00	11983		0	119369	599158	880763	419411	5009	62985	2050
C	Level C Considered as Base										

Pseudo Seismic Force

Full Building

	[kip]	[ft]	[ft]	[kip-ft]		[kip]	[kip]
Floor	**W_i**	**h_i**	**$(h_i)^k$**	**$W_i(h_i)^k$**	**C_{vi}**	**F_i**	**V_i**
E.Roof	728	103.8	911.9	663742	0.084	1067	1067
5/W.Roof	1637	92.8	773.6	1266471	0.159	2036	3103
4	1698	81.8	642.9	1091628	0.137	1755	4858
3	2433	70.8	520.1	1265228	0.159	2034	6893
2	2792	59.8	406.0	1133616	0.143	1823	8715
1	5584	46.5	280.4	1565806	0.197	2517	11233
Ground	4364	30.5	151.0	658801	0.083	1059	12292
A	2957	20.0	81.3	240316	0.030	386	12678
B	2050	10.0	29.4	60224	0.008	97	12775
C	Level C Considered as Base						
	24243			7945831	1.00	12775	

T 1.436 sec
k 1.47

W 17748 kip
C 1.0 [Modification factor, buildings 4 stories or greater]
S_a 0.720 g
V 12775 kip

Approximate Period of Structure

System // Moment-resisting frame systems of steel

h_n 103.83 ft
β 0.8 [Moment-resisting frame systems of steel]
C_t 0.035 [Moment-resisting frame systems of steel]

T 1.436 sec
S_a 0.720 g

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SHEET NO. 9
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Column Axial Stress Check

F_y	33	ksi	
$0.1F_y$	3.3	ksi	(Quick Check Limit for Gravity Axial Stresses)

Column: H3

Tributary area 708.5 ft^2

Floor Abv	Col H [ft]	Section	A [in^2]	DL_{COL} [lbs]	DL_{SLAB} [lbs]	DL_{JOIST} [lbs]	$DL_{SUPERIMP}$ [lbs]	DL [kip]	LL [psf]	LL [kip]	D+L [kip]	$D+L_{TOTAL}$ [kip]	σ [ksi]	Limit [ksi]	DCR
W.Roof	11.00	14WF119	34.99	1309	26569	20901	43573	92	50	35	128	128	3.7	3.3	1.11
4	11.00	14WF150	44.08	1650	26569	20901	43573	93	50	35	128	256	5.8	3.3	1.76
3	11.00	14WF150	44.08	1650	26569	20901	43573	93	50	35	128	384	8.7	3.3	2.64
2	13.33	14WF202	59.39	2693	26569	20901	43573	94	50	35	129	513	8.6	3.3	2.62
1	16.00	14WF202	59.39	3232	35425	24798	44990	108	100	71	179	692	11.7	3.3	3.53
Ground	10.50	14WF237	69.69	2489	35425	24798	44990	108	100	71	179	871	12.5	3.3	3.79
A	10.00	14WF237	69.69	2370	35425	24798	44990	108	100	71	178	1049	15.1	3.3	4.56
B	10.00	14WF287	84.37	2870	35425	24798	44990	108	100	71	179	1228	14.6	3.3	4.41
C															

Column: H5

Tributary area 702.0 ft^2

Floor Abv	Col H [ft]	Section	A [in^2]	DL_{COL} [lbs]	DL_{SLAB} [lbs]	DL_{JOIST} [lbs]	$DL_{SUPERIMP}$ [lbs]	DL [kip]	LL [psf]	LL [kip]	D+L [kip]	$D+L_{TOTAL}$ [kip]	σ [ksi]	Limit [ksi]	DCR
2	13.33	14WF127	37.33	1693	26325	20709	43173	92	50	35	127	127	3.4	3.3	1.03
1	16.00	14WF127	37.33	2032	35100	24570	44577	106	100	70	176	303	8.1	3.3	2.46
Ground	10.50	14WF150	44.08	1575	35100	24570	44577	106	100	70	176	480	10.9	3.3	3.30
A	10.00	14WF150	44.08	1500	35100	24570	44577	106	100	70	176	655	14.9	3.3	4.51
B	10.00	14WF176	51.73	1760	35100	24570	44577	106	100	70	176	832	16.1	3.3	4.87
C															

Column: H8

Tributary area 611.0 ft^2

Floor Abv	Col H [ft]	Section	A [in^2]	DL_{COL} [lbs]	DL_{SLAB} [lbs]	DL_{JOIST} [lbs]	$DL_{SUPERIMP}$ [lbs]	DL [kip]	LL [psf]	LL [kip]	D+L [kip]	$D+L_{TOTAL}$ [kip]	σ [ksi]	Limit [ksi]	DCR
E.Roof	11.00	14WF78	22.94	858	26325	18025	37577	83	50	31	113	113	4.9	3.3	1.50
5	11.00	14WF78	22.94	858	26325	18025	37577	83	50	31	113	227	9.9	3.3	2.99
4	11.00	14WF136	39.98	1496	26325	18025	37577	83	50	31	114	341	8.5	3.3	2.58
3	11.00	14WF136	39.98	1496	26325	18025	37577	83	50	31	114	455	11.4	3.3	3.45
2	13.33	14WF202	59.39	2693	26325	18025	37577	85	50	31	115	570	9.6	3.3	2.91
1	16.00	14WF202	59.39	3232	30550	21385	38799	94	100	61	155	725	12.2	3.3	3.70
Ground	10.50	14WF219	64.36	2300	30550	21385	38799	93	100	61	154	879	13.7	3.3	4.14
A	10.00	14WF219	64.36	2190	30550	21385	38799	93	100	61	154	1033	16.1	3.3	4.86
B	10.00	14WF246	72.33	2460	30550	21385	38799	93	100	61	154	1187	16.4	3.3	4.97
C															

Flexural Stress Check

West Tower (Gridlines 1 to 3)

F_y	33	ksi	
$1.0F_y$	33	ksi	(Quick Check Limit for Flexural Stresses)
M_s	9		(System Modification Factor for Collapse Prevention)

Columns Units: in^3

	Zx	Zy
14WF103	178.94	87.13
14WF111	193.78	94.22
14WF119	209.07	101.68
14WF127	224.01	108.86
14WF136	240.75	116.85
14WF142	252.61	129.15
14WF150	268.36	137.29
14WF158	284.24	145.31
14WF167	301.15	153.78
14WF176	318.87	162.71
14WF184	335.62	171.19
14WF193	353.13	179.95
14WF202	371.47	189.15
14WF211	389.40	198.12
14WF219	405.96	206.41
14WF228	424.91	215.88
14WF237	443.12	224.98
14WF246	462.17	234.47
14WF264	500.25	253.42
14WF287	549.04	277.69
14WF314	608.90	307.19
14WF342	671.10	338.01
14WF370	735.14	369.37
14WF61	100.37	32.60
14WF74	123.66	40.35
14WF78	132.01	52.27
14WF84	143.33	56.87
14WF87	149.53	72.88
14WF95	164.01	79.80

Beams Units: in^3

	Zx	Zy
16WF40	71.82	12.68
12WF50	70.83	21.28
12WF79	117.51	54.30
18WF50	99.95	16.57
12WF40	55.90	16.75
12WF45	63.19	18.93
21WF63	144.27	21.93
21WF112	275.34	74.43
21WF96	224.12	39.78
24WF84	222.01	32.62
24WF94	250.60	37.30
24WF100	274.96	57.03
24WF145	412.79	102.65
21WF68	157.79	24.34
21WF82	189.28	33.13
16WF50	90.75	16.25
18WF85	175.96	36.72
18WF60	121.78	20.58
18WF70	143.15	29.54
24WF160	459.86	115.10
18WF77	158.86	33.01

E-W Motion

Floor	Col H [ft]	V_i [kip]	n_c	n_f	Z_{col}	Z_{beam}	σ_{col} [ksi]	Limit [ksi]	DCR	σ_{beam} [ksi]	Limit [ksi]	DCR
W.Roof	11.00	2059	23	8	2384	1905	9.7	33.0	0.29	12.2	33.0	0.37
4	11.00	3492	23	8	3169	2000	12.4	33.0	0.38	19.6	33.0	0.59
3	11.00	4197	23	8	3169	2189	14.9	33.0	0.45	21.6	33.0	0.65
2												

N-S Motion

Floor	Col H [ft]	V_i [kip]	n_c	n_f	Z_{col}	Z_{beam}	σ_{col} [ksi]	Limit [ksi]	DCR	σ_{beam} [ksi]	Limit [ksi]	DCR
W.Roof	11.00	2059	23	3	4821	6486	3.6	33.0	0.11	2.7	33.0	0.08
4	11.00	3492	23	3	6339	6302	4.6	33.0	0.14	4.7	33.0	0.14
3	11.00	4197	23	3	6339	6756	5.6	33.0	0.17	5.2	33.0	0.16
2												

Flexural Stress Check

East Tower (Gridlines 7 to 9)

F_y	33	ksi	
$1.0F_y$	33	ksi	(Quick Check Limit for Flexural Stresses)
M_s	9		(System Modification Factor for Collapse Prevention)

Columns Units: in^3

	Zx	Zy
14WF103	178.94	87.13
14WF111	193.78	94.22
14WF119	209.07	101.68
14WF127	224.01	108.86
14WF136	240.75	116.85
14WF142	252.61	129.15
14WF150	268.36	137.29
14WF158	284.24	145.31
14WF167	301.15	153.78
14WF176	318.87	162.71
14WF184	335.62	171.19
14WF193	353.13	179.95
14WF202	371.47	189.15
14WF211	389.40	198.12
14WF219	405.96	206.41
14WF228	424.91	215.88
14WF237	443.12	224.98
14WF246	462.17	234.47
14WF264	500.25	253.42
14WF287	549.04	277.69
14WF314	608.90	307.19
14WF342	671.10	338.01
14WF370	735.14	369.37
14WF61	100.37	32.60
14WF68	112.83	36.74
14WF74	123.66	40.35
14WF78	132.01	52.27
14WF84	143.33	56.87
14WF87	149.53	72.88
14WF95	164.01	79.80

Beams Units: in^3

	Zx	Zy
16WF40	71.82	12.68
12WF50	70.83	21.28
12WF79	117.51	54.30
18WF50	99.95	16.57
12WF40	55.90	16.75
12WF45	63.19	18.93
21WF63	144.27	21.93
21WF112	275.34	74.43
21WF96	224.12	39.78
24WF84	222.01	32.62
24WF94	250.60	37.30
24WF100	274.96	57.03
24WF145	412.79	102.65
21WF68	157.79	24.34
21WF82	189.28	33.13
16WF50	90.75	16.25
18WF85	175.96	36.72
18WF60	121.78	20.58
14WF61	100.37	32.60
18WF55	110.71	18.51
18WF114	245.57	70.84
21WF73	170.25	26.48
24WF160	459.86	115.10
18WF70	143.15	29.54
24WF76	198.25	28.62

E-W Motion

Floor	Col H [ft]	V_i [kip]	n_c	n_f	Z_{col}	Z_{beam}	σ_{col} [ksi]	Limit [ksi]	DCR	σ_{beam} [ksi]	Limit [ksi]	DCR
E.Roof	11.00	1999	18	6	1419	2095	15.5	33.0	0.47	10.5	33.0	0.32
5	11.00	3530	18	6	1419	1870	27.4	33.0	0.83	20.8	33.0	0.63
4	11.00	4517	18	6	2515	2161	19.8	33.0	0.60	23.0	33.0	0.70
3	11.00	5401	18	6	2515	1870	23.6	33.0	0.72	31.8	33.0	0.96
2		0										

N-S Motion

Floor	Col H [ft]	V_i [kip]	n_c	n_f	Z_{col}	Z_{beam}	σ_{col} [ksi]	Limit [ksi]	DCR	σ_{beam} [ksi]	Limit [ksi]	DCR
E.Roof	11.00	1999	18	3	3066	4531	5.7	33.0	0.17	3.9	33.0	0.12
5	11.00	3530	18	3	3066	4772	10.1	33.0	0.31	6.5	33.0	0.20
4	11.00	4517	18	3	4980	5309	8.0	33.0	0.24	7.5	33.0	0.23
3	11.00	5401	18	3	4980	5197	9.5	33.0	0.29	9.1	33.0	0.28
2		0										

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Flexural Stress Check

Lower Building

F_y	33	ksi	
$1.0F_y$	33	ksi	(Quick Check Limit for Flexural Stresses)
M_s	9		(System Modification Factor for Collapse Prevention)

Columns Units: in^3

	Zx	Zy
14WF103	178.94	87.13
14WF111	193.78	94.22
14WF119	209.07	101.68
14WF127	224.01	108.86
14WF136	240.75	116.85
14WF142	252.61	129.15
14WF150	268.36	137.29
14WF158	284.24	145.31
14WF167	301.15	153.78
14WF176	318.87	162.71
14WF184	335.62	171.19
14WF193	353.13	179.95
14WF202	371.47	189.15
14WF211	389.40	198.12
14WF219	405.96	206.41
14WF228	424.91	215.88
14WF237	443.12	224.98
14WF246	462.17	234.47
14WF264	500.25	253.42
14WF287	549.04	277.69
14WF314	608.90	307.19
14WF342	671.10	338.01
14WF370	735.14	369.37
14WF61	100.37	32.60
14WF74	123.66	40.35
14WF78	132.01	52.27
14WF84	143.33	56.87
14WF87	149.53	72.88
14WF95	164.01	79.80
14WF43	67.83	17.20

Beams Units: in^3

	Zx	Zy
16WF40	71.82	12.68
12WF50	70.83	21.28
12WF79	117.51	54.30
18WF50	99.95	16.57
12WF40	55.90	16.75
12WF45	63.19	18.93
21WF63	144.27	21.93
21WF112	275.34	74.43
21WF96	224.12	39.78
24WF84	222.01	32.62
24WF94	250.60	37.30
24WF100	274.96	57.03
24WF145	412.79	102.65
21WF68	157.79	24.34
21WF82	189.28	33.13
16WF50	90.75	16.25
18WF85	175.96	36.72
18WF60	121.78	20.58
14WF61	100.37	32.60
18WF55	110.71	18.51
18WF114	245.57	70.84
21WF73	170.25	26.48
24WF160	459.86	115.10
18WF70	143.15	29.54
24WF76	198.25	28.62
21WF127	315.17	85.68
21WF142	354.02	96.51
18WF77	158.86	33.01
30WF108	341.27	43.89
30WF132	432.28	58.34
16WF45	81.10	14.40
33WF141	507.26	66.74
27WF94	274.37	38.80
30WF124	403.13	53.89
16WF58	104.66	23.71
18WF64	130.16	26.72
18WF105	224.71	64.60
24WF110	304.21	63.45
30WF210	726.52	154.18
33WF200	745.35	146.56
24WF120	332.89	69.68
24WF130	365.40	89.99

E-W Motion

Floor	Col H [ft]	V_i [kip]	n_c	n_f	Z_{col}	Z_{beam}	σ_{col} [ksi]	Limit [ksi]	DCR	σ_{beam} [ksi]	Limit [ksi]	DCR
2	13.33	8715	54	8	7819	8430	11.6	33.0	0.35	10.8	33.0	0.33
1	16.00	11233	67	8	9114	20017	14.9	33.0	0.45	6.8	33.0	0.21
Ground	10.50	12292	68	8	9859	16939	9.9	33.0	0.30	5.8	33.0	0.17
A	10.00	12678	42	5	7072	10428	13.6	33.0	0.41	9.2	33.0	0.28
B	10.00	12775	32	4	5517	8327	17.6	33.0	0.53	11.7	33.0	0.35
C		0										

N-S Motion

Floor	Col H [ft]	V_i [kip]	n_c	n_f	Z_{col}	Z_{beam}	σ_{col} [ksi]	Limit [ksi]	DCR	σ_{beam} [ksi]	Limit [ksi]	DCR
2	13.33	8715	54	12	15649	22565	6.4	33.0	0.19	4.4	33.0	0.13
1	16.00	11233	67	12	18270	29741	8.0	33.0	0.24	4.9	33.0	0.15
Ground	10.50	12292	68	12	19802	24548	5.3	33.0	0.16	4.3	33.0	0.13
A	10.00	12678	42	12	14008	16357	8.4	33.0	0.26	7.2	33.0	0.22
B	10.00	12775	32	12	10902	10761	12.5	33.0	0.38	12.7	33.0	0.38
C		0										

Drift Check

West Tower (Gridlines 1 to 3)

Quick Check Drift Limit: 3%

E-W Motion

Floor	Col H [ft]	Beam L [ft]	V_i [kip]	Col Sect	Modulus I	k_c	Beam Sect	Modulus I	k_b	V_c [kip]	D_r	Limit	DCR
W.Roof	11.00	27.50	2059	14WF103	420	3.18	12WF40	310	0.94	90	0.05	0.03	1.56
4	11.00	27.50	3492	14WF150	703	5.32	12WF45	351	1.06	152	0.07	0.03	2.17
3	11.00	27.50	4197	14WF150	703	5.32	12WF50	395	1.20	182	0.07	0.03	2.36
2													

N-S Motion

Floor	Col H [ft]	Beam L [ft]	V_i [kip]	Col Sect	Modulus I	k_c	Beam Sect	Modulus I	k_b	V_c [kip]	D_r	Limit	DCR
W.Roof	11.00	26.00	2059	14WF103	1166	8.83	18WF70	1154	3.70	90	0.01	0.03	0.43
4	11.00	26.00	3492	14WF150	1787	13.54	18WF77	1287	4.12	152	0.02	0.03	0.61
3	11.00	26.00	4197	14WF150	1787	13.54	18WF85	1430	4.58	182	0.02	0.03	0.67
2													

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Drift Check

East Tower (Gridlines 7 to 9)

Quick Check Drift Limit: 3%

E-W Motion

Floor	Col H [ft]	Beam L [ft]	V_i [kip]	Col Sect	Modulus I	k_c	Beam Sect	Modulus I	k_b	V_c [kip]	D_r	Limit	DCR
E.Roof	11.00	27.50	1999	14WF61	107	0.81	12WF40	310	0.94	111	0.10	0.03	3.22
5	11.00	27.50	3530	14WF61	107	0.81	12WF40	310	0.94	196	0.17	0.03	5.69
4	11.00	27.50	4517	14WF95	384	2.91	12WF40	310	0.94	251	0.13	0.03	4.47
3	11.00	27.50	5401	14WF95	384	2.91	12WF40	310	0.94	300	0.16	0.03	5.34
2													

N-S Motion

Floor	Col H [ft]	Beam L [ft]	V_i [kip]	Col Sect	Modulus I	k_c	Beam Sect	Modulus I	k_b	V_c [kip]	D_r	Limit	DCR
E.Roof	11.00	26.00	1999	14WF61	642	4.86	18WF55	890	2.85	111	0.02	0.03	0.78
5	11.00	26.00	3530	14WF61	642	4.86	18WF70	1154	3.70	196	0.04	0.03	1.18
4	11.00	26.00	4517	14WF95	1064	8.06	18WF70	1154	3.70	251	0.04	0.03	1.25
3	11.00	26.00	5401	14WF95	1064	8.06	18WF70	1154	3.70	300	0.04	0.03	1.50
2													

Drift Check

Lower Building

Quick Check Drift Limit: 3%

E-W Motion

Floor	Col H [ft]	Beam L [ft]	V_i [kip]	Col Sect	Modulus I	k_c	Beam Sect	Modulus I	k_b	V_c [kip]	D_r	Limit	DCR
2	13.33	27.50	8715	14WF150	703	4.39	12WF50	395	1.20	156	0.08	0.03	2.54
1	16.00	27.50	11233	14WF150	703	3.66	12WF50	395	1.20	160	0.10	0.03	3.28
Ground	10.50	27.50	12292	14WF176	838	6.65	12WF50	395	1.20	198	0.07	0.03	2.36
A	10.00	27.50	12678	14WF176	838	6.98	12WF50	395	1.20	295	0.10	0.03	3.32
B	10.00	27.50	12775	14WF184	883	7.36	12WF50	395	1.20	336	0.11	0.03	3.76
C													

N-S Motion

Floor	Col H [ft]	Beam L [ft]	V_i [kip]	Col Sect	Modulus I	k_c	Beam Sect	Modulus I	k_b	V_c [kip]	D_r	Limit	DCR
2	13.33	26.00	8715	14WF150	1787	11.17	24WF94	2683	8.60	156	0.01	0.03	0.49
1	16.00	26.00	11233	14WF150	1787	9.31	21WF112	2621	8.40	160	0.02	0.03	0.67
Ground	10.50	26.00	12292	14WF176	2150	17.06	21WF112	2621	8.40	205	0.01	0.03	0.44
A	10.00	26.00	12678	14WF176	2150	17.91	21WF112	2621	8.40	259	0.02	0.03	0.52
B	10.00	26.00	12775	14WF184	2275	18.96	21WF112	2621	8.40	312	0.02	0.03	0.62
C													

Strong Column-Weak Beam Check

West Tower (Gridlines 1 to 3)

Column: H2, Gridline H

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
W.Roof	14WF176	162.7	12WF40	12WF40	111.8	OK
4	14WF228	378.6	12WF45	12WF45	126.4	OK
3	14WF228	431.8	12WF50	12WF50	141.7	OK
2						

Column: H2, Gridline 2

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
W.Roof	14WF176	318.9	21WF96	21WF96	448.2	NG
4	14WF228	743.8	21WF96	21WF96	448.2	OK
3	14WF228	849.8	21WF96	21WF96	448.2	OK
2						

Column: D2, Gridline D

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
W.Roof	14WF184	171.2	12WF40	12WF40	111.8	OK
4	14WF237	396.2	12WF45	12WF45	126.4	OK
3	14WF237	450.0	12WF50	12WF50	141.7	OK
2						

Column: D2, Gridline 2

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
W.Roof	14WF184	335.6	21WF96	24WF160	684.0	NG
4	14WF237	778.7	21WF96	21WF112	499.5	OK
3	14WF237	886.2	21WF96	21WF112	499.5	OK
2						

Column: B2, Gridline B

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
W.Roof	14WF119	101.7	18WF50	18WF60	221.7	NG
4	14WF158	247.0	18WF50	18WF50	199.9	OK
3	14WF158	290.6	18WF50	18WF60	221.7	OK
2						

Column: F3, Gridline 3

Floor	Column	Σ Z Col	Beam		Σ Z Beam	
W.Roof	14WF119	209.1	18WF70	18WF70	286.3	NG
4	14WF150	477.4	18WF77	18WF77	317.7	OK
3	14WF150	536.7	18WF85	18WF85	351.9	OK
2						

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Strong Column-Weak Beam Check

East Tower (Gridlines 7 to 9)

Column: H8, Gridline H

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
E.Roof	14WF78	52.3	12WF40	12WF40	111.8	NG
5	14WF78	104.5	12WF40	12WF40	111.8	NG
4	14WF136	169.1	12WF40	12WF40	111.8	OK
3	14WF136	233.7	12WF40	12WF40	111.8	OK
2						

Column: H8, Gridline 8

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
E.Roof	14WF78	132.0	21WF73	21WF73	340.5	NG
5	14WF78	264.0	21WF96	21WF96	448.2	NG
4	14WF136	372.8	21WF96	21WF96	448.2	NG
3	14WF136	481.5	21WF96	21WF96	448.2	OK
2						

Column: D8, Gridline D

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
E.Roof	14WF87	72.9	18WF114	12WF40	301.5	NG
5	14WF87	145.8	14WF61	12WF40	156.3	NG
4	14WF142	202.0	18WF114	12WF40	301.5	NG
3	14WF142	258.3	14WF61	12WF40	156.3	OK
2						

Column: D8, Gridline 8

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
E.Roof	14WF87	149.5	21WF73	24WF160	630.1	NG
5	14WF87	299.1	21WF96	21WF96	448.2	NG
4	14WF142	402.1	21WF96	24WF160	684.0	NG
3	14WF142	505.2	21WF96	21WF96	448.2	OK
2						

Column: B8, Gridline B

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
E.Roof	14WF61	32.6	18WF55	18WF50	210.7	NG
5	14WF61	65.2	18WF60	18WF50	221.7	NG
4	14WF95	112.4	18WF60	18WF50	221.7	NG
3	14WF95	159.6	18WF60	18WF50	221.7	NG
2						

Column: F9, Gridline 9

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
E.Roof	14WF61	100.4	18WF55	18WF55	221.4	NG
5	14WF61	200.7	18WF70	18WF70	286.3	NG
4	14WF95	264.4	18WF70	18WF70	286.3	NG
3	14WF95	328.0	24WF84	24WF84	444.0	NG
2						

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Strong Column-Weak Beam Check

Lower Building

Column: H2, Gridline H

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
3	14WF228					
2	14WF287	493.6	12WF50	12WF50	141.7	OK
1	14WF287	555.4	12WF50	12WF50	141.7	OK
Ground	14WF314	584.9	12WF50	12WF50	141.7	OK
A	14WF314	614.4	12WF50	12WF50	141.7	OK
B	14WF342	645.2	16WF40	16WF40	143.6	OK
C						

Column: H2, Gridline 2

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
3	14WF228					
2	14WF287	974.0	24WF94	24WF94	501.2	OK
1	14WF287	1098.1	24WF94	24WF94	501.2	OK
Ground	14WF314	1157.9	21WF112	21WF112	550.7	OK
A	14WF314	1217.8	21WF112	21WF112	550.7	OK
B	14WF342	1280.0		21WF112	275.3	OK
C						

Column: F7, Gridline F

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
3	14WF87					
2	14WF150	210.2	12WF50	12WF50	141.7	OK
1	14WF150	274.6	21WF73	12WF50	241.1	OK
Ground	14WF211	335.4	18WF77	12WF50	229.7	OK
A	14WF211	396.2	18WF50	18WF50	199.9	OK
B						
C						

Column: F7, Gridline 7

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
3	14WF87					
2	14WF150	417.9	21WF96	21WF96	448.2	NG
1	14WF150	536.7	24WF94	24WF100	525.6	OK
Ground	14WF211	657.8	21WF142	21WF112	629.4	OK
A	14WF211	778.8		21WF112	275.3	OK
B						
C						

Column: F6, Gridline 6

Floor	Column	Σ Z Col	Beam L	Beam R	Σ Z Beam	
3	14WF87					
2	14WF150	417.9	24WF76	24WF160	658.1	NG
1	14WF150	536.7	21WF82	21WF127	504.5	OK
Ground	14WF211	657.8	24WF145	21WF127	728.0	NG
A	14WF211	778.8		21WF127	315.2	OK
B						
C						

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Compactness Check

f_y	33	ksi
R_y	1.1	
E	29000	ksi

AISC 341-16 Critieria for Moderately Ductile Members:

Flanges:	$0.40(E/R_yf_y)^{0.5}$	11.3
Webs:	$1.57(E/R_yf_y)^{0.5}$	44.4

Units: inches

Section	bf	tf	bf/tf	h/tw	Flange	Web
12WF40	8.00	0.52	7.75	32.60	Compact	Compact
12WF45	8.04	0.58	6.98	28.52	Compact	Compact
12WF50	8.08	0.64	6.30	25.83	Compact	Compact
12WF79	12.08	0.74	8.21	20.39	Compact	Compact
14WF103	14.58	0.81	8.96	22.83	Compact	Compact
14WF111	14.62	0.87	8.37	20.92	Compact	Compact
14WF119	14.65	0.94	7.81	19.82	Compact	Compact
14WF127	14.69	1.00	7.36	18.52	Compact	Compact
14WF136	14.74	1.06	6.93	17.12	Compact	Compact
14WF142	15.50	1.06	7.29	16.62	Compact	Compact
14WF150	15.52	1.13	6.88	16.26	Compact	Compact
14WF158	15.55	1.19	6.54	15.48	Compact	Compact
14WF167	15.60	1.25	6.25	14.49	Compact	Compact
14WF176	15.64	1.31	5.96	13.78	Compact	Compact
14WF184	15.66	1.38	5.68	13.45	Compact	Compact
14WF193	15.71	1.44	5.46	12.70	Compact	Compact
14WF202	15.75	1.50	5.24	12.15	Compact	Compact
14WF211	15.80	1.56	5.05	11.53	Compact	Compact
14WF219	15.83	1.62	4.88	11.24	Compact	Compact
14WF228	15.87	1.69	4.70	10.81	Compact	Compact
14WF237	15.91	1.75	4.55	10.37	Compact	Compact
14WF246	15.95	1.81	4.40	10.04	Compact	Compact
14WF264	16.03	1.94	4.13	9.38	Compact	Compact
14WF287	16.13	2.09	3.85	8.63	Compact	Compact
14WF314	16.24	2.28	3.56	7.99	Compact	Compact
14WF342	16.37	2.47	3.32	7.31	Compact	Compact
14WF370	16.48	2.66	3.10	6.83	Compact	Compact
14WF43	8.00	0.53	7.58	36.69	Compact	Compact
14WF61	10.00	0.64	7.78	29.89	Compact	Compact
14WF74	10.07	0.78	6.43	25.11	Compact	Compact
14WF78	12.00	0.72	8.36	26.40	Compact	Compact
14WF84	12.02	0.78	7.73	25.05	Compact	Compact
14WF87	14.50	0.69	10.54	26.90	Compact	Compact
14WF95	14.55	0.75	9.72	24.30	Compact	Compact

Section	bf	tf	bf/tf	h/tw	Flange	Web
16WF40	7.00	0.50	6.96	46.25	Compact	NG
16WF45	7.04	0.56	6.25	41.04	Compact	Compact
16WF50	7.07	0.63	5.63	37.37	Compact	Compact
16WF58	8.46	0.65	6.56	33.44	Compact	Compact
18WF105	11.79	0.91	6.47	27.74	Compact	Compact
18WF114	11.83	0.99	5.97	25.83	Compact	Compact
18WF50	7.50	0.57	6.58	44.88	Compact	NG
18WF55	7.53	0.63	5.98	41.20	Compact	Compact
18WF60	7.56	0.70	5.44	38.62	Compact	Compact
18WF64	8.72	0.69	6.35	38.55	Compact	Compact
18WF70	8.75	0.75	5.83	35.47	Compact	Compact
18WF77	8.79	0.83	5.29	32.71	Compact	Compact
18WF85	8.84	0.91	4.85	29.54	Compact	Compact
21WF112	13.00	0.87	7.51	34.27	Compact	Compact
21WF127	13.06	0.99	6.63	30.71	Compact	Compact
21WF142	13.13	1.10	6.00	27.40	Compact	Compact
21WF63	8.25	0.62	6.65	45.85	Compact	NG
21WF68	8.27	0.69	6.04	43.72	Compact	Compact
21WF73	8.30	0.74	5.60	41.32	Compact	Compact
21WF82	8.96	0.80	5.64	36.52	Compact	Compact
21WF96	9.04	0.94	4.83	31.70	Compact	Compact
24WF100	12.00	0.78	7.74	45.38	Compact	NG
24WF110	12.04	0.86	7.04	41.64	Compact	Compact
24WF120	12.09	0.93	6.50	38.20	Compact	Compact
24WF130	14.00	0.90	7.78	37.44	Compact	Compact
24WF145	14.04	1.02	6.88	34.79	Compact	Compact
24WF160	14.09	1.14	6.21	32.25	Compact	Compact
24WF76	8.99	0.68	6.59	49.06	Compact	NG
24WF84	9.02	0.77	5.84	45.93	Compact	NG
24WF94	9.06	0.87	5.20	41.83	Compact	Compact
27WF94	9.99	0.75	6.69	49.57	Compact	NG
30WF108	10.48	0.76	6.90	49.43	Compact	NG
30WF124	10.52	0.93	5.66	46.30	Compact	NG
30WF132	10.55	1.00	5.28	44.05	Compact	Compact
30WF210	15.11	1.32	5.74	33.81	Compact	Compact
33WF141	11.54	0.96	6.01	49.74	Compact	NG
33WF200	15.75	1.15	6.85	40.66	Compact	Compact

Panel Zone Check

West Tower (Gridlines 1 to 3)

f_y 33 ksi

Panel Zone Shear = $0.8*\Sigma(Fy*Z_{x,beam}/d_{beam})$

Panel Zone Strength $R_n = 0.6*Fy*d_{column}*t_{w,column}$

Column: H2

Floor	Column	d	t_w	R_n [kip]	Panel Shear	Check
W.Roof	14WF176	15.3	0.8	247.6	559.8	NG
4	14WF228	16.0	1.0	331.1	559.8	NG
3	14WF228	16.0	1.0	331.1	559.8	NG
2						

Column: F2

Floor	Column	d	t_w	R_n [kip]	Panel Shear	Check
W.Roof	14WF202	15.6	0.9	0.0	771.0	NG
4	14WF264	16.5	1.2	393.7	626.0	NG
3	14WF264	16.5	1.2	393.7	626.0	NG
2						

Panel Zone Check

East Tower (Gridlines 7 to 9)

f_y 33 ksi

Panel Zone Shear = $0.8*\Sigma(Fy*Z_{x,beam}/d_{beam})$

Panel Zone Strength $R_n = 0.6*Fy*d_{column}*t_{w,column}$

Column: H8

Floor	Column	d	t_w	R_n [kip]	Panel Shear	Check
E.Roof	14WF78	14.1	0.4	119.2	423.2	NG
5	14WF78	14.1	0.4	119.2	559.8	NG
4	14WF136	14.8	0.7	192.8	559.8	NG
3	14WF136	14.8	0.7	192.8	559.8	NG
2						

Column: D8

Floor	Column	d	t_w	R_n [kip]	Panel Shear	
E.Roof	14WF87	14.0	0.4	116.4	702.7	NG
5	14WF87	14.0	0.4	116.4	559.8	NG
4	14WF142	14.8	0.7	198.6	771.0	NG
3	14WF142	14.8	0.7	198.6	559.8	NG
2						

Panel Zone Check

Lower Building

f_y 33 ksi

Panel Zone Shear = $0.8*\Sigma(Fy*Z_{x,beam}/d_{beam})$

Panel Zone Strength $R_n = 0.6*Fy*d_{column}*t_{w,column}$

Column: H2

Floor	Column	d	t_w	R_n [kip]	Panel Shear	Check
2	14WF287	16.8	1.3	436.0	544.7	NG
1	14WF287	16.8	1.3	436.0	544.7	NG
Ground	14WF314	17.2	1.4	481.6	692.3	NG
A	14WF314	17.2	1.4	481.6	692.3	NG
B	14WF342	17.6	1.5	537.2		
C						

Column: F7

Floor	Column	d	t_w	R_n [kip]	Panel Shear	Check
2	14WF87	14.0	0.4	116.4	549.1	NG
1	14WF87	14.0	0.4	116.4	574.8	NG
Ground	14WF150	14.9	0.7	204.8	781.7	NG
A	14WF150	14.9	0.7	204.8		
B	14WF211	15.8	1.0	305.6		
C						

SIMPSON GUMPERTZ & HEGER

Engineering of Structures
and Building Enclosures

CLIENT UCSF

SUBJECT Tier 1 - Quick Checks - Millberry Union

SHEET NO. 23

PROJECT NO. 197042.00

DATE 12 June 2020

BY CAO/LZ

CHECKED KDP

Moment-Resisting Connection Check

Yield Strength:

f_y	33	ksi
f_{ye}	36	ksi
$1.1f_{ye}$	40	ksi

Bolt Strength at Tee:

n [bolts]	10	
Ø [bolt]	0.88	in
A [bolt]	0.60	in^2
f_{nv} [bolt]	54	ksi
R_n	325	kip

24Ix120 Tee Web Strength:

tw	0.80	in
width	14.5	in
R_n	382	kip

	Zx	d	$1.1F_{ye}Z_x/d$	Bolt Check	Tee Check
18WF105	224.71	18.32	489.8	NG	NG
18WF50	99.95	18.00	221.7	OK	OK
18WF55	110.71	18.12	244.0	OK	OK
18WF70	143.15	18.00	317.6	OK	OK
18WF77	158.86	18.16	349.3	NG	OK
18WF85	175.96	18.32	383.5	NG	NG
21WF112	275.34	21.00	523.5	NG	NG
21WF127	315.17	21.24	592.5	NG	NG
21WF142	354.02	21.46	658.7	NG	NG
21WF63	144.27	21.00	274.3	OK	OK
21WF68	157.79	21.13	298.2	OK	OK
21WF73	170.25	21.24	320.1	OK	OK
21WF82	189.28	20.86	362.3	NG	OK
21WF96	224.12	21.14	423.3	NG	NG
24WF100	274.96	24.00	457.5	NG	NG
24WF110	304.21	24.16	502.8	NG	NG
24WF120	332.89	24.31	546.8	NG	NG
24WF130	365.40	24.25	601.7	NG	NG
24WF145	412.79	24.49	673.0	NG	NG
24WF160	459.86	24.72	742.8	NG	NG
24WF76	198.25	23.91	331.1	NG	OK
24WF84	222.01	24.09	368.0	NG	OK
24WF94	250.60	24.29	412.0	NG	NG
27WF94	274.37	26.91	407.1	NG	NG
30WF210	726.52	30.38	954.9	NG	NG
33WF200	745.35	33.00	901.9	NG	NG