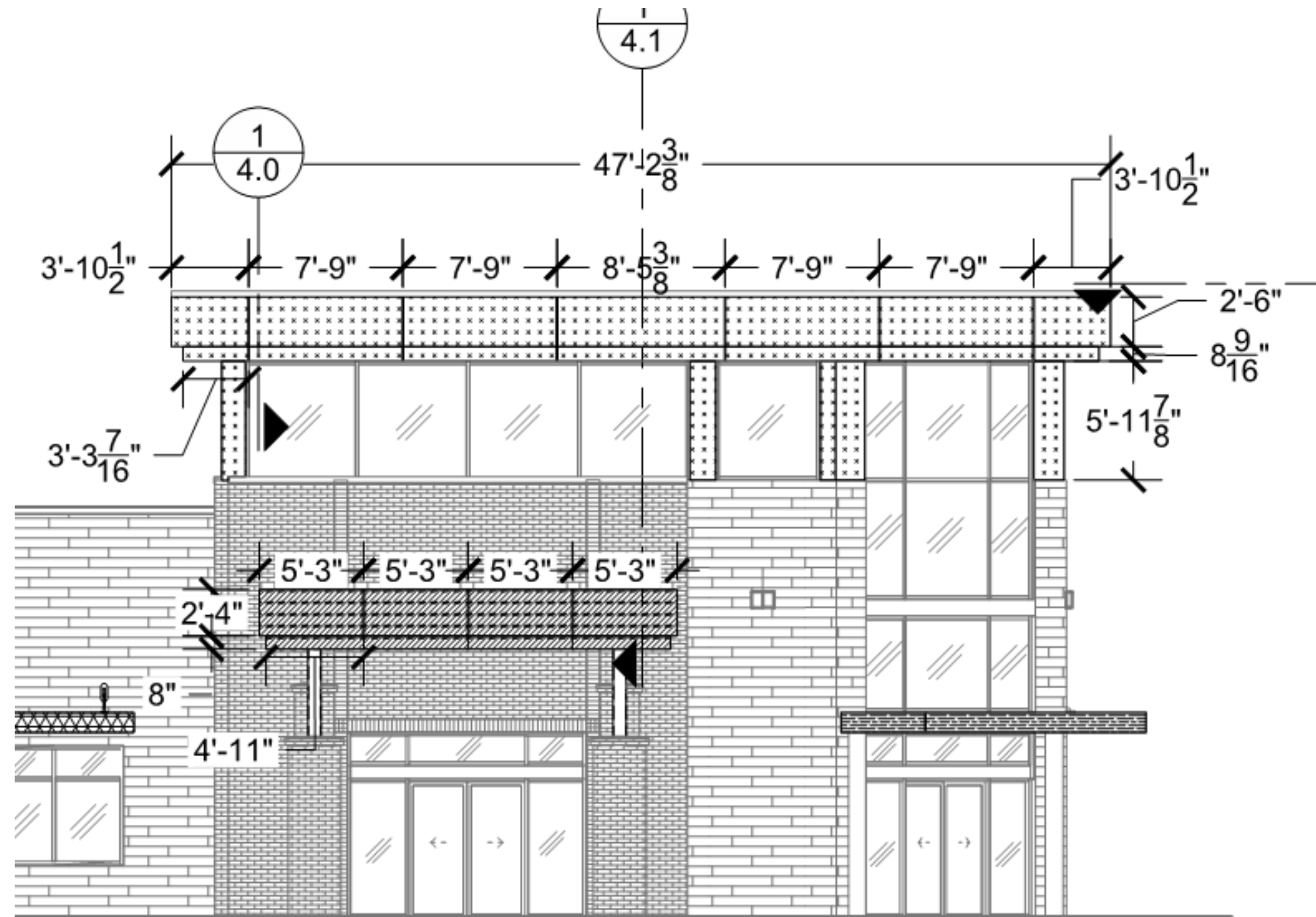




Structural Design Analysis

HealthCare Medical Office Building

Structure Elevation



Laws & Regulations

NBC 2018	—	North Carolina Building Code
IBC 2018	—	International Building Code
ASCE 7-16	—	American Society of civil Engineers (Minimum Design loads for buildings & other structures)
AISC 360-16	—	American Institute of steel construction (Specification for structural steel buildings)
AISI — 2007	—	American Iron and Steel Institute (Design of Cold Formed steel & structural members)
ACI 318-14	—	American Concrete Institute (Building code requirements for structural concrete)
ASTM	—	American Society for Testing and materials.

All CFS frame will be designed to AISI LRFD CFS design standard.

AMERICAN IRON AND STEEL INSTITUTE DESIGN **AISI 2007** OF COLD FORMED STEEL & STRUCTURAL MEMBERS.

Cochere Height:

Total Height — 16'-6"

5. STRUCTURE LOADING CALCULATION

Dead Loads:

Roof Total DL = 30 psf

Live Load:

Live Load Roof = 20psf

Snow Load:

Snow Load Summary:

Wind Load:

Building data

Type of roof = Canopy
Length of building; b = 21 ft
Width of building; d = 28 ft

General wind load requirements

Basic wind speed; V = 115.0 mph
Risk category; II
Velocity pressure exponent coef (Table 26.6-1); Kd = 0.85
Exposure category (cl 26.7.3); B

Design Wind pressure = 16 psf

6. LOADS COMBINATION

Load combinations using strength design or load and resistance factor design. Where strength design or load and resistance factor design is used, buildings and other structures, and portions thereof, shall be designed to resist the most critical effects resulting from the following combinations of factored loads:

According to IBC-2018

1.4D
1.2D + 1.6L + 0.5(Lr or S or R)
1.2D + 1.6(Lr or S or R) + (L or 0.5W)
1.2D + 1.0W + L + 0.5(Lr or S or R)
1.2D + 1.0E + L + 0.2S
0.9D + 1.0W
0.9D + 1.0E

Notations

D = Dead load.
L = Live load, except roof live load, including any permitted live load reduction.
Lr = Roof live load including any permitted live load reduction.
R = Rain load.
S = Snow load.
W = Load due to wind pressure.
E = Combined effect of horizontal and vertical earthquake induced forces as defined in Section12.4.2 of ASCE 7.

Where D = Dead, L = Live, W = Wind, S = Snow

7. STRUCTURAL MATERIAL

Reinforced concrete:

Footings, pedestals, & grade beams : 3000 psi
Exterior grade supported slab : 5000 psi
Interior grade supported slab : 5000 psi

Light Gauge steel Section:

All Material manufactured to meet the requirements of S136-07 and S136S2-10 (Supplements 2) with minimum Yield strength: 33 ksi (for design thicknesses less than or equal43mil)and minimum Yield strength: 50 ksi (for design thicknesses greater than or equal 54mil).

Material Thicknesses is given as the minimum thickness exclusive of coatings and represent 95- of the design thickness, see **S136-07 Section A2.4.**

Structural Steel:

The structural steel design as the following material

Rolled W and WT shapes : ASTM A992, Grade 50 ksi

Rolled M, S, C and MC shapes and Angle: ASTM A36, FY = 36 ksi
Plated and Bars : ASTM A36, FY = 36 ksi
Round Section : ASTM A 500, Grade C, FY - 46 ksi
Square and Rectangular sections : ASTM A500, Grade B, FY - 46 ksi
Steel Pipes : ASTM A53, Type E or S, Grade B, FY - 35 ksi

8. SERVICIALBITY DEFLECTION LIMIT

Roof = L/360
= TL/240

9. DESIGN PHYLOSOPHY TO STRUCTURAL ANALYSIS & DESIGNS

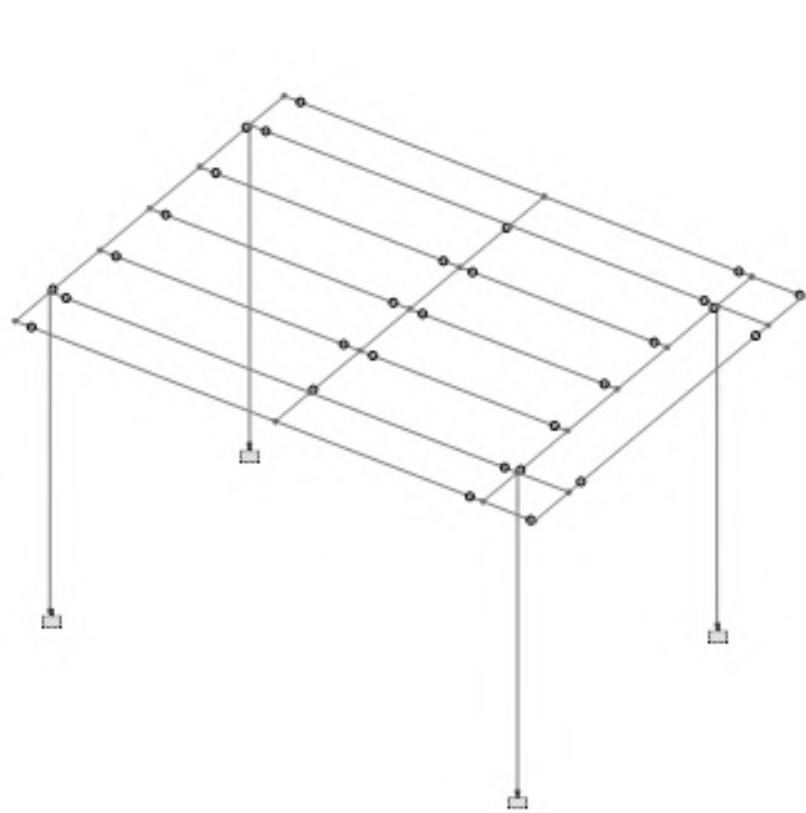
These studs are provided at the load-bearing walls stud shall be designed as compression members by ‘elastic theory of design’. These studs are for transferring of lateral forces from X strap bracing. These studs are of light gauge structural steel.

The floor and roof have design considering the dead and live load coming on to it and checking flexure, shear and deflection for the governing load using AISI code and inhouse spreadsheet.

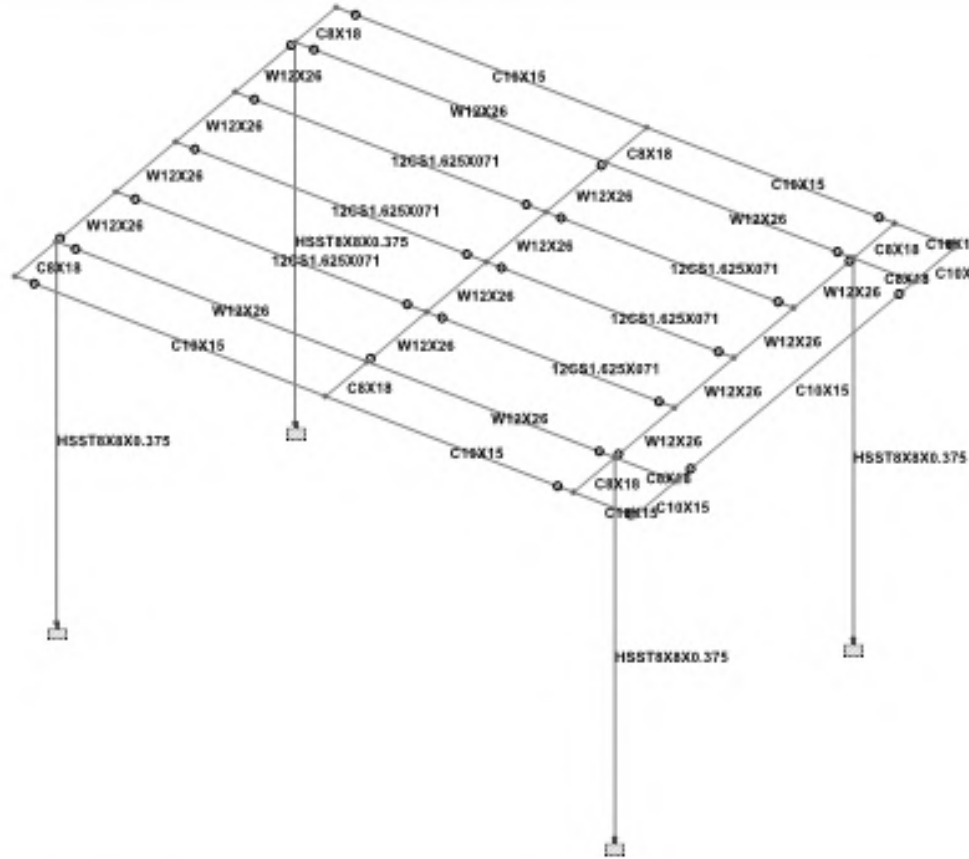
10. DESIGN OF PORTE COCHERE STEEL FRAME

10.1 STEEL FRAME DESIGN

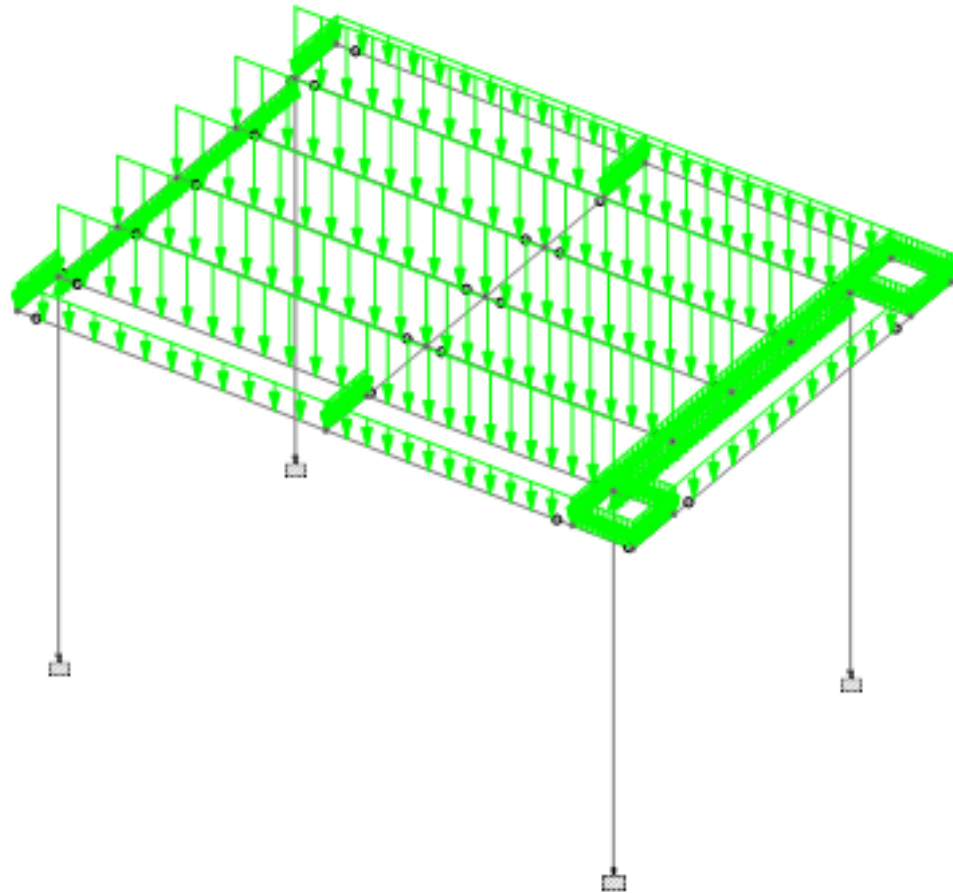
Roof Dead Load : 30 psf
Roof Live Load : 20 psf
Wind pressure : 16 psf
Snow load : 5 psf



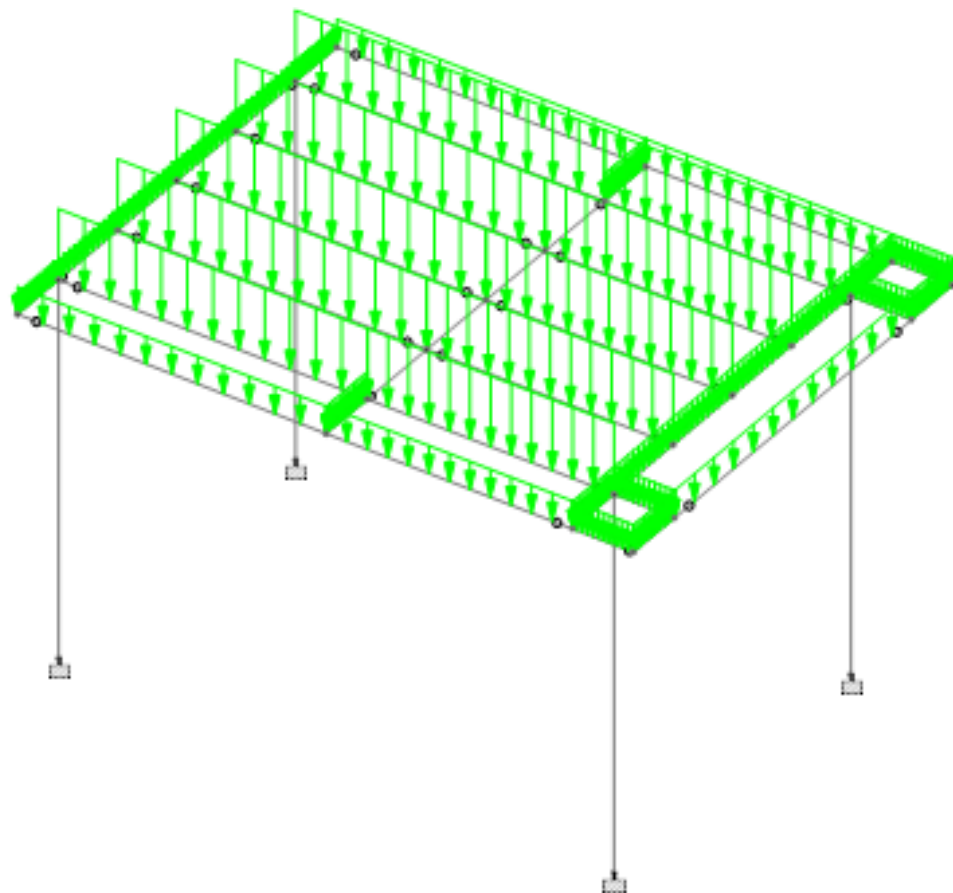
Geometry



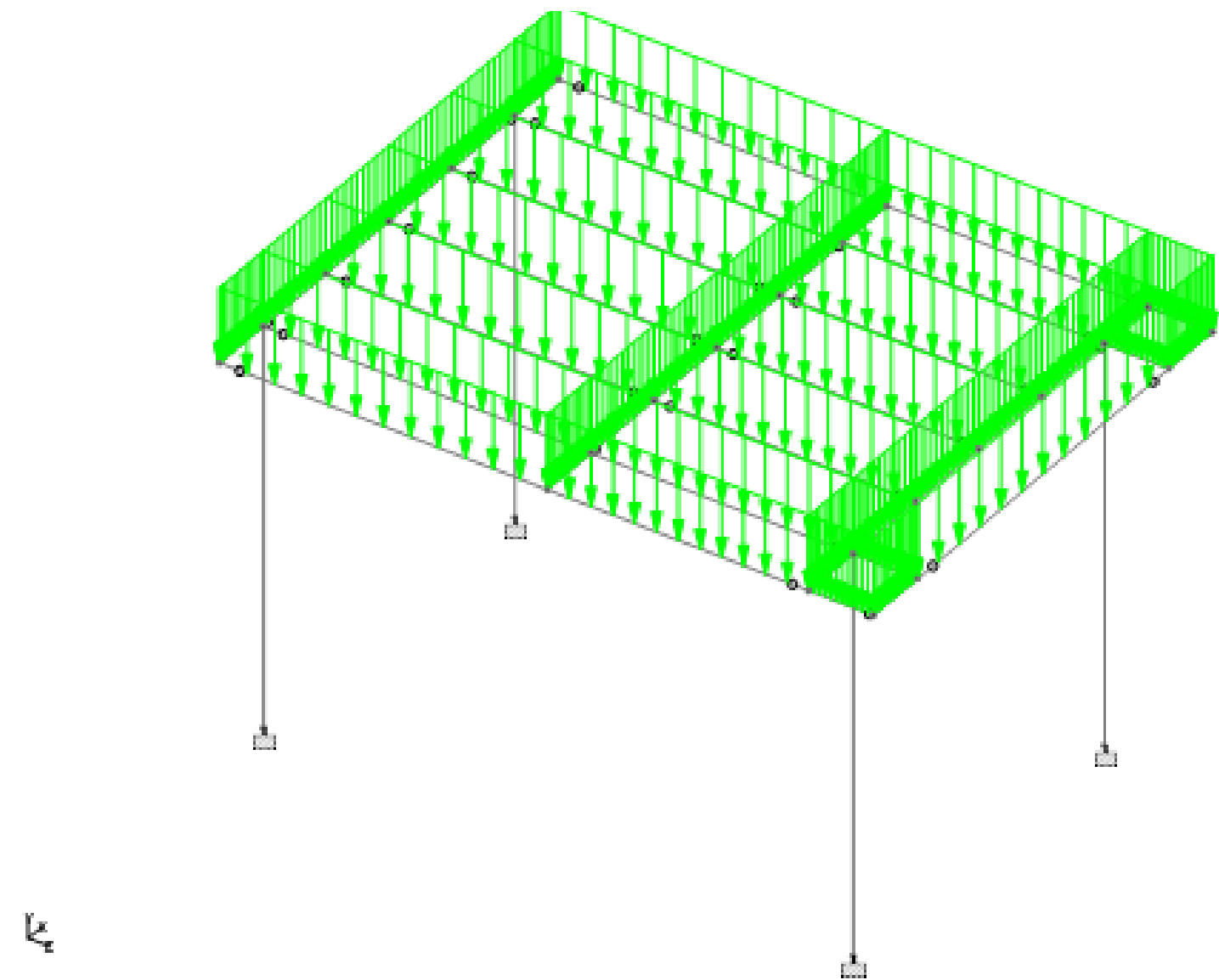
Section Properties



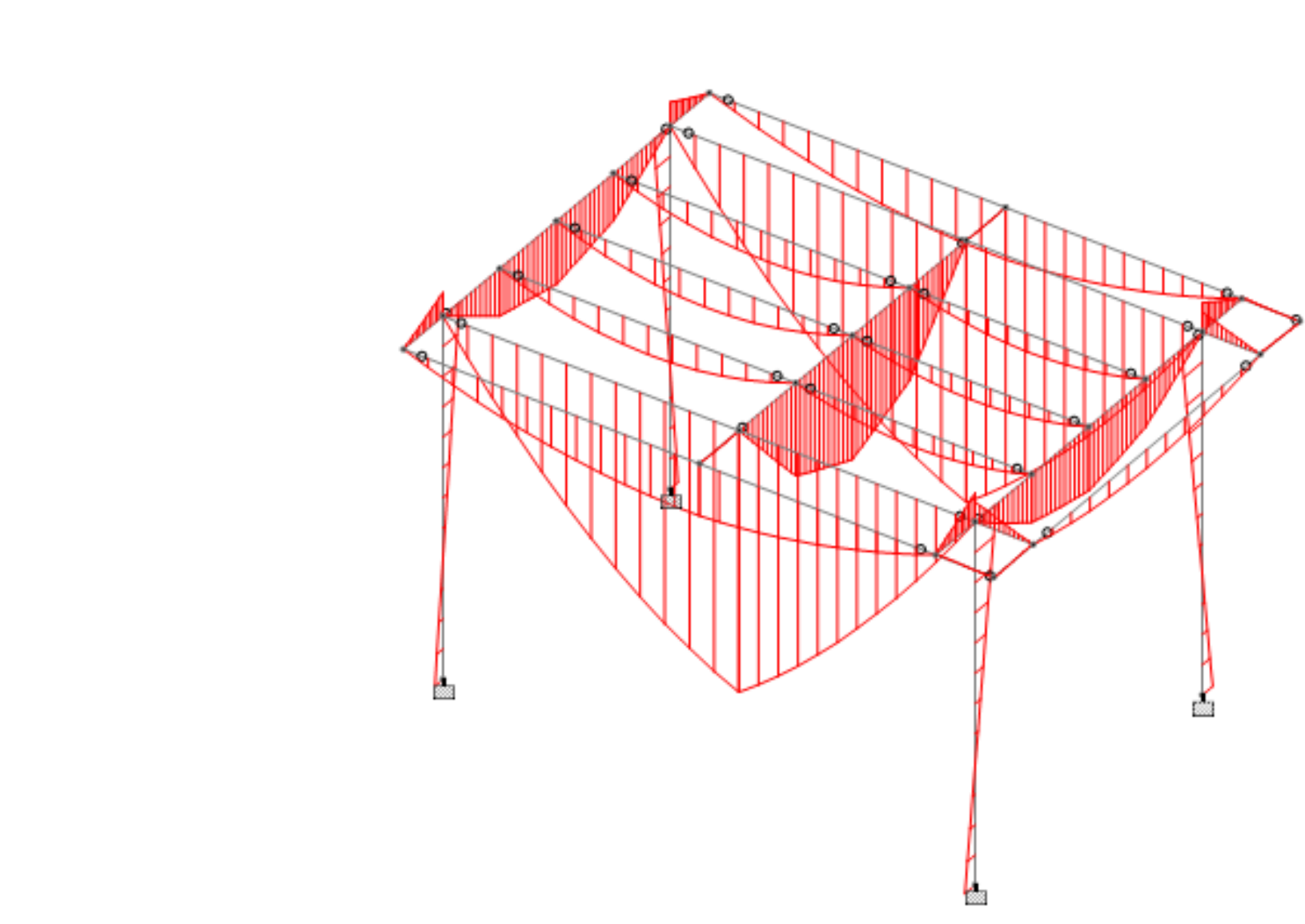
Dead Load



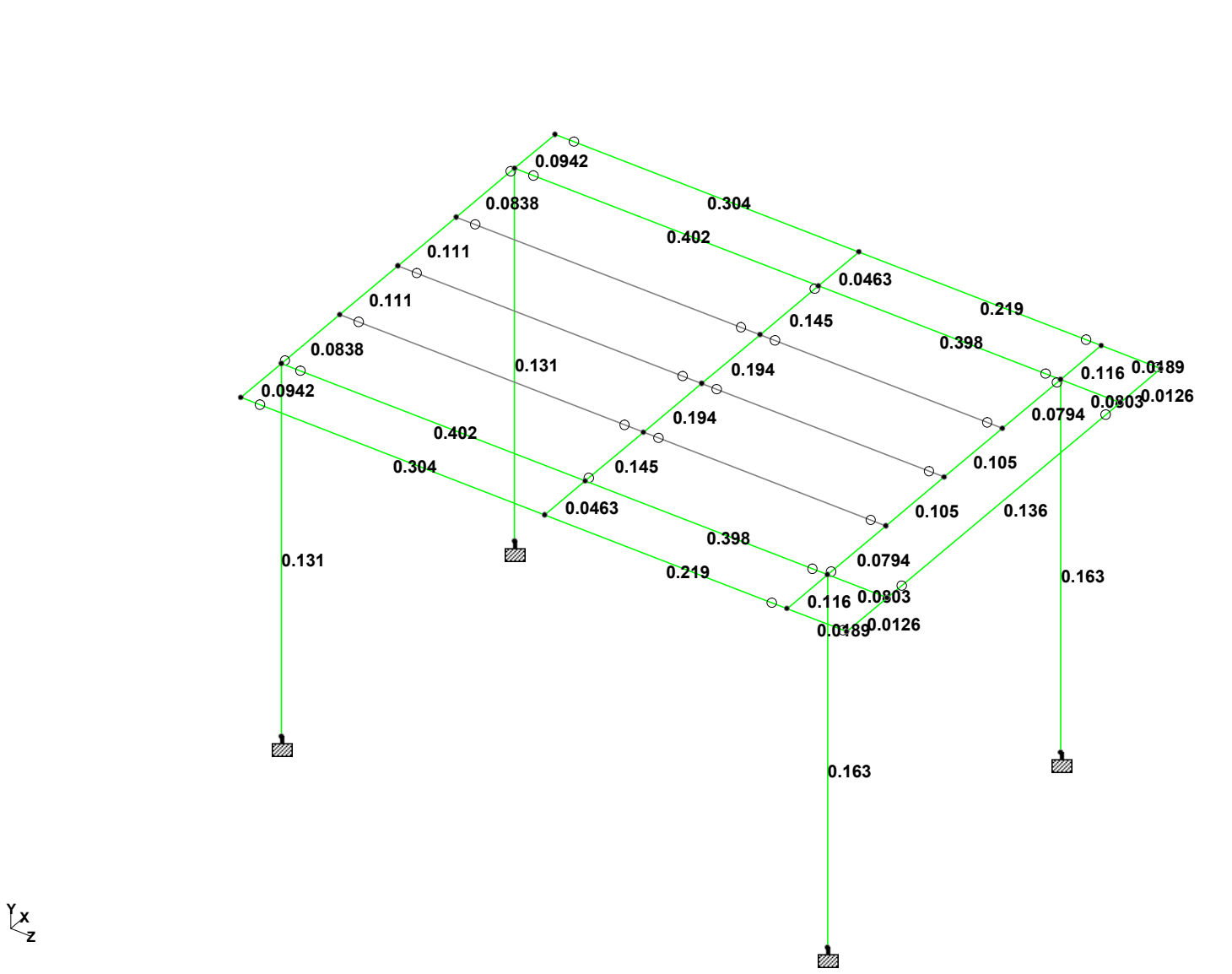
Live Load



Now Load



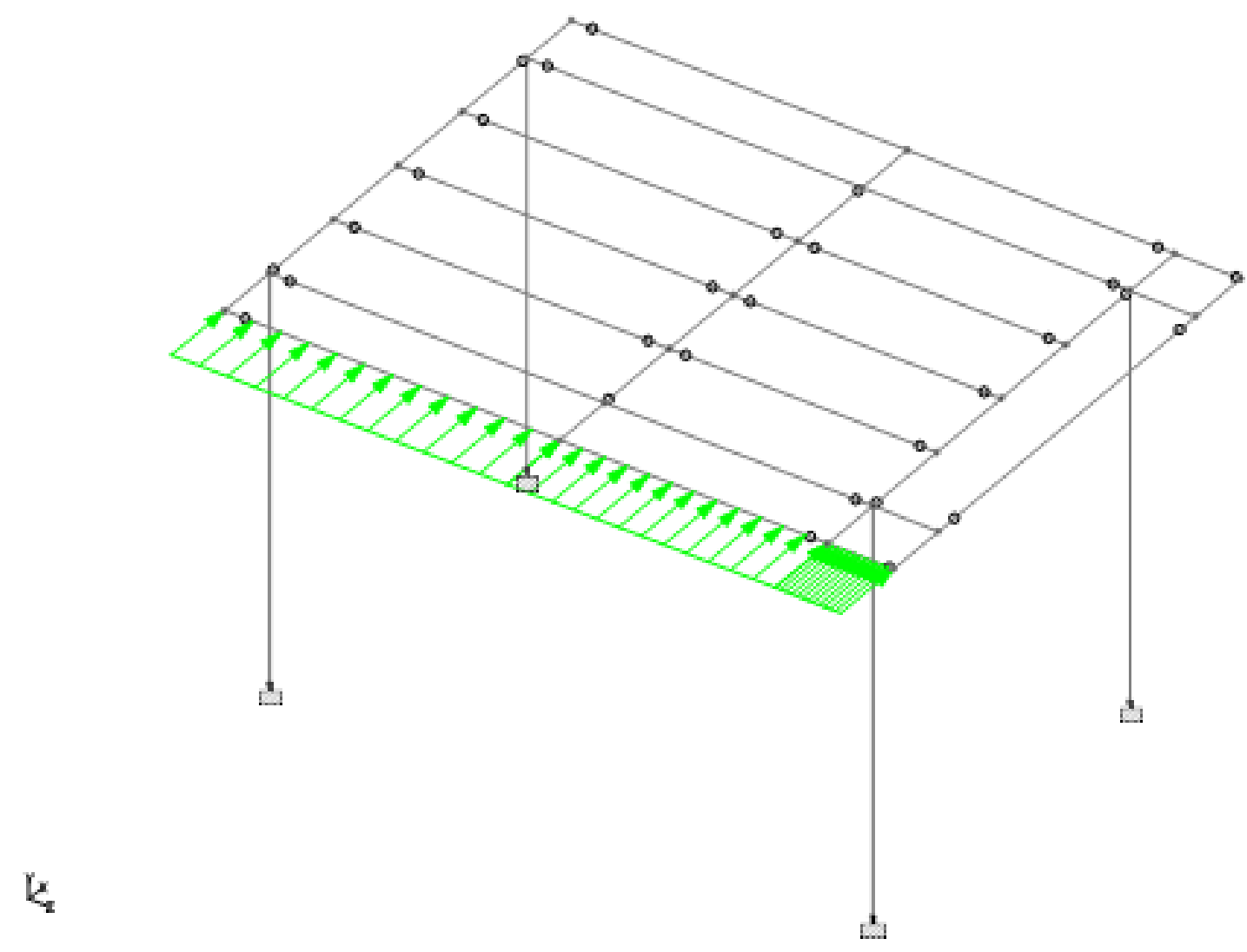
Moment Diagram



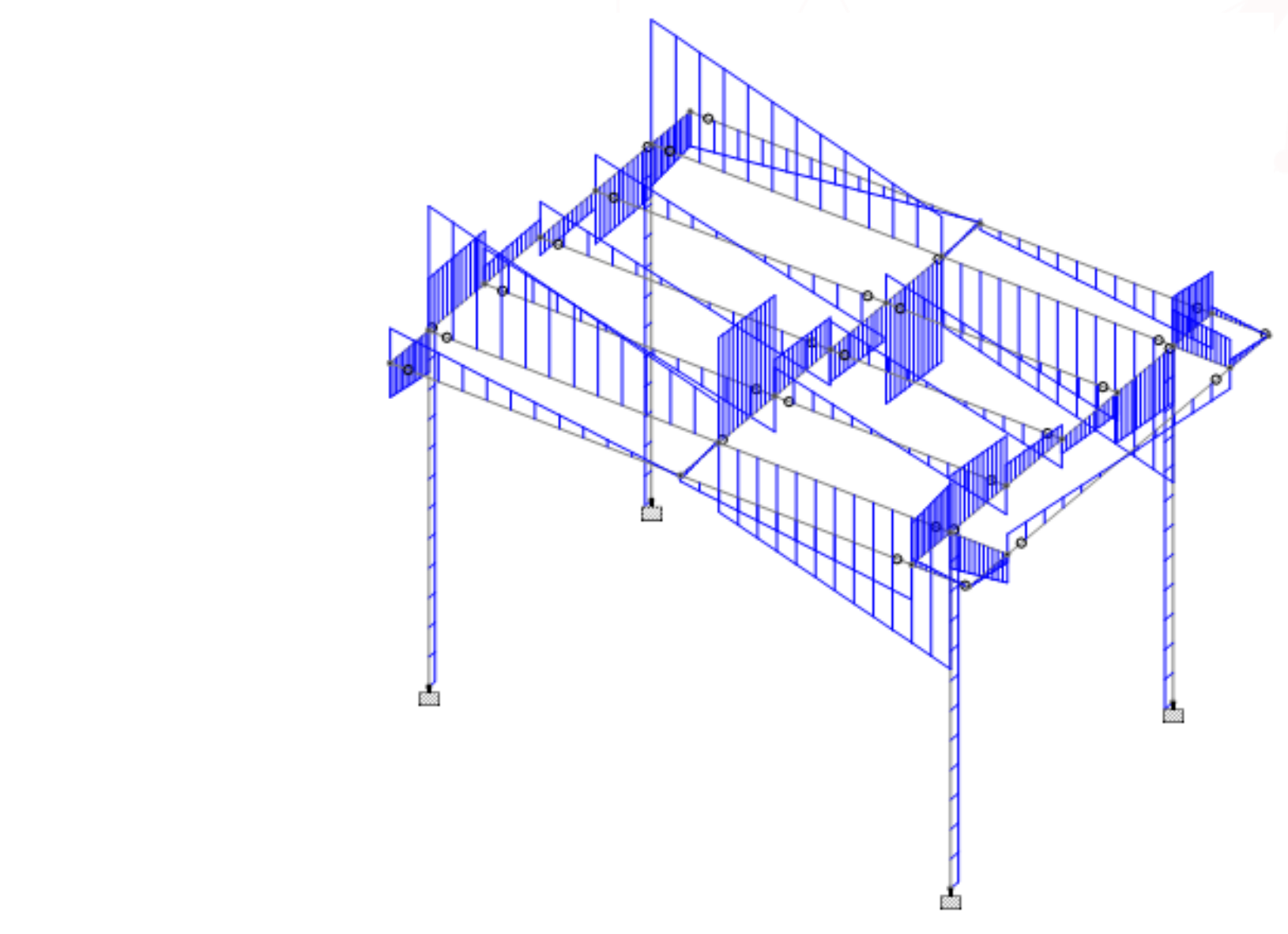
Utility Ratio

1 DL : Beam Loads

Beam	Type		Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
1	UNI	kips/ft	GY	-0.045	-	-	-	-
2	UNI	kips/ft	GY	-0.115	-	-	-	-
3	UNI	kips/ft	GY	-0.045	-	-	-	-
4	UNI	kips/ft	GY	-0.115	-	-	-	-
5	UNI	kips/ft	GY	-0.045	-	-	-	-
6	UNI	kips/ft	GY	-0.045	-	-	-	-
7	UNI	kips/ft	GY	-0.115	-	-	-	-
8	UNI	kips/ft	GY	-0.115	-	-	-	-
9	UNI	kips/ft	GY	-0.045	-	-	-	-
10	UNI	kips/ft	GY	-0.045	-	-	-	-
11	UNI	kips/ft	GY	-0.045	-	-	-	-
12	UNI	kips/ft	GY	-0.045	-	-	-	-
13	UNI	kips/ft	GY	0.03	-	-	-	-
	UNI	kips/ft	GY	-0.045	-	-	-	-
15	UNI	kips/ft	GY	0.03	-	-	-	-
22	UNI	kips/ft	GY	0.03	-	-	-	-
23	UNI	kips/ft	GY	0.03	-	-	-	-
24	UNI	kips/ft	GY	0.03	-	-	-	-
28	UNI	kips/ft	GY	0.03	-	-	-	-
	UNI	kips/ft	GY	-0.045	-	-	-	-
29	UNI	kips/ft	GY	0.03	-	-	-	-
	UNI	kips/ft	GY	-0.045	-	-	-	-
30	UNI	kips/ft	GY	-0.045	-	-	-	-
	UNI	kips/ft	GY	0.03	-	-	-	-
31	UNI	kips/ft	GY	-0.115	-	-	-	-
32	UNI	kips/ft	GY	-0.115	-	-	-	-

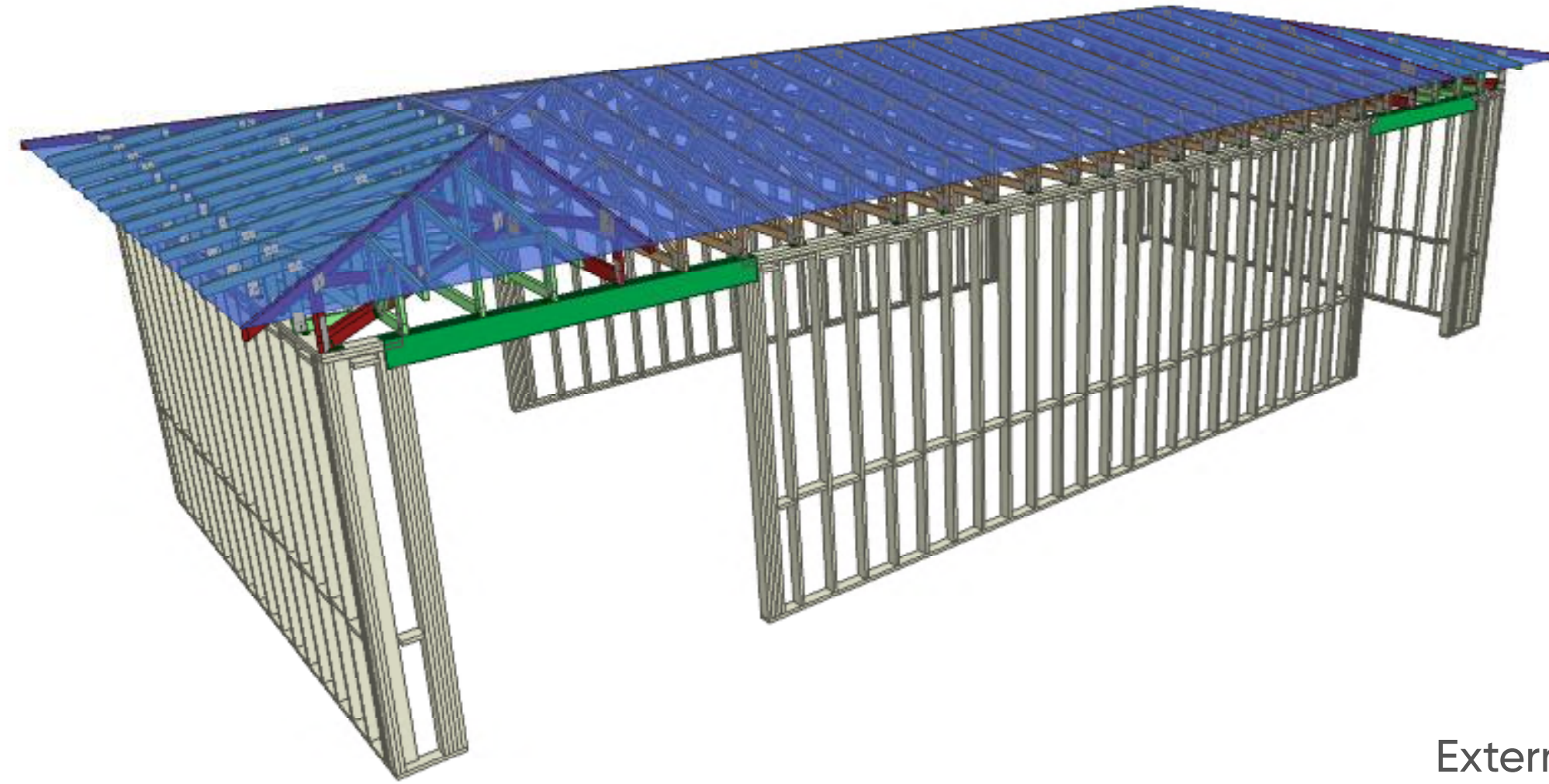


Wind Load

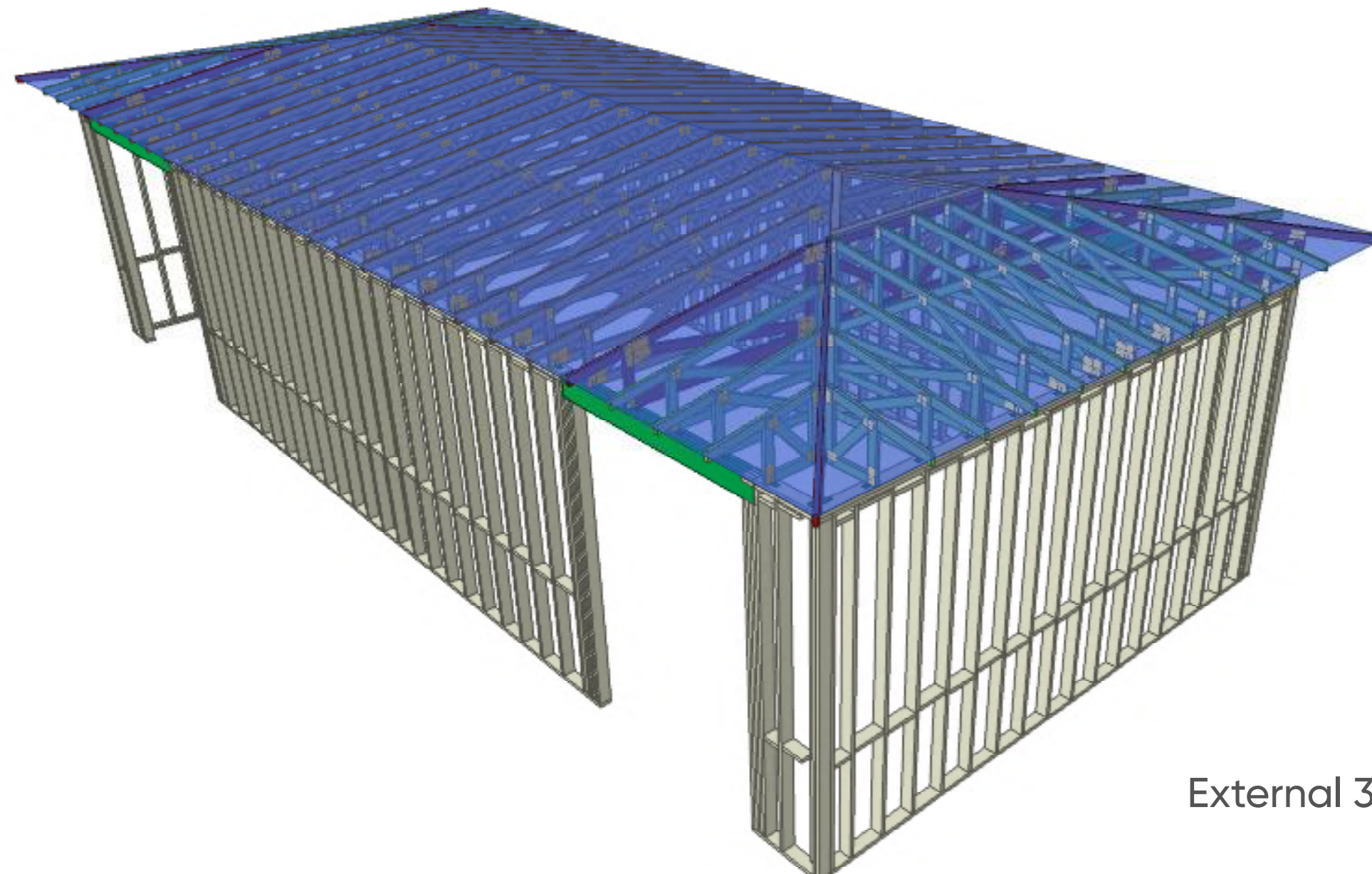


Shear Force Diagram

Shed Design



External 3D View - Showing STUDS

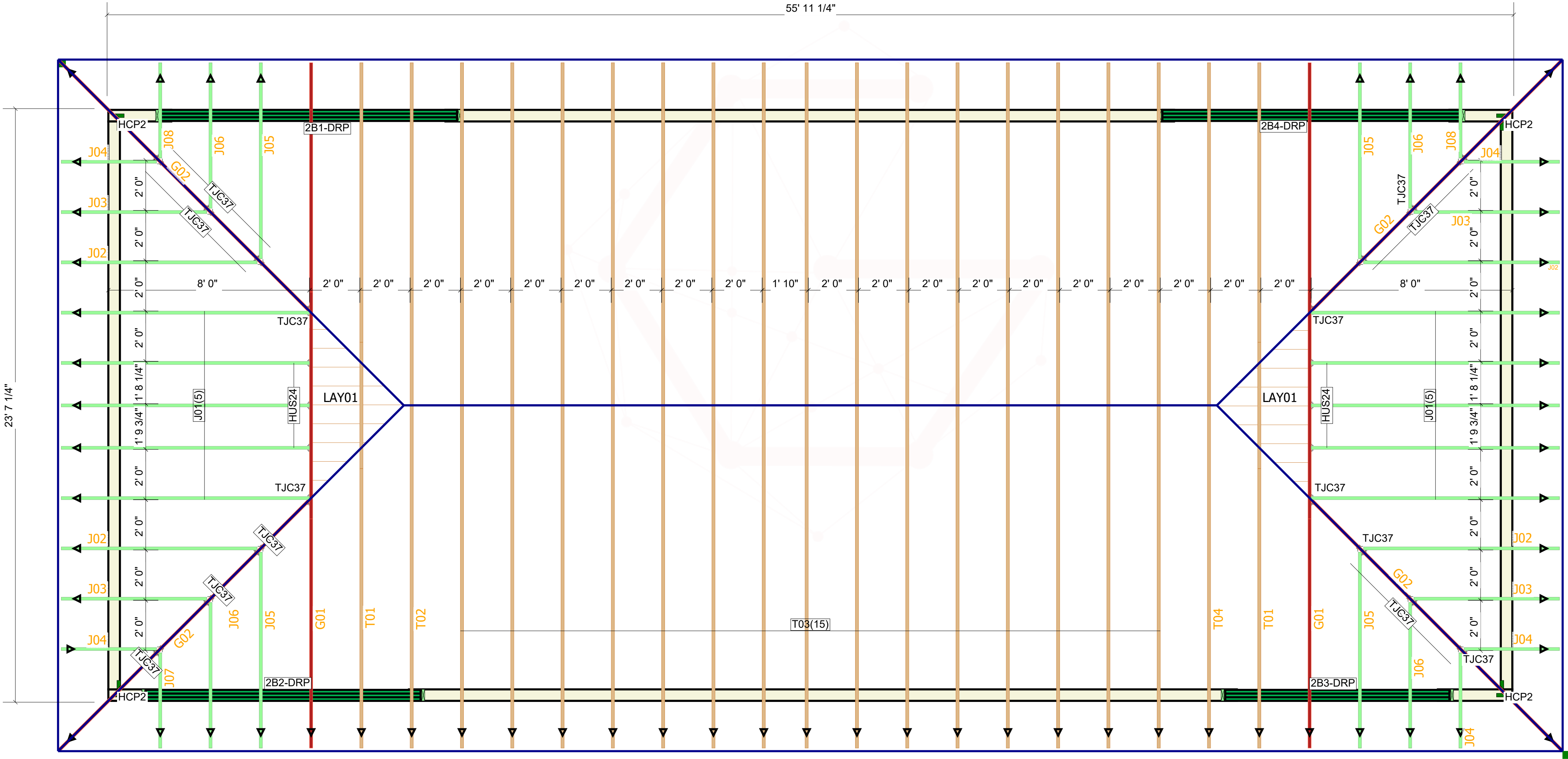


External 3D View - Showing STUDS

Products					
PlotID	Length	Product	Plies	Net Qty	Fab Type
2B1-DRP	12' 0"	1-3/4" x 9-1/4" VERSA-LAM® LVL 2.1E 3100 SP	3	3	MFD
2B4-DRP	12' 0"	1-3/4" x 9-1/4" VERSA-LAM® LVL 2.1E 3100 SP	3	3	MFD
2B2-DRP	11' 0"	1-3/4" x 9-1/4" VERSA-LAM® LVL 2.1E 3100 SP	3	3	MFD
2B3-DRP	9' 0"	1-3/4" x 9-1/4" VERSA-LAM® LVL 2.1E 3100 SP	3	3	MFD

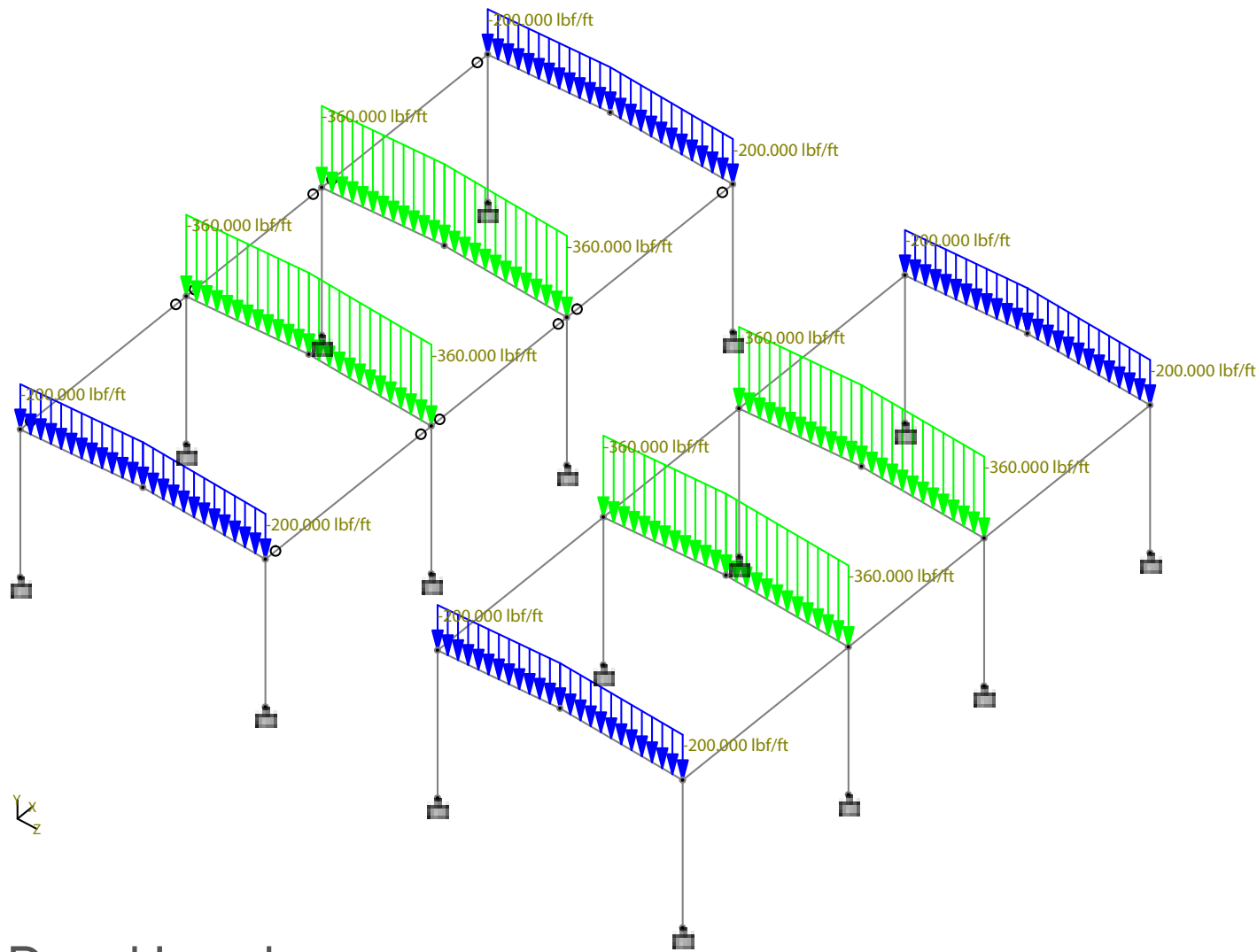
Truss Connector Total List		
Manuf	Product	Qty
	HCP2	4
	HUS24	6
	One H2.5A	76
	TJC37	28

Accessories					
PlotID	Length	Product	Plies	Net Qty	Fab Type
		PLY 4X8X5/8 CDX WEST. (RED)	1	58	MFD



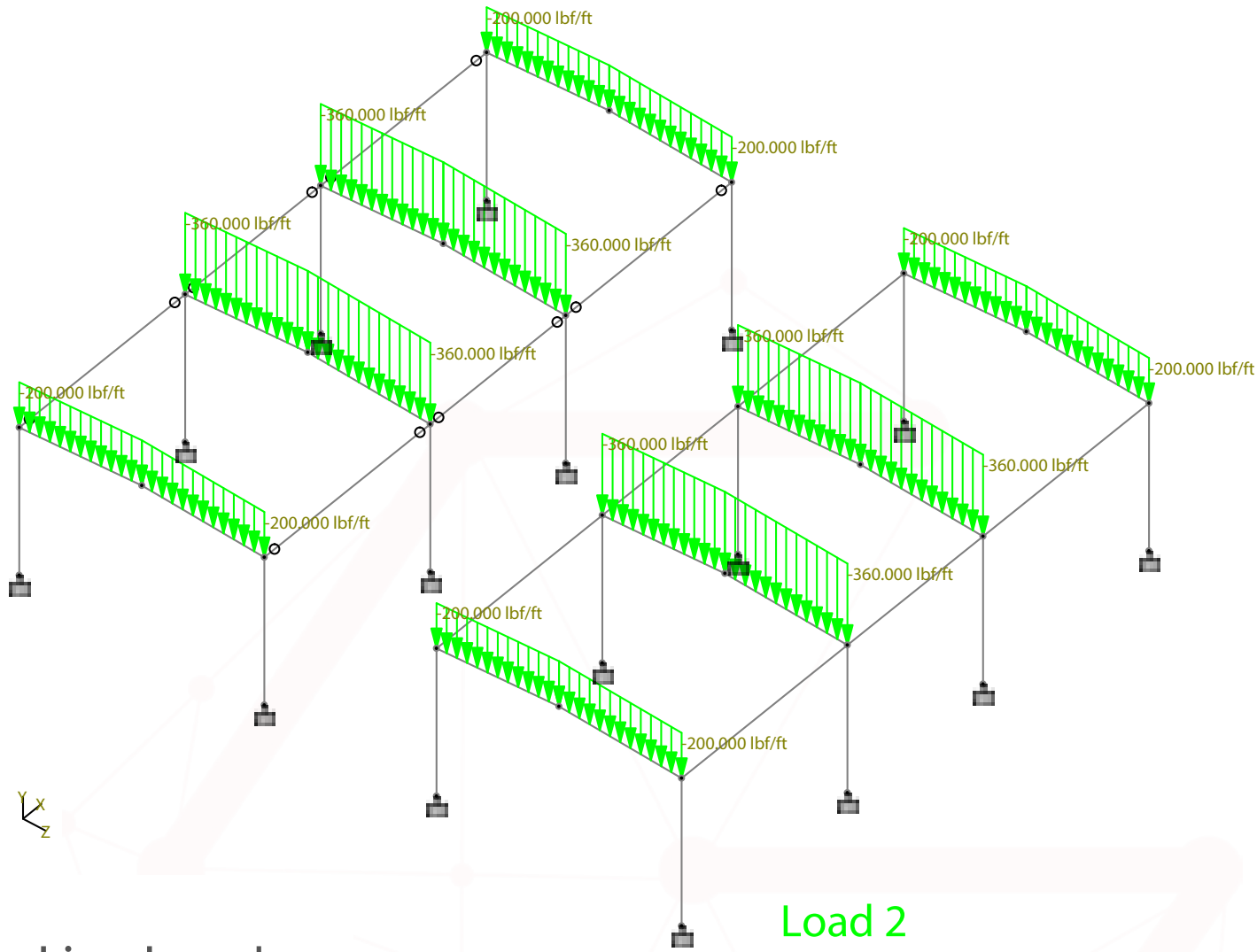
Roof Framing Plan

Steel Frame



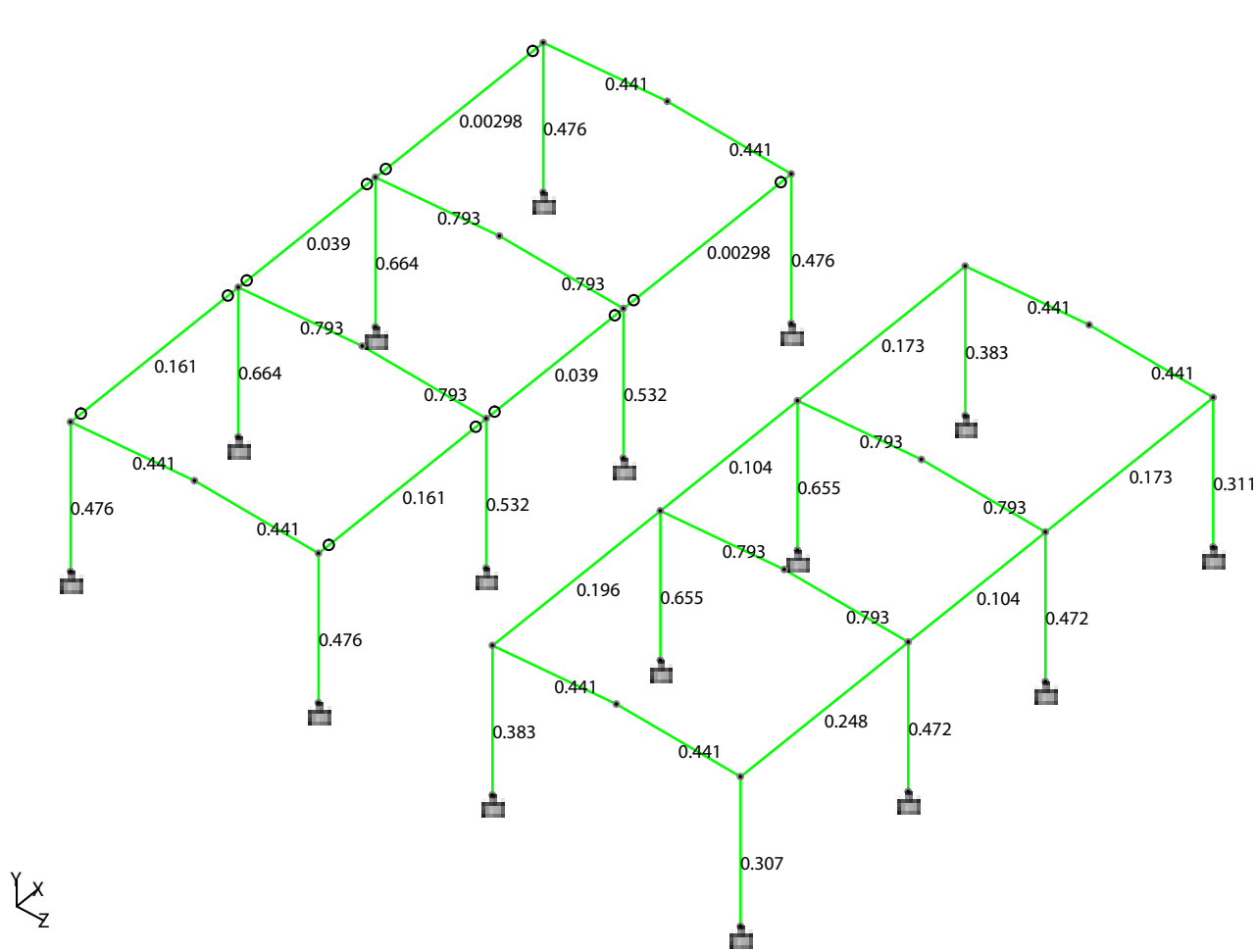
Dead Load

Load 1



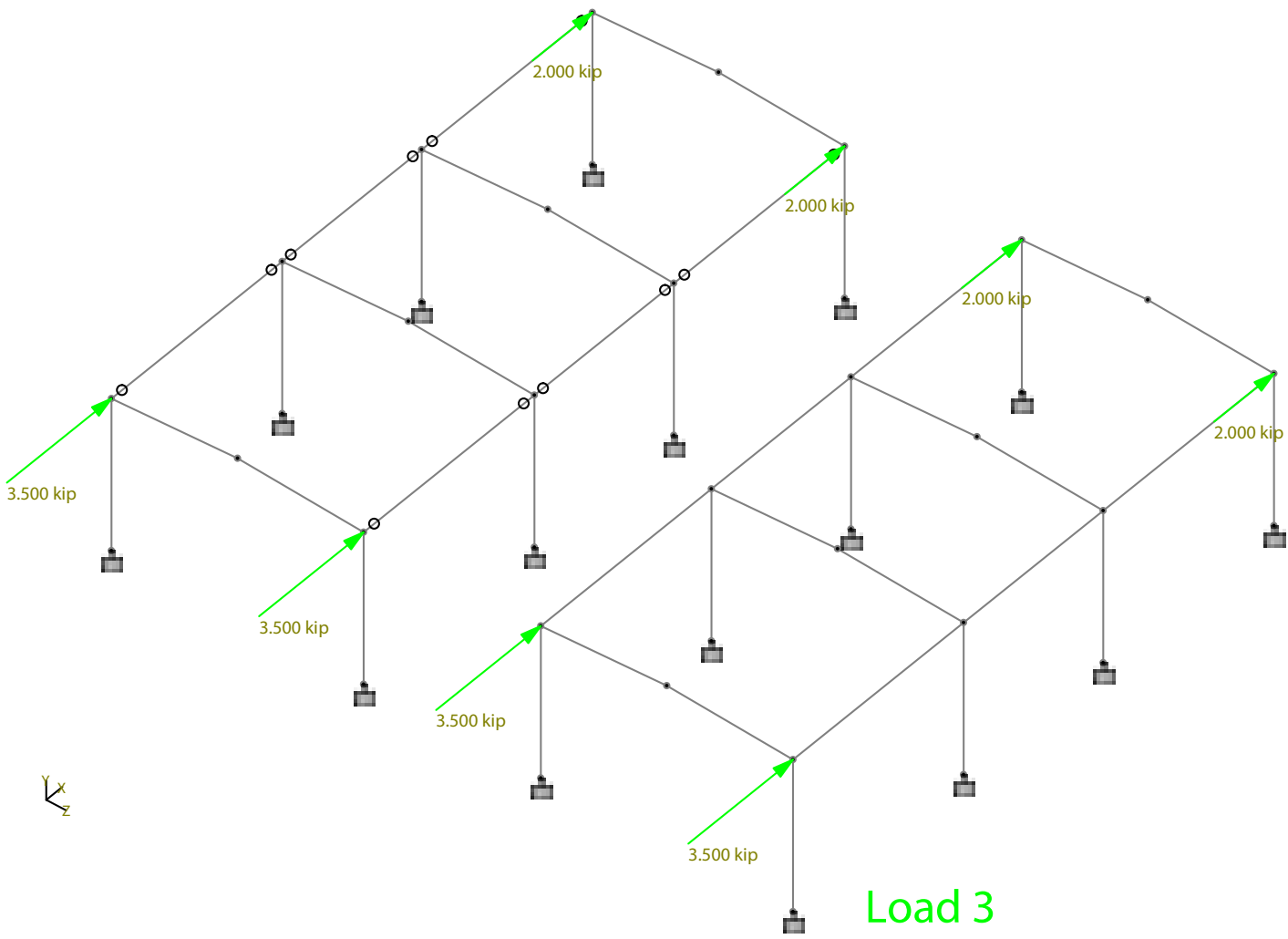
Live Load

Load 2



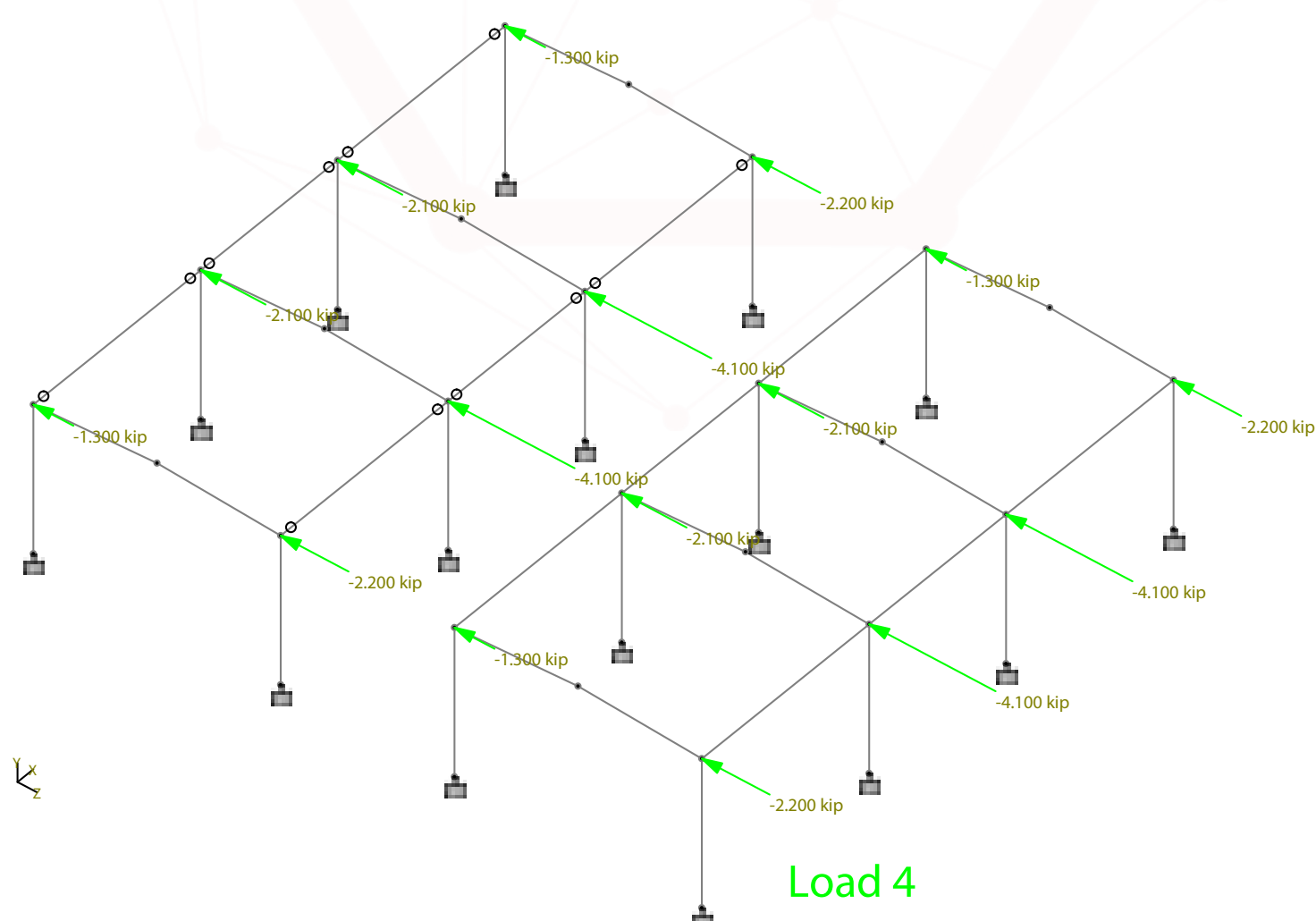
Utility Ratio

Load 3



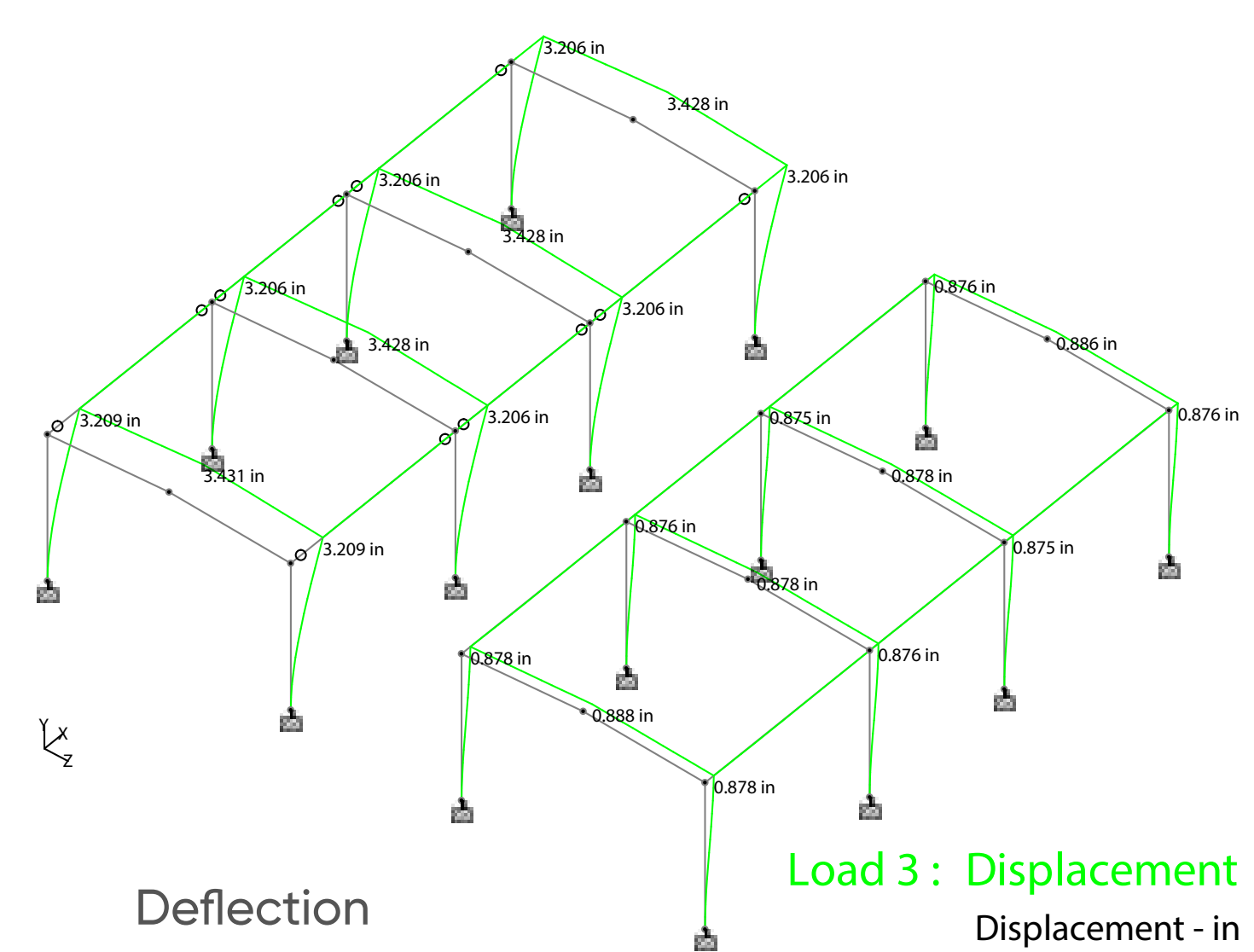
Lateral Load

Load 3



Lateral Load

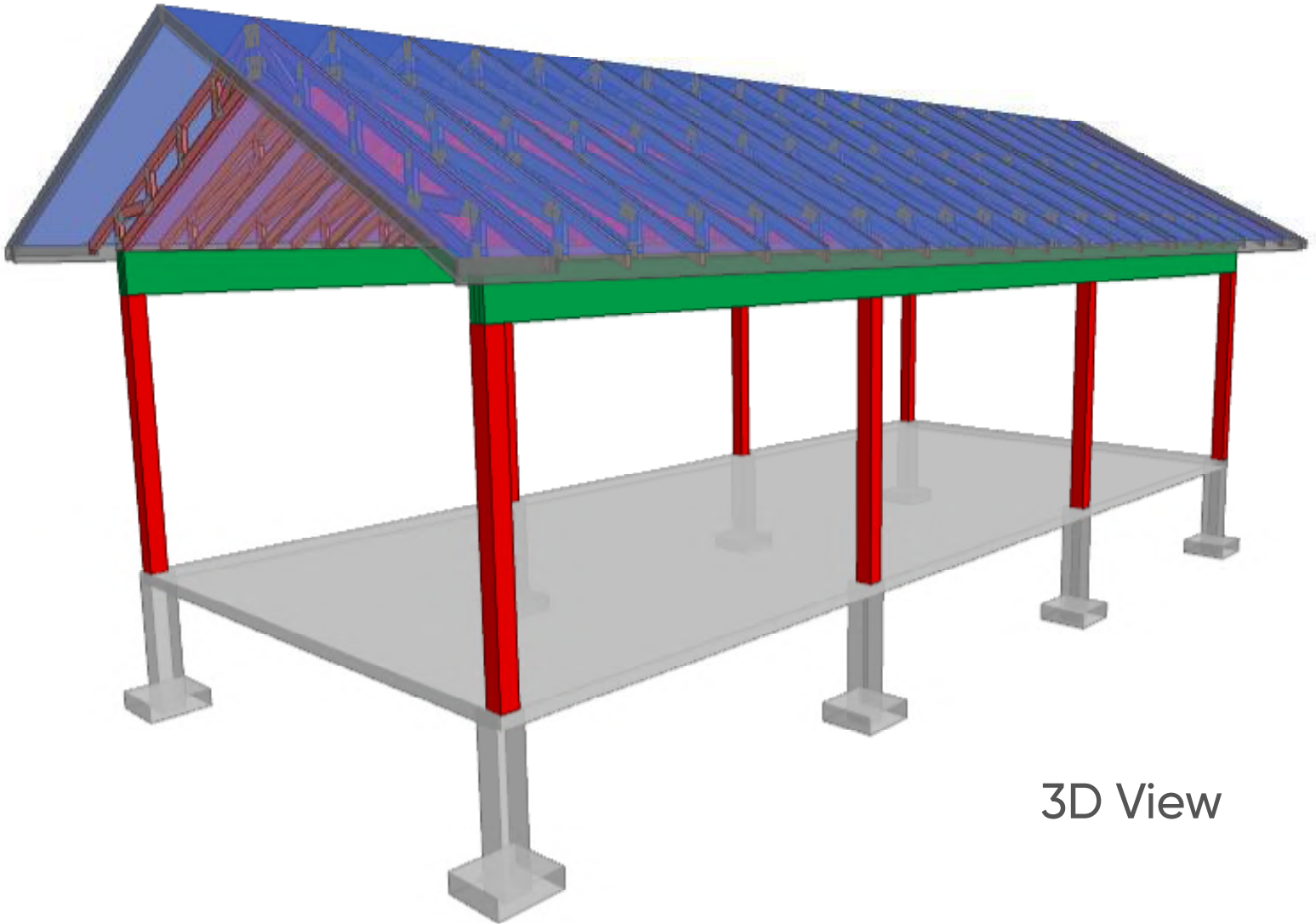
Load 4



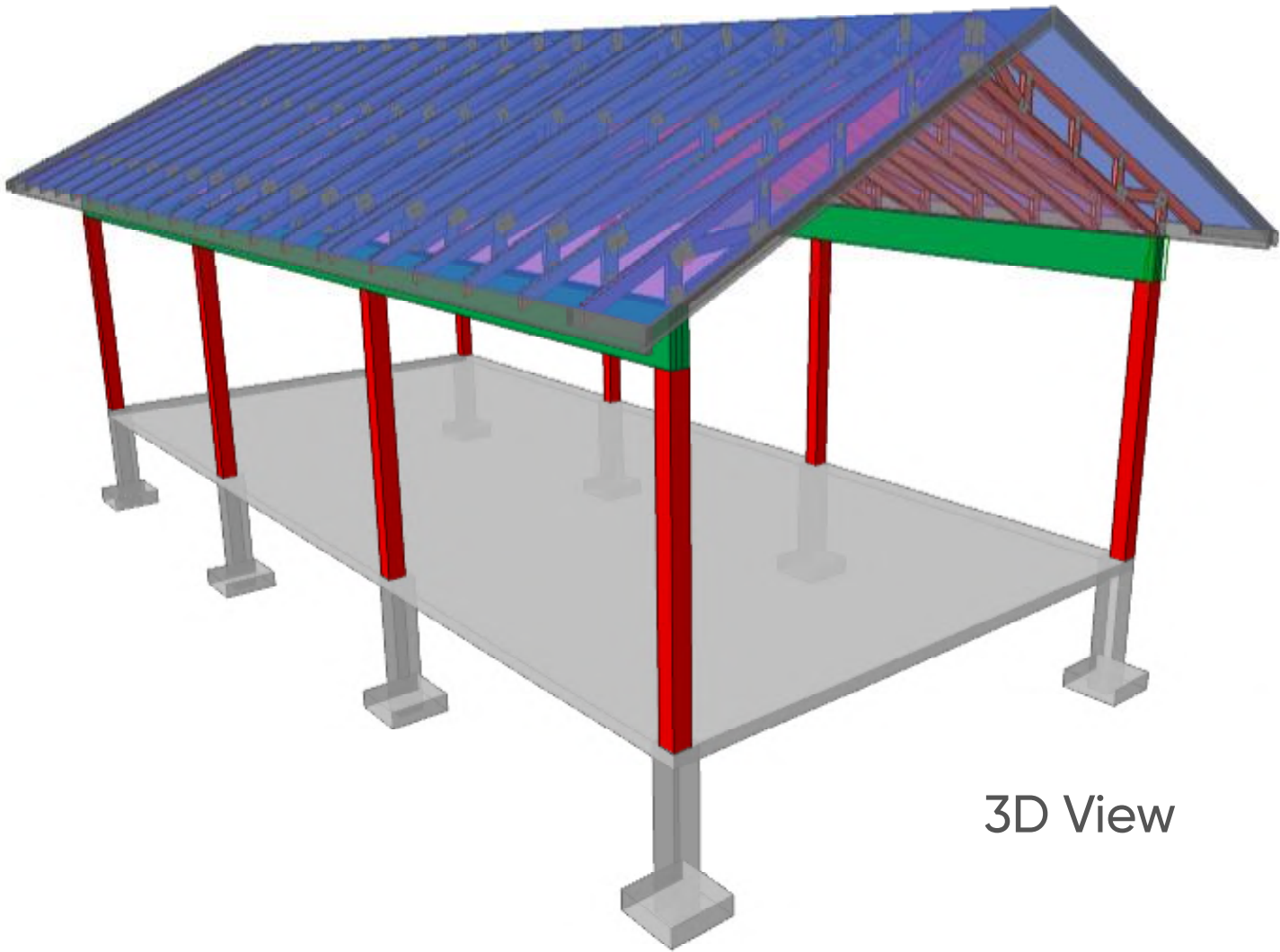
Deflection

Load 3 : Displacement
Displacement - in

Truss Design

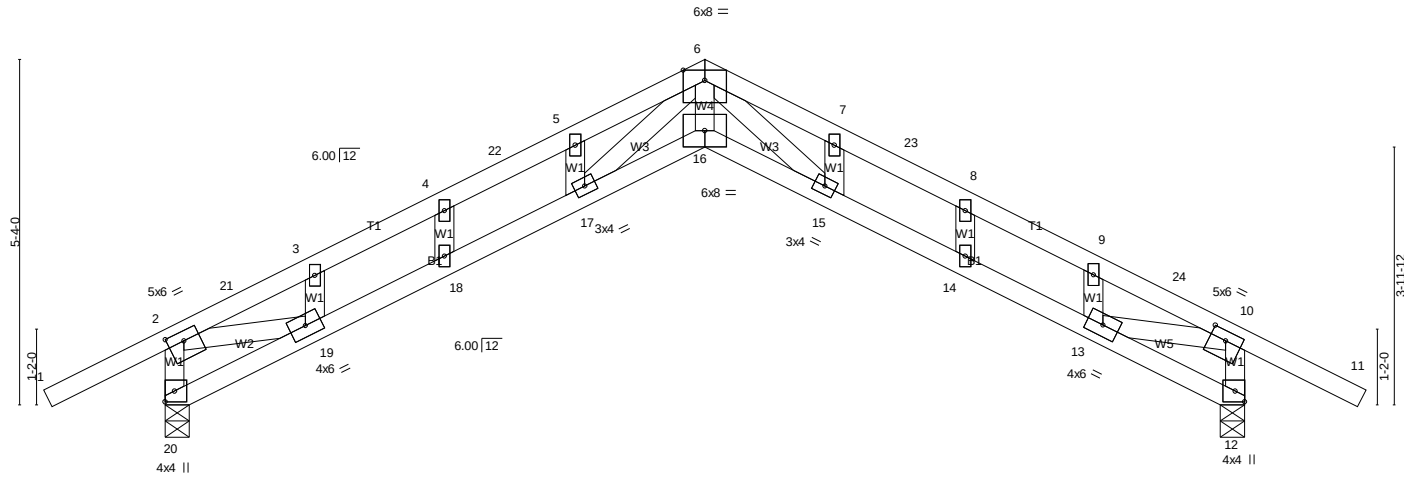


3D View



3D View

Job	Truss	Truss Type	Qty	Ply	Porch Truss					
PORCH TRUSS	T01GE	GABLE	2	1						
-1-10-8 2-3-12 4-3-12 6-4-0 8-4-0 10-4-0 12-4-4 14-4-0 16-8-0 18-6-8 1-10-8 2-3-12 2-0-0 2-0-4 2-0-0 2-0-0 2-0-4 1-11-12 2-4-0 1-10-8										
Scale = 1:30.0										



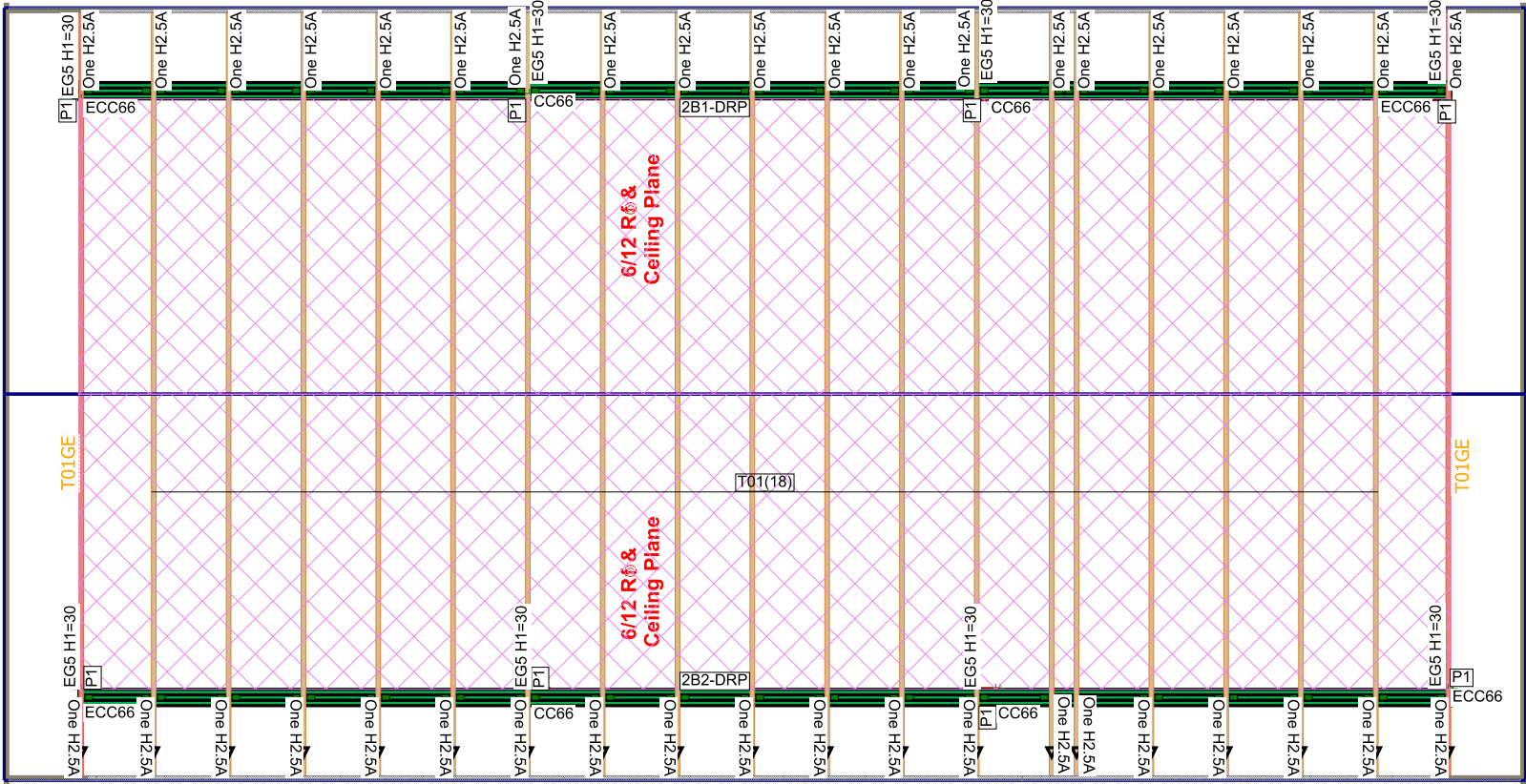
	2-3-12 2-3-12	4-3-12 2-0-0	6-4-0 2-0-4	8-4-0 2-0-0	10-4-0 2-0-0	12-4-4 2-0-4	14-4-0 1-11-12	16-8-0 2-4-0
Overall Truss Height: 5-4-6								
Plate Offsets (X,Y)--	[2-0-3-0,0-1-12], [10-0-3-0,0-1-12]							

Heel to Peak: 9-10-12 Overhang Rake Distance: Left 1-11-6, Right 1-11-6
Qty: 2 Span: 16-8-0 Slope: 6.00/12, 6.00/12 Overhang: 1-10-8, 1-10-8 Loading: 20.0-10.0-0.0-10.0 Spacing: 1-11-4 o.c. Camber: 7/16 in Weight: 66 lb Board Feet: 84.00bft
Last saved: February 28, 2024

NOTES: 1) All plates are 2x4 MT20 unless otherwise indicated.		
====<<<< CHORDS >>>>====(Sq.Cut=90)		
PIECE: B1, B1 63.4 26.6 OL:9-4-2 0-1-8 0-2-0 0-4-0	(4) 2x4 1650F 1.5E SPF - 10' CL:9-3-2 LS:9-1-14 PL:9-3-13 SCARF: 0-1-11 SCARF: 0-1-12 0-1-9 0-2-11 0-1-6	26.6 63.4 63.4 15.8 47.7
PIECE: T1, T1 90.0 OL:11-4-15	(4) 2x4 No.2 SPF - 12' CL:11-4-1 LS:11-4-15	63.4
====<<<< WEBS >>>>====(Sq.Cut=90)		
PIECE: W1, W1, W1, W1, W1, W1 63.4 OL:0-10-3 PIECE: W4 90.0 OL:0-9-5 PIECE: W2 97.2 19.4 OL:1-11-2	(16) 2x4 No.2 SPF - 1' CL:0-8-7 LS:0-8-7 (2) 2x4 No.2 SPF - 1' CL:0-9-5 LS:0-8-7 (2) 2x4 No.2 SPF - 2' CL:1-10-11 LS:1-5-15	63.4 63.4 63.4 19.4 97.2
PIECE: W5 97.4 OL:1-11-6 PIECE: W3, W3 47.7 OL:2-3-12	(2) 2x4 No.2 SPF - 2' CL:1-10-15 LS:1-6-2 (4) 2x4 No.2 SPF - 3' CL:2-3-12 LS:1-7-15	19.2 97.4 15.8 47.7

Accessories					
PlotID	Length	Product	Plies	Net Qty	Fab Type
		PLY 4X8X5/8 CDX WEST. (RED)	1	33	MFD
Products					
PlotID	Length	Product	Plies	Net Qty	Fab Type
2B1-DRP	37' 0"	1-3/4" x 14" VERSA-LAM® LVL 2.1E 3100 SP	3	3	MFD
2B2-DRP	37' 0"	1-3/4" x 14" VERSA-LAM® LVL 2.1E 3100 SP	3	3	MFD
P1	8' 0"	6x6 SYP No.2 PT	1	8	MFD

Connector Summary			
Qty	Manuf	Product	Flange
4	Simpson	CC66	None
4	Simpson	ECC66	None
8	Simpson	EG5 H1=30	None
Truss Connector Total List			
Manuf	Product	Qty	
	One H2.5A	40	



Framing Plan

Job	Truss	Truss Type	Qty	Ply	Porch Truss
PORCH TRUSS	T01	Roof Special	18	1	

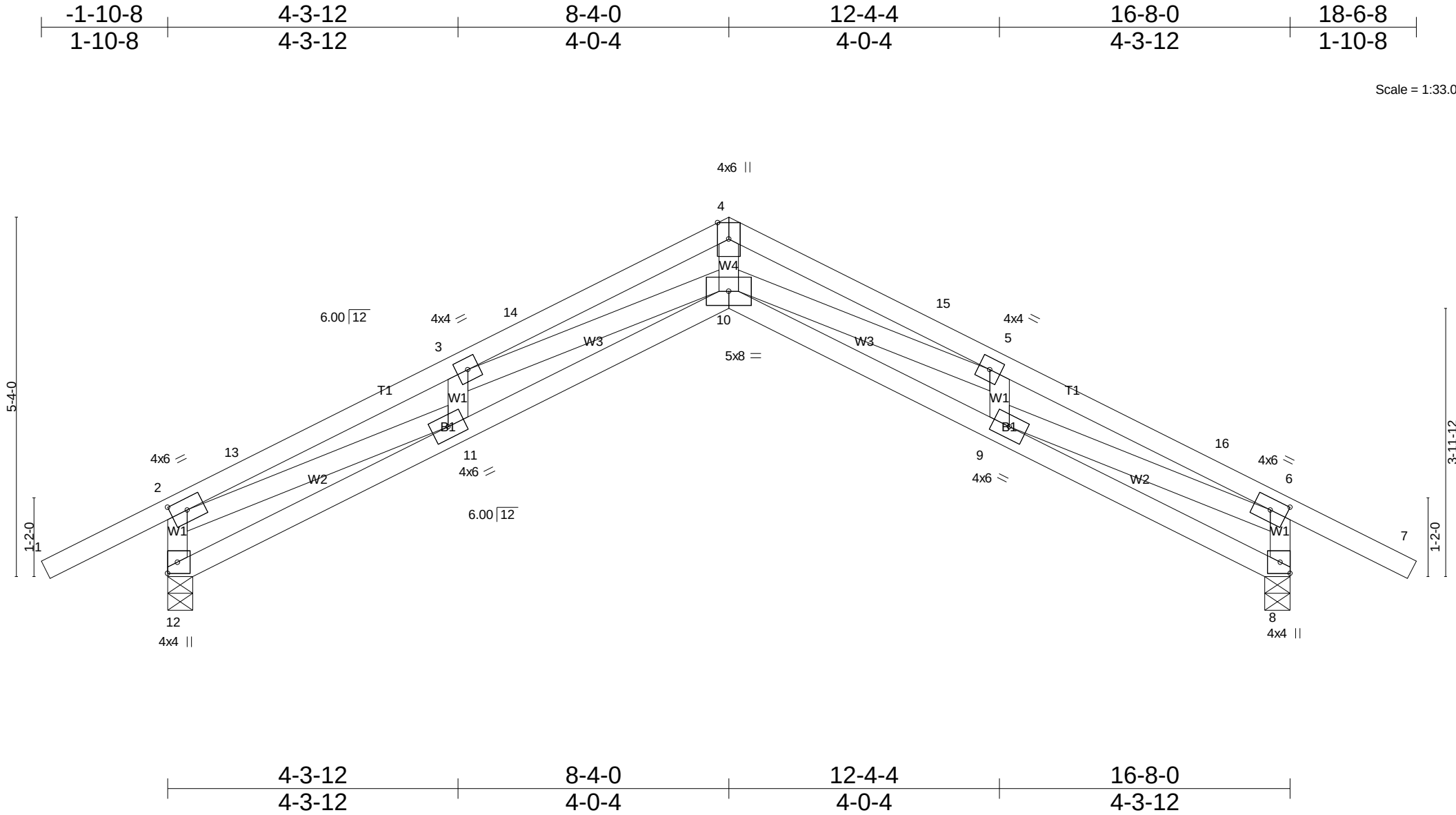


Plate Offsets (X,Y)--	[2:0-2-15,0-2-0], [6:0-2-15,0-2-0]
-----------------------	------------------------------------

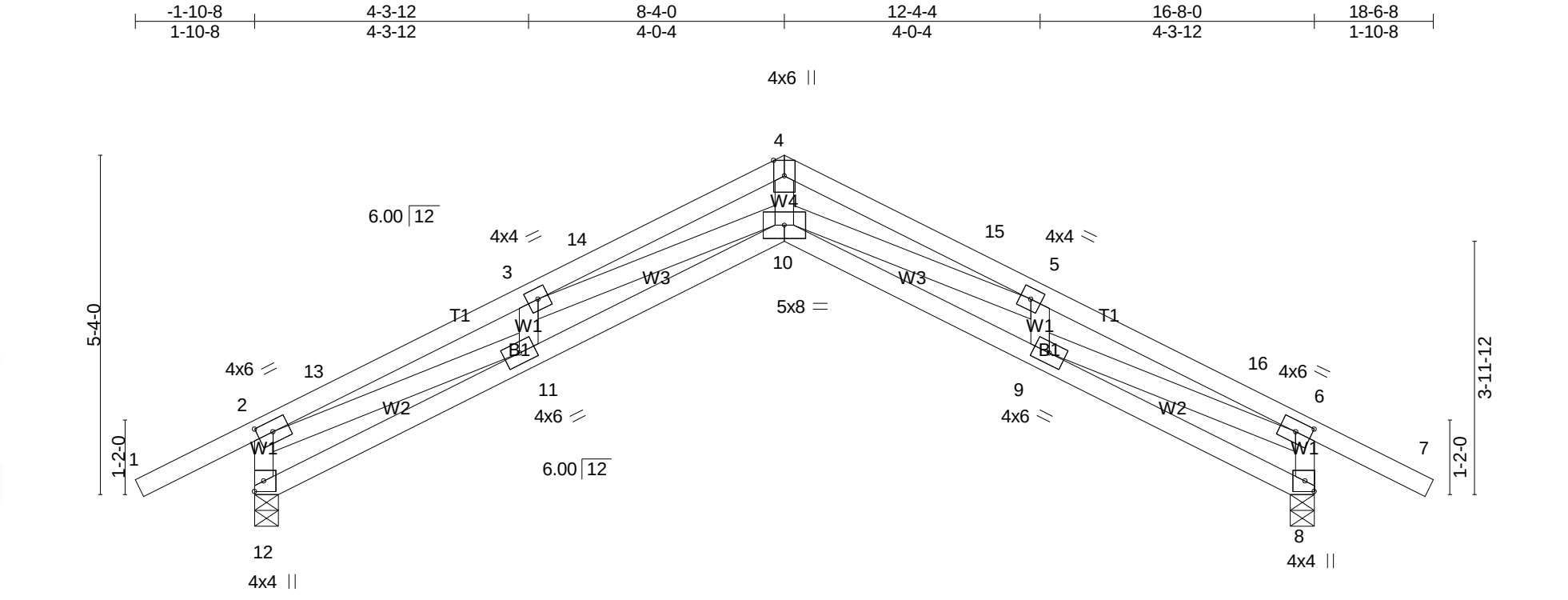
Heel to Peak: 9-10-12 Overhang Rake Distance: Left 1-11-6, Right 1-11-6

Qty: 18 Span: 16-8-0 Slope: 6.00/12, 6.00/12 Overhang: 1-10-8, 1-10-8 Loading: 20.0-10.0-0.0-10.0 Spacing: 2-0-0 o.c. Camber: 1/4 in Weight: 71 lb Board Feet: 828.00bft
Last saved: February 28, 2024

===== CHORDS =====(Sq.Cut=90)			
PIECE: T1, T1	90.0	(36) 2x4 No.2 SPF - 12'	63.4
OL:11-4-15 CL:11-4-1 LS:11-4-15			
PIECE: B1, B1	63.4	(36) 2x4 No.2 SPF - 10'	26.6
OL:9-4-2 CL:9-3-2 LS:9-1-14 PL:9-3-13			
0-0-12 0-1-9 0-0-13			
0-1-8 0-2-0 0-2-11			
SCARF: 0-1-11 SCARF: 0-1-12			
0-4-0 0-1-6			
===== WEBS =====(Sq.Cut=90)			
PIECE: W1, W1, W1, W1	63.4	(72) 2x4 No.2 SPF - 1'	63.4
OL:0-10-3 CL:0-8-7 LS:0-8-7			
68.2		2x4 No.2 SPF-	68.2
(36) W2 OL:4-3-8 CL:4-2-1 LS:4-2-1			
(36) W3 OL:4-1-8 CL:4-0-2 LS:4-0-2			
PIECE: W4	90.0	(18) 2x4 No.2 SPF - 1'	63.4
OL:0-9-5 CL:0-9-5 LS:0-8-7			

Truss Details

Job	Truss	Truss Type	Qty	Ply	Porch Truss
PORCH TRUSS	T01	Roof Special	18	1	Job Reference (optional)



		4-3-12		8-4-0		12-4-4		16-8-0	
		4-3-12		4-0-4		4-0-4		4-3-12	
Plate Offsets (X,Y)-- [2:0-2-15,0-2-0], [6:0-2-15,0-2-0]									
LOADING (psf)		SPACING- 2-0-0		CSI.		DEFL. in (loc) l/defl L/d		PLATES GRIP	
TCLL 20.0		Plate Grip DOL 1.15		TC 0.40		Vert(LL) -0.20 10 >974 240		MT20 197/144	
TCDL 10.0		Lumber DOL 1.15		BC 0.60		Vert(CT) -0.41 10 >480 180			
BCLL 0.0 *		Rep Stress Incr YES		WB 0.55		Horz(CT) 0.44 8 n/a n/a			
BCDL 10.0		Code IRC2018/TPI2014		Matrix-S				Weight: 71 lb FT = 20%	

Job	Truss	Truss Type	Qty	Ply	Porch Truss
PORCH TRUSS	T01GE	GABLE	2	1	Job Reference (optional)

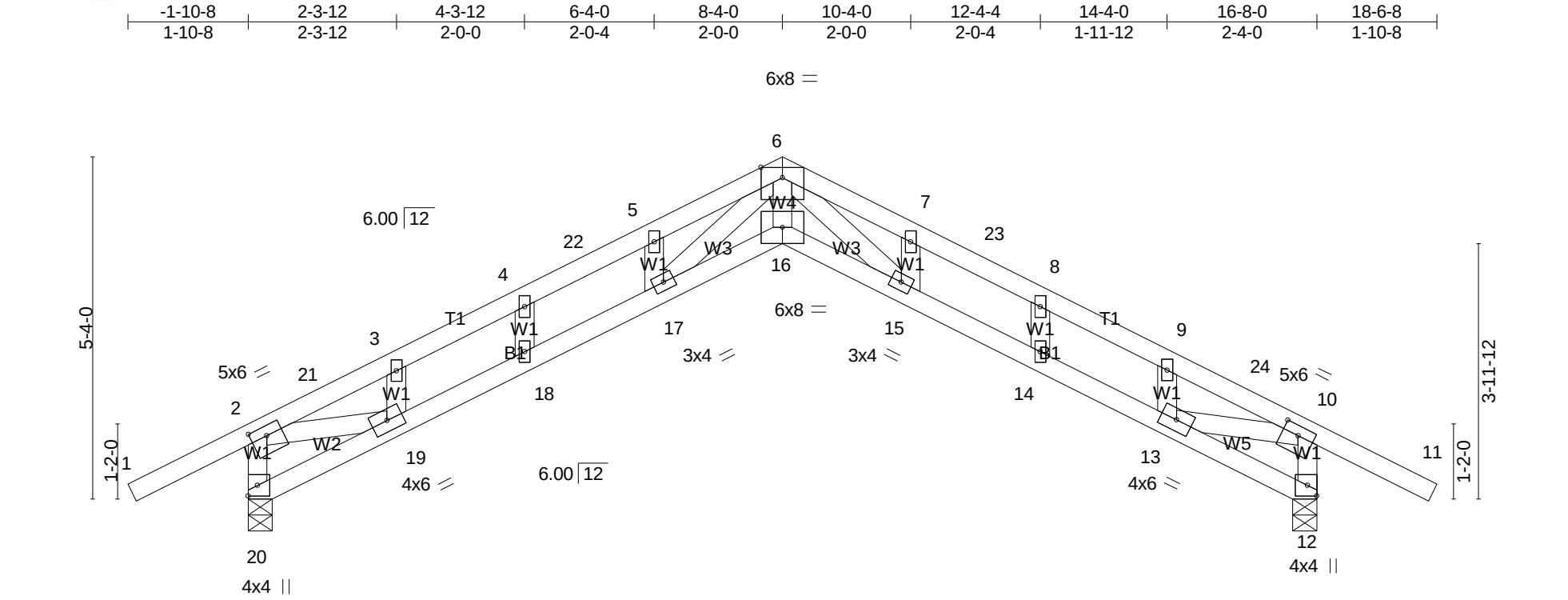


Plate Offsets (X,Y)-- [2:0-3-0,0-1-12], [10:0-3-0,0-1-12]											
LOADING (psf)		SPACING-		1-11-4		CSI.		DEFL.		in (loc) l/defl L/d	
TCLL 20.0		Plate Grip DOL		1.15		TC 0.65		Vert(LL) -0.38		16 >518 240	
TCDL 10.0		Lumber DOL		1.15		BC 0.91		Vert(CT) -0.76		16 >257 180	
BCLL 0.0 *		Rep Stress Incr		YES		WB 0.68		Horz(CT) 0.81		12 n/a n/a	
BCDL 10.0		Code IRC2018/TPI2014				Matrix-S					
										Weight: 66 lb FT = 20%	



Thank You

Thank you for your time and interest in Gsource. Your trust is vital as we bring your vision to life. Should you need more information or have any questions, please feel free to contact us. We're eager to work with you.



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