Vila Structural Consulting Engineers, Inc.

Structural Calculations for

New Residence for
Eliges Investors Construction
at
9841 SW 73rd Court
Pinecrest, FL
Bldg. Department Comments Rev. 01

Pages
1 to 21
Project Number: 22CB006

Jose E Vila Alvarez

Digitally signed by Jose E Vila Alvarez
DN: CN=Jose E Vila Alvarez, dnQualifier=A01410D0000017ED766EF45000BBAAC, O=VILA STRUCTURAL CONSULTING ENGINEERS, C=US
Date: 2022.09.12 03:15:39-04'00'

Jose E. Vila Alvarez
FL PE# 89027
September 12, 2022

Table of Content

Jax Apex Technology, Inc.
9000 Regency Square Boulevard, Suite 100
Jacksonville, FL 32211

Evaluation reports are the opinion of the engineer who prepared the report, based on the findings, and in no way constitute or imply approval by a local building authority. The engineer, in review of the data submitted, finds that, in his opinion, the product, material, system, or method of construction specifically identified in this report conforms with or is a suitable alternate to that specified in the Florida Building Code, SUBJECT TO THE LIMITATIONS IN THIS REPORT

Jeffrey P. Arneson, P.E., a licensed Florida professional engineer and employee of Jax Apex Technology, Inc. (Apex Technology) has reviewed the data submitted for compliance with the Florida Building Code. Neither Jeffrey P. Arneson, nor Apex Technology, are responsible for any errors or omissions to any documents, calculations, drawings, specifications, tests, or summaries prepared and submitted by the design professional or preparer of record who are listed in the Substantiating Data section of this report.

REPORT NO: SIM202003

CATEGORY: Structural Components

SUBCATEGORY: Wood Connectors

SUBMITTED BY:

SIMPSON STRONG-TIE COMPANY, INC.
5956 W. LAS POSITAS BOULEVARD
PLEASANTON, CA 94588

1. CERTIFICATION OF INDEPENDENCE:

Jeffrey P. Arneson, the Florida engineer who prepared this report, and Apex Technology have no financial interest in the manufacturing, sales, or distribution of the products included in this report. Jeffrey P. Arneson and Apex Technology comply with all criteria as stated in Florida Administrative Code Chapter 61G20-3.

2. PRODUCT NAME:

Column Caps for CMU and Concrete Piers

CCQM, CCTQM, CCCQM, ECCLQM, ECCLLQMD, ECCLRQMD

Wood to Masonry Hangers

LGUM26-2, LGUM28-2, LGUM210-2, LGUM26-3, LGUM28-3, LGUM210-3, LGUM26-4, LGUM28-4, LGUM210-4, LGUM46, LGUM48, LGUM410, HGUM5.25, HGUM5.50, HGUM7.00, HGUM7.25, HGUM9.00

MBHU3.56/9.25KT, MBHU3.56/11.25KT, MBHU3.56/11.88KT, MBHU3.56/14KT, MBHU3.56/16KT, MBHU3.56/18KT, MBHU5.50/9.25KT, MBHU5.50/11.25KT, MBHU5.50/11.88KT, MBHU5.50/14KT, MBHU5.50/16KT, MBHU5.50/18KT

MBHA3.12/9.25, MBHA3.12/11.25, MBHA3.56/7.25, MBHA3.56/9.25, MBHA3.56/11.25, MBHA3.56/11.88, MBHA3.56/14, MBHA3.56/16, MBHA3.56/18, MBHA5.50/7.25, MBHA5.50/9.25, MBHA5.50/11.25, MBHA5.50/11.88, MBHA5.50/14, MBHA5.50/16, MBHA5.50/18

3. SCOPE OF EVALUATION:

Load evaluation as a structural component using the requirements of the 7*th Edition (2020) Florida Building Code, Building* and 7*th Edition (2020) Florida Building Code, Residential*.

4. DESCRIPTION:

4.1 CCQM-SDSHDG, CCTQM-SDSG, CCCQM-SDSG, ECCLQM-KT and ECCLQMD-KT Column Caps for CMU and Concrete Piers. The CCQM, CCTQM, CCCQM, and ECCLQM are used to connect wood beams to the top of CMU or concrete piers, primarily for raised pier foundations. The beams can be oriented in a "straight" configuration (CCQM), "T" configuration (CCTQM), "cross" configuration (CCCQM), or an "L" configuration (ECCLQM). The ECCLQMD has an extended main bucket to support a deck joist framing into the corner. The ECCLQMD is available in left (ECCLLQMD) and right (ECCLRQMD) versions. The column caps fasten to the beams with ¼"×2½" long Strong-Drive® SDS Heavy-Duty Connector screws. Specially shaped anchor bolts are factory welded to the bottom of the buckets, and become embedded in the top of the pier. The ECCLQMG-KT and ECCLQMD-KT both include two MSTQM straps, which extend up to provide a holdown for corner framing above. The CCQM, CCTQM, CCCQM, ECCLQM and ECCLQMD are manufactured from 7 gauge steel meeting ASTM A1011 GRADE 33 with a hot-dipped galvanized finish in accordance with ASTM A153. The MSTQM strap is manufactured from 12 gauge steel meeting ASTM A653 SS GRADE 40 with a G90 galvanized finish. Column cap fastener schedule and allowable loads are shown in Table 1. Column cap dimensions are shown in Table 2. MSTQM strap fastener schedule and allowable loads are specified in Note 8 of Table 1. See Figures 1, 2, and 3 for additional details.

4.2 LGUM / HGUM Masonry Girder Hangers. The LGUM and HGUM series of high capacity hangers are used to connect wood girders and beams to masonry or concrete walls. Both series use Simpson Strong-Tie® Titen HD® Heavy-Duty Screw Anchors to attach to the masonry or concrete wall, and Strong-Drive® SDS Heavy-Duty Connector screws to attach the beam to the hanger. The LGUM is manufactured from 12 gauge steel meeting ASTM A653 SS Grade 40 with a G90 galvanized finish. The HGUM is manufactured from 7 gauge galvanized steel meeting ASTM A653 SS Grade 33 with a G90 galvanized finish. Girder hanger fastener schedule, dimensions, and allowable loads are shown in Table 3. See Figure 4 for additional details.

4.3 MBHU Masonry Beam Hangers. The MBHU series of hangers are used to anchor wood beams, joists, trusses, or rafters to masonry or concrete walls. The MBHU fastens to the wood member with ¼"×2½" long Strong-Drive® SDS Heavy-Duty Connector screws, and fastens to the masonry or concrete wall with two ¾"×5" Titen HD® Heavy-Duty Screw Anchors. These connectors are manufactured from 10 gauge steel meeting ASTM A653 SS Grade 33 with a G90 galvanized finish. MBHU fastener schedules, dimensions, and allowable loads are shown in Table 4. See Figures 5 and 6 for additional details.

4.4 MBHA Masonry Hangers. The MBHA series of hangers are used to anchor wood beams, joists, trusses, or rafters to masonry or concrete walls. The MBHA fastens to the wood member with 0.148"×3" nails and fastens to the masonry or concrete with two lengths of threaded rod embedded in the wall using either Simpson Strong-Tie® ET-HP® Epoxy Adhesive or Simpson Strong-Tie SET-XP® Epoxy Adhesive. These connectors are manufactured from 10 gauge steel meeting ASTM A653 SS Grade 33 with a G90 galvanized finish. Hanger fastener schedules, dimensions, and allowable loads are shown in Table 5. See Figure 7 for additional details.

5. MATERIALS:

5.1 Steel. Steel specifications for each product listed in this evaluation report shall be as indicated in the previous section. In addition to the standard G90 coating, some models (designated with a model number ending with Z) are available with a G185 zinc coating specification in accordance with ASTM A653. Some models (designated with a model number ending with HDG or G) are available with a hot-dip galvanization, also known as "batch" galvanization, in accordance with ASTM A123, with a minimum specified coating weight of 2.0 ounces of zinc per square foot of surface area, total for both sides. Some models (designated with a model number ending with SS) are available in Type 316L stainless material manufactured in accordance with ASTM A240 sheet, strip or plate and ASTM A480 (General Requirements) in the following designation: UNS designation S31603, AISI Type 316L. Model numbers in this report may not include the Z, HDG, or SS ending, but the information shown applies.

5.2 Wood. Wood members to which these connectors are fastened shall be solid sawn lumber, glued-laminated lumber, or structural composite lumber having dimensions consistent with the connector dimensions shown in Tables 1 through 6. Unless otherwise noted, lumber shall be Southern Pine (SP) or Douglas Fir-Larch (DF) having a minimum specific gravity of 0.55 or 0.50, respectively. Where indicated by SPF, lumber shall be Spruce-Pine-Fir having a minimum specific gravity of 0.42.

5.3 Concrete/Masonry. Concrete and Masonry design specifications shall be the stricter of the specifications by the engineer of record, the Florida Building Code minimum standards, the following, or as noted in the report:

Material	Specification	Minimum Compressive Strength
Concrete, f'_c	-	2,500 psi[1]
Masonry, f'_m	ASTM C1314	1,500 psi
Masonry Unit	ASTM C90	2,000 psi
Mortar	ASTM C270 Type S	1,800 psi (or by proportions)
Grout	ASTM C476	2,000 psi (or by proportions)

1. Where noted for CCQM models, 3,000 psi concrete is required.

5.4 Nails. Unless noted otherwise, nails shall be common nails. Nails shall comply with ASTM F1667 and shall have the minimum bending yield strengths F_{yb}:

Nail Pennyweight	Nail Shank Diameter (inch)	Nail Length (inch)	F_{yb} (psi)
10d	0.148	3	90,000
16d×2½	0.162	2½	90,000

Fasteners for galvanized connectors in pressure-preservative treated wood shall be hot-dipped zinc coated galvanized steel with coating weights in accordance with

ASTM A153 or steel mechanically galvanized in accordance with ASTM B695, Class 55. Fasteners for stainless steel connectors shall be stainless steel except where otherwise permitted by the treatment manufacturer.

The allowable loads of stainless-steel connectors match those of carbon-steel connectors when installed with Simpson Strong-Tie stainless-steel, SCNR ring-shank nails, unless noted otherwise.

5.5 Strong-Drive® SDS Heavy-Duty Connector Screws. Fasteners used with the connectors described in Tables 1, 3, and 4 of the report must be Simpson Strong-Tie® Strong-Drive SDS Heavy-Duty Connector Screws as recognized in FL9589. SDS screws used in contact with preservative-treated or fire-retardant-treated lumber must, at a minimum, comply with FL9589. The lumber treater or Simpson Strong-Tie Company should be contacted for recommendations on minimum corrosion resistance and connection capacities of fasteners used with the specific proprietary preservative-treated or fire retardant-treated lumber.

5.6 Titen HD® Heavy-Duty Screw Anchors. Anchors shown in Tables 3 and 4 and Figures 4 and 6 shall be Simpson Strong-Tie® Titen HD Heavy-Duty Screw Anchors for masonry or concrete as recognized in FL15730 and FL16230. Installation shall be as specified in FL15730 and FL16230.

5.7 Epoxy Anchoring Adhesives. Anchors shown in Table 5 and Figure 7 shall be all-thread rod installed with either Simpson Strong-Tie® ET-HP® Epoxy Adhesive or Simpson Strong-Tie SET-XP® High-Strength Epoxy Adhesive for masonry or concrete as recognized in FL15730 and FL16230. Installation shall be as specified in FL15730 and FL16230.

6. INSTALLATION:

Installation shall be in accordance with this report and the most recent edition of the Simpson Strong-Tie *Wood Construction Connectors* catalog. Information in this report supersedes any conflicting information between information provided in this report and the catalog.

7. SUBSTANTIATING DATA:

Test data submitted by Testing Engineers Inc. and Simpson Strong-Tie, and signed and sealed calculations performed by Bryan Wert, P.E., in accordance with the *7th Edition (2020) Florida Building Code, Building* and *Residential* codes.

Model	Test Lab	Test Number
ECCLQM	Testing Engineers, Inc.	P002, P004, P005, Q375
ECCLQMD	Simpson Strong-Tie, Inc.	S944, S945
CCQM, CCTQM	Testing Engineers, Inc.	P006, P007, P008, P009
LGUM	Testing Engineers, Inc.	M202, M203, M204, M211, M212, M213, M221, M222, M224
HGUM	Testing Engineers, Inc.	M207, M209, M216, M217, Q690, Q691, R058, R059
MBHU	Testing Engineers, Inc.	N447, N448, N449, N450, O356, O357, O360, O361, P773, P774, Q848, Q849
MBHA	Testing Engineers, Inc.	F391, F392, F393, F394, F964, F965

8. FINDINGS:

The connectors listed in this evaluation report comply with the *7th Edition (2020) Florida Building Code, Building*, and *7th Edition (2020) Florida Building Code, Residential* when installed in accordance with this report.

9. LIMITATIONS:

1. Maximum allowable loads shall not exceed the allowable loads listed in this report. Allowable loads listed in this report are based on allowable stress design. The loads in this report are not applicable to Load and Resistance Factor Design.
2. Capacity of wood members is not covered by this report. Capacity of wood members must be checked by the building designer.
3. Connectors in this report having a galvanized coating thickness less than G185 shall not be installed in contact with preservative-treated wood products that are exposed to rainfall or ground moisture.
4. Allowable loads for more than one direction for a single connection cannot be added together. A design load that can be divided into components in the directions given must be evaluated as follows:

   (Design Uplift / Allowable Uplift) + (Design Lateral / Allowable Lateral) < 1.0

10. ALLOWABLE LOADS:

The tables that follow reference the allowable loads for the aforementioned products.

TABLE 1: CCQM / CCCQM / CCTQM / ECCLQM Fasteners and Allowable Loads

Model No.	No. of ¼"×2½" SDS Screws			16" Square Grout-Filled CMU Pier[3,6]				16" Square CMU Shell Filled with 3,000 psi Concrete[3,7]			
				Uplift (160)			Lateral (160)	Uplift (160)			Lateral (160)
	Main Beam	Side Beam	Deck Beam	Main Beam	Side Beam	Total		Main Beam	Side Beam	Total	
CCQM-SDSHDG	12	—	—	6,750	—	6,750	2,460	6,495	—	6,495	2,650
CCTQM-SDSG	12	8	—	6,750	5,375	6,750	2,460	6,495	5,375	6,495	2,650
CCCQM-SDSG	12	8	—	6,750	5,375	6,750	2,460	6,495	5,375	6,495	2,650
ECCLQMG-KT[8]	16	16	—	6,240	6,240	7,340	2,220	6,240	6,240	7,830	2,565
ECCLQMDG-KT[9]	16	16	6	6,240	6,240	7,340	2,220	6,240	6,240	7,830	2,565

Notes:

1. Uplift loads have been increased 60% for wind loading as permitted by the code. No further increase permitted. Reduce where other loads govern.
2. Total uplift load and lateral load is based on tested anchor failure in the pier.
3. Allowable loads are based on either a 16" square grout-filled CMU pier with f'_m of 1,500 psi or a 16" square CMU shell filled with 3,000 psi concrete. A minimum of (4) #7 vertical rebars or equivalent steel area is required. The Designer shall design and detail the GFCMU/concrete pier to resist all forces including uplift, shear, and moment.
4. Pier height per Building Designer.
5. Side beam and main beam uplift loads assume DF or SP members and are not additive.
6. The allowable loads listed for grout-filled CMU apply to solid concrete piers of 2,500 psi concrete a minimum of 16" square.
7. The allowable loads listed for CMU shell filled with 3,000 psi concrete apply to solid concrete piers of 3,000 psi concrete a minimum of 14" square.
8. The ECCLQM-KT is a kit packaged with (2) MSTQM straps and (32) SDS ¼"×2½" screws. One strap may be installed on each face of the ECCLQM (as shown), using the SDS screws into the beams and (26) 0.162"x2½" nails (not provided) into the wall framing. The MSTQM strap's allowable tension load is 6,240 lbs. If straps are not installed, table uplift applies to beam only.
9. The ECCLQMD-KT is a kit packaged with (2) MSTQM straps and (32) SDS ¼"×2½" screws. The allowable download for the deck joist connection is 5,475 lb. (2-2X joist) or 5,240 lb. (2X joist) and the allowable uplift is 2,010 lb.

TABLE 2: CCQM / CCTQM / CCCQM / ECCLQM Dimensions				
Model No.	Main Channel Width, W_1 (in.)	Side Stirrup Width, W_3 and W_4 (in.)	Main Channel Length, L_1 (in.)	Side Stirrup Length, L_2 (in.)
CCQM3.62-SDSHDG	3 5/8	—	11	—
CCQM4.62-SDSHDG	4 5/8	—	11	—
CCQM5.50-SDSHDG	5 ½	—	11	—
CCTQM3.62-SDSG	3 5/8	3 5/8	11 ½	4
CCTQM4.62-SDSG	4 5/8	4 5/8	13 ½	4
CCTQM5.50-SDSG	5 ½	5 ½	13 ½	4
CCCQM3.62-SDSG	3 5/8	3 5/8	11 ½	4
CCCQM4.62-SDSG	4 5/8	4 5/8	13 ½	4
CCCQM5.50-SDSG	5 ½	5 ½	13 ½	4
ECCLQM3.62G-KT[1]	3 5/8	3 5/8	11 ½ [2]	7 ¾
ECCLQM4.62G-KT[1]	4 5/8	4 5/8	11 ½ [2]	7 ¾
ECCLQM5.50G-KT[1]	5 ½	5 ½	11 ½ [2]	7 ¾

Notes:
1. The MSTQM is a component of the ECCLQM kits. It is 12 ga.; 3" wide and 48" long.
2. The ECCLL/RQMDG-KT has the same dimensions as ECCLQMG-KT, except W1 = 16½".

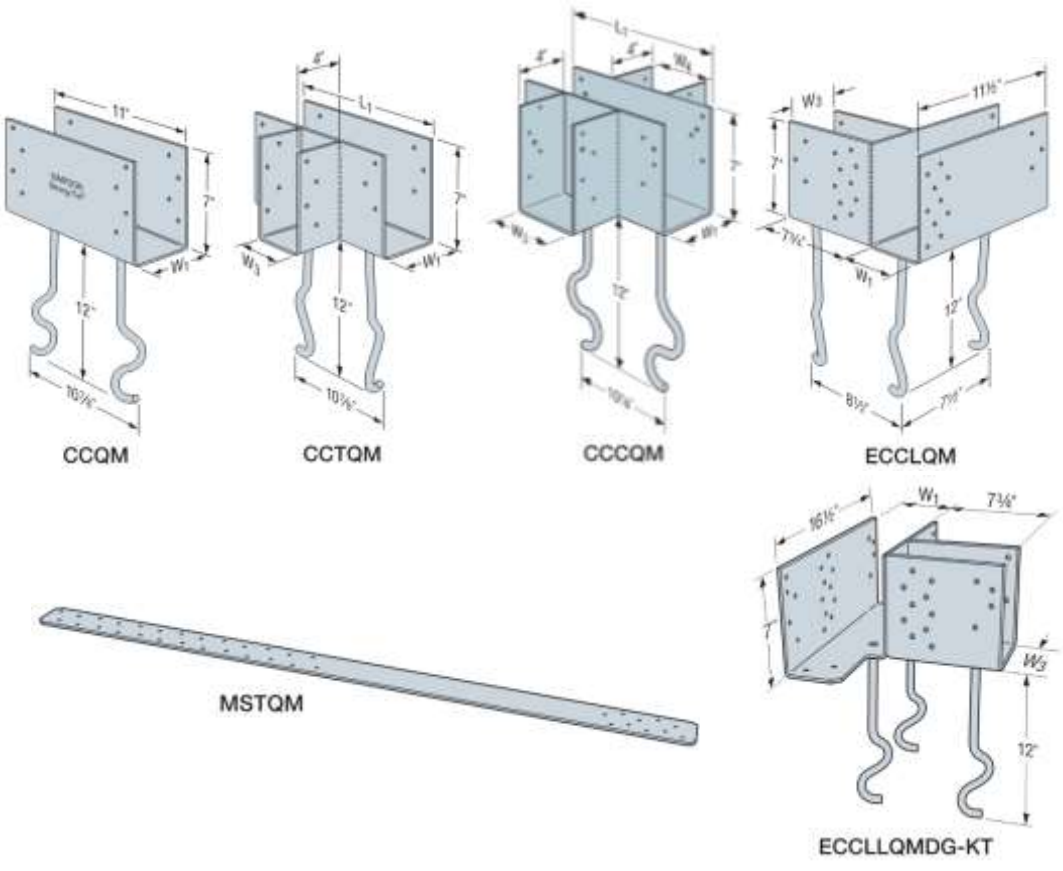


FIGURE 1: CCQM / CCTQM / CCCQM / ECCLQM / ECCLQMD / MSTQM Dimensions

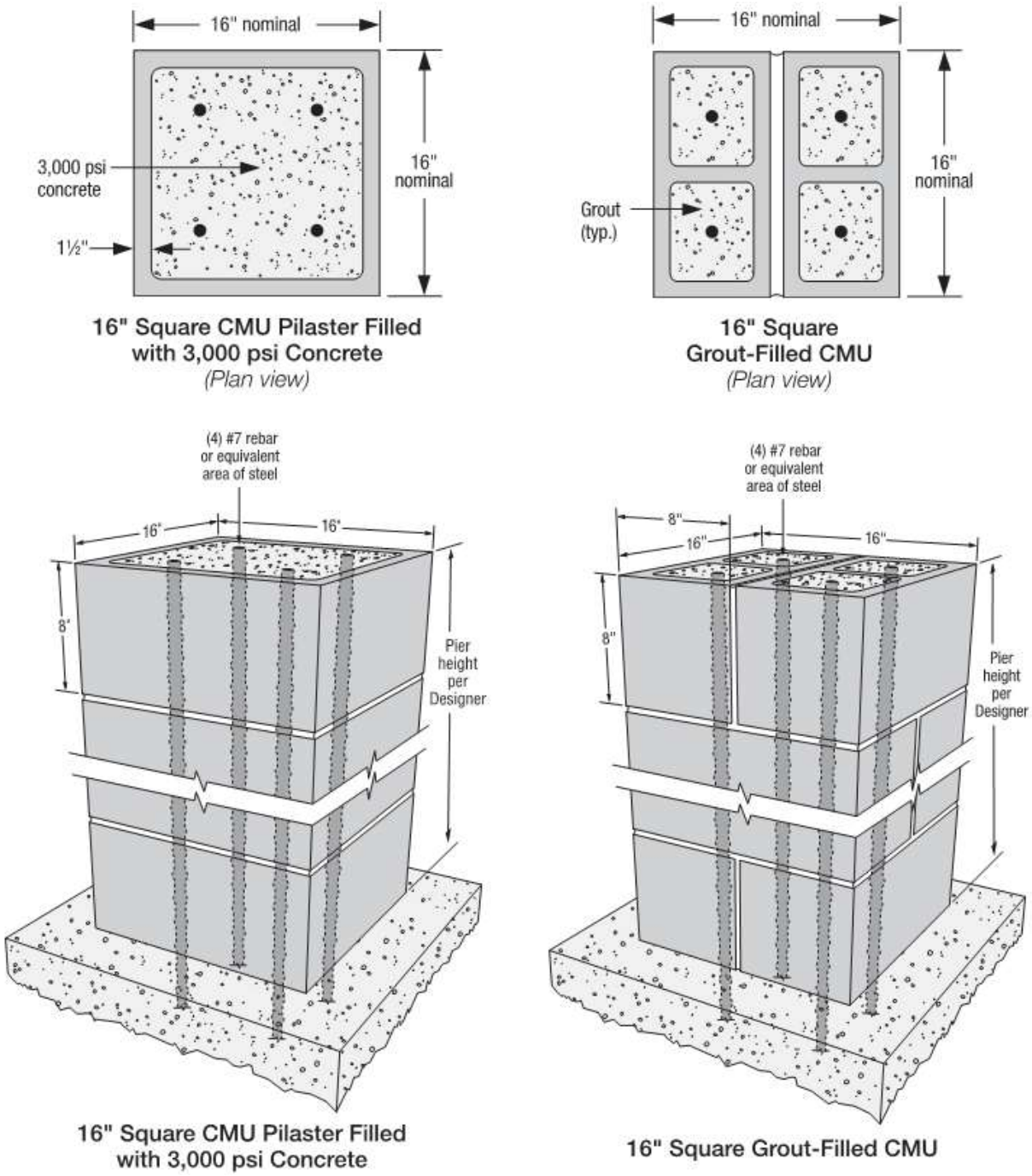
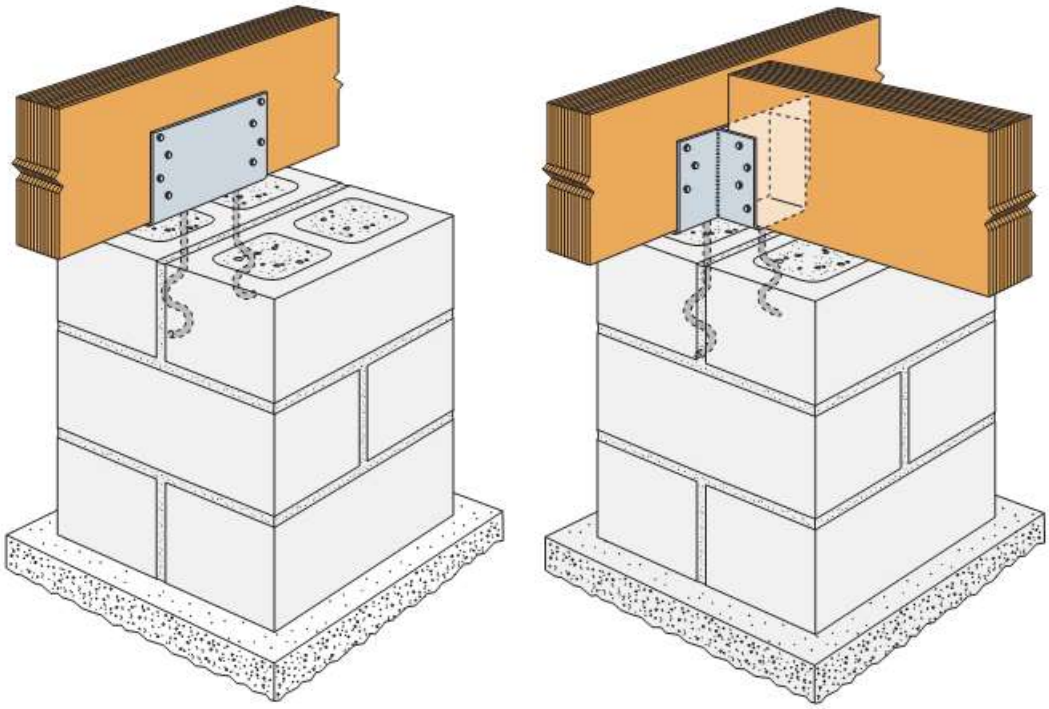
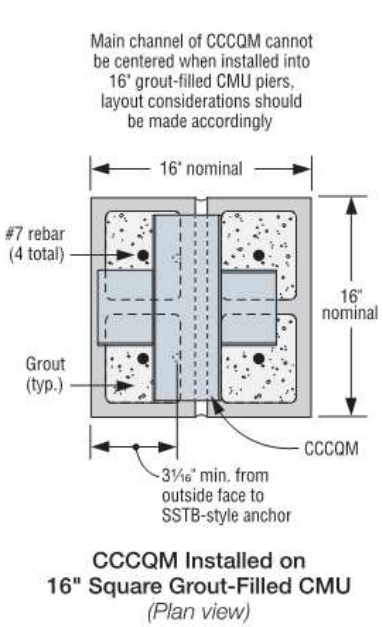


FIGURE 2: Pier Typical Dimensions and Minimum Requirements

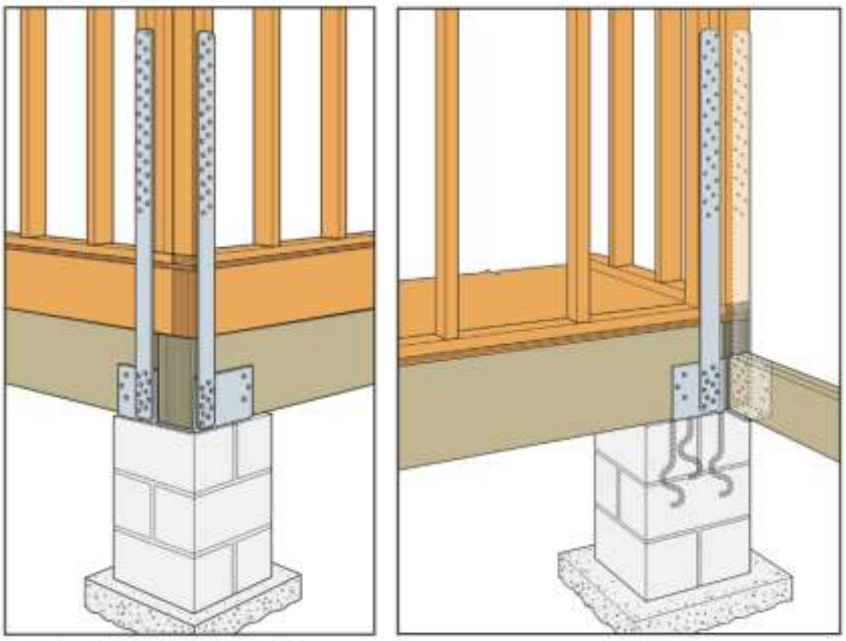


Typical CCQM Installation

Typical CCTQM Installation



CCCQM Installed on 16" Square Grout-Filled CMU *(Plan view)*



Typical ECCLQM Installation

Typical ECCLRQMD-KT Installation

FIGURE 3: CCQM / CCTQM / CCCQM / ECCLQM / ECCLQMD / MSTQM Installation Details

TABLE 3 – LGUM and HGUM Dimensions, Fasteners and Allowable Loads										
Model No.	Ga.	Dimensions (in.)			Fasteners		DF/SP Allowable Loads (lb.)			
		W	H	B	GFCMU and Concrete	Joist	Uplift[2] (160)		Download (100/115/125)	
					Titen HD® Anchors[7]	Strong-Drive® SDS Screws	GFCMU	Concrete	GFCMU	Concrete
Double 2x Sizes										
LGUM26-2	12	3 7/16	5	4	(4) ⅜"×4"	(4) ¼"×2½"	1,430		5,595	
LGUM28-2	12	3 7/16	7	4	(6) ⅜"×4"	(6) ¼"×2½"	2,435		8,250	
LGUM210-2	12	3 7/16	9	4	(8) ⅜"×4"	(8) ¼"×2½"	3,575		9,575	
Triple 2x Sizes										
LGUM26-3	12	5 ⅛	5 ⅛	4	(4) ⅜"×4"	(4) ¼"×2½"	1,430		5,610	
LGUM28-3	12	5 ⅛	7 ⅛	4	(6) ⅜"×4"	(6) ¼"×2½"	2,435		8,290	
LGUM210-3	12	5 ⅛	9 ⅛	4	(8) ⅜"×4"	(8) ¼"×2½"	3,575		9,715	
Quadruple 2x Sizes										
LGUM26-4	12	6 11/16	5 5/16	4	(4) ⅜"×4"	(4) ¼"×2½"	1,430		5,625	
LGUM28-4	12	6 11/16	7 5/16	4	(6) ⅜"×4"	(6) ¼"×2½"	2,435		8,335	
LGUM210-4	12	6 11/16	9 5/16	4	(8) ⅜"×4"	(8) ¼"×2½"	3,575		9,860	
4x Sizes										
LGUM46	12	3 ⅝	4 ⅞	4	(4) ⅜"×4"	(4) ¼"×2½"	1,430		5,600	
LGUM48	12	3 ⅝	6 ⅞	4	(6) ⅜"×4"	(6) ¼"×2½"	2,435		8,260	
LGUM410	12	3 ⅝	8 ⅞	4	(8) ⅜"×4"	(8) ¼"×2½"	3,575		9,620	
Engineered Wood & Structural Composite Lumber Sizes (Heavy Duty)										
HGUM5.25	7	5 ¼	11 to 30	5 ¼	(8) ⅝"×5"	(24) ¼"×2½"	4,105[2]	5,075[2]	14,025	14,770
HGUM5.50	7	5 ½		5 ¼	(8) ⅝"×5"	(24) ¼"×2½"			14,000	14,915
HGUM7.00	7	7		5 ¼	(8) ⅝"×5"	(24) ¼"×2½"			13,840	14,915
HGUM7.25	7	7 ¼		5 ¼	(8) ⅝"×5"	(24) ¼"×2½"			13,810	14,915
HGUM9.00	7	9		5 ¼	(8) ⅝"×5"	(24) ¼"×2½"			13,625	14,915

Notes:

1. Uplift loads have been increased 60% for wind loading as permitted by the code. No further increase permitted. Reduce where other loads govern.
2. Tabulated uplift loads are based on a 4" min. distance to top of wall. For HGUM installations with a 15" min. distance to top of wall, uplift loads may be increased to 6,180 lb. for GFCMU and 6,585 lb. for concrete.
3. Minimum f'_m = 1,500 psi and f'_c = 2,500 psi.
4. LGUM must be installed on minimum 6" thick wall and HGUM on minimum 8" thick wall (nominal values for GFCMU).
5. Titen HD anchors may be installed into the head or bed joints.
6. Structural composite lumber (SCL) shall have a minimum specific gravity of 0.50.
7. For stainless steel LGUM and HGUM models, use ⅜"×5" and ⅝"×6" Stainless-Steel Titen HD anchors, respectively, to achieve tabulated loads.

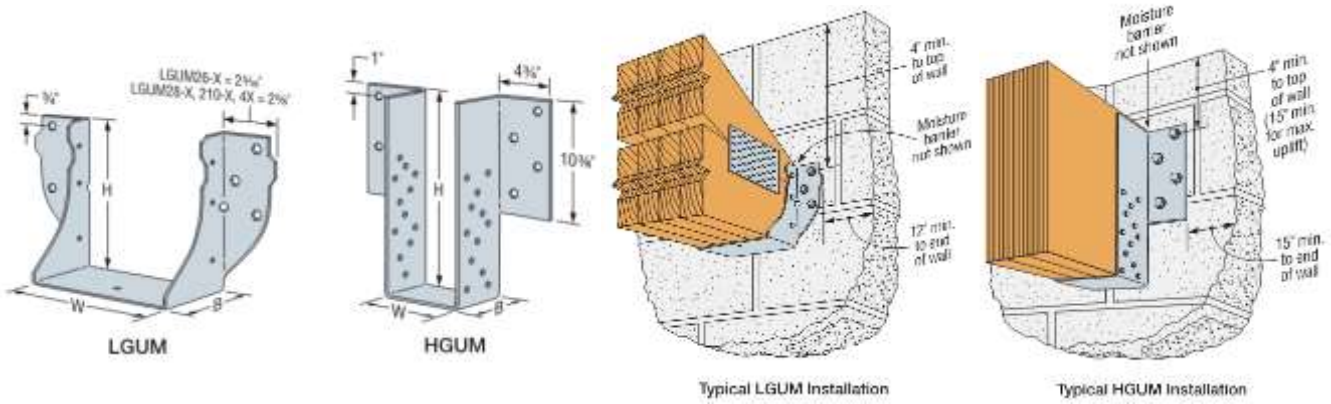


FIGURE 4: LGUM / HGUM Dimensions and Installation Details

TABLE 4: MBHU Dimensions, Fasteners, and Allowable Loads												
Model No.	Dimensions (in.)			Fasteners		DF/SP Allowable Loads (lb.)					
				GFCMU and Concrete	Joist	End of Wall / Outside Corner				Away From Edge	
						GFCMU		Concrete		GFCMU/Concrete	
	W	H	B	Titen HD® Anchors[5]	SDS Screws	Uplift (160)	Download (100)	Uplift (160)	Download (100)	Uplift (160)	Download (100)
MBHU3.56/9.25	3 9/16	9 ¼	3 ½	(2) ¾"×5"	(12) ¼"×2½"	1,610	2,440	2,715	4,190	2,210	4,005
MBHU3.56/11.25		11 ¼									
MBHU3.56/11.88		11 ⅞									
MBHU3.56/14		14				1,610	2,440	2,715	4,190	3,345	6,065
MBHU3.56/16		16									
MBHU3.56/18		18									
MBHU5.50/9.25	5 ½	9 ¼	3 ½	(2) ¾"×5"	(12) ¼"×2½"	1,610	2,440	2,715	4,190	2,210	4,005
MBHU5.50/11.25		11 ¼									
MBHU5.50/11.88		11 ⅞									
MBHU5.50/14		14				2,240	3,260[4]	3,485	6,970	3,345	6,065
MBHU5.50/16		16									
MBHU5.50/18		18									

Notes:

1. Uplift loads have been increased 60% for wind loading as permitted by the code. No further increase permitted. Reduce where other loads govern.
2. Minimum f'_m = 1,500 psi and f'_c = 2,500 psi.
3. Structural composite lumber (SCL) shall have a minimum specific gravity of 0.50.
4. Where noted in the table, download is for End of Wall condition. Download for Outside Corner is 3,640 lb.
5. For stainless steel MBHU models, use ¾"×6" Stainless-Steel Titen HD® anchors to achieve tabulated loads.

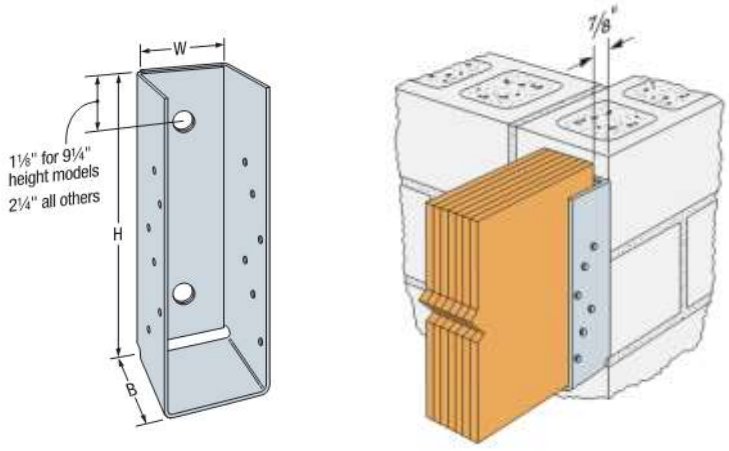


FIGURE 5: MBHU Dimensions and Installation Detail

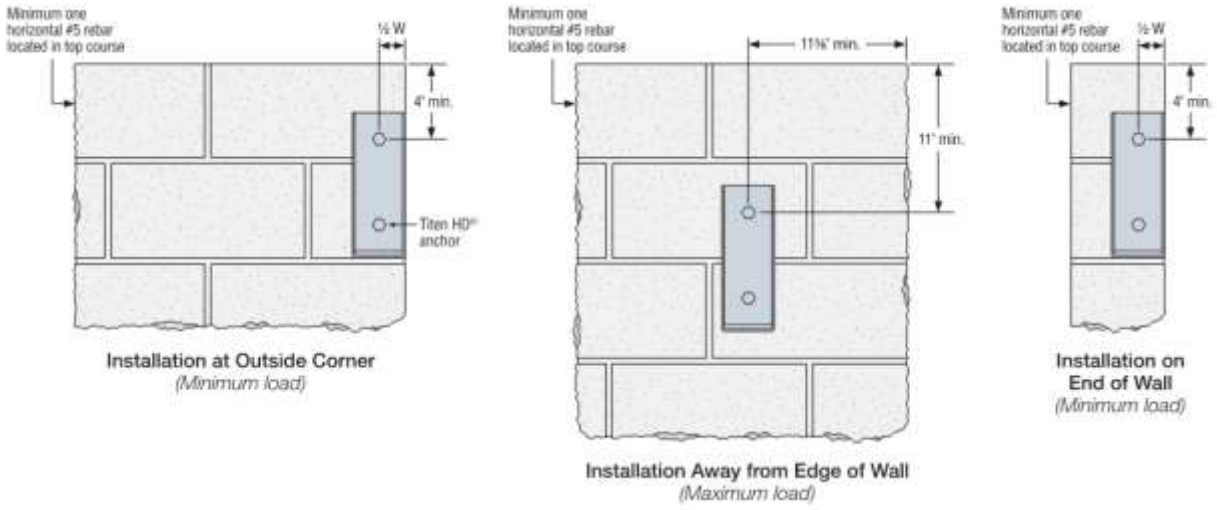


FIGURE 6: MBHU Installation Location Options

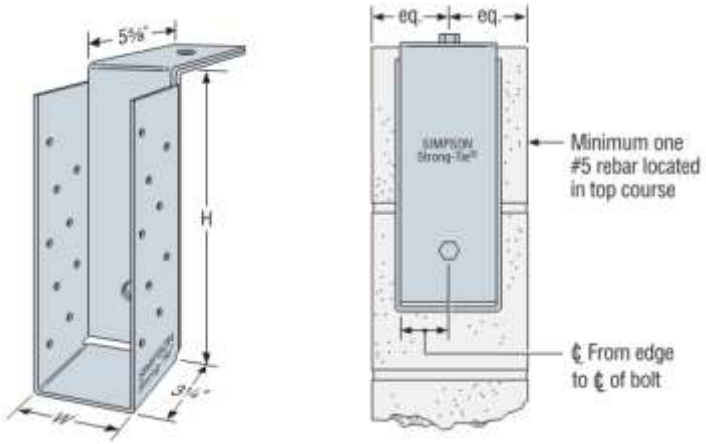


FIGURE 7: MBHA Dimensions and Installation Detail

TABLE 5: MBHA Dimensions, Fasteners, and Allowable Loads								
Model No.	Dimensions (in.)			Fasteners			DF/SP Allowable Loads (lb.)	
				GFCMU / Concrete[2,3]		Joist	GFCMU / Concrete[6,7]	
	W	H	B	Top	Face		Uplift (160)	Download (100)
MBHA3.56/7.25	3 9/16	7 ¼	3 ¼	(1) ATR¾ [4]	(1) ATR¾ [5]	(18) 0.148"×3"	1,885	4,380
MBHA5.50/7.25	5 ½	7 ¼	3 ¼					
MBHA3.12/9.25	3 1/8	9 ¼	3 ¼	(1) ATR¾ [4]	(1) ATR¾ [4]	(18) 0.148"×3"	3,475 [7]	6,275 [7]
MBHA3.12/11.25	3 1/8	11 ¼	3 ¼					
MBHA3.56/9.25	3 9/16	9 ¼	3 ¼					
MBHA3.56/11.25	3 9/16	11 ¼	3 ¼					
MBHA3.56/11.88	3 9/16	11 7/8	3 ¼					
MBHA3.56/14	3 9/16	14	3 ¼					
MBHA3.56/16	3 9/16	16	3 ¼					
MBHA3.56/18	3 9/16	18	3 ¼					
MBHA5.50/9.25	5 ½	9 ¼	3 ¼					
MBHA5.50/11.25	5 ½	11 ¼	3 ¼					
MBHA5.50/11.88	5 ½	11 7/8	3 ¼					
MBHA5.50/14	5 ½	14	3 ¼					
MBHA5.50/16	5 ½	16	3 ¼					
MBHA5.50/18	5 ½	18	3 ¼					

Notes:

1. Uplift loads have been increased 60% for wind loading as permitted by the code. No further increase permitted. Reduce where other loads govern.
2. Minimum f'_m = 1,500 psi and f'_c = 2,500 psi.
3. ATR is all-thread rod, ¾" diameter, grade A307 or better.
4. Loads for MBHA are based on installation using Simpson Strong-Tie® ET-HP® Epoxy Adhesive or Simpson Strong-Tie SET-XP® High-Strength Epoxy Adhesive with 6¾" minimum embedment required.
5. MBHA hangers with height of 7¼" require a 3½" minimum embedment of the face bolt using ET-HP Epoxy Adhesive or Simpson Strong-Tie SET-XP High-Strength Epoxy Adhesive.
6. Alternate anchorage permitted when designed by others to have equivalent or better capacity.
7. MBHA hangers with height of 9¼" and greater installed into concrete achieve 3,980 lb. uplift (160) and 6,790 lb. download (100).

11. REFERENCES:

Florida Building Code, Building 7th Edition (2020)

Section 104.11	Alternative materials, design, and methods of construction and equipment
Chapter 19	Concrete
Chapter 21	Masonry
Chapter 22	Steel
Chapter 23	Wood

Florida Building Code, Residential 7th Edition (2020)

R101.2	Scope
R4405	HVHZ Concrete
R4407	HVHZ Masonry
R4408	HVHZ Steel
R4409	HVHZ Wood

Standards

AISI S100	2016
ANSI/AWC NDS	2018
ASTM D7147	2011

12. IDENTIFICATION:

Each connector covered by this report shall be stamped with the manufacturer's name and/or trademark and the product name.

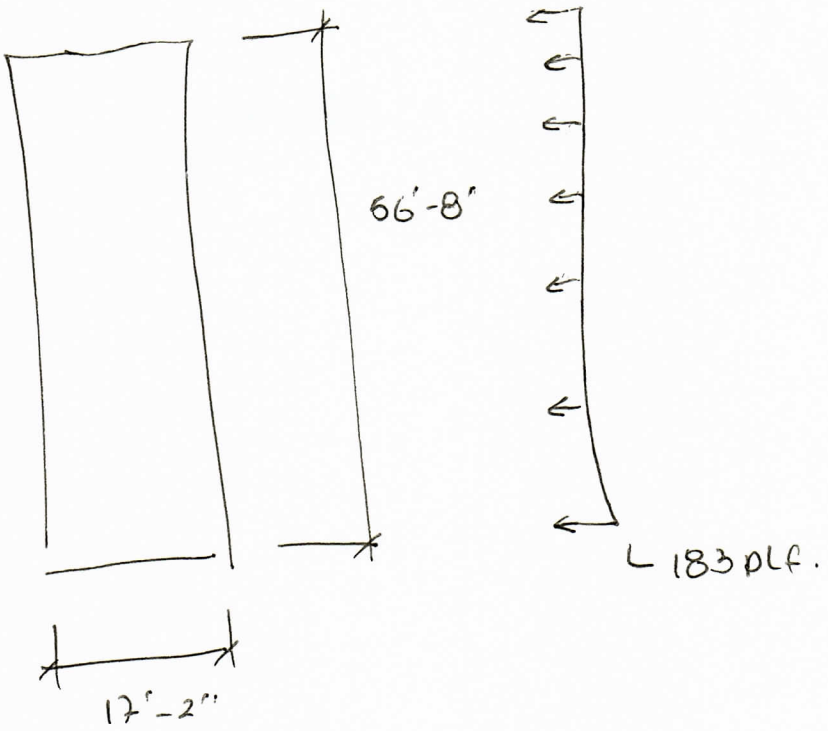
DocuSigned by:

079614DB26EB432...

Jax Apex Technology, Inc.
Jeffrey P. Arneson, P.E.
P.E. No. 58544
October 13, 2020

Using the critical load from page 3

At roof level Pressure = 28.2 psf.



$183 \text{ plf} \times \frac{56'-8"}{2} = 5186^{\#}$

$5186^{\#} / 17'-2" = 302 \text{ plf}.$

In the original calculation I use the conservative value of using the 2x face of the supporting element. As responded on Review Comment 4 and as updated on S-6.01 Truss Schedule the plywood will be connected to a support wider than 3; in this case; 3½". Therefore we can use the corresponding value from page 8 of the original calculations.

$\frac{670^{\text{plf}}}{2} = 335 \text{ plf} \geq 302 \text{ plf}$ OK//

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: New Residence.ec6

DESCRIPTION: Pool Deck

Code Reference

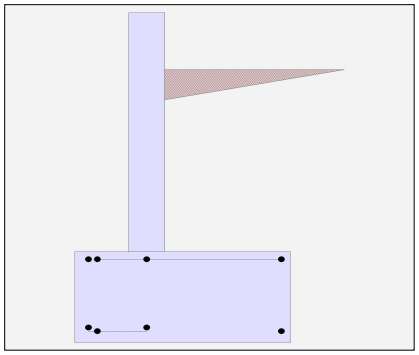
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	1.25 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	150.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	3.50 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem (Strength Level)	=	80.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: New Residence.ec6

LIC# : KW-06012775, Build:20.22.8.17 CBenginfo (c) ENERCALC INC 1983-2022

DESCRIPTION: Pool Deck

Design Summary

Wall Stability Ratios

Overturning	=	2.78	OK
Sliding	=	1.65	OK
Global Stability	=	3.51	

Total Bearing Load	=	3,102	lbs	
...resultant ecc.	=	6.65	in	
Eccentricity within middle third				
Soil Pressure @ Toe	=	1,420	psf	OK
Soil Pressure @ Heel	=	131	psf	OK
Allowable	=	2,000	psf	
Soil Pressure Less Than Allowable				
ACI Factored @ Toe	=	1,988	psf	
ACI Factored @ Heel	=	183	psf	
Footing Shear @ Toe	=	1.0	psi	OK
Footing Shear @ Heel	=	3.8	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	976.4	lbs	
less 100% Passive Force	-	375.0	lbs	
less 100% Friction Force	-	1,240.7	lbs	
Added Force Req'd	=	0.0	lbs	OK
....for 1.5 Stability	=	0.0	lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 5		
Rebar Spacing	=	12.00		
Rebar Placed at	=	Center		

Design Data

fb/FB + fa/Fa	=	**0.377**
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	913.5
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	1,948.2
Moment.....Allowable	=	5,154.8
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	19.0
Shear.....Allowable	psi =	82.2
Anet (Masonry)	in2 =	
Wall Weight	psf =	100.0
Rebar Depth 'd'	in =	4.00

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Cantilevered Retaining Wall

DESCRIPTION: Pool Deck

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1176 in2/ft		
(4/3) * As :	0.1568 in2/ft	Min Stem T&S Reinf Area 1.008 in2	
200bd/fy : 200(12)(4)/60000 :	0.16 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.31 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.6503 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	3.00
Total Footing Width	=	4.00
Footing Thickness	=	24.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,988	183 psf	
Mu' : Upward	=	919	1,454 ft-#	
Mu' : Downward	=	180	3,071 ft-#	
Mu: Design	=	739 OK	1,617 ft-#	OK
phiMn	=	47,775	50,151 ft-#	
Actual 1-Way Shear	=	1.04	3.79 psi	
Allow 1-Way Shear	=	82.16	82.16 psi	

Toe Reinforcing = # 6 @ 10.00 in
Heel Reinforcing = # 6 @ 10.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 4.62 in, #5@ 7.17 in, #6@ 10.18 in, #7@ 13.88 in, #8@ 18.28 in, #9@ 23.14 in, #10@ 29.39 in

Heel: #4@ 4.62 in, #5@ 7.17 in, #6@ 10.18 in, #7@ 13.88 in, #8@ 18.28 in, #9@ 23.14 in, #10@ 29.39 in

Key: No key defined

Min footing T&S reinf Area 2.07 in2
Min footing T&S reinf Area per foot 0.52 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 4.63 in	#4@ 9.26 in
#5@ 7.18 in	#5@ 14.35 in
#6@ 10.19 in	#6@ 20.37 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: New Residence.ec6

LIC# : KW-06012775, Build:20.22.8.17 CBenginfo (c) ENERCALC INC 1983-2022

DESCRIPTION: Pool Deck

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		630.0	2.00	1,260.0	Soil Over HL (ab. water tbl)	1,026.7	2.83	2,908.9
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		2.83	2,908.9
Hydrostatic Force					Watre Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=	286.4	3.00	859.1	Surcharge Over Heel	= 350.0	2.83	991.7
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=	60.0	6.63	397.5	Soil Over Toe	=		
	=				Surcharge Over Toe	=		
					Stem Weight(s)	= 525.0	1.33	700.0
					Earth @ Stem Transitions	=		
Total	=	976.4	**O.T.M.** =	2,516.6	Footing Weight	= 1,200.0	2.00	2,400.0
					Key Weight	=		
					Vert. Component	=		
					Total =	3,101.7 lbs	**R.M.=**	7,000.6

Resisting/Overturning Ratio = **2.78**

Vertical Loads used for Soil Pressure = 3,101.7 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.052	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

DESCRIPTION: Pool Deck

Rebar Lap & Embedment Lengths Information

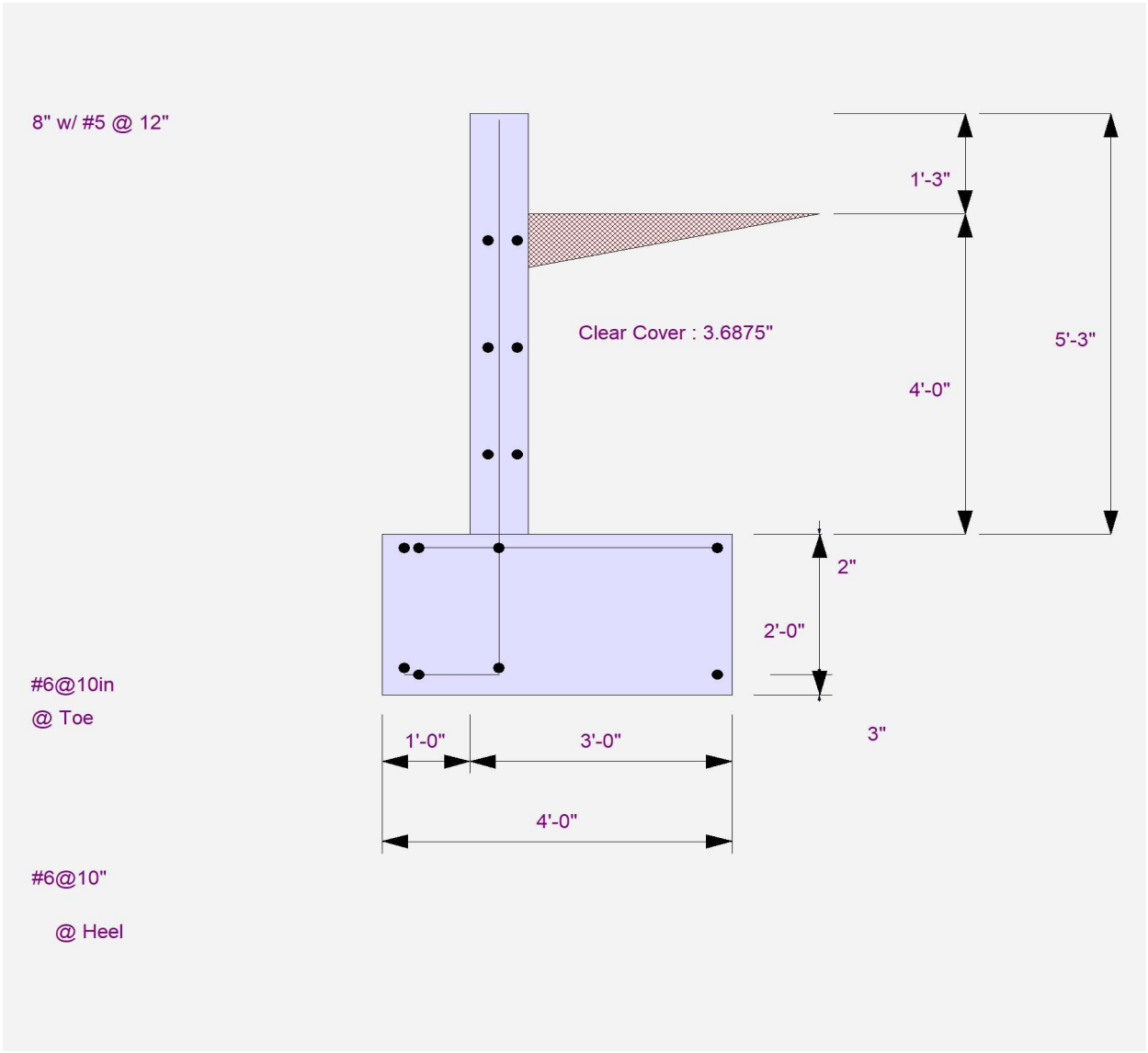
Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment =	21.36 in
Development length for #5 bar specified in this stem design segment =	16.43 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	9.59 in
As Provided =	0.3100 in2/ft
As Required =	0.1728 in2/ft

Cantilevered Retaining Wall

DESCRIPTION: Pool Deck



Cantilevered Retaining Wall

DESCRIPTION: Pool Deck