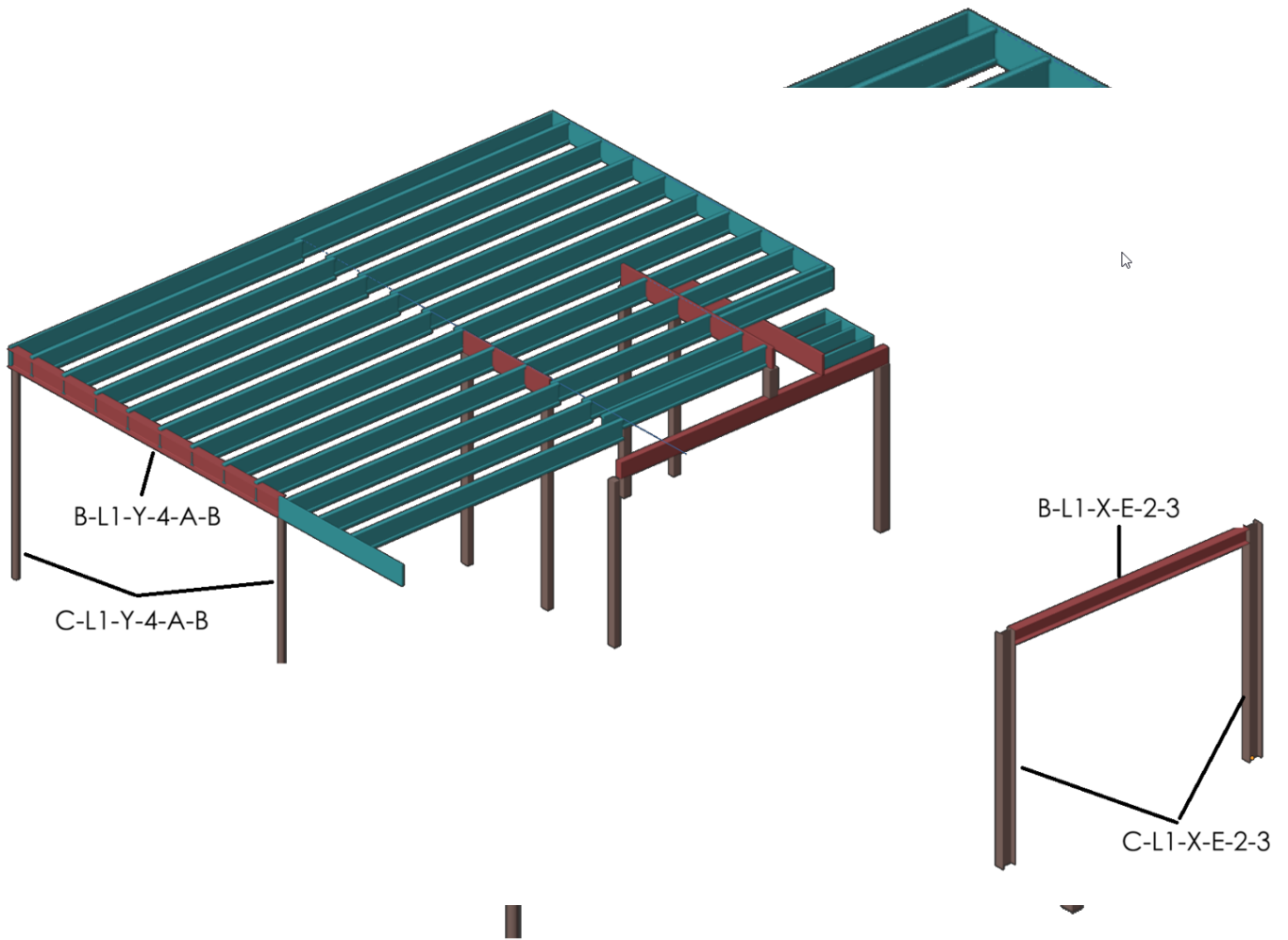


Steel Design - Mezzanine

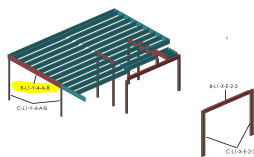
- Beam Design: B-L1-Y-4-A-B
- Column Design: C-L1-Y-4-A-B
- Steel Frame Design



Beam Design: B-L1-Y-4-A-B

Components

Length: 16.8 ft



Section	Product / Species	Grade
W10x30	Steel W Section	A36

Loads

Source	Dead	Live	Snow	Wind	Width
Floor - Mezzanine	20 psf	80 psf	-	-	7.5 ft
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	65.9 psf	-	1 ft
External second-storey wall (Width denotes Height)	10 psf	-	-	-	16 ft
Self-weight	30 psf	-	-	-	1 ft

Analysis and Design Results

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 46.4 kip-ft	M_U : 58.2 kip-ft	0.8	✓
D + S	Bending	M: 43.4 kip-ft	M_U : 58.2 kip-ft	0.75	✓
D + 0.75 L + 0.75 S	Bending	M: 54.8 kip-ft	M_U : 58.2 kip-ft	0.94	✓
D + L	Shear	V: 11 kip	V_U : 40.6 kip	0.27	✓
D + S	Shear	V: 10.3 kip	V_U : 40.6 kip	0.25	✓
D + 0.75 L + 0.75 S	Shear	V: 13 kip	V_U : 40.6 kip	0.32	✓

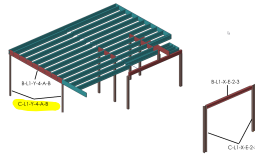
Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.75 L + 0.75 S	Deflection	d: 0.3 in	d_U : 0.56 in (L / 360)	0.54	✓
D + 0.75 L + 0.75 S	Deflection	d: 0.56 in	d_U : 0.84 in (L / 240)	0.67	✓

Column Design: C-L1-Y-4-A-B

Components

Height: 10 ft



Section	Product / Species	Grade
HSS 3.5x0.188	Steel Round Hollow Section	A36

Loads

Source	Dead	Live	Snow	Wind	Area
Floor - Mezzanine	20 psf	80 psf	-	-	63 ft ²
Roof - Mezzanine	25 psf	-	30 psf	-	126 ft ²
Roof - Mezzanine - snow drift	-	-	65.9 psf	-	8.4 ft ²
External second-storey wall	10 psf	-	-	-	134.4 ft ²
Steel beam w10x30	30 psf	-	-	-	8.4 ft ²

Analysis and Design Results

Strength Checks (ASD)

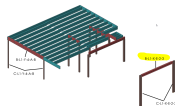
Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 11 kip	P_U : 22.7 kip , F_{CR} : 20.82 ksi	0.49	✓
D + S	Buckling	P: 10.3 kip	P_U : 22.7 kip , F_{CR} : 20.82 ksi	0.46	✓
D + 0.75 L + 0.75 S	Buckling	P: 13 kip	P_U : 22.7 kip , F_{CR} : 20.82 ksi	0.58	✓

NB: No serviceability checks required

Steel Moment Frame Design

Components: B-L1-X-E-2-3

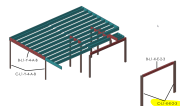
Length: 13.55 ft



Section	Product / Species	Grade
W8x18	Steel W Section	A36

Components: C-L1-X-E-2-3

Height: 10.72 ft



Section	Product / Species	Grade
W10x22	Steel W Section	A36

Distributed loads

Source	Dead	Snow	Wind	Width
Roof - Mezzanine	25 psf	30 psf	-	1 ft
External second-storey wall (Width denotes Height)	10 psf	-	-	16 ft
Self-weight	18 plf	-	-	-

Concentrated loads

Source	Location (@z=10.72 ft)	Dead	Snow	Wind
Canopy (vertical)	@x=0 ft	83 lbf	249 lbf	-
Canopy (vertical)	@x=6 ft	120 lbf	360 lbf	-
Canopy (vertical)	@x=12 ft	83 lbf	249 lbf	-
Canopy (out-of-plane horizontal)	@x=0 ft	78 lbf	234 lbf	-
Canopy (out-of-plane horizontal)	@x=6 ft	112.8 lbf	338.4 lbf	-
Canopy (out-of-plane horizontal)	@x=12 ft	78 lbf	234 lbf	-
Wind (in-plane horizontal)	@x=0 ft	-	-	6705 lbf
Wind (in-plane horizontal)	@x=13.55 ft	-	-	6705 lbf
Wind (vertical end reactions from upper wall)	@x=0 ft	-	-	-10540 lbf
Wind (vertical end reactions from upper wall)	@x=7.5 ft	-	-	10540 lbf