

Structural Analysis (Roof Check)

December 28, 2023

Site: BA00324A, "SF324 Meadow Park School"

Type: Rooftop

Address: 5400 Nave Dr., Novato, CA 94949

County: Marin County

Lat/Long: 38° 3' 2.0" N, 122° 31' 49.7" W (38.050544, -122.530467)

P#/Eng: P-095412/AN



DATE: 12/27/2023
EXPIRES: 09/30/2025

J5 Infrastructure Partners (J5IP) is pleased to submit this structural analysis report to T-Mobile. The purpose of this analysis is to evaluate existing roof structure. The project scope of work relevant to this report includes the following items:

- Remove (6) (E) Panel Antennas
- Remove (4) (E) RRU Units
- Remove (4) (E) TMAs
- Remove (2) (E) Diplexers
- Install (4) (P) Panel Antennas
- Install (4) (P) RRU Units

A site visit was performed by J5IP personnel on June 13, 2019. Existing elements relevant to the project scope of work were visually inspected and found to be in good condition.

This report was prepared in accordance with the 2022 CBC, ASCE 7-16, AISC 360-16, and the NDS-2018.

This analysis is based off third party data and assumes satisfactory workmanship of all previously-installed and proposed components. If existing conditions vary from what is shown in this report, or if assumptions made within this analysis are inaccurate, the Engineer of Record shall be notified immediately in writing.

It has been our pleasure to be of service to you in this matter. The results of our analysis are summarized in the table below. Please contact us should you have any specific questions, require further clarification, or if we can be of further service.

Sincerely,
J5 Infrastructure Partners, Inc.

Description of Element	Demand-Capacity Ratio	Result	Notes
(E) Roof Purlin - Sector A (6x12 DFL No. 2)	89%	PASS	
(E) Roof Purlin - Sector B (6x12 DFL No. 2)	98%	PASS	

Due Diligence Review

This report is based on the information obtained in the documents listed below.

Documents Summary

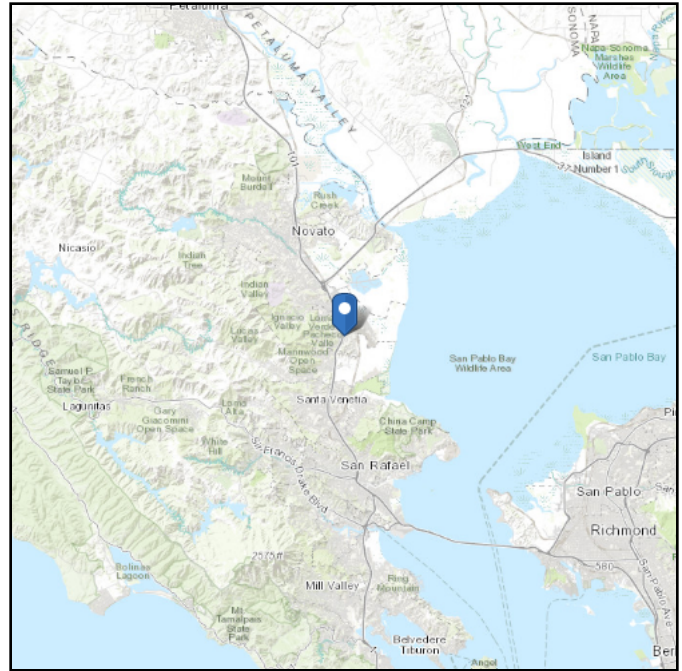
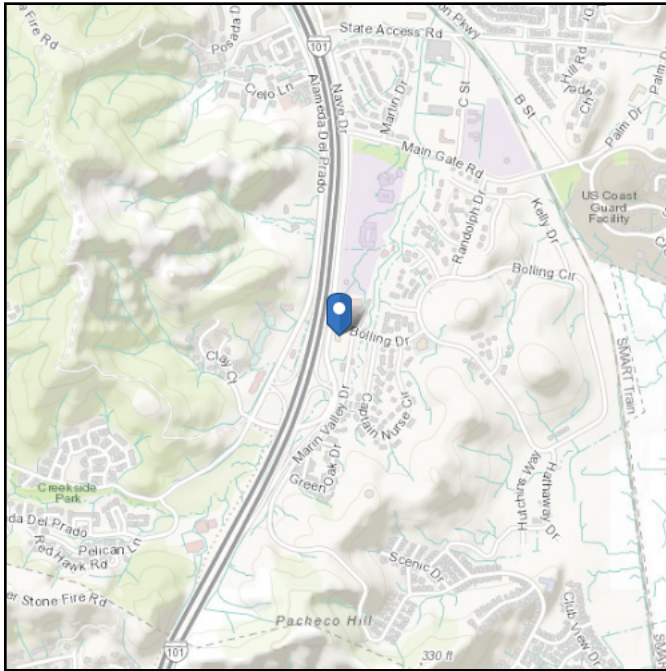
No.	Document Type	Firm	Date	Information Obtained
1	Site Visit Photos	Centerline	Jul 10, 2023	Site Photos
2	As-Built Drawings	ZON Architects	Dec 30, 2015	(E) Equipment Anchorage (Assume 6" Pad)
3	Structural Analysis	ZON Architects	Nov 5, 2015	(E) Antenna Mount Framing Analysis (E) Roof Framing Check

ASCE 7 Hazards Report

Address:
5400 Nave Dr
Novato, California
94949

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

Latitude: 38.050669
Longitude: -122.530488
Elevation: 79.7455980899168 ft (NAVD 88)



Wind

Results:

Wind Speed	92 Vmph
10-year MRI	64 Vmph
25-year MRI	70 Vmph
50-year MRI	74 Vmph
100-year MRI	79 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: Fri Dec 15 2023

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 :	1.5	S_{D1} :	N/A
S_1 :	0.6	T_L :	12
F_a :	1.2	PGA :	0.583
F_v :	N/A	PGA _M :	0.7
S_{MS} :	1.8	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.2	C_v :	1.4

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

Data Accessed: Fri Dec 15 2023

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

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

Seismic Design Criteria where ASCE 7-16 CH 11.4.8 Applies

The web-based tools used to determine seismic design criteria do not produce values for F_a and F_v where ASCE 7-16 CH 11.4.8 is applicable. This tool produces the missing values and determines if a site-specific ground motion study per ASCE 7-16 CH 21.1 is required.

Site Information

Risk Category: **II**
Site Class: **D (Default)**
 S_S : **1.500**
 S_1 : **0.600**
 F_a : 1.200
 F_v : 1.700
 S_{MS} : 1.800
 S_{M1} : 1.020
 S_{DS} : **1.200**
 S_{D1} : **0.680**
 T_L : **12**
 T_S : 0.567
 T_0 : 0.113

For Site Class D, Only

Is Site Class assumed? **Yes**

Seismic Design Category

Seismic Design Category: **D**

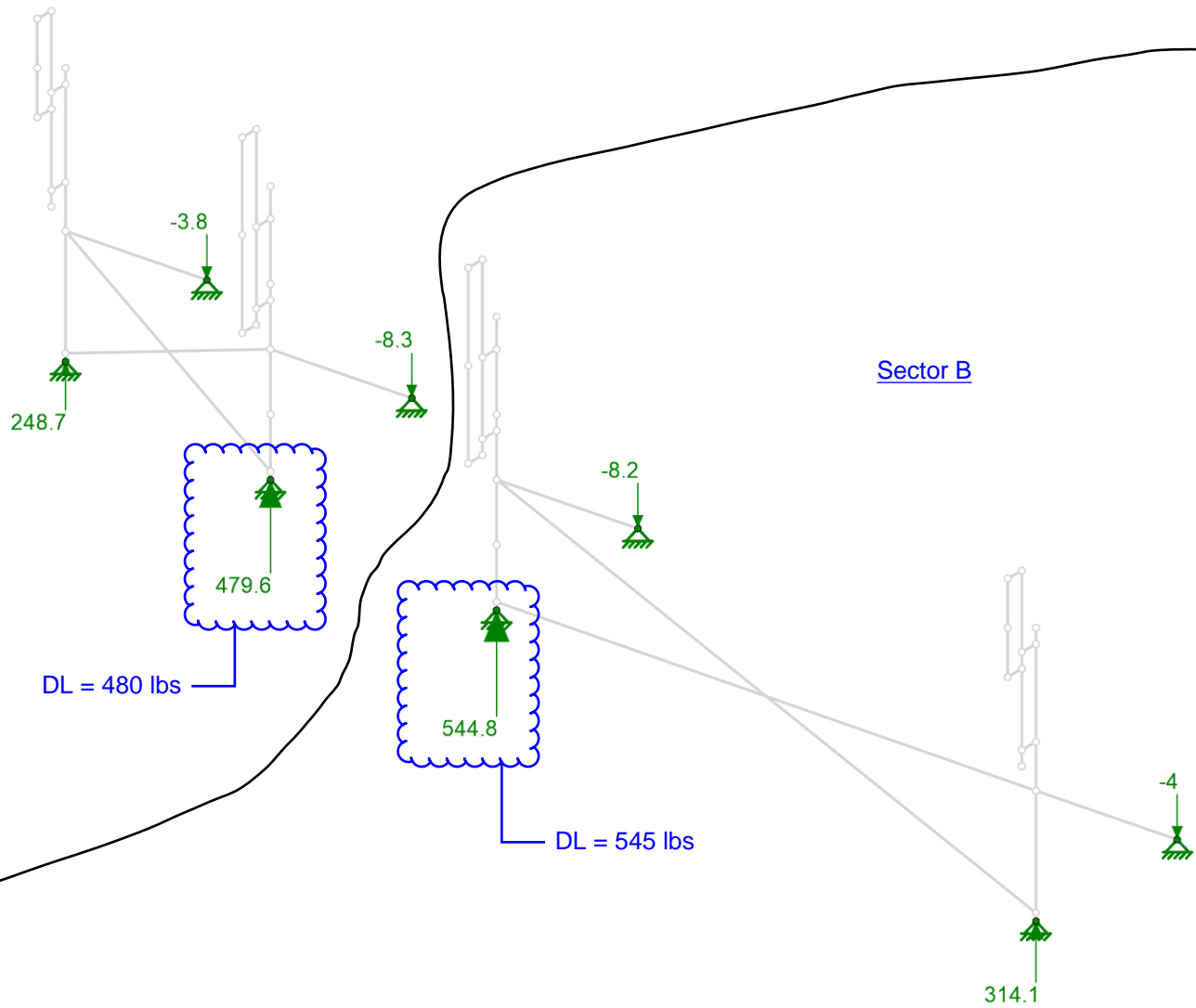
Notes regarding ASCE 7-16 CH 11.4.8

A site-specific analysis is not required for structures on Site Class D sites where $S_1 \geq 0.2$, provided the seismic response coefficient, C_s , is modified per ASCE CH 11.4.8 Exception 2. There are no additional requirements for non-structural components designed per ASCE CH 13.



Sector A

Sector B



Results for LC 59, DL
Y-direction Reaction Units are lbs and lb-ft



Centerline
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SK-1

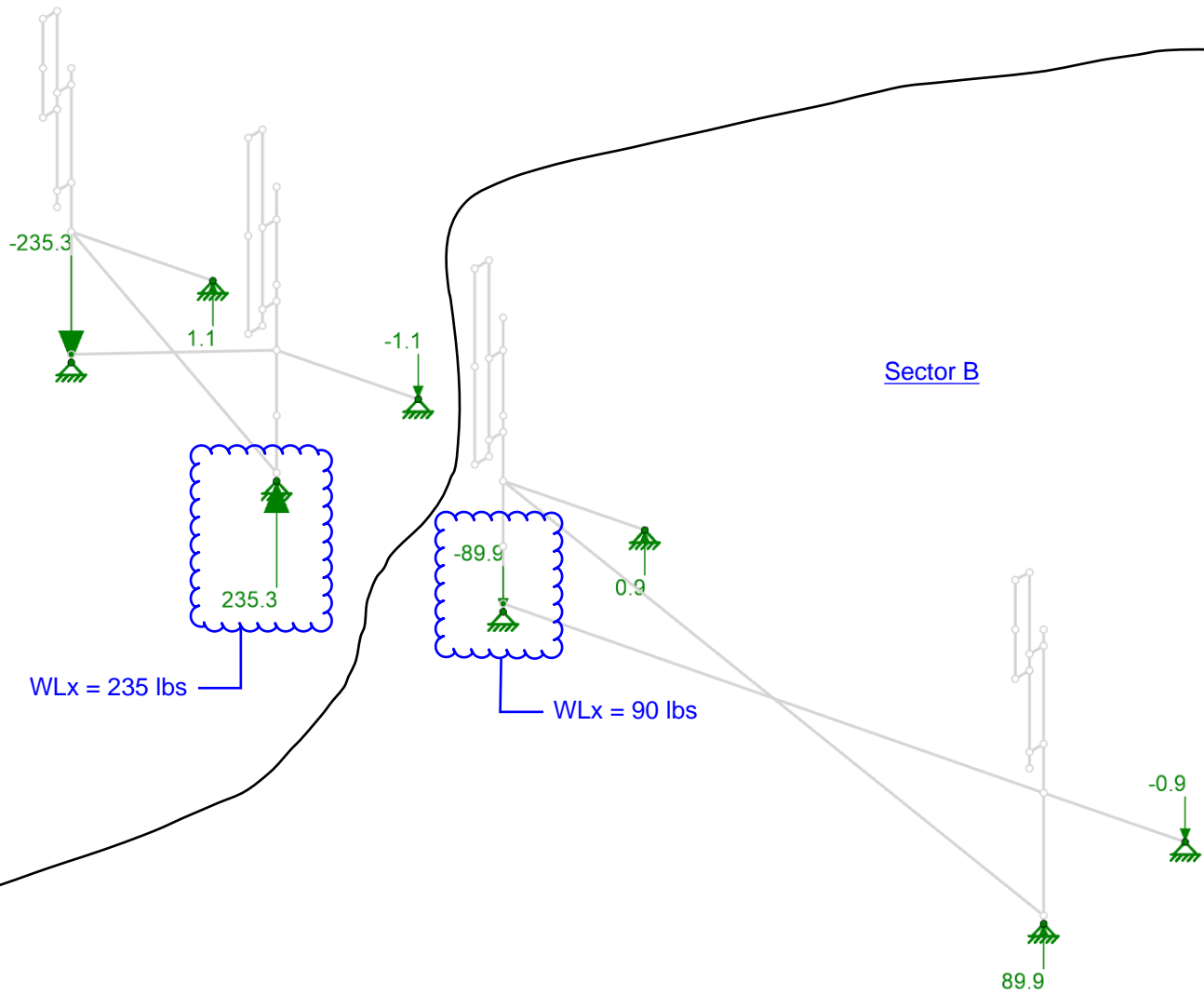
Dec 27, 2023 at 03:10 PM

BA00324A.r3d



Sector A

Sector B



Results for LC 60, WLx
Y-direction Reaction Units are lbs and lb-ft



Centerline
AN
BA00324A

BA00324A

SK-2

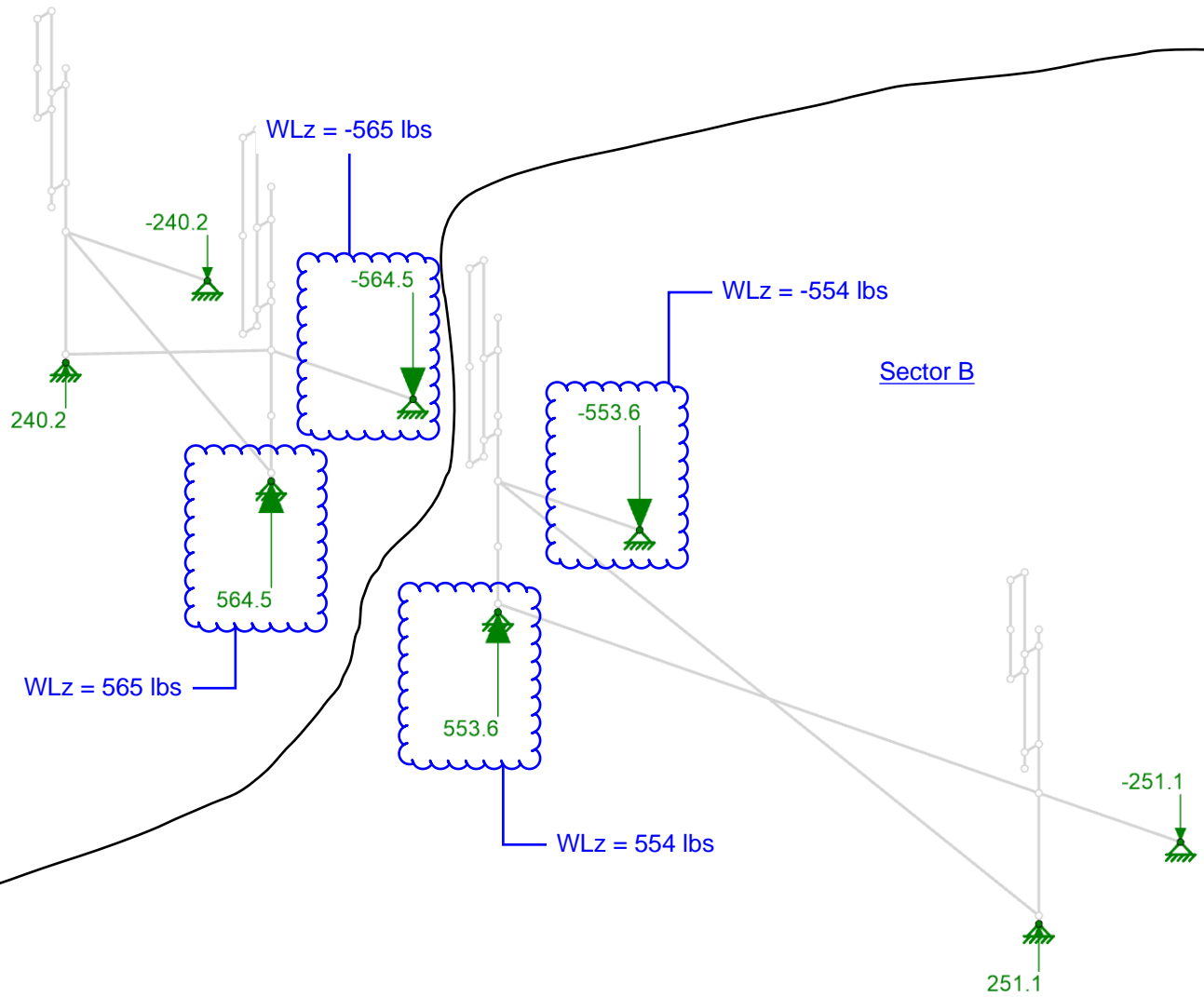
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BA00324A.r3d



Sector A

Sector B



Results for LC 62, WLz
Y-direction Reaction Units are lbs and lb-ft



Centerline
AN
BA00324A

BA00324A

SK-3

Dec 27, 2023 at 03:11 PM

BA00324A.r3d

There are (2) cases to be considered for each roof beam in order to examine lateral load (i.e. wind) in orthogonal directions (i.e. X-axis and Z-axis in RISA 3D). All the reactions are obtained from RISA 3D output. All loads are vertical and (-) indicates uplift.

General Roof Load:

Dead Load:	15	psf	*per Structural Analysis by ZON Architects, dated November 5, 2014
Live Load:	20	psf	

(E) Beam below Sector A

Case 1 - WL _x	DL ₁ :	480	lbs	at post - see the previous page
	DL ₂ :	-8.3	lbs	
	WL _{x1} :	235	lbs	at kicker - see the previous page
	WL _{x2} :	-1.1	lbs	

Case 2 - WL _z	DL ₁ :	Identical to Case 1		at post - see the previous page
	DL ₂ :	Identical to Case 1		
	WL _{z1} :	565	lbs	at kicker - see the previous page
	WL _{z2} :	-565	lbs	

(E) Beam below Sector B

Case 1 - WL _x	DL ₁ :	545	lbs	at post - see the previous page
	DL ₂ :	-8.2	lbs	
	WL _{x1} :	-90	lbs	at kicker - see the previous page
	WL _{x2} :	0.9	lbs	

Case 2 - WL _z	DL ₁ :	Identical to Case 1		at post - see the previous page
	DL ₂ :	Identical to Case 1		
	WL _{z1} :	554	lbs	at kicker - see the previous page
	WL _{z2} :	-554	lbs	

See the following pages for existing roof beam evaluation.

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

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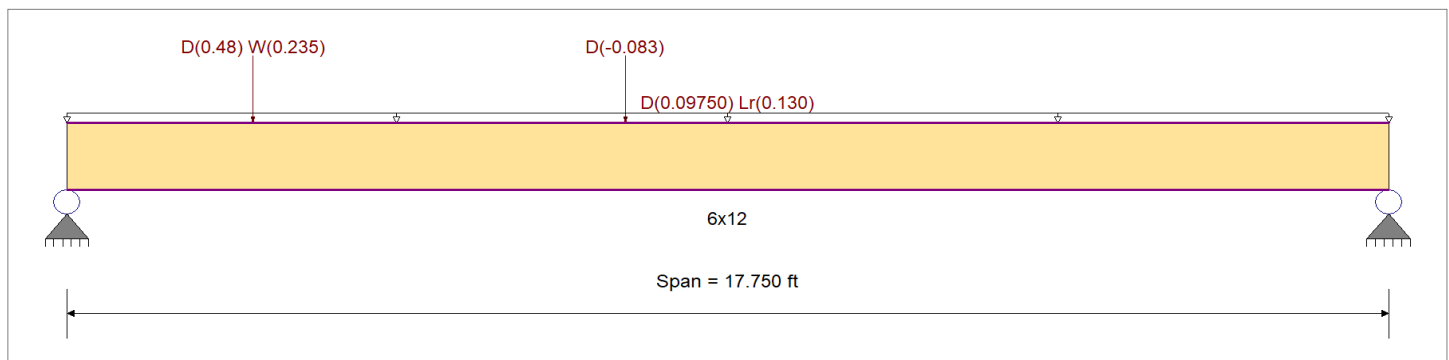
DESCRIPTION: Sector A - Case 1 (WLx)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	875.0 psi	Ebend- xx
	Fc - Prll	600.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	170.0 psi	
	Ft	425.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			31.210pcf



Applied Loads

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

Beam self weight calculated and added to loading
 Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, Lr = 0.020 ksf, Tributary Width = 6.50 ft
 Point Load : D = 0.480, W = 0.2350 k @ 2.50 ft, (from antenna frame post)
 Point Load : D = -0.0830 k @ 7.50 ft, (from antenna mount kicker)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.886	1	Maximum Shear Stress Ratio	=	0.255	: 1
Section used for this span		6x12		Section used for this span		6x12	
fb: Actual	=	969.11	psi	fv: Actual	=	54.22	psi
F'b	=	1,093.75	psi	F'v	=	212.50	psi
Load Combination		+D+Lr		Load Combination		+D+Lr	
Location of maximum on span	=	8.745	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.322	in	Ratio =	660	>=360	Span: 1 : Lr Only
Max Upward Transient Deflection		0	in	Ratio =	0	<360	n/a
Max Downward Total Deflection		0.624	in	Ratio =	341	>=180	Span: 1 : +D+Lr
Max Upward Total Deflection		0	in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v			
D Only	Length = 17.750 ft	1	0.587	0.194	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0
+D+Lr	Length = 17.750 ft	1	0.886	0.255	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0
+D+0.750Lr	Length = 17.750 ft	1	0.770	0.226	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0
+D+0.60W	Length = 17.750 ft	1	0.343	0.120	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

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DESCRIPTION: Sector A - Case 1 (WLx)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
+D+0.750Lr+0.450W	Length = 17.750 ft	1	0.611	0.185	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.65	855.8	1,400.0	0.0	0.00	0.0	0.0
+D+0.450W	Length = 17.750 ft	1	0.340	0.117	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.81	476.2	1,400.0	0.0	0.00	0.0	0.0
+0.60D+0.60W	Length = 17.750 ft	1	0.211	0.076	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.99	295.9	1,400.0	0.0	0.00	0.0	0.0
+0.60D	Length = 17.750 ft	1	0.198	0.065	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.80	277.5	1,400.0	0.0	0.00	0.0	0.0

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.505	2.173
Max Upward from Load Combinations	2.505	2.173
Max Upward from Load Cases	1.351	1.154
D Only	1.351	1.020
+D+Lr	2.505	2.173
+D+0.750Lr	2.217	1.885
+D+0.60W	1.473	1.039
+D+0.750Lr+0.450W	2.308	1.900
+D+0.450W	1.442	1.034
+0.60D+0.60W	0.932	0.632
+0.60D	0.811	0.612
Lr Only	1.154	1.154
W Only	0.202	0.033

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

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DESCRIPTION: Sector A - Case 2 (WLz)

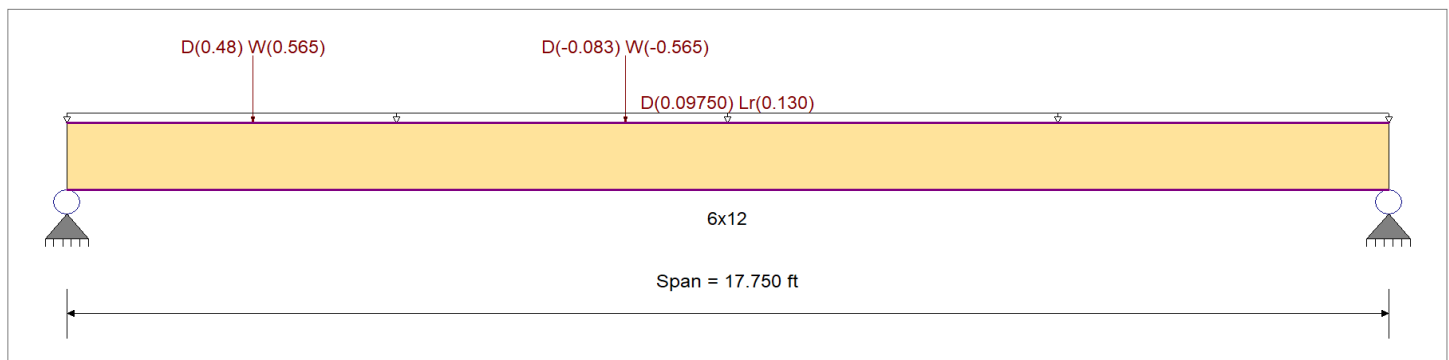
CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	875.0 psi	Ebend- xx
	Fc - Prll	600.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	170.0 psi	Density
	Ft	425.0 psi	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

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

Beam self weight calculated and added to loading

Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, Lr = 0.020 ksf, Tributary Width = 6.50 ft

Point Load : D = 0.480, W = 0.5650 k @ 2.50 ft, (from antenna mount post)

Point Load : D = -0.0830, W = -0.5650 k @ 7.50 ft, (from antenna mount kicker)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.886	1	Maximum Shear Stress Ratio	=	0.255	: 1
Section used for this span		6x12		Section used for this span		6x12	
fb: Actual	=	969.11	psi	fv: Actual	=	54.22	psi
F'b	=	1,093.75	psi	F'v	=	212.50	psi
Load Combination		+D+Lr		Load Combination		+D+Lr	
Location of maximum on span	=	8.745	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.322	in	Ratio =	660	>=360	Span: 1 : Lr Only
Max Upward Transient Deflection		-0.070	in	Ratio =	3047	>=360	Span: 1 : W Only
Max Downward Total Deflection		0.624	in	Ratio =	341	>=180	Span: 1 : +D+Lr
Max Upward Total Deflection		0	in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values								
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v						
D Only	Length = 17.750 ft	1	0.587	0.194	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0	0.0
+D+Lr	Length = 17.750 ft	1	0.886	0.255	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0	0.0
+D+0.750Lr	Length = 17.750 ft	1	0.770	0.226	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0	0.0
+D+0.60W	Length = 17.750 ft	1	0.271	0.117	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.00	0.0	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

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DESCRIPTION: Sector A - Case 2 (WLz)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.450W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.750 ft	1		0.557	0.183	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.88	779.6	1,400.0	2.10	49.8	272.0
+D+0.450W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.750 ft	1		0.286	0.115	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.04	399.9	1,400.0	1.32	31.4	272.0
+0.60D+0.60W						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.750 ft	1		0.152	0.074	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.15	213.0	1,400.0	0.85	20.1	272.0
+0.60D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.750 ft	1		0.198	0.065	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.80	277.5	1,400.0	0.75	17.8	272.0

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.505	2.173
Max Upward from Load Combinations	2.505	2.173
Max Upward from Load Cases	1.351	1.154
Max Downward from all Load Conditio		-0.159
Max Downward from Load Cases (Resis		-0.159
D Only	1.351	1.020
+D+Lr	2.505	2.173
+D+0.750Lr	2.217	1.885
+D+0.60W	1.447	0.924
+D+0.750Lr+0.450W	2.288	1.813
+D+0.450W	1.423	0.948
+0.60D+0.60W	0.906	0.516
+0.60D	0.811	0.612
Lr Only	1.154	1.154
W Only	0.159	-0.159

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

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DESCRIPTION: Sector B - Case 1 (WLx)

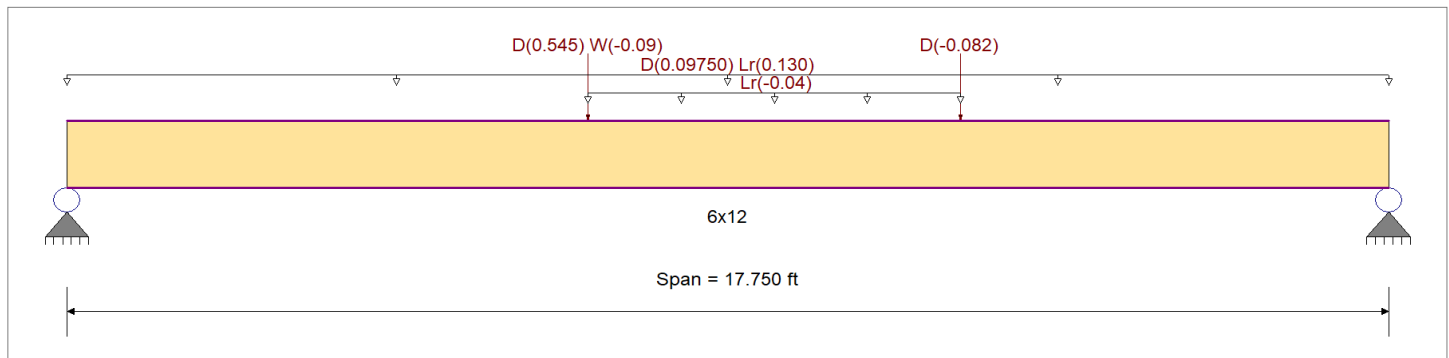
CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	875.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	600.0 psi	Eminbend - xx	470.0ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	170.0 psi		
	Ft	425.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading

Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, Lr = 0.020 ksf, Tributary Width = 6.50 ft

Point Load : D = 0.5450, W = -0.090 k @ 7.0 ft, (from antenna mount post)

Point Load : D = -0.0820 k @ 12.0 ft, (from antenna mount kicker)

Uniform Load : Lr = -0.020 ksf, Extent = 7.0 --> 12.0 ft, Tributary Width = 2.0 ft, ((-) roof live load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.958 < 1	Maximum Shear Stress Ratio	=	0.238 < 1
Section used for this span		6x12	Section used for this span		6x12
fb: Actual	=	1,047.65psi	fv: Actual	=	50.57 psi
F'b	=	1,093.75psi	F'v	=	212.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.579ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.280 in Ratio = 761 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection		-0.019 in Ratio = 11237 >=360	Span: 1 : W Only		
Max Downward Total Deflection		0.654 in Ratio = 325 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection		0 in Ratio = 0 <180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 17.750 ft	1	0.793	0.184	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.31	624.3	787.5	0.0	0.00	0.0	0.0
+D+Lr	Length = 17.750 ft	1	0.958	0.238	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.58	1,047.6	1,093.8	2.13	50.6	212.5	
+D+0.750Lr	Length = 17.750 ft	1	0.860	0.212	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.51	941.1	1,093.8	1.90	45.0	212.5	
+D+0.60W	Length = 17.750 ft	1				1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

Centerline Communications

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DESCRIPTION: Sector B - Case 1 (WLx)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	f _v	F'v
Length = 17.750 ft	1	0.430	0.101	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6.08	601.7	1,400.0	1.16	27.4	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0
Length = 17.750 ft	1	0.661	0.163	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.34	924.9	1,400.0	1.87	44.4	272.0	
+D+0.450W					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.434	0.102	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6.14	607.4	1,400.0	1.17	27.6	272.0	
+0.60D+0.60W					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.251	0.059	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.56	352.0	1,400.0	0.68	16.2	272.0	
+0.60D					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.268	0.062	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.78	374.6	1,400.0	0.71	16.9	272.0	

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.351	2.193
Max Upward from Load Combinations	2.351	2.193
Max Upward from Load Cases	1.290	1.146
Max Downward from all Load Conditio	-0.055	-0.035
Max Downward from Load Cases (Resis	-0.055	-0.035
D Only	1.290	1.146
+D+Lr	2.351	2.193
+D+0.750Lr	2.086	1.931
+D+0.60W	1.258	1.125
+D+0.750Lr+0.450W	2.062	1.916
+D+0.450W	1.266	1.130
+0.60D+0.60W	0.742	0.667
+0.60D	0.774	0.688
Lr Only	1.061	1.047
W Only	-0.055	-0.035

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

Centerline Communications

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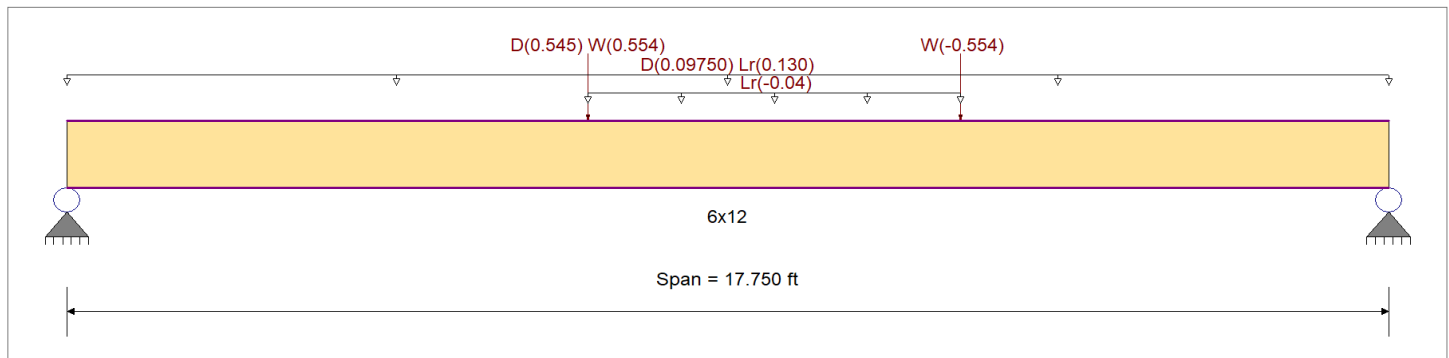
DESCRIPTION: Sector B - Case 2 (WLz)

CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	875.0 psi	Ebend- xx
	Fc - Prll	600.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	170.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	425.0 psi	31.210pcf



Applied Loads

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

Beam self weight calculated and added to loading
 Loads on all spans...

- Uniform Load on ALL spans : D = 0.0150, Lr = 0.020 ksf, Tributary Width = 6.50 ft
- Point Load : D = 0.5450, W = 0.5540 k @ 7.0 ft, (from antenna mount post)
- Point Load : W = -0.5540 k @ 12.0 ft, (Antenna Frame Load 2)
- Uniform Load : Lr = -0.020 ksf, Extent = 7.0 --> 12.0 ft, Tributary Width = 2.0 ft, ((-) roof live load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.976 : 1	Maximum Shear Stress Ratio	=	0.241 : 1
Section used for this span		6x12	Section used for this span		6x12
fb: Actual	=	1,067.77 psi	fv: Actual	=	51.20 psi
F'b	=	1,093.75 psi	F'v	=	212.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.709ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.280 in Ratio = 761 >=360	Span: 1 : Lr Only		
Max Upward Transient Deflection		-0.004 in Ratio = 49369 >=360	Span: 1 : W Only		
Max Downward Total Deflection		0.670 in Ratio = 318 >=180	Span: 1 : +D+Lr		
Max Upward Total Deflection		0 in Ratio = 0 <180	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 17.750 ft	1	0.816	0.189	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.49	642.8	787.5	0.0	0.00	0.0	0.0
+D+Lr	Length = 17.750 ft	1	0.976	0.241	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.79	1,067.8	1,093.8	2.16	51.2	212.5	0.0
+D+0.750Lr	Length = 17.750 ft	1	0.878	0.215	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.71	960.9	1,093.8	1.92	45.6	212.5	0.0
+D+0.60W	Length = 17.750 ft	1				1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: BA00324A.ec6

LIC# : KW-06013597, Build:20.23.08.01

Centerline Communications

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DESCRIPTION: Sector B - Case 2 (WLz)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	f _v	F _v
Length = 17.750 ft	1	0.505	0.114	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.15	707.5	1,400.0	1.31	31.1	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.719	0.174	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.16	1,006.1	1,400.0	1.99	47.3	272.0	
+D+0.450W					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.494	0.112	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6.98	691.3	1,400.0	1.29	30.5	272.0	
+0.60D+0.60W					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.322	0.072	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.55	450.5	1,400.0	0.82	19.5	272.0	
+0.60D					1.00	1.00	1.00	1.00	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 17.750 ft	1	0.275	0.064	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.90	385.7	1,400.0	0.73	17.3	272.0	

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.378	2.249
Max Upward from Load Combinations	2.378	2.249
Max Upward from Load Cases	1.317	1.202
Max Downward from all Load Conditions		-0.156
Max Downward from Load Cases (Resis)		-0.156
D Only	1.317	1.202
+D+Lr	2.378	2.249
+D+0.750Lr	2.113	1.987
+D+0.60W	1.411	1.108
+D+0.750Lr+0.450W	2.183	1.917
+D+0.450W	1.387	1.132
+0.60D+0.60W	0.884	0.628
+0.60D	0.790	0.721
Lr Only	1.061	1.047
W Only	0.156	-0.156