WISCONSIN
DAVID E. GROBLEWSKI
E-12754
MILWAUKEE, WIS.
PROFESSIONAL ENGINEER

Pg 1-30
David Groblewski
12/10/2015

LEE RIORDAN RESIDENCE
1081 EAST THURNE LANE
FOX POINT, WI 53217-3647

NORTH BATHROOM REMODEL - 2ND LEVEL

1) CHECK EXISTING FLOOR JOISTS W/O EAST WALL BEARING
LENGTH = 20'±; SECTION = $1\frac{5}{8} \times 9\frac{3}{8}$ HEM FIR #1; 16" c/c
FAILS AS ONE SPAN SEE Pg. 2
ADEQUATE AS TWO SPANS SEE Pg. 3

2) NEW 18' HEADER ABOVE WALL BETWEEN NEW AND EXISTING BATHS...
LOAD FROM SECOND FLOOR: .75(860) = 645 plf D = 215 L = 430
WALL : 8'(10) = 80 plf D = 80
CEILING JOISTS: $\frac{20}{2}(15+10)$ = 250 plf D = 150 L = 100
W = 975 plf w_D = 445 w_L = 530
ATTIC HEADER: SEE Pg. 4
(2) $1\frac{3}{4}$" x 18" M = L

3) WALL STUD CAPACITY IN TENSION:
SEE Pg. 5 OK

4) FLOOR JOIST TO STUD CONNECTORS:
USE SIMPSON H10S CAPACITY = 870# > 852#
SEE Pg. 6-9

5) STUD TO HEADER CONNECTORS
USE SIMPSON CS20 CAPACITY = 1030# ≈ 852
SEE Pg. 10-11

Project: Vintage Design

Location: Riordan Upper Bath Floor Joists @ 19' Span
Floor Joist
[2012 International Residential Code(2012 NDS)]
1.625 IN x 9.375 IN x 20.0 FT (1 + 19) @ 16 O.C.
#1 - Hem-Fir - Dry Use
Section Inadequate By: 37.5%
Controlling Factor: Deflection / Depth Required 10.82 In.

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 9:44:05 AM

DEFLECTIONS	Left		Center	
Live Load	-0.09	IN 2L/262	0.59	IN L/384
Dead Load	-0.04	in	0.28	in
Total Load	-0.13	IN 2L/182	0.87	IN L/262

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	947	lb	486	lb
Dead Load	604	lb	236	lb
Total Load	1551	lb	722	lb
Bearing Length	2.36	in	1.10	in

BEAM DATA	Left		Center	
Span Length	1	ft	19	ft
Unbraced Length-Top	0	ft	0	ft
Unbraced Length-Bottom	0	ft	0	ft

Floor sheathing applied to top of joists-top of joists fully braced.
Sheathing/sheetrock applied to bottom of joists-bottom of joists fully braced.
Floor Duration Factor 1.00

MATERIAL PROPERTIES
#1 - Hem-Fir

	Base Values		Adjusted	
Bending Stress:	Fb =	975 psi	Fb' =	1233 psi
	Cd=1.00 CF=1.10 Cr=1.15			
Shear Stress:	Fv =	150 psi	Fv' =	150 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1500 ksi	E' =	1500 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	405 psi	Fc - ⊥' =	405 psi

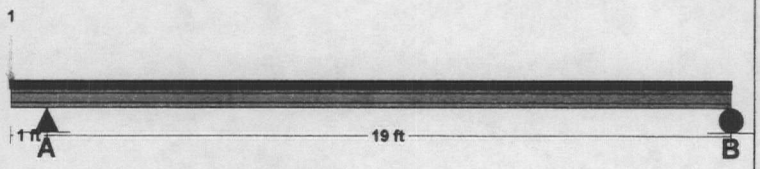
Controlling Moment: 3262 ft-lb
9.88 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 1, 2
Controlling Shear: 737 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 1, 2

Comparisons with required sections	Req'd	Provided
Section Modulus:	31.74 in3	23.8 in3
Area (Shear):	7.37 in2	15.23 in2
Moment of Inertia (deflection):	218.09 in4	158.56 in4
Moment:	3262 ft-lb	2447 ft-lb
Shear:	737 lb	1523 lb

Decking Information
Plywood Thickness: T = 3/4 in
Plywood Is Glued:
Moment of Inertia Calculations For Glued Floor:

Joist Area:	A-joist =	15.23	IN2
Plywood Area:	A-ply =	2.08	IN2
Section Centroid:	C =	5	IN ABOVE BASE
Moment of Inertia (deflection):	I-comb =	159	IN4

LOADING DIAGRAM



JOIST LOADING

Uniform Floor Loading		Left		Center	
Live Load	LL =	40	psf	40	psf
Dead Load	DL =	20	psf	20	psf
Total Load	TL =	60	psf	60	psf
TL Adj. For Joist Spacing	wT =	80	plf	80	plf
Wall Loading					
Wall One					
Live Load (⊥ to Joists):	L1 =	275	plf	0	plf
Dead Load (⊥ to Joists):	D1 =	230	plf	0	plf
Load Location	X1 =	0	ft	0	ft

Project: Vintage Design

Location: Riordan Upper Bath Floor Joists @ 11' + 8' Span
Floor Joist
[2012 International Residential Code(2012 NDS)]
1.625 IN x 9.375 IN x 20.0 FT (1 + 11 + 8) @ 16 O.C.
#1 - Hem-Fir - Dry Use
Section Adequate By: 107.1%
Controlling Factor: Shear

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 9:46:18 AM

DEFLECTIONS	Left		Center		Right	
Live Load	0.00	IN 2L/5678	0.03	IN L/4037	0.01	IN L/MAX
Dead Load	0.00	in	0.01	in	0.01	in
Total Load	0.00	IN 2L/10416	0.04	IN L/3135	0.01	IN L/7011

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B	C
Live Load	701 lb	586 lb	147 lb
Dead Load	488 lb	274 lb	78 lb
Total Load	1189 lb	860 lb	225 lb
Bearing Length	1.81 in	1.31 in	0.34 in

BEAM DATA	Left	Center	Right
Span Length	1 ft	11 ft	8 ft
Unbraced Length-Top	0 ft	0 ft	0 ft
Unbraced Length-Bottom	0 ft	0 ft	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Sheathing/sheetrock applied to bottom of joists-bottom of joists fully braced.
Floor Duration Factor 1.00

MATERIAL PROPERTIES

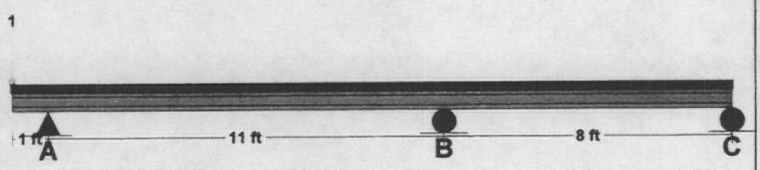
#1 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 975 psi	Fb' = 1233 psi
	Cd=1.00 CF=1.10 Cr=1.15	
Shear Stress:	Fv = 150 psi	Fv' = 150 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1500 ksi	E' = 1500 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 405 psi

Controlling Moment: -764 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 1, 2, 3
Controlling Shear: -736 lb
At a distance d from left support of span 1 (Left Span)
Created by combining all dead loads and live loads on span(s) 1, 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	7.43 in3	23.8 in3
Area (Shear):	7.36 in2	15.23 in2
Moment of Inertia (deflection):	9.95 in4	111.58 in4
Moment:	-764 ft-lb	2447 ft-lb
Shear:	-736 lb	1523 lb

LOADING DIAGRAM



JOIST LOADING

Uniform Floor Loading		Left	Center	Right
Live Load	LL =	40 psf	40 psf	40 psf
Dead Load	DL =	20 psf	20 psf	20 psf
Total Load	TL =	60 psf	60 psf	60 psf
TL Adj. For Joist Spacing	wT =	80 plf	80 plf	80 plf
Wall Loading				
Wall One				
Live Load (⊥ to Joists):	L1 =	275 plf	0 plf	0 plf
Dead Load (⊥ to Joists):	D1 =	230 plf	0 plf	0 plf
Load Location	X1 =	0 ft	0 ft	0 ft

Project: Vintage Design

Location: Riordan Attic Header
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.75 IN x 18.0 IN x 18.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 10.6%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 11:32:26 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

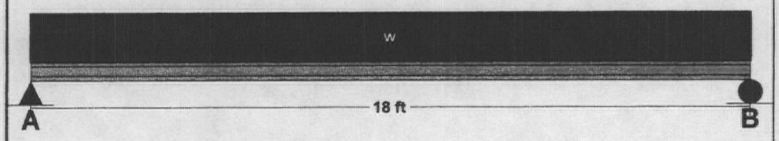
DEFLECTIONS	Center	
Live Load	0.39	IN L/558
Dead Load	0.34	in
Total Load	0.73	IN L/297

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	4770	lb	4770	lb
Dead Load	4182	lb	4182	lb
Total Load	8952	lb	8952	lb
Bearing Length	3.41	in	3.41	in

BEAM DATA	Center	
Span Length	18	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	18	ft
Live Load Duration Factor	1.15	
Notch Depth	0.00	

LOADING DIAGRAM



UNIFORM LOADS	Center	
Uniform Live Load	530	plf
Uniform Dead Load	445	plf
Beam Self Weight	20	plf
Total Uniform Load	995	plf

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

	Base Values		Adjusted	
Bending Stress:	Fb = 2600	psi	Fb' = 2830	psi
	Cd=1.15 CF=0.95			
Shear Stress:	Fv = 285	psi	Fv' = 328	psi
	Cd=1.15			
Modulus of Elasticity:	E = 1900	ksi	E' = 1900	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750	psi	Fc - ⊥' = 750	psi

Controlling Moment: 40285 ft-lb
9.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -7520 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	170.85 in3	189 in3
Area (Shear):	34.42 in2	63 in2
Moment of Inertia (deflection):	1373.71 in4	1701 in4
Moment:	40285 ft-lb	44565 ft-lb
Shear:	-7520 lb	13766 lb

Project: Vintage Design

Location: Riordan Wall Between Baths
Column
[2012 International Residential Code(2012 NDS)]
1.5 IN x 3.5 IN x 8.0 FT
#2 - Spruce-Pine-Fir - Dry Use
Section Adequate By: 100.0%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 11:49:12 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	-586	lb
Dead Load:	Vert-DL-Rxn =	-266	lb
Total Load:	Vert-TL-Rxn =	-852	lb

COLUMN DATA

Total Column Length:	8	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	1	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

#2 - Spruce-Pine-Fir

	Base Values	Adjusted
Compressive Stress:	Fc = 1150 psi	Fc' = 0 psi
	Cd=0.00 Cf=1.15 Cp=0.00	
Bending Stress (X-X Axis):	Fbx = 875 psi	Fbx' = 0 psi
	Cd=0.00 CF=1.50 Cr=1.15 Cl=0.00	
Bending Stress (Y-Y Axis):	Fby = 875 psi	Fby' = 0 psi
	Cd=0.00 CF=1.50 Cr=1.15	
Modulus of Elasticity:	E = 1400 ksi	E' = 1400 ksi

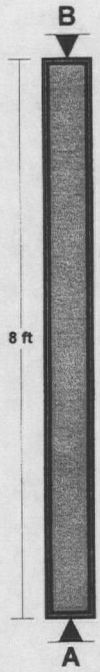
Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	1.5	in
Area:	A =	5.25	in2
Section Modulus (X-X Axis):	Sx =	3.06	in3
Section Modulus (Y-Y Axis):	Sy =	1.31	in3
Slenderness Ratio:	Lex/dx =	27.43	
	Ley/dy =	8	

Column Calculations (Controlling Case Only):

Controlling Load Case:

Actual Compressive Stress:	Fc =	0	psi
Allowable Compressive Stress:	Fc' =	0	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	0	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	0	psi
Combined Stress Factor:	**CSF =**	**0**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	-586	lb
Dead Load:	PD =	-274	lb
Column Self Weight:	CSW =	8	lb
Total Load:	PT =	-852	lb

$$f_t = \frac{852^{\#}}{5.25\square''} = 162 \text{ psi}$$

$$F_t' = 675 \text{ psi} > 162 \quad \underline{\underline{OK}}$$

www.strongtie.com

H/TSP Seismic and Hurricane Ties

Simpson Strong-Tie® hurricane ties provide a positive connection between truss/rafter and the wall of the structure to resist wind and seismic forces. New additions to the line provide even more options.

- H10AR – The heavy-duty design of the H10A available with a 2" wide throat to accommodate rough lumber
- H10A-2 – The H10A design with a 3" throat for double 2x members
- H2ASS, H2.5ASS and H10ASS – Popular ties now available in stainless steel.

The H16 series has a presloped seat of 5/12 for double trusses.

The presloped 5/12 seat of the H16 provides for a tight fit and reduced deflection. The strap length provides for various truss height up to a maximum of 13 1/2" (H16 series). Minimum heel height for H16 series is 4".

The HGA10 attaches to gable trusses and provides good lateral wind resistance. The HS24 attaches the bottom chord of a truss or rafter at pitches from 0/12 to 4/12 to double 2x4 top plates. Double shear nailing allows for higher lateral resistance.

Material: See tables.

Finish: Galvanized. H7Z and H11Z—ZMAX® coating. Some models available in stainless steel or ZMAX® coating; See Corrosion Information.

Installation:

- Use all specified fasteners. See General Notes.
- Use hot-dip galvanized (HDG) nails with ZMAX and HDG connector products. Use Type 316 stainless-steel nails with our stainless-steel connector products.
- H1 can be installed with flanges facing inwards (reverse of *H1 drawing*).
- H2.5T, H3, H4, H5 and H6 ties are only shipped in equal quantities of rights and lefts (right versions shown below).
- Hurricane ties do not replace solid blocking.
- When installing ties on plated trusses (on the side opposite the truss plate) do not fasten through the truss plate from behind. This can force the truss plate off of the truss and compromise truss performance.
- H10A optional nailing to connect shear blocking, use 8d nails. Slots allow maximum field bending up to a pitch of 6:12, use H10A slopec loads for field bent installation.
- HGA10KT: sold as a kit with (10) HGA10 connectors. Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws are included.
- HS24 requires slant nailing only when bottom chord of truss or rafter has no slope.

Some products may be installed with the Strong-Drive® SD Structural Connector screw - click here for details

Load Tables
Gallery of images, uninstalled
Gallery of images, installed
Hurricane Tie Installations
Code Reports
Drawings
Catalog Page
Related Categories
Technical Bulletins
Fliers
Engineering Letters
Help for downloads

INSTALLATION

View step-by-step installation instructions

Considerations for Hurricane Tie Selection

1. What is the uplift load?
2. What is the parallel-to-plate load?
3. What is the perpendicular-to-plate load?
4. What is the species of wood used for the rafter and the top plates? (Select the load table based on the lowest performing species of wood.)
5. Will the hurricane tie be nailed into both top plates or the upper top plate only?
6. What load or loads will the hurricane tie be taking?*
7. Select hurricane tie based on performance, application, installed cost and ease of installation.

* When a connector is loaded simultaneously in more than one direction, the allowable load must be evaluated as shown here. For all connectors use the following equation:

Design Uplift/Allowable Uplift + Design Lateral Parallel to Plate / Allowable Lateral Parallel to Plate + Design Lateral Perpendicular to Plate / Allowable Lateral Perpendicular to Plate < 1.0.

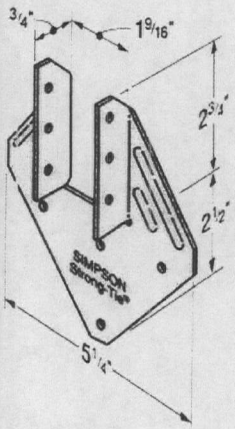
The three terms in the unity equation are due to possible directions that exist to generate force on a hurricane tie. The actual number of terms used in the equation for each condition is dependant on designer's method of calculating wind forces and the utilization of the tie in the structural system.

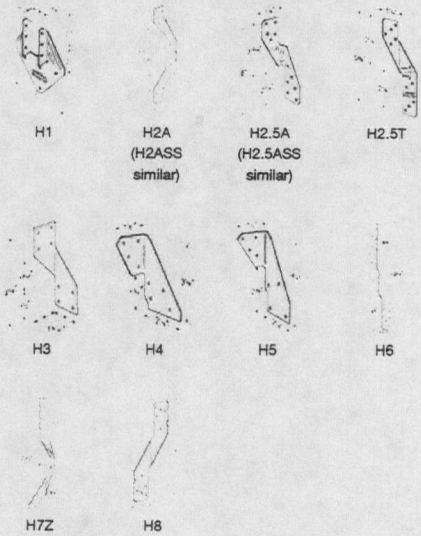
As an alternate, certain roof to wall connectors (embedded truss anchors, seismic and hurricane ties (on this page), and twist straps) can be evaluated using the following: The design load in each direction shall not exceed the published allowable load in that direction multiplied by 0.75.

Gallery, Uninstalled:

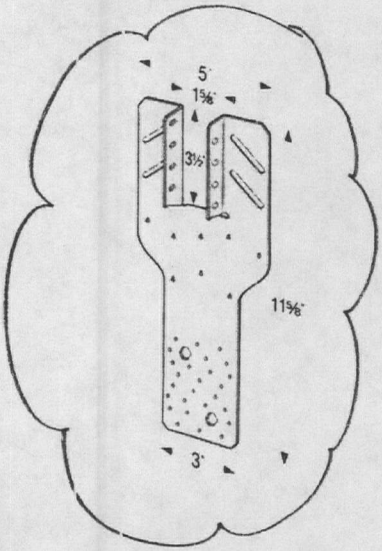
▲top

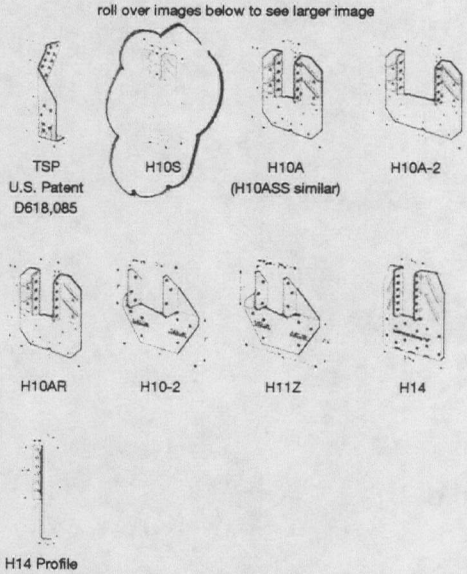
roll over images below to see larger image





roll over images below to see larger image

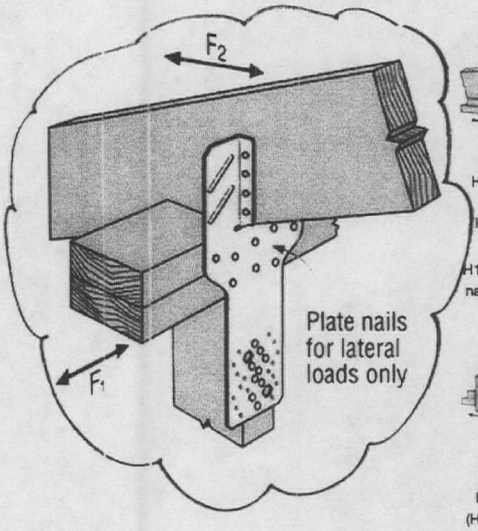


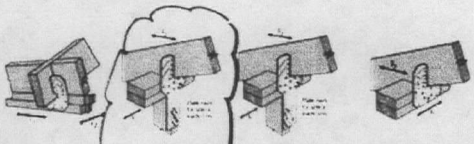


Gallery, Installed:

▲top

roll over images below to see larger image





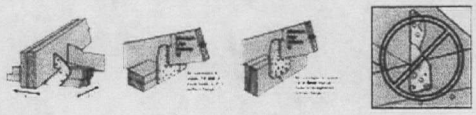
17. H10A Field-Bent Installation

18. H10S Installation

19. H10S Installation with stud offset

20. H10A Installation

H10A optional nailing connects shear blocking to rafter. Use 8d common nails. Slot allows maximum field-bending up to a pitch of 6/12, use 75% of the table uplift load; bend one time only.

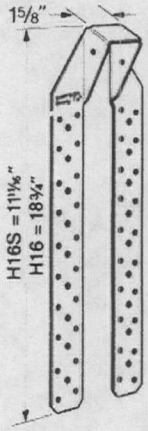


21. H10A-2 Installation (H11Z similar)

1 22. H14 Installation to double top plates

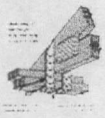
2 23. H14 Installation to double 2x header

AVOID A MISINSTALLATION! Do not make your own holes or overdrive nails!



roll over images below to see larger image

H16 and H16S Presloped at 5/12. Truss/ Rafter Pitch of 3/12 to 7/12 is acceptable

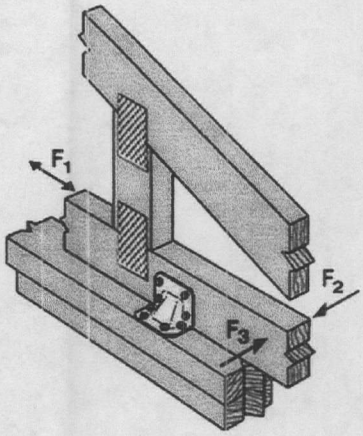


H16 Installation

HS24

HS24 Installation

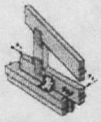
roll over images below to see larger image



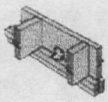
H16-2 and H16-2S Presloped at 5/12. Pitch of 3/12 to 7/12 is acceptable

H16-2 Installation Depending on heel height, strap may wrap to back of plate.

HGA10



HGA10 Installation to Double Top Plates

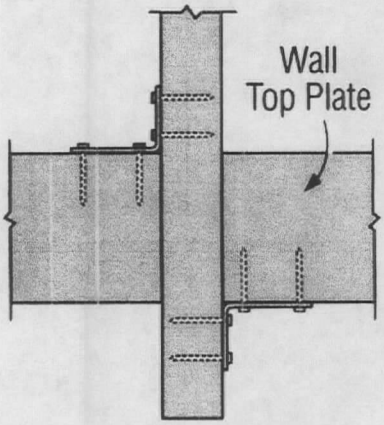


HGA10 Installation to Rim Joist

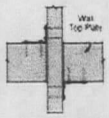
Hurricane Tie Installations to Achieve Twice the Load (Top View)

top

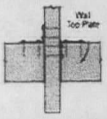
roll over images below to see larger image



Both connectors shall be same model.



Install diagonally across from each other for minimum 2x truss.



Products can be on the same side of the wall provided they are configured as shown.

Nailing into both sides of a single ply 2x truss may cause the wood to split.

Load Tables: See code report listings below

top

Load Values with Carbon Steel Nails

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These models are approved for installation with the Strong-Drive® SD Connector screw. See the load values below.

Model No.	Ga	Fasteners: To Rafters/ Truss	Fasteners: To Plates	Fasteners: To Studs	DF/SP Allowable Loads: Uplift (160)	DF/SP: Lateral (160) F_1	DF/SP: Lateral (160) F_2	Uplift with 8dx1½ Nails (160)	SPF/HF Allowable Loads: Uplift (160)	SPF/HF: Lateral (160) F_1	SPF/HF: Lateral (160) F_2	Uplift with 8dx1½ Nails (160)
H1	18	6-8dx1½	4-8d	—	585	485	165	455	400	415	140	370
H2A	18	5-8dx1½	2-8dx1½	5-8dx1½	575	130	55	—	495	130	55	—
H2ASS	18	5-SS8D	2-SS8D	5-SS8D	400	130	55	400	345	130	55	345
H2.5A	18	5-8d	5-8d	—	600	110	110	575	535	110	110	495
H2.5ASS	18	5-SS8d	5-SS8d	—	440	75	70	365	380	75	70	310
H2.5T	18	5-8d	5-8d	—	545	135	145	425	545	135	145	425
H3	18	4-8d	4-8d	—	455	125	160	415	320	105	140	290
H4	20	4-8d	4-8d	—	360	165	160	360	235	140	135	235
H5	18	4-8d	4-8d	—	455	115	200	455	265	100	170	265
H6	16	—	8-8d	8-8d	950	—	—	—	820	—	—	—
H7Z	16	4-8d	2-8dx1½	8-8d	985	400	—	—	845	345	—	—
H8	18	5-10dx1½	5-10dx1½	—	745	75	—	630	565	75	—	510
H10A Sloped	18	9-10dx1½	9-10dx1½	—	855	590	285	—	760	505	285	—
H10A	18	9-10dx1½	9-10dx1½	—	1140[7]	590	285	—	1015	505	285	—
H10ASS	18	9-SSN10	9-SSN10	—	970	565	170	—	835	485	170	—
H10AR	18	9-10dx1½	9-10dx1½	—	1050	490	285	—	905	420	285	—
H10S[9,10]	18	8-8dx1½	8-8dx1½[10]	8-8d	1010	660	215	550	870	570	185	475
H10A-2	18	9-10dx1½	9-10dx1½	—	1245	815	260	—	1070	700	225	—
H10-2	18	6-10d	6-10d	—	760	455	395	—	655	390	340	—
H11Z	18	6-16dx2½	6-16dx2½	—	830	525	760	—	715	450	655	—
H14	18	1 12-8dx1½	13-8d	—	1350[7]	515	265	—	1050	480	245	—
		2 12-8dx1½	15-8d	—	1350[7]	515	265	—	1050	480	245	—
TSP	16	9-10dx1½	6-10dx1½	—	740	310	190	—	635	265	160	—
		9-10dx1½	6-10d	—	890	310	190	—	765	265	160	—

1. Loads have been increased for wind or earthquake loading with no further increase allowed; reduce where other loads govern.
2. Allowable loads are for one anchor. A minimum rafter thickness of 2 1/2" must be used when framing anchors are installed on each side of the joist and on the same side of the plate (exception: connectors installed such that nails on opposite sides don't interfere).
3. Allowable DF/SP uplift load for stud to bottom plate installation (see detail 15) is 400 lbs. (H2.5); 390 lbs. (H2.5A); 360 lbs. (H4) and 310 lbs. (H8). For SPF/HF values multiply these values by 0.86.
4. Allowable loads in the F_1 direction are not intended to replace diaphragm boundary members or prevent cross grain bending of the truss or rafter members.
5. When cross-grain bending or cross-grain tension cannot be avoided in the members, mechanical reinforcement to resist such forces may be considered.
6. Hurricane Ties are shown installed on the outside of the wall for clarity and assume a minimum overhang of 3 1/2" installation on the inside of the wall is acceptable (see General Instructions for the Installer notes u). For uplift Continuous Load Path, connections in the same area (i.e. truss to plate connector and plate to stud connector) must be on same side of the wall. See T-HTIEBEARING for more information.
7. Southern Pine allowable uplift loads for H10A = 1340 lbs. and for H14 = 1465 lbs.
8. Refer to technical bulletin T-HTIEBEARING for selected hurricane ties allowable bearing enhancement loads.
9. H10S can have the stud offset a maximum of 1" from rafter (center to center) for a reduced uplift of 890 lbs. (DF/SP), and 765 lbs. (SPF).
10. H10S nails to plates are optional for uplift but required for lateral loads.

www.strongtie.com SIMPSON Strong-Tie

CS/CMST Coiled Straps

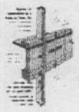
CMSTC provides nail slots for easy installation; it can be cut to length. CS are continuous utility straps which can be cut to length on the job site. Packaged in lightweight (about 40 pounds) cartons.

Finish: Galvanized. Some products available in ZMAX® coating; see Corrosion Information.

Installation:

- Use all specified fasteners. See General Notes.
- Wood shrinkage after strap installation across horizontal wood members may cause strap to buckle outward.
- Refer to the applicable code for minimum nail penetration and minimum wood edge and end distances.
- The table shows the maximum allowable loads and the nails required to obtain them. Fewer nails may be used; reduce the allowable load as shown in footnote 3.
- The cut length of the strap shall be equal to twice the "End Length" noted in the table plus the clear span dimension.
- CMST only - Use every other triangle hole if the wood tends to split. Use round and triangle holes for comparable MST loads, providing wood does not tend to split.
- For lap splice and alternate nailing information, See Technical Bulletin T-CMST.
- CS straps are available in 25' lengths, order CS14-R, CS16-R, CS18-R, CS20-R or CS22-R.

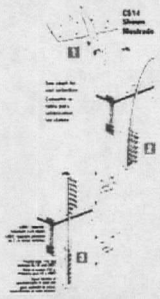
Gauge stamped on part for easy identification



Load Table
Gallery of images
Code Reports
Drawings
Catalog Pages
Related Categories
Technical Bulletins
Fliers
Help for downloads

Coil Strap Calculator 6
Find the most efficient solution to meet your load demands.

INSTALLATION

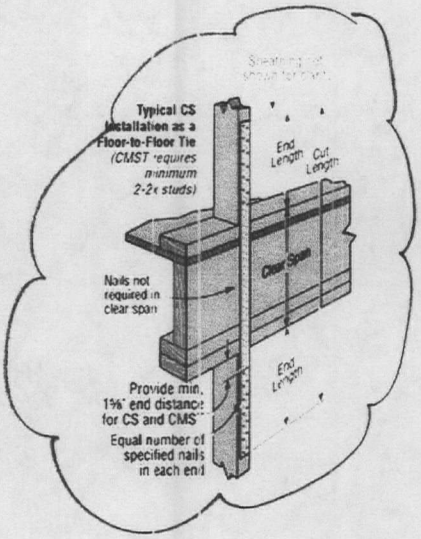


View step-by-step installation instructions

Gallery:

top

roll over images below to see larger image

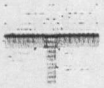


Typical CS Installation as a Floor-to-Floor Tie (CMST requires minimum 2-2x studs)

CS16 Hole Pattern (all other CS straps similar)

CMST14 Hole Pattern (CMST12 similar)

CMSTC16 Hole Pattern



Typical Horizontal CS/CMST Installation

Load Table: See code report listings below

▲top

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These models are approved for installation with the Strong-Drive® SD Connector screw.

Model No.	Total L	Ga	DF/SP Fasteners	DF/SP End Length	SPF/HF Fasteners	SPF/HF End Length	Allowable Tension Loads (160)
CMST12	40'	12	74 - 16d	33"	84 - 16d	38"	9215
			86 - 10d	39"	98 - 10d	44"	9215
CMST14	52½'	14	56 - 16d	26"	66 - 16d	30"	6490
			66 - 10d	30"	76 - 10d	34"	6490
CMSTC16	54'	16	50 - 16d sinker	20"	58 - 16d sinker	25"	4585
CS14	100'	14	26 - 10d	15"	30 - 10d	16"	2490
			30 - 8d	16"	36 - 8d	19"	2490
CS16	150'	16	20-10d	11"	22 - 10d	13	1705
			22 - 8d	13"	26 - 8d	14"	1705
CS18	200'	18	16 - 10d	9"	18 - 10d	11"	1370
			18 - 8d	11"	22 - 8d	12"	1370
CS20	250'	20	12 - 10d	6"	14 - 10d	9	1030
			14 - 8d	9"	16 - 8d	9"	1030
CS22	300'	22	10 - 10d	7"	12 - 10d	7"	845
			12 - 8d	7"	14 - 8d	8"	845

1. Fastener quantities and end lengths are calculated using an increase for wind or seismic loading.
2. Use half of the required nails in each member being connected to achieve the listed loads.
3. Calculate the connector value for a reduced number of nails as follows:

$$\text{Allowable Load} = \frac{\text{No. of Nails Used}}{\text{No. of Nails in Table}} \times \text{Table Load}$$

Example: CMSTC16 in DF/SP with 40 nails total.
(Half of the nails in each member being connected)

$$\text{Allowable Load} = \frac{\text{40 Nails (Used)}}{\text{50 Nails (Table)}} \times 4585 \text{ lbs} = 3668 \text{ lbs}$$

4. Tension loads apply for uplift when installed vertically.
5. NAILS: 16d = 0.162" dia. x 3 1/2" long, 16d Sinker = 0.148" dia. x 3 1/4" long, 10d = 0.148" dia. x 3 " long. See other nail sizes and information.

Code Reports (PDFs):

▼next ▲top

	IAPMO UES ER	ICC-ES ESR	CITY OF LOS ANGELES	STATE OF FLORIDA	LEGACY REPORTS ICC-ES NER	ICC-ES ER	ICC-ES ES
CMST			See specific model numbers for code listings.				
CMST12	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CMST14	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CMSTC			No code listing. Please contact us for test data.				
CMSTC16	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS			See specific model numbers for code listings.				
CS14	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS14-R	ER-124			FL10852			
CS16	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS16-R	ER-124	ESR-2105 / ESR-2523 *	RR25489	FL10852			
CS16Z	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852			
CS18	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS18-R	ER-124	ESR-2105 / ESR-2523 *	RR25489	FL10852			
CS18S	ER-124	ESR-2105 / ESR-2523 *		FL10852			
CS20	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			

6) COLUMN: TO SUPPORT 18' HEADER

SEE Pg. 13

$3\frac{1}{2}" \times 3\frac{1}{2}"$ PARALLAM COLUMN

7) HEADER OVER KITCHEN WINDOW TO SUPPORT NORTH COLUMN OF 18' HEADER ; SPAN $\leq 7'$

$w = 505$ plf $\quad w_D = 230 \quad w_L = 275$

$P = 9013^{\#} \quad P_D = 4243 \quad P_L = 4770$

SEE Pg. 14: (2) $1\frac{3}{4}" \times 11\frac{7}{8}"$ M=L

ALT: SEE Pg. 15 : (3) $1\frac{3}{4}" \times 9\frac{1}{4}"$ M=L

8) HEADER ABOVE WEST BATHROOM WINDOWS:

$w = 505$ plf $\quad w_D = 230 \quad w_L = 275$

SEE Pg. 16 : (2) 2×10 SPF #2

9) REVISE ATTIC HEADER TO 12' SPAN: SEE Pg. 17

(2) $1\frac{3}{4}" \times 11\frac{1}{4}"$ M=L

10) CHECK HEADER OVER KITCHEN WINDOW: OK SEE Pg. 18

(3) $1\frac{3}{4}" \times 9\frac{1}{4}"$ M=L

11) ATTIC HEADER TO SUPPORT N-S ATTIC HEADER: SEE Pg. 19

(2) $1\frac{3}{4}" \times 18"$ M=L

12) COLUMN TO SUPPORT EAST END OF 11) SEE Pg. 20: $3\frac{1}{2}"$ ⌀ PARALLAM

USE SIMPSON POST BASE ABW447 $P \leq 4200^{\#}$ SEE Pg. 21

CHECK 3" BASEMENT FLOOR: $N_c = 2\sqrt{3000} = 110$ psi

$$v = \frac{4200}{4(4+3)1.5} = 100 \text{ psi} \quad \underline{\underline{OK}}$$

Project: Vintage Design

Location: Riordan Column for 18' Header Column
[2012 International Residential Code(2012 NDS)]
3.5 IN x 3.5 IN x 16 FT
1.8E Parallam Column - iLevel Trus Joist
Section Adequate By: 22.0%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/28/2015 8:53:14 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	4770	lb
Dead Load:	Vert-DL-Rxr =	4243	lb
Total Load:	Vert-TL-Rxn =	9013	lb

COLUMN DATA

Total Column Length:	16	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	8	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

1.8E Parallam Column - iLevel Trus Joist

	Base Values	Adjusted
Compressive Stress:	Fc = 2500 psi	Fc' = 943 psi
	Cd=1.00 Cp=0.38	
Bending Stress (X-X Axis):	Fbx = 2400 psi	Fbx' = 2752 psi
	Cd=1.00 CF=1.15	
Bending Stress (Y-Y Axis):	Fby = 2400 psi	Fby' = 2752 psi
	Cd=1.00 CF=1.15	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi

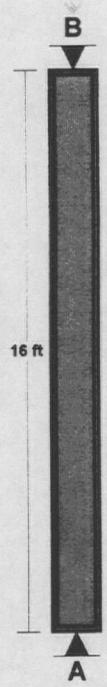
Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	27.43	
	Ley/dy =	27.43	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	736	psi
Allowable Compressive Stress:	Fc' =	943	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	2752	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	2752	psi
Combined Stress Factor:	**CSF =**	**0.78**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	4770	lb
Dead Load:	PD =	4182	lb
Column Self Weight:	CSW =	61	lb
Total Load:	PT =	9013	lb

Project: Vintage Design

Location: Riordan Header Above North Kitchen Window
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.75 IN x 11.875 IN x 7.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 8.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/28/2015 9:27:28 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center	
Live Load	0.08	IN L/1057
Dead Load	0.07	in
Total Load	0.15	IN L/560

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	3348 lb	3348 lb
Dead Load	2972 lb	2972 lb
Total Load	6319 lb	6319 lb
Bearing Length	2.41 in	2.41 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

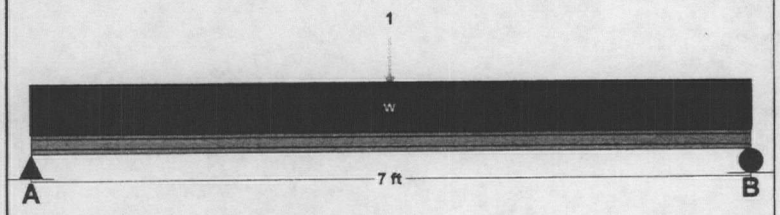
	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 2994 psi
	Cd=1.15 CF=1.00	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 18945 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -5812 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	75.93 in3	82.26 in3
Area (Shear):	26.6 in2	41.56 in2
Moment of Inertia (deflection):	209.41 in4	488.41 in4
Moment:	18945 ft-lb	20525 ft-lb
Shear:	-5812 lb	9081 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	13 plf
Total Uniform Load	518 plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	4770 lb
Dead Load	4243 lb
Location	3.5 ft

Project: Vintage Design

Location: Riordan Header Above North Kitchen Window-REVISED
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(3) 1.75 IN x 9.25 IN x 7.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 1.9%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/1/2015 6:07:30 PM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center	
Live Load	0.11	IN L/749
Dead Load	0.10	in
Total Load	0.21	IN L/396

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	3348	lb	3348	lb
Dead Load	2980	lb	2980	lb
Total Load	6327	lb	6327	lb
Bearing Length	1.61	in	1.61	in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

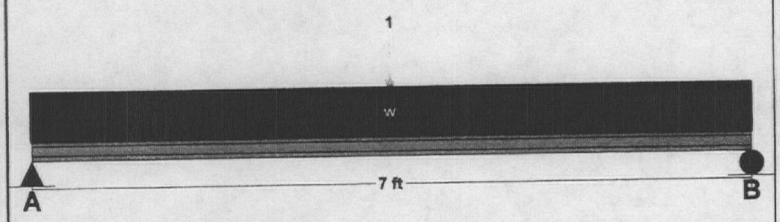
	Base Values		Adjusted	
Bending Stress:	Fb =	2600 psi	Fb' =	3098 psi
	Cd=1.15	*CF=1.04*		
Shear Stress:	Fv =	285 psi	Fv' =	328 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1900 ksi	E' =	1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	750 psi	Fc - ⊥' =	750 psi

Controlling Moment: 18959 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 5927 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	73.44 in3	74.87 in3
Area (Shear):	27.12 in2	48.56 in2
Moment of Inertia (deflection):	209.59 in4	346.26 in4
Moment:	18959 ft-lb	19327 ft-lb
Shear:	5927 lb	10611 lb

LOADING DIAGRAM



UNIFORM LOADS	Center	
Uniform Live Load	275	plf
Uniform Dead Load	230	plf
Beam Self Weight	15	plf
Total Uniform Load	520	plf

POINT LOADS - CENTER SPAN		
Load Number	One	
Live Load	4770	lb
Dead Load	4243	lb
Location	3.5	ft

Project: Vintage Design

Location: Riordan Header Above West Bathroom Windows
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.5 IN x 9.25 IN x 7.0 FT
#2 - Spruce-Pine-Fir - Dry Use
Section Adequate By: 26.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/1/2015 6:18:29 PM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

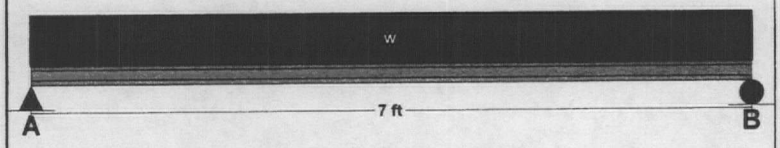
DEFLECTIONS	Center	
Live Load	0.05	IN L/1567
Dead Load	0.05	in
Total Load	0.10	IN L/845

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	963 lb	963 lb
Dead Load	823 lb	823 lb
Total Load	1785 lb	1785 lb
Bearing Length	1.40 in	1.40 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	5 plf
Total Uniform Load	510 plf

MATERIAL PROPERTIES
#2 - Spruce-Pine-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 875 psi	Fb' = 1107 psi
	Cd=1.15 CF=1.10	
Shear Stress:	Fv = 135 psi	Fv' = 155 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1400 ksi	E' = 1400 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 425 psi	Fc - ⊥' = 425 psi

Controlling Moment: 3124 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -1392 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	33.87 in3	42.78 in3
Area (Shear):	13.45 in2	27.75 in2
Moment of Inertia (deflection):	56.22 in4	197.86 in4
Moment:	3124 ft-lb	3946 ft-lb
Shear:	-1392 lb	2872 lb

Project: Vintage Design

Location: Riordan Attic Header - REVISED
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.75 IN x 11.25 IN x 12.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 2.8%
Controlling Factor: Deflection

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:34:39 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

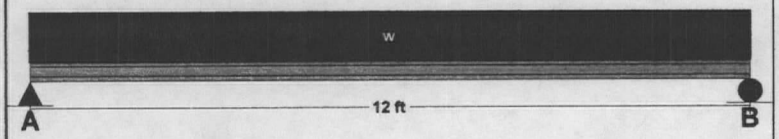
DEFLECTIONS	Center	
Live Load	0.31	IN L/460
Dead Load	0.27	in
Total Load	0.58	IN L/247

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	3180	lb	3180	lb
Dead Load	2744	lb	2744	lb
Total Load	5924	lb	5924	lb
Bearing Length	2.26	in	2.26	in

BEAM DATA	Center	
Span Length	12	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	12	ft
Live Load Duration Factor	1.15	
Notch Depth	0.00	

LOADING DIAGRAM



UNIFORM LOADS	Center	
Uniform Live Load	530	plf
Uniform Dead Load	445	plf
Beam Self Weight	12	plf
Total Uniform Load	987	plf

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

	Base Values		Adjusted	
Bending Stress:	Fb =	2600 psi	Fb' =	3016 psi
	Cd=1.15 CF=1.01			
Shear Stress:	Fv =	285 psi	Fv' =	328 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1900 ksi	E' =	1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	750 psi	Fc - ⊥' =	750 psi

Controlling Moment: 17771 ft-lb
6.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -5094 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	70.7 in3	73.83 in3
Area (Shear):	23.32 in2	39.38 in2
Moment of Inertia (deflection):	404 in4	415.28 in4
Moment:	17771 ft-lb	18558 ft-lb
Shear:	-5094 lb	8603 lb

CONNECTOR @ SOUTH END:
USE SIMPSON FACE MOUNT
HANGER HGUS48

Project: Vintage Design

Location: Riordan Header Above North Kitchen Window-CHECK
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(3) 1.75 IN x 9.25 IN x 7.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 42.6%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:39:15 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center	
Live Load	0.08	IN L/1021
Dead Load	0.07	in
Total Load	0.15	IN L/546

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2553 lb	2553 lb
Dead Load	2230 lb	2230 lb
Total Load	4783 lb	4783 lb
Bearing Length	1.21 in	1.21 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

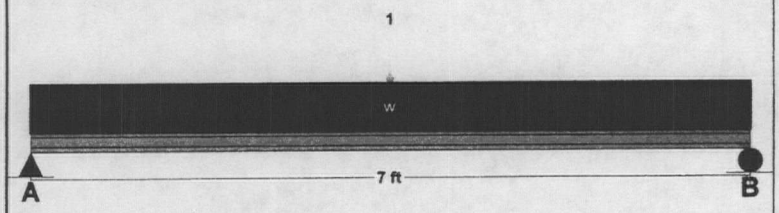
	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 3098 psi
	Cd=1.15 CF=1.04	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 13553 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 4382 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	52.5 in3	74.87 in3
Area (Shear):	20.06 in2	48.56 in2
Moment of Inertia (deflection):	152.24 in4	346.26 in4
Moment:	13553 ft-lb	19327 ft-lb
Shear:	4382 lb	10611 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	15 plf
Total Uniform Load	520 plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	3180 lb
Dead Load	2744 lb
Location	3.5 ft

Project: Vintage Design

Location: Riordan E/W Attic Support Header
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.75 IN x 18.0 IN x 18.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 84.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:44:22 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center	
Live Load	0.18	IN L/1216
Dead Load	0.17	in
Total Load	0.35	IN L/626

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2120 lb	1060 lb
Dead Load	2007 lb	1092 lb
Total Load	4127 lb	2152 lb
Bearing Length	1.57 in	0.82 in

BEAM DATA	Center
Span Length	18 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	12 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

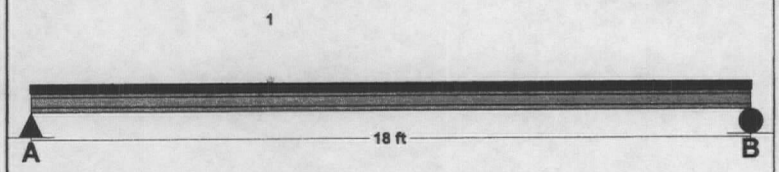
MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 2830 psi
	Cd=1.15 CF=0.95	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 24175 ft-lb
6.12 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 4098 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	102.53 in3	189 in3
Area (Shear):	18.76 in2	63 in2
Moment of Inertia (deflection):	652.44 in4	1701 in4
Moment:	24175 ft-lb	44565 ft-lb
Shear:	4098 lb	13766 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	0 plf
Uniform Dead Load	0 plf
Beam Self Weight	20 plf
Total Uniform Load	20 plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	3180 lb
Dead Load	2744 lb
Location	6 ft

Project: Vintage Design

Location: Riordan E/W Header Column
Column
[2012 International Residential Code(2012 NDS)]
3.5 IN x 3.5 IN x 10 FT
1.8E Parallam Column - iLevel Trus Joist
Section Adequate By: 45.1%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:49:19 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	2120	lb
Dead Load:	Vert-DL-Rxn =	2045	lb
Total Load:	Vert-TL-Rxn =	4165	lb

COLUMN DATA

Total Column Length:	10	ft
Unbraced Length (X-Axis) Lx:	10	ft
Unbraced Length (Y-Axis) Ly:	10	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

1.8E Parallam Column - iLevel Trus Joist

	Base Values	Adjusted
Compressive Stress:	Fc = 2500 psi	Fc' = 620 psi
	Cd=1.00 Cp=0.25	
Bending Stress (X-X Axis):	Fbx = 2400 psi	Fbx' = 2752 psi
	Cd=1.00 CF=1.15	
Bending Stress (Y-Y Axis):	Fby = 2400 psi	Fby' = 2752 psi
	Cd=1.00 CF=1.15	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi

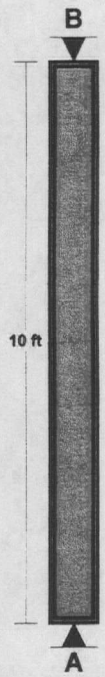
Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	34.29	
	Ley/dy =	34.29	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	340	psi
Allowable Compressive Stress:	Fc' =	620	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	2752	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	2752	psi
Combined Stress Factor:	**CSF =**	**0.55**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	2120	lb
Dead Load:	PD =	2007	lb
Column Self Weight:	CSW =	38	lb
Total Load:	PT =	4165	lb

Project: Vintage Design ALTERNATE

Location: Riordan E/W Header Column-Steel Section Column

[2012 International Residential Code(AISC 13th Ed ASD)]

HSS 4 x 2-1/2 x 3/16 x 10.0 FT /ASTM A500-GR.B-46

Section Adequate By: 66.9%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/23/2015 12:28:13 PM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	2120	lb
Dead Load:	Vert-DL-Rxn =	2082	lb
Total Load:	Vert-TL-Rxn =	4202	lb

COLUMN DATA

Total Column Length:	10	ft
Unbraced Length (X-Axis) Lx:	10	ft
Unbraced Length (Y-Axis) Ly:	10	ft
Column End Condtion-K (e):	1	
Load Eccentricity (X-Axis) - ex:	0	in
Load Eccentricity (Y-Axis) - ey:	3	in

COLUMN PROPERTIES

HSS 4 x 2-1/2 x 3/16 - Rectangular

Steel Yield Strength:	Fy =	46 ksi			
Modulus of Elasticity:	E =	29 ksi			
Column Section:	dx =	4 in	dy =	2.5 in	
Column Wall Thickness:	t =	0.174 in			
Area:	A =	2.06 in			
Moment of Inertia (deflection):	Ix =	4.3 in4	Iy =	2.06 in4	
Section Modulus:	Sx =	2.15 in3	Sy =	1.65 in3	
Plastic Section Modulus:	Zx =	2.67 in3	Zy =	1.93 in3	
Rad. of Gyration:	rx =	1.44 in	ry =	1 in	

Column Compression Calculations:

KL/r Ratio:	KLx/rx =	83.33	KLy/ry =	120.12
Controlling Direction for Compr. Calcs: (Y-Y Axis)				
Flexural Buckling Stress:	Fcr =	17.4 ksi		
Controlling Equation	F7-1			
Nominal Compressive Strength:	Pc =	21 kip		

Column Bending Calculations per AISC 13th Edition Steel Manual:

Controlling Load Case: Axial Total Load (D + L)

Eccentricity Moment:	Mx-ex =	0 ft-lb	My-ey =	1032 ft-lb
Lateral Moment + Eccentricity:	Mrx =	0 ft-lb	Mry =	1032 ft-lb
Flange Buckling Ratio:	FBR =	11.37		
Allow. Flange Buckling Ratio:	AFBR =	28.12		
Allow. FBR for Non-Compact:	NC =	35.15		
Web Buckling Ratio:	WBRX =	19.99	WBRY =	0
Allow. WBR for Eqn. F7-5:	AWBR =	60.76		
Nmnl. Flex. Str. w/ Sfty Factor:	Mcx =	6.1 ft-kip	Mcy =	4.4 ft-kip
Controlling Equation	F7-1		F7-1	

Combined Stress Calculations:

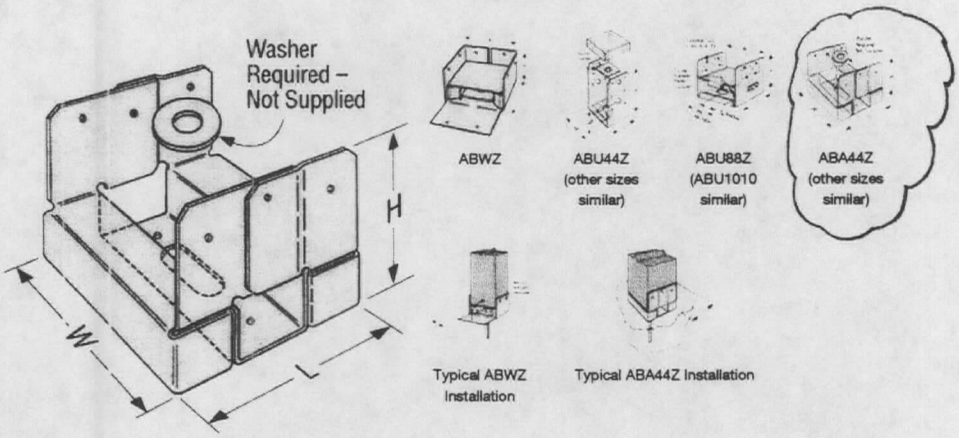
H1-1b Controls : 0.33

Controlling Combined Stress Factor: 0.33

LOADING DIAGRAM

AXIAL LOADING

Live Load:	PL =	2120	lb
Dead Load:	PD =	2007	lb
Column Self Weight:	CSW =	75	lb
Total Load:	PT =	4202	lb



Load Tables: See code report listings below

▲ top

Load Values with Nails

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

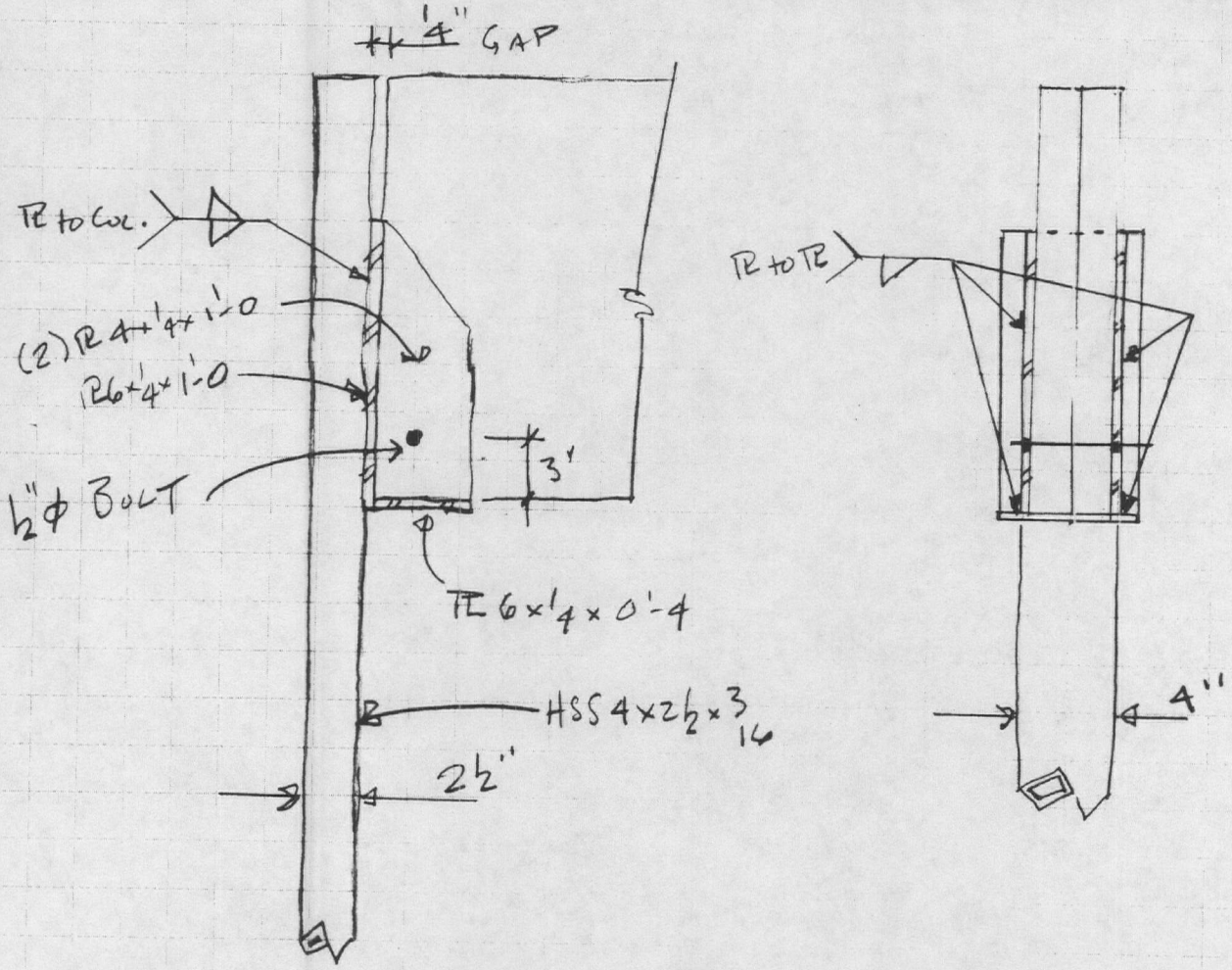
These models are approved for installation with the Strong-Drive® SD Connector screw. See the load values below.

Model No.	Nominal Post Size	Material		Dimensions (in.)				Fasteners				Allowable Loads		
		Base (Ga)	Strap (Ga)	W	L	H	HB[6]	Anchor Dia. (in.)	Nails	Machine Bolts Qty.	Machine Bolts Dia.	Uplift Nails	Uplift Bolts	Down (100)
ABA44Z	4x4	16	16	3 9/16	3 1/8	3 1/16	—	1/2	6-10d	—	—	555	—	6000
ABW44Z	4x4	16	16	3 9/16	3 9/16	2 1/4	—	1/2	8-10d	—	—	1005	—	7180
ABU44Z	4x4	16	12	3 9/16	3	5 1/2	1 3/4	5/8	12-16d	2	1/2	2200	2160	6665
ABU44RZ	Rough 4x4	16	12	4	4	5 1/4	1 1/2	5/8	12-16d	2	1/2	2200	2160	6665
ABA44RZ	Rough 4x4	16	16	4 1/16	3 1/8	2 13/16	—	1/2	6-10d	—	—	555	—	8000
ABW44RZ	Rough 4x4	16	16	4	4 1/16	1 32/33	—	1/2	8-10d	—	—	835	—	7180
ABW46Z	4x6	12	16	3 9/16	5 9/16	3	—	1/2	10-10d	—	—	845	—	4590
ABA46Z	4x6	14	14	3 9/16	5 3/16	3 1/8	—	5/8	8-16d	—	—	700	—	9435
ABU46Z	4x6	12	12	3 9/16	5	7	2 5/8	5/8	12-16d	2	1/2	2300	2300	10335
ABU46RZ	Rough 4x6	12	12	4	6	6 3/4	2 3/8	5/8	12-16d	2	1/2	2300	2300	10335
ABW46RZ	Rough 4x6	12	16	4	6	2 13/16	—	1/2	10-10d	—	—	780	—	4590
ABA46RZ	Rough 4x6	14	14	4 1/16	5 3/16	2 7/8	—	5/8	8-16d	—	—	700	—	12000
ABU5-5	5 1/8x5 1/8	12	10	5 1/4	5	6 1/16	1 3/4	5/8	12-16d	2	1/2	2235	2235	12000
ABU5-6	5 1/8x6	12	10	6 1/8	5	6 1/16	1 3/4	5/8	12-16d	2	1/2	2235	2235	12000
ABA66Z	6x6	14	14	5 1/2	5 1/4	3 1/8	—	5/8	8-16d	—	—	720	—	10665
ABW66Z	6x6	12	14	5 1/2	5 9/16	3	—	1/2	12-10d	—	—	1190	—	12935
ABU66Z	6x6	12	10	5 1/2	5	6 1/16	1 3/4	5/8	12-16d	2	1/2	2300	2300	12000
ABU66RZ	Rough 6x6	12	10	6	6	5 9/16	1 7/8	5/8	12-16d	2	1/2	2300	2300	12000
ABA66RZ	Rough 6x6	14	14	6	5 3/16	2 7/8	—	5/8	8-16d	—	—	720	—	12665
ABW66RZ	Rough 6x6	12	14	6	6	2 13/16	—	1/2	12-10d	—	—	1065	—	12935
ABU88Z	8x8	14	12	7 1/2	7	7	—	2-5/8	18-16d	—	—	2320	—	24335
ABU88R	Rough 8x8	14	12	8	7	7	—	2-5/8	18-16d	—	—	2320	—	24335
ABU1010Z	10x10	12	12	9 1/2	9	7 1/4	—	2-5/8	22-16d	—	—	2270	—	32020
ABU1010RZ	Rough 10x10	12	12	10	9	7	—	2-5/8	22-16d	—	—	2270	—	32020

1. Uplift loads have been increased for wind or earthquake with no further increase allowed; reduce where other loads govern.
2. Downloads may not be increased for short-term loading.
3. Specifier to design concrete for uplift capacity.
4. ABU products may be installed with either bolts or nails (not both) to achieve table loads. ABU88Z, ABU88R, ABU1010Z and ABU1010RZ may be installed with 8-1/4"x3" Strong-Drive® SDS Heavy-Duty Connector screws (sold separately) for the same table load.
5. For AB bases, higher download can be achieved by solidly packing grout under 1" standoff plate before installation. Base download on column, grout, or concrete according to the code.
6. HB dimension is the distance from the bottom of the post up to the first bolt hole.
7. Structural composite lumber columns have sides that show either the wide face or the edges of the lumber strands/veneers. For SCL columns, the fasteners for these products should always be installed in the wide face.

ATLAS
RESTORATION, LLC
16043 Depot Place
Lincolnshire, IL 60069
www.atlasrestoration.com

JOB RIORDAN
SHEET NO. 21A OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE NO SCALE



Project: Vintage Design

Location: Riordan Header Above North Kitchen Window-FLITCH PLATE
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 0.25 IN Steel Flitch Plate(s) x (3) 1.75 IN x 7.25 IN x 7.0 FT
1.9E Microllam - iLevel Trus Joist
Section Inadequate By: 2.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 5/7/2015 2:31:49 PM

DEFLECTIONS	Center	
Live Load	0.07	IN L/1206
Dead Load	0.06	in
Total Load	0.13	IN L/642

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2553 lb	2553 lb
Dead Load	2262 lb	2262 lb
Total Load	4814 lb	4814 lb
Bearing Length	1.22 in	1.22 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft
Live Load Duration Factor	1.15

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 2990 psi
	Cd=1.15 CF=1.00	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

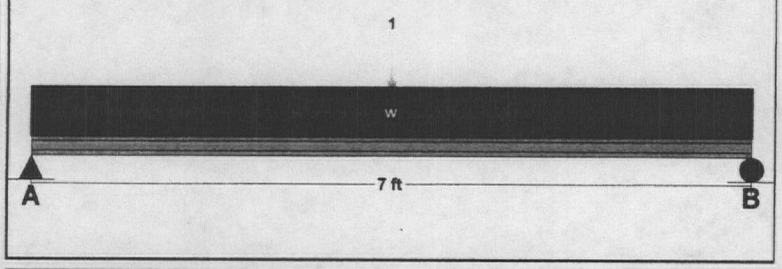
Controlling Moment: 13609 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 4814 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	115.39 in3	112.85 in3
Area (Shear):	22.03 in2	93.39 in2
Moment of Inertia (deflection):	152.97 in4	409.07 in4
Moment:	13609 ft-lb	28118 ft-lb
Shear:	4814 lb	20406 lb

Flitch Design Requirements

Modular Ratio (E-stl/E-wood)	n =	15.26
Transformed Section Width	w-trans =	12.88 in
Allowable Steel Bending Stress	Fb-stl =	21600 PSI
Lmtd. Bending Stress for Transformed Section	Fb-stl-lim =	1415 PSI
Ctrl. Bending Stress for Wood Transform	Fb-cont =	1415 PSI
Plate Width to Thickness Ratio	(d/w-plate) =	29
Lmtd. Width to Thickness Ratio for Fv=0.4*Fy	AWSL =	63.33
Allowable Steel Shear Stress	Fv-stl	14400 PSI
Lmtd. Shear Stress for Wood Transform	Fv-stl-lim =	943 PSI
Ctrl. Allowable Shear Stress for Wood Transform	Fv-cont =	328 PSI
Percentage of Load Carried by Steel Plate	Steel% =	59.24 %

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	24 plf
Total Uniform Load	529 plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	3180 lb
Dead Load	2744 lb
Location	3.5 ft

Project: Vintage Design

Location: Riordan Header Above North Kitchen Window-STEEL
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(AISC 13th Ed ASD)]
A36 C7x12.2 x 7.0 FT
Section Adequate By: 12.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 5/8/2015 2:00:03 PM

DEFLECTIONS	Center	
Live Load	0.08	IN L/1089
Dead Load	0.07	in
Total Load	0.14	IN L/583

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2553 lb	2553 lb
Dead Load	2220 lb	2220 lb
Total Load	4772 lb	4772 lb
Bearing Length	0.88 in	0.88 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft

STEEL PROPERTIES
C7x12.2 - A36

Properties:

Yield Stress:	Fy =	36	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	7	in
Web Thickness:	tw =	0.31	in
Flange Width:	bf =	2.19	in
Flange Thickness:	tf =	0.37	in
Distance to Web Toe of Fillet:	k =	0.88	in
Moment of Inertia About X-X Axis:	Ix =	24.2	in4
Section Modulus About X-X Axis:	Sx =	6.92	in3
Plastic Section Modulus About X-X Axis:	Zx =	8.46	in3

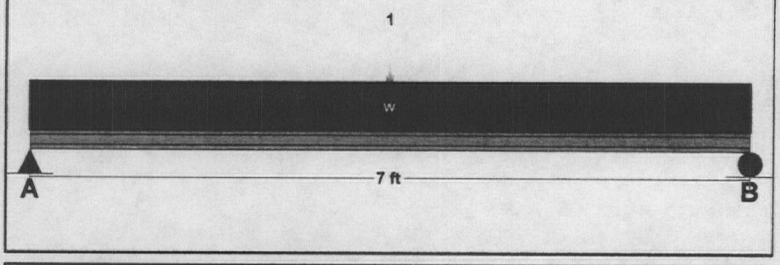
Design Properties per AISC 13th Edition Steel Manual:

Flange Buckling Ratio:	FBR =	2.99	
Allowable Flange Buckling Ratio:	AFBR =	10.79	
Web Buckling Ratio:	WBR =	16.72	
Allowable Web Buckling Ratio:	AWBR =	106.72	
Controlling Unbraced Length:	Lb =	0	ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	2.36	ft
Nominal Flexural Strength w/ safety factor:	Mn =	15198	ft-lb
Controlling Equation:	F2-1		
Web height to thickness ratio:	h/tw =	16.72	
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	63.58	
Cv Factor:	Cv =	1	
Controlling Equation:	G2-3		
Nominal Shear Strength w/ safety factor:	Vn =	28429	lb

Controlling Moment: 13535 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -4772 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	9.96 in4	24.2 in4
Moment:	13535 ft-lb	15198 ft-lb
Shear:	-4772 lb	28429 lb

LOADING DIAGRAM



UNIFORM LOADS	Center	
Uniform Live Load	275	plf
Uniform Dead Load	230	plf
Beam Self Weight	12	plf
Total Uniform Load	517	plf

POINT LOADS - CENTER SPAN		
Load Number	One	
Live Load	3180	lb
Dead Load	2744	lb
Location	3.5	ft

Project: Vintage Design

Location: Riordan Header Above North Kitchen Window-STEEL
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(AISC 13th Ed ASD)]
HSS 6 x 3 x 3/8 x 7.0 FT / ASTM A500-GR.B-46
Section Adequate By: 67.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 5/8/2015 2:05:46 PM

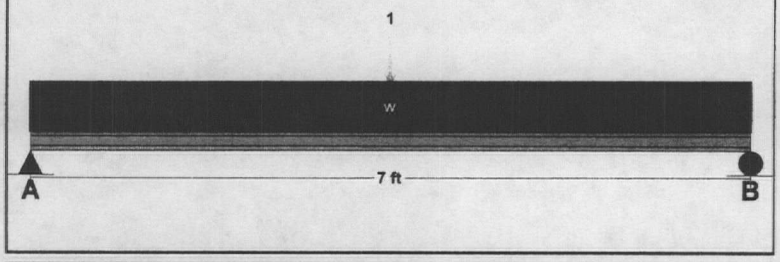
DEFLECTIONS	Center	
Live Load	0.08	IN L/1022
Dead Load	0.07	in
Total Load	0.15	IN L/545

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2553 lb	2553 lb
Dead Load	2247 lb	2247 lb
Total Load	4800 lb	4800 lb
Bearing Length	0.70 in	0.70 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	20 plf
Total Uniform Load	525 plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	3180 lb
Dead Load	2744 lb
Location	3.5 ft

STEEL PROPERTIES
HSS 6 x 3 x 3/8 - A500-GR.B-46

Properties:

Steel Yield Strength:	Fy =	46	ksi
Modulus of Elasticity:	E =	29000	ksi
Tube Steel Section (X Axis):	dx =	6	in
Tube Steel Section (Y Axis):	dy =	3	in
Tube Steel Wall Thickness:	t =	0.349	in
Area:	A =	5.48	in2
Moment of Inertia (X Axis):	Ix =	22.7	in4
Section Modulus (X Axis):	Sx =	7.57	in3
Plastic Section Modulus (X Axis):	Zx =	9.9	in3
Plastic Section Modulus (Y Axis):	Zy =	6.03	in3

Design Properties per AISC 13th Edition Steel Manual:

Flange Buckling Ratio:	FBR =	5.6	
Allowable Flange Buckling Ratio:	AFBR =	28.12	
Allowable Flange Buckling Ratio non-compact:	AFBR_NC =	35.15	
Web Buckling Ratio:	WBR =	14.19	
Allowable Web Buckling Ratio for Eqn. F7-5:	AWBR =	60.76	
Nominal Flexural Strength w/ Safety Factor:	Mn =	22725	ft-lb
Controlling Equation:	F7-1		
Web height to thickness ratio:	h/tw =	14.19	lb
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	56.24	
Cv Factor:	Cv =	1	
Controlling Equation:	G2-2		
Nominal Shear Strength w/ safety factor:	Vn =	63612	

Controlling Moment: 13583 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 4800 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	10 in4	22.7 in4
Moment:	13583 ft-lb	22725 ft-lb
Shear:	4800 lb	63612 lb

Project: Vintage Design

Location: Riordan Support Beam at Overhang
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
5.25 IN x 18.0 IN x 22.0 FT
2.0E Parallam - iLevel Trus Joist
Section Adequate By: 32.8%
Controlling Factor: Deflection

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 6/7/2015 10:53:26 AM

DEFLECTIONS	Center	
Live Load	0.28	IN L/930
Dead Load	0.27	in
Total Load	0.55	IN L/478

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/360

REACTIONS	A	B
Live Load	3025 lb	3025 lb
Dead Load	2855 lb	2855 lb
Total Load	5880 lb	5880 lb
Bearing Length	1.49 in	1.49 in

BEAM DATA	Center
Span Length	22 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	22 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES

2.0E Parallam - iLevel Trus Joist

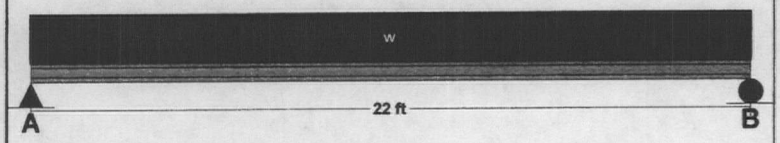
	Base Values	Adjusted
Bending Stress:	Fb = 2900 psi	Fb' = 3188 psi
	Cd=1.15 CF=0.96	
Shear Stress:	Fv = 290 psi	Fv' = 334 psi
	Cd=1.15	
Modulus of Elasticity:	E = 2000 ksi	E' = 2000 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 32339 ft-lb
11.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 5174 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	121.73 in3	283.5 in3
Area (Shear):	23.27 in2	94.5 in2
Moment of Inertia (deflection):	1920.64 in4	2551.5 in4
Moment:	32339 ft-lb	75319 ft-lb
Shear:	5174 lb	21011 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	30 plf
Total Uniform Load	535 plf

Project: Vintage Design

Location: Riordan North Cantilever Support
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
3.5 IN x 11.875 IN x 16.0 FT
2.0E Parallam - iLevel Trus Joist
Section Adequate By: 2.3%
Controlling Factor: Deflection

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 6/1/2015 5:24:37 PM

DEFLECTIONS	Center
Live Load	0.42 IN L/463
Dead Load	0.37 in
Total Load	0.78 IN L/246

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2200 lb	2200 lb
Dead Load	1944 lb	1944 lb
Total Load	4144 lb	4144 lb
Bearing Length	1.58 in	1.58 in

BEAM DATA	Center
Span Length	16 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	16 ft
Live Load Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

2.0E Parallam - iLevel Trus Joist

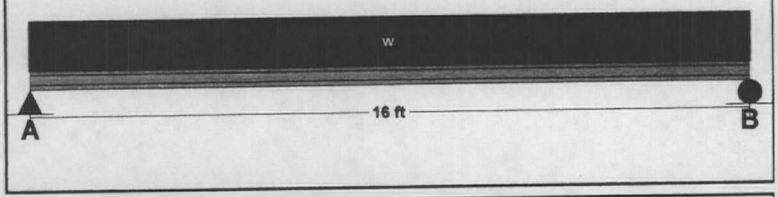
	Base Values	Adjusted
Bending Stress:	Fb = 2900 psi	Fb' = 2903 psi
	Cd=1.00 CF=1.00	
Shear Stress:	Fv = 290 psi	Fv' = 290 psi
	Cd=1.00	
Modulus of Elasticity:	E = 2000 ksi	E' = 2000 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 16576 ft-lb
8.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -3647 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	68.51 in3	82.26 in3
Area (Shear):	18.86 in2	41.56 in2
Moment of Inertia (deflection):	477.3 in4	488.41 in4
Moment:	16576 ft-lb	19902 ft-lb
Shear:	-3647 lb	8035 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	13 plf
Total Uniform Load	518 plf

Project: Vintage Design

Location: Riordan North Support Column
Column
[2012 International Residential Code(2012 NDS)]
3.5 IN x 3.5 IN x 9.5 FT
1.8E Parallam Column - iLevel Trus Joist
Section Adequate By: 50.4%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 6/1/2015 5:24:12 PM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	2200	lb
Dead Load:	Vert-DL-Rxn =	1980	lb
Total Load:	Vert-TL-Rxn =	4180	lb

COLUMN DATA

Total Column Length:	9.5	ft
Unbraced Length (X-Axis) Lx:	9.5	ft
Unbraced Length (Y-Axis) Ly:	9.5	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.15	

COLUMN PROPERTIES

1.8E Parallam Column - iLevel Trus Joist

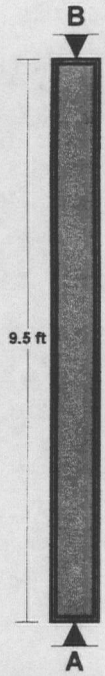
	Base Values	Adjusted
Compressive Stress:	Fc = 2500 psi	Fc' = 688 psi
	Cd=1.15 Cp=0.24	
Bending Stress (X-X Axis):	Fbx = 2400 psi	Fbx' = 3165 psi
	Cd=1.15 CF=1.15	
Bending Stress (Y-Y Axis):	Fby = 2400 psi	Fby' = 3165 psi
	Cd=1.15 CF=1.15	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi

Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	32.57	
	Ley/dy =	32.57	

Column Calculations (Controlling Case Only):
Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	341	psi
Allowable Compressive Stress:	Fc' =	688	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	3165	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	3165	psi
Combined Stress Factor:	**CSF =**	**0.5**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	2200	lb
Dead Load:	PD =	1944	lb
Column Self Weight:	CSW =	36	lb
Total Load:	PT =	4180	lb

Project: Vintage Design

Location: Riordan Steel Beam Over Media Room
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(AISC 13th Ed ASD)]
A992-50 W12x26 x 20.0 FT
Section Adequate By: 4.8%
Controlling Factor: Deflection

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 6/7/2015 10:45:42 AM

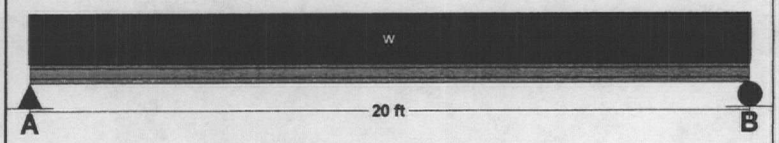
DEFLECTIONS	Center	
Live Load	0.29	IN L/822
Dead Load	0.34	in
Total Load	0.64	IN L/377

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/360

REACTIONS	A		B	
Live Load	4800	lb	4800	lb
Dead Load	5660	lb	5660	lb
Total Load	10460	lb	10460	lb
Bearing Length	0.68	in	0.68	in

BEAM DATA	Center	
Span Length	20	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	20	ft

LOADING DIAGRAM



UNIFORM LOADS	Center	
Uniform Live Load	480	plf
Uniform Dead Load	540	plf
Beam Self Weight	26	plf
Total Uniform Load	1046	plf

STEEL PROPERTIES
W12x26 - A992-50

Properties:

Yield Stress:	Fy =	50	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	12.2	in
Web Thickness:	tw =	0.23	in
Flange Width:	bf =	6.49	in
Flange Thickness:	tf =	0.38	in
Distance to Web Toe of Fillet:	k =	0.68	in
Moment of Inertia About X-X Axis:	Ix =	204	in4
Section Modulus About X-X Axis:	Sx =	33.4	in3
Plastic Section Modulus About X-X Axis:	Zx =	37.2	in3

Design Properties per AISC 13th Edition Steel Manual:

Flange Buckling Ratio:	FBR =	8.54	
Allowable Flange Buckling Ratio:	AFBR =	9.15	
Web Buckling Ratio:	WBR =	47.13	
Allowable Web Buckling Ratio:	AWBR =	90.55	
Controlling Unbraced Length:	Lb =	0	ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	5.33	ft
Nominal Flexural Strength w/ safety factor:	Mn =	92814	ft-lb
Controlling Equation:	F2-1		
Web height to thickness ratio:	h/tw =	47.13	
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95	
Cv Factor:	Cv =	1	
Controlling Equation:	G2-2		
Nominal Shear Strength w/ safety factor:	Vn =	56120	lb

Controlling Moment: 52300 ft-lb
10.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -10460 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	194.74 in4	204 in4
Moment:	52300 ft-lb	92814 ft-lb
Shear:	-10460 lb	56120 lb

Project: Vintage Design

Location: Riordan Sunroom East Column
Column
[2012 International Residential Code(2012 NDS)]
5.25 IN x 5.25 IN x 10 FT
1.8E Parallam Column - iLevel Trus Joist
Section Adequate By: 77.4%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 6/7/2015 11:01:37 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	3025	lb
Dead Load:	Vert-DL-Rxn =	2941	lb
Total Load:	Vert-TL-Rxn =	5966	lb

COLUMN DATA

Total Column Length:	10	ft
Unbraced Length (X-Axis) Lx:	10	ft
Unbraced Length (Y-Axis) Ly:	10	ft
Column End Condtion-K (e):	1	
Load Eccentricity (X-Axis) - ex:	0	in
Load Eccentricity (Y-Axis) - ey:	2	in
Axial Load Duration Factor	1.15	

COLUMN PROPERTIES

1.8E Parallam Column - iLevel Trus Joist

	Base Values	Adjusted
Compressive Stress:	Fc = 2500 psi	Fc' = 1327 psi
	Cd=1.15 Cp=0.46	
Bending Stress (X-X Axis):	Fbx = 2400 psi	Fbx' = 3026 psi
	Cd=1.15 CF=1.10	
Bending Stress (Y-Y Axis):	Fby = 2400 psi	Fby' = 3026 psi
	Cd=1.15 CF=1.10	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi

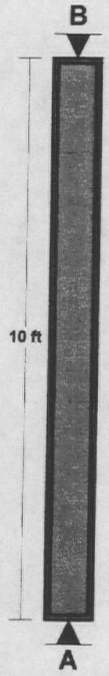
Column Section (X-X Axis):	dx =	5.25	in
Column Section (Y-Y Axis):	dy =	5.25	in
Area:	A =	27.56	in2
Section Modulus (X-X Axis):	Sx =	24.12	in3
Section Modulus (Y-Y Axis):	Sy =	24.12	in3
Slenderness Ratio:	Lex/dx =	22.86	
	Ley/dy =	22.86	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	216	psi
Allowable Compressive Stress:	Fc' =	1327	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	980	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	3026	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	3026	psi
Combined Stress Factor:	**CSF =**	**0.23**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	3025	lb
Dead Load:	PD =	2855	lb
Column Self Weight:	CSW =	86	lb
Total Load:	PT =	5966	lb

Project: Vintage Design

Location: Riordan Sunroom West Column
Column
[2012 International Residential Code(AISC 13th Ed ASD)]
HSS 6 x 6 x 3/16 x 10.0 FT /ASTM A500-GR.B-46
Section Adequate By: 76.3%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 6/7/2015 10:59:39 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	7825	lb
Dead Load:	Vert-DL-Rxn =	8661	lb
Total Load:	Vert-TL-Rxn =	16486	lb

COLUMN DATA

Total Column Length:	10	ft
Unbraced Length (X-Axis) Lx:	10	ft
Unbraced Length (Y-Axis) Ly:	10	ft
Column End Condtion-K (e):	1	
Load Eccentricity (X-Axis) - ex:	0	in
Load Eccentricity (Y-Axis) - ey:	2	in

COLUMN PROPERTIES

HSS 6 x 6 x 3/16 - Square

Steel Yield Strength:	Fy =	46	ksi		
Modulus of Elasticity:	E =	29	ksi		
Column Section:	dx =	6	in	dy =	6 in
Column Wall Thickness:	t =	0.174	in		
Area:	A =	3.98	in		
Moment of Inertia (deflection):	Ix =	22.3	in4	Iy =	22.3 in4
Section Modulus:	Sx =	7.42	in3	Sy =	7.42 in3
Plastic Section Modulus:	Zx =	8.63	in3	Zy =	0.27 in3
Rad. of Gyration:	rx =	2.37	in	ry =	2.37 in

Column Compression Calculations:

KL/r Ratio:	KLx/rx =	50.63	KLy/ry =	50.63

Controlling Direction for Compr. Calcs: (Y-Y Axis)

Flexural Buckling Stress:	Fcr =	38.71	ksi
Controlling Equation	F7-2		
Nominal Compressive Strength:	Pc =	92	kip

Column Bending Calculations per AISC 13th Edition Steel Manual:

Controlling Load Case: Axial Total Load (D + L)

Eccentricity Moment:	Mx-ex =	0 ft-lb	My-ey =	2723 ft-lb
Lateral Moment + Eccentricity:	Mrx =	0 ft-lb	Mry =	2723 ft-lb
Flange Buckling Ratio:	FBR =	31.48		
Allow. Flange Buckling Ratio:	AFBR =	28.12		
Allow. FBR for Non-Compact:	NC =	35.15		
Web Buckling Ratio:	WBRX =	31.48	WBRY =	0
Allow. WBR for Eqn. F7-5:	AWBR =	60.76		
Nmnl. Flex. Str. w/ Sfty Factor:	Mcx =	18.5 ft-kip	Mcy =	18.5 ft-kip
Controlling Equation	F7-2		F7-2	

Combined Stress Calculations:

H1-1b Controls : 0.24

Controlling Combined Stress Factor: 0.24

LOADING DIAGRAM

AXIAL LOADING

Live Load:	PL =	7825	lb
Dead Load:	PD =	8515	lb
Column Self Weight:	CSW =	146	lb
Total Load:	PT =	16486	lb

WISCONSIN
DAVID E. GROBLEWSKI
E-12754
MILWAUKEE, WIS.
PROFESSIONAL ENGINEER

4/13/2015

LEE RIORDAN RESIDENCE
1081 EAST THORNE LANE
FOX POINT, WI 53217-3647

NORTH BATHROOM REMODEL - 2ND LEVEL

1) CHECK EXISTING FLOOR JOISTS W/O EAST WALL BEARING
LENGTH = 20'±; SECTION = $1\frac{5}{8} \times 9\frac{3}{8}$ HEM FIR #1; 16" c/c
FAILS AS ONE SPAN SEE Pg. 2
ADEQUATE AS TWO SPANS SEE Pg. 3

2) NEW 18' HEADER ABOVE WALL BETWEEN NEW AND EXISTING BATHS ...
LOAD FROM SECOND FLOOR: .75(860) = 645 plf D = 215 L = 430
WALL : 8'(10) = 80 plf D = 80
CEILING JOISTS: $\frac{20}{2}$(15+10) = 250 plf D = 150 L = 100
W = 975 plf w_D = 445 w_L = 530
ATTIC HEADER: SEE Pg. 4
(2) $1\frac{3}{4}$" x 18" M = L

3) WALL STUD CAPACITY IN TENSION:
SEE Pg. 5 OK

4) FLOOR JOIST TO STUD CONNECTORS:
USE SIMPSON H10S CAPACITY = 870# > 852#
SEE Pg. 6-9

5) STUD TO HEADER CONNECTORS
USE SIMPSON CS20 CAPACITY = 1030# ≈ 852
SEE Pg. 10-11

6) COLUMNS TO SUPPORT 18' HEADER

SEE Pg. 13

3½" × 3½" PARALLAM COLUMN

7) HEADER OVER KITCHEN WINDOW TO SUPPORT NORTH COLUMN OF 18' HEADER ; SPAN ≤ 7'

$w = 505$ plf $w_D = 230$ $w_L = 275$

$P = 9013$ # $P_D = 4243$ $P_L = 4770$

SEE Pg. 14: (2) 1¾" × 11⅞" M=L

ALT: SEE Pg. 15 : (3) 1¾" × 9¼" M=L

8) HEADER ABOVE WEST BATHROOM WINDOWS :

$w = 505$ plf $w_D = 230$ $w_L = 275$

SEE Pg. 16 : (2) 2 × 10 SPF #2

9) REVISE ATTIC HEADER TO 12' SPAN : SEE Pg. 17

(2) 1¾" × 11¼" M=L

10) CHECK HEADER OVER KITCHEN WINDOW : OK SEE Pg. 18

(3) 1¾" × 9¼" M=L

11) ATTIC HEADER TO SUPPORT N-S ATTIC HEADER : SEE Pg. 19

(2) 1¾" × 18" M=L

12) COLUMN TO SUPPORT EAST END OF 11) SEE Pg. 20 : 3½" □ PARALLAM

USE SIMPSON POST BASE ABW447 $P \leq 4200$# SEE Pg. 21

CHECK 3" BASEMENT FLOOR : $N_c = 2\sqrt{3000} = 110$ psi

$$N = \frac{4200}{4(4+3)1.5} = 100 \text{ psi}$$ OK

Project: Vintage Design

Location: Riordan E/W Attic Support Header
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.75 IN x 18.0 IN x 18.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 84.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:44:22 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center
Live Load	0.18 IN L/1216
Dead Load	0.17 in
Total Load	0.35 IN L/626

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	2120 lb	1060 lb
Dead Load	2007 lb	1092 lb
Total Load	4127 lb	2152 lb
Bearing Length	1.57 in	0.82 in

BEAM DATA	Center
Span Length	18 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	12 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

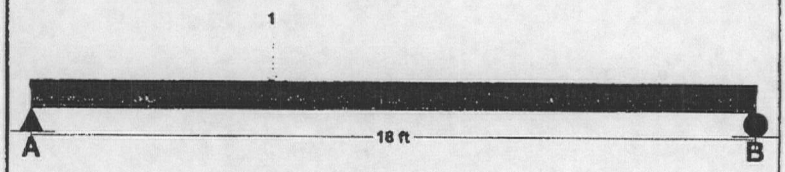
MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 2830 psi
	Cd=1.15 CF=0.95	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 24175 ft-lb
6.12 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 4098 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	102.53 in3	189 in3
Area (Shear):	18.76 in2	63 in2
Moment of Inertia (deflection):	652.44 in4	1701 in4
Moment:	24175 ft-lb	44565 ft-lb
Shear:	4098 lb	13766 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	0 plf
Uniform Dead Load	0 plf
Beam Self Weight	20 plf
Total Uniform Load	20 plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	3180 lb
Dead Load	2744 lb
Location	6 ft

Project: Vintage Design

Location: Riordan E/W Header Column-Steel Section Column
[2012 International Residential Code(AISC 13th Ed ASD)]
HSS 4 x 2-1/2 x 3/16 x 10.0 FT /ASTM A500-GR.B-46
Section Adequate By: 66.9%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

page of

StruCalc Version 9.0.1.3 4/23/2015 12:28:13 PM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	2120	lb
Dead Load:	Vert-DL-Rxn =	2082	lb
Total Load:	Vert-TL-Rxn =	4202	lb

COLUMN DATA

Total Column Length:	10	ft
Unbraced Length (X-Axis) Lx:	10	ft
Unbraced Length (Y-Axis) Ly:	10	ft
Column End Condtion-K (e):	1	
Load Eccentricity (X-Axis) - ex:	0	in
Load Eccentricity (Y-Axis) - ey:	3	in

COLUMN PROPERTIES

HSS 4 x 2-1/2 x 3/16 - Rectangular

Steel Yield Strength:	Fy =	46 ksi		
Modulus of Elasticity:	E =	29 ksi		
Column Section:	dx =	4 in	dy =	2.5 in
Column Wall Thickness:	t =	0.174 in		
Area:	A =	2.06 in		
Moment of Inertia (deflection):	Ix =	4.3 in4	Iy =	2.06 in4
Section Modulus:	Sx =	2.15 in3	Sy =	1.65 in3
Plastic Section Modulus:	Zx =	2.67 in3	Zy =	1.93 in3
Rad. of Gyration:	rx =	1.44 in	ry =	1 in

Column Compression Calculations:

KL/r Ratio:	KLx/rx =	83.33	KLy/ry =	120.12

Controlling Direction for Compr. Calcs: (Y-Y Axis)

Flexural Buckling Stress:	Fcr =	17.4 ksi
Controlling Equation	F7-1	
Nominal Compressive Strength:	Pc =	21 kip

Column Bending Calculations per AISC 13th Edition Steel Manual:

Controlling Load Case: Axial Total Load (D + L)

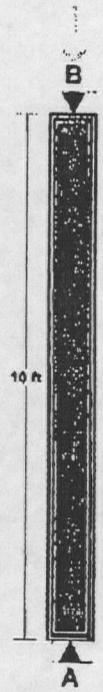
Eccentricity Moment:	Mx-ex =	0 ft-lb	My-ey =	1032 ft-lb
Lateral Moment + Eccentricity:	Mrx =	0 ft-lb	Mry =	1032 ft-lb
Flange Buckling Ratio:	FBR =	11.37		
Allow. Flange Buckling Ratio:	AFBR =	28.12		
Allow. FBR for Non-Compact:	NC =	35.15		
Web Buckling Ratio:	WBRX =	19.99	WBRY =	0
Allow. WBR for Eqn. F7-5:	AWBR =	60.76		
Nmnl. Flex. Str. w/ Sfty Factor:	Mcx =	6.1 ft-kip	Mcy =	4.4 ft-kip
Controlling Equation	F7-1		F7-1	

Combined Stress Calculations:

H1-1b Controls : 0.33

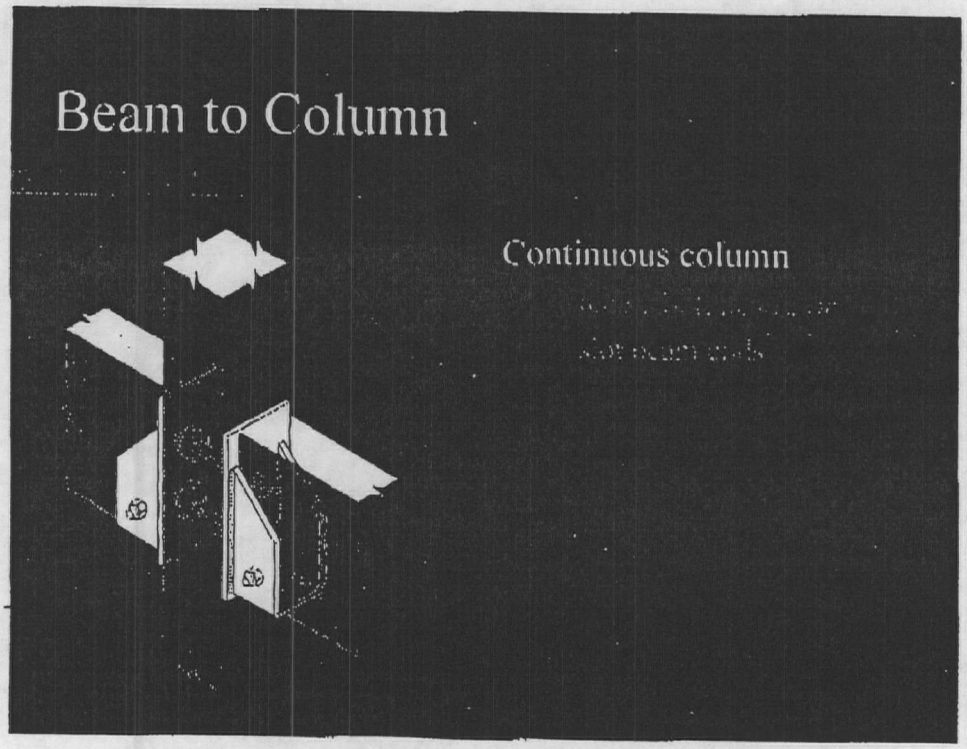
Controlling Combined Stress Factor: 0.33

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	2120	lb
Dead Load:	PD =	2007	lb
Column Self Weight:	CSW =	75	lb
Total Load:	PT =	4202	lb



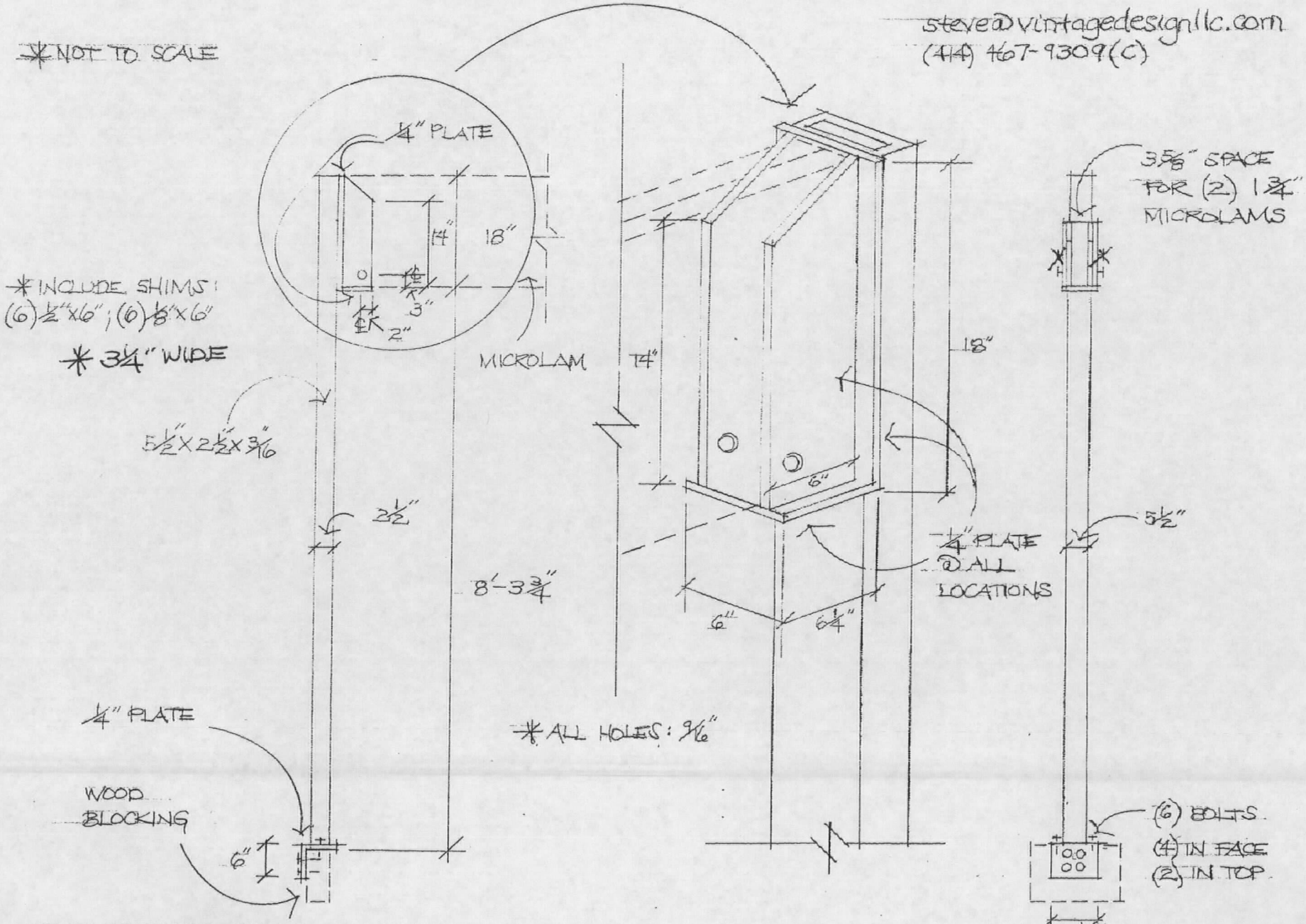
When both beams and columns are continuous and the connection must remain in-plane, either the beam or the column must be spliced at the connection. In this detail the column continuity is maintained. Optional shear plates may be used to transfer higher loads. Note that, unless the bolt heads are completely recessed into the back of the bracket, the beam end will likely require slotting. In a building with many bays, it may be difficult to maintain dimensions in the beam direction when using this connection.

STEVE – CONCEPT OF HANGER
IN SKETCH....

04/23/2015 14:05 FAX 14142585185 DAVID E GROBLEWSKI PE 004

steve@vintagedesignllc.com
(414) 467-9309(C)

*NOT TO SCALE



STEEL COLUMN DETAIL

RIORDAN RESIDENCE

VINTAGE DESIGN

Project: Vintage Design
Location: Riordan Column for 18' Header
Column
2012 International Residential Code(2012 NDS)]
3.5 IN x 3.5 IN x 16 FT
1.8E Parallam Column - iLevel Trus Joist
Section Adequate By: 22.0%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/28/2015 8:53:14 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	4770	lb
Dead Load:	Vert-DL-Rxn =	4243	lb
Total Load:	Vert-TL-Rxn =	9013	lb

COLUMN DATA

Total Column Length:	16	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	8	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

1.8E Parallam Column - iLevel Trus Joist

	Base Values	Adjusted
Compressive Stress:	Fc = 2500 psi	Fc' = 943 psi
	Cd=1.00 Cp=0.38	
Bending Stress (X-X Axis):	Fbx = 2400 psi	Fbx' = 2752 psi
	Cd=1.00 CF=1.15	
Bending Stress (Y-Y Axis):	Fby = 2400 psi	Fby' = 2752 psi
	Cd=1.00 CF=1.15	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi

Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	27.43	
	Ley/dy =	27.43	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	736	psi
Allowable Compressive Stress:	Fc' =	943	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	2752	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	2752	psi
Combined Stress Factor:	**CSF =**	**0.78**	

LOADING DIAGRAM

AXIAL LOADING

Live Load:	PL =	4770	lb
Dead Load:	PD =	4182	lb
Column Self Weight:	CSW =	61	lb
Total Load:	PT =	9013	lb

Project: Vintage Design

Location: Riordan E/W Header Column
Column
[2012 International Residential Code(2012 NDS)]
3.5 IN x 3.5 IN x 10 FT
1.8E Parallam Column - iLevel Trus Joist
Section Adequate By: 45.1%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:49:19 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	2120	lb
Dead Load:	Vert-DL-Rxn =	2045	lb
Total Load:	Vert-TL-Rxn =	4165	lb

COLUMN DATA

Total Column Length:	10	ft
Unbraced Length (X-Axis) Lx:	10	ft
Unbraced Length (Y-Axis) Ly:	10	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

1.8E Parallam Column - iLevel Trus Joist

	Base Values	Adjusted
Compressive Stress:	Fc = 2500 psi	Fc' = 620 psi
	Cd=1.00 Cp=0.25	
Bending Stress (X-X Axis):	Fbx = 2400 psi	Fbx' = 2752 psi
	Cd=1.00 CF=1.15	
Bending Stress (Y-Y Axis):	Fby = 2400 psi	Fby' = 2752 psi
	Cd=1.00 CF=1.15	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi

Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	34.29	
	Ley/dy =	34.29	

Column Calculations (Controlling Case Only):
Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	340	psi
Allowable Compressive Stress:	Fc' =	620	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	2752	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	2752	psi
Combined Stress Factor:	**CSF =**	**0.55**	

LOADING DIAGRAM

AXIAL LOADING

Live Load:	PL =	2120	lb
Dead Load:	PD =	2007	lb
Column Self Weight:	CSW =	38	lb
Total Load:	PT =	4165	lb

Project: Vintage Design

Location: Riordan Attic Header - REVISED
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(2012 NDS)]
(2) 1.75 IN x 11.25 IN x 12.0 FT
1.9E Microllam - iLevel Trus Joist
Section Adequate By: 2.8%
Controlling Factor: Deflection

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/11/2015 7:34:39 AM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

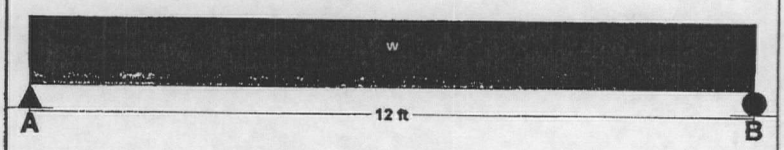
DEFLECTIONS	Center	
Live Load	0.31	IN L/460
Dead Load	0.27	in
Total Load	0.58	IN L/247

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	3180 lb	3180 lb
Dead Load	2744 lb	2744 lb
Total Load	5924 lb	5924 lb
Bearing Length	2.26 in	2.26 in

BEAM DATA	Center
Span Length	12 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	12 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	530 plf
Uniform Dead Load	445 plf
Beam Self Weight	12 plf
Total Uniform Load	987 plf

MATERIAL PROPERTIES
1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi	Fb' = 3016 psi
	Cd=1.15 CF=1.01	
Shear Stress:	Fv = 285 psi	Fv' = 328 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 17771 ft-lb
6.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -5094 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	70.7 in3	73.83 in3
Area (Shear):	23.32 in2	39.38 in2
Moment of Inertia (deflection):	404 in4	415.28 in4
Moment:	17771 ft-lb	18558 ft-lb
Shear:	-5094 lb	8603 lb

CONNECTOR @ SOUTH END:

USE SIMPSON FACE MOUNT HANGER HGU548

NO PGS. 15 + 16

Project: Vintage Design

Location: Riordan Wall Between Baths
Column
[2012 International Residential Code(2012 NDS)]
1.5 IN x 3.5 IN x 8.0 FT
#2 - Spruce-Pine-Fir - Dry Use
Section Adequate By: 100.0%

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 11:49:12 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	-586	lb
Dead Load:	Vert-DL-Rxn =	-266	lb
Total Load:	Vert-TL-Rxn =	-852	lb

COLUMN DATA

Total Column Length:	8	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	1	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

#2 - Spruce-Pine-Fir

	Base Values	Adjusted
Compressive Stress:	Fc = 1150 psi	Fc' = 0 psi
	Cd=0.00 Cf=1.15 Cp=0.00	
Bending Stress (X-X Axis):	Fbx = 875 psi	Fbx' = 0 psi
	Cd=0.00 CF=1.50 Cr=1.15 Cl=0.00	
Bending Stress (Y-Y Axis):	Fby = 875 psi	Fby' = 0 psi
	Cd=0.00 CF=1.50 Cr=1.15	
Modulus of Elasticity:	E = 1400 ksi	E' = 1400 ksi

Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	1.5	in
Area:	A =	5.25	in2
Section Modulus (X-X Axis):	Sx =	3.06	in3
Section Modulus (Y-Y Axis):	Sy =	1.31	in3
Slenderness Ratio:	Lex/dx =	27.43	
	Ley/dy =	8	

Column Calculations (Controlling Case Only):

Controlling Load Case:			
Actual Compressive Stress:	Fc =	0	psi
Allowable Compressive Stress:	Fc' =	0	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	0	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	0	psi
Combined Stress Factor:	CSF =	0	

LOADING DIAGRAM

AXIAL LOADING

Live Load:	PL =	-586	lb
Dead Load:	PD =	-274	lb
Column Self Weight:	CSW =	8	lb
Total Load:	PT =	-852	lb

$$f_t = \frac{852^{\#}}{5.25\square''} = 162 \text{ psi}$$

$$F_t' = 675 \text{ psi} > 162 \quad \underline{\underline{ok}}$$

Project: Vintage Design

Location: Riordan Header Above North Kitchen Window-STEEL
Multi-Loaded Multi-Span Beam
[2012 International Residential Code(AISC 13th Ed ASD)]
HSS 6 x 3 x 3/8 x 7.0 FT / ASTM A500-GR.B-46
Section Adequate By: 67.3%
Controlling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 5/8/2015 2:05:46 PM

DEFLECTIONS	Center	
Live Load	0.08	IN L/1022
Dead Load	0.07	in
Total Load	0.15	IN L/545

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	2553	lb	2553	lb
Dead Load	2247	lb	2247	lb
Total Load	4800	lb	4800	lb
Bearing Length	0.70	in	0.70	in

BEAM DATA	Center	
Span Length	7	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	7	ft

STEEL PROPERTIES

HSS 6 x 3 x 3/8 - A500-GR.B-46

Properties:

Steel Yield Strength:	Fy =	46	ksi
Modulus of Elasticity:	E =	29000	ksi
Tube Steel Section (X Axis):	dx =	6	in
Tube Steel Section (Y Axis):	dy =	3	in
Tube Steel Wall Thickness:	t =	0.349	in
Area:	A =	5.48	in2
Moment of Inertia (X Axis):	Ix =	22.7	in4
Section Modulus (X Axis):	Sx =	7.57	in3
Plastic Section Modulus (X Axis):	Zx =	9.9	in3
Plastic Section Modulus (Y Axis):	Zy =	6.03	in3

Design Properties per AISC 13th Edition Steel Manual:

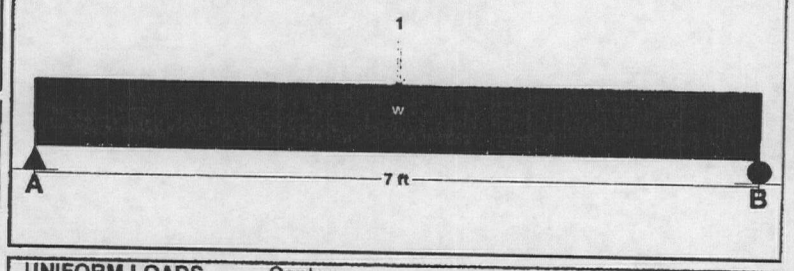
Flange Buckling Ratio:	FBR =	5.6	
Allowable Flange Buckling Ratio:	AFBR =	28.12	
Allowable Flange Buckling Ratio non-compact:	AFBR_NC =	35.15	
Web Buckling Ratio:	WBR =	14.19	
Allowable Web Buckling Ratio for Eqn. F7-5:	AWBR =	60.76	
Nominal Flexural Strength w/ Safety Factor:	Mn =	22725	ft-lb
Controlling Equation:	F7-1		
Web height to thickness ratio:	h/tw =	14.19	lb
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	56.24	
Cv Factor:	Cv =	1	
Controlling Equation:	G2-2		
Nominal Shear Strength w/ safety factor:	Vn =	63612	

Controlling Moment: 13583 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 4800 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	10 in4	22.7 in4
Moment:	13583 ft-lb	22725 ft-lb
Shear:	4800 lb	63612 lb

LOADING DIAGRAM



UNIFORM LOADS	Center	
Uniform Live Load	275	plf
Uniform Dead Load	230	plf
Beam Self Weight	20	plf
Total Uniform Load	525	plf

POINT LOADS - CENTER SPAN		
Load Number	One	
Live Load	3180	lb
Dead Load	2744	lb
Location	3.5	ft

'roject: Vintage Design

.ocation: Riordan Header Above West Bathroom Windows
/lulti-Loaded Multi-Span Beam
2012 International Residential Code(2012 NDS)]
2) 1.5 IN x 9.25 IN x 7.0 FT
:2 - Spruce-Pine-Fir - Dry Use
;ection Adequate By: 26.3%
:ontrolling Factor: Moment

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 4/1/2015 6:18:29 PM

CAUTIONS
* Laminations are to be fully connected to provide uniform transfer of loads to all members

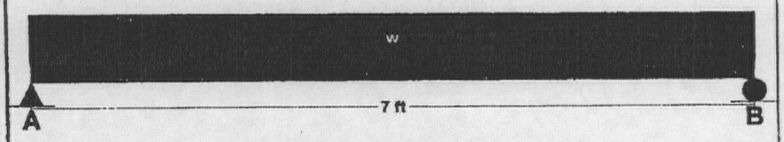
DEFLECTIONS	Center	
Live Load	0.05	IN L/1567
Dead Load	0.05	in
Total Load	0.10	IN L/845

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	963 lb	963 lb
Dead Load	823 lb	823 lb
Total Load	1785 lb	1785 lb
Bearing Length	1.40 in	1.40 in

BEAM DATA	Center
Span Length	7 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	7 ft
Live Load Duration Factor	1.15
Notch Depth	0.00

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	275 plf
Uniform Dead Load	230 plf
Beam Self Weight	5 plf
Total Uniform Load	510 plf

MATERIAL PROPERTIES
#2 - Spruce-Pine-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 875 psi	Fb' = 1107 psi
	Cd=1.15 CF=1.10	
Shear Stress:	Fv = 135 psi	Fv' = 155 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1400 ksi	E' = 1400 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 425 psi	Fc - ⊥' = 425 psi

Controlling Moment: 3124 ft-lb
3.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -1392 lb
At a distance d from right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	33.87 in3	42.78 in3
Area (Shear):	13.46 in2	27.75 in2
Moment of Inertia (deflection):	56.22 in4	197.86 in4
Moment:	3124 ft-lb	3946 ft-lb
Shear:	-1392 lb	2872 lb

Project: Vintage Design

Location: Riordan Upper Bath Floor Joists @ 11' + 8' Span
Floor Joist
[2012 International Residential Code(2012 NDS)]
1.625 IN x 9.375 IN x 20.0 FT (1 + 11 + 8) @ 16 O.C.
#1 - Hem-Fir - Dry Use
Section Adequate By: 107.1%
Controlling Factor: Shear

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 9:46:18 AM

DEFLECTIONS	Left		Center		Right	
Live Load	0.00	IN 2L/5678	0.03	IN L/4037	0.01	IN L/MAX
Dead Load	0.00	in	0.01	in	0.01	in
Total Load	0.00	IN 2L/10416	0.04	IN L/3135	0.01	IN L/7011

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B	C
Live Load	701 lb	586 lb	147 lb
Dead Load	488 lb	274 lb	78 lb
Total Load	1189 lb	860 lb	225 lb
Bearing Length	1.81 in	1.31 in	0.34 in

BEAM DATA	Left	Center	Right
Span Length	1 ft	11 ft	8 ft
Unbraced Length-Top	0 ft	0 ft	0 ft
Unbraced Length-Bottom	0 ft	0 ft	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Sheathing/sheetrock applied to bottom of joists-bottom of joists fully braced.
Floor Duration Factor 1.00

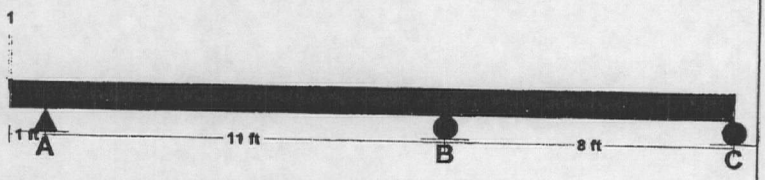
MATERIAL PROPERTIES
#1 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 975 psi	Fb' = 1233 psi
	Cd=1.00 CF=1.10 Cr=1.15	
Shear Stress:	Fv = 150 psi	Fv' = 150 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1500 ksi	E' = 1500 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 405 psi

Controlling Moment: -764 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 1, 2, 3
Controlling Shear: -736 lb
At a distance d from left support of span 1 (Left Span)
Created by combining all dead loads and live loads on span(s) 1, 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	7.43 in3	23.8 in3
Area (Shear):	7.36 in2	15.23 in2
Moment of Inertia (deflection):	9.95 in4	111.58 in4
Moment:	-764 ft-lb	2447 ft-lb
Shear:	-736 lb	1523 lb

LOADING DIAGRAM



JOIST LOADING

Uniform Floor Loading		Left	Center	Right
Live Load	LL =	40 psf	40 psf	40 psf
Dead Load	DL =	20 psf	20 psf	20 psf
Total Load	TL =	60 psf	60 psf	60 psf
TL Adj. For Joist Spacing	wT =	80 plf	80 plf	80 plf
Wall Loading				
Wall One				
Live Load (⊥ to Joists):	L1 =	275 plf	0 plf	0 plf
Dead Load (⊥ to Joists):	D1 =	230 plf	0 plf	0 plf
Load Location	X1 =	0 ft	0 ft	0 ft

Project: Vintage Design

Location: Riordan Upper Bath Floor Joists @ 19' Span
Floor Joist
[2012 International Residential Code(2012 NDS)]
1.625 IN x 9.375 IN x 20.0 FT (1 + 19) @ 16 O.C.
#1 - Hem-Fir - Dry Use
Section Inadequate By: 37.5%
Controlling Factor: Deflection / Depth Required 10.82 In.

David E. Groblewski
David E. Groblewski, P.E., Inc.
808 South 116 Street
West Allis, WI 53214-2101

StruCalc Version 9.0.1.3 3/27/2015 9:44:05 AM

DEFLECTIONS	Left		Center	
Live Load	-0.09	IN 2L/262	0.59	IN L/384
Dead Load	-0.04	in	0.28	in
Total Load	-0.13	IN 2L/182	0.87	IN L/262

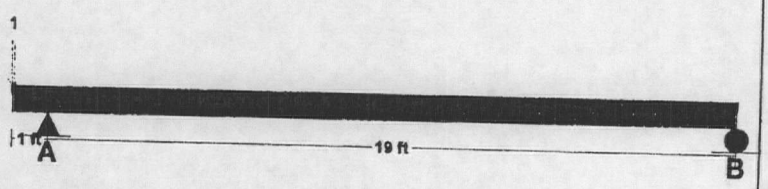
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	947 lb	486 lb
Dead Load	604 lb	236 lb
Total Load	1551 lb	722 lb
Bearing Length	2.36 in	1.10 in

BEAM DATA	Left	Center
Span Length	1 ft	19 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	0 ft	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Sheathing/sheetrock applied to bottom of joists-bottom of joists fully braced.
Floor Duration Factor 1.00

LOADING DIAGRAM



JOIST LOADING

Uniform Floor Loading		Left		Center	
Live Load	LL =	40	psf	40	psf
Dead Load	DL =	20	psf	20	psf
Total Load	TL =	60	psf	60	psf
TL Adj. For Joist Spacing	wT =	80	plf	80	plf
Wall Loading					
Wall One					
Live Load (⊥ to Joists):	L1 =	275	plf	0	plf
Dead Load (⊥ to Joists):	D1 =	230	plf	0	plf
Load Location	X1 =	0	ft	0	ft

MATERIAL PROPERTIES
#1 - Hem-Fir

	Base Values		Adjusted	
Bending Stress:	Fb =	975 psi	Fb' =	1233 psi
	Cd=1.00 CF=1.10 Cr=1.15			
Shear Stress:	Fv =	150 psi	Fv' =	150 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1500 ksi	E' =	1500 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	405 psi	Fc - ⊥' =	405 psi

Controlling Moment: 3262 ft-lb
9.88 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 1, 2
Controlling Shear: 737 lb
At a distance d from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 1, 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	31.74 in3	23.8 in3
Area (Shear):	7.37 in2	15.23 in2
Moment of Inertia (deflection):	218.09 in4	158.56 in4
Moment:	3262 ft-lb	2447 ft-lb
Shear:	737 lb	1523 lb

Decking Information
Plywood Thickness: T = 3/4 in
Plywood Is Glued:
Moment of Inertia Calculations For Glued Floor:

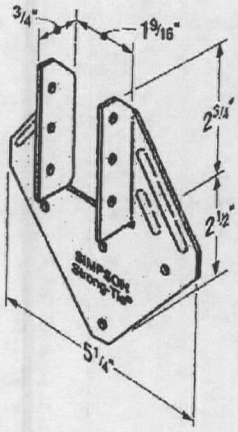
Joist Area:	A-joist =	15.23 IN2
Plywood Area:	A-ply =	2.08 IN2
Section Centroid:	C =	5 IN ABOVE BASE
Moment of Inertia (deflection):	I-comb =	159 IN4

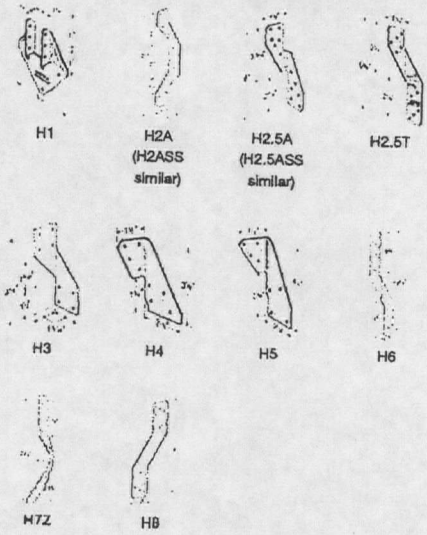
As an alternate, certain roof to wall connectors (embedded truss anchors, seismic and hurricane ties (on this page), and twist straps) can be evaluated using the following: The design load in each direction shall not exceed the published allowable load in that direction multiplied by 0.75.

Gallery, Uninstalled:

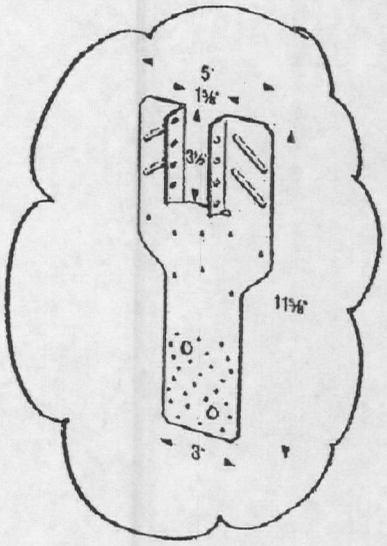
▲top

roll over images below to see larger image

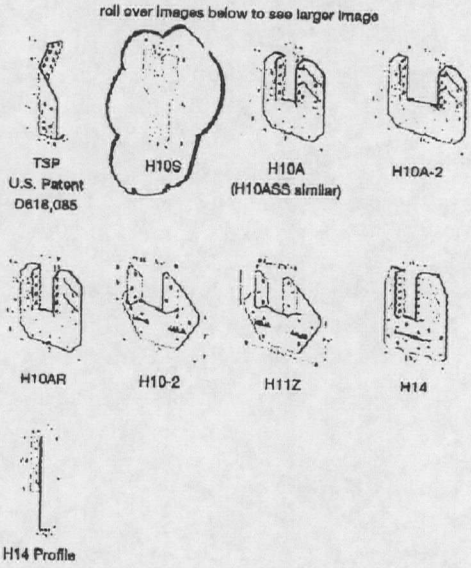




INSTALL UPSIDE DOWN



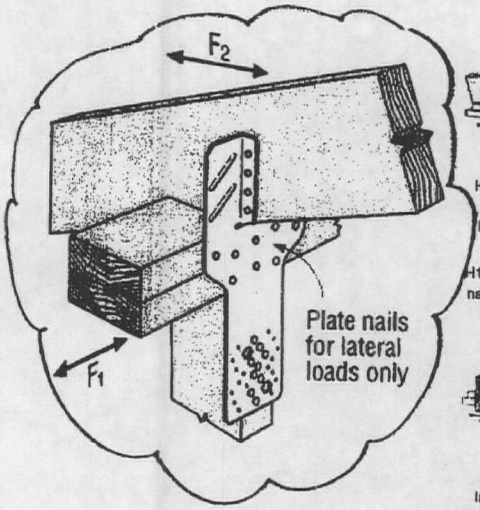
roll over images below to see larger image

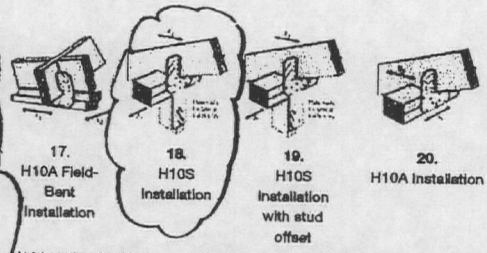


Gallery, Installed:

▲top

roll over images below to see larger image





17. H10A Field-Bent Installation

18. H10S Installation

19. H10S Installation with stud offset

20. H10A Installation

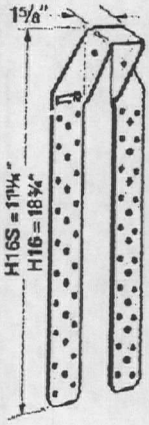
H10A optional nailing connects shear blocking to rafter. Use 8d common nails. Slot allows maximum field-bending up to a pitch of 6/12, use 75% of the table uplift load; bend one time only.

21. H10A-2 Installation (H11Z similar)

1 22. H14 Installation to double top plates

2 23. H14 Installation to double 2x header

AVOID A MISINSTALLATION! Do not make your own holes or overdrive nails!



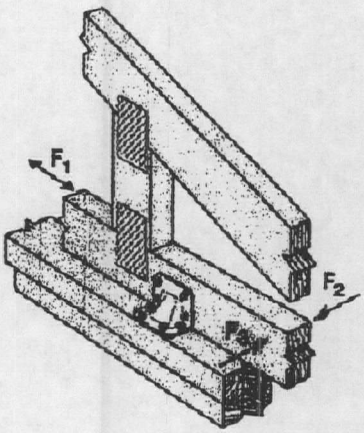
roll over images below to see larger image

H16 and H16S Presloped at 5/12. Truss/ Rafter Pitch of 3/12 to 7/12 is acceptable

H16 Installation

HS24

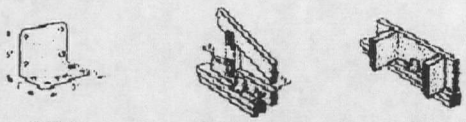
HS24 Installation



roll over images below to see larger image

H16-2 and H16-2S Presloped at 5/12. Pitch of 3/12 to 7/12 is acceptable

H16-2 Installation Depending on heel height, strap may wrap to back of plate.



HGA10

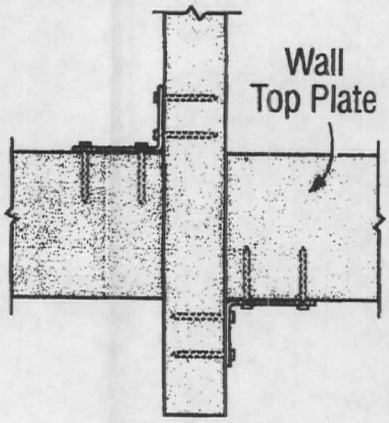
HGA10 Installation to Double Top Plates

HGA10 Installation to Rim Joist

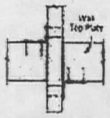
Hurricane Tie Installations to Achieve Twice the Load (Top View)

▲top

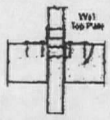
roll over images below to see larger image



Both connectors shall be same model.



Install diagonally across from each other for minimum 2x truss.



Products can be on the same side of the wall provided they are configured as shown.

Nailing into both sides of a single ply 2x truss may cause the wood to split.

Load Tables: See code report listings below

▲top

Load Values with Carbon Steel Nails

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These models are approved for installation with the Strong-Drive® SD Connector screw. See the load values below.

Model No.	Ga	Fasteners: To Rafters/ Truss	Fasteners: To Plates	Fasteners: To Studs	DF/SP Allowable Loads: Uplift (160)	DF/SP Lateral (160): F_1	DF/SP Lateral (160): F_2	Uplift with 8dx1½ Nails (160)	SPF/HF Allowable Loads: Uplift (160)	SPF/HF Lateral (160): F_1	SPF/HF Lateral (160): F_2	Uplift with 8dx1½ Nails (160)
H1	18	6-8dx1½	4-8d	—	585	485	165	455	400	415	140	370
H2A	18	5-8dx1½	2-8dx1½	5-8dx1½	575	130	55	—	495	130	55	—
H2ASS	18	5-SS8D	2-SS8D	5-SS8D	400	130	55	400	345	130	55	345
H2.5A	18	5-8d	5-8d	—	600	110	110	575	535	110	110	495
H2.5ASS	18	5-SS8d	5-SS8d	—	440	75	70	365	380	75	70	310
H2.5T	18	5-8d	5-8d	—	545	135	145	425	545	135	145	425
H3	18	4-8d	4-8d	—	455	125	160	415	320	105	140	290
H4	20	4-8d	4-8d	—	360	165	160	360	235	140	135	235
H5	18	4-8d	4-8d	—	455	115	200	455	265	100	170	265
H6	16	—	6-8d	8-8d	950	—	—	—	820	—	—	—
H7Z	16	4-8d	2-8dx1½	8-8d	985	400	—	—	845	345	—	—
H8	18	5-10dx1½	5-10dx1½	—	745	75	—	630	565	75	—	510
H10A Sloped	18	9-10dx1½	9-10dx1½	—	855	590	285	—	760	505	285	—
H10A	18	9-10dx1½	9-10dx1½	—	1140[7]	590	285	—	1015	505	285	—
H10ASS	18	9-SSN10	9-SSN10	—	970	565	170	—	835	485	170	—
H10AR	18	9-10dx1½	9-10dx1½	—	1050	490	285	—	905	420	285	—
H10S[9,10]	18	8-8dx1½	8-8dx1½[10]	8-8d	1010	660	215	550	870	570	185	475
H10A-2	18	9-10dx1½	9-10dx1½	—	1245	815	260	—	1070	700	225	—
H10-2	18	6-10d	6-10d	—	760	455	395	—	655	390	340	—
H11Z	18	6-16dx2½	6-16dx2½	—	830	525	760	—	715	450	655	—
H14	18	1: 12-8dx1½	13-8d	—	1350[7]	515	265	—	1050	480	245	—
		2: 12-8dx1½	15-8d	—	1350[7]	515	265	—	1050	480	245	—
TSP	16	9-10dx1½	6-10dx1½	—	740	310	190	—	635	265	160	—
		9-10dx1½	6-10d	—	890	310	190	—	765	265	160	—

1. Loads have been increased for wind or earthquake loading with no further increase allowed; reduce where other loads govern.
2. Allowable loads are for one anchor. A minimum rafter thickness of 2 1/2" must be used when framing anchors are installed on each side of the joist and on the same side of the plate (exception: connectors installed such that nails on opposite sides don't interfere).
3. Allowable DF/SP uplift load for stud to bottom plate installation (see detail 15) is 400 lbs. (H2.5); 390 lbs. (H2.5A); 360 lbs. (H4) and 310 lbs. (H8). For SPF/HF values multiply these values by 0.86.
4. Allowable loads in the F_1 direction are not intended to replace diaphragm boundary members or prevent cross grain bending of the truss or rafter members.
5. When cross-grain bending or cross-grain tension cannot be avoided in the members, mechanical reinforcement to resist such forces may be considered.
6. Hurricane Ties are shown installed on the outside of the wall for clarity and assume a minimum overhang of 3 1/2" installation on the inside of the wall is acceptable (see General Instructions for the Installer notes u). For uplift Continuous Load Path, connections in the same area (i.e. truss to plate connector and plate to stud connector) must be on same side of the wall. See T-HTIEBEARING for more information.
7. Southern Pine allowable uplift loads for H10A = 1340 lbs. and for H14 = 1465 lbs.
8. Refer to technical bulletin T-HTIEBEARING for selected hurricane ties allowable bearing enhancement loads.
9. H10S can have the stud offset a maximum of 1" from rafter (center to center) for a reduced uplift of 890 lbs. (DF/SP), and 765 lbs. (SPF).
10. H10S nails to plates are optional for uplift but required for lateral loads.

9" ON LVL, 9" ON STUD - FILL ALL HOLES WITH FASTENERS PER DAVE 5/19/13

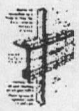
www.strongtie.com

SIMPSON Strong-Tie

CS/CMST Coiled Straps

CMSTC provides nail slots for easy installation; it can be cut to length. CS are continuous utility straps which can be cut to length on the job site. Packaged in lightweight (about 40 pounds) cartons.

Finish: Galvanized. Some products available in ZMAX® coating; see Corrosion Information.



Installation:

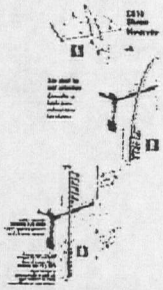
- Use all specified fasteners. See General Notes.
- Wood shrinkage after strap installation across horizontal wood members may cause strap to buckle outward.
- Refer to the applicable code for minimum nail penetration and minimum wood edge and end distances.
- The table shows the maximum allowable loads and the nails required to obtain them. Fewer nails may be used; reduce the allowable load as shown in footnote 3.
- The cut length of the strap shall be equal to twice the "End Length" noted in the table plus the clear span dimension.
- CMST only - Use every other triangle hole if the wood tends to split. Use round and triangle holes for comparable MST loads, providing wood does not tend to split.
- For lap splice and alternate nailing information, See Technical Bulletin T-CMST.
- CS straps are available in 25' lengths, order CS14-R, CS16-R, CS18-R, CS20-R or CS22-R.

Load Table
Gallery of Images
Code Reports
Drawings
Catalog Pages
Related Categories
Technical Bulletins
Fliers
Help for downloads

Gauge stamped on part for easy identification

Coil Strap Calculator
Find the most efficient solution to meet your load demands

INSTALLATION

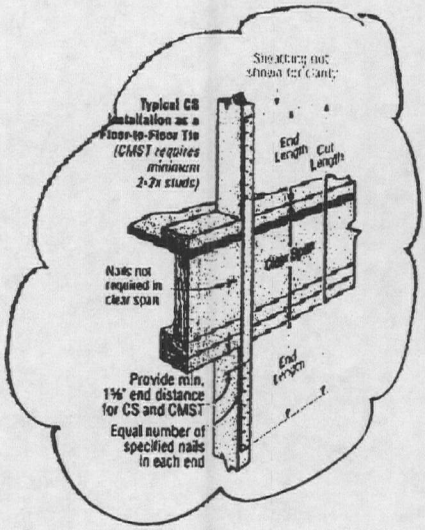


View step-by-step installation instructions

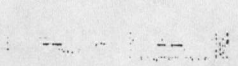
Gallery:

=top

roll over images below to see larger image



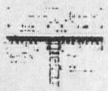
Typical CS Installation as a Floor-to-Floor Tie (CMST requires minimum 2-2x studs)



CS16 Hole Pattern (all other CS straps similar)

CMST14 Hole Pattern (CMST12 similar)

CMSTC16 Hole Pattern



Typical Horizontal CS/CMST Installation

Load Table: See code report listings below

▲top

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These models are approved for installation with the Strong-Drive® SD Connector screw.

Model No.	Total L	Ga	DF/SP		SPF/HF		Allowable Tension Loads (160)
			Fasteners	End Length	Fasteners	End Length	
CMST12	40'	12	74 - 16d	33"	84 - 16d	38"	9215
			86 - 10d	39"	98 - 10d	44"	9215
CMST14	52½'	14	56 - 16d	26"	66 - 16d	30"	6490
			66 - 10d	30"	76 - 10d	34"	6490
CMSTC16	54'	16	50 - 16d sinker	20"	58 - 16d sinker	25"	4585
CS14	100'	14	26 - 10d	15"	30 - 10d	16"	2490
			30 - 8d	16"	36 - 8d	19"	2490
CS16	150'	16	20-10d	11"	22 - 10d	13"	1705
			22 - 8d	13"	26 - 8d	14"	1705
CS18	200'	18	16 - 10d	9"	18 - 10d	11"	1370
			18 - 8d	11"	22 - 8d	12"	1370
CS20	250'	20	12 - 10d	6"	14 - 10d	9"	1030
			14 - 8d	9"	16 - 8d	9"	1030
CS22	300'	22	10 - 10d	7"	12 - 10d	7"	845
			12 - 8d	7"	14 - 8d	8"	845

1. Fastener quantities and end lengths are calculated using an increase for wind or seismic loading.
2. Use half of the required nails in each member being connected to achieve the listed loads.
3. Calculate the connector value for a reduced number of nails as follows:

$$\text{Allowable Load} = \frac{\text{No. of Nails Used}}{\text{No. of Nails in Table}} \times \text{Table Load}$$

Example: CMSTC16 in DF/SP with 40 nails total.
(Half of the nails in each member being connected)

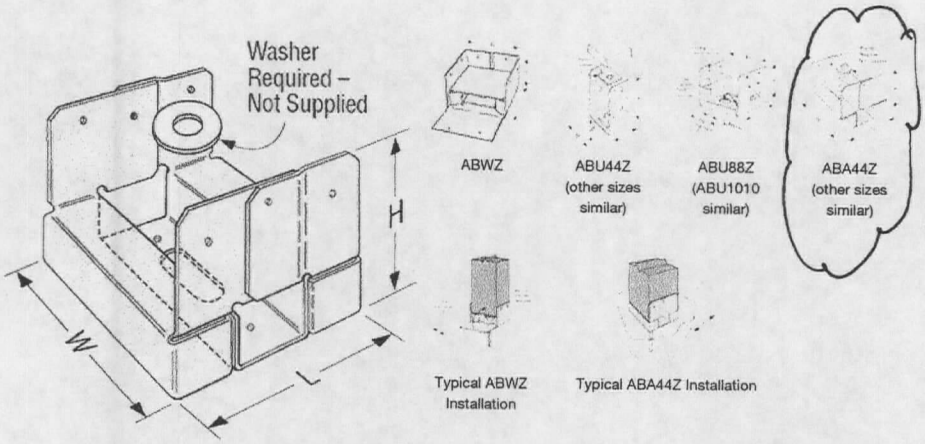
$$\text{Allowable Load} = \frac{\text{40 Nails (Used)}}{\text{50 Nails (Table)}} \times 4585 \text{ lbs} = 3668 \text{ lbs}$$

4. Tension loads apply for uplift when installed vertically.
5. NAILS: 16d = 0.162" dia. x 3 1/2" long, 16d Sinker = 0.148" dia. x 3 1/4" long, 10d = 0.148" dia. x 3 " long. See other nail sizes and information.

Code Reports (PDFs):

▼next ▲top

	IAPMO UES ER	ICC-ES ESR	CITY OF LOS ANGELES	STATE OF FLORIDA	LEGACY REPORTS ICC-ES NER	ICC-ES ER	ICC-ES ES
CMST	See specific model numbers for code listings.						
CMST12	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CMST14	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CMSTC	No code listing. Please contact us for test data.						
CMSTC16	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS	See specific model numbers for code listings.						
CS14	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS14-R	ER-124			FL10852			
CS16	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS16-R	ER-124	ESR-2105 / ESR-2523 *	RR25489	FL10852			
CS16Z	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852			
CS18	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			
CS18-R	ER-124	ESR-2105 / ESR-2523 *	RR25489	FL10852			
CS18S	ER-124	ESR-2105 / ESR-2523 *		FL10852			
CS20	ER-124	ESR-2105 / ESR-2523 *	RR25713 / RR25489	FL10852 / FL13872			



Load Tables: See code report listings below

▲ top

Load Values with Nails

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These models are approved for installation with the Strong-Drive® SD Connector screw. See the load values below.

Model No.	Nominal Post Size	Material		Dimensions (in.)				Fasteners				Allowable Loads		
		Base (Ga)	Strap (Ga)	W	L	H	HB[6]	Anchor Dia. (in.)	Nails	Machine Bolts Qty.	Machine Bolts Dia.	Uplift Nails	Uplift Bolts	Down (100)
ABA44Z	4x4	16	16	3 9/16	3 1/8	3 1/16	—	1/2	6-10d	—	—	555	—	6000
ABW44Z	4x4	16	16	3 9/16	3 9/16	2 1/4	—	1/2	8-10d	—	—	1005	—	7180
ABU44Z	4x4	16	12	3 9/16	3	5 1/2	1 3/4	5/8	12-16d	2	1/2	2200	2160	6665
ABU44RZ	Rough 4x4	16	12	4	4	5 1/4	1 1/2	5/8	12-16d	2	1/2	2200	2160	6665
ABA44RZ	Rough 4x4	16	16	4 1/16	3 1/8	2 13/16	—	1/2	6-10d	—	—	555	—	8000
ABW44RZ	Rough 4x4	16	16	4	4 1/16	1 32/33	—	1/2	8-10d	—	—	835	—	7180
ABW46Z	4x6	12	16	3 9/16	5 9/16	3	—	1/2	10-10d	—	—	845	—	4590
ABA46Z	4x6	14	14	3 9/16	5 3/16	3 1/8	—	5/8	8-16d	—	—	700	—	9435
ABU46Z	4x6	12	12	3 9/16	5	7	2 5/8	5/8	12-16d	2	1/2	2300	2300	10335
ABU46RZ	Rough 4x6	12	12	4	6	6 3/4	2 3/8	5/8	12-16d	2	1/2	2300	2300	10335
ABW46RZ	Rough 4x6	12	16	4	6	2 13/16	—	1/2	10-10d	—	—	780	—	4590
ABA46RZ	Rough 4x6	14	14	4 1/16	5 3/16	2 7/8	—	5/8	8-16d	—	—	700	—	12000
ABU5-5	5 1/8x5 1/8	12	10	5 1/4	5	6 1/16	1 3/4	5/8	12-16d	2	1/2	2235	2235	12000
ABU5-6	5 1/8x6	12	10	6 1/8	5	6 1/16	1 3/4	5/8	12-16d	2	1/2	2235	2235	12000
ABA66Z	6x6	14	14	5 1/2	5 1/4	3 1/8	—	5/8	8-16d	—	—	720	—	10665
ABW66Z	6x6	12	14	5 1/2	5 9/16	3	—	1/2	12-10d	—	—	1190	—	12935
ABU66Z	6x6	12	10	5 1/2	5	6 1/16	1 3/4	5/8	12-16d	2	1/2	2300	2300	12000
ABU66RZ	Rough 6x6	12	10	6	6	5 13/16	1 1/2	5/8	12-16d	2	1/2	2300	2300	12000
ABA66RZ	Rough 6x6	14	14	6	5 3/16	2 7/8	—	5/8	8-16d	—	—	720	—	12665
ABW66RZ	Rough 6x6	12	14	6	6	2 13/16	—	1/2	12-10d	—	—	1065	—	12935
ABU88Z	8x8	14	12	7 1/2	7	7	—	2-5/8	18-16d	—	—	2320	—	24335
ABU88R	Rough 8x8	14	12	8	7	7	—	2-5/8	18-16d	—	—	2320	—	24335
ABU1010Z	10x10	12	12	9 1/2	9	7 1/4	—	2-5/8	22-16d	—	—	2270	—	32020
ABU1010RZ	Rough 10x10	12	12	10	9	7	—	2-5/8	22-16d	—	—	2270	—	32020

1. Uplift loads have been increased for wind or earthquake with no further increase allowed; reduce where other loads govern.
2. Downloads may not be increased for short-term loading.
3. Specifier to design concrete for uplift capacity.
4. ABU products may be installed with either bolts or nails (not both) to achieve table loads. ABU88Z, ABU88R, ABU1010Z and ABU1010RZ may be installed with 8-1/4"x3" Strong-Drive® SDS Heavy-Duty Connector screws (sold separately) for the same table load.
5. For AB bases, higher download can be achieved by solidly packing grout under 1" standoff plate before installation. Base download on column, grout, or concrete according to the code.
6. HB dimension is the distance from the bottom of the post up to the first bolt hole.
7. Structural composite lumber columns have sides that show either the wide face or the edges of the lumber strands/veneers. For SCL columns, the fasteners for these products should always be installed in the wide face.