Project:

Location: Combination Roof And Floor Beam 1
Combination Roof And Floor Beam
[2012 International Building Code(AISC 14th Ed ASD)]
A36 W8x21 x 11.5 FT
Section Adequate By: 56.7%
Controlling Factor: Deflection

## DEFLECTIONS

| | Center | |
|---|---|---|
| Live Load | 0.18 IN | L/752 |
| Dead Load | 0.06 in | |
| Total Load | 0.24 IN | L/568 |

Live Load Deflection Criteria: L/480    Total Load Deflection Criteria: L/240

## REACTIONS

| | A | B |
|---|---|---|
| Live Load | 5854 lb | 5854 lb |
| Dead Load | 1903 lb | 1903 lb |
| Total Load | 7757 lb | 7757 lb |
| Bearing Length | 0.70 in | 0.70 in |

## BEAM DATA

| | Center |
|---|---|
| Span Length | 11.5 ft |
| Unbraced Length-Top | 0 ft |
| Roof Pitch | 0 :12 |
| Floor Duration Factor | 0.00 |
| Roof Duration Factor | 0.00 |

## STEEL PROPERTIES
W8x21 - A36

### Properties:

| | | |
|---|---|---|
| Yield Stress: | $F_y$ = | 36 ksi |
| Modulus of Elasticity: | E = | 29000 ksi |
| Depth: | d = | 8.28 in |
| Web Thickness: | $t_w$ = | 0.25 in |
| Flange Width: | $b_f$ = | 5.27 in |
| Flange Thickness: | $t_f$ = | 0.4 in |
| Distance to Web Toe of Fillet: | k = | 0.7 in |
| Moment of Inertia About X-X Axis: | $I_x$ = | 75.3 in4 |
| Section Modulus About X-X Axis: | $S_x$ = | 18.2 in3 |
| Plastic Section Modulus About X-X Axis: | $Z_x$ = | 20.4 in3 |

### Design Properties per AISC 14th Edition Steel Manual:

| | | |
|---|---|---|
| Flange Buckling Ratio: | FBR = | 6.59 |
| Allowable Flange Buckling Ratio: | AFBR = | 10.79 |
| Web Buckling Ratio: | WBR = | 27.52 |
| Allowable Web Buckling Ratio: | AWBR = | 106.72 |
| Controlling Unbraced Length: | $L_b$ = | 0 ft |
| Limiting Unbraced Length - for lateral-torsional buckling: | $L_p$ = | 5.25 ft |
| Nominal Flexural Strength w/ safety factor: | $M_n$ = | 36647 ft-lb |
| Controlling Equation: | F2-1 | |
| Web height to thickness ratio: | h/tw = | 27.52 |
| Limiting height to thickness ratio for eqn. G2-2: | h/tw-limit = | 63.58 |
| Cv Factor: | Cv = | 1 |
| Controlling Equation: | G2-2 | |
| Nominal Shear Strength w/ safety factor: | $V_n$ = | 29808 lb |

Controlling Moment:          22301 ft-lb
  5.75 ft from left support
  Created by combining all dead and live loads.

Controlling Shear:          7757 lb
  At support.
  Created by combining all dead and live loads.

### Comparisons with required sections:

| | Req'd | Provided |
|---|---|---|
| Moment of Inertia (deflection): | 48.04 in4 | 75.3 in4 |
| Moment: | 22301 ft-lb | 36647 ft-lb |

## LOADING DIAGRAM



A                    11.5 ft                    B
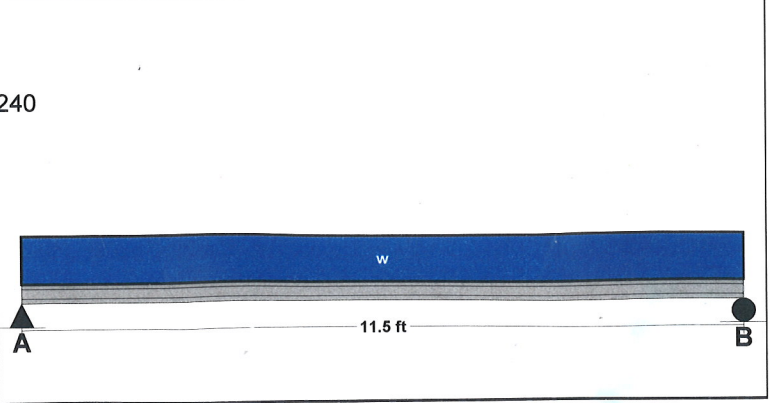
## ROOF LOADING

| | | Side 1 | Side 2 |
|---|---|---|---|
| Roof Live Load | RLL = | 47 psf | 0 psf |
| Roof Dead Load | RDL = | 10 psf | 0 psf |
| Roof Tributary Width | RTW = | 14 ft | 0 ft |

## FLOOR LOADING

| | | Side 1 | Side 2 |
|---|---|---|---|
| Floor Live Load | FLL = | 40 psf | 40 psf |
| Floor Dead Load | FDL = | 10 psf | 10 psf |
| Floor Tributary Width | FTW = | 7 ft | 2 ft |
| Wall Load | WALL = | 80 plf | |

## BEAM LOADING

| | | |
|---|---|---|
| Roof Uniform Live Load: | wL-roof = | 658 plf |
| Roof Uniform Dead Load: | wD-roof = | 140 plf |
| Floor Uniform Live Load: | wL-floor = | 360 plf |
| Floor Uniform Dead Load: | wD-floor = | 90 plf |
| Beam Self Weight: | BSW = | 21 plf |
| Combined Uniform Live Load: | wL = | 1018 plf |
| Combined Uniform Dead Load: | wD = | 331 plf |
| Combined Uniform Total Load: | wT = | 1349 plf |
| Controlling Total Design Load: | wT-cont = | 1349 plf |

## NOTES