MITEK® HARDY FRAME® SPECIAL MOMENT FRAME

PRODUCT CATALOG

MiTek®
HARDY FRAME®
Leading in Lateral

11-1-18

MiTek® Hardy Frames manufactures and markets pre-fabricated shear wall systems. We have been the innovative leader in the industry for over 15 years. Our company first introduced the Original Hardy Frame® Panels and Brace Frames in 1996. In 2006, we joined forces with SidePlate Systems, Inc. to launch the Hardy Frame® Special Moment Frame, the first pre-engineered, pre-fabricated Moment Frame in the industry.

The MiTek® Hardy Frame® Moment Frame may be installed in single or multistory structures and uses the new-generation SidePlate® special moment connection to resist lateral forces from earthquakes and wind. This connection was conceived and developed by David Houghton, a licensed structural engineer, to eliminate problems that were exposed in traditional moment connections as a result of the 1994 Northridge earthquake. The outstanding performance of the SidePlate® system is nationally recognized and is the same technology we use in the MiTek® Hardy Frame® Moment Frame to provide high allowable loads in narrow wall sections. Adding to the structural benefits, our Special Moment Frame is designed to arrive at the jobsite completely pre-assembled with no field welding and no special inspection required.

The mission of MiTek® Hardy Frame is to provide cost effective, state-of-the-art, lateral force resisting systems that are easily installed to meet architectural, engineering and code requirements.

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GENERAL INFORMATION

CODE EVALUATIONS:

SidePlate® is a prequalified connection per Chapter 11 of the AISC358-10 and AISC358-16. In addition, SidePlate has been evaluated by IAPMO's Uniform Evaluation Service (UES) jointly with LADBS under the City's Pilot Program to Satisfy Requirements in Los Angeles and California. The report number is: ER-0525

Testing:

SidePlate® connections have been extensively tested and qualified in accordance with AISC and UES criteria. Products in this catalog are designed in accordance with the provisions of Chapter 11 of AISC358-10 and AISC358-16. A calculation package, stamped and signed by a registered design professional of MiTek USA Inc., is provided upon request for building department submittal which includes the complete design of the moment frame conforming to SMF standards.

Product Use:

MiTek® Hardy Frame® products 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.

MiTek® Hardy Frame® Moment Frames are manufactured from prime quality steel and are supplied with mill finish:

Plate Material:

- ASTM A572 Grade 50: SidePlates, Base Plates, Stiffeners, Splice Plates, and Built-Up Columns
- ASTM A36: Angle and Plate shear transfer connections

Rolled Shapes:

- ASTM A500 Grade B (F_y=46ksi): Beams (Hollow Structural Sections - HSS)

Misc. Materials

- ASTM A193 Grade B7: Anchor bolts at column base plates
- ASTM A36 (min): Welded studs
- ASTM A325: Machine bolts at Splice connection
- No. 2 Douglas Fir Larch or better: Beam and column nailers

MOMENT FRAME DESIGN AND CONSTRUCTION STANDARDS

Referenced Documents:

- American Institute of Steel Construction Specification for Structural Steel Buildings, 2010 and 2016 (AISC360-10 and AISC360-16)
- American Institute of Steel Construction Seismic Provisions for Structural Steel Buildings 2010 and 2016 (AISC341-10 and AISC341-16)
- American Institute of Steel Construction, Prequalified Connections for Special and Intermediate Steel Moment Frame for Seismic Application, AISC358-10 and AISC358-16
- 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-0525
- 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

Model represents P-Delta effects, fully rigid panel zone & SidePlate® connection stiffness and pinned column bases

Allowable Story Drift, Δ_a: All moment frames were designed using Δ_a = 0.025h_{SX}.

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

LRFD Load Combinations:

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

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

Design Factors of Safety:

Stress and vertical beam deflections are limited to 90% of code allowable for all designs. Under 90% limit for stress, stress governs over L/240 and L/360 beam deflection criteria; for actual reported deflections see "Hardy Frame® Special Moment Frame Calculations" design package.

SidePlate® Connection Design:

The SidePlate® connection design used to complete the MiTek® Hardy Frame® Special Moment Frame design is prepared by a registered design professional of MiTek USA Inc. using the SidePlate® Connection Design Software (compliant with the requirements of AISC358-10, AISC358-16, & IAPMO's UES ER-0525). A strong column-weak beam relationship at the SidePlate® connection is achieved for all moment frame designs.

Table 1A Hardy Frame® Special Moment Frame Width Dimensioning [1]

Model Number	Column [2]	Beam [3]	Max. W_{IN} (ft-in)		Max. W_{CL} (ft-in)	Max. W_{OUT} (ft-in)		
			$W_{IN-WOOD}$	$W_{IN-STEEL}$	W_{CL-COL}	$W_{OUT-STEEL}$	W_{OUT-SP}	$W_{OUT-WOOD}$
			2x Wood Nailers	Col. Flanges	Col. Centerlines	Col. Flanges	SidePlates	2x Wood Nailers
HFMF611-8x	BU6.5x33	HSS6x4x3/8	8' 4"	8' 7"	9' 1-1/2"	9' 8"	9' 9"	9' 11"
HFPIC611-8x							9' 9-1/2"	
HFMF811-8x	BU8.5x59	HSS6x6x5/8			9' 3-1/2"	10' 0"	10' 1"	10' 3"
HFPIC811-8x							10' 1-1/2"	
HFMF1013-8x	BU10.5x61	HSS8x6x1/2			9' 5-1/2"	10' 4"	10' 5"	10' 7"
HFPIC1013-8x							10' 5-1/2"	
HFMF1214-8x	BU12.5x64	HSS8x6x5/8			9' 7-1/2"	10' 8"	10' 9"	10' 11"
HFPIC1214-8x							10' 9-1/2"	
HFMF611-10x	BU6.5x33	HSS6x4x3/8	10' 4"	10' 7"	11' 1-1/2"	11' 8"	11' 9"	11' 11"
HFPIC611-10x							11' 9-1/2"	
HFMF811-10x	BU8.5x59	HSS6x6x5/8			11' 3-1/2"	12' 0"	12' 1"	12' 3"
HFPIC811-10x							12' 1-1/2"	
HFMF1013-10x	BU10.5x61	HSS8x6x1/2			11' 5-1/2"	12' 4"	12' 5"	12' 7"
HFPIC1013-10x							12' 5-1/2"	
HFMF1214-10x	BU12.5x64	HSS8x6x5/8			11' 7-1/2"	12' 8"	12' 9"	12' 11"
HFPIC1214-10x							12' 9-1/2"	
HFMF1416-10x	BU14.5x66	HSS10x6x1/2			11' 9-1/2"	13' 0"	13' 1"	13' 3"
HFPIC1416-10x							13' 1-1/2"	
HFMF611-12x	BU6.5x33	HSS6x4x3/8	12' 4"	12' 7"	13' 1-1/2"	13' 8"	13' 9"	13' 11"
HFPIC611-12x							13' 9-1/2"	
HFMF811-12x	BU8.5x59	HSS6x6x5/8			13' 3-1/2"	14' 0"	14' 1"	14' 3"
HFPIC811-12x							14' 1-1/2"	
HFMF1013-12x	BU10.5x61	HSS8x6x1/2			13' 5-1/2"	14' 4"	14' 5"	14' 7"
HFPIC1013-12x							14' 5-1/2"	
HFMF1214-12x	BU12.5x64	HSS8x6x5/8			13' 7-1/2"	14' 8"	14' 9"	14' 11"
HFPIC1214-12x							14' 9-1/2"	
HFMF1416-12x	BU14.5x66	HSS10x6x1/2			13' 9-1/2"	15' 0"	15' 1"	15' 3"
HFPIC1416-12x							15' 1-1/2"	
HFMF611-14x	BU6.5x33	HSS6x4x3/8	14' 4"	14' 7"	15' 1-1/2"	15' 8"	15' 9"	15' 11"
HFPIC611-14x							15' 9-1/2"	
HFMF811-14x	BU8.5x59	HSS6x6x5/8			15' 3-1/2"	16' 0"	16' 1"	16' 3"
HFPIC811-14x							16' 1-1/2"	
HFMF1013-14x	BU10.5x61	HSS8x6x1/2			15' 5-1/2"	16' 4"	16' 5"	16' 7"
HFPIC1013-14x							16' 5-1/2"	
HFMF1214-14x	BU12.5x64	HSS8x6x5/8			15' 7-1/2"	16' 8"	16' 9"	16' 11"
HFPIC1214-14x							16' 9-1/2"	
HFMF1416-14x	BU14.5x66	HSS10x6x1/2			15' 9-1/2"	17' 0"	17' 1"	17' 3"
HFPIC1416-14x							17' 1-1/2"	
HFMF611-16x	BU6.5x33	HSS6x4x3/8	16' 4"	16' 7"	17' 1-1/2"	17' 8"	17' 9"	17' 11"
HFPIC611-16x							17' 9-1/2"	
HFMF813-16x	BU8.5x59	HSS8x6x1/2			17' 3-1/2"	18' 0"	18' 1"	18' 3"
HFPIC813-16x							18' 1-1/2"	
HFMF1014-16x	BU10.5x61	HSS8x6x5/8			17' 5-1/2"	18' 4"	18' 5"	18' 7"
HFPIC1014-16x							18' 5-1/2"	

Table 1A Hardy Frame® Special Moment Frame Width Dimensioning [1]

Model Number	Column [2]	Beam [3]	Max. W_{IN} (ft-in)		Max. W_{CL} (ft-in)	Max. W_{OUT} (ft-in)		
			$W_{IN\text{-}WOOD}$	$W_{IN\text{-}STEEL}$	$W_{CL\text{-}COL}$	$W_{OUT\text{-}STEEL}$	$W_{OUT\text{-}SP}$	$W_{OUT\text{-}WOOD}$
			2x Wood Nailers	Col. Flanges	Col. Centerlines	Col. Flanges	SidePlates	2x Wood Nailers
HFMF1216-16x	BU12.5x64	HSS10x6x1/2	16’ 4”	16’ 7”	17’ 7-1/2”	18’ 8”	18’ 9”	18’ 11”
HFPIC1216-16x							18’ 9-1/2”	
HFMF1416-16x	BU14.5x66	HSS10x6x5/8			17’ 9-1/2”	19’ 0”	19’ 1”	19’ 3”
HFPIC1416-16x							19’ 1-1/2”	
HFMF813-18x	BU8.5x59	HSS8x6x1/2	18’ 4”	18’ 7”	19’ 3-1/2”	20’ 0”	20’ 1”	20’ 3”
HFPIC813-18x							20’ 1-1/2”	
HFMF1014-18x	BU10.5x61	HSS8x6x5/8			19’ 5-1/2”	20’ 4”	20’ 5”	20’ 7”
HFPIC1014-18x							20’ 5-1/2”	
HFMF1216-18x	BU12.5x64	HSS10x6x1/2			19’ 7-1/2”	20’ 8”	20’ 9”	20’ 11”
HFPIC1216-18x							20’ 9-1/2”	
HFMF1416-18x	BU14.5x66	HSS10x6x5/8			19’ 9-1/2”	21’ 0”	21’ 1”	21’ 3”
HFPIC1416-18x							21’ 1-1/2”	
HFMF813-20x	BU8.5x59	HSS8x6x1/2	20’ 4”	20’ 7”	21’ 3-1/2”	22’ 0”	22’ 1”	22’ 3”
HFPIC813-20x							22’ 1-1/2”	
HFMF1014-20x	BU10.5x61	HSS8x6x5/8			21’ 5-1/2”	22’ 4”	22’ 5”	22’ 7”
HFPIC1014-20x							22’ 5-1/2”	
HFMF1216-20x	BU12.5x64	HSS10x6x1/2			21’ 7-1/2”	22’ 8”	22’ 9”	22’ 11”
HFPIC1216-20x							22’ 9-1/2”	
HFMF1416-20x	BU14.5x66	HSS10x6x5/8			21’ 9-1/2”	23’ 0”	23’ 1”	23’ 3”
HFPIC1416-20x							23’ 1-1/2”	
HFMF813-22x	BU8.5x59	HSS8x6x1/2	22’ 4”	22’ 7”	23’ 3-1/2”	24’ 0”	24’ 1”	24’ 3”
HFPIC813-22x							24’ 1-1/2”	
HFMF1014-22x	BU10.5x61	HSS8x6x5/8			23’ 5-1/2”	24’ 4”	24’ 5”	24’ 7”
HFPIC1014-22x							24’ 5-1/2”	
HFMF1216-22x	BU12.5x64	HSS10x6x1/2			23’ 7-1/2”	24’ 8”	24’ 9”	24’ 11”
HFPIC1216-22x							24’ 9-1/2”	
HFMF1416-22x	BU14.5x66	HSS10x6x5/8			23’ 9-1/2”	25’ 0”	25’ 1”	25’ 3”
HFPIC1416-22x							25’ 1-1/2”	
HFMF813-24x	BU8.5x59	HSS8x6x1/2	24’ 4”	24’ 7”	25’ 3-1/2”	26’ 0”	26’ 1”	26’ 3”
HFPIC813-24x							26’ 1-1/2”	
HFMF1014-24x	BU10.5x61	HSS8x6x5/8			25’ 5-1/2”	26’ 4”	26’ 5”	26’ 7”
HFPIC1014-24x							26’ 5-1/2”	
HFMF1216-24x	BU12.5x64	HSS10x6x1/2			25’ 7-1/2”	26’ 8”	26’ 9”	26’ 11”
HFPIC1216-24x							26’ 9-1/2”	
HFMF1416-24x	BU14.5x66	HSS10x6x5/8			25’ 9-1/2”	27’ 0”	27’ 1”	27’ 3”
HFPIC1416-24x							27’ 1-1/2”	

Notes:
1. Standard widths assume dimensions per table unless specified otherwise prior to fabrication.
2. BU designates Built-Up column, see Column Assembly Depths for section properties.
3. HSS designates Hollow Structural Section, see Beam Assembly Depths for section properties.

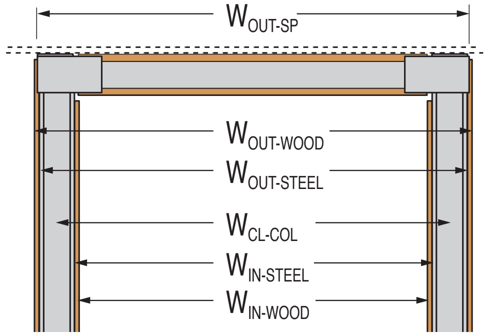
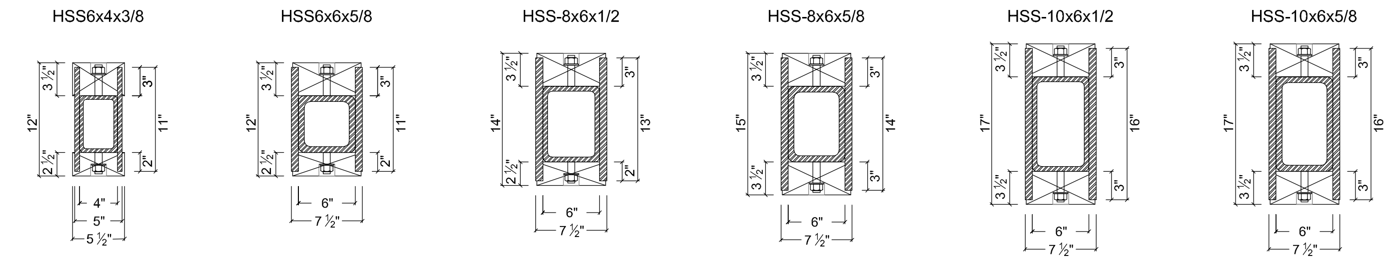


FIGURE 1 BEAM ASSEMBLIES

NAILERS AT HEADER BEAM



ANGLE AT HEADER BEAM

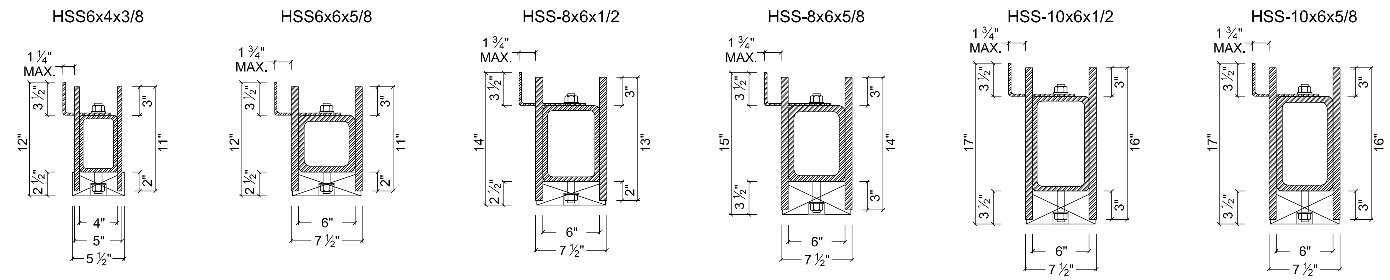
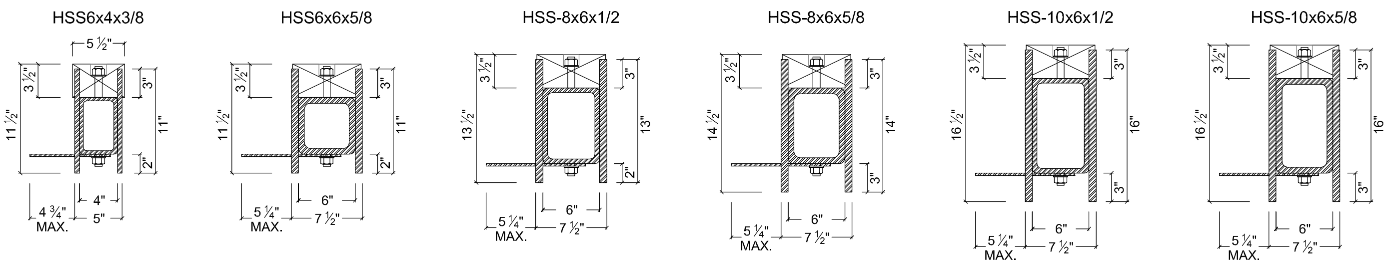
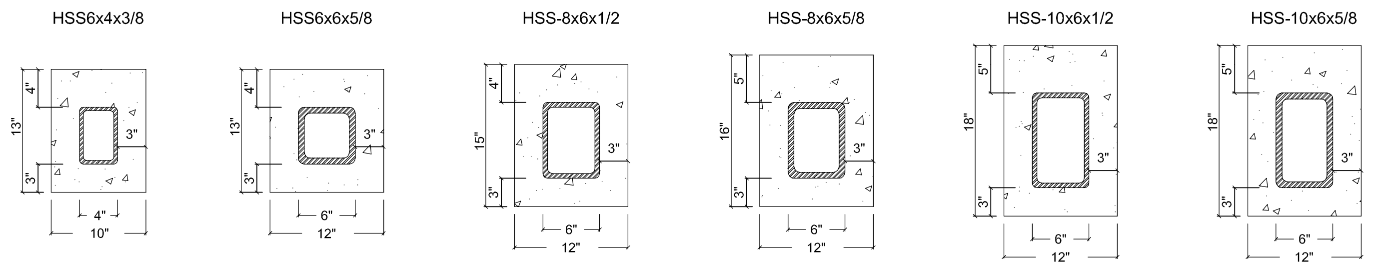


PLATE AT HEADER BEAM



MINIMUM CONCRETE COVERAGE AT FOUNDATION BEAM



MINIMUM CONCRETE COVERAGE AT FOUNDATION BEAM ASSEMBLY

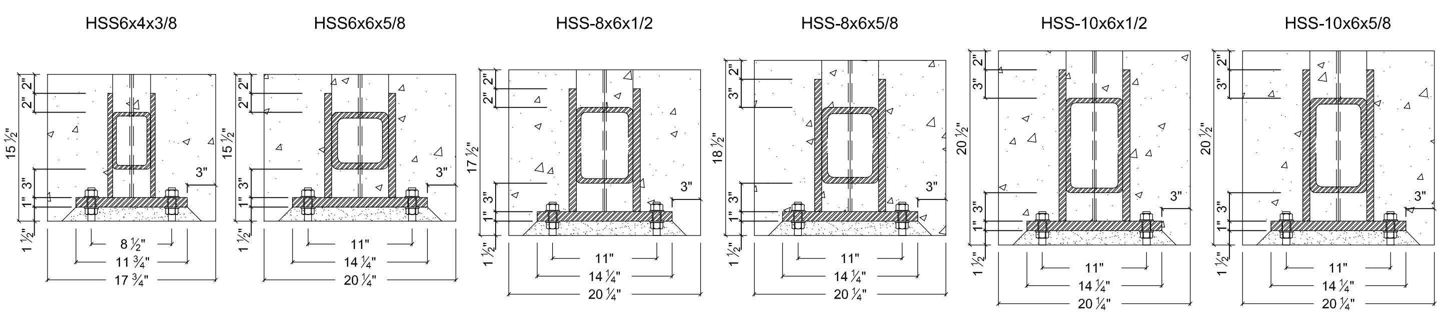
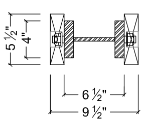


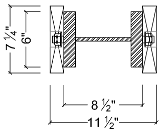
FIGURE 2 COLUMN ASSEMBLIES

FLANGE NAILERS

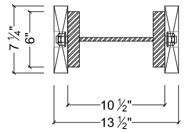
BU6.5x33



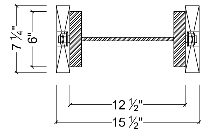
BU8.5x59



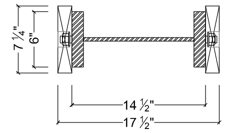
BU10.5x61



BU12.5x64

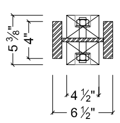


BU14.5x66



WEB NAILERS

BU6.5x33



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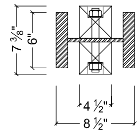

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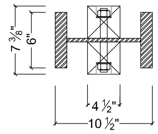

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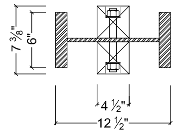

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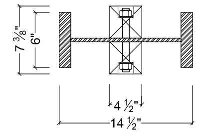
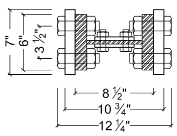


COLUMN SPLICE

BU6.5x33

Splice Not Available for BU6.5x33 Column

BU8.5x59



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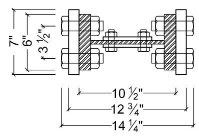

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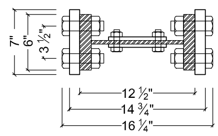
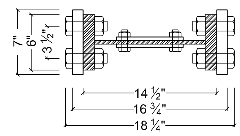
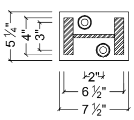


BU14.5x66



HFMF BASE PLATE

BU6.5x33



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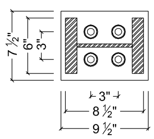
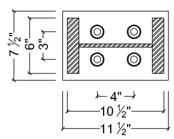


BU10.5x61



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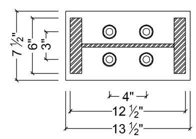
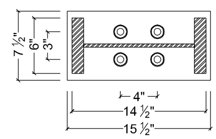
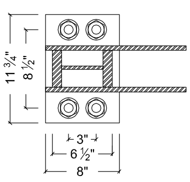


BU14.5x66



HFPIC BASE PLATE

BU6.5x33



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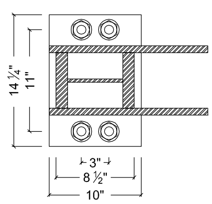
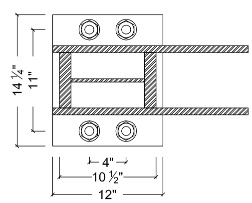
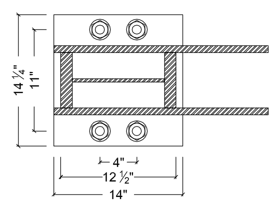


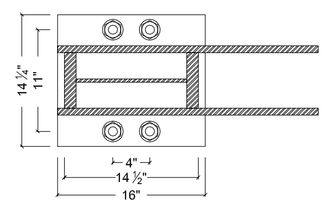
BU10.5x61



BU12.5x64



BU14.5x66



DESIGNING WITH HARDY FRAME® SPECIAL MOMENT FRAMES OVERVIEW

WHEN TO USE A HARDY FRAME® SPECIAL MOMENT FRAME:

- At large openings with narrow wall space and high shear loads
- When different seismic force resisting systems are used in combination, all parallel walls must be designed at the lowest R-Value. Specify a Hardy Frame Special Moment Frame and design at the same R=6.5 as design of plywood shear walls.
- NOTE: Standard Hardy Frame Special Moment Frames are listed for opening widths up to 24 feet and wall heights up to 14 feet. When both the width and the height exceed 13 feet, the Frame is over-sized for trucking pre-assembled and must ship as a "Knock-Down" unit, which requires field welding and special inspection to be supplied by others, or with a "Column Splice" to accommodate field bolting.

DESIGN:

- Calculate the design shear load based on an R-Value of 6.5
- Select a Hardy Frame Special Moment Frame based on the required geometry
- Check that the tabulated Allowable Shear meets the design shear load
- If the design shear load exceeds the allowable table value, for both the HFMF and HFPIC models use the Special Moment Frame Design Manager app (https://builderproducts.mii.com/specialmomentframe/) to submit custom design requests.
- Calculate the design vertical loads at beam mid-span using ASD load combinations
- Check that design vertical loads do not exceed the tabulated Maximum Vertical Load at Allowable Shear (Pu)
- Calculate the design Column Base Reactions for use in the foundation design. For more information see the Allowable Load tables and the corresponding table notes.

SPECIFICATION:

On the Foundation Plan

- Specify the Hardy Frame Special Moment Frame model number once per Frame with a multi-leader indicating each column
- Indicate the anchorage table and associated anchorage detail Anchorage Table: 2/HFMF-2 HFMF Anchorage at Footing: 4A/HFMF-2 HFPIC Anchorage at Footing: 4B/HFMF-2
- For HFMF specify connection of column base to install at the top of curb, slab, or stem wall (if application): 3/HFMF-2

On the Framing Plan

- Specifiy the Hardy Frame Special Moment Frame model number once per Frame with a multi-leader indicating each column
- Specify a shear connection from the collector (or "drag") to the Hardy Frame Moment Frame beam assembly. Refer to Typical Installation Details (HFMF-3) for standard connections
- Indicate whether the beam assembly installs beneath the floor framing (2/HFMF-3) or within the floor cavity (3/HFMF-3). Consider out-of-plane stability bracing at the columns (Note: no additional out-of-plane bracing is required at the plastic hinge locations or along the beam span).

SUBMITTAL:

- Include a calculation package for the model number specified (provided by Hardy Frames)
- Include Typical Installation Detail Sheets as "supplemental pages"

ADDITIONAL ITEMS:

- The table values in this catalog for both the HFMF and the HFPIC assume Pinned Base anchorage.
- Fixed Base designs (with conventional grade beam) are available. Use the Special Moment Frame Design Manager app (http://builderproducts.mii.com/specialmomentframe/) to submit custom design requests.
    - Allowable shear loads for Seismic applications have been adjusted to an R-Value of 6.5 (Cd = 4.0). For conversion of designs at 3.5 (Cd = 3.0), multiply by 4.0/3.0.
    - Allowable shear loads for Seismic applications are based on a story drift of 0.025h. To convert shear loads to a story drift of 0.020h multiply by a factor of 0.8.
- When designing lateral resistance for a wall line with varying shear resisting elements the stiffness (drift/allowable shear load) must be proportioned.
- Custom Moment Frame designs are available. Visit the Special Moment Frame Design Manager app (http://builderproducts.mii.com/specialmomentframe/) and submit to Hardy Frame to check the required configuration and loading.

PRE-ASSEMBLED 2-STORY MOMENT FRAMES

PRE-ASSEMBLED 2-BAY MOMENT FRAMES

INSTALLING HARDY FRAME PICTURE FRAME

COLUMN SPLICE OPTION

HARDY FRAME PICTURE FRAME INSTALLATION

SPECIAL MOMENT FRAMES IN NEW CONSTRUCTION

DESIGN EXAMPLE – HFMF PINNED BASE

Given: Loading & Geometry

- 8' Nominal Wall Height
- 16' Garage Door Clear Span
- 17" Maximum Column Assembly Depth (including wood nailers at flanges)
- 17" Maximum Header Beam Assembly Depth (including wood nailers at top and bottom beam)
- 7-1/2" Maximum Wall Thickness
- ASD Seismic Design Shear: at R = 6.5, C_d = 4.0, V_{DSN} = 15,000 lbs
- Uniform Gravity Loading on Header: W_D = 256 plf, W_L = 480 plf
- ASD Overturning Point Load on Header:Q_E = 7,000 lbs (excluding Ω_0), W = 0 lbs

Check Allowable ASD Shear (V) & Frame Geometry

From Table 1.8 (8' 0-3/4" Nominal Wall Heights), look up 16' 7" in Maximum Span column

Try: HFMF1216-16x8

- Allowable ASD Seismic Shear = 15,540 lbs > 15,000 lbs **Ok**
- From Table 1A
  - Column Assembly = BU12.5x64
  - Header Beam = HSS10x6x1/2
- From Figures 1 and 2, Beam and Column Sections
  - BU12.5x64 Column Assembly Depth (with Flange Nailers) = 15-1/2" ≤ 17" **OK**
  - HSS10x6x1/2 Header Beam Assembly Depth (with Nailers at Header Beam) = 17" ≤ 17" **OK**
  - Frame Thickness = 7-1/2" ≤ 7-1/2" Maximum Wall Thickness **OK**

Calculate & Check the Aggregate Additional Vertical Load, P_{DSN}

HFMF1216-16x8:

- From Table 1A – Column Center-to-Center Span, $W_{CL\text{-}COL}$ = 17' 7-1/2" = 17.625 ft
- From Table 1.8 – Max Vertical Load @ Allowable V, P_u = 27,500 lbs
- Equivalent Point Load for Design Dead Load, D = 256 plf x 17.625 ft = 4,510 lbs
- Equivalent Point Load for Design Live Load, L = 480 plf x 17.625 ft = 8,460 lbs
- ASD Overturning Point Load on Moment Frame Header Beam from Earthquake, Q_E = 7,000 lbs (excluding Ω_0)
- ASD Overturning Point Load on Moment Frame Header Beam from Wind, W = 0 lbs
- Over-strength Factor for Earthquake Load, Ω_0 = 3

ASD Load Combinations (Note- Example below only shows the critical combinations):

1. D + L = 4,510 lbs + 8,460 lbs = 12,970 lbs
2. D + 0.6W = 4,510 lbs + 0.6 x 0 lbs = 4,510 lbs
3. D + 0.75L + 0.75(0.6W) = 4,510 lbs + 0.75 x 8,460 lbs + 0.75 x (0.6 x 0 lbs) = 10,860 lbs
4. D + 0.7(Ω_0 x Q_E) = 4,510 lbs + 0.7 x (3 x 7,000 lbs) = 19,210 lbs
5. D + 0.525(Ω_0 x Q_E) + 0.75L = 4,510 lbs + 0.525 x (3 x 7,000 lbs) + 0.75 x 8,460 lbs = 21,880 lbs

Maximum Design Point Load, P_{DSN} = 21,880 lbs < 27,500 lbs **OK**

Use: HFMF1216-16x8

Calculate Resultant ASD Shear at Column Base (ASD Design Shear & Maximum Design Point Load)

HFMF1216-16x8:

- From Table 1.8 –Shear @ Max P_u = 9,630 lbs
- Shear Multiplier for Maximum Design Point Load, V_{mult} = Shear @ Max P_u / Max P_u = 9,630 lbs / 27,500 lbs = 0.35
- Resultant Shear at Column Base, V_R = (V_{DSN} / 2) + (P_{DSN} x V_{Mult}) = (15,000 lbs / 2) + (21,880 lbs x 0.35) = 15,160 lbs

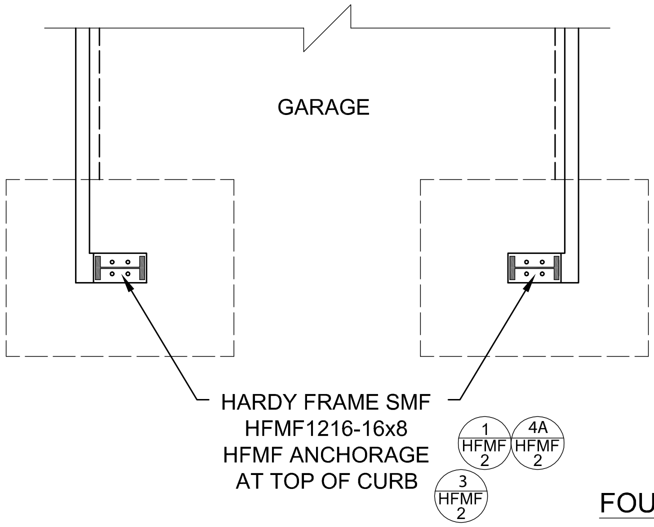
Calculate Resultant ASD Tension and Compression at Column Base (ASD Design Shear & Maximum Design Point Load)

HFMF1216-16x8:

- Tension and Compression from ASD Design Shear = $(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}$ = (15,000 lbs x 8.06') / 17.625' = 6,860 lbs
- Resultant Compression at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}] + (P_{DSN} / 2)$ = 6,860 lbs + (21,880 lbs / 2) = 17,800 lbs
- Resultant Tension at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}] - [0.6D - 0.7(\Omega_0 \times Q_E)] / 2$
  = 6,860 lbs – [0.6 x (4,510 lbs) – 0.7 x (3 x 7,000 lbs)] / 2 = 12,860 lbs

On the Foundation Plan

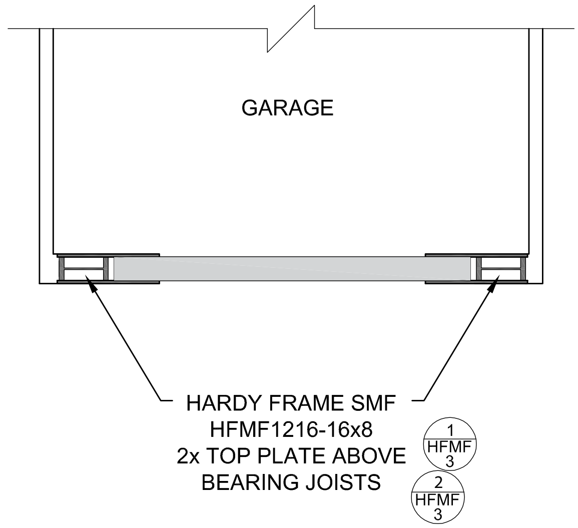
1. Specify the model number once per Frame with a multi-leader indicating each column
   - Model number: HFMF1216-16x8
2. Indicate the anchorage table and the associated anchorage detail for HFMF Anchorage at Footing
   - Anchorage table: 1 / HFMF-2
   - HFMF anchorage detail: 4A / HFMF-2
3. Specify the bottom connection of the column base to install at the top of curb, slab, or stem wall (if applicable)
   - Bottom connection at top of concrete: 3 / HFMF-2



FOUNDATION PLAN

On the Framing Plan

1. Specify the model number once per Frame with a multi-leader indicating each column
   - Model number: HFMF1216-16x8
2. Specify the shear connection from the collector (or "drag") to the Moment Frame Header Beam assembly
   - Top connection to 2x top plate above: 1 / HFMF-3
3. Indicate whether the Header Beam assembly installs beneath the floor framing or within the floor cavity
   - Section at header w/ bearing joists: 2 / HFMF-3



FRAMING PLAN

DESIGN EXAMPLE – HFPIC PICTURE FRAME

Given: Loading & Geometry

- 8' Nominal Wall Height
- 16' Garage Door Clear Span
- 15" Maximum Column Assembly Depth (including wood nailers at column flanges)
- 17" Maximum Header Beam Assembly Depth (including wood nailers at top and bottom beam)
- 7-1/2" Maximum Wall Thickness
- ASD Seismic Design Shear: at R = 6.5, C_d = 4.0, V_{DSN} = 15,000 lbs
- Uniform Gravity Loading on Header: W_D = 256 plf, W_L = 480 plf
- ASD Overturning Point Load on Header: Q_E = 7,000 lbs (excluding Ω_0), W = 0 lbs

Check Allowable ASD Shear (V) & Frame Geometry

From Table 1.8 8' 0-3/4" Max Wall Heights & 16' - 7" Max span at inside Column Flanges

Try: HFMF1216-16x8

- Allowable ASD Seismic Shear = 15,540 lbs > 15,000 lbs **Ok**
- From Table 1A
  - Column Assembly = BU12.5x64
- From Figures 1 and 2, Beam and Column Sections
  - BU12.5x64 Column Assembly Depth (with Flange Nailers) = 15-1/2" >15" **NG**

Try: HFPIC1014-16x8

- Allowable ASD Seismic Shear = 15,380lbs > 15,000 lbs **OK**
- From Table 1A
  - Column Assembly = BU10.5x61
  - Header Beam = HSS8x6x5/8
- From Figures 1 and 2, Beam and Column Sections
  - BU10.5x61 Column Assembly Depth (with Flange Nailers) = 13-1/2" ≤ 15" **OK**
  - HSS8x6x5/8 Header Beam Assembly Depth (with Nailers at Header Beam) = 15" ≤ 17" **OK**
  - Frame Thickness = 7-1/2" ≤ 7-1/2" Maximum Wall Thickness **OK**

Calculate & Check the Aggregate Additional Vertical Load, P_{DSN}

HFPIC1014-16x8:

- From Table 1A – Column Center-to-Center Span, W_{CL-COL} = 17' 5-1/2" = 17.458 ft
- From Table 1.8 – Max Vertical Load @ Allowable V, P_u = 28,140 lbs
- Equivalent Point Load for Design Dead Load, D = 256 plf x 17.458 ft = 4,470 lbs
- Equivalent Point Load for Design Live Load, L = 480 plf x 17.458 ft = 8,380 lbs
- ASD Overturning Point Load on Moment Frame Header Beam from Earthquake, Q_E = 7,000 lbs (excluding Ω_0)
- ASD Overturning Point Load on Moment Frame Header Beam from Wind, W = 0 lbs
- Over-strength Factor for Earthquake Load, Ω_0 = 3

ASD Load Combinations (Note- Example below only shows the critical combinations):

1. D + L = 4,470 lbs + 8,380 lbs = 12,850 lbs
2. D + 0.6W = 4,470 lbs + 0.6 x 0 lbs = 4,470 lbs
3. D + 0.75L + 0.75(0.6W) = 4,470 lbs + 0.75 x 8,380 lbs + 0.75 x (0.6 x 0 lbs) = 10,760 lbs
4. D + 0.7(Ω_0 x Q_E) = 4,470 lbs + 0.7 x (3 x 7,000 lbs) = 19,170 lbs
5. D + 0.525(Ω_0 x Q_E) + 0.75L = 4,470 lbs + 0.525 x (3 x 7,000 lbs) + 0.75 x 8,380 lbs = 21,780 lbs

Maximum Design Point Load, P_{DSN} = 21,780 lbs < 28,140 lbs **OK**

Use: HFPIC1014-16x8

Calculate Resultant ASD Shear at Column Base (ASD Design Shear & Maximum Design Point Load)

HFPIC1014-16x8:

- From Table 1.8 –Shear @ Max P_u = 0 lbs (Resisted by the Foundation Beam Assembly)
- Shear Multiplier for Maximum Design Point Load, V_{Mult} = Shear @ Max P_u / Max P_u = 0 lbs / 28,140 lbs = 0.00
- Resultant Shear at Column Base, V_R = (V_{DSN} / 2) + (P_{DSN} x V_{Mult}) = (15,000 lbs / 2) + (21,780 lbs x 0.00) = 7,500 lbs

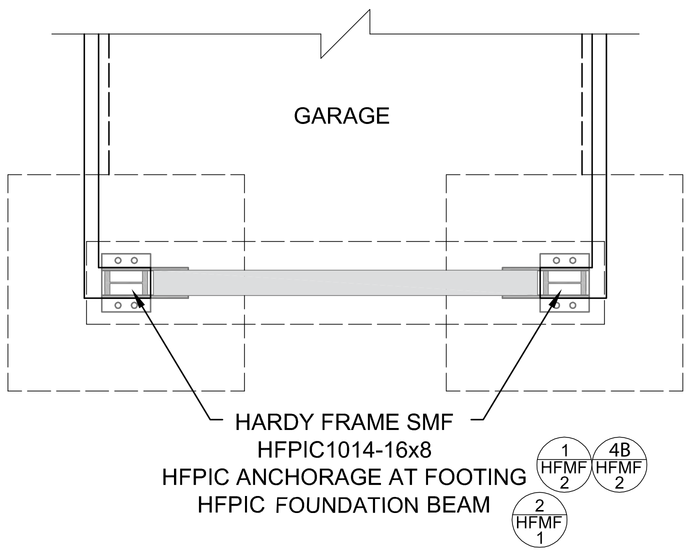
Calculate Resultant ASD Tension and Compression at Column Base (ASD Design Shear & Maximum Design Point Load)

HFPIC1014-16x8:

- Tension and Compression from ASD Design Shear = $(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}$ = (15,000 lbs x 8.06') / 17.458'= 6,930 lbs
- Resultant Compression at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}] + (P_{DSN} / 2)$ = 6,930 lbs + (21,780 lbs / 2) = 17,820 lbs
- Resultant Tension at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}] – [0.6D – 0.7(\Omega_0 \times Q_E)] / 2$
  = 6,930 lbs – [0.6 x (4,470 lbs) – 0.7 x (3 x 7,000 lbs)] / 2 = 12,940 lbs

On the Foundation Plan

1. Specify the model number once per Frame with a multi-leader indicating each column
   - Model number: HFPIC1014-16x8
2. Indicate the anchorage table and the associated anchorage detail for HFPIC Anchorage at Footing
   - Anchorage table: 1 / HFMF-2
   - HFPIC anchorage detail: 4B / HFMF-2
3. Specify the pre-fabricated HFPIC Foundation Beam assembly with minimum concrete coverage
   - Section at HFPIC Foundation Beam: 2 / HFMF-1



On the Framing Plan

1. Specify the model number once per Frame with a multi-leader indicating each column
   - Model number: HFPIC1014-16x8
2. Specify the shear connection from the collector (or “drag”) to the Picture Frame Header Beam assembly
   - Top connection to 2x top plate above: 1 / HFMF-3
3. Indicate whether the Header Beam assembly installs beneath the floor framing or within the floor cavity
   - Section at header w/ bearing joists: 2 / HFMF-3

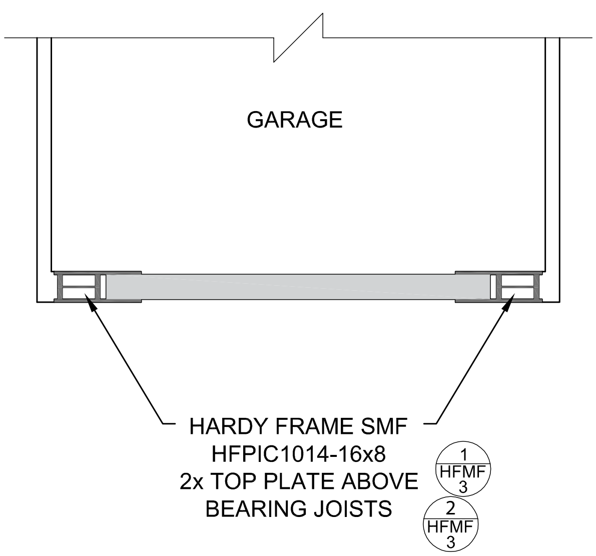


Table 1.8: 8-ft Nominal Wall Height (net wall height = 8' 0-3/4")

Model Number	Maximum Span, $W_{in\text{-}steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD): Seismic 4,5 (R=6.5) (lbs.)	Allowable In-Plane Shear, V (ASD): Wind 6 (Stress) (lbs.)	Max. Vertical Load @ Allowable V, P_u 7 (lbs.)	Column Base Reactions (ASD): Shear @ Allowable V (lbs.)	Column Base Reactions (ASD): Shear @ Max. P_u (lbs.)	Column Base Reactions (ASD): Resultant Shear, V_R 9 (lbs.)	Column Base Reactions (ASD): Uplift @ Allowable V (P_u = 0) 10 (lbs)	Frame Weight (lbs.)
HFMF611-8x8	8' 7"	3,310	1,890	7,500	1,650	1,110	2,760	2,770	729
HFPIC611-8x8		6,690	3,830	15,250	3,340	-	3,340	6,470	1,031
HFMF811-8x8		8,710	4,970	34,000	4,350	5,530	9,880	7,160	1,335
HFPIC811-8x8		15,960	9,120	32,860	7,980	-	7,980	15,130	1,905
HFMF1013-8x8		16,080	9,200	32,500	8,040	5,520	13,560	13,000	1,370
HFPIC1013-8x8		28,890	16,510	30,800	14,440	-	14,440	27,430	1,970
HFMF1214-8x8		21,220	12,090	31,250	10,610	5,830	16,440	16,850	1,517
HFPIC1214-8x8		35,980	20,560	32,400	17,990	-	17,990	33,870	2,236
HFMF611-10x8	10' 7"	2,820	1,620	14,000	1,410	2,550	3,960	1,940	778
HFPIC611-10x8		5,400	3,080	16,290	2,700	-	2,700	4,270	1,129
HFMF811-10x8		7,120	4,080	28,750	3,560	5,840	9,400	4,820	1,428
HFPIC811-10x8		12,630	7,220	28,320	6,310	-	6,310	9,850	2,091
HFMF1013-10x8		13,230	7,590	31,770	6,620	6,730	13,350	8,830	1,463
HFPIC1013-10x8		22,700	12,970	29,690	11,350	-	11,350	17,790	2,155
HFMF1214-10x8		17,060	9,750	30,620	8,530	7,060	15,590	11,220	1,628
HFPIC1214-10x8		27,840	15,900	33,420	13,920	-	13,920	21,700	2,459
HFMF1416-10x8		27,560	15,750	23,750	13,780	5,520	19,300	17,870	1,643
HFPIC1416-10x8		43,830	25,050	29,340	21,910	-	21,910	34,300	2,486
HFMF611-12x8	12' 7"	2,430	1,400	14,220	1,210	3,190	4,400	1,410	828
HFPIC611-12x8		4,500	2,570	13,770	2,250	-	2,250	3,020	1,228
HFMF811-12x8		6,020	3,470	24,690	3,010	6,020	9,030	3,460	1,521
HFPIC811-12x8		10,390	5,940	24,750	5,190	-	5,190	6,890	2,277
HFMF1013-12x8		11,160	6,380	26,880	5,580	6,830	12,410	6,340	1,555
HFPIC1013-12x8		18,690	10,680	27,350	9,350	-	9,350	12,470	2,340
HFMF1214-12x8		14,220	8,160	28,750	7,110	7,900	15,010	7,980	1,740
HFPIC1214-12x8		22,570	12,890	31,060	11,280	-	11,280	15,010	2,683
HFMF1416-12x8		22,750	13,040	25,000	11,380	6,920	18,300	12,610	1,750
HFPIC1416-12x8		35,310	20,180	30,110	17,650	-	17,650	23,630	2,700
HFMF611-14x8	14' 7"	2,130	1,220	11,170	1,070	2,950	4,020	1,080	877
HFPIC611-14x8		3,830	2,190	11,590	1,910	-	1,910	2,240	1,326
HFMF811-14x8		3,830	2,190	21,560	2,600	6,130	8,730	2,600	1,614
HFPIC811-14x8		8,790	5,020	21,890	4,390	-	4,390	5,060	2,463
HFMF1013-14x8		9,620	5,540	24,380	4,810	7,220	12,030	4,760	1,648
HFPIC1013-14x8		15,760	9,000	25,100	7,880	-	7,880	9,160	2,526
HFMF1214-14x8		12,140	6,950	26,880	6,070	8,580	14,650	5,940	1,852
HFPIC1214-14x8		18,880	10,790	28,490	9,440	-	9,440	10,950	2,907
HFMF1416-14x8		19,470	11,060	25,000	9,730	8,030	17,760	9,430	1,858
HFPIC1416-14x8		29,330	16,760	29,150	14,670	-	14,670	17,140	2,915
HFMF611-16x8	16' 7"	1,900	1,100	8,830	950	2,690	3,640	940	926
HFPIC611-16x8		3,340	1,910	9,020	1,680	-	1,860	850	1,424
HFMF813-16x8		7,450	4,220	23,000	3,720	7,010	1,680	1,720	1,702
HFPIC813-16x8		12,580	7,190	25,310	6,290	-	6,290	6,530	2,659
HFMF1014-16x8		9,620	5,480	27,190	4,810	9,070	13,880	4,210	1,909
HFPIC1014-16x8		15,380	8,790	28,140	7,690	-	7,690	7,980	3,057
HFMF1216-16x8		15,540	8,810	27,500	7,770	9,630	17,400	6,740	1,926
HFPIC1216-16x8		23,830	13,620	29,490	11,910	-	11,910	12,470	3,075
HFMF1416-16x8		18,810	10,790	31,880	9,400	11,490	20,890	8,080	2,170
HFPIC1416-16x8		28,460	16,260	34,910	14,230	-	14,230	14,760	3,540
HFMF813-18x8	18'-7"	6,680	3,830	22,500	3,340	7,770	11,110	2,640	1,795
HFPIC813-18x8		11,150	6,370	22,790	5,570	-	5,570	5,190	2,844
HFMF1014-18x8		8,540	4,880	24,690	4,270	9,290	13,560	3,350	2,020
HFPIC1014-18x8		13,520	7,730	25,580	6,760	-	6,760	6,290	3,281
HFMF1216-18x8		13,790	7,880	25,620	6,890	10,110	17,000	5,370	2,033
HFPIC1216-18x8		20,840	11,910	27,140	10,420	-	10,420	9,800	3,290
HFMF1416-18x8		16,620	9,560	30,000	8,310	12,150	20,460	6,420	2,301
HFPIC1416-18x8		24,920	14,240	32,090	12,460	-	12,460	11,620	3,801

Table 1.8: 8-ft Nominal Wall Height (net wall height = 8' 0-3/4")

Model Number	Maximum Span, $W_{in\text{-}steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD)		Max. Vertical Load @ Allowable V, P_u [7] (lbs.)	Column Base Reactions (ASD)				Frame Weight (lbs.)
		Seismic [4,5] (R=6.5) (lbs.)	Wind [6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R [9] (lbs.)	Uplift @ Allowable V (P_u = 0) [10] (lbs)	
HFMF813-20x8	20'-7"	6,070	3,470	20,310	3,030	7,830	10,860	2,180	1,887
HFPIC813-20x8		9,990	5,700	20,310	4,990	-	4,990	4,210	3,029
HFMF1014-20x8		7,710	4,410	22,500	3,850	9,420	13,270	2,750	2,132
HFPIC1014-20x8		12,030	6,870	23,400	6,010	-	6,010	5,080	3,504
HFMF1216-20x8		12,250	7,040	23,750	6,130	10,420	16,550	4,330	2,141
HFPIC1216-20x8		18,420	10,530	25,040	9,210	-	9,210	7,860	3,505
HFMF1416-20x8		14,870	8,540	28,120	7,430	12,640	20,070	5,220	2,431
HFPIC1416-20x8		22,040	12,600	29,600	11,020	-	11,020	9,330	4,062
HFMF813-22x8	22'-7"	5,580	3,200	17,190	2,790	7,330	10,120	1,830	1,980
HFPIC813-22x8		9,060	5,180	17,190	4,530	-	4,530	3,490	3,214
HFMF1014-22x8		7,000	4,040	20,620	3,500	9,510	13,010	2,280	2,244
HFPIC1014-22x8		10,830	6,190	21,420	5,410	-	5,410	4,190	3,728
HFMF1216-22x8		11,160	6,380	21,880	5,580	10,570	16,150	3,610	2,248
HFPIC1216-22x8		16,580	9,480	23,040	8,290	-	8,290	6,480	3,720
HFMF1416-22x8		13,450	7,700	25,940	6,720	12,810	19,530	4,320	2,562
HFPIC1416-22x8		19,760	11,290	27,270	9,880	-	9,880	7,670	4,323
HFMF813-24x8	24'-7"	5,140	2,930	14,530	2,570	6,790	9,360	1,550	2,072
HFPIC813-24x8		8,270	4,730	14,530	4,130	-	4,130	2,930	3,399
HFMF1014-24x8		6,450	3,680	18,120	3,220	9,130	12,350	1,940	2,356
HFPIC1014-24x8		9,850	5,630	18,400	4,920	-	4,920	3,510	3,951
HFMF1216-24x8		10,180	5,810	20,310	5,090	10,720	15,810	3,030	2,356
HFPIC1216-24x8		15,010	8,580	21,340	7,500	-	7,500	5,400	3,935
HFMF1416-24x8		12,250	7,040	24,060	6,130	12,950	19,080	3,630	2,692
HFPIC1416-24x8		17,900	10,230	25,130	8,950	-	8,950	6,410	4,584

Notes:

1. The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.

2. Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).

3. The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.

4. For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, C_d = 4.0, Ω_0 = 3.0) and do not exceed code-required inter-story drift limitations (Δ_s = 0.025h). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.

5. For Seismic designs requiring redundancy factor ρ = 1.3, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (ρ_u) and column base reactions assume stresses at ρ = 1.0.

6. For Wind design, allowable shear loads are limited to h/400 story drift, including a factor ($Wind_{Drift}$ / $Wind_{Stress}$ = 0.6) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.

7. Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.

8. Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.

9. Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (Shear\ @\ Max.P_u / Max.P_u)]$$

V_{DSN} = Design shear load (lbs.)
P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

10. Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$Uplift\ w/\ Seismic\ HD\ Forces = [(V_{DSN} \times H_{MF})/W_{CL\text{-}COL}] - [(0.6D - 0.7\Omega_0\, Q_E)/2]$$
$$Uplift\ w/\ Wind\ HD\ Forces = [(V_{DSN} \times H_{MF})/W_{CL\text{-}COL}] - [(0.6D - 0.6W)/2]$$

V_{DSN} = Design shear load (lbs.)
H_{MF} = Moment Frame height (ft.)
$W_{CL\text{-}COL}$ = Column center-to-center span (ft.)
D = Design aggregate point load at beam mid-span due to dead load only (lbs.)
Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)
W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

Table 1.10: 10-ft Nominal Wall Height (net wall height = 10' 0-3/4")

Model Number	Maximum Span, $W_{in\text{-}steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD)		Max. Vertical Load @ Allowable V, P_u [7] (lbs.)	Column Base Reactions (ASD)				Frame Weight (lbs.)
		Seismic [4,5] (R=6.5) (lbs.)	Wind [6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R [9] (lbs.)	Uplift @ Allowable V (P_u = 0) [10] (lbs)	
HFMF611- 8x10	8' 7"	2,250	1,290	5,000	1,130	540	1,670	2,370	861
HFPIC611-8x10		5,090	2,910	12,000	2,540	-	2,540	6,030	1,163
HFMF811-8x10		6,120	3,530	34,000	3,060	4,220	7,280	6,350	1,571
HFPIC811-8x10		12,600	7,200	35,250	6,300	-	6,300	14,650	2,141
HFMF1013-8x10		11,270	6,420	30,000	5,640	3,870	9,510	11,490	1,614
HFPIC1013-8x10		22,800	13,030	35,750	11,400	-	11,400	26,470	2,214
HFMF1214-8x10		15,100	8,630	34,000	7,550	4,860	12,410	15,120	1,773
HFPIC1214-8x10		28,810	16,460	32,430	14,400	-	14,400	33,110	2,492
HFMF611-10x10	10' 7"	1,960	1,110	12,000	980	1,670	2,650	1,700	910
HFPIC611-10x10		4,180	2,390	15,920	2,090	-	2,090	4,050	1,261
HFMF811-10x10		5,140	2,960	32,500	2,570	5,060	7,630	4,390	1,664
HFPIC811-10x10		10,080	5,760	30,240	5,040	-	5,040	9,650	2,327
HFMF1013-10x10		9,520	5,450	36,250	4,760	5,870	10,630	8,010	1,707
HFPIC1013-10x10		18,230	10,410	32,660	9,110	-	9,110	17,460	2,399
HFMF1214-10x10		12,470	7,130	36,880	6,230	6,550	12,780	10,340	1,884
HFPIC1214-10x10		22,690	12,970	35,550	11,340	-	11,340	21,590	2,715
HFMF1416-10x10		19,910	11,340	33,750	9,950	6,040	15,990	16,290	1,907
HFPIC1416-10x10		35,630	20,360	32,680	17,820	-	17,820	33,930	2,750
HFMF611-12x10	12' 7"	1,710	990	13,120	860	2,230	3,090	1,260	960
HFPIC611-12x10		3,520	2,020	13,120	1,750	-	1,760	2,900	1,360
HFMF811-12x10		4,440	2,540	26,880	2,220	5,050	7,270	3,220	1,757
HFPIC811-12x10		8,370	4,780	26,000	4,180	-	4,180	6,800	2,513
HFMF1013-12x10		8,100	4,640	31,250	4,050	6,100	10,150	5,800	1,799
HFPIC1013-12x10		15,080	8,620	29,230	7,540	-	7,540	12,300	2,584
HFMF1214-12x10		10,500	6,000	32,500	5,250	6,900	12,150	7,430	1,996
HFPIC1214-12x10		18,510	10,580	32,400	9,250	-	9,250	15,020	2,939
HFMF1416-12x10		16,620	9,560	31,250	8,310	6,680	14,990	11,620	2,014
HFPIC1416-12x10		28,980	16,560	32,010	14,490	-	14,490	23,600	2,964
HFMF611-14x10	14' 7"	1,540	890	10,160	770	2,050	2,820	980	1,009
HFPIC611-14x10		3,040	1,740	10,780	1,520	-	1,520	2,170	1,458
HFMF811-14x10		3,860	2,210	22,810	1,930	5,020	6,950	2,430	1,850
HFPIC811-14x10		7,130	4,070	22,760	3,560	-	3,560	5,040	2,699
HFMF1013-14x10		7,120	4,040	26,880	3,560	6,140	9,700	4,440	1,892
HFPIC1013-14x10		12,830	7,330	26,350	6,410	-	6,410	9,110	2,770
HFMF1214-14x10		9,030	5,160	29,380	4,510	7,270	11,780	5,570	2,108
HFPIC1214-14x10		15,570	8,900	29,400	7,780	-	7,780	11,030	3,163
HFMF1416-14x10		14,330	8,160	29,380	7,160	7,310	14,470	8,750	2,122
HFPIC1416-14x10		24,300	13,890	30,310	12,150	-	12,150	17,280	3,179
HFMF611-16x10	16' 7"	1,390	790	8,120	700	1,890	2,590	780	1,058
HFPIC611-16x10		2,680	1,530	8,440	1,340	-	1,340	1,690	1,556
HFMF813-16x10		5,370	3,050	23,500	2,680	5,470	8,150	2,990	1,938
HFPIC813-16x10		10,130	5,790	25,000	5,060	-	5,060	6,430	2,895
HFMF1014-16x10		7,120	4,040	29,690	3,560	7,630	11,190	3,930	2,153
HFPIC1014-16x10		12,560	7,180	29,400	6,280	-	6,280	7,960	3,301
HFMF1216-16x10		11,390	6,470	31,250	5,690	8,430	14,120	6,230	2,182
HFPIC1216-16x10		19,640	11,220	30,880	9,820	-	9,820	12,510	3,331
HFMF1416-16x10		14,000	8,030	35,620	7,000	9,930	16,930	7,590	2,434
HFPIC1416-16x10		23,580	13,470	36,240	11,790	-	11,790	14,880	3,804
HFMF813-18x10	18'-7"	4,880	2,780	22,810	2,440	6,030	8,470	2,440	2,031
HFPIC813-18x10		9,010	5,150	24,080	4,500	-	4,500	5,120	3,080
HFMF1014-18x10		6,350	3,630	26,560	3,170	7,720	10,890	3,140	2,264
HFPIC1014-18x10		11,090	6,330	26,600	5,540	-	5,540	6,300	3,525
HFMF1216-18x10		10,180	5,810	28,120	5,090	8,560	13,650	5,000	2,289
HFPIC1216-18x10		17,180	9,820	28,210	8,590	-	8,590	9,830	3,546
HFMF1416-18x10		12,470	7,130	32,500	6,230	10,200	16,430	6,080	2,565
HFPIC1416-18x10		20,740	11,850	33,120	10,370	-	10,370	11,770	4,065

Table 1.10: 10-ft Nominal Wall Height (net wall height = 10' 0-3/4")

Model Number	Maximum Span, $W_{in\text{-}Steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD)		Max. Vertical Load @ Allowable V, P_u [7] (lbs.)	Column Base Reactions (ASD) [8]				Frame Weight (lbs.)
		Seismic [4,5] (R=6.5) (lbs.)	Wind [6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R [9] (lbs.)	"Uplift @ Allowable V (P_u = 0) [10] (lbs.)	
HFMF813-20x10	20'-7"	4,440	2,540	18,910	2,220	5,600	7,820	2,010	2,123
HFPIC813-20x10		8,110	4,640	19,790	4,050	-	4,050	4,180	3,265
HFMF1014-20x10		5,740	3,290	24,060	2,870	7,800	10,670	2,580	2,376
HFPIC1014-20x10		9,920	5,670	24,160	4,960	-	4,960	5,120	3,748
HFMF1216-20x10		9,200	5,250	25,940	4,600	8,810	13,410	4,100	2,397
HFPIC1216-20x10		15,320	8,760	25,900	7,660	-	7,660	7,950	3,761
HFMF1416-20x10		11,270	6,420	30,000	5,640	10,470	16,110	4,990	2,695
HFPIC1416-20x10		18,370	10,490	30,480	9,180	-	9,180	9,460	4,326
HFMF813-22x10	22'-7"	4,110	2,340	15,940	2,050	5,230	7,280	1,700	2,216
HFPIC813-22x10		7,380	4,220	16,570	3,690	-	3,690	3,480	3,450
HFMF1014-22x10		5,250	3,000	20,310	2,630	7,270	9,900	2,160	2,488
HFPIC1014-22x10		8,960	5,120	20,910	4,480	-	4,480	4,220	3,972
HFMF1216-22x10		8,310	4,790	23,750	4,150	8,890	13,040	3,390	2,504
HFPIC1216-22x10		13,790	7,880	23,800	6,890	-	6,890	6,550	3,976
HFMF1416-22x10		10,180	5,810	27,810	5,090	10,680	15,770	4,120	2,826
HFPIC1416-22x10		16,530	9,450	28,020	8,260	-	8,260	7,800	4,587
HFMF813-24x10	24'-7"	3,810	2,180	13,590	1,900	4,900	6,800	1,450	2,308
HFPIC813-24x10		6,760	3,860	14,030	3,380	-	3,380	2,930	3,635
HFMF1014-24x10		4,880	2,780	17,190	2,440	6,730	9,170	1,850	2,600
HFPIC1014-24x10		8,170	4,670	17,610	4,080	-	4,080	3,550	4,195
HFMF1216-24x10		7,660	4,370	21,880	3,830	8,960	12,790	2,880	2,612
HFPIC1216-24x10		12,530	7,160	21,910	6,260	-	6,260	5,490	4,191
HFMF1416-24x10		9,310	5,340	25,620	4,650	10,740	15,390	3,480	2,956
HFPIC1416-24x10		14,990	8,570	25,810	7,490	-	7,490	6,520	4,848

Notes:

1. The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.

2. Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).

3. The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.

4. For Seismic design, allowable shear loads are determined using light-frame design coefficients ($R = 6.5$, $C_d = 4.0$, $\Omega_0 = 3.0$) and do not exceed code-required inter-story drift limitations ($\Delta_s = 0.025h$). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.

5. For Seismic designs requiring redundancy factor $\rho = 1.3$, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (ρ_u) and column base reactions assume stresses at $\rho = 1.0$.

6. For Wind design, allowable shear loads are limited to h/400 story drift, including a factor ($Wind_{Drift} / Wind_{Stress} = 0.6$) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.

7. Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.

8. Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.

9. Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$V_R = (V_{DSN}/2) + [P_{DSN} \times (Shear\ @\ Max.P_u / Max.P_u)]$

V_{DSN} = Design shear load (lbs.)

P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

10. Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

Uplift w/ Seismic HD Forces = $[(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}] - [(0.6D - 0.7\Omega_0 Q_E)/2]$

Uplift w/ Wind HD Forces = $[(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL}] - [(0.6D - 0.6W)/2]$

V_{DSN} = Design shear load (lbs.)

H_{MF} = Moment Frame height (ft.)

$W_{CL\text{-}COL}$ = Column center-to-center span (ft.)

D = Design aggregate point load at beam mid-span due to dead load only (lbs.)

Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)

W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

Table 1.12: 12-ft Nominal Wall Height (net wall height =12’ 0-3/4”)

Model Number	Maximum Span, $W_{in\text{-}Steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD)		Max. Vertical Load @ Allowable V, P_u [7] (lbs.)	Column Base Reactions (ASD) [8]				Frame Weight (lbs.)
		Seismic[4, 5] (R = 6.5) (lbs.)	Wind [6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R [9] (lbs.)	Uplift @ Allowable V (P_u = 0) [10] (lbs.)	
HFMF811-8x12	8’-7”	4,600	2,630	34,000	2,300	3,370	5,670	5,760	1,807
HFPIC811-8x12		10,180	5,810	35,250	5,090	-	5,090	14,030	2,377
HFMF1013-8x12		8,310	4,730	28,000	4,150	2,880	7,030	10,230	1,858
HFPIC1013-8x12		18,380	10,500	35,750	9,190	-	9,190	25,210	2,458
HFMF1214-8x12		11,270	6,470	34,000	5,640	3,890	9,530	13,640	2,029
HFPIC1214-8x12		23,620	13,490	32,380	11,810	-	11,810	32,050	2,748
HFMF811-10x12	10’-7”	3,920	2,240	32,500	1,960	4,060	6,020	4,040	1,900
HFPIC811-10x12		8,250	4,710	32,500	4,120	-	4,120	9,360	2,563
HFMF1013-10x12		7,120	4,080	42,500	3,560	5,510	9,070	7,230	1,951
HFPIC1013-10x12		14,940	8,540	35,750	7,470	-	7,470	16,910	2,643
HFMF1214-10x12		9,460	5,390	43,120	4,730	6,160	10,890	9,470	2,140
HFPIC1214-10x12		18,800	10,740	38,470	9,400	-	9,400	21,120	2,971
HFMF1416-10x12		14,980	8,540	42,500	7,490	6,110	13,600	14,790	2,171
HFPIC1416-10x12		29,640	16,940	36,770	14,820	-	14,820	33,240	3,014
HFMF811-12x12	12’-7”	3,390	1,950	27,500	1,690	4,160	5,850	2,970	1,993
HFPIC811-12x12		6,900	3,940	27,420	3,450	-	3,450	6,640	2,749
HFMF1013-12x12		6,190	3,540	35,000	3,090	5,490	8,580	5,350	2,043
HFPIC1013-12x12		12,460	7,130	31,420	6,230	-	6,230	12,020	2,828
HFMF1214-12x12		8,100	4,640	36,250	4,050	6,220	10,270	6,920	2,252
HFPIC1214-12x12		15,450	8,830	34,160	7,720	-	7,720	14,810	3,195
HFMF1416-12x12		12,810	7,310	37,500	6,400	6,470	12,870	10,810	2,278
HFPIC1416-12x12		24,300	13,890	34,370	12,150	-	12,150	23,300	3,228
HFMF811-14x12	14’-7”	2,990	1,710	21,250	1,490	3,780	5,270	2,270	2,086
HFPIC811-14x12		5,910	3,380	22,650	2,950	-	2,950	4,950	2,935
HFMF1013-14x12		5,470	3,120	29,380	2,730	5,410	8,140	4,120	2,136
HFPIC1013-14x12		10,660	6,090	27,840	5,330	-	5,330	8,950	3,014
HFMF1214-14x12		7,000	4,040	31,880	3,500	6,390	9,890	5,220	2,364
HFPIC1214-14x12		13,080	7,470	30,570	6,540	-	6,540	10,930	3,419
HFMF1416-14x12		11,160	6,380	33,120	5,580	6,670	12,250	8,230	2,386
HFPIC1416-14x12		20,450	11,690	31,930	10,220	-	10,220	17,130	3,443
HFMF813-16x12	16’-7”	4,060	2,330	21,000	2,030	3,910	5,940	2,730	2,174
HFPIC813-16x12		8,320	4,760	26,220	4,160	-	4,160	6,240	3,131
HFMF1014-16x12		5,470	3,120	32,190	2,730	6,670	9,400	3,650	2,397
HFPIC1014-16x12		10,480	5,990	30,880	5,240	-	5,240	7,840	3,545
HFMF1216-16x12		8,750	4,970	35,000	4,380	7,600	11,980	5,780	2,438
HFPIC1216-16x12		16,410	9,380	32,680	8,200	-	8,200	12,310	3,587
HFMF1416-16x12		10,830	6,200	39,380	5,410	8,880	14,290	7,090	2,698
HFPIC1416-16x12		19,960	11,400	37,790	9,980	-	9,980	14,840	4,068
HFMF813-18x12	18’-7”	3,720	2,120	21,090	1,860	4,470	6,330	2,240	2,267
HFPIC813-18x12		7,450	4,260	22,710	3,720	-	3,720	5,010	3,316
HFMF1014-18x12		4,930	2,810	27,500	2,460	6,460	8,920	2,950	2,508
HFPIC1014-18x12		9,290	5,310	27,700	4,640	-	4,640	6,240	3,769
HFMF1216-18x12		7,870	4,500	31,250	3,930	7,680	11,610	4,670	2,545
HFPIC1216-18x12		14,490	8,280	29,550	7,240	-	7,240	9,770	3,802
HFMF1416-18x12		9,730	5,580	35,620	4,870	9,060	13,930	5,730	2,829
HFPIC1416-18x12		17,500	10,000	34,460	8,750	-	8,750	11,690	4,329
HFMF813-20x12	20’-7”	3,430	1,950	17,660	1,710	4,210	5,920	1,870	2,359
HFPIC813-20x12		6,740	3,850	18,730	3,370	-	3,370	4,100	3,501
HFMF1014-20x12		4,480	2,580	22,810	2,240	5,980	8,220	2,430	2,620
HFPIC1014-20x12		8,350	4,770	23,910	4,170	-	4,170	5,080	3,992
HFMF1216-20x12		7,120	4,080	28,120	3,560	7,720	11,280	3,830	2,653
HFPIC1216-20x12		12,940	7,400	26,930	6,470	-	6,470	7,920	4,017
HFMF1416-20x12		8,870	5,060	32,190	4,430	9,120	13,550	4,740	2,959
HFPIC1416-20x12		15,610	8,930	31,450	7,810	-	7,810	9,480	4,590

Table 1.12: 12-ft Nominal Wall Height (net wall height =12' 0-3/4")

Model Number	Maximum Span, $W_{in\text{-}Steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD)		Max. Vertical Load @ Allowable V, P_u [7] (lbs.)	Column Base Reactions (ASD) [8]				Frame Weight (lbs.)
		Seismic[4, 5] (R = 6.5) (lbs.)	Wind [6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R [9] (lbs.)	Uplift @ Allowable V (P_u = 0) [10] (lbs.)	
HFMF813-22x12	22'-7"	3,180	1,800	15,000	1,590	3,970	5,560	1,590	2,452
HFPIC813-22x12		6,150	3,510	15,730	3,070	-	3,070	3,420	3,686
HFMF1014-22x12		4,160	2,370	19,220	2,080	5,580	7,660	2,060	2,732
HFPIC1014-22x12		7,560	4,320	20,000	3,780	-	3,780	4,210	4,216
HFMF1216-22x12		6,560	3,750	25,620	3,280	7,780	11,060	3,230	2,760
HFPIC1216-22x12		11,690	6,680	24,630	5,840	-	5,840	6,550	4,232
HFMF1416-22x12		8,050	4,590	29,380	4,020	9,180	13,200	3,940	3,090
HFPIC1416-22x12		14,070	8,040	28,860	7,030	-	7,030	7,820	4,851
HFMF813-24x12	24'-7"	2,950	1,700	12,810	1,470	3,730	5,200	1,360	2,544
HFPIC813-24x12		5,650	3,230	13,340	2,820	-	2,820	2,900	3,871
HFMF1014-24x12		3,830	2,180	16,410	1,910	5,220	7,130	1,750	2,844
HFPIC1014-24x12		6,910	3,950	16,890	3,450	-	3,450	3,540	4,439
HFMF1216-24x12		6,020	3,450	23,440	3,010	7,790	10,800	2,740	2,868
HFPIC1216-24x12		10,640	6,080	22,630	5,320	-	5,320	5,490	4,447
HFMF1416-24x12		7,380	4,220	27,190	3,690	9,280	12,970	3,330	3,220
HFPIC1416-24x12		12,770	7,290	26,560	6,380	-	6,380	6,550	5,112

Notes:

1. The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.

2. Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).

3. The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.

4. For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, C_d = 4.0, Ω_0 = 3.0) and do not exceed code-required inter-story drift limitations (Δ_s = 0.025h). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.

5. For Seismic designs requiring redundancy factor ρ = 1.3, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (ρ_u) and column base reactions assume stresses at ρ = 1.0.

6. For Wind design, allowable shear loads are limited to h/400 story drift, including a factor ($Wind_{Drift}$ / $Wind_{Stress}$ = 0.6) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.

7. Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.

8. Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.

9. Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (\text{Shear @ Max.}P_u / \text{Max.}P_u)]$$

V_{DSN} = Design shear load (lbs.)
P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

10. Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$\text{Uplift w/ Seismic HD Forces} = [(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL})] - [(0.6D - 0.7\Omega_0 Q_E)/2]$$
$$\text{Uplift w/ Wind HD Forces} = [(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL})] - [(0.6D - 0.6W)/2]$$

V_{DSN} = Design shear load (lbs.)
H_{MF} = Moment Frame height (ft.)
$W_{CL\text{-}COL}$ = Column center-to-center span (ft.)
D = Design aggregate point load at beam mid-span due to dead load only (lbs.)
Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)
W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

Table 1.14: 14-ft Nominal Wall Height (net wall height = 14' 0-3/4")

Model Number	Maximum Span, W_{in} Steel (ft-in)	Allowable In-Plane Shear, V (ASD)		Max. Vertical Load @ Allowable V, P_u [7] (lbs.)	Column Base Reactions (ASD) [8]				Frame Weight (lbs.)
		Seismic [4, 5] (R = 6.5) (lbs.)	Wind [6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R [9] (lbs.)	Uplift @ Allowable V (P_u = 0) [10] (lbs.)	
HFMF811-8x14	8'-7"	3,550	2,040	34,000	1,770	2,770	4,540	5,210	2,043
HFPIC811-8x14		8,390	4,800	35,250	4,190	-	4,190	13,370	2,613
HFMF1013-8x14		6,400	3,660	27,500	3,200	2,320	5,520	9,230	2,102
HFPIC1013-8x14		15,120	8,640	35,750	7,560	-	7,560	23,950	2,702
HFMF1214-8x14		8,750	5,030	34,000	4,380	3,220	7,600	12,410	2,285
HFPIC1214-8x14	10'-7"	19,610	11,210	32,390	9,800	-	9,800	30,680	3,004
HFMF811-10x14		3,060	1,760	31,560	1,530	3,270	4,800	3,700	2,136
HFPIC811-10x14		6,890	3,930	31,560	3,440	-	3,440	9,030	2,799
HFMF1013-10x14		5,580	3,200	41,250	2,790	4,410	7,200	6,640	2,195
HFPIC1013-10x14		12,440	7,110	35,750	6,220	-	6,220	16,260	2,887
HFMF1214-10x14		7,450	4,280	49,380	3,720	5,860	9,580	8,730	2,396
HFPIC1214-10x14		15,830	9,050	41,730	7,910	-	7,910	20,510	3,227
HFMF1416-10x14		11,700	6,660	40,000	5,850	4,770	10,620	13,540	2,435
HFPIC1416-10x14		24,930	14,250	38,720	12,460	-	12,460	32,190	3,278
HFMF811-12x14	12'-7"	2,710	1,550	25,620	1,350	3,220	4,570	2,780	2,229
HFPIC811-12x14		5,810	3,320	26,900	2,900	-	2,900	6,470	2,985
HFMF1013-12x14		4,880	2,790	35,310	2,440	4,590	7,030	4,940	2,287
HFPIC1013-12x14		10,490	5,990	33,800	5,240	-	5,240	11,670	3,072
HFMF1214-12x14		6,450	3,680	40,000	3,220	5,720	8,940	6,460	2,508
HFPIC1214-12x14		13,140	7,510	36,050	6,570	-	6,570	14,520	3,451
HFMF1416-12x14		10,180	5,810	43,120	5,090	6,190	11,280	10,060	2,542
HFPIC1416-12x14		20,630	11,790	35,900	10,310	-	10,310	22,770	3,492
HFMF811-14x14	14'-7"	2,410	1,370	20,000	1,200	2,960	4,160	2,150	2,322
HFPIC811-14x14		5,010	2,860	21,630	2,500	-	2,500	4,850	3,171
HFMF1013-14x14		4,350	2,480	30,940	2,170	4,740	6,910	3,840	2,380
HFPIC1013-14x14		9,030	5,160	29,410	4,510	-	4,510	8,740	3,258
HFMF1214-14x14		5,630	3,230	34,380	2,810	5,760	8,570	4,920	2,620
HFPIC1214-14x14		11,180	6,390	31,860	5,590	-	5,590	10,770	3,675
HFMF1416-14x14		8,870	5,060	37,500	4,430	6,300	10,730	7,660	2,650
HFPIC1416-14x14		17,500	10,000	33,250	8,750	-	8,750	16,870	3,707
HFMF813-16x14	16'-7"	3,180	1,800	19,000	1,590	2,910	4,500	2,500	2,410
HFPIC813-16x14		6,970	3,980	25,650	3,480	-	3,480	6,030	3,367
HFMF1014-16x14		4,350	2,480	31,560	2,170	5,430	7,600	3,400	2,641
HFPIC1014-16x14		8,890	5,090	31,900	4,450	-	4,450	7,670	3,789
HFMF1216-16x14		6,890	3,950	38,750	3,440	6,980	10,420	5,330	2,694
HFPIC1216-16x14		13,980	7,980	32,660	6,990	-	6,990	12,080	3,843
HFMF1416-16x14		8,710	4,970	43,120	4,350	8,100	12,450	6,670	2,962
HFPIC1416-16x14		17,060	9,750	38,910	8,530	-	8,530	14,600	4,332
HFMF813-18x14	18'-7"	2,940	1,680	19,690	1,470	3,450	4,920	2,070	2,503
HFPIC813-18x14		6,270	3,580	21,570	3,130	-	3,130	4,870	3,552
HFMF1014-18x14		3,970	2,270	25,940	1,980	5,070	7,050	2,780	2,752
HFPIC1014-18x14		7,920	4,530	27,860	3,960	-	3,960	6,130	4,013
HFMF1216-18x14		6,300	3,620	33,750	3,150	6,900	10,050	4,380	2,801
HFPIC1216-18x14		12,370	7,070	30,970	6,180	-	6,180	9,600	4,058
HFMF1416-18x14		7,870	4,500	38,120	3,930	8,100	12,030	5,420	3,093
HFPIC1416-18x14		15,060	8,610	35,820	7,530	-	7,530	11,590	4,593
HFMF813-20x14	20'-7"	2,710	1,550	16,560	1,350	3,270	4,620	1,740	2,595
HFPIC813-20x14		5,690	3,250	17,820	2,840	-	2,840	4,000	3,737
HFMF1014-20x14		3,640	2,070	21,560	1,820	4,720	6,540	2,310	2,864
HFPIC1014-20x14		7,140	4,080	22,910	3,570	-	3,570	5,010	4,236
HFMF1216-20x14		5,740	3,290	30,000	2,870	6,870	9,740	3,620	2,909
HFPIC1216-20x14		11,110	6,350	28,020	5,550	-	5,550	7,820	4,273
HFMF1416-20x14		7,120	4,080	34,380	3,560	8,150	11,710	4,450	3,223
HFPIC1416-20x14		13,450	7,680	32,570	6,720	-	6,720	9,390	4,854

Table 1.14: 14-ft Nominal Wall Height (net wall height = 14' 0-3/4")

Model Number	Maximum Span, $W_{in\ Steel}$ (ft-in)	Allowable In-Plane Shear, V (ASD)		Max.w Vertical Load @ Allowable V, P_u[7] (lbs.)	Column Base Reactions (ASD)[8]				Frame Weight (lbs.)
		Seismic[4, 5] (R = 6.5) (lbs.)	Wind[6] (Stress) (lbs.)		Shear @ Allowable V (lbs.)	Shear @ Max. P_u (lbs.)	Resultant Shear, V_R[9] (lbs.)	Uplift @ Allowable V (P_u = 0)[10] (lbs.)	
HFMF813-22x14	22'-7"	2,550	1,460	14,060	1,270	3,090	4,360	1,490	2,688
HFPIC813-22x14		5,210	2,980	15,000	2,600	-	2,600	3,350	3,922
HFMF1014-22x14		3,340	1,920	18,280	1,670	4,430	6,100	1,940	2,976
HFPIC1014-22x14		6,480	3,710	19,210	3,240	-	3,240	4,160	4,460
HFMF1216-22x14		5,300	3,020	26,880	2,650	6,810	9,460	3,060	3,016
HFPIC1216-22x14		10,060	5,750	25,530	5,030	-	5,030	6,480	4,488
HFMF1416-22x14		6,560	3,750	31,250	3,280	8,180	11,460	3,760	3,354
HFPIC1416-22x14		12,160	6,950	29,760	6,080	-	6,080	7,780	5,115
HFMF813-24x14	24'-7"	2,380	1,370	12,030	1,190	2,910	4,100	1,280	2,780
HFPIC813-24x14		4,810	2,750	12,740	2,400	-	2,400	2,840	4,107
HFMF1014-24x14		3,130	1,790	15,620	1,560	4,160	5,720	1,670	3,088
HFPIC1014-24x14		5,940	3,390	16,250	2,970	-	2,970	3,510	4,683
HFMF1216-24x14		4,900	2,790	24,060	2,450	6,690	9,140	2,610	3,124
HFPIC1216-24x14		9,170	5,240	23,380	4,590	-	4,590	5,450	4,703
HFMF1416-24x14		6,020	3,450	28,750	3,010	8,240	11,250	3,190	3,484
HFPIC1416-24x14		11,060	6,320	27,310	5,530	-	5,530	6,530	5,376

Notes:

1. The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.

2. Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).

3. The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.

4. For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, C_d = 4.0, Ω_0 = 3.0) and do not exceed code-required inter-story drift limitations (Δ_s = 0.025h). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.

5. For Seismic designs requiring redundancy factor ρ = 1.3, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (ρ_u) and column base reactions assume stresses at ρ = 1.0.

6. For Wind design, allowable shear loads are limited to h/400 story drift, including a factor ($Wind_{Drift}$ / $Wind_{Stress}$ = 0.6) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.

7. Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.

8. Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.

9. Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (Shear\ @\ Max.P_u / Max.P_u)]$$

V_{DSN} = Design shear load (lbs.)
P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

10. Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$Uplift\ w/\ Seismic\ HD\ Forces = [(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL})] - [(0.6D - 0.7\Omega_0\ Q_E)/2]$$
$$Uplift\ w/\ Wind\ HD\ Forces = [(V_{DSN} \times H_{MF}) / W_{CL\text{-}COL})] - [(0.6D - 0.6W)/2]$$

V_{DSN} = Design shear load (lbs.)
H_{MF} = Moment Frame height (ft.)
$W_{CL\text{-}COL}$ = Column center-to-center span (ft.)
D = Design aggregate point load at beam mid-span due to dead load only (lbs.)
Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)
W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

INSTALLER

HOW TO QUOTE A HARDY FRAME® MOMENT FRAME:

Locate the model number call-out on Foundation and Framing plans.

Note: One Moment Frame consists of two columns and a header beam (Picture Frame includes an additional foundation beam). Be careful not to double the count by confusing Moment Frame columns with individual Hardy Frame® Panels.

Call your material supplier with the following information for a job quote:

- Job name and location
- Quantity and model number
- Chosen delivery option: Pre-assembled, column splice or knock-down (KD)
- Project accessibility for trucks to deliver
- Jobsite access for installing the Frame

Check minimum edge distance requirements at top of concrete to determine wood framing requirements.

Check job conditions for accessibility and placement of pre-assembled Frames with a forklift or crane.

ORDERING A HARDY FRAME® MOMENT FRAME:

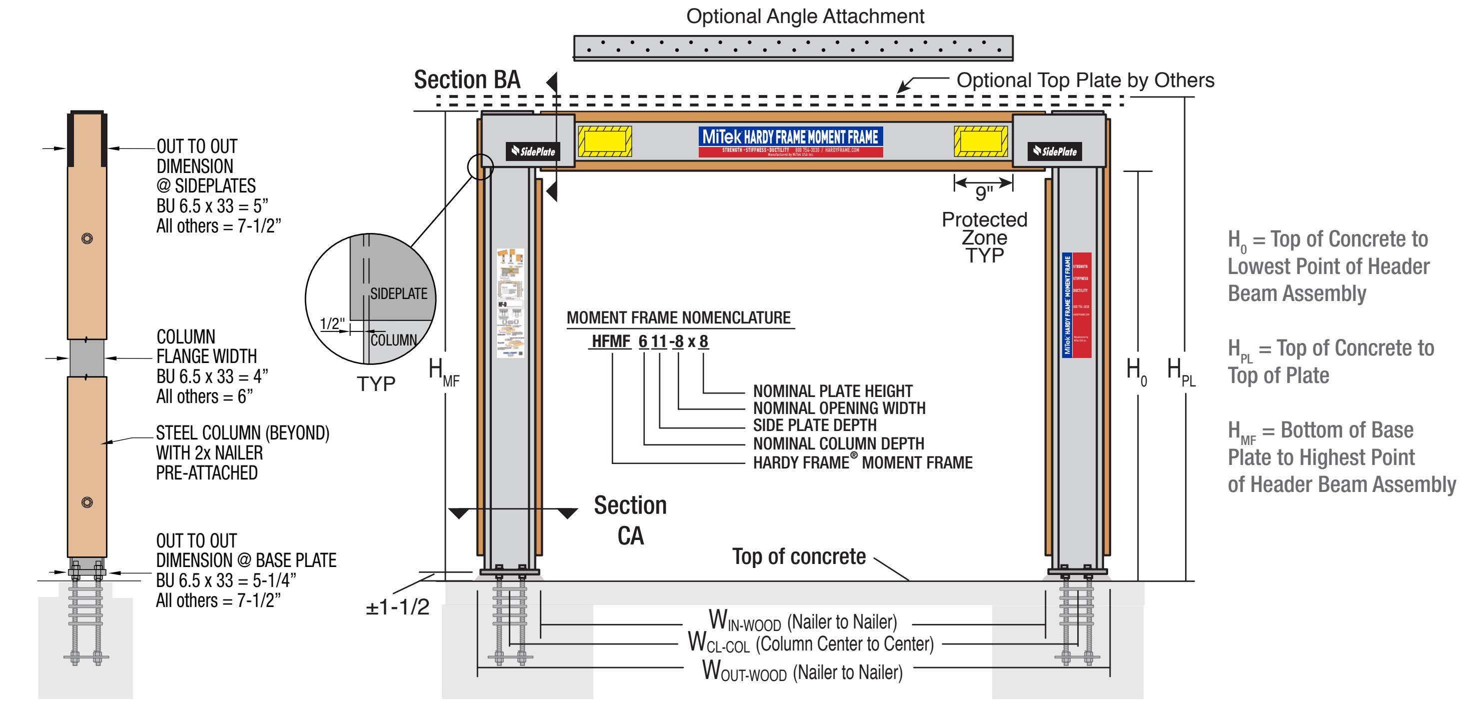
- Prior to fabrication a "Dimension Sheet" will be provided indicating standard inside and outside widths and heights as well as standard anchor lengths. This is a working document that allows the contractor to adjust dimensions, request changes to wood nailer sizes or customize nailer applications.
- Template Kits are provided when purchasing Moment Frames. Standard kits are in stock and can ship within one to two business days to expedite pouring concrete.
- Lead times for delivery of Moment Frames vary depending on job location, quantities and plant schedule.

INSTALLING TEMPLATE KITS AND HOLD DOWN ANCHORS:

- Assemble the Kit as shown in Hardy Frame Typical Installation Details and the illustrations provided on the Template and Template Kit box labels.
- Locate one Template Kit assembly at each of the column locations.
- Be sure to place the Templates so that the slotted holes are oriented perpendicular to the Moment Frame.
- Measure the slot to slot distance to be the same as the "$W_{CL\text{-}COL}$" (column center to center) dimension for the Frame being ordered.
- Set the top of all hold down bolts at 4-1/4 inches (minimum) to 6 inches (maximum) above top of concrete. Be sure that the embed end is extending the required distance into the footing below (l_e).
- Pour concrete and check that the assembly did not move out of alignment prior to the concrete hardening.

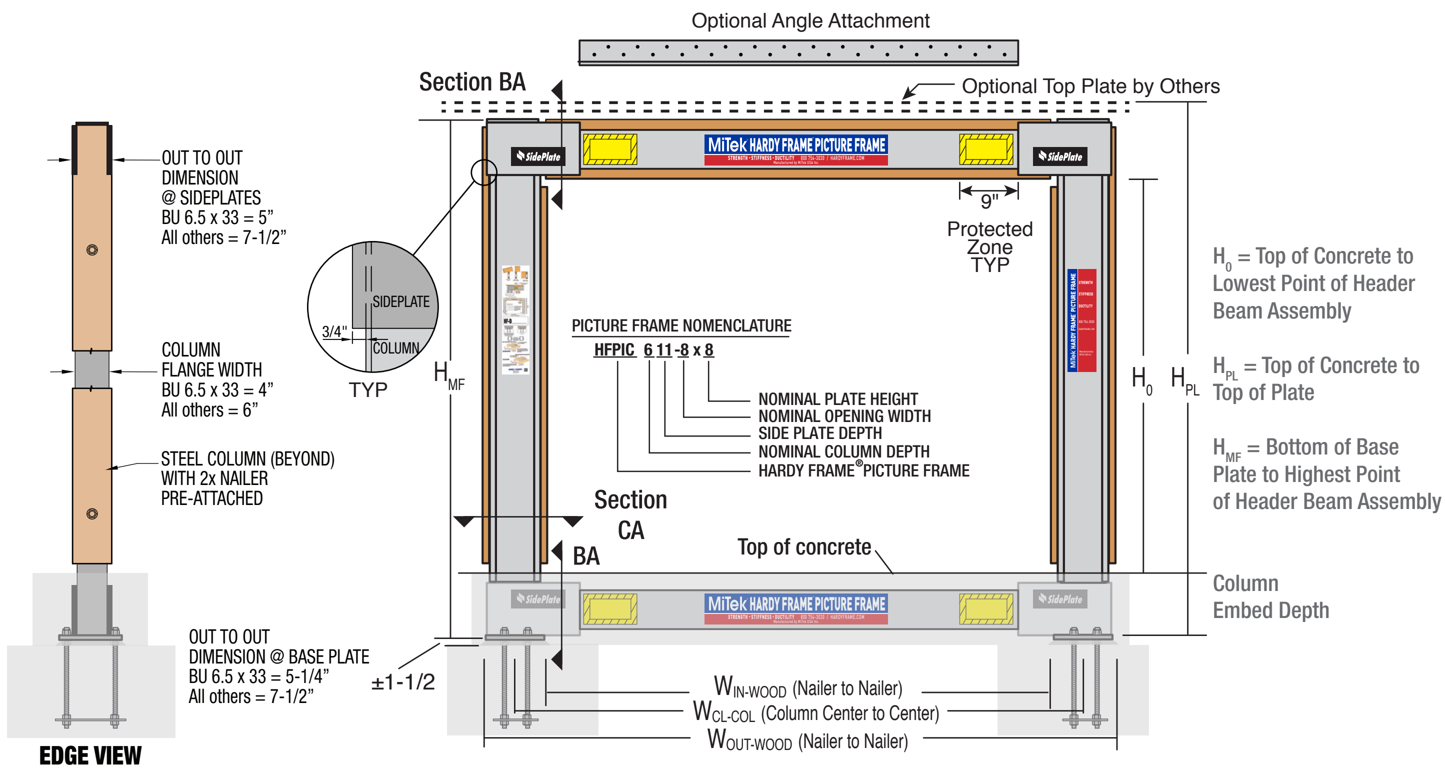
INSTALLING THE HARDY FRAME® MOMENT FRAME:

- Install one nut below one washer on all hold down anchors. Set the top of washer at approximately 1-1/2 inches above top of concrete.
- Unload the Moment Frame by lifting with forks or a crane at the header.
- Install the Moment Frame on the hold downs so that the base plates seat firmly on the washers and nuts below.
- Install one washer in contact with the base plate and one nut above it on all hold down bolts.
- Level the Frame and make minor height adjustments by raising or lowering the double nut connection at the base plates, then secure the connection until all nuts are "snug-tight". For installations on nuts and washers with high strength non-shrink grout, third party inspection may be required.
- Install wood framing above as occurs and make connections per details to transfer shear loads. If the specified connection will be concealed when framing is installed above, be sure to get inspections while still visible.



HARDY FRAME MOMENT FRAME (HFMF)

Section BA = See Beam Assembly Depths for Section Properties
Section CA = See Column Assembly Depths for Section Properties

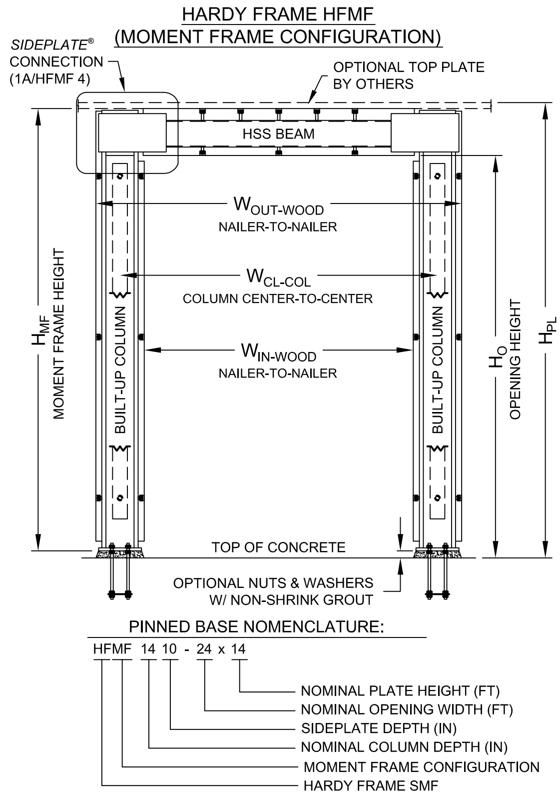


HARDY FRAME PICTURE FRAME (HFPIC)

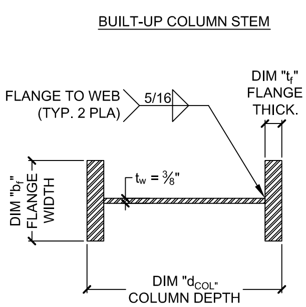
Section BA = See Beam Assembly Depths for Section Properties
Section CA = See Column Assembly Depths for Section Properties

FRAME CONFIGURATIONS AND GEOMETRY						
MODEL NUMBER	BU COLUMN	HSS BEAM	W_{CL-COL} (min)	W_{CL-COL} (max)	H_O (max)	H_{PL} (max)
HFMF611 HFPIC611	BU6.5x33	HSS6x4x3/8	8'-2 ½"	17'-1 ½"	8'-11 ¼"	10'-0 ¾"
HFMF811 HFPIC811	BU8.5x59	HSS6x6x5/8	8'-4 ½"	15'-3 ½"	12'-11 ¼"	14'-0 ¾"
HFMF813 HFPIC813	BU8.5x59	HSS8x6x1/2	15'-4 ½"	25'-3 ½"	12'-9 ¼"	14'-0 ¾"
HFMF1013 HFPIC1013	BU10.5x61	HSS8x6x1/2	8'-6 ½"	15'-5 ½"	12'-9 ¼"	14'-0 ¾"
HFMF1014 HFPIC1014	BU10.5x61	HSS8x6x5/8	15'-6 ½"	25'-5 ½"	12'-8 ¼"	14'-0 ¾"
HFMF1214 HFPIC1214	BU12.5x64	HSS8x6x5/8	8'-8 ½"	15'-7 ½"	12'-8 ¼"	14'-0 ¾"
HFMF1216 HFPIC1216	BU12.5x64	HSS10x6x1/2	15'-8 ½"	25'-7 ½"	12'-6 ¼"	14'-0 ¾"
HFMF1416 HFPIC1416	BU14.5x66	HSS10x6x1/2	9'-10 ½"	15'-9 ½"	12'-6 ¼"	14'-0 ¾"
HFMF1416 HFPIC1416	BU14.5x66	HSS10x6x5/8	15'-10 ½"	25'-9 ½"	12'-6 ¼"	14'-0 ¾"

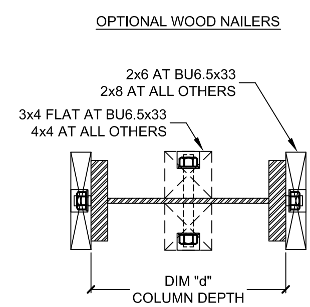
NOTES:
1. FINAL FRAME DIMENSIONS MAY BE ADJUSTED TO FIELD-SPECIFIC CONDITIONS. ANY CHANGE EXCEEDING THE NOMINAL HEIGHT OR SPAN FOR THE MODEL NUMBER SPECIFIED REQUIRES REVIEW AND APPROVAL BY THE ENGINEER OF RECORD PRIOR TO FRAME FABRICATION.
2. CUSTOM DESIGNS AVAILABLE FOR FRAMES EXCEEDING THE OVERALL LIMITATIONS OF THE MINIMUM AND MAXIMUM DIMENSIONS SHOWN ABOVE.
3. BU DESIGNATES BUILT-UP COLUMN. REFER TO 1/HFMF2 FOR COLUMN SECTION PROPERTIES.
4. LATERAL BEAM BRACING NOT REQUIRED FOR ANY MODEL AT THE SPANS SHOWN ABOVE.
5. $W_{IN-WOOD}$ AND $W_{OUT-WOOD}$ ASSUMED MIN 2x NAILER ATTACHED ON STEEL COLUMN FLANGES.

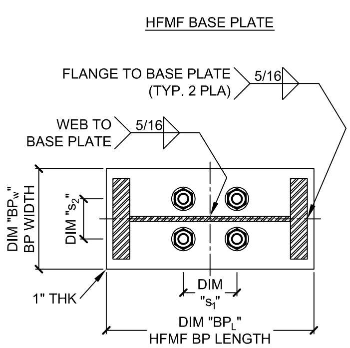


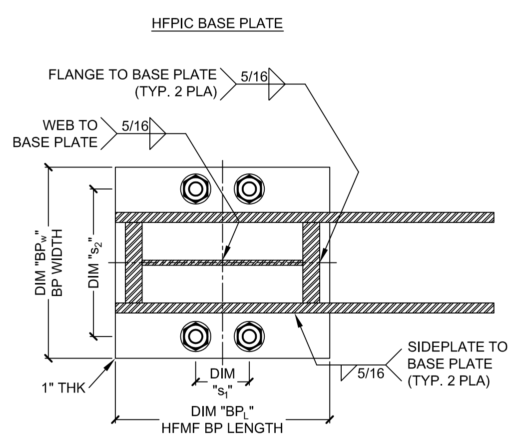
FRAME CONFIGURATIONS AND GEOMETRY

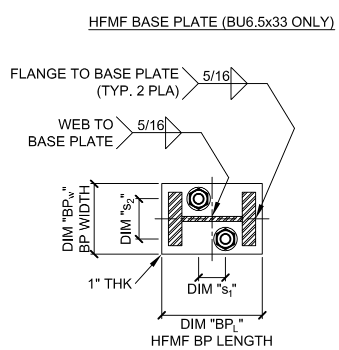


COLUMN & BASE PLATE SECTION PROPERTIES								
COLUMN SECTION	FRAME TYPE	d_{COL}	b_f	t_f	BP_L	BP_W	s_1	s_2
BU6.5x33	HFMF	6 ½"	4"	1"	7 ½"	5 ¼"	2"	3"
	HFPIC				8"	11 ¾"	3"	8 ½"
BU8.5x59	HFMF	8 ½"	6"	1 ¼"	9 ½"	7 ½"	3"	3"
	HFPIC				10"	14 ¼"		11"
BU10.5x61	HFMF	10 ½"	6"	1 ¼"	11 ½"	7 ½"	4"	3"
	HFPIC				12"	14 ¼"		11"
BU12.5x64	HFMF	12 ½"	6"	1 ¼"	13 ½"	7 ½"	4"	3"
	HFPIC				14"	14 ¼"		11"
BU14.5x66	HFMF	14 ½"	6"	1 ¼"	15 ½"	7 ½"	4"	3"
	HFPIC				16"	14 ¼"		11"





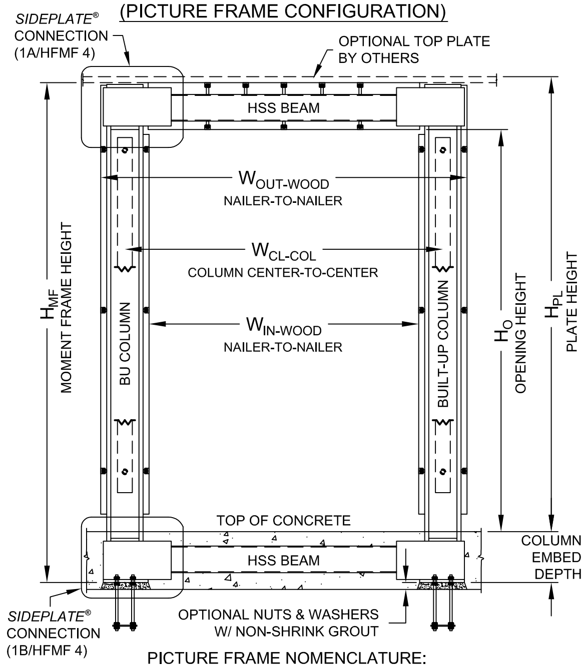




COLUMN & BASE PLATE SECTIONS

3

HARDY FRAME HFPIC (PICTURE FRAME CONFIGURATION)

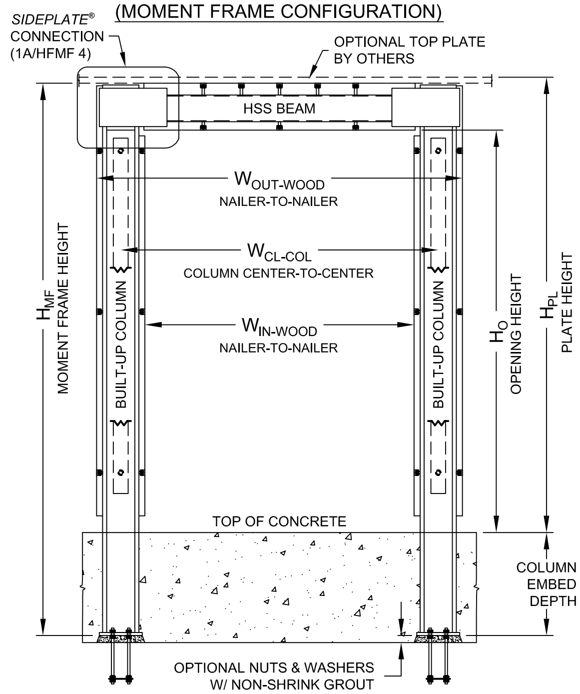


PICTURE FRAME NOMENCLATURE:

HFPIC 14 10 - 24 x 14

- NOMINAL PLATE HEIGHT (FT)
- NOMINAL OPENING WIDTH (FT)
- SIDEPLATE DEPTH (IN)
- NOMINAL COLUMN DEPTH (IN)
- PICTURE FRAME CONFIGURATION
- HARDY FRAME SMF

HARDY FRAME HFMF (MOMENT FRAME CONFIGURATION)

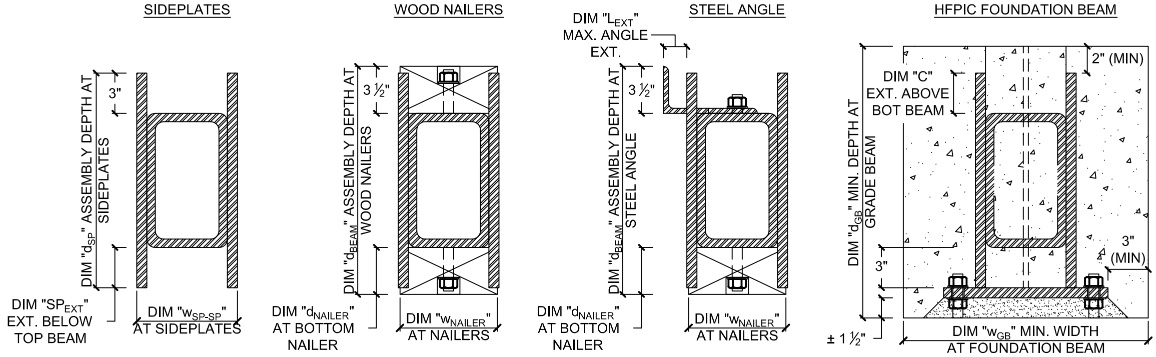


FIXED BASE NOMENCLATURE:

HFMF 14 10 - 24 x 14 FB

- FIXED BASE
- NOMINAL PLATE HEIGHT (FT)
- NOMINAL OPENING WIDTH (FT)
- SIDEPLATE DEPTH (IN)
- NOMINAL COLUMN DEPTH (IN)
- MOMENT FRAME CONFIGURATION
- HARDY FRAME SMF

1



HEADER BEAM & FOUNDATION BEAM SECTION PROPERTIES											
BEAM SECTION	FRAME TYPE	d_{SP}	$w_{SP\text{-}SP}$	SP_{EXT}	d_{BEAM} w/ NAILER	w_{NAILER}	d_{NAILER}	d_{BEAM} w/ ANGLE	L_{EXT}	d_{GB}	w_{GB}
HSS6x4x3/8	HFMF	11"	5"	2"	12"	5 ½"	2 ½"	12"	1 ¼"	N/A	N/A
	HFPIC									15 ½"	17 ¾"
HSS6x6x5/8	HFMF	11"	7 ½"	2"	12"	7 ¼"	2 ½"	12"	1 ¾"	N/A	N/A
	HFPIC									15 ½"	20 ¼"
HSS8x6x1/2	HFMF	13"	7 ½"	2"	14"	7 ¼"	2 ½"	14"	1 ¾"	N/A	N/A
	HFPIC									17 ½"	20 ¼"
HSS8x6x5/8	HFMF	14"	7 ½"	3"	15"	7 ¼"	3 ½"	15"	1 ¾"	N/A	N/A
	HFPIC									18 ½"	20 ¼"
HSS10x6x1/2	HFMF	16"	7 ½"	3"	17"	7 ¼"	3 ½"	17"	1 ¾"	N/A	N/A
	HFPIC									20 ½"	20 ¼"
HSS10x6x5/8	HFMF	16"	7 ½"	3"	17"	7 ¼"	3 ½"	17"	1 ¾"	N/A	N/A
	HFPIC									20 ½"	20 ¼"

HEADER BEAM & FOUNDATION BEAM SECTIONS

2

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

HARDY FRAME® SPECIAL MOMENT FRAME

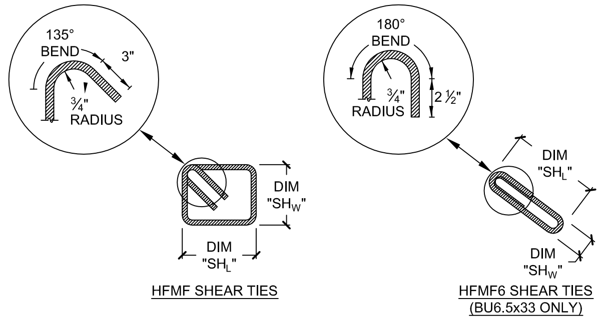
TYPICAL INSTALLATION DETAILS
FRAME GEOMETRY & CONFIGURATIONS

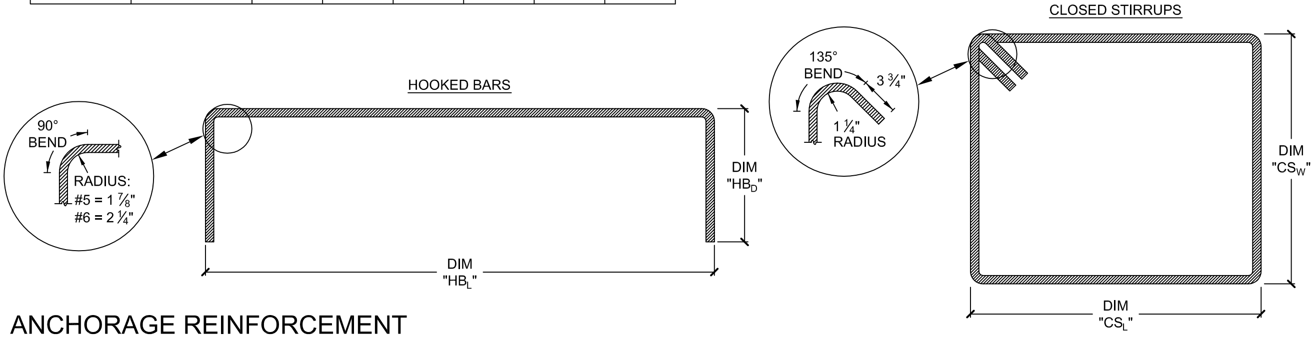
REVISIONS	DATE

DATE:
08-01-18

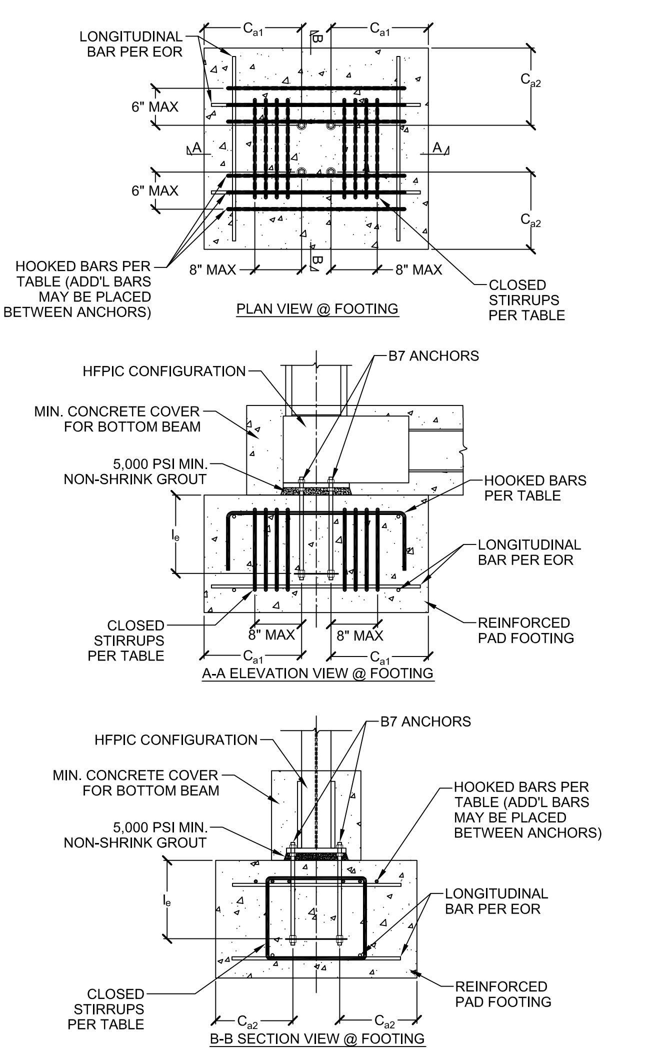
HFMF
1

REINFORCEMENT PARAMETERS							
COLUMN SECTION	FRAME TYPE	SHEAR TIES		CLOSED STIRRUPS		HOOKED BARS	
		SH_L	SH_W	CS_L	CS_W	HB_L	HB_D
BU6.5x33	HFMF	5 ⅞"	2 ¼"	N/A	N/A	N/A	N/A
	HFPIC	N/A	N/A	17"		29 ¾"	10 ½"
BU8.5x59	HFMF	5 ¼"	5 ¼"	17"		29 ¾"	10 ½"
	HFPIC	N/A	N/A	19"		34"	12 ½"
BU10.5x61	HFMF	6 ¼"	5 ¼"	17"		30 ¾"	10 ½"
	HFPIC	N/A	N/A	19"	18"	35"	12 ½"
BU12.5x64	HFMF	6 ¼"	5 ¼"	17"		30 ¾"	10 ½"
	HFPIC	N/A	N/A	19"		35"	12 ½"
BU14.5x66	HFMF	6 ¼"	5 ¼"	17"		30 ¾"	10 ½"
	HFPIC	N/A	N/A	19"		35"	12 ½"

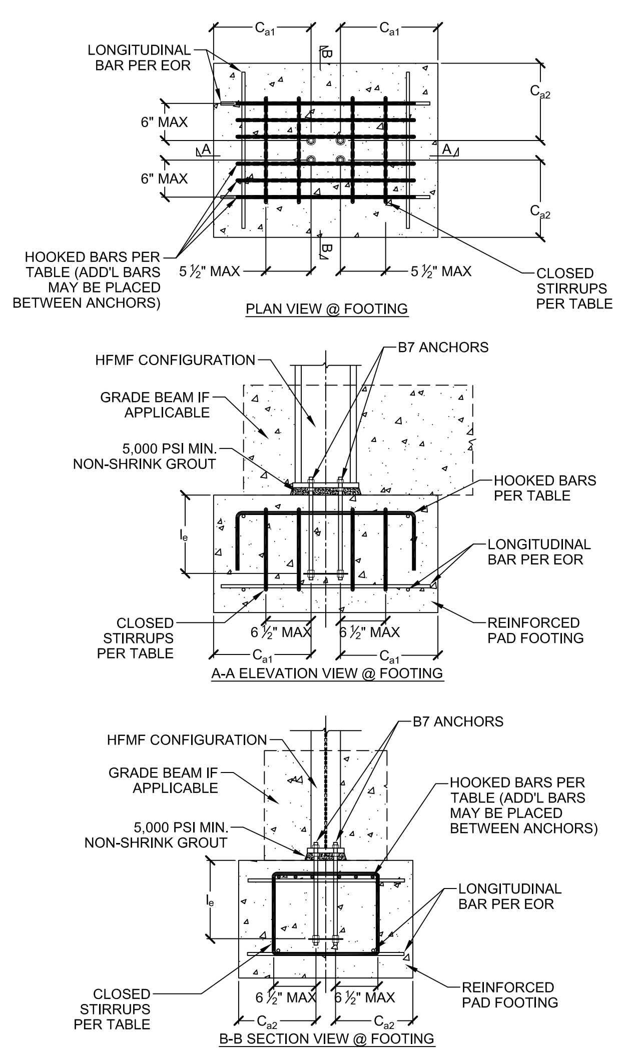




ANCHORAGE REINFORCEMENT 2



HFPIC ANCHORAGE AT FOOTING 4B



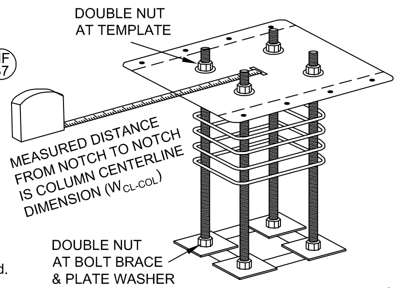
HFMF ANCHORAGE AT FOOTING 4A

COLUMN SECTION	FRAME TYPE	ANCHORAGE: QTY-DIA [4]	ANCHORAGE: PLATE WASHER	TOP OF CONCRETE: MIN END DIST	TOP OF CONCRETE: MIN EDGE DIST	TOP OF CONCRETE: SHEAR TIES [5,6]	CONCRETE FOOTING: EMBED DEPTH, l_e	CONCRETE FOOTING: END DIST, C_{a1}	CONCRETE FOOTING: EDGE DIST, C_{a2}	CONCRETE FOOTING: CLOSED STIRRUPS [7]	CONCRETE FOOTING: HOOKED BARS [8]
BU6.5x33	HFMF	2 - 3/4"	N/A	2 3/4"	2 1/4"	#3 @ 3" o.c.	18"	27"	21"	N/A	N/A
	HFPIC	4 - 1 1/8"	N/A	N/A	N/A	N/A				4-#5	4-#5
BU8.5x59	HFMF	4 - 3/4"	N/A	3 1/4"	2 1/4"	#3 @ 3" o.c.				4-#5	4-#5
	HFPIC	4 - 1 1/8"	1/2"x3"x3"	N/A	N/A	N/A				8-#5	6-#6
BU10.5x61	HFMF	4 - 3/4"	1/2"x3"x3"	3 3/4"	2 1/4"	#3 @ 3" o.c.				4-#5	6-#5
	HFPIC	4 - 1 1/8"	1/2"x3"x3"	N/A	N/A	N/A				8-#5	8-#6
BU12.5x64	HFMF	4 - 3/4"	1/2"x3"x3"	4 3/4"	2 1/4"	#3 @ 3" o.c.				5-#5	6-#5
	HFPIC	4 - 1 1/8"	1/2"x3"x3"	N/A	N/A	N/A				8-#5	8-#6
BU14.5x66	HFMF	4 - 3/4"	1/2"x3"x3"	5 3/4"	2 1/4"	#3 @ 3" o.c.				4-#5	8-#5
	HFPIC	4 - 1 1/8"	1/2"x3"x3"	N/A	N/A	N/A				8-#5	10-#6

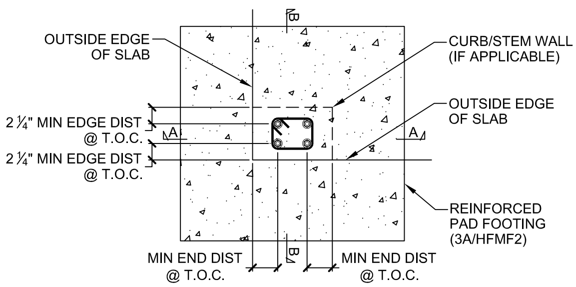
ANCHORAGE & TEMPLATE KITS [1,2,3,9,10]

NOTES:

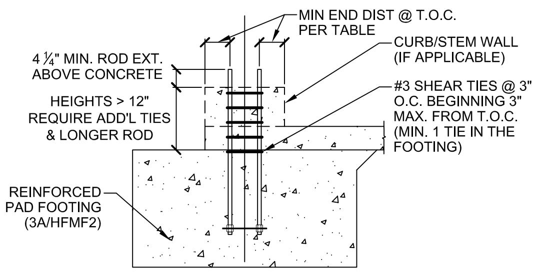
1) Dimensions provided are the minimum requirement to satisfy pullout and shear transfer. Foundation, stem wall, and grade beam design by the engineer of record.
2) Anchorage is designed per AISC 341-10 and ACI 318-14 Chapter 17 assuming f'c = 2,500 psi. min.
3) Anchorage to shallow podium slabs or to existing concrete shall be designed by the engineer of record.
4) Anchor rods provided by MiTek-Hardy Frame comply with ASTM A193 Gr. B7 (or equal) and are stamped on both ends. HF B7
5) Unless frame is sitting directly on pad footing, shear ties will be required.
6) The number of shear ties should be determined based on the curb/stem wall/pedestal height and following the maximum spacing. In any case, at least 4 shear ties should be provided with min of 1 shear tie in the pad footing.
7) Closed stirrups are for transferring tension from anchorage to the concrete. See table for size and number per column.
8) Hooked bars are for transferring shear from anchorage to the concrete. See table for size and number per column.
9) Anchorage is designed assuming using Hardy Frame Template Kits. For alternate anchorage designs, calculations shall be supplied by the engineer of record.
10) Hardy Frame Moment Frame Template Kits Include the following accessories (see illustration for complete assembly):
    - 2-Templates (HFMF-T)
    - 2-Bolt Braces (HFMF-BB)
    - 5-#3 Grade 60 Shear Ties
    - 8-Anchor rods (4 for HFMF6) w/ 2 ea. Hardened Washers, 4 ea. Heavy Hex Nuts, & 1 ea. 3"x3"x1/2" plate washer per rod.



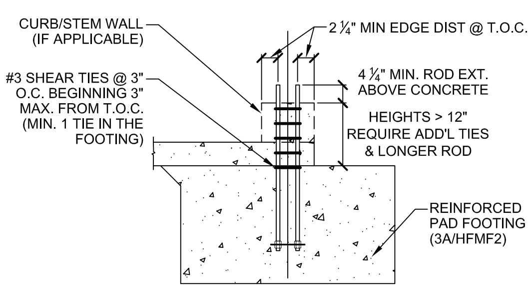
ANCHORAGE REQUIREMENTS 1



PLAN VIEW @ TOP OF CONCRETE



A-A ELEVATION VIEW @ TOP OF CONCRETE



B-B SECTION VIEW @ TOP OF CONCRETE

HFMF AT TOP OF CONCRETE 3

ORDERING AND INSTALLATION INSTRUCTIONS

1. CALL MiTek-USA, Inc. (800) 754-3030 FOR ORDERING INFORMATION.
   A. PROVIDE THE FOLLOWING INFORMATION FOR PRICING AND ORDERING:
      - JOB NAME, DELIVERY ADDRESS AND REQUESTED DELIVERY DATE
      - MODEL NUMBER AND TRACKING NUMBER (TRACKING NUMBERS APPLY TO NON-STANDARD MOMENT FRAMES ONLY)
      - ORDER QUANTITY FOR EACH MODEL NUMBER
2. JOBSITE CONDITIONS
   A. CONSIDER JOBSITE ACCESS FOR UNLOADING, LOCATING AND INSTALLING PRE-ASSEMBLED MOMENT FRAMES
   B. DETERMINE EQUIPMENT NEEDED TO UNLOAD AND INSTALL PRE-ASSEMBLED MOMENT FRAMES SUCH AS FORKLIFT, CRANE, ETC.
3. ORDER HARDY FRAME MOMENT FRAME TEMPLATE KITS (ALLOW 5-6 BUSINESS DAYS LEAD TIME FOR DELIVERY)
4. CONCRETE PREPARATION
   A. DETERMINE LOCATION AND LAYOUT OF TEMPLATES AND MOMENT FRAMES PER PLANS
   B. INSTALL TEMPLATES AND EMBED ANCHORS PER PLAN DETAILS. REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT TEMPLATE ORIENTATION, ROD ASSEMBLIES, ROD HEIGHT ABOVE CONCRETE AND TEMPLATE SPACING FOR FINISH FRAME WIDTH
   C. SLOTTED HOLES ARE PROVIDED IN TEMPLATES FOR PULLING THE COLUMN CENTERLINE WIDTH (W_{CL-COL}). PRIOR TO POURING CONCRETE CONFIRM THE SLOT TO SLOT DIMENSION CORRESPONDS TO THE CORRECT Win DIMENSION FOR THE MOMENT FRAME MODEL NUMBER BEING INSTALLED.
5. MOMENT FRAME INSTALLATION
   A. INSTALL BOTTOM (LEVELING) NUT AND WASHER ON ALL ANCHORS.
   B. AT ONE ANCHOR SET TOP OF WASHER TO BE 1-1/2 INCH ABOVE TOP OF FINISH CONCRETE. USE A LEVELING DEVICE (HAND HELD LASER RECOMMENDED) TO SET THE OTHER LEVELING NUTS AND WASHERS TO ASSURE THE FRAME WILL BE INSTALLED LEVEL AND PLUMB.
   C. LIFT AND PLACE THE MOMENT FRAME ONTO THE ANCHORS ONE COLUMN AT A TIME. THE COLUMNS WILL FLEX SLIGHTLY TO ALLOW SETTING THE SECOND COLUMN.
   D. INSTALL WASHERS AND NUTS ABOVE THE BASE PLATES AND FINGER TIGHTEN.
   E. VERIFY THE COLUMNS ARE PLUMB, THE FRAME IS IN THE WALL PLANE AND THE HEADER IS LEVEL. MAKE NECESSARY ADJUSTMENTS BY RAISING OR LOWERING THE LEVELING NUTS BELOW THE BASE PLATES.
   F. WHEN FIT AND ALIGNMENT MEET FRAMERS APPROVAL TIGHTEN ALL NUTS UNTIL "SNUG TIGHT".
   G. BRACE THE INSTALLED MOMENT FRAME IN THE OUT OF PLANE DIRECTION AND RE-CHECK FOR PLUMB.
   H. MAKE TOP CONNECTIONS PER PLANS AND SPECIFICATIONS.
   I. INSTALL HIGH STRENGTH NON-SHRINK GROUT BELOW BASE PLATES PER DETAILS AND INSTALLATION INSTRUCTIONS.

RECOMMENDED INSTALLATION TOOLS

- MOMENT FRAME TEMPLATES ON HAND TO CHECK EMBED SPACING
- HAND HELD LASER AND STANDARD LEVEL (3' TO 4')
- ONE OR TWO 16"-18" CRESCENT WRENCHES
- ELECTRIC IMPACT WRENCH OR HAND RATCHET WRENCH
- IMPACT 1-1/8" SOCKETS FOR PLAIN NUTS AT 3/4" ANCHORS
- SOCKET EXTENSION AND U-JOINT (SWIVEL)
- THREAD CHASERS FOR EMBED BOLTS IN CASE THREADS ARE DAMAGED

GENERAL NOTES A

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

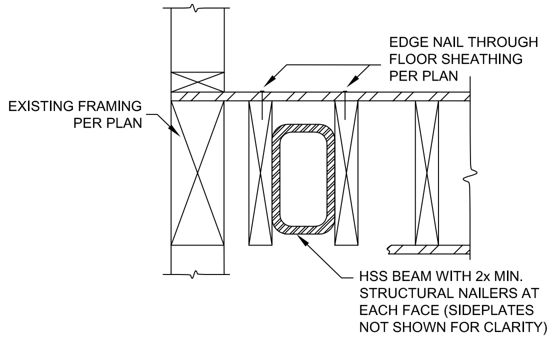
HARDY FRAME® SPECIAL MOMENT FRAME

TYPICAL INSTALLATION DETAILS
FRAME ANCHORAGE & SECTION PROPERTIES

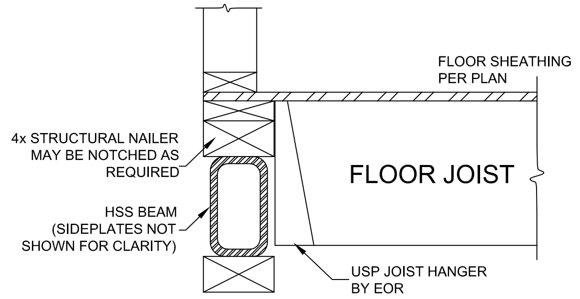
REVISIONS	DATE

DATE:
08-01-18

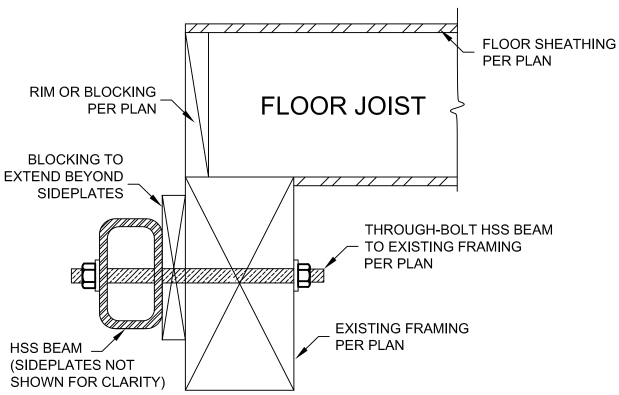
HFMF
2



EDGE NAILING AT BEAM FACE NAILERS 4



SECTION AT HEADER W/ HANGING JOISTS 3



THROUGH-BOLT AT HSS BEAM 7

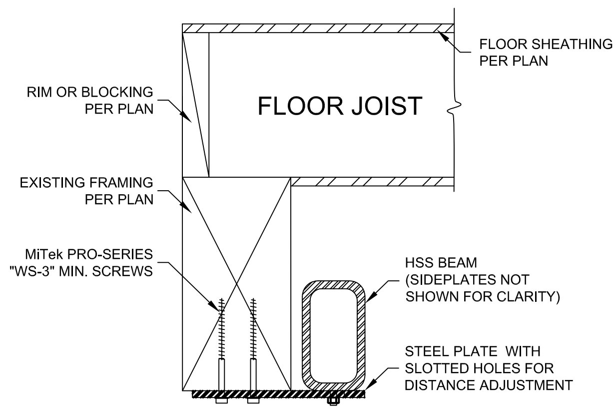
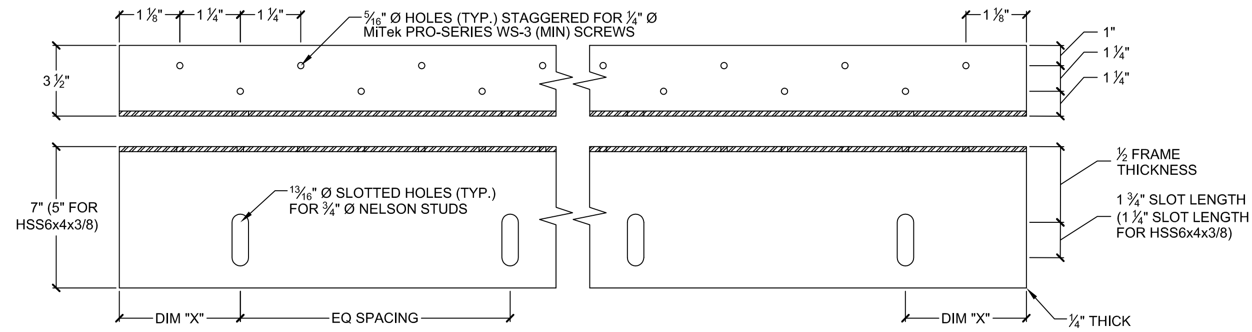
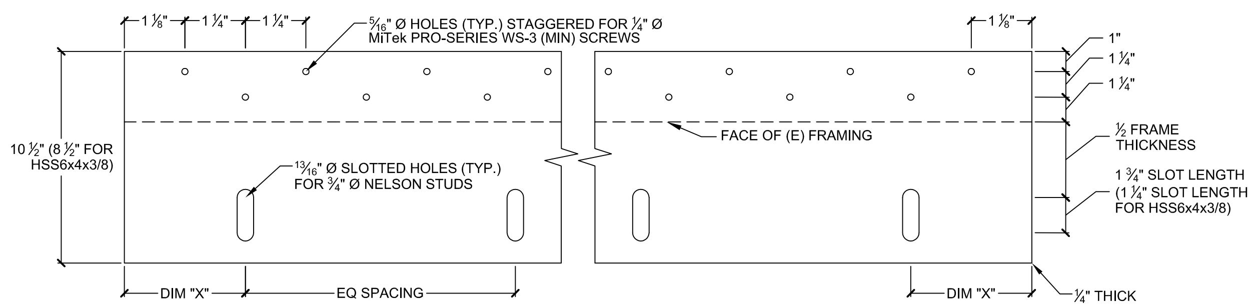


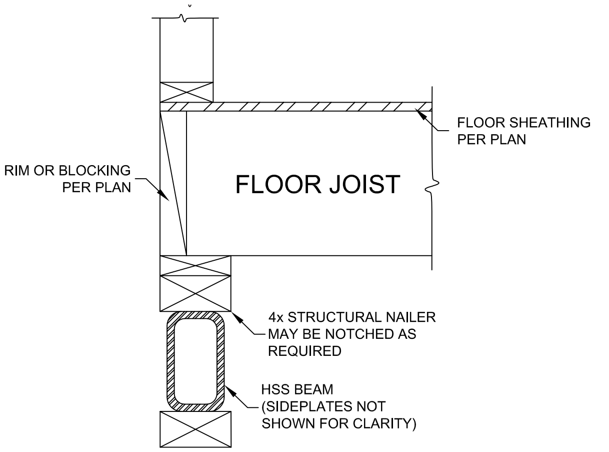
PLATE AT BOTTOM BEAM 6



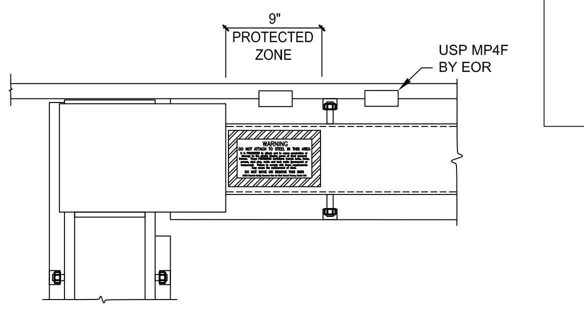
STEEL ANGLE 9A



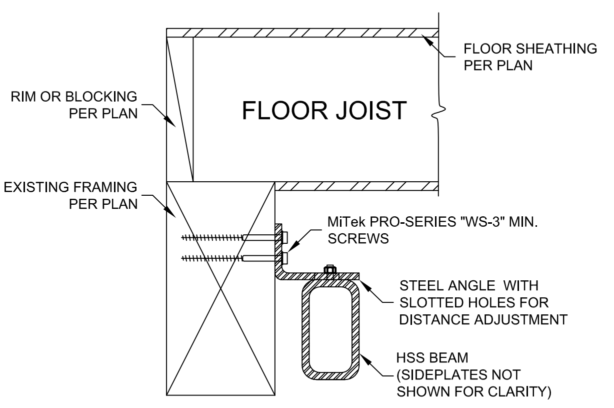
STEEL PLATE 9B



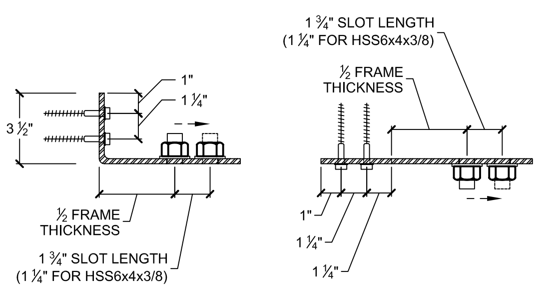
SECTION AT HEADER W/ BEARING JOISTS 2



TOP CONNECTION AT 2x TOP PLATE 1



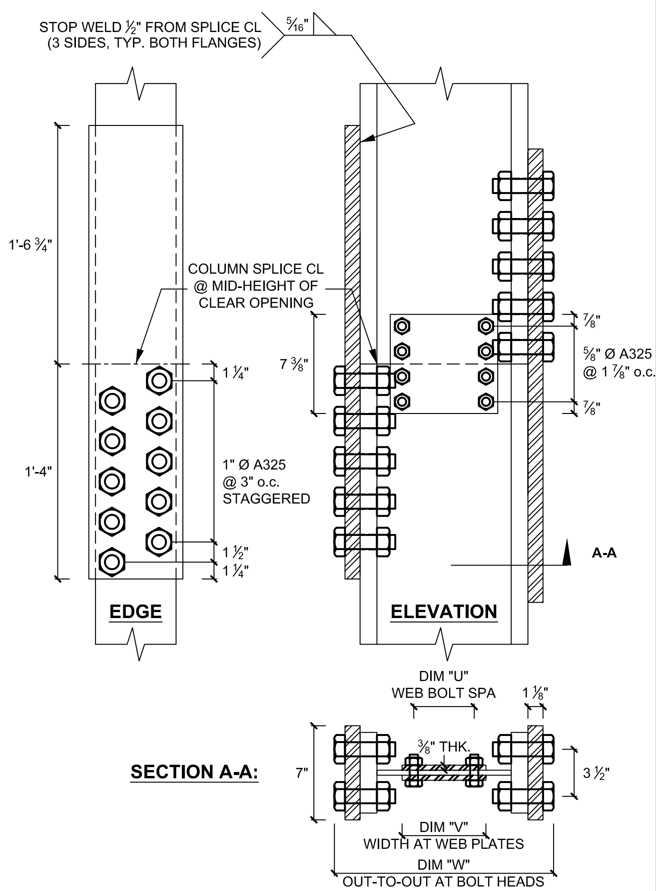
ANGLE AT TOP BEAM 5



STEEL ANGLE & STEEL PLATE ATTACHMENTS						
BEAM SECTION	FRAME TYPE	FOR $W_{IN\text{-}STEEL}$ <	ANGLE/ PLATE QTY EA FRAME	STUD QTY EA ANGLE/ PLATE	*MIN. SCREW QTY EA ANGLE/ PLATE	DIM X
HSS6x4x3/8	HFMF	16'-7"	2	4	20	2 ½"
	HFPIC					
HSS6x6x5/8 HSS8x6x1/2 HSS8x6x5/8 HSS10x6x1/2 HSS10x6x5/8	HFMF	8'-7"	2	4	20	2 ½"
	HFPIC		1	8	52	8 ½"
	HFMF	10'-7"	2	4	20	2 ½"
	HFPIC		1	8	60	10"
	HFMF	24'-7"	3	4	20	2 ½"
	HFPIC					

* DESIGN ASSUMES THE USE OF MiTek PRO-SERIES WS-3 MIN. SCREWS. FOR HFPIC1416 AND $W_{IN\text{-}STEEL}$ LESS THAN 10'-7", WS-45 MIN. SCREWS ARE REQUIRED.

STEEL ANGLE & PLATE ATTACHMENTS 9



COLUMN SPLICE PARAMETERS				
COLUMN SECTION	FRAME TYPE	DIM U	DIM V	DIM W
BU6.5x33	HFMF	N/A	N/A	N/A
	HFPIC			
BU8.5x59	HFMF	2 ½"	4 ¼"	12 ¼"
	HFPIC			
BU10.5x61	HFMF	3 ½"	5 ¼"	14 ¼"
	HFPIC			
BU12.5x64	HFMF	4 ½"	6 ¼"	16 ¼"
	HFPIC			
BU14.5x66	HFMF	5 ½"	7 ¼"	18 ¼"
	HFPIC			

BOLTED COLUMN SPLICE 8

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www.hardyframe.com

HARDY FRAME

HARDY FRAME® SPECIAL MOMENT FRAME

TYPICAL INSTALLATION DETAILS
FRAMING CONNECTIONS & ATTACHMENTS

REVISIONS	DATE

DATE:
08-01-18

HFMF
3

HARDY FRAME® SPECIAL MOMENT FRAME - GENERAL NOTES

GENERAL REQUIREMENTS

1. REFERENCED DOCUMENTS: THE DESIGN, FABRICATION AND QUALITY ASSURANCE OF THE HARDY FRAME SPECIAL MOMENT FRAME SYSTEM COMPLIES WITH THE FOLLOWING:
   A. INTERNATIONAL BUILDING CODE (IBC) - 2012 & 2015
   B. PREQUALIFIED CONNECTIONS FOR SPECIAL MOMENT FRAMES FOR SEISMIC APPLICATIONS (AISC 358s2-14 & AISC 358-16, CH. 11)
   C. AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (AISC 360-10 & AISC 360-16)
   D. AMERICAN INSTITUTE OF STEEL CONSTRUCTION SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS (AISC 341-10 & AISC 341-16)
   E. AMERICAN WELDING SOCIETY D1.1 2015 STRUCTURAL WELDING CODE-STEEL (AWS D1.1 & D1.8)
2. ALPHA AND NUMERIC DESIGNATORS [#] & {#} USED HEREIN TO SIMPLIFY THE IDENTIFICATION OF PLATES AND WELDS, RESPECTIVELY. DESIGNATORS ARE DEFINED BELOW (REFER TO DETAIL 1/HFMF 4):
   [A] SIDE PLATES, PARALLEL TO WEB OF COLUMN, CONNECTING BEAM TO COLUMN.
   [D] HORIZONTAL SHEAR PLATE
   {1} FILLET WELD CONNECTING SIDE PLATE [A] TO HORIZONTAL SHEAR PLATE [D]
   {2} FILLET WELD CONNECTING INSIDE FACE OF SIDE PLATE [A] TO FLANGE TIPS OF W-COLUMN
   {3} FILLET WELD CONNECTING INTERIOR EDGES OF HORIZONTAL SHEAR PLATE [D] TO FACES OF FLANGES AND WEB OF W-COLUMN
   {6} FILLET WELD CONNECTING SIDE WALL OF HSS BEAM TO SIDE PLATE [A]
   {7} HORIZONTAL FLARE-BEVEL WELD CONNECTING HSS BEAM RADIUS TO SIDE PLATE [A]

MATERIAL

1. MATERIAL:
   A. MOMENT CONNECTION PLATE AND BUILT-UP COLUMN PLATE MATERIAL MEETS THE REQUIREMENTS OF ASTM A572, GRADE 50
   B. BASE PLATE MATERIAL MEETS THE REQUIREMENTS OF ASTM A572
   C. ALL OTHER FASTENERS AND COMPONENTS MEET THE REQUIREMENTS OF ASTM A36
   D. ANCHOR BOLTS SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A307 (AS REQUIRED BY LOCAL JURISDICTIONS)
   E. NELSON STUDS (Fy=70ksi)
   F. COLUMN & BEAM WOOD NAILERS MEET THE REQUIREMENTS OF NO. 2 DOUGLAS FIR LARCH OR BETTER
2. ROLLED SHAPES:
   A. ROLLED SHAPES USED FOR COLUMNS MEET THE REQUIREMENTS OF ASTM A992
   B. HSS SECTIONS USED FOR BEAMS MEET THE REQUIREMENTS OF ASTM A500 GRADE B
3. WELD FILLER METAL:
   A. THE WELD FILLER METAL AND ASSOCIATED WELDING PROCESS FOR ALL FILLET AND FLARE-BEVEL WELDS MAY BE ANY OF THE FOLLOWING, PROVIDED COMPLIANCE WITH NOTES 3.b AND 3.c BELOW IS DEMONSTRATED:
      E70T-6, E71T-1, E71T-8 OR E70TG-K2 FOR FCAW
      E7XT-9 FOR FLUX CORED ARC WELDING (FCAW) WITH GAS SHIELDING
      F7A2-EXXX FOR SUBMERGED ARC WELDING (SAW)
      E7018 STICK ELECTRODE FOR SHIELDED METAL ARC WELDING (SMAW)
      THE WELD FILLER METAL USED DEMONSTRATES AN ENERGY EQUIVALENT TO A MINIMUM CVN TOUGHNESS OF 20 FT-LBS. IMPACT STRENGTH AT A TEMPERATURE OF -20°F AND 40 FT-LBS IMPACT STRENGTH AT 70°F AS DETERMINED BY AWS CLASSIFICATION TEST METHODS OR MANUFACTURER CERTIFICATION.
   B. ALL WELD FILLER METAL SATISFIES A MAXIMUM DIFFUSIBLE HYDROGEN CONTENT REQUIREMENT OF 16 MILLILITERS OF HYDROGEN PER 100 GRAMS OF WELD METAL OR LESS (H16).

FIELD WELDING (AS OCCURS FOR FILLET/FLARE BEVEL WELDS ON HSS BEAMS TO SIDE PLATES)

FIELD WELDING SHALL COMPLY FULLY WITH THE REQUIREMENTS OUTLINED IN SECTION "SHOP WELDING."

PREPARATION

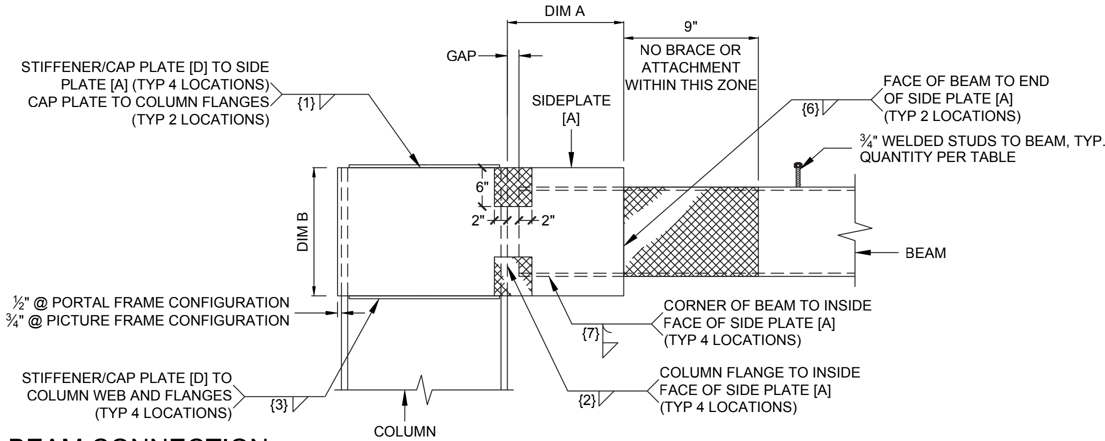
1. THE FABRICATOR EMPLOYS A DISTORTION CONTROL PROGRAM TO ADDRESS CONTROL OF DISTORTION AND WELD SHRINKAGE, INCLUDING MAINTENANCE OF DIMENSIONAL ACCURACY.
2. BASE METAL SURFACE PREPARATION: SURFACES ON WHICH WELD METAL IS TO BE DEPOSITED, INCLUDING BUT NOT LIMITED TO COLUMN FLANGE TIPS (I.E., COLUMN FLANGE-TO-SIDE PLATE [A] ATTACHMENT), BEAM RADII, AND THERMAL CUT EDGES ARE SMOOTH, UNIFORM, AND FREE FROM LOOSE OR THICK SCALE, SLAG, RUST, MOISTURE, GREASE AND OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING.
3. THERMAL CUTTING:
   A. THE ROUGHNESSES OF ALL THERMAL-CUT SURFACES ARE NOT GREATER THAN AN ANSI SURFACE ROUGHNESS VALUE OF 1000 MICRO-INCHES. ROUGHNESS EXCEEDING THIS VALUE, AND NOTCHES OR GOUGES NOT MORE THAN 3/16 INCH DEEP, ON OTHERWISE SATISFACTORY SURFACES ARE REMOVED BY MACHINING OR GRINDING.
   B. FLAME CUT SURFACES ARE FREE OF GLOBULES AND LOOSE SLAG. THE THERMAL CUTTING EQUIPMENT IS SO ADJUSTED AND MANIPULATED AS TO AVOID CUTTING BEYOND (INSIDE) THE PRESCRIBED LINES.
   C. THERMAL CUTTING PROCESSES ARE LIMITED TO PLASMA ARC-CUTTING OR OXYFUEL GAS PROCESSES.

QUALITY CONTROL

1. MiTek-USA, Inc. OR THEIR SUBCONTRACTORS ARE RESPONSIBLE FOR QUALITY CONTROL AND PROVIDE IN-PROCESS VISUAL INSPECTION OF ALL FABRICATION ACTIVITIES TO ENSURE THAT MATERIALS AND WORKMANSHIP MEET THE REQUIREMENTS OF THE DESIGN. QC INSPECTION INCLUDES HOLD POINTS FOR POST-WELD VISUAL INSPECTION OF FILLET WELD {2} PRIOR TO INSERTION OF BEAM TO VERIFY WELD INTEGRITY.
   AS OCCURS, FIELD WELDING QUALITY CONTROL IS THE RESPONSIBILITY OF THE PURCHASER (SEE "UT INSPECTION" SECTION).

SHOP WELDING

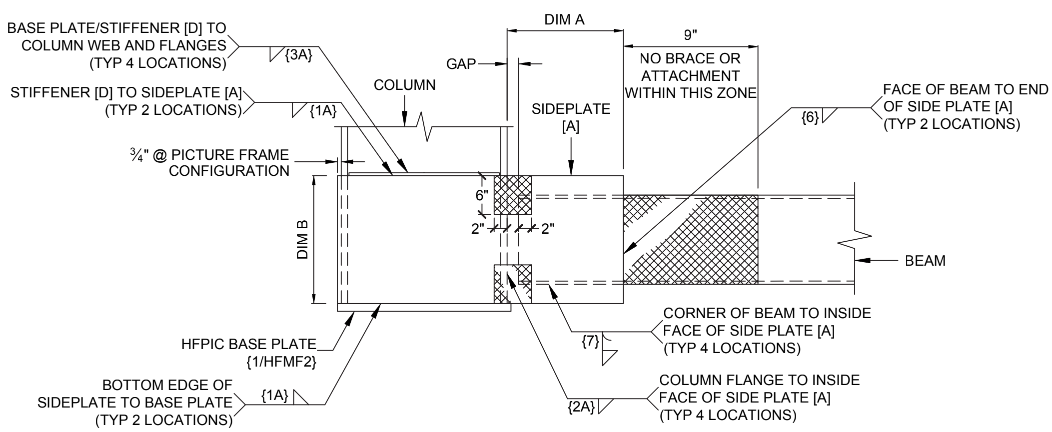
1. WELDER QUALIFICATION: THE PERFORMANCES OF ALL WELDERS, WELDING OPERATORS AND TACK WELDERS ARE QUALIFIED IN CONFORMANCE WITH AWS D1.1, SECTION 4, PART C TO DEMONSTRATE ABILITY TO PRODUCE SOUND WELDS.
2. WELDING PROCEDURE SPECIFICATIONS (WPS):
   A. THE FABRICATION CONTRACTOR HAS PREPARED A SPECIFIC WRITTEN WPS FOR EACH DIFFERENT WELDING APPLICATION. DIFFERENT WELDING APPLICATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE JOINT DETAILS AND TOLERANCES, PREHEAT AND INTERPASS TEMPERATURE, SINGLE OR MULTIPLE STRINGER PASSES, WELDING CURRENT, POLARITY, ALLOWABLE AMPERAGE RANGES, ALLOWABLE VOLTAGE RANGES, ALLOWABLE TRAVEL SPEED RANGES, ELECTRODE EXTENSION, ROOT TREATMENT, WELDING POSITION, WELDING PROCESS, ELECTRODE MANUFACTURER, FILLER METAL TRADE NAME FOR THE ELECTRODE TYPE SELECTED, AND OTHER ESSENTIAL VARIABLES AS DEFINED IN AWS D1.1 REQUIRED TO COMPLETE THE FABRICATION OF THE MOMENT FRAME(S). AMPERAGE, VOLTAGE, TRAVEL SPEED AND ELECTRODE EXTENSION ARE MAINTAINED WITHIN THE FILLER METAL MANUFACTURE'S RECOMMENDATIONS.
   B. EACH WPS PREPARED IS BASED ON AND REFERENCED TO A DOCUMENTED AND APPROVED PROCEDURE QUALIFICATION RECORD (PQR).
   C. THE APPROVED WPS FOR EACH APPLICABLE PRODUCTION WELD IS CLEARLY DISPLAYED TO PROVIDE READY ACCESS BY THE ASSIGNED WELDERS, WELDING SUPERVISORS AND INSPECTORS.
   D. ALL WPSs ARE PREPARED BY QUALIFIED INDIVIDUALS. WPSs ARE PREPARED BY THE SAME INDIVIDUAL RESPONSIBLE FOR THE SUITABILITY OF THE WPS.
3. WELDING PROCEDURE QUALIFICATION (PQR):
   A. DOCUMENTED PROCEDURE QUALIFICATION RECORDS ARE MAINTAINED BY HARDY FRAMES, INC. PROCEDURE QUALIFICATION CONFORMS TO THE REQUIREMENTS OF AWS D1.1, TABLE 4.1 AND EMPLOYS THE FOLLOWING TESTING METHODS AND ACCEPTANCE CRITERIA:
      VISUAL INSPECTION IN ACCORDANCE WITH AWS D1.1, SECTION 4.8.1.
      RADIOGRAPHIC TESTING (RT) OR ULTRASONIC TESTING (UT) BEFORE PREPARING MECHANICAL TEST SPECIMENS, IN ACCORDANCE WITH AWS D1.1, SECTION 4.8.2.
      MECHANICAL TESTING IN ACCORDANCE WITH AWS D1.1, SECTION 4.8.3. THE TYPE AND NUMBER OF TEST SPECIMENS, FOR EACH QUALIFIED PRODUCTION WELDING POSITION, SHALL BE PER AWS D1.1, TABLE 4.2 (1), USING A GROOVE WELD TEST PLATE PER FIGURE 4.10(2).
      CHARPY V-NOTCH IMPACT TESTING OF THE WELD METAL IN ACCORDANCE WITH AWS D1.1, SECTION 4.1.1.3. THE REQUIRED TEST TEMPERATURE AND ENERGY VALUE IS THAT SPECIFIED IN MATERIAL SECTION 3.b. THE TYPE AND NUMBER OF NOTCH TOUGHNESS SPECIMENS, FOR EACH QUALIFIED PRODUCTION WELDING POSITION, IS PER AWS D1.1, ANNEX III, TABLE III-1. ONE SPECIMEN MAY BE LESS THAN THE MINIMUM AVERAGE OF 20 FT-LBS., BUT NOT LESS THAN 15 FT-LBS.
   B. ALL PROCEDURE QUALIFICATION TESTING IS PERFORMED BY AN INDEPENDENT CERTIFIED AND APPROVED TESTING LABORATORY.
   C. IN LIEU OF THE REQUIREMENTS OF 3.a AND 3.b, A CURRENT CERTIFICATE OF CONFORMANCE PROVIDED BY THE WIRE MANUFACTURER MAY BE USED AS THE SUPPORTING PQR PROVIDED FULL COMPLIANCE IS MET FOR EVERY CONDITION OF PREQUALIFICATION FOUND IN AWS D1.1 SECTION 3 FOR PREQUALIFIED FILLET WELDS. THE SELECTION OF THIS OPTION BY THE CONTRACTOR'S FABRICATION/ERECTION SUBCONTRACTOR IS PREDICATED ON ITS ACKNOWLEDGEMENT THAT ITS CERTIFIED WELDERS ARE EXPERIENCED AND CONFIDENT IN THE USE AND SETTINGS SPECIFIED IN THE CERTIFICATE OF CONFORMANCE WITH THE ALLOWABLE TOLERANCES FOR ESSENTIAL VARIABLES FOUND IN TABLE 4.5 OF AWSD1.1.
4. TACK WELDS:
   A. TACK WELDS ARE SUBJECT TO THE SAME QUALITY REQUIREMENTS AS THE FINAL WELDS, INCLUDING PREHEAT AND UNDERCUT, IN ACCORDANCE WITH AWS D1.1, SECTION 5.18.2. THESE QUALITY REQUIREMENTS APPLY EQUALLY TO TACK WELDING OF BACKING STRIPS, FILLER PLATE, WELD RUN-OFF TABS, AND ANY OTHER CONSTRUCTION AIDS.
   B. VERTICAL TACK WELDS BETWEEN SIDE PLATE [A] AND FLANGE EDGES OF COLUMN ARE NOT PLACED WITHIN 2 INCHES OF EACH END OF WELD {2} .
   C. TACK WELDS BETWEEN SIDE PLATES [A] AND HSS BEAM ARE NOT PLACED WITHIN 2 INCHES OF EACH END OF WELD {7} .
   D. ALIGNMENT CONTROL METHODS MAY INCLUDE, BUT ARE NOT LIMITED TO, TACK WELDING OF TEMPORARY ANGLE STRUTS ('DOGS') TO TOP AND BOTTOM FREE EDGES OF SIDE PLATE [A] , NOT CLOSER THAN 2 INCHES FROM THE VERTICAL FREE EDGE OF SIDE PLATE [A] , IN ORDER TO MAINTAIN THE NECESSARY SEPARATION DISTANCE REQUIRED TO INSTALL THE HSS BEAM.
5. WELD RUN-OFF TABS ARE NOT USED FOR FILLET WELDS.
6. PREHEAT AND INTERPASS TEMPERATURE REQUIREMENTS:
   A. THE MINIMUM PREHEAT AND INTERPASS TEMPERATURES FOR A GIVEN THICKNESS OF BASE METAL TO BE WELDED IS DETERMINED BY AWS D1.1 TABLE 3.2.
   B. PREHEAT TEMPERATURES ARE MEASURED AT A DISTANCE FROM THE WELD EQUAL TO THE THICKNESS OF THE PART BEING WELDED, BUT NOT LESS THAN THREE INCHES IN ANY DIRECTION INCLUDING THE THROUGH THICKNESS OF THE PIECE. WHERE PLATES ARE OF DIFFERENT THICKNESS, THE PREHEAT REQUIREMENT FOR THE THICKER PLATE GOVERNS. MAINTENANCE OF PREHEAT TEMPERATURE THROUGH THE EXECUTION OF THE WELD (I.E. THE INTERPASS TEMPERATURE) IS ESSENTIAL. MAXIMUM INTERPASS TEMPERATURE IS LIMITED TO 550 DEGREES FAHRENHEIT, MEASURED AT A DISTANCE NOT EXCEEDING ONE INCH FROM THE START OF THE WELD PASS. WELDING OPERATORS AND INSPECTORS ARE IN POSSESSION OF AND UTILIZING TEMPERATURE STICKS.
   C. IN NO CASE, REGARDLESS OF THE WELDING PROCESS, SHALL THE PREHEAT TEMPERATURE BE LESS THAN THAT REQUIRED TO DRIVE OFF ANY SURFACE MOISTURE OR CONDENSATION WHICH MAY BE PRESENT ON THE STEEL ELEMENTS TO BE WELDED.
7. ALL SLAG IS REMOVED AFTER EACH WELD PASS BEFORE WELDING OVER PREVIOUSLY DEPOSITED WELD METAL, AND THE WELD AND THE ADJACENT BASE METAL SHALL BE BRUSHED CLEAN. THIS REQUIREMENT SHALL APPLY NOT ONLY TO SUCCESSIVE LAYERS BUT ALSO TO SUCCESSIVE BEADS AND TO THE CRATER AREA WHEN WELDING IS RESUMED AFTER ANY INTERRUPTION, IN ACCORDANCE WITH AWS D1.1 SECTION 5.30.1.
8. ARC STRIKES ON CONNECTION PLATES, BEAMS AND COLUMNS ARE TO BE AVOIDED.
9. WELD TIE-INS ARE NOT PERMITTED
10. PEENING IS NOT ALLOWED.



TOP BEAM CONNECTION 1A

NOTICE OF PROPRIETARY INFORMATION

The *SIDEPLATE*® steel frame connection information for the *Hardy Frame*® Moment Frame herein is PROPRIETARY Information belonging to MiTek-USA, Inc., Tel. (800) 754-3030, www.hardyframe.com. The *SIDEPLATE*® Connection Technology is patented in the U.S.A. (U.S. Patent nos. 5,660,017, 6,138,427, 6,516,583 & 6,591,573) and other countries, with other patents applied for. Use or disclosure of this information is strictly prohibited except as authorized in writing by MiTek-USA, Inc. Violators will be prosecuted in accordance with U.S.A. and Foreign Patent and Intellectual Property Laws.



BOTTOM BEAM CONNECTION (HFPIC CONFIGURATION ONLY) 1B

SIDEPLATE CONNECTION DESIGN PARAMETERS

MODEL NUMBER	COLUMN	PLATE THICKNESS		WELD SIZE						BEAM	GAP	DIMENSIONS		WELD SIZE		¾" STUDS**
		[A]	[D]	{1}	{1A}	{2}	{2A}	{3}	{3A}			A	B	{6}	{7}*	QTY.
HFMF611	BU6.5x33	½"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS6x4x3/8	1"	8"	11"	¼"	¼"	6
HFPIC611					5/16"		7/16"		5/16"							
HFMF811	BU8.5x59	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS6x6x5/8	1 ½"	8"	11"	¼"	¼"	8
HFPIC811					5/16"		7/16"		5/16"							8
HFMF813	BU8.5x59	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS8x6x1/2	1 ½"	10"	13"	¼"	¼"	8
HFPIC813					5/16"		7/16"		5/16"							
HFMF1013	BU10.5x61	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS8x6x1/2	1 ½"	10"	13"	¼"	¼"	10
HFPIC1013					5/16"		7/16"		5/16"							15
HFMF1014	BU10.5x61	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS8x6x5/8	1 ½"	10"	14"	¼"	¼"	10
HFPIC1014					5/16"		7/16"		5/16"							
HFMF1214	BU12.5x64	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS8x6x5/8	1 ½"	10"	14"	¼"	¼"	12
HFPIC1214					5/16"		7/16"		5/16"							18
HFMF1216	BU12.5x64	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS10x6x1/2	1 ½"	13"	16"	¼"	¼"	12
HFPIC1216					5/16"		7/16"		5/16"							
HFMF1416	BU14.5x66	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS10x6x1/2	1 ½"	13"	16"	¼"	¼"	14
HFPIC1416					5/16"		7/16"		5/16"							22
HFMF1416	BU14.5x66	¾"	⅜"	¼"	N/A	5/16"	N/A	¼"	N/A	HSS10x6x5/8	1 ½"	13"	16"	¼"	¼"	14
HFPIC1416					5/16"		7/16"		5/16"							

* WELD {7} IS A FLAIR-BEVEL GROOVE WELD WITH REINFORCING FILLET. SIZE IN TABLE INDICATES SIZE OF FILLET

** STUD QTY ASSUMES ATTACHMENT TO 4x NAILER. FOR ATTACHMENT TO STEEL ANGLE OR PLATE, SEE STUD QTY PER DETAIL 5 / HFMF 3

SIDEPLATE MOMENT CONNECTION PARAMETERS 1

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HARDY FRAME

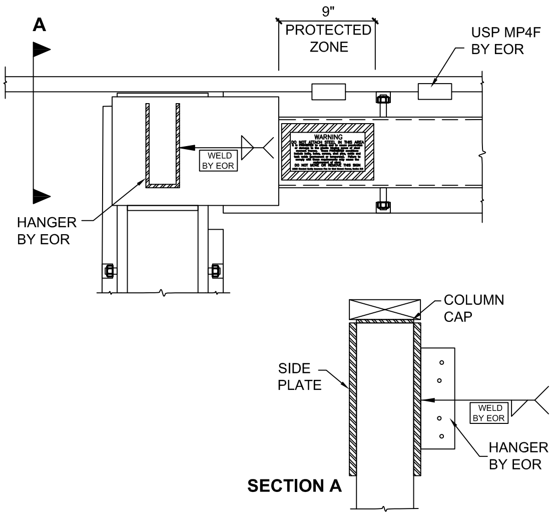
HARDY FRAME® SPECIAL MOMENT FRAME

TYPICAL INSTALLATION DETAILS
GENERAL NOTES AND SIDEPLATE CONNECTIONS

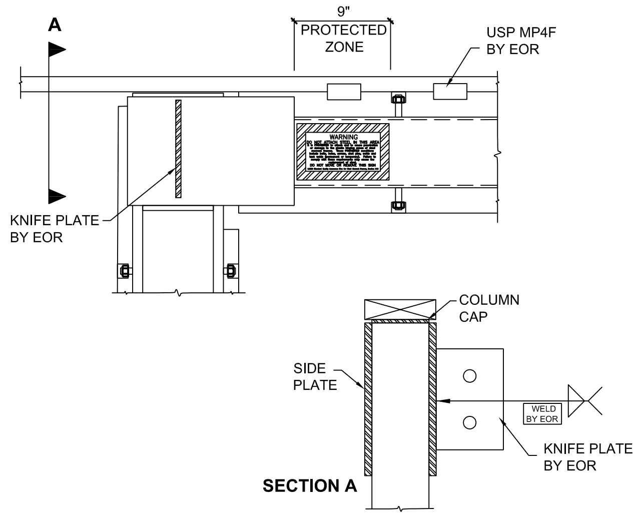
REVISIONS	DATE

DATE: 08-01-18

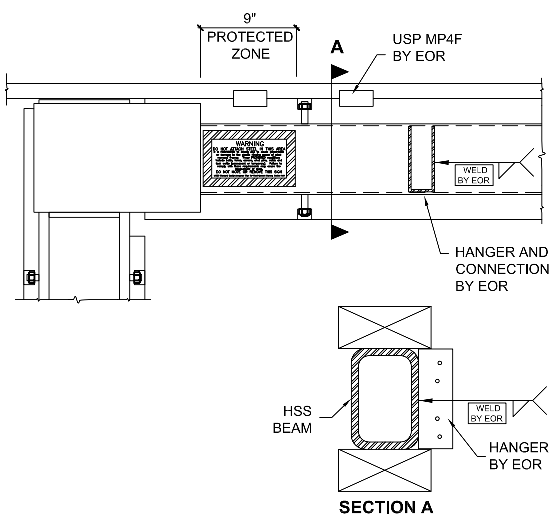
HFMF 4



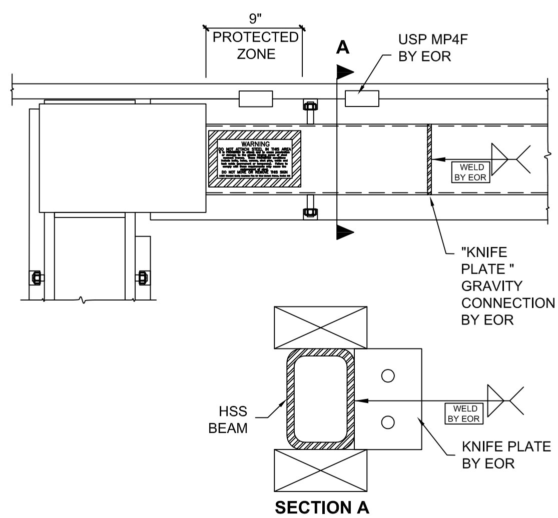
HANGER @ FACE OF SIDEPLATE FACE 4



KNIFE PLATE @ FACE OF SIDEPLATE 3

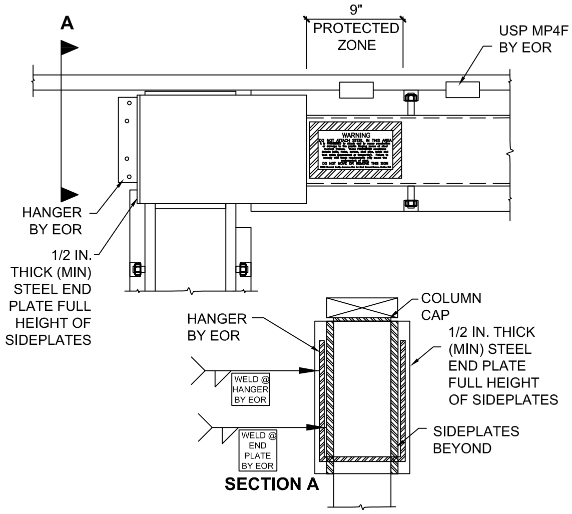


HANGER @ HEADER 8

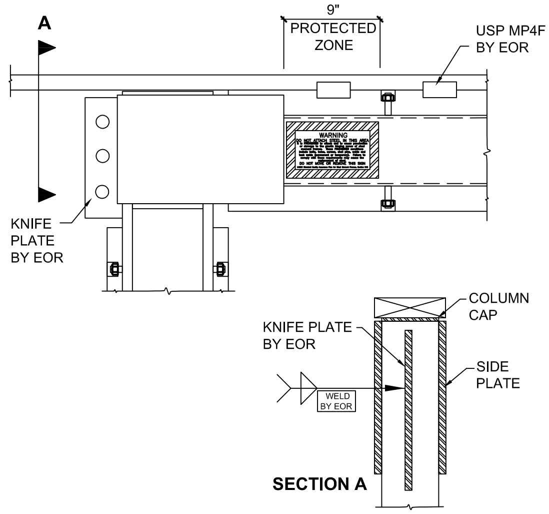


KNIFE PLATE TO HEADER 7

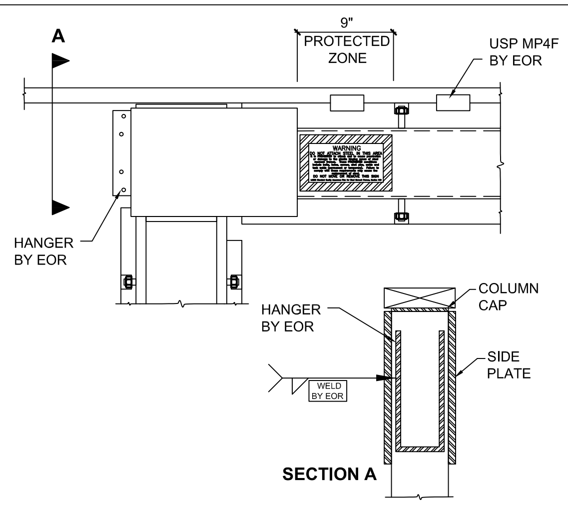
INFORMATION AND DETAILING ON THIS SHEET IS INTENDED FOR USE BY THE PROJECT DESIGN PROFESSIONAL AS ALTERNATES TO REMOVE AND REPLACE DETAILS ON SHEET HFMF 3.



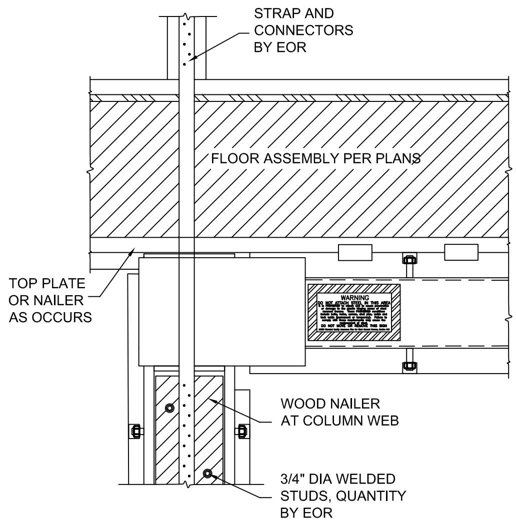
HANGER @ COLUMN TO END PLATE 2



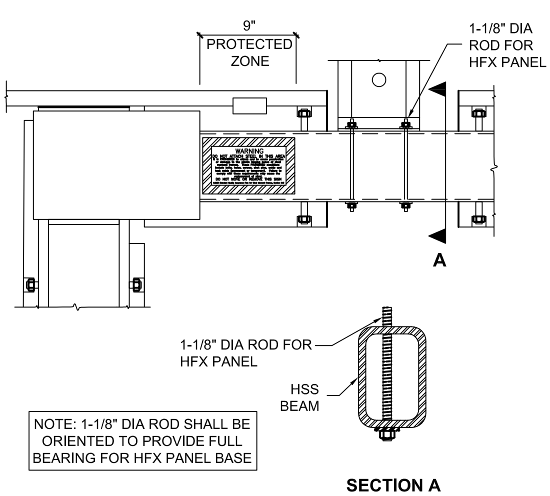
STEEL BEAM TO COLUMN FLANGE 1



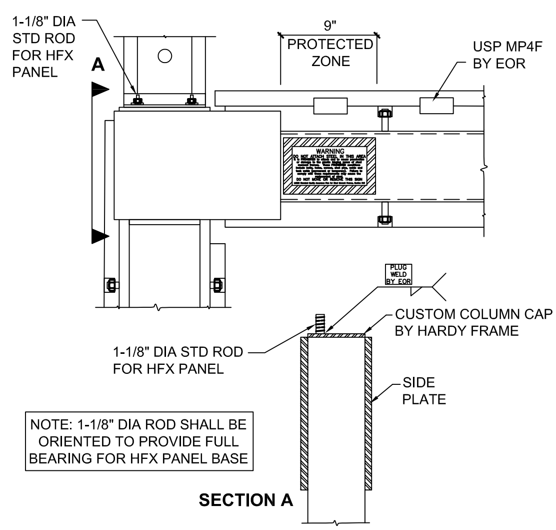
HANGER @ COLUMN FLANGE 6



HOLD DOWN STRAP TO COLUMN WEB 5



HFX PANEL @ HEADER 10



HFX PANEL @ COLUMN CAP 9

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HARDY FRAME

HARDY FRAME® SPECIAL MOMENT FRAME

TYPICAL INSTALLATION DETAILS
SUPPLEMENTAL CONNECTIONS & ATTACHMENTS

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HFMF 5

MiTek® Hardy Frames introduced the first standardized, prefabricated Special Moment Frame in 2006. Since then we have delivered thousands of Moment Frames that have been successfully installed. Our Special Moment Frames provide maximum structural capacities with minimal member sizes to enable large openings in architectural design.

The MiTek® Hardy Frame® Special Moment Frame (HFSMF) connections are approved in the AISC 358 Prequalified Moment Connection Standard. As part of the review, testing was submitted to confirm that **lateral bracing to prevent twist and out-of-plane displacements is not required** at the Hollow Structural Section (HSS) beams used in the HFSMF.

MOMENT FRAME PICTURE FRAME

CONFIGURATIONS

The MiTek® Hardy Frame® Special Moment Frame is available in multi-story, multi-bay, Moment Frame and Picture Frame configurations. Picture Frames consist of four column to beam special moment connections.

HFSMF IN NEW CONSTRUCTION

- Standard Sizes
- Table values
- Pre-engineered anchorage solutions
- Compatible with wood framing
- Fits in standard wood walls/framing

HFSMF IN RETROFIT CONDITIONS

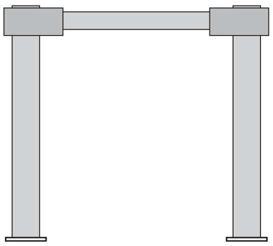
- Custom designs to meet job specific conditions
- Delivery options
  - Preassembled
  - Column Splice - Field Bolted
  - Knock-Down - Limited Field Welded Assembly

SPECIAL MOMENT FRAMES NEW CONSTRUCTION

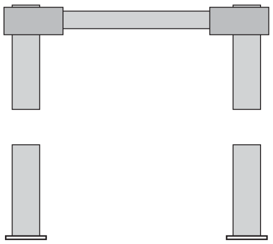
PICTURE FRAME WITH FOUNDATION BEAM INSTALLATION

SPECIAL MOMENT FRAMES DELIVERY TO JOB SITE

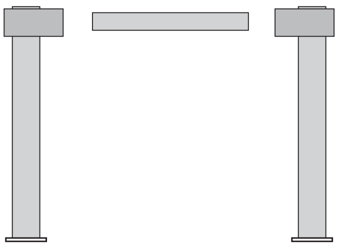
SPECIAL MOMENT FRAME IN RETROFIT APPLICATIONS



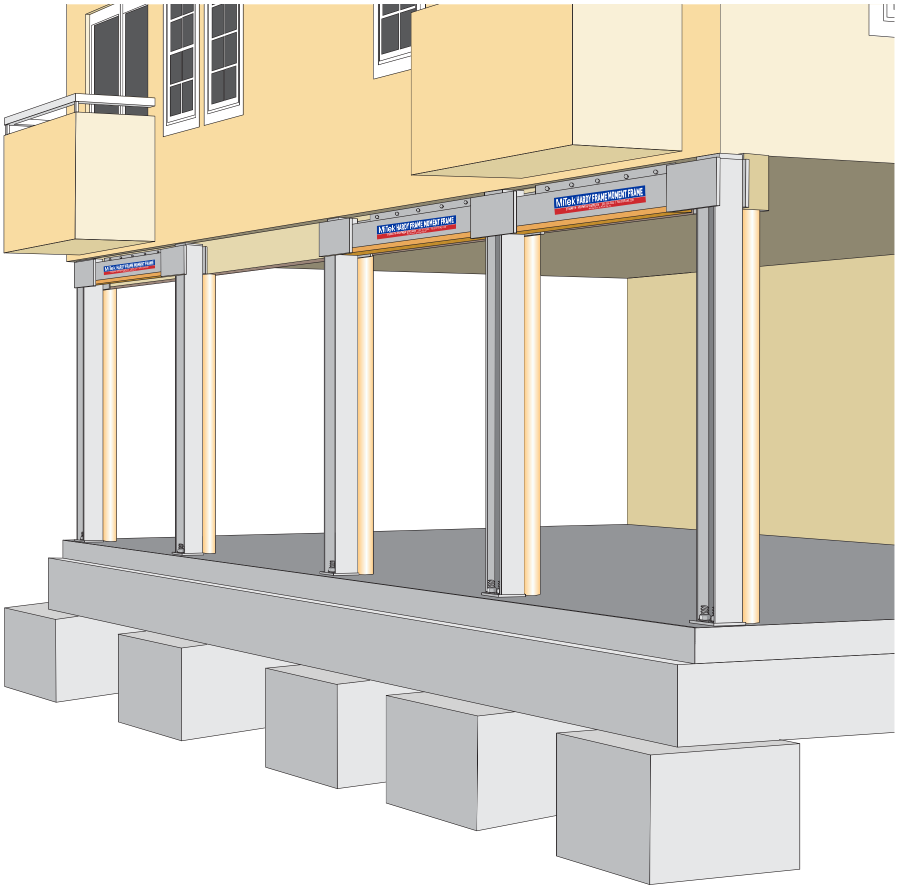
PRE-ASSEMBLED

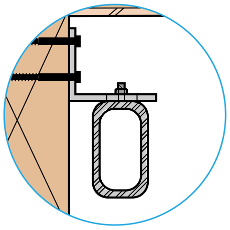


COLUMN SPLICE

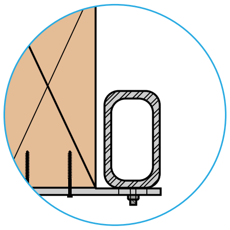


KNOCK DOWN

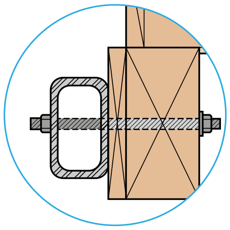




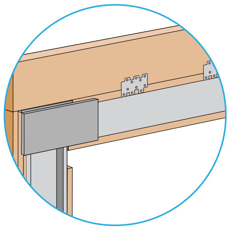
ANGLE



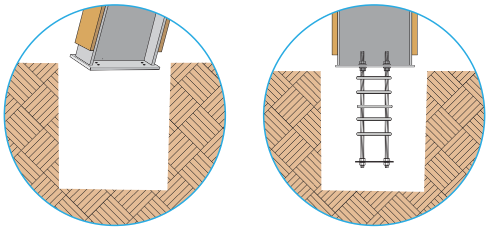
PLATE



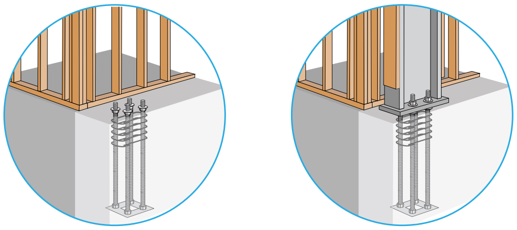
THROUGH BOLT



MITEK CONNECTORS



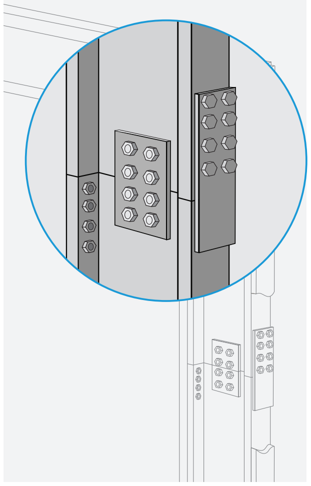
POURED IN PLACE ANCHORS



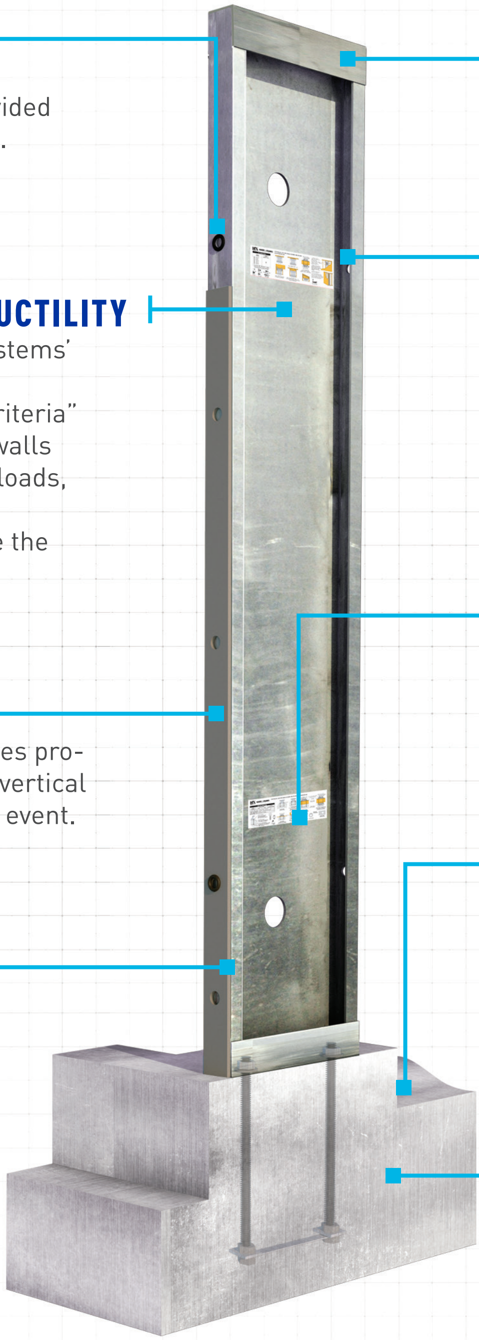
PRE-CAST ANCHORS

SPECIAL MOMENT FRAME COLUMN SPLICE OPTION

The column splice enables installations in restricted existing conditions.



WHAT TO LOOK FOR IN A PRE-FABRICATED STEEL SHEAR WALL SYSTEM



ELECTRICAL ACCESS

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

STRENGTH, STIFFNESS & DUCTILITY

The Hardy Frame® Shear Wall Systems' proprietary design meets the ICC Evaluation Service "Acceptance Criteria" (AC322) for pre-fabricated shear walls with the strength to resist lateral loads, stiffness to reduce damage to the structure and ductility to dissipate the energy of an earthquake.

RESERVE CAPACITY

Steel "stiffeners" at the Panel edges provide a reserve capacity to hold up vertical loads after a seismic or high wind event.

WIDTH

The 9 inch wide Hardy Frame® is the narrowest pre-fabricated shear Panel in the industry. Panel widths include 9, 12, 15, 18, 21 and 24-inches. For architectural designs that maximize openings choose Hardy Frame® Panels to resist earthquake and wind forces with the highest allowable loads in the industry.

CUSTOM HEIGHTS

For non-standard wall heights choose a shear wall system that offers custom height manufacturing.

PANEL SHAPE

Look for the steel Shear Panel that is a C-shape. The cavity of the C-shape can be used to recess fixtures like porch lights and sockets, install wood backing and can be insulated. Hardy Frame® Panels are the only C-shape shear wall system in the industry.

INSTALLATION INSTRUCTIONS

Labels provide illustrated instructions for top and bottom connections that won't get lost or separated from the Panel.

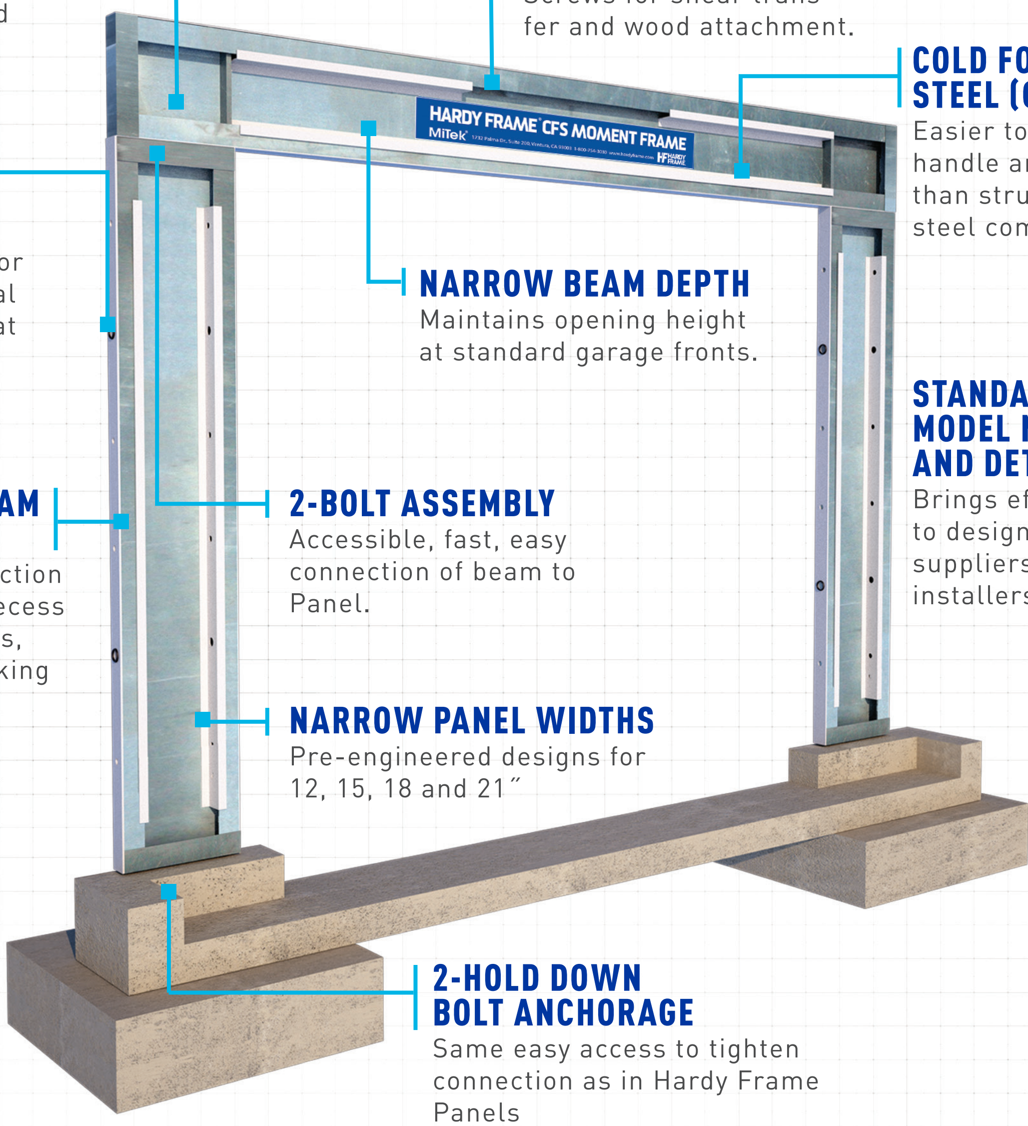
MULTIPLE APPLICATIONS

Hardy Frame® Shear Wall Systems have multiple applications. Panels can be installed on concrete, on wood floor systems or stacked floor to floor by combining the Panel with the appropriate Hardy Frame® accessory.

ECONOMICAL OPTIONS

Shear walls that require high-strength anchors regardless of the design load drive up material cost. Hardy Frame® Panels provide allowable loads for both standard and high strength anchors.

WHAT TO LOOK FOR IN A COLD FORMED STEEL MOMENT FRAME



PANEL ZONE
Provides Moment Connection with high capacity and ductile behavior.

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.

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

NARROW BEAM DEPTH
Maintains opening height at standard garage fronts.

STANDARD MODEL NUMBERS AND DETAILING
Brings efficiencies to designers, suppliers and installers.

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

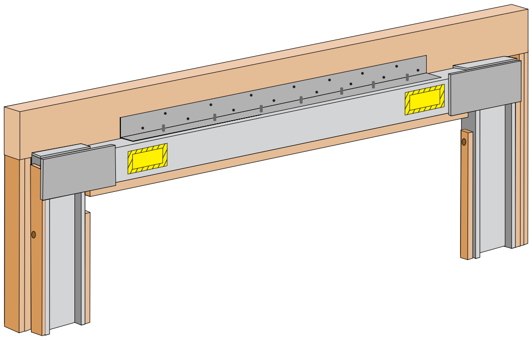
2-BOLT ASSEMBLY
Accessible, fast, easy connection of beam to Panel.

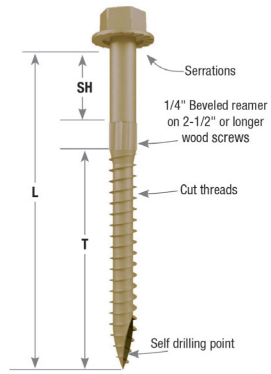
NARROW PANEL WIDTHS
Pre-engineered designs for 12, 15, 18 and 21″

2-HOLD DOWN BOLT ANCHORAGE
Same easy access to tighten connection as in Hardy Frame Panels

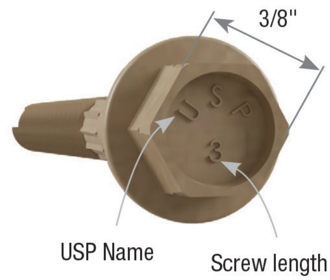
MiTek® PRO SERIES™

MITEK® PRO-SERIES™ SCREWS FOR TOP CONNECTION WITH ANGLE OR PLATE





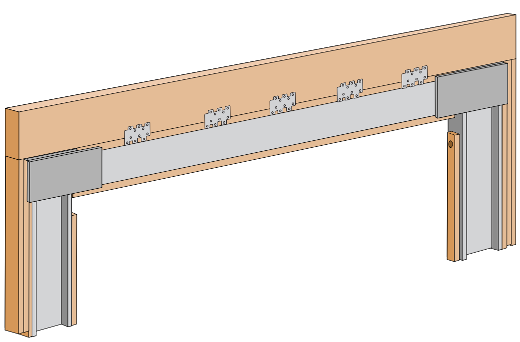
WS Screws



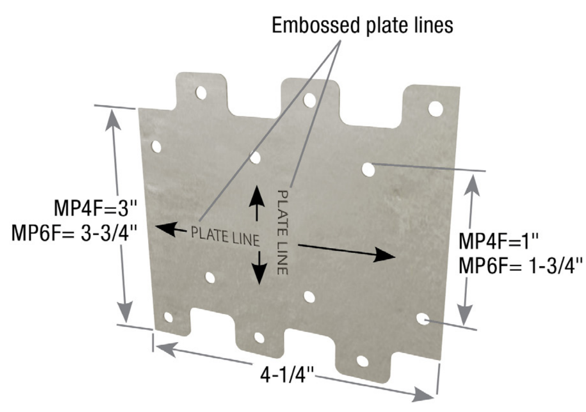
USP Stock No.	Description	Dimensions (in)				Finish	Allowable Shear (160%)	
		L	SH	T	Thread		3 GA Steel to DF-L/SP	3 GA Steel to S-P-F
WS3	1/4" x 3"	3	3/4	2-1/4	2	Zinc	731 lbs	584 lbs
WS45	1/4" x 4-1/2"	4-1/2	1-1/4	3-1/4	3	Zinc	849 lbs	606 lbs

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

MITEK® PLATE CONNECTORS FOR TOP CONNECTION TO FRAMING ABOVE

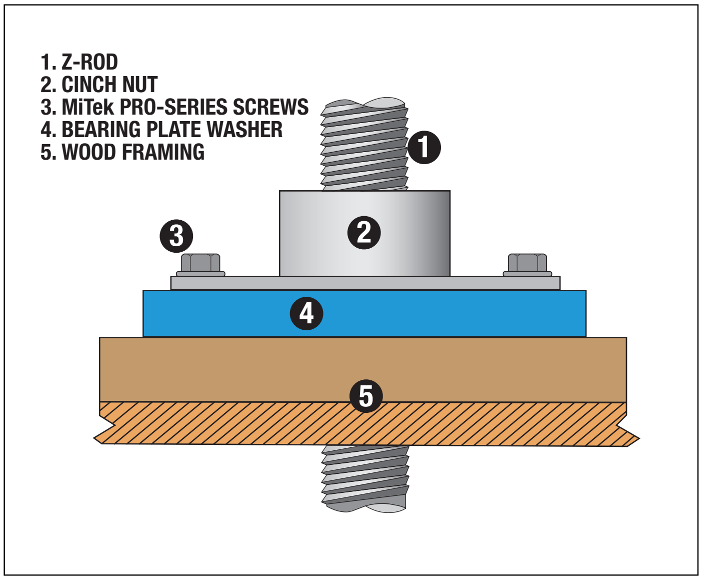


"MP4F" Plate Connector



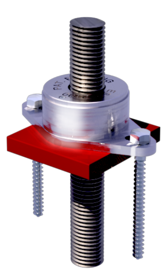
USP Stock No.	Steel Gauge	Orientation	Fastener Schedule		Direction of Load	Allowable Shear (160%)	
			Each Member			DF-L/SP	S-P-F
			Qty	Type			
MP4F	20	H	6	8d x 1-1/2	H	845 lbs	710 lbs

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



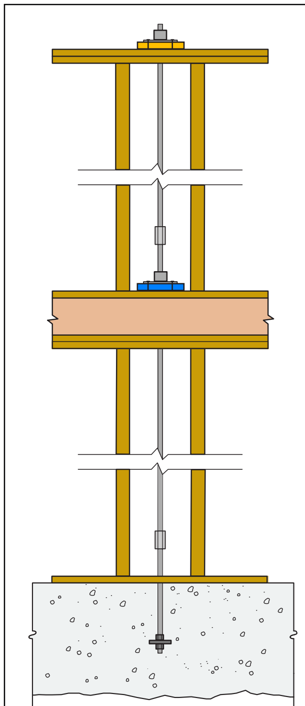
MiTek® Z4 Tie-Down Systems utilize CNX-Series Cinch Nuts to compensate for wood shrinkage and building settlement that cause connections to loosen over time. The Cinch Nut uses a self-ratcheting action that permits the cinch nut to move (the rod doesn't move) or "travel" perpetually in one direction 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.

- 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

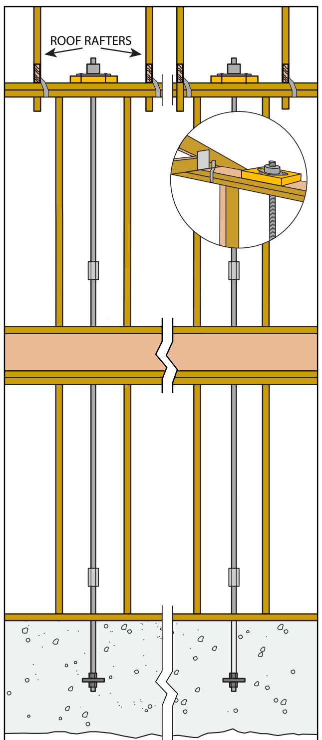
BPW7 AND LARGER INSTALLATION



for Lateral Loads

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 are all available lines of **MiTek®, USA.**



for Wind Uplift Loads

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

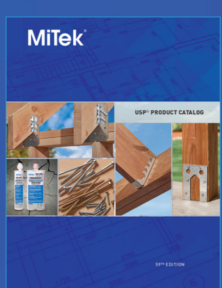
The MiTek® Hardy Frame® Installation Guide was written specifically for Suppliers and Installers. This publication provides all HFX model numbers, dimensions, bolt and screw patterns, connectors, installation illustrations, attachments and information regarding Template Kit (HFXTK) and Floor to Floor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

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