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Note: T-Bracing / I-Bracing to be used when continuous lateral bracing is impractical. T-Brace / I-Brace must cover 90% of web length.

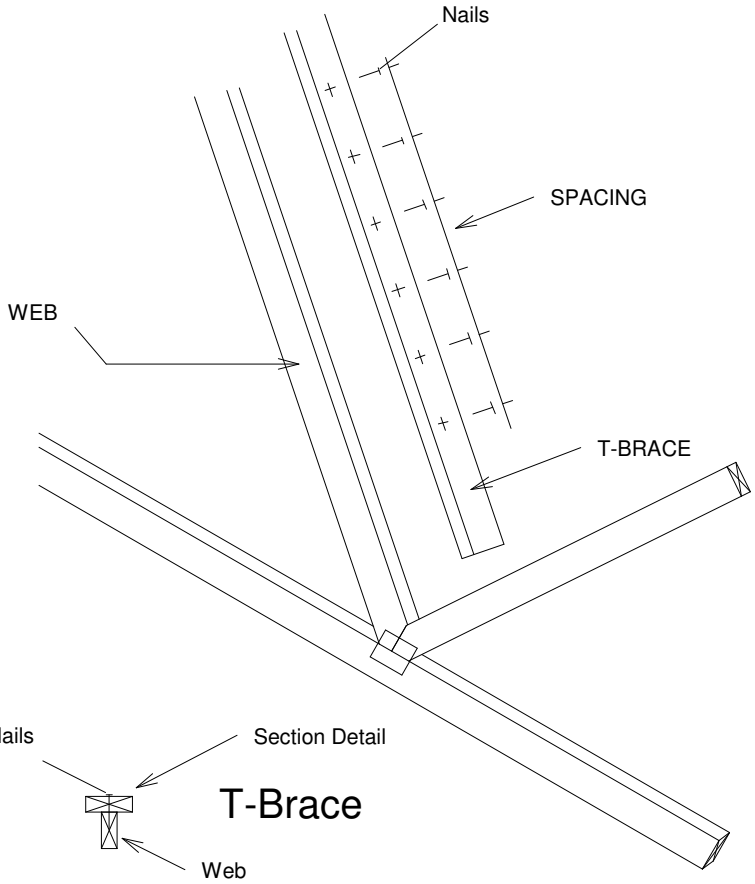
Note: This detail NOT to be used to convert T-Brace / I-Brace webs to continuous lateral braced webs.

Nailing Pattern		
T-Brace size	Nail Size	Nail Spacing
2x4 or 2x6 or 2x8	10d	6" o.c.
Note: Nail along entire length of T-Brace / I-Brace (On Two-Ply's Nail to Both Plies)		

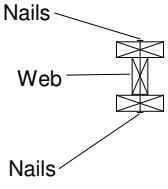
	Brace Size for One-Ply Truss	
	Specified Continuous Rows of Lateral Bracing	
Web Size	1	2
2x3 or 2x4	2x4 T-Brace	2x4 I-Brace
2x6	2x6 T-Brace	2x6 I-Brace
2x8	2x8 T-Brace	2x8 I-Brace

	Brace Size for Two-Ply Truss	
	Specified Continuous Rows of Lateral Bracing	
Web Size	1	2
2x3 or 2x4	2x4 T-Brace	2x4 I-Brace
2x6	2x6 T-Brace	2x6 I-Brace
2x8	2x8 T-Brace	2x8 I-Brace

T-Brace / I-Brace must be same species and grade (or better) as web member.



T-Brace



I-Brace

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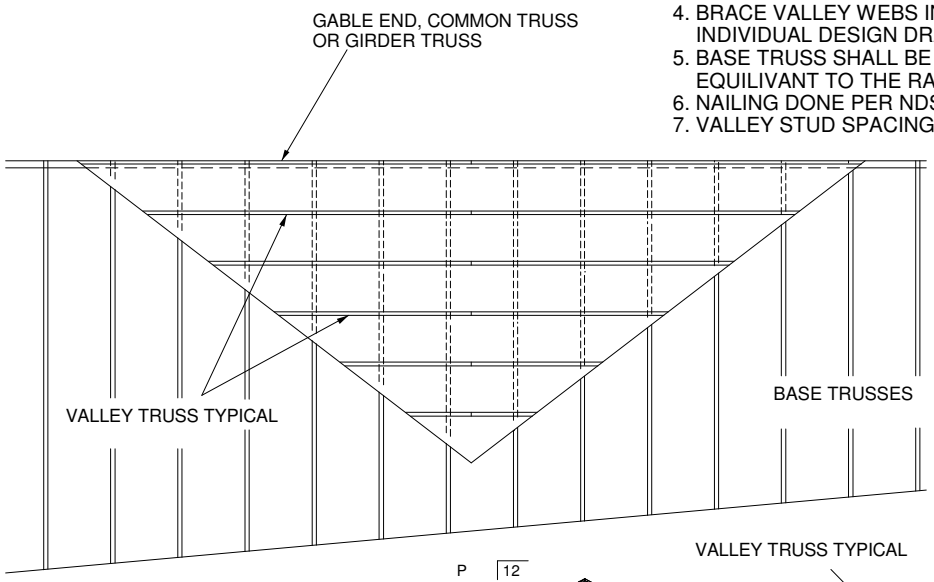
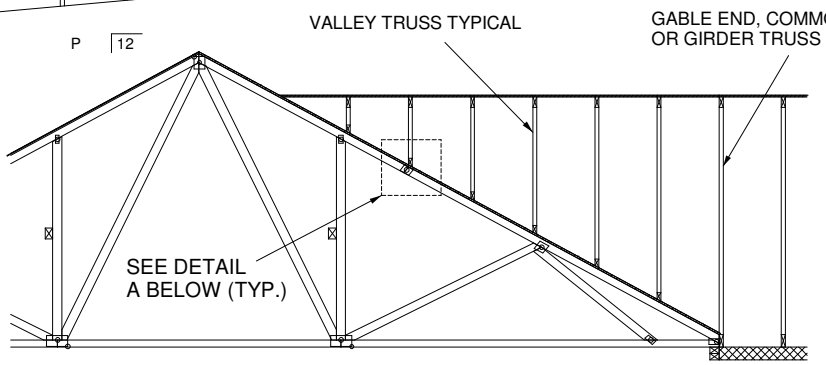
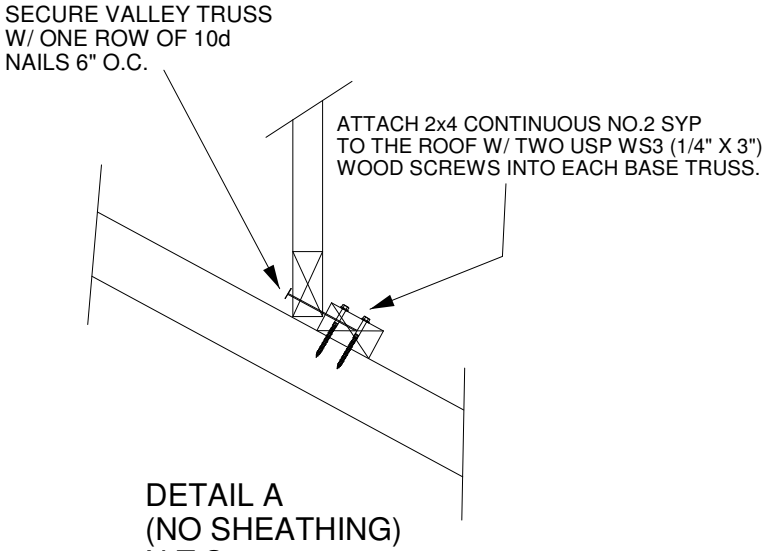
GENERAL SPECIFICATIONS

1. NAIL SIZE = 3" X 0.131" = 10d
2. WOOD SCREW = 3" WS3 USP OR EQUIVALENT
   DO NOT USE DRYWALL OR DECKING TYPE SCREW
3. INSTALL VALLEY TRUSSES (24" O.C. MAXIMUM) AND
   SECURE PER DETAIL A
4. BRACE VALLEY WEBS IN ACCORDANCE WITH THE
   INDIVIDUAL DESIGN DRAWINGS.
5. BASE TRUSS SHALL BE DESIGNED WITH A PURLIN SPACING
   EQUILIVANT TO THE RAKE DIMENSION OF THE VALLEY TRUSS SPACING.
6. NAILING DONE PER NDS - 01
7. VALLEY STUD SPACING NOT TO EXCEED 48" O.C.







DETAIL A
(NO SHEATHING)
N.T.S.

WIND DESIGN PER ASCE 7-98, ASCE 7-02, ASCE 7-05 146 MPH
WIND DESIGN PER ASCE 7-10 160 MPH
MAX MEAN ROOF HEIGHT = 30 FEET
ROOF PITCH = MINIMUM 3/12 MAXIMUM 6/12
CATEGORY II BUILDING
EXPOSURE C
WIND DURATION OF LOAD INCREASE : 1.60
MAX TOP CHORD TOTAL LOAD = 50 PSF
MAX SPACING = 24" O.C. (BASE AND VALLEY)
MINIMUM REDUCED DEAD LOAD OF 6 PSF
ON THE TRUSSES

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NOTES:
1. TOE-NAILS SHALL BE DRIVEN AT AN ANGLE OF 45 DEGREES WITH THE MEMBER AND MUST HAVE FULL WOOD SUPPORT. (NAIL MUST BE DRIVEN THROUGH AND EXIT AT THE BACK CORNER OF THE MEMBER END AS SHOWN.
2. THE END DISTANCE, EDGE DISTANCE, AND SPACING OF NAILS SHALL BE SUCH AS TO AVOID UNUSUAL SPLITTING OF THE WOOD.
3. ALLOWABLE VALUE SHALL BE THE LESSER VALUE OF THE TWO SPECIES FOR MEMBERS OF DIFFERENT SPECIES.

	TOE-NAIL SINGLE SHEAR VALUES PER NDS 2001 (lb/nail)					
	DIAM.	SP	DF	HF	SPF	SPF-S
3.5" LONG	.131	88.0	80.6	69.9	68.4	59.7
	.135	93.5	85.6	74.2	72.6	63.4
	.162	108.8	99.6	86.4	84.5	73.8
3.25" LONG	.128	74.2	67.9	58.9	57.6	50.3
	.131	75.9	69.5	60.3	59.0	51.1
	.148	81.4	74.5	64.6	63.2	52.5

VALUES SHOWN ARE CAPACITY PER TOE-NAIL.
APPLICABLE DURATION OF LOAD INCREASES MAY BE APPLIED.

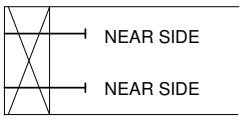
EXAMPLE:
(3) - 16d NAILS (.162" diam. x 3.5") WITH SPF SPECIES BOTTOM CHORD

For load duration increase of 1.15:
3 (nails) X 84.5 (lb/nail) X 1.15 (DOL) = 291.5 lb Maximum Capacity

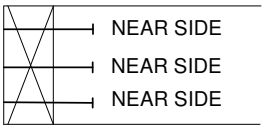
THIS DETAIL APPLICABLE TO THE THREE END DETAILS SHOWN BELOW

VIEWS SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY

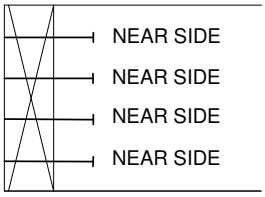
SIDE VIEW
(2x3)
2 NAILS

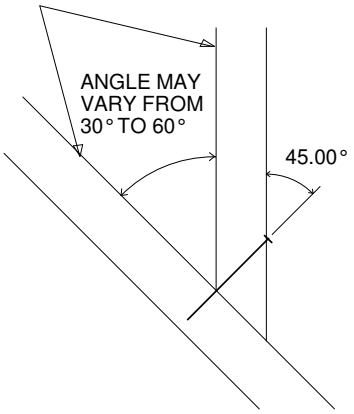


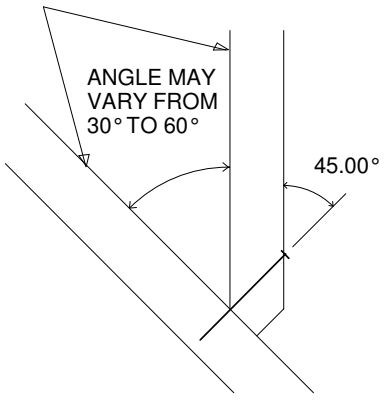
SIDE VIEW
(2x4)
3 NAILS

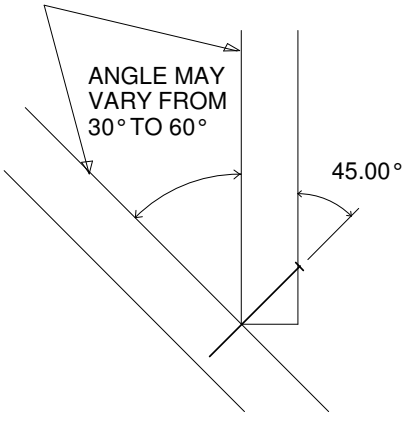


SIDE VIEW
(2x6)
4 NAILS









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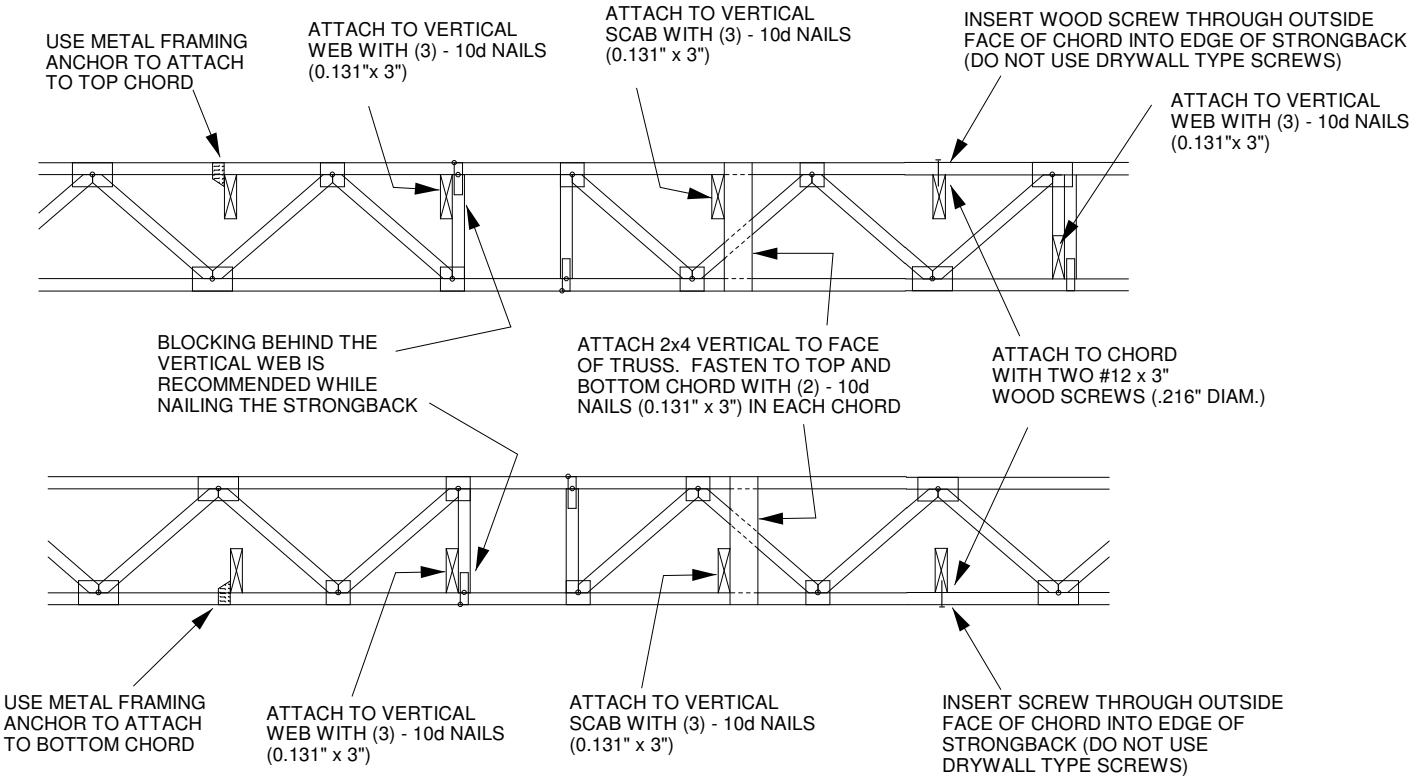
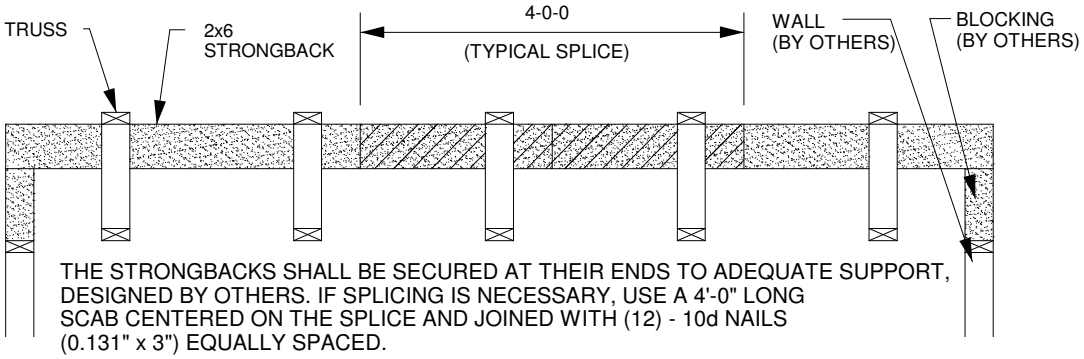
TO MINIMIZE VIBRATION COMMON TO ALL SHALLOW FRAMING SYSTEMS, 2x6 "STRONGBACK" IS RECOMMENDED, LOCATED EVERY 8 TO 10 FEET ALONG A FLOOR TRUSS.

NOTE 1: 2X6 STRONGBACK ORIENTED VERTICALLY MAY BE POSITIONED DIRECTLY UNDER THE TOP CHORD OR DIRECTLY ABOVE THE BOTTOM CHORD. SECURELY FASTENED TO THE TRUSS USING ANY OF THE METHODS ILLUSTRATED BELOW.

NOTE 2: STRONGBACK BRACING ALSO SATISFIES THE LATERAL BRACING REQUIREMENTS FOR THE BOTTOM CHORD OF THE TRUSS WHEN IT IS PLACED ON TOP OF THE BOTTOM CHORD, IS CONTINUOUS FROM END TO END, CONNECTED WITH A METHOD OTHER THAN METAL FRAMING ANCHOR, AND PROPERLY CONNECTED, BY OTHERS, AT THE ENDS.





THE STRONGBACKS SHALL BE SECURED AT THEIR ENDS TO ADEQUATE SUPPORT, DESIGNED BY OTHERS. IF SPLICING IS NECESSARY, USE A 4'-0" LONG SCAB CENTERED ON THE SPLICE AND JOINED WITH (12) - 10d NAILS (0.131" x 3") EQUALLY SPACED.

ALTERNATE METHOD OF SPLICING:
OVERLAP STRONGBACK MEMBERS A MINIMUM OF 4'-0" AND FASTEN WITH (12) - 10d NAILS (0.131" x 3") STAGGERED AND EQUALLY SPACED.
(TO BE USED ONLY WHEN STRONGBACK IS NOT ALIGNED WITH A VERTICAL)

FEBRUARY 14, 2012	STANDARD PIGGYBACK TRUSS CONNECTION DETAIL	ST-PIGGY-7-10

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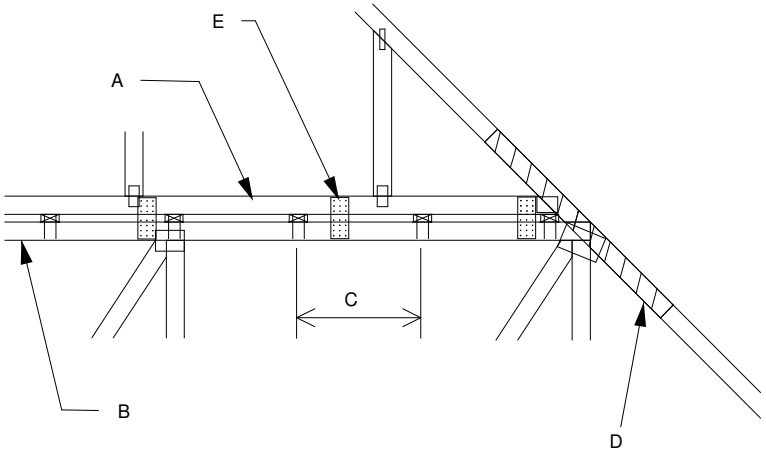
MAXIMUM WIND SPEED = REFER TO NOTES D AND OR E MAX MEAN ROOF HEIGHT = 30 FEET MAX TRUSS SPACING = 24 " O.C. CATEGORY II BUILDING EXPOSURE B or C ASCE 7-10 DURATION OF LOAD INCREASE : 1.60
DETAIL IS NOT APPLICABLE FOR TRUSSES TRANSFERING DRAG LOADS (SHEAR TRUSSES). ADDITIONAL CONSIDERATIONS BY BUILDING ENGINEER/DESIGNER ARE REQUIRED.

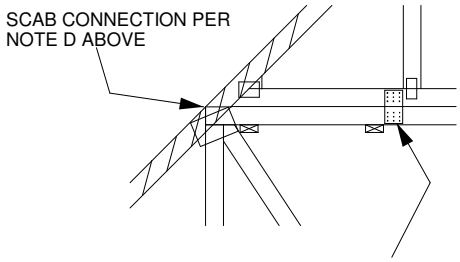
A - PIGGBACK TRUSS, REFER TO MITEK TRUSS DESIGN DRAWING. SHALL BE CONNECTED TO EACH PURLIN WITH (2) 0.131" X 3.5" TOE NAILED.
B - BASE TRUSS, REFER TO MITEK TRUSS DESIGN DRAWING.
C - PURLINS AT EACH BASE TRUSS JOINT AND A MAXIMUM 24" O.C. UNLESS SPECIFIED CLOSER ON MITEK TRUSS DESIGN DRAWING. CONNECT TO BASE TRUSS WITH (2) 0.131" X 3.5" NAILS EACH.
D - 2 X __ X 4'-0" SCAB, SIZE AND GRADE TO MATCH TOP CHORD OF PIGGYBACK TRUSS, ATTACHED TO ONE FACE, CENTERED ON INTERSECTION, WITH (2) ROWS OF 0.131" X 3" NAILS @ 4" O.C. SCAB MAY BE OMITTED PROVIDED THE TOP CHORD SHEATHING IS CONTINUOUS OVER INTERSECTION AT LEAST 1 FT. IN BOTH DIRECTIONS AND:
1. WIND SPEED OF 115 MPH OR LESS FOR ANY PIGGYBACK SPAN, OR
2. WIND SPEED OF 116 MPH TO 160 MPH WITH A MAXIMUM PIGGYBACK SPAN OF 12 ft.

E - FOR WIND SPEEDS BETWEEN 126 AND 160 MPH, ATTACH MITEK 3X8 20 GA Nail-On PLATES TO EACH FACE OF TRUSSES AT 72" O.C. W/ (4) 0.131" X 1.5" PER MEMBER. STAGGER NAILS FROM OPPOSING FACES. ENSURE 0.5" EDGE DISTANCE. (MIN. 2 PAIRS OF PLATES REQ. REGARDLESS OF SPAN)

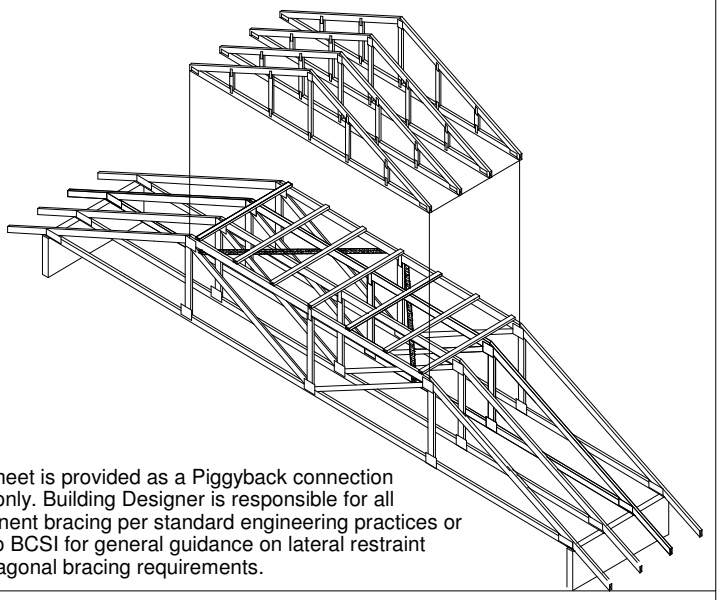


WHEN NO GAP BETWEEN PIGGYBACK AND BASE TRUSS EXISTS:

REPLACE TOE NAILING OF PIGGYBACK TRUSS TO PURLINS WITH Nail-On PLATES AS SHOWN, AND INSTALL PURLINS TO BOTTOM EDGE OF BASE TRUSS TOP CHORD AT SPECIFIED SPACING SHOWN ON BASE TRUSS MITEK DESIGN DRAWING.

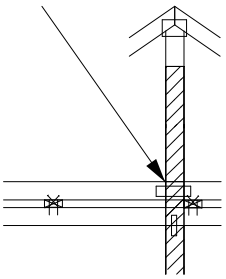


FOR ALL WIND SPEEDS, ATTACH MITEK 3X6 20 GA Nail-On PLATES TO EACH FACE OF TRUSSES AT 48" O.C. W/ (4) 0.131" X 1.5" PER MEMBER. STAGGER NAILS FROM OPPOSING FACES ENSURE 0.5" EDGE DISTANCE.



This sheet is provided as a Piggyback connection detail only. Building Designer is responsible for all permanent bracing per standard engineering practices or refer to BCSI for general guidance on lateral restraint and diagonal bracing requirements.

VERTICAL WEB TO EXTEND THROUGH BOTTOM CHORD OF PIGGYBACK



FOR LARGE CONCENTRATED LOADS APPLIED TO CAP TRUSS REQUIRING A VERTICAL WEB:

1) VERTICAL WEBS OF PIGGYBACK AND BASE TRUSS MUST MATCH IN SIZE, GRADE, AND MUST LINE UP AS SHOWN IN DETAIL.
2) ATTACH 2 x ___ x 4'-0" SCAB TO EACH FACE OF TRUSS ASSEMBLY WITH 2 ROWS OF 10d (0.131" X 3") NAILS SPACED 4" O.C. FROM EACH FACE. (SIZE AND GRADE TO MATCH VERTICAL WEBS OF PIGGYBACK AND BASE TRUSS.) (MINIMUM 2X4)
3) THIS CONNECTION IS ONLY VALID FOR A MAXIMUM CONCENTRATED LOAD OF 4000 LBS (@1.15). REVIEW BY A QUALIFIED ENGINEER IS REQUIRED FOR LOADS GREATER THAN 4000 LBS.
4) FOR PIGGYBACK TRUSSES CARRYING GIRDER LOADS, NUMBER OF PLYS OF PIGGYBACK TRUSS TO MATCH BASE TRUSS.
5) CONCENTRATED LOAD MUST BE APPLIED TO BOTH THE PIGGYBACK AND THE BASE TRUSS DESIGN.

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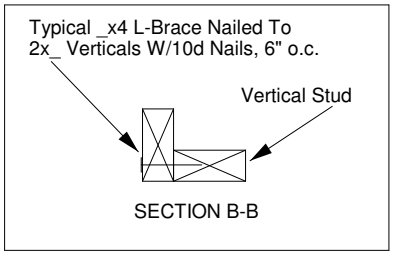
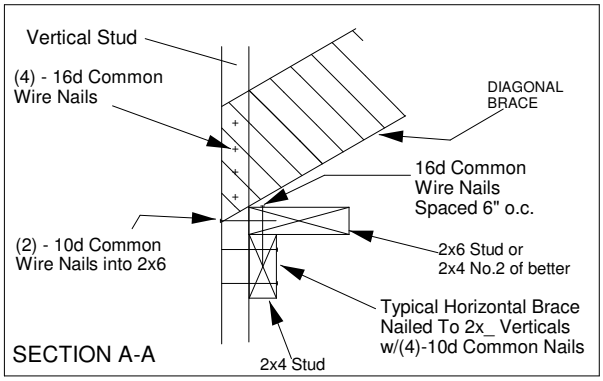
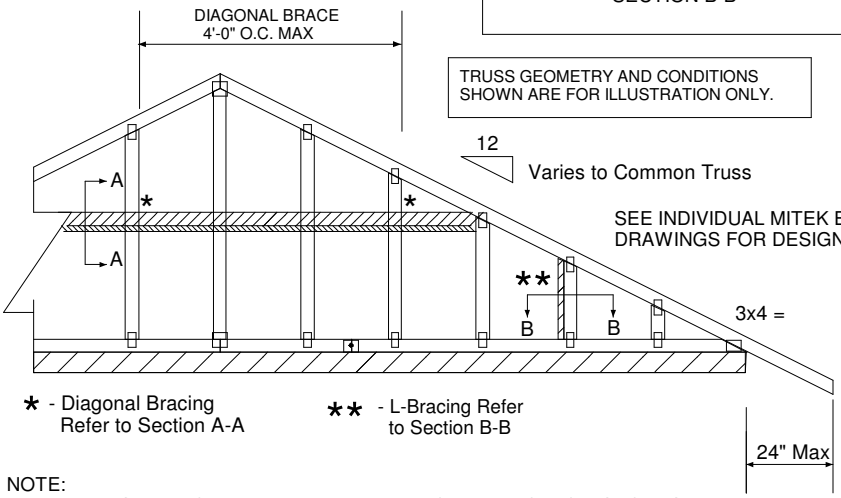






TRUSS GEOMETRY AND CONDITIONS SHOWN ARE FOR ILLUSTRATION ONLY.

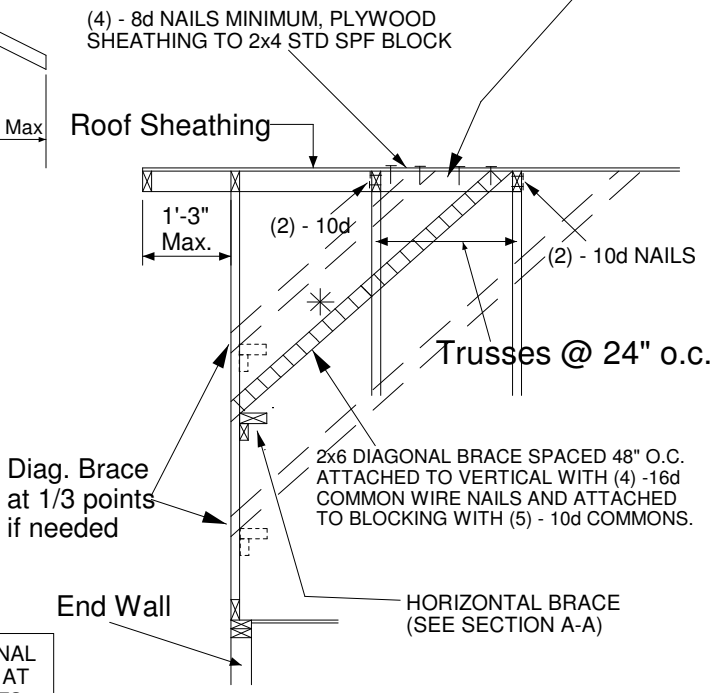
SEE INDIVIDUAL MITEK ENGINEERING DRAWINGS FOR DESIGN CRITERIA

* - Diagonal Bracing Refer to Section A-A

** - L-Bracing Refer to Section B-B

NOTE:
1. MINIMUM GRADE OF #2 MATERIAL IN THE TOP AND BOTTOM CHORDS.
2. CONNECTION BETWEEN BOTTOM CHORD OF GABLE END TRUSS AND WALL TO BE PROVIDED BY PROJECT ENGINEER OR ARCHITECT.
3. BRACING SHOWN IS FOR INDIVIDUAL TRUSS ONLY. CONSULT BLDG. ARCHITECT OR ENGINEER FOR TEMPORARY AND PERMANENT BRACING OF ROOF SYSTEM.
4. "L" BRACES SPECIFIED ARE TO BE FULL LENGTH. GRADES: 1x4 SRB OR 2x4 STUD OR BETTER WITH ONE ROW OF 10d NAILS SPACED 6" O.C.
5. DIAGONAL BRACE TO BE APPROXIMATELY 45 DEGREES TO ROOF DIAPHRAM AT 4'-0" O.C.
6. CONSTRUCT HORIZONTAL BRACE CONNECTING A 2x6 STUD AND A 2x4 STUD AS SHOWN WITH 16d NAILS SPACED 6" O.C. HORIZONTAL BRACE TO BE LOCATED AT THE MIDSPAN OF THE LONGEST STUD. ATTACH TO VERTICAL STUDS WITH (4) 10d NAILS THROUGH 2x4. (REFER TO SECTION A-A)
7. GABLE STUD DEFLECTION MEETS OR EXCEEDS L/240.
8. THIS DETAIL DOES NOT APPLY TO STRUCTURAL GABLES.
9. DO NOT USE FLAT BOTTOM CHORD GABLES NEXT TO SCISSOR TYPE TRUSSES.

PROVIDE 2x4 BLOCKING BETWEEN THE FIRST TWO TRUSSES AS NOTED. TOENAIL BLOCKING TO TRUSSES WITH (2) - 10d NAILS AT EACH END. ATTACH DIAGONAL BRACE TO BLOCKING WITH (5) - 10d COMMON WIRE NAILS.



Minimum Stud Size Species and Grade	**Stud Spacing**	**Without Brace**	**1x4 L-Brace**	**2x4 L-Brace**	DIAGONAL BRACE	2 DIAGONAL BRACES AT 1/3 POINTS
		Maximum Stud Length				
2x4 SPF Std/Stud	12" O.C.	4-0-7	4-3-2	6-0-4	8-0-15	12-1-6
2x4 SPF Std/Stud	16" O.C.	3-7-0	3-8-4	5-2-10	7-1-15	10-8-15
2x4 SPF Std/Stud	24" O.C.	2-11-1	3-0-2	4-3-2	5-10-3	8-9-4

✳ Diagonal braces over 6'-3" require a 2x4 T-Brace attached to one edge. Diagonal braces over 12'-6" require 2x4 I-braces attached to both edges. Fasten T and I braces to narrow edge of web with 10d common wire nails 8in o.c., with 3in minimum end distance. Brace must cover 90% of diagonal length.

MAX MEAN ROOF HEIGHT = 30 FEET
CATEGORY II BUILDING
EXPOSURE B or C
ASCE 7-98, ASCE 7-02, ASCE 7-05 130 MPH
ASCE 7-10 160 MPH
DURATION OF LOAD INCREASE : 1.60

STUD DESIGN IS BASED ON COMPONENTS AND CLADDING.
CONNECTION OF BRACING IS BASED ON MWFRS.

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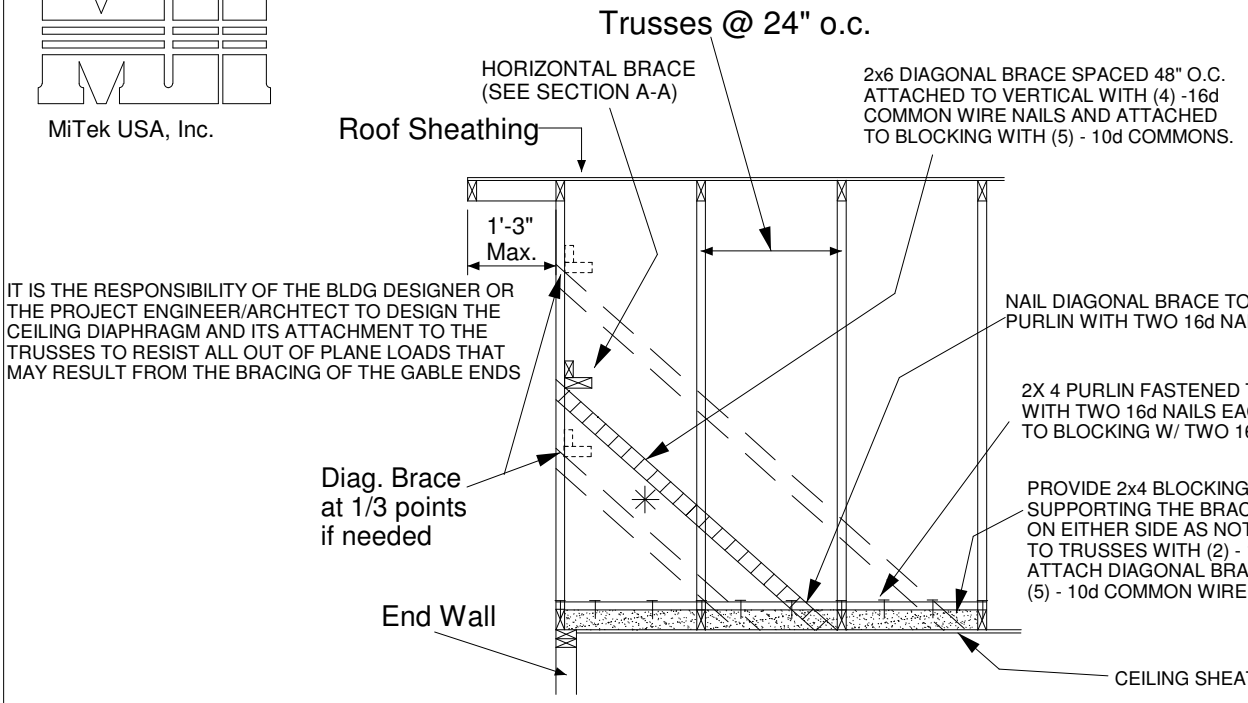
ALTERNATE DIAGONAL BRACING TO THE BOTTOM CHORD



BRACING REQUIREMENTS FOR STRUCTURAL GABLE TRUSSES

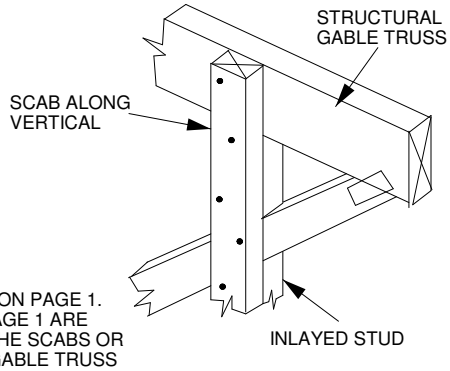
STRUCTURAL GABLE TRUSSES MAY BE BRACED AS NOTED:

METHOD 1 : ATTACH A MATCHING GABLE TRUSS TO THE INSIDE FACE OF THE STRUCTURAL GABLE AND FASTEN PER THE FOLLOWING NAILING SCHEDULE.

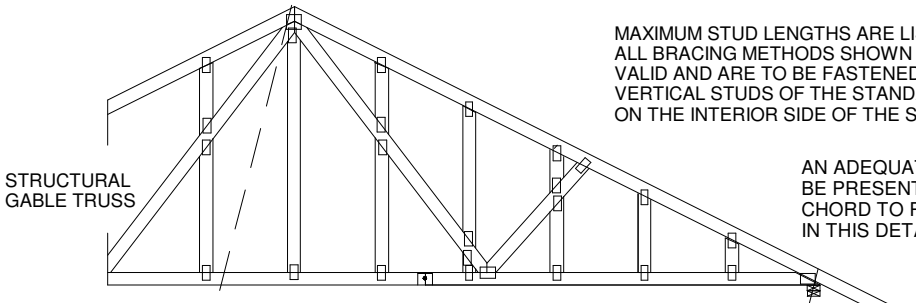
METHOD 2 : ATTACH 2X _ SCABS TO THE FACE OF EACH VERTICAL MEMBER ON THE STRUCTURAL GABLE PER THE FOLLOWING NAILING SCHEDULE. SCABS ARE TO BE OF THE SAME SIZE, GRADE AND SPECIES AS THE TRUSS VERTICALS

NAILING SCHEDULE:

- FOR WIND SPEEDS 120 MPH (ASCE 7-98, 02, 05), 150 MPH (ASCE 7-10) OR LESS, NAIL ALL MEMBERS WITH ONE ROW OF 10d (.131" X 3") NAILS SPACED 6" O.C.
- FOR WIND SPEEDS GREATER 120 MPH (ASCE 7-98, 02, 05), 150 MPH (ASCE 7-10) NAIL ALL MEMBERS WITH TWO ROWS OF 10d (.131" X 3") NAILS SPACED 6" O.C. (2X 4 STUDS MINIMUM)

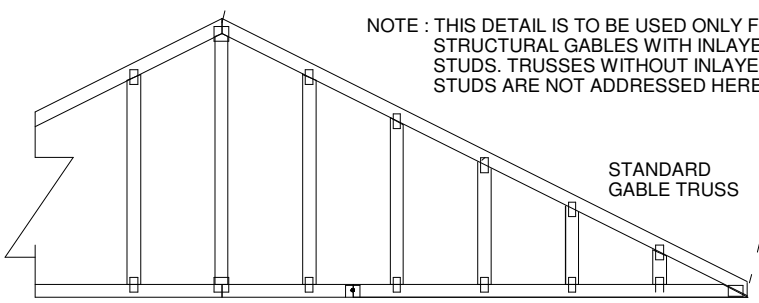


MAXIMUM STUD LENGTHS ARE LISTED ON PAGE 1. ALL BRACING METHODS SHOWN ON PAGE 1 ARE VALID AND ARE TO BE FASTENED TO THE SCABS OR VERTICAL STUDS OF THE STANDARD GABLE TRUSS ON THE INTERIOR SIDE OF THE STRUCTURE.



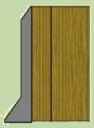
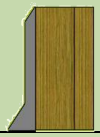
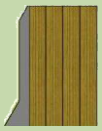
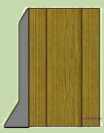
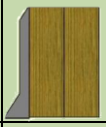
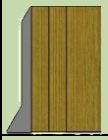
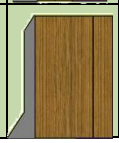
AN ADEQUATE DIAPHRAGM OR OTHER METHOD OF BRACING MUST BE PRESENT TO PROVIDE FULL LATERAL SUPPORT OF THE BOTTOM CHORD TO RESIST ALL OUT OF PLANE LOADS. THE BRACING SHOWN IN THIS DETAIL IS FOR THE VERTICAL/STUDS ONLY.

NOTE : THIS DETAIL IS TO BE USED ONLY FOR STRUCTURAL GABLES WITH INLAYED STUDS. TRUSSES WITHOUT INLAYED STUDS ARE NOT ADDRESSED HERE.



Multiple-Member Connections for Side-Loaded Beams with Concentrated Loads

Table 1: Maximum Concentrated Load Applied to Beam – Bolt or Nail Connection (lbs)[1]

Beam Configuration		Hanger Type	½"ø or ¾"ø Bolts[3][4]					16d (0.148" x 3¼") Nails			
			Bolt Diameter[2]	# Bolts				# Nails			
				2	4	6	8	6	12	18	24
3-ply 1¾" (5¼" Beam)		FACE	0.5	2,100	4,200	6,300	8,400	2,125[5]	4,250[5]	6,370[5]	8,495[5]
			0.75	3,060	6,120	9,180	12,240				
		TOP	0.5	760	1,525	2,285	3,050	1,060[6]	2,125[6]	3,185[6]	4,250[6]
			0.75	930	1,860	2,790	3,720				
3½"+1¾" (5¼" Beam)		FACE	---	---	---	---	---	---	---	---	---
			---	---	---	---	---				
		TOP	0.5	1,050	2,100	3,150	4,200	1,060	2,125	3,185	4,250
			0.75	1,530	3,060	4,590	6,120				
3½"+1¾" (5¼" Beam)		FACE / TOP	0.5	2,100	4,200	6,300	8,400	2,125[5]	4,250[5]	6,370[5]	8,495[5]
			0.75	3,060	6,120	9,180	12,240				
4-ply 1¾" (7" Beam)		FACE	0.5	1,400	2,800	4,200	5,600	---	---	---	---
			0.75	2,040	4,080	6,120	8,160				
		TOP	0.5	675	1,355	2,030	2,710	---	---	---	---
			0.75	825	1,655	2,480	3,305				
2-ply 1¾" + 3½" (7" Beam)		FACE	0.5	2,800	5,600	8,400	11,200	2,830[5]	5,665[5]	8,495[5]	11,330[5]
			0.75	5,025	10,050	15,070	20,095				
		TOP	0.5	935	1,865	2,800	3,735	945[6]	1,890[6]	2,830[6]	3,775[6]
			0.75	1,360	2,720	4,080	5,440				
2-ply 3½" (7" Beam)		FACE / TOP	0.5	1,720	3,440	5,160	6,880	---	---	---	---
			0.75	2,480	4,960	7,440	9,920				
2-ply 1¾" + 3½" (7" Beam)		FACE / TOP	0.5	1,015	2,030	3,050	4,065	---	---	---	---
			0.75	1,240	2,480	3,720	4,960				
2-ply 1¾" + 3½" (7" Beam)		FACE	0.5	1,720	3,440	5,160	6,880	---	---	---	---
			0.75	2,480	4,960	7,440	9,920				
		TOP	0.5	675	1,355	2,030	2,710	---	---	---	---
			0.75	825	1,655	2,480	3,305				
5¼" + 1¾" (7" Beam)		FACE / TOP	0.5	2,800	5,600	8,400	11,200	2,830[5]	5,665[5]	8,495[5]	11,330[5]
			0.75	5,025	10,050	15,070	20,095				

1. See page 4 for table General Notes, connection details and beam depth limitations.
2. Washers required. Bolt holes to be 9/16" maximum for ½" bolts, 13/16" maximum for ¾" bolts.
3. Minimum end distance for bolts is 6".
4. Drilling bolt holes reduces the section of the beam and thus the load capacity of the supporting member. Shear and moment capacity of the beam must be checked at the location of each row of bolts.
5. Number of required nails shown must be installed from side opposite hanger.
6. Number of required nails shown must be installed from hanger side. Additionally, install half the number of required nails from side opposite hanger.

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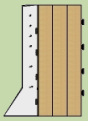
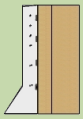
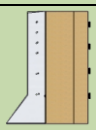
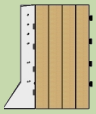
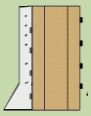
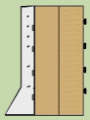
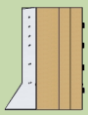
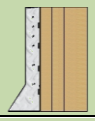
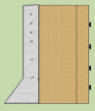
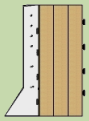
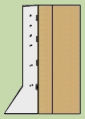
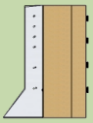
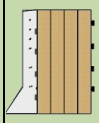
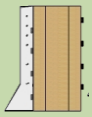
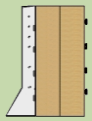
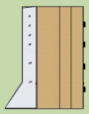
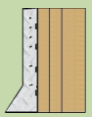
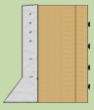
Table 2A: Maximum Concentrated Load Applied to Beam – Wood Screw Connection (lbs)[1]

Beam Configuration		Hanger Type	Wood Screw Length	Fastener Type							
				USP WS				Simpson SDS			
				# Screws				# Screws			
				2	4	6	8	2	4	6	8
3-ply 1¾" (5¼" Beam)		FACE [3]	3½"	1,435	2,870	4,305	5,740	2,040	4,080	6,120	8,160
		TOP [2]	3½"	720	1,435	2,155	2,870	1,020	2,040	3,060	4,080
3½"+1¾" (5¼" Beam)		FACE	3½"	---	---	---	---	---	---	---	---
		TOP [4]	3½"	720	1,435	2,155	2,870	1,020	2,040	3,060	4,080
3½"+1¾" (5¼" Beam)		FACE / TOP [3]	3½"	1,435	2,870	4,305	5,740	2,040	4,080	6,120	8,160
4-ply 1¾" (7" Beam)		FACE [2]	6"[5]	1,055	2,110	3,165	4,220	1,360	2,720	4,080	5,440
		TOP [2]	6"[5]	705	1,405	2,110	2,810	905	1,815	2,720	3,625
2-ply 1¾" + 3½" (7" Beam)		FACE [3]	3½"	1,915	3,825	5,740	7,655	2,720	5,440	8,160	10,880
			6"[5]	2,110	4,220	6,325	8,435	2,720	5,440	8,160	10,880
		TOP [2]	3½"	640	1,275	1,915	2,550	905	1,815	2,720	3,625
			6"[5]	705	1,405	2,110	2,810	905	1,815	2,720	3,625
2-ply 3½" (7" Beam)		FACE / TOP [2]	6"[5]	1,055	2,110	3,165	4,220	930	1,860	2,785	3,715
2-ply 1¾" + 3½" (7" Beam)		FACE / TOP [3]	6"[5]	1,055	2,110	3,165	4,220	1,360	2,720	4,080	5,440
2-ply 1¾" + 3½" (7" Beam)		FACE[4]	6"[5]	1,055	2,110	3,165	4,220	930	1,860	2,785	3,715
		TOP[4]	6"[5]	705	1,405	2,110	2,810	905	1,815	2,720	3,625
5¼" + 1¾" (7" Beam)		FACE / TOP [3]	3½"	1,915	3,825	5,740	7,655	2,720	5,440	8,160	10,880

1. See page 4 for table General Notes, connection details and beam depth limitations.
2. Install screws from both sides of beam.
3. Install screws from side opposite hanger only.
4. Install screws from hanger side only.
5. 6" SDS or WS screws can be used with Parallam® PSL and Microllam® LVL, but are not recommended for TimberStrand® LSL.

Table 2B: Maximum Concentrated Load Applied to Beam – Wood Screw Connection (lbs)[1]

Beam Configuration		Hanger Type	Wood Screw Length	Connection Name: TrussLok # Screws: 2	4	6	8
3-ply 1¾" (5¼" Beam)		FACE [3]	3⅜"	1,600	3,205	4,805	6,410
		TOP [2]	3⅜"	800	1,600	2,405	3,205
3½"+1¾" (5¼" Beam)		FACE	3⅜"	---	---	---	---
		TOP [4]	3⅜"	800	1,600	2,405	3,205
3½"+1¾" (5¼" Beam)		FACE / TOP [3]	3⅜"	1,600	3,205	4,805	6,410
4-ply 1¾" (7" Beam)		FACE [2]	5", 6¾"	1,160	2,320	3,480	4,640
		TOP [2]	5", 6¾"	775	1,545	2,320	3,095
2-ply 1¾" + 3½" (7" Beam)		FACE [3]	3⅜"	2,135	4,270	6,410	8,545
			5", 6¾"	2,320	4,640	6,960	9,280
		TOP [2]	3⅜"	710	1,425	2,135	2,850
			5", 6¾"	775	1,545	2,320	3,095
2-ply 3½" (7" Beam)		FACE / TOP [2]	5", 6¾"	1,160	2,320	3,480	4,640
2-ply 1¾" + 3½" (7" Beam)		FACE / TOP [3]	5", 6¾"	1,160	2,320	3,480	4,640
2-ply 1¾" + 3½" (7" Beam)		FACE[4]	5", 6¾"	1,160	2,320	3,480	4,640
		TOP [4]	5", 6¾"	1,160	2,320	3,480	4,640
5¼" + 1¾" (7" Beam)		FACE / TOP [3]	5", 6¾"	2,320	4,640	6,960	9,280

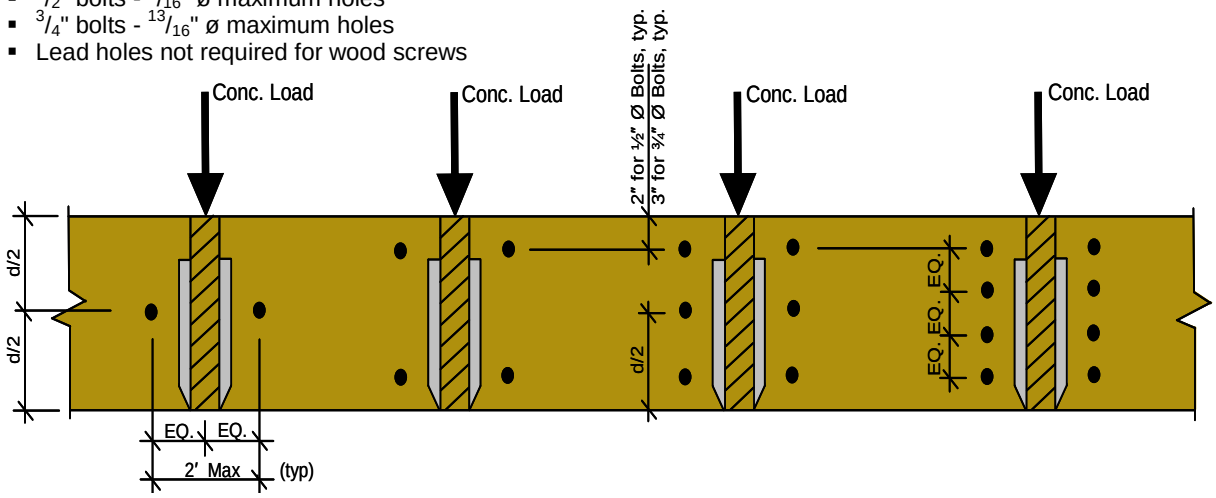
1. See page 4 for table General Notes, connection details and beam depth limitations.
2. Install screws from both sides of beam.
3. Install screws from side opposite hanger only.
4. Install screws from hanger side only.

Table 1, 2A, 2B General Notes

- Connections are based on NDS® 2005 or manufacturer's code report.
- All plies must be the same material and grade.
- Values are for 100% duration of load. Increase 15% for snow load or 25% for non-snow roof load conditions, where code allows.
- Rotational effects should be considered for 7″ wide beams loaded from one side only.
- Capacities shown for face mount hanger conditions are based on 16d common (0.162″ x 3½″) nails installed in the hanger. Other nails used for face mount hanger installations invalidate the capacities in these tables.
- Verify adequacy of beam with all loads applied by using iLevel software or other methods.
- See the iLevel Trus Joist® Beams, Headers, and Columns Specifier's Guide (#TJ-9000) for required connections for uniform side loads.

Bolt or Wood Screw Connection Details

- 1/2" bolts - 9/16" ø maximum holes
- 3/4" bolts - 13/16" ø maximum holes
- Lead holes not required for wood screws



2 Fastener Pattern

4 Fastener Pattern
Min. Beam Depth:
d = 7¼″ for ½″ ø bolts
d = 9¼″ for ¾″ ø bolts

6 Fastener Pattern
Min. Beam Depth:
d = 9¼″ for ½″ ø bolts
d = 14″ for ¾″ ø bolts

8 Fastener Pattern
Min. Beam Depth:
d = 11¼″ for ½″ ø bolts
d = 16″ for ¾″ ø bolts

Nailed Connection Detail

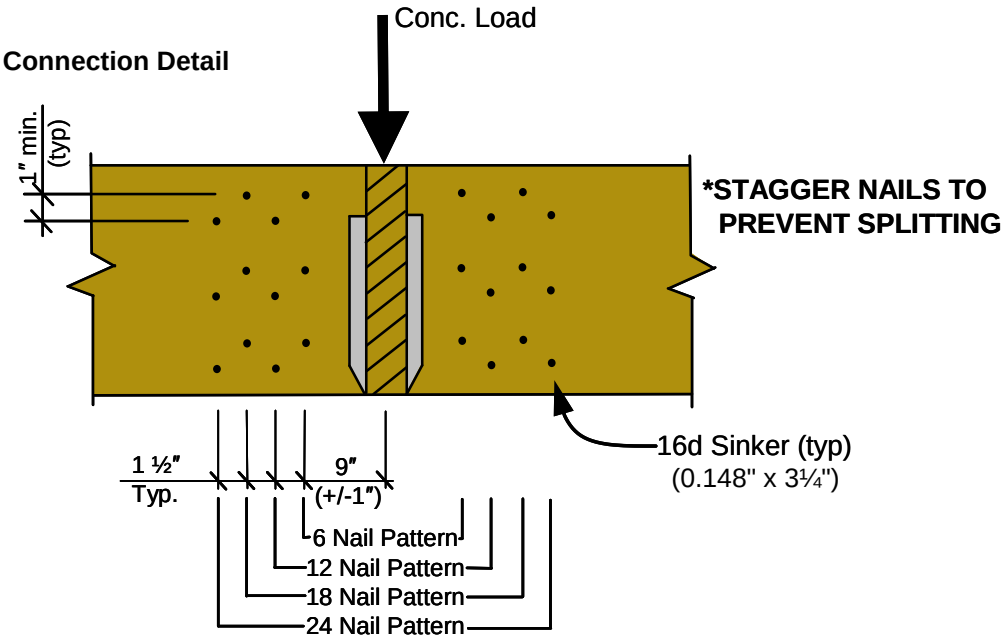


Table 3: Allowable Capacities of 5¼″ Beams with Bolt Connections

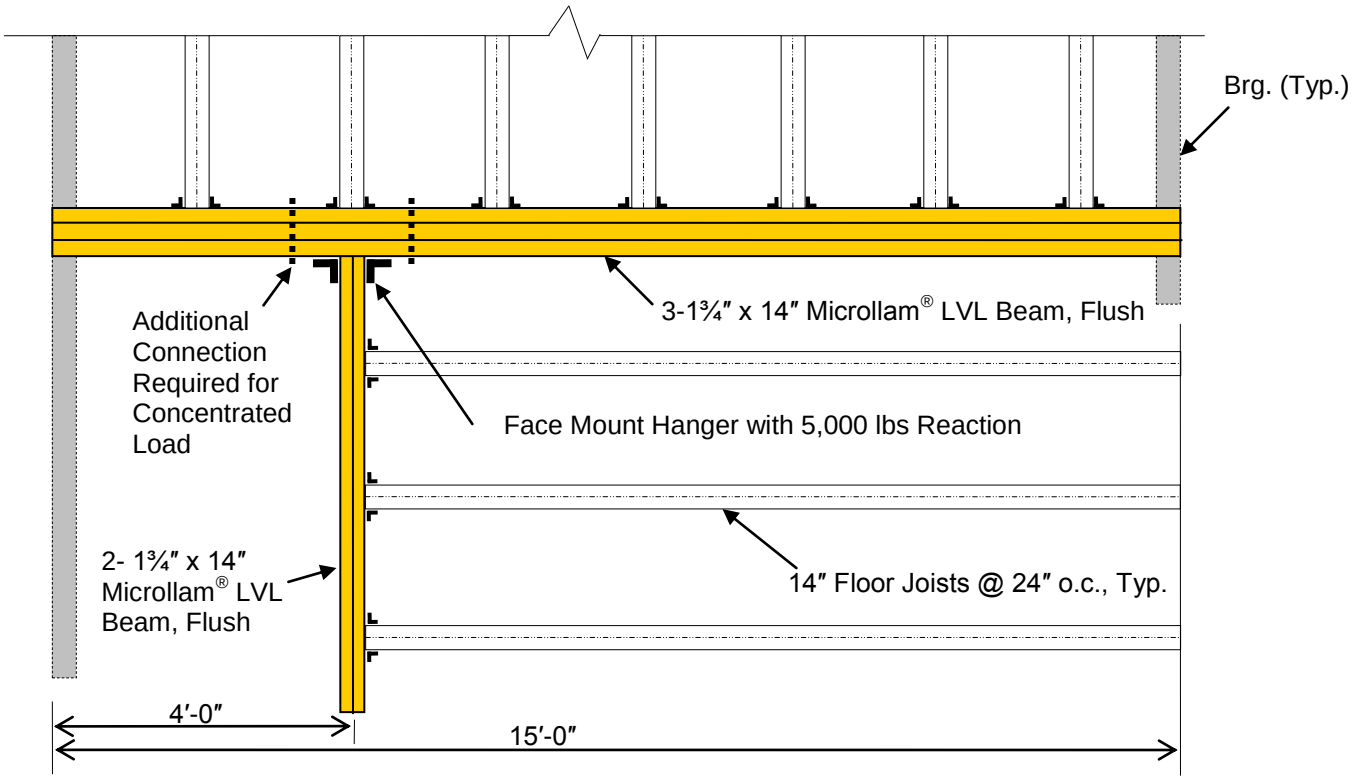
		Bolt Dia.	Conn. Loc.	Beam Depth									
				7¼″	9¼″	9½″	11¼″	11⅞″	14″	16″	18″	20″	24″
TimberStrand® LSL	Max Shear (lbs)	½″	< 5d		6,235	6,545	8,755	9,560	12,345	15,005			
			≥ 5d		10,150	10,500	12,950	13,825	16,800	19,600			
		¾″	< 5d		3,995	4,260	6,210	6,940	9,510	12,015			
			≥ 5d		8,750	9,100	11,550	12,425	15,400	18,200			
	Max Moment (ft-lb)	½″	2		10,605	15,295	15,685	23,905	32,760	42,265			
			4		9,355	13,470	13,730	20,915	28,725	37,250			
			6		9,350	13,470	13,730	20,910	28,725	37,245			
			8				13,510	20,575	28,275	36,685			
		¾″	2		10,600	15,290	15,685	23,900	32,755	42,260			
			4		9,900	14,215	14,195	21,490	29,020	37,225			
			6						29,015	37,220			
			8							36,655			
Microllam® LVL	Max Shear (lbs)	½″	< 5d	2,745	4,445	4,665	6,240	6,810	8,795	10,690	12,610	14,545	18,440
			≥ 5d	5,235	7,230	7,480	9,225	9,850	11,970	13,965	15,960	17,955	21,945
		¾″	< 5d	1,455	2,845	3,035	4,425	4,945	6,775	8,560	10,390	12,250	16,040
			≥ 5d	4,240	6,235	6,485	8,230	8,855	10,975	12,970	14,965	16,960	20,950
	Max Moment (ft-lb)	½″	2	9,960	16,220	17,105	23,990	26,730	36,385	46,670	58,130	70,740	99,375
			4	9,025	14,305	15,065	21,000	23,385	31,905	41,130	51,535	63,100	89,670
			6		14,305	15,060	20,995	23,385	31,905	41,125	51,530	63,100	89,670
			8				20,660	23,010	31,405	40,510	50,795	62,250	88590
		¾″	2	9,950	16,210	17,100	23,985	26,725	36,380	46,665	58,125	70,740	99,370
			4		15,145	15,895	21,710	24,030	32,235	41,105	51,120	62,285	88,015
			6						32,230	41,100	51,115	62,280	88,010
			8							40,475	50,335	61,335	86,745
Parallam® PSL	Max Shear (lbs)	½″	< 5d		4,520	4,745	6,350	6,930	8,950	10,880	12,830		
			≥ 5d		7,360	7,615	9,390	10,025	12,180	14,210	16,240		
		¾″	< 5d		2,895	3,090	4,505	5,030	6,895	8,710	10,575		
			≥ 5d		6,345	6,600	8,375	9,010	11,165	13,195	15,225		
	Max Moment (ft-lb)	½″	2		18,090	19,080	26,760	29,815	40,740	52,430	65,495		
			4		15,960	16,805	23,420	26,085	35,725	46,205	58,065		
			6		15,955	16,800	23,420	26,080	35,725	46,205	58,060		
			8				23,045	25,665	35,165	45,510	57,235		
		¾″	2		18,080	19,070	26,755	29,810	40,735	52,425	65,490		
			4		16,890	17,730	24,215	26,805	36,095	46,180	57,600		
			6						36,085	46,170	57,595		
			8							45,470	56,715		

Table 3 General Notes

- Connection location refers to distance from face of bearing to centerline of connection, where d is the beam depth. Less than 5d refers to connections located less than five times the depth of the beam from the face of bearing.
- Shear reduction has been taken in accordance with NDS 3.4.3.3.
- All values shown are for 5¼″ widths. Multiply by 1.33 for 7″ wide beams.
- 9¼″ and 11¼″ TimberStrand® LSL are 1.3E grade, all other depths are 1.55E grade.

Connection Design Example

Given the floor framing shown below, specify the necessary connections for the a 3-ply Microllam® LVL beam supporting a 2-ply Microllam® LVL beam on one side and floor joists from the other side. The floor joists apply a 500 plf load to the side of the beam while the 2-ply beam reaction is 5,000 lbs. See the following page for the solution.



Partial Framing Plan

Solution:

- Use the iLevel Trus Joist® Beams, Headers, and Columns Specifier's Guide (#TJ-9000) to select a connection for the uniform loading. Multiple options exist that meets or exceed the 500 plf requirement:
  - 2 rows of ½" diameter bolts at 16" on-center (570 plf)
  - 2 rows of USP WS35 wood screws at 16" on-center (540 plf) on each side of beam
  - 2 rows of SDS ¼" x 3½" at 24" on-center (510 plf) on each side of beam
  - 2 rows of 5" TrussLok wood screws at 24" on-center (500 plf)

- Determine what additional connection is needed for the concentrated load using the information in this Technical Bulletin:
  1. Using Table 1, 2A or 2B of this bulletin, locate the section for a 3-ply 1¾" member and face mount hanger. Again, multiple options exist that exceed the 5,000 lb load requirement:
     - ½" diameter bolts in a 6-bolt connection (6,300 lbs)
     - 16d (0.148" x 3¼") sinker nails in an 18-nail connection (6,370 lbs)
     - 3½" WS wood screws in an 8-screw connection (5,740 lbs)
     - 3½" SDS wood screws in a 6-screw connection (6,120 lbs)
     - 3⅜" TrussLok wood screws in an 8-screw connection (6,410 lbs)

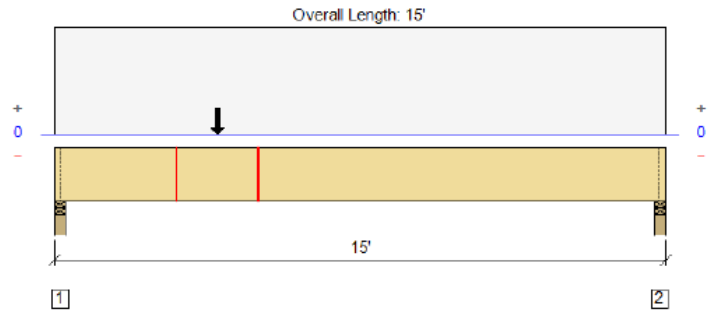
     Note that the allowable applied concentrated load is dependent upon the type of hanger used and 16d common nails must be used for face mount hanger installation to achieve the capacities shown.

  2. If the bolted connection option is chosen, the 3-ply beam must be checked for the effect of the bolt holes from the 6-bolt connection. This task may be accomplished by utilizing the location analysis feature in iLevel software. Per the detail on page 4, the bolt holes will be located approximately 1′ to either side of the concentrated load location. After inputting the span and load information, choose the two locations corresponding to the concentrated load location ($^{+}/_{-}$) 1′. Upon completion of the analysis, compare the calculated shear and moment for each of the two locations against the reduced allowable shear and moment capacities of the beam for the bolt pattern selected using Table 3 on page 5 of this bulletin.

     See the Forte® software output on the following page for results of this analysis. The 3-ply Microllam® LVL beam works for the given loading. Refer to the highlighted values for the results at both bolt locations (1′ on either side of the load). The highest calculated shear at either location is 6035 lbs. The highest calculated moment is 25,215 ft-lbs. The connection is less than 5d (48" < 14" * 5 = 70") from the end of the member. From Table 3 of this bulletin, the reduced allowable shear for the 3-ply 14" Microllam® LVL beam with the 6 bolt pattern located less than 5d from the end of the member is 8,795 lbs while the reduced allowable moment is 31,905 ft-lbs. Therefore, the beam is acceptable with the 6 bolt connection.

- Select the preferred options for both the uniform load connection along the length of the beam and the concentrated load connection at the hanger location and specify both on the drawings including information on fastener type, size, spacing and installation pattern as appropriate.

3 PIECE(S) 1 3/4" x 14" 1.9E Microllam® LVL PASSED



All Dimensions are Horizontal; Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF
Member Reaction (lbs)	7595 @ 2"	7809	Passed (97%)	- -
Shear (lbs)	6837 @ 1' 5 1/2"	13965	Passed (49%)	1.0
Moment (Ft-lbs)	25215 @ 4' 11 7/8"	36387	Passed (69%)	1.0
Live Load Defl. (in)	0.356 @ 7' 1 13/16"	0.489	Passed (L/494)	- -
Total Load Defl. (in)	0.456 @ 7' 1 7/8"	0.733	Passed (L/386)	- -

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Design results assume a fully braced condition where all compression edges (top and bottom) are properly braced to provide lateral stability.
- Bracing (Lu): All compression edges (top and bottom) must be braced at 13' 15/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

Supports	Total Bearing	Available Bearing	Required Bearing	Support Reactions (lbs) Dead / Floor / Roof / Snow	Accessories
1 - Stud wall - Spruce Pine Fir	3.50"	3.50"	3.40"	1641 / 5955 / 0 / 0	Blocking
2 - Stud wall - Spruce Pine Fir	3.50"	3.50"	2.33"	1164 / 4045 / 0 / 0	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform(PSF)	0 to 15'	1'	100.0	400.0	0.0	0.0	10' Floor
2 - Point(lb)	4'	N/A	1000	4000	0	0	

Location Analysis	Shear (lbs) Actual / Allowed / LDF	Moment (Ft – lbs) Actual / Allowed / LDF	Comments
1 - 3'	6035 / 13965 / 1.0	19186 / 36387 / 1.0	BOLTS LEFT OF HANGER
2 - 5'	39 / 12569 / 0.9	25215 / 36387 / 1.0	BOLTS RIGHT OF HANGER

Forte™ Software Operator	Job Notes

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