Evaluator: HK
Date: 6/14/19

ASCE 41-17 Tier 1 Seismic Evaluation
Building Name: American Baptist Seminary, Karpe Hall
CAAN ID: 1995
Auxiliary Building ID: N/A
Address: 2521 Hillegass Avenue, Berkeley, CA 94704
Site location coordinates: Latitude 37.8645 Longitudinal -122.2561
Evaluator Name: Heavenz Kaur, Ray Pugliesi

Aerial Photo


West Exterior Elevation

UCOP *SEISMIC PERFORMANCE LEVEL* (OR "RATING") BASED ON TIER 1 EVALUATION: V

BUILDING DATA
ASCE 41-17 Model Building Type (Governing Building Type bolded for Seismic Risk Model when multiple types exist):

a. Longitudinal Direction: **RM1** & RM2: Reinforced Masonry Bearing Walls with Flexible and Stiff Diaphragms
b. Transverse Direction: **RM1** & RM2: Reinforced Masonry Bearing Walls with Flexible and Stiff Diaphragms

Square Footage: 6,692 sf (UCB occupies 4,015 sf)
Building Length: 92'-0" (approximately)
Building Width: 60'-0" (approximately)
Building Height: 30'-0" (approximately)
Story Height: 12'-0"
Number of stories *above* grade: 2.
Number of basement stories *below* grade: 0

Year of Original Construction and Code Year: 1962, Unknown
Year of Later Construction and Code Year: Retrofitted in 2001, 1997 UBC (Assumed)

COST RANGE TO RETROFIT (if applicable): Medium: Between $50-$200 per square foot

BUILDING DESCRIPTION

General

Karpe Hall is one of the buildings located on the campus of the American Baptist Seminary West in Berkeley. It is a two story, reinforced brick, steel and wood framed building, with an attic, about 6 ft in height. The building is approximately 92 ft in length in the east-west direction and approximately 60 ft in width in the north-south direction. Karpe Hall is located on a sloping site and the Basement daylights on the south side of the building. It is connected with the Academic Building with an underground passage located under the covered walkway at it north side.

The University only leases the First Floor in Karpe Hall.

Structural System

Gravity System of the building at the First Floor consists of concrete over metal deck spanning between steel joists that are supported on exterior reinforced masonry walls or interior steel columns. The Attic and Roof Level are framed with glulam beams and 2x wood framing and have been retrofitted to provide strengthened out of plane wall connections with the diaphragms. The basement walls have been constructed with reinforced 8" thick concrete masonry with brick veneer, while the upper walls have been constructed with 12" reinforced brick masonry.

Lateral system of the building is composed of plywood diaphragm at the Roof and Attic, and concrete over metal deck diaphragm at First Floor that are connected to the exterior masonry shear walls for lateral stability. The retrofit performed in 1998, strengthened the wall out of plane connections with the diaphragm at the Attic floor. The walls are founded on shallow, continuous footings.

Building Condition

Good, no visible sign of structural or non structural damage were observed during the site visit.

Date of Site Visit: 05/31/2019, Ray Pugliesi & Heavenz Kaur, Degenkolb Engineers
Limitations of walk-through: None

SITE INFORMATION

Site Class (A-F): D Basis: Default per ASCE 41-17
Site Specific Ground Motion Study? No
BSE-1N Spectral Accelerations: Basis: USGS Design Summary Report for ASCE 41-17
S_{DS}: 1.614 S_{D1}: 1.007
BSE-2E Spectral Accelerations: Basis: USGS Design Summary Report for ASCE 41-17
S_{XS}: 2.391 S_{X1}: 1.255
Level of Seismicity: High
Performance Level: Collapse Prevention Structural Performance

Geologic Hazards:

Fault Rupture No Basis: Earthquake Zones of Required Investigation- Oakland West Quadrangle https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/
Liquefaction No Basis: Earthquake Zones of Required Investigation- Oakland West Quadrangle https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/
Landslide No Basis: Earthquake Zones of Required Investigation- Oakland West Quadrangle https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/

PREVIOUS RATINGS SUMMARY

1. Very Poor – Independent Structural Review, dated May 7,1997, Degenkolb Engineers.

DOCUMENTATION

Architectural Drawings: Academic and Multipurpose Building, Berkeley Baptist Divinity School, by Ratcliff, Slama and Cadwalder Architects, dated October 28,1962. (Incomplete Set)

Structural Drawings: Academic and Multipurpose Building, Berkeley Baptist Divinity School, by Alan R, McKay & Associates Civil and Structural Engineers, dated October 28,1962. (Incomplete Set)

American Baptist Seminary of the West, Limited Voluntary Seismic Upgrades for Karpe Hall, by Jedco Consulting Engineers, dated, September 27, 1998.

Seismic Evaluations: Independent Structural Review, dated May 7, 1997, by Degenkolb Engineers.

Geotechnical Reports: Not available

Other Documents: Letter from Jedco Consulting Engineers, Inc. re: Seismic Upgrading for the UMB building at 2515 Hillegass, dated April 19, 2001

CONSTRUCTION DATA

Gravity Load Structural System:	Roof and Attic 2x wood framing and steel joists at First Floor supported by exterior masonry walls and interior steel columns, founded on spread footings at the Basement Level.		
Exterior Transverse Walls:	12" thick, punched reinforced masonry walls	Opening(s)?	Yes
Exterior Longitudinal Walls:	Similar to Transverse Walls	Opening(s)?	Yes
Roof Materials/Framing:	Roof framing spanning between exterior walls, overlaid by plywood and slate shingles.		
Intermediate Floors/Framing:	Concrete over metal deck supported by steel joists.		
Ground Floor:	Concrete slab on grade		
Columns:	Steel	Foundation:	Continuous footings at walls and isolated spread footings at columns.
General Condition of Structure:	Good		
Evidence of Settling?:	No		
Special Features & Comments:	Karpe Hall is connected to the Academic Building by a subterranean passage and a covered walkway at the North side of the building. The		

roof structure of the covered walkway is an independent structure, supported by Basement Walls of the passage below. This roof structure consists of a concrete roof on four cantilever, reinforced masonry, cruciform columns

LATERAL-FORCE-RESISTING SYSTEM

	Longitudinal	Transverse
ASCE 41-17 Building Type:	RM1 & RM2: Reinforced Masonry Bearing Walls with Flexible and Stiff Diaphragms	RM1 & RM2: Reinforced Masonry Bearing Walls with Flexible and Stiff Diaphragms
Diaphragms:	Plywood sheathing over 2x framing at roof and Attic Levels and concrete over metal deck over steel joists at First Level.	Plywood sheathing over 2x framing at roof and Attic Levels and concrete over metal deck over steel joists at First Level.
Vertical Elements:	12" thick exterior reinforced masonry walls and steel interior columns.	12" thick exterior reinforced masonry walls and steel interior columns.
Connections:	See structural drawings	See structural drawings
Details:	See structural drawings	See structural drawings
Estimated Fundamental Period, T (sec):	0.256	0.256
BSE-2E Spectral Acceleration, S_a:	2.39g	2.39g
Modification Factor, C:	1.1 (C2 – Table 4-7)	1.1 (C2 – Table 4-7)
Building Weight, W (kips):	1,815	1,815
Seismic Base Shear, V (kips):	4,775	4,775
System Modification Factor, M_s:	4.5 - Collapse Prevention	4.5 - Collapse Prevention

Significant Structural Deficiencies, Potentially Affecting *Seismic Performance Level* Designation:

- ☑ Lateral System Stress Check (wall shear, column shear or flexure, or brace axial as applicable)
- ☐ Load Path
- ☑ Adjacent Buildings
- ☐ Weak Story
- ☐ Soft Story
- ☐ Geometry (vertical irregularities)
- ☐ Torsion
- ☐ Mass – Vertical Irregularity
- ☐ Cripple Walls
- ☐ Wood Sills (bolting)
- ☐ Diaphragm Continuity

☑ Openings at Shear Walls (concrete or masonry)
☐ Liquefaction
☐ Slope Failure
☐ Surface Fault Rupture
☑ Masonry or Concrete Wall Anchorage at Flexible Diaphragm
☐ URM wall height to thickness ratio
☐ URM Parapets or Cornices
☐ URM Chimney
☐ Heavy Partitions Braced by Ceilings
☐ Appendages

OVERALL SEISMIC DEFICIENCIES & EXPECTED SEISMIC PERFORMANCE

The below items have been identified as non-compliant:

1. *Lateral System Stress Check:* Exterior shear walls are deficient in shear capacity primarily due to the large number of window openings in the building. The shear walls may develop large shear cracks during a lateral event due to lack of shear capacity.
2. *Adjacent Buildings:* Karpe Hall is connected to the Academic Building via a two story, covered walkway. The walkway roof almost aligns with the Roof of Karpe Hall and Second Floor of Academic Building. Due to a small joint, pounding is expected between the walkway roof and Academic Building in the north-south direction, but minimal structural damage is anticipated since the floor levels almost align. Although there is a structural separation between the walkway roof and Karpe Hall, in the east-west direction, the canopy roof is 'locked' into the door cavity of the Academic Building. The Academic Building is structurally stiffer than the walkway cantilever columns, and will resist movement of the walkway roof, but the far side of the roof (near Karpe Hall) is free to move. This will cause significant torsion in the walkway roof and increased demands and damage to the cantilevered columns. Some cracks may appear in the roof slab and columns due to unequal load distribution due to torsion.
3. *Openings at Shear Walls:* A large diaphragm opening along the west shear wall occurs at the First Floor. Cracking around the opening corners may occur during an earthquake due to stress concentration. Existing drawings of the building are not available to understand if the floor was detailed adequately with reinforcing around this opening to prevent cracking and have an adequate diaphragm force transfer around the opening.
4. *Masonry or Concrete Wall Anchorage at Flexible Diaphragm:* The out of plane anchorage of the two story masonry wall above the stair opening at the First Floor is inadequate, and the diaphragm may pull away from the wall in case of a seismic event and may cause a partial collapse of the roof.

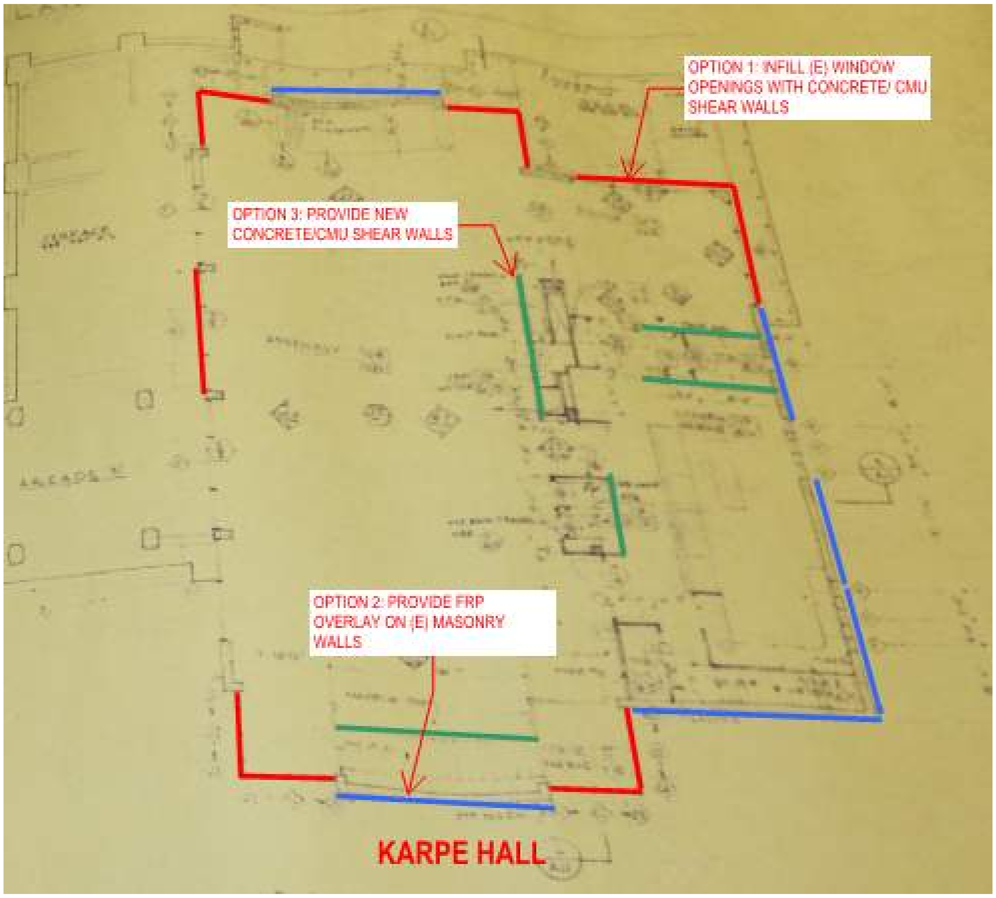
As a result of these deficiencies, the structure has been assigned a SPL V rating.

Recommended Next Steps

Due to lack of as built drawings, it is recommended that investigative and materials testing should be performed to understand the constitution of the shear walls, followed by a Tier 2 analysis. A limited retrofit to increase the shear capacity of shear walls may be necessary to address the identified deficiencies and improve the SPL rating to IV.

Seismic Retrofit Concept Sketches/Description (only if above-listed rating is V or greater):

In order to increase the shear capacity of the shear walls some of the window openings can be infilled with concrete or masonry, additional interior masonry walls can be built, or Fiber Reinforced Polymer (FRP) overlay can be applied to existing walls to increase shear capacity.



Preliminary proposed retrofit schemes

Appendices

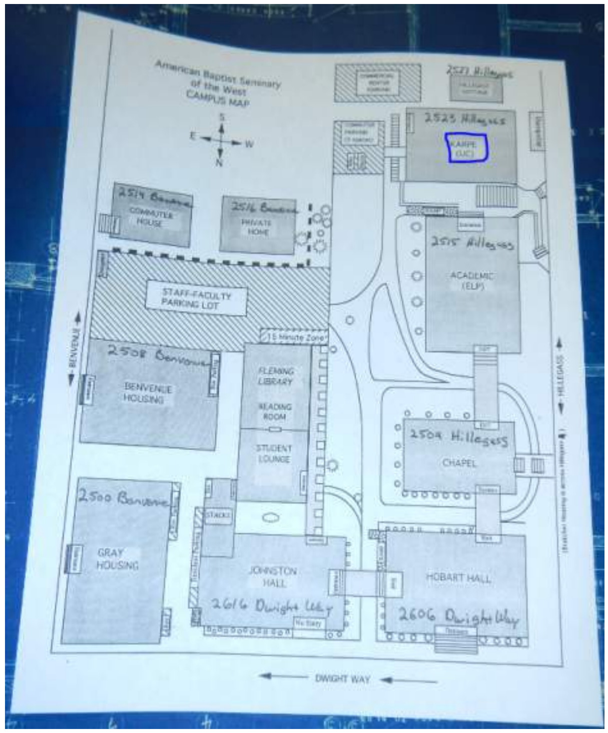
A. Additional Photos

B. ASCE 41-17 Tier 1 Checklists (Structural)

C. UCOP Seismic Safety Policy Falling Hazards Assessment Summary

D. Quick Check Calculations

APPENDIX A
Additional Photos



Keyplan of American Baptist Seminary West campus

Concrete bond beam at top od masonry wall at Attic Level

Large stair opening in the diphragm at First Floor next to the extrior shear wall causing a two story wall

A combination of coneret masonry at the Basement and brick masonry at the upper levels ahs been used in Karpe Hall

Walkway between Karpe Hall and Academic Building

APPENDIX B

ASCE 41-17 Tier 1 Checklist (Structural)

UC Campus:	BERKELEY			Date:	06/14/2019
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB EGINEERS
Building Name:	KARPE HALL			Initials:	HK
Checked:					
Building Address:	2521 HILLEGASS AVENUE, BERKELEY, CA 94704			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:**.
○	◉	○	○	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:** The walkway located north of the building may pound against the north masonry wall of the building in case of a seismic event.
◉	○	○	○	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:**
◉	○	○	○	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:**

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

UC Campus:	BERKELEY			Date:	06/14/2019	
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB EGINEERS	
Building Name:	KARPE HALL			Initials:	HK	Checked:
Building Address:	2521 HILLEGASS AVENUE, BERKELEY, CA 94704			Page:	2	of 3

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

C NC N/A U	Description
(x) C ( ) NC ( ) N/A ( ) U	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:**
(x) C ( ) NC ( ) N/A ( ) U	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:**
(x) C ( ) NC ( ) N/A ( ) U	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
(x) 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:**
(x) 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:**
(x) 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:**

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

ASCE 41-17
Collapse Prevention Basic Configuration Checklist

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

FOUNDATION CONFIGURATION

C NC N/A U	Description
C (selected)	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:** 60/30=2>0.6*2.39=1.434
C (selected)	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:**

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

UC Campus:	BERKELEY			Date:	06/13/2019		
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB EGINEERS		
Building Name:	KARPE HALL			Initials:	HK	Checked:	
Building Address:	25121 HILLEGASS, BERKELEY, CA 94704			Page:	1	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type RM1-RM2

LOW AND MODERATE SEISMICITY

SEISMIC-FORCE-RESISTING SYSTEM

	Description
C ● NC ○ N/A ○ U ○	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:**
C ○ NC ● N/A ○ U ○	SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 70 lb/in.^{2} (0.48 MPa). (Commentary: Sec. A.3.2.4.1. Tier 2: Sec. 5.5.3.1.1) **Comments:** D/C in shear walls at both levels is approximately 1.25.
C ○ NC ○ N/A ○ U ●	REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in. (1220 mm), and all vertical bars extend to the top of the walls. (Commentary: Sec. A.3.2.4.2. Tier 2: Sec. 5.5.3.1.3) **Comments:**

STIFF DIAPHRAGMS

	Description
C ○ NC ○ N/A ● U ○	TOPPING SLAB: Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab. (Commentary: Sec. A.4.5.1. Tier 2: Sec. 5.6.4) **Comments:**

CONNECTIONS

	Description
C ○ NC ● N/A ○ U ○	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7. (Commentary: Sec. A.5.1.1. Tier 2: Sec. 5.7.1.1) **Comments:** The out of plane anchorage of the two story masonry wall above the stair opening at the First Floor is inadequate, and the diaphragm may pull away from the wall in case of a seismic event and may cause a partial collapse of the roof.

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

UC Campus:	BERKELEY			Date:	06/13/2019		
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB EGINEERS		
Building Name:	KARPE HALL			Initials:	HK	Checked:	
Building Address:	25121 HILLEGASS, BERKELEY, CA 94704			Page:	2	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type RM1-RM2

C NC N/A U	
Selected: C	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers. (Commentary: Sec. A.5.1.2. Tier 2: Sec. 5.7.1.3) **Comments:**
Selected: C	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls. (Commentary: Sec. A.5.2.1. Tier 2: Sec. 5.7.2) **Comments:**
Selected: N/A	TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements. (Commentary: Sec. A.5.2.3. Tier 2: Sec. 5.7.2) **Comments:**
Selected: U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation. (Commentary: Sec. A.5.3.5. Tier 2: Sec. 5.7.3.4) **Comments:**
Selected: N/A	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:**

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

STIFF DIAPHRAGMS

C NC N/A U	Description
Selected: N/A	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length. (Commentary: Sec. A.4.1.4. Tier 2: Sec. 5.6.1.3) **Comments:**
Selected: N/A	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 8 ft (2.4 m) long. (Commentary: Sec. A.4.1.6. Tier 2: Sec. 5.6.1.3) **Comments:**

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

UC Campus:	BERKELEY			Date:	06/13/2019	
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB EGINEERS	
Building Name:	KARPE HALL			Initials:	HK	Checked:
Building Address:	25121 HILLEGASS, BERKELEY, CA 94704			Page:	3	of 4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type RM1-RM2

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:** Continuous cross (glulam beams) ties exist in the north-south direction, but it is unclear if they exist in the east west direction. If they do not, then it is a Tier 1 non-compliance.
C ( ) NC (•) N/A ( ) U ( )	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length. (Commentary: Sec. A.4.1.4. Tier 2: Sec. 5.6.1.3) **Comments:** Stair opening at First Floor Level along the west wall spans about the entire length of wall (19 ft)
C ( ) NC (•) N/A ( ) U ( )	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 8 ft (2.4 m) long. (Commentary: Sec. A.4.1.6. Tier 2: Sec. 5.6.1.3) **Comments:** Stair opening at First Floor Level along the west wall spans about the entire length of wall (19 ft)
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:** It is not clear from the limited drawings that are available if the plywood diaphragm at the Attic and Roof Levels are blocked. If they are not then it is a Tier 1 non compliance.
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:**

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

UC Campus:	BERKELEY			Date:	06/13/2019		
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB EGINEERS		
Building Name:	KARPE HALL			Initials:	HK	Checked:	
Building Address:	25121 HILLEGASS, BERKELEY, CA 94704			Page:	4	of	4

ASCE 41-17
Collapse Prevention Structural Checklist For Building Type RM1-RM2

CONNECTIONS

	Description
C NC N/A U (C selected)	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. (3 mm) before engagement of the anchors. (Commentary: Sec. A.5.1.4. Tier 2: Sec. 5.7.1.2) **Comments:**

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

APPENDIX C

UCOP Seismic Safety Policy Falling Hazards Assessment Summary

UC Campus:	BERKELEY			Date:	6/14/2019		
Building CAAN:	1995	Auxiliary CAAN:	N/A	By Firm:	DEGENKOLB ENGINEERS		
Building Name:	KARPE HALL			Initials:	HK	Checked:	
Building Address:	2521 HILLEGASS AVENUE, BERKELEY, CA 94704			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:**
P ☐ **N/A** ☒	**Unrestrained natural gas-fueled equipment such as water heaters, boilers, emergency generators, etc.** **Comments:**
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

APPENDIX D
ASCE 41-17 Quick Check Calculations

Degenkolb Engineers
1300 Clay St, 9th Floor
Oakland, CA 94612-2047
Phone: 510.272.9040
Fax: 510.272.9526

Subject: Weight Take Off	**Job Number:** B8114004.00	**Date:** 6/14/2019	
Job: UCB, 2521 Hillegass Avenue-Karpe Hall	**By:** HK	**Section:**	
	Checked By:	**Page/of:**	

Second Level

	Area (ft2)	Thickness (in)	Weight (pcf)		Flat Load (psf)	
Floor Finish (Carpet/linoleum)	4950				3	
Concrete over metal deck					67	
Steel Joist Framing					5	
Ceiling/Misc					5	
		Length (ft)	Height (ft)	Weight (psf)	Weight (lbs)	Convert to Flat Load (psf)
12" Perimeter Wall	4950	290	12	175	609000	123
Total Flat Load: (Slab)*(Area - Open)+Beams+Girder+Col+Ext.Panel+5 psf				1027	kips	
Effective Flat Dead Load (includes 10psf Partition)				218	psf	

Roof+Attic

	Area (ft2)	Thickness (in)	Weight (pcf)		Flat Load (psf)		
Gable Roof							
Roof Slate Shingles (1/4")					12		20% increas due to gable roof
2x framing					4		20% increas due to gable roof
Plywood sheathing					3		20% increas due to gable roof
							20% increas due to gable roof
Attic Floor							
2x framing					4		
Plywood sheathing					4		
Wood Walls					5		
Ceiling+Misc					5		
		Length (ft)	Height (ft)	Weight (psf)	Weight (lbs)	Convert to Flat Load (psf)	
12" Perimeter Wall	4950	290	12	175	609000	123	
Total Flat Load: (Slab)*(Area - Open)+Beams+Girder+Col+Ext.Panel				788	kips		
Effective Flat Dead Load +10 psf Partitions				169	psf		

Total Building Weight 1815 kips

Degenkolb

Subject:	Base forces	Job Number:	B8114004.00	Date:	14-Jun-2019
Job:	UCB, 2521 Hillegass Avenue-Karpe Hall	By:	HK		
	Tier 1 evaluation, RC shear walls	Checked By:			

ASCE 41-17 Linear Static Base Shear & Vertical Force Distribution
Tier 1

INPUT DATA

C:	Modification factor (Table 4-7) =	1.1		
S_1:	Spectral Response Acceleration @ 1 sec. =	0.74		(from MCE maps or Site Specific)
S_s:	Short Period Response Acceleration =	1.99		(from MCE maps or Site Specific)
SC:	Soil Class =	D		(A through F), 1.6.1.4.1

Table 1-5:	S_1 <= 0.1	S_1 = 0.2	S_1 = 0.3	S_1 = 0.4	S_1 >= 0.5
Soil Class D	2.4	2.2	2.0	1.9	1.8
F_v	-	-	-	-	1.80

F_v:	Site Coefficient for S_1 =	1.70		(Table 11.4-1)

Table 1-4:	S_s <= 0.25	S_s = 0.50	S_s = 0.75	S_s = 1.00	S_s >= 1.25
Soil Class D	1.6	1.4	1.2	1.1	1.0
F_a	-	-	-	-	1.00

F_a:	Site Coefficient for S_s =	1.20		(Table 11.4-2)
S_{X1}:	Spectral Response Acceleration @ 1 sec. =	1.255		USGS
S_{xs}:	Short Period Acceleration =	2.391		USGS
β:	Building System Exponent =	0.75		(4.4.2.4)
C_t:	Building System Coefficient =	0.02		(4.4.2.4)
W:	Total Building Weight =	1815	kips	
hn:	Total Building Height =	30	feet	
n:	Number of Stories =	2		

CALCULATE BASE SHEAR FOR BSE-2E (MCE)

T:	Fundamental Period of Vibration = $C_t * h^{\beta}$ =	0.256	sec.	(4-4)
S_a:	Spectral Acceleration at Building Period =	2.39		(4-3)
V:	Pseudo Seismic Force =	4775	kips	(4-1)

Subject:	ASCE 41 Shear Stress check, Section 4.4.3.3	**Job Number:**	B8114004.00	**Date:**	06/14/19
Job:	UCB, 2521 Hillegass Avenue-Karpe Hall	**By:**	HK	**Section:**	
Model:	ASCE 41, TIER 1	**Checked By:**		**Page**	**of**

Story Shears

Base Shear V **4775** kips
k 1
Ms 4.5 for RC wall, Collapse Prevention

x	w_x	h_x	$w_x h_x^k$	F_x	V_j
Roof	788	25	19705	3139	3139
Level 2	1027	10	10273	1636	1636
	1815		29978	4775	

Level	Wall Length		Average Wall thickness	f'c	2sqrt(f'c) (psi)	Demand (psi)		D/C- Tier 1	
	N/S	E/W				N/S	E/W	N/S	E/W
Roof	69.00	56.00	12.00		70.00	70.20	86.49	1.00	1.24
Level 2	84.00	110.00	12.00		70.00	30.06	22.96	0.43	0.33

Specifier's comments:

Grout in detail.

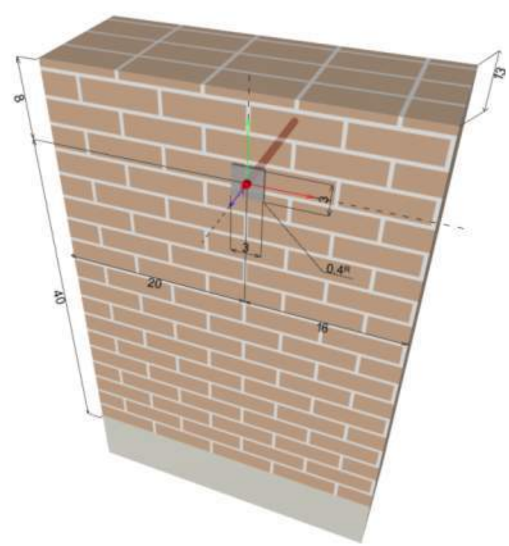
1 Input data

Anchor type and diameter:	**HY 270 + threaded rod A307 3/4, HIT-SC 26x125 + HIT-SC 26x200**
Item number:	2084047 HIT-V 3/4"x16" (element) / 2194247 HIT-HY 270 (adhesive) / 360487 HIT-SC 26x125, 360488 HIT-SC 26x200 (sieve sleeves)
Effective embedment depth:	h_{ef} = 13.000 in.
Material:	ASTM A 307
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	3/4/2018 | -
Proof:	Design Method Hilti Technical Data
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.400 in.
Anchor plate[R] :	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.400 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	Multi-wythe solid brick, L x W x H: 8.000 in. x 4.000 in. x 2.625 in.; Joints: vertical: 0.375 in.; horizontal: 0.375 in. Base material temperature: 68 °F
Installation:	Face installation
Seismic loads	no

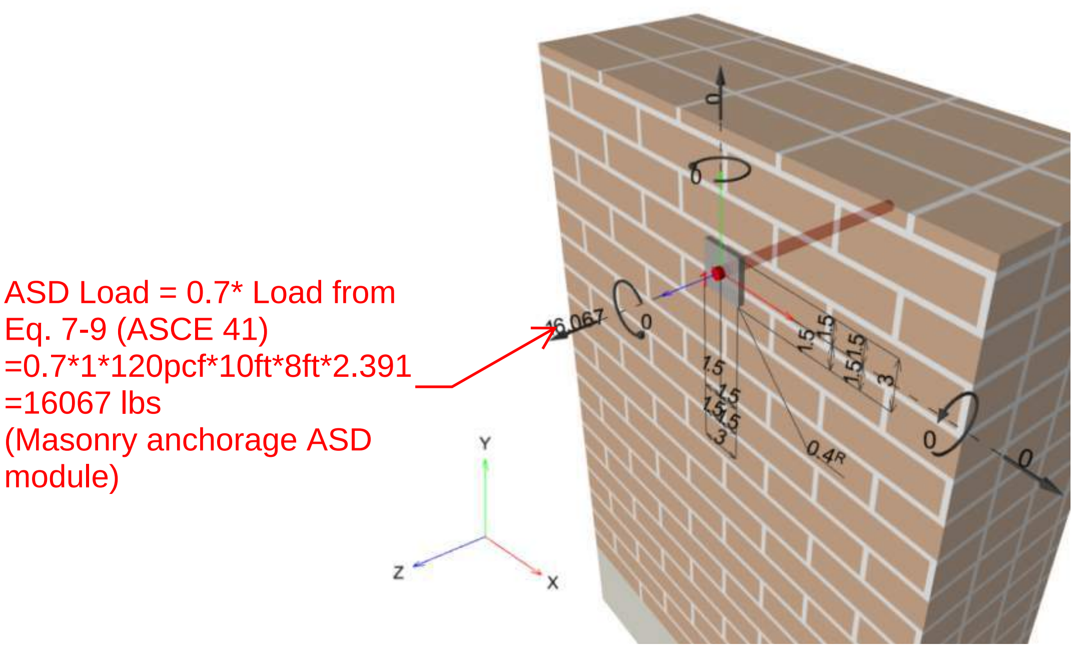
8" in detail

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.]



Geometry [in.] & Loading [lb, in.lb]

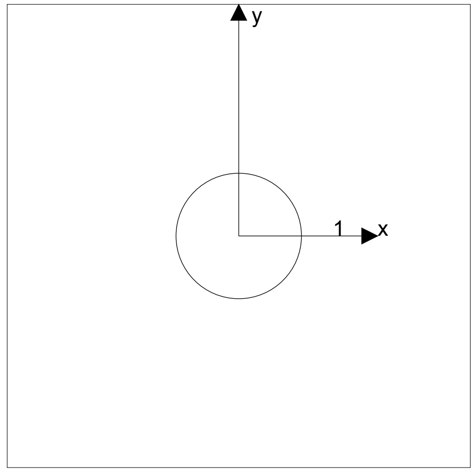


1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 16,067; V_x = 0; V_y = 0; M_x = 0; M_y = 0; M_z = 0;	no	1,506

Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Masonry - Jun 19, 2019 (1)	Date:	6/21/2019
Fastening point:			

2 Load case/Resulting anchor forces



Load case: Service loads

Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	16,067	0	0	0

max. compressive strain: - [‰]
max. compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 16,067 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load (Most utilized anchor 1)

	Load P_s [lb]	Capacity P_t [lb]	Utilization $\beta_P = P_s/P_t$ [%]	Status
Steel strength	16,067	8,750	184	not recommended
Bond strength	16,067	1,068	1,506	not recommended

184/2=92%

1506/2=753% (NG)
for 2 anchors in detail
1/S6

3.1 Steel strength

$P_{t,s}$ = Value refer to Hilti Technical Data
$P_{t,s} \geq P_s$

Results

$P_{t,s}$ [lb]	P_s [lb]
8,750	16,067

3.2 Bond strength

$P_{t,b,Base}$ = Value refer to Hilti Technical Data
$P_{t,b} = P_{t,b,Base} \cdot f_{red,E} \cdot f_{red,s} \cdot f_{red,Temp}$
$P_{t,b} \geq P_s$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
8.000	16.000	16.000	-	68

Results

$P_{t,b}$ [lb]	$P_{t,b,Base}$ [lb]	P_s [lb]	$f_{red,E}$	$f_{red,S}$	$f_{red,Temp}$
1,068	2,135	16,067	0.500	1.000	1.000

4 Shear load (Most utilized anchor 1)

	Load V_s [lb]	Capacity V_t [lb]	Utilization $\beta_V = V_s/V_t$ [%]	Status
Overall strength	N/A	N/A	N/A	N/A

5 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2018, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- The min. sizes of the bricks, the masonry compressive strength, the type / strength of the mortar and the grout (in case of fully grouted CMU walls) has to fulfill the requirements given in the relevant ESR-approval or in the PTG.
- Only the local load transfer from the anchor(s) to the wall is considered, a further load transfer in the wall is not covered by PROFIS!
- Wall is assumed as being perfectly aligned vertically – checking required(!): Noncompliance can lead to significantly different distribution of forces and higher tension loads than those calculated by PROFIS. Masonry wall must not have any damages (neither visible nor not visible)! While installation, the positioning of the anchors needs to be maintained as in the design phase i.e. either relative to the brick or relative to the mortar joints.
- The effect of the joints on the compressive stress distribution on the plate / bricks was not taken into consideration.
- If no significant resistance is felt over the entire depth of the hole when drilling (e.g. in unfilled butt joints), the anchor should not be set at this position or the area should be assessed and reinforced. Hilti recommends the anchoring in masonry always with sieve sleeve. Anchors can only be installed without sieve sleeves in solid bricks when it is guaranteed that it has not any hole or void.
- The accessories and installation remarks listed on this report are for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.
- The compliance with current standards (e.g. 2015, 2012, 2009 and 2006 IBC) is the responsibility of the user.
- Drilling method (hammer, rotary) to be in accordance with the approval!
- Masonry needs to be built in a regular way in accordance with state-of the art guidelines!

Fastening does not meet the design criteria!

6 Installation data

Profile: no profile

Hole diameter in the fixture: d_f = 0.813 in.

Plate thickness (input): 0.400 in.

Drilling method: Drilled in rotary mode

Anchor type and diameter: HY 270 + threaded rod A307 3/4, HIT-SC 26x125 + HIT-SC 26x200

Item number: 2084047 HIT-V 3/4"x16" (element) / 2194247 HIT-HY 270 (adhesive) / 360487 HIT-SC 26x125, 360488 HIT-SC 26x200 (sieve sleeves)

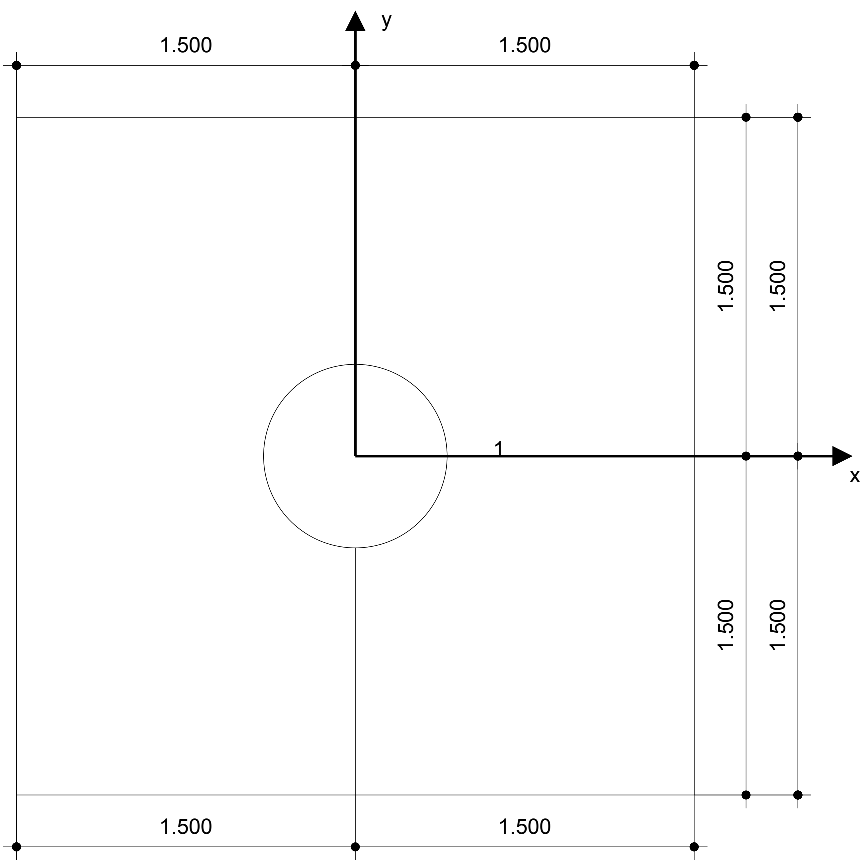
Installation torque: 720 in.lb

Hole diameter in the base material: 1.000 in.

Hole depth in the base material: 13.250 in.

Minimum thickness of the base material: 13.000 in.

Hilti HIT-V threaded rod with HIT-HY 270 injection mortar and 2 HIT-SC 26x125 + HIT-SC 26x200 sieve sleeve(s) with 13 in embedment h_ef, 3/4, Steel galvanized, Rotary drilled installation per Technical data



Coordinates Anchor in.

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	0.000	20.000	16.000	40.000	8.000

7 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.