



BRAD YOUNG & ASSOCIATES Inc.
STRUCTURAL ENGINEERING

These calculations must be on site and made available by the Permittee for all inspections.

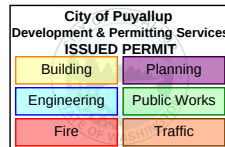
PRMH20251022

Transmittal

BYA Project #: 251072

Date: 9/26/2025

To: Lennox
Attn: Dave Mercik
From: Brad Young



**City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE**

BSnowden
10/01/2025
8:10:57 AM



Subject: Ross #593 – HVAC Replacement – Puyallup, WA

Comments:

We have completed our assessment of the subject building's roof system capacity to support the proposed HVAC loads. The new loads are resulting from replacing existing HVAC units with new units in the same locations as the previous units. The existing HVAC units RTU 1 - 7 are to be replaced with new units: RTU 1 & 6 (proposed Lennox unit, model #LGT036H5E), RTU 2 (proposed Lennox unit, model #LGT156H5M), RTU 3 (proposed Lennox unit, model #LGT092H5E), RTU 4 (proposed Lennox unit, model #LGT120H5E) & RTU 5 & 7 (proposed Lennox unit, model #LGT072H5E). An analysis of the existing roof framing showed that the new HVAC units with existing curbs and accessories could be supported by the existing framing.

Following this transmittal are structural calculations indicating that the existing roof framing meets applicable building code requirements for the new HVAC unit and curb loading. If the adapter weight is exceeded, then a new analysis will need to be performed to recheck the existing framing for the increased loading. The existing curbs are to remain and the connection of the roof curb to the roof to resist overturning forces due to wind and seismic forces was not checked. These calculations are based on site survey information and HVAC information provided by Lennox.

Please feel free to call me if you have any questions or if you need anything else.

Thank You,

Brad Young, SE
President

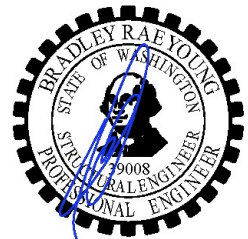


EXPIRES 11-7-2025

**STRUCTURAL ENGINEERING
CALCULATIONS**
(HVAC REPLACEMENT)

**ROSS #593
4102 S MERIDIAN
PUYALLUP, WA**

BYA# 251072
September 25, 2025



EXPIRES 11-7-2025

Prepared For:

**Lennox National Account Services
3410 N. San Fernando Rd. #5
Los Angeles, CA 90065**

ROSS-593

T.I. - HVAC replacement

Puyallup, WA

Design Parameters

Code	= 2021 WAECB
Wind	= 97 MPH, Exp. C, $I_w = 1.0$
Seismic	= Site Class D $S_s = 1.262$ $S_1 = 0.435$ $I = 1.0$ $R = N/A$
Steel fy (W.F.) A992	= 50 ksi, UNO
Steel fy (Tube) A500 Grade B	= 46 ksi, UNO
Steel fy (Pipe) A53 Grade B	= 35 ksi, UNO
Steel fy (Misc.) A36	= 36 ksi, UNO
Light gage studs fy	= 50 ksi minimum, UNO
High Strength Bolts	= A325N
Typical Bolts	= A307
Concrete f'c (Foundation)	= 3000 psi, UNO
Concrete f'c (walls)	= 3000 psi, UNO
Concrete f'c (Columns)	= 3000 psi, UNO
Concrete f'c (Floor decks)	= 3000 psi, UNO
Rebar #3 bars	= Gr. 40, fy = 40,000 psi, UNO
Rebar #4 and larger bars	= Gr. 60, fy = 60,000 psi, UNO
Welded Rebar	= A706
Dimensioned Lumber	= DF#2, UNO
Glulam Beams	= 24F-V4 @ simple spans, UNO = 24F-V8 @ Cantilever spans, UNO
Wood Connectors (Manufacture)	= Simpson Strong Tie, UNO (Equivalent may be used)
Masonry f'm	= 1500 psi, UNO
Allowable Soil Bearing Pressure	= 1500 psf

Note: The above material properties are typical properties and apply unless noted otherwise within this calculation package. The materials listed are not necessarily used in this design. Please see the following calculations for the actual types of

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Print Date: 9/25/2025

File Name: 251072.xmcd

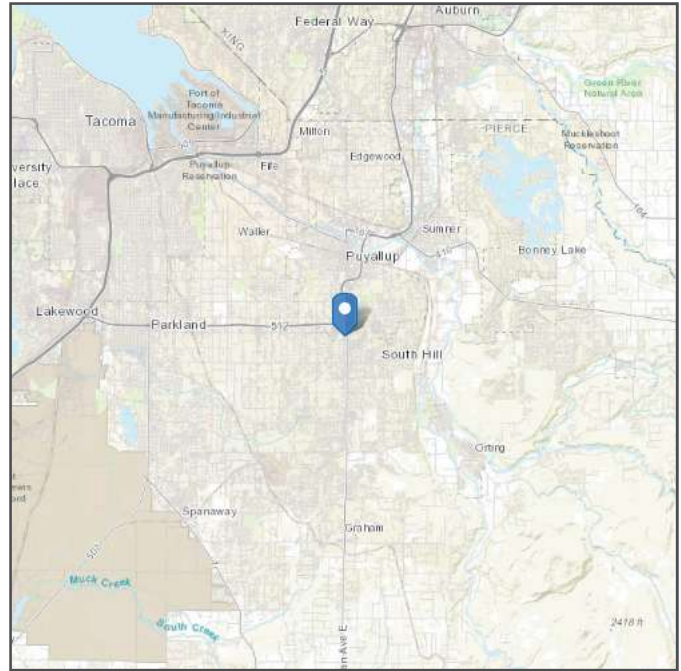
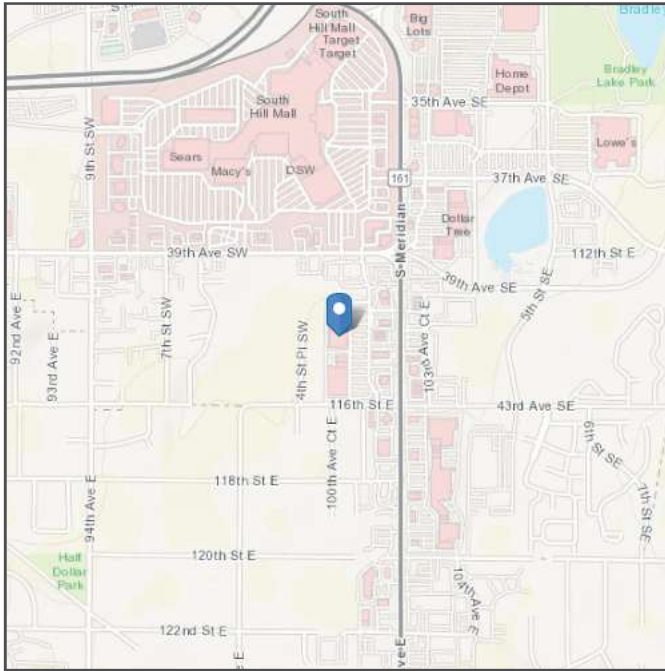
Engineer: JV

Address:
Ross - 4102 S Meridian
Puyallup,

ASCE Hazards Report

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 47.152815
Longitude: -122.295162
Elevation: 458.5018955480444 ft
(NAVD 88)



Wind

Results:

Wind Speed	97 Vmph
10-year MRI	67 Vmph
25-year MRI	73 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Wed Sep 24 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.262	S_{D1} :	N/A
S_1 :	0.435	T_L :	6
F_a :	1.2	PGA :	0.5
F_v :	N/A	PGA _M :	0.6
S_{MS} :	1.514	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.009	C_v :	1.352

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Wed Sep 24 2025

Date Source: [USGS Seismic Design Maps](#)

17C.20.170 Ground Snow Loads.

Section 1608.2 of the International Building Code is amended to add the following:

1608.2 Ground snow loads. The ground snow loads to be used in determining the design snow loads for roofs shall be 25 pounds per square foot for elevations up to 700 feet. Ground snow load determination for sites above 700 feet shall be based on the "Snow Load Analysis for Washington" prepared by the Structural Engineers Association of Washington as approved by the building official.

(Ord. 2004-30s § 3 (part), 2004)

The Pierce County Code is current through Ordinance 2025-507, passed April 15, 2025.

Disclaimer: The Pierce County Council has the official version of the Pierce County Code. Users should contact the Code Reviser for ordinances passed subsequent to the ordinance cited above.

County Website: www.piercecountywa.gov

Hosted by General Code.

materials used for this specific design.

The following calculations will address the following:

1. HVAC replacement.

All other work, if required or not addressed in this package, is by others.

Loading

Main Roof

$DL_{\text{roof}} :=$

Component	PSF
Roofing	2.0
Rigid Insulation	2.0
Metal Deck	2.3
Roof Joists	3.0
MEP	1.9
Suspended Ceiling	1.8
Miscellaneous	2.0
Total Dead Load	15

$$DL_{\text{roof}} := DL_{\text{roof}} \cdot \text{psf}$$

$$DL_{\text{roof}} = 15 \cdot \text{psf}$$

$$LL_{\text{roof}} := 20 \cdot \text{psf}$$

$$LL_{\text{roof}} = 20 \cdot \text{psf}$$

Note: When possible reduce roof live load for tributary area per ASCE 7-16 Section 4.8.
When applicable live load reduction will be noted by R_1 .

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Engineer: JV

Snow Load

$$p_g := 25 \cdot \text{psf}$$

Ground Snow Load

$$\text{Slope}_{\text{roof}} := \frac{1}{12}$$

$$C_e := 1.0$$

Exposure Factor

$$C_t := 1.0$$

Thermal Factor

$$I_s := 1.0$$

Importance Factor

$$LL_{\text{rain}} := \text{if}(0 \cdot \text{psf} < p_g \leq 20 \cdot \text{psf}, 5 \cdot \text{psf}, 0 \cdot \text{psf})$$

$$LL_{\text{rain}} = 0 \cdot \text{psf}$$

$$p_{f.1} := 0.7 \cdot C_e \cdot C_t \cdot I_s \cdot p_g + LL_{\text{rain}}$$

$$p_{f.1} = 17.5 \cdot \text{psf}$$

$$p_{f.\text{min}} := \text{if}(p_g < 20 \cdot \text{psf}, p_g \cdot I_s, 20 \cdot \text{psf} \cdot I_s)$$

$$p_{f.\text{min}} = 20 \cdot \text{psf}$$

$$p_f := \max(p_{f.1}, p_{f.\text{min}})$$

$$p_f = 20 \cdot \text{psf}$$

$$C_s := 1.0$$

$$p_s := C_s \cdot p_f$$

$$LL_{\text{snow}} := p_s$$

$$LL_{\text{snow}} = 20 \cdot \text{psf}$$

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Snow Drift

This project has a 4' tall parapet on all sides of the building.

Snow Drift - per ASCE 7-16 Section 7.7.1

$$\gamma := \min\left(\frac{0.13}{\text{ft}} \cdot p_g + 14 \cdot \text{pcf}, 30 \cdot \text{pcf}\right) \quad \gamma = 17.25 \cdot \text{pcf}$$

$$h_o = 4 \text{ ft} \quad \text{height of obstruction above roof level}$$

$$h_b := \frac{p_s}{\gamma} = 1.159 \text{ ft} \quad \text{height of balanced snow}$$

$$h_c := \max(h_o - h_b, 0) = 2.841 \text{ ft} \quad \text{max drift height}$$

$$l_{u.lee} := 20 \cdot \text{ft} \quad \text{length of high roof}$$

$$l_{u.wind} = 185.333 \text{ ft} \quad \text{length of low roof}$$

Leeward Case

$$h_{d.lee} := \min\left[\left(0.43 \cdot \sqrt[3]{\frac{l_{u.lee}}{\text{ft}}} \cdot \sqrt[4]{\frac{p_g}{\text{psf}} + 10} - 1.5\right) \cdot \text{ft} \cdot \sqrt{l_s}, 0.6 \cdot l_{u.wind}\right] \quad h_{d.lee} = 1.339 \text{ ft}$$

Windward Case

$$h_{d.wind} := \frac{3}{4} \cdot \left[\left(0.43 \cdot \sqrt[3]{\frac{l_{u.wind}}{\text{ft}}} \cdot \sqrt[4]{\frac{p_g}{\text{psf}} + 10} - 1.5\right) \cdot \text{ft} \cdot \sqrt{l_s}\right] \quad h_{d.wind} = 3.347 \text{ ft}$$

$$h_d := \min(\max(h_{d.lee}, h_{d.wind}), h_c) \quad h_d = 2.841 \text{ ft}$$

$$w := \min\left(\text{if}\left(h_d > h_c, \frac{4 \cdot h_d^2}{h_c}, 4 \cdot h_d\right), 8 \cdot h_c\right) \quad w = 11.362 \text{ ft}$$

$$LL_{\text{snow.drift}} := \gamma \cdot h_d \quad LL_{\text{snow.drift}} = 49 \cdot \text{psf}$$

$$L_{\text{drift}} := w \quad L_{\text{drift}} = 11.4 \text{ ft}$$

Item 1 - HVAC Replacement

7 HVAC units will be removed and replaced in existing locations. A site survey found that the existing roof framing consists of steel open web joists and a metal deck. Check the existing roof framing for new HVAC loads.

Per the information provided, the weight of existing and new mechanical units, including roof curbs and accessories, is as follows:

Weights are provided by Lennox

$$\text{RTU}_{1.\text{exist}} := 781 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 896 \text{lb}$$

$$\text{RTU}_{1.\text{new}} := 745 \cdot \text{lb} + 95 \cdot \text{lb} + 115 \text{lb} = 955 \text{lb}$$

$$\text{RTU}_{2.\text{exist}} := 2535 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 2650 \text{lb}$$

$$\text{RTU}_{2.\text{new}} := 2303 \cdot \text{lb} + 0 \cdot \text{lb} + 115 \text{lb} = 2418 \text{lb}$$

$$\text{RTU}_{3.\text{exist}} := 1231 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 1346 \text{lb}$$

$$\text{RTU}_{3.\text{new}} := 1260 \cdot \text{lb} + 0 \cdot \text{lb} + 115 \text{lb} = 1375 \text{lb}$$

$$\text{RTU}_{4.\text{exist}} := 1280 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 1395 \text{lb}$$

$$\text{RTU}_{4.\text{new}} := 1272 \cdot \text{lb} + 0 \cdot \text{lb} + 115 \text{lb} = 1387 \text{lb}$$

$$\text{RTU}_{5.\text{exist}} := 880 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 995 \text{lb}$$

$$\text{RTU}_{5.\text{new}} := 780 \cdot \text{lb} + 95 \cdot \text{lb} + 115 \text{lb} = 990 \text{lb}$$

$$\text{RTU}_{6.\text{exist}} := 781 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 896 \text{lb}$$

$$\text{RTU}_{6.\text{new}} := 745 \cdot \text{lb} + 95 \cdot \text{lb} + 115 \text{lb} = 955 \text{lb}$$

$$\text{RTU}_{7.\text{exist}} := 880 \cdot \text{lb} + 0 \text{lb} + 115 \cdot \text{lb} = 995 \text{lb}$$

$$\text{RTU}_{7.\text{new}} := 780 \cdot \text{lb} + 95 \cdot \text{lb} + 115 \text{lb} = 990 \text{lb}$$

Note: The weights of the new units RTU 2, RTU 4, RTU 5 & RTU 7 decreased and by inspection, is okay per 2021 WA EBC 706.2, which allows load increase to existing framing by up to 5% before additional support framing is required. Check existing framing below RTU 1, RTU 3 & RTU 6.

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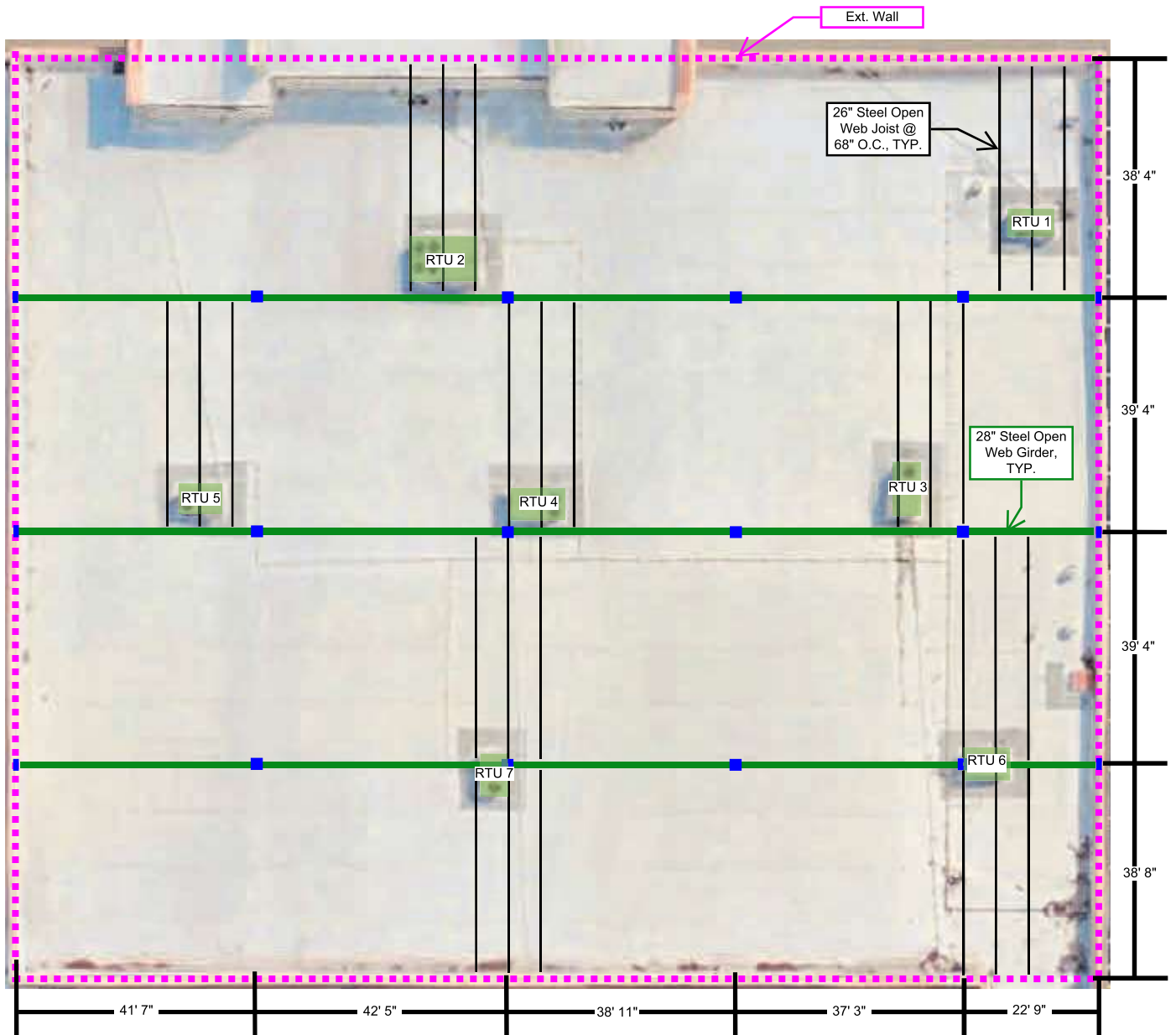
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File Name: 251072.xmcd

Engineer: JV

251072 LENNOX
ROSS - 593
4102 SOUTH MERIDIAN
PUYALLUP, WA



Member 1 - Existing Steel Open Web Joists @ RTU 1

Check the load increase at the member

$$L := 38 \cdot \text{ft} + 4 \text{ in} = 38.333 \text{ ft}$$

length of member

$$w_{\text{tributary}} := \frac{68 \text{ in} + 68 \text{ in}}{2} = 5.667 \text{ ft}$$

Tributary width

$$A_t := L \cdot w_{\text{tributary}}$$

$$A_t = 217 \text{ ft}^2$$

$$R_1 := \text{if} \left(A_t \leq 200 \cdot \text{ft}^2, 1, \text{if} \left(A_t < 600 \cdot \text{ft}^2, 1.2 - 0.001 \cdot \frac{A_t}{\text{ft}^2}, 0.6 \right) \right)$$

$$R_1 = 0.983$$

$$w_{\text{DL}} := DL_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{DL}} = 85 \cdot \text{plf}$$

$$w_{\text{LL}} := R_1 \cdot LL_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{LL}} = 111 \cdot \text{plf}$$

$$w_{\text{SL}} := LL_{\text{snow}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL}} = 113 \cdot \text{plf}$$

Snow Drift at L = 0 to 11.4 ft

$$w_{\text{SL.drift}} := LL_{\text{snow.drift}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL.drift}} = 278 \cdot \text{plf}$$

RTU 1 weight is supported by at least 2 joists. Divide the RTU weight by 4 to get the point load at each support location.

$$P_{\text{RTU.1.exist}} := \frac{\text{RTU}_{1.\text{exist}}}{4} = 224 \text{ lb}$$

at L = 26 & 29.417 ft

$$P_{\text{RTU.1.new}} := \frac{\text{RTU}_{1.\text{new}}}{4} = 239 \text{ lb}$$

at L = 26 & 29.417 ft

Check Roof Joist Capacity

$$M_{\text{exist}} := 41761 \cdot \text{lb} \cdot \text{ft}$$

$$V_{\text{exist}} := 5347 \cdot \text{lb}$$

Per attached Enercalc report

$$M_{\text{new}} := 41919 \cdot \text{lb} \cdot \text{ft}$$

$$V_{\text{new}} := 5355 \cdot \text{lb}$$

Per attached Enercalc report

$$\frac{M_{\text{new}} - M_{\text{exist}}}{M_{\text{exist}}} = 0.378 \cdot \%$$

< 5% Load increase within allowable limits

$$\frac{V_{\text{new}} - V_{\text{exist}}}{V_{\text{exist}}} = 0.15 \cdot \%$$

< 5% Load increase within allowable limits

Per Section 706.2 of the 2021 WAEBC, the existing framing is allowed an increase of loading of 5% before additional support framing is required. The moment and shear force increase due to the new loading is less than 5%, so the existing roof framing members are okay.

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Print Date: 9/25/2025

File Name: 251072.xmcd

Engineer: JV

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

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(c) ENERCALC, LLC 1982-2025

DESCRIPTION: member 1 - existing load

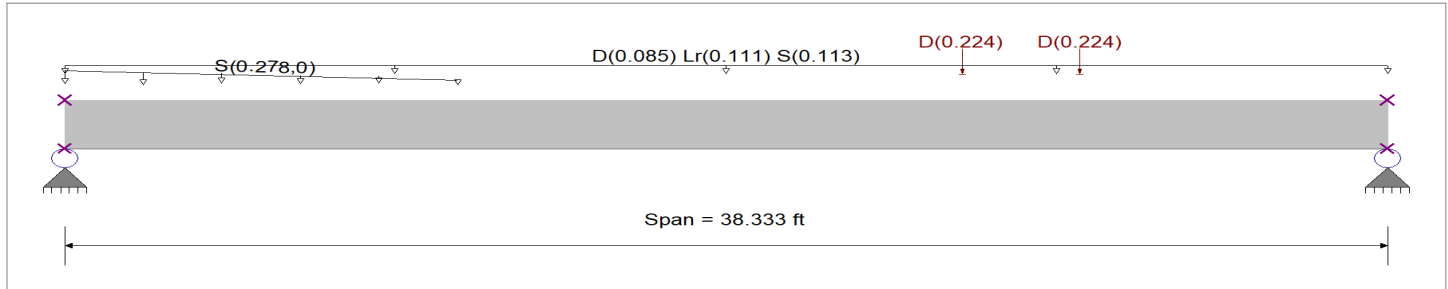
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 38.333 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, Lr = 0.1110, S = 0.1130 k/ft, Tributary Width = 1.0 ft, (roof)

Varying Uniform Load : S = 0.2780->0.0 k/ft, Extent = 0.0 --> 11.40 ft, Trib Width = 1.0 ft, (snow drift)

Point Load : D = 0.2240 k @ 26.0 ft, (rtu)

Point Load : D = 0.2240 k @ 29.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	41.761 k-ft	Maximum Shear =	5.347 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	18.975 ft	Location of maximum on span	0.000 ft
Maximum Deflection	Deflection	Ratio	Span Load Combo
Max Downward Transient Deflection	2.230 in	206	Span #1 S Only
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.898 in	117	Span #1 +D+S
Max Upward Total Deflection	0.000 in	0	N/A

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)					
Segment Length	Span #		M	V	Mmax +	Mmax -	Ma -	Max	Mnx	Mnx/Omega	Cb	Rm	Va	Max	Vnx	Vnx/Omega
Overall MAXimum Envelope																
Dsgn. L = 38.33 ft	1				41.76			41.76						5.35		
D Only																
Dsgn. L = 38.33 ft	1				18.08			18.08						1.95		
+D+Lr																
Dsgn. L = 38.33 ft	1				38.42			38.42						4.08		
+D+S																
Dsgn. L = 38.33 ft	1				41.76			41.76						5.35		
+D+0.750Lr																
Dsgn. L = 38.33 ft	1				33.33			33.33						3.55		
+D+0.750S																
Dsgn. L = 38.33 ft	1				35.82			35.82						4.45		
+0.60D																
Dsgn. L = 38.33 ft	1				10.85			10.85						1.17		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.8984	19.167		0.0000	0.000

General Beam Analysis

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LIC# : KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 1 - existing load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.347	4.276
Overall MINimum		
D Only	1.753	1.953
+D+Lr	3.881	4.080
+D+S	5.347	4.276
+D+0.750Lr	3.349	3.549
+D+0.750S	4.448	3.695
+0.60D	1.052	1.172
Lr Only	2.127	2.127
S Only	3.593	2.323

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 1 - new load

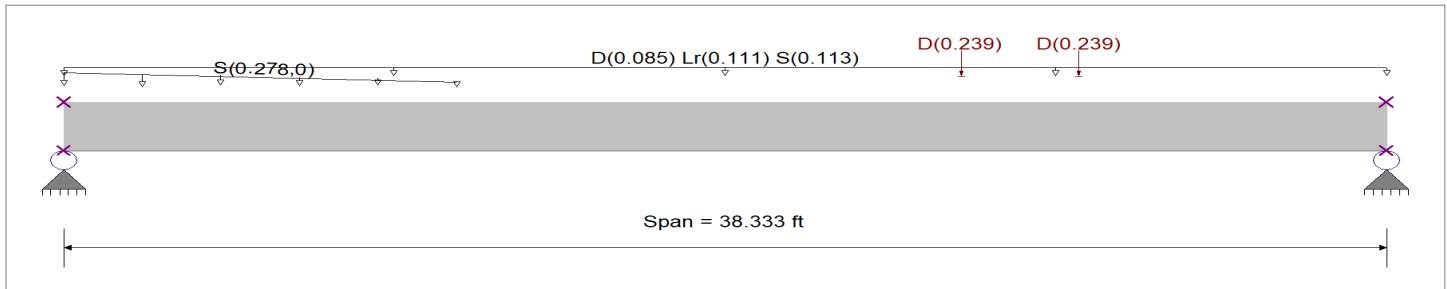
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 38.333 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, Lr = 0.1110, S = 0.1130 k/ft, Tributary Width = 1.0 ft, (roof)

Varying Uniform Load : S = 0.2780->0.0 k/ft, Extent = 0.0 -->> 11.40 ft, Trib Width = 1.0 ft, (snow drift)

Point Load : D = 0.2390 k @ 26.0 ft, (rtu)

Point Load : D = 0.2390 k @ 29.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	41.919 k-ft	Maximum Shear =	5.355 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	18.975 ft	Location of maximum on span	0.000 ft
Maximum Deflection	Deflection	Ratio	Span
Max Downward Transient Deflection	2.230 in	206	Span #1
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.914 in	117	Span #1
Max Upward Total Deflection	0.000 in	0	N/A
			Load Combo
			S Only
			+D+S

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)					
Segment	Length	Span #	M	V	Mmax +	Mmax -	Ma -	Max	Mnx	Mnx/Omega	Cb	Rm	Va	Max	Vnx	Vnx/Omega
Overall MAXimum Envelope																
Dsgn.	L = 38.33 ft	1			41.92			41.92						5.35		
D Only																
Dsgn.	L = 38.33 ft	1			18.26			18.26						1.97		
+D+Lr																
Dsgn.	L = 38.33 ft	1			38.58			38.58						4.10		
+D+S																
Dsgn.	L = 38.33 ft	1			41.92			41.92						5.35		
+D+0.750Lr																
Dsgn.	L = 38.33 ft	1			33.50			33.50						3.57		
+D+0.750S																
Dsgn.	L = 38.33 ft	1			35.98			35.98						4.46		
+0.60D																
Dsgn.	L = 38.33 ft	1			10.95			10.95						1.18		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.9140	19.167		0.0000	0.000

General Beam Analysis

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LIC# : KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 1 - new load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.355	4.298
Overall MINimum		
D Only	1.762	1.975
+D+Lr	3.889	4.102
+D+S	5.355	4.298
+D+0.750Lr	3.357	3.570
+D+0.750S	4.457	3.717
+0.60D	1.057	1.185
Lr Only	2.127	2.127
S Only	3.593	2.323

Member 2 - Existing Steel Open Web Joists @ RTU 3

Check the load increase at the member

$$L := 39 \cdot \text{ft} + 4 \text{ in} = 39.333 \text{ ft}$$

length of member

$$w_{\text{tributary}} := \frac{68 \text{ in} + 68 \text{ in}}{2} = 5.667 \text{ ft}$$

Tributary width

$$A_t := L \cdot w_{\text{tributary}}$$

$$A_t = 223 \text{ ft}^2$$

$$R_1 := \text{if} \left(A_t \leq 200 \cdot \text{ft}^2, 1, \text{if} \left(A_t < 600 \cdot \text{ft}^2, 1.2 - 0.001 \cdot \frac{A_t}{\text{ft}^2}, 0.6 \right) \right)$$

$$R_1 = 0.977$$

$$w_{\text{DL}} := \text{DL}_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{DL}} = 85 \cdot \text{plf}$$

$$w_{\text{LL}} := R_1 \cdot \text{LL}_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{LL}} = 111 \cdot \text{plf}$$

$$w_{\text{SL}} := \text{LL}_{\text{snow}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL}} = 113 \cdot \text{plf}$$

RTU 3 weight is supported by at least 2 joists. Divide the RTU weight by 4 to get the point load at each support location.

$$P_{\text{RTU.3.exist}} := \frac{\text{RTU}_{3.\text{exist}}}{4} = 337 \text{ lb}$$

at L = 2 & 10.417 ft

$$P_{\text{RTU.3.new}} := \frac{\text{RTU}_{3.\text{new}}}{4} = 344 \text{ lb}$$

at L = 2 & 10.417 ft

Check Roof Joist Capacity

$$M_{\text{exist}} := 40411 \cdot \text{lb} \cdot \text{ft}$$

$$V_{\text{exist}} := 4462 \cdot \text{lb}$$

Per attached Enercalc report

$$M_{\text{new}} := 40456 \cdot \text{lb} \cdot \text{ft}$$

$$V_{\text{new}} := 4473 \cdot \text{lb}$$

Per attached Enercalc report

$$\frac{M_{\text{new}} - M_{\text{exist}}}{M_{\text{exist}}} = 0.111 \cdot \%$$

< 5% Load increase within allowable limits

$$\frac{V_{\text{new}} - V_{\text{exist}}}{V_{\text{exist}}} = 0.247 \cdot \%$$

< 5% Load increase within allowable limits

Per Section 706.2 of the 2021 WAEBEC, the existing framing is allowed an increase of loading of 5% before additional support framing is required. The moment and shear force increase due to the new loading is less than 5%, so the existing roof framing members are okay.

BRAD YOUNG & ASSOCIATES

STRUCTURAL ENGINEERING

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Print Date: 9/25/2025

File Name: 251072.xmcd

Engineer: JV

General Beam Analysis

Project File: 251072.ec6

LIC#: KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 2 - existing load

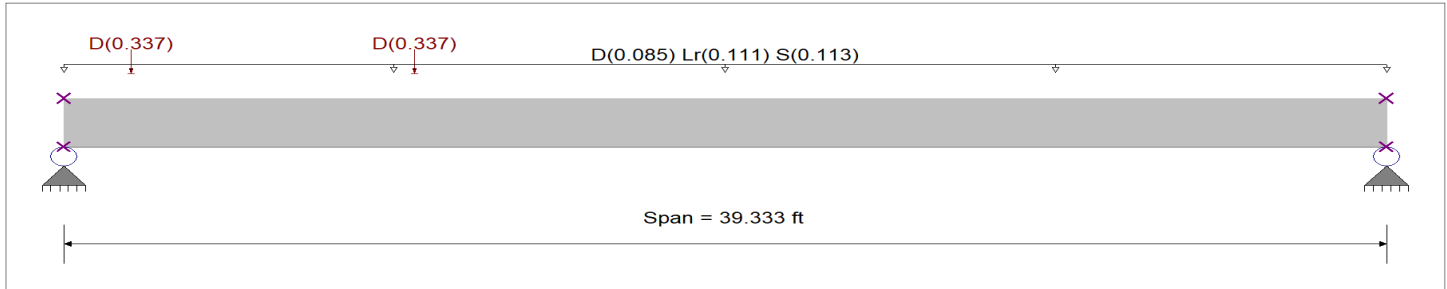
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 39.333 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, Lr = 0.1110, S = 0.1130 k/ft, Tributary Width = 1.0 ft, (roof)

Point Load : D = 0.3370 k @ 2.0 ft, (rtu)

Point Load : D = 0.3370 k @ 10.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	40.411 k-ft	Maximum Shear =	4.462 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	19.077 ft	Location of maximum on span	0.000 ft
Maximum Deflection	Deflection	Ratio	Span
Max Downward Transient Deflection	2.115 in	223	Span #1
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.931 in	120	Span #1
Max Upward Total Deflection	0.000 in	0	N/A
			Load Combo
			S Only
			+D+S

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)							Shear Values (k)	
Segment Length	Span #		M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
Overall MAXimum Envelope													
Dsgn. L = 39.33 ft	1				40.41		40.41					4.46	
D Only													
Dsgn. L = 39.33 ft	1				18.60		18.60					2.24	
+D+Lr													
Dsgn. L = 39.33 ft	1				40.02		40.02					4.42	
+D+S													
Dsgn. L = 39.33 ft	1				40.41		40.41					4.46	
+D+0.750Lr													
Dsgn. L = 39.33 ft	1				34.66		34.66					3.88	
+D+0.750S													
Dsgn. L = 39.33 ft	1				34.95		34.95					3.91	
+0.60D													
Dsgn. L = 39.33 ft	1				11.16		11.16					1.34	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.9308	19.667		0.0000	0.000

Vertical Reactions

Load Combination	Support 1	Support 2	Support notation : Far left is #:	Values in KIPS
Overall MAXimum	4.462	4.000		
Overall MINimum				

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 2 - existing load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
D Only	2.239	1.778
+D+Lr	4.422	3.961
+D+S	4.462	4.000
+D+0.750Lr	3.877	3.415
+D+0.750S	3.906	3.445
+0.60D	1.344	1.067
Lr Only	2.183	2.183
S Only	2.222	2.222

General Beam Analysis

Project File: 251072.ec6

LIC#: KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 2 - new load

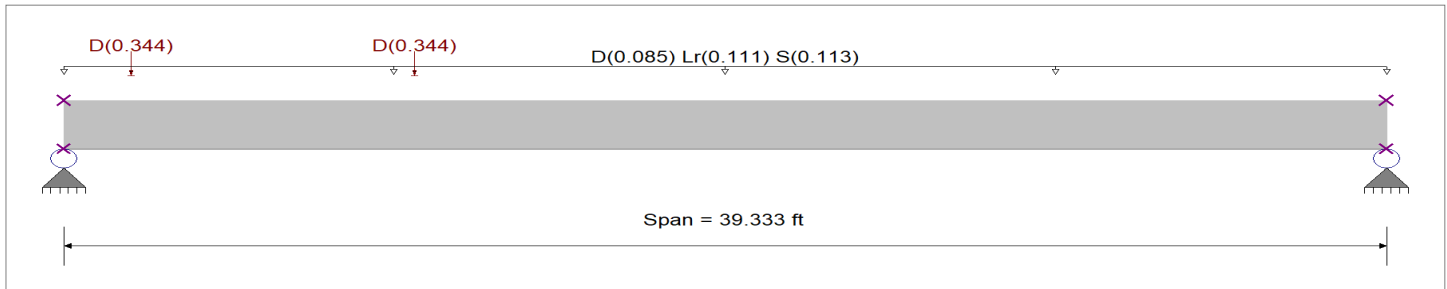
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 39.333 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, Lr = 0.1110, S = 0.1130 k/ft, Tributary Width = 1.0 ft, (roof)

Point Load : D = 0.3440 k @ 2.0 ft, (rtu)

Point Load : D = 0.3440 k @ 10.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	40.456 k-ft	Maximum Shear =	4.473 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	19.077 ft	Location of maximum on span	0.000 ft
Maximum Deflection	Deflection	Ratio	Span
Max Downward Transient Deflection	2.115 in	223	Span #1
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.936 in	119	Span #1
Max Upward Total Deflection	0.000 in	0	N/A
			Load Combo
			S Only
			+D+S

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)		
Segment Length	Span #		M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
Overall MAXimum Envelope													
Dsgn. L = 39.33 ft	1				40.46		40.46					4.47	
D Only													
Dsgn. L = 39.33 ft	1				18.64		18.64					2.25	
+D+Lr													
Dsgn. L = 39.33 ft	1				40.07		40.07					4.43	
+D+S													
Dsgn. L = 39.33 ft	1				40.46		40.46					4.47	
+D+0.750Lr													
Dsgn. L = 39.33 ft	1				34.71		34.71					3.89	
+D+0.750S													
Dsgn. L = 39.33 ft	1				35.00		35.00					3.92	
+0.60D													
Dsgn. L = 39.33 ft	1				11.19		11.19					1.35	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.9355	19.667		0.0000	0.000

Vertical Reactions

Load Combination	Support 1	Support 2
Overall MAXimum	4.473	4.003
Overall MINimum		

Support notation : Far left is #.

Values in KIPS

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 2 - new load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
D Only	2.251	1.780
+D+Lr	4.434	3.963
+D+S	4.473	4.003
+D+0.750Lr	3.888	3.417
+D+0.750S	3.918	3.447
+0.60D	1.351	1.068
Lr Only	2.183	2.183
S Only	2.222	2.222

Member 3 - Existing Steel Open Web Joists @ RTU 6

Check the load increase at the member

$$L := 38 \cdot \text{ft} + 8 \text{ in} = 38.667 \text{ ft}$$

length of member

$$w_{\text{tributary}} := \frac{68 \text{ in} + 68 \text{ in}}{2} = 5.667 \text{ ft}$$

Tributary width

$$A_t := L \cdot w_{\text{tributary}}$$

$$A_t = 219 \text{ ft}^2$$

$$R_1 := \text{if} \left(A_t \leq 200 \cdot \text{ft}^2, 1, \text{if} \left(A_t < 600 \cdot \text{ft}^2, 1.2 - 0.001 \cdot \frac{A_t}{\text{ft}^2}, 0.6 \right) \right)$$

$$R_1 = 0.981$$

$$w_{\text{DL}} := \text{DL}_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{DL}} = 85 \cdot \text{plf}$$

$$w_{\text{LL}} := R_1 \cdot \text{LL}_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{LL}} = 111 \cdot \text{plf}$$

$$w_{\text{SL}} := \text{LL}_{\text{snow}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL}} = 113 \cdot \text{plf}$$

Snow Drift at L = 0 to 11.4 ft

$$w_{\text{SL.drift}} := \text{LL}_{\text{snow.drift}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL.drift}} = 278 \cdot \text{plf}$$

RTU 6 weight is supported by a steel girder and two steel joists. Divide the RTU weight by 4 to get the point load at each support location.

$$P_{\text{RTU.6.exist}} := \frac{\text{RTU}_{6.\text{exist}}}{4} = 224 \text{ lb}$$

at L = 35 & 38.417 ft

$$P_{\text{RTU.6.new}} := \frac{\text{RTU}_{6.\text{new}}}{4} = 239 \text{ lb}$$

at L = 35 & 38.417 ft

Check Roof Joist Capacity

$$M_{\text{exist}} := 40498 \cdot \text{lb} \cdot \text{ft} \quad V_{\text{exist}} := 5280 \cdot \text{lb} \quad \text{Per attached Enercalc report}$$

$$M_{\text{new}} := 40526 \cdot \text{lb} \cdot \text{ft} \quad V_{\text{new}} := 5281 \cdot \text{lb} \quad \text{Per attached Enercalc report}$$

$$\frac{M_{\text{new}} - M_{\text{exist}}}{M_{\text{exist}}} = 0.069\% \quad < 5\% \quad \text{Load increase within allowable limits}$$

$$\frac{V_{\text{new}} - V_{\text{exist}}}{V_{\text{exist}}} = 0.019\% \quad < 5\% \quad \text{Load increase within allowable limits}$$

Per Section 706.2 of the 2021 WAEBEC, the existing framing is allowed an increase of loading of 5% before additional support framing is required. The moment and shear force increase due to the new loading is less than 5%, so the existing roof framing members are okay.

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Print Date: 9/25/2025

File Name: 251072.xmcd

Engineer: JV

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 3 - existing load

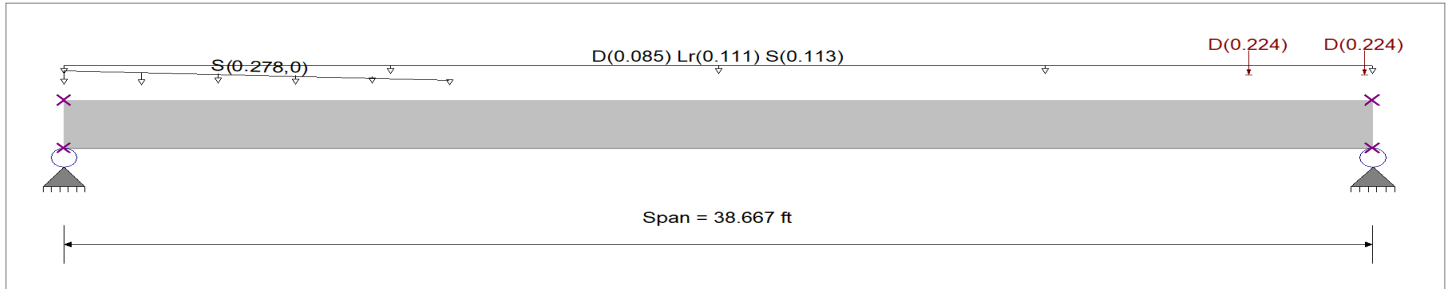
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 38.667 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, Lr = 0.1110, S = 0.1130 k/ft, Tributary Width = 1.0 ft, (roof)

Varying Uniform Load : S= 0.2780->0.0 k/ft, Extent = 0.0 --> 11.40 ft, Trib Width = 1.0 ft, (snow drift)

Point Load : D = 0.2240 k @ 35.0 ft, (rtu)

Point Load : D = 0.2240 k @ 38.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	40.498 k-ft	Maximum Shear =	5.280 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	18.753 ft	Location of maximum on span	0.000 ft
Maximum Deflection	Deflection	Ratio	Span Load Combo
Max Downward Transient Deflection	2.304 in	201	Span #1 S Only
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.838 in	120	Span #1 +D+S
Max Upward Total Deflection	0.000 in	0	N/A

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)							Shear Values (k)				
Segment Length	Span #		M	V	Mmax +	Mmax -	Ma -	Max	Mnx	Mnx/Omega	Cb	Rm	Va	Max	Vnx	Vnx/Omega
Overall MAXimum Envelope																
Dsgn. L =	38.67 ft	1			40.50			40.50						5.28		
D Only																
Dsgn. L =	38.67 ft	1			16.33			16.33						2.07		
+D+Lr																
Dsgn. L =	38.67 ft	1			37.07			37.07						4.21		
+D+S																
Dsgn. L =	38.67 ft	1			40.50			40.50						5.28		
+D+0.750Lr																
Dsgn. L =	38.67 ft	1			31.88			31.88						3.68		
+D+0.750S																
Dsgn. L =	38.67 ft	1			34.45			34.45						4.38		
+0.60D																
Dsgn. L =	38.67 ft	1			9.80			9.80						1.24		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.8378	19.334		0.0000	0.000

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 3 - existing load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.280	4.409
Overall MINimum		
D Only	1.666	2.069
+D+Lr	3.812	4.215
+D+S	5.280	4.409
+D+0.750Lr	3.276	3.678
+D+0.750S	4.376	3.824
+0.60D	1.000	1.241
Lr Only	2.146	2.146
S Only	3.614	2.340

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

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DESCRIPTION: member 3 - new load

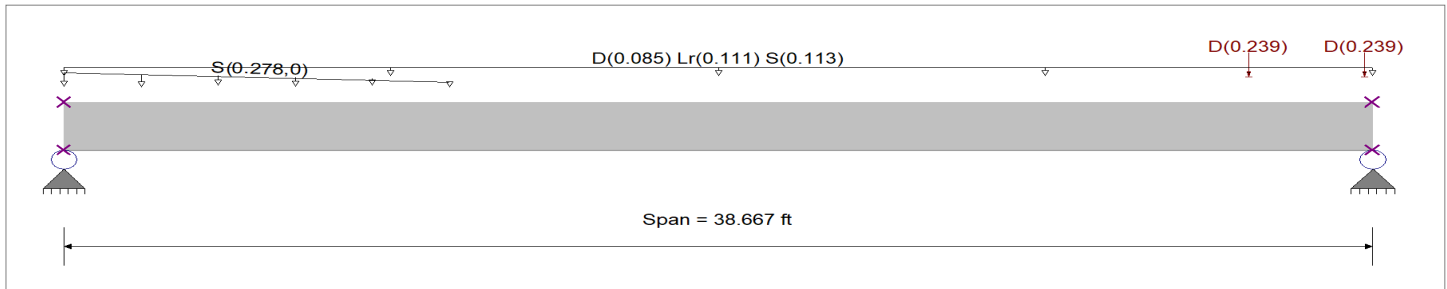
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 38.667 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, Lr = 0.1110, S = 0.1130 k/ft, Tributary Width = 1.0 ft, (roof)

Varying Uniform Load : S = 0.2780->0.0 k/ft, Extent = 0.0 --> 11.40 ft, Trib Width = 1.0 ft, (snow drift)

Point Load : D = 0.2390 k @ 35.0 ft, (rtu)

Point Load : D = 0.2390 k @ 38.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	40.526 k-ft	Maximum Shear =	5.281 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	18.753 ft	Location of maximum on span	0.000 ft
Maximum Deflection	Deflection	Ratio	Span Load Combo
Max Downward Transient Deflection	2.304 in	201	Span #1 S Only
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.841 in	120	Span #1 +D+S
Max Upward Total Deflection	0.000 in	0	N/A

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)							Shear Values (k)				
Segment Length	Span #		M	V	Mmax +	Mmax -	Ma -	Max	Mnx	Mnx/Omega	Cb	Rm	Va	Max	Vnx	Vnx/Omega
Overall MAXimum Envelope																
Dsgn. L = 38.67 ft	1				40.53			40.53						5.28		
D Only																
Dsgn. L = 38.67 ft	1				16.36			16.36						2.10		
+D+Lr																
Dsgn. L = 38.67 ft	1				37.10			37.10						4.24		
+D+S																
Dsgn. L = 38.67 ft	1				40.53			40.53						5.28		
+D+0.750Lr																
Dsgn. L = 38.67 ft	1				31.91			31.91						3.71		
+D+0.750S																
Dsgn. L = 38.67 ft	1				34.48			34.48						4.38		
+0.60D																
Dsgn. L = 38.67 ft	1				9.81			9.81						1.26		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.8411	19.334		0.0000	0.000

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 3 - new load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.281	4.438
Overall MINimum		
D Only	1.668	2.097
+D+Lr	3.814	4.243
+D+S	5.281	4.438
+D+0.750Lr	3.277	3.707
+D+0.750S	4.378	3.852
+0.60D	1.001	1.258
Lr Only	2.146	2.146
S Only	3.614	2.340

Member 4 - Existing Steel Open Web Girder @ RTU 6

Check the load increase at the member

$$L := 22 \cdot \text{ft} + 9 \text{ in} = 22.75 \text{ ft}$$

length of member

$$w_{\text{tributary}} := \frac{39.333 \text{ ft} + 38.667 \text{ ft}}{2} = 39 \text{ ft}$$

Tributary width

$$A_t := L \cdot w_{\text{tributary}}$$

$$A_t = 887 \text{ ft}^2$$

$$R_1 := \text{if} \left(A_t \leq 200 \cdot \text{ft}^2, 1, \text{if} \left(A_t < 600 \cdot \text{ft}^2, 1.2 - 0.001 \cdot \frac{A_t}{\text{ft}^2}, 0.6 \right) \right)$$

$$R_1 = 0.600$$

$$w_{\text{DL}} := \text{DL}_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{DL}} = 585 \cdot \text{plf}$$

$$w_{\text{LL}} := R_1 \cdot \text{LL}_{\text{roof}} \cdot w_{\text{tributary}}$$

$$w_{\text{LL}} = 468 \cdot \text{plf}$$

$$w_{\text{SL}} := \text{LL}_{\text{snow}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL}} = 780 \cdot \text{plf}$$

Snow Drift at L = 11.388 to 22.75 ft

$$w_{\text{SL.drift}} := \text{LL}_{\text{snow.drift}} \cdot w_{\text{tributary}}$$

$$w_{\text{SL.drift}} = 1911 \cdot \text{plf}$$

RTU 6 weight is supported by a steel girder. Divide the RTU weight by 2 to get the point load at each support location.

$$P_{\text{RTU.6.exist}} := \frac{\text{RTU}_{6.\text{exist}}}{2} = 448 \text{ lb}$$

at L = 1 & 9.417 ft

$$P_{\text{RTU.6.new}} := \frac{\text{RTU}_{6.\text{new}}}{2} = 478 \text{ lb}$$

at L = 1 & 9.417 ft

Check Roof Joist Capacity

$$M_{\text{exist}} := 112100 \cdot \text{lb} \cdot \text{ft} \quad V_{\text{exist}} := 24781 \cdot \text{lb} \quad \text{Per attached Enercalc report}$$

$$M_{\text{new}} := 112241 \cdot \text{lb} \cdot \text{ft} \quad V_{\text{new}} := 24795 \cdot \text{lb} \quad \text{Per attached Enercalc report}$$

$$\frac{M_{\text{new}} - M_{\text{exist}}}{M_{\text{exist}}} = 0.126\% \quad < 5\% \quad \text{Load increase within allowable limits}$$

$$\frac{V_{\text{new}} - V_{\text{exist}}}{V_{\text{exist}}} = 0.056\% \quad < 5\% \quad \text{Load increase within allowable limits}$$

Per Section 706.2 of the 2021 WAEBEC, the existing framing is allowed an increase of loading of 5% before additional support framing is required. The moment and shear force increase due to the new loading is less than 5%, so the existing roof framing members are okay.

BRAD YOUNG & ASSOCIATES

STRUCTURAL ENGINEERING

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Print Date: 9/25/2025

File Name: 251072.xmcd

Engineer: JV

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 4 - existing load

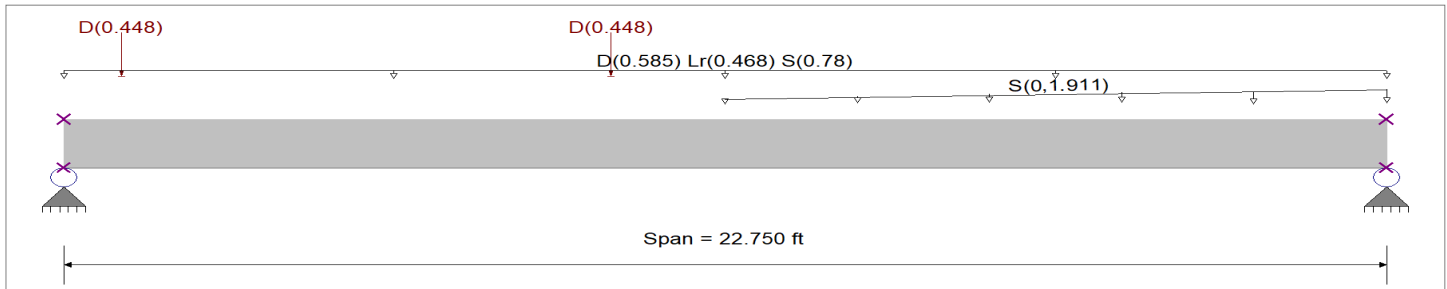
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 22.750 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.5850, Lr = 0.4680, S = 0.780 k/ft, Tributary Width = 1.0 ft, (roof)

Varying Uniform Load : S = 0.0->1.911 k/ft, Extent = 11.388 --> 22.750 ft, Trib Width = 1.0 ft, (snow drift)

Point Load : D = 0.4480 k @ 1.0 ft, (rtu)

Point Load : D = 0.4480 k @ 9.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	112.100 k-ft	Maximum Shear =	24.781 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	12.513 ft	Location of maximum on span	22.750 ft
Maximum Deflection	Deflection	Ratio	Span Load Combo
Max Downward Transient Deflection	2.356 in	115	Span #1 S Only
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.652 in	74	Span #1 +D+S
Max Upward Total Deflection	0.000 in	0	N/A

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)					
Segment Length	Span #		M	V	Mmax +	Mmax -	Ma -	Max	Mnx	Mnx/Omega	Cb	Rm	Va	Max	Vnx	Vnx/Omega
Overall MAXimum Envelope																
Dsgn. L = 22.75 ft	1				112.10			112.10						24.78		
D Only																
Dsgn. L = 22.75 ft	1				40.22			40.22						7.35		
+D+Lr																
Dsgn. L = 22.75 ft	1				70.48			70.48						12.67		
+D+S																
Dsgn. L = 22.75 ft	1				112.10			112.10						24.78		
+D+0.750Lr																
Dsgn. L = 22.75 ft	1				62.91			62.91						11.34		
+D+0.750S																
Dsgn. L = 22.75 ft	1				93.99			93.99						20.30		
+0.60D																
Dsgn. L = 22.75 ft	1				24.13			24.13						4.41		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.6516	11.716		0.0000	0.000

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 4 - existing load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	18.025	24.781
Overall MINimum		
D Only	7.345	6.860
+D+Lr	12.669	12.183
+D+S	18.025	24.781
+D+0.750Lr	11.338	10.852
+D+0.750S	15.355	20.301
+0.60D	4.407	4.116
Lr Only	5.324	5.324
S Only	10.680	17.922

General Beam Analysis

Project File: 251072.ec6

LIC#: KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: member 4 - new load

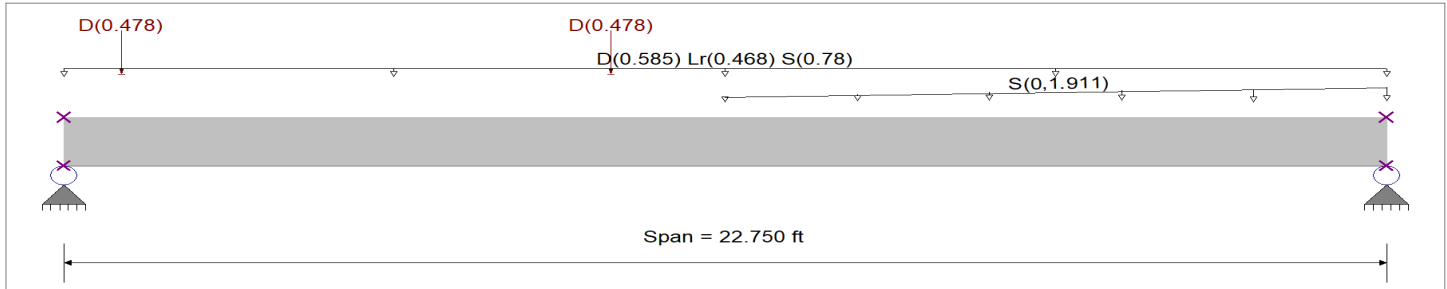
Code References

Governing Code : IBC 2018, CBC 2019

Load Combinations Used : ASCE 7-16

General Beam Properties

Elastic Modulus 29,000.0 ksi
Span #1 Span Length = 22.750 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.5850, Lr = 0.4680, S = 0.780 k/ft, Tributary Width = 1.0 ft, (roof)

Varying Uniform Load : S = 0.0->1.911 k/ft, Extent = 11.388 --> 22.750 ft, Trib Width = 1.0 ft, (snow drift)

Point Load : D = 0.4780 k @ 1.0 ft, (rtu)

Point Load : D = 0.4780 k @ 9.417 ft, (rtu)

DESIGN SUMMARY

Maximum Bending =	112.241 k-ft	Maximum Shear =	24.795 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	12.513 ft	Location of maximum on span	22.750 ft
Maximum Deflection	Deflection	Ratio	Span Load Combo
Max Downward Transient Deflection	2.356 in	115	Span #1 S Only
Max Upward Transient Deflection	0.000 in	0	N/A
Max Downward Total Deflection	3.656 in	74	Span #1 +D+S
Max Upward Total Deflection	0.000 in	0	N/A

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)	
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega	Cb	Rm	Va Max
Overall MAXimum Envelope												
Dsgn. L = 22.75 ft	1				112.24		112.24					24.79
D Only												
Dsgn. L = 22.75 ft	1				40.38		40.38					7.39
+D+Lr												
Dsgn. L = 22.75 ft	1				70.64		70.64					12.72
+D+S												
Dsgn. L = 22.75 ft	1				112.24		112.24					24.79
+D+0.750Lr												
Dsgn. L = 22.75 ft	1				63.07		63.07					11.38
+D+0.750S												
Dsgn. L = 22.75 ft	1				94.14		94.14					20.31
+0.60D												
Dsgn. L = 22.75 ft	1				24.23		24.23					4.43

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.6564	11.716		0.0000	0.000

General Beam Analysis

Project File: 251072.ec6

LIC# : KW-06018181, Build:20.25.09.16

BRAD YOUNG & ASSOCIATES, INC

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DESCRIPTION: member 4 - new load

Vertical Reactions

Support notation : Far left is #.

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	18.071	24.795
Overall MINimum		
D Only	7.392	6.873
+D+Lr	12.715	12.197
+D+S	18.071	24.795
+D+0.750Lr	11.384	10.866
+D+0.750S	15.401	20.314
+0.60D	4.435	4.124
Lr Only	5.324	5.324
S Only	10.680	17.922