Date Prepared: May 28, 2021
Ref. No.: P21AT008

Initial Design	1
PCC Revision	

STRUCTURAL CALCULATIONS

for

SAINT VINCENT DE PAUL HS (NOKIA MBO)

(P21AT008)

849 KEOKUK ST.
PETALUMA, CA 94952

Prepared for:

AT&T MOBILITY

2255 6TH STREET
OROVILLE, CA 95965

Prepared by:

DELTA GROUPS ENGINEERING, INC.

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SAINT VINCENT DE PAUL HS (NOKIA MBO)

849 Keokuk St, Petaluma, CA 94952, USA

Latitude, Longitude: 38.24356100000001, -122.6507041

Date	5/18/2021, 3:04:57 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.6	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.8	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.2	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.596	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.715	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	1.742	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.898	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.671	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.739	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.596	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.918	Mapped value of the risk coefficient at short periods

LATERAL ANALYSIS

1) Seismic Load

Code Compliance California Building Code 2019 Editior ASCE7-16

Soil Site Class =	D	
Response Spectral Acc. (0.2 sec.), S_S =	1.500	*Figure 22-1 through 22-8*
Response Spectral Acc. (1.0 sec.), S_1 =	0.6	*Figure 22-1 through 22-8*
Site Coefficient, F_a =	1.2	*Table 11.4-1*
Site Coefficient, F_v =	1.7	*Table 11.4-2*
Max. Considered Earthquake Acc, $S_{MS} = Fa * S_s$ =	1.8	*Eq. 11.4-1*
Max. Considered Earthquake Acc, $S_{M1} = Fv * S_1$ =	1.02	*Eq. 11.4-2*
$S_{DS} = 2/3 * (S_{MS})$ =	1.200	*Eq. 11.4-3*
$S_{D1} = 2/3 * (S_{M1})$ =	0.680	*Eq. 11.4-4*
Component Amplification Factor, a_P =	1.0	*Table 13.5-1 through 13.6-1*
Component Importance Factor, I_P =	1.25	*13.1.3, Page 121*
Component Operating Weight, W_P (lbs) =	100	Max. per Antenna, MBO unit & Mounting Weight
Component Response Modification Factor, R_P =	2.5	*Table 13.5-1 through 13.6-1*
Height in structure of point of attachment component with respect to the base, z (ft) =	1	
Average roof height of structure with respect to the base, h (ft) =	1	

Seismic Design Force, F_P

$$F_p = \frac{0.4 a_p S_{DS} W_p (1 + 2\frac{z}{h})}{\left(\frac{R_p}{I_p}\right)}$$ = **72.00** lbs *Eq. 13.3-1*

$$F_{p(max)} = 1.6 S_{DS} I_p W_p$$ = **240.00** lbs *Eq. 13.3-2*

$$F_{p(min)} = 0.3 S_{DS} I_p W_p$$ = **45.00** lbs *Eq. 13.3-3*

2) Wind Load

Desigh Wind Speed, V = **100** mph (ASCE 7-16 Figure 26.5-1A, page 254)
Exposure : **C**

Design Wind Pressure:

$$q_z = 0.00256 K_z K_{zt} K_d K_e V^2$$ = **19.6** psf (ASCE7-16 Eq. 26.10-1, Page 268)

Velocity Pressure Exposure Coefficients, Kz = **0.90** (ASCE7-16 Table 26.10-1, Page 268)
Topographic Factor, Kzt = **1.00** (ASCE7-16 Section 26.8.2, Page 268)
Wind Directionality Factor, Kd = **0.85** (ASCE7-16 Table 26.6-1, Page 266)
Ground Elevation Factor, Ke = **1.00** (ASCE7-16 Table 26.9-1, Page 268)

$$F = q_z G C_f A_s$$ = **92** lbs (ASCE7-16 Eq. 29.3-1, Page 322)

Gust Effect Factor, G = **0.85** (ASCE7-16 Section 26.11.1, Page 269)
Force Coefficient, Cf = **1.20** (ASCE7-16 Figure 29.3-1, Page 323)
Gross Area, As= **5** ft^2 = **1.00** ft x **5** ft Max. per post

3) Design Lateral Load

Seismic Design Force, F_P = **72.00** lbs = **0.7** W_p
Design Wind Force, F_W = **91.89** lbs = **19.98** **psf** <--Design Wind Load

Since, F_P < F_W **Wind Govern Design**

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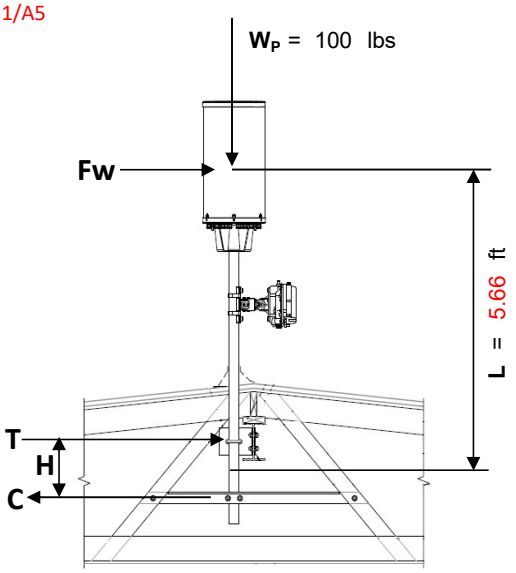
PAGE NO. :
DATE : 05/28/21
PROJECT NO. :

LAG SCREW FOR ANTENNA MOUNTING ANALYSIS

Ref. detail: 1/A5



Design Of Antenna Mounting:

Antenna and Mounting Weight: = 100 lbs Max.

Lateral Anlysis:

1 Seismic load: F_p = 72.0 lbs

2 Wind load: F_w = 91.9 lbs

Wind Govern Design

V = W_p = 100 lbs **H** = 1.08 ft. Min.

T x H = Fw x **L**

1.1 **x T =** 92 x 5.66

T = 481.6 lbs

Total Applied Shear Load: **V =** 100.0 lbs

Total Applied Tension Load **T** = 481.6 lbs

Total Number Of Bolt Resisting Shear **Ns** = 4

Total Number Of Bolt Resisting Tension N_T = 2

Applied Tension Load: **Ps** = **T** / N_T = 240.8 lbs

Applied Shear Load: **Vs** = **V** / **Ns** = 25 lbs

Check 5/8"ø Bolts Capacity

Allowable Tension : Ta' = 6900 lbs (AISC Steel Construction Manual 15th ed.Table 7-1,7-2)

Allowable Shear : Va' = 4140 lbs (AISC Steel Construction Manual 15th ed.Table 7-1,7-2)

Interaction Check : Ps / Ta' + Vs / Va' = 0.04 < 1.0 [O.K.]

Use 5/8 in. Diameter Bolt

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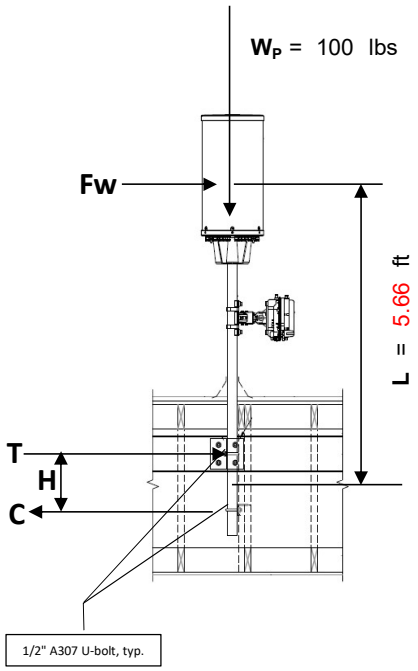
PROJECT NO. :

U-BOLT FOR ANTENNA MOUNTING ANALYSIS

Ref. detail: 1/A5



Design Of Antenna Mounting:

Antenna and Mounting Weight: = 100 lbs Max.

Lateral Anlysis:

1 **Seismic load:** F_p = 72.0 lbs

2 **Wind load:** F_w = 91.9 lbs

Wind Govern Design

V = W_p = 100 lbs **H** = 1.08 ft. Min.

T x H = Fw x L

1.1 **x T =** 92 x 5.7

T = 481.6 lbs

Total Applied Shear Load: **V =** 100.0 lbs

Total Applied Tension Load **T** = 481.6 lbs

Total Number Of Bolt Resisting Shear **Ns** = 2

Total Number Of Bolt Resisting Tension N_T = 1

Applied Shear Load: **Vs** = **V** / **Ns** = 50 lbs

Applied Tension Load: **Ps** = **T** / N_T = 481.6 lbs

Check A316 U-Bolt Capacity Bolt Diameter d = 0.5 in Design Torque T= 90 lbs-ft
Friction Factor μ = 0.2 Fy = 30000 psi

Allowable Shear Load :

Clamping Force P = T/μd = 1080 lbs-in / 0.2 / 0.5 in = 10800 lbs

Friction Shear Capacity Vt = P x μ = 10800 lbs x 0.2 = 2160 lbs > **Vs** = 50 lbs

Allowable Tension Load **Pt** = A x 2 x Fy = 0.196 in^2 x 2 x 30000 psi = 11781 lbs > **Ps** = 481.6 lbs

(Vs/Vt) + (Ps/Pt) = 0.064 **<** 1 **OK**

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

File: WF beam check.ec6

Lic. # : KW-06001779
DELTA GROUPS ENGINEERING

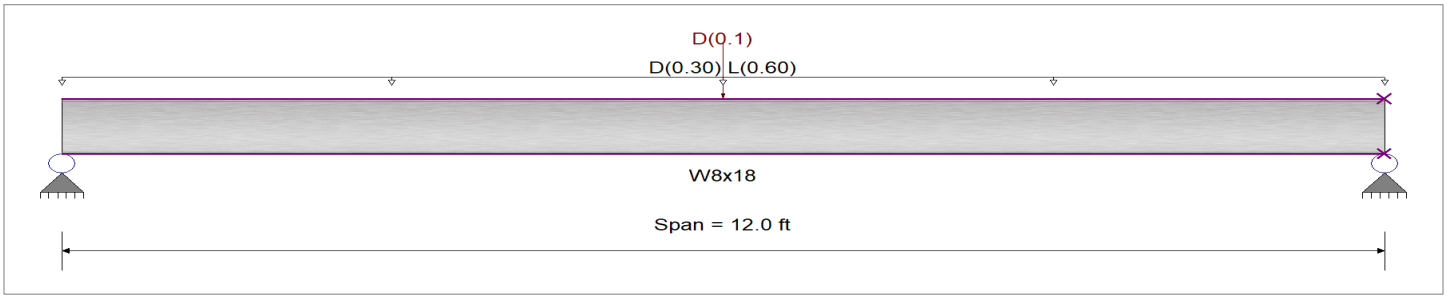
DESCRIPTION: (E) WF beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	36.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.020, L = 0.040 ksf, Tributary Width = 15.0 ft

Load(s) for Span Number 1
Point Load : D = 0.10 k @ 6.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.540 : 1	Maximum Shear Stress Ratio =	0.202 : 1
Section used for this span	W8x18	Section used for this span	W8x18
Ma : Applied	16.500 k-ft	Va : Applied	5.450 k
Mn / Omega : Allowable	30.539 k-ft	Vn/Omega : Allowable	26.960 k
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span	6.000 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	0.157 in	Ratio =	919 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.238 in	Ratio =	604 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 12.00 ft	1	0.187	0.069	5.70		5.70	51.00	30.54	1.00	1.00	1.85	40.44	26.96
+D+L													
Dsgn. L = 12.00 ft	1	0.540	0.202	16.50		16.50	51.00	30.54	1.00	1.00	5.45	40.44	26.96
+D+0.750L													
Dsgn. L = 12.00 ft	1	0.452	0.169	13.80		13.80	51.00	30.54	1.00	1.00	4.55	40.44	26.96
+0.60D													
Dsgn. L = 12.00 ft	1	0.112	0.041	3.42		3.42	51.00	30.54	1.00	1.00	1.11	40.44	26.96

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2385	6.034		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.450	5.450
Overall MINimum	1.110	1.110
D Only	1.850	1.850

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

File: WF beam check.ec6

Lic. # : KW-06001779

DELTA GROUPS ENGINEERING

DESCRIPTION: (E) WF beam

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+L	5.450	5.450
+D+0.750L	4.550	4.550
+0.60D	1.110	1.110
L Only	3.600	3.600

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Lic. # : KW-06001779 DELTA GROUPS ENGINEERING

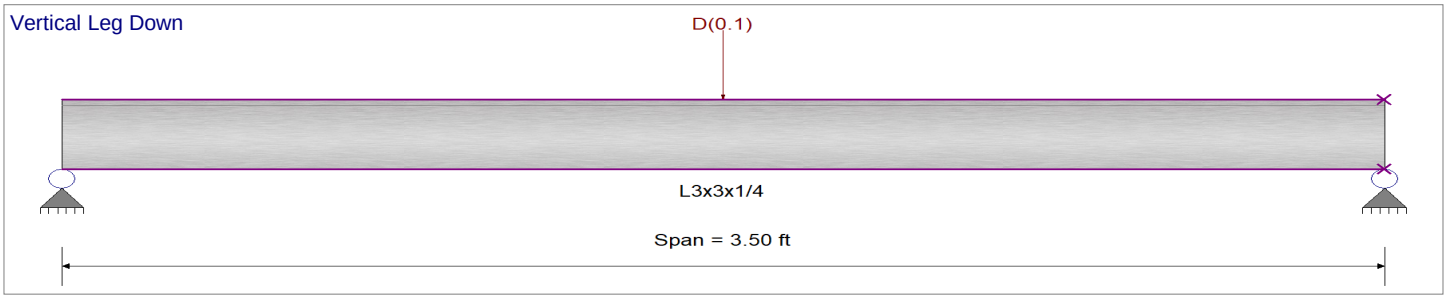
DESCRIPTION: (N) 3X3X1/4

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight NOT internally calculated and added
Load(s) for Span Number 1
Point Load : D = 0.10 k @ 1.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.041 : 1	Maximum Shear Stress Ratio =	0.004 : 1
Section used for this span	L3x3x1/4	Section used for this span	L3x3x1/4
Ma : Applied	0.088 k-ft	Va : Applied	0.050 k
Mn / Omega : Allowable	2.127 k-ft	Vn/Omega : Allowable	13.473 k
Load Combination	D Only	Load Combination	D Only
Location of maximum on span	1.750 ft	Location of maximum on span	1.760 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.004 in	Ratio =	9665 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 3.50 ft	1	0.041	0.004	0.09		0.09	3.55	2.13	1.00	1.00	0.05	22.50	13.47
+0.60D													
Dsgn. L = 3.50 ft	1	0.025	0.002	0.05		0.05	3.55	2.13	1.00	1.00	0.03	22.50	13.47

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0043	1.750		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.050	0.050
Overall MINimum	0.030	0.030
D Only	0.050	0.050
+0.60D	0.030	0.030