16

Bell Garage, Columbia County FL

Wind Load Analysis Requirements

(In Compliance with the 2010 Florida Building Code)

Prepared By: Marty J. Humphries, P.E. # 51976
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Description of buildig:

Footprint: 20' wide x 20'6" deep(see plan set #P 1201 by Haygood Homes Inc.)
Walls: SPF 2x4 studs -16" O.C. with 15/32" OSB sheathing and hardiplank lap siding/ or brick veneer(see elevations for location)
Roof Structure: Pre-engineered roof trusses and 15/32" OSB or 15/32" CDX plywood sheathing
Roof Type: hip (analyzed for 2' eave overhang)
Foundation: monolithic

Windload Data and Exposure:

Basic Wind Speed = 120 mph
Importance Factor = 1.0
Exposure category = B
Height and Exposure Adjustment Coefficient = 1.0
Residential Occupancy = Group R3
Analysis Method = ASCE 7
Risk Category = II
Component and Cladding Pressures: Roof – Zone 1=23.7,-25.9, Zone 2=23.7,-30.9, Zone 3=23.7,-30.9, Wall – Zone 4=25.9,-28.1, Zone 5 =25.9, -34.7(units are psf)
Mean roof height = 14'
Roof Cross Slope = 5:12
Eave Overhang= 2'
Wall Height = 10' (above slab)
Shear Wall locations = exterior walls only(>3' in length)(all exterior walls shall be sheathed)

Nailing Pattern Requirements:

Wall sheathing: (exterior walls)	Shall be 15/32" Oriented Strand Board(OSB) minimum nailed with 8d common nails 3" on center around edges(including around doors and windows) and 6" on center interior. Long dimension of sheathing shall be installed vertical and full depth blocking shall be installed at horizontal joints in sheathing.
Roof sheathing:	Shall be 15/32" Oriented Strand Board(OSB) or 15/32" CDX plywood nailed with 8d ring shank nails 6" on center at panel ends and overhangs and 6" on center elsewhere.
Top wall plate:	Nail with 1-16d common nail 12" O.C.(average)

Marty J. Humphries
10-17-12

Strapping and Anchor Requirements:

truss to wall plate:	For common trusses Install one Simpson model H10 hurricane anchor at each location. For hip trusses install Simpson HCP hurricane anchor each location. For jack trusses install Simpson H2.5A anchor each location.
wall strap tie requirements: (exterior walls)	At top and bottom of wall install one Simpson model SP4 at each side of each door or window 4' or less in width. For garage door install two Simpson model SPH4's each side of opening at top and bottom of the wall. At all other wall locations install one Simpson model SP4 - 4' on center, top and bottom of the wall.

Foundation Requirements:

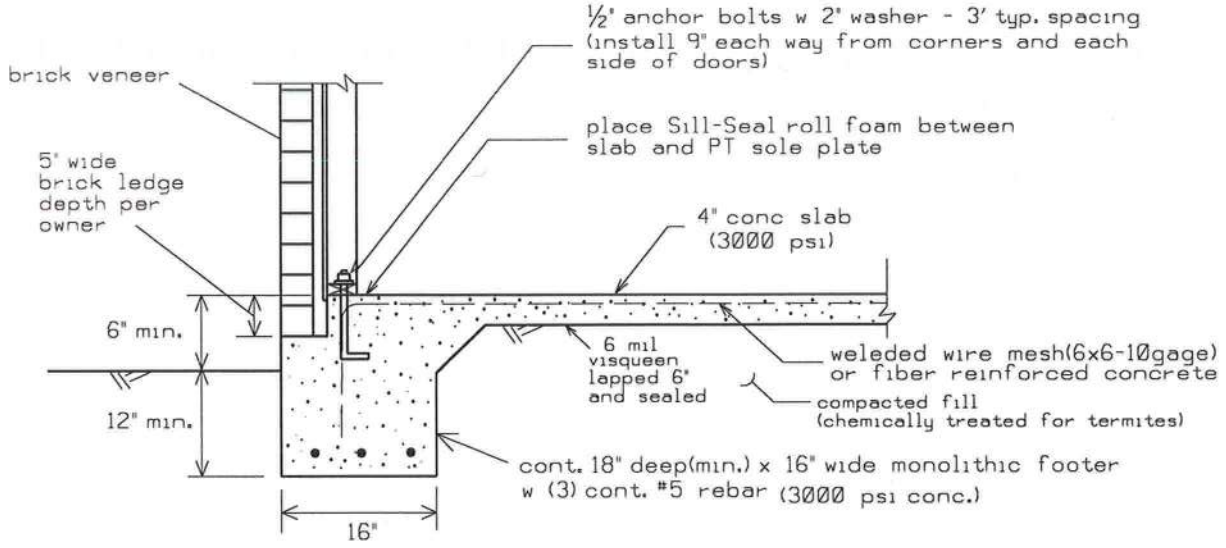
Monolithic:	Minimum size of footer shall be 12" wide x 18" deep with 2-#5 rebar continuous and ½" anchor bolts with 2" washers shall be installed 3' on center, each side of doors, and 9" from corners each way. (3000 psi concrete min.) For brick veneer area widen footer to 16" with ledge blocked-out for brick veneer and 3-#5 rebar continuous(all other requirements remain the same)(see footer details)
Stemwall: (optional)	Minimum size of footer shall be 10" x 16" wide with 2-#5 rebar continuous and 1 #5 vertical rebar 48" on center. All cells shall be filled with concrete. ½" anchor bolts with 2" washers shall be installed 3' on center, each side of doors, and 9" from corners each way. (3000 psi concrete min.) For brick veneer area widen footer to 21"(inside edge offset 4" inside of blocks) w 3-#5 rebar continuous, all other requirements shall remain the same.(see footer details)

Header Requirements:

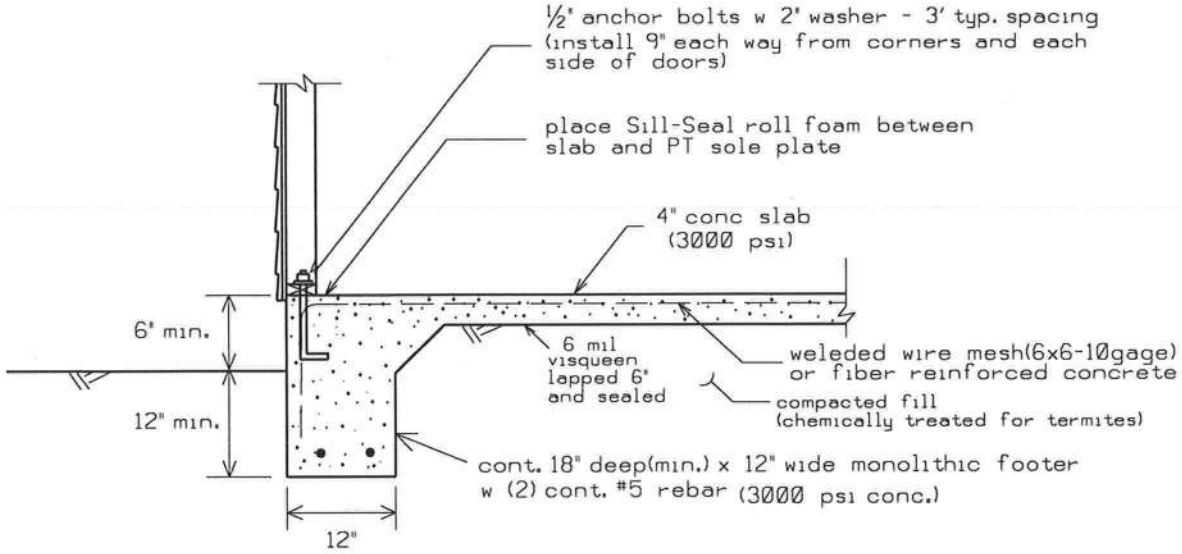
Windows, Doors, Porches:	For windows & passage door and garage door: minimum header shall be 2 - #2 SYP 2x12's w 1/2" OSB or plywood between nailed w 12d nails 10" on center top & bottom.

Equivalent capacity anchors may be substituted, installed in accordance with the manufacturers requirements.

Mitz D. [signature]
10-17-12



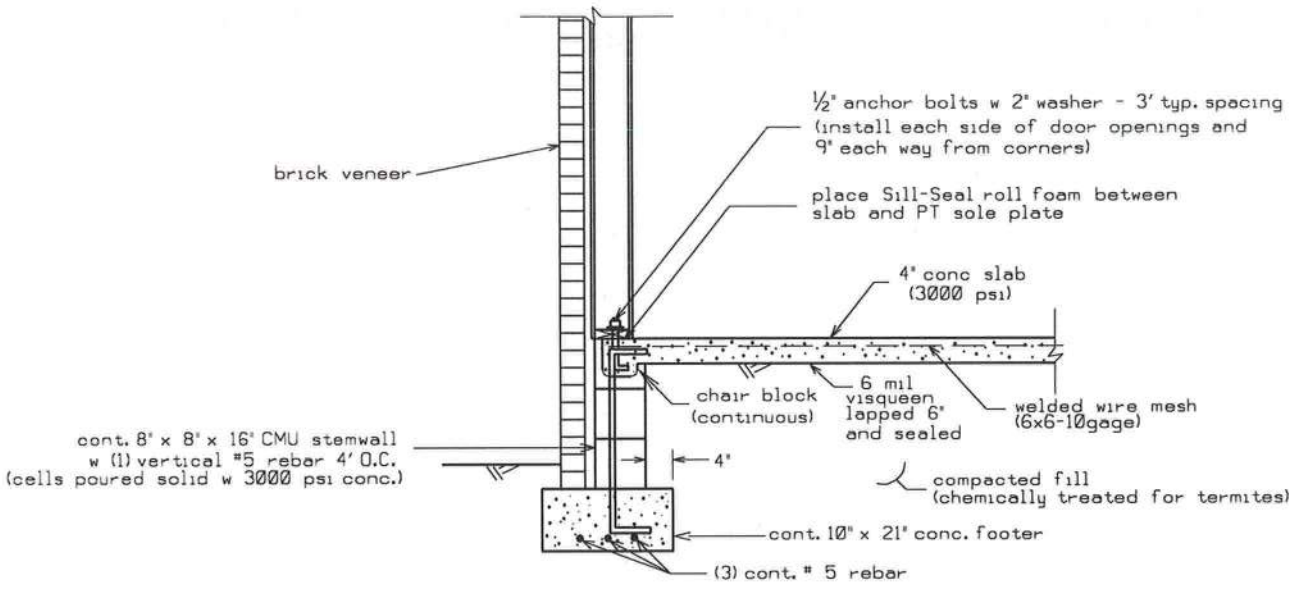
MONOLITHIC FOUNDATION w BRICK VENEER(N.T.S.)



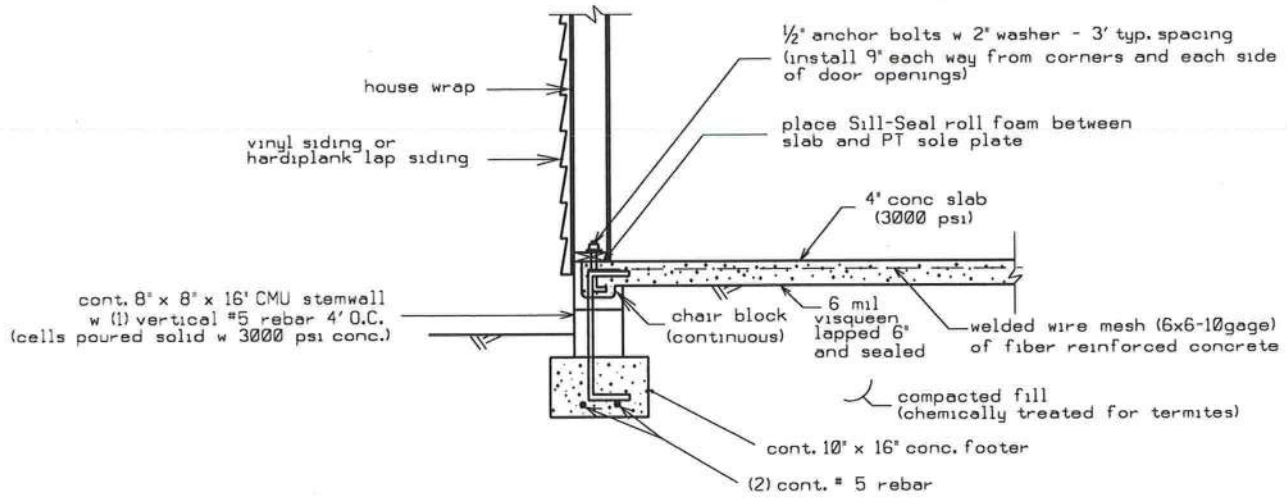
MONOLITHIC FOUNDATION(N.T.S.)

Marty J. Humphries
10-17-12

Bell Garage Columbia County, FL	DETAIL PREPARED BY: MARTY J. HUMPHRIES P.E. # 51976 7932 240TH ST., O'BRIEN, FL 32071



STEMWALL FOUNDATION w BRICK VENEER(N.T.S.)



STEMWALL FOUNDATION(N.T.S.)

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NEW! The H2.5A is symetrically designed for easy installation, with higher uplift loads to meet new code requirements. A placement mark allows easy installation on double top plates.

NEW! The H5A has an installed cost benefit, as it only requires 6 nails, to meet lower uplift requirements.

The H connector series provides wind and seismic ties for trusses and rafters.

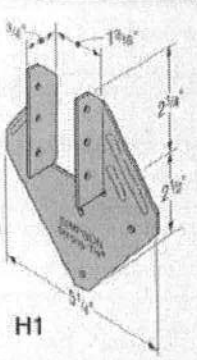
Allowable loads for more than one direction for a single connection cannot be added together. A design load which can be divided into components in the directions given must be evaluated as follows:
Design Shear/Allowable Shear + Design Tension/Allowable Tension ≤ 1.0.

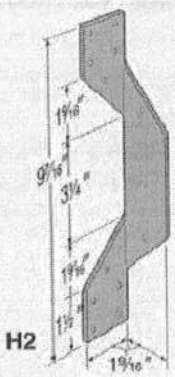
MATERIAL: See table

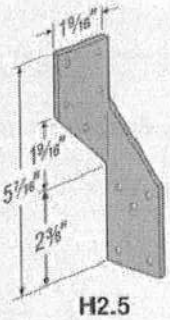
FINISH: Galvanized; H10-2, H11Z–Z-MAX. Other models available in stainless steel or Z-MAX; see Corrosion-Resistance, page 5.

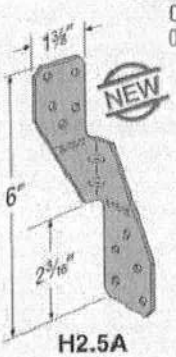
INSTALLATION:
- Use all specified fasteners. See General Notes.
- H1 can be installed with flanges facing outwards (reverse of drawing number 1). When installed inside a wall, a birdsmouth cut is required.
- H2.5, H3, H4, H5 and H6 ties are shipped in equal quantities of rights and lefts.
- Bend the H7 over the top of the truss. Install a minimum of four 8d nails into the truss, including two into the truss side.
- Hurricane Ties do not replace solid blocking.

CODES: BOCA, ICBO, SBCCI NER-422, NER-393, NER-432; NER-499; City of L.A. RR 24818; Dade Co, FL 00-0512.11 (H10); 00-0926.01 (H1, H2.5, H3, H4, H5).


H1


H2


H2.5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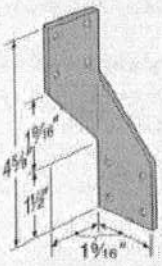
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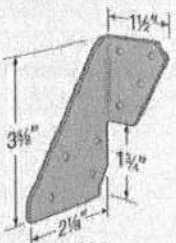
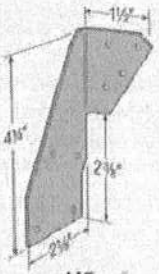
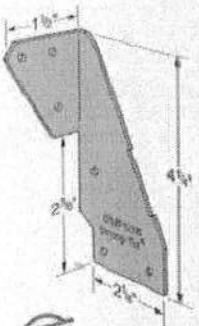
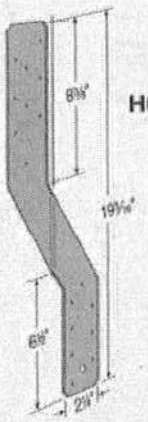

H4
U.S. Patent 4,714,372


H5
U.S. Patent 4,714,372


H5A
U.S. Patent 4,714,372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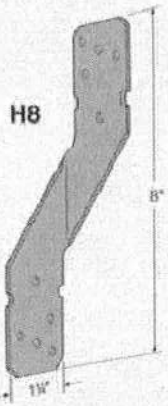
H7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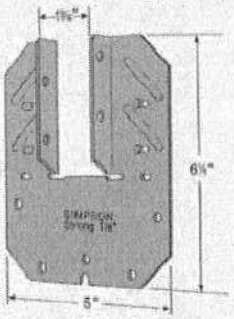
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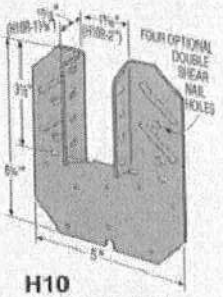
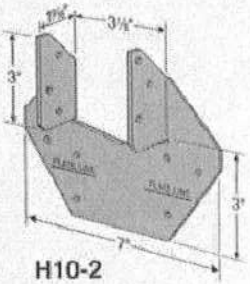
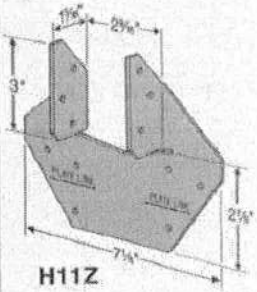

H10
(H10R similar)
U.S. Patents 4,480,941; Canada Patent 1,193,418

Model No.	Ga	Fasteners			Uplift Avg Ult	Doug-Fir Larch/So. Pine Allowable Loads[1,2]				Uplift Load with 8dx1½ Nails (133 & 160)	Spruce-Pine-Fir Allowable Loads[1,2]				Uplift Load with 8dx1½ Nails (133 & 160)
		To Rafters/ Truss	To Plates	To Studs		Uplift		Lateral (133/160)			Uplift		Lateral (133/160)		
						(133)	(160)	F_1	F_2		(133)	(160)	F_1	F_2	
H1	18	6-8dx1½	4-8d	—	1958	490	585	485	165	455	400	400	415	140	370
H2	18	5-8d	—	5-8d	1040	335	335	—	—	335	230	230	—	—	230
H2.5	18	5-8d	5-8d	—	1300	415	415	150	150	415	365	365	130	130	365
NEW H2.5A	18	5-8d	5-8d	—	1793	600	600	110	110	480	520	535	110	110	460
H3	18	4-8d	4-8d	—	1433	455	455	125	160	415	320	320	105	140	290
H4	20	4-8d	4-8d	—	1144	360	360	165	160	360	235	235	140	135	235
H5	18	4-8d	4-8d	—	1485	455	465	115	200	455	265	265	100	170	265
NEW H5A	18	3-8d	3-8d	—	1500	350	420	115	180	280	245	245	100	120	170
H6	16	—	8-8d	8-8d	3983	915	950	650	—	—	783	820	560	—	—
H7	16	4-8d	2-8d	8-8d	2991	930	985	400	—	—	800	845	345	—	—
H8	18	5-10dx1½	5-10dx1½	—	2422	620	745	—	—	—	530	565	—	—	—
H9KT	18	4-SDS¼x1½	5-SDS¼x1½	—	2812	875	875	680	125	—	755	755	680	125	—
H10	18	8-8dx1½	8-8dx1½	—	3135	905	990	585	525	—	780	850	505	450	—
H10R	18	8-8dx1½	8-8dx1½	—	3135	905	990	585	525	—	780	850	505	450	—
H10-2	18	6-10d	6-10d	—	2447	760	760	455	395	—	655	655	390	340	—
H11Z	18	6-16dx2½	6-16dx2½	—	5097	830	830	525	760	—	715	715	450	655	—


H10-2


H11Z

1. Loads have been increased 33% and 60% for earthquake or wind loading with no further increase allowed.
2. Allowable loads are for one anchor. A minimum rafter thickness of 2½" must be used when framing anchors are installed on each side of the joist and on the same side of the plate.
3. Allowable uplift load for stud to bottom plate installation is 400 lbs (H2.5); 390 lbs (H2.5A); 360 lbs (H4) and 310 lbs (H8).
4. The H9KT is sold in 20 piece packs with screws.
5. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
6. Hurricane Ties are shown installed on the outside of the wall for clarity. Installation on the inside of the wall is acceptable. For a Continuous Load Path, connections must be on same side of the wall.

LSU/LSSU ADJUSTABLE LIGHT SLOPEABLE/SKEWABLE U HANGERS

SIMPSON StrongTie

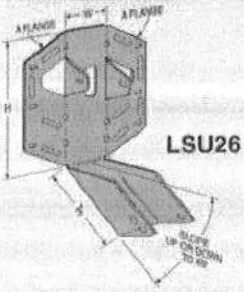
This series attach joists or rafters to headers, sloped up or down, and skewed left or right, up to 45°.

MATERIAL: See table.

FINISH: Galvanized

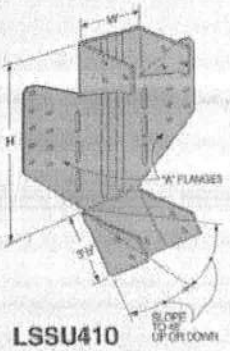
INSTALLATION: • Use all specified fasteners. See General Notes.
- Attach the sloped joist at both ends so that the horizontal force developed by the slope is fully supported by the supporting members.
- Web stiffeners required for I-joist applications.

CODES: BOCA, ICBO, SBCCI NER-209, NER-421, NER-432. City of L.A. RR 24949, RR 25074 and RR 25076.



LSU26

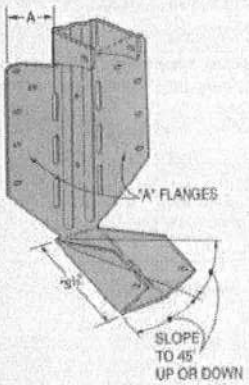
U.S. Patent 4,423,977 and Canada Patent 1,168,827



LSSU410 (LSSU210-2 similar)

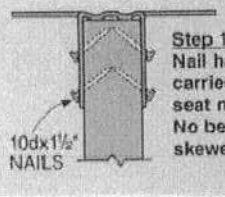
Joist Width	Model No.	Ga	Dimensions W	H	A	Fasteners Face	Joist	Allowable Loads DF/SP Species Header Uplift[2] (133)	Uplift[2] (160)	Floor (100)	Roof Snow (115)	Roof Const (125)	SPF Species Header Uplift[2] (133)	Floor (100)	Roof Snow (115)	Roof Const (125)
Sloped Only Hangers																
1½	LSU26	18	1⅜	4⅞	1½	6-10d	5-10dx1½	485	535	665	765	800	415	575	660	690
1½	LSSU28	18	1⅜	7⅛	1½	10-10d	5-10dx1½	485	535	1110	1275	1390	415	960	1105	1200
1½	LSSU210	18	1⅜	8½	1⅝	10-10d	7-10dx1½	730	875	1110	1275	1390	625	960	1105	1200
2½	LSSUH310	16	2⅜	8½	3½	18-16d	12-10dx1½	1150	1150	2395	2565	2565	990	2070	2215	2215
3	LSSU210-2	16	3⅜	8½	2⅞	18-16d	12-10dx1½	1150	1150	2395	2755	2990	990	2070	2380	2590
3½	LSSU410	16	3⅜	8½	2⅜	18-16d	12-10dx1½	1150	1150	2395	2755	2990	990	2070	2380	2590
Skewed Hangers or Sloped and Skewed																
1½	LSU26	18	1⅜	4⅞	1½	6-10d	5-10dx1½	485	535	665	765	800	415	575	660	690
1½	LSSU28	18	1⅜	7⅛	1½	9-10d	5-10x1½	485	535	885	885	885	415	765	765	765
1½	LSSU210	18	1⅜	8½	1⅝	9-10d	7-10dx1½	730	785	995	1145	1205	625	860	995	1050
2½	LSSUH310	16	2⅜	8½	3½	14-16d	12-10dx1½	1150	1150	1600	1600	1600	990	1385	1385	1385
3	LSSU210-2	16	3⅜	8½	2⅞	14-16d	12-10dx1½	1150	1150	1825	1865	1865	990	1580	1610	1610
3½	LSSU410	16	3⅜		2⅜											

1. Roof loads are 125% of floor loads unless limited by other criteria. Floor loads may be adjusted for load durations according to the code provided they do not exceed those in the roof columns.
2. Uplift loads include a 33% and 60% increase for earthquake or wind loading; no further increase is allowed.

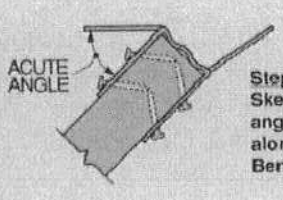


LSSU28

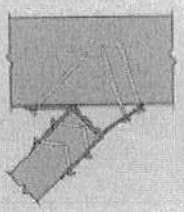
LSSU INSTALLATION SEQUENCE



Step 1
Nail hanger to slope-cut carried member, installing seat nail first.
No bevel necessary for skewed installation.



Step 2
Skew flange to form acute angle. Bend other flange back along centerline of slots.
Bend one time only.



Step 3
Attach hanger to the carrying member, acute angle side first. Install nails at an angle.

HCP HIP CORNER PLATES

The HCP connects a rafter or joist to double top plates at a 45° angle.

MATERIAL: 18 gauge.

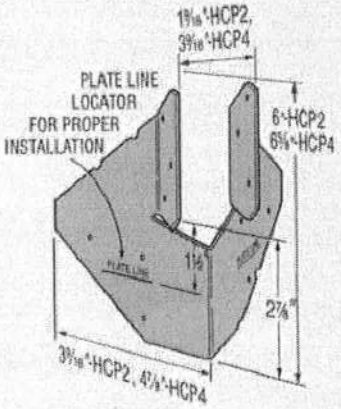
FINISH: HCP2–galvanized or Z-MAX; HCP4–galvanized.

INSTALLATION: • Use all specified fasteners. See General Notes.
- Attach HCP to double top plates; birdsmouth not required for table loads.
- Install rafter and complete nailing. Rafter may be sloped to 45°.

CODE: BOCA, ICBO, SBCCI NER-499.

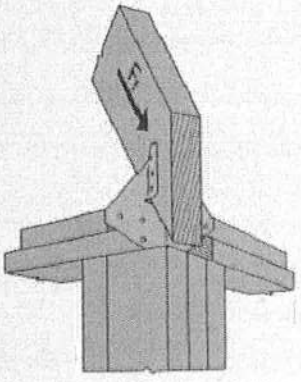
Member Size	Model No.	Fasteners To Rafters	To Plates	Uplift Avg Ult	Doug-Fir-Larch/ So. Pine Allowable Loads[1] (133 & 160) Uplift	F_1	Spruce-Pine-Fir Allowable Loads[1] (133 & 160) Uplift	F_1
2x	HCP2	6-10dx1½	6-10dx1½	2017	605	300	520	260
4x	HCP4	8-10d	8-10d	3367	1000	265	860	230

1. Loads may not be increased for short-term loading.
2. The HCP can be installed on the inside and the outside of the wall with a flat bottom chord truss and achieve twice the load capacity.
3. Uplift loads include a 33% and 60% increase for earthquake or wind loading; no further increase allowed.



HCP2 (HCP4 similar)

U.S. Patent 5,380,115



Typical HCP Installation

Solid Sawn Connectors

Z2 clips secure 2x4 flat blocking between joists or trusses to support sheathing.

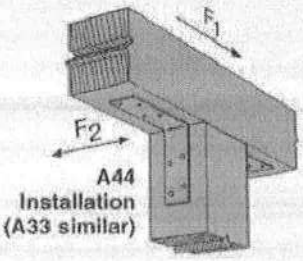
MATERIAL: Z clips–see table. A21 and A23–18 ga.; all other A angles–12 ga.

FINISH: Galvanized

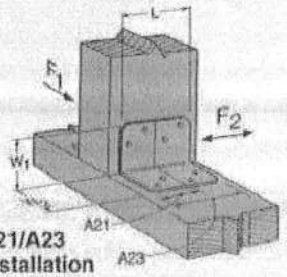
INSTALLATION: • Use all specified fasteners. See General Notes.
• Z clips do not provide lateral stability. Do not walk on stiffeners or apply load until diaphragm is installed and nailed to stiffeners.

CODES: BOCA, ICBO, SBCCI NER-421 (except A33, A44); City of L.A. RR 25076 (except A33, A44); Dade Co. FL 99-0623.04 (A21 and A23).

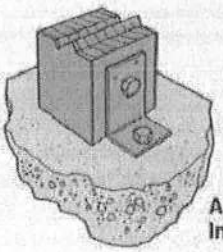
Model No.	Dimensions			Fasteners				Avg Ult F_2	Allowable Loads[2] DF/SP			
				Base		Post			(133)		(160)	
	W_1	W_2	L	Bolts	Nails	Bolts	Nails		F_1	F_2	F_1	F_2
A21	2	1½	1⅜	—	2-10dx1½	—	2-10dx1½	540	245	175	290	175
A23	2	1½	2¾	—	4-10dx1½	—	4-10dx1½	1767	485	485	585	565
A33	3	3	1½	—	4-10d	—	4-10d	2635	625	330	750	330
A44	4⅜	4⅜	1½	—	4-10d	—	4-10d	2490	625	295	750	295
A66	5⅞	5⅞	1½	2-⅜	—	2-⅜	—	N/A	N/A	N/A	N/A	N/A
A88	8	8	2	3-⅜	—	3-⅜	—	N/A	N/A	N/A	N/A	N/A
A24	3⅝	2	2½	1-½	—	1-½	2-10d	N/A	N/A	N/A	N/A	N/A
A311	11	3⅝	2	1-½	—	1-½	4-10d	N/A	N/A	N/A	N/A	N/A

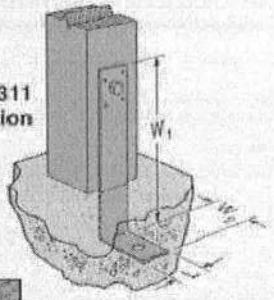


A44 Installation (A33 similar)



A21/A23 Installation

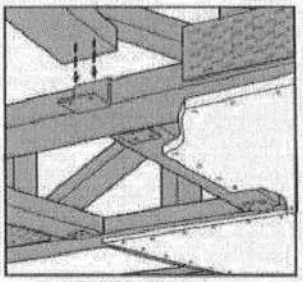

A24 Installation

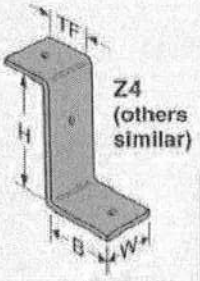


A311 Installation

Model No.	Ga	Dimensions				Fasteners[1] (Total)	Avg Ult	Allowable[2] Download (125)
		W	H	B	TF			
Z2	20	2⅜	1½	1⅜	1⅜	4-10dx1½	1507	465
Z4	12	1½	3⅛	2⅛	1¼	2-16d	1450	465
Z6	12	1½	5⅛	2	1⅜	2-16d	1517	485
Z28	28	2⅜	1½	1⅜	1⅜	10dx1½[3]	—	—
Z38	28	2⅜	2½	1⅜	1⅜	10dx1½[3]	—	—
Z44	12	2½	3½	2	1⅜	4-16d	2800	865

1. Z28 and Z38 do not have nail holes. Fastener quantities are as required.
2. Allowable loads have been increased 25% for roof loading (Z clips), 33% and 60% for earthquake or wind loading (A angles); no further increase allowed; reduce for other load durations according to the code.
3. Z4 and Z6 loads apply with a nail into the top and a nail into the seat.


Typical Z2 Installation



Z4 (others similar)

SP/SPH/RSP4 STUD PLATE TIES

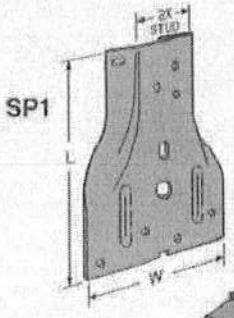
The RSP4 is a reversible stud plate tie with locating tabs, which aid placement on double top plates or a single bottom plate.

MATERIAL: SPH–18 gauge, all others–20 gauge **FINISH**: Galvanized

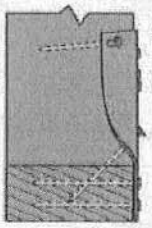
INSTALLATION: • Use all specified fasteners; see General Notes.
• SP–one of the 10d common stud nails is driven at a 45° angle through the stud into the plate.

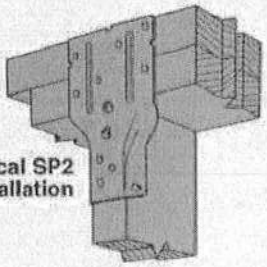
CODES: BOCA, ICBO, SBCCI NER-432, NER-443, NER-499; SBCCI 9603A; City of LA RR 25318 (RSP4); Dade Co. FL 99-0623.04 (SP1, SP2, SP4, SP6, SP8).

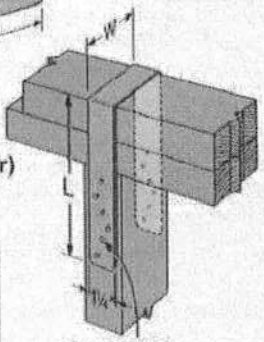
Model No.	Dimensions		Fasteners		Avg Ult	Allowable Uplift Loads DF/SP	
	W	L	Stud[1]	Plate		(133)[2]	(160)[2]
SP1	3½	5⅛	6-10d	4-10d	1950	585	585
SP2	3½	6⅝	6-10d	6-10d	3300	890	1065
SP3	4½	6⅝	6-10d	6-10d	3467	890	1065
SP4	3⅝	7¼	6-10dx1½	—	2917	735	885
SP5	4½	5⅛	6-10d	4-10d	1950	585	585
SP6	5⅛	7¼	6-10dx1½	—	2917	735	885
SP8	7⅛	8⅛	6-10dx1½	—	2917	735	885
SPH4	3⅝	8¾	10-10dx1½	—	3993	1240	1240
			12-10dx1½	—	4470	1360	1360
SPH6	5⅛	9¼	10-10dx1½	—	3993	1240	1240
			12-10dx1½	—	4470	1360	1360
SPH8	7⅛	8⅜	10-10dx1½	—	3993	1240	1240
			12-10dx1½	—	4470	1360	1360
RSP4 (1)	2⅜	4½	4-8dx1½	4-8dx1½	1032	315	315
RSP4 (2)	2⅜	4⅛	4-8dx1½	4-8dx1½	1445	450	450



SP1

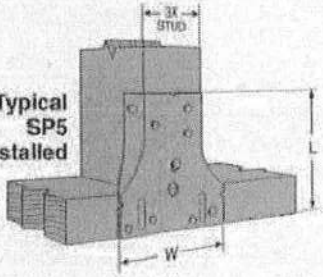

SP1 Nailing Profile


Typical SP2 Installation

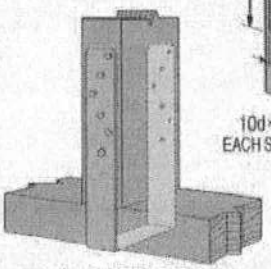


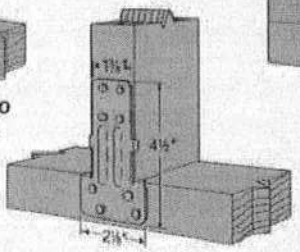
Typical SPH Installation (SP4, 6, 8 similar)

10d×1½" NAILS EACH SIDE OF STUD

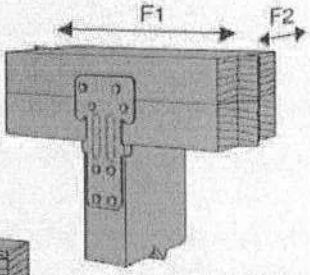


Typical SP5 Installed


Typical SPH4 Stud to Single Bottom Plate



(1) Typical RSP4 Stud to Single Bottom Plate



(2) Typical RSP4 Stud to Double Top Plate (see footnote 4)

1. SP1, 2, 3 and SP5: drive one stud nail at an angle through the stud into the plate to achieve the table load (see illustration).
2. Allowable loads have been increased 33% and 60% for earthquake or wind loading; no further increase allowed. Reduce by 33% and 60% for normal loading.
3. RSP4–see Installation details (1) and (2) for reference.
4. RSP4 F2 is 280 lbs (installation 1) and 305 lbs (installation 2). F1 load is 210 lbs for both installations.
5. Maximum load for SPH in Southern Yellow Pine is 1490 lbs.
6. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement

U.S. Patent 5,697,725