

The background of the slide is an aerial photograph of a large-scale construction or industrial site. The image is heavily filtered with a teal color. In the foreground, there's a large, rectangular structure with a grid-like pattern, possibly a rebar for a concrete slab. To the right, there are large, cylindrical structures, likely storage tanks or parts of a refinery. The overall scene is complex and industrial.

Structural Engineering Risa Project

C.T

Slippery Rock University

Civil Engineering



Background and Objective



Rooftop Deck and Guest Room

Space

Deck Part: BBQ grill , Garden Wood Pavilion

Playing room : Bathroom , Small Bedroom and a living.

Two Windows front and back

Material

Hot Rolled Steel for the Columns, beams and Girders.

Wood for the pavilion.

4000 PSI NW concrete frame with rebar

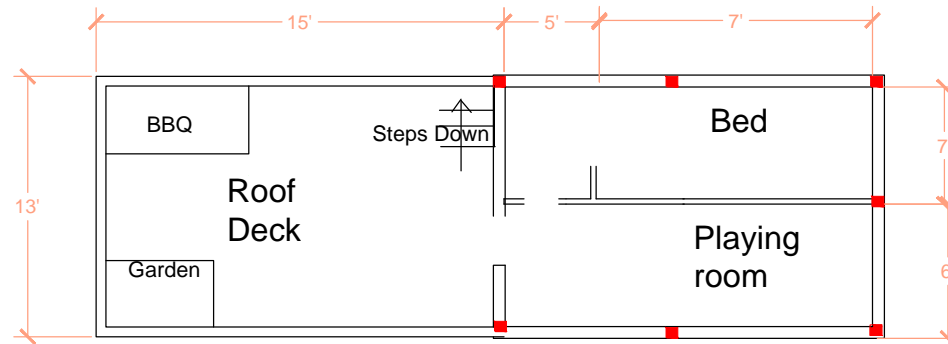
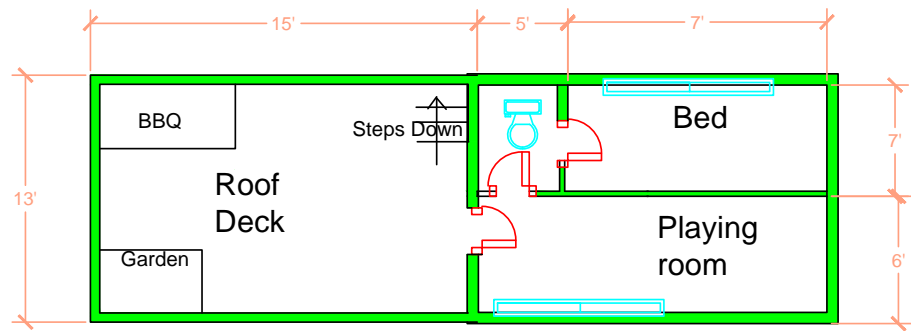
Loads

Dead loads: Self- Weight .8 in NW concrete slab

Live load Apply

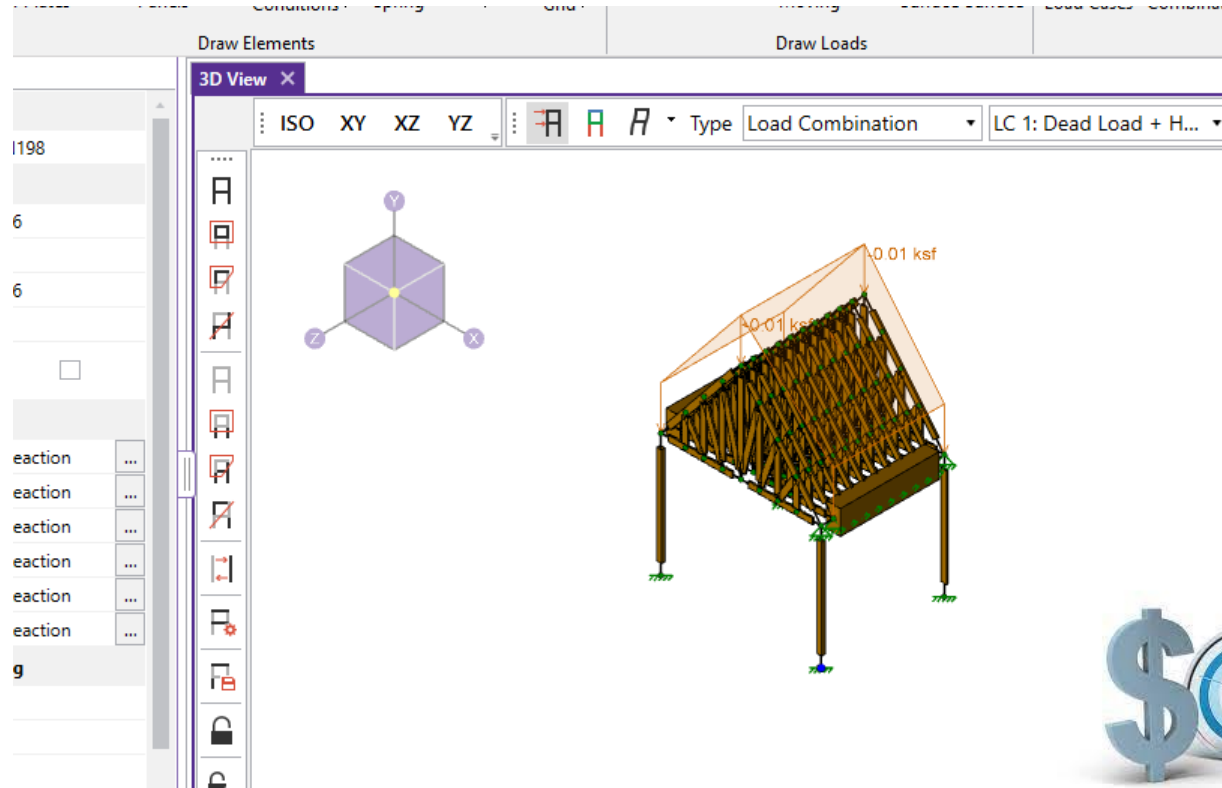
100 lbs./ft downward to all beam and girder elements.

10 lbs./ft on the roof of the pavilion.



Floor Plans

Wooden Pratt Pavilion



Pressure Treated pine (2in
x 4 in x 16 in)

Cost Analysis

$1035 \text{ ft} * 11.25 = \$11,644$

Load Combination: LC 1: Dead Load + Hangin... Member Label: M213 Add to Full Report Options Print

Detail Report: M213 Unity Check: 0.007 (axial/bending) Load Combination: LC 1: Dead Load + Hanging load

Input Data:

Shape:	4XS (nominal)	I Node:	N198
Member Type:	Column	J Node:	N183
Length (ft):	10	I Release:	Fixed
Material Type:	Wood	J Release:	Fixed
Design Rule:	Typical	I Offset (in):	N/A
Number of Internal Sections:	97	J Offset (in):	N/A

Material Properties:

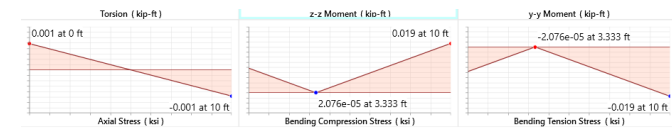
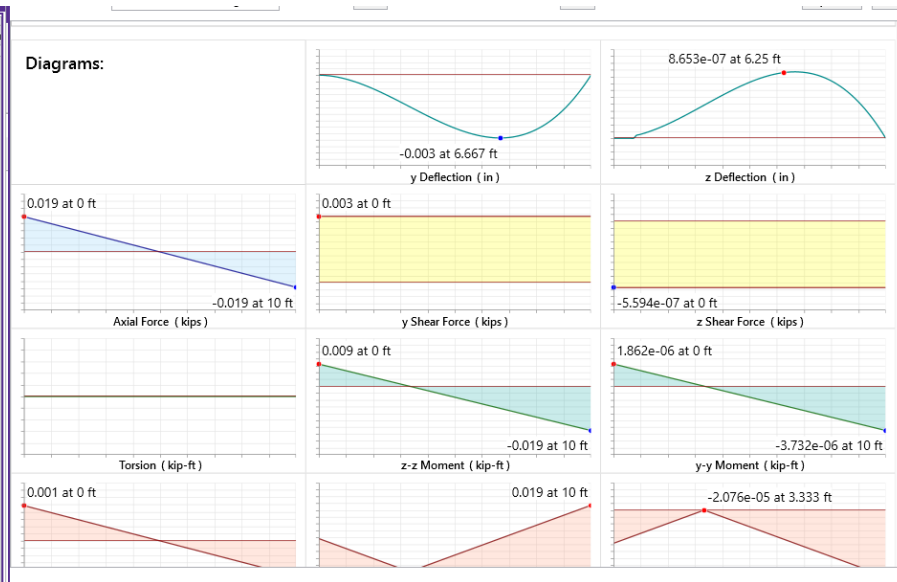
Material:	DF	Grade:	No.1	Nu:	0.3
Type:	Solid Sawn	Cm:	No	Therm. Coeff. (1e-4/F°):	0.3
Database:	Visually Graded	Emod:	1	Density (k/ft³):	0.035
Species:	Douglas Fir-Larch				

Shape Properties:

F_b (ksi):	1	E (ksi):	1700	F_{min} (ksi):	621.025
F_t (ksi):	0.675	E_{mod} :	1	b (actual) (in):	3.5
F_v (ksi):	0.18	COV_E (Table F1):	0.25	d (actual) (in):	4.5
F_c (ksi):	1.5				

Design Properties:

le_2 (ft):	N/A	C_D :	1	Max Defl Ratio:	L/10000
le_1 (ft):	N/A	R_B :	6.639	Max Defl Location:	0
le -bend top (ft):	Lbyy	C_L :	0.993	Span:	N/A
le -bend bot (ft):	N/A	C_D :	1		
K_{y-y} :	1	C_{Ft} :	1.05		
K_{z-z} :	1	C_P :	0.175		
y sway:	No				
z sway:	No				



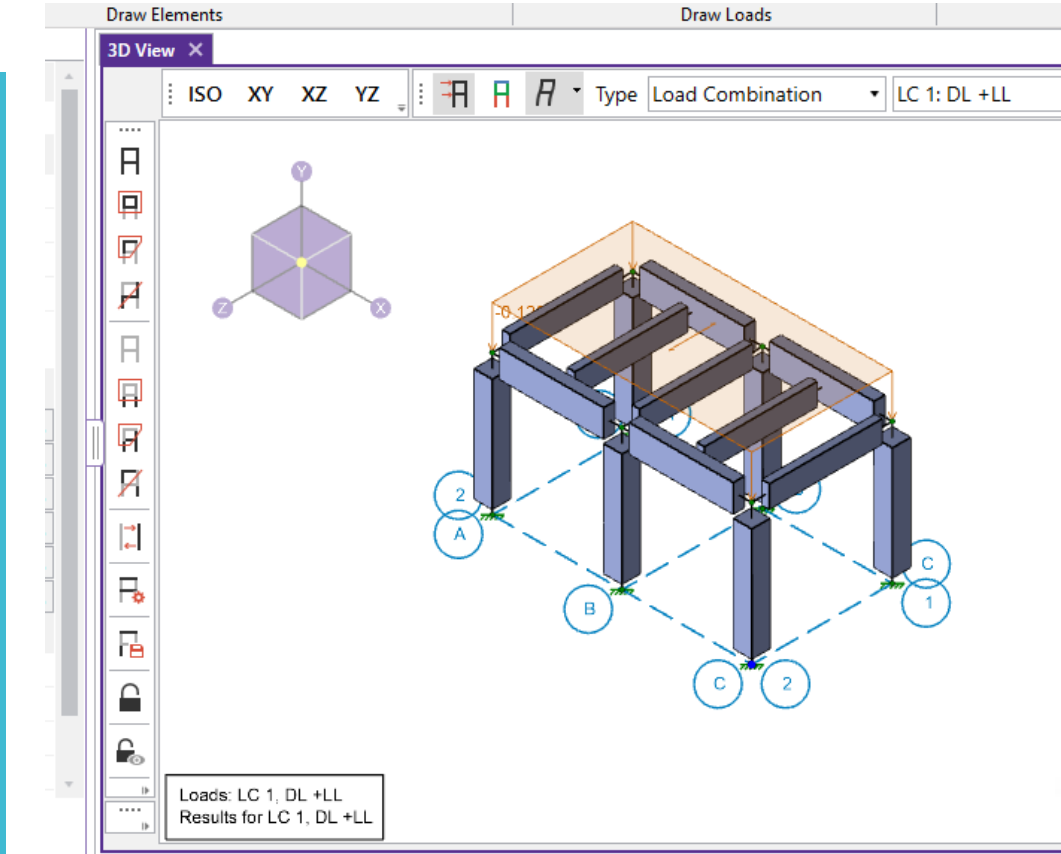
AWC NDS-15: LRFD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Compression Analysis	0.000 ksi	0.623 ksi	-	-
Axial Tension Analysis	-0.001 ksi	2.041 ksi	-	-
Flexural Analysis, Fb1'	0.019 ksi	3.002 ksi	-	-
Flexural Analysis, Fb2'	0.000 ksi	3.174 ksi	-	-
Bending & Axial Compression Analysis	-	-	0.007	Pass
Bending & Axial Tension Analysis	-	-	0.007	Pass
Shear Analysis	0.000 ksi	0.389 ksi	0.001	Pass

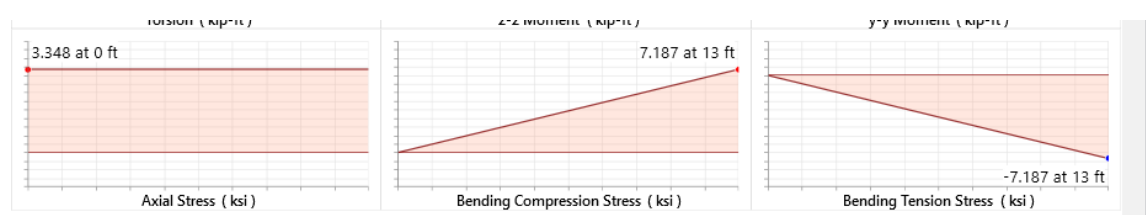


Member Analysis

4000 psi
Concrete
Frame
12'x13'



\$117 per cubic yard
Cost Analysis
15.7 cu yard * 117 = \$1837



AISC 15th (360-16): ASD Code Check

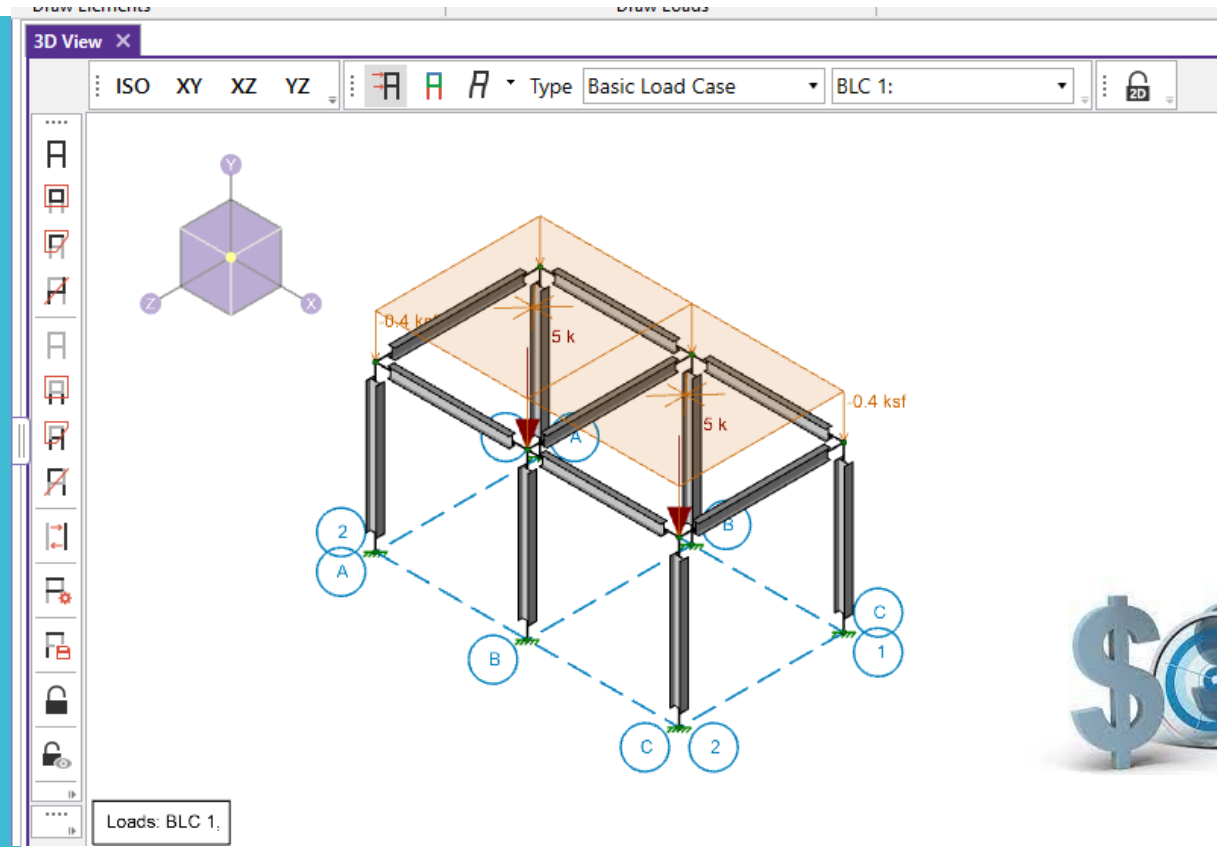
Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial				
Applied Loading - Shear + Torsion	-	-	-	-
Axial Tension Analysis	0.000 k	290.719 k	-	-
Axial Compression Analysis	32.509 k	181.324 k	-	-
Flexural Analysis (Strong Axis)	20.699 k-ft	96.806 k-ft	-	-
Flexural Analysis (Weak Axis)	0.092 k-ft	34.93 k-ft	-	-
Shear Analysis (Major Axis y)	2.46 k	56.434 k	0.044	Pass
Shear Analysis (Minor Axis z)	2.137 k	124.405 k	0.017	Pass
Bending & Axial Interaction Check (UC Bending Max)	-	-	0.306	Pass

Close



Member Analysis

W 10x33 Hot rolled steel double angle Support



\$0.4 per pound
Cost Analysis
4.5 k * 0.4 = \$18000

Detail Report: M1 Unity Check: 0.006 (axial/bending) Load Combination: Envelope

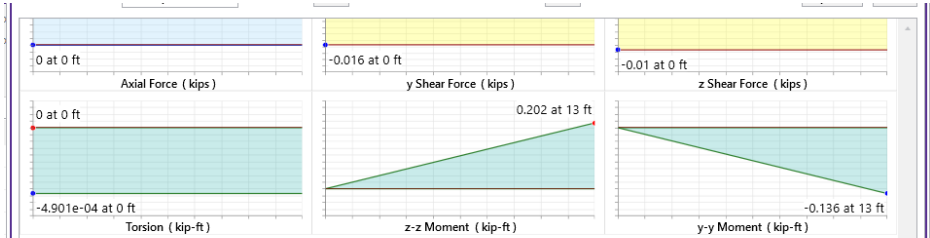
Input Data:
 Shape: RECT20X20 I Node: J Node: I Release: J Release:
 Member Type: Column Length (ft): 13 Material Type: Concrete Design Rule: Beam1 Design Code: ACI 318-19

Material Properties:
 Material: Conc4000NW Therm. Coeff. (1e-4/F): 0.6 Lambda: Flex Steel (ksi):
 E (ksi): 3644 Density (k/ft³): 0.145 Flex Steel (ksi):
 G (ksi): 1584 Fc (ksi): 4 Shear Steel (ksi):
 Nu: 0.15

Shape Properties:
 D (in): 20 W (in): 20

Design Properties:
 Concrete Stress Block: Rectangular Flex Rebar Set:
 Cracked Sections Used: Yes Shear Rebar Set:
 Cracked "I" Factor: 0.7 Top Cover (in):
 Effective "I" (in⁴): 9333.333 Bottom Cover (in):
 Effective "I" (Service) (in⁴): 13346.667 Side Cover (in):
 Legs/Stirrup:

Diagrams:
 y Deflection (in): 1.104e-04 at 7.448 ft, -1.666e-06 at 13 ft
 z Deflection (in): 9.872e-04 at 13 ft
 Axial Force (kips): 4.889 at 0 ft, 0 at 0 ft
 y Shear Force (kips): 0 at 0 ft, -0.016 at 0 ft
 z Shear Force (kips): 0 at 0 ft, -0.01 at 0 ft
 Torsion (kip-ft): -4.901e-04 at 0 ft
 z-z Moment (kip-ft): 0.202 at 13 ft
 y-y Moment (kip-ft): -0.136 at 13 ft



ACI 318-19 Code Check

Column Design does not consider any Torsional Moments

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial					
Flexural Reinforcement		4 in ²	4.811 in ²	-	Pass
Axial Capacity	1	4,889 k	848,784 k	0.006	Pass
Bending Unity Check					
Y Shear Design Strength	0	0.016 k	56,027 k	0.000	Pass
Z Shear Design Strength	0	0.01 k	56,027 k	0.000	Pass
Threshold Torsion		0.000 k-ft	8,094 k-ft	1	Pass
Span Information					
Rebar Detailing					



Member Analysis

Reinforced Concrete Slab



Thank you!
Any question?