

MITEK® HARDY FRAME® COLD-FORMED STEEL MOMENT FRAMES



MiTek® Hardy Frame® introduces the first cold-formed steel moment frames specifically for wood frame construction in both single and multi-story construction.



MiTek®
HARDY FRAME®
Leading in Lateral

08/01/2019



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General Information

Code Evaluations:

MiTek CFS Moment Frames have been evaluated by IAPMO's Uniform Evaluation Service (UES). The report number is: ER-0491. For the most current code report listings refer to our website www.hardyframe.com.

Testing:

MiTek CFS Moment Frames have been extensively tested and qualified in accordance with ASTM E2126, AISI341 and ASTM D7989 criteria.

Product Use:

MiTek CFS Moment Frames are designed and manufactured for the specific purposes described in this catalog. Any changes to the products or installation procedures must be approved by the designer of record and are the sole responsibility of the designer.

Quality Statement:

MiTek USA, Inc. warrants to its customers that its products are free from material defects of manufacture and design, and will perform in substantial accordance with published specifications, if properly used.

Material:

- ASTM A36: Horizontal and Vertical Boundary Plates at Panel Zone, End Plates at Beams and Columns, and flange stiffeners
- ASTM A653 or A1003 Grade 50: Beams, Columns and Channels

Misc. Materials

- Column Base Anchor Bolts: ASTM A193 Grade B7
- Machine Bolts at Panel Zone to Column Connections: ASTM F3125 Grade A325 or SAE J429 Grade 8
- Nuts: A563 Grade DH Heavy Hex or SAE J995 Grade 8
- Hardened Round Washers: ASTM F436
- Load Indicating Washers (DTI): ASTM F959

Finish:

All galvanized steel has a minimum G60 hot-dipped galvanized zinc coating.

Moment Frame Design and Construction Standards

Referenced Documents:

- American Institute of Steel Construction (AISC) Specification for Structural Steel Buildings, 2010 and 2016 (AISC360-10 and AISC360-16)
- American Iron and Steel Institute (AISI) Standard Specification – 2016
- American Welding Society D1.1 2015 Structural Welding Code-Steel (AWS D1.1)
- IAPMO's (International Association of Plumbing and Mechanical Officials) Uniform Evaluation Service (UES) Report ER-0491
- California Building Code (CBC) – 2013 and 2016
- Los Angeles Building Code – 2017
- International Building Code – 2012, 2015, and 2018

Frame Design Input:

Frame Modeling Software: SAP2000

Allowable Story Drift: All CFS Moment Frames were designed using $\Delta a = 0.025h_{sx}$.

Load Cases: Dead (DL, includes self-weight), Live (LL), Roof Live (LLr), Snow (S), Earthquake (EQ) and Wind (W).

Note: EQ includes horizontal and vertical earthquake load components, assuming values of $\rho = 1.0$ and $S_{ds} = 1.8$.

ASD Load Combinations:

1.0DL + 1.0(LL or LLr or S or R)
 1.0DL + 0.75LL + 0.75(0.6W) + 0.75(LLr or S or R)
 1.0DL + 0.7EQ
 1.0DL + 0.6EQ
 1.0DL + 0.525EQ + 0.75LL + 0.75S
 0.6DL ± 0.6W
 0.6DL ± 0.7EQ

LRFD Load Combinations:

1.4DL
 1.2DL + 1.6LL + 0.5(LLr or S)
 1.2DL + 1.0W + 0.5LL + 0.5(LLr or S)
 1.2DL + 1.0EQ + 0.5LL + 0.7S
 0.9DL ± 1.0W
 0.9DL ± 1.0EQ

Design Factors of Safety:

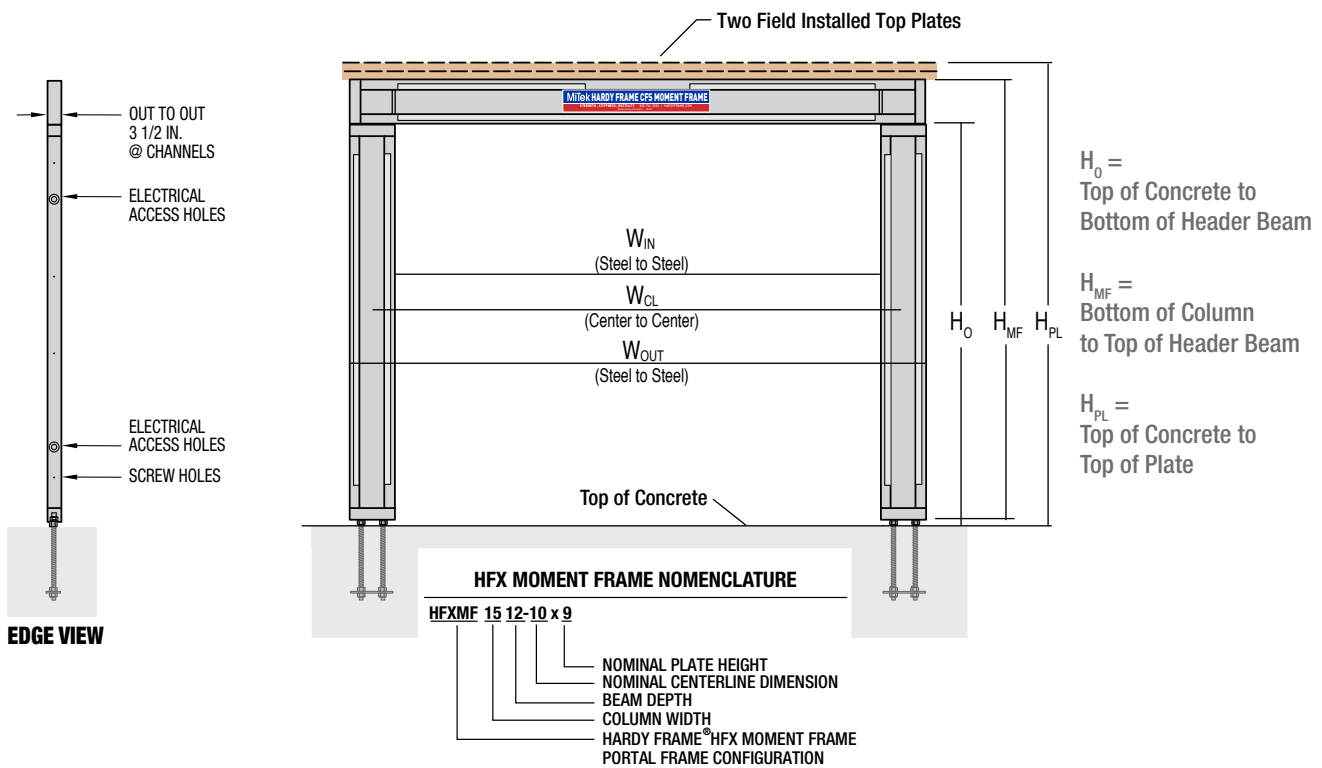
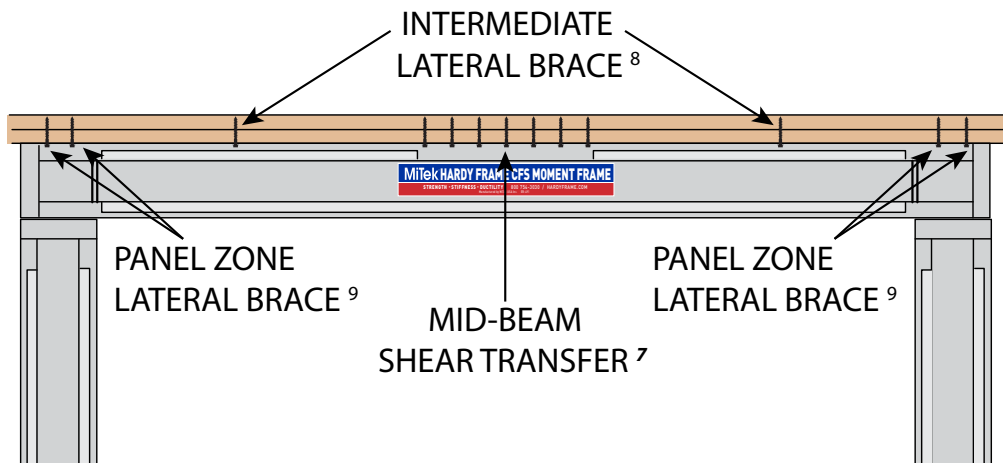
Stress and vertical beam deflections are limited to 95% of code allowable for all designs. Within 95% limit, stress governs compared to L/240 and L/360 beam deflection criteria.

TABLE 1.0A - HARDY FRAME® HFX MOMENT FRAME DIMENSIONS & CONNECTORS 1, 2, 3, 4

Model Number ⁵	Column Width ⁶ (in)	Beam Depth ⁶ (in)	W _{IN} (ft-in)	W _{CL} (ft-in)	W _{OUT} (ft-in)	Minimum Screw Quantity			Frame Weight ¹⁰ (lbs)
						Mid-Beam ⁷	Intermediate ⁸	Panel Zones ⁹	
HFXMF1212-8x	12	12	7'-0"	8'-0"	9'-0"	20	2	4	547
HFXMF1512-8x	15	12	6'-9"		9'-3"	24	2	4	587
HFXMF1515-8x		15				30	2	4	600
HFXMF1812-8x	18	12	6'-6"		9'-6"	28	2	4	635
HFXMF1815-8x		15				34	2	4	647
HFXMF2112-8x	21	12	6'-3"		9'-9"	30	2	4	675
HFXMF2115-8x		15				36	2	4	687
HFXMF1212-10x	12	12	9'-0"	10'-0"	11'-0"	20	2	4	581
HFXMF1512-10x	15	12	8'-9"		11'-3"	24	2	4	621
HFXMF1515-10x		15				30	2	4	636
HFXMF1812-10x	18	12	8'-6"		11'-6"	28	2	4	669
HFXMF1815-10x		15				34	2	4	683
HFXMF2112-10x	21	12	8'-3"		11'-9"	30	2	4	709
HFXMF2115-10x		15				36	2	4	723
HFXMF1212-12x	12	12	11'-0"	12'-0"	13'-0"	20	2	4	619
HFXMF1512-12x	15	12	10'-9"		13'-3"	24	2	4	660
HFXMF1515-12x		15				30	2	4	678
HFXMF1812-12x	18	12	10'-6"		13'-6"	28	2	4	707
HFXMF1815-12x		15				34	2	4	725
HFXMF2112-12x	21	12	10'-3"		13'-9"	30	2	4	747
HFXMF2115-12x		15				36	2	4	766
HFXMF1212-14x	12	12	13'-0"	14'-0"	15'-0"	20	4	4	653
HFXMF1512-14x	15	12	12'-9"		15'-3"	24	4	4	694
HFXMF1515-14x		15				30	4	4	714
HFXMF1812-14x	18	12	12'-6"		15'-6"	28	4	4	741
HFXMF1815-14x		15				34	4	4	761
HFXMF2112-14x	21	12	12'-3"		15'-9"	30	4	4	781
HFXMF2115-14x		15				36	4	4	802
HFXMF1212-16x	12	12	15'-0"	16'-0"	17'-0"	20	4	4	687
HFXMF1512-16x	15	12	14'-9"		17'-3"	24	4	4	728
HFXMF1515-16x		15				30	4	4	750
HFXMF1812-16x	18	12	14'-6"		17'-6"	28	4	4	775
HFXMF1815-16x		15				34	4	4	798
HFXMF2112-16x	21	12	14'-3"		17'-9"	30	4	4	815
HFXMF2115-16x		15				36	4	4	838
HFXMF1212-18x	12	12	17'-0"	18'-0"	19'-0"	20	4	4	721
HFXMF1512-18x	15	12	16'-9"		19'-3"	24	4	4	762
HFXMF1515-18x		15				30	4	4	787
HFXMF1812-18x	18	12	16'-6"		19'-6"	28	4	4	809
HFXMF1815-18x		15				34	4	4	834
HFXMF2112-18x	21	12	16'-3"		19'-9"	30	4	4	849
HFXMF2115-18x		15				36	4	4	874
HFXMF1212-20x	12	12	19'-0"	20'-0"	21'-0"	20	4	4	755
HFXMF1512-20x	15	12	18'-9"		21'-3"	24	4	4	796
HFXMF1515-20x		15				30	4	4	823
HFXMF1812-20x	18	12	18'-6"		21'-6"	28	4	4	843
HFXMF1815-20x		15				34	4	4	870
HFXMF2112-20x	21	12	18'-3"		21'-9"	30	4	4	883
HFXMF2115-20x		15				36	4	4	910

Notes

- For nominal Plate Heights of 8, 9 and 10 feet the HFX MF net height is 92-1/4, 104-1/4 and 116-1/4 inches respectively.
- All HFX Moment Frames are 3-1/2 inches thick.
- Panel Zone to column connections are made with (2 ea.) 1-1/8 in. diameter, Grade 8 machine bolts. Orient the head and DTI Washer in the column, the nut and Hardened Round Washer in the Panel Zone.
- Hold down anchors are 1-1/8 in. diameter High Strength (ASTM A193 Grade B7) all thread connected with (1 ea.) Hardened Round Washer and (1 ea.) Grade 8 nut per rod.
- Reinforced Webs are available in columns greater than 12 in. wide, specify by adding "RW" to the end of the model number (i.e. HFXMF2115-20x8 RW).
- Connections to adjacent posts, studs, trimmers and jacks are not required unless specified by the engineer of record. When making connections (4 ea.) predrilled holes are provided through each flange of each column. Interior flanges of the Header Beam are manufactured with predrilled holes at 12" o.c.
- For shear transfer, predrilled holes are provided within a 3 foot section located at the middle of the beam span. 1/4" x 3" MiTek Pro-Series WS-3 (min.) Screws are required through the top flange of the header beam.
- For lateral bracing of the header beam, predrilled holes are provided in the flanges at 12" o.c. Use 1/4" x 3" MiTek Pro-Series WS-3 (min.) Screws at 4' o.c. (max.) through the top flange of the header beam.
- For lateral bracing of the moment connection, predrilled holes are provided within each Panel Zone. (2 ea.) 1/4" x 3" MiTek Pro-Series WS-3 (min.) Screws are required at each Panel Zone through the top flange of the header beam, one on each end of the Panel Zone.
- Frame Weight shown for 8-ft nominal Frame heights. For other Frame heights, add 34 plf for 12" columns, 36 plf for 15" columns, 39 plf for 18" columns, or 41 plf for 21" columns.



HFX MOMENT FRAME PORTAL CONFIGURATION

Portal Configuration Templates				Picture Configuration Templates		
HFXMFT Templates	HFXMFBB Bolt Brace	HFXMFDT Templates	HFXMFDBB Bolt Brace	HFXPICT Templates	HFXPICDT Templates	HFXPICDBB Templates
HFXMFT12	HFXMFBB12	HFXMFDT12	HFXMFDBB12	HFXPICT12Z	HFXPICDT12Z	HFXPICDBB
HFXMFT15	HFXMFBB15	HFXMFDT15	HFXMFDBB15	HFXPICT15Z	HFXPICDT15Z	HFXPICSBDBB
HFXMFT18	HFXMFBB18	HFXMFDT18	HFXMFDBB18	HFXPICT18Z	HFXPICDT18Z	
HFXMFT21	HFXMFBB21	HFXMFDT21	HFXMFDBB21	HFXPICT21Z	HFXPICDT21Z	
HFXMFT24	HFXMFBB24	HFXMFDT24	HFXMFDBB24	HFXPICT24Z	HFXPICDT24Z	
HFXMFT12Z	HFXMFBB12Z	HFXMFDT12Z	HFXMFDBB12Z	HFXPICSBT	HFXPICSBDT	
HFXMFT15Z	HFXMFBB15Z	HFXMFDT15Z	HFXMFDBB15Z			
HFXMFT18Z	HFXMFBB18Z	HFXMFDT18Z	HFXMFDBB18Z			
HFXMFT21Z	HFXMFBB21Z	HFXMFDT21Z	HFXMFDBB21Z			
HFXMFT24Z	HFXMFBB24Z	HFXMFDT24Z	HFXMFDBB24Z			

HFXMFT	HFXMFBB	HFXMFDT	HFXMFDBB			
HFXMFTZ	HFXMFBBZ	HFXMFDTZ	HFXMFDBBZ			

Anchorage		Frame Fasteners & Tools		Extensions
Anchor Bolt Assemblies (HFXMF)	Shear Bolt Assemblies (HFXPIC)	Panel Zone Connectors	Tools for Panel Zone Bolting	Base Extension
HFAB1-1/8x36HS	HFSB5/8x36HS	HFPZ1-1/8x4-1/2ST	Socket (1-11/16 Dia. Nut)	HFBX
HFAB1-1/8x48HS	HFSB5/8x48HS	HFPZ1-1/8x4-1/2PT	Ratchet	HFBX46-L
HFAB1-1/8x60HS	HFSB5/8x60HS		Extension Bar	HFBX46-R
HFAB1-1/8x72HS	HFSB5/8x72HS			HFBX66-L
Tie-Down Bolt Assemblies	HFSB7/8x36HS			HFBX66-R
HFTDB 5/8 x 36 HS	HFSB7/8x48HS			HFXDBX
HFTDB 3/4 x 36 HS	HFSB7/8x60HS			
HFTDB 7/8 x 36 HS	HFSB7/8x72HS			
HFTDB 1 x 36 HS				
HFTDB 1 1/8 x 36 HS				
HFTDB 1 1/4 x 36 HS				
HFTDB 1 3/8 x 36 HS				
HFTDB 1 1/2 x 36 HS				

HFAB	HFSB	HFBX	HFBX46R
		HFBX46L	HFXDBX

Also available in (STD) standard grade

Anchor Bolt Assemblies for anchoring columns at Portal Configuration.
Note: Nuts and Washers available separately.

Shear Bolt Assemblies for use in Picture Frame Sill Beam when installed on concrete

Panel Zone Connectors for Snug Tight (ST) and Pretensioned (PT) column to beam connections

MF	MOMENT FRAME	SB	SILL BEAM
PIC	PICTURE FRAME	AB	ANCHOR BOLT
T	TEMPLATE	SB	SHEAR BOLT
DT	DOUBLE TEMPLATE	PZST	PANEL ZONE SNUG TIGHT
BB	BOLT BRACE	PZPT	PANEL ZONE PRETENSIONED
DBB	DOUBLE BOLT BRACE	TDB	TIE-DOWN BOLT
Z	Z ROD	BX	BASE EXTENSION
STD	STANDARD GRADE	HS	HIGH STRENGTH GRADE

HFXMF DT 15 Z

Accommodates Z4 Tie-Down Column Width
Double Template
(Back to Back Installations)
HFX Moment Frame

HFX PIC SB T

Template
Sill Beam
Picture Configuration
HFX Moment Frame

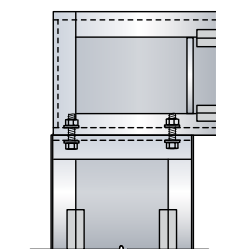
HFAB 1-1/8 x 36 HS

High Strength
Anchor Bolt Length
Anchor Bolt Diameter
Hardy Frame Anchor Bolt

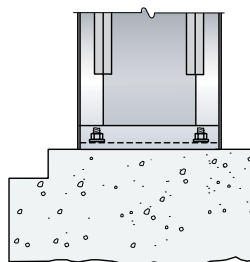




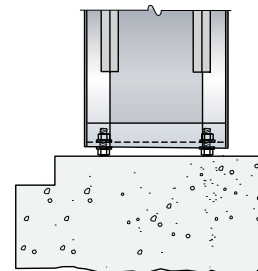
PRO SERIES SCREW
SHEAR TRANSFER



PANEL ZONE
BOLTED ASSEMBLY



HOLD DOWN / SHEAR TRANSFER
ANCHORAGE



ON NUTS & WASHERS
PLUS OR MINUS 1-1/2 IN.
GAP FILLED WITH 5000 psi
NON-SHRINK GROUT (MIN)

TABLE 1.1A: LATERAL LOAD CAPACITY FOR HFX MOMENT FRAME ON CONCRETE^{1,2,5,10}

HFXMF Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ³ lbs	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	Force and Moment at Col Base from V_{ASD} ^{8,9}		Force and Moment at Col Base from ω_g and self weight ^{8,9}		
								Axial $P_{base-lat}$ lbs	Moment $M_{base-lat}$ lbs-in	Axial P_{base-g} lbs	Shear V_{base-g} lbs	Moment M_{base-g} lbs-in
HFXMF1212 8x8	8'-0"	8'-0"	11,400	0.399	2,230	22,400	22,400	4,680	287,800	9,370	920	16,400
HFXMF1512 8x8	8'-0"	8'-0"	13,000	0.368	3,140	27,000	33,200	5,050	341,900	13,200	1,410	21,000
HFXMF1515 8x8	8'-0"	8'-0"	14,100	0.355	3,930	25,000	31,900	5,880	352,700	16,550	1,380	20,800
HFXMF1812 8x8	8'-0"	8'-0"	17,000	0.359	2,950	22,600	28,100	6,080	472,000	12,440	1,500	20,500
HFXMF1815 8x8	8'-0"	8'-0"	18,400	0.345	3,430	20,500	26,500	7,220	483,300	14,460	1,440	19,300
HFXMF2112 8x8	8'-0"	8'-0"	18,800	0.313	3,110	24,400	30,300	6,160	549,100	13,120	1,740	21,200
HFXMF2115 8x8	8'-0"	8'-0"	20,500	0.300	4,300	22,000	28,500	7,540	563,100	18,190	2,020	24,800
HFXMF1212 9x8	9'-0"	8'-0"	11,300	0.399	1,780	23,100	23,100	4,080	286,700	8,360	980	17,500
HFXMF1512 9x8	9'-0"	8'-0"	13,000	0.372	2,410	27,400	33,500	4,440	344,700	9,510	1,450	21,400
HFXMF1515 9x8	9'-0"	8'-0"	14,100	0.358	2,950	25,600	32,400	5,190	354,300	13,920	1,420	20,900
HFXMF1812 9x8	9'-0"	8'-0"	17,000	0.365	2,330	23,000	28,500	5,320	476,600	11,000	1,580	21,200
HFXMF1815 9x8	9'-0"	8'-0"	18,400	0.349	2,620	21,200	27,200	6,370	486,200	12,420	1,470	20,200
HFXMF2112 9x8	9'-0"	8'-0"	18,800	0.318	2,820	24,800	30,600	5,370	555,200	13,340	2,090	25,000
HFXMF2115 9x8	9'-0"	8'-0"	20,500	0.305	3,700	22,800	29,200	6,630	567,000	17,510	2,330	28,400
HFXMF1212 10x8	10'-0"	8'-0"	11,200	0.399	1,450	23,800	23,800	3,600	285,800	7,580	1,030	18,600
HFXMF1512 10x8	10'-0"	8'-0"	13,000	0.377	1,920	27,600	33,700	3,950	347,600	8,550	1,480	22,100
HFXMF1515 10x8	10'-0"	8'-0"	14,100	0.362	2,300	26,000	32,800	4,640	356,100	12,010	1,420	21,500
HFXMF1812 10x8	10'-0"	8'-0"	17,000	0.369	1,890	23,300	28,700	4,710	481,400	9,900	1,650	22,000
HFXMF1815 10x8	10'-0"	8'-0"	18,400	0.351	2,090	21,600	27,600	5,680	489,400	10,930	1,520	20,500
HFXMF2112 10x8	10'-0"	8'-0"	18,800	0.322	2,550	25,100	30,900	4,730	561,300	13,340	2,390	28,700
HFXMF2115 10x8	10'-0"	8'-0"	20,500	0.308	2,950	23,300	29,600	5,900	571,400	15,470	2,390	29,000
HFXMF1212 11x8	11'-0"	8'-0"	11,000	0.399	1,230	24,400	24,400	3,210	284,100	7,040	1,110	19,900
HFXMF1512 11x8	11'-0"	8'-0"	13,000	0.382	1,570	27,700	33,800	3,540	350,600	7,800	1,520	22,800
HFXMF1515 11x8	11'-0"	8'-0"	14,100	0.363	1,840	26,300	33,000	4,190	358,100	10,570	1,450	21,900
HFXMF1812 11x8	11'-0"	8'-0"	17,000	0.375	1,580	23,400	28,700	4,210	486,300	9,070	1,710	22,900
HFXMF1815 11x8	11'-0"	8'-0"	18,400	0.356	1,710	22,000	27,900	5,110	492,800	9,810	1,570	21,100
HFXMF2112 11x8	11'-0"	8'-0"	18,800	0.327	2,190	25,300	31,000	4,200	567,500	12,630	2,550	30,600
HFXMF2115 11x8	11'-0"	8'-0"	20,500	0.310	2,410	23,600	29,900	5,290	576,000	13,880	2,460	29,800
HFXMF1212 12x8	12'-0"	8'-0"	10,900	0.399	1,050	24,900	24,900	2,880	283,100	6,540	1,170	21,000
HFXMF1512 12x8	12'-0"	8'-0"	13,000	0.387	1,310	27,800	33,800	3,210	353,700	7,180	1,580	23,300
HFXMF1515 12x8	12'-0"	8'-0"	14,100	0.367	1,510	26,500	33,200	3,810	360,200	9,440	1,500	22,100
HFXMF1812 12x8	12'-0"	8'-0"	17,000	0.381	1,350	23,500	28,700	3,790	491,200	8,410	1,790	23,700
HFXMF1815 12x8	12'-0"	8'-0"	18,400	0.360	1,430	22,200	28,000	4,640	496,400	8,940	1,610	21,800
HFXMF2112 12x8	12'-0"	8'-0"	18,800	0.331	1,860	25,300	31,000	3,770	573,700	11,680	2,630	31,400
HFXMF2115 12x8	12'-0"	8'-0"	20,500	0.315	2,020	23,800	30,100	4,780	580,800	12,660	2,530	30,300
HFXMF1212 13x8	13'-0"	8'-0"	10,800	0.399	910	25,400	25,400	2,600	281,500	6,170	1,240	22,300
HFXMF1512 13x8	13'-0"	8'-0"	13,000	0.391	1,120	27,800	33,700	2,920	356,600	6,680	1,620	24,000
HFXMF1515 13x8	13'-0"	8'-0"	14,100	0.370	1,260	26,600	33,300	3,490	362,400	8,550	1,520	22,600
HFXMF1812 13x8	13'-0"	8'-0"	17,000	0.385	1,160	23,500	28,600	3,440	496,000	7,860	1,850	24,700
HFXMF1815 13x8	13'-0"	8'-0"	18,400	0.362	1,220	22,300	28,100	4,240	499,900	8,220	1,670	22,500
HFXMF2112 13x8	13'-0"	8'-0"	18,800	0.336	1,620	25,400	30,900	3,400	579,700	10,900	2,720	32,100
HFXMF2115 13x8	13'-0"	8'-0"	20,500	0.318	1,720	24,000	30,200	4,360	585,600	11,670	2,580	31,000
HFXMF1212 14x8	14'-0"	8'-0"	10,700	0.399	800	25,700	25,700	2,370	280,900	5,810	1,300	23,300
HFXMF1512 14x8	14'-0"	8'-0"	13,000	0.396	960	27,700	33,600	2,670	359,700	6,250	1,670	24,600
HFXMF1515 14x8	14'-0"	8'-0"	14,100	0.373	1,070	26,700	33,300	3,220	364,500	7,820	1,560	23,100
HFXMF1812 14x8	14'-0"	8'-0"	17,000	0.391	1,020	23,400	28,500	3,130	500,700	7,400	1,910	25,400
HFXMF1815 14x8	14'-0"	8'-0"	18,400	0.367	1,050	22,400	28,100	3,890	503,600	7,640	1,720	23,100
HFXMF2112 14x8	14'-0"	8'-0"	18,800	0.340	1,410	25,300	30,800	3,090	585,500	10,240	2,800	32,900
HFXMF2115 14x8	14'-0"	8'-0"	20,500	0.328	1,490	24,200	30,300	3,970	589,100	10,890	2,660	32,000
HFXMF1212 16x8	16'-0"	8'-0"	10,400	0.399	640	26,500	26,500	1,980	278,400	5,280	1,420	25,500
HFXMF1512 16x8	16'-0"	8'-0"	12,800	0.399	760	28,100	34,100	2,250	359,900	5,720	1,800	26,500
HFXMF1515 16x8	16'-0"	8'-0"	14,100	0.381	810	26,700	33,200	2,770	369,000	6,690	1,620	24,000
HFXMF1812 16x8	16'-0"	8'-0"	16,900	0.399	810	23,300	28,400	2,640	508,200	6,700	2,060	27,200
HFXMF1815 16x8	16'-0"	8'-0"	18,400	0.375	820	22,400	28,000	3,330	510,900	6,750	1,830	24,300
HFXMF2112 16x8	16'-0"	8'-0"	18,800	0.345	1,120	25,700	31,100	2,550	589,100	9,310	3,000	34,900
HFXMF2115 16x8	16'-0"	8'-0"	20,500	0.330	1,190	24,800	31,000	3,320	589,100	9,860	2,870	34,100
HFXMF1212 18x8	18'-0"	8'-0"	10,200	0.399	520	27,100	27,100	1,700	276,300	4,860	1,540	27,500
HFXMF1512 18x8	18'-0"	8'-0"	12,500	0.399	630	28,800	34,700	1,900	357,300	5,370	1,950	28,500

TABLE 1.1A: LATERAL LOAD CAPACITY FOR HFX MOMENT FRAME ON CONCRETE^{1,2,5,1}

HFXMF Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ³ lbs	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	Force and Moment at Col Base from V_{ASD} ^{8,9}		Force and Moment at Col Base from ω_g and self weight ^{8,9}		
								Axial $P_{base-lat}$ lbs	Moment $M_{base-lat}$ lbs-in	Axial P_{base-g} lbs	Shear V_{base-g} lbs	Moment M_{base-g} lbs-in
HFXMF1515 18x8	18'-0"	8'-0"	14,100	0.389	640	26,600	33,100	2,420	373,400	5,880	1,680	24,800
HFXMF1812 18x8	18'-0"	8'-0"	16,500	0.399	680	24,100	29,100	2,210	504,900	6,350	2,260	29,600
HFXMF1815 18x8	18'-0"	8'-0"	18,400	0.382	660	22,300	27,800	2,890	518,100	6,090	1,930	25,600
HFXMF2112 18x8	18'-0"	8'-0"	18,800	0.347	930	26,100	31,500	2,140	589,000	8,630	3,190	36,900
HFXMF2115 18x8	18'-0"	8'-0"	20,500	0.332	970	25,400	31,500	2,830	589,200	9,060	3,070	36,000
HFXMF1212 20x8	20'-0"	8'-0"	10,000	0.399	440	27,700	27,700	1,460	274,000	4,510	1,650	29,400
HFXMF1512 20x8	20'-0"	8'-0"	12,200	0.399	530	29,300	35,300	1,630	354,500	5,070	2,080	30,500
HFXMF1515 20x8	20'-0"	8'-0"	14,100	0.395	520	26,800	33,300	2,120	374,200	5,380	1,780	26,200
HFXMF1812 20x8	20'-0"	8'-0"	16,200	0.399	590	24,600	29,700	1,880	501,900	6,040	2,440	31,800
HFXMF1815 20x8	20'-0"	8'-0"	18,400	0.389	540	22,100	27,500	2,540	525,100	5,580	2,030	26,800
HFXMF2112 20x8	20'-0"	8'-0"	18,800	0.332	780	26,400	31,900	1,820	589,200	8,040	3,360	38,500
HFXMF2115 20x8	20'-0"	8'-0"	20,500	0.334	820	25,800	31,900	2,430	589,100	8,410	3,250	37,900
HFXMF1212 8x9	8'-0"	9'-0"	9,600	0.449	2,640	21,800	21,800	4,500	273,900	11,130	920	19,900
HFXMF1512 8x9	8'-0"	9'-0"	11,400	0.425	3,220	24,500	30,300	5,050	337,500	13,630	1,260	22,800
HFXMF1515 8x9	8'-0"	9'-0"	12,300	0.411	4,200	22,800	29,300	5,810	347,400	17,750	1,260	23,200
HFXMF1812 8x9	8'-0"	9'-0"	14,800	0.413	2,990	20,600	25,700	6,090	465,100	12,670	1,340	22,600
HFXMF1815 8x9	8'-0"	9'-0"	16,000	0.396	3,620	18,700	24,500	7,160	475,400	15,340	1,300	22,100
HFXMF2112 8x9	8'-0"	9'-0"	16,400	0.357	3,090	22,200	27,700	6,190	540,700	13,110	1,540	23,300
HFXMF2115 8x9	8'-0"	9'-0"	17,900	0.345	4,300	20,100	26,300	7,490	553,000	18,290	1,810	27,400
HFXMF1212 9x9	9'-0"	9'-0"	9,500	0.449	2,060	22,500	22,500	3,940	272,900	9,750	970	21,000
HFXMF1512 9x9	9'-0"	9'-0"	11,400	0.430	2,470	25,000	30,600	4,440	340,100	9,730	1,280	23,400
HFXMF1515 9x9	9'-0"	9'-0"	12,300	0.413	3,140	23,400	29,800	5,130	348,900	14,860	1,290	23,300
HFXMF1812 9x9	9'-0"	9'-0"	14,800	0.419	2,350	21,100	26,200	5,330	469,400	11,150	1,410	23,400
HFXMF1815 9x9	9'-0"	9'-0"	16,000	0.400	2,760	19,400	25,100	6,320	477,900	13,110	1,350	22,500
HFXMF2112 9x9	9'-0"	9'-0"	16,400	0.363	2,800	22,700	28,100	5,400	546,500	13,310	1,820	27,900
HFXMF2115 9x9	9'-0"	9'-0"	17,900	0.347	3,810	20,800	27,000	6,590	556,500	18,130	2,090	32,400
HFXMF1212 10x9	10'-0"	9'-0"	9,400	0.449	1,670	23,200	23,200	3,470	271,800	8,740	1,030	22,200
HFXMF1512 10x9	10'-0"	9'-0"	11,400	0.435	1,960	25,200	30,900	3,940	342,800	8,730	1,330	24,000
HFXMF1515 10x9	10'-0"	9'-0"	12,300	0.416	2,430	23,800	30,200	4,600	350,600	12,770	1,310	23,600
HFXMF1812 10x9	10'-0"	9'-0"	14,800	0.424	1,910	21,400	26,400	4,720	473,900	10,010	1,470	24,300
HFXMF1815 10x9	10'-0"	9'-0"	16,000	0.404	2,190	19,900	25,600	5,640	480,900	11,490	1,400	23,100
HFXMF2112 10x9	10'-0"	9'-0"	16,400	0.369	2,540	23,000	28,400	4,760	552,400	13,320	2,100	31,900
HFXMF2115 10x9	10'-0"	9'-0"	17,900	0.352	3,030	21,400	27,400	5,870	560,600	15,950	2,150	33,100
HFXMF1212 11x9	11'-0"	9'-0"	9,300	0.449	1,390	23,700	23,700	3,090	270,500	7,960	1,080	23,400
HFXMF1512 11x9	11'-0"	9'-0"	11,400	0.441	1,600	25,400	31,000	3,540	345,600	7,930	1,380	24,600
HFXMF1515 11x9	11'-0"	9'-0"	12,300	0.421	1,950	24,100	30,500	4,150	352,400	11,200	1,340	24,300
HFXMF1812 11x9	11'-0"	9'-0"	14,800	0.429	1,590	21,600	26,500	4,220	478,600	9,140	1,520	25,100
HFXMF1815 11x9	11'-0"	9'-0"	16,000	0.408	1,780	20,300	25,900	5,070	484,100	10,270	1,440	23,700
HFXMF2112 11x9	11'-0"	9'-0"	16,400	0.375	2,190	23,200	28,500	4,240	558,400	12,650	2,260	34,200
HFXMF2115 11x9	11'-0"	9'-0"	17,900	0.356	2,470	21,700	27,800	5,270	565,000	14,270	2,230	33,800
HFXMF1212 12x9	12'-0"	9'-0"	9,200	0.449	1,170	24,200	24,200	2,790	269,600	7,330	1,140	24,500
HFXMF1512 12x9	12'-0"	9'-0"	11,400	0.446	1,330	25,500	31,000	3,210	348,500	7,290	1,400	25,300
HFXMF1515 12x9	12'-0"	9'-0"	12,300	0.424	1,590	24,300	30,700	3,780	354,300	9,970	1,370	24,600
HFXMF1812 12x9	12'-0"	9'-0"	14,800	0.437	1,350	21,700	26,600	3,800	483,200	8,450	1,580	26,000
HFXMF1815 12x9	12'-0"	9'-0"	16,000	0.412	1,480	20,500	26,100	4,610	487,300	9,310	1,480	24,400
HFXMF2112 12x9	12'-0"	9'-0"	16,400	0.379	1,860	23,300	28,600	3,800	564,300	11,680	2,340	35,300
HFXMF2115 12x9	12'-0"	9'-0"	17,900	0.360	2,060	22,000	28,000	4,770	569,500	12,970	2,270	34,500
HFXMF1212 13x9	13'-0"	9'-0"	9,100	0.449	1,020	24,600	24,600	2,510	268,100	6,850	1,190	25,700
HFXMF1512 13x9	13'-0"	9'-0"	11,300	0.449	1,140	25,700	31,300	2,910	349,300	6,850	1,470	26,200
HFXMF1515 13x9	13'-0"	9'-0"	12,300	0.428	1,330	24,500	30,800	3,460	356,300	9,000	1,390	25,000
HFXMF1812 13x9	13'-0"	9'-0"	14,800	0.442	1,160	21,700	26,600	3,460	487,800	7,880	1,640	27,100
HFXMF1815 13x9	13'-0"	9'-0"	16,000	0.416	1,250	20,700	26,200	4,210	490,800	8,530	1,520	25,100
HFXMF2112 13x9	13'-0"	9'-0"	16,400	0.384	1,610	23,400	28,600	3,440	570,100	10,880	2,400	36,200
HFXMF2115 13x9	13'-0"	9'-0"	17,900	0.364	1,760	22,200	28,100	4,340	574,000	11,920	2,340	35,200
HFXMF1212 14x9	14'-0"	9'-0"	9,000	0.449	880	25,000	25,000	2,290	267,400	6,400	1,250	26,700
HFXMF1512 14x9	14'-0"	9'-0"	11,200	0.449	1,010	26,100	31,700	2,630	348,000	6,540	1,530	27,400
HFXMF1515 14x9	14'-0"	9'-0"	12,300	0.431	1,120	24,600	30,800	3,190	358,400	8,190	1,420	25,500

TABLE 1.1A: LATERAL LOAD CAPACITY FOR HFX MOMENT FRAME ON CONCRETE^{1,2,5,10}

HFXMF Model Numbers	Nominal Col Center to Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load (R = 6.5) V_{ASD} ³ lbs	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	Force and Moment at Col Base from V_{ASD} ^{8,9}		Force and Moment at Col Base from ω_g and self weight ^{8,9}		
								Axial $P_{base-lat}$ lbs	Moment $M_{base-lat}$ lbs-in	Axial P_{base-g} lbs	Shear V_{base-g} lbs	Moment M_{base-g} lbs-in
HFXMF1812 14x9	14'-0"	9'-0"	14,800	0.447	1,020	21,700	26,500	3,150	492,400	7,410	1,700	27,900
HFXMF1815 14x9	14'-0"	9'-0"	16,000	0.421	1,080	20,800	26,300	3,870	494,200	7,910	1,560	25,800
HFXMF2112 14x9	14'-0"	9'-0"	16,400	0.390	1,400	23,400	28,500	3,130	575,800	10,210	2,480	37,100
HFXMF2115 14x9	14'-0"	9'-0"	17,900	0.369	1,510	22,300	28,200	3,980	578,600	11,060	2,390	36,000
HFXMF1212 16x9	16'-0"	9'-0"	8,800	0.449	690	25,700	25,700	1,920	264,900	5,740	1,360	28,900
HFXMF1512 16x9	16'-0"	9'-0"	10,900	0.449	800	26,800	32,400	2,200	345,500	6,020	1,670	29,800
HFXMF1515 16x9	16'-0"	9'-0"	12,300	0.440	850	24,700	30,900	2,750	362,500	6,980	1,470	26,400
HFXMF1812 16x9	16'-0"	9'-0"	14,500	0.449	840	22,500	27,300	2,610	489,300	6,940	1,890	30,900
HFXMF1815 16x9	16'-0"	9'-0"	16,000	0.430	860	21,300	26,800	3,280	495,800	7,130	1,700	27,900
HFXMF2112 16x9	16'-0"	9'-0"	16,400	0.400	1,100	23,300	28,300	2,620	586,500	9,130	2,610	38,900
HFXMF2115 16x9	16'-0"	9'-0"	17,900	0.377	1,170	22,400	28,200	3,380	587,800	9,720	2,500	37,600
HFXMF1212 18x9	18'-0"	9'-0"	8,600	0.449	560	26,200	26,200	1,640	262,900	5,210	1,450	30,900
HFXMF1512 18x9	18'-0"	9'-0"	10,700	0.449	660	27,400	33,000	1,870	343,200	5,600	1,790	32,000
HFXMF1515 18x9	18'-0"	9'-0"	12,300	0.447	670	25,100	31,300	2,370	361,900	6,290	1,570	28,100
HFXMF1812 18x9	18'-0"	9'-0"	14,200	0.449	700	23,100	28,000	2,190	486,900	6,510	2,050	33,500
HFXMF1815 18x9	18'-0"	9'-0"	16,000	0.438	670	20,900	26,100	2,880	507,900	6,230	1,740	28,500
HFXMF2112 18x9	18'-0"	9'-0"	16,400	0.405	900	23,600	28,600	2,210	589,300	8,420	2,780	41,000
HFXMF2115 18x9	18'-0"	9'-0"	17,900	0.385	950	22,900	28,600	2,890	589,000	8,890	2,670	39,800
HFXMF1212 20x9	20'-0"	9'-0"	8,500	0.449	470	26,700	26,700	1,420	260,600	4,810	1,540	32,900
HFXMF1512 20x9	20'-0"	9'-0"	10,500	0.449	550	27,800	33,500	1,600	341,000	5,240	1,910	34,000
HFXMF1515 20x9	20'-0"	9'-0"	12,100	0.449	560	25,600	31,800	2,070	360,000	5,790	1,680	30,000
HFXMF1812 20x9	20'-0"	9'-0"	13,900	0.449	600	23,700	28,600	1,870	484,100	6,160	2,220	36,000
HFXMF1815 20x9	20'-0"	9'-0"	16,000	0.446	560	21,200	26,400	2,510	509,100	5,820	1,870	30,500
HFXMF2112 20x9	20'-0"	9'-0"	16,400	0.406	760	23,900	28,900	1,880	589,000	7,870	2,930	43,100
HFXMF2115 20x9	20'-0"	9'-0"	17,900	0.388	800	23,300	29,000	2,490	589,100	8,250	2,830	42,000
HFXMF1212 8x10	8'-0"	10'-0"	8,200	0.499	3,020	20,700	20,700	4,340	261,500	12,820	940	23,400
HFXMF1512 8x10	8'-0"	10'-0"	10,100	0.485	3,300	21,900	27,100	5,050	333,600	11,290	1,150	24,400
HFXMF1515 8x10	8'-0"	10'-0"	10,900	0.471	4,420	20,300	26,300	5,770	343,100	18,760	1,190	24,900
HFXMF1812 8x10	8'-0"	10'-0"	13,200	0.469	3,000	18,400	23,100	6,110	459,400	12,810	1,200	24,200
HFXMF1815 8x10	8'-0"	10'-0"	14,200	0.452	3,720	16,700	22,000	7,120	468,700	15,880	1,190	24,200
HFXMF2112 8x10	8'-0"	10'-0"	14,600	0.405	3,060	19,700	24,800	6,230	533,400	13,070	1,380	25,400
HFXMF2115 8x10	8'-0"	10'-0"	15,800	0.391	4,040	17,900	23,600	7,470	544,600	17,260	1,500	27,600
HFXMF1212 9x10	9'-0"	10'-0"	8,200	0.499	2,340	21,400	21,400	3,800	260,500	11,090	980	24,400
HFXMF1512 9x10	9'-0"	10'-0"	10,100	0.490	2,520	22,300	34,500	4,440	336,100	9,920	1,180	25,100
HFXMF1515 9x10	9'-0"	10'-0"	10,900	0.473	3,290	20,900	33,700	5,100	344,400	15,660	1,180	25,300
HFXMF1812 9x10	9'-0"	10'-0"	13,200	0.476	2,360	18,900	23,500	5,350	463,600	11,240	1,250	24,900
HFXMF1815 9x10	9'-0"	10'-0"	14,200	0.455	2,860	17,400	22,700	6,280	471,100	13,660	1,230	24,700
HFXMF2112 9x10	9'-0"	10'-0"	14,600	0.410	2,780	20,300	31,800	5,430	538,800	13,290	1,640	30,000
HFXMF2115 9x10	9'-0"	10'-0"	15,800	0.395	3,710	18,600	24,400	6,580	547,900	17,740	1,820	33,900
HFXMF1212 10x10	10'-0"	10'-0"	8,100	0.499	1,870	21,900	21,900	3,360	259,500	9,830	1,010	25,500
HFXMF1512 10x10	10'-0"	10'-0"	10,100	0.496	2,000	22,600	27,800	3,950	338,700	8,870	1,200	25,600
HFXMF1515 10x10	10'-0"	10'-0"	10,900	0.476	2,550	21,400	27,300	4,560	346,000	13,410	1,220	25,700
HFXMF1812 10x10	10'-0"	10'-0"	13,200	0.482	1,910	19,200	23,800	4,750	467,800	10,050	1,320	25,900
HFXMF1815 10x10	10'-0"	10'-0"	14,200	0.459	2,260	17,900	23,200	5,610	473,900	11,920	1,290	25,200
HFXMF2112 10x10	10'-0"	10'-0"	14,600	0.417	2,520	20,700	25,600	4,790	544,600	13,290	1,890	34,400
HFXMF2115 10x10	10'-0"	10'-0"	15,800	0.399	3,090	19,200	24,900	5,850	551,700	16,330	1,980	36,300
HFXMF1212 11x10	11'-0"	10'-0"	8,000	0.499	1,540	22,500	22,500	2,990	258,300	8,880	1,060	26,700
HFXMF1512 11x10	11'-0"	10'-0"	10,000	0.499	1,640	23,000	35,100	3,530	339,300	8,150	1,250	26,600
HFXMF1515 11x10	11'-0"	10'-0"	10,900	0.480	2,020	21,700	34,300	4,120	347,700	11,720	1,240	26,300
HFXMF1812 11x10	11'-0"	10'-0"	13,200	0.488	1,590	19,500	24,000	4,250	472,300	9,160	1,360	27,000
HFXMF1815 11x10	11'-0"	10'-0"	14,200	0.464	1,830	18,300	23,600	5,050	476,800	10,620	1,300	26,000
HFXMF2112 11x10	11'-0"	10'-0"	14,600	0.422	2,190	20,900	32,200	4,280	550,300	12,640	2,030	37,200
HFXMF2115 11x10	11'-0"	10'-0"	15,800	0.403	2,520	19,600	25,300	5,260	555,800	14,590	2,010	37,100
HFXMF1212 12x10	12'-0"	10'-0"	7,900	0.499	1,290	22,900	22,900	2,690	257,200	8,130	1,110	27,800
HFXMF1512 12x10	12'-0"	10'-0"	9,900	0.499	1,400	23,500	28,700	3,160	338,000	7,660	1,320	27,900
HFXMF1515 12x10	12'-0"	10'-0"	10,900	0.484	1,650	21,900	27,800	3,760	349,500	10,390	1,260	26,600
HFXMF1812 12x10	12'-0"	10'-0"	13,200	0.495	1,340	19,600	24,100	3,830	476,800	8,450	1,410	27,900

TABLE 1.1A: LATERAL LOAD CAPACITY FOR HFX MOMENT FRAME ON CONCRETE^{1,2,5,10}

HFXMF Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load (R = 6.5) V_{ASD} ³ lbs	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	Force and Moment at Col Base from V_{ASD} ^{8,9}		Force and Moment at Col Base from ω_g and self weight ^{8,9}		
								Axial $P_{base-lat}$ lbs	Moment $M_{base-lat}$ lbs-in	Axial P_{base-g} lbs	Shear V_{base-g} lbs	Moment M_{base-g} lbs-in
HFXMF1815 12x10	12'-0"	10'-0"	14,200	0.469	1,520	18,600	23,800	4,600	479,900	9,580	1,340	26,700
HFXMF2112 12x10	12'-0"	10'-0"	14,600	0.429	1,850	21,100	26,000	3,840	556,000	11,660	2,090	38,400
HFXMF2115 12x10	12'-0"	10'-0"	15,800	0.406	2,100	19,900	25,500	4,760	560,000	13,210	2,050	38,000
HFXMF1212 13x10	13'-0"	10'-0"	7,800	0.499	1,100	23,300	23,300	2,440	256,200	7,500	1,160	28,900
HFXMF1512 13x10	13'-0"	10'-0"	9,800	0.499	1,220	24,000	36,100	2,850	336,500	7,250	1,380	29,200
HFXMF1515 13x10	13'-0"	10'-0"	10,900	0.489	1,380	22,100	34,600	3,440	351,400	9,350	1,280	27,100
HFXMF1812 13x10	13'-0"	10'-0"	13,100	0.499	1,180	19,900	24,400	3,460	477,800	7,990	1,490	29,300
HFXMF1815 13x10	13'-0"	10'-0"	14,200	0.472	1,290	18,800	24,000	4,200	483,100	8,770	1,380	27,400
HFXMF2112 13x10	13'-0"	10'-0"	14,600	0.435	1,600	21,200	32,200	3,470	561,600	10,850	2,150	39,400
HFXMF2115 13x10	13'-0"	10'-0"	15,800	0.412	1,780	20,100	25,700	4,340	564,400	12,120	2,120	38,900
HFXMF1212 14x10	14'-0"	10'-0"	7,700	0.499	960	23,700	23,700	2,220	254,800	7,000	1,200	30,100
HFXMF1512 14x10	14'-0"	10'-0"	9,700	0.499	1,060	24,300	29,500	2,590	335,200	6,890	1,440	30,600
HFXMF1515 14x10	14'-0"	10'-0"	10,900	0.493	1,170	22,300	28,100	3,170	352,400	8,550	1,300	27,700
HFXMF1812 14x10	14'-0"	10'-0"	12,900	0.499	1,050	20,400	24,900	3,120	476,000	7,680	1,580	31,000
HFXMF1815 14x10	14'-0"	10'-0"	14,200	0.477	1,110	18,900	24,100	3,860	486,400	8,110	1,420	28,100
HFXMF2112 14x10	14'-0"	10'-0"	14,600	0.442	1,390	21,200	26,000	3,160	567,100	10,170	2,220	40,500
HFXMF2115 14x10	14'-0"	10'-0"	15,800	0.416	1,530	20,300	25,800	3,980	568,800	11,220	2,160	39,500
HFXMF1212 16x10	16'-0"	10'-0"	7,600	0.499	740	24,300	24,300	1,870	252,700	6,190	1,290	32,200
HFXMF1512 16x10	16'-0"	10'-0"	9,500	0.499	840	25,000	37,300	2,150	332,600	6,290	1,560	32,900
HFXMF1515 16x10	16'-0"	10'-0"	10,800	0.499	900	22,900	35,500	2,690	350,900	7,510	1,400	29,600
HFXMF1812 16x10	16'-0"	10'-0"	12,600	0.499	860	21,200	25,700	2,580	472,900	7,140	1,740	34,200
HFXMF1815 16x10	16'-0"	10'-0"	14,200	0.488	860	19,100	24,100	3,310	492,900	7,080	1,500	29,500
HFXMF2112 16x10	16'-0"	10'-0"	14,600	0.452	1,090	21,200	31,800	2,650	577,700	9,080	2,340	42,500
HFXMF2115 16x10	16'-0"	10'-0"	15,800	0.425	1,180	20,400	25,900	3,390	577,500	9,820	2,260	41,300
HFXMF1212 18x10	18'-0"	10'-0"	7,400	0.499	600	24,800	24,800	1,600	250,900	5,570	1,370	34,200
HFXMF1512 18x10	18'-0"	10'-0"	9,300	0.499	680	25,500	30,800	1,840	330,600	5,810	1,660	35,200
HFXMF1515 18x10	18'-0"	10'-0"	10,600	0.499	730	23,600	29,500	2,310	348,200	6,790	1,500	31,700
HFXMF1812 18x10	18'-0"	10'-0"	12,400	0.499	710	21,800	26,400	2,170	469,800	6,690	1,900	37,100
HFXMF1815 18x10	18'-0"	10'-0"	14,200	0.497	690	19,500	24,500	2,850	494,100	6,490	1,620	31,700
HFXMF2112 18x10	18'-0"	10'-0"	14,600	0.463	880	21,100	25,700	2,270	587,600	8,240	2,450	44,200
HFXMF2115 18x10	18'-0"	10'-0"	15,800	0.435	940	20,400	25,800	2,930	586,100	8,790	2,360	42,900
HFXMF1212 20x10	20'-0"	10'-0"	7,300	0.499	490	25,200	25,200	1,390	248,900	5,090	1,450	36,100
HFXMF1512 20x10	20'-0"	10'-0"	9,100	0.499	570	26,000	38,400	1,580	328,300	5,420	1,770	37,200
HFXMF1515 20x10	20'-0"	10'-0"	10,500	0.499	600	24,000	36,700	2,010	346,700	6,190	1,590	33,500
HFXMF1812 20x10	20'-0"	10'-0"	12,100	0.499	610	22,300	26,900	1,860	467,000	6,290	2,030	39,700
HFXMF1815 20x10	20'-0"	10'-0"	14,000	0.499	590	20,100	25,200	2,470	491,100	6,120	1,750	34,400
HFXMF2112 20x10	20'-0"	10'-0"	14,600	0.467	740	21,300	31,700	1,940	589,000	7,690	2,590	46,600
HFXMF2115 20x10	20'-0"	10'-0"	15,800	0.446	780	20,700	26,000	2,550	589,000	8,090	2,490	45,000

TABLE 1.1A: LATERAL LOAD CAPACITY FOR HFX MOMENT FRAME ON CONCRETE^{1,2,5,10}

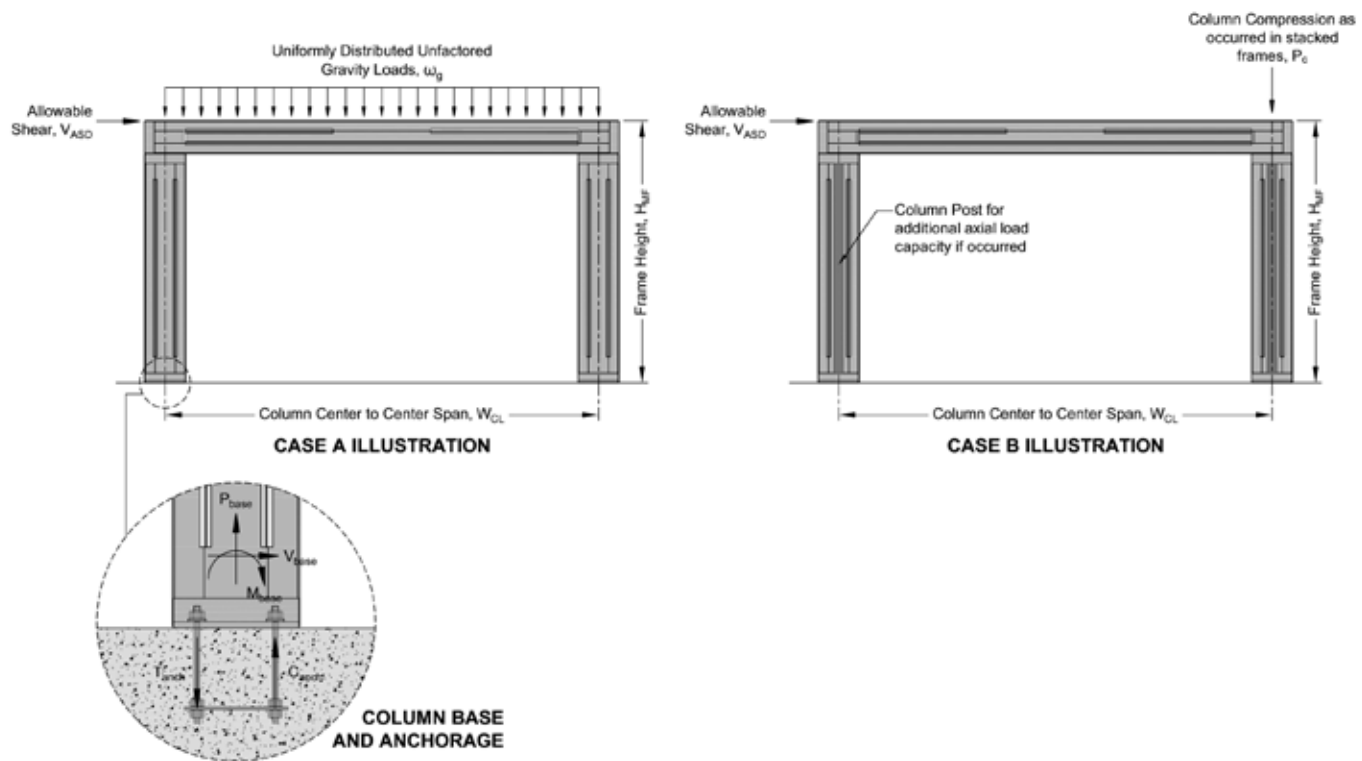
Table Notes:

1. These table values reflect Allowable Strength Design (ASD) with Tensioned bolts connections at the Panel Zones and installation on 2,500 psi. min. concrete or nuts and washers elevated up to 1-1/2 inch above concrete with 5,000 psi min. non shrink grout.
2. Hardy Frame CFS Moment Frames are designed to meet strain and deflection limitation per applicable code requirements (AISI-S100, AISI-S240, AISI-S400, AISC-360 and IBC) using Load and Resistance Factored Design (LRFD).
3. V_{ASD} in this table are seismic capacities for $R = 6.5$ and $C_d = 4.0$. For wind design, allowable shear loads can be determined by multiplying values in the table with a factor of 0.85.

$$V_{ASD-wind} = 0.85V_{ASD}$$
4. Δ_{ASD} represents inter-story drift at allowable shear load (V_{ASD}) that does not exceed the code required limitation for seismic load ($\Delta_s = 0.025h$) and is limited to $h/267$ for ASD wind load.
5. Tabulated allowable axial load on column, forces and moment at column base reactions exclude the overstrength (Ω_0) factor.
6. ω_g is the maximum unfactored uniform gravity loads applied on the beam in combination with V_{ASD} as shown in Case A illustration below.
7. P_c is the maximum axial load that can be applied on the column in combination with V_{ASD} as shown in Case B illustration below. When uniform gravity loads on the beam, ω , are combined with both V_{ASD} and P_c , reduce P_c by $\omega \times W_{CL}/2$ as follow: $P_c - \omega \times W_{CL}/2$.
8. Tension transferred from each anchor to the concrete is determined by tabulated base reaction values as follows:

$$T_{anch} = M_{base}/(d_{col} - X) + P_{base}/2 \quad X = 4.125" \text{ for } 15, 18 \text{ \& } 21" \text{ col \& } 3.25" \text{ for } 12" \text{ col}$$
9. Shear transferred from each anchor to the concrete is determined by tabulated base reaction values and V_{ASD} as follows:

$$V_{anch} = V_{ASD}/4 + V_{base-g}/2$$
10. Anchor bolts grade to concrete must comply with ASTM A193 Grade B7 or equivalent.



Design Example – HFX Moment Frame (HFXMF)

Given:

- Minimum Opening Dimension 6' 0" W x 6' 8" H
- Wall Dimension 10' 0" W x 8' 1" H
- 3-1/2" (4" Nominal) Wall Thickness
- ASD Seismic Design Shear (V_{DSN}) at R of 6.5 = 13,600 lbs
- Uniform Gravity Loads on Header: $w_D = 300$ plf, $w_L = 480$ plf
- Total Unfactored Uniform Gravity Loads: $w_{DSN} = 300$ plf + 480 plf = 780 plf
- Additional Axial Compression on each Column: $P_{DSN} = 22,000$ lbs

Check Allowable Frame Geometry

- Maximum Available Column Width (assuming 2x Nailer attached on each column flange)
= (10' 0" Maximum Wall Width – 6' 0" Minimum Opening Width – 4 each 1-1/2" Nailers) / 2 Columns = 21" / column
- Maximum Available Header Beam Depth (assuming 2x Nailer attached on bottom flange of beam)
= 8' 1" Wall Height – 6' 8" Opening Height – 3" double Top Plates – 1 each 1-1/2" bottom flange Nailer = 12-1/2"
- Estimated Column Center to Center Width = (10' 0" Maximum Wall Width + 6' 0" Minimum Opening Width) / 2 = 8' 0"

Select Frame Model Number based on Allowable Geometry and ASD Shear (V_{ASD})

From Allowable Load Table 1.1A – 8' 1" Wall Heights & 8' 0" Center to Center Column Width

- HFXMF1812-8x8: Allowable ASD Seismic Shear, $V_{ASD} = 17,000$ lbs > 13,600 lbs V_{DSN} **OK**

From Table 1.0A Dimensions and Connectors

- Column Depth = 18" < 21" maximum available column depth **OK**
- Header Beam Depth = 12" < 12-1/2" maximum available header beam depth **OK**
- Frame Thickness = 3-1/2" = wall thickness **OK**

Check Unfactored Gravity Loads on the Beam, w_{DSN} & Column Axial Loads, P_{DSN}

From Allowable Load Table 1.1A: HFXMF1812-8x8:

- Maximum Allowable Unfactored Gravity Load, $w_g = 2,950$ plf
- Check Uniform Gravity Loads: $w_{DSN} = 780$ plf < 2,950 plf **OK**
- Maximum Allowable Axial Load on Column (w/o Reinforced Web), $P_c = 22,600$ lbs
- Determine Maximum Axial Load on Column in combination with w_{DSN} : $P_c - (w_{DSN} \times W_{CL}/2)$
= 22,600 lbs – (780 plf x 8 ft / 2) = 19,480 lbs < 22,000 lbs NG - **Try HFXMF1812-8x8 RW (Reinforced Web)**
- Maximum Allowable Axial Load on Column (w/ Reinforced Web), $P_c = 28,100$ lbs
- Determine Maximum Axial Load on Column in combination with w_{DSN} : $P_c - (w_{DSN} \times W_{CL}/2)$
= 28,100 lbs – (780 plf x 8 ft / 2) = 24,980 lbs > 22,000 lbs **OK**

Use HFXMF1812-8x8RW

Note: RW = Reinforced Column Webs that provide additional axial load capacity, see the capacity table

Calculate Unfactored Design ASD Resultant Compression and Moment at each Column Base

Resultant compression and moment is used to determine the total compressive stress on top of concrete to be used by EOR for their foundation design.

ASD Resultant Compression: $P_{base-DSN} = P_{DSN} + P_{base-lat-DSN} + P_{base-g-DSN} = 22,000$ lbs + 4,860 lbs + 3,280 lbs = 30,140 lbs

Where:

- $P_{DSN} = 22,000$ lbs (Given)
- $P_{base-lat-DSN} = P_{base-lat} \times (V_{DSN}/V_{ASD}) = 6,080$ lbs x (13,600 lbs / 17,000 lbs) = 4,860 lbs
- $P_{base-g-DSN} = P_{base-g} \times (w_{DSN}/w_g) = 12,440$ lbs x (780 plf / 2950 plf) = 3,280 lbs
- $P_{base-lat}$ & P_{base-g} are given in Allowable Load Table 1.1A

ASD resultant moment at each column base, $M_{base-DSN} = M_{base-lat-DSN} + M_{base-g-DSN} = 377,600$ in-lbs + 5,410 in-lbs = 383,010 in-lbs

Where:

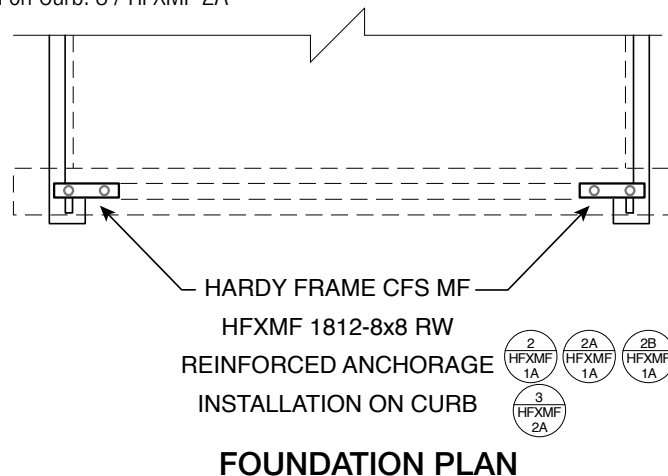
- $M_{base-lat-DSN} = M_{base-lat} \times (V_{DSN}/V_{ASD}) = 472,000$ in-lbs x (13,600 lbs / 17,000 lbs) = 377,600 in-lbs
- $M_{base-g-DSN} = M_{base-g} \times (w_{DSN}/w_g) = 20,500$ in-lbs x (780 plf / 2950 plf) = 5,410 in-lbs
- $M_{base-lat}$ & M_{base-g} are given in Allowable Load Table 1.1A

Calculate Design ASD Resultant Tension and Shear Transferred from Anchorage to Concrete

- For HFX Moment Frames, the distance from face of column flange to centroid of compression block $X = 3.625$ " for 12" columns, 4.125" for 15" columns, and 4.375" for 18" columns and above.
- ASD tension at one anchor due to lateral load, $T_{\text{anch-lat}} = M_{\text{base-lat-DSN}} / (d_{\text{col}} - X) + P_{\text{base-lat-DSN}} / 2$
 $= [377,600 \text{ in-lbs} / (18" - 4.375")] + (4,860 \text{ lbs} / 2) = 30,140 \text{ lbs}$
- ASD tension at one anchor due to gravity load on beam, $T_{\text{anch-g}} = M_{\text{base-g-DSN}} / (d_{\text{col}} - X) - P_{\text{base-g-DSN}} / 2$
 $= [5,410 \text{ in-lbs} / (18" - 4.375")] - (3,280 \text{ lbs} / 2) = -1,240 \text{ lbs}$
 - (The result of a negative value indicates there is no resultant tension at the anchor due to gravity load)
- ASD resultant shear at each column base due to lateral load, $V_{\text{base-lat-DSN}} = V_{\text{DSN}} / 2 = 13,600 \text{ lbs} / 2 = 6,800 \text{ lbs}$
- ASD resultant shear at each column base due to gravity load on beam, $V_{\text{base-g-DSN}} = V_{\text{base-g}} \times (w_{\text{DSN}} / w_g)$
 $= 1,500 \text{ lbs} \times (780 \text{ plf} / 2950 \text{ plf}) = 400 \text{ lbs}$
 - $V_{\text{base-g}}$ is given in Allowable Load Table 1.1A
 - For HFX Moment Frames, the ASD resultant shear at each anchor can be determined by $V_{\text{base}} / 2$
 - Reactions from lateral and gravity loads can be combined using appropriate load combinations from ASCE7.

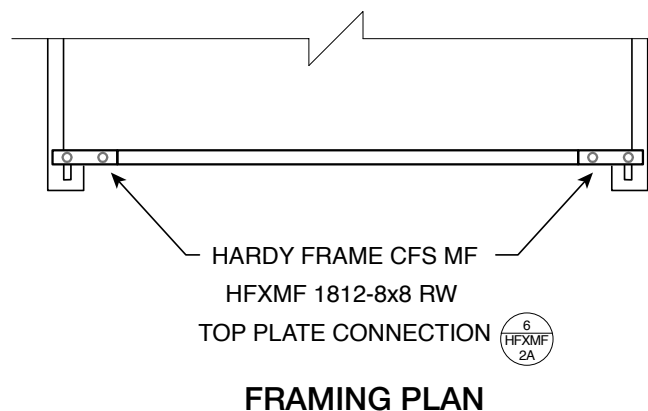
Foundation Plan Call-Outs

- Specify the model number, once per Frame, with a multi-leader indicating each column
 - Model number: HFXMF1812-8x8 RW
- Indicate the table and the associated detail for reinforced Anchorage at Footing
 - Reinforced
 - Anchorage table: 2 / HFXMF 1A
 - Anchorage details: 2A, 2B / HFXMF 1A
- Specify the bottom connection of the column base at the top of curb, slab, or stem wall per plans
 - Installation on Curb: 3 / HFXMF 2A



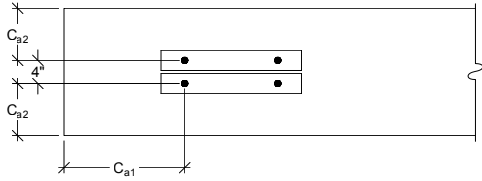
Framing Plan Call-Outs

- Specify the model number, once per Frame, with a multi-leader indicating each column
 - Model number: HFXMF1812-8x8 RW
- Specify the shear connection from the collector (or "drag") to the Header Beam
 - Top connection to top plates above: 6/ HFXMF 2A

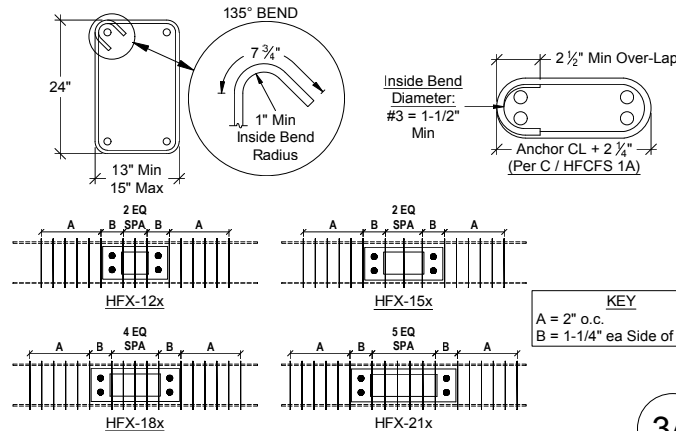


BACK TO BACK REINFORCED ANCHORAGE (BB-RA) IN HFXMF

MODEL NUMBER	COLUMN WIDTH	ANCHOR DIA & GRADE ^{1,2}	EMBED DEPTH, l_e ³	MIN END DIST, C_{a1} ⁴	MIN EDGE DIST, C_{a2} ⁵	STIRRUPS ⁸	SHEAR TIES ^{6,7}
HFXMF12	12"	1-1/8" HS	23"	22 3/4"	13"	15 - #4	#3 (MIN) @ 3" O.C.
HFXMF15	15"					15 - #4	
HFXMF18	18"					17 - #4	
HFXMF21	21"					18 - #4	



3

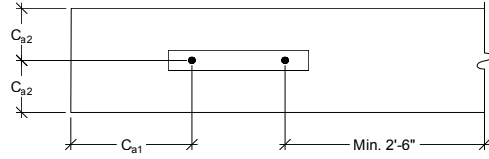


3A

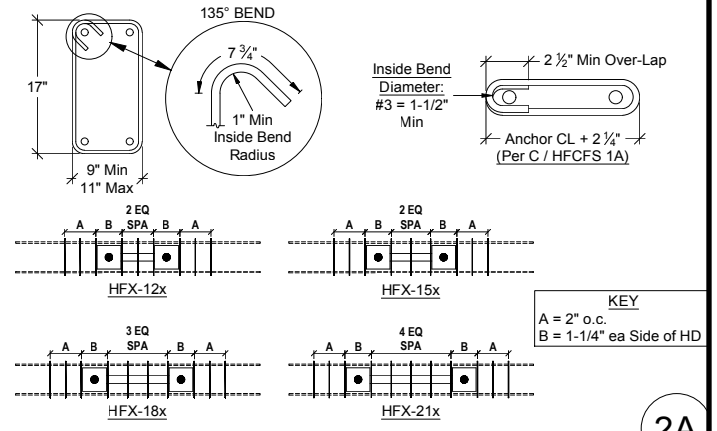
BB-RA SHEAR TIES & STIRRUPS

SINGLE REINFORCED ANCHORAGE (RA) IN HFXMF

MODEL NUMBER	COLUMN WIDTH	ANCHOR DIA & GRADE ^{1,2}	EMBED DEPTH, l_e ³	MIN END DIST, C_{a1} ⁴	MIN EDGE DIST, C_{a2} ⁵	STIRRUPS ⁸	SHEAR TIES ^{6,7}
HFXMF12	12"	1-1/8" HS	16"	16 3/4"	12"	9 - #4	#3 (MIN) @ 3" O.C.
HFXMF15	15"					9 - #4	
HFXMF18	18"					10 - #4	
HFXMF21	21"					11 - #4	



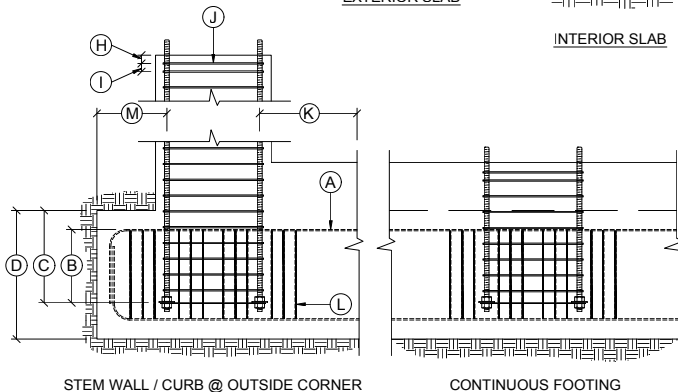
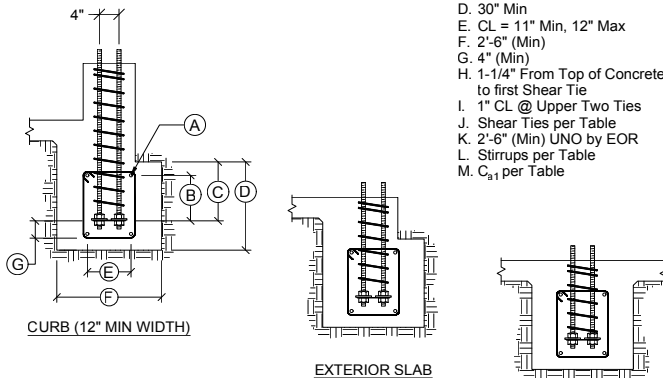
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2A

RA SHEAR TIES & STIRRUPS

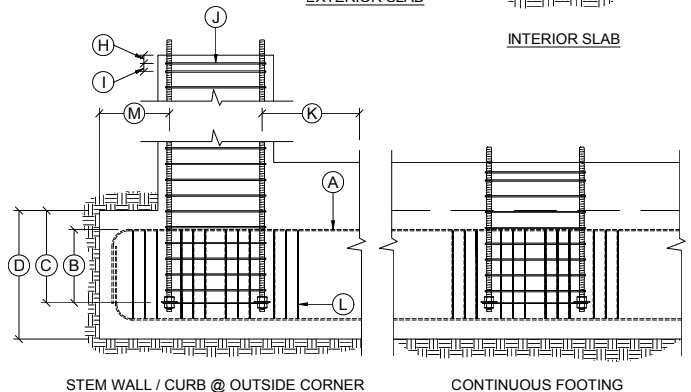
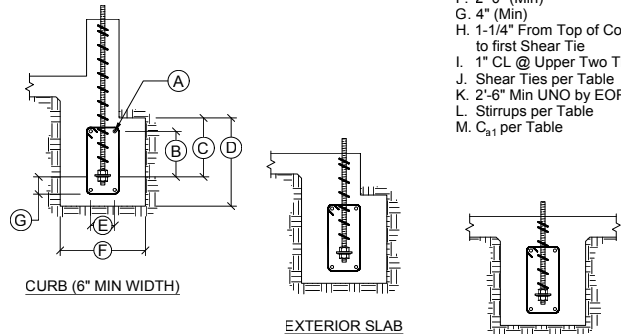
- A. #4 (Min) Longitudinal Rebar Top and Bottom by EOR
- B. 20" Max
- C. 23" Min
- D. 30" Min
- E. CL = 11" Min, 12" Max
- F. 2'-6" (Min)
- G. 4" (Min)
- H. 1-1/4" From Top of Concrete to first Shear Tie
- I. 1" CL @ Upper Two Ties
- J. Shear Ties per Table
- K. 2'-6" (Min) UNO by EOR
- L. Stirrups per Table
- M. C_{a1} per Table



BB-RA SECTIONS & ELEVATIONS

3B

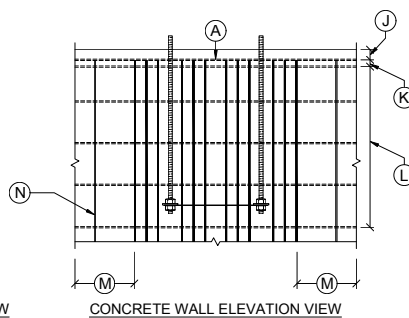
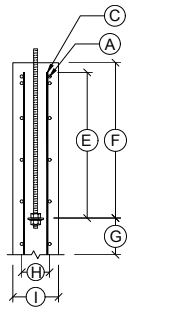
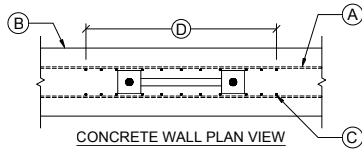
- A. #4 (Min) Longitudinal Rebar Top and Bottom by EOR
- B. 13" Max
- C. 16" Min
- D. 23" Min
- E. CL = 7" Min, 8" Max
- F. 2'-0" (Min)
- G. 4" (Min)
- H. 1-1/4" From Top of Concrete to first Shear Tie
- I. 1" CL @ Upper Two Ties
- J. Shear Ties per Table
- K. 2'-6" (Min) UNO by EOR
- L. Stirrups per Table
- M. C_{a1} per Table



RA SECTIONS & ELEVATIONS

2B

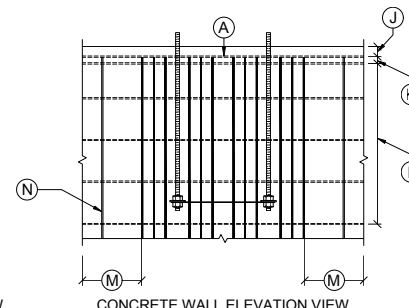
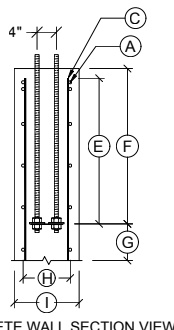
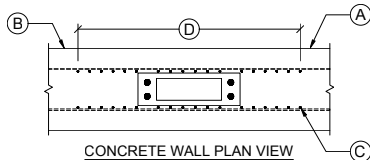
- A. 2 ea. #4 min. longitudinal rebar @ both faces of the wall (4 total) by EOR
B. Face of concrete
C. #4 straight rebar
D. Quantity & spacing per Detail 2A
E. 28" Min.
F. $l_b = 29\text{--}1/2"$ Min.
G. Rebar to extend 24" min. below end of the anchorage & lap w/ continuous wall reinforcement specified by EOR
H. CL = 0.6 x wall width Max.
I. Wall width by EOR to provide min. concrete coverage per ACI requirements
J. 1-1/2" clear spacing from top of concrete at first longitudinal rebar
K. 2" CL spacing between top 2 longitudinal rebar
L. 6" max. CL spacing for horizontal rebar within anchorage embedment depth
M. Longitudinal rebar to be developed beyond last rebar by EOR
N. Vertical rebar by EOR



RA TERMINATION WITHIN CONCRETE WALL

1A

- A. 2 ea. #5 min. longitudinal rebar @ both faces of the wall (4 total) by EOR
B. Face of concrete
C. #4 straight rebar
D. Quantity & spacing per Detail 3A
E. 32" Min.
F. $l_b = 33\text{--}1/2"$ Min.
G. Rebar to extend 24" min. below end of the anchorage & lap w/ continuous wall reinforcement specified by EOR
H. CL = 0.6 x wall width Max.
I. Wall width by EOR to provide min. concrete coverage per ACI requirements
J. 1-1/2" clear spacing from top of concrete at first longitudinal rebar
K. 2" Max. between top 2 longitudinal rebar
L. 6" max. CL for horizontal rebar within anchorage embedment depth
M. Longitudinal rebar to be developed beyond last rebar by EOR
N. Vertical rebar by EOR



BB-RA TERMINATION WITHIN CONCRETE WALL

1B

- TABLE NOTES**
- DESIGNS ARE TO RESIST LOADING PER ACI 318-14, SECTION 17.2.3.4.3.
 - HS INDICATES ANCHORS COMPLYING WITH ASTM A193 GRADE B7 WITH A 1/2" X 3" X 3" (MIN) HFPW PLATE WASHER INSTALLED WITH DOUBLE NUTS ON THE EMBED END (HFXBB NOT REQUIRED).
 - l_b = LENGTH OF EMBEDMENT FROM THE TOP OF FOOTING OR GRADE BEAM TO THE TOP OF THE HFXBB BOLT BRACE (TOP OF THE EMBEDDED HFPW PLATE WASHER @ HS ANCHORS)
 - C_{a1} = DISTANCE FROM HD CENTERLINE TO THE END OF THE FOOTING OR GRADE BEAM.
 - C_{a2} = DISTANCE FROM HD CENTERLINE TO BOTH THE FRONT AND THE BACK FACE OF THE FOOTING OR GRADE BEAM.
 - SHEAR TIES ARE GRADE 60 (MIN) REBAR AND REQUIRED PER ACI-318-14, $F'c = 2,500$ PSI. CURBS AND STEM WALLS MUST BE 6 INCH (MIN) WIDTH FOR RA, 12 INCH (MIN) WIDTH FOR BB-RA. IN ANY CASE, THE MINIMUM CONCRETE COVERAGE SHOULD BE PROVIDED PER ACI 318-14.
 - SHEAR TIES ARE NOT REQUIRED FOR INSTALLATION ON WOOD FRAMING, OR FOR IRC BRACED WALL PANEL APPLICATIONS.
 - STIRRUPS ARE GRADE 60 (MIN) REBAR. SEE TABLE FOR SIZE AND SPACING. SEE "STIRRUP LAYOUT" DIAGRAMS AND "KEY" FOR LAYOUT PATTERNS.
 - CONCRETE EDGE DISTANCES MUST COMPLY WITH ACI 318-14, SECTION 17.7.1

A

- DETERMINE LOCATION AND LAYOUT OF THE MOMENT FRAME TEMPLATES PER PLANS.
- INSTALL TEMPLATES AND ANCHORS PER PLAN DETAILS. REFER TO INSTALLATION INSTRUCTIONS AND PRODUCT LABELING FOR CORRECT TEMPLATE ORIENTATION, ANCHOR ASSEMBLIES, ANCHOR HEIGHT ABOVE CONCRETE AND SPACING BETWEEN TEMPLATES FOR FINISH FRAME WIDTH.
- SLOTTED HOLES ARE PROVIDED IN TEMPLATES FOR PULLING THE COLUMN CENTERLINE DIMENSIONS. PRIOR TO POURING CONCRETE, CONFIRM THE SLOT TO SLOT DIMENSION ACCURATELY CORRESPONDS TO THE COLUMN CENTERLINE DIMENSION FOR THE MOMENT FRAME MODEL NUMBER BEING INSTALLED OR PER PLAN CALLOUTS BY THE DESIGN PROFESSIONAL.

CONCRETE PREPARATION INSTRUCTIONS

B

TOP OF CONCRETE			
Model	Width	A	B
HFXMF12	12"	2-1/8"	7-3/4"
HFXMF15	15"	2-5/8"	9-3/4"
HFXMF18	18"		12-3/4"
HFXMF21	21"		15-3/4"

C

HFXMF ANCHOR CENTERLINES

IMPORTANT!

- ANCHORAGE IS DESIGNED FOR SINGLE STORY APPLICATIONS ONLY.
- ANCHORAGE IS DESIGNED FOR TENSION AND SHEAR TRANSFER ONLY. FOUNDATION DESIGN PER EOR.
- REINFORCEMENT SHOWN IS THE MINIMUM REQUIREMENT AND IS NOT INTENDED TO REPLACE REINFORCEMENT DESIGNED BY THE EOR.
- FOR RA AND BB-RA INSTALLATIONS, THE HFXBB BOLT BRACE MAY BE PLACED ON TOP OF THE STIRRUPS WITH DOUBLE-NUTS INSTALLED AT EMBED END OF STANDARD GRADE ANCHOR RODS. (NOTE: 1/2" x 3" x 3" MIN. HFPW PLATE WASHERS ARE REQUIRED TO BE DOUBLE-NUTTED AT EMBED END OF HIGH STRENGTH ANCHOR RODS.)
- HIGH STRENGTH ALL-THREAD RODS PROVIDED BY MITEK ARE STAMPED ON BOTH ENDS.

HF
B7

HARDY FRAME HFX MOMENT FRAME PORTAL CONFIGURATION INSTALLATION DETAILS

ENGINEER OF RECORD IS RESPONSIBLE FOR DESIGN TO ACCOMMODATE ACTUAL PROJECT CONDITIONS

MiTek USA, Inc.
555 S. Promenade Ave., Suite 104,
Corona, CA 92879 (805) 477-0793
www.hardyframe.com



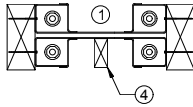
IMPORTANT NOTES

D

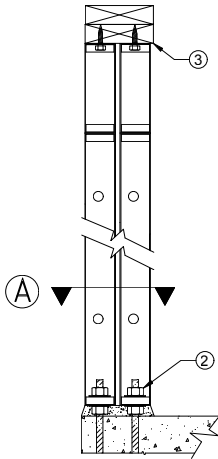
HFXMF
1A

08-01-2019

NOTE:
ATTACHMENTS TO ADJACENT TRIMMERS MAY BE MADE AT PREPUNCHED SCREW HOLES OR WITH SELF TAPPING SCREWS (#12 AT EDGES).



1. CAVITY ORIENTED FOR CONNECTION ACCESS.
2. NUTS AND WASHERS PER TABLE NOTE 1.
3. NOMINAL 8 INCH FRAMING ABOVE (MIN).
4. FIELD INSTALLED WOOD BACKING AS NEEDED.

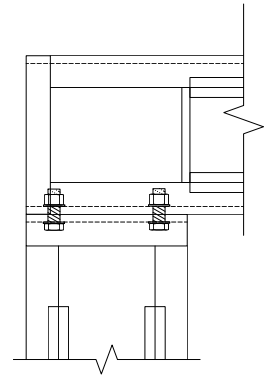


BACK TO BACK FRAME INSTALLATION

5

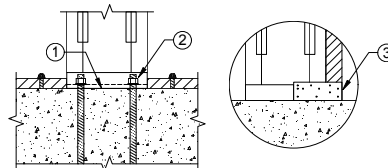
CFS HEADER BEAM TO COLUMNS ASSEMBLY INSTRUCTIONS

1. LAYOUT THE HEADER BEAM AND COLUMNS WITH OPEN (CAVITY) FACE UP.
2. CHECK THAT ACCESS AT MID-SPAN OF HEADER BEAM FOR SHEAR TRANSFER SCREWS TO WOOD FRAMING IS ORIENTED CORRECTLY.
3. ORIENT THE BOLTS THROUGH THE HEADER BEAM WITH THE HEAD AND DIRECT TENSION INDICATOR (DTI) WASHER IN THE COLUMN, HARDENED ROUND WASHER AND GRADE 8 NUT IN THE PANEL ZONE.
4. SNUG NUTS AT ALL BOLTS, THEN TIGHTEN UNTIL THE MAJORITY OF ORANGE SILICONE POCKETS BURST INDICATING REQUIRED TENSION IS MET.
5. WHEN BOLT CONNECTIONS ARE NOTED SNUG-TIGHT, HARDENED ROUND WASHERS CAN SUBSTITUTE FOR DTI WASHERS.



HEADER BEAM TO COLUMN ASSEMBLY INSTRUCTIONS

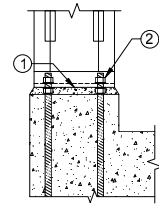
2



1. 15# FELT OR EQUIVALENT MOISTURE BARRIER RECOMMENDED BETWEEN PANEL BASE AND CONCRETE.
2. NUTS AND WASHERS PER TABLE 1 NOTE 1.
3. OPTIONAL INSTALLATION WITH HARDY FRAME BASE EXTENSION (HFBX) FOR ADJACENT FRAMING.

ON CONCRETE

4

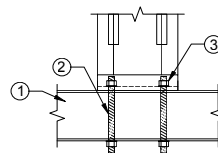
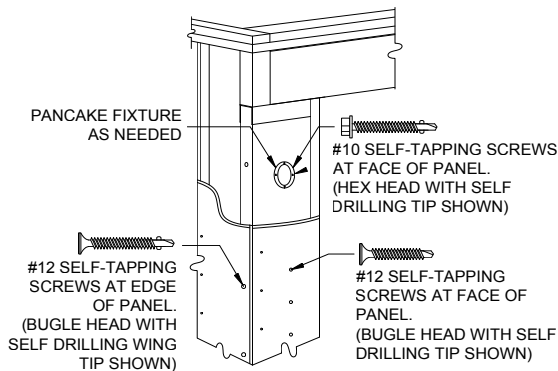


1. PLUS OR MINUS 1-1/2" GAP TO BE FILLED WITH 5,000 PSI NON-SHRINK GROUT (MINIMUM).
2. NUTS AND WASHERS PER TABLE 1 NOTE 1.

ON CURB

3

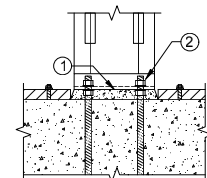
- NOTE:**
1. SURFACE FINISHED. CONNECTORS AND FIXTURES ARE ATTACHED TO THE PANEL FACE WITH #10 SELF-TAPPING SCREWS SPACED NO LESS THAN 2-1/4" O.C.
 2. ATTACHMENTS TO THE PANEL EDGES ARE MADE WITH #12 SELF-TAPPING SCREWS.
 3. STRUCTURAL CONNECTIONS ARE TO BE DESIGNED BY THE DESIGN PROFESSIONAL.
 4. STRUCTURAL HARDWARE USED TO TRANSFER LOADS SHOULD NOT EXCEED 12 GAGE.
 5. OPEN OR "CAVITY" FACE CAN BE ORIENTED TOWARD OUTSIDE FACE OF STUD TO FACILITATE RECESSING FIXTURES AND ELIMINATE NEED FOR ADDITIONAL HOLES IN PANEL FACE.



1. STEEL BEAM PER PLANS
2. HOLD DOWN ALL THREAD RODS THRU-BOLTED TO BOTTOM FLANGE OF STEEL.
3. NUTS AND WASHERS PER TABLE 1 NOTE 1.

STEEL BEAM THRU-BOLT

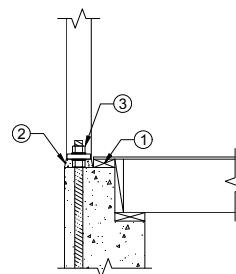
8



1. PLUS OR MINUS 1-1/2" GAP TO BE FILLED WITH 5,000 PSI NON-SHRINK GROUT (MINIMUM).
2. NUTS AND WASHERS PER TABLE 1 NOTE 1.

ON NUTS & WASHERS

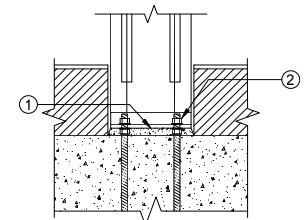
7



1. NOTCH SILL AT FRAME COLUMN.
2. PLUS OR MINUS 1-1/2" GAP TO BE FILLED WITH 5,000 PSI NON-SHRINK GROUT (MINIMUM).
3. NUTS AND WASHERS PER TABLE 1 NOTE 1.

RAISED STEM WALL

10



1. PLUS OR MINUS 1-1/2" GAP TO BE FILLED WITH 5,000 PSI NON-SHRINK GROUT (MINIMUM).
2. NUTS AND WASHERS PER TABLE 1 NOTE 1.

RAISED FLOOR HEAD-OUT

9



SELF TAPPING SCREWS

11

TABLE 1: MEMBER DIMENSIONS, GEOMETRY, & CONNECTORS

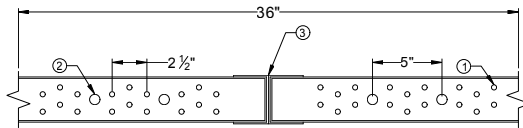
TABLE 1: MEMBER DIMENSIONS, GEOMETRY, & CONNECTORS									
MODEL NUMBER	MEMBER DIMENSIONS			CONNECTORS					
	COLUMN WIDTH, W _{COL}	BEAM DEPTH, D _{BEAM}	COLUMN DEPTH, D _{COL}	HOLD DOWN QTY, DIA, & GRADE ¹	JOINT BOLT QTY, DIA, AND GRADE	MINIMUM SCREW QTY AT HEADER BEAM ²			SCREW QTY AVAILABLE AT COLUMNS ³
						MID-BEAM	INTERMEDIATE	PANEL ZONES	
HFXMF1212	12"	12"	3 ½"	4 EA 1 ⅛" HS	4 EA 1 ⅛" HS	20	4' O.C. (MAX)	2 @ EA. JOINT	4 @ EA. EDGE
HFXMF1512	15"					24			
HFXMF1515	15"	15"				30			
HFXMF1812	18"	12"				28			
HFXMF1815	18"	15"				34			
HFXMF2115	21"					36			

TABLE NOTES:

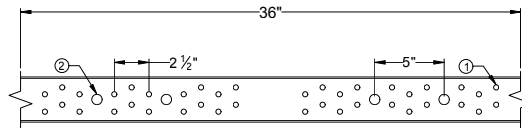
- HOLD DOWN ANCHOR BOLTS CONNECT TO THE COLUMN BASE WITH HARDENED ROUND WASHERS BELOW GRADE 8 NUTS. ALTERNATE WASHERS ARE (2 EA) ROUND-FLAT OR (2 EA) SAE WASHERS ON EACH BOLT. ALTERNATE NUTS ARE 2H HEAVY HEX.
- 1/4" DIAMETER MITEK PRO-SERIES SCREWS ARE 3" (MINIMUM) WHEN CONNECTING DIRECTLY TO THE COLLECTOR ABOVE.
- ADJACENT FRAMING WITH 1/4" DIAMETER SCREWS IS REQUIRED AT THE COLUMN EDGES WHEN INSTALLING A FILLER ABOVE THE BEAM THAT IS GREATER THAN 1-1/2" OR WHEN SPECIFIED BY THE DESIGN PROFESSIONAL.

CFS MOMENT FRAME INSTALLATION INSTRUCTIONS

- CONSIDER THE NEED FOR ELECTRIC FIXTURES, WOOD BACKING, OR BATT INSULATION THEN STAND THE ASSEMBLED MOMENT FRAME WITH THE OPEN (CAVITY) FACE ORIENTED IN THE DIRECTION THAT ACCOMMODATES OTHER TRADES.
- LIFT AND INSTALL THE FRAME OVER THE ANCHORS AND SET DIRECTLY ON NUTS AND WASHERS.
- INSTALL HARDENED ROUND WASHERS IN CONTACT WITH THE BOTTOM OF THE COLUMN THEN A GRADE 8 HEX NUT. USE A DEEP SOCKET AND SWIVEL (RECOMMENDED) FOR A SNUG-TIGHT CONNECTION.
- BRACE THE FRAME IN THE OUT OF PLANE DIRECTION AND CHECK FOR PLUMB.
- MAKE TOP CONNECTION TO FRAMING MEMBERS ABOVE WITH MITEK PRO-SERIES SCREWS PER PLANS.



W/ HEADER BEAM SPLICE



W/O HEADER BEAM SPLICE

- 5/16" HOLES FOR WS SCREWS (QTY PER TABLE)
- 3/4" HOLES FOR 5/8" HS CAST IN PLACE ANCHORS NOT REQUIRED TO BE FILLED.
- SPLICE AT MID-SPAN REQUIRED WHEN OUT-TO-OUT IS >13 FT.

MEMBER DIMENSIONS, GEOMETRY, & CONNECTORS

1

**HARDY FRAME HFX MOMENT FRAME
PORTAL CONFIGURATION INSTALLATION DETAILS**

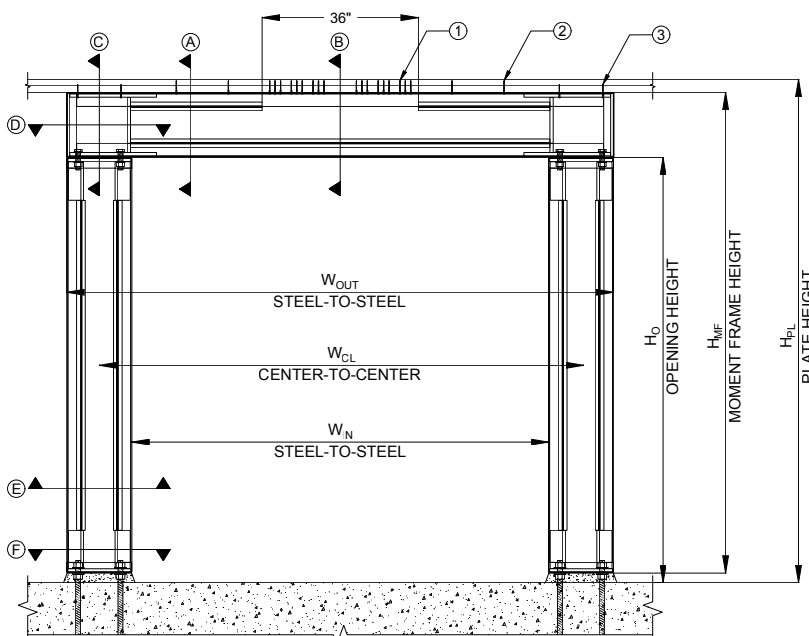
ENGINEER OF RECORD IS RESPONSIBLE FOR DESIGN TO
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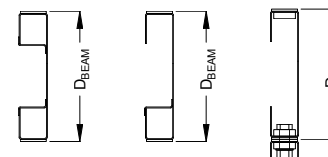
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**HFXMF
2A**

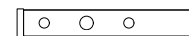


WHEN CONNECTING DIRECTLY TO COLLECTOR:

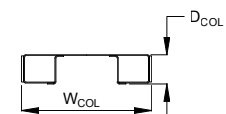
- 1/4" x 3" (MIN) WS SCREWS AT MID-BEAM FOR SHEAR TRANSFER (QTY PER TABLE)
- 1/4"x3" (MIN) WS SCREWS THROUGHOUT INTERMEDIATE BEAM SPAN FOR LATERAL BRACING (QTY PER TABLE)
- 1/4"x3" (MIN) WS SCREWS AT PANEL ZONES FOR LATERAL BRACING (QTY PER TABLE)



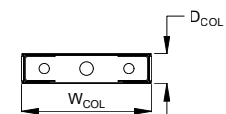
SECTION A SECTION B SECTION C



SECTION D



SECTION E



SECTION F

CFS MOMENT FRAME NOMENCLATURE

HFX	MF	18	12	-	8	x	8

- NOMINAL WALL HEIGHT (FT)
- NOMINAL CENTER TO CENTER SPAN (FT)
- BEAM DEPTH (IN)
- COLUMN WIDTH (IN)
- HARDY FRAME CFS MOMENT FRAME

NOMENCLATURE AND DIMENSIONING

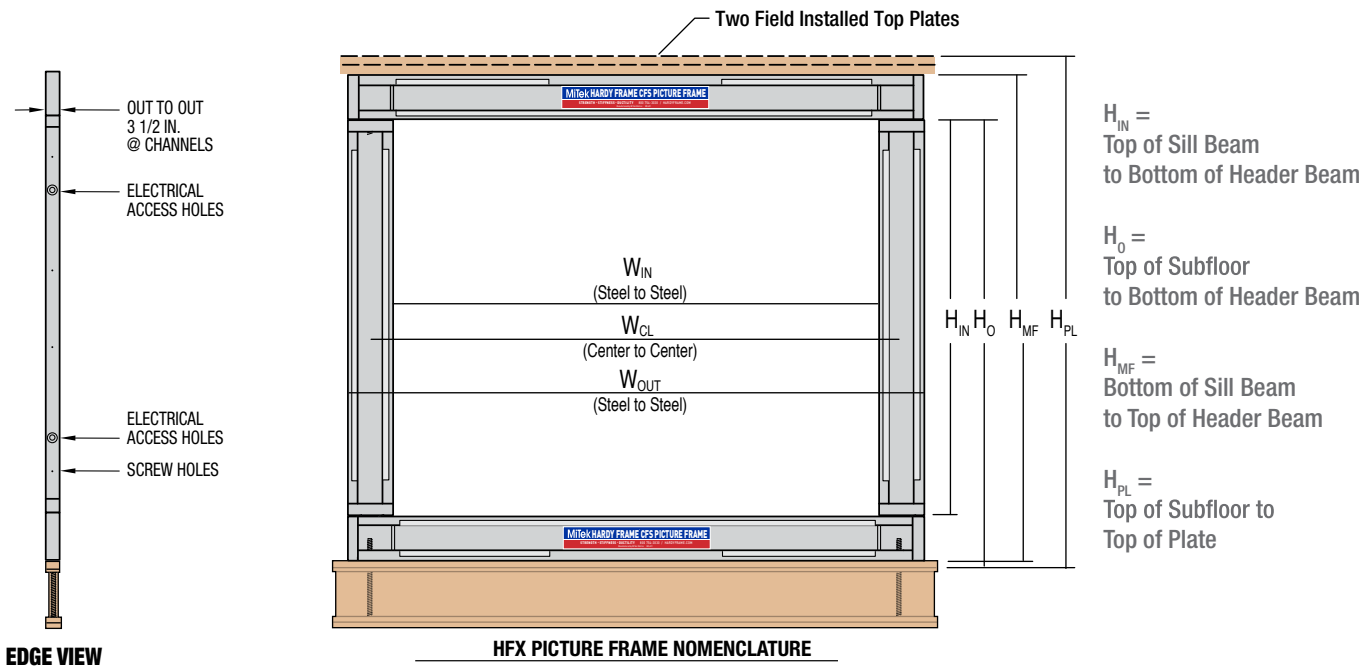
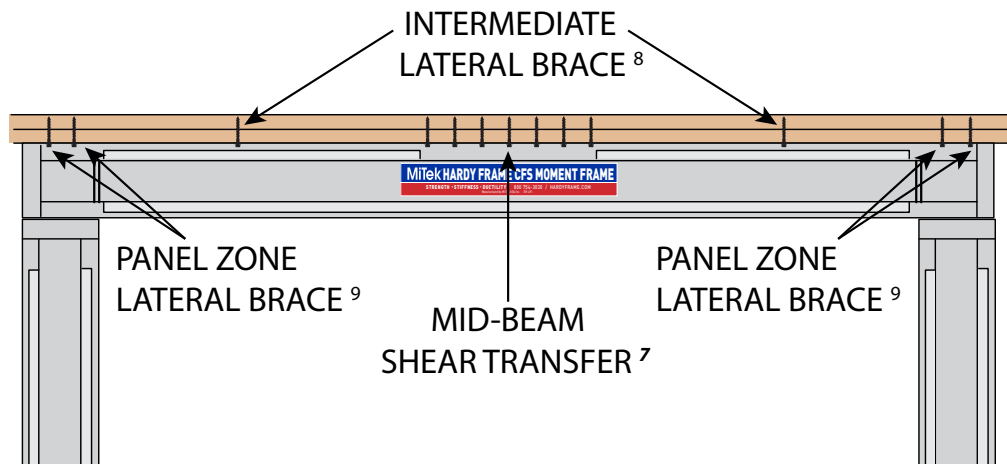
6

TABLE 2.0A - HARDY FRAME® HFX PICTURE FRAME DIMENSIONS & CONNECTORS 1, 2, 3, 4

Model Number ⁵	Column Width (in)	Beam Depth ⁶ (in)	W _{IN} (ft-in)	W _{CL} (ft-in)	W _{OUT} (ft-in)	Minimum Screw Quantity			Frame Weight ¹⁰ (lbs)
						Mid-Beam ⁷	Intermediate ⁸	Panel Zones ⁹	
						(Per Beam)	(Header Beam Only)		
HFXPIC1212-8x	12	12	7'-0"	8'-0"	9'-0"	20	2	4	771
HFXPIC1512-8x	15	12	6'-9"		9'-3"	24	2	4	823
HFXPIC1515-8x		15				30	2	4	848
HFXPIC1812-8x	18	12	6'-6"		9'-6"	28	2	4	882
HFXPIC1815-8x		15				34	2	4	906
HFXPIC2112-8x	21	12	6'-3"		9'-9"	30	2	4	934
HFXPIC2115-8x		15		36		2	4	958	
HFXPIC1212-10x	12	12	9'-0"	10'-0"	11'-0"	20	2	4	839
HFXPIC1512-10x	15	12	8'-9"		11'-3"	24	2	4	891
HFXPIC1515-10x		15				30	2	4	921
HFXPIC1812-10x	18	12	8'-6"		11'-6"	28	2	4	950
HFXPIC1815-10x		15				34	2	4	979
HFXPIC2112-10x	21	12	8'-3"		11'-9"	30	2	4	1002
HFXPIC2115-10x		15				36	2	4	1031
HFXPIC1212-12x	12	12	11'-0"		12'-0"	13'-0"	20	2	4
HFXPIC1512-12x	15	12	10'-9"	13'-3"		24	2	4	968
HFXPIC1515-12x		15				30	2	4	1005
HFXPIC1812-12x	18	12	10'-6"	13'-6"		28	2	4	1027
HFXPIC1815-12x		15				34	2	4	1063
HFXPIC2112-12x	21	12	10'-3"	13'-9"		30	2	4	1079
HFXPIC2115-12x		15				36	2	4	1115
HFXPIC1212-14x	12	12	13'-0"	14'-0"		15'-0"	20	4	4
HFXPIC1512-14x	15	12	12'-9"		15'-3"	24	4	4	1036
HFXPIC1515-14x		15				30	4	4	1077
HFXPIC1812-14x	18	12	12'-6"		15'-6"	28	4	4	1095
HFXPIC1815-14x		15				34	4	4	1135
HFXPIC2112-14x	21	12	12'-3"		15'-9"	30	4	4	1147
HFXPIC2115-14x		15				36	4	4	1188
HFXPIC1212-16x	12	12	15'-0"		16'-0"	17'-0"	20	4	4
HFXPIC1512-16x	15	12	14'-9"	17'-3"		24	4	4	1104
HFXPIC1515-16x		15				30	4	4	1150
HFXPIC1812-16x	18	12	14'-6"	17'-6"		28	4	4	1163
HFXPIC1815-16x		15				34	4	4	1208
HFXPIC2112-16x	21	12	14'-3"	17'-9"		30	4	4	1215
HFXPIC2115-16x		15				36	4	4	1260
HFXPIC1212-18x	12	12	17'-0"	18'-0"		19'-0"	20	4	4
HFXPIC1512-18x	15	12	16'-9"		19'-3"	24	4	4	1172
HFXPIC1515-18x		15				30	4	4	1222
HFXPIC1812-18x	18	12	16'-6"		19'-6"	28	4	4	1231
HFXPIC1815-18x		15				34	4	4	1280
HFXPIC2112-18x	21	12	16'-3"		19'-9"	30	4	4	1283
HFXPIC2115-18x		15				36	4	4	1332
HFXPIC1212-20x	12	12	19'-0"		20'-0"	21'-0"	20	4	4
HFXPIC1512-20x	15	12	18'-9"	21'-3"		24	4	4	1240
HFXPIC1515-20x		15				30	4	4	1295
HFXPIC1812-20x	18	12	18'-6"	21'-6"		28	4	4	1299
HFXPIC1815-20x		15				34	4	4	1353
HFXPIC2112-20x	21	12	18'-3"	21'-9"		30	4	4	1351
HFXPIC2115-20x		15				36	4	4	1405

Notes

- For nominal Plate Heights of 8, 9 and 10 feet the HFX PIC net height is 92-1/4, 104-1/4 and 116-1/4 inches respectively.
- All HFX Picture Frames are 3-1/2 inches thick.
- Panel Zone to column connections are made with (2 ea.) 1-1/8 in. diameter, Grade 8 machine bolts. Orient the head and DTI Washer in the column, the nut and Hardened Round Washer in the Panel Zone.
- Hold down anchors are 1-1/8 in. diameter High Strength (ASTM A193 Grade B7) all thread connected with (1 ea.) Hardened Round Washer and (1 ea.) Grade 8 nut per rod. For HFX Picture Frames installed on concrete, shear bolts at the sill beam are (4 ea.) 5/8 in. diameter High Strength (ASTM A193 Grade B7) through predrilled holes, connected with (1 ea.) Hardened Round Washer and (1 ea.) Grade 8 nut per rod.
- Reinforced Webs are available in columns greater than 12 in. wide, specify by adding "RW" to the end of the model number (i.e. HFXPIC2115-20x8 RW).
- Connections to adjacent posts, studs, trimmers and jamps are not required unless specified by the engineer of record. When making connections (4 ea.) predrilled holes are provided through each flange of each column. Interior flanges of the Header and Sill Beams are manufactured with predrilled holes at 12" o.c.
- For shear transfer, predrilled holes are provided within a 3 foot section located at the middle of the beam span. 1/4" x 3" MiTek Pro-Series WS-3 (min.) Screws are required through the top flange of the header beam. For HFX Picture Frames installed on wood the same shear connection is required at the bottom flange of the sill beam.
- For lateral bracing of the header beam, predrilled holes are provided in the flanges at 12" o.c. Use 1/4" x 3" MiTek Pro-Series WS-3 (min.) Screws at 4' o.c. (max.) through the top flange of the header beam. Lateral bracing is not required at the sill beam of HFX Picture Frames.
- For lateral bracing of the moment connection, predrilled holes are provided within each Panel Zone. (2 ea.) 1/4" x 3" MiTek Pro-Series WS-3 (min.) Screws are required at each Panel Zone through the top flange of the header beam, one on each end of the Panel Zone. Lateral bracing is not required at the sill beam Panel Zone of HFX Picture Frames.
- Frame Weight shown for 8-ft nominal Frame heights. For other Frame heights, add 34 plf for 12" columns, 36 plf for 15" columns, 39 plf for 18" columns, or 41 plf for 21" columns.

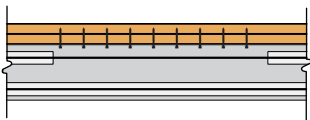


HFX PICTURE FRAME NOMENCLATURE

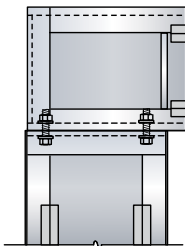
HFXPIC 15 12-10 x 9

- NOMINAL PLATE HEIGHT
- NOMINAL CENTERLINE DIMENSION
- BEAM DEPTH
- PANEL WIDTH
- HARDY FRAME® HFX PICTURE FRAME
- PICTURE FRAME CONFIGURATION

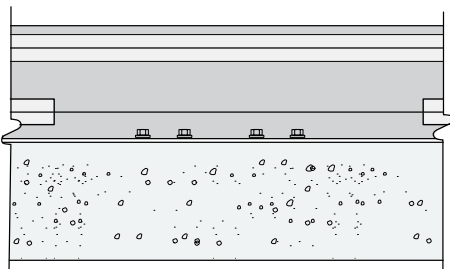
HFX PICTURE FRAME PICTURE FRAME CONFIGURATION



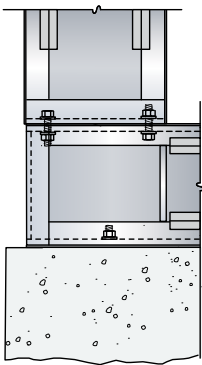
PRO SERIES SCREW
SHEAR TRANSFER



PANEL ZONE
BOLTED ASSEMBLY



ANCHOR BOLT SHEAR TRANSFER



HOLD DOWN / SHEAR
TRANSFER ANCHORAGE

TABLE 2.1A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON CONCRETE^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC1212 8x8	8'-0"	8'-0"	12,000	0.387	1,800	32,600	32,600	7,200
HFXPIC1512 8x8	8'-0"	8'-0"	14,300	0.397	1,890	35,800	43,600	7,600
HFXPIC1515 8x8	8'-0"	8'-0"	18,100	0.380	1,440	30,400	37,600	5,800
HFXPIC1812 8x8	8'-0"	8'-0"	16,600	0.383	2,000	37,000	44,900	8,000
HFXPIC1815 8x8	8'-0"	8'-0"	21,000	0.356	1,800	31,900	39,300	7,200
HFXPIC2112 8x8	8'-0"	8'-0"	18,700	0.376	2,280	38,000	46,400	9,100
HFXPIC2115 8x8	8'-0"	8'-0"	23,900	0.345	2,220	33,000	40,800	8,900
HFXPIC1212 9x8	9'-0"	8'-0"	12,000	0.397	1,320	33,200	33,200	5,900
HFXPIC1512 9x8	9'-0"	8'-0"	13,900	0.399	1,630	37,800	45,700	7,400
HFXPIC1515 9x8	9'-0"	8'-0"	18,100	0.388	1,050	31,300	38,500	4,700
HFXPIC1812 9x8	9'-0"	8'-0"	16,600	0.398	1,500	37,900	45,900	6,800
HFXPIC1815 9x8	9'-0"	8'-0"	21,000	0.365	1,310	32,900	40,300	5,900
HFXPIC2112 9x8	9'-0"	8'-0"	18,700	0.394	1,710	38,900	47,300	7,700
HFXPIC2115 9x8	9'-0"	8'-0"	23,900	0.356	1,640	34,100	42,000	7,400
HFXPIC1212 10x8	10'-0"	8'-0"	11,700	0.399	1,150	34,800	34,800	5,700
HFXPIC1512 10x8	10'-0"	8'-0"	13,400	0.399	1,410	39,400	47,500	7,000
HFXPIC1515 10x8	10'-0"	8'-0"	18,100	0.397	780	32,000	39,200	3,900
HFXPIC1812 10x8	10'-0"	8'-0"	16,000	0.399	1,380	40,000	48,100	6,900
HFXPIC1815 10x8	10'-0"	8'-0"	21,000	0.376	990	33,800	41,200	4,900
HFXPIC2112 10x8	10'-0"	8'-0"	18,100	0.399	1,530	40,800	49,400	7,700
HFXPIC2115 10x8	10'-0"	8'-0"	23,900	0.367	1,250	35,100	43,000	6,300
HFXPIC1212 11x8	11'-0"	8'-0"	11,400	0.399	1,020	36,300	36,300	5,600
HFXPIC1512 11x8	11'-0"	8'-0"	13,000	0.399	1,240	40,900	49,100	6,800
HFXPIC1515 11x8	11'-0"	8'-0"	17,800	0.399	730	33,500	40,800	4,000
HFXPIC1812 11x8	11'-0"	8'-0"	15,400	0.399	1,170	41,700	50,000	6,400
HFXPIC1815 11x8	11'-0"	8'-0"	21,000	0.387	770	34,500	41,900	4,200
HFXPIC2112 11x8	11'-0"	8'-0"	17,400	0.399	1,420	42,800	51,500	7,800
HFXPIC2115 11x8	11'-0"	8'-0"	23,900	0.380	980	35,900	43,800	5,400
HFXPIC1212 12x8	12'-0"	8'-0"	11,100	0.399	890	37,500	37,500	5,400
HFXPIC1512 12x8	12'-0"	8'-0"	12,600	0.399	1,110	42,400	50,700	6,700
HFXPIC1515 12x8	12'-0"	8'-0"	17,400	0.399	700	35,000	42,400	4,200
HFXPIC1812 12x8	12'-0"	8'-0"	14,800	0.399	1,150	43,400	51,800	6,900
HFXPIC1815 12x8	12'-0"	8'-0"	21,000	0.398	620	35,100	42,600	3,700
HFXPIC2112 12x8	12'-0"	8'-0"	16,600	0.399	1,300	44,400	53,400	7,800
HFXPIC2115 12x8	12'-0"	8'-0"	23,900	0.393	790	36,500	44,500	4,700
HFXPIC1212 13x8	13'-0"	8'-0"	10,700	0.399	810	38,900	38,900	5,300
HFXPIC1512 13x8	13'-0"	8'-0"	12,200	0.399	1,000	43,600	52,100	6,500
HFXPIC1515 13x8	13'-0"	8'-0"	17,000	0.399	670	36,300	43,900	4,300
HFXPIC1812 13x8	13'-0"	8'-0"	14,200	0.399	1,050	44,800	53,500	6,800
HFXPIC1815 13x8	13'-0"	8'-0"	20,500	0.399	620	36,700	44,300	4,000
HFXPIC2112 13x8	13'-0"	8'-0"	15,900	0.399	1,200	46,000	55,100	7,800
HFXPIC2115 13x8	13'-0"	8'-0"	23,500	0.399	730	37,900	45,900	4,800
HFXPIC1212 14x8	14'-0"	8'-0"	10,500	0.399	730	40,000	40,000	5,100
HFXPIC1512 14x8	14'-0"	8'-0"	11,800	0.399	890	44,800	53,400	6,300
HFXPIC1515 14x8	14'-0"	8'-0"	16,600	0.399	630	37,600	45,300	4,400
HFXPIC1812 14x8	14'-0"	8'-0"	13,700	0.399	960	46,100	54,900	6,700
HFXPIC1815 14x8	14'-0"	8'-0"	19,900	0.399	620	38,300	46,000	4,300
HFXPIC2112 14x8	14'-0"	8'-0"	15,300	0.399	1,100	47,300	56,600	7,700
HFXPIC2115 14x8	14'-0"	8'-0"	22,700	0.399	730	39,500	47,700	5,100
HFXPIC1212 16x8	16'-0"	8'-0"	9,900	0.399	600	42,200	42,200	4,800
HFXPIC1512 16x8	16'-0"	8'-0"	11,100	0.399	740	46,800	55,600	5,900
HFXPIC1515 16x8	16'-0"	8'-0"	15,800	0.399	550	39,800	47,800	4,400
HFXPIC1812 16x8	16'-0"	8'-0"	12,800	0.399	820	48,400	57,400	6,500
HFXPIC1815 16x8	16'-0"	8'-0"	18,800	0.399	580	40,900	48,900	4,600
HFXPIC2112 16x8	16'-0"	8'-0"	14,100	0.399	940	49,700	59,200	7,600
HFXPIC2115 16x8	16'-0"	8'-0"	21,300	0.399	680	42,300	50,900	5,500
HFXPIC1212 18x8	18'-0"	8'-0"	9,400	0.399	510	44,000	44,000	4,600
HFXPIC1512 18x8	18'-0"	8'-0"	10,400	0.399	630	48,600	57,600	5,600
HFXPIC1515 18x8	18'-0"	8'-0"	15,100	0.399	490	41,800	50,000	4,400
HFXPIC1812 18x8	18'-0"	8'-0"	11,900	0.399	690	50,300	59,600	6,300

TABLE 2.1A: LATERAL LOAD CAPACITY FOR HF PICTURE FRAME ON CONCRETE^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load (R = 6.5) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC1815 18x8	18'-0"	8'-0"	17,800	0.399	530	43,200	51,500	4,800
HFXPIC2112 18x8	18'-0"	8'-0"	13,100	0.399	810	51,600	61,300	7,300
HFXPIC2115 18x8	18'-0"	8'-0"	20,000	0.399	640	44,800	53,600	5,700
HFXPIC1212 20x8	20'-0"	8'-0"	8,900	0.399	440	45,700	45,700	4,300
HFXPIC1512 20x8	20'-0"	8'-0"	9,900	0.399	530	50,200	59,400	5,300
HFXPIC1515 20x8	20'-0"	8'-0"	14,500	0.399	440	43,600	52,000	4,400
HFXPIC1812 20x8	20'-0"	8'-0"	11,200	0.399	600	51,900	61,400	6,000
HFXPIC1815 20x8	20'-0"	8'-0"	16,900	0.399	480	45,200	53,800	4,800
HFXPIC2112 20x8	20'-0"	8'-0"	12,200	0.399	700	53,200	63,100	7,000
HFXPIC2115 20x8	20'-0"	8'-0"	18,900	0.399	580	46,800	55,900	5,800
HFXPIC1212 8x9	8'-0"	9'-0"	10,300	0.449	2,070	30,100	30,100	8,300
HFXPIC1512 8x9	8'-0"	9'-0"	12,000	0.449	2,350	33,700	40,900	9,400
HFXPIC1515 8x9	8'-0"	9'-0"	15,300	0.442	1,860	28,100	34,800	7,400
HFXPIC1812 8x9	8'-0"	9'-0"	14,200	0.438	2,210	33,900	41,300	8,800
HFXPIC1815 8x9	8'-0"	9'-0"	17,800	0.411	2,200	29,400	36,400	8,800
HFXPIC2112 8x9	8'-0"	9'-0"	16,100	0.428	2,490	34,700	42,500	10,000
HFXPIC2115 8x9	8'-0"	9'-0"	20,200	0.395	2,280	30,400	37,700	9,100
HFXPIC1212 9x9	9'-0"	9'-0"	10,000	0.449	1,700	31,700	31,700	7,700
HFXPIC1512 9x9	9'-0"	9'-0"	11,600	0.449	1,940	35,300	42,700	8,700
HFXPIC1515 9x9	9'-0"	9'-0"	15,300	0.449	1,410	29,200	35,900	6,300
HFXPIC1812 9x9	9'-0"	9'-0"	14,000	0.449	1,780	35,300	42,800	8,000
HFXPIC1815 9x9	9'-0"	9'-0"	17,800	0.421	1,610	30,500	37,400	7,200
HFXPIC2112 9x9	9'-0"	9'-0"	16,100	0.447	1,870	35,600	43,500	8,400
HFXPIC2115 9x9	9'-0"	9'-0"	20,200	0.406	1,950	31,500	38,900	8,800
HFXPIC1212 10x9	10'-0"	9'-0"	9,700	0.449	1,430	33,100	33,100	7,100
HFXPIC1512 10x9	10'-0"	9'-0"	11,200	0.449	1,650	36,900	44,400	8,200
HFXPIC1515 10x9	10'-0"	9'-0"	15,000	0.449	1,240	30,800	37,600	6,200
HFXPIC1812 10x9	10'-0"	9'-0"	13,500	0.449	1,570	37,200	44,800	7,800
HFXPIC1815 10x9	10'-0"	9'-0"	17,800	0.431	1,220	31,300	38,200	6,100
HFXPIC2112 10x9	10'-0"	9'-0"	15,400	0.449	1,690	37,700	45,700	8,500
HFXPIC2115 10x9	10'-0"	9'-0"	20,200	0.419	1,490	32,400	39,800	7,400
HFXPIC1212 11x9	11'-0"	9'-0"	9,400	0.449	1,230	34,400	34,400	6,800
HFXPIC1512 11x9	11'-0"	9'-0"	10,900	0.449	1,430	38,300	45,900	7,800
HFXPIC1515 11x9	11'-0"	9'-0"	14,700	0.449	1,090	32,100	39,100	6,000
HFXPIC1812 11x9	11'-0"	9'-0"	13,000	0.449	1,400	38,800	46,600	7,700
HFXPIC1815 11x9	11'-0"	9'-0"	17,800	0.443	950	31,900	38,900	5,200
HFXPIC2112 11x9	11'-0"	9'-0"	14,800	0.449	1,540	39,500	47,700	8,500
HFXPIC2115 11x9	11'-0"	9'-0"	20,200	0.432	1,170	33,200	40,600	6,400
HFXPIC1212 12x9	12'-0"	9'-0"	9,200	0.449	1,060	35,600	35,600	6,400
HFXPIC1512 12x9	12'-0"	9'-0"	10,600	0.449	880	39,500	47,200	5,300
HFXPIC1515 12x9	12'-0"	9'-0"	14,300	0.449	990	33,400	40,500	5,900
HFXPIC1812 12x9	12'-0"	9'-0"	12,500	0.449	1,260	40,200	48,200	7,600
HFXPIC1815 12x9	12'-0"	9'-0"	17,500	0.449	860	33,200	40,300	5,100
HFXPIC2112 12x9	12'-0"	9'-0"	14,100	0.449	1,400	41,100	49,400	8,400
HFXPIC2115 12x9	12'-0"	9'-0"	20,200	0.446	940	33,800	41,300	5,600
HFXPIC1212 13x9	13'-0"	9'-0"	8,900	0.449	940	36,700	36,700	6,100
HFXPIC1512 13x9	13'-0"	9'-0"	10,200	0.449	1,100	40,600	48,500	7,200
HFXPIC1515 13x9	13'-0"	9'-0"	14,000	0.449	880	34,600	41,800	5,800
HFXPIC1812 13x9	13'-0"	9'-0"	12,100	0.449	1,140	41,600	49,600	7,400
HFXPIC1815 13x9	13'-0"	9'-0"	17,100	0.449	810	34,700	41,900	5,300
HFXPIC2112 13x9	13'-0"	9'-0"	13,600	0.449	1,270	42,500	51,000	8,300
HFXPIC2115 13x9	13'-0"	9'-0"	19,700	0.449	890	35,300	42,900	5,800
HFXPIC1212 14x9	14'-0"	9'-0"	8,700	0.449	840	37,700	37,700	5,900
HFXPIC1512 14x9	14'-0"	9'-0"	9,900	0.449	990	41,700	49,700	6,900
HFXPIC1515 14x9	14'-0"	9'-0"	13,700	0.449	810	35,700	43,000	5,600
HFXPIC1812 14x9	14'-0"	9'-0"	11,600	0.449	1,040	42,700	51,000	7,200
HFXPIC1815 14x9	14'-0"	9'-0"	16,600	0.449	770	36,000	43,400	5,400
HFXPIC2112 14x9	14'-0"	9'-0"	13,000	0.449	1,170	43,700	52,300	8,200

TABLE 2.1A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON CONCRETE^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	Phase-g at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC2115 14x9	14'-0"	9'-0"	19,100	0.449	860	36,900	44,600	6,000
HFXPIC1212 16x9	16'-0"	9'-0"	8,300	0.449	670	39,500	39,500	5,400
HFXPIC1512 16x9	16'-0"	9'-0"	9,300	0.449	800	43,500	51,700	6,400
HFXPIC1515 16x9	16'-0"	9'-0"	13,100	0.449	670	37,700	45,200	5,400
HFXPIC1812 16x9	16'-0"	9'-0"	10,900	0.449	860	44,800	53,200	6,900
HFXPIC1815 16x9	16'-0"	9'-0"	15,700	0.449	670	38,400	46,000	5,400
HFXPIC2112 16x9	16'-0"	9'-0"	12,000	0.449	990	45,800	54,700	7,900
HFXPIC2115 16x9	16'-0"	9'-0"	17,900	0.449	780	39,400	47,500	6,200
HFXPIC1212 18x9	18'-0"	9'-0"	7,800	0.449	560	41,200	41,200	5,000
HFXPIC1512 18x9	18'-0"	9'-0"	8,800	0.449	670	45,100	53,500	6,000
HFXPIC1515 18x9	18'-0"	9'-0"	12,500	0.449	580	39,500	47,200	5,200
HFXPIC1812 18x9	18'-0"	9'-0"	10,200	0.449	730	46,500	55,200	6,600
HFXPIC1815 18x9	18'-0"	9'-0"	14,900	0.449	600	40,400	48,300	5,400
HFXPIC2112 18x9	18'-0"	9'-0"	11,200	0.449	840	47,600	56,700	7,500
HFXPIC2115 18x9	18'-0"	9'-0"	16,900	0.449	690	41,600	49,900	6,200
HFXPIC1212 20x9	20'-0"	9'-0"	7,500	0.449	480	42,600	42,600	4,700
HFXPIC1512 20x9	20'-0"	9'-0"	8,400	0.449	560	46,500	55,000	5,600
HFXPIC1515 20x9	20'-0"	9'-0"	12,000	0.449	490	41,000	48,900	5,000
HFXPIC1812 20x9	20'-0"	9'-0"	9,500	0.449	630	48,000	56,900	6,200
HFXPIC1815 20x9	20'-0"	9'-0"	14,200	0.449	530	42,200	50,300	5,300
HFXPIC2112 20x9	20'-0"	9'-0"	10,500	0.449	720	49,100	58,400	7,200
HFXPIC2115 20x9	20'-0"	9'-0"	15,900	0.449	620	43,500	52,000	6,200
HFXPIC1212 8x10	8'-0"	10'-0"	8,700	0.499	2,570	28,300	28,300	10,300
HFXPIC1512 8x10	8'-0"	10'-0"	10,200	0.499	2,740	31,000	37,800	10,900
HFXPIC1515 8x10	8'-0"	10'-0"	13,100	0.499	2,460	26,100	32,400	9,800
HFXPIC1812 8x10	8'-0"	10'-0"	12,500	0.496	2,380	30,500	37,300	9,500
HFXPIC1815 8x10	8'-0"	10'-0"	15,400	0.467	2,510	26,700	33,100	10,100
HFXPIC2112 8x10	8'-0"	10'-0"	14,100	0.481	2,590	31,200	38,400	10,400
HFXPIC2115 8x10	8'-0"	10'-0"	17,500	0.446	2,330	27,400	34,300	9,300
HFXPIC1212 9x10	9'-0"	10'-0"	8,400	0.499	2,050	29,600	29,600	9,200
HFXPIC1512 9x10	9'-0"	10'-0"	9,900	0.499	2,220	32,600	39,400	10,000
HFXPIC1515 9x10	9'-0"	10'-0"	12,800	0.499	2,000	27,700	34,000	9,000
HFXPIC1812 9x10	9'-0"	10'-0"	12,100	0.499	2,000	32,400	39,300	9,000
HFXPIC1815 9x10	9'-0"	10'-0"	15,400	0.478	1,830	27,600	34,100	8,300
HFXPIC2112 9x10	9'-0"	10'-0"	13,900	0.499	2,080	32,400	39,700	9,400
HFXPIC2115 9x10	9'-0"	10'-0"	17,500	0.458	2,190	28,500	35,400	9,800
HFXPIC1212 10x10	10'-0"	10'-0"	8,200	0.499	1,690	30,900	30,900	8,500
HFXPIC1512 10x10	10'-0"	10'-0"	9,600	0.499	1,850	33,900	40,900	9,300
HFXPIC1515 10x10	10'-0"	10'-0"	12,600	0.499	1,650	29,000	35,500	8,300
HFXPIC1812 10x10	10'-0"	10'-0"	11,700	0.499	1,740	34,000	41,100	8,700
HFXPIC1815 10x10	10'-0"	10'-0"	15,400	0.490	1,400	28,400	34,900	7,000
HFXPIC2112 10x10	10'-0"	10'-0"	13,400	0.499	1,840	34,300	41,800	9,200
HFXPIC2115 10x10	10'-0"	10'-0"	17,500	0.480	1,670	29,400	36,300	8,400
HFXPIC1212 11x10	11'-0"	10'-0"	8,000	0.499	1,430	32,100	32,100	7,900
HFXPIC1512 11x10	11'-0"	10'-0"	9,300	0.499	1,590	35,200	42,300	8,700
HFXPIC1515 11x10	11'-0"	10'-0"	12,300	0.499	1,420	30,200	36,800	7,800
HFXPIC1812 11x10	11'-0"	10'-0"	11,200	0.499	1,530	35,500	42,700	8,400
HFXPIC1815 11x10	11'-0"	10'-0"	15,300	0.499	1,160	29,500	36,000	6,400
HFXPIC2112 11x10	11'-0"	10'-0"	12,800	0.499	1,650	36,000	43,600	9,100
HFXPIC2115 11x10	11'-0"	10'-0"	17,500	0.487	1,310	30,200	37,100	7,200
HFXPIC1212 12x10	12'-0"	10'-0"	7,800	0.499	1,230	33,100	33,100	7,400
HFXPIC1512 12x10	12'-0"	10'-0"	9,000	0.499	1,040	36,300	43,500	6,200
HFXPIC1515 12x10	12'-0"	10'-0"	12,100	0.499	1,240	31,400	38,100	7,400
HFXPIC1812 12x10	12'-0"	10'-0"	10,800	0.499	1,360	36,800	44,200	8,200
HFXPIC1815 12x10	12'-0"	10'-0"	14,900	0.499	1,060	30,900	37,500	6,400
HFXPIC2112 12x10	12'-0"	10'-0"	12,300	0.499	1,490	37,400	45,100	8,900
HFXPIC2115 12x10	12'-0"	10'-0"	17,400	0.499	1,110	31,100	38,100	6,600
HFXPIC1212 13x10	13'-0"	10'-0"	7,600	0.499	1,060	34,000	34,000	6,900
HFXPIC1512 13x10	13'-0"	10'-0"	8,800	0.499	1,210	37,300	44,600	7,800
HFXPIC1515 13x10	13'-0"	10'-0"	11,800	0.499	1,080	32,400	39,200	7,100

TABLE 2.1A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON CONCRETE^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC1812 13x10	13'-0"	10'-0"	10,400	0.499	1,220	38,100	45,500	7,900
HFXPIC1815 13x10	13'-0"	10'-0"	14,500	0.499	970	32,200	39,000	6,300
HFXPIC2112 13x10	13'-0"	10'-0"	11,800	0.499	1,350	38,700	46,600	8,800
HFXPIC2115 13x10	13'-0"	10'-0"	16,900	0.499	1,040	32,600	39,700	6,800
HFXPIC1212 14x10	14'-0"	10'-0"	7,400	0.499	930	34,900	34,900	6,500
HFXPIC1512 14x10	14'-0"	10'-0"	8,500	0.499	1,060	38,200	45,600	7,400
HFXPIC1515 14x10	14'-0"	10'-0"	11,600	0.499	970	33,400	40,300	6,800
HFXPIC1812 14x10	14'-0"	10'-0"	10,100	0.499	1,100	39,100	46,700	7,700
HFXPIC1815 14x10	14'-0"	10'-0"	14,100	0.499	900	33,400	40,300	6,300
HFXPIC2112 14x10	14'-0"	10'-0"	11,300	0.499	1,230	39,800	47,800	8,600
HFXPIC2115 14x10	14'-0"	10'-0"	16,400	0.499	970	33,900	41,200	6,800
HFXPIC1212 16x10	16'-0"	10'-0"	7,000	0.499	740	36,600	36,600	6,000
HFXPIC1512 16x10	16'-0"	10'-0"	8,000	0.499	860	39,900	47,400	6,800
HFXPIC1515 16x10	16'-0"	10'-0"	11,100	0.499	790	35,200	42,200	6,300
HFXPIC1812 16x10	16'-0"	10'-0"	9,400	0.499	900	41,000	48,800	7,200
HFXPIC1815 16x10	16'-0"	10'-0"	13,400	0.499	770	35,600	42,700	6,100
HFXPIC2112 16x10	16'-0"	10'-0"	10,500	0.499	1,020	41,800	50,000	8,200
HFXPIC2115 16x10	16'-0"	10'-0"	15,400	0.499	860	36,300	43,800	6,800
HFXPIC1212 18x10	18'-0"	10'-0"	6,700	0.499	610	37,900	37,900	5,500
HFXPIC1512 18x10	18'-0"	10'-0"	7,600	0.499	700	41,300	49,000	6,300
HFXPIC1515 18x10	18'-0"	10'-0"	10,600	0.499	660	36,700	43,900	5,900
HFXPIC1812 18x10	18'-0"	10'-0"	8,800	0.499	760	42,600	50,500	6,800
HFXPIC1815 18x10	18'-0"	10'-0"	12,700	0.499	670	37,400	44,700	6,000
HFXPIC2112 18x10	18'-0"	10'-0"	9,800	0.499	860	43,400	51,800	7,800
HFXPIC2115 18x10	18'-0"	10'-0"	14,500	0.499	750	38,300	46,000	6,700
HFXPIC1212 20x10	20'-0"	10'-0"	6,400	0.499	500	39,200	39,200	5,100
HFXPIC1512 20x10	20'-0"	10'-0"	7,200	0.499	590	42,500	50,400	5,900
HFXPIC1515 20x10	20'-0"	10'-0"	10,200	0.499	550	38,100	45,400	5,500
HFXPIC1812 20x10	20'-0"	10'-0"	8,300	0.499	650	43,900	52,100	6,500
HFXPIC1815 20x10	20'-0"	10'-0"	12,100	0.499	580	39,000	46,500	5,800
HFXPIC2112 20x10	20'-0"	10'-0"	9,100	0.499	740	44,800	53,300	7,400
HFXPIC2115 20x10	20'-0"	10'-0"	13,700	0.499	660	40,000	47,900	6,600

TABLE 2.1A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON CONCRETE^{1,2,5,12}

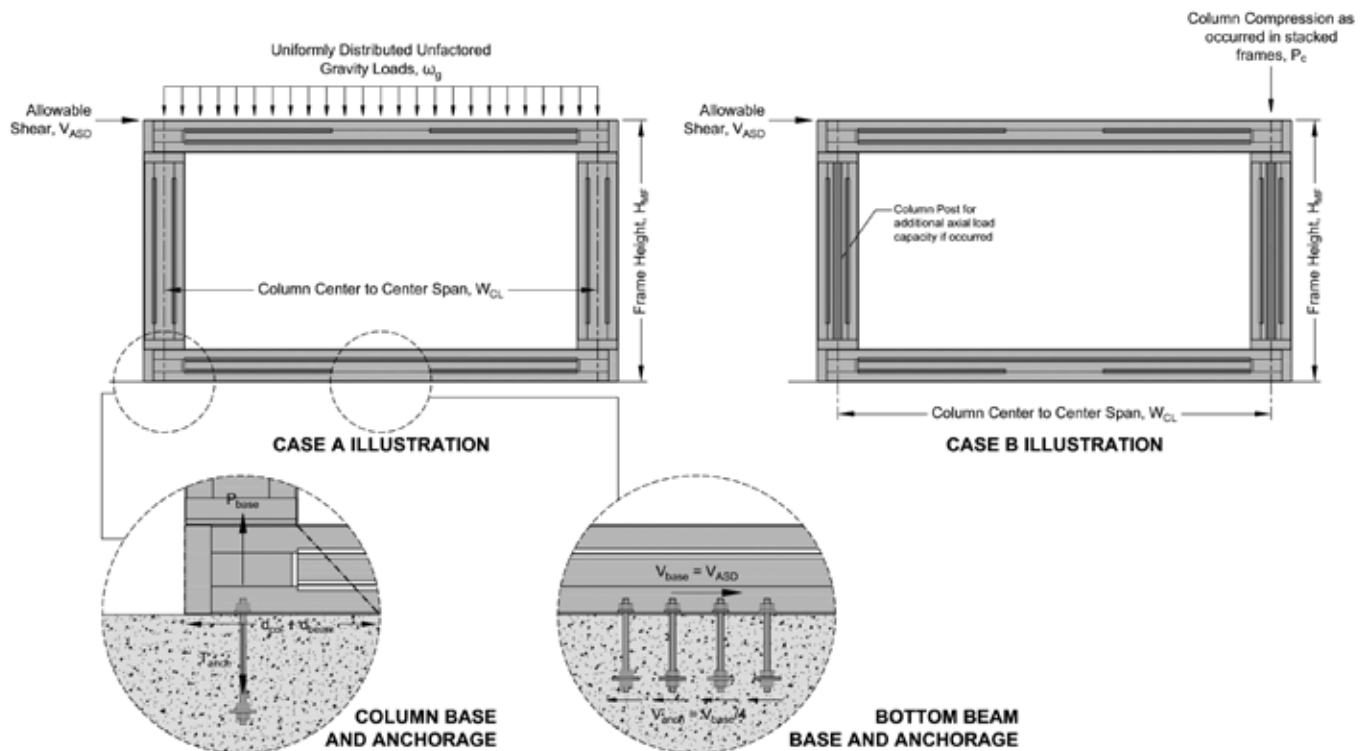
Table Notes:

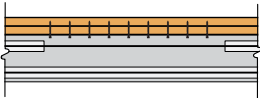
1. These table values reflect Allowable Strength Design (ASD) with Tensioned bolts connections at the Panel Zones and installation on 2,500 psi. min. concrete or nuts and washers elevated up to 1-1/2 inch above concrete with 5,000 psi min. non shrink grout.
2. Hardy Frame HFX Picture Frames are designed to meet strain and deflection limitation per applicable code requirements (AISI-S100, AISI-S240, AISI-S400, AISC-360 and IBC) using Load and Resistance Factored Design (LRFD).
3. V_{ASD} in this table are seismic capacities for $R = 6.5$ and $C_d = 4.0$. For wind design, allowable shear loads can be determined by multiplying values in the table with a factor of 0.85.

$$V_{ASD-wind} = 0.85V_{ASD}$$
4. Δ_{ASD} represents inter-story drift at allowable shear load (V_{ASD}) that does not exceed the code required limitation for seismic load ($\Delta_s = 0.025h$) and is limited to $h/267$ for ASD wind load.
5. Tabulated allowable axial load on column, forces and moment at column base reactions exclude the overstrength (Ω_0) factor.
6. ω_g is the maximum unfactored uniform gravity loads applied on the beam in combination with V_{ASD} as shown in Case A illustration below.
7. P_c is the maximum axial load that can be applied on the column in combination with V_{ASD} as shown in Case B illustration below. When uniform gravity loads on the beam, ω , are combined with both V_{ASD} and P_c , reduce P_c by $\omega \times W_{CL}/2$ as follow: $P_c - \omega \times W_{CL}/2$.
8. T_{anch} is the tension and compression at the column base resulting from lateral loads and can be determined by allowable shear load as follow:

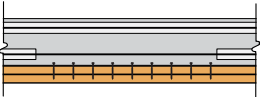
$$T_{anch} = V_{ASD} \times H_{MF}/W_{CL}$$
9. P_{base-g} is the ω_g compression at the column base.
10. The effective column base bearing length is the depth of beam (d_{beam}) + depth of column (d_{col}).
11. Shear transferred from each anchor to the concrete is determined by allowable shear load as follow:

$$V_{anch} = V_{ASD}/4$$
12. Anchor bolts grade to concrete must comply with ASTM A193 Grade B7 or equivalent.

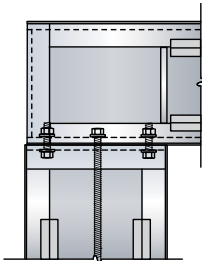




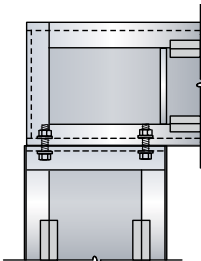
PRO SERIES SCREW
SHEAR TRANSFER
AT HEADER BEAM



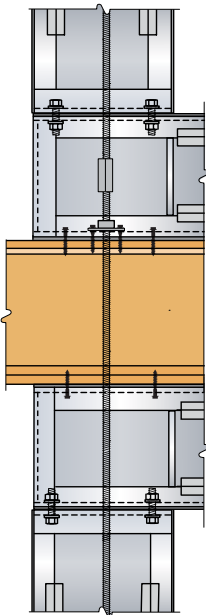
PRO SERIES SCREW
SHEAR TRANSFER
AT SILL BEAM



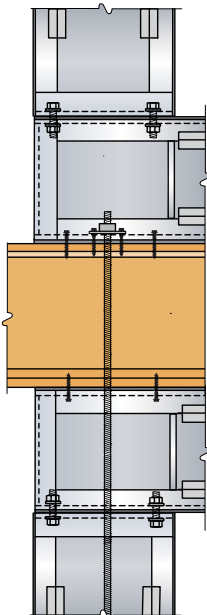
TIE-DOWN
TERMINATION AT
HEADER BEAM



PANEL ZONE
BOLTED ASSEMBLY



STRAIGHT STACK
CONTINUOUS
TIE-DOWN



STRAIGHT STACK
TIE-DOWN TERMINATION
AT SILL BEAM

TABLE 2.2A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON WOOD^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC1212 8x8	8'-0"	8'-0"	11,800	0.399	1,800	32,600	32,600	7,200
HFXPIC1512 8x8	8'-0"	8'-0"	13,600	0.399	1,890	35,800	43,600	7,600
HFXPIC1515 8x8	8'-0"	8'-0"	18,000	0.399	1,440	30,400	37,600	5,800
HFXPIC1812 8x8	8'-0"	8'-0"	16,600	0.399	2,000	37,000	44,900	8,000
HFXPIC1815 8x8	8'-0"	8'-0"	21,000	0.374	1,800	31,900	39,300	7,200
HFXPIC2112 8x8	8'-0"	8'-0"	18,700	0.390	2,280	38,000	46,400	9,100
HFXPIC2115 8x8	8'-0"	8'-0"	23,900	0.361	2,220	33,000	40,800	8,900
HFXPIC1212 9x8	9'-0"	8'-0"	11,500	0.399	1,320	33,200	33,200	5,900
HFXPIC1512 9x8	9'-0"	8'-0"	13,200	0.399	1,630	37,800	45,700	7,400
HFXPIC1515 9x8	9'-0"	8'-0"	17,700	0.399	1,050	31,300	38,500	4,700
HFXPIC1812 9x8	9'-0"	8'-0"	16,000	0.399	1,500	37,900	45,900	6,800
HFXPIC1815 9x8	9'-0"	8'-0"	21,000	0.384	1,310	32,900	40,300	5,900
HFXPIC2112 9x8	9'-0"	8'-0"	18,300	0.399	1,710	38,900	47,300	7,700
HFXPIC2115 9x8	9'-0"	8'-0"	23,900	0.370	1,640	34,100	42,000	7,400
HFXPIC1212 10x8	10'-0"	8'-0"	11,200	0.399	1,150	34,800	34,800	5,700
HFXPIC1512 10x8	10'-0"	8'-0"	12,800	0.399	1,410	39,400	47,500	7,000
HFXPIC1515 10x8	10'-0"	8'-0"	17,300	0.399	780	32,000	39,200	3,900
HFXPIC1812 10x8	10'-0"	8'-0"	15,400	0.399	1,380	40,000	48,100	6,900
HFXPIC1815 10x8	10'-0"	8'-0"	21,000	0.394	990	33,800	41,200	4,900
HFXPIC2112 10x8	10'-0"	8'-0"	17,600	0.399	1,530	40,800	49,400	7,700
HFXPIC2115 10x8	10'-0"	8'-0"	23,900	0.384	1,250	35,100	43,000	6,300
HFXPIC1212 11x8	11'-0"	8'-0"	10,900	0.399	1,020	36,300	36,300	5,600
HFXPIC1512 11x8	11'-0"	8'-0"	12,400	0.399	1,240	40,900	49,100	6,800
HFXPIC1515 11x8	11'-0"	8'-0"	16,900	0.399	730	33,500	40,800	4,000
HFXPIC1812 11x8	11'-0"	8'-0"	14,800	0.399	1,170	41,700	50,000	6,400
HFXPIC1815 11x8	11'-0"	8'-0"	20,800	0.399	770	34,500	41,900	4,200
HFXPIC2112 11x8	11'-0"	8'-0"	16,800	0.399	1,420	42,800	51,500	7,800
HFXPIC2115 11x8	11'-0"	8'-0"	23,900	0.396	980	35,900	43,800	5,400
HFXPIC1212 12x8	12'-0"	8'-0"	10,600	0.399	890	37,500	37,500	5,400
HFXPIC1512 12x8	12'-0"	8'-0"	12,000	0.399	1,110	42,400	50,700	6,700
HFXPIC1515 12x8	12'-0"	8'-0"	16,500	0.399	700	35,000	42,400	4,200
HFXPIC1812 12x8	12'-0"	8'-0"	14,300	0.399	1,150	43,400	51,800	6,900
HFXPIC1815 12x8	12'-0"	8'-0"	20,100	0.399	620	35,100	42,600	3,700
HFXPIC2112 12x8	12'-0"	8'-0"	16,100	0.399	1,300	44,400	53,400	7,800
HFXPIC2115 12x8	12'-0"	8'-0"	23,400	0.399	790	36,500	44,500	4,700
HFXPIC1212 13x8	13'-0"	8'-0"	10,300	0.399	810	38,900	38,900	5,300
HFXPIC1512 13x8	13'-0"	8'-0"	11,700	0.399	1,000	43,600	52,100	6,500
HFXPIC1515 13x8	13'-0"	8'-0"	16,100	0.399	670	36,300	43,900	4,300
HFXPIC1812 13x8	13'-0"	8'-0"	13,700	0.399	1,050	44,800	53,500	6,800
HFXPIC1815 13x8	13'-0"	8'-0"	19,700	0.399	620	36,700	44,300	4,000
HFXPIC2112 13x8	13'-0"	8'-0"	15,500	0.399	1,200	46,000	55,100	7,800
HFXPIC2115 13x8	13'-0"	8'-0"	22,600	0.399	730	37,900	45,900	4,800
HFXPIC1212 14x8	14'-0"	8'-0"	10,000	0.399	730	40,000	40,000	5,100
HFXPIC1512 14x8	14'-0"	8'-0"	11,300	0.399	890	44,800	53,400	6,300
HFXPIC1515 14x8	14'-0"	8'-0"	15,800	0.399	630	37,600	45,300	4,400
HFXPIC1812 14x8	14'-0"	8'-0"	13,300	0.399	960	46,100	54,900	6,700
HFXPIC1815 14x8	14'-0"	8'-0"	19,100	0.399	620	38,300	46,000	4,300
HFXPIC2112 14x8	14'-0"	8'-0"	14,800	0.399	1,100	47,300	56,600	7,700
HFXPIC2115 14x8	14'-0"	8'-0"	21,900	0.399	730	39,500	47,700	5,100
HFXPIC1212 16x8	16'-0"	8'-0"	9,500	0.399	600	42,200	42,200	4,800
HFXPIC1512 16x8	16'-0"	8'-0"	10,700	0.399	740	46,800	55,600	5,900
HFXPIC1515 16x8	16'-0"	8'-0"	15,100	0.399	550	39,800	47,800	4,400
HFXPIC1812 16x8	16'-0"	8'-0"	12,400	0.399	820	48,400	57,400	6,500
HFXPIC1815 16x8	16'-0"	8'-0"	18,100	0.399	580	40,900	48,900	4,600
HFXPIC2112 16x8	16'-0"	8'-0"	13,700	0.399	940	49,700	59,200	7,600
HFXPIC2115 16x8	16'-0"	8'-0"	20,600	0.399	680	42,300	50,900	5,500
HFXPIC1212 18x8	18'-0"	8'-0"	9,000	0.399	510	44,000	44,000	4,600
HFXPIC1512 18x8	18'-0"	8'-0"	10,100	0.399	630	48,600	57,600	5,600
HFXPIC1515 18x8	18'-0"	8'-0"	14,500	0.399	490	41,800	50,000	4,400
HFXPIC1812 18x8	18'-0"	8'-0"	11,600	0.399	690	50,300	59,600	6,300

TABLE 2.2A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON WOOD^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC1815 18x8	18'-0"	8'-0"	17,100	0.399	530	43,200	51,500	4,800
HFXPIC2112 18x8	18'-0"	8'-0"	12,800	0.399	810	51,600	61,300	7,300
HFXPIC2115 18x8	18'-0"	8'-0"	19,400	0.399	640	44,800	53,600	5,700
HFXPIC1212 20x8	20'-0"	8'-0"	8,600	0.399	440	45,700	45,700	4,300
HFXPIC1512 20x8	20'-0"	8'-0"	9,600	0.399	530	50,200	59,400	5,300
HFXPIC1515 20x8	20'-0"	8'-0"	13,900	0.399	440	43,600	52,000	4,400
HFXPIC1812 20x8	20'-0"	8'-0"	10,900	0.399	600	51,900	61,400	6,000
HFXPIC1815 20x8	20'-0"	8'-0"	16,300	0.399	480	45,200	53,800	4,800
HFXPIC2112 20x8	20'-0"	8'-0"	12,000	0.399	700	53,200	63,100	7,000
HFXPIC2115 20x8	20'-0"	8'-0"	18,400	0.399	580	46,800	55,900	5,800
HFXPIC1212 8x9	8'-0"	9'-0"	9,800	0.449	2,070	30,100	30,100	8,300
HFXPIC1512 8x9	8'-0"	9'-0"	11,400	0.449	2,350	33,700	40,900	9,400
HFXPIC1515 8x9	8'-0"	9'-0"	14,700	0.449	1,860	28,100	34,800	7,400
HFXPIC1812 8x9	8'-0"	9'-0"	14,000	0.449	2,210	33,900	41,300	8,800
HFXPIC1815 8x9	8'-0"	9'-0"	17,800	0.431	2,200	29,400	36,400	8,800
HFXPIC2112 8x9	8'-0"	9'-0"	16,100	0.444	2,490	34,700	42,500	10,000
HFXPIC2115 8x9	8'-0"	9'-0"	20,200	0.412	2,280	30,400	37,700	9,100
HFXPIC1212 9x9	9'-0"	9'-0"	9,500	0.449	1,700	31,700	31,700	7,700
HFXPIC1512 9x9	9'-0"	9'-0"	11,100	0.449	1,940	35,300	42,700	8,700
HFXPIC1515 9x9	9'-0"	9'-0"	14,400	0.449	1,410	29,200	35,900	6,300
HFXPIC1812 9x9	9'-0"	9'-0"	13,500	0.449	1,780	35,300	42,800	8,000
HFXPIC1815 9x9	9'-0"	9'-0"	17,800	0.442	1,610	30,500	37,400	7,200
HFXPIC2112 9x9	9'-0"	9'-0"	15,600	0.449	1,870	35,600	43,500	8,400
HFXPIC2115 9x9	9'-0"	9'-0"	20,200	0.425	1,950	31,500	38,900	8,800
HFXPIC1212 10x9	10'-0"	9'-0"	9,300	0.449	1,430	33,100	33,100	7,100
HFXPIC1512 10x9	10'-0"	9'-0"	10,700	0.449	1,650	36,900	44,400	8,200
HFXPIC1515 10x9	10'-0"	9'-0"	14,200	0.449	1,240	30,800	37,600	6,200
HFXPIC1812 10x9	10'-0"	9'-0"	13,000	0.449	1,570	37,200	44,800	7,800
HFXPIC1815 10x9	10'-0"	9'-0"	17,600	0.449	1,220	31,300	38,200	6,100
HFXPIC2112 10x9	10'-0"	9'-0"	14,900	0.449	1,690	37,700	45,700	8,500
HFXPIC2115 10x9	10'-0"	9'-0"	20,200	0.437	1,490	32,400	39,800	7,400
HFXPIC1212 11x9	11'-0"	9'-0"	9,000	0.449	1,230	34,400	34,400	6,800
HFXPIC1512 11x9	11'-0"	9'-0"	10,400	0.449	1,430	38,300	45,900	7,800
HFXPIC1515 11x9	11'-0"	9'-0"	13,900	0.449	1,090	32,100	39,100	6,000
HFXPIC1812 11x9	11'-0"	9'-0"	12,500	0.449	1,400	38,800	46,600	7,700
HFXPIC1815 11x9	11'-0"	9'-0"	17,200	0.449	950	31,900	38,900	5,200
HFXPIC2112 11x9	11'-0"	9'-0"	14,300	0.449	1,540	39,500	47,700	8,500
HFXPIC2115 11x9	11'-0"	9'-0"	20,200	0.449	1,170	33,200	40,600	6,400
HFXPIC1212 12x9	12'-0"	9'-0"	8,800	0.449	1,060	35,600	35,600	6,400
HFXPIC1512 12x9	12'-0"	9'-0"	10,100	0.449	880	39,500	47,200	5,300
HFXPIC1515 12x9	12'-0"	9'-0"	13,600	0.449	990	33,400	40,500	5,900
HFXPIC1812 12x9	12'-0"	9'-0"	12,100	0.449	1,260	40,200	48,200	7,600
HFXPIC1815 12x9	12'-0"	9'-0"	16,800	0.449	860	33,200	40,300	5,100
HFXPIC2112 12x9	12'-0"	9'-0"	13,700	0.449	1,400	41,100	49,400	8,400
HFXPIC2115 12x9	12'-0"	9'-0"	19,600	0.449	940	33,800	41,300	5,600
HFXPIC1212 13x9	13'-0"	9'-0"	8,600	0.449	940	36,700	36,700	6,100
HFXPIC1512 13x9	13'-0"	9'-0"	9,800	0.449	1,100	40,600	48,500	7,200
HFXPIC1515 13x9	13'-0"	9'-0"	13,300	0.449	880	34,600	41,800	5,800
HFXPIC1812 13x9	13'-0"	9'-0"	11,700	0.449	1,140	41,600	49,600	7,400
HFXPIC1815 13x9	13'-0"	9'-0"	16,300	0.449	810	34,700	41,900	5,300
HFXPIC2112 13x9	13'-0"	9'-0"	13,200	0.449	1,270	42,500	51,000	8,300
HFXPIC2115 13x9	13'-0"	9'-0"	19,000	0.449	890	35,300	42,900	5,800
HFXPIC1212 14x9	14'-0"	9'-0"	8,400	0.449	840	37,700	37,700	5,900
HFXPIC1512 14x9	14'-0"	9'-0"	9,500	0.449	990	41,700	49,700	6,900
HFXPIC1515 14x9	14'-0"	9'-0"	13,000	0.449	810	35,700	43,000	5,600
HFXPIC1812 14x9	14'-0"	9'-0"	11,300	0.449	1,040	42,700	51,000	7,200
HFXPIC1815 14x9	14'-0"	9'-0"	15,900	0.449	770	36,000	43,400	5,400
HFXPIC2112 14x9	14'-0"	9'-0"	12,700	0.449	1,170	43,700	52,300	8,200
HFXPIC2115 14x9	14'-0"	9'-0"	18,400	0.449	860	36,900	44,600	6,000
HFXPIC1212 16x9	16'-0"	9'-0"	7,900	0.449	670	39,500	39,500	5,400

TABLE 2.2A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON WOOD^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load ($R = 6.5$) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC1512 16x9	16'-0"	9'-0"	9,000	0.449	800	43,500	51,700	6,400
HFXPIC1515 16x9	16'-0"	9'-0"	12,500	0.449	670	37,700	45,200	5,400
HFXPIC1812 16x9	16'-0"	9'-0"	10,500	0.449	860	44,800	53,200	6,900
HFXPIC1815 16x9	16'-0"	9'-0"	15,100	0.449	670	38,400	46,000	5,400
HFXPIC2112 16x9	16'-0"	9'-0"	11,800	0.449	990	45,800	54,700	7,900
HFXPIC2115 16x9	16'-0"	9'-0"	17,300	0.449	780	39,400	47,500	6,200
HFXPIC1212 18x9	18'-0"	9'-0"	7,600	0.449	560	41,200	41,200	5,000
HFXPIC1512 18x9	18'-0"	9'-0"	8,500	0.449	670	45,100	53,500	6,000
HFXPIC1515 18x9	18'-0"	9'-0"	12,000	0.449	580	39,500	47,200	5,200
HFXPIC1812 18x9	18'-0"	9'-0"	9,900	0.449	730	46,500	55,200	6,600
HFXPIC1815 18x9	18'-0"	9'-0"	14,400	0.449	600	40,400	48,300	5,400
HFXPIC2112 18x9	18'-0"	9'-0"	10,900	0.449	840	47,600	56,700	7,500
HFXPIC2115 18x9	18'-0"	9'-0"	16,300	0.449	690	41,600	49,900	6,200
HFXPIC1212 20x9	20'-0"	9'-0"	7,200	0.449	480	42,600	42,600	4,700
HFXPIC1512 20x9	20'-0"	9'-0"	8,100	0.449	560	46,500	55,000	5,600
HFXPIC1515 20x9	20'-0"	9'-0"	11,500	0.449	490	41,000	48,900	5,000
HFXPIC1812 20x9	20'-0"	9'-0"	9,300	0.449	630	48,000	56,900	6,200
HFXPIC1815 20x9	20'-0"	9'-0"	13,700	0.449	530	42,200	50,300	5,300
HFXPIC2112 20x9	20'-0"	9'-0"	10,200	0.449	720	49,100	58,400	7,200
HFXPIC2115 20x9	20'-0"	9'-0"	15,500	0.449	620	43,500	52,000	6,200
HFXPIC1212 8x10	8'-0"	10'-0"	8,200	0.499	2,570	28,300	28,300	10,300
HFXPIC1512 8x10	8'-0"	10'-0"	9,700	0.499	2,740	31,000	37,800	10,900
HFXPIC1515 8x10	8'-0"	10'-0"	12,400	0.499	2,460	26,100	32,400	9,800
HFXPIC1812 8x10	8'-0"	10'-0"	12,000	0.499	2,380	30,500	37,300	9,500
HFXPIC1815 8x10	8'-0"	10'-0"	15,400	0.491	2,510	26,700	33,100	10,100
HFXPIC2112 8x10	8'-0"	10'-0"	14,000	0.499	2,590	31,200	38,400	10,400
HFXPIC2115 8x10	8'-0"	10'-0"	17,500	0.467	2,330	27,400	34,300	9,300
HFXPIC1212 9x10	9'-0"	10'-0"	8,100	0.499	2,050	29,600	29,600	9,200
HFXPIC1512 9x10	9'-0"	10'-0"	9,500	0.499	2,220	32,600	39,400	10,000
HFXPIC1515 9x10	9'-0"	10'-0"	12,100	0.499	2,000	27,700	34,000	9,000
HFXPIC1812 9x10	9'-0"	10'-0"	11,600	0.499	2,000	32,400	39,300	9,000
HFXPIC1815 9x10	9'-0"	10'-0"	15,300	0.499	1,830	27,600	34,100	8,300
HFXPIC2112 9x10	9'-0"	10'-0"	13,500	0.499	2,080	32,400	39,700	9,400
HFXPIC2115 9x10	9'-0"	10'-0"	17,500	0.479	2,190	28,500	35,400	9,800
HFXPIC1212 10x10	10'-0"	10'-0"	7,900	0.499	1,690	30,900	30,900	8,500
HFXPIC1512 10x10	10'-0"	10'-0"	9,200	0.499	1,850	33,900	40,900	9,300
HFXPIC1515 10x10	10'-0"	10'-0"	11,900	0.499	1,650	29,000	35,500	8,300
HFXPIC1812 10x10	10'-0"	10'-0"	11,200	0.499	1,740	34,000	41,100	8,700
HFXPIC1815 10x10	10'-0"	10'-0"	15,000	0.499	1,400	28,400	34,900	7,000
HFXPIC2112 10x10	10'-0"	10'-0"	12,900	0.499	1,840	34,300	41,800	9,200
HFXPIC2115 10x10	10'-0"	10'-0"	17,500	0.492	1,670	29,400	36,300	8,400
HFXPIC1212 11x10	11'-0"	10'-0"	7,700	0.499	1,430	32,100	32,100	7,900
HFXPIC1512 11x10	11'-0"	10'-0"	8,900	0.499	1,590	35,200	42,300	8,700
HFXPIC1515 11x10	11'-0"	10'-0"	11,700	0.499	1,420	30,200	36,800	7,800
HFXPIC1812 11x10	11'-0"	10'-0"	10,800	0.499	1,530	35,500	42,700	8,400
HFXPIC1815 11x10	11'-0"	10'-0"	14,600	0.499	1,160	29,500	36,000	6,400
HFXPIC2112 11x10	11'-0"	10'-0"	12,400	0.499	1,650	36,000	43,600	9,100
HFXPIC2115 11x10	11'-0"	10'-0"	17,200	0.499	1,310	30,200	37,100	7,200
HFXPIC1212 12x10	12'-0"	10'-0"	7,500	0.499	1,230	33,100	33,100	7,400
HFXPIC1512 12x10	12'-0"	10'-0"	8,700	0.499	1,040	36,300	43,500	6,200
HFXPIC1515 12x10	12'-0"	10'-0"	11,500	0.499	1,240	31,400	38,100	7,400
HFXPIC1812 12x10	12'-0"	10'-0"	10,400	0.499	1,360	36,800	44,200	8,200
HFXPIC1815 12x10	12'-0"	10'-0"	14,200	0.499	1,060	30,900	37,500	6,400
HFXPIC2112 12x10	12'-0"	10'-0"	11,900	0.499	1,490	37,400	45,100	8,900
HFXPIC2115 12x10	12'-0"	10'-0"	16,800	0.499	1,110	31,100	38,100	6,600
HFXPIC1212 13x10	13'-0"	10'-0"	7,300	0.499	1,060	34,000	34,000	6,900
HFXPIC1512 13x10	13'-0"	10'-0"	8,400	0.499	1,210	37,300	44,600	7,800
HFXPIC1515 13x10	13'-0"	10'-0"	11,200	0.499	1,080	32,400	39,200	7,100
HFXPIC1812 13x10	13'-0"	10'-0"	10,100	0.499	1,220	38,100	45,500	7,900
HFXPIC1815 13x10	13'-0"	10'-0"	13,900	0.499	970	32,200	39,000	6,300

TABLE 2.2A: LATERAL LOAD CAPACITY FOR HFX PICTURE FRAME ON WOOD^{1,2,5,12}

HFXPIC Model Numbers	Nominal Col Center to Center Span W_{CL}	Nominal Frame Height H_{MF}	Allowable Shear Load (R = 6.5) V_{ASD} ^{3, 8, 11}	Story Drift Δ_{ASD} ⁴ in	Unfactored Gravity Load ω_g ⁶ lbs/ft	Axial Load on Col (w/o col post) P_c ⁷ lbs	Axial Load on Col (w/ col post) P_c ⁷ lbs	P_{base-g} at Col Base from ω_g and Self Weight ^{9,10,11} lbs
HFXPIC2112 13x10	13'-0"	10'-0"	11,500	0.499	1,350	38,700	46,600	8,800
HFXPIC2115 13x10	13'-0"	10'-0"	16,200	0.499	1,040	32,600	39,700	6,800
HFXPIC1212 14x10	14'-0"	10'-0"	7,100	0.499	930	34,900	34,900	6,500
HFXPIC1512 14x10	14'-0"	10'-0"	7,400	0.499	1,060	38,200	45,600	7,400
HFXPIC1515 14x10	14'-0"	10'-0"	11,000	0.499	970	33,400	40,300	6,800
HFXPIC1812 14x10	14'-0"	10'-0"	9,700	0.499	1,100	39,100	46,700	7,700
HFXPIC1815 14x10	14'-0"	10'-0"	13,500	0.499	900	33,400	40,300	6,300
HFXPIC2112 14x10	14'-0"	10'-0"	11,000	0.499	1,230	39,800	47,800	8,600
HFXPIC2115 14x10	14'-0"	10'-0"	15,800	0.499	970	33,900	41,200	6,800
HFXPIC1212 16x10	16'-0"	10'-0"	6,800	0.499	740	36,600	36,600	6,000
HFXPIC1512 16x10	16'-0"	10'-0"	7,700	0.499	860	39,900	47,400	6,800
HFXPIC1515 16x10	16'-0"	10'-0"	10,600	0.499	790	35,200	42,200	6,300
HFXPIC1812 16x10	16'-0"	10'-0"	9,100	0.499	900	41,000	48,800	7,200
HFXPIC1815 16x10	16'-0"	10'-0"	12,900	0.499	770	35,600	42,700	6,100
HFXPIC2112 16x10	16'-0"	10'-0"	10,200	0.499	1,020	41,800	50,000	8,200
HFXPIC2115 16x10	16'-0"	10'-0"	14,900	0.499	860	36,300	43,800	6,800
HFXPIC1212 18x10	18'-0"	10'-0"	6,500	0.499	610	37,900	37,900	5,500
HFXPIC1512 18x10	18'-0"	10'-0"	7,300	0.499	700	41,300	49,000	6,300
HFXPIC1515 18x10	18'-0"	10'-0"	10,200	0.499	660	36,700	43,900	5,900
HFXPIC1812 18x10	18'-0"	10'-0"	8,600	0.499	760	42,600	50,500	6,800
HFXPIC1815 18x10	18'-0"	10'-0"	12,300	0.499	670	37,400	44,700	6,000
HFXPIC2112 18x10	18'-0"	10'-0"	9,500	0.499	860	43,400	51,800	7,800
HFXPIC2115 18x10	18'-0"	10'-0"	14,100	0.499	750	38,300	46,000	6,700
HFXPIC1212 20x10	20'-0"	10'-0"	6,200	0.499	500	39,200	39,200	5,100
HFXPIC1512 20x10	20'-0"	10'-0"	7,000	0.499	590	42,500	50,400	5,900
HFXPIC1515 20x10	20'-0"	10'-0"	9,800	0.499	550	38,100	45,400	5,500
HFXPIC1812 20x10	20'-0"	10'-0"	8,100	0.499	650	43,900	52,100	6,500
HFXPIC1815 20x10	20'-0"	10'-0"	11,700	0.499	580	39,000	46,500	5,800
HFXPIC2112 20x10	20'-0"	10'-0"	8,900	0.499	740	44,800	53,300	7,400
HFXPIC2115 20x10	20'-0"	10'-0"	13,300	0.499	660	40,000	47,900	6,600

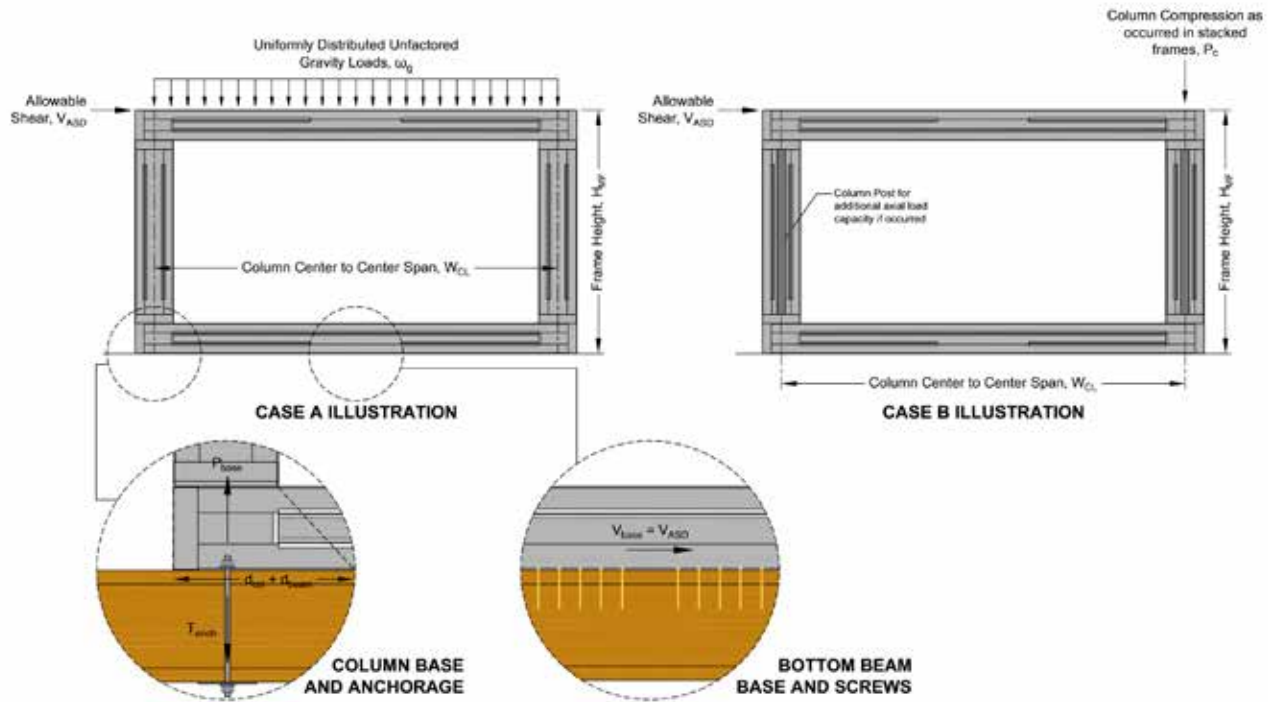
Table Notes:

1. These table values reflect Allowable Strength Design (ASD) with Tensioned bolts connections at the Panel Zones and installation on Douglas Fir Larch wood sill, beam, or equivalent with a minimum compressive strength of 625 psi.
2. Hardy Frame HFX Picture Frames are designed to meet strain and deflection limitation per applicable code requirements (AISI-S100, AISI-S240, AISI-S400, AISC-360 and IBC) using Load and Resistance Factored Design (LRFD).
3. V_{ASD} in this table are seismic capacities for $R = 6.5$ and $C_d = 4.0$. For wind design, allowable shear loads can be determined by multiplying values in the table with a factor of 0.85.

$$V_{ASD-wind} = 0.85V_{ASD}$$
4. Δ_{ASD} represents inter-story drift at allowable shear load (V_{ASD}) that does not exceed the code required limitation for seismic load ($\Delta_s = 0.025h$) and is limited to $h/267$ for ASD wind load.
5. Tabulated allowable axial load on column, forces and moment at column base reactions exclude the overstrength (Ω_0) factor.
6. ω_g is the maximum unfactored uniform gravity load applied on the beam in combination with V_{ASD} as shown in Case A illustration below.
7. P_c is the maximum axial load that can be applied on the top of the column in combination with the V_{ASD} as shown in Case B illustration below. When uniform gravity loads on the beam, ω , are combined with both V_{ASD} and P_c , reduce P_c by $\omega \times W_{CL}/2$ as follow: $P_c - \omega \times W_{CL}/2$.
8. T_{anch} is the tension and compression at the column base resulting from lateral loads and can be determined by allowable shear load as follow:

$$T_{anch} = V_{ASD} \times H_{MF}/W_{CL}$$
9. P_{base-g} is the ω_g compression at the column base. Compression resulting from lateral loads is the same as T_{anch} .
10. The effective column base bearing length is the depth of beam (d_{beam}) + depth of column (d_{col}).
11. Shear transferred from each anchor to the concrete is determined by allowable shear load as follow:

$$V_{anch} = V_{ASD}/4$$
12. Anchor bolts grade to concrete must comply with ASTM A193 Grade B7 or equivalent.



Design Example – HFX Picture Frame (HFXPIC)

Given:

- Minimum Opening Dimension 6' 0" W x 5' 0" H, Top of Opening at 6' 8"
- Wall Dimension 10' 0" W x 8' 1" H
- 3-1/2" (4" Nominal) Wall Thickness
- ASD Seismic Design Shear (V_{DSN}) at R of 6.5 = 12,800 lbs
- Uniform Gravity Loads on Header: $w_D = 250$ plf, $w_L = 400$ plf
- Total Unfactored Uniform Gravity Loads: $w_{DSN} = 250$ plf + 400 plf = 650 plf
- Additional Axial Compression on each Column: $P_{DSN} = 20,000$ lbs
- Bearing on DF Larch

Check Allowable Frame Geometry

- Maximum Available Column Width (assuming 2x Nailer attached on each column flange)
= (10' 0" Maximum Wall Width – 6' 0" Minimum Opening Width – 4 each 1-1/2" Nailers) / 2 Columns = 21" / column
- Maximum Available Header and Sill Beam Depth (assuming Frame is installed on a 2x bottom plate, 2x Nailer attached on top flange of Sill Beam and 2x Nailer attached on bottom flange of Header Beam)
= (8' 1" Wall Height – 5' 0" Opening Height – 4 1/2" bottom and top plates – 3" flange Nailers) / 2 Beams = 14-3/4"
- Maximum Available Header Beam Depth (assuming 2x Nailer attached on bottom flange of beam)
= 8' 1" Wall Height – 6' 8" Opening Height – 3" double Top Plates – 1 each 1-1/2" bottom flange Nailer = 12-1/2"
- Estimated Column Center to Center Width = (10' 0" Maximum Wall Width + 6' 0" Minimum Opening Width) / 2 = 8' 0"

Select Frame Model Number based on Allowable Frame Geometry and ASD Shear (V_{ASD})

From Allowable Load Table 2.2A – 8' 1" Wall Heights & 8' 0" Center to Center Column Width

- HFXPIC1512-8x8: Allowable ASD Seismic Shear, $V_{ASD} = 13,600$ lbs > 12,800 lbs V_{DSN} **OK**

From Table 2.0A Dimensions and Connectors

- Column Depth = 15" < 21" maximum available column depth **OK**
- Header and Sill Beam Depth = 12" < 14-3/4" maximum available beam depth **OK**
- Header Beam Depth = 12" < 12-1/2" maximum available header beam depth **OK**
- Frame Thickness = 3-1/2" = wall thickness **OK**

Check Unfactored Gravity Loads on the Beam, w_{DSN} & Column Axial Loads, P_{DSN}

From Allowable Load Table 2.2A: HFXPIC1512-8x8:

- Maximum Allowable Unfactored Gravity Loads, $w_g = 1,890$ plf
- Check Uniform Gravity Loads: $w_{DSN} = 650$ plf < 1,890 plf **OK**
- Maximum Allowable Axial Load on Column (w/o Reinforced Web), $P_c = 35,800$ lbs
- Determine Maximum Allowable Axial Load on Column in combination with w_{DSN} : $P_c - (w_{DSN} \times W_{CL}/2)$
= 35,800 lbs – (650 plf x 8 ft / 2) = 33,200 lbs > 20,000 lbs **OK**

Use HFXPIC1512-8x8

Calculate Unfactored Design ASD Resultant Compression at Column Base

Resultant compression is used to determine the total compressive stress on top of the wood bearing surface.

ASD Resultant Compression: $P_{base-DSN} = P_{DSN} + P_{base-lat-DSN} + P_{base-g-DSN} = 20,000$ lbs + 12,800 lbs + 2,610 lbs = 35,410 lbs

Where:

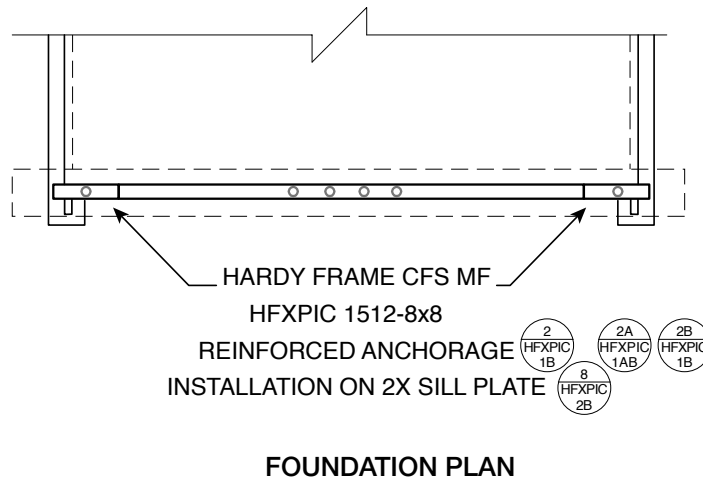
- $P_{DSN} = 20,000$ lbs (Given)
- $P_{base-lat-DSN} = V_{DSN} \times H_{MF}/W_{CL} = 12,800$ lbs x (8 lf / 8 lf) = 12,800 lbs
- $P_{base-g-DSN} = P_{base-g} \times (w_{DSN}/w_g) = 7,600$ lbs x (650 plf / 1890 plf) = 2,610 lbs
- P_{base-g} is given in Allowable Load Table 1.2B

Calculate Design ASD Resultant Tension and Shear

- ASD tension at each anchor at column base due to lateral load, $T_{anch-lat} = P_{base-lat-DSN} = 12,800$ in-lbs
- ASD shear at sill beam due to lateral load, $V_{base-lat-DSN} = V_{DSN} = 12,800$ lbs
- No additional shear at anchorage from gravity load and column axial load.
- Reactions from lateral and gravity loads can be combined using appropriate load combinations from ASCE7

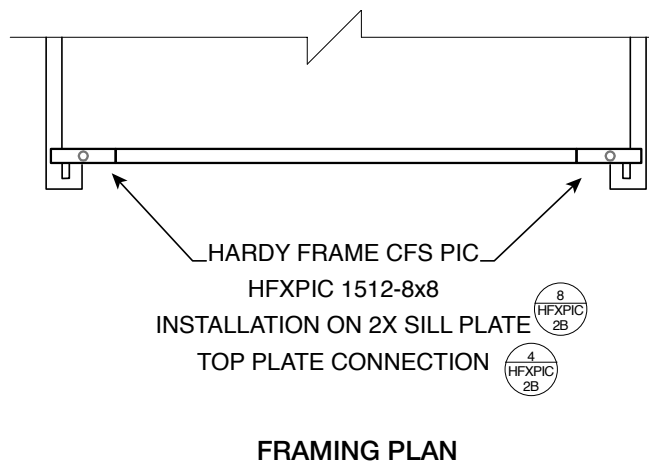
On the Foundation Plan

1. Specify the model number, once per Frame, with a multi-leader indicating each column
 - Model number: HFXMF1512-8X8
2. Indicate the table and the associated detail for reinforced Anchorage at Footing
 - Reinforced Anchorage table: 2/ HFXPIC 1B
 - Reinforced Anchorage details: 2A, 2B / HFXPIC 1B
3. Specify the bottom connection on a 2x Sill Plate
 - Installation on 2x Sill Plate: 8 / HFXPIC 2B



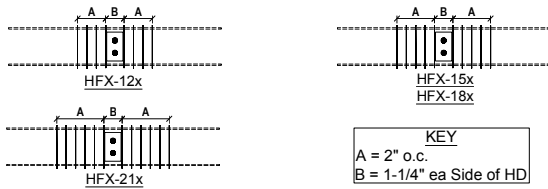
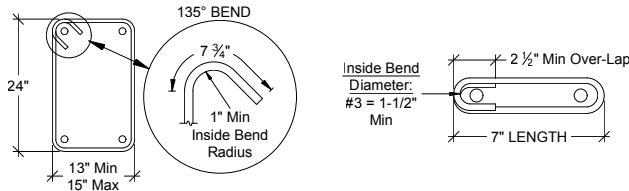
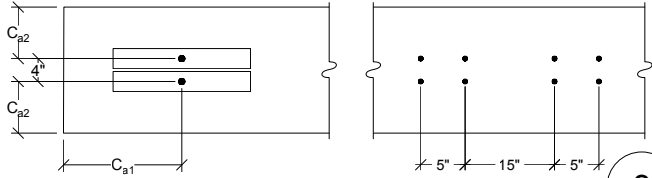
On the Framing Plan

1. Specify the model number, once per Frame, with a multi-leader indicating each column
 - Model number: HFXPIC1512-8x8
2. Specify the shear connection from the collector (or “drag”) to the Header Beam
 - Top connection to top plates: 4 / HFXPIC 2B

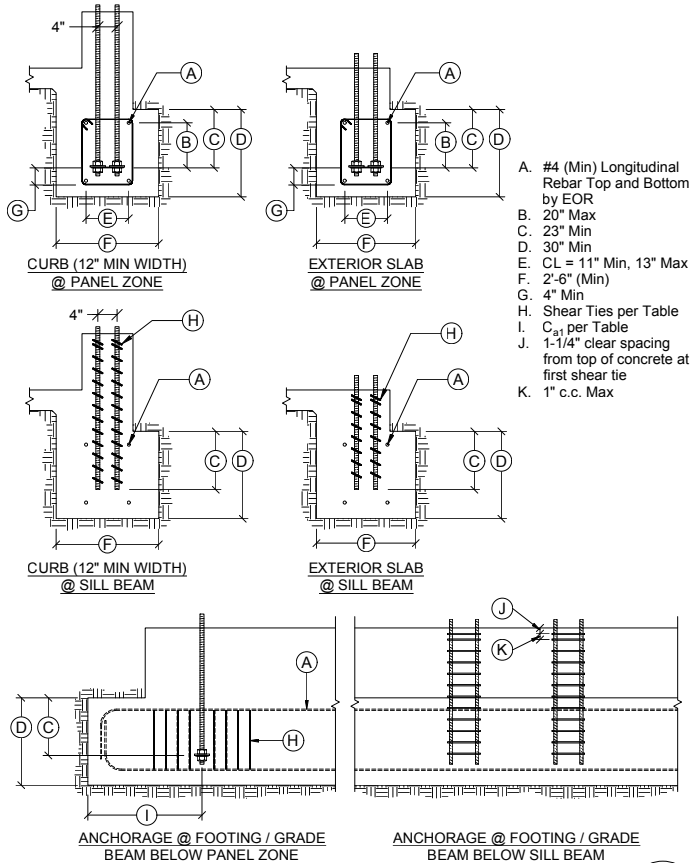


BACK-TO-BACK REINFORCED ANCHORAGE (BB-RA)

MODEL NUMBER	COLUMN WIDTH	ANCHOR DIA & GRADE ^{1,2}	EMBED DEPTH, l_e ³	MIN END DIST, C_{a1} ⁴	MIN EDGE DIST, C_{a2} ⁵	STIRRUPS ⁸	SHEAR TIES ^{6,7}
HFXPIC12	12"	1-1/8" HS @ Columns & 5/8" HS @ Mid Beam	23"	22 3/4"	13"	8 - #4	#3 (MIN) @ 3' O.C.
HFXPIC15	15"					10 - #4	
HFXPIC18	18"					10 - #4	
HFXPIC21	21"					12 - #4	



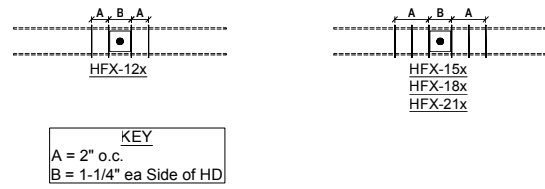
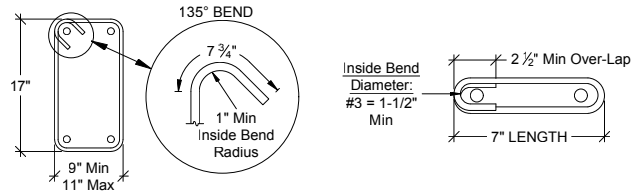
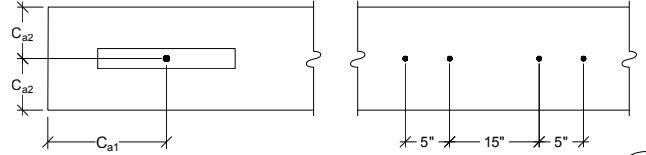
BB-RA SHEAR TIES & STIRRUPS



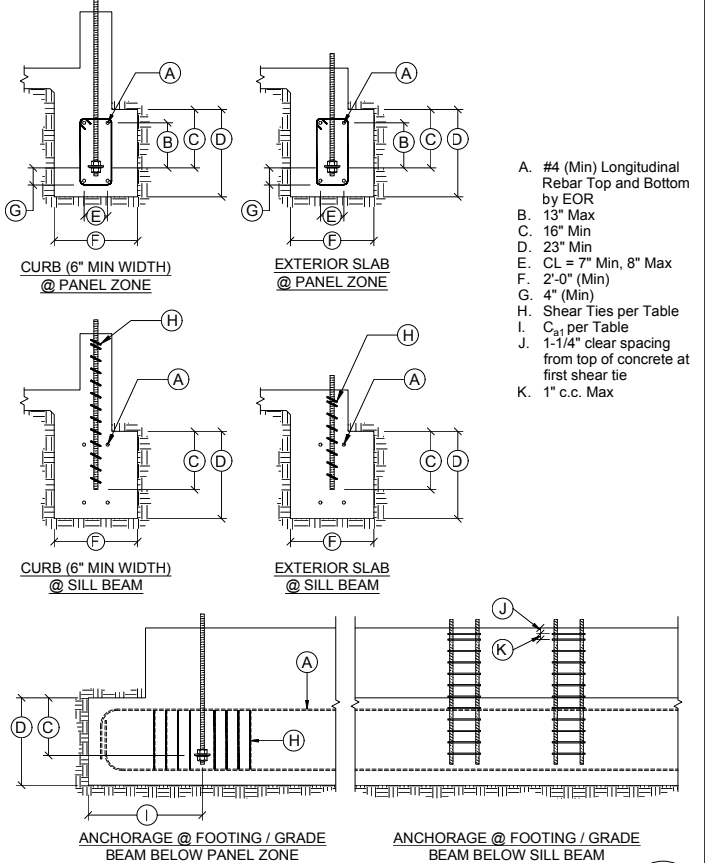
BB-RA SECTIONS & ELEVATIONS

SINGLE REINFORCED ANCHORAGE (RA)

MODEL NUMBER	COLUMN WIDTH	ANCHOR DIA & GRADE ^{1,2}	EMBED DEPTH, l_e ³	MIN END DIST, C_{a1} ⁴	MIN EDGE DIST, C_{a2} ⁵	STIRRUPS ⁸	SHEAR TIES ^{6,7}
HFXPIC12	12"	1-1/8" HS @ Columns & 5/8" HS @ Mid Beam	16"	16 3/4"	12"	4 - #4	#3 (MIN) @ 3' O.C.
HFXPIC15	15"					6 - #4	
HFXPIC18	18"					6 - #4	
HFXPIC21	21"					6 - #4	

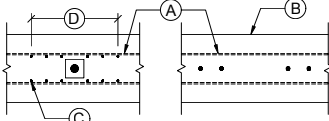


RA SHEAR TIES & STIRRUPS

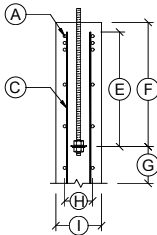


RA SECTIONS & ELEVATIONS

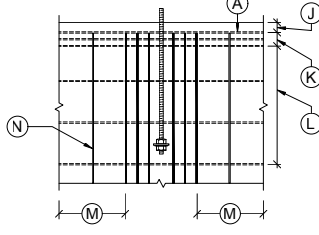
- A. 3 ea. #5 min. longitudinal rebar @ both faces of the wall (6 total) by EOR
B. Face of concrete
C. #4 straight rebar
D. Quantity & spacing per Detail 2A
E. 28" Min.
F. $l_e = 29\text{--}1/2"$ Min.
G. Rebar to extend 24" min. below end of the anchorage & lap w/ continuous wall reinforcement specified by EOR
H. CL = 0.6 x wall width Max.
I. Wall width by EOR to provide min. concrete coverage per ACI requirements
J. 1-1/2" clear spacing from top of concrete at first longitudinal rebar
K. 2" CL spacing between top 3 longitudinal rebar
L. 6" max. CL spacing for horizontal rebar within anchorage embedment depth
M. Longitudinal rebar to be developed beyond last rebar by EOR
N. Vertical rebar by EOR



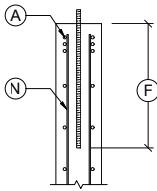
CONCRETE WALL PLAN VIEW



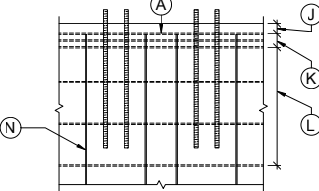
WALL SECTION VIEW @ PANEL ZONE



WALL ELEVATION VIEW @ PANEL ZONE



WALL SECTION VIEW @ SILL BEAM

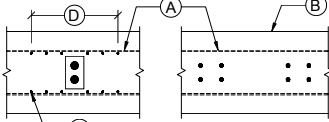


WALL ELEVATION VIEW @ SILL BEAM

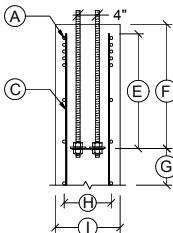
RA TERMINATION WITHIN CONCRETE WALL

1A

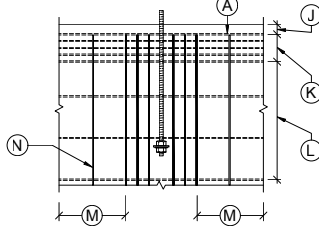
- A. 5 ea. #5 min. longitudinal rebar @ both faces of the wall (10 total) by EOR
B. Face of concrete
C. #4 straight rebar
D. Quantity & spacing per Detail 3A
E. 32" Min.
F. $l_e = 33\text{--}1/2"$ Min.
G. Rebar to extend 24" min. below end of the anchorage & lap w/ continuous wall reinforcement specified by EOR
H. CL = 0.6 x wall width Max.
I. Wall width by EOR to provide min. concrete coverage per ACI requirements
J. 1-1/2" clear spacing from top of concrete at first longitudinal rebar
K. 2" CL spacing between top 5 longitudinal rebar
L. 6" max. CL spacing for horizontal rebar within anchorage embedment depth
M. Longitudinal rebar to be developed beyond last rebar by EOR
N. Vertical rebar by EOR



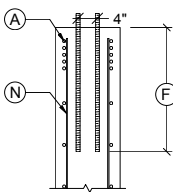
CONCRETE WALL PLAN VIEW



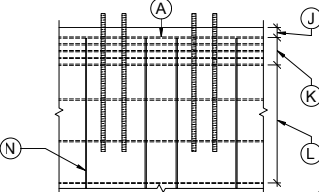
WALL SECTION VIEW @ PANEL ZONE



WALL ELEVATION VIEW @ PANEL ZONE



WALL SECTION VIEW @ SILL BEAM



WALL ELEVATION VIEW @ SILL BEAM

BB-RA TERMINATION WITHIN CONCRETE WALL

1B

TABLE NOTES

- DESIGNS ARE TO RESIST LOADING PER ACI 318-14, SECTION 17.2.3.4.3.
- HS INDICATES ANCHORS COMPLYING WITH ASTM A193 GRADE B7 WITH A 1/2" X 3" X 3"(MIN) HFPW PLATE WASHER INSTALLED WITH DOUBLE NUTS ON THE EMBED END (HFXBB NOT REQUIRED).
- l_e = LENGTH OF EMBEDMENT FROM THE TOP OF FOOTING OR GRADE BEAM TO THE TOP OF THE HFXBB BOLT BRACE (TOP OF THE EMBEDDED HFPW PLATE WASHER @ HS ANCHORS)
- C_{a1} = DISTANCE FROM HD CENTERLINE TO THE END OF THE FOOTING OR GRADE BEAM.
- C_{a2} = DISTANCE FROM HD CENTERLINE TO BOTH THE FRONT AND THE BACK FACE OF THE FOOTING OR GRADE BEAM.
- SHEAR TIES ARE GRADE 60 (MIN) REBAR AND REQUIRED PER ACI-318-14, $F'c = 2,500$ PSI. CURBS AND STEM WALLS MUST BE 6 INCH (MIN) WIDTH FOR RA, 12 INCH (MIN) WIDTH FOR BB-RA. IN ANY CASE, THE MINIMUM CONCRETE COVERAGE SHOULD BE PROVIDED PER ACI 318-14.
- SHEAR TIES ARE NOT REQUIRED FOR INSTALLATION ON WOOD FRAMING, OR FOR IRC BRACED WALL PANEL APPLICATIONS.
- STIRRUPS ARE GRADE 60 (MIN) REBAR. SEE TABLE FOR SIZE AND SPACING. SEE "STIRRUP LAYOUT" DIAGRAMS AND "KEY" FOR LAYOUT PATTERNS.
- CONCRETE EDGE DISTANCES MUST COMPLY WITH ACI 318-14, SECTION 17.7.1

A

- DETERMINE LOCATION AND LAYOUT OF THE MOMENT FRAME TEMPLATES PER PLANS.
- INSTALL TEMPLATES AND ANCHORS PER PLAN DETAILS. REFER TO INSTALLATION INSTRUCTIONS AND PRODUCT LABELING FOR CORRECT TEMPLATE ORIENTATION, ANCHOR ASSEMBLIES, ANCHOR HEIGHT ABOVE CONCRETE AND SPACING BETWEEN TEMPLATES FOR FINISH FRAME WIDTH.
- SLOTTED HOLES ARE PROVIDED IN TEMPLATES FOR PULLING THE COLUMN CENTERLINE DIMENSIONS. PRIOR TO POURING CONCRETE, CONFIRM THE SLOT TO SLOT DIMENSION ACCURATELY CORRESPONDS TO THE COLUMN CENTERLINE DIMENSION FOR THE MOMENT FRAME MODEL NUMBER BEING INSTALLED OR PER PLAN CALLOUTS BY THE DESIGN PROFESSIONAL.

B

CONCRETE PREPARATION INSTRUCTIONS

IMPORTANT!

- ANCHORAGE IS DESIGNED FOR SINGLE STORY APPLICATIONS ONLY.
- ANCHORAGE IS DESIGNED FOR TENSION AND SHEAR TRANSFER ONLY, FOUNDATION DESIGN PER EOR.
- REINFORCEMENT SHOWN IS THE MINIMUM REQUIREMENT AND IS NOT INTENDED TO REPLACE REINFORCEMENT DESIGNED BY THE EOR.
- FOR RA AND BB-RA INSTALLATIONS, THE HFXBB BOLT BRACE MAY BE PLACED ON TOP OF THE STIRRUPS WITH DOUBLE-NUTS INSTALLED AT EMBED END OF STANDARD GRADE ANCHOR RODS. (NOTE: 1/2" x 3" x 3" MIN. HFPW PLATE WASHERS ARE REQUIRED TO BE DOUBLE-NUTTED AT EMBED END OF HIGH STRENGTH ANCHOR RODS.)
- HIGH STRENGTH ALL-THREAD RODS PROVIDED BY MITEK ARE STAMPED ON BOTH ENDS.

**HF
B7**

REVISIONS	DATE

**HARDY FRAME HFX PICTURE FRAME
PICTURE CONFIGURATION INSTALLATION DETAILS**

ENGINEER OF RECORD IS RESPONSIBLE FOR DESIGN TO
ACCOMMODATE ACTUAL PROJECT CONDITIONS

MiTek USA, Inc.

555 S. Promenade Ave., Suite 104
Corona, CA 92879 (855) 477-0793
www.hardyframe.com



DATE:
08-01-2019

**HFXPIC
1B**

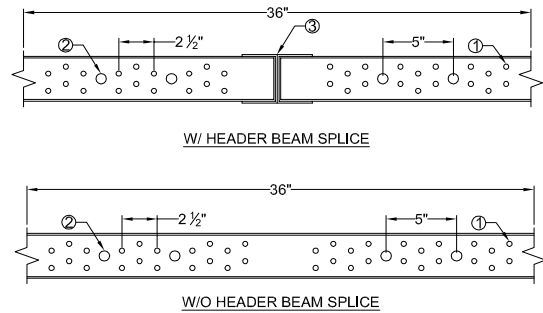
C

IMPORTANT NOTES

1. AT LOCATIONS OF PICTURE FRAME INSTALLATIONS FRAME WITH A 4x (MINIMUM) RIM, 4x BLOCKING AT CANTILEVER CONDITIONS. SHEET THE FLOOR THEN LAYOUT THE 2x SILL PLATE FOR WALL FRAMING.
2. DETERMINE THE LOCATION OF PICTURE FRAME AND USE TEMPLATES BY MANUFACTURER TO PULL COLUMN CENTERLINE DIMENSIONS WHILE CHECKING FOR END AND EDGE DISTANCES. SLOTTED HOLES ARE PROVIDED IN TEMPLATES FOR PULLING THE COLUMN CENTERLINE DIMENSION. MARK FOR DRILLING THE CONTINUOUS TIE-DOWN SYSTEM ROD.
3. PRIOR TO DRILLING CONFIRM THAT THE SLOT TO SLOT DIMENSION ACCURATELY CORRESPONDS TO THE COLUMN CENTERLINE DIMENSION FOR THE PICTURE FRAME MODEL NUMBER BEING INSTALLED OR PER PLAN CALLOUTS BY THE DESIGN PROFESSIONAL.
4. DRILL THROUGH THE SILL PLATE, FLOOR SYSTEM AND TOP PLATES OF WALL BELOW. INSTALL THE CONTINUOUS ALL-THREAD ROD (PER PLANS) TO A COUPLER NUT IN WALL FRAMING BELOW. WITH TOP OF ROD EXTENDING 7-1/2 INCHES ABOVE TOP OF FLOOR SHEETING INSTALL THE 2x SILL PLATE.

FLOOR SYSTEM PREPARATION INSTRUCTIONS

3

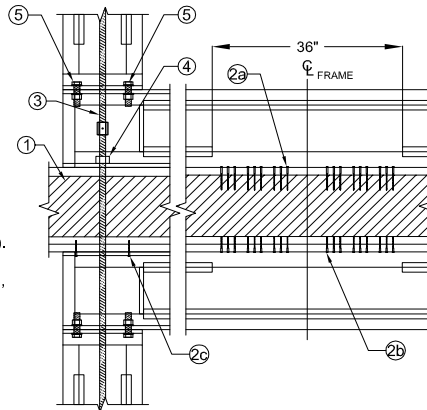


1. 5/16" HOLES FOR WS SCREWS (QTY PER TABLE)
2. 3/4" HOLES FOR 5/8" HS CAST IN PLACE ANCHORS.
3. SPLICE AT MID-SPAN REQUIRED WHEN OUT-TO-OUT IS >13 FT.

SCREW HOLE PATTERN

2

1. 4x RIM (MIN)
 2. a) 1/4" x 4-1/2" (MIN) WS SCREWS (QTY PER TABLE 2)
b) 1/4" x 3" (MIN) WS SCREWS (QTY PER TABLE 2)
c) 1/4" x 3" (MIN) WS SCREWS FOR OUT-OF-PLANE BRACING
 3. Z4 CONTINUOUS TIE DOWN SYSTEM.
 4. CINCH NUT (CNX), LOCATED AT TOP PANEL ZONE WHEN PANEL RUN ENDS (AS OCCURS).
 5. GRADE 8 MACHINE BOLT WITH HEAD AND HARDENED ROUND WASHER IN PANEL ZONE, DTI WASHER AND GRADE 8 NUT IN COLUMN.
- IMPORTANT:** SILICONE POCKETS TO BE IN CONTACT WITH TOP OF COLUMN!

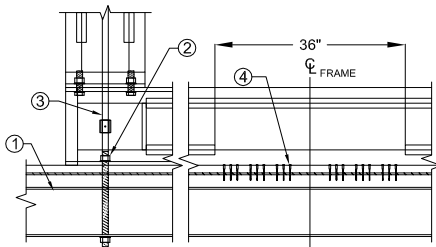


CFS HEADER BEAM TO COLUMNS ASSEMBLY INSTRUCTIONS

1. LAYOUT THE HEADER BEAM AND COLUMNS WITH OPEN (CAVITY) FACE UP.
2. CHECK THAT ACCESS AT MID-SPAN OF HEADER BEAM FOR SHEAR TRANSFER SCREWS TO WOOD FRAMING IS ORIENTED CORRECTLY.
3. ORIENT THE BOLTS THROUGH THE HEADER BEAM WITH THE HEAD AND DIRECT TENSION INDICATOR (DTI) WASHER IN THE COLUMN, HARDENED ROUND WASHER AND GRADE 8 NUT IN THE PANEL ZONE.
4. SNUG NUTS AT ALL BOLTS, THEN TIGHTEN UNTIL THE MAJORITY OF ORANGE SILICONE POCKETS BURST INDICATING REQUIRED TENSION IS MET.
5. WHEN BOLT CONNECTIONS ARE NOTED SNUG-TIGHT, HARDENED ROUND WASHERS CAN SUBSTITUTE FOR DTI WASHERS.

MULTISTORY INSTALLATION

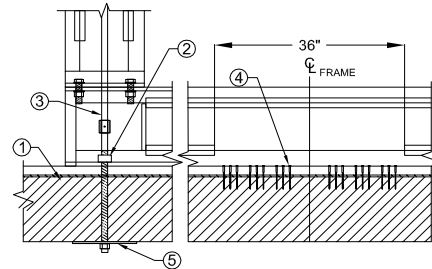
4



1. STEEL BEAM WITH STRUCTURAL NAILER PER PLANS.
2. NUTS AND WASHERS PER TABLE 2 NOTE 1.
3. Z4 CONTINUOUS TIE DOWN SYSTEM WHEN OCCURS.
4. 1/4" x 4-1/2" (MIN) WS SCREWS (QTY PER TABLE 2)

STEEL BEAM THRU-BOLT

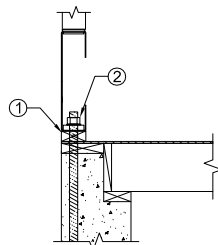
6



1. WOOD BEAM PER PLAN.
2. CINCH (NUT) CNX
3. Z4 CONTINUOUS TIE DOWN SYSTEM WHEN OCCURS.
4. 1/4" x 4-1/2" (MIN) WS SCREWS (QTY PER TABLE 2)
5. BEARING PLATE WASHER AT UNDERSIDE OF BEAM SIZED PER BUILDING DESIGN PROFESSIONAL TO LIMIT CRUSHING FROM ANCHOR TENSION.

WOOD BEAM THRU-BOLT

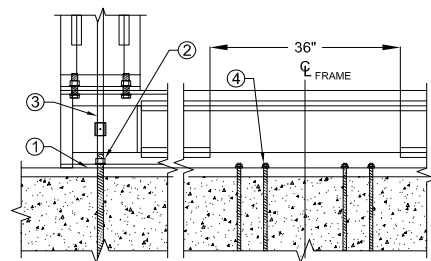
5



1. INSTALL FRAME ON 2x PLATE OVER SHEATHING.
2. NUTS AND WASHERS PER TABLE NOTE 1.

RAISED STEM WALL

9



1. 15# FELT OR EQUIVALENT MOISTURE BARRIER RECOMMENDED BETWEEN FRAME AND TREATED PLATE.
2. NUTS AND WASHERS PER TABLE 2 NOTE 1.
3. Z4 CONTINUOUS TIE DOWN SYSTEM WHEN OCCURS.
4. CAST IN PLACE ANCHORS.

INSTALLATION ON 2x SILL PLATE

8

TABLE 2: MEMBER DIMENSIONS, GEOMETRY & CONNECTORS

MODEL NUMBER	MEMBER DIMENSIONS			FRAME GEOMETRY						CONNECTORS			
	COLUMN WIDTH, W_{COL}	BEAM DEPTH, D_{BEAM}	COLUMN DEPTH, D_{COL}	H_{MF} (max)	H_O (max)	W_{IN} (min)	W_{IN} (max)	W_{CL} (max)	W_{OUT} (max)	HOLD DOWN QTY, DIA, & GRADE ¹	SCREW QTY ² (MIN)	SCREW QTY AVAILABLE AT EDGES ³ (MIN)	JOINT BOLT QTY, DIA, AND GRADE
HFXPIC1212	12"	12"	3 1/2"	9'-8 1/4"	8'-9 3/4"	7'-0"	17'-0"	20'-0"	19'-0"	4 EA 1 1/8" HS	20	4	4 EA 1 1/8" HS
HFXPIC1512	15"				8'-9 3/4"	6'-9"	16'-9"		19'-3"		24		
HFXPIC1515	15"	15"			8'-6 3/4"	6'-9"	16'-9"		19'-3"		30		
HFXPIC1812	18"	12"			8'-9 3/4"	6'-6"	16'-6"		19'-6"		28		
HFXPIC1815	18"	15"			8'-6 3/4"	6'-6"	16'-6"		19'-6"		34		
HFXPIC2112	21"	12"			8'-9 3/4"	6'-3"	16'-3"		19'-9"		32		
HFXPIC2115	21"	15"			8'-6 3/4"	6'-3"	16'-3"		19'-9"		36		

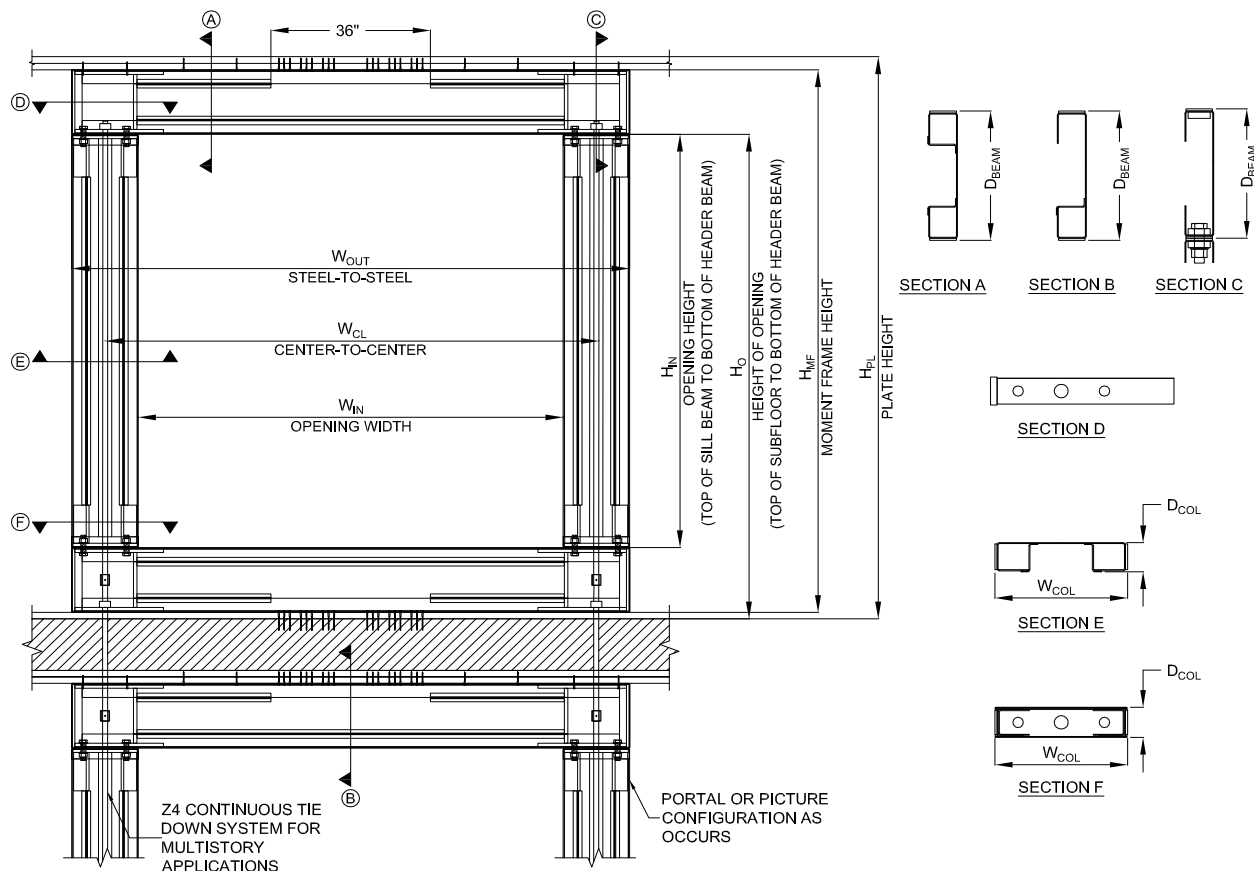
TABLE NOTES:

- HOLD DOWN ANCHOR BOLTS CONNECT TO THE COLUMN BASE WITH HARDENED ROUND WASHERS BELOW GRADE 8 NUTS. ALTERNATE WASHERS ARE (2 EA) ROUND-FLAT OR (2 EA) SAE WASHERS ON EACH BOLT. ALTERNATE NUTS ARE 2H HEAVY HEX.
- 1/4" DIAMETER MITEK PRO-SERIES SCREWS ARE 3" (MINIMUM) WHEN CONNECTING DIRECTLY TO THE COLLECTOR ABOVE.
- ADJACENT FRAMING WITH 1/4" DIAMETER SCREWS IS REQUIRED AT THE COLUMN EDGES WHEN INSTALLING A FILLER ABOVE THE BEAM THAT IS GREATER THAN 1-1/2" OR WHEN SPECIFIED BY THE DESIGN PROFESSIONAL.

CFS PICTURE FRAME INSTALLATION INSTRUCTIONS

- CONSIDER ACCESS TO MAKE SCREW CONNECTIONS INTO FRAMING MEMBERS ABOVE AND BELOW, THE NEED FOR ELECTRIC FIXTURES, WOOD BACKING OR BATT INSULATION THEN STAND THE ASSEMBLED FRAME WITH THE OPEN (CAVITY) FACE ORIENTED IN THE DIRECTION THAT ACCOMMODATES CONNECTIONS AND CONSIDERS THE OTHER TRADES.
- LIFT AND INSTALL THE FRAME OVER CONTINUOUS TIE-DOWN RODS AND SET DIRECTLY ON 2x SILL PLATE.
- INSTALL A Z4 CINCH NUT (CNX) PER PLANS PUSHING DOWN THE ROD UNTIL IT SEATS TO THE INSIDE FLANGE OF THE PANEL ZONE. INSTALL SCREWS THROUGH THE CNX FLANGES INTO THE HOLES PROVIDED IN THE PANEL ZONE FLANGE. INSTALL A COUPLER NUT THAT WILL RECEIVE THE TIE-DOWN ROD FROM ABOVE.
- BRACE THE FRAME IN THE OUT OF PLANE DIRECTION AND CHECK FOR PLUMB.
- MAKE TOP AND BOTTOM CONNECTIONS TO FRAMING MEMBERS ABOVE AND BELOW WITH MITEK PRO-SERIES SCREWS PER PLANS.

MEMBER DIMENSIONS, GEOMETRY & CONNECTORS



CFS PICTURE FRAME NOMENCLATURE

HFX	PIC	18	12	-	8	x	8

NOMENCLATURE AND DIMENSIONING

**HARDY FRAME HFX PICTURE FRAME
PICTURE CONFIGURATION INSTALLATION DETAILS**

ENGINEER OF RECORD IS RESPONSIBLE FOR DESIGN TO
ACCOMMODATE ACTUAL PROJECT CONDITIONS

MiTek USA, Inc.
555 S. Promenade Ave., Suite 104,
Corona, CA 92879 (805) 477-0793
www.hardyframe.com



DATE:
08-01-2019

**HFXPIC
2B**

HARDY FRAME® COLD-FORMED STEEL MOMENT FRAME DESIGN MANAGER

Wood frame building structural requirements can limit architectural window openings. The solution is the new code evaluated, Hardy Frame CFS Moment Frame System. And now MiTek® offers the CFS Moment Frame Design Manager as a tool.



The new CFS Moment Frame Design Manager is the latest Shear Wall System software from MiTek.® It is an interactive web based program used to enter geometry and loading at vertically stacked CFS Moment Frames. User submittals go direct to our engineering department for a wall design incorporating stacked Moment Frames at multiple locations.

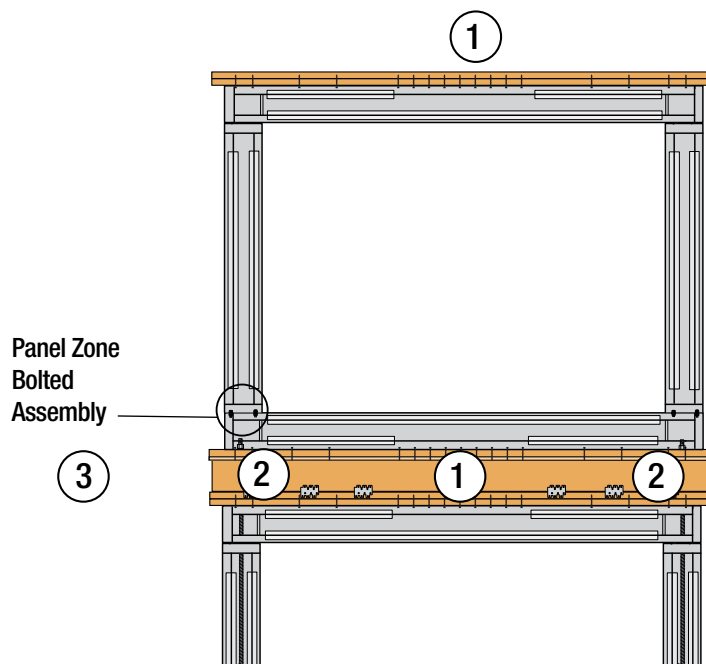
We promptly acknowledge receipt of submittal information followed by a preliminary design proposal. The documents provided for submittal to Building Departments include

- ➔ Elevation view of CFS Moment Frame stacks with model numbers called-out and their Z4 Tie-Down System design included
- ➔ Installation details
- ➔ A calculation package to meet loading and drift that includes load distribution between Frames and a check of the stack cumulative loading

Visit: <https://builderproducts.mii.com/cfsmomentframe>

MiTek®
HARDY FRAME®
Leading in Lateral

1-800-754-3030
hardyframe.com



1 MiTek® Pro Series™ Screws

USP Stock No.	Description	Dimensions (in)				Finish	Allowable Shear (160%)	
		L	SH	T	Thread		12 GA Steel to DF-L/SP	12 GA Steel to S-P-F
WS3	1/4" x 3"	3	3/4	2-1/4	2	Zinc	668 lbs	475 lbs
WS45	1/4" x 4-1/2"	4-1/2	1-1/4	3-1/4	3	Zinc	825 lbs	673 lbs

1. Allowable loads have been increased 60% for short term loading; no further increase shall be permitted.
2. Zinc finish = Yellow Zinc Dichromate.
3. Code Approved by ICC Evaluation Service (ESR-2761), LA City (RR-25850), and State of Florida (FL-16091).

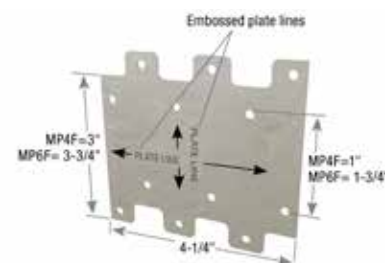
2 USP® Plate Connectors

USP Stock No.	Steel Gauge	Orientation	Fastener Schedule		Direction of Load	Allowable Shear (160%)	
			Each Member			DF-L/SP	S-P-F
			Qty	Type			
MP4F	20	H	6	8d x 1-1/2	H	845 lbs	710 lbs

1. Allowable loads have been increased 60% for short term loading; no further increase shall be permitted.
2. 8d nails are .131" dia. x 1-1/2" long, minimum embedment shall be 1-5/16".
3. Code Approved by ICC Evaluation Service (ESR-3455), LA City (RR-25779), and State of Florida (FL-821).



Pro Series Screw

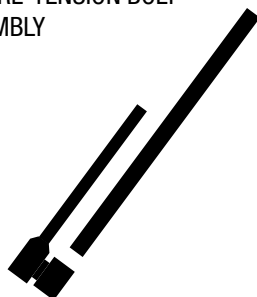


MP4F

Assembly and Installation Tools

SOCKET, RATCHET AND EXTENSION BAR
FOR PANEL ZONE PRE-TENSION BOLT
ASSEMBLY

3



RIGHT ANGLE DRILL WITH NUT DRIVER
FOR SHEAR SCREW CONNECTIONS

1



SOCKET, SWIVEL AND
IMPACT FOR HOLD DOWN AND
SHEAR BOLTS TO CONCRETE



WHAT TO LOOK FOR IN A COLD FORMED STEEL MOMENT FRAME

PANEL ZONE

Provides Moment Connection with high capacity and ductile behavior.

ELECTRICAL ACCESS

3/4 inch holes with grommets for running electrical wiring provided at upper and lower area of Panels.

PANEL AND BEAM SHAPE

C-shape construction can be used to recess electrical fixtures, install wood backing or insulate.

PRE-PUNCHED SCREW HOLES

Install USP Pro-Series Screws for shear transfer and wood attachment.

COLD FORMED STEEL (CFS)

Easier to ship, handle and install than structural steel components.

NARROW BEAM DEPTH

Maintains opening height at standard garage fronts.

2-BOLT ASSEMBLY

Connection of beam to Panel.

NARROW PANEL WIDTHS

Pre-engineered designs for 12, 15, 18 and 21"

STANDARD MODEL NUMBERS AND DETAILING

Brings efficiencies to designers, suppliers and installers.

2-HOLD DOWN BOLT ANCHORAGE

Same easy access to tighten connection as in Hardy Frame Panels

MiTek®
HARDY FRAME®
Leading in Lateral

1-800-754-3030
hardyframe.com

WHAT TO LOOK FOR IN A COLD FORMED STEEL PICTURE FRAME

PANEL ZONE

Provides Moment Connection with high capacity and ductile behavior.

NARROW WALL SECTIONS

For applications in wood frame construction at large openings and end conditions.

COMPATIBLE WITH STANDARD WOOD FRAMING

Designed for installation in wood structures.

MITEK Z4 CINCH NUT

At continuous tie-down keeps connections tight in the event of wood shrinkage and deformation.

C-SHAPE PANEL AND BEAM

Enables electrical fixtures, wood backing and insulation.

"SELF REACTING" MOMENT FRAME

Distributes compression from high overturning forces without crushing wood below.

PRE-PUNCHED SCREW HOLES

Install USP Pro-Series Screws for shear transfer and wood nailer attachment.

COLD FORMED STEEL (CFS) PANEL

Easier to install, lighter to handle and more effective than multiple compression post.

MULTI-STORY APPLICATION

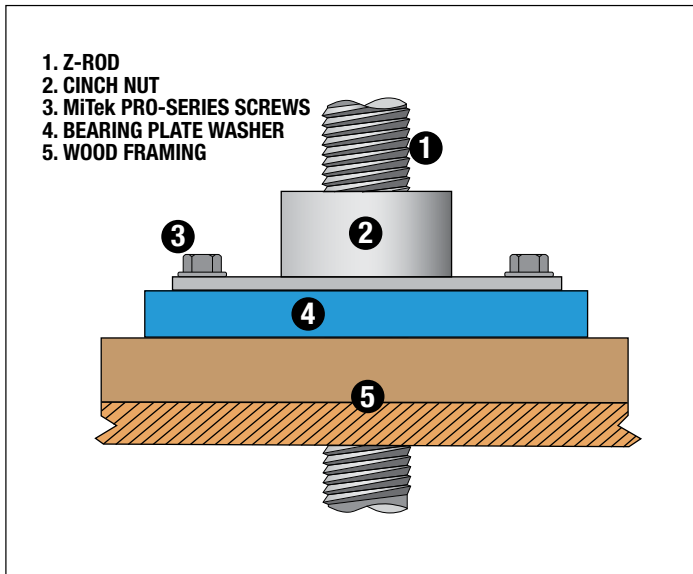
Able to stack up to 5-stories.

LATERAL FORCE RESISTING SYSTEM

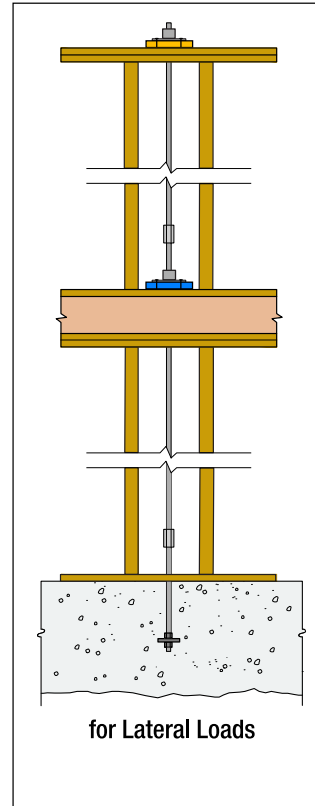
Resists lateral shear, provides continuous tie-down for accumulated uplift and distributes compression forces.

MiTek®
HARDY FRAME®
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hardyframe.com



MiTek® Z4 Tie-Down Systems utilize CNX-Series Cinch Nuts to compensate for wood shrinkage and building settlement that cause connections to loosen over time. The Cinch Nut uses a self-ratcheting action that permits the cinch nut to move (the rod doesn't move) or "travel" perpetually in one direction only down the rod. Available for installation with threaded rods that are 3/8 inch through 1-1/2 inch diameter in 1/8 inch increments, the CNX Cinch Nut has been code evaluated and published in ESR-2190.



MiTek® Z4 Tie-Down System for Lateral Load

To resist tension loads due to overturning moments in multi-story buildings the CNX Cinch Nut is installed over a Bearing Plate Washer at each level in a fast and easy application. At the upper-most level a Cinch Nut is installed over a Bearing Plate Washer above the top plates. At walls below that bear on wood floor systems, the Cinch Nut and Bearing Plate Washer are installed over the bottom plate. Tension loads are gathered at each level and transferred into the foundation through a continuous system of Cinch Nuts, Bearing Plate Washers, Z-Rods/ATRs and Couplers all are available lines of **MiTek®, USA.**

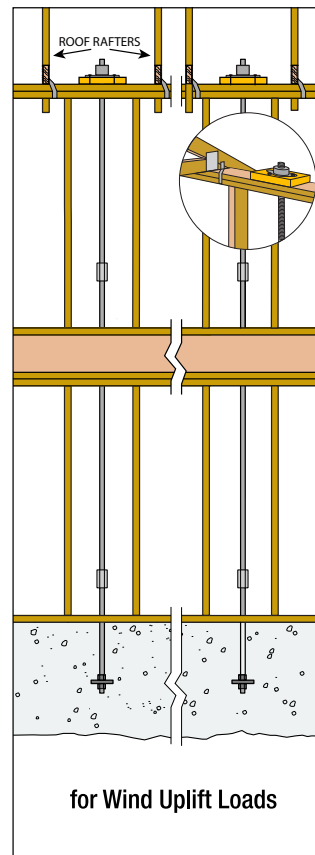
- Place the specified Bearing Plate Washer onto the bottom plate of a wood framed wall.
- With the "wings" oriented downward, place Cinch Nut over the Z-Rod extending from below and push down until it seats firmly on the Bearing Plate Washer.
- Install 1/4 inch diameter MiTek® Pro-Series™ Screws through the wings, penetrating 1-1/2 inches (minimum) into the wood bottom plate.
- Model numbers BPW5 and BPW6 fit in-between the screws fastening the wings.
- Model numbers BPW7 (3-1/4 x 4-3/8) and larger are provided with two screw holes. Align the wing and the Bearing Plate Washer screw holes to allow installation of 1/4 inch diameter MiTek® Pro-Series™ Screws.



**BPW5, BPW6
Installation**



**BPW7 and larger
Installation**



MiTek® Z4 Tie-Down System for Wind Uplift

For resisting roof uplift loads resulting from wind the Z4 Cinch Nut is installed over a Bearing Plate Washer above the top plates with roof framing above to create a tie-down system. Uplift forces are transferred into a continuous system of Z-Rods / ATRs and Couplers that form a load path to the foundation.

ADDITIONAL PUBLICATIONS FROM MiTek®, USA

MiTek® Builder Products is a division of MiTek® USA, Inc. MiTek product lines include the Hardy Frame® Shear Wall system, USP® Structural Connectors and Z4 Tie-Down System.



HARDY FRAME® SPECIAL MOMENT FRAME DESIGN MANAGER

The interactive, web based HF SMF Design Manager from MiTek® enables you to easily input SMF design parameters then submit to our engineers with the click of a mouse. Custom SMF Designs and job specific installation details have never been so easy. Submittal of the design request provides all project information and data necessary for the MiTek® – Hardy Frame engineering department to deliver the most economical design with the best up-to-date SidePlate® technology. Visit: <https://builderproducts.mii.com/specialmomentframe>



PRODUCT CATALOG

The MiTek® Hardy Frame® Product Catalog provides complete information for Engineers, Architects and Designers to specify our shear wall system. There is a complete listing of all Panels, Brace Frames and Accessories, allowable shear loads, corresponding uplift and drift, pre-engineered anchorage information, specification tips, photos and Typical Installation Details. The Installation Details in the Product Catalog conveniently match our ACad version that can be included as supplemental sheets to plan submittals.



INSTALLATION GUIDE

The MiTek® Hardy Frame® Installation Guide was written specifically for Suppliers and Installers. This publication provides all HFX model numbers, dimensions, bolt and screw patterns, connectors, installation illustrations, attachments and information regarding Template Kit (HFXTK) and Floor to Floor Tension Connector Kit (HFTC) components.



RETROFIT GUIDE

Provides Building Owners with an introduction to construction techniques and MiTek® product lines available to strengthen soft-story buildings in retrofit applications. The MiTek® Hardy Frame® Shear Wall System combined with USP® Structural Connectors provides soft story solutions. This guide can be used by the Design Professional to illustrate retrofit concepts to their clients.



MITEK® Z4 PRODUCT CATALOG

The MiTek® Z4 product line includes the Cinch Nut, Continuity Tie (CT) and Tension Tie (T2). The Cinch Nut is a self ratcheting device that is designed to maintain a tight connection in the Z4 continuous "Quick Connect" rod system. The Cinch Nut, along with the CT and T2, offer more design options than any other hold down system and are rated for tension capacities that range from 5,000 to over 82,000 lbs. In addition to continuous rod applications, the T2 can be used as a hold down in conventionally framed shear walls.



MITEK® USP® STRUCTURAL CONNECTORS PRODUCT CATALOG

Introducing the 2017 online catalog featuring new structural connector products and updated technical information. Our digital version will be updated often to ensure content is always current. This catalog is a comprehensive guide to our extensive product line featuring over 250 detailed application illustrations and detailed installation instructions, fastening schedules and load ratings. EWP and Plated Truss connectors are included. www.mitek-us.com/resources/Product-Catalog/

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