Structural Analysis of Proposed Antenna & Equipment Platform Installation on Existing Building Roof Top

CH95063B – 35 S. WASHINGTON ST. RT
35 S. Washington St.
Naperville, IL 60540

Date Prepared: 3/13/2019
Revision 1: 04/05/2019
Revision 2: 05/12/2020

KCS CORPORATION
CONSULTING ENGINEERS

1125 Remington Rd.,
Schaumburg, IL 60173

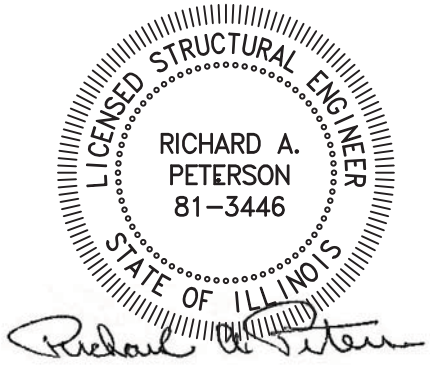
KCS CORPORATION
CONSULTING ENGINEERS

CALCULATION COVER SHEET

CLIENT:	T-Mobile	CALC. No.	2
PROJECT:	35 S. WASHINGTON ST. RT	REVISION	DATE
		0	3/13/2019
PROJECT No.:	CH95063B	1	4/05/2019
		2	5/12/2020
		Designed &	FC
		Reviewed By:	RP

TITLE: Structural Analysis of Proposed Antenna & Equipment Platform Installation on Existing Building Rooftop

CONTENTS:



Signature:
Date 7/27/2020
License No. 81-3446
Expires: 11/30/2020

Distribution:
Original to Project File

Design of steel platform for equipment support and Antenna sled mounts

INTRODUCTION

T-Mobile proposes to install a new Telecom cell site on the existing building. T-Mobile's equipment will be placed on a new steel platform with screen wall with posts supported on existing roof joists. The new three (3) antenna sectors will be installed non penetrating sled mounts.

APPLICABLE CODES AND STANDARDS

- TIA/EIA-222-H 2017
- 2018 International Building Code
- ASCE 7-16, Minimum design loads for Buildings and other structures

DESIGN CRITERIA

1. Load Case: Basic Wind Speed
   -Wind speed = 107 mph

Structural steel shall confirm to the following ASTM specifications:

- Structural W shape - A992
- Structural C and L shape and plates - A36
- Structural Bolts -A325
- Structural Tube -A500, Gr. B

- Platform Live Load = 60 psf (governs over snow load)
- Platform Snow Load = 30 psf

SUMMARY/ METHODOLOGY

The proposed sled mount was analyzed for the new antenna loads using RISA3D as suggested by the manufacturer due to the load eccentricity. The required balast is also determined by using the same RISA3D model. The resulting reactions from the model are then used to check the capacity of existing Roof joists and the reinforcement required.

The proposed platform with with screenwall on three sides was also modeled and design in Risa3D. Similarly, The existing joist where the platform is supported are checked against the resulting reaction from the analysis model.

CONCLUSION

A. Existing Roof Structure (Passed w/ reinforcement provided)

The existing Roof framing is capable of supporting the proposed antenna and equipment support loads provided that the joist reinforcements as detailed on the construction drawings are installed.

B. The Commercial and Custom Sled Mounts (Passed)

The sled mount is capable of supporting the proposed Antenna and appurtenance loads per sector provided the prescribed amount of ballast are installed as shown on construction CD's.

C. The Equipment Platfrom (Passed)

The equipment platform is designed and therefore is capable of supporting the loads imposed by the proposed Antennas and equipment installation including the screenwall enclosure.

APPURTENANCE LOADING SCHEDULE

EQUIPMENT			QTY	DIMENSIONS			WT (lbs)	Total Wt.
				H	W	D		
1.	ANTENNAS:							
	a.	Commscope FFHH-65B-R3	3	72"	25.2"	9.3"	101.4	304.2
	b.	Nokia AAFIA MIMO B22/B66	3	73"	26"	10"	274.0	822.0
								1,126.2
2.	RRUs + MISC							
	b.	AHLOA	3	22	12.2	7.44	84.0	252.0
	c.	FXFC	3	22.1	19.3"	5.3"	56.0	168.0
								420.0
3.	PLATFORM EQUIPMENTS							-
	a.	FSMF	1	22"	19.3"	5.3"	56.0	56.0
	b.	OVP	1	20.50	16.50	5.83"	19.5	19.5
	c.	SSC	1	72.00	30.00	36.00	1,640.0	1,640.0
	d.	BBU	2	72.00	30.00	36.00	2,565.0	5,130.0
	e.	CIENA	1	21.00	16.50	6.00	60.0	60.0
								6905.5

GRAVITY LOAD CALCS

Grating Load on platform

$GrL := 10 \cdot psf$

Live Load on platform

$LL := 60 \cdot psf$

Platform equipment

$W_{BBU} := 2565 \cdot lb$ BBU with plinth

$w_{BBU} := \frac{W_{BBU}}{2 \cdot 4ft} = 320.63 \cdot plf$ Applied as uniform load on supporting beams

$W_{SSC} := 1640 \cdot lb$ SCC with plinth

$w_{SSC} := \frac{W_{SSC}}{2 \cdot 4ft} = 205 \cdot plf$ Applied as uniform load on supporting beams

$W_{CIENA} := \frac{60lb}{4} = 15\,lb$ Applied on handrails

$W_{PPC} := \frac{240lb}{4} = 60\,lb$ Applied on handrails

$W_{OVP} := \frac{19.5lb}{2} = 9.75\,lb$ applied on handrails

Antenna weight + mounting kit

(1) FFHH-65B-R3

$W_{ANT.1} := 101.4lb + 14lb = 115.4\,lb$ $\frac{W_{ANT.1}}{2} = 57.7\,lb$ applied on supports

(1) AAFIA - MIMO

$W_{ANT.2} := 254 \cdot lb + 14 \cdot lb = 268\,lb$ $\frac{W_{ANT.2}}{2} = 134\,lb$ applied on supports

Additional Equipment on the frame mount

$W_{OVP} := 19.5lb$ OVP weight applied on supports

$W_{RRU1} := 84.0lb$ AHLOA weight applied on supports

$W_{RRU2} := 56lb$ FXFC weight applied on supports

Weight of existing screen wall w/ framing

$W := 10.psf$ $h_{wall} := 3.5ft$ $S_{post} := 5ft$

$W_{wall} := Round\left[\left(W \cdot h_{wall} \cdot S_{post}\right), 100lb\right] = 200\,lb$

Weight of new screenwall

$W_s := 3psf$

WIND LOAD CALCS

1. DESIGN WIND LOAD per TIA-EIA-222 -H

$V := 107\,mph$ — Basic Wind Speed

$\_ := 7$ $\quad Z_g := 1200\,ft$ — For exposure category "B"

$Z := 60\,ft$ — Above-ground height to center line antenna

$K_z := 2.01 \cdot \left(\frac{Z}{Z_g}\right)^{\frac{2}{\_}}$ $\quad K_z = 0.85$ — Velocity Pressure coefficient (Section 2.6.5.2)

$I := 1.0$ — Importance Factor, Structure Class II

$K_d := 0.95$ — Wind Directionality Factor

$K_{zt} := 1$ — Topographic factor, Section 2.6.6.4

$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I \cdot \frac{psf}{mph^2} = 23.78 \cdot psf$ — Velocity pressure

2. WIND LOAD CALCULATIONS

SSC & BBU Wind Load

$H := 72\,in$ $\quad W := 41\,in$ $\quad D := 35\,in$ — Dimensions of SSC & BBU Cabinets

$A_{SSC\ BBU\ N} := H \cdot W = 20.5\,ft^2$ — Projected area of antenna

$A_{SSC\ BBU\ T} := H \cdot D = 17.5\,ft^2$

$C_{A\ N} = 1.2$ $\quad C_{A\ T} = 1.2$

$EPA_N := C_{A\ N} A_{SSC\ BBU\ N} = 24.6\,ft^2$ — Effective projected wind area on 2 antennae

$EPA_T := C_{A\ T} A_{SSC\ BBU\ T} = 21\,ft^2$

$F_N := \frac{EPA_N \cdot q_z \cdot 3.5ft}{2.5ft \cdot 4ft} = 204.74\,lb \cdot ft^{-1}$ — uplift and downward wind force per support

$F_T := \frac{EPA_T \cdot q_z \cdot 3.5ft}{4ft \cdot 2ft} = 218.47\,lb \cdot ft^{-1}$ — uplift and downward wind force per support

$F_{N\ horizontal} := 0.5 EPA_N \cdot q_z = 292.49\,lb$ — Horizontal wind force

$F_{T\ horizontal} := 0.5 EPA_T \cdot q_z = 249.69\,lb$ — Horizontal wind force

Antenna 1 - Model# FFHH-65B-R3

$H_{ANT1} := 72in$ $W_{ANT1} := 25.2in$ $D_{ANT1} := 9.3in$

$A_{A1\_N} := H_{ANT1} \cdot W_{ANT1} = 12.6\,ft^2$ Projected area of antenna

$A_{A1\_T} := H_{ANT1} \cdot D_{ANT1} = 4.65\,ft^2$

$C_{A\_N} = 1.22$ $C_{A\_T} = 1.42$

$EPA_{A1\_N} := C_{A\_N} A_{A1\_N} = 15.32\,ft^2$ Effective projected wind area on 2 antennae

$F_{A1\_N} := EPA_{A1\_N} \cdot q_z = 364.3\,lb$ $\frac{F_{A1\_N}}{2} = 182.15\,lb$ Wind force per support

$EPA_{A1\_T} := C_{A\_T} A_{A1\_T} = 6.62\,ft^2$

$F_{A1\_T} := EPA_{A1\_T} \cdot q_z$ $\frac{F_{A1\_T}}{2} = 78.77\,lb$

Antenna 2 - Model# AAFIA Nokia MIMO B25/B66

$H_{ANT2} := 73in$ $W_{ANT2} := 26in$ $D_{ANT2} := 10in$

$A_{A2\_N} := H_{ANT2} \cdot W_{ANT2} = 13.18\,ft^2$ Projected area of antenna

$A_{A2\_T} := H_{ANT2} \cdot D_{ANT2} = 5.07\,ft^2$

$C_{A\_N} = 1.21$ $C_{A\_T} = 1.41$

$EPA_{A2\_N} := C_{A\_N} A_{A2\_N} = 16\,ft^2$ Effective projected wind area on 2 antennae

$EPA_{A2\_T} := C_{A\_T} A_{A2\_T} = 7.15\,ft^2$

$F_{A2\_N} := EPA_{A2\_N} \cdot q_z$ $\frac{F_{A2\_N}}{2} = 190.2\,lb$ Wind force per support

$F_{A2\_T} := EPA_{A2\_T} \cdot q_z$ $\frac{F_{A2\_T}}{2} = 84.99\,lb$

AHLOA

$H_{AHL} := 22in$ $W_{AHL} := 12.2in$ $D_{AHL} := 7.44in$

$A_{AHL\_N} := H_{AHL} \cdot W_{AHL} = 1.86\,ft^2$ Projected area of AHLOA

$A_{AHL\_T} := H_{AHL} \cdot D_{AHL} = 1.14\,ft^2$

$C_{A\_N} = 1.2$ $C_{A\_T} = 1.22$

$EPA_{AHL\_N} := C_{A\_N} \cdot A_{AHL\_N} = 2.24\,ft^2$ Effective projected area of AHLOA,

$EPA_{AHL\_T} := C_{A\_T} \cdot A_{AHL\_T} = 1.39\,ft^2$

$F_{AHL\_N} := EPA_{AHL\_N} \cdot q_z = 53.19\,lb$ Wind force per support

$F_{AHL\_T} := EPA_{AHL\_T} \cdot q_z = 32.98\,lb$

FXFC

$H_{FX} := 22in$ $W_{FX} := 19.3in$ $D_{FX} := 5.3in$

$A_{FX\_N} := H_{FX} \cdot W_{FX} = 2.95\,ft^2$

Projected area of FXFC

$A_{FX\_T} := H_{FX} \cdot D_{FX} = 0.81\,ft^2$

$C_{A\_N} = 1.2$ $C_{A\_T} = 1.27$

$EPA_{FX\_N} := C_{A\_N} \cdot A_{FX\_N} = 3.54\,ft^2$ Effective projected area of FXFB,

$EPA_{FX\_T} := C_{A\_T} \cdot A_{FX\_T} = 1.03\,ft^2$

$F_{FX\_N} := EPA_{FX\_N} \cdot q_z = 84.14\,lb$ Wind force per support

$F_{FX\_T} := EPA_{FX\_T} \cdot q_z = 24.52\,lb$

Sled Mount Vertical Members

$h_{p1} := 96in$ $w_{p1} := 2.875in$ $C_a := 1.2$ $n_{p1} := 3$ $CL_1 := 8ft$

$Wu_{p1} := q_z \cdot w_{p1} \cdot C_a \cdot h_{p1} \cdot n_{p1} = 164.08\,lb$

$h_{p2} := 84in$ $w_{p2} := 3.5in$ $C_a := 1.2$ $n_{p2} := 4$ $CL_2 := 3.5ft$

$Wu_{p2} := q_z \cdot w_{p2} \cdot C_a \cdot h_{p2} \cdot n_{p2} = 233.04\,lb$

COMMERCIAL ROOFTOP BALLAST FRAME DESIGN

$SF := 1.5$ $L_{TRAY} := 7.85ft$ Safety Factor

$W_{equip} := W_{ANT.1} + W_{ANT.2} + W_{RRU1} + W_{RRU2} = 523.4\,lb$ Weight of equipment

$WL_{equip} := F_{A1\_N} + F_{A2\_N} + F_{AHL\_N} + F_{FX\_N} = 882.03\,lb$ Wind Load on equipment per sector

$w_{mount} := 1064lb$ Wt. sled mount (RT-NF12-3-96)

Antenna Wind Load

$AL := W_{equip} = 523.4\,lb$

$FL := Wu_{p2} + Wu_{p1} = 397.12\,lb$ Frame Wind Load

$HF := 5.75ft$ $H := 8ft$

$$WT := \frac{[(AL \cdot H) + (FL \cdot HF)](1.5)}{3.375ft} = 2875.84\,lb$$ Total Ballast Weight required

$$W_{tray} := \frac{WT}{4} = 718.96\,lb$$

$$n_{blocks} := ceil\left(\frac{W_{tray}}{74lb}\right) = 10$$

$WT := 4n_{blocks} \cdot 74lb = 2960\,lb$ Total ballast weight to be provided

Sled Mount Loads w/ Ballast:

$$P_F := \frac{\left(W_{tray} \cdot 19.66ft\right) + \left(W_{equip} \cdot 5.39ft\right) + \left(0.6w_{mount} \cdot 5.39ft\right) + \left(0.4w_{mount} \cdot 2.5ft\right)}{L_{TRAY}} = 2733.87\,lb$$ Sled mount reaction (Front)

$P_R := \left(W_{tray} \cdot 5 + w_{mount} + W_{equip}\right) - P_F = 2448.33\,lb$ Sled mount reaction (Rear)

CUSTOM ROOFTOP BALLAST FRAME DESIGN

Custom frame for Antenna mount with stealth wall

$W_{s.w} := 10psf$ Stealth wall panel Weight

$h_{s.w} := 6.5ft$ height

$L_{s.w} := 15ft$ Length

$$W_{s.w} \cdot \frac{h_{s.w}}{2} = 32.5 \cdot plf$$ superimposed DL load on framing members

$q_z := 25psf$ Design wind pressure on Stealth panel

Calculate required ballast for overturning

$FS := 1.5$ Factor of Safety

$W_{equip} := W_{ANT.1} + W_{ANT.2} + W_{RRU1} + W_{RRU2} = 523.4\,lb$ Weight of equipment

$W_{block} := 74lb$ Wt. cmu of block

$WL_{equip} := F_{A1\_N} + F_{A2\_N} + F_{AHL\_N} + F_{FX\_N} = 882.03\,lb$ Wind load on equipment per sector

$WL_{s.w} := L_{s.w} \cdot h_{s.w} \cdot q_z = 2437.5\ lb$ Wind load on screen wall

$WL_{frame} := 500 lb$ Approx. wind load on frame

$w_{mount} := 3500 lb$ Wt. sled mount (RT-NF12-3-96)

$n_{block} := 38$

$W_{ballast} := W_{block} \cdot n_{block} = 2812\ lb$ Weight of one ballast tray: Governs

$M_O := \left(WL_{equip} \cdot 7ft\right) + \left(WL_{s.w} \cdot 7ft\right) + \left(WL_{frame} \cdot 5.25ft\right) = 25.86 \cdot kip \cdot ft$ Overturing Moment

$M_R := \left(W_{ballast} \cdot 10.5ft\right) + \left(0.45 \cdot w_{mount} \cdot 4.5ft\right) + \left(0.55 \cdot w_{mount} \cdot 1.5ft\right) = 39.5 \cdot kip \cdot ft$ Restraining Moment

$\frac{M_R}{M_O} = 1.53 \quad if\left(\frac{M_R}{M_O} > FS, \text{"OK"}, \text{"More Ballast Required"}\right) = \text{"OK"}$ 1.5 Safety Factor met

$W_{total\_gamma} := w_{mount} + 2W_{ballast} + W_{equip} = 9.65 \cdot kip$

$Joist_{load} := \frac{\left(0.5W_{ballast} + 0.5 \cdot 0.55 w_{mount} + 0.5W_{equip}\right)}{15ft} = 175.35 \cdot plf$ Dead Load on front supporting joist

$Joist_{load} := \frac{\left(0.5W_{ballast} + 0.5 \cdot 0.45 w_{mount}\right)}{15ft} = 146.23 \cdot plf$ Dead Load on back supporting joist

Calculate required ballast for sliding

$FS := 1.5$ Factor of Safety $n := 2$ no. of ballast trays

$F_h := q_z \cdot h_{s.w} \cdot L_{s.w} = 2437.5\ lb$ Wind Force on Stealth wall

$R := (832.6 + 523.4 + 968.1 + 248.7 + 94.4 + 219.6) lb = 2886.8\ lb \quad R := 2.887 kip$ LC-12: 0.6D

$N_{ballast.tray} := ceil\left[\frac{\left[\left(2FS \cdot F_h\right) - R\right]}{W_{block} \cdot n}\right] = 30$ No. of blocks required per tray

$W_{ballast.tray} := N_{ballast.tray} \cdot W_{block} = 2220\ lb$ Does Not Govern

Existing Roof Loads:

$w_{m.deck} := 1.7 psf \quad w_{ins\_r} := 4.5 psf \quad w_{wpm} := 1.5 psf$

$w_{CEILING} := 2 psf \quad w_{MEP} := 2 psf$

$DL_{roof} := w_{m.deck} + w_{ins\_r} + w_{wpm} + w_{CEILING} + w_{MEP} = 11.7 \cdot psf$

$DL := Round(8.5\ psf, 15 psf) = 15 \cdot psf$

$LL_{roof} := 25 psf$

DESIGN OF EXISTING ROOF JOISTS

Existing Roof Loads

$w_{m.deck} := 1.7psf$ $w_{ins\_r} := 4.5psf$ $w_{wpm} := 1.5psf$

$w_{CEILING} := 2psf$ $w_{MEP} := 2psf$

$DL_{roof} := w_{m.deck} + w_{ins\_r} + w_{wpm} + w_{CEILING} + w_{MEP} = 11.7 \cdot psf$

$DL := Round(11.7\ psf, 15psf) = 15 \cdot psf$

$LL_{roof} := 20psf$

1. 22K4 W/ NEW sled mount ALPHA

22K4 "Vulcraft" for 31.83' span

$w_{T\ table} := 265 \cdot plf$ $L_i := 31.83ft$ $d_i := 22in - 2in = 20 \cdot in$ $\_ := 1.67$ $F_y := 36ksi$

$w_{SW} := 8plf$ selfweight of joist

Loadings:

$DL := 15psf$ $LL := 25psf$ Existing Roof Loads

$PL_1 := 1.367kip$ $PL_2 := 1.224kip$ Sled mount loads (see alpha sector plan)

$PL_3 := .5$ Existing RTU

$$M_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) \cdot L_i^{\,2}\right]}{8} = 32.55 \cdot ft \cdot kip$$ $M_{max} := 37.613ft \cdot kip$ From Enercalc

Check Moment Capacity $if\left(M_{max} < M_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"No Good, reinf. required"}$

$$As_{required} := \frac{\left[\_ \cdot \left(M_{max} - M_{CAP}\right)\right]}{d_i \cdot F_y} = 0.14 \cdot in^2$$

$A_{angle} := .524in^2$ Provide 2-L1 1/2X1 1/2X3/16 angles at first (2) diagonals

$As_{Provided} := 2 \cdot A_{angle} = 1.05 \cdot in^2$

$V_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) L_i\right]}{2} = 4.09 \cdot kip$ $R_{max} := 4.860 kip$ From Enercalc

$V_{max} := R_{max} = 4.86 \cdot kip$

Check Shear Capacity $if\left(V_{max} < V_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"No Good, reinf. required"}$

$As_{required} := \frac{\left[\_ \cdot \left(V_{max} - V_{CAP}\right)\right]}{F_y \cdot sin(30.deg)} = 0.07 \cdot in^2$

$A_{angle} := .524 in^2$ Provide 2-L1 1/2X1 1/2X3/16 angles at first (2) diagonals

$As_{Provided} := 2 \cdot A_{angle} = 1.05 \cdot in^2$

2. 22K10 W/ NEW sled mount GAMMA

22K10 "Vulcraft" for 32' span

$w_{SW} := 12.6 plf$ selfweight of joist

$w_{T\ table} := 517 \cdot plf$ $L_i := 32 ft$ $d_i := 22 in - 2 in = 20 \cdot in$ $\_ := 1.67$ $F_y := 36 ksi$

Loadings:

$DL := 15 psf$ $LL := 25 psf$ Existing Roof Loads

$PL_1 := 175 \cdot plf$ Sled Mount, Equipment & Ballast Load on joist

$PL_2 := .2 kip$ screen wall $w_{Screen\ Wall} := 35 plf \cdot 1.42 \frac{ft}{5 ft} = 9.94 \cdot plf$ Existing RTU

$M_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) \cdot L_i^{\ 2}\right]}{8} = 64.56 \cdot ft \cdot kip$ $M_{max} := 43.128 ft \cdot kip$ From Enercalc

Check Moment Capacity $if\left(M_{max} < M_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"Okay"}$

$V_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) \cdot L_i\right]}{2} = 8.07 \cdot kip$ $R_{max} := 4.958 kip$ From Enercalc

$V_{max} := R_{max} = 4.96 \cdot kip$

Check Shear Capacity $if\left(V_{max} < V_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"Okay"}$

3. 22K4 W/ NEW sled mount GAMMA

22K4 "Vulcraft" for 32' span

$w_{SW} := 8plf$ selfweight of joist

$w_{T\ table} := 265 \cdot plf$ $L_j := 32ft$ $d_j := 22in - 2in = 20 \cdot in$ $\_ := 1.67$ $F_y := 36ksi$

Loadings:

$DL := 15psf$ $LL := 25psf$ Existing Roof Loads

$PL_1 := 175 \cdot plf$ Sled mount loads (see gamma sector plan)

$PL_2 := .2kip$ screen wall

$$M_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) \cdot L_j^{\,2}\right]}{8} = 32.9 \cdot ft \cdot kip$$ $M_{max} := 41.943ft \cdot kip$ From Enercalc

Check Moment Capacity $if\left(M_{max} < M_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"No Good, reinf. required"}$

$$As_{required} := \frac{\left[\_ \cdot \left(M_{max} - M_{CAP}\right)\right]}{d_j \cdot F_y} = 0.25 \cdot in^2$$

$A_{angle} := .524in^2$ Provide 2-L1 1/2X1 1/2X3/16 angles at first (2) diagonals

$As_{Provided} := 2 \cdot A_{angle} = 1.05 \cdot in^2$

$$V_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) \cdot L_j\right]}{2} = 4.11 \cdot kip$$ $R_{max} := 4.853kip$ From Enercalc

$V_{max} := R_{max} = 4.85 \cdot kip$

Check Shear Capacity $if\left(V_{max} < V_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"No Good, reinf. required"}$

$$As_{required} := \frac{\left[\_ \cdot \left(V_{max} - V_{CAP}\right)\right]}{F_y \cdot \sin(30.deg)} = 0.07 \cdot in^2$$

$A_{angle} := .524in^2$ Provide 2-L1 1/2X1 1/2X3/16 angles at first (2) diagonals

$As_{Provided} := 2 \cdot A_{angle} = 1.05 \cdot in^2$

4. 22K7 W/ NEW sled mount GAMMA

22K7 "Vulcraft" for 32' span

$w_{SW} := 9.7 plf$

$w_{T\ table} := 363 \cdot plf$ $L_i := 32 ft$ $d_i := 22 in - 2 in = 20 \cdot in$ $\_ := 1.67$ $F_y := 36 ksi$

Loadings:

$DL := 15 psf$ $LL := 25 psf$ Existing Roof Loads

$PL_1 := 146 \cdot plf$ Sled mount loads (see gamma sector plan)

$PL_2 := .2 kip$ screen wall

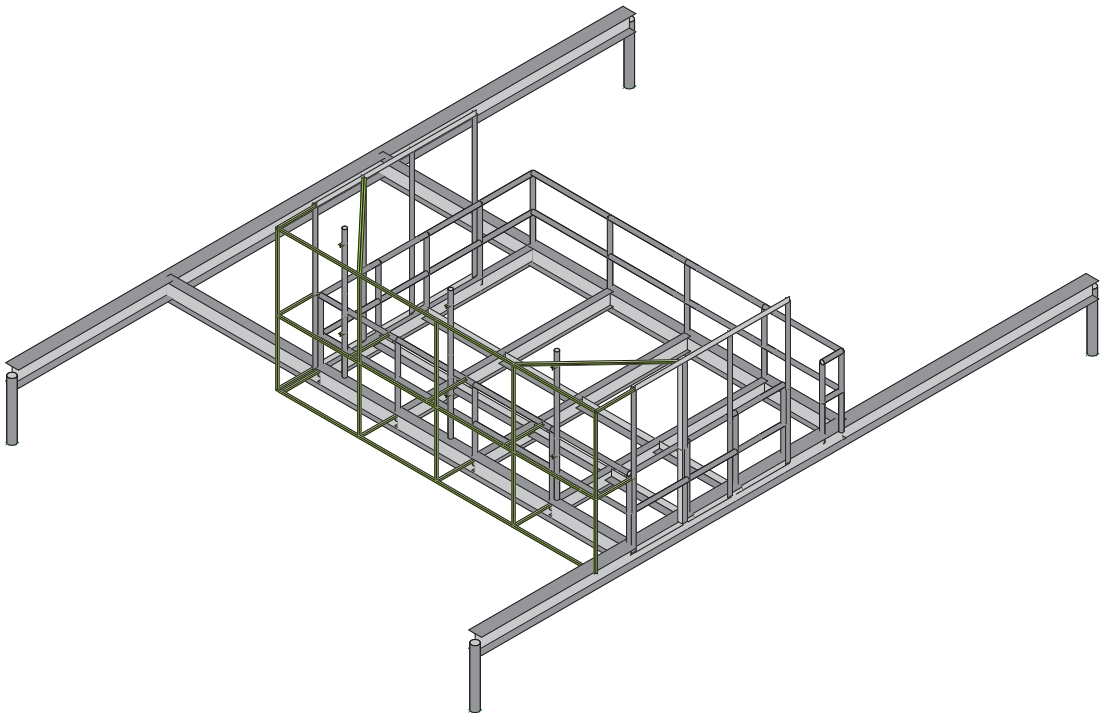
$M_{CAP} := \frac{\left[\left(w_{T\ table} - w_{SW}\right) \cdot L_i^{\,2}\right]}{8} = 45.22 \cdot ft \cdot kip$ $M_{max} := 43.184 ft \cdot kip$ From Enercalc

Check Moment Capacity $if\left(M_{max} < M_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"Okay"}$

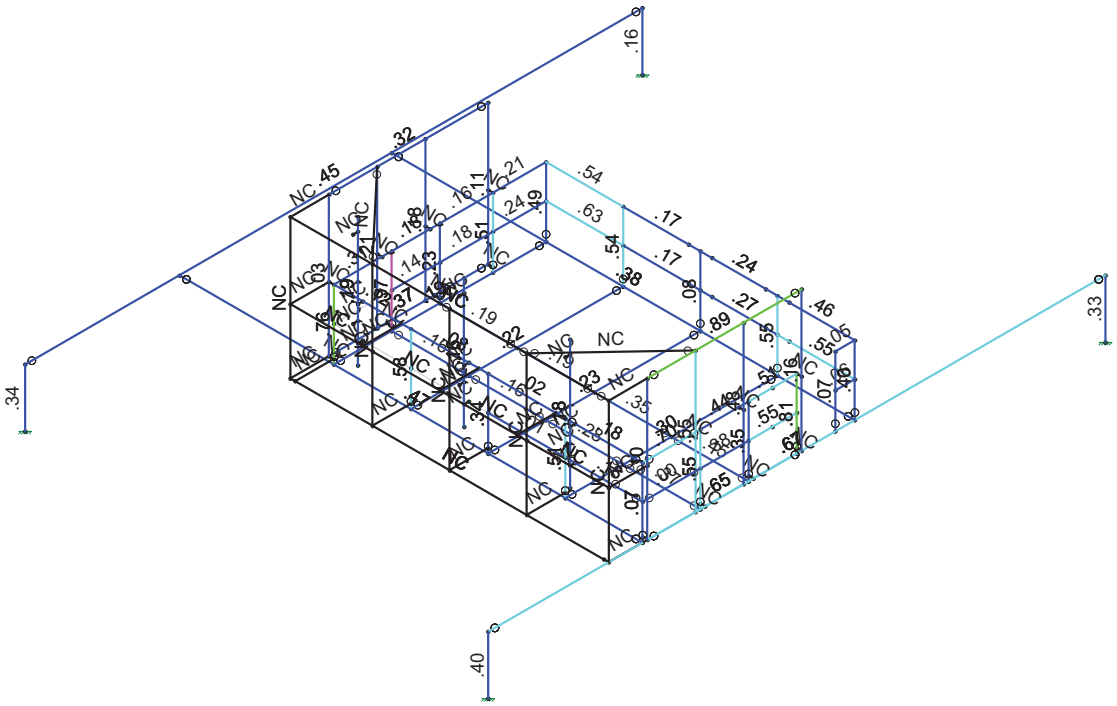
$V_{CAP} := \frac{\left(w_{T\ table} \cdot L_i\right)}{2} = 5.81 \cdot kip$ $R_{max} := 4.866 kip$ From Enercalc

$V_{max} := R_{max} = 4.87 \cdot kip$

Check Shear Capacity $if\left(V_{max} < V_{CAP}, \text{"Okay"}, \text{"No Good, reinf. required"}\right) = \text{"Okay"}$

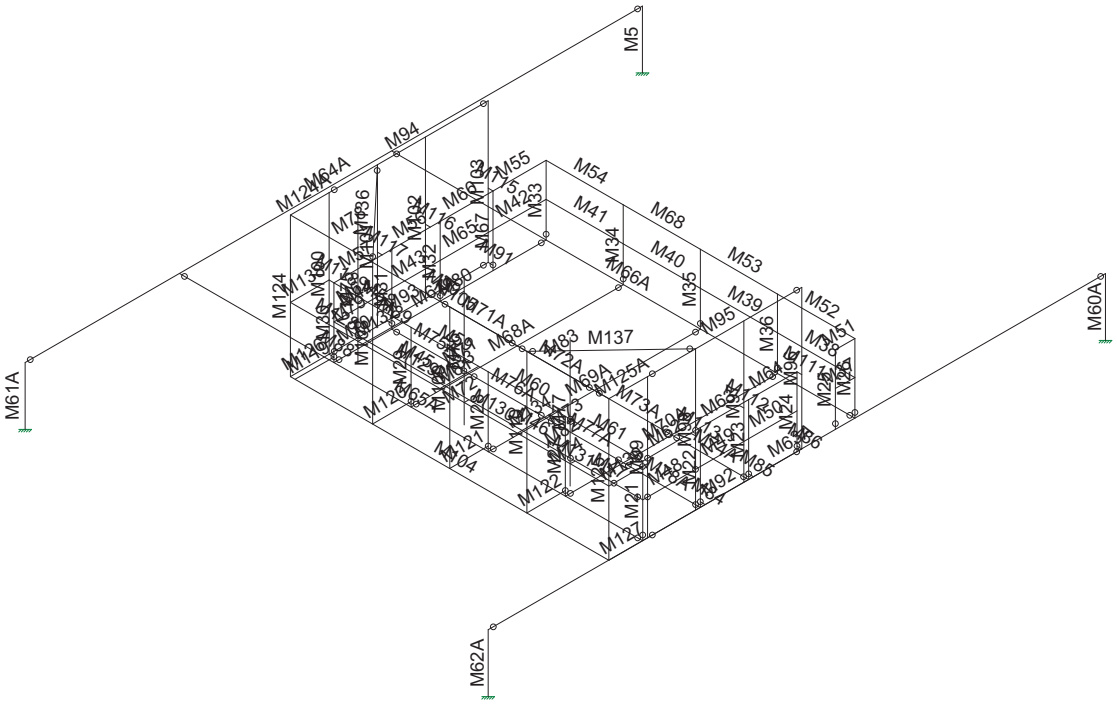


KCS Corp.		SK - 1
FC	Gamma Sector Antenna & Screen Wall Frame	May 11, 2020 at 3:54 PM
CH95063B	3D Render	Platform & Beta Sector.R3D

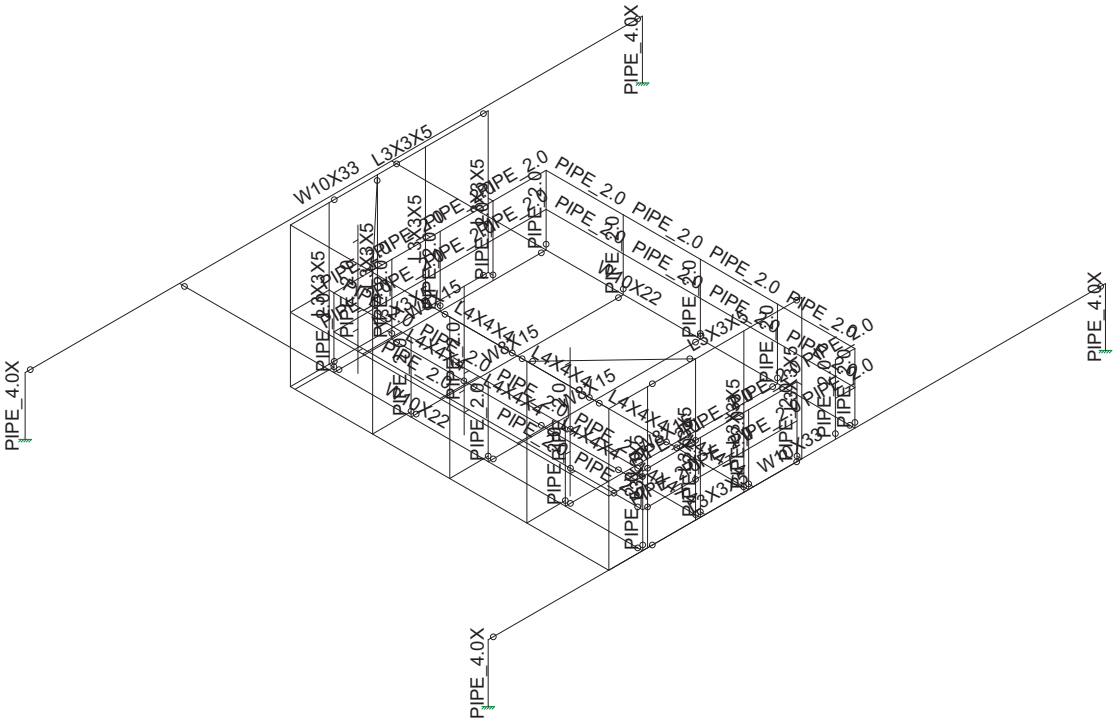


Member Code Checks Displayed (Enveloped)
Results for LC 5, 1.2DL+1.0WLZ (+)

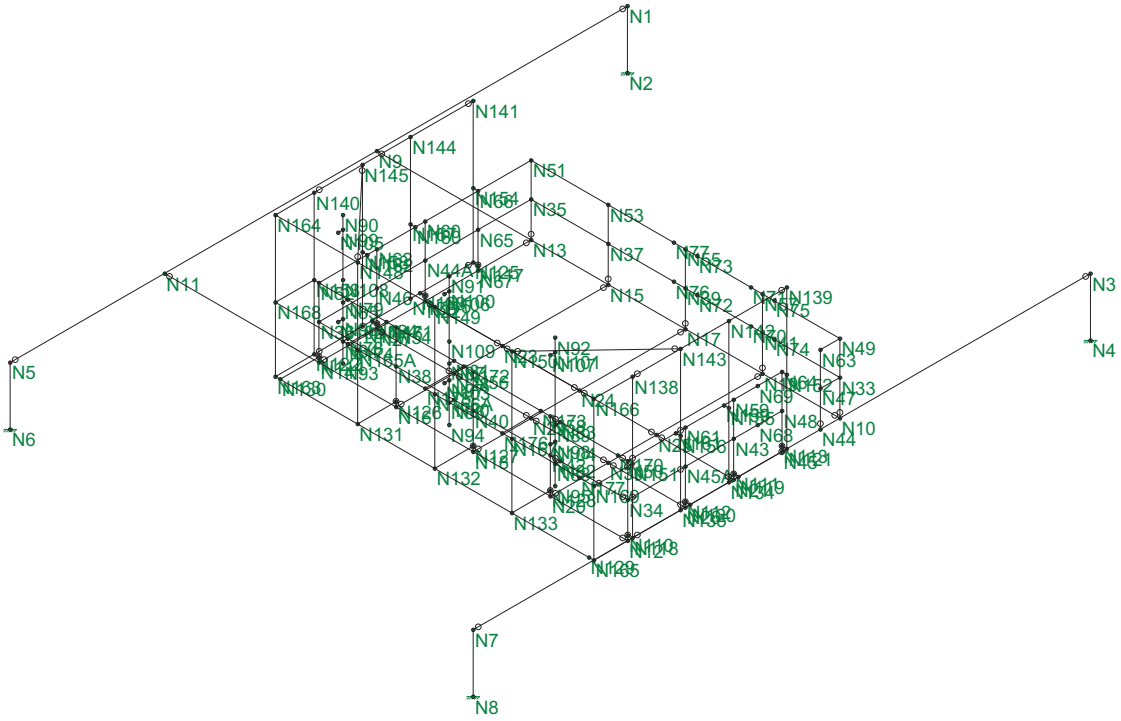
KCS Corp.		SK - 2
FC	Gamma Sector Antenna & Screen Wall Frame	May 11, 2020 at 8:30 PM
CH95063B	Unity Bending	Platform & Beta Sector.R3D



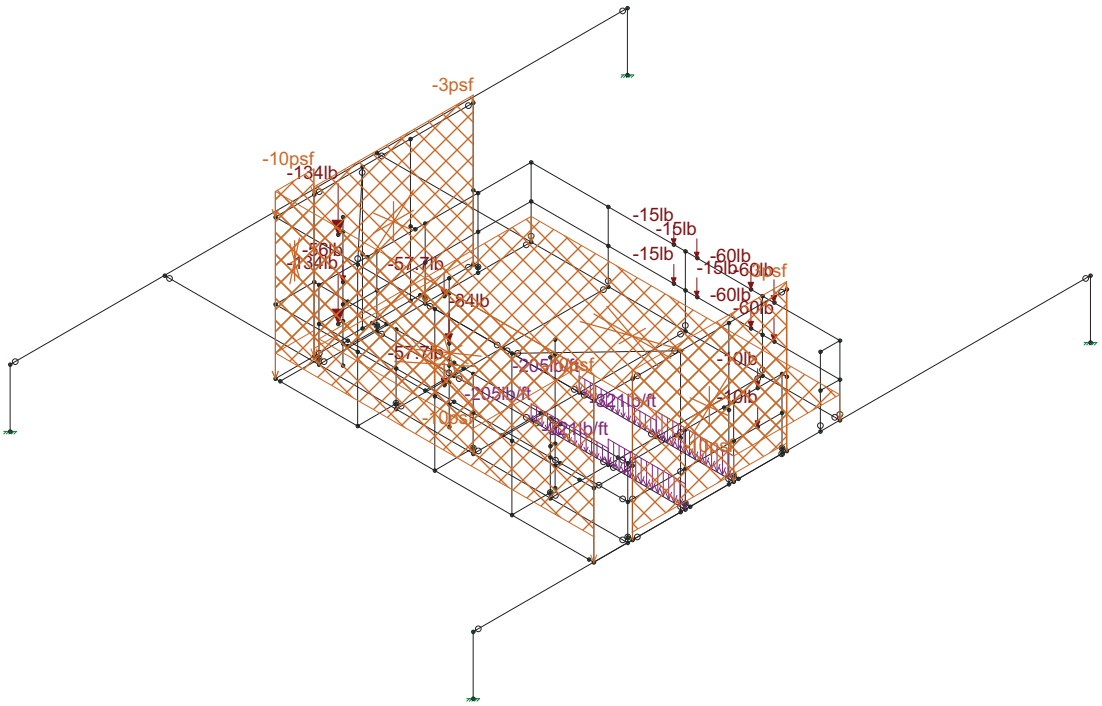
KCS Corp.		SK - 3
FC	Gamma Sector Antenna & Screen Wall Frame	May 11, 2020 at 3:55 PM
CH95063B	Members	Platform & Beta Sector.R3D



KCS Corp.		SK - 4
FC	Gamma Sector Antenna & Screen Wall Frame	May 11, 2020 at 3:56 PM
CH95063B	Shapes	Platform & Beta Sector.R3D

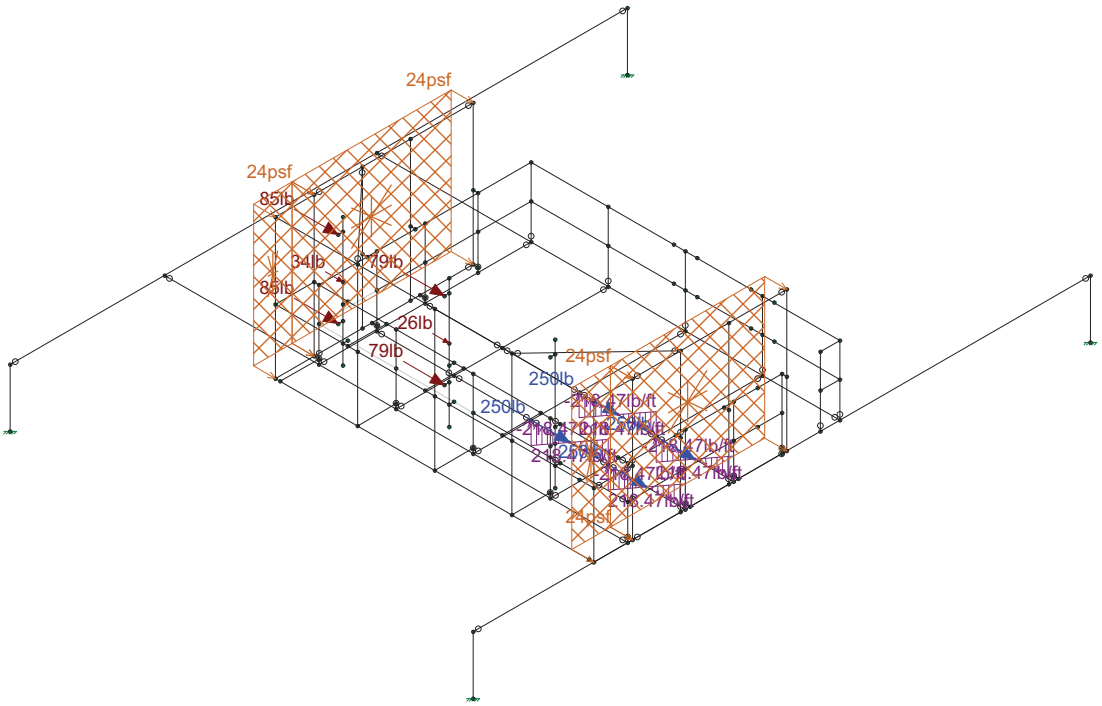


KCS Corp.	Gamma Sector Antenna & Screen Wall Frame	SK - 5
FC		May 11, 2020 at 3:56 PM
CH95063B	Nodes	Platform & Beta Sector.R3D



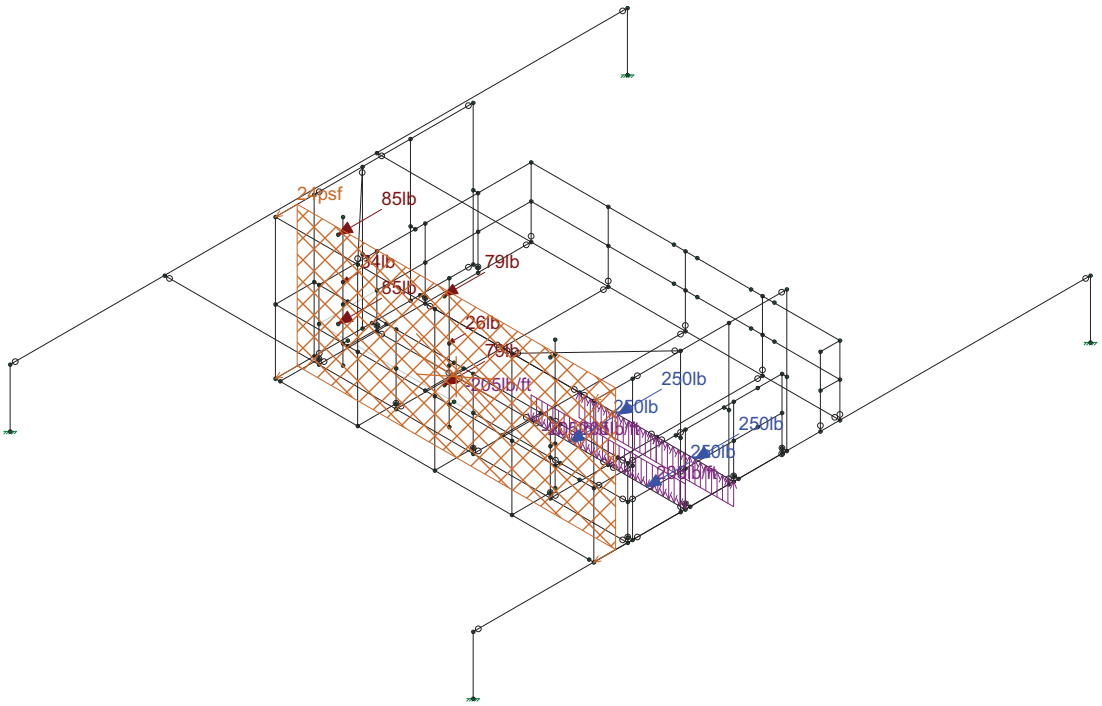
Loads: BLC 1, Dead Load

KCS Corp.		SK - 6
FC	Gamma Sector Antenna & Screen Wall Frame	May 11, 2020 at 4:06 PM
CH95063B	Dead Loads	Platform & Beta Sector.R3D



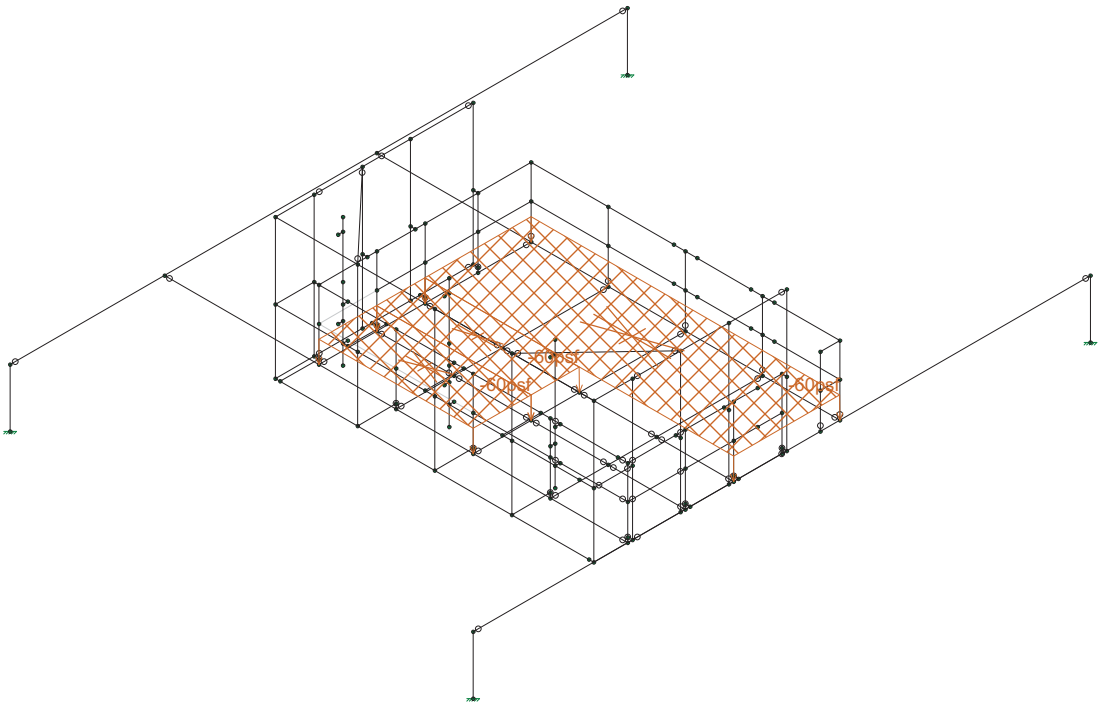
Loads: BLC 2, Wind Load (X-Direction)

KCS Corp.		SK - 7
FC	Gamma Sector Antenna & Screen Wall Frame	May 11, 2020 at 8:31 PM
CH95063B	Wind Load (X-Direction)	Platform & Beta Sector.R3D



Loads: BLC 3, Wind Load (Z-Direction)

KCS Corp.	Gamma Sector Antenna & Screen Wall Frame	SK - 8
FC		May 11, 2020 at 8:31 PM
CH95063B	Wind Load (Z-Direction)	Platform & Beta Sector.R3D



Loads: BLC 4, Live Load

KCS Corp.	Gamma Sector Antenna & Screen Wall Frame	SK - 9
FC		May 11, 2020 at 8:32 PM
CH95063B	Live Load	Platform & Beta Sector.R3D

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M5	N2	N1			Platform Post	Column	Pipe	A53 Gr.B	Typical
2	M60A	N4	N3			Platform Post	Column	Pipe	A53 Gr.B	Typical
3	M61A	N6	N5			Platform Post	Column	Pipe	A53 Gr.B	Typical
4	M62A	N8	N7			Platform Post	Column	Pipe	A53 Gr.B	Typical
5	M63A	N7	N3			W10X33	Beam	Wide Flange	A992	Typical
6	M64A	N5	N1			W10X33	Beam	Wide Flange	A992	Typical
7	M65A	N11	N12			W10X22	Beam	Wide Flange	A992	Typical
8	M66A	N9	N10			W10X22	Beam	Wide Flange	A992	Typical
9	M67A	N14	N13			W8X15	Beam	Wide Flange	A992	Typical
10	M68A	N16	N15			W8X15	Beam	Wide Flange	A992	Typical
11	M69A	N18	N17			W8X15	Beam	Wide Flange	A992	Typical
12	M70A	N20	N19			W8X15	Beam	Wide Flange	A992	Typical
13	M71A	N22	N23			L4X4	Beam	Single Angle	A36 Gr.36	Typical
14	M72A	N23	N24			L4X4	Beam	Single Angle	A36 Gr.36	Typical
15	M73A	N24	N25			L4X4	Beam	Single Angle	A36 Gr.36	Typical
16	M74A	N25	N21			L4X4	Beam	Single Angle	A36 Gr.36	Typical
17	M75A	N27	N28			L4X4	Beam	Single Angle	A36 Gr.36	Typical
18	M76A	N28	N29			L4X4	Beam	Single Angle	A36 Gr.36	Typical
19	M77A	N29	N30			L4X4	Beam	Single Angle	A36 Gr.36	Typical
20	M78A	N30	N26			L4X4	Beam	Single Angle	A36 Gr.36	Typical
21	M21	N12	N50			Handrail Post	Column	Pipe	A53 Gr.B	Typical
22	M22	N26	N61			Handrail Post	Column	Pipe	A53 Gr.B	Typical
23	M23	N21	N59			Handrail Post	Column	Pipe	A53 Gr.B	Typical
24	M24	N45	N64			Handrail Post	Column	Pipe	A53 Gr.B	Typical
25	M25	N44	N63			Handrail Post	Column	Pipe	A53 Gr.B	Typical
26	M26	N10	N49			Handrail Post	Column	Pipe	A53 Gr.B	Typical
27	M27	N20	N58			Handrail Post	Column	Pipe	A53 Gr.B	Typical
28	M28	N18	N56			Handrail Post	Column	Pipe	A53 Gr.B	Typical
29	M29	N16	N54			Handrail Post	Column	Pipe	A53 Gr.B	Typical
30	M30	N14	N52			Handrail Post	Column	Pipe	A53 Gr.B	Typical
31	M31	N27	N62			Handrail Post	Column	Pipe	A53 Gr.B	Typical
32	M32	N22	N60			Handrail Post	Column	Pipe	A53 Gr.B	Typical
33	M33	N13	N51			Handrail Post	Column	Pipe	A53 Gr.B	Typical
34	M34	N15	N53			Handrail Post	Column	Pipe	A53 Gr.B	Typical
35	M35	N17	N55			Handrail Post	Column	Pipe	A53 Gr.B	Typical
36	M36	N19	N57			Handrail Post	Column	Pipe	A53 Gr.B	Typical
37	M37	N47	N33			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
38	M38	N33	N41			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
39	M39	N41	N39			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
40	M40	N39	N37			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
41	M41	N37	N35			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
42	M42	N35	N65			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
43	M43	N44A	N46			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
44	M44	N46	N36			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
45	M45	N36	N40			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
46	M46	N40	N42			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
47	M47	N42	N34			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
48	M48	N34	N45A			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
49	M49	N45A	N43			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
50	M50	N43	N48			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
51	M51	N63	N49			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
52	M52	N49	N57			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
53	M53	N57	N55			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
54	M54	N53	N51			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
55	M55	N51	N66			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
56	M56	N60	N62			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
57	M57	N62	N52			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
58	M58	N52	N54			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
59	M59	N54	N56			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
60	M60	N56	N58			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
61	M61	N58	N50			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
62	M62	N50	N61			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
63	M63	N61	N59			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
64	M64	N59	N64			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
65	M65	N65	N44A			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
66	M66	N66	N60			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
67	M67	N67	N66			Handrail Post	Column	Pipe	A53 Gr.B	Typical
68	M68	N55	N53			Handrail Beam	Beam	Pipe	A53 Gr.B	Typical
69	M69	N79	N85			RIGID	None	None	RIGID	Typical
70	M70	N78	N84			RIGID	None	None	RIGID	Typical
71	M71	N81	N87			RIGID	None	None	RIGID	Typical
72	M72	N80	N86			RIGID	None	None	RIGID	Typical
73	M73	N83	N89			RIGID	None	None	RIGID	Typical
74	M74	N82	N88			RIGID	None	None	RIGID	Typical
75	M75	N93	N90			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
76	M76	N94	N91			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
77	M77	N95	N92			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
78	M78	N105	N99			RIGID	None	None	RIGID	Typical
79	M79	N102	N96			RIGID	None	None	RIGID	Typical
80	M80	N106	N100			RIGID	None	None	RIGID	Typical
81	M81	N103	N97			RIGID	None	None	RIGID	Typical
82	M82	N104	N98			RIGID	None	None	RIGID	Typical
83	M83	N107	N101			RIGID	None	None	RIGID	Typical
84	M84	N112	N120			RIGID	None	None	RIGID	Typical
85	M85	N111	N119			RIGID	None	None	RIGID	Typical
86	M86	N113	N121			RIGID	None	None	RIGID	Typical
87	M88	N114	N122			RIGID	None	None	RIGID	Typical
88	M89	N116	N124			RIGID	None	None	RIGID	Typical
89	M90	N115	N123			RIGID	None	None	RIGID	Typical
90	M91	N117	N125			RIGID	None	None	RIGID	Typical
91	M92	N121	N118			Screen Wall Be...	Beam	Single Angle	A36 Gr.36	Typical
92	M93	N125	N122			Screen Wall Be...	Beam	Single Angle	A36 Gr.36	Typical
93	M94	N141	N140			Screen Wall Be...	Beam	Single Angle	A36 Gr.36	Typical
94	M95	N139	N138			Screen Wall Be...	Beam	Single Angle	A36 Gr.36	Typical
95	M96	N121	N139			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
96	M97	N134	N142			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
97	M98	N143	N135			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
98	M99	N118	N138			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
99	M100	N122	N140			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
100	M101	N137	N145			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
101	M102	N136	N144			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
102	M103	N125	N141			Screen Wall Col...	Column	Single Angle	A36 Gr.36	Typical
103	M104	N163	N165			RIGID	None	None	RIGID	Typical
104	M105	N164	N166			RIGID	None	None	RIGID	Typical
105	M108	N131	N148			RIGID	None	None	RIGID	Typical
106	M109	N132	N149			RIGID	None	None	RIGID	Typical
107	M110	N133	N150			RIGID	None	None	RIGID	Typical
108	M111	N64	N152			RIGID	None	None	RIGID	Typical
109	M112	N159	N155			RIGID	None	None	RIGID	Typical
110	M113	N161	N156			RIGID	None	None	RIGID	Typical
111	M115	N66	N154			RIGID	None	None	RIGID	Typical
112	M116	N160	N157			RIGID	None	None	RIGID	Typical
113	M117	N162	N158			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
114	M118	N52	N153			RIGID	None	None	RIGID	Typical
115	M119	N114	N130			RIGID	None	None	RIGID	Typical
116	M120	N126	N131			RIGID	None	None	RIGID	Typical
117	M121	N127	N132			RIGID	None	None	RIGID	Typical
118	M122	N128	N133			RIGID	None	None	RIGID	Typical
119	M124	N163	N164			RIGID	None	None	RIGID	Typical
120	M125	N165	N166			RIGID	None	None	RIGID	Typical
121	M124A	N140	N164			RIGID	None	None	RIGID	Typical
122	M125A	N138	N166			RIGID	None	None	RIGID	Typical
123	M126	N122	N163			RIGID	None	None	RIGID	Typical
124	M127	N118	N165			RIGID	None	None	RIGID	Typical
125	M128	N168	N165A			RIGID	None	None	RIGID	Typical
126	M129	N165A	N166A			RIGID	None	None	RIGID	Typical
127	M130	N166A	N167			RIGID	None	None	RIGID	Typical
128	M131	N167	N169			RIGID	None	None	RIGID	Typical
129	M132	N171	N174			RIGID	None	None	RIGID	Typical
130	M133	N172	N175			RIGID	None	None	RIGID	Typical
131	M134	N173	N176			RIGID	None	None	RIGID	Typical
132	M136	N145	N148			RIGID	None	None	RIGID	Typical
133	M137	N150	N143			RIGID	None	None	RIGID	Typical
134	M138	N153	N168			RIGID	None	None	RIGID	Typical
135	M139	N151	N169			RIGID	None	None	RIGID	Typical

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1						
2	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N3						
4	N4	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N5						
6	N6	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N7						
8	N8	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
9	N9						
10	N10						
11	N11						
12	N12						
13	N13						
14	N14						
15	N15						
16	N16						
17	N17						
18	N18						
19	N19						
20	N20						
21	N21						
22	N22						
23	N23						
24	N24						
25	N25						
26	N26						
27	N27						
28	N28						
29	N29						
30	N30						

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
31	N44						
32	N45						
33	N33						
34	N34						
35	N35						
36	N36						
37	N37						
38	N38						
39	N39						
40	N40						
41	N41						
42	N42						
43	N43						
44	N44A						
45	N45A						
46	N46						
47	N47						
48	N48						
49	N49						
50	N50						
51	N51						
52	N52						
53	N53						
54	N54						
55	N55						
56	N56						
57	N57						
58	N58						
59	N59						
60	N60						
61	N61						
62	N62						
63	N63						
64	N64						
65	N78						
66	N79						
67	N80						
68	N81						
69	N82						
70	N83						
71	N84						
72	N85						
73	N86						
74	N87						
75	N88						
76	N89						
77	N90						
78	N91						
79	N92						
80	N93						
81	N94						
82	N95						
83	N96						
84	N97						
85	N98						
86	N99						
87	N100						

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
88	N101						
89	N102						
90	N103						
91	N104						
92	N105						
93	N106						
94	N107						
95	N108						
96	N109						
97	N110						
98	N111						
99	N112						
100	N113						
101	N114						
102	N115						
103	N116						
104	N118						
105	N119						
106	N120						
107	N121						
108	N122						
109	N123						
110	N124						
111	N126						
112	N127						
113	N128						
114	N129						
115	N130						
116	N131						
117	N132						
118	N133						
119	N134						
120	N135						
121	N136						
122	N137						
123	N138						
124	N139						
125	N140						
126	N142						
127	N143						
128	N144						
129	N145						
130	N148						
131	N149						
132	N150						
133	N151						
134	N152						
135	N153						
136	N155						
137	N156						
138	N157						
139	N158						
140	N159						
141	N160						
142	N161						
143	N162						
144	N163						

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
145	N164						
146	N165						
147	N166						
148	N165A						
149	N166A						
150	N167						
151	N168						
152	N169						
153	N170						
154	N171						
155	N172						
156	N173						
157	N174						
158	N175						
159	N176						
160	N177						

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M5	Platform Post	3									Lateral
2	M60A	Platform Post	3	Segment	Segment							Lateral
3	M61A	Platform Post	3									Lateral
4	M62A	Platform Post	3	Segment	Segment							Lateral
5	M63A	W10X33	32	Segment	Segment	Lbyy						Lateral
6	M64A	W10X33	32	Segment	Segment	Lbyy						Lateral
7	M65A	W10X22	24	Segment	Segment	Lbyy						Lateral
8	M66A	W10X22	24	Segment	Segment	Lbyy						Lateral
9	M67A	W8X15	11			Lbyy						Lateral
10	M68A	W8X15	11			Lbyy						Lateral
11	M69A	W8X15	11			Lbyy						Lateral
12	M70A	W8X15	11			Lbyy						Lateral
13	M71A	L4X4	4			Lbyy						Lateral
14	M72A	L4X4	4			Lbyy						Lateral
15	M73A	L4X4	4			Lbyy						Lateral
16	M74A	L4X4	4			Lbyy						Lateral
17	M75A	L4X4	4			Lbyy						Lateral
18	M76A	L4X4	4			Lbyy						Lateral
19	M77A	L4X4	4			Lbyy						Lateral
20	M78A	L4X4	4			Lbyy						Lateral
21	M21	Handrail Post	3.583	Segment	Segment							Lateral
22	M22	Handrail Post	3.583									Lateral
23	M23	Handrail Post	3.583									Lateral
24	M24	Handrail Post	3.583									Lateral
25	M25	Handrail Post	3.583									Lateral
26	M26	Handrail Post	3.583									Lateral
27	M27	Handrail Post	3.583									Lateral
28	M28	Handrail Post	3.583									Lateral
29	M29	Handrail Post	3.583									Lateral
30	M30	Handrail Post	3.583	Segment	Segment							Lateral
31	M31	Handrail Post	3.583									Lateral
32	M32	Handrail Post	3.583									Lateral
33	M33	Handrail Post	3.583	Segment	Segment							Lateral
34	M34	Handrail Post	3.583	Segment	Segment							Lateral
35	M35	Handrail Post	3.583									Lateral
36	M36	Handrail Post	3.583									Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
37	M37	Handrail Be...	1			Lbyy						Lateral
38	M38	Handrail Be...	4			Lbyy						Lateral
39	M39	Handrail Be...	4			Lbyy						Lateral
40	M40	Handrail Be...	4			Lbyy						Lateral
41	M41	Handrail Be...	4			Lbyy						Lateral
42	M42	Handrail Be...	2.75			Lbyy						Lateral
43	M43	Handrail Be...	2.5			Lbyy						Lateral
44	M44	Handrail Be...	3			Lbyy						Lateral
45	M45	Handrail Be...	8	Segment	Segment	Lbyy						Lateral
46	M46	Handrail Be...	4			Lbyy						Lateral
47	M47	Handrail Be...	4			Lbyy						Lateral
48	M48	Handrail Be...	3			Lbyy						Lateral
49	M49	Handrail Be...	2.5			Lbyy						Lateral
50	M50	Handrail Be...	2.5			Lbyy						Lateral
51	M51	Handrail Be...	1			Lbyy						Lateral
52	M52	Handrail Be...	4			Lbyy						Lateral
53	M53	Handrail Be...	4			Lbyy						Lateral
54	M54	Handrail Be...	4			Lbyy						Lateral
55	M55	Handrail Be...	2.75			Lbyy						Lateral
56	M56	Handrail Be...	2.5			Lbyy						Lateral
57	M57	Handrail Be...	3			Lbyy						Lateral
58	M58	Handrail Be...	4	Segment	Segment	Lbyy						Lateral
59	M59	Handrail Be...	4	Segment	Segment	Lbyy						Lateral
60	M60	Handrail Be...	4			Lbyy						Lateral
61	M61	Handrail Be...	4			Lbyy						Lateral
62	M62	Handrail Be...	3			Lbyy						Lateral
63	M63	Handrail Be...	2.5			Lbyy						Lateral
64	M64	Handrail Be...	2.5			Lbyy						Lateral
65	M65	Handrail Be...	2.75			Lbyy						Lateral
66	M66	Handrail Be...	2.75			Lbyy						Lateral
67	M67	Handrail Post	3.583									Lateral
68	M68	Handrail Be...	4			Lbyy						Lateral
69	M75	Antenna Pipe	6.667									Lateral
70	M76	Antenna Pipe	6.667									Lateral
71	M77	Antenna Pipe	6.667									Lateral
72	M92	Screen Wall...	8	Segment	Segment	Lbyy						Lateral
73	M93	Screen Wall...	8.25	Segment	Segment	Lbyy						Lateral
74	M94	Screen Wall...	8.25	Segment	Segment	Lbyy						Lateral
75	M95	Screen Wall...	8	Segment	Segment	Lbyy						Lateral
76	M96	Screen Wall...	7.25									Lateral
77	M97	Screen Wall...	7.25									Lateral
78	M98	Screen Wall...	7.25									Lateral
79	M99	Screen Wall...	7.25									Lateral
80	M100	Screen Wall...	7.25									Lateral
81	M101	Screen Wall...	7.25									Lateral
82	M102	Screen Wall...	7.25									Lateral
83	M103	Screen Wall...	7.25									Lateral

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distri...	Area(Memb...	Surface(Plate/Wall)
1	Dead Load	DL		-1		16		4	6	
2	Wind Load (X-Direction)	WLX				6	4	4	4	
3	Wind Load (Z-Direction)	WLZ				6	4	4	1	
4	Live Load	LL							3	
5	BLC 1 Transient Area Loads	None						144		

Basic Load Cases (Continued)

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distri...	Area(Memb...	Surface(Plate/Wall)
6	BLC 4 Transient Area Loads	None						63		
7	BLC 2 Transient Area Loads	None						48		
8	BLC 3 Transient Area Loads	None						42		

Load Combinations

	Description	Sol...	PDelta	SR...	B...	Factor	BLC	Factor	BLC	Fac...	BLC	F...	BLC	F...
1	1.4DL	Yes	Y		DL	1.4								
2	1.2DL+1.6LL	Yes	Y		DL	1.2	LL	1.6						
3	1.2DL+1.0WLX (+)	Yes	Y		DL	1.2	WLX	1						
4	1.2DL+1.0WLX (-)	Yes	Y		DL	1.2	WLX	-1						
5	1.2DL+1.0WLZ (+)	Yes	Y		DL	1.2	WLZ	1						
6	1.2DL+1.0WLZ (-)	Yes	Y		DL	1.2	WLZ	-1						
7	0.9DL+1.0WLX (+)	Yes	Y		DL	.9	WLX	1						
8	0.9DL+1.0WLX (-)	Yes	Y		DL	.9	WLX	-1						
9	0.9DL+1.0WLZ (+)	Yes	Y		DL	.9	WLZ	1						
10	0.9DL+1.0WLZ (-)	Yes	Y		DL	.9	WLZ	-1						
11	1.0DL	Yes	Y		DL	1								
12	1.0LL	Yes	Y		LL	1								
13	1.0WLX (+)	Yes	Y		W...	1								
14	1.0WLX (-)	Yes	Y		W...	-1								
15	1.0WLZ (+)	Yes	Y		W...	1								
16	1.0WLZ (-)	Yes	Y		W...	-1								

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N2	max	738.85	14	4312.6...	2	626.231	6	1887.887	6	0	16	2222.219	3
2		min	-736.478	3	-208.188	13	-625.557	5	-1884.585	5	0	1	-2230.053	4
3	N4	max	809.307	14	7783.0...	2	1502.573	6	4550.497	6	0	16	2462.993	3
4		min	-812.122	3	-374.311	15	-1503.227	5	-4545.612	5	0	1	-2452.262	4
5	N6	max	1573.1...	14	6019.1...	2	628.403	16	1895.04	6	0	16	4766.861	3
6		min	-1581....	3	-537.473	13	-626.416	15	-1891.786	5	0	1	-4742.985	4
7	N8	max	1792.3...	4	10727....	2	1507.788	16	4566.924	6	0	16	5415.807	3
8		min	-1785....	13	-536.968	14	-1507.031	15	-4578.379	5	0	1	-5441.175	4
9	Totals:	max	4910.1...	4	28842....	2	4259.176	6						
10		min	-4910....	13	-.008	13	-4259.159	15						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
1	N1	max	.056	3	0	13	.047	5	1.924e-3	5	0	16	2.28e-3	4
2		min	-.056	4	-.002	2	-.047	6	-1.927e-3	6	0	1	-2.272e-3	3
3	N2	max	0	16	0	16	0	16	0	16	0	16	0	16
4		min	0	1	0	1	0	1	0	1	0	1	0	1
5	N3	max	.062	3	0	15	.114	5	4.64e-3	5	0	16	2.508e-3	4
6		min	-.061	4	-.003	2	-.114	6	-4.645e-3	6	0	1	-2.519e-3	3
7	N4	max	0	16	0	16	0	16	0	16	0	16	0	16
8		min	0	1	0	1	0	1	0	1	0	1	0	1
9	N5	max	.119	3	0	13	.047	5	1.931e-3	5	0	16	4.838e-3	4
10		min	-.118	4	-.002	2	-.047	6	-1.935e-3	6	0	1	-4.863e-3	3
11	N6	max	0	16	0	16	0	16	0	16	0	16	0	16
12		min	0	1	0	1	0	1	0	1	0	1	0	1
13	N7	max	.135	3	0	14	.114	5	4.674e-3	5	0	16	5.55e-3	4
14		min	-.136	4	-.004	2	-.114	6	-4.662e-3	6	0	1	-5.525e-3	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
15	N8	max	0	16	0	16	0	16	0	16	0	16	0	16
16		min	0	1	0	1	0	1	0	1	0	1	0	1
17	N9	max	2.298	3	.146	13	.048	5	6.185e-3	2	7.314e-3	3	3.319e-3	4
18		min	-2.294	14	-2.287	2	-.048	6	-5.03e-4	13	-7.294e-3	14	-3.325e-3	3
19	N10	max	2.298	3	.15	14	.115	5	1.144e-2	2	6.58e-3	3	3.744e-3	4
20		min	-2.294	14	-4.234	2	-.115	6	-5.261e-4	14	-6.558e-3	14	-3.74e-3	3
21	N11	max	1.958	3	.128	13	.048	5	8.952e-4	13	1.34e-2	14	4.199e-3	4
22		min	-1.953	14	-1.767	2	-.048	6	-1.365e-2	2	-1.342e-2	3	-4.215e-3	3
23	N12	max	1.958	3	.131	14	.115	5	9.269e-4	14	1.246e-2	14	4.79e-3	4
24		min	-1.953	14	-3.253	2	-.115	6	-2.53e-2	2	-1.251e-2	3	-4.773e-3	3
25	N13	max	2.298	3	.178	15	.728	15	7.937e-3	2	9.469e-5	6	9.103e-4	14
26		min	-2.294	14	-4.107	2	-.732	6	-1.604e-4	13	-7.812e-5	15	-1.436e-2	2
27	N14	max	1.959	3	.113	13	.728	15	3.576e-4	15	4.679e-4	5	9.439e-4	14
28		min	-1.955	14	-2.894	2	-.732	6	-1.753e-2	2	-4.544e-4	16	-6.109e-3	2
29	N15	max	2.298	3	.2	15	.582	15	8.812e-3	2	4.006e-3	5	1.018e-3	14
30		min	-2.294	14	-4.631	2	-.586	6	-3.37e-5	16	-4.013e-3	16	-7.189e-3	2
31	N16	max	1.959	3	.048	13	.579	15	4.257e-4	15	3.813e-3	5	1.432e-3	14
32		min	-1.955	14	-3.045	2	-.584	6	-1.947e-2	2	-3.806e-3	16	-3.546e-3	3
33	N17	max	2.298	3	.194	15	.424	15	9.688e-3	2	3.047e-3	5	1.296e-3	12
34		min	-2.294	14	-4.794	2	-.429	6	-1.83e-4	14	-3.037e-3	16	-2.95e-3	3
35	N18	max	1.959	3	.018	14	.424	15	4.938e-4	15	3.077e-3	5	1.392e-3	14
36		min	-1.955	14	-3.191	2	-.429	6	-2.141e-2	2	-3.057e-3	16	-4.008e-3	3
37	N19	max	2.298	3	.164	15	.273	15	1.056e-2	2	3.258e-3	15	6.256e-3	2
38		min	-2.294	14	-4.623	2	-.279	6	-3.546e-4	14	-3.312e-3	6	-1.234e-3	13
39	N20	max	1.959	3	.084	14	.273	15	6.232e-4	14	3.236e-3	15	1.181e-3	14
40		min	-1.954	14	-3.335	2	-.279	6	-2.336e-2	2	-3.27e-3	6	-2.086e-3	3
41	N21	max	2.424	3	.165	14	.115	5	8.467e-4	15	2.556e-3	4	4.267e-3	4
42		min	-2.416	14	-4.349	2	-.115	6	-7.635e-3	2	-2.533e-3	13	-4.256e-3	3
43	N22	max	2.421	3	.087	13	.729	15	1.736e-3	15	2.144e-3	4	9.271e-4	14
44		min	-2.413	14	-3.562	2	-.733	6	-9.168e-3	2	-2.142e-3	13	-1.024e-2	2
45	N23	max	2.421	3	.085	15	.581	15	1.751e-3	15	1.905e-3	14	1.225e-3	14
46		min	-2.414	14	-3.972	2	-.585	6	-1.197e-2	2	-1.903e-3	3	-4.875e-3	2
47	N24	max	2.422	3	.093	15	.424	15	1.642e-3	15	1.892e-3	14	1.265e-3	14
48		min	-2.415	14	-4.133	2	-.429	6	-1.212e-2	2	-1.892e-3	3	-3.479e-3	3
49	N25	max	2.423	3	.091	15	.273	15	1.359e-3	15	1.871e-3	14	2.782e-3	2
50		min	-2.415	14	-4.146	2	-.279	6	-9.727e-3	2	-1.872e-3	3	-1.444e-3	3
51	N26	max	2.291	3	.156	14	.115	5	8.918e-4	15	6.362e-3	14	4.504e-3	4
52		min	-2.284	14	-3.998	2	-.115	6	-1.58e-2	2	-6.412e-3	3	-4.491e-3	3
53	N27	max	2.287	3	.099	13	.729	15	1.944e-3	15	6.569e-3	14	9.347e-4	14
54		min	-2.28	14	-3.273	2	-.733	6	-1.011e-2	2	-6.6e-3	3	-8.361e-3	2
55	N28	max	2.287	3	.041	13	.58	15	1.751e-3	15	6.992e-3	14	1.319e-3	14
56		min	-2.281	14	-3.58	2	-.585	6	-1.402e-2	2	-7.038e-3	3	-4.047e-3	3
57	N29	max	2.288	3	.042	15	.424	15	1.68e-3	15	7.003e-3	14	1.323e-3	14
58		min	-2.281	14	-3.734	2	-.429	6	-1.425e-2	2	-7.05e-3	3	-3.72e-3	3
59	N30	max	2.289	3	.085	14	.273	15	1.435e-3	15	7.018e-3	14	1.203e-3	2
60		min	-2.283	14	-3.813	2	-.279	6	-1.229e-2	2	-7.065e-3	3	-1.736e-3	3
61	N44	max	2.366	3	.156	14	.115	5	7.914e-3	2	4.834e-3	3	3.839e-3	4
62		min	-2.362	14	-4.35	2	-.115	6	-4.252e-4	14	-4.805e-3	14	-3.834e-3	3
63	N45	max	2.441	3	.163	14	.115	5	1.647e-3	5	1.391e-3	3	4.029e-3	4
64		min	-2.436	14	-4.456	2	-.115	6	-5.17e-4	16	-1.321e-3	14	-4.022e-3	3
65	N33	max	2.396	3	.15	14	.247	5	9.292e-3	2	2.835e-3	13	1.633e-3	14
66		min	-2.344	14	-4.235	2	-.123	16	-3.77e-4	14	-3.598e-3	4	-2.984e-3	3
67	N34	max	2.046	3	.131	14	.169	15	2.531e-3	15	1.246e-2	14	1.444e-3	14
68		min	-1.987	14	-3.254	2	-.26	6	-9.178e-3	2	-1.251e-2	3	-3.771e-3	3
69	N35	max	2.394	3	.178	15	.812	15	2.995e-3	15	1.74e-3	13	1.61e-3	14
70		min	-2.345	14	-4.108	2	-.891	6	-8.742e-3	2	-2.106e-3	4	-4.453e-3	3
71	N36	max	2.045	3	.114	13	.811	15	3.236e-3	15	3.126e-3	4	1.28e-3	14

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
72		min	-1.987	14	-2.896	2	-.889	6	-9.601e-3	2	-2.971e-3	13	-3.84e-3	3
73	N37	max	2.394	3	.2	15	.673	15	3.699e-3	15	4.083e-3	15	1.521e-3	14
74		min	-2.345	14	-4.63	2	-.711	6	-5.703e-3	2	-5.166e-3	6	-4.507e-3	3
75	N38	max	2.045	3	.048	13	.657	15	3.658e-3	15	3.257e-3	15	1.392e-3	14
76		min	-1.987	14	-3.043	2	-.735	6	-9.276e-3	2	-3.297e-3	6	-3.699e-3	3
77	N39	max	2.395	3	.193	15	.495	5	3.336e-3	5	4.033e-3	15	1.572e-3	14
78		min	-2.345	14	-4.794	2	-.475	16	-2.258e-3	16	-5.197e-3	6	-3.559e-3	3
79	N40	max	2.045	3	.018	14	.504	15	3.671e-3	15	3.07e-3	15	1.419e-3	14
80		min	-1.987	14	-3.19	2	-.583	6	-9.276e-3	2	-3.111e-3	6	-3.756e-3	3
81	N41	max	2.395	3	.164	15	.357	5	4.653e-3	2	3.921e-3	15	1.849e-3	12
82		min	-2.344	14	-4.622	2	-.281	16	-1.018e-3	14	-5.025e-3	6	-2.73e-3	3
83	N42	max	2.046	3	.084	14	.354	15	3.652e-3	15	3.178e-3	5	1.382e-3	14
84		min	-1.987	14	-3.337	2	-.432	6	-9.235e-3	2	-3.17e-3	16	-3.765e-3	3
85	N43	max	2.489	3	.165	14	.169	15	1.801e-3	15	4.515e-3	4	2.146e-3	15
86		min	-2.449	14	-4.346	2	-.26	6	-8.596e-3	2	-4.386e-3	13	-3.777e-3	6
87	N44A	max	2.457	3	.087	13	.812	15	2.861e-3	15	3.363e-3	4	1.157e-3	15
88		min	-2.405	14	-3.562	2	-.89	6	-9.243e-3	2	-3.236e-3	13	-3.295e-3	6
89	N45A	max	2.328	3	.156	14	.169	15	2.279e-3	15	6.254e-3	4	2.32e-3	15
90		min	-2.285	14	-3.999	2	-.26	6	-9.505e-3	2	-6.2e-3	13	-3.778e-3	6
91	N46	max	2.297	3	.099	13	.811	15	2.895e-3	15	7.376e-3	4	1.213e-3	15
92		min	-2.241	14	-3.273	2	-.89	6	-9.583e-3	2	-7.305e-3	13	-3.526e-3	6
93	N47	max	2.424	3	.156	14	.247	5	9.442e-3	2	3.269e-3	13	1.154e-3	12
94		min	-2.381	14	-4.35	2	-.123	16	-3.507e-4	14	-3.938e-3	4	-2.728e-3	3
95	N48	max	2.589	3	.164	14	.169	15	1.884e-3	15	2.933e-3	4	4.96e-3	14
96		min	-2.55	14	-4.458	2	-.261	6	-7.179e-3	2	-2.77e-3	13	-6.414e-3	3
97	N49	max	2.467	3	.15	14	.398	2	9.254e-3	2	2.476e-3	15	2.303e-3	2
98		min	-2.377	14	-4.236	2	-.128	16	-4.449e-4	14	-3.884e-3	6	-2.249e-3	3
99	N50	max	2.12	3	.131	14	.221	15	2.545e-3	15	1.246e-2	14	8.145e-4	14
100		min	-2.014	14	-3.255	2	-.396	2	-8.774e-3	2	-1.251e-2	3	-2.874e-3	3
101	N51	max	2.472	3	.178	15	.882	15	2.434e-3	15	2.085e-3	13	1.289e-3	14
102		min	-2.377	14	-4.109	2	-1.028	6	-8.321e-3	2	-2.836e-3	4	-4.564e-3	3
103	N52	max	2.121	3	.114	13	.886	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
104		min	-2.014	14	-2.896	2	-1.032	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
105	N53	max	2.471	3	.2	15	.746	15	3.154e-3	15	4.232e-3	15	1.216e-3	14
106		min	-2.377	14	-4.629	2	-.812	6	-5.309e-3	2	-6.193e-3	6	-4.623e-3	3
107	N54	max	2.121	3	.048	13	.734	15	3.743e-3	15	3.147e-3	5	1.289e-3	14
108		min	-2.014	14	-3.043	2	-.881	6	-9.236e-3	2	-3.144e-3	16	-3.67e-3	3
109	N55	max	2.469	3	.193	15	.565	5	3.282e-3	5	4.688e-3	15	1.291e-3	14
110		min	-2.377	14	-4.793	2	-.522	16	-2.169e-3	16	-6.806e-3	6	-3.227e-3	3
111	N56	max	2.121	3	.018	14	.582	15	3.72e-3	15	3.172e-3	5	1.332e-3	14
112		min	-2.014	14	-3.19	2	-.73	6	-9.253e-3	2	-3.164e-3	16	-3.686e-3	3
113	N57	max	2.468	3	.164	15	.447	5	4.589e-3	2	4.261e-3	15	3.088e-3	2
114		min	-2.377	14	-4.622	2	-.297	16	-8.878e-4	16	-6.247e-3	6	-2.023e-3	3
115	N58	max	2.121	3	.084	14	.431	15	3.622e-3	15	3.209e-3	5	1.331e-3	14
116		min	-2.014	14	-3.337	2	-.579	6	-9.243e-3	2	-3.188e-3	16	-3.641e-3	3
117	N59	max	2.564	3	.165	14	.22	15	1.52e-3	15	6.195e-3	4	2.106e-3	15
118		min	-2.488	14	-4.344	2	-.395	2	-8.e-3	2	-6.009e-3	13	-3.861e-3	6
119	N60	max	2.506	3	.087	13	.883	15	2.532e-3	15	4.291e-3	4	1.114e-3	15
120		min	-2.408	14	-3.562	2	-1.029	6	-9.097e-3	2	-4.015e-3	13	-3.264e-3	6
121	N61	max	2.35	3	.156	14	.221	15	1.375e-3	15	7.13e-3	14	2.459e-3	15
122		min	-2.281	14	-3.999	2	-.396	2	-1.064e-2	2	-7.436e-3	3	-3.666e-3	6
123	N62	max	2.323	3	.099	13	.884	15	2.759e-3	15	7.695e-3	4	1.312e-3	13
124		min	-2.218	14	-3.273	2	-1.03	6	-9.505e-3	2	-7.532e-3	13	-3.635e-3	4
125	N63	max	2.479	3	.156	14	.398	2	9.484e-3	2	2.536e-3	13	1.541e-3	12
126		min	-2.404	14	-4.35	2	-.128	16	-4.423e-4	14	-3.773e-3	4	-2.466e-3	3
127	N64	max	2.721	3	.164	14	.22	15	2.393e-3	15	5.162e-3	4	4.685e-3	14
128		min	-2.654	14	-4.459	2	-.395	2	-7.666e-3	2	-4.713e-3	13	-5.787e-3	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
129	N65	max	2.479	3	.134	15	.812	15	2.445e-3	15	1.604e-3	3	9.189e-4	14
130		min	-2.432	14	-3.848	2	-.89	6	-8.751e-3	2	-1.456e-3	14	-2.945e-3	3
131	N66	max	2.547	3	.134	15	.882	15	2.584e-3	15	1.33e-3	3	1.431e-3	14
132		min	-2.458	14	-3.848	2	-1.028	6	-8.812e-3	2	-1.163e-3	14	-3.389e-3	3
133	N67	max	2.415	3	.134	15	.729	15	1.413e-3	15	1.911e-3	3	9.187e-4	14
134		min	-2.409	14	-3.848	2	-.732	6	-8.188e-3	2	-1.829e-3	14	-1.23e-2	2
135	N68	max	2.545	3	.163	14	.169	15	2.28e-4	13	3.399e-3	4	3.485e-3	14
136		min	-2.505	14	-4.407	2	-.261	6	-1.841e-3	2	-3.323e-3	13	-5.017e-3	3
137	N69	max	2.648	3	.163	14	.22	15	1.473e-4	13	6.18e-3	4	3.096e-3	14
138		min	-2.576	14	-4.403	2	-.395	2	-2.013e-3	2	-5.683e-3	13	-4.513e-3	3
139	N70	max	2.395	3	.167	15	.378	5	4.054e-3	3	3.973e-3	15	3.758e-3	2
140		min	-2.344	14	-4.644	2	-.31	16	-8.775e-4	16	-5.112e-3	6	-1.753e-3	3
141	N71	max	2.468	3	.168	15	.464	5	4.212e-3	5	4.463e-3	15	4.301e-3	2
142		min	-2.377	14	-4.65	2	-.329	16	-1.08e-3	16	-6.617e-3	6	-1.496e-3	3
143	N72	max	2.395	3	.191	15	.474	5	3.462e-3	5	4.052e-3	15	1.999e-3	12
144		min	-2.345	14	-4.787	2	-.446	16	-2.015e-3	16	-5.233e-3	6	-2.484e-3	3
145	N73	max	2.469	3	.191	15	.546	5	3.446e-3	5	4.762e-3	15	1.931e-3	12
146		min	-2.377	14	-4.787	2	-.487	16	-1.977e-3	16	-7.009e-3	6	-2.491e-3	3
147	N74	max	2.396	3	.16	15	.337	5	5.349e-3	2	3.908e-3	15	6.634e-3	2
148		min	-2.344	14	-4.591	2	-.253	16	-9.217e-4	14	-5.002e-3	6	-1.339e-3	13
149	N75	max	2.468	3	.159	15	.432	5	5.289e-3	2	4.123e-3	15	6.933e-3	2
150		min	-2.377	14	-4.585	2	-.267	16	-7.826e-4	16	-6.178e-3	6	-1.28e-3	13
151	N76	max	2.394	3	.195	15	.516	5	3.189e-3	5	4.098e-3	15	1.208e-3	14
152		min	-2.345	14	-4.784	2	-.504	16	-2.476e-3	16	-5.289e-3	6	-3.768e-3	3
153	N77	max	2.47	3	.195	15	.584	5	3.089e-3	5	4.778e-3	15	1.145e-3	14
154		min	-2.377	14	-4.786	2	-.556	16	-2.318e-3	16	-7.027e-3	6	-3.585e-3	3
155	N78	max	2.045	3	.089	13	.756	15	3.49e-3	15	3.332e-3	5	1.308e-3	14
156		min	-1.987	14	-2.959	2	-.837	6	-9.144e-3	2	-3.294e-3	16	-3.761e-3	3
157	N79	max	2.121	3	.089	13	.836	15	4.696e-3	15	3.078e-3	5	1.786e-3	14
158		min	-2.015	14	-2.958	2	-.981	6	-8.8e-3	2	-3.069e-3	16	-4.206e-3	3
159	N80	max	2.045	3	.022	16	.541	15	3.712e-3	15	3.11e-3	15	1.34e-3	14
160		min	-1.987	14	-3.155	2	-.62	6	-9.24e-3	2	-3.12e-3	16	-3.642e-3	3
161	N81	max	2.121	3	.02	16	.621	15	4.338e-3	15	3.312e-3	5	1.797e-3	14
162		min	-2.014	14	-3.154	2	-.769	6	-9.082e-3	2	-3.293e-3	16	-4.052e-3	3
163	N82	max	2.046	3	.091	14	.33	15	3.551e-3	15	4.558e-3	5	1.208e-3	14
164		min	-1.987	14	-3.346	2	-.412	6	-9.125e-3	2	-4.01e-3	16	-2.737e-3	3
165	N83	max	2.121	3	.091	14	.405	15	3.537e-3	15	4.366e-3	5	1.214e-3	14
166		min	-2.014	14	-3.346	2	-.555	6	-9.099e-3	2	-4.238e-3	16	-2.747e-3	3
167	N84	max	2.044	3	.092	13	.756	15	3.49e-3	15	3.332e-3	5	1.308e-3	14
168		min	-1.986	14	-2.931	2	-.837	6	-9.144e-3	2	-3.294e-3	16	-3.761e-3	3
169	N85	max	2.12	3	.092	13	.836	15	4.696e-3	15	3.078e-3	5	1.786e-3	14
170		min	-2.013	14	-2.931	2	-.981	6	-8.8e-3	2	-3.069e-3	16	-4.206e-3	3
171	N86	max	2.043	3	.033	16	.541	15	3.712e-3	15	3.11e-3	15	1.34e-3	14
172		min	-1.985	14	-3.127	2	-.62	6	-9.24e-3	2	-3.12e-3	16	-3.642e-3	3
173	N87	max	2.12	3	.033	16	.621	15	4.338e-3	15	3.312e-3	5	1.797e-3	14
174		min	-2.013	14	-3.127	2	-.769	6	-9.082e-3	2	-3.293e-3	16	-4.052e-3	3
175	N88	max	2.046	3	.09	14	.33	15	3.551e-3	15	4.558e-3	5	1.208e-3	14
176		min	-1.986	14	-3.319	2	-.412	6	-9.125e-3	2	-4.01e-3	16	-2.737e-3	3
177	N89	max	2.119	3	.09	14	.405	15	3.537e-3	15	4.366e-3	5	1.214e-3	14
178		min	-2.013	14	-3.319	2	-.555	6	-9.099e-3	2	-4.238e-3	16	-2.747e-3	3
179	N90	max	2.479	3	.092	13	1.215	15	9.303e-3	15	3.075e-3	5	6.396e-3	14
180		min	-2.256	14	-2.932	2	-1.464	6	-1.098e-2	6	-3.071e-3	16	-8.889e-3	3
181	N91	max	2.458	3	.033	16	.971	15	8.593e-3	15	3.31e-3	5	6.054e-3	14
182		min	-2.244	14	-3.127	2	-1.253	6	-1.123e-2	6	-3.295e-3	16	-8.343e-3	3
183	N92	max	2.249	3	.09	14	.571	15	3.537e-3	15	4.366e-3	5	1.213e-3	14
184		min	-2.07	14	-3.319	2	-.875	6	-9.104e-3	2	-4.238e-3	16	-2.747e-3	3
185	N93	max	1.998	3	.092	13	.714	15	3.49e-3	15	3.332e-3	5	1.308e-3	14

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
186		min	-1.97	14	-2.931	2	-.758	6	-9.144e-3	2	-3.294e-3	16	-3.761e-3	3
187	N94	max	1.999	3	.033	16	.496	15	3.712e-3	15	3.11e-3	15	1.34e-3	14
188		min	-1.969	14	-3.127	2	-.536	6	-9.24e-3	2	-3.12e-3	16	-3.642e-3	3
189	N95	max	2.013	3	.09	14	.287	15	3.551e-3	15	4.558e-3	5	1.208e-3	14
190		min	-1.971	14	-3.319	2	-.329	6	-9.125e-3	2	-4.01e-3	16	-2.737e-3	3
191	N96	max	2.086	3	.092	13	.799	15	3.786e-3	15	3.187e-3	5	1.239e-3	14
192		min	-2	14	-2.931	2	-.917	6	-8.97e-3	2	-3.166e-3	16	-3.501e-3	3
193	N97	max	2.086	3	.033	16	.585	15	3.794e-3	15	3.223e-3	5	1.276e-3	14
194		min	-2	14	-3.127	2	-.704	6	-9.185e-3	2	-3.219e-3	16	-3.585e-3	3
195	N98	max	2.088	3	.09	14	.373	15	3.584e-3	15	4.448e-3	5	1.32e-3	14
196		min	-2.001	14	-3.319	2	-.493	6	-9.036e-3	2	-4.14e-3	16	-3.783e-3	3
197	N99	max	2.408	3	.092	13	1.141	15	9.303e-3	15	3.075e-3	5	6.396e-3	14
198		min	-2.205	14	-2.932	2	-1.376	6	-1.098e-2	6	-3.071e-3	16	-8.889e-3	3
199	N100	max	2.391	3	.033	16	.903	15	8.593e-3	15	3.31e-3	5	6.054e-3	14
200		min	-2.196	14	-3.127	2	-1.163	6	-1.123e-2	6	-3.295e-3	16	-8.343e-3	3
201	N101	max	2.227	3	.09	14	.543	15	3.537e-3	15	4.366e-3	5	1.213e-3	14
202		min	-2.06	14	-3.319	2	-.821	6	-9.104e-3	2	-4.238e-3	16	-2.747e-3	3
203	N102	max	2.085	3	.095	13	.799	15	3.786e-3	15	3.187e-3	5	1.239e-3	14
204		min	-1.999	14	-2.904	2	-.917	6	-8.97e-3	2	-3.166e-3	16	-3.501e-3	3
205	N103	max	2.085	3	.044	16	.585	15	3.794e-3	15	3.223e-3	5	1.276e-3	14
206		min	-1.999	14	-3.099	2	-.704	6	-9.185e-3	2	-3.219e-3	16	-3.585e-3	3
207	N104	max	2.088	3	.089	14	.373	15	3.584e-3	15	4.448e-3	5	1.32e-3	14
208		min	-1.999	14	-3.292	2	-.493	6	-9.036e-3	2	-4.14e-3	16	-3.783e-3	3
209	N105	max	2.408	3	.094	13	1.141	15	9.303e-3	15	3.075e-3	5	6.396e-3	14
210		min	-2.205	14	-2.909	2	-1.376	6	-1.098e-2	6	-3.071e-3	16	-8.889e-3	3
211	N106	max	2.392	3	.059	16	.903	15	8.593e-3	15	3.31e-3	5	6.054e-3	14
212		min	-2.196	14	-3.101	2	-1.163	6	-1.123e-2	6	-3.295e-3	16	-8.343e-3	3
213	N107	max	2.225	3	.089	14	.543	15	3.537e-3	15	4.366e-3	5	1.213e-3	14
214		min	-2.058	14	-3.292	2	-.821	6	-9.104e-3	2	-4.238e-3	16	-2.747e-3	3
215	N108	max	2.187	3	.092	13	.909	15	7.177e-3	15	3.077e-3	5	4.267e-3	14
216		min	-2.051	14	-2.931	2	-1.086	6	-9.697e-3	6	-3.07e-3	16	-6.725e-3	3
217	N109	max	2.183	3	.033	16	.688	15	6.616e-3	15	3.311e-3	5	4.075e-3	14
218		min	-2.05	14	-3.127	2	-.873	6	-9.611e-3	6	-3.294e-3	16	-6.349e-3	3
219	N110	max	1.97	3	.131	14	.121	15	2.509e-3	15	1.246e-2	14	1.603e-3	14
220		min	-1.958	14	-3.253	2	-.135	6	-9.688e-3	2	-1.251e-2	3	-4.127e-3	3
221	N111	max	2.431	3	.165	14	.121	15	1.858e-3	15	3.09e-3	4	2.17e-3	15
222		min	-2.419	14	-4.348	2	-.136	6	-9.004e-3	2	-2.875e-3	13	-3.529e-3	6
223	N112	max	2.295	3	.156	14	.121	15	1.992e-3	15	6.176e-3	4	1.279e-3	15
224		min	-2.283	14	-3.998	2	-.137	6	-1.122e-2	2	-5.955e-3	13	-3.266e-3	6
225	N113	max	2.461	3	.163	14	.121	15	2.597e-3	15	7.302e-4	4	5.02e-3	14
226		min	-2.451	14	-4.456	2	-.136	6	-1.021e-2	2	-6.218e-4	13	-6.666e-3	3
227	N114	max	1.971	3	.114	13	.738	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
228		min	-1.96	14	-2.896	2	-.752	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
229	N115	max	2.424	3	.087	13	.741	15	3.233e-3	15	2.212e-3	14	8.454e-4	13
230		min	-2.41	14	-3.562	2	-.754	6	-9.336e-3	2	-2.243e-3	3	-2.837e-3	4
231	N116	max	2.288	3	.1	13	.741	15	3.294e-3	15	5.334e-3	4	1.696e-3	13
232		min	-2.275	14	-3.273	2	-.755	6	-9.628e-3	2	-5.315e-3	13	-3.82e-3	4
233	N117	max	2.425	3	.134	15	.742	15	4.34e-3	15	6.349e-4	3	1.446e-3	14
234		min	-2.414	14	-3.848	2	-.756	6	-9.522e-3	2	-5.081e-4	14	-3.341e-3	3
235	N118	max	1.971	3	.154	14	.122	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
236		min	-1.96	14	-3.493	2	-.139	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
237	N119	max	2.431	3	.168	14	.12	15	1.858e-3	15	3.09e-3	4	2.17e-3	15
238		min	-2.419	14	-4.351	2	-.135	6	-9.004e-3	2	-2.875e-3	13	-3.529e-3	6
239	N120	max	2.295	3	.155	14	.121	15	1.992e-3	15	6.176e-3	4	1.279e-3	15
240		min	-2.283	14	-4.003	2	-.137	6	-1.122e-2	2	-5.955e-3	13	-3.266e-3	6
241	N121	max	2.461	3	.179	14	.12	15	2.597e-3	15	7.302e-4	4	5.02e-3	14
242		min	-2.451	14	-4.46	2	-.136	6	-1.021e-2	2	-6.218e-4	13	-6.666e-3	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
243	N122	max	1.971	3	.118	13	.748	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
244		min	-1.96	14	-2.887	2	-.762	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
245	N123	max	2.424	3	.085	13	.744	15	3.233e-3	15	2.212e-3	14	8.454e-4	13
246		min	-2.41	14	-3.555	2	-.757	6	-9.336e-3	2	-2.243e-3	3	-2.837e-3	4
247	N124	max	2.288	3	.094	13	.745	15	3.294e-3	15	5.334e-3	4	1.696e-3	13
248		min	-2.275	14	-3.264	2	-.759	6	-9.628e-3	2	-5.315e-3	13	-3.82e-3	4
249	N125	max	2.425	3	.132	15	.743	15	4.34e-3	15	6.349e-4	3	1.446e-3	14
250		min	-2.414	14	-3.843	2	-.757	6	-9.522e-3	2	-5.081e-4	14	-3.341e-3	3
251	N126	max	1.971	3	.048	13	.587	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
252		min	-1.96	14	-3.043	2	-.601	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
253	N127	max	1.971	3	.018	14	.435	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
254		min	-1.96	14	-3.19	2	-.45	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
255	N128	max	1.971	3	.084	14	.283	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
256		min	-1.96	14	-3.337	2	-.299	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
257	N129	max	1.956	3	.141	14	.132	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
258		min	-1.943	14	-3.261	2	-.148	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
259	N130	max	1.956	3	.134	16	.738	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
260		min	-1.943	14	-2.674	2	-.752	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
261	N131	max	1.956	3	.119	16	.587	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
262		min	-1.943	14	-2.82	2	-.601	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
263	N132	max	1.956	3	.105	16	.435	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
264		min	-1.943	14	-2.967	2	-.45	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
265	N133	max	1.956	3	.091	16	.283	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
266		min	-1.943	14	-3.114	2	-.299	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
267	N134	max	2.413	3	.166	14	.12	15	1.419e-3	15	3.841e-3	4	1.965e-3	14
268		min	-2.4	14	-4.293	2	-.136	6	-1.032e-2	2	-3.586e-3	13	-4.152e-3	3
269	N135	max	2.258	3	.151	14	.121	15	1.98e-3	15	7.809e-3	4	2.104e-3	15
270		min	-2.243	14	-3.934	2	-.137	6	-1.144e-2	2	-7.221e-3	13	-2.563e-3	6
271	N136	max	2.406	3	.087	13	.744	15	2.373e-3	15	3.504e-3	14	5.319e-4	15
272		min	-2.393	14	-3.498	2	-.758	6	-9.478e-3	2	-3.522e-3	3	-2.674e-3	2
273	N137	max	2.25	3	.094	13	.745	15	2.799e-3	15	7.202e-3	4	1.779e-3	13
274		min	-2.237	14	-3.206	2	-.759	6	-9.76e-3	2	-7.176e-3	13	-4.131e-3	4
275	N138	max	2.297	3	.154	14	.442	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
276		min	-2.079	14	-3.493	2	-.839	2	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
277	N139	max	2.93	3	.178	14	.442	15	5.893e-3	15	5.162e-3	4	4.877e-3	15
278		min	-2.837	14	-4.46	2	-.839	2	-1.027e-2	2	-4.713e-3	13	-5.245e-3	6
279	N140	max	2.297	3	.118	13	1.068	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
280		min	-2.079	14	-2.887	2	-1.371	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
281	N141	max	2.739	3	.132	15	1.068	15	4.686e-3	15	1.33e-3	3	3.071e-3	15
282		min	-2.55	14	-3.843	2	-1.37	6	-9.66e-3	2	-1.163e-3	14	-5.313e-3	6
283	N142	max	2.562	3	.166	14	.442	15	1.994e-3	15	1.405e-2	4	2.796e-3	13
284		min	-2.373	14	-4.292	2	-.839	2	-9.258e-3	2	-1.216e-2	13	-6.461e-3	4
285	N143	max	2.317	3	.15	14	.442	15	3.219e-3	15	6.191e-3	5	1.399e-4	16
286		min	-2.1	14	-3.934	2	-.839	2	-1.129e-2	2	-4.47e-3	16	-4.959e-3	2
287	N144	max	2.47	3	.087	13	1.068	15	2.477e-3	15	7.066e-3	4	3.602e-3	13
288		min	-2.261	14	-3.498	2	-1.37	6	-9.437e-3	2	-6.698e-3	13	-5.94e-3	4
289	N145	max	2.317	3	.095	13	1.068	15	2.759e-3	15	3.586e-3	4	1.163e-3	15
290		min	-2.1	14	-3.206	2	-1.371	6	-9.61e-3	2	-3.348e-3	13	-3.514e-3	6
291	N148	max	2.281	3	.119	16	.907	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
292		min	-2.063	14	-2.82	2	-1.211	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
293	N149	max	2.281	3	.105	16	.755	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
294		min	-2.063	14	-2.967	2	-1.06	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
295	N150	max	2.281	3	.091	16	.604	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
296		min	-2.063	14	-3.114	2	-.909	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
297	N151	max	2.141	3	.154	14	.27	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
298		min	-2.034	14	-3.493	2	-.419	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
299	N152	max	2.721	3	.178	14	.218	15	2.393e-3	15	5.162e-3	4	4.685e-3	14

Envelope Joint Displacements (Continued)

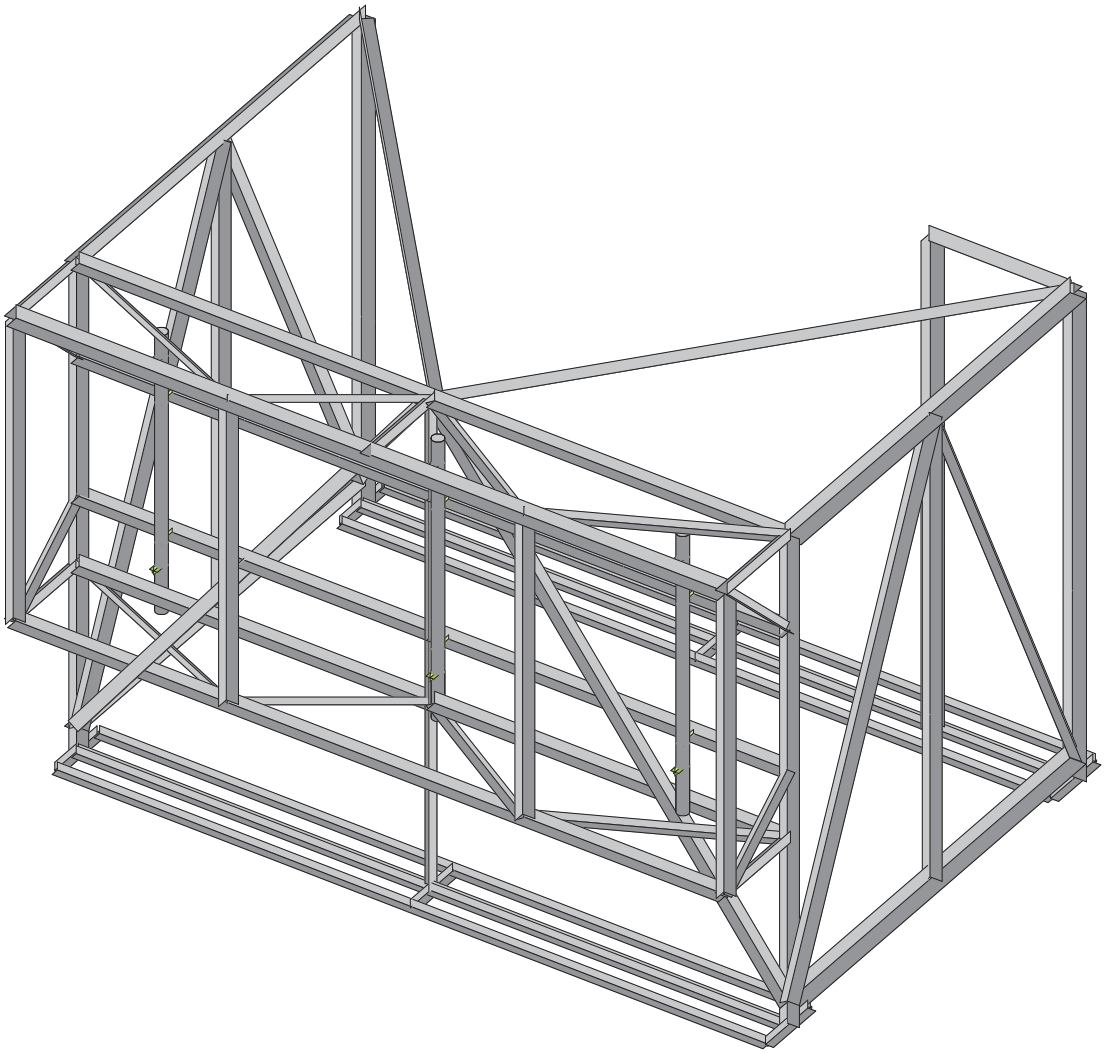
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
300		min	-2.654	14	-4.46	2	-.397	2	-7.666e-3	2	-4.713e-3	13	-5.787e-3	3
301	N153	max	2.121	3	.118	13	.895	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
302		min	-2.014	14	-2.887	2	-1.042	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
303	N154	max	2.547	3	.132	15	.88	15	2.584e-3	15	1.33e-3	3	1.431e-3	14
304		min	-2.458	14	-3.843	2	-1.025	6	-8.812e-3	2	-1.163e-3	14	-3.389e-3	3
305	N155	max	2.527	3	.166	14	.22	15	2.472e-3	15	6.433e-3	4	2.055e-3	15
306		min	-2.451	14	-4.293	2	-.397	2	-9.918e-3	2	-6.54e-3	3	-3.935e-3	6
307	N156	max	2.307	3	.151	14	.215	15	2.797e-3	15	8.4e-3	4	2.27e-3	15
308		min	-2.235	14	-3.934	2	-.401	2	-1.163e-2	2	-7.67e-3	13	-3.374e-3	6
309	N157	max	2.48	3	.087	13	.883	15	2.876e-3	15	5.436e-3	4	1.094e-3	15
310		min	-2.381	14	-3.499	2	-1.028	6	-9.348e-3	2	-5.161e-3	13	-3.26e-3	6
311	N158	max	2.278	3	.095	13	.886	15	3.074e-3	15	7.598e-3	4	1.704e-3	13
312		min	-2.173	14	-3.206	2	-1.032	6	-9.644e-3	2	-7.47e-3	13	-4.04e-3	4
313	N159	max	2.527	3	.165	14	.22	15	2.472e-3	15	6.433e-3	4	2.055e-3	15
314		min	-2.451	14	-4.287	2	-.396	2	-9.918e-3	2	-6.54e-3	3	-3.935e-3	6
315	N160	max	2.48	3	.09	13	.883	15	2.876e-3	15	5.436e-3	4	1.094e-3	15
316		min	-2.381	14	-3.506	2	-1.029	6	-9.348e-3	2	-5.161e-3	13	-3.26e-3	6
317	N161	max	2.307	3	.155	14	.221	15	2.797e-3	15	8.4e-3	4	2.27e-3	15
318		min	-2.235	14	-3.93	2	-.396	2	-1.163e-2	2	-7.67e-3	13	-3.374e-3	6
319	N162	max	2.278	3	.1	13	.884	15	3.074e-3	15	7.598e-3	4	1.704e-3	13
320		min	-2.173	14	-3.215	2	-1.031	6	-9.644e-3	2	-7.47e-3	13	-4.04e-3	4
321	N163	max	1.956	3	.135	16	.748	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
322		min	-1.943	14	-2.664	2	-.762	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
323	N164	max	2.281	3	.135	16	1.068	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
324		min	-2.063	14	-2.664	2	-1.371	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
325	N165	max	1.956	3	.145	14	.122	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
326		min	-1.943	14	-3.27	2	-.139	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
327	N166	max	2.281	3	.145	14	.442	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
328		min	-2.063	14	-3.27	2	-.839	2	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
329	N165A	max	2.105	3	.119	16	.734	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
330		min	-1.998	14	-2.82	2	-.881	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
331	N166A	max	2.105	3	.105	16	.582	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
332		min	-1.998	14	-2.967	2	-.73	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
333	N167	max	2.105	3	.091	16	.431	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
334		min	-1.998	14	-3.114	2	-.579	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
335	N168	max	2.105	3	.135	16	.895	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
336		min	-1.998	14	-2.664	2	-1.042	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
337	N169	max	2.105	3	.145	14	.27	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
338		min	-1.998	14	-3.27	2	-.419	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
339	N170	max	2.12	3	.126	14	.247	15	2.687e-3	15	5.071e-3	5	3.989e-3	2
340		min	-2.014	14	-3.279	2	-.412	6	-8.82e-3	2	-4.481e-3	16	-8.955e-4	16
341	N171	max	2.121	3	.056	13	.753	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
342		min	-2.014	14	-3.025	2	-.9	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
343	N172	max	2.121	3	.018	16	.601	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
344		min	-2.014	14	-3.172	2	-.749	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
345	N173	max	2.121	3	.076	14	.45	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
346		min	-2.014	14	-3.319	2	-.598	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
347	N174	max	2.105	3	.121	16	.753	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
348		min	-1.998	14	-2.802	2	-.9	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
349	N175	max	2.105	3	.107	16	.601	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
350		min	-1.998	14	-2.949	2	-.749	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
351	N176	max	2.105	3	.093	16	.45	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
352		min	-1.998	14	-3.096	2	-.598	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3
353	N177	max	2.105	3	.133	14	.298	15	3.68e-3	15	3.179e-3	5	1.371e-3	14
354		min	-1.998	14	-3.243	2	-.447	6	-9.275e-3	2	-3.169e-3	16	-3.742e-3	3

Envelope AISC 14th(360-10): LRFD Steel Code Checks

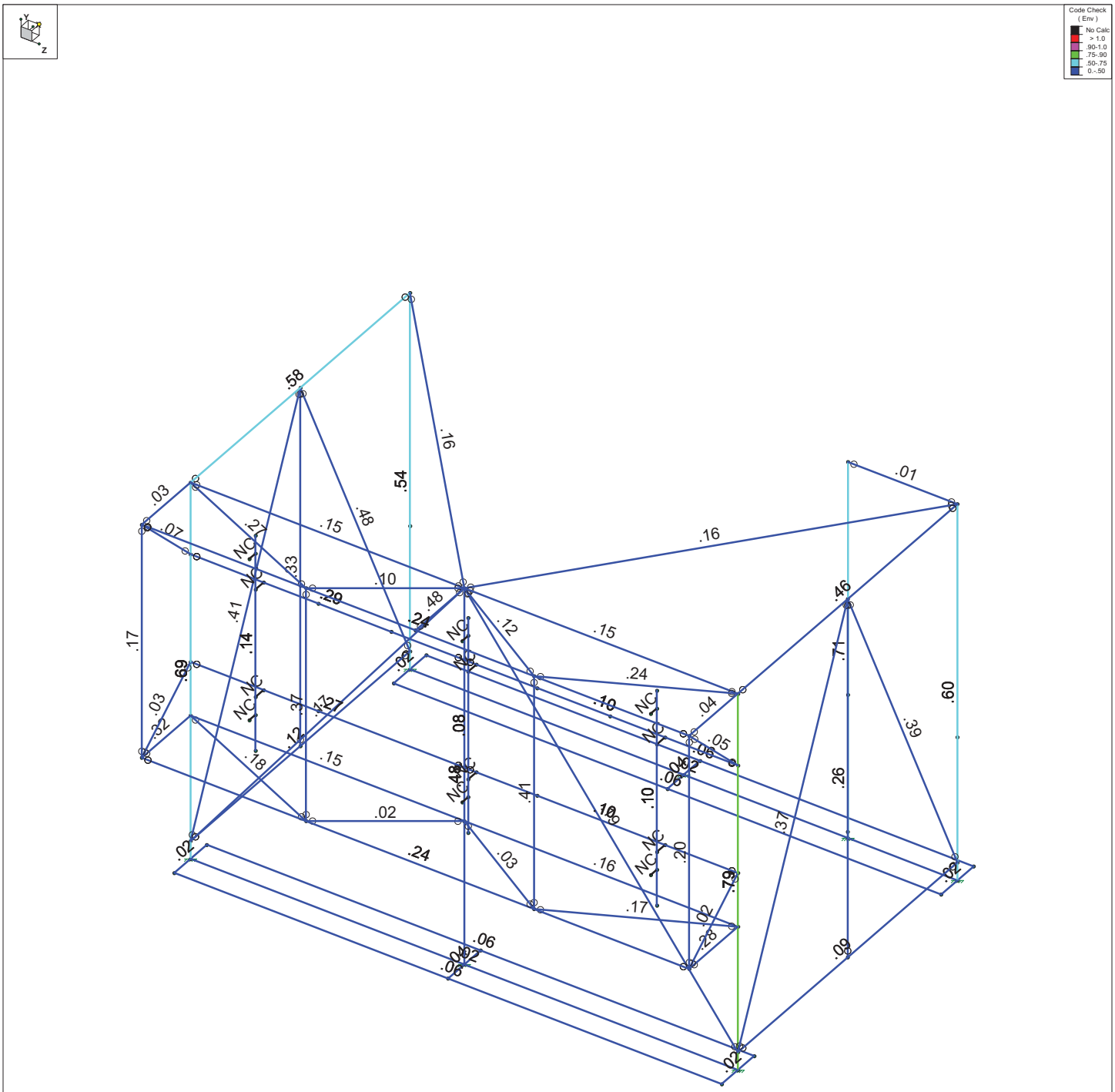
	Member	Shape	Code ...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc...	phi*Pnt ...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M5	PIPE_4.0X	.164	0	4	.019	0		4	126541....	130410	14516.25	14516.25	1...	H1-1b
2	M60A	PIPE_4.0X	.331	0	6	.039	0		6	126541....	130410	14516.25	14516.25	1...	H1-1b
3	M61A	PIPE_4.0X	.342	0	4	.041	0		3	126541....	130410	14516.25	14516.25	1...	H1-1b
4	M62A	PIPE_4.0X	.402	0	3	.046	0		4	126541....	130410	14516.25	14516.25	1...	H1-1b
5	M63A	W10X33	.674	16	2	.126	0	y	2	254506....	436950	52500	145500	1...	H1-1b
6	M64A	W10X33	.453	8.333	4	.071	0	y	2	254506....	436950	52500	131372....	1...	H1-1b
7	M65A	W10X22	.467	8	5	.158	12	y	2	198999....	292050	22875	97500	1...	H1-1b
8	M66A	W10X22	.376	12	2	.084	24	y	2	262060....	292050	22875	97500	1...	H1-1b
9	M67A	W8X15	.188	2.979	3	.025	0	y	2	44212.8...	199800	10012.5	34512.4...	1...	H1-1b
10	M68A	W8X15	.220	5.5	2	.041	0	y	2	44212.8...	199800	10012.5	31802.4...	1...	H1-1b
11	M69A	W8X15	.231	5.5	2	.038	0	y	2	44212.8...	199800	10012.5	32241.2...	1...	H1-1b
12	M70A	W8X15	.300	5.5	3	.045	11	y	2	44212.8...	199800	10012.5	32849.1...	1.2	H1-1b
13	M71A	L4X4X4	.190	2	2	.030	4	y	2	47595.6...	62532	3137.597	6489.274	1...	H2-1
14	M72A	L4X4X4	.190	2	2	.023	4	y	2	47595.6...	62532	3137.597	6489.274	1...	H2-1
15	M73A	L4X4X4	.352	2	6	.051	4	y	6	47595.6...	62532	3137.597	6423.823	1...	H2-1
16	M74A	L4X4X4	.445	2	6	.065	0	y	6	47595.6...	62532	3137.597	6429.88	1...	H2-1
17	M75A	L4X4X4	.155	2	2	.026	0	y	2	47595.6...	62532	3137.597	6510.561	1...	H2-1
18	M76A	L4X4X4	.155	2	2	.017	0	y	2	47595.6...	62532	3137.597	6510.561	1...	H2-1
19	M77A	L4X4X4	.281	1.917	5	.048	0	y	5	47595.6...	62532	3137.597	6492.802	1...	H2-1
20	M78A	L4X4X4	.374	1.917	5	.070	0	y	5	47595.6...	62532	3137.597	6486.052	1...	H2-1
21	M21	PIPE_2.0	.075	3.583	3	.009	1.866		5	30971.62	32130	1871.625	1871.625	2...	H1-1b
22	M22	PIPE_2.0	.548	.224	4	.483	0		4	27545.4...	32130	1871.625	1871.625	1...	H1-1b
23	M23	PIPE_2.0	.352	.224	2	.349	0		4	27545.4...	32130	1871.625	1871.625	3...	H1-1b
24	M24	PIPE_2.0	.807	.224	4	.714	0		4	27545.4...	32130	1871.625	1871.625	2...	H3-6
25	M25	PIPE_2.0	.065	3.583	2	.075	0		3	27545.4...	32130	1871.625	1871.625	1...	H1-1b
26	M26	PIPE_2.0	.397	3.583	2	.157	0		3	27545.4...	32130	1871.625	1871.625	2...	H1-1b
27	M27	PIPE_2.0	.512	.224	2	.171	0		4	27545.4...	32130	1871.625	1871.625	1...	H1-1a
28	M28	PIPE_2.0	.336	.224	2	.093	0		4	27545.4...	32130	1871.625	1871.625	1...	H1-1a
29	M29	PIPE_2.0	.577	.224	5	.498	0		6	27545.4...	32130	1871.625	1871.625	1...	H1-1a
30	M30	PIPE_2.0	.765	.224	5	.697	0		6	32105.9...	32130	1871.625	1871.625	2...	H3-6
31	M31	PIPE_2.0	.966	.224	3	.716	0		3	27545.4...	32130	1871.625	1871.625	1...	H3-6
32	M32	PIPE_2.0	.233	.224	6	.358	0		6	27545.4...	32130	1871.625	1871.625	2...	H1-1b
33	M33	PIPE_2.0	.488	3.583	2	.111	1.866		2	30971.62	32130	1871.625	1871.625	2...	H1-1b
34	M34	PIPE_2.0	.539	3.583	2	.170	1.866		2	30971.62	32130	1871.625	1871.625	2...	H1-1b
35	M35	PIPE_2.0	.078	3.583	2	.082	0		2	27545.4...	32130	1871.625	1871.625	2...	H1-1b
36	M36	PIPE_2.0	.546	3.583	2	.176	1.866		2	27545.4...	32130	1871.625	1871.625	2...	H1-1b
37	M37	PIPE_2.0	.063	1	3	.069	1		2	31747.0...	32130	1871.625	1871.625	2...	H1-1b
38	M38	PIPE_2.0	.554	0	2	.120	0		2	26521.4...	32130	1871.625	1871.625	2...	H1-1b
39	M39	PIPE_2.0	.275	4	2	.107	0		2	26521.4...	32130	1871.625	1871.625	2...	H1-1b
40	M40	PIPE_2.0	.174	0	2	.087	4		2	26521.4...	32130	1871.625	1871.625	2.1	H1-1b
41	M41	PIPE_2.0	.629	4	2	.104	4		2	26521.4...	32130	1871.625	1871.625	2...	H1-1b
42	M42	PIPE_2.0	.241	0	6	.051	0		3	29344.85	32130	1871.625	1871.625	2...	H1-1b
43	M43	PIPE_2.0	.137	2.5	6	.039	2.5		4	29810.2...	32130	1871.625	1871.625	2...	H1-1b
44	M44	PIPE_2.0	.288	3	3	.079	0		3	28843.4...	32130	1871.625	1871.625	1...	H1-1b
45	M45	PIPE_2.0	.165	0	3	.043	0		4	31274.8...	32130	1871.625	1871.625	2...	H1-1b
46	M46	PIPE_2.0	.011	0	5	.001	4		2	26521.4...	32130	1871.625	1871.625	3...	H1-1b
47	M47	PIPE_2.0	.181	.5	2	.034	4		5	26521.4...	32130	1871.625	1871.625	1...	H1-1b
48	M48	PIPE_2.0	.003	1.5	6	.056	0		5	28843.4...	32130	1871.625	1871.625	1...	H1-1b
49	M49	PIPE_2.0	.377	0	5	.083	0		3	29810.2...	32130	1871.625	1871.625	2...	H1-1b
50	M50	PIPE_2.0	.553	0	2	.112	2.5		3	29810.2...	32130	1871.625	1871.625	2...	H1-1b
51	M51	PIPE_2.0	.050	1	2	.082	1		2	31747.0...	32130	1871.625	1871.625	2...	H1-1b
52	M52	PIPE_2.0	.463	0	2	.111	0		2	26521.4...	32130	1871.625	1871.625	2...	H1-1b
53	M53	PIPE_2.0	.243	4	2	.099	0		2	26521.4...	32130	1871.625	1871.625	2...	H1-1b
54	M54	PIPE_2.0	.544	4	2	.095	4		2	26521.4...	32130	1871.625	1871.625	2...	H1-1b
55	M55	PIPE_2.0	.208	0	6	.070	0		2	29344.85	32130	1871.625	1871.625	2...	H1-1b
56	M56	PIPE_2.0	.179	.521	5	.095	0		3	29810.2...	32130	1871.625	1871.625	1...	H1-1b

Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

	Member	Shape	Code ...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc...	phi*Pnt ...	phi*Mn ...	phi*Mn ...	Cb	Eqn
57	M57	PIPE_2.0	.310	3	3	.106	.5		3	28843.4...	32130	1871.625	1871.625	2...	H1-1b
58	M58	PIPE_2.0	.124	1.5	4	.086	0		5	31274.8...	32130	1871.625	1871.625	2...	H1-1b
59	M59	PIPE_2.0	.081	3.5	4	.129	3.5		5	32033.8...	32130	1871.625	1871.625	2...	H1-1b
60	M60	PIPE_2.0	.025	4	3	.013	3.5		5	26521.4...	32130	1871.625	1871.625	4...	H1-1b
61	M61	PIPE_2.0	.183	.5	2	.029	4		5	26521.4...	32130	1871.625	1871.625	1...	H1-1b
62	M62	PIPE_2.0	.699	2.5	2	.129	2.5		3	28843.4...	32130	1871.625	1871.625	1...	H1-1b
63	M63	PIPE_2.0	.444	1.979	5	.278	2.005		4	29810.2...	32130	1871.625	1871.625	1...	H1-1b
64	M64	PIPE_2.0	.515	0	2	.122	2.5		4	29810.2...	32130	1871.625	1871.625	2...	H1-1b
65	M65	PIPE_2.0	.176	2.75	6	.040	0		6	29344.85	32130	1871.625	1871.625	2...	H1-1b
66	M66	PIPE_2.0	.157	0	6	.042	0		4	29344.85	32130	1871.625	1871.625	2...	H1-1b
67	M67	PIPE_2.0	.514	.224	4	.530	0		4	27545.4...	32130	1871.625	1871.625	2...	H3-6
68	M68	PIPE_2.0	.171	0	2	.079	4		2	26521.4...	32130	1871.625	1871.625	1...	H1-1b
69	M75	PIPE_2.0	.194	2.778	5	.032	2.014		5	18857.4...	32130	1871.625	1871.625	3...	H1-1b
70	M76	PIPE_2.0	.164	2.778	5	.023	2.778		3	18857.4...	32130	1871.625	1871.625	3...	H1-1b
71	M77	PIPE_2.0	.184	1.042	2	.074	1.042		2	18857.4...	32130	1871.625	1871.625	3...	H1-1b
72	M92	L3X3X5	.654	2.5	2	.115	5	y	5	50167.7...	57672	2014.646	4269.151	1...	H2-1
73	M93	L3X3X5	.374	5.328	4	.039	5.672	y	5	57351.3...	57672	2014.646	3864.208	1.1	H2-1
74	M94	L3X3X5	.318	5.758	4	.034	5.672	z	4	50167.9...	57672	2014.646	4572.498	1...	H2-1
75	M95	L3X3X5	.890	5.5	3	.081	3	y	5	50167.7...	57672	2014.646	4331.983	1...	H2-1
76	M96	L3X3X5	.161	3.398	6	.019	3.323	y	4	18057.5...	57672	2014.646	4209.386	1...	H2-1
77	M97	L3X3X5	.485	3.398	5	.045	3.398	z	5	18057.5...	57672	2014.646	4418.343	1...	H2-1
78	M98	L3X3X5	.554	0	5	.044	0	z	5	18057.5...	57672	2014.646	4572.498	2...	H2-1
79	M99	L3X3X5	.098	0	4	.009	0	y	14	18057.5...	57672	2014.646	4572.498	2...	H2-1
80	M100	L3X3X5	.028	3.398	4	.005	3.398	y	14	18057.5...	57672	2014.646	4308.119	1...	H2-1
81	M101	L3X3X5	.215	7.25	4	.022	6.419	y	4	18057.5...	57672	2014.646	4572.498	2...	H2-1
82	M102	L3X3X5	.181	7.25	6	.013	7.174	y	4	18057.5...	57672	2014.646	4572.498	2...	H2-1
83	M103	L3X3X5	.110	0	3	.008	0	z	4	18057.5...	57672	2014.646	4572.498	2...	H2-1

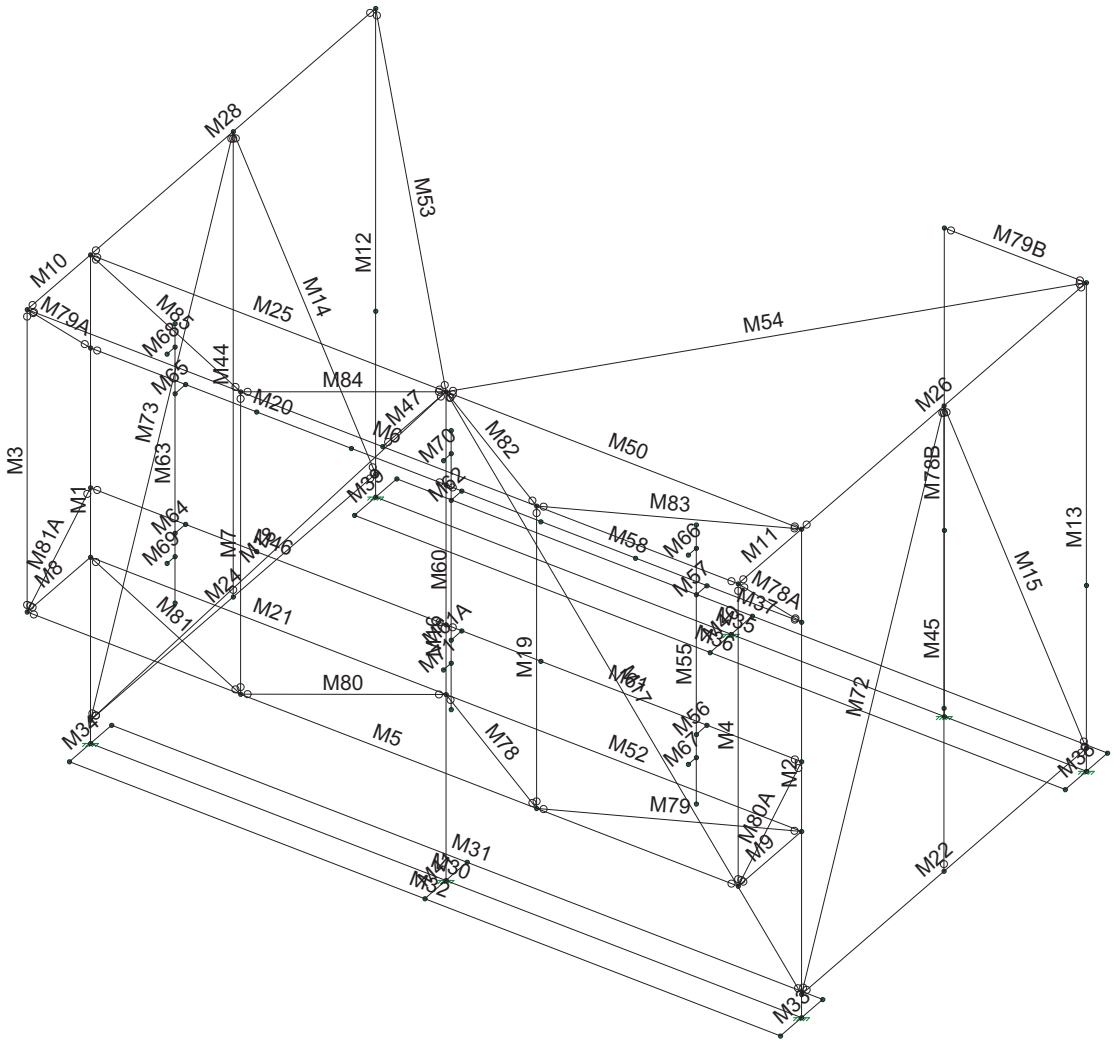


KCS Corp		SK - 1
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:28 PM
CH95063B	3D Render	CH95063A Custom Sled Mount.R3D

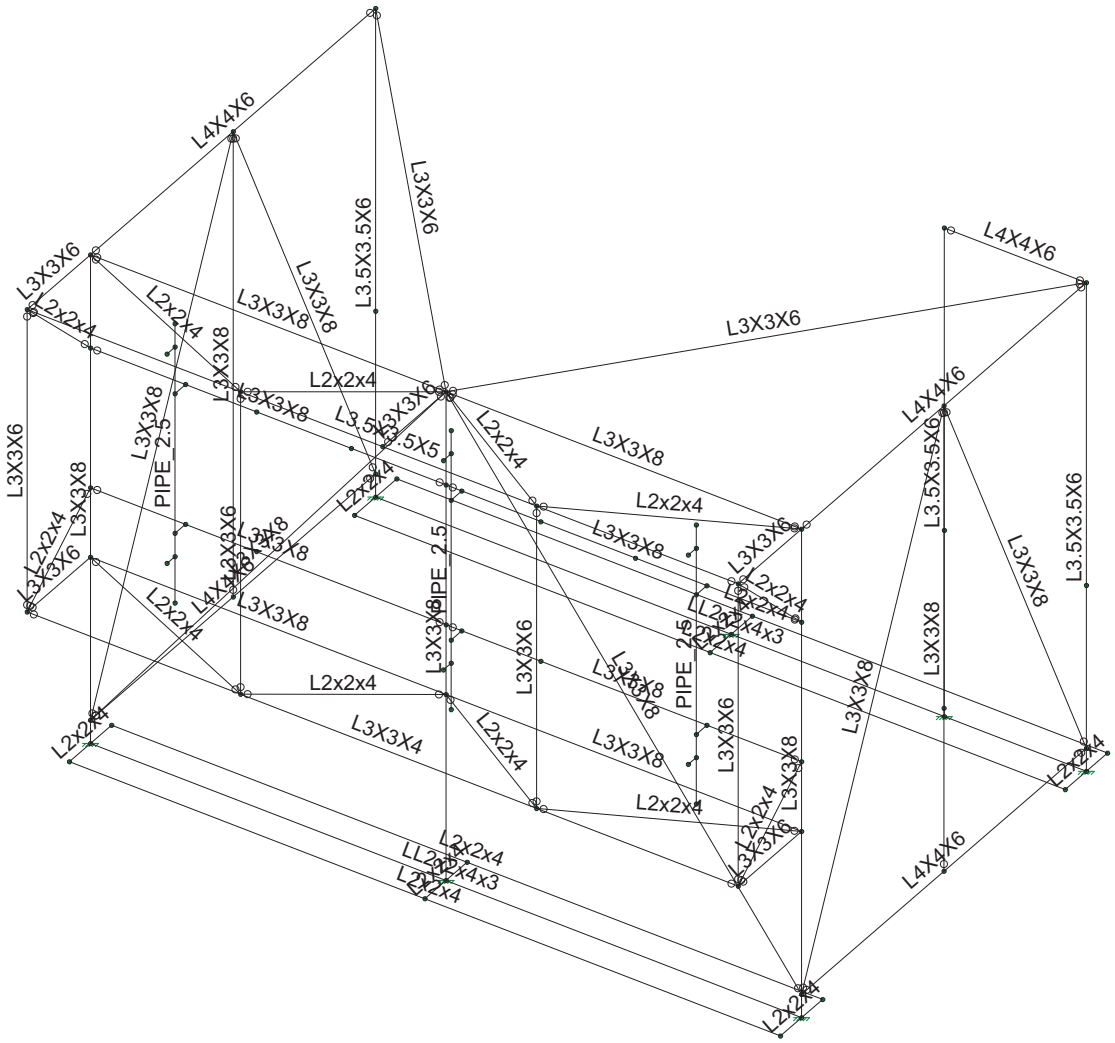


Member Code Checks Displayed (Enveloped)
Results for LC 1, SELF WEIGHT

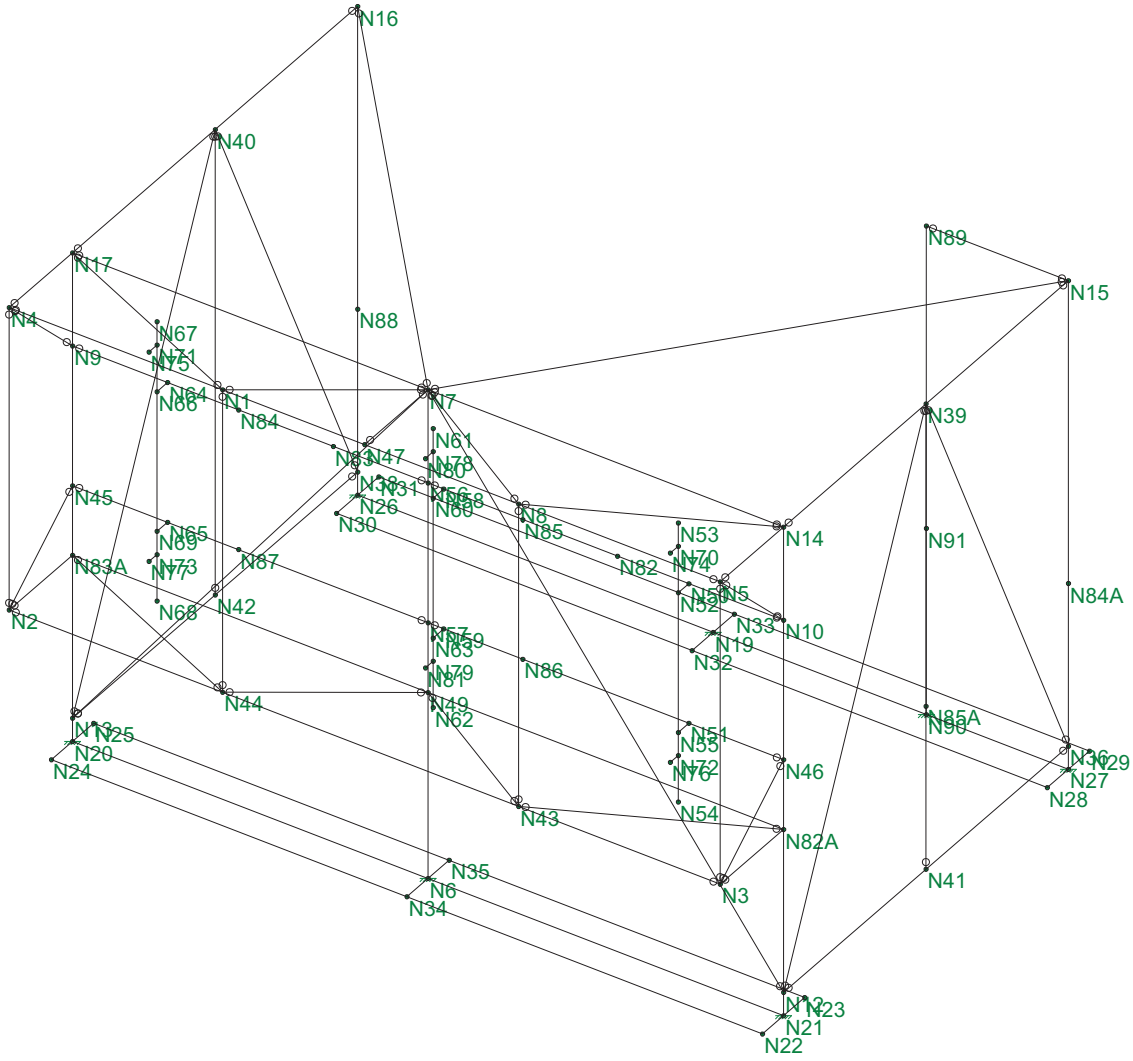
KCS Corp		SK - 2
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:29 PM
CH95063B	Unity Bending	CH95063A Custom Sled Mount.R3D



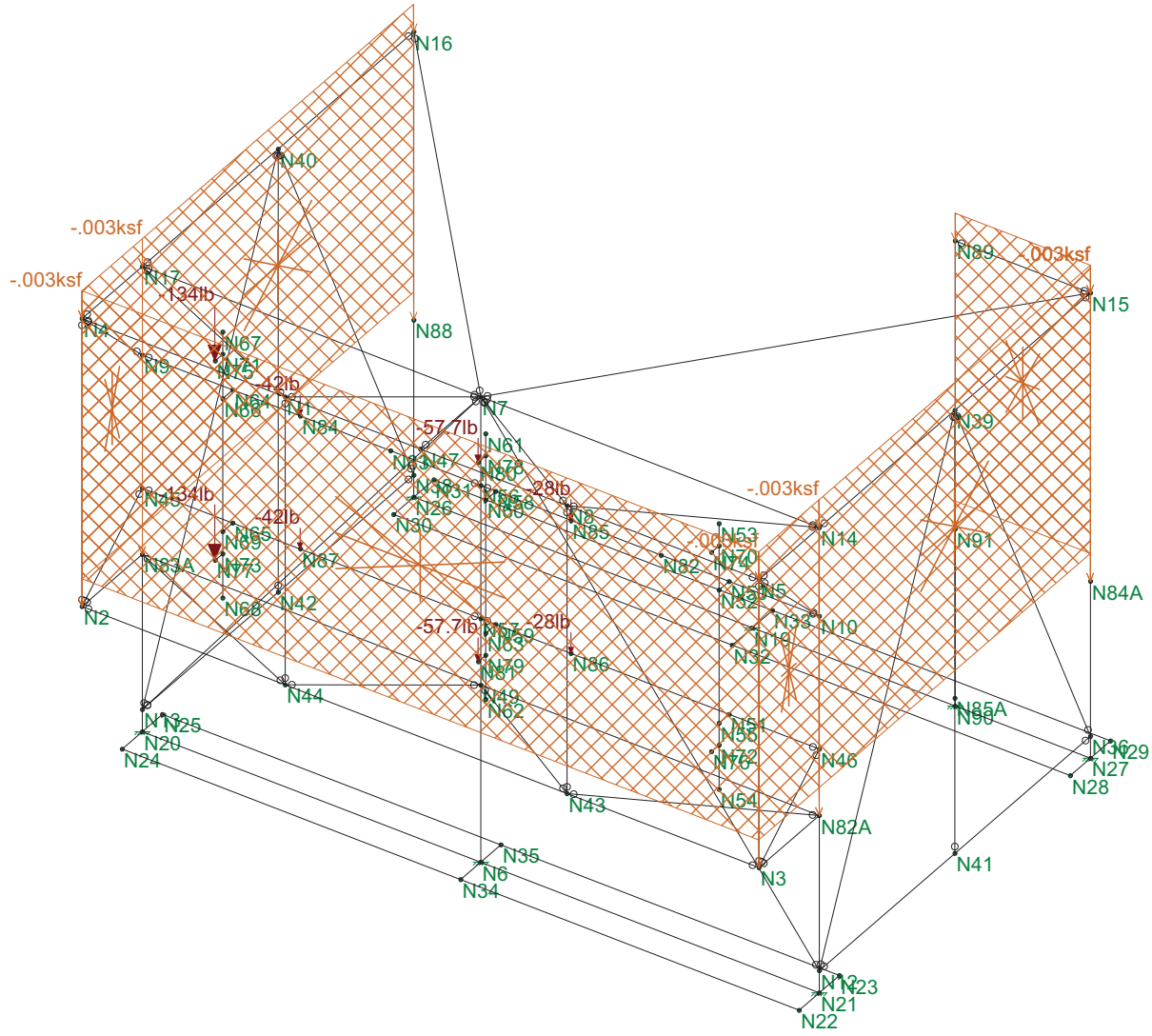
KCS Corp		SK - 3
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:30 PM
CH95063B	Members	CH95063A Custom Sled Mount.R3D



KCS Corp		SK - 4
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:30 PM
CH95063B	Shapes	CH95063A Custom Sled Mount.R3D

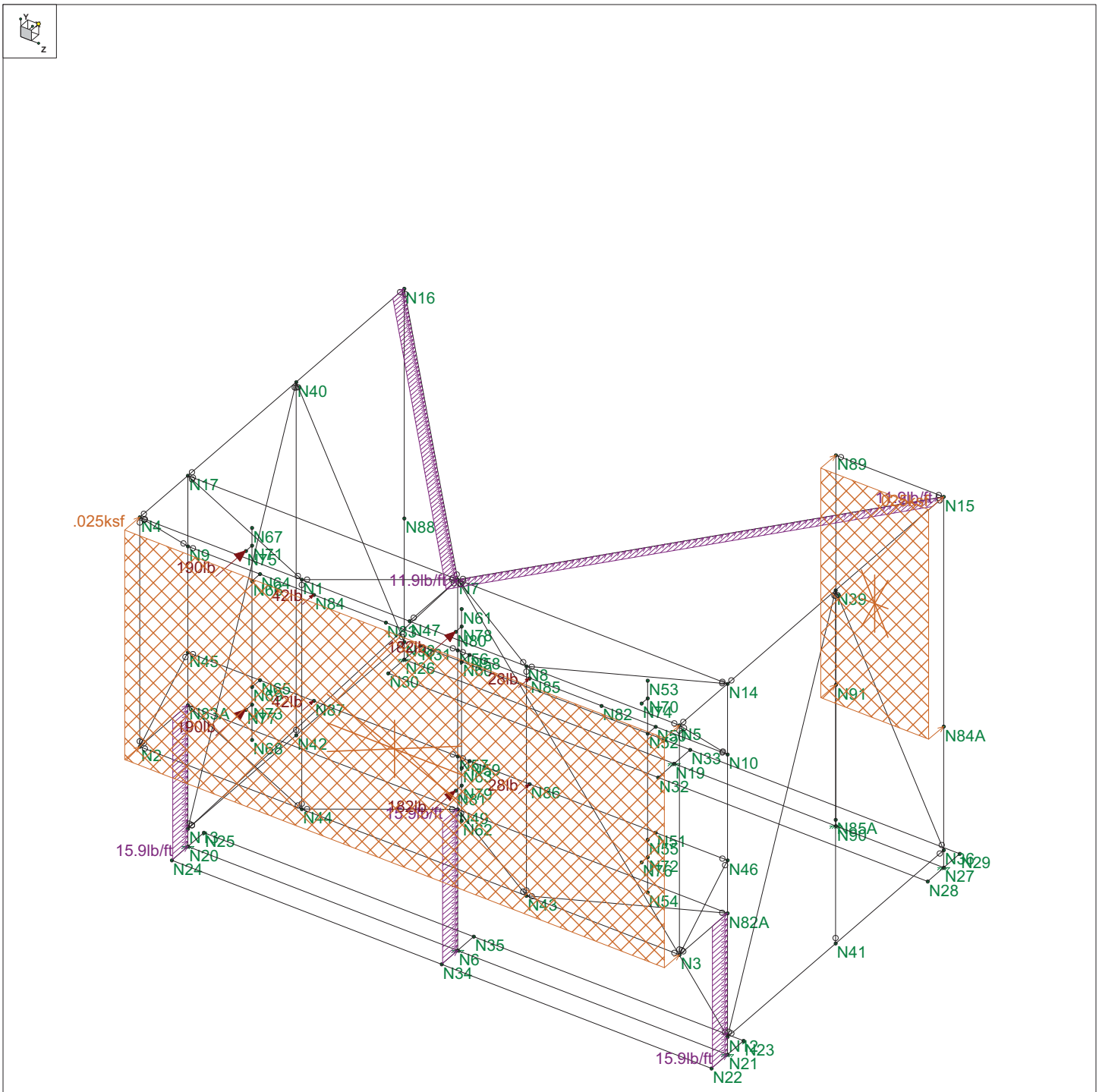


KCS Corp		SK - 5
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:31 PM
CH95063B	Nodes	CH95063A Custom Sled Mount.R3D



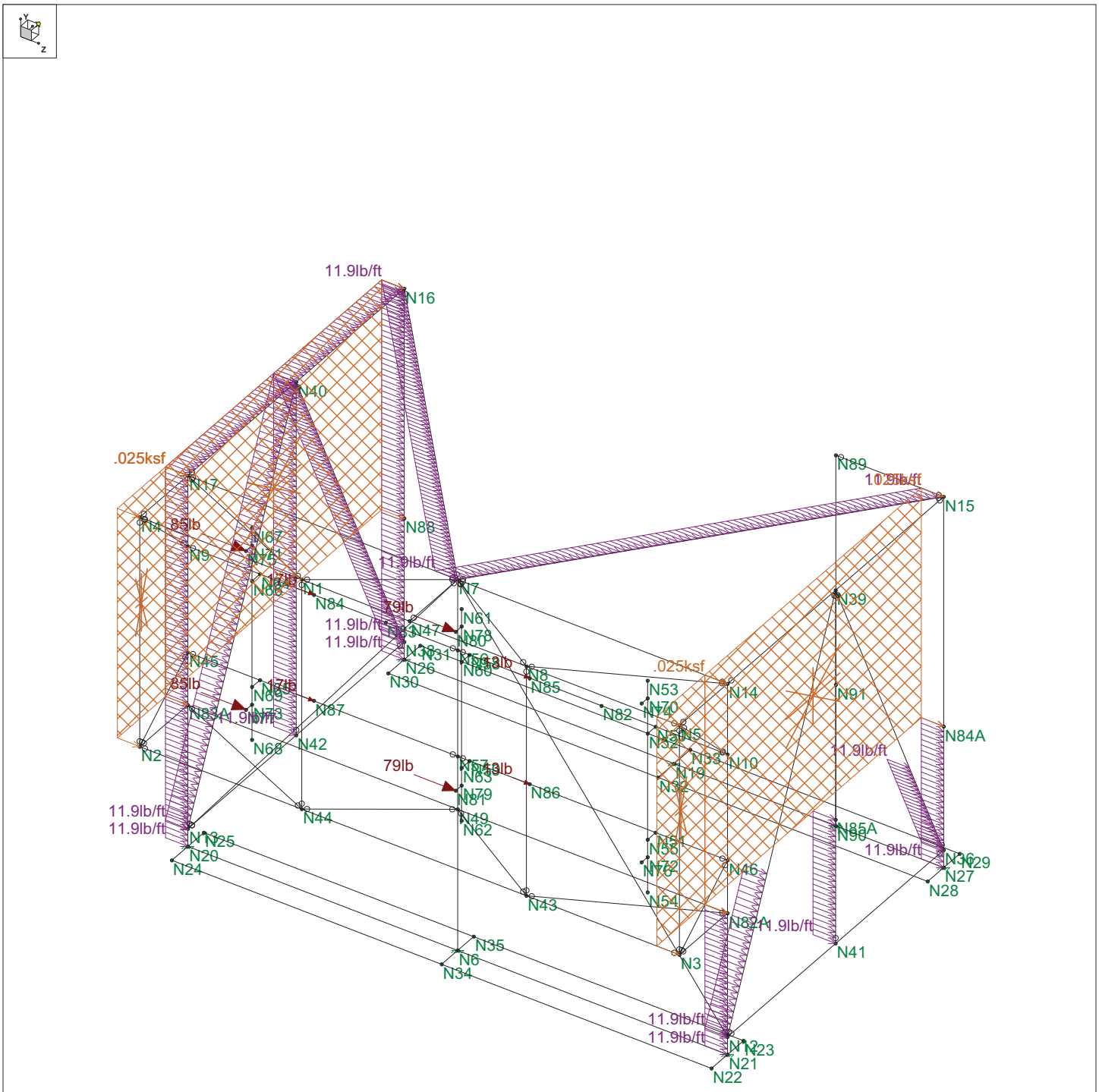
Loads: BLC 2, SDL

KCS Corp	CH95063B - CUSTOM BALLAT FRAME	SK - 6
FC		May 11, 2020 at 3:31 PM
CH95063B	Dead Loads	CH95063A Custom Sled Mount.R3D



Loads: BLC 3, WLx (+)

KCS Corp		SK - 7
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:32 PM
CH95063B	Wind Load (X-Direction)	CH95063A Custom Sled Mount.R3D



Loads: BLC 6, WLz(+)

KCS Corp		SK - 8
FC	CH95063B - CUSTOM BALLAT FRAME	May 11, 2020 at 3:33 PM
CH95063B	Wind Load (Z-Direction)	CH95063A Custom Sled Mount.R3D

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N20	N17			L3X3X8	Column	Single Angle	A36 Gr.36	Typical
2	M2	N21	N14			L3X3X8	Column	Single Angle	A36 Gr.36	Typical
3	M3	N2	N4			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
4	M4	N3	N5			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
5	M5	N2	N3			L3X3X4	Beam	Single Angle	A36 Gr.36	Typical
6	M6	N4	N5			L3.5X3.5X5	Beam	Single Angle	A36 Gr.36	Typical
7	M7	N44	N1			L3X3X6	Column	Single Angle	A36 Gr.36	Typical
8	M8	N83A	N2			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
9	M9	N82A	N3			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
10	M10	N17	N4			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
11	M11	N14	N5			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
12	M12	N26	N16			L3.5X3.5X6	Column	Single Angle	A36 Gr.36	Typical
13	M13	N27	N15			L3.5X3.5X6	Column	Single Angle	A36 Gr.36	Typical
14	M14	N38	N40			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
15	M15	N39	N36			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
16	M16	N7	N6			L3X3X8	Column	Single Angle	A36 Gr.36	Typical
17	M17	N7	N12			L3X3X8	VBrace	Single Angle	A36 Gr.36	Typical
18	M18	N7	N13			L3X3X8	VBrace	Single Angle	A36 Gr.36	Typical
19	M19	N43	N8			L3X3X6	Column	Single Angle	A36 Gr.36	Typical
20	M20	N9	N56			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
21	M21	N83A	N49			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
22	M22	N12	N36			L4X4X6	Beam	Single Angle	A36 Gr.36	Typical
23	M24	N38	N13			L4X4X6	Beam	Single Angle	A36 Gr.36	Typical
24	M25	N17	N7			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
25	M26	N14	N15			L4X4X6	Beam	Single Angle	A36 Gr.36	Typical
26	M28	N16	N17			L4X4X6	Beam	Single Angle	A36 Gr.36	Typical
27	M30	N20	N21		180	LL2x2x4x3	Beam	Single Angle	A36 Gr.36	Typical
28	M31	N25	N23			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
29	M32	N24	N22			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
30	M33	N22	N23			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
31	M34	N24	N25			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
32	M35	N26	N27		180	LL2x2x4x3	Beam	Single Angle	A36 Gr.36	Typical
33	M36	N30	N28			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
34	M37	N31	N29			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
35	M38	N28	N29			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
36	M39	N30	N31			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
37	M40	N32	N33			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
38	M41	N34	N35			L2x2x4	Beam	Single Angle	A36 Gr.36	Typical
39	M44	N42	N40			L3X3X8	Column	Single Angle	A36 Gr.36	Typical
40	M45	N41	N39			L3X3X8	Column	Single Angle	A36 Gr.36	Typical
41	M46	N45	N57			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
42	M47	N7	N47			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
43	M50	N7	N14			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
44	M52	N49	N82A			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
45	M53	N7	N16			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
46	M54	N15	N7			L3X3X6	Beam	Single Angle	A36 Gr.36	Typical
47	M55	N54	N53			PIPE_2.5	Column	Pipe	A500 Gr.B RND	Typical
48	M56	N55	N51			RIGID	None	None	RIGID	Typical
49	M57	N52	N50			RIGID	None	None	RIGID	Typical
50	M58	N56	N10			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
51	M61	N57	N46			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
52	M60	N62	N61			PIPE_2.5	Column	Pipe	A500 Gr.B RND	Typical
53	M61A	N63	N59			RIGID	None	None	RIGID	Typical
54	M62	N60	N58			RIGID	None	None	RIGID	Typical
55	M63	N68	N67			PIPE_2.5	Column	Pipe	A500 Gr.B RND	Typical
56	M64	N69	N65			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
57	M65	N66	N64			RIGID	None	None	RIGID	Typical
58	M66	N74	N70			RIGID	None	None	RIGID	Typical
59	M67	N76	N72			RIGID	None	None	RIGID	Typical
60	M68	N75	N71			RIGID	None	None	RIGID	Typical
61	M69	N77	N73			RIGID	None	None	RIGID	Typical
62	M70	N80	N78			RIGID	None	None	RIGID	Typical
63	M71	N81	N79			RIGID	None	None	RIGID	Typical
64	M72	N12	N39			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
65	M73	N13	N40			L3X3X8	Beam	Single Angle	A36 Gr.36	Typical
66	M78	N49	N43			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
67	M79	N43	N82A			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
68	M80	N49	N44			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
69	M81	N44	N83A			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
70	M78A	N5	N10			L2x2x4	VBrace	Single Angle	A36 Gr.36	Typical
71	M79A	N4	N9			L2x2x4	VBrace	Single Angle	A36 Gr.36	Typical
72	M80A	N3	N46			L2x2x4	VBrace	Single Angle	A36 Gr.36	Typical
73	M81A	N2	N45			L2x2x4	VBrace	Single Angle	A36 Gr.36	Typical
74	M82	N7	N8			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
75	M83	N8	N14			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
76	M84	N7	N1			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
77	M85	N1	N17			L2x2x4	VBrace	Wide Flange	A36 Gr.36	Typical
78	M78B	N90	N89			L3.5X3.5X6	Column	Single Angle	A36 Gr.36	Typical
79	M79B	N15	N89			L4X4X6	Beam	Single Angle	A36 Gr.36	Typical

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N21	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N6	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N20	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N26	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N19	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N27	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N30						
8	N31						
9	N38						
10	N88						
11	N90	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	L3X3X8	10.5	Segment	Segment	Lbyy						Lateral
2	M2	L3X3X8	10.5	Segment	Segment	Lbyy						Lateral
3	M3	L3X3X6	6.5			Lbyy						Lateral
4	M4	L3X3X6	6.5			Lbyy						Lateral
5	M5	L3X3X4	15	Segment	Segment	Lbyy						Lateral
6	M6	L3.5X3.5X5	15	Segment	Segment	Lbyy						Lateral
7	M7	L3X3X6	6.5			Lbyy						Lateral
8	M8	L3X3X6	2			Lbyy						Lateral
9	M9	L3X3X6	2			Lbyy						Lateral
10	M10	L3X3X6	2			Lbyy						Lateral
11	M11	L3X3X6	2			Lbyy						Lateral
12	M12	L3.5X3.5X6	10.5			Lbyy						Lateral
13	M13	L3.5X3.5X6	10.5			Lbyy						Lateral
14	M14	L3X3X8	10.966	5.5		Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
15	M15	L3X3X8	10.966	5.5		Lbyy						Lateral
16	M16	L3X3X8	10.5	Segment	Segment	Lbyy						Lateral
17	M17	L3X3X8	12.5	6.25		Lbyy						Lateral
18	M18	L3X3X8	12.5	6.25		Lbyy						Lateral
19	M19	L3X3X6	6.5			Lbyy						Lateral
20	M20	L3X3X8	7.5			Lbyy						Lateral
21	M21	L3X3X8	7.5			Lbyy						Lateral
22	M22	L4X4X6	9			Lbyy						Lateral
23	M24	L4X4X6	9			Lbyy						Lateral
24	M25	L3X3X8	7.5			Lbyy						Lateral
25	M26	L4X4X6	9			Lbyy						Lateral
26	M28	L4X4X6	9			Lbyy						Lateral
27	M30	LL2x2x4x3	15			Lbyy						Lateral
28	M31	L2x2x4	15			Lbyy						Lateral
29	M32	L2x2x4	15	Segment	Segment	Lbyy						Lateral
30	M33	L2x2x4	1.333			Lbyy						Lateral
31	M34	L2x2x4	1.333			Lbyy						Lateral
32	M35	LL2x2x4x3	15			Lbyy						Lateral
33	M36	L2x2x4	15	Segment	Segment	Lbyy						Lateral
34	M37	L2x2x4	15			Lbyy						Lateral
35	M38	L2x2x4	1.333			Lbyy						Lateral
36	M39	L2x2x4	1.333			Lbyy						Lateral
37	M40	L2x2x4	1.333			Lbyy						Lateral
38	M41	L2x2x4	1.333			Lbyy						Lateral
39	M44	L3X3X8	10			Lbyy						Lateral
40	M45	L3X3X8	10			Lbyy						Lateral
41	M46	L3X3X8	7.5			Lbyy						Lateral
42	M47	L3X3X6	2			Lbyy						Lateral
43	M50	L3X3X8	7.5			Lbyy						Lateral
44	M52	L3X3X8	7.5			Lbyy						Lateral
45	M53	L3X3X6	11.715	5.5								Lateral
46	M54	L3X3X6	11.715	5.5								Lateral
47	M55	PIPE_2.5	6									Lateral
48	M58	L3X3X8	7.5			Lbyy						Lateral
49	M61	L3X3X8	7.5			Lbyy						Lateral
50	M60	PIPE_2.5	6									Lateral
51	M63	PIPE_2.5	6									Lateral
52	M72	L3X3X8	10.966	5.5								Lateral
53	M73	L3X3X8	10.966	5.5								Lateral
54	M78	L2x2x4	3.816									Lateral
55	M79	L2x2x4	4.697									Lateral
56	M80	L2x2x4	3.606									Lateral
57	M81	L2x2x4	4.924									Lateral
58	M78A	L2x2x4	2.828									Lateral
59	M79A	L2x2x4	2.828									Lateral
60	M80A	L2x2x4	2.498									Lateral
61	M81A	L2x2x4	2.498									Lateral
62	M82	L2x2x4	3.816									Lateral
63	M83	L2x2x4	4.697									Lateral
64	M84	L2x2x4	3.606									Lateral
65	M85	L2x2x4	4.924									Lateral
66	M78B	L3.5X3.5X6	10.5			Lbyy						Lateral
67	M79B	L4X4X6	3			Lbyy						Lateral

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distri...	Area(Memb...	Surface(Plate/Wall)
1	SELF WEIGHT	None		-1						
2	SDL	None				8			6	
3	WLx (+)	None				8		5	2	
4	WLx (-)	None				8		23	2	
5	WLz(-)	None				8		12	4	
6	WLz(+)	None				8		13	4	
7	BLC 2 Transient Area Loads	None						85		
8	BLC 3 Transient Area Loads	None						35		
9	BLC 4 Transient Area Loads	None						35		
10	BLC 6 Transient Area Loads	None						50		
11	BLC 5 Transient Area Loads	None						50		

Load Combinations

	Description	Sol...	PDelta	SR...	B...	Factor	BLC	Factor	BLC	Fac...	BLC	F...	BLC	F...
1	SELF WEIGHT	Yes	Y		1	1								
2	SDL	Yes	Y		2	1								
3	DL	Yes	Y		1	1	2	1						
4	D+WLx	Yes	Y		1	1	2	1	3	1				
5	D-WLx	Yes	Y		1	1	2	1	4	1				
6	D+WLz	Yes	Y		1	1	2	1	6	1				
7	D-WLz	Yes	Y		1	1	2	1	5	1				
8	.6D+WLx	Yes	Y		1	.6	2	.6	3	1				
9	.6D-WLx	Yes	Y		1	.6	2	.6	4	1				
10	.6D+WLz	Yes	Y		1	.6	2	.6	6	1				
11	.6D-WLz	Yes	Y		1	.6	2	.6	5	1				
12	0.6D	Yes	Y		1	.6	2	.6						
13	-WLx	Yes	Y		4	1								

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N21	max	994.834	5	4319.3...	6	1739.095	11	1.234	11	.006	4	1.074	4
2		min	-440.037	8	-1737....	11	-2171.513	6	-1.424	6	-.008	5	-1.394	13
3	N6	max	460.956	13	1019.5...	5	348.353	4	.929	4	.004	11	1.189	4
4		min	-419.67	4	154.703	13	-373.173	13	-.955	13	-.004	6	-1.269	13
5	N20	max	697.095	7	4248.9...	7	1964.29	7	1.251	11	.006	5	1.104	4
6		min	-426.831	10	-2026....	10	-2011.551	10	-1.394	6	0	2	-1.316	13
7	N26	max	2073.3...	13	1695.3...	4	385.362	7	.462	11	.005	7	.843	4
8		min	-1814....	4	-1707....	13	-429.886	10	-.623	6	0	2	-1.014	13
9	N19	max	5.744	7	102.049	7	0	13	.019	7	0	7	0	7
10		min	0	2	0	2	-11.719	1	0	2	0	2	0	2
11	N27	max	1967.0...	13	1807.8...	4	376.977	7	.48	7	0	2	.937	4
12		min	-1445....	4	-2001....	13	-354.309	10	-.442	10	-.006	6	-1.243	13
13	N90	max	248.861	5	157.289	4	84.375	5	.892	5	0	13	1.702	4
14		min	-239.322	8	0	13	-78.268	4	-.816	8	0	1	-1.799	5
15	Totals:	max	6046.7...	5	4913.36	5	4737.517	11						
16		min	-4278.57	8	0	13	-5204.505	6						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
1	N1	max	.029	8	.111	13	.016	10	1.872e-3	4	8.644e-6	11	5.006e-3	4
2		min	-.041	5	-.239	4	-.015	7	-1.04e-3	13	-1.951e-4	5	-3.629e-3	13

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
3	N2	max	.156	4	.029	13	.084	10	1.414e-3	6	7.679e-4	11	2.64e-3	13
4		min	-.16	13	-.033	4	-.094	7	-1.104e-3	11	-9.361e-4	6	-2.778e-3	4
5	N3	max	.131	4	.025	13	.083	10	1.28e-3	6	8.851e-4	7	2.582e-3	13
6		min	-.146	13	-.027	4	-.094	7	-1.146e-3	11	-9.137e-4	10	-2.684e-3	4
7	N4	max	.013	8	.03	13	.016	10	3.063e-3	11	8.121e-4	11	5.006e-3	4
8		min	-.017	5	-.033	4	-.015	7	-3.727e-3	6	-1.069e-3	6	-3.629e-3	13
9	N5	max	.013	8	.026	13	.017	6	3.079e-3	11	9.13e-4	11	5.159e-3	4
10		min	-.019	5	-.028	4	-.015	11	-3.75e-3	6	-1.05e-3	6	-3.618e-3	13
11	N6	max	0	13	0	13	0	13	0	13	0	13	0	13
12		min	0	1	0	1	0	1	0	1	0	1	0	1
13	N7	max	.032	8	0	2	.017	10	2.553e-3	11	-3.298e-4	13	9.089e-3	4
14		min	-.047	5	-.001	5	-.015	7	-4.62e-3	6	-1.522e-3	5	-6.149e-3	13
15	N8	max	.029	8	.106	13	.017	6	1.243e-3	13	3.331e-4	5	5.159e-3	4
16		min	-.04	5	-.228	4	-.015	11	-2.265e-3	4	-1.688e-4	8	-3.618e-3	13
17	N9	max	.046	4	0	10	.096	6	2.052e-3	7	4.47e-5	13	1.891e-3	4
18		min	-.049	13	-.002	7	-.082	11	-2.152e-3	6	-1.302e-4	4	-1.91e-3	13
19	N10	max	.04	4	0	11	.096	6	2.037e-3	7	4.322e-4	13	1.532e-3	4
20		min	-.046	13	-.001	6	-.082	11	-2.17e-3	6	-3.63e-4	4	-1.71e-3	13
21	N12	max	.005	4	0	11	.007	6	1.526e-3	10	2.191e-4	13	1.986e-3	13
22		min	-.007	13	0	6	-.006	11	-1.479e-3	7	-2.843e-4	4	-1.649e-3	4
23	N13	max	.006	4	0	10	.006	10	1.361e-3	10	8.721e-5	4	2.016e-3	13
24		min	-.006	13	0	7	-.006	7	-1.471e-3	7	-9.648e-5	13	-1.877e-3	4
25	N14	max	.013	8	0	11	.018	6	3.09e-3	11	2.62e-4	5	1.059e-3	4
26		min	-.019	5	-.002	6	-.016	7	-3.792e-3	6	-1.838e-4	8	-9.775e-4	13
27	N15	max	.012	8	0	13	.021	8	2.036e-3	7	9.507e-5	6	2.05e-3	4
28		min	-.018	5	0	6	-.032	5	-2.063e-3	6	-8.158e-5	11	-2.232e-3	13
29	N16	max	.012	8	0	10	.04	5	2.03e-3	7	9.1e-5	6	1.427e-3	7
30		min	-.016	5	0	7	-.026	8	-2.589e-3	10	-7.828e-5	11	-1.781e-3	10
31	N17	max	.012	8	0	10	.019	6	3.077e-3	11	9.209e-5	11	1.272e-3	4
32		min	-.017	5	-.002	7	-.016	7	-3.768e-3	6	-1.512e-4	6	-1.164e-3	13
33	N19	max	0	13	0	13	0	13	0	13	0	13	0	13
34		min	0	1	0	1	0	1	0	1	0	1	0	1
35	N20	max	0	13	0	13	0	13	0	13	0	13	0	13
36		min	0	1	0	1	0	1	0	1	0	1	0	1
37	N21	max	0	13	0	13	0	13	0	13	0	13	0	13
38		min	0	1	0	1	0	1	0	1	0	1	0	1
39	N22	max	0	7	0	13	0	13	0	13	0	13	8.949e-5	7
40		min	0	2	0	1	0	1	-5.219e-4	1	-8.354e-5	1	0	2
41	N23	max	0	7	0	13	0	13	0	13	0	13	0	13
42		min	0	2	0	1	0	1	-4.844e-4	1	-1.319e-5	1	-3.235e-5	1
43	N24	max	0	7	0	13	0	13	4.844e-4	7	1.319e-5	7	3.235e-5	7
44		min	0	2	0	1	0	1	0	2	0	2	0	2
45	N25	max	0	7	0	13	0	13	5.219e-4	7	8.354e-5	7	0	13
46		min	0	2	0	1	0	1	0	2	0	2	-8.949e-5	1
47	N26	max	0	13	0	13	0	13	0	13	0	13	0	13
48		min	0	1	0	1	0	1	0	1	0	1	0	1
49	N27	max	0	13	0	13	0	13	0	13	0	13	0	13
50		min	0	1	0	1	0	1	0	1	0	1	0	1
51	N28	max	0	7	0	13	0	13	0	13	0	13	8.949e-5	7
52		min	0	2	0	1	0	1	-5.219e-4	1	-8.354e-5	1	0	2
53	N29	max	0	7	0	13	0	13	0	13	0	13	0	13
54		min	0	2	0	1	0	1	-4.844e-4	1	-1.319e-5	1	-3.235e-5	1
55	N30	max	0	7	0	13	0	13	4.844e-4	7	1.319e-5	7	3.235e-5	7
56		min	0	2	0	1	0	1	0	2	0	2	0	2
57	N31	max	0	7	0	13	0	13	5.219e-4	7	8.354e-5	7	0	13
58		min	0	2	0	1	0	1	0	2	0	2	-8.949e-5	1
59	N32	max	0	13	0	13	0	13	0	13	0	13	1.413e-4	7

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
60		min	0	1	0	1	0	1	-2.029e-5	1	-3.541e-5	1	0	2
61	N33	max	0	13	0	13	0	13	2.029e-5	7	3.541e-5	7	0	13
62		min	0	1	0	1	0	1	0	2	0	2	-1.413e-4	1
63	N34	max	0	13	0	13	0	13	0	13	0	13	1.413e-4	7
64		min	0	1	0	1	0	1	-2.029e-5	1	-3.541e-5	1	0	2
65	N35	max	0	13	0	13	0	13	2.029e-5	7	3.541e-5	7	0	13
66		min	0	1	0	1	0	1	0	2	0	2	-1.413e-4	1
67	N36	max	.004	4	0	13	.003	10	6.983e-4	10	9.507e-5	6	1.215e-3	13
68		min	-.005	13	0	4	-.003	7	-7.478e-4	7	-8.158e-5	11	-9.343e-4	4
69	N38	max	.004	4	0	13	.002	10	6.993e-4	10	9.1e-5	6	8.593e-4	13
70		min	-.004	13	0	4	-.002	7	-6.291e-4	7	-7.828e-5	11	-6.687e-4	4
71	N39	max	.012	8	0	10	.201	10	2.198e-3	11	2.923e-4	5	1.081e-5	5
72		min	-.018	5	-.001	7	-.202	7	-2.548e-3	6	-1.931e-4	8	-1.097e-6	8
73	N40	max	.011	8	0	11	.27	6	2.199e-3	11	2.071e-4	8	1.622e-5	5
74		min	-.016	5	-.001	6	-.204	11	-2.761e-3	6	-3.243e-4	5	-1.425e-7	8
75	N41	max	.005	4	0	10	.042	10	1.112e-3	10	3.864e-5	6	4.24e-6	6
76		min	-.006	13	-.001	7	-.043	7	-1.113e-3	7	-3.074e-5	11	-2.644e-6	11
77	N42	max	.005	4	0	11	.049	6	1.03e-3	10	3.164e-5	10	4.206e-6	7
78		min	-.005	13	-.002	6	-.043	7	-1.05e-3	7	-3.537e-5	7	-3.104e-6	10
79	N43	max	.148	4	.106	13	.082	10	1.272e-3	13	5.051e-4	13	2.582e-3	13
80		min	-.161	13	-.228	4	-.094	7	-2.986e-3	4	-6.038e-4	4	-2.684e-3	4
81	N44	max	.16	4	.111	13	.083	10	2.535e-3	4	5.222e-5	6	2.64e-3	13
82		min	-.168	13	-.239	4	-.094	7	-9.822e-4	13	-5.214e-5	13	-2.778e-3	4
83	N45	max	.133	4	0	10	.105	10	1.212e-3	4	3.139e-4	13	2.219e-3	4
84		min	-.139	13	-.001	7	-.107	7	-1.095e-3	13	-4.539e-4	4	-2.196e-3	13
85	N46	max	.111	4	0	11	.105	10	1.168e-3	6	7.325e-4	13	1.846e-3	4
86		min	-.127	13	-.001	6	-.107	7	-9.553e-4	13	-6.681e-4	4	-1.961e-3	13
87	N47	max	.032	8	.134	13	.016	10	1.452e-6	13	3.686e-5	7	5.079e-3	4
88		min	-.047	5	-.264	4	-.015	7	-5.853e-5	4	-4.296e-5	13	-3.624e-3	13
89	N49	max	.156	4	0	13	.083	10	1.156e-3	6	9.53e-4	6	4.347e-3	13
90		min	-.166	13	0	5	-.093	7	-1.024e-3	11	-8.091e-4	11	-4.309e-3	4
91	N50	max	.098	4	.005	13	.096	6	1.626e-4	11	2.22e-3	13	1.557e-3	4
92		min	-.109	13	-.013	6	-.082	11	-2.625e-4	6	-2.043e-3	4	-1.863e-3	13
93	N51	max	.154	4	.005	13	.105	10	1.795e-4	11	1.671e-3	13	1.561e-3	4
94		min	-.177	13	-.013	6	-.107	7	-2.875e-4	6	-1.393e-3	4	-1.871e-3	13
95	N52	max	.098	4	.012	13	.092	6	1.626e-4	11	2.22e-3	13	1.557e-3	4
96		min	-.109	13	-.018	4	-.082	11	-2.625e-4	6	-2.043e-3	4	-1.863e-3	13
97	N53	max	.07	4	.012	13	.088	6	1.626e-4	11	2.22e-3	13	1.557e-3	4
98		min	-.076	13	-.018	4	-.079	11	-2.625e-4	6	-2.043e-3	4	-1.863e-3	13
99	N54	max	.182	4	.012	13	.108	10	1.795e-4	11	1.671e-3	13	1.561e-3	4
100		min	-.21	13	-.018	4	-.11	7	-2.875e-4	6	-1.393e-3	4	-1.871e-3	13
101	N55	max	.154	4	.012	13	.103	10	1.795e-4	11	1.671e-3	13	1.561e-3	4
102		min	-.177	13	-.018	4	-.107	7	-2.875e-4	6	-1.393e-3	4	-1.871e-3	13
103	N56	max	.194	4	0	13	.096	6	2.331e-3	7	-2.055e-4	10	4.037e-3	4
104		min	-.184	13	-.001	5	-.082	11	-1.975e-3	10	-1.17e-3	5	-4.243e-3	13
105	N57	max	.221	4	0	13	.105	10	1.102e-3	6	5.507e-4	10	1.911e-3	13
106		min	-.228	13	0	5	-.107	7	-9.699e-4	13	-8.965e-4	7	-2.27e-3	4
107	N58	max	.192	4	.002	13	.096	6	7.58e-4	4	-3.386e-5	10	8.502e-4	8
108		min	-.185	13	-.004	4	-.082	11	-5.204e-4	13	-5.077e-4	4	-1.252e-3	5
109	N59	max	.22	4	.002	13	.105	10	8.224e-4	4	-2.794e-5	2	8.356e-4	8
110		min	-.229	13	-.004	4	-.107	7	-5.627e-4	13	-3.907e-4	5	-1.288e-3	5
111	N60	max	.192	4	.007	13	.096	6	7.58e-4	4	-3.386e-5	10	8.502e-4	8
112		min	-.185	13	-.007	4	-.083	11	-5.204e-4	13	-5.077e-4	4	-1.252e-3	5
113	N61	max	.182	4	.007	13	.103	6	7.581e-4	4	5.437e-5	10	5.02e-4	4
114		min	-.169	13	-.007	4	-.08	11	-5.204e-4	13	-5.079e-4	4	-8.011e-4	5
115	N62	max	.236	4	.007	13	.106	10	8.224e-4	4	1.577e-5	10	9.503e-4	8
116		min	-.251	13	-.007	4	-.122	7	-5.627e-4	13	-3.907e-4	5	-1.353e-3	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
117	N63	max	.22	4	.007	13	.105	10	8.224e-4	4	-2.794e-5	2	8.356e-4	8
118		min	-.229	13	-.007	4	-.108	7	-5.627e-4	13	-3.907e-4	5	-1.288e-3	5
119	N64	max	.174	4	.043	13	.097	6	1.696e-3	4	3.8e-3	4	1.359e-3	4
120		min	-.17	13	-.083	4	-.082	11	-9.834e-4	13	-3.737e-3	13	-9.289e-4	13
121	N65	max	.248	4	.036	13	.105	10	1.534e-3	4	3.119e-3	4	2.857e-3	4
122		min	-.236	13	-.077	4	-.107	7	-9.045e-4	13	-3.05e-3	13	-2.513e-3	13
123	N66	max	.174	4	.047	13	.101	6	1.696e-3	4	3.8e-3	4	1.359e-3	4
124		min	-.17	13	-.089	4	-.08	11	-9.834e-4	13	-3.737e-3	13	-9.289e-4	13
125	N67	max	.154	4	.047	13	.118	6	1.697e-3	4	3.801e-3	4	1.096e-3	4
126		min	-.16	13	-.089	4	-.071	11	-9.834e-4	13	-3.735e-3	13	-5.22e-4	13
127	N68	max	.302	4	.047	13	.104	10	1.534e-3	4	3.12e-3	4	3.028e-3	4
128		min	-.283	13	-.089	4	-.125	7	-9.045e-4	13	-3.05e-3	13	-2.613e-3	13
129	N69	max	.248	4	.047	13	.107	10	1.534e-3	4	3.119e-3	4	2.857e-3	4
130		min	-.236	13	-.089	4	-.103	7	-9.045e-4	13	-3.05e-3	13	-2.513e-3	13
131	N70	max	.079	4	.012	13	.089	6	1.626e-4	11	2.22e-3	13	1.557e-3	4
132		min	-.087	13	-.018	4	-.08	11	-2.625e-4	6	-2.043e-3	4	-1.863e-3	13
133	N71	max	.161	4	.047	13	.112	6	1.697e-3	4	3.801e-3	4	1.096e-3	4
134		min	-.163	13	-.089	4	-.074	11	-9.834e-4	13	-3.735e-3	13	-5.22e-4	13
135	N72	max	.163	4	.012	13	.104	10	1.795e-4	11	1.671e-3	13	1.561e-3	4
136		min	-.188	13	-.018	4	-.108	7	-2.875e-4	6	-1.393e-3	4	-1.871e-3	13
137	N73	max	.265	4	.047	13	.106	10	1.534e-3	4	3.12e-3	4	3.028e-3	4
138		min	-.252	13	-.089	4	-.111	7	-9.045e-4	13	-3.05e-3	13	-2.613e-3	13
139	N74	max	.079	4	.018	13	.086	6	1.626e-4	11	2.22e-3	13	1.557e-3	4
140		min	-.087	13	-.023	4	-.08	7	-2.625e-4	6	-2.043e-3	4	-1.863e-3	13
141	N75	max	.161	4	.048	13	.116	6	1.697e-3	4	3.801e-3	4	1.096e-3	4
142		min	-.163	13	-.092	4	-.073	11	-9.834e-4	13	-3.735e-3	13	-5.22e-4	13
143	N76	max	.163	4	.018	13	.103	10	1.795e-4	11	1.671e-3	13	1.561e-3	4
144		min	-.188	13	-.023	4	-.108	7	-2.875e-4	6	-1.393e-3	4	-1.871e-3	13
145	N77	max	.265	4	.054	13	.107	10	1.534e-3	4	3.12e-3	4	3.028e-3	4
146		min	-.252	13	-.098	4	-.108	7	-9.045e-4	13	-3.05e-3	13	-2.613e-3	13
147	N78	max	.185	4	.007	13	.1	6	7.581e-4	4	5.437e-5	10	5.02e-4	4
148		min	-.174	13	-.007	4	-.081	11	-5.204e-4	13	-5.079e-4	4	-8.01e-4	5
149	N79	max	.225	4	.007	13	.105	10	8.224e-4	4	1.577e-5	10	9.503e-4	8
150		min	-.236	13	-.007	4	-.112	7	-5.627e-4	13	-3.907e-4	5	-1.353e-3	5
151	N80	max	.185	4	.009	13	.1	6	7.581e-4	4	5.437e-5	10	5.02e-4	4
152		min	-.174	13	-.009	4	-.082	11	-5.204e-4	13	-5.079e-4	4	-8.01e-4	5
153	N81	max	.225	4	.01	13	.105	10	8.224e-4	4	1.577e-5	10	9.503e-4	8
154		min	-.236	13	-.01	4	-.113	7	-5.627e-4	13	-3.907e-4	5	-1.353e-3	5
155	N82	max	.135	4	.006	13	.096	6	1.417e-4	13	1.826e-3	13	1.346e-3	4
156		min	-.146	13	-.015	6	-.082	11	-1.718e-4	4	-1.961e-3	4	-1.667e-3	13
157	N83	max	.227	4	.035	13	.096	6	1.188e-3	13	9.113e-4	13	3.063e-3	4
158		min	-.22	13	-.066	4	-.082	11	-2.226e-3	4	-8.353e-4	4	-3.038e-3	13
159	N84	max	.222	4	.051	13	.097	6	6.437e-5	13	1.494e-3	4	2.089e-3	4
160		min	-.217	13	-.097	4	-.082	11	-1.766e-4	4	-1.441e-3	13	-1.833e-3	13
161	N85	max	.175	4	.008	13	.096	6	3.88e-4	6	7.912e-4	13	1.064e-3	8
162		min	-.179	13	-.014	4	-.082	11	-7.732e-5	13	-1.246e-3	4	-1.425e-3	5
163	N82A	max	.13	4	0	11	.083	10	1.224e-3	6	8.742e-4	13	4.64e-4	5
164		min	-.146	13	0	6	-.093	7	-1.132e-3	11	-8.076e-4	4	-2.598e-4	8
165	N83A	max	.156	4	0	10	.083	10	1.359e-3	6	4.384e-4	13	4.181e-4	5
166		min	-.16	13	-.001	7	-.093	7	-1.086e-3	11	-6.029e-4	4	-2.892e-4	10
167	N84A	max	.066	4	0	13	.062	10	1.372e-3	10	9.507e-5	6	1.502e-3	5
168		min	-.079	13	0	4	-.065	7	-1.437e-3	7	-8.158e-5	11	-1.37e-3	4
169	N85A	max	.126	11	0	10	.313	10	4.286e-3	10	1.001e-4	5	1.757e-3	10
170		min	-.129	10	-.001	7	-.311	11	-4.258e-3	11	-6.441e-5	8	-1.721e-3	11
171	N86	max	.209	4	.008	13	.105	10	3.98e-4	6	4.817e-4	13	1.058e-3	8
172		min	-.228	13	-.015	4	-.107	7	-7.05e-5	13	-8.792e-4	4	-1.457e-3	5
173	N87	max	.283	4	.045	13	.105	10	2.88e-5	1	7.982e-4	4	1.458e-3	4

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation ...	LC	Y Rotation ...	LC	Z Rotation [...	LC
174		min	-.273	13	-.09	4	-.107	7	-1.665e-4	4	-1.005e-3	13	-1.307e-3	13
175	N88	max	.033	7	0	13	.078	10	1.943e-3	6	9.1e-5	6	9.428e-4	10
176		min	-.038	10	0	4	-.062	7	-1.426e-3	11	-7.828e-5	11	-7.105e-4	7
177	N89	max	1.297	4	0	13	.021	8	1.927e-3	8	0	13	1.355e-2	5
178		min	-1.382	5	0	3	-.032	5	-2.077e-3	5	0	1	-1.258e-2	4
179	N90	max	0	13	0	13	0	13	0	13	0	13	0	13
180		min	0	1	0	1	0	1	0	1	0	1	0	1
181	N91	max	.308	4	0	13	.03	13	7.04e-4	13	0	13	1.168e-2	5
182		min	-.324	5	0	3	-.032	4	-7.691e-4	4	0	1	-1.105e-2	4

Envelope AISC 14th(360-10): ASD Steel Code Checks

	Member	Shape	Code ...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om ...	Pnt/om ...	Mnyy/o...	Mnzz/o...	Cb	Eqn
1	M1	L3X3X8	.693	0	7	.105	0	z	7	59162.7...	59497.0...	1.904	4.201	1...	H2-1
2	M2	L3X3X8	.785	0	6	.122	0	z	6	59162.7...	59497.0...	1.904	4.41	2...	H2-1
3	M3	L3X3X6	.172	3.25	4	.007	0	y	4	17596.5...	45485.03	1.535	3.346	1...	H2-1
4	M4	L3X3X6	.199	3.25	4	.010	0	y	4	17596.5...	45485.03	1.535	3.328	1...	H2-1
5	M5	L3X3X4	.244	7.656	4	.012	4.375	z	4	13066.4...	31041.9...	1.123	1.657	1...	H2-1
6	M6	L3.5X3.5X5	.237	4.531	4	.013	7.5	y	5	39143.2...	45269.4...	1.918	3.258	1...	H2-1
7	M7	L3X3X6	.371	3.25	5	.018	6.5	y	5	17596.5...	45485.03	1.535	3.338	1...	H2-1
8	M8	L3X3X6	.323	0	4	.019	0	y	4	41577.2...	45485.03	1.535	3.541	1...	H2-1
9	M9	L3X3X6	.278	0	13	.016	0	y	4	41577.2...	45485.03	1.535	3.541	1...	H2-1
10	M10	L3X3X6	.034	0	5	.002	0	y	4	41577.2...	45485.03	1.535	3.541	1...	H2-1
11	M11	L3X3X6	.037	0	5	.002	2	y	5	41577.2...	45485.03	1.535	3.541	1...	H2-1
12	M12	L3.5X3.5X6	.541	0	4	.123	0	y	13	11041.3...	53892.2...	2.222	4.958	4...	H2-1
13	M13	L3.5X3.5X6	.602	0	13	.118	0	y	13	11041.3...	53892.2...	2.222	4.958	3...	H2-1
14	M14	L3X3X8	.476	6.054	6	.017	10.9...	z	6	28823.1...	59497.0...	1.904	4.41	1...	H2-1
15	M15	L3X3X8	.393	4.912	7	.014	0	z	6	28823.1...	59497.0...	1.904	4.41	1...	H2-1
16	M16	L3X3X8	.477	10.5	13	.035	0	y	5	41486.3...	59497.0...	1.904	4.41	2...	H2-1
17	M17	L3X3X8	.186	6.38	6	.019	0	y	4	23191.0...	59497.0...	1.904	3.778	1	H2-1
18	M18	L3X3X8	.173	6.38	7	.016	0	z	13	23191.0...	59497.0...	1.904	3.778	1	H2-1
19	M19	L3X3X6	.409	3.25	5	.023	0	y	4	17596.5...	45485.03	1.535	3.332	1...	H2-1
20	M20	L3X3X8	.291	1.953	4	.036	0	z	5	17229.0...	59497.0...	1.904	4.41	1...	H2-1
21	M21	L3X3X8	.153	7.5	6	.020	7.5	y	4	17229.0...	59497.0...	1.904	4.41	1...	H2-1
22	M22	L4X4X6	.095	4.5	6	.006	4.594	z	10	22365.2...	61652.6...	2.926	5.864	1...	H2-1
23	M24	L4X4X6	.116	4.5	7	.006	0	z	10	22365.2...	61652.6...	2.926	5.865	1...	H2-1
24	M25	L3X3X8	.148	3.75	13	.033	7.5	y	4	17229.0...	59497.0...	1.904	4.288	1...	H2-1
25	M26	L4X4X6	.462	4.5	6	.025	.188	z	6	22365.2...	61652.6...	2.926	5.877	1...	H2-1
26	M28	L4X4X6	.578	4.5	10	.031	9	z	6	22365.2...	61652.6...	2.926	5.889	1...	H2-1
27	M30	LL2x2x4x3	.021	0	7	.002	0	y	7	3210.273	40742.5...	2.391	1.407	1	H1-1b
28	M31	L2x2x4	.056	7.5	7	.003	7.5	y	7	655.888	20349.7...	.46	.725	1...	H2-1
29	M32	L2x2x4	.057	7.5	7	.003	7.5	y	7	2623.553	20349.7...	.46	.906	1...	H2-1
30	M33	L2x2x4	.021	.667	7	.014	.667	z	7	18598.5...	20349.7...	.46	1.049	1...	H2-1
31	M34	L2x2x4	.021	.667	7	.014	.667	z	7	18598.5...	20349.7...	.46	1.049	1...	H2-1
32	M35	LL2x2x4x3	.021	0	7	.002	0	y	7	3210.273	40742.5...	2.391	1.407	1	H1-1b
33	M36	L2x2x4	.057	7.5	7	.003	7.5	y	7	2623.553	20349.7...	.46	.906	1...	H2-1
34	M37	L2x2x4	.056	7.5	7	.003	7.5	y	7	655.888	20349.7...	.46	.725	1...	H2-1
35	M38	L2x2x4	.021	.667	7	.014	.667	z	7	18598.5...	20349.7...	.46	1.049	1...	H2-1
36	M39	L2x2x4	.021	.667	7	.014	.667	z	7	18598.5...	20349.7...	.46	1.049	1...	H2-1
37	M40	L2x2x4	.040	.667	7	.005	.667	y	7	18598.5...	20349.7...	.46	1.049	1...	H2-1
38	M41	L2x2x4	.040	.667	7	.005	.667	y	7	18598.5...	20349.7...	.46	1.049	1...	H2-1
39	M44	L3X3X8	.326	5.104	6	.011	10	z	6	9691.331	59497.0...	1.904	4.11	1...	H2-1
40	M45	L3X3X8	.263	5	10	.008	10	z	7	9691.331	59497.0...	1.904	4.111	1...	H2-1
41	M46	L3X3X8	.273	1.953	4	.032	3.516	z	4	17229.0...	59497.0...	1.904	4.41	2...	H2-1
42	M47	L3X3X6	.475	0	5	.071	0	y	6	41577.2...	45485.03	1.535	3.541	1...	H2-1
43	M50	L3X3X8	.146	3.75	13	.034	0	y	4	17229.0...	59497.0...	1.904	4.288	1...	H2-1

Envelope AISC 14th(360-10): ASD Steel Code Checks (Continued)

	Member	Shape	Code ...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om ...	Pnt/om ...	Mnyy/o...	Mnzz/o...	Cb	Eqn
44	M52	L3X3X8	.157	7.5	6	.019	7.5	y	4	17229.0...	59497.0...	1.904	4.41	2...	H2-1
45	M53	L3X3X6	.156	5.858	7	.016	0	z	4	20694.5...	45485.03	1.535	2.906	1...	H2-1
46	M54	L3X3X6	.156	5.858	6	.007	0	z	6	20694.5...	45485.03	1.535	2.906	1...	H2-1
47	M55	PIPE_2.5	.099	4.5	4	.035	1.5		4	28433.0...	40491.0...	2.871	2.871	1...	H1-1b
48	M58	L3X3X8	.101	5.547	4	.298	0	z	4	17229.0...	59497.0...	1.904	4.401	1...	H2-1
49	M61	L3X3X8	.099	5.547	4	.282	0	z	4	17229.0...	59497.0...	1.904	4.41	1...	H2-1
50	M60	PIPE_2.5	.075	4.5	5	.022	4.5		4	28433.0...	40491.0...	2.871	2.871	1...	H1-1b
51	M63	PIPE_2.5	.139	4.5	6	.038	1.5		4	28433.0...	40491.0...	2.871	2.871	1...	H1-1b
52	M72	L3X3X8	.370	6.054	10	.015	10.9...	z	7	28823.1...	59497.0...	1.904	4.035	1...	H2-1
53	M73	L3X3X8	.411	6.054	10	.019	10.9...	z	6	28823.1...	59497.0...	1.904	4.034	1...	H2-1
54	M78	L2x2x4	.030	1.908	7	.013	0	y	4	9737.28	20349.7...	.46	1.006	1...	H2-1
55	M79	L2x2x4	.174	2.349	4	.013	4.697	y	4	6688.944	20349.7...	.46	.969	1...	H2-1
56	M80	L2x2x4	.023	1.803	4	.012	0	y	4	10538.6...	20349.7...	.46	1.016	1...	H2-1
57	M81	L2x2x4	.183	2.462	4	.011	4.924	y	4	6085.56	20349.7...	.46	.96	1...	H2-1
58	M78A	L2x2x4	.054	1.444	5	.003	0	y	6	13573.69	20349.7...	.46	1.049	1...	H2-1
59	M79A	L2x2x4	.067	1.444	5	.003	0	y	6	13573.69	20349.7...	.46	1.049	1...	H2-1
60	M80A	L2x2x4	.021	1.275	4	.003	2.498	y	6	14837.6...	20349.7...	.46	1.049	1...	H2-1
61	M81A	L2x2x4	.032	1.275	4	.003	2.498	y	6	14837.6...	20349.7...	.46	1.049	1...	H2-1
62	M82	L2x2x4	.120	1.908	5	.015	0	y	6	9737.28	20349.7...	.46	1.006	1...	H2-1
63	M83	L2x2x4	.239	2.349	4	.011	4.697	y	6	6688.944	20349.7...	.46	.969	1...	H2-1
64	M84	L2x2x4	.103	1.803	5	.009	0	y	7	10538.6...	20349.7...	.46	1.016	1...	H2-1
65	M85	L2x2x4	.271	2.462	4	.008	4.924	y	4	6085.56	20349.7...	.46	.96	1...	H2-1
66	M78B	L3.5X3.5X6	.707	0	5	.015	0	y	5	11041.3...	53892.2...	2.222	4.689	1...	H2-1
67	M79B	L4X4X6	.014	1.5	5	.120	0	z	5	55096.5...	61652.6...	2.926	6.578	1...	H2-1

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

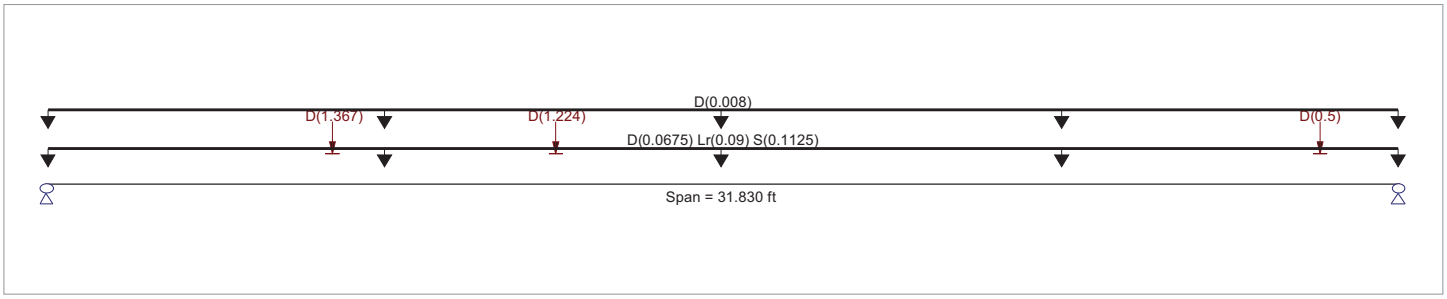
Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : 22K4 ALPHA SECTOR

General Beam Properties

Elastic Modulus 29,000.0 ksi

Span #1 Span Length = 31.830 ft Area = 1.60 in^2 Moment of Inertia = 199.0 in^4



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.50 ft, (Roof Loads)
Point Load : D = 1.367 k @ 6.750 ft, (PL-1-sled mount)
Point Load : D = 1.224 k @ 12.0 ft, (PL-2 sled mount)
Point Load : D = 0.50 k @ 30.0 ft, (PL3-rtu load)
Uniform Load : D = 0.0080 k/ft, Tributary Width = 1.0 ft, (s.w. of joist)

DESIGN SUMMARY

Maximum Bending =	37.613 k-ft	Maximum Shear =	4.860 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	12.095ft	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	0.454 in	841	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	1.171 in	326	
Max Upward Total Deflection	0.000 in	0	

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
Overall MAXimum Envelope													
Dsgn. L = 31.83 ft	1			37.61		37.61					4.86		
+D+H													
Dsgn. L = 31.83 ft	1			24.19		24.19					3.07		
+D+L+H													
Dsgn. L = 31.83 ft	1			24.19		24.19					3.07		
+D+Lr+H													
Dsgn. L = 31.83 ft	1			34.93		34.93					4.50		
+D+S+H													
Dsgn. L = 31.83 ft	1			37.61		37.61					4.86		
+D+0.750Lr+0.750L+H													
Dsgn. L = 31.83 ft	1			32.24		32.24					4.14		
+D+0.750L+0.750S+H													
Dsgn. L = 31.83 ft	1			34.26		34.26					4.41		
+D+0.60W+H													
Dsgn. L = 31.83 ft	1			24.19		24.19					3.07		
+D+0.70E+H													
Dsgn. L = 31.83 ft	1			24.19		24.19					3.07		
+D+0.750Lr+0.750L+0.450W+H													
Dsgn. L = 31.83 ft	1			32.24		32.24					4.14		
+D+0.750L+0.750S+0.450W+H													
Dsgn. L = 31.83 ft	1			34.26		34.26					4.41		
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 31.83 ft	1			34.26		34.26					4.41		
+0.60D+0.60W+0.60H													
Dsgn. L = 31.83 ft	1			14.51		14.51					1.84		
+0.60D+0.70E+0.60H													
Dsgn. L = 31.83 ft	1			14.51		14.51					1.84		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137
Licensee : KCS Corporation

Description : 22K4 ALPHA SECTOR

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.1707	15.597		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.860	4.215
Overall MINimum	1.432	1.432
+D+H	3.070	2.424
+D+L+H	3.070	2.424
+D+Lr+H	4.502	3.857
+D+S+H	4.860	4.215
+D+0.750Lr+0.750L+H	4.144	3.498
+D+0.750L+0.750S+H	4.413	3.767
+D+0.60W+H	3.070	2.424
+D+0.70E+H	3.070	2.424
+D+0.750Lr+0.750L+0.450W+H	4.144	3.498
+D+0.750L+0.750S+0.450W+H	4.413	3.767
+D+0.750L+0.750S+0.5250E+H	4.413	3.767
+0.60D+0.60W+0.60H	1.842	1.455
+0.60D+0.70E+0.60H	1.842	1.455
D Only	3.070	2.424
Lr Only	1.432	1.432
L Only		
S Only	1.790	1.790
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W16X26 Beam (2.5 to 3 on A)(Alpha Sector Support)

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

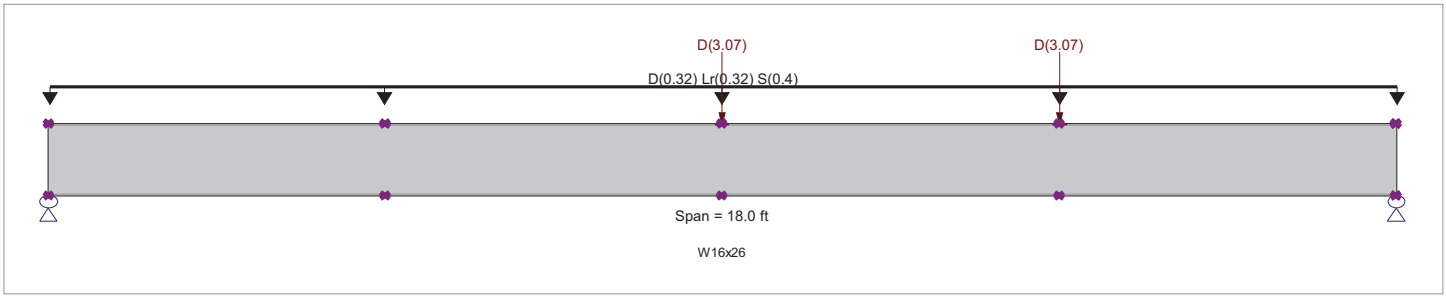
Material Properties

Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending
Load Combination : ASCE 7-10

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

First Brace starts at 4.50 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 4.50 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 16.0 ft, (Rooftop Loads)
Point Load : D = 3.070 k @ 9.0 ft, (Sled Mount Loads)
Point Load : D = 3.070 k @ 13.50 ft, (Sled Mount Loads)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.408 : 1	Maximum Shear Stress Ratio =	0.133 : 1
Section used for this span	W16x26	Section used for this span	W16x26
Mu : Applied	67.603 k-ft	Vu : Applied	14.102 k
Mn * Phi : Allowable	165.750 k-ft	Vn * Phi : Allowable	105.975 k
Load Combination	+1.20D+0.50L+1.60S+1.60H	Load Combination	+1.20D+0.50L+1.60S+1.60H
Location of maximum on span	9.000 ft	Location of maximum on span	18.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.109 in	Ratio =	1,986
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	0.328 in	Ratio =	659
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.3280	9.154		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.017	10.552
Overall MINimum	2.880	2.880
+D+H	5.417	6.952
+D+L+H	5.417	6.952
+D+Lr+H	8.297	9.832
+D+S+H	9.017	10.552
+D+0.750Lr+0.750L+H	7.577	9.112
+D+0.750L+0.750S+H	8.117	9.652
+D+0.60W+H	5.417	6.952
+D+0.70E+H	5.417	6.952
+D+0.750Lr+0.750L+0.450W+H	7.577	9.112
+D+0.750L+0.750S+0.450W+H	8.117	9.652
+D+0.750L+0.750S+0.5250E+H	8.117	9.652
+0.60D+0.60W+0.60H	3.250	4.171
+0.60D+0.70E+0.60H	3.250	4.171

Steel Beam

Description : W16X26 Beam (2.5 to 3 on A)(Alpha Sector Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
D Only	5.417	6.952
Lr Only	2.880	2.880
L Only		
S Only	3.600	3.600
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

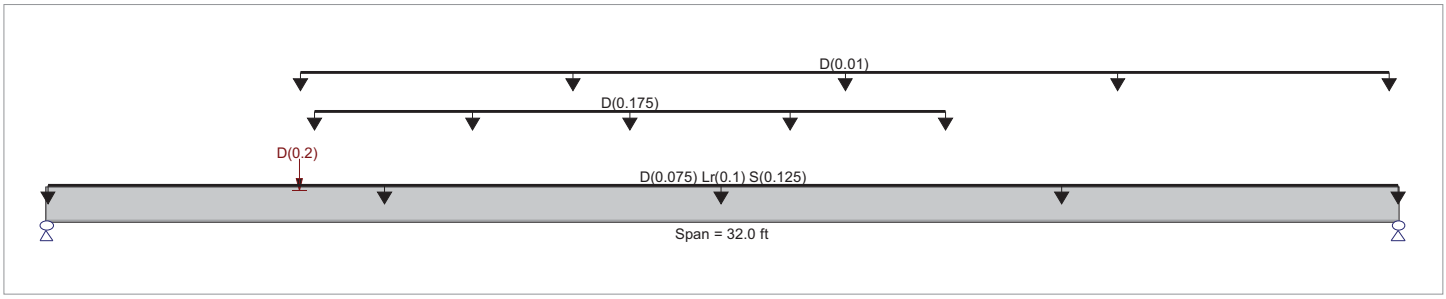
Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : 22K10 GAMMA SECTOR

General Beam Properties

Elastic Modulus 29,000.0 ksi

Span #1 Span Length = 32.0 ft Area = 10.0 in^2 Moment of Inertia = 100.0 in^4



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.0 ft, (Roof Loads)
Uniform Load : D = 0.1750 k/ft, Extent = 6.333 -->> 21.333 ft, Tributary Width = 1.0 ft, (Sled Mount Load)
Point Load : D = 0.20 k @ 6.0 ft, (screen wall)
Uniform Load : D = 0.010 k/ft, Extent = 6.0 -->> 31.830 ft, Tributary Width = 1.0 ft, (screen wall)

DESIGN SUMMARY

Maximum Bending =	43.128 k-ft	Maximum Shear =	4.958 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	15.360 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	1.025 in	374	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	2.709 in	141	
Max Upward Total Deflection	0.000 in	0	

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
Overall MAXimum Envelope													
Dsgn. L = 32.00 ft	1			43.13		43.13					4.96		
D Only													
Dsgn. L = 32.00 ft	1			27.16		27.16					2.96		
+D+L+H													
Dsgn. L = 32.00 ft	1			27.16		27.16					2.96		
+D+Lr+H													
Dsgn. L = 32.00 ft	1			39.93		39.93					4.56		
+D+S+H													
Dsgn. L = 32.00 ft	1			43.13		43.13					4.96		
+D+0.750Lr+0.750L+H													
Dsgn. L = 32.00 ft	1			36.74		36.74					4.16		
+D+0.750L+0.750S+H													
Dsgn. L = 32.00 ft	1			39.13		39.13					4.46		
+D+W+H													
Dsgn. L = 32.00 ft	1			27.16		27.16					2.96		
+D+0.70E+H													
Dsgn. L = 32.00 ft	1			27.16		27.16					2.96		
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 32.00 ft	1			36.74		36.74					4.16		
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 32.00 ft	1			39.13		39.13					4.46		
+D+0.750Lr+0.750L+0.5250E+H													
Dsgn. L = 32.00 ft	1			36.74		36.74					4.16		
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 32.00 ft	1			39.13		39.13					4.46		
+0.60D+W+H													
Dsgn. L = 32.00 ft	1			16.30		16.30					1.78		
+0.60D+0.70E+H													
Dsgn. L = 32.00 ft	1			16.30		16.30					1.78		

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137
Licensee : KCS Corporation

Description : 22K10 GAMMA SECTOR

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	2.7091	15.840		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.958	4.525
Overall MINimum	1.600	1.515
D Only	2.958	2.525
+D+L+H	2.958	2.525
+D+Lr+H	4.558	4.125
+D+S+H	4.958	4.525
+D+0.750Lr+0.750L+H	4.158	3.725
+D+0.750L+0.750S+H	4.458	4.025
+D+W+H	2.958	2.525
+D+0.70E+H	2.958	2.525
+D+0.750Lr+0.750L+0.750W+H	4.158	3.725
+D+0.750L+0.750S+0.750W+H	4.458	4.025
+D+0.750Lr+0.750L+0.5250E+H	4.158	3.725
+D+0.750L+0.750S+0.5250E+H	4.458	4.025
+0.60D+W+H	1.775	1.515
+0.60D+0.70E+H	1.775	1.515
D Only	2.958	2.525
Lr Only	1.600	1.600
L Only		
S Only	2.000	2.000
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

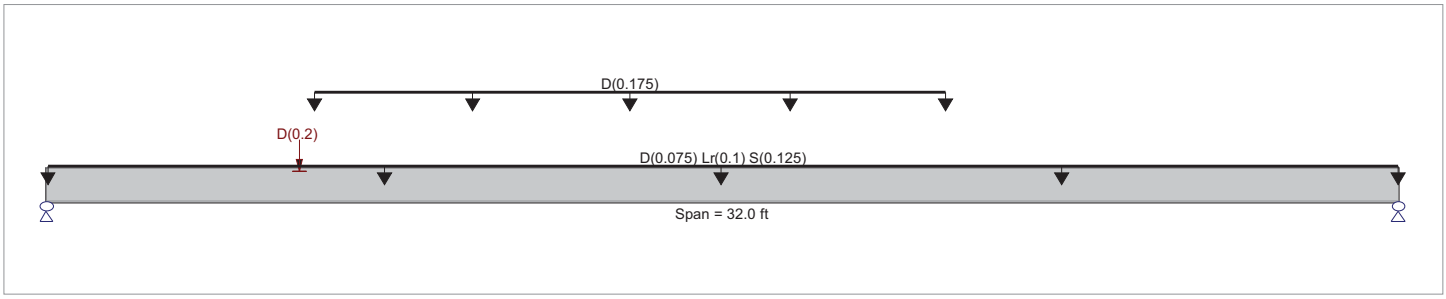
Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : 22K4 GAMMA SECTOR

General Beam Properties

Elastic Modulus 29,000.0 ksi

Span #1 Span Length = 32.0 ft Area = 10.0 in^2 Moment of Inertia = 100.0 in^4



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.0 ft, (Roof Loads)
Uniform Load : D = 0.1750 k/ft, Extent = 6.333 -->> 21.333 ft, Tributary Width = 1.0 ft, (Sled mount)
Point Load : D = 0.20 k @ 6.0 ft, (SCREEN WALL)

DESIGN SUMMARY

Maximum Bending =	41.943 k-ft	Maximum Shear =	4.853 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	15.360 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	1.025 in	374	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	2.634 in	145	
Max Upward Total Deflection	0.000 in	0	

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
Overall MAXimum Envelope													
Dsgn. L = 32.00 ft	1			41.94		41.94					4.85		
D Only													
Dsgn. L = 32.00 ft	1			25.98		25.98					2.85		
+D+L+H													
Dsgn. L = 32.00 ft	1			25.98		25.98					2.85		
+D+Lr+H													
Dsgn. L = 32.00 ft	1			38.75		38.75					4.45		
+D+S+H													
Dsgn. L = 32.00 ft	1			41.94		41.94					4.85		
+D+0.750Lr+0.750L+H													
Dsgn. L = 32.00 ft	1			35.55		35.55					4.05		
+D+0.750L+0.750S+H													
Dsgn. L = 32.00 ft	1			37.95		37.95					4.35		
+D+W+H													
Dsgn. L = 32.00 ft	1			25.98		25.98					2.85		
+D+0.70E+H													
Dsgn. L = 32.00 ft	1			25.98		25.98					2.85		
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 32.00 ft	1			35.55		35.55					4.05		
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 32.00 ft	1			37.95		37.95					4.35		
+D+0.750Lr+0.750L+0.5250E+H													
Dsgn. L = 32.00 ft	1			35.55		35.55					4.05		
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 32.00 ft	1			37.95		37.95					4.35		
+0.60D+W+H													
Dsgn. L = 32.00 ft	1			15.59		15.59					1.71		
+0.60D+0.70E+H													
Dsgn. L = 32.00 ft	1			15.59		15.59					1.71		

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Description : 22K4 GAMMA SECTOR

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	2.6340	15.840		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.853	4.372
Overall MINimum	1.600	1.423
D Only	2.853	2.372
+D+L+H	2.853	2.372
+D+Lr+H	4.453	3.972
+D+S+H	4.853	4.372
+D+0.750Lr+0.750L+H	4.053	3.572
+D+0.750L+0.750S+H	4.353	3.872
+D+W+H	2.853	2.372
+D+0.70E+H	2.853	2.372
+D+0.750Lr+0.750L+0.750W+H	4.053	3.572
+D+0.750L+0.750S+0.750W+H	4.353	3.872
+D+0.750Lr+0.750L+0.5250E+H	4.053	3.572
+D+0.750L+0.750S+0.5250E+H	4.353	3.872
+0.60D+W+H	1.712	1.423
+0.60D+0.70E+H	1.712	1.423
D Only	2.853	2.372
Lr Only	1.600	1.600
L Only		
S Only	2.000	2.000
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

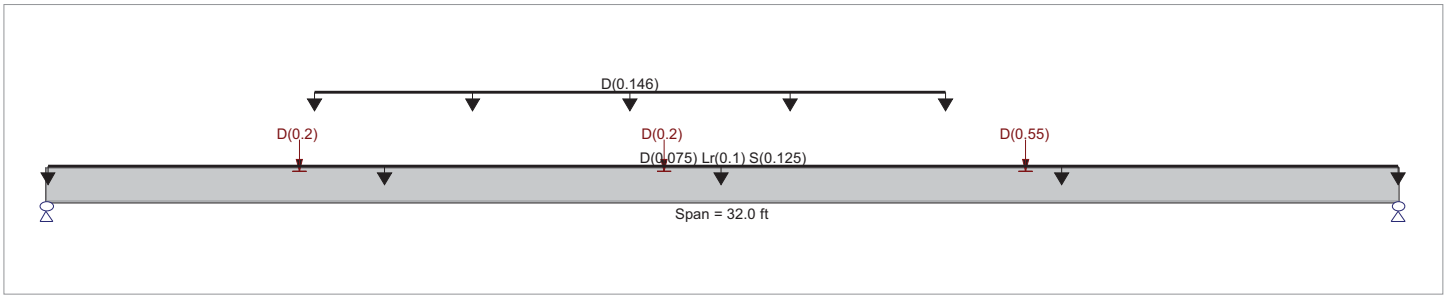
Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : 22K7 GAMMA SECTOR

General Beam Properties

Elastic Modulus 29,000.0 ksi

Span #1 Span Length = 32.0 ft Area = 10.0 in^2 Moment of Inertia = 199.0 in^4



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.0 ft, (Roof Loads)
Uniform Load : D = 0.1460 k/ft, Extent = 6.333 -->> 21.333 ft, Tributary Width = 1.0 ft, (Sled Mount)
Point Load : D = 0.20 k @ 6.0 ft, (Screen Wall)
Point Load : D = 0.20 k @ 14.625 ft, (RTU)
Point Load : D = 0.550 k @ 23.20 ft, (RTU)

DESIGN SUMMARY

Maximum Bending =	43.184 k-ft	Maximum Shear =	4.866 k
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	15.520 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	0.515 in	745	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	1.369 in	280	
Max Upward Total Deflection	0.000 in	0	

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
Overall MAXimum Envelope													
Dsgn. L = 32.00 ft	1			43.18		43.18					4.87		
D Only													
Dsgn. L = 32.00 ft	1			27.20		27.20					2.87		
+D+L+H													
Dsgn. L = 32.00 ft	1			27.20		27.20					2.87		
+D+Lr+H													
Dsgn. L = 32.00 ft	1			39.99		39.99					4.47		
+D+S+H													
Dsgn. L = 32.00 ft	1			43.18		43.18					4.87		
+D+0.750Lr+0.750L+H													
Dsgn. L = 32.00 ft	1			36.79		36.79					4.07		
+D+0.750L+0.750S+H													
Dsgn. L = 32.00 ft	1			39.19		39.19					4.37		
+D+W+H													
Dsgn. L = 32.00 ft	1			27.20		27.20					2.87		
+D+0.70E+H													
Dsgn. L = 32.00 ft	1			27.20		27.20					2.87		
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 32.00 ft	1			36.79		36.79					4.07		
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 32.00 ft	1			39.19		39.19					4.37		
+D+0.750Lr+0.750L+0.5250E+H													
Dsgn. L = 32.00 ft	1			36.79		36.79					4.07		
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 32.00 ft	1			39.19		39.19					4.37		
+0.60D+W+H													
Dsgn. L = 32.00 ft	1			16.32		16.32					1.72		
+0.60D+0.70E+H													
Dsgn. L = 32.00 ft	1			16.32		16.32					1.72		

General Beam Analysis

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137
Licensee : KCS Corporation

Description : 22K7 GAMMA SECTOR

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.3691	16.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.866	4.674
Overall MINimum	1.600	1.600
D Only	2.866	2.674
+D+L+H	2.866	2.674
+D+Lr+H	4.466	4.274
+D+S+H	4.866	4.674
+D+0.750Lr+0.750L+H	4.066	3.874
+D+0.750L+0.750S+H	4.366	4.174
+D+W+H	2.866	2.674
+D+0.70E+H	2.866	2.674
+D+0.750Lr+0.750L+0.750W+H	4.066	3.874
+D+0.750L+0.750S+0.750W+H	4.366	4.174
+D+0.750Lr+0.750L+0.5250E+H	4.066	3.874
+D+0.750L+0.750S+0.5250E+H	4.366	4.174
+0.60D+W+H	1.719	1.605
+0.60D+0.70E+H	1.719	1.605
D Only	2.866	2.674
Lr Only	1.600	1.600
L Only		
S Only	2.000	2.000
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W16X26 Beam (1 to 1.5 on C.1) (Gamma Sector Support)

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

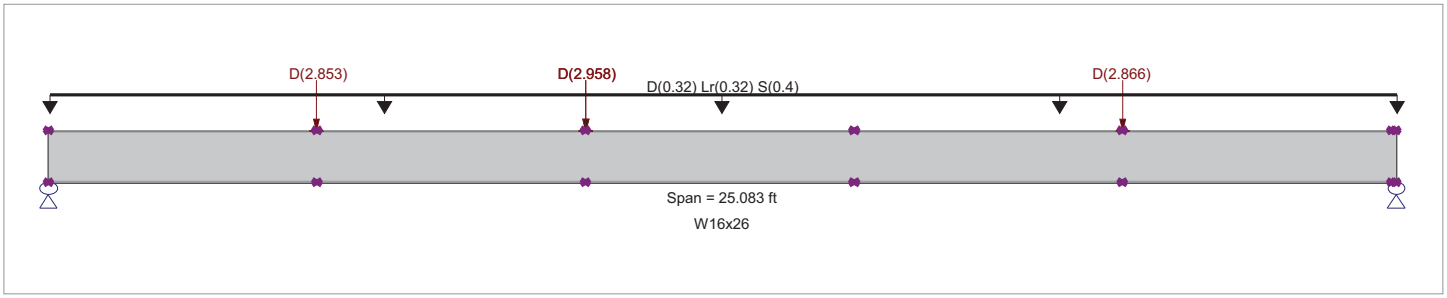
Material Properties

Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending
Load Combination : ASCE 7-10

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

First Brace starts at 5.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 5.0 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 16.0 ft
Point Load : D = 2.853 k @ 5.0 ft, (Sled Mount Load (front))
Point Load : D = 2.958 k @ 10.0 ft, (Sled Mount Load (front))
Point Load : D = 2.958 k @ 10.0 ft, (Sled Mount Load (back))
Point Load : D = 2.866 k @ 20.0 ft, (Sled Mount Load (back))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.873 : 1	Maximum Shear Stress Ratio =	0.198 : 1
Section used for this span	W16x26	Section used for this span	W16x26
Mu : Applied	139.527 k-ft	Vu : Applied	20.941 k
Mn * Phi : Allowable	159.842 k-ft	Vn * Phi : Allowable	105.975 k
Load Combination	+1.20D+0.50L+1.60S+1.60H	Load Combination	+1.20D+0.50L+1.60S+1.60H
Location of maximum on span	10.033 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	0.410 in	Ratio =	734
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	1.343 in	Ratio =	224
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.3432	12.327		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	15.779	14.569
Overall MINimum	4.013	4.013
+D+H	10.762	9.552
+D+L+H	10.762	9.552
+D+Lr+H	14.775	13.565
+D+S+H	15.779	14.569
+D+0.750Lr+0.750L+H	13.772	12.562
+D+0.750L+0.750S+H	14.524	13.314
+D+0.60W+H	10.762	9.552
+D+0.70E+H	10.762	9.552
+D+0.750Lr+0.750L+0.450W+H	13.772	12.562
+D+0.750L+0.750S+0.450W+H	14.524	13.314
+D+0.750L+0.750S+0.5250E+H	14.524	13.314

Steel Beam

Description : W16X26 Beam (1 to 1.5 on C.1) (Gamma Sector Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+0.60D+0.60W+0.60H	6.457	5.731
+0.60D+0.70E+0.60H	6.457	5.731
D Only	10.762	9.552
Lr Only	4.013	4.013
L Only		
S Only	5.017	5.017
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W16X40 Beam (1 to 1.5 on B)(Gamma Sector Support)

CODE REFERENCES

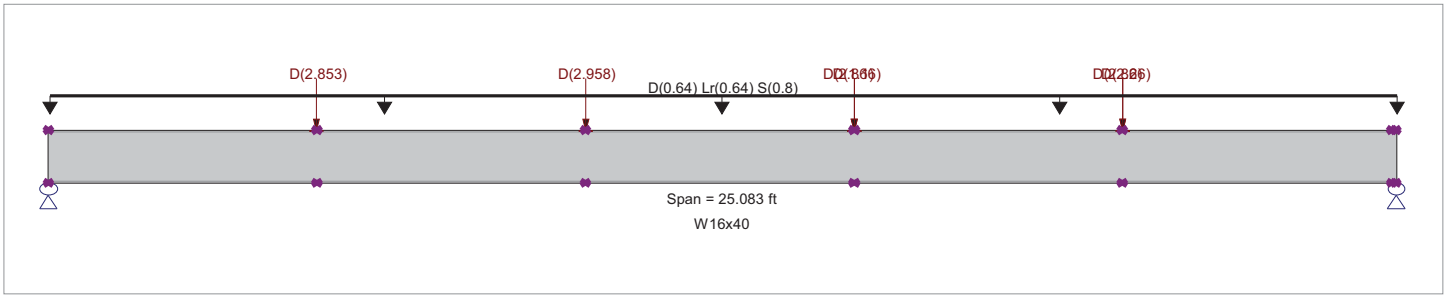
Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method :	Load Resistance Factor Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam bracing is defined as a set spacing over all spans	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		
Load Combination	ASCE 7-10		

Unbraced Lengths

First Brace starts at 5.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 5.0 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 32.0 ft, (Roof Loads)
Point Load : D = 2.853 k @ 5.0 ft, (Sled Mount Load (front))
Point Load : D = 2.958 k @ 10.0 ft, (Sled Mount Load (front))
Point Load : D = 1.10 k @ 15.0 ft, (RTU)
Point Load : D = 2.20 k @ 20.0 ft, (RTUs)
Point Load : D = 2.866 k @ 15.0 ft, (Sled Mount Load (back))
Point Load : D = 2.866 k @ 20.0 ft, (Sled Mount Load (back))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.843 : 1	Maximum Shear Stress Ratio =	0.246 : 1
Section used for this span	W16x40	Section used for this span	W16x40
Mu : Applied	230.874 k-ft	Vu : Applied	36.081 k
Mn * Phi : Allowable	273.750 k-ft	Vn * Phi : Allowable	146.40 k
Load Combination	+1.20D+0.50L+1.60S+1.60H	Load Combination	+1.20D+0.50L+1.60S+1.60H
Location of maximum on span	13.043ft	Location of maximum on span	25.083 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.476 in	Ratio =	631
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	1.302 in	Ratio =	231
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.3021	12.685		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	25.248	26.723
Overall MINimum	8.027	8.027
+D+H	15.214	16.689
+D+L+H	15.214	16.689
+D+Lr+H	23.241	24.716
+D+S+H	25.248	26.723
+D+0.750Lr+0.750L+H	21.234	22.709
+D+0.750L+0.750S+H	22.739	24.214
+D+0.60W+H	15.214	16.689
+D+0.70E+H	15.214	16.689
+D+0.750Lr+0.750L+0.450W+H	21.234	22.709

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137
Licensee : KCS Corporation

Description : W16X40 Beam (1 to 1.5 on B)(Gamma Sector Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+0.450W+H	22.739	24.214
+D+0.750L+0.750S+0.5250E+H	22.739	24.214
+0.60D+0.60W+0.60H	9.129	10.014
+0.60D+0.70E+0.60H	9.129	10.014
D Only	15.214	16.689
Lr Only	8.027	8.027
L Only		
S Only	10.033	10.033
W Only		
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W24X68 Beam (1.5 to 2.5 on B)(Platform Support)

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-05

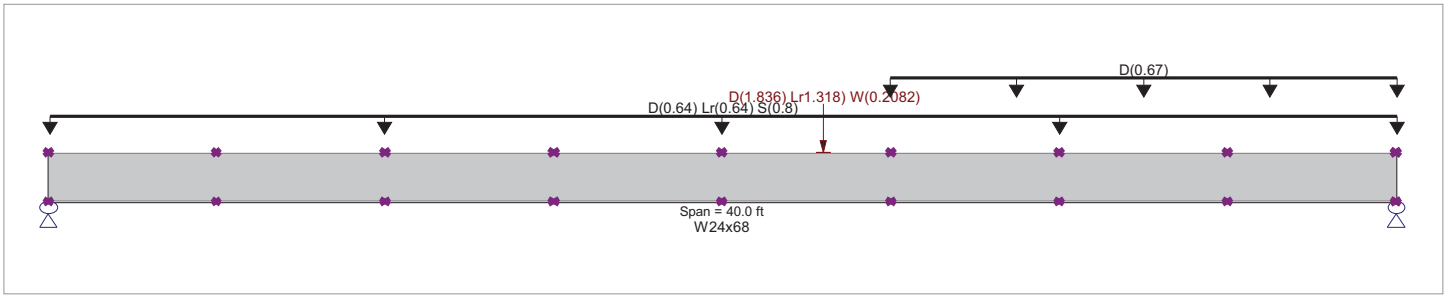
Material Properties

Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending
Load Combination : ASCE 7-05

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

First Brace starts at 5.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 5.0 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 32.0 ft, (Rooftop Loads)
Point Load : D = 1.836, Lr = 1.318, W = 0.2082 k @ 23.0 ft, (Platform Supporting Loads)
Uniform Load : D = 0.670 k/ft, Extent = 25.0 -->> 40.0 ft, Tributary Width = 1.0 ft, (RTU (Assumed 10kip DL - Conserva)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.744 : 1	Maximum Shear Stress Ratio =	0.182 : 1
Section used for this span	W24x68	Section used for this span	W24x68
Mu : Applied	493.793 k-ft	Vu : Applied	53.753 k
Mn * Phi : Allowable	663.750 k-ft	Vn * Phi : Allowable	295.065 k
Load Combination	+1.20D+1.60S+0.80W	Load Combination	+1.20D+1.60S+0.80W
Location of maximum on span	21.486 ft	Location of maximum on span	40.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.871 in	Ratio =	550
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	1.945 in	Ratio =	247
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.9455	20.343		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	32.825	39.381
Overall MINimum	0.088	0.120
D Only	16.825	23.381
+D+L+H	16.825	23.381
+D+Lr+H	30.185	36.939
+D+S+H	32.825	39.381
+D+0.750Lr+0.750L+H	26.845	33.550
+D+0.750L+0.750S+H	28.825	35.381
+D+W+H	16.913	23.501
+D+0.70E+H	16.825	23.381
+D+0.750Lr+0.750L+0.750W+H	26.911	33.639
+D+0.750L+0.750S+0.750W+H	28.891	35.471
+D+0.750Lr+0.750L+0.5250E+H	26.845	33.550
+D+0.750L+0.750S+0.5250E+H	28.825	35.381
+0.60D+W+H	10.183	14.149

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137
Licensee : KCS Corporation

Description : W24X68 Beam (1.5 to 2.5 on B)(Platform Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+0.60D+0.70E+H	10.095	14.029
D Only	16.825	23.381
Lr Only	13.360	13.558
L Only		
S Only	16.000	16.000
W Only	0.088	0.120
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W16X26 Beam (2.5 to 3 on C.1)(Platform Support)

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

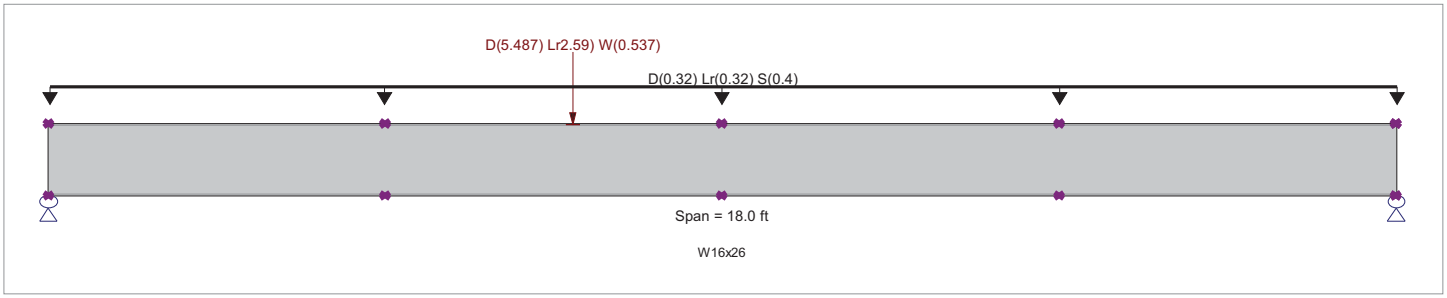
Material Properties

Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending
Load Combination : ASCE 7-10

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

First Brace starts at 4.50 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 4.50 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 16.0 ft
Point Load : D = 5.487, Lr = 2.590, W = 0.5370 k @ 7.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.499 : 1	Maximum Shear Stress Ratio =	0.142 : 1
Section used for this span	W16x26	Section used for this span	W16x26
Mu : Applied	82.690 k-ft	Vu : Applied	15.065 k
Mn * Phi : Allowable	165.750 k-ft	Vn * Phi : Allowable	105.975 k
Load Combination	+1.20D+1.60Lr+0.50W+1.60H	Load Combination	+1.20D+1.60Lr+0.50W+1.60H
Location of maximum on span	6.994 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	0.145 in	Ratio =	1,485
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	0.363 in	Ratio =	594
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.3633	8.743		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	10.930	9.135
Overall MINimum	0.328	0.209
+D+H	6.467	5.248
+D+L+H	6.467	5.248
+D+Lr+H	10.930	9.135
+D+S+H	10.067	8.848
+D+0.750Lr+0.750L+H	9.814	8.163
+D+0.750L+0.750S+H	9.167	7.948
+D+0.60W+H	6.664	5.373
+D+0.70E+H	6.467	5.248
+D+0.750Lr+0.750L+0.450W+H	9.962	8.257
+D+0.750L+0.750S+0.450W+H	9.315	8.042
+D+0.750L+0.750S+0.5250E+H	9.167	7.948
+0.60D+0.60W+0.60H	4.077	3.274
+0.60D+0.70E+0.60H	3.880	3.149
D Only	6.467	5.248

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137
Licensee : KCS Corporation

Description : W16X26 Beam (2.5 to 3 on C.1)(Platform Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Lr Only	4.463	3.887
L Only		
S Only	3.600	3.600
W Only	0.328	0.209
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W16X26 Beam (2.5 to 3 on B)(Platform Support)

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

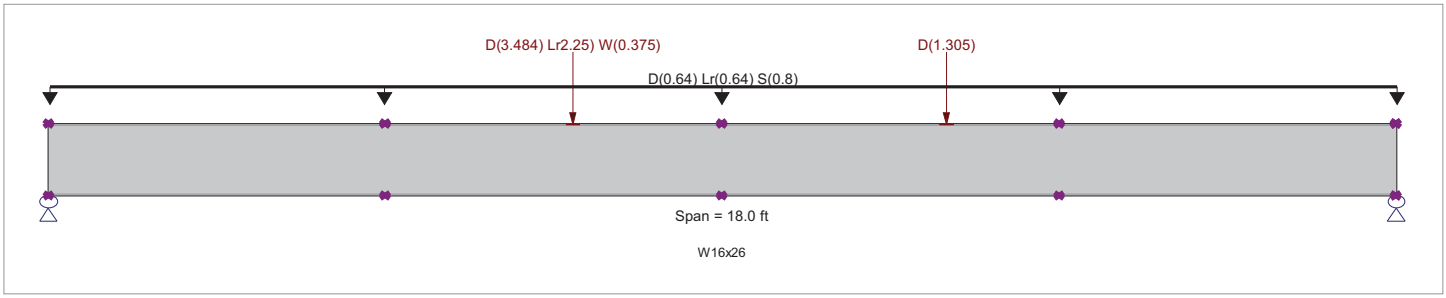
Material Properties

Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending
Load Combination : ASCE 7-10

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

First Brace starts at 4.50 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 4.50 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 32.0 ft, (Rooftop Loads)
Point Load : D = 3.484, Lr = 2.250, W = 0.3750 k @ 7.0 ft, (Platform and Beta Sector)
Point Load : D = 1.305 k @ 12.0 ft, (RTU)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.653 : 1	Maximum Shear Stress Ratio =	0.207 : 1
Section used for this span	W16x26	Section used for this span	W16x26
Mu : Applied	108.247 k-ft	Vu : Applied	21.904 k
Mn * Phi : Allowable	165.750 k-ft	Vn * Phi : Allowable	105.975 k
Load Combination	+1.20D+1.60Lr+0.50W+1.60H	Load Combination	+1.20D+1.60S+0.50W+1.60H
Location of maximum on span	7.611 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	0.225 in	Ratio =	961
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	0.511 in	Ratio =	423
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.5110	8.897		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	15.758	15.419
Overall MINimum	0.229	0.146
+D+H	8.558	8.219
+D+L+H	8.558	8.219
+D+Lr+H	15.693	14.854
+D+S+H	15.758	15.419
+D+0.750Lr+0.750L+H	13.909	13.195
+D+0.750L+0.750S+H	13.958	13.619
+D+0.60W+H	8.696	8.306
+D+0.70E+H	8.558	8.219
+D+0.750Lr+0.750L+0.450W+H	14.012	13.261
+D+0.750L+0.750S+0.450W+H	14.061	13.685
+D+0.750L+0.750S+0.5250E+H	13.958	13.619
+0.60D+0.60W+0.60H	5.272	5.019
+0.60D+0.70E+0.60H	5.135	4.931

Steel Beam

Description : W16X26 Beam (2.5 to 3 on B)(Platform Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
D Only	8.558	8.219
Lr Only	7.135	6.635
L Only		
S Only	7.200	7.200
W Only	0.229	0.146
E Only		
H Only		

KCS CORP.
1125 Remington Rd.
Schaumburg, IL 60176

Project Title:
Engineer:
Project Descr:

Project ID:

Steel Beam

File = C:\Users\S\Desktop\1-WORK~1\T-Mobile\CH9506~1.RT(\2020RE~1\CH95063B.ec6
ENERCALC, INC. 1983-2015, Build:6.15.10.6, Ver:6.16.11.30

Lic. # : KW-06011137 — Licensee : KCS Corporation

Description : W16X26 Beam (2 to 2.5 on C.1)(Platform Support)

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, ASCE 7-10
Load Combination Set : ASCE 7-10

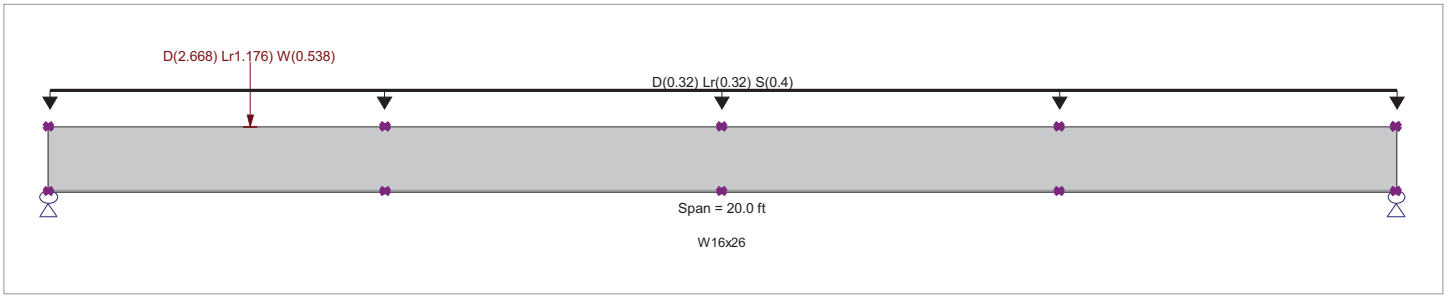
Material Properties

Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending
Load Combination : ASCE 7-10

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi

Unbraced Lengths

First Brace starts at 5.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 5.0 ft



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 16.0 ft, (Rooftop Loads)
Point Load : D = 2.668, Lr = 1.176, W = 0.5380 k @ 3.0 ft, (Platform and Beta Sector)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.358 : 1	Maximum Shear Stress Ratio =	0.130 : 1
Section used for this span	W16x26	Section used for this span	W16x26
Mu : Applied	58.094 k-ft	Vu : Applied	13.821 k
Mn * Phi : Allowable	162.075 k-ft	Vn * Phi : Allowable	105.975 k
Load Combination	+1.20D+1.60S+0.50W+1.60H	Load Combination	+1.20D+1.60Lr+0.50W+1.60H
Location of maximum on span	9.486 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	0.166 in	Ratio =	1,448
Max Upward Transient Deflection	0.000 in	Ratio =	0 <180
Max Downward Total Deflection	0.348 in	Ratio =	690
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.3478	9.886		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.927	7.860
Overall MINimum	0.457	0.081
+D+H	5.728	3.860
+D+L+H	5.728	3.860
+D+Lr+H	9.927	7.237
+D+S+H	9.728	7.860
+D+0.750Lr+0.750L+H	8.878	6.393
+D+0.750L+0.750S+H	8.728	6.860
+D+0.60W+H	6.002	3.909
+D+0.70E+H	5.728	3.860
+D+0.750Lr+0.750L+0.450W+H	9.083	6.429
+D+0.750L+0.750S+0.450W+H	8.934	6.897
+D+0.750L+0.750S+0.5250E+H	8.728	6.860
+0.60D+0.60W+0.60H	3.711	2.365
+0.60D+0.70E+0.60H	3.437	2.316
D Only	5.728	3.860

Steel Beam

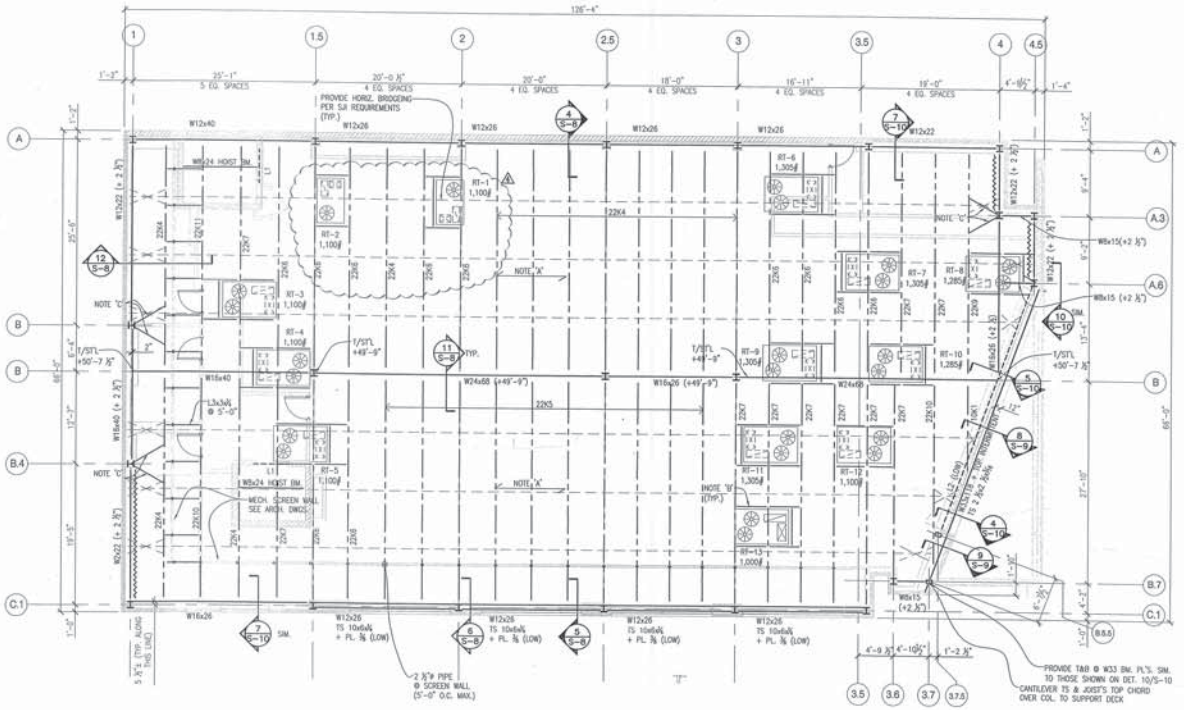
Description : W16X26 Beam (2 to 2.5 on C.1)(Platform Support)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Lr Only	4.200	3.376
L Only		
S Only	4.000	4.000
W Only	0.457	0.081
E Only		
H Only		

APPENDIX



– T/STL EL. = +50'-7 ½" (TYP. U.N.O.)

INDICATES X-BRACING, SEE S-9 FOR DETAILS

– VERIFY AND COORDINATE ALL ELEVATIONS WITH ARCHITECTURAL DRAWINGS.

– VERIFY AND COORDINATE ALL MECHANICAL DECK OPENINGS AND RTU WEIGHTS WITH MECHANICAL DRAWINGS.

NOTES:

A– PROVIDE 1 ½"–22 GA WIDE RIB TYPE GALVANIZED DECK, CONTINUOUS OVER 3 SPANS MINIMUM.

B– PROVIDE STEEL FRAMES PER DETAIL 13/S-8 TYPICAL AT ALL DECK OPENINGS.

C– PROVIDE L3x3x¼ COLUMN BRACE ANGLES TO ADJACENT JOIST'S TOP PANEL POINT.

ROOF FRAMING PLAN

1/8" = 1'-0"

ethos workshop

22 W. State St. #1
Geneva, IL 60134

tele 630.208.6089
fax 630.717.6089

HUTTER TRANKINA ENGINEERING

CONSULTING STRUCTURAL ENGINEERS
AURORA – CHICAGO
HTE 02117

77 S. Broadway, Suite 207
Aurora, Illinois 60505
Tel: (630) 897-2366
E-mail: gen@htedesign.com
WEB site: www.htedesign.com

K2 Development

VAN BUREN PLACE

33 N. WASHINGTON ST.
NAPERVILLE, ILLINOIS

NO.	DATE	COMMENTS
1	01-08-03	FOR PND. PERMIT #03-85
2	01-13-03	FOR FULL PERMIT #03-85
3	01-28-03	
4	02-28-03	PER OWNER

DESIGN	JLT	JOB NO.	HTE 02117
FIELD WORK	UV		
DRAWN BY	CWS	DATE	12-01-02
CHK'D			

S-5

A1

A1

STRUCTURAL NOTES

CODES & STANDARDS:

1. INTERNATIONAL BUILDING CODE, LATEST EDITION
2. AMERICAN WELDING SOCIETY WELDING CODE, LATEST EDITION
3. AISC MANUAL OF STEEL CONSTRUCTION, FOURTEENTH EDITION

GENERAL:

1. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND DIMENSIONS PRIOR TO BEGINNING WORK, AND NOTIFY THE ENGINEER OF ANY CONDITIONS DIFFERENT THAN THOSE SHOWN IN THE CONTRACT DOCUMENTS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION AND COORDINATION OF DIMENSIONS AND FOR THE PROPER FIT-UP OF THE ANTENNA SUPPORT STRUCTURE AND EQUIPMENT.

STRUCTURAL STEEL:

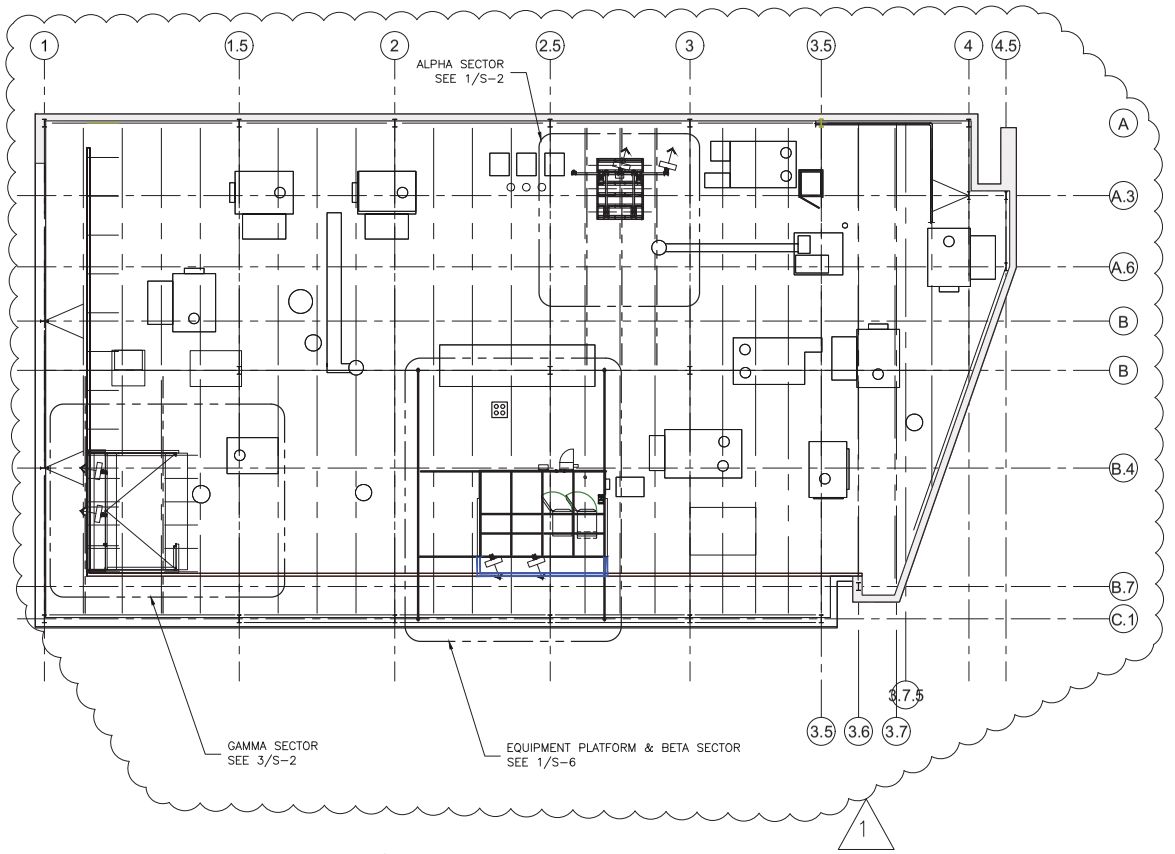
1. PLATFORM DESIGN IS BASED ON OWNER-SUPPLIED EQUIPMENT LOADS AND DESIGN LOADS SHOWN ON THIS DRAWING AND EIA/TIA 222.-E-91 REQUIREMENTS. IN CASE OF CONFLICT BETWEEN ABOVE CODES AND LOCAL BUILDING CODE, THE CONSTRUCTION MANAGER SHALL BRING THIS TO THE ENGINEER'S ATTENTION FOR SOLUTION.
2. STRUCTURAL STEEL DESIGN AND FABRICATION SHALL CONFORM TO THE LATEST EDITION OF AISC MANUAL FOR STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN. CONTRACTOR SHALL FURNISH SHOP DRAWINGS FOR ENGINEER'S REVIEW. UNLESS NOTED OR DETAILED HEREIN, FIELD CONNECTIONS SHALL BE WELDED. FIELD BOLTING ON EXISTING MEMBERS SHALL BE PRE-APPROVED BY E.O.R. PRIOR TO USE. USE MIN. 2 BOLTS PER CONN., MIN. ANGLE LEG THICKNESS OF 5/16" AND MIN. GUSSET PL. THICKNESS OF 3/8.
3. EXCEPTION IS TAKEN TO AISC CODE OF STANDARD PRACTICE PARAGRAPH 4.2.1 REGARDING OWNER'S AND FABRICATOR'S RESPONSIBILITY FOR CONNECTION DESIGN AND ADEQUACY OF SHOP DRAWINGS. COMPLIANCE WITH THE REQUIREMENTS SHOWN ON DRAWINGS AND/OR SPECIFICATIONS, CONNECTION DESIGN AND DETAILING IS THE CONTRACTOR'S RESPONSIBILITY. ENGINEER'S REVIEW OF SHOP DRAWINGS IS FOR GENERAL CONSIDERATIONS ONLY AND DOES NOT CONSTITUTE AN ACCEPTANCE OF THESE RESPONSIBILITIES BY THE OWNER AND/OR ENGINEER.
4. STRUCTURAL STEEL PLATES AND SHAPES SHALL CONFORM TO ASTM A36. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A53, GRADE B. ALL STRUCTURAL BOLTS SHALL BE WITH 3/4"ø ASTM A325. HIGH STRENGTH, BEARING TYPE, WITH THREADS EXCLUDED FROM SHEAR PLANE AND HARDENED WASHER PER ASTM F436.
5. ALL MATERIALS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION, PER ASTM A123 AND A153. TOUCH UP DAMAGED GALVANIZING DURING CONSTRUCTION WITH ZINC RICH PAINT.
6. WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY (AWS) D1.1. STRUCTURAL WELDING CODE, LATEST EDITION. WELDING ELECTRODE SHALL BE E70XX.
7. USE ¾"ø A325N H.S. BOLTS FOR ALL CONNECTIONS.
8. GRATING SHALL BE MIN. 1"x3/16" WELDED STEEL, GALVANIZED. PROVIDE BANDING AT CUT EDGE OF BEARING BARS. GRATING SHALL BE SECURED TO STRUCTURAL STEEL WITH TYPE C SADDLE CLIPS, MIN. 14 GA. AND SELF TAPPING SCREWS. PROVIDE MIN. 4 SADDLE CLIPS PER GRATING PANEL.
9. DESIGN LOADS:
   SNOW ROOF LOAD: 25 PSF
   DEAD LOAD (EQUIPMENT CABINETS): 8,000 LBS.
   WIND LOAD: 20 PSF
   LIVE LOAD: 60 PSF

BUILT-UP ROOFING:

1. CONTRACTOR SHALL USE ACCREDITED ROOFING CONTRACTOR TO FURNISH AND INSTALL ALL NECESSARY MEMBRANE AND FLASHING MATERIALS FOR ALL PENETRATIONS TO THE EXISTING ROOFING SYSTEM. ALL WARRANTIES SHALL BE MAINTAINED BY ACCREDITED ROOFING CONTRACTOR.
2. CONTRACTOR TO MEET OR EXCEED SYSTEM REQUIREMENTS FOR ROOF PENETRATION.

REPAIR & RESTORATION WORKS:

THE CONTRACTOR SHALL REPAIR, RESTORE AND RE-PAINT ALL WALLS DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE ALL REPAIR WORKS WITH THE BUILDING OWNER.



N

1 ROOF FRAMING PLAN
S-1 SCALE: 1/16" = 1'-0"

T-Mobile
1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____
DATE: 7/27/20 EXPIRES: 11/30/20

REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

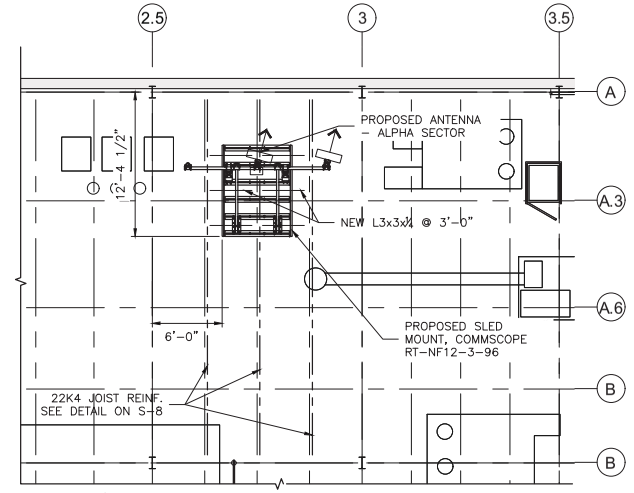
CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:
STRUCTURAL NOTES AND OVERALL PLAN

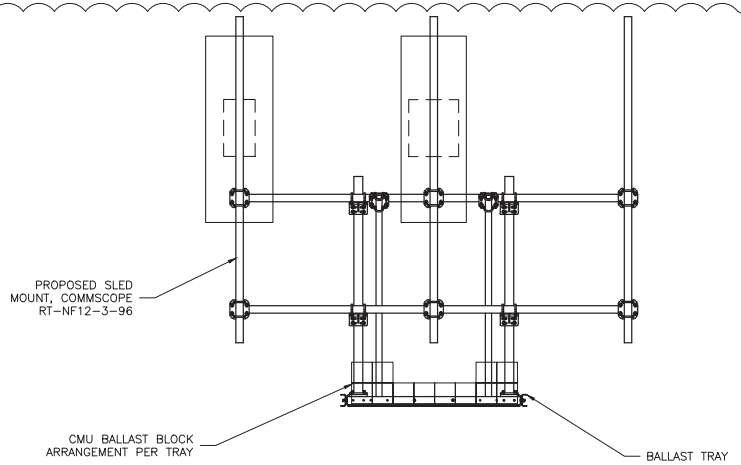
Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

Drawing Number
S-1

B1



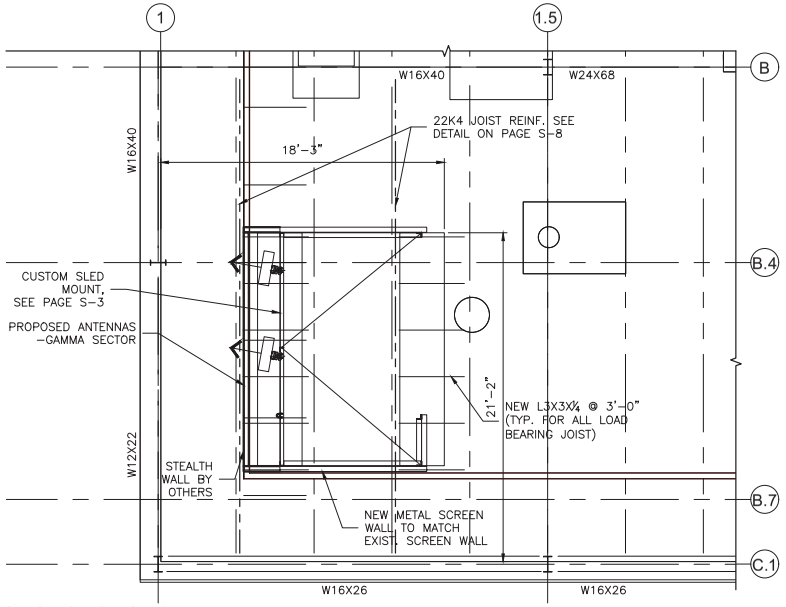
1 DETAILED PLAN–ALPHA SECTOR
S-2 SCALE: 3/32" = 1'-0"



NOTES:

1. ARRANGE BALLAST AS SHOWN ON DETAIL.
2. TOTAL NO. OF BALLAST PER TRAY = 10 BLOCKS
3. TOTAL WT OF BALLAST PER TRAY = 10 BLOCKS * 74 LBS/BLOCK = 740 LBS
4. TOTAL WT OF BALLAST = 4 TRAYS * 740 LBS = 2960 LBS

2 BALLAST ARRANGEMENT
S-2 SCALE: 1/4" = 1'-0"



3 DETAILED PLAN–GAMMA SECTOR
S-2 SCALE: 1/8" = 1'-0"

1

B2

T-Mobile
1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____
DATE: 7/27/20 EXPIRES: 11/30/20

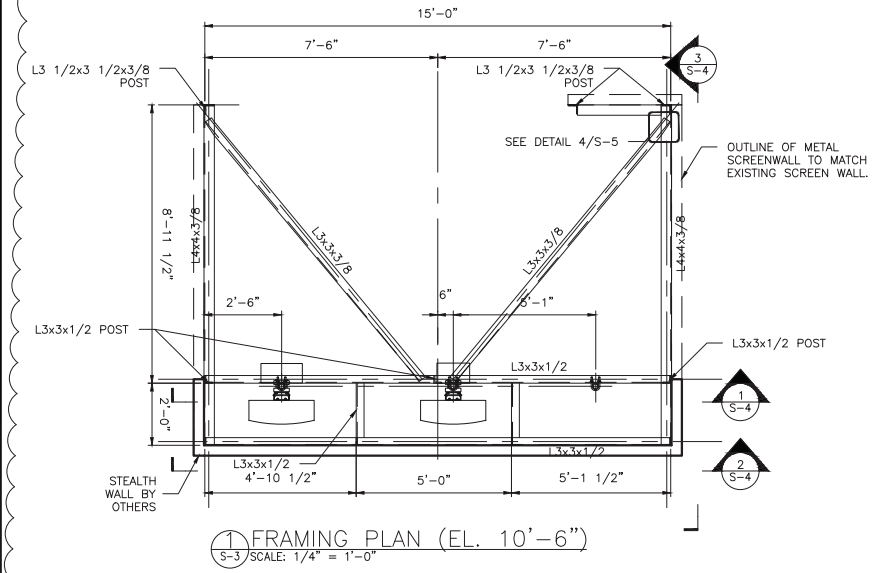
REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

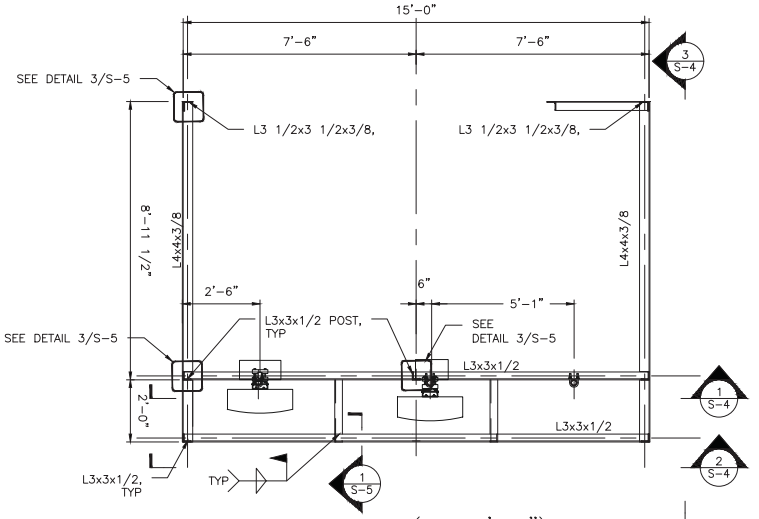
Drawing Title:
ALPHA & GAMMA SECTORS FRAMING DETAILS

Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

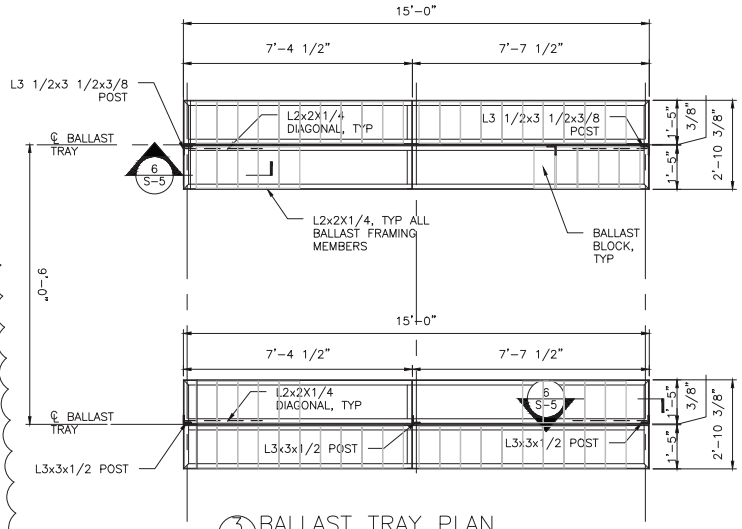
Drawing Number
S-2



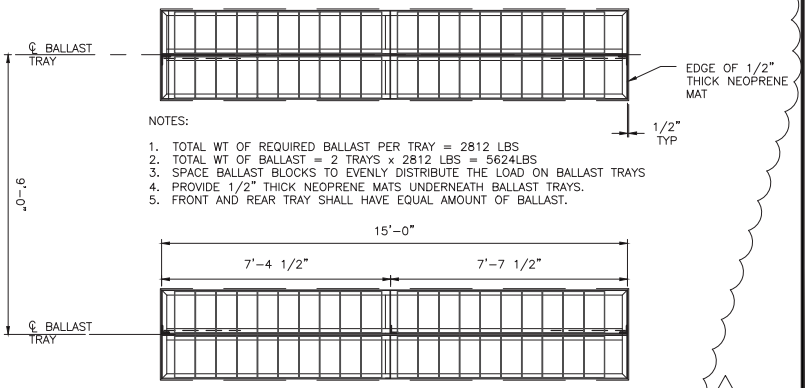
1 S-3 FRAMING PLAN (EL. 10'-6")
SCALE: 1/4" = 1'-0"



2 S-3 FRAMING PLAN (EL. 1'-0")
SCALE: 1/4" = 1'-0"



3 S-3 BALLAST TRAY PLAN
SCALE: 1/4" = 1'-0"



4 S-3 BALLAST ARRANGEMENT PLAN
SCALE: 1/4" = 1'-0"

T-Mobile
1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____
DATE: 7/27/20 EXPIRES: 11/30/20

REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

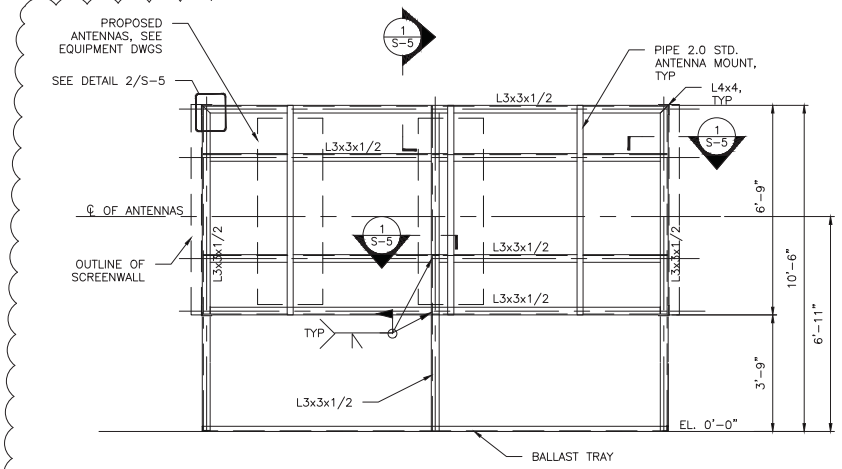
CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:
GAMMA SECTOR FRAMING DETAILS

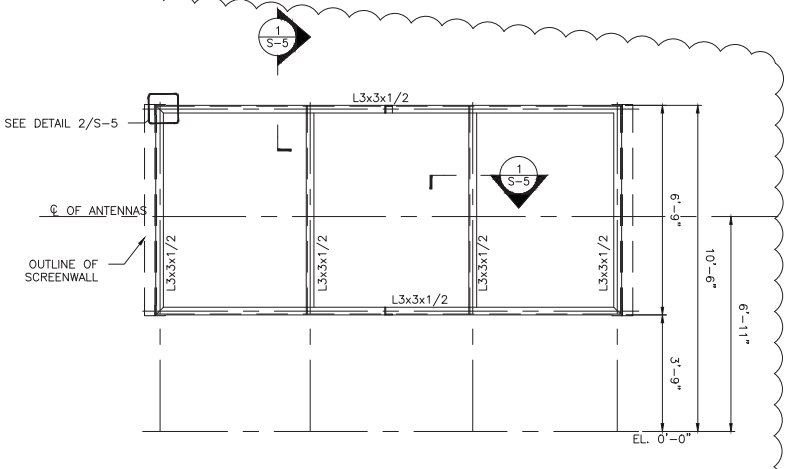
Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

Drawing Number
S-3

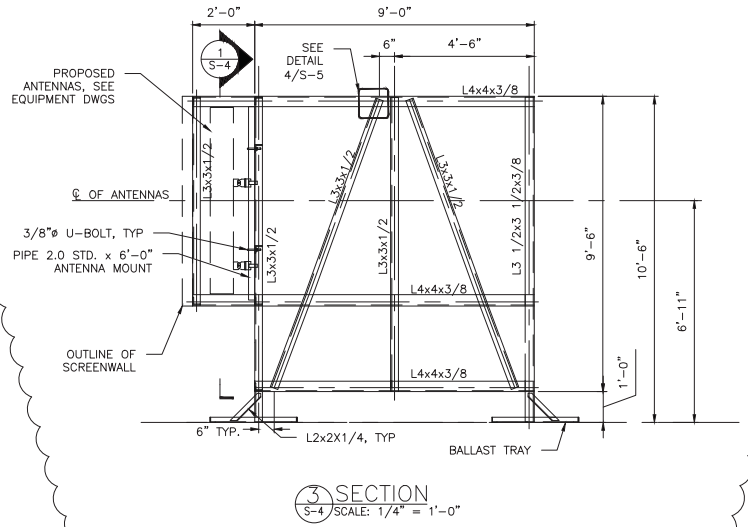
B3



1 SECTION S-4 SCALE: 1/4" = 1'-0"



2 SECTION S-4 SCALE: 1/4" = 1'-0"



3 SECTION S-4 SCALE: 1/4" = 1'-0"

B4

T-Mobile
1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____

DATE: 7/27/20 EXPIRES: 11/30/20

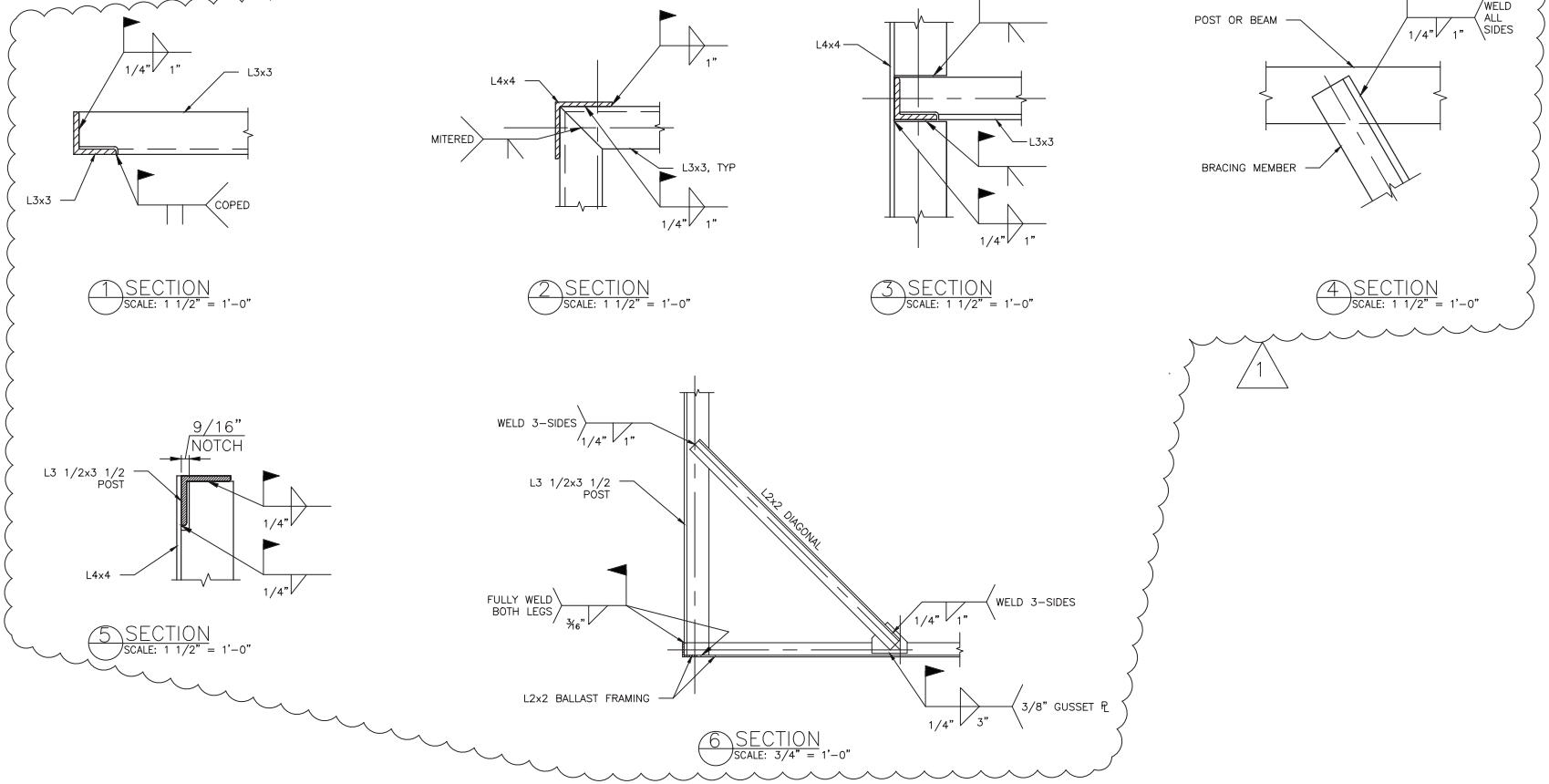
REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:
GAMMA SECTOR FRAMING DETAILS

Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

Drawing Number
S-4



B5

T-Mobile

1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____

DATE: 7/24/20 EXPIRES: 11/30/20

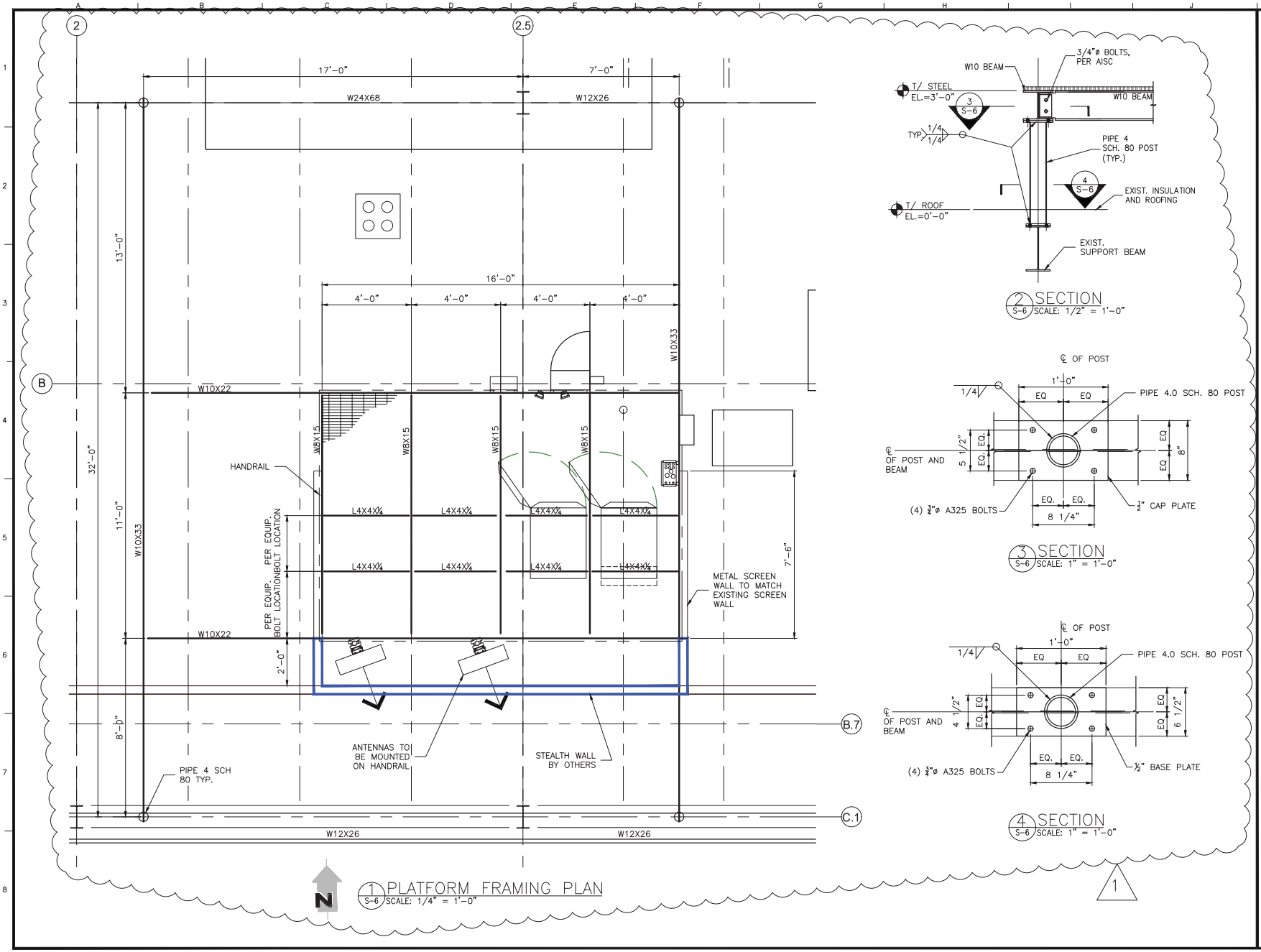
REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:
GAMMA SECTOR FRAMING DETAILS

Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

Drawing Number
S-5



1 PLATFORM FRAMING PLAN
S-6 SCALE: 1/4" = 1'-0"

2 SECTION
S-6 SCALE: 1/2" = 1'-0"

3 SECTION
S-6 SCALE: 1" = 1'-0"

4 SECTION
S-6 SCALE: 1" = 1'-0"

1

B6

T-Mobile

1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____
DATE: 7/27/20 EXPIRES: 11/30/20

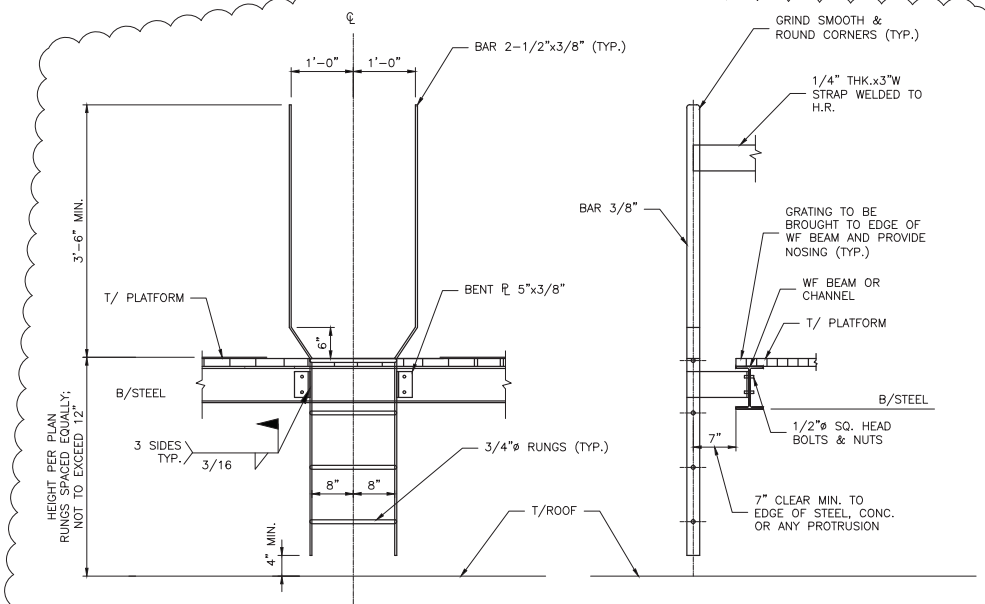
REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

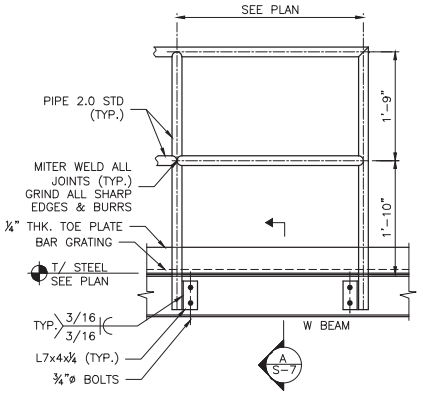
Drawing Title:
PLATFORM FRAMING PLAN & CONNECTION DETAILS

Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

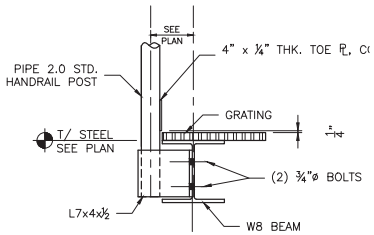
Drawing Number
S-6



1 DETAIL—PLATFORM LADDER
SCALE: 1/2" = 1'-0"

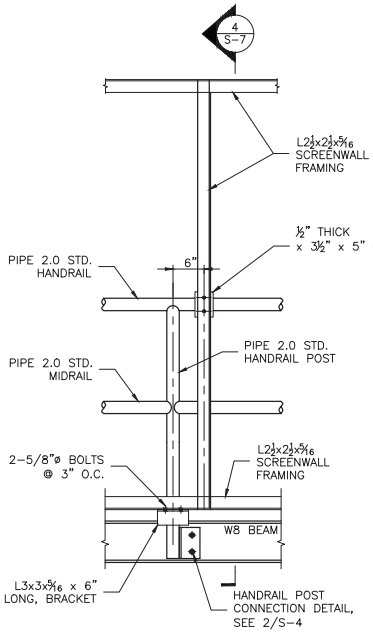


2 DETAIL—HANDRAIL
SCALE: 1/2" = 1'-0"

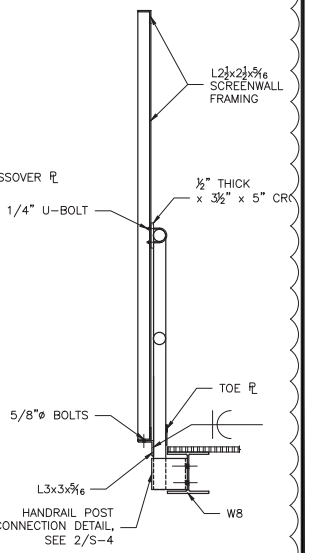


SECTION A

A S-4 SECTION—HANDRAIL CONN.
SCALE: 3/4" = 1'-0"



3 DETAIL
SCALE: 1/2" = 1'-0"



4 SECTION
SCALE: 1/2" = 1'-0"

T-Mobile
1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____
DATE: 7/27/20 EXPIRES: 11/30/20

REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

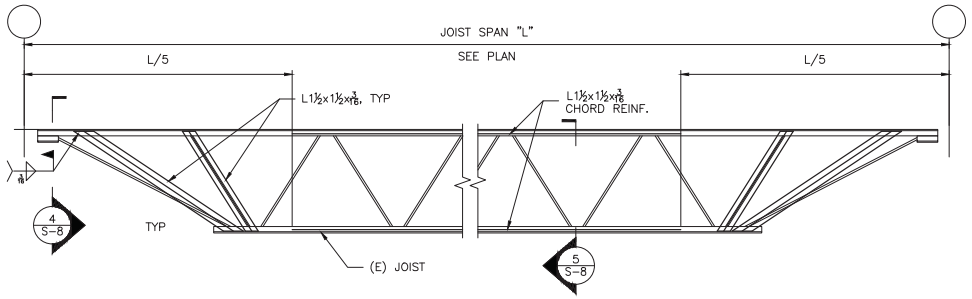
CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:
PLATFORM LADDER & HANDRAIL DETAILS,

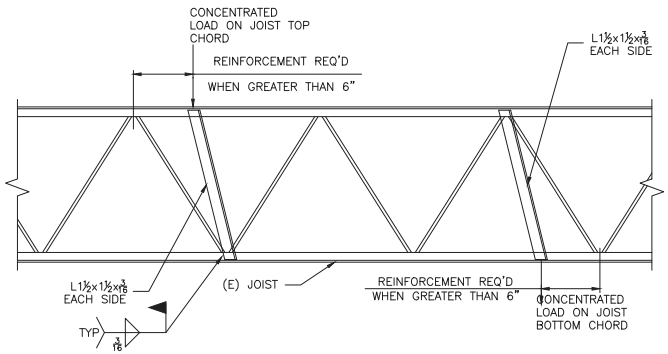
Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

Drawing Number
S-7

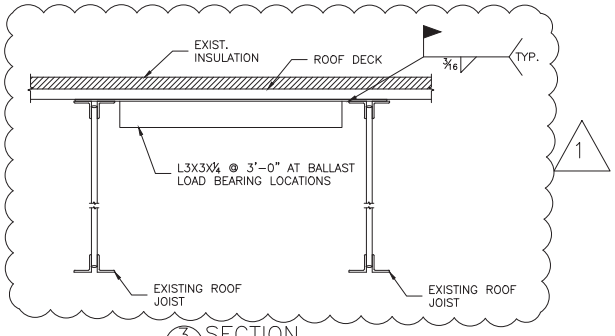
B7



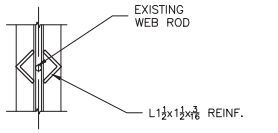
1 JOIST REINFORCEMENT DETAIL
SCALE: 1/2" = 1'-0"

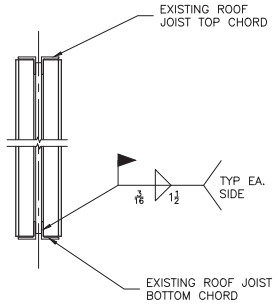


2 JOIST REINFORCEMENT @ PLATFORM SUPPORT
SCALE: 3/4" = 1'-0"

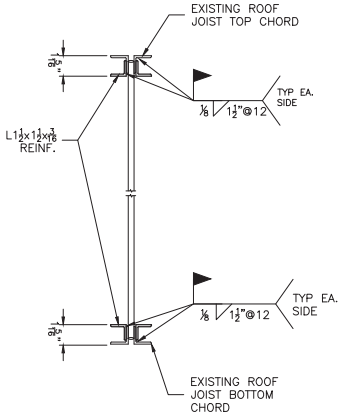


3 SECTION
S-8 SCALE: 1 1/2" = 1'-0"





4 SECTION
S-8 SCALE: 1 1/2" = 1'-0"



5 SECTION
S-8 SCALE: 1 1/2" = 1'-0"

T-Mobile
1400 OPUS PLACE, SUITE 700
DOWNERS GROVE, IL 60515
PHONE:
FAX:

KCS CORPORATION
CONSULTING ENGINEERS
ILLINOIS DESIGN FIRM REGISTRATION NO.: 184.002139
1125 REMINGTON RD., SCHAUMBURG, IL 60173
PHONE: 847-490-8200; FAX: 847-490-8225
www.kcscorp.com

LICENSED STRUCTURAL ENGINEER
RICHARD A. PETERSON
81-3446
STATE OF ILLINOIS

SIGNATURES: _____
DATE: 7/27/20 EXPIRES: 11/30/20

REV.	DESCRIPTION	DATE
1	REVISED PER T-MOBILE REDESIGN	7/24/20
0	ISSUED FOR PERMIT	3/13/19
D	ISSUED FOR REVIEW	2/26/19
C	ISSUED FOR REVIEW	1/18/19
B	ISSUED FOR REVIEW	11/1/18
A	ISSUED FOR REVIEW	10/19/18

CH95063B
35 S. WASHINGTON ST. RT
35 S. WASHINGTON ST, NAPERVILLE, IL 60540

Drawing Title:
JOIST REINFORCEMENT

Project Number:	Drawn by: PA
	Date: 8/21/18
Client Project Number:	Checked by: MS
	Date: 8/23/18
Scale:	Approved by:
	Date:

Drawing Number
S-8

B8

FFHH-65B-R3

8-port sector antenna, 4x 617-806 and 4x 1695–2360 MHz, 65° HPBW, 3x RET, 600 MHz-Ready Antenna Technology

Electrical Specifications

Frequency Band, MHz	617-698	698–806	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.1	14.3	17.6	18.4	19.0	19.7
Beamwidth, Horizontal, degrees	65	60	66	60	60	54
Beamwidth, Vertical, degrees	14.9	13.3	5.7	5.3	4.9	4.4
Beam Tilt, degrees	2–14	2–14	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	19	17	20	19	19	20
Front-to-Back Ratio at 180°, dB	33	29	36	40	40	42
Isolation, dB	28	28	28	28	28	28
Isolation, Intersystem, dB	28	28	28	28	28	28
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc		-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	250	250	200	200	200	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	617-698	698–806	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	13.6	13.9	17.2	18.1	18.5	19.3
Gain by all Beam Tilts Tolerance, dB	±0.6	±0.6	±0.6	±0.5	±0.5	±0.5
Gain by Beam Tilt, average, dBi	2 ° | 13.4 8 ° | 13.7 14 ° | 13.5	2 ° | 13.8 8 ° | 13.9 14 ° | 13.8	2 ° | 17.1 7 ° | 17.3 12 ° | 17.1	2 ° | 18.0 7 ° | 18.2 12 ° | 17.9	2 ° | 18.3 7 ° | 18.6 12 ° | 18.4	2 ° | 19.0 7 ° | 19.4 12 ° | 19.2
Beamwidth, Horizontal Tolerance, degrees	±3	±4	±4.5	±5.6	±6.5	±7.9
Beamwidth, Vertical Tolerance, degrees	±1.1	±1.1	±0.3	±0.3	±0.4	±0.2
USLS, beampeak to 20° above beampeak, dB	19	17	15	15	16	17
Front-to-Back Total Power at 180° ± 30°, dB	24	21	29	32	32	32
CPR at Boresight, dB	22	24	18	16	18	22
CPR at Sector, dB	8	9	7	7	9	9

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

(Sizes of colored boxes are not true depictions of array sizes)

Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	617-806	1-2	1	ANxxxxxxxxxxxxxxxx1
R2	617-806	3-4		
Y1	1695-2360	5-6	2	ANxxxxxxxxxxxxxxxx2
Y2	1695-2360	7-8	3	ANxxxxxxxxxxxxxxxx3

Port Configuration

General Specifications

Operating Frequency Band 1695 – 2360 MHz | 617 – 806 MHz

FFHH-65B-R3

Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	900 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	765.0 N @ 150 km/h 172.0 lbf @ 150 km/h
Wind Loading, lateral	251.0 N @ 150 km/h 56.4 lbf @ 150 km/h
Wind Loading, maximum	1041.0 N @ 150 km/h 234.0 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1830.0 mm | 72.0 in
Width	640.0 mm | 25.2 in
Depth	235.0 mm | 9.3 in
Net Weight, without mounting kit	46.0 kg | 101.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (1)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	10 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

FFHH-65B-R3

Packed Dimensions

Length	1982.0 mm | 78.0 in
Width	752.0 mm | 29.6 in
Depth	387.0 mm | 15.2 in
Shipping Weight	57.0 kg | 125.7 lb

Regulatory Compliance/Certifications

Agency	**Classification**
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

BSAMNT-4 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

NOKIA

Technical Datasheet

AAFIA

Product Code: 474486A

Contacts: Job Benson, Teresa Hagans

Smart Radio Product Management NAM

March 2018

AirScale MAA 16T16R B25/B66 200W AAFIA
Dual band massive MIMO, 5G New Radio ready, integrated antenna system

C6

Radios	FDD LTE/**LTE-A/LTE-Pro/NR**	
RF power per band	100W (16 x 6.3W)	
Band specification	RX	TX
Band 66	1710 – 1780 MHz	2110 – 2200 MHz
Band 25	1850 - 1915 MHz	1930 – 1995 MHz
Instantaneous Bandwidth	**Band 66: DL 90MHz/UL 70MHz , Band 25: DL/UL 65MHz**	
Occupied Bandwidth	**Band 66: 40MHz, Band 25: 40MHz**	
Power Consumption	1600W (70% load), 2400W 100% load on both bands	
Beamforming	Horizontal Sectorization, Azimuth Beamforming	
Modulation Schemes	QPSK, 16QAM, 64QAM, 256QAM, 1024QAM	
L1 Split	**L1 Low in RF**	
Fronthaul Interface	CPRI (Rate 7), two 9.8Gb/s SFP ports per band	
Mounting	Wall, Pole	
IP Rating	IP65	
Input Power	-48V DC (range: -40V~-57V)	
Size	1840 x 650 x 300 mm 72.44"Hx25.59"Wx11.81"D 124kg 273.37 lbs	

NOKIA

AirScale MAA 16T16R B25/B66 200W AAFIA

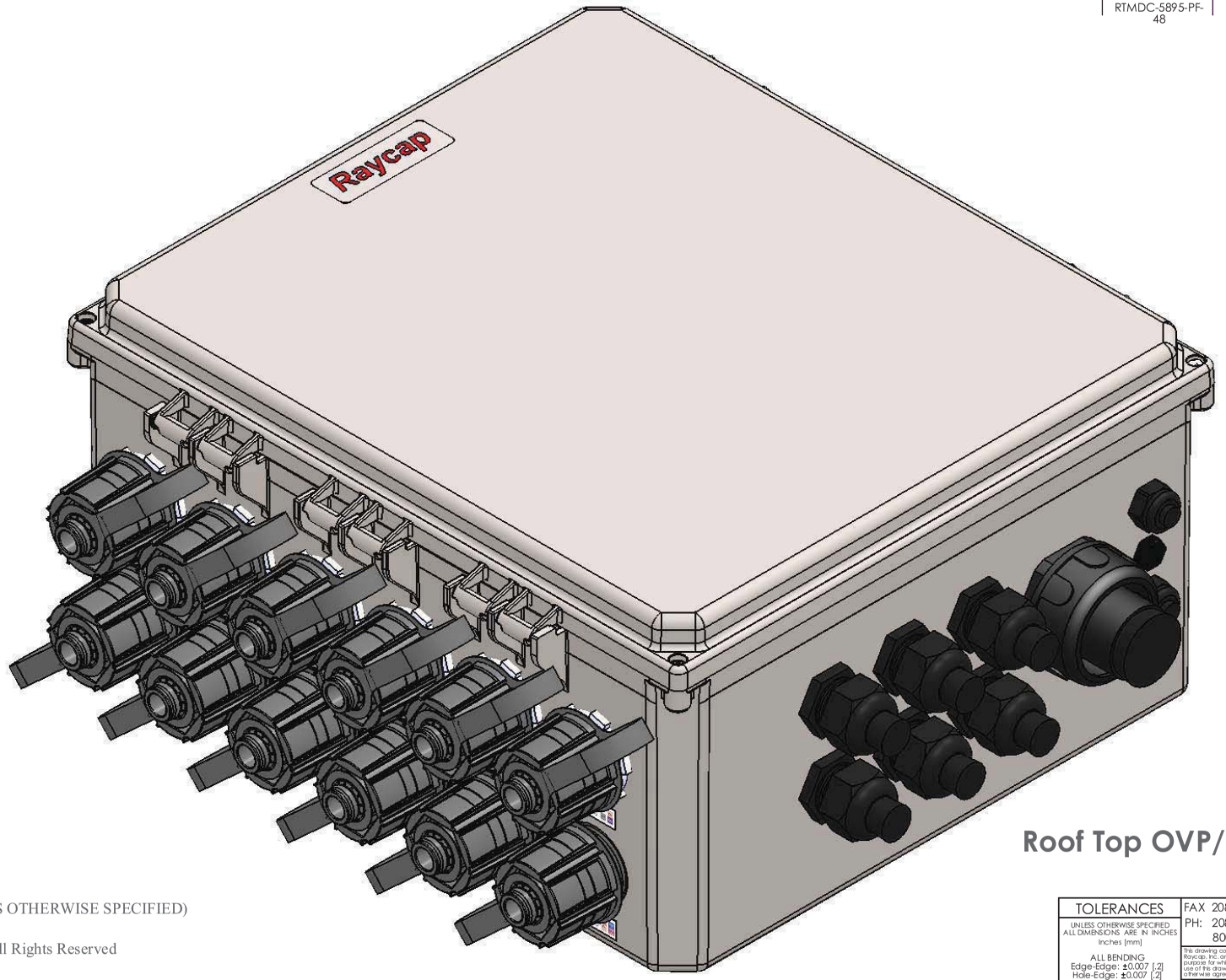
Antenna Details

Frequency Band, MHz	Band 66		Band 25	
	RX	TX	RX	TX
Antenna configuration	8-column X-pol. antenna		8-column X-pol. antenna	
Operating frequency	1710 – 1780	2110 – 2200	1850 - 1915	1930 – 1995
Beamforming Gain [dBi] (S1 beam)	> 23	> 24	> 23	> 24
Azimuth beamwidth, [°] (S1 beam)	16 ± 3	13 ± 3	15 ± 3	14 ± 3
Beamforming Gain [dBi] (S2 beam)	> 20	> 21	> 20	> 21
Azimuth beamwidth, [°] (S2 beam)	34 ± 4	32 ± 4	33 ± 4	33 ± 4
Beamforming Gain [dBi] (B1 beam)	> 18	> 18	> 18	> 18
Azimuth beamwidth, [°] (B1 beam)	60 ± 5	60 ± 5	60 ± 5	60 ± 5
Elevation beamwidth, typical [°]	5.5 ± 1	5.5 ± 1	5.5 ± 1	5.5 ± 1
RET (Remote electrical tilt)	2…12°			
Beam steering range (S1)	+/- 45°			
Beam steering range (S2)	+/- 35°			
USLS [dB]	> 15			
SLS [dB], azimuth, with power tapering	> 20			
FronttoBack Ratio, at 180°±30° [dB]	> 25			
Passive Intermodulation, 2x43dBm [dBc]	< -153			

C7

DWG NO.	REV	PROJECT	DESCRIPTION OF CHANGE
RTMDC-5895-PF-48	09	ESR-607	Added model number to title block

C8



Roof Top OVP/Fiber Junction Box

NOTES: (UNLESS OTHERWISE SPECIFIED)

Third Angle Projection

TOLERANCES

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
Inches [mm]

ALL BENDING
Edge-Edge: ±0.007 [.2]
Hole-Edge: ±0.007 [.2]
Hole-Hole: ±0.007 [.2]
Hole-Fold: ±0.015 [.4]
Edge-Fold: ±0.015 [.4]
Fold-Fold: ± 0.020 [.5]
Angles: ±1.0

TOLERANCES TO BE ±1.0°

FAX 208-777-4466
PH: 208-777-1166
800-890-2569

Raycap

Roof Top OVP/Fiber Junction Box

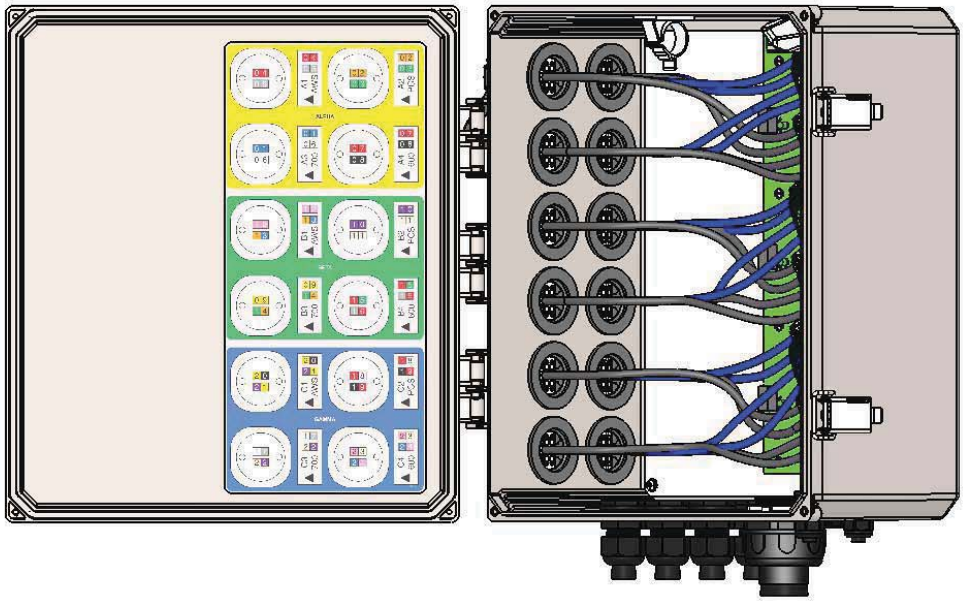
	DATE	NAME
DRAWN BY:	6/29/2018	J. Kale
CHECKED BY:		
ENG:		
MFG ENG:		

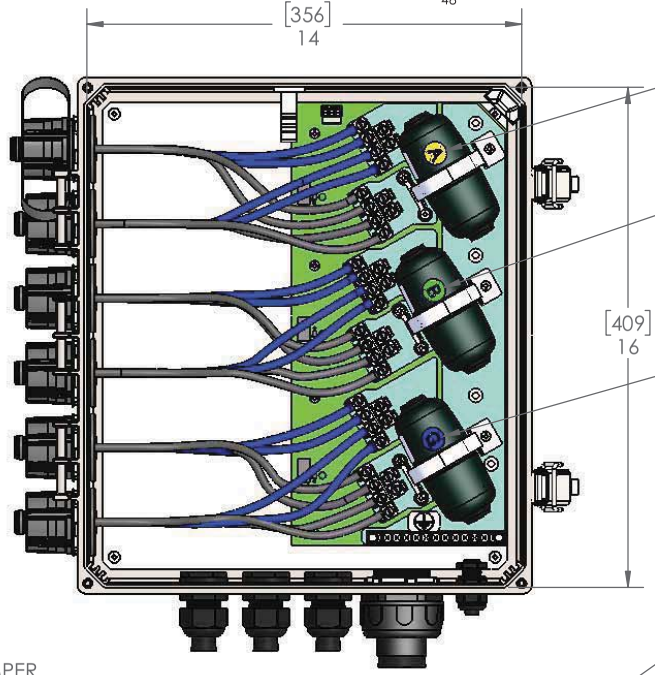
SAP NO.

DWG. NO. RTMDC-5895-PF-48 REV. 09

SCALE : NOT TO SCALE SHEET 1 OF 3

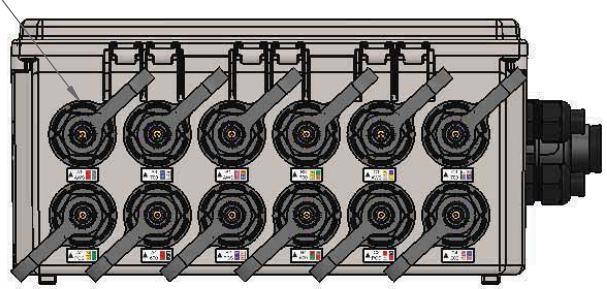
DWG NO.	REV	PROJECT	DESCRIPTION OF CHANGE
RTMDC-5895-PF-48	09	ESR-607	Added model number to title block



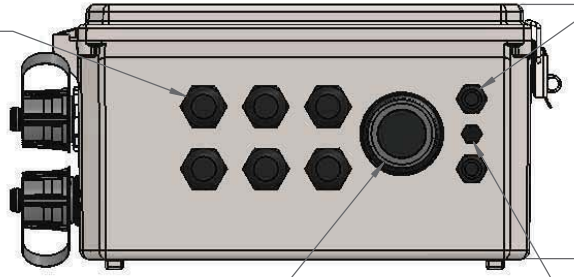


C9

12X Senko HYBRID PORT
CONNECTORS
WITH COVERS



6X FIBER JUMPER
CABLE RANGE:
.512"-.709"
[13-18mm]



MAIN TRUNK
CABLE RANGE
1/2in Conduit:
1.457"-1.732"
[37-44mm]

NOTES: (UNLESS OTHERWISE SPECIFIED)

TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES Inches [mm] ALL BENDING Edge-Edge: ±0.007 [.2] Hole-Edge: ±0.007 [.2] Hole-Hole: ±0.007 [.2] Hole-Fold: ±0.015 [.4] Edge-Fold: ±0.015 [.4] Fold-Fold: ± 0.020 [.5] Angles: ±1.0 TOLERANCES TO BE ±1.0°

Third Angle Projection

FAX 208-777-4466
PH: 208-777-1166
800-890-2569

Raycap

	DATE	NAME
DRAWN BY:	6/29/2018	J. Kale
CHECKED BY:		
ENG:		
MFG ENG:		

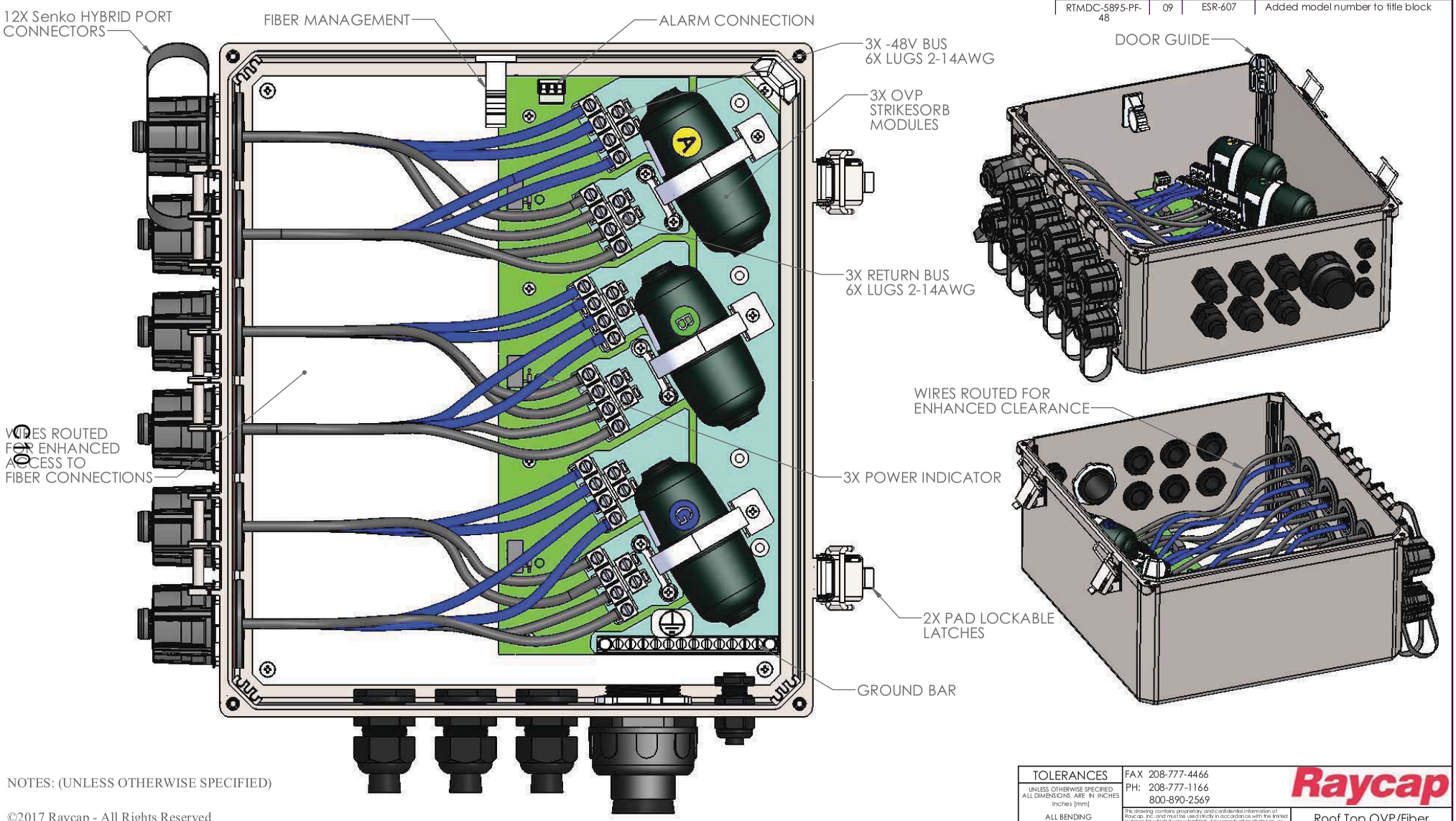
Roof Top OVP/Fiber Junction Box

SAP NO.

DWG. NO. RTMDC-5895-PF-48 REV. 09

SCALE: NOT TO SCALE SHEET 2 OF 3

DWG NO.	REV	PROJECT	DESCRIPTION OF CHANGE
RTMDC-5895-PF-48	09	ESR-607	Added model number to title block



NOTES: (UNLESS OTHERWISE SPECIFIED)

TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES Inches [mm] ALL BENDING Edge-Edge: ±0.007 [.2] Hole-Edge: ±0.007 [.2] Hole-Hole: ±0.007 [.2] Hole-Fold: ±0.015 [.4] Edge-Fold: ±0.015 [.4] Fold-Fold: ± 0.020 [.5] Angles: ±1.0 TOLERANCES TO BE ±1.0°

Third Angle Projection

FAX 208-777-4466
PH: 208-777-1166
800-890-2569

Raycap

	DATE	NAME
DRAWN BY:	6/29/2018	J. Kale
CHECKED BY:		
ENG:		
MFG ENG:		

Roof Top OVP/Fiber Junction Box

SAP NO.

DWG. NO. RTMDC-5895-PF-48 REV. 09

SCALE: NOT TO SCALE SHEET 3 OF 3

Nokia Networks

AirScale AHLOA RRH 4T4R B12/71 240W

Technical Datasheet - Draft

5th June 2017

C11

fidential

AirScale Dual RRH 4T4R B12/71 240W AHLOA (Draft)

Product Code: 474331A	
Supported Frequency bands	3GPP Band 12/71
Frequencies	Band 12 adjusted: Rx 698 – 715 MHz, TX 728 – 745 MHz Band 71: RX 663 MHz – 698 MHz, TX 617 MHz – 652 MHz
Number of TX/RX paths/pipes	4 pipes; 2T2R, 2T4R, 4T4R for both bands
Instantaneous Bandwidth IBW	16 MHz for B12 and 35MHz for B71 1 MHz below B12 NB IoT future use
Occupied Bandwidth OBW	52 MHz total across bands
Output Power	60W per TX shared between bands
Supply Voltage / Range	DC-48 V / -36 V to -60 V
Typical Power Consumption	664W [ETSI Busy Hour Load at 4TX@60W Both Bands Active] 395W [ETSI Busy Hour Load at 4TX@30W (One Band Active)]
Antenna Ports	4 ports, 4.3-10+
Optical Ports	2 x CPRI 9.8 Gbps
ALD Control Interfaces	AISG3.0 from ANT1, 2, 3, 4 and RET (DC on ANT1 & ANT3)
Other Interfaces	External Alarm MDR-26 Serial connector (4 inputs, 1 Output) DC Circular Power Connector
Physical	560 mm x 308 mm x 189 mm Approximately 38kg with no covers or brackets
Operating Temperature Range	-40°C to 55°C (with no solar load)
Surge Protection	Class II 5A
Installation Options	Vertical & Horizontal Book Mount, Pole & Wall Mount

(22.05" x 12.13" x 7.44")
(83.78 lbs.)

C12

NOKIA

Copyright and confidentiality

C13

The contents of this document are proprietary and confidential property of Nokia Solutions and Networks. This document is provided subject to confidentiality obligations of the applicable agreement(s).

This document is intended for use of Nokia Solutions and Networks customers and collaborators only for the purpose for which this document is submitted by Nokia Solution and Networks. No part of this document may be reproduced or made available to the public or to any third party in any form or means without the prior written permission of Nokia Solutions and Networks. This document is to be used by properly trained professional personnel. Any use of the contents in this document is limited strictly to the use(s) specifically created in the applicable agreement(s) under which the document is submitted. The user of this document may voluntarily provide suggestions, comments or other feedback to Nokia Solutions and Networks in respect of the contents of this document ("Feedback"). Such Feedback may be used in Nokia Solutions and Networks products and related specifications or other documentation. Accordingly, if the user of this document gives Nokia Solutions and Networks Feedback on the contents of this document, Nokia Solutions and Networks may freely use, disclose, reproduce, license, distribute and otherwise commercialize the feedback in any Nokia Solutions and Networks product, technology, service, specification or other documentation.

Nokia Solutions and Networks operates a policy of ongoing development. Nokia Solutions and Networks reserves the right to make changes and improvements to any of the products and/or services described in this document or withdraw this document at any time without prior notice.

The contents of this document are provided "as is". Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy, reliability or contents of this document. NOKIA SOLUTIONS AND NETWORKS SHALL NOT BE RESPONSIBLE IN ANY EVENT FOR ERRORS IN THIS DOCUMENT or for any loss of data or income or any special, incidental, consequential, indirect or direct damages howsoever caused, that might arise from the use of this document or any contents of this document.

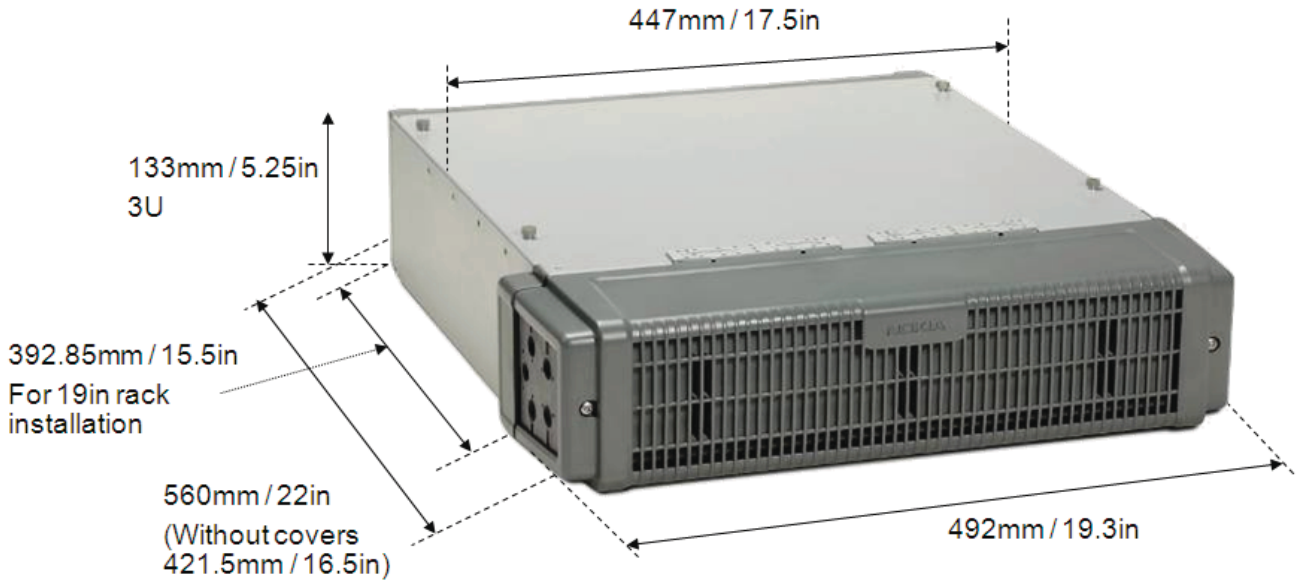
This document and the product(s) it describes are protected by copyright according to the applicable laws.

Nokia is a registered trademark of Nokia Corporation. Other product and company names mentioned herein may be trademarks or trade names of their respective owners.

NOKIA

Flexi Multiradio BTS System Module FSMF

- < 15 liters
- < 15 kg
- 3 height units
- IP65
- -35 to +55 °C



C14

FXFC for GSM and UMTS Design Specification

1.1 FXFC Description

1.1.1 Overview

The FXFC which is feature RAN2742 is a 3-sector Flexi RF module with 80W PA at the antenna connector.

The IBW is 35MHz in downlink and 60MHz in uplink.

Here is a picture of the FXFC

Maximum capacity of one Flexi Multiradio RF Module sector for GSM/EDGE is up to 6 TRXs, for WCDMA up to 4 carriers.
The FXFC can support the following SFP:

- FOSG/B for multimode fiber 3Gbps
- FOSA for single mode fiber 3Gbps
- FOSI for single mode fiber 6Gbps which is recommended for large configurations

1.1.2 FXFC ports descriptions

The ports of the FXFC are shown in the drawing next page

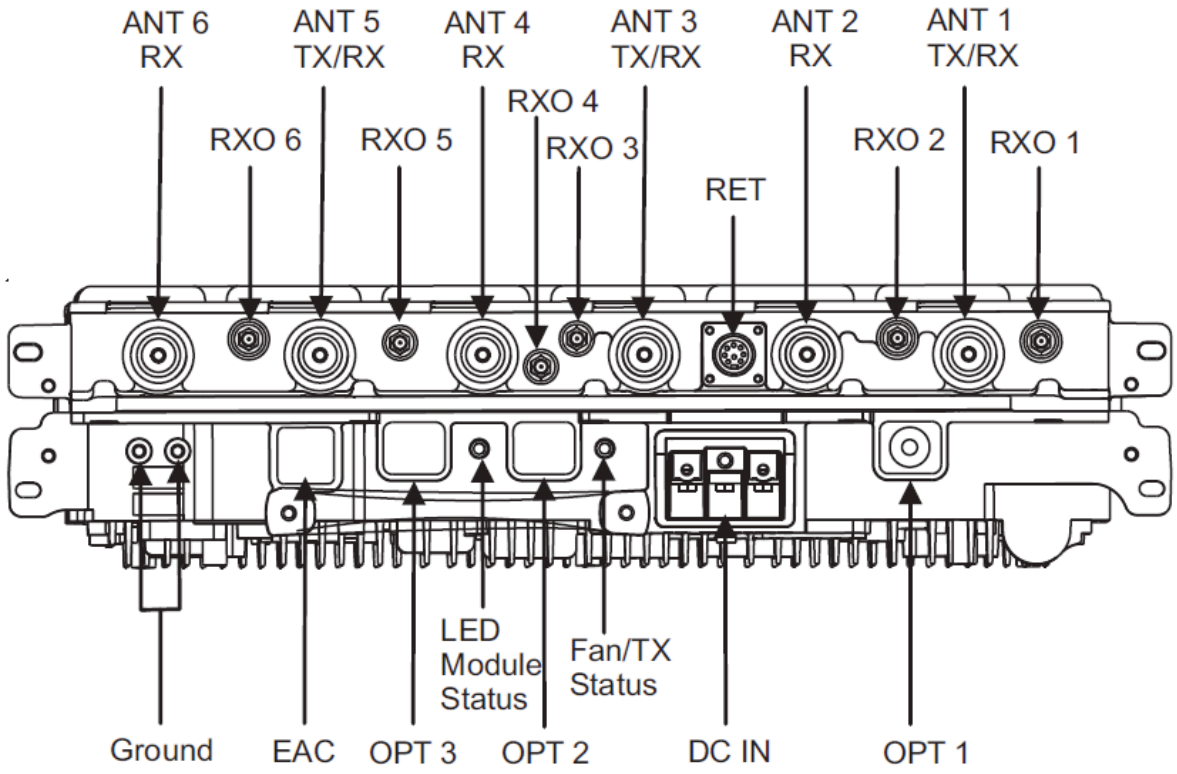


Figure 12 FXCB and FXFC front panel view

Here is a description of the ports for FXFC

Label name on module	Description	Connector type	Cable types and Interface(s)	Signal direction
Ant 1 Tx/Rx Ant 3 Tx/Rx Ant 5 Tx/Rx	RF signal interface to antenna (Tx and Rx main)	7/16 (female)	Antenna jumper or feeder cables	To and from the module
Ant 2 Rx Ant 4 Rx Ant 6 Rx	RF signal interface to antenna (Rx diversity)	7/16 (female)	• Antenna jumper or feeder cables • Other module when antenna sharing (co-siting) is used	To the module
RxO 1….6/ ANT 1….6 Rx Out	Provides an external BTS or module with the RX signal from Ant 1….6 when antenna sharing (co-siting) is used	QMA (female)	External BTS or module	From the module
PWR IN	-48 V DC input power with fuse protection	Screw-in terminal	System module or junction box	To the module

OPT 1, OPT 2, OPT 3	Control interface to the module (OBSAI RP3-1)	Duplex LC connector	System module or RF module	To and from the module
EAC	External alarm interface (four alarm inputs)	RJ45 female shielded	FPA/B or external alarm interface	To and from the module
RET	Remote eletrical tilt	8-pin circular	Antenna line	From the module

1.1.3 FXFC main blocks

The RF Module (FXxx) includes the following functional blocks:

- RF Baseband (RF BB)
  - RF control
- Provides three optical interfaces with the System Module or other RF modules (OBSAI RP3_01)
- Provides the external alarm interface
- Most of the module internal connections are made through this block
- Processes signals and module control functionalities
  - Transmitter
- Direct conversion from TX interface to TX RF
- Digital power control
- TX Double Power and IDD support
  - Predistortion transmitter
  - Receiver
- Dual down conversion from RX RF to RX baseband signal
- Diversity reception
- Power Amplifier (PA)
  - Amplifies signal coming from RF BB TX output and feeds it to TX input of the filters
- RF Front end
  - Includes three duplexers and three diversity RX filters with LNAs and RF test loops
  - Processes air interface RF signals for selected channels
  - Provides connection for Flexi Antenna Line to Flexi Multiradio Base Station
  - Supports usage of NSN Masthead Amplifier (MHA) units
  - Provides the supply voltage to the Flexi Antenna Line units via main antenna branch
  - Provides the supply voltage for dual MHA unit via diversity antenna branches or two single MHAs via both antenna lines
  - Contains integrated bias-Ts with over-current and undercurrent alarm detection/protection
- Power supply unit (PSU)
  - Contains power input and distribution of internal supply voltages
- Fan assembly
- Consists of three separate fans and a fan plate which mechanically mounts to the fan shroud

1.1.4 FXFC power

1.1.4.1 DC cable

The DC cable is not included in the 80 W RF Module delivery. 48 VDC power can be fed from a System Module or directly from an external power source.

The following requirements apply if power is fed from an external power source:

- The allowed diameter of shielded or jacketed cables is 6-25 mm (0.24-1 in.).
- The allowed cross section of individual DC wires is 6-25 mm2 (10-4 AWG) at the DC terminal. It is recommended that 25 mm2 (4 AWG) wires are capped to avoid loose strands. If thicker DC wires are required, then an FSEC/FSES or other IP65 DC distribution box is required to reduce the cable thickness at the module.
- Recommended DC cable lengths, thicknesses, and type are provided in the section Feederless site and Distributed site solution requirements in NOLS
- The DC connector has three screw terminals. The outer terminals are for (+) and (-) wires. The middle terminal is for grounding the shielded DC cable braid.

1.1.4.2 Voltage range

Here is the voltage range for FXFC

Property	Value
Nominal system voltage	48 V DC
Input voltage range	40.5 - 57 V DC

1.1.5 FXFC dimension

The FXFC is the same dimension as the FXFB and same weight

Property	Value
Width 1)	447/492 mm (17.6/19.4 in.)
Height	133 mm/ 3U (5.2 in.)
Depth 2)	422/560 mm (16.6/22.1 in.)
Weight	25 kg (55.1 lbs)

Large Battery 3 Cabinet

LB3 Site Support Enclosure

Product Feature

- Direct air cooling solution with optional Gore filter
- Supports four strings of -48V VRLA batteries up to 210Ah
- 600A bus bar with individual 200A breakers per string
- Bulk Input / Output with ability to daisy chain cabinets
- Connection kit includes cables with disconnects
- Rear hatch access
- Corrosion resistant aluminum construction
- Powder coated high gloss finish
- Designed to meet GR-487

Smarter. Greener. Together.

Specifications

Model	Large 3 Battery (LB3) Cabinet
1. General	
Construction	Aluminum enclosure
Dimensions (W x H x D)	30 x 72 x 35 in. (766 x 1829x 889mm), Depth with door: 41 in. (1045mm)
Weight	~540lbs (245kg) (without batteries)
Internal rack dimension	4 battery trays to support up to 210Ah batteries
Mounting options	Pad-mount, plinth option
Finish	Polyester Powder Paint (Tan)
Safety	UL Listed, IEC / EN 60950
2. Environment	
Operating temperature	-40C to +50C (-40F to +122F) with solar load.
Protection class	IP55 designed to GR-487
Acoustics	65 dBA
Humidity (relative)	95%, non-condensing (Max.)
3. Thermal management	
Cooling	Direct Air Cooling: (4) Axial Fans. Filters: F6 front and rear
Heating	Forced air heating (2) 1000W AC heaters
4. Equipment	
Cable Entry	Knock-out plate on each upper side wall Additional knockouts each side
Door latch	3 point latching, 5/16 Nut driver tool, pad-locking capability
Lifting Ears	4 eye bolts
Standard equipment	AC Load Center with AC Surge protection and GFCI outlet Left or Right side AC entry options (2) 1000W AC powered heater DC Load Center 600A bulk feed bus bar (4) 20050A DIN rail battery breakers (4) 2-hole lug landings (2) Anderson SB350 input connectors to daisy chain 2nd battery cabinet 2AWG battery cables from breakers to trays Configurable trays for (4) strings of up to 210Ah batteries Door intrusion switch LED interior cabinet light Fan Control Board, factory wired alarms via RJ45 output (fan & breaker alarms) Cabinet Connection kit (2) 4/0 cables with SB350 disconnects to connect to power cabinet

5. Ordering information		
Cabinet	ESOF015-ECV04	Large Battery 3 Cabinet
Plinth, 6”	37993318816900-S	Plinth for V1/V2, HPL2, LB2 cabinets only

*All specifications are subject to change without prior notice.

Delta Group Website:
www.deltaww.com

Product Website:
www.deltapowersolutions.com

United States of America & Canada:
Delta Electronics U.S. Inc.
2925 E. Plano Parkway
Plano, TX (Texas) 75074

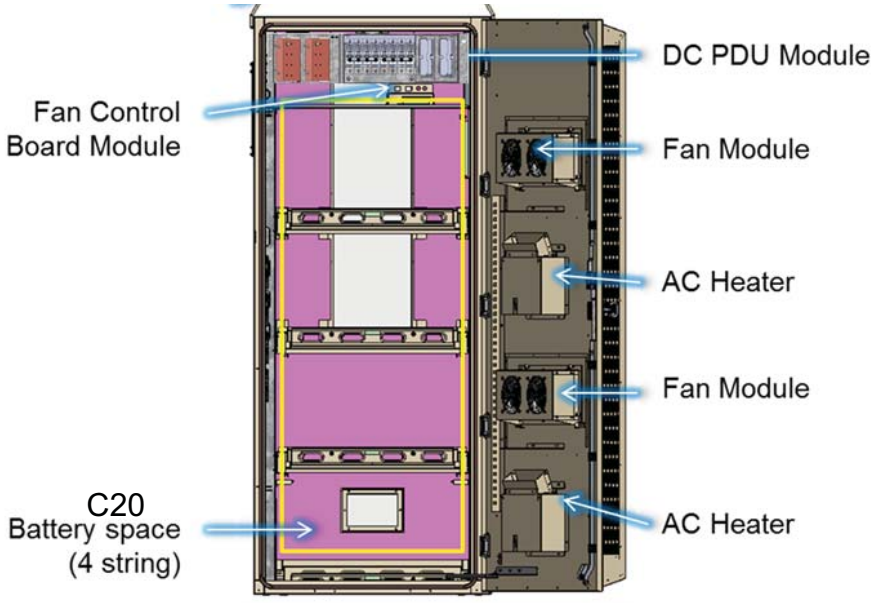
Sales and Support:
Sales: DEUSTPS.Sales@deltaww.com
Orders: DEUSTPS.Orders@deltaww.com

Field Support:
1-877-DELTA-08 option 3
(877-335-8208 option 3)
DEUSTPS.Support@deltaww.com

Installation Services:
DEUSTPS.Services@deltaww.com

RMA:
DEUSTPS.RMA@deltaww.com=

EN_v0.2 022019



HP-Large 3 Power Cabinet

Product Features

Compact design for equipment & power:

- 30RU supports 3 radios and transport equipment
- 600A @ -48V power system
- Slimline high efficiency rectifier
- ORION Touch screen Controller
- Rear Access Hatch

Direct air-cooling solution, 6000W capacity, 5°C delta T

Easy slide-in filter replacement

Connects with:

- SB3, 2-string battery cabinet
- LB3, 4-string battery cabinet
- V2, Expansion equipment and battery cabinet

Designed to GR-487 specifications

Smarter. Greener. Together.

Specifications

Model	HPL3 (HP-Large 3 Power Cabinet)	
1. General		
Construction	Aluminum enclosure	
Dimensions (W x H x D)	30 x 72 x 34.6 in. (762 x 1829x 879mm), Depth with Door/Hatch: 44.7 in. (1136mm)	
Weight	~595 lbs (~270kg) (without customer equipment or batteries)	
Internal rack dimension	Total Equipment space 30RU: Horizontal rack: 19" x 27RU Vertical rack: 19" x 3RU Power System space: 23" x 12RU	
Mounting options	Pad-mount, plinth option	
Finish	Polyester Power Paint (Tan)	
Safety	UL Listed , IEC / EN 60950	
2. Environment		
Operating temperature	-40°C to +50°C (-40°F to +122°F) with solar load. IP 55	
Protection class	designed to GR-487	
Acoustics	65dBA @5000W heat load , 70dBA @ 6000W	
Humidity (relative)	95%, non-condensing (Max.)	
3. Thermal Management		
Cooling Equipment:	Direct Air Cooling, 6000W capacity, 5°C delta T	
Heating Equipment:	Forced air heating (2) 1000W AC heaters	
4. Equipment		
Cable entry	Knock-out plate on each upper side wall / Additional knockouts on sides (1) 3" conduit hole with hole plug	
Door latch	3 point latching, 5/16 nut driver tool, pad-locking capability	
Primary ground	10 double-hole ¼"-20 threaded holes on 5/8" center ground bar	
Lifting Ears	4 Lifting Tabs	
Plinth	Optional 6" plinth available	
Standard equipment	AC Load Center: 240V split phase, dual feed / (1) 200A + (1)100A 208V 3-phase, single feed / (1) 200A AC Surge Protection for each breaker feed GFCI Receptacle 120V Temp Probes (6 form-C) Alarm Termination block 605A/ 54V (336kW) redundant Power System with DIN rail distribution: 12 rectifier positions (3x55A DPR3000 rectifiers included) 48 poles for load (2x10A, 3x50A, and 6x100A load breakers included) 16 poles for battery (2) SB350 / (2) SB175 Battery connections (3) SB350 Generator connections	
Front Door:	(6) DC powered centrifugal fans with (3) MERV-13 filters, (GORE option) Clogged Filter alarm pressure switch Door intrusion alarm (2) 1000W AC powered heaters LED interior cabinet light	
Rear Hatch:	Exhaust vent with (3) MERV-13 filters, (GORE option)	
5. Ordering information		
Cabinet	ESOA600-HCU01	HP-Large 3 600A Power / Equipment Cabinet
Rectifier	ESR-48/60A A-T	48V / 56A 3000W, 96.4%, CAN communication
Controller (Spare)	TPS1020028AU17	Orion TOUCH Controller
Plinth, 6"	37993318816900-S	Plinth for V1/V2, HPL2, HPL3, LB2 and LB3

*All specifications are subject to change without prior notice

Delta Group Website:
www.deltaww.com

Product Website:
www.deltapowersolutions.com

United States of America & Canada:
Delta Electronics (USA) Inc.
2925 E. Plano Parkway
Plano, TX (Texas) 75074

Sales and Orders:
DEUSTPS.Sales@deltaww.com
DEUSTPS.Orders@deltaww.com

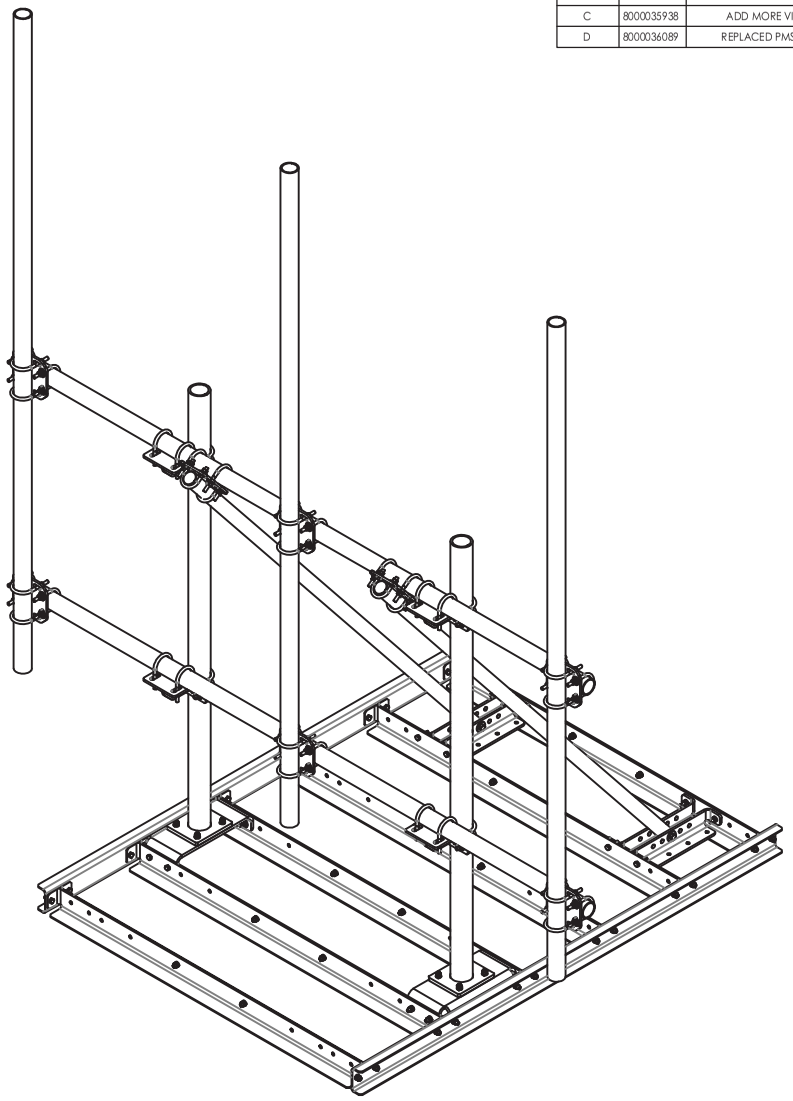
Field Support:
1-877-DELTA-08 option 3
(877-335-8208 option 3)
DEUSTPS.Support@deltaww.com

Installation Services:
DEUSTPS.Services@deltaww.com

RMA:
DEUSTPS.RMA@deltaww.com

NOTES:
1.0 GENERAL
1.1 ALL METRIC DIMENSIONS ARE IN BRACKETS
1.2 FOR PATENT INFO :https://www.cs-pat.com
2.0 DESIGN NOTES
2.1 SEE STEP INSTRUCTIONS IN DRAWING PACKAGE FOR ASSEMBLY.
3.0 MANUFACTURING/SPECIAL REQUIRMENTS
4.0 TEST
5.0 PACKAGING

REVISIONS				
REV.	ECN	DESCRIPTION	BY	DATE
B	8000034738	INITIAL RELEASE	RJC	04/29/19
C	8000035938	ADD MORE VIEWS FOR BETTER ASSEMBLY	RJC	06/19/19
D	8000036089	REPLACED PMSL02 WITH RTNF114 SEE SHT 6	RJC	07/02/19



RT-NF10-3-126 SHOWN

TOP LEVEL COMPONENTS

PART NO.	DESCRIPTION	BALLAST KIT	SECTOR KIT	CROSSOVER KIT	PIPE BUNDLE
RT-NF-BAL	BALLAST TRAY	RT-NF-BAL	N/A	N/A	N/A
RT-NF7-B	MOUNT, 7' BALLAST W/O PIPES	RT-NF-BAL	RT-NF-SCTR	N/A	PB0207K
RT-NF7-2-96	MOUNT, 7' BALLAST W/2 96" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 4)	PB0208K0207K
RT-NF7-2-126	MOUNT, 7' BALLAST W/2 126" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 4)	PB0210K0207K
RT-NF7-3-96	MOUNT, 7' BALLAST W/3 96" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 6)	PB0308K0207K
RT-NF7-3-126	MOUNT, 7' BALLAST W3 126" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 6)	PB0310K0207K
RT-NF10-B	MOUNT, 10' BALLAST W/O PIPES	RT-NF-BAL	RT-NF-SCTR	N/A	PB0210K
RT-NF10-3-96	MOUNT, 10' BALLAST W/3 96" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 6)	PB0210K0308K
RT-NF10-3-126	MOUNT, 10' BALLAST W/3 126" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 6)	PB0510K
RT-NF10-4-96	MOUNT, 10' BALLAST W/4, 96" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 8)	PB0210K0408K
RT-NF10-4-126	MOUNT, 10' BALLAST W/4, 126" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 8)	PB0610K
RT-NF12-B	MOUNT, 12' BALLAST W/O PIPES	RT-NF-BAL	RT-NF-SCTR	N/A	PB0212K
RT-NF12-3-96	MOUNT, 12' BALLAST W/3 96" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 6)	PB0212K0308K
RT-NF12-3-126	MOUNT, 12' BALLAST W/4 126" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 6)	PB0212K0310K
RT-NF12-4-96	MOUNT, 12' BALLAST W/4 96" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 8)	PB0212K0408K
RT-NF12-4-126	MOUNT, 12' BALLAST W/4 126" PIPES	RT-NF-BAL	RT-NF-SCTR	XP-2525 (QTY 8)	PB0212K0410K

PIPE BUNDLE TABLE

PART NO.	FACE PIPE	ANTENNA PIPE
PB0207K	MT54684	N/A
PB0208K0207K	MT54684	MT54696
PB0210K0207K	MT54684	MT-546-126
PB0308K0207K	MT54684	MT54696
PB0310K0207K	MT54684	MT-546-126
PB0210K	MT-546-126	N/A
PB0210K0308K	MT-546-126	MT54696
PB0510K	MT-546-126	MT-546-126
PB0210K0408K	MT-546-126	MT54696
PB0610K	MT-546-126	MT-546-126
PB0212K	MT-546-150	N/A
PB0212K0308K	MT-546-150	MT54696
PB0212K0310K	MT-546-150	MT-546-126
PB0212K0408K	MT-546-150	MT54696
PB0212K0410K	MT-546-150	MT-546-126

DENSITY		lbs/in³
MASS	963.26	lbs
VOLUME	3417.30	in³
SURFACE AREA	35982.98	in²
HEIGHT		
LENGTH		
WIDTH		

COMMSCOPE, INC. OF NORTH CAROLINA

TOLERANCES
0 PLACE X ± .25 2 PLACE .XX ± 0.06
1 PLACE X ± 0.12 ANGLES ± 2°

SAP MATERIAL MASTER: RT-NF

FINISH: GALV A123

MATERIAL: A500, A1011

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. INTERPRET PER ANSI Y14.5M-1994

	NAME	DATE
CE	RJC	03/01/19
RW	BCAMPBELLCON	07/02/2019
RV		
AD	MC1107	07/02/2019
RE	FA1024	07/02/2019

ECN 008000034738

TITLE: NON-PENETRATING ROOF FRAME

SCALE: 1:20

DOCUMENT NO.: RT-NF

SIZE	WORK AREA	MODEL			DRAWING			SHEET
		VERSION	STATUS	REVISION	VERSION	STATUS	REVISION	
C	24	02	RE	D	01	RE	D	1 OF 7

D1