

Date: August 16, 2021

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Subject: Structural Analysis Report

T-Mobile

Site Number: ML22218E
Site Name: Shorehaven RT

Engineering Firm Designation: Westchester Services, LLC

Site Data: 1305 W. Wisconsin Ave., Oconomowoc, WI 53066
Waukesha County – 50ft Rooftop

Eric Laugesen,

Westchester Services, LLC is pleased to submit this “Structural Analysis Report” to determine the structural integrity of the above mentioned antenna mounting system.

The purpose of the analysis is to determine acceptability of the antenna mounting system stress level. Based on our analysis we have determined the stress levels to be:

Existing and Proposed Equipment - Sufficient Capacity w/ Proposed Modifications

Note: See Table 2-1 for the existing and proposed loading.

Member Type	Result	Pass/Fail
Overall	93.9%	Pass

The analysis has been performed in accordance with the TIA-222-G standard and local code requirements.

We at Westchester Services, LLC appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this or any other projects please give us a call.

I certify that this report was prepared by me or under my direct supervision and that I am a licensed Professional Engineer under the laws of the State of Wisconsin.

Philip Koziol, PE
Professional Engineer



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1) INTRODUCTION

This is an 50ft tall rooftop located in Waukesha County, WI. The proposed antennas will be mounted on proposed antenna mounts.

2) ANALYSIS CRITERIA

The structural analysis was performed for this structure in accordance with the requirements of TIA-222-G Structural Standards for Antenna Supporting Structures and Antennas using an ultimate gust wind speed of 115 mph (converted to 89 mph 3-second gust) with no ice, 40 mph with 0.75 inch ice thickness, structure class II, exposure category D with topographic category 1 and crest height of 0 feet.

Table 2-1 – Proposed Final Antenna Configuration
(New antennas in **bold**)

Center Line Elevation (ft)	Sector	Pos.	Antenna	Radio(s)	Note
56	Alpha	1	(1) FFVV-65C-R3-V1	(1) AHLOA (1) AHFIG	
		2	(1) AEHC MIMO		
		3			
		4		(1) HCS 2.0 Breakout Box	
56	Beta	1	(1) FFVV-65C-R3-V1	(1) AHLOA (1) AHFIG	
		2	(1) AEHC MIMO		
		3			
		4		(1) HCS 2.0 Breakout Box	
56	Gamma	1	(1) FFVV-65C-R3-V1	(1) AHLOA (1) AHFIG	
		2	(1) AEHC MIMO		
		3			
		4		(1) HCS 2.0 Breakout Box	
T-Mobile Feedlines:			(3) HCS 2.0 Trunk		

3) ANALYSIS PROCEDURE

Table 3-1 – Documents Provided

Document	Remarks	Reference	Date	Source
Most Recent Site Photos	N/A	N/A	April 2021	
Building Drawing	N/A	N/A	N/A	Landlord

Table 3-2 – Companion Document

Document	Remarks	Date	Note
Preliminary Construction Drawings	Westchester Services	5/4/21	Rev B
Scoping Document	LCC	3/17/21	

3.1) Analysis Method

Risa-3D (version 17.0.4) is a finite element analysis software program was used for modeling and analyzing frame structures. The output from the analysis can be found in Appendix A.

Mathcad 15 is a mathematics software program used for creating hand calc templates. The output of these calculations can be found in Appendix A.

4) ANALYSIS RESULTS

Table 4-1 – Critical Section Capacity (Summary)

Member Type	% Capacity	Pass/Fail
Antenna Mount	45.3	Pass
Parapet Wall	67.9	Pass
Kicker Anchors	93.9	Pass
Overall	93.9	Pass

4.1) Recommendations

The antenna mounts and local structure will sufficient capacity to carry the existing and proposed loads provided the mounts are built per the attached details.

5) ASSUMPTIONS

- The analysis performed is to the theoretical capacity of the members and connections. No accommodations are taken for any damaged, rusted, deteriorated, or otherwise compromised member conditions. To this, the tower or structure is assumed to be properly maintained and monitored and this analysis cannot be considered to be a condition assessment of the structure.
- The analysis is performed to the minimum design wind, ice, and other environmental loading prescribed by the governing building codes and standards. Any higher loading conditions required by the local jurisdiction or structure owner should be made known to Westchester immediately for analysis. No lesser conditions will be accommodated.
- Member sizes are assumed to be of standard AISC or manufacturer designations unless explicitly specified otherwise. The geometry of the tower or structure is assumed as schematic. Steel grade and concrete strength are assumed to be conservative standard and fully developed unless otherwise specified.
- The information provided to Westchester for analysis is assumed accurate and up to date as supplied. No independent efforts were taken by Westchester to verify the validity of the information supplied. If any additional information is presented at any time that contradicts what is referenced in the analysis, the analysis is invalid and must be performed again with the new information.
- Any reinforcement or modifications are assumed to be fully installed and functional.
- All welds are assumed to have been performed to current welding standards and are assumed to develop their full capacity and to be in good condition. In addition, all bolts and bolt-like anchors are assumed to be fully tightened, fastened, or bonded to the manufacturers' specifications and are assumed to have full capacity.
- Numerous connection details of large-scale structures are unobtainable and are omitted from the structural analysis. This includes, but is not limited to: bolts, welds, flanges, and plates. These connections are considered adequate and are therefore neglected from the analysis. In addition, in the absence of building plans, many wall, floor, and ceiling constructions can only be determined from observable field data and are supplemented by best judgment and experience.
- Antennas, dishes, feedlines, and any other such appurtenances are assumed adequate through manufacturer testing. No analysis is provided for the structural strength or stability of these items unless otherwise specified.
- Equipment mounting systems are assumed structurally sound unless specifically called for in the analysis.
- Soil conditions and foundations are not considered unless specified in the analysis and have no deterioration or defects. For sites located on a building, only local effects of the equipment is considered unless otherwise specified. The overall structure of the building and its foundation are assumed to be unaffected by the telecom equipment.
- Any differences between the scope of work and that found at the site at any time prior to installation must be brought to the attention of Westchester immediately. Any changes or substitutions to any part of the scope of work must be brought to Westchester for explicit approval. Any changes made without prior approval will render the analysis and its conclusions invalid.

APPENDIX A
CALCULATIONS

References:

- 1) Wisconsin Commercial Building Code (2015 IBC)
- 2) ANSI TIA-222-G, Structural Standard for Antenna Supporting Structures and Antennas
- 3) AISC 360-10 Specification for Structural Steel Buildings
- 4) SSMA Product Technical Guide

Input**Wind Factors (as per TIA-222-G)**

$V := 115 \cdot \sqrt{.6} = 89.079$	mph	V_{ult} per Ref. (1) converted to V_{nom} for Ref. (2)
$V_i := 40$	mph	Basic wind speed with ice
$t_i := .75$	in	Design ice thickness
$G_H := 1.0$		Ref. (2), Section 2.6.7
$i_m := 1$		Importance Factor
$K_d := 0.95$		Wind Direction Probability Factor, Ref. (2), Table 2-2
$Ex := "D"$		Exposure category. See Ref. (2), Table 2-4
$TC := "1"$		Topographic Category. See Ref. (2), Table 2-5
$H := 0$	ft	Crest Height

Antennas/Radios

Antenna name/model

Elevation of antennas

"not used"
 "FFVV-65C-R3-V1"
 "not used"
 AEHC MIMO
 AHLOA
 "not used"
 "not used"
 AHFIG
 "not used"
 2.0 Tower Breakout Box

z_{ant} := (56) .ft
 (56)
 (56)
 (56)
 (56)
 (56)
 (56)
 (56)
 (56)

Number of antenna groups

N_{antenna} := 10

Height of antennas*

Width of antennas*

Depth of antennas*

Weight of antennas

height_{ant} := (1) .in
 (95.9)
 (1)
 (38.2)
 (22.1)
 (1)
 (1)
 (27.3)
 (1)
 (12)

width_{ant} := (1) .in
 (25.2)
 (1)
 (21.5)
 (12.1)
 (1)
 (1)
 (12.1)
 (1)
 (8)

depth_{ant} := (1) .in
 (9.3)
 (1)
 (5.9)
 (7.44)
 (1)
 (1)
 (5.2)
 (1)
 (3)

Weight_{ant} := (0) .lbf
 (127.6)
 (0)
 (108.0)
 (83.6)
 (0)
 (0)
 (70.5)
 (0)
 (20)

Local Shielding Factor

LocalShielding := (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)
 (0.90)

Antenna Shape?

SHAPE := (1)
 (1)
 (1)
 (1)
 (1)
 (1)
 (1)
 (1)
 (1)
 (1)
 (1)

Shape Guide:
 0 = Round
 1 = Flat
 2 = Dish w/o Radome
 3 = Dish w/ Radome
 4 = Dish w/ Shroud
 5 = Grid Dish

h & w for dishes are outer diameters.
 Ellipse shape OK

*Matrix elements with a value of "1" are just placeholder values to prevent divide by 0 / NaN errors.

Wind load calculations collapsed



Equipment Frame

The following matrices represent the antennas and equipment that are present on each position.

$$P1 := \begin{pmatrix} 2 \\ 8 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$P2 := \begin{pmatrix} 4 \\ 5 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$P3 := \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$P4 := \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

RISA 3D Loads Input

Loads will be applied to fictitious members intended to represent the antenna and radios. The members will be stood off from the antenna pipes to accurately describe the eccentric loading on the antenna pipes and mount frame.

	Wind Load (no ice)	Wind Load (with ice)	Dead Load (no ice)	Dead Load (with ice)
Position 1:	$\frac{F_1}{2} = 268.487 \text{ lbf}$	$\frac{F_{1.ice}}{2} = 63.856 \text{ lbf}$	$\frac{W_1}{2} = 99.05 \text{ lbf}$	$\frac{W_{1.ice} - W_1}{2} = 238.402 \text{ lbf}$
Position 2:	$\frac{F_2}{2} = 102.066 \text{ lbf}$	$\frac{F_{2.ice}}{2} = 26.573 \text{ lbf}$	$\frac{W_2}{2} = 95.8 \text{ lbf}$	$\frac{W_{2.ice} - W_2}{2} = 105.3 \text{ lbf}$
Position 3:	$\frac{F_3}{2} = 0 \text{ lbf}$	$\frac{F_{3.ice}}{2} = 0 \text{ lbf}$	$\frac{W_3}{2} = 0 \text{ lbf}$	$\frac{W_{3.ice} - W_3}{2} = 0 \text{ lbf}$
Position 4:	$\frac{F_4}{2} = 0 \text{ lbf}$	$\frac{F_{4.ice}}{2} = 0 \text{ lbf}$	$\frac{W_4}{2} = 0 \text{ lbf}$	$\frac{W_{4.ice} - W_4}{2} = 0 \text{ lbf}$

Wind loads on frame members

Round

$$h := 2.375 \text{ in} \quad C_a := 1.2 \quad K_a := 0.9$$

$$w := K_a \cdot h \cdot q_{z.ant} \cdot C_a = 5.344 \cdot \text{plf}$$

$$w_{ice} := K_a \cdot h \cdot q_{z.ant.ice} \cdot C_a = 1.078 \cdot \text{plf}$$

Check Light Gauge Parapet*(Studs are 7-5/8" x 1-5/8" @ 16" oc, assume 800S162-43 studs)*

$$F_y := 33\text{ksi}$$

Steel grade (assumed)

$$s := 16\text{in}$$

Spacing

$$h := 4.5\text{ft}$$

Parapet height

$$S := 1.019\text{in}^3$$

Stud section modulus

$$A := 0.537\text{in}^2$$

Cross-sectional area

$$s_{\text{sup}} := 3\text{ft}$$

Spacing of the supports

$$d_{\text{so}} := 0.5\text{ft}$$

*Pipe standoff distance**Mount reactions (Position 1, worst load case)**Use (2) studs minimum.*

$$X_{\text{max}} := 971\text{lbf}$$

$$Y_{\text{max}} := 1023\text{lbf}$$

$$Z_{\text{max}} := 0\text{lbf}$$

$$n_{\text{stud}} := 2$$

$$M_{\text{max}} := X_{\text{max}} \cdot s_{\text{sup}} + Y_{\text{max}} \cdot d_{\text{so}} = 3.425 \cdot \text{kip} \cdot \text{ft}$$

$$f_b := \frac{M_{\text{max}}}{n_{\text{stud}} S} = 20.164 \cdot \text{ksi}$$

$$F_b := 0.9 \cdot F_y = 29.7 \cdot \text{ksi}$$

$$\frac{f_b}{F_b} = 67.892\%$$

Mount reactions (Position 2)

$$X_{\text{max}} := 216\text{lbf}$$

$$Y_{\text{max}} := 538\text{lbf}$$

$$Z_{\text{max}} := 0\text{lbf}$$

$$M_{\text{max}} := X_{\text{max}} \cdot s_{\text{sup}} + Y_{\text{max}} \cdot d_{\text{so}} = 0.917 \cdot \text{kip} \cdot \text{ft}$$

$$f_b := \frac{M_{\text{max}}}{n_{\text{stud}} S} = 5.399 \cdot \text{ksi}$$

$$F_b := 0.9 \cdot F_y = 29.7 \cdot \text{ksi}$$

$$\frac{f_b}{F_b} = 18.18\%$$

Kicker Anchors Use (2) 1/2" dia. Hilti Kwik-Bolt 3 anchors with 2-1/4" embedment.

$X_{\max} := 1803\text{ lbf}$

$Y_{\max} := 2075\text{ lbf}$

$Z_{\max} := 902\text{ lbf}$

$n_{\text{bolt}} := 2$

$T_{\max} := Y_{\max}$

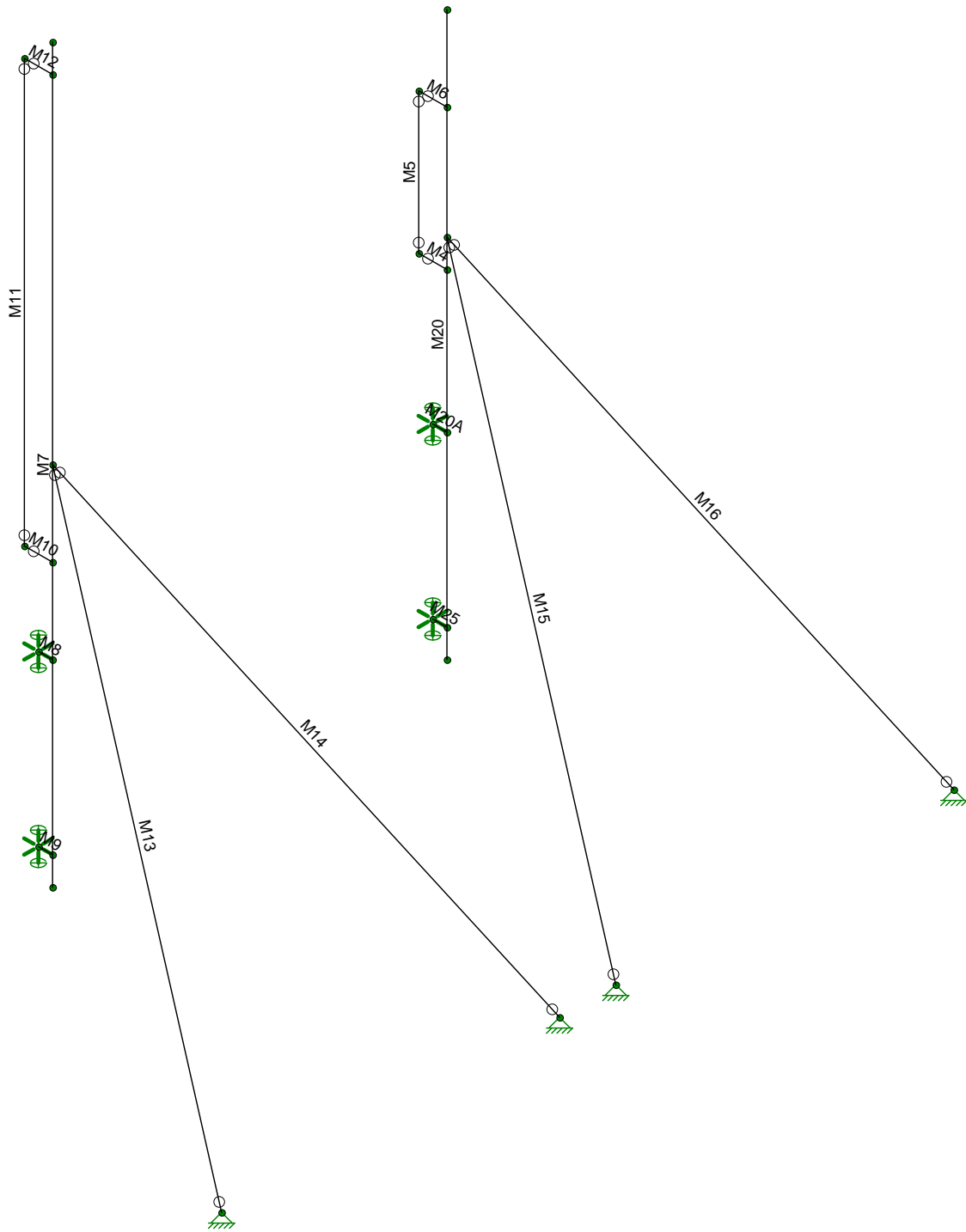
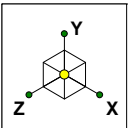
$V_{\max} := \sqrt{X_{\max}^2 + Z_{\max}^2}$

$T_{\text{all}} := 2415\text{ lbf}$

$V_{\text{all}} := 0.76 \cdot 2605\text{ lbf}$

Allowble loads per anchor

$$\frac{T_{\max}}{n_{\text{bolt}} \cdot T_{\text{all}}} + \frac{V_{\max}}{n_{\text{bolt}} \cdot V_{\text{all}}} = 93.876\% \quad \text{OK}$$





Company : Westchester Services
 Designer : PK
 Job Number : ML22218E
 Model Name : Antenna Mount

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(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISACONNECTION CODE	AISC 14th(360-10): LRFD
Cold Formed Steel Code	AISI S100-12: LRFD
Wood Code	AWC NDS-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-15: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8



(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt	
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From ...
1	N1	-.25	3.5	0	0	
2	N2	-.25	.5	0	0	
3	N3	0	10	0	0	
4	N4	0	0	0	0	
5	N5	0	3.5	0	0	
6	N6	0	.5	0	0	
7	N7	0	8.5	0	0	
8	N8	0	6	0	0	
9	N9	-.5	8.5	0	0	
10	N10	-.5	6	0	0	
11	N11	-.25	3.5	7	0	
12	N12	-.25	.5	7	0	
13	N13	0	13	7	0	
14	N14	0	0	7	0	
15	N15	0	3.5	7	0	
16	N16	0	.5	7	0	
17	N17	0	12.5	7	0	
18	N18	0	5	7	0	
19	N19	-.5	12.5	7	0	



Company : Westchester Services
 Designer : PK
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Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From ...
20	N20	-5	5	7	0	
21	N21	0	6.5	0	0	
22	N22	0	6.5	7	0	
23	N23	6	-5	-3	0	
24	N24	6	-5	4	0	
25	N25	6	-5	3	0	
26	N26	6	-5	10	0	

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	Reaction	Reaction	Reaction		Reaction	
2	N2	Reaction	Reaction	Reaction		Reaction	
3	N11	Reaction	Reaction	Reaction		Reaction	
4	N12	Reaction	Reaction	Reaction		Reaction	
5	N26	Reaction	Reaction	Reaction			
6	N24	Reaction	Reaction	Reaction			
7	N25	Reaction	Reaction	Reaction			
8	N23	Reaction	Reaction	Reaction			

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M20	N3	N4			PIPE 2.0	Column	Wide Flange	A53 Gr.B	Typical
2	M20A	N5	N1			RIGID	None	None	RIGID	Typical
3	M25	N6	N2			RIGID	None	None	RIGID	Typical
4	M4	N8	N10			RIGID	None	None	RIGID	Typical
5	M5	N10	N9			RIGID	None	None	RIGID	Typical
6	M6	N7	N9			RIGID	None	None	RIGID	Typical
7	M7	N13	N14			PIPE 3.0	Column	Wide Flange	A53 Gr.B	Typical
8	M8	N15	N11			RIGID	None	None	RIGID	Typical
9	M9	N16	N12			RIGID	None	None	RIGID	Typical
10	M10	N18	N20			RIGID	None	None	RIGID	Typical
11	M11	N20	N19			RIGID	None	None	RIGID	Typical
12	M12	N17	N19			RIGID	None	None	RIGID	Typical
13	M13	N26	N22			L3X3X4	HBrace	Single Angle	A36 Gr.36	Typical
14	M14	N22	N24			L3X3X4	HBrace	Single Angle	A36 Gr.36	Typical
15	M15	N25	N21			L3X3X4	HBrace	Single Angle	A36 Gr.36	Typical
16	M16	N21	N23			L3X3X4	HBrace	Single Angle	A36 Gr.36	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torq...	Kyy	Kzz	Cb	Function
1	M20	PIPE 2.0	10			Lbyy						Lateral
2	M7	PIPE 3.0	13			Lbyy						Lateral
3	M13	L3X3X4	9.695									Lateral
4	M14	L3X3X4	9.695									Lateral
5	M15	L3X3X4	9.695									Lateral
6	M16	L3X3X4	9.695									Lateral

Joint Loads and Enforced Displacements (BLC 3 : W-NS)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N19	L	X	.268
2	N20	L	X	.268



Joint Loads and Enforced Displacements (BLC 3 : W-NS) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
3	N9	L	X	.102
4	N10	L	X	.102

Joint Loads and Enforced Displacements (BLC 4 : W-EW)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N19	L	Z	.268
2	N20	L	Z	.268
3	N9	L	Z	.102
4	N10	L	Z	.102

Joint Loads and Enforced Displacements (BLC 5 : w-ns)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N19	L	X	.064
2	N20	L	X	.064
3	N9	L	X	.027
4	N10	L	X	.027

Joint Loads and Enforced Displacements (BLC 6 : w-ew)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N19	L	Z	.064
2	N20	L	Z	.064
3	N9	L	Z	.027
4	N10	L	Z	.027

Joint Loads and Enforced Displacements (BLC 7 : Weight-noise)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N19	L	Y	.099
2	N20	L	Y	.099
3	N9	L	Y	.096
4	N10	L	Y	.096

Joint Loads and Enforced Displacements (BLC 8 : Weight-ice)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	N19	L	Y	.238
2	N20	L	Y	.238
3	N9	L	Y	.105
4	N10	L	Y	.105

Member Distributed Loads (BLC 3 : W-NS)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,...]	End Location[ft,%]
1	M20	X	.005	.005	0	0

Member Distributed Loads (BLC 4 : W-EW)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,...]	End Location[ft,%]
1	M20	Z	.005	.005	0	0

Member Distributed Loads (BLC 5 : w-ns)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,...]	End Location[ft,%]
1	M20	X	.001	.001	0	0

Member Distributed Loads (BLC 6 : w-ew)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,...]	End Location[ft,%]
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Member Distributed Loads (BLC 6 : w-ew) (Continued)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,...]	End Location[ft, %]
1 M20	Z	.001	.001	0	0

Basic Load Cases

BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...)	Surface(P...
1 Self-Weight Only	DL		-1					
2 DL	DL							
3 W-NS	WL				4		1	
4 W-EW	WL				4		1	
5 w-ns	WL				4		1	
6 w-ew	WL				4		1	
7 Weight-noise	DL				4			
8 Weight-ice	SL				4			

Load Combinations

Description	So...P...	S...	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..	BLCFac..
1 1.4DL	Yes	Y	1	1.4	2	-1.4	7	-1.4						
2 1.2DL+1.6Wo 0deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	1.6	4			
3 1.2DL+1.6Wo 30deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	1.3...	4	.8		
4 1.2DL+1.6Wo 60deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	.8	4	1.3...		
5 1.2DL+1.6Wo 90deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3		4	1.6		
6 1.2DL+1.6Wo 120deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	-.8	4	1.3...		
7 1.2DL+1.6Wo 150deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	-1.3...	4	.8		
8 1.2DL+1.6Wo 180deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	-1.6	4			
9 1.2DL+1.6Wo 210deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	-1.3...	4	-.8		
10 1.2DL+1.6Wo 240deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	-.8	4	-1.3...		
11 1.2DL+1.6Wo 270deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3		4	-1.6		
12 1.2DL+1.6Wo 300deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	.8	4	-1.3...		
13 1.2DL+1.6Wo 330deg	Yes	Y	1	1.2	2	-1.2	7	-1.2	3	1.3...	4	-.8		
14 1.2DL+1.0Wi+1.0DLi 0...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	1	5	8	-1	
15 1.2DL+1.0Wi+1.0DLi 3...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	.866	5	.5	8	-1
16 1.2DL+1.0Wi+1.0DLi 6...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	.5	5	.866	8	-1
17 1.2DL+1.0Wi+1.0DLi 9...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6		5	1	8	-1
18 1.2DL+1.0Wi+1.0DLi 1...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	-.5	5	.866	8	-1
19 1.2DL+1.0Wi+1.0DLi 1...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	-.866	5	.5	8	-1
20 1.2DL+1.0Wi+1.0DLi 1...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	-1	5		8	-1
21 1.2DL+1.0Wi+1.0DLi 2...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	-.866	5	-.5	8	-1
22 1.2DL+1.0Wi+1.0DLi 2...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	-.5	5	-.866	8	-1
23 1.2DL+1.0Wi+1.0DLi 2...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6		5	-1	8	-1
24 1.2DL+1.0Wi+1.0DLi 3...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	.5	5	-.866	8	-1
25 1.2DL+1.0Wi+1.0DLi 3...	Yes	Y	1	1.2	2	-1.2	7	-1.2	6	.866	5	-.5	8	-1

Joint Reactions

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1 N1	-.093	.204	0	0	0	0
2	1 N2	.042	.239	0	0	0	0
3	1 N11	-.071	.337	0	0	0	0
4	1 N12	.034	.178	0	0	0	0
5	1 N26	.019	.012	.009	LOCKED	0	LOCKED
6	1 N24	.019	.012	-.009	LOCKED	0	LOCKED
7	1 N25	.025	.004	.013	0	LOCKED	LOCKED
8	1 N23	.025	.004	-.013	LOCKED	LOCKED	0
9	1 Totals:	0	.989	0			



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Joint Reactions (Continued)

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
10	1	COG (ft):	X: .531	Y: 6.319	Z: 3.811		
11	2	N1	.078	-.003	0	0	0
12	2	N2	-.045	-.181	0	0	0
13	2	N11	.848	-.448	0	0	0
14	2	N12	-.179	-.928	0	0	0
15	2	N26	-.763	.919	-.382	LOCKED	0
16	2	N24	-.763	.919	.382	LOCKED	0
17	2	N25	-.22	.285	-.11	0	LOCKED
18	2	N23	-.22	.285	.11	LOCKED	LOCKED
19	2	Totals:	-1.264	.848	0		
20	2	COG (ft):	X: .531	Y: 6.319	Z: 3.811		
21	3	N1	.057	.021	.055	0	-.096
22	3	N2	-.034	-.129	-.017	0	.004
23	3	N11	.726	-.35	.43	0	-.322
24	3	N12	-.151	-.784	-.053	0	.013
25	3	N26	-1.465	1.738	-.732	LOCKED	0
26	3	N24	.147	-.143	-.074	LOCKED	0
27	3	N25	-.428	.528	-.214	0	LOCKED
28	3	N23	.054	-.034	-.027	LOCKED	LOCKED
29	3	Totals:	-1.095	.848	-.632		
30	3	COG (ft):	X: .531	Y: 6.319	Z: 3.811		
31	4	N1	0	.086	.095	0	-.165
32	4	N2	-.004	.012	-.029	0	.007
33	4	N11	.394	-.079	.746	0	-.558
34	4	N12	-.075	-.388	-.092	0	.023
35	4	N26	-1.77	2.094	-.885	LOCKED	0
36	4	N24	1.023	-1.165	-.512	LOCKED	0
37	4	N25	-.517	.631	-.258	0	LOCKED
38	4	N23	.319	-.343	-.159	LOCKED	LOCKED
39	4	Totals:	-.632	.848	-1.095		
40	4	COG (ft):	X: .531	Y: 6.319	Z: 3.811		
41	5	N1	-.079	.175	.109	0	-.191
42	5	N2	.036	.204	-.034	0	.008
43	5	N11	-.061	.289	.861	0	-.644
44	5	N12	.029	.153	-.106	0	.027
45	5	N26	-1.597	1.891	-.798	LOCKED	0
46	5	N24	1.628	-1.871	-.815	LOCKED	0
47	5	N25	-.461	.566	-.23	0	LOCKED
48	5	N23	.504	-.559	-.252	LOCKED	LOCKED
49	5	Totals:	0	.848	-1.264		
50	5	COG (ft):	X: .531	Y: 6.319	Z: 3.811		
51	6	N1	-.158	.264	.095	0	-.165
52	6	N2	.077	.397	-.029	0	.007
53	6	N11	-.516	.656	.746	0	-.558
54	6	N12	.133	.695	-.092	0	.023
55	6	N26	-.991	1.185	-.495	LOCKED	0
56	6	N24	1.803	-2.075	-.902	LOCKED	0
57	6	N25	-.276	.35	-.138	0	LOCKED
58	6	N23	.56	-.625	-.28	LOCKED	LOCKED
59	6	Totals:	.632	.848	-1.095		
60	6	COG (ft):	X: .531	Y: 6.319	Z: 3.811		
61	7	N1	-.216	.329	.055	0	-.095
62	7	N2	.107	.538	-.017	0	.004
63	7	N11	-.849	.925	.431	0	-.322
64	7	N12	.21	1.093	-.053	0	.013
65	7	N26	-.115	.163	-.058	LOCKED	0
66	7	N24	1.498	-1.719	-.749	LOCKED	0



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Joint Reactions (Continued)

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]	
67	7	N25	-.011	.041	-.005	0	LOCKED	LOCKED
68	7	N23	.472	-.522	-.236	LOCKED	LOCKED	0
69	7	Totals:	1.095	.848	-.632			
70	7	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
71	8	N1	-.237	.353	0	0	0	0
72	8	N2	.118	.59	0	0	0	0
73	8	N11	-.971	1.023	0	0	0	0
74	8	N12	.237	1.238	0	0	0	0
75	8	N26	.796	-.9	.398	LOCKED	0	LOCKED
76	8	N24	.796	-.9	-.398	LOCKED	0	LOCKED
77	8	N25	.263	-.278	.131	0	LOCKED	LOCKED
78	8	N23	.263	-.278	-.131	LOCKED	LOCKED	0
79	8	Totals:	1.264	.848	0			
80	8	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
81	9	N1	-.216	.329	-.055	0	.095	0
82	9	N2	.107	.538	.017	0	-.004	0
83	9	N11	-.849	.925	-.431	0	.322	0
84	9	N12	.21	1.093	.053	0	-.013	0
85	9	N26	1.498	-1.719	.749	LOCKED	0	LOCKED
86	9	N24	-.115	.163	.058	LOCKED	0	LOCKED
87	9	N25	.472	-.522	.236	0	LOCKED	LOCKED
88	9	N23	-.011	.041	-.005	LOCKED	LOCKED	0
89	9	Totals:	1.095	.848	.632			
90	9	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
91	10	N1	-.158	.264	-.095	0	.165	0
92	10	N2	.077	.397	.029	0	-.007	0
93	10	N11	-.516	.656	-.746	0	.558	0
94	10	N12	.133	.695	.092	0	-.023	0
95	10	N26	1.803	-2.075	.902	LOCKED	0	LOCKED
96	10	N24	-.991	1.185	.495	LOCKED	0	LOCKED
97	10	N25	.56	-.625	.28	0	LOCKED	LOCKED
98	10	N23	-.276	.35	.138	LOCKED	LOCKED	0
99	10	Totals:	.632	.848	1.095			
100	10	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
101	11	N1	-.079	.175	-.109	0	.191	0
102	11	N2	.036	.204	.034	0	-.008	0
103	11	N11	-.061	.289	-.861	0	.644	0
104	11	N12	.029	.153	.106	0	-.027	0
105	11	N26	1.628	-1.871	.815	LOCKED	0	LOCKED
106	11	N24	-1.597	1.891	.798	LOCKED	0	LOCKED
107	11	N25	.504	-.559	.252	0	LOCKED	LOCKED
108	11	N23	-.461	.566	.23	LOCKED	LOCKED	0
109	11	Totals:	0	.848	1.264			
110	11	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
111	12	N1	0	.086	-.095	0	.165	0
112	12	N2	-.004	.012	.029	0	-.007	0
113	12	N11	.394	-.079	-.746	0	.558	0
114	12	N12	-.075	-.388	.092	0	-.023	0
115	12	N26	1.023	-1.165	.512	LOCKED	0	LOCKED
116	12	N24	-1.77	2.094	.885	LOCKED	0	LOCKED
117	12	N25	.319	-.343	.159	0	LOCKED	LOCKED
118	12	N23	-.517	.631	.258	LOCKED	LOCKED	0
119	12	Totals:	-.632	.848	1.095			
120	12	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
121	13	N1	.057	.021	-.055	0	.096	0
122	13	N2	-.034	-.129	.017	0	-.004	0
123	13	N11	.726	-.35	-.43	0	.322	0



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Joint Reactions (Continued)

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]	
124	13	N12	-.151	-.784	.053	0	-.013	0
125	13	N26	.147	-.143	.074	LOCKED	0	LOCKED
126	13	N24	-1.465	1.738	.732	LOCKED	0	LOCKED
127	13	N25	.054	-.034	.027	0	LOCKED	LOCKED
128	13	N23	-.428	.528	.214	LOCKED	LOCKED	0
129	13	Totals:	-1.095	.848	.632			
130	13	COG (ft):	X: .531	Y: 6.319	Z: 3.811			
131	14	N1	-.148	.278	.018	0	-.032	0
132	14	N2	.064	.36	-.005	0	.001	0
133	14	N11	-.171	.646	.13	0	-.097	0
134	14	N12	.068	.355	-.016	0	.004	0
135	14	N26	-.19	.251	-.095	LOCKED	0	LOCKED
136	14	N24	.294	-.314	-.147	LOCKED	0	LOCKED
137	14	N25	-.035	.07	-.018	0	LOCKED	LOCKED
138	14	N23	.12	-.111	-.06	LOCKED	LOCKED	0
139	14	Totals:	0	1.534	-.192			
140	14	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
141	15	N1	-.135	.263	.016	0	-.027	0
142	15	N2	.058	.329	-.004	0	.001	0
143	15	N11	-.103	.591	.113	0	-.084	0
144	15	N12	.052	.274	-.014	0	.003	0
145	15	N26	-.216	.281	-.108	LOCKED	0	LOCKED
146	15	N24	.203	-.209	-.102	LOCKED	0	LOCKED
147	15	N25	-.044	.08	-.022	0	LOCKED	LOCKED
148	15	N23	.09	-.076	-.045	LOCKED	LOCKED	0
149	15	Totals:	-.096	1.534	-.166			
150	15	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
151	16	N1	-.126	.252	.009	0	-.016	0
152	16	N2	.053	.307	-.002	0	0	0
153	16	N11	-.053	.551	.065	0	-.048	0
154	16	N12	.041	.215	-.008	0	.002	0
155	16	N26	-.17	.227	-.085	LOCKED	0	LOCKED
156	16	N24	.072	-.055	-.036	LOCKED	0	LOCKED
157	16	N25	-.03	.064	-.015	0	LOCKED	LOCKED
158	16	N23	.047	-.027	-.024	LOCKED	LOCKED	0
159	16	Totals:	-.166	1.534	-.096			
160	16	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
161	17	N1	-.122	.249	0	0	0	0
162	17	N2	.051	.299	0	0	0	0
163	17	N11	-.035	.536	0	0	0	0
164	17	N12	.037	.193	0	0	0	0
165	17	N26	-.065	.104	-.032	LOCKED	0	LOCKED
166	17	N24	-.065	.104	.032	LOCKED	0	LOCKED
167	17	N25	.003	.024	.002	0	LOCKED	LOCKED
168	17	N23	.003	.024	-.002	LOCKED	LOCKED	0
169	17	Totals:	-.192	1.534	0			
170	17	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
171	18	N1	-.126	.252	-.009	0	.016	0
172	18	N2	.053	.307	.002	0	0	0
173	18	N11	-.053	.551	-.065	0	.048	0
174	18	N12	.041	.215	.008	0	-.002	0
175	18	N26	.072	-.055	.036	LOCKED	0	LOCKED
176	18	N24	-.17	.227	.085	LOCKED	0	LOCKED
177	18	N25	.047	-.027	.024	0	LOCKED	LOCKED
178	18	N23	-.03	.064	.015	LOCKED	LOCKED	0
179	18	Totals:	-.166	1.534	.096			
180	18	COG (ft):	X: .07	Y: 7.201	Z: 4.279			



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Joint Reactions (Continued)

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]	
181	19	N1	-.135	.263	-.016	0	.027	0
182	19	N2	.058	.329	.004	0	-.001	0
183	19	N11	-.103	.591	-.113	0	.084	0
184	19	N12	.052	.274	.014	0	-.003	0
185	19	N26	.203	-.209	.102	LOCKED	0	LOCKED
186	19	N24	-.216	.281	.108	LOCKED	0	LOCKED
187	19	N25	.09	-.076	.045	0	LOCKED	LOCKED
188	19	N23	-.044	.08	.022	LOCKED	LOCKED	0
189	19	Totals:	-.096	1.534	.166			
190	19	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
191	20	N1	-.148	.278	-.018	0	.032	0
192	20	N2	.064	.36	.005	0	-.001	0
193	20	N11	-.171	.646	-.13	0	.097	0
194	20	N12	.068	.355	.016	0	-.004	0
195	20	N26	.294	-.314	.147	LOCKED	0	LOCKED
196	20	N24	-.19	.251	.095	LOCKED	0	LOCKED
197	20	N25	.12	-.111	.06	0	LOCKED	LOCKED
198	20	N23	-.035	.07	.018	LOCKED	LOCKED	0
199	20	Totals:	0	1.534	.192			
200	20	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
201	21	N1	-.161	.292	-.016	0	.027	0
202	21	N2	.07	.391	.004	0	-.001	0
203	21	N11	-.239	.701	-.113	0	.084	0
204	21	N12	.083	.436	.014	0	-.003	0
205	21	N26	.32	-.344	.16	LOCKED	0	LOCKED
206	21	N24	-.1	.145	.05	LOCKED	0	LOCKED
207	21	N25	.129	-.122	.064	0	LOCKED	LOCKED
208	21	N23	-.006	.035	.003	LOCKED	LOCKED	0
209	21	Totals:	.096	1.534	.166			
210	21	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
211	22	N1	-.171	.303	-.009	0	.016	0
212	22	N2	.075	.413	.002	0	0	0
213	22	N11	-.289	.741	-.065	0	.048	0
214	22	N12	.095	.496	.008	0	-.002	0
215	22	N26	.274	-.291	.137	LOCKED	0	LOCKED
216	22	N24	.032	-.008	-.016	LOCKED	0	LOCKED
217	22	N25	.115	-.105	.057	0	LOCKED	LOCKED
218	22	N23	.037	-.015	-.019	LOCKED	LOCKED	0
219	22	Totals:	.166	1.534	.096			
220	22	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
221	23	N1	-.174	.307	0	0	0	0
222	23	N2	.076	.421	0	0	0	0
223	23	N11	-.308	.756	0	0	0	0
224	23	N12	.099	.517	0	0	0	0
225	23	N26	.168	-.168	.084	LOCKED	0	LOCKED
226	23	N24	.168	-.168	-.084	LOCKED	0	LOCKED
227	23	N25	.081	-.066	.04	0	LOCKED	LOCKED
228	23	N23	.081	-.066	-.04	LOCKED	LOCKED	0
229	23	Totals:	.192	1.534	0			
230	23	COG (ft):	X: .07	Y: 7.201	Z: 4.279			
231	24	N1	-.171	.303	.009	0	-.016	0
232	24	N2	.075	.413	-.002	0	0	0
233	24	N11	-.289	.741	.065	0	-.048	0
234	24	N12	.095	.496	-.008	0	.002	0
235	24	N26	.032	-.008	.016	LOCKED	0	LOCKED
236	24	N24	.274	-.291	-.137	LOCKED	0	LOCKED
237	24	N25	.037	-.015	.019	0	LOCKED	LOCKED



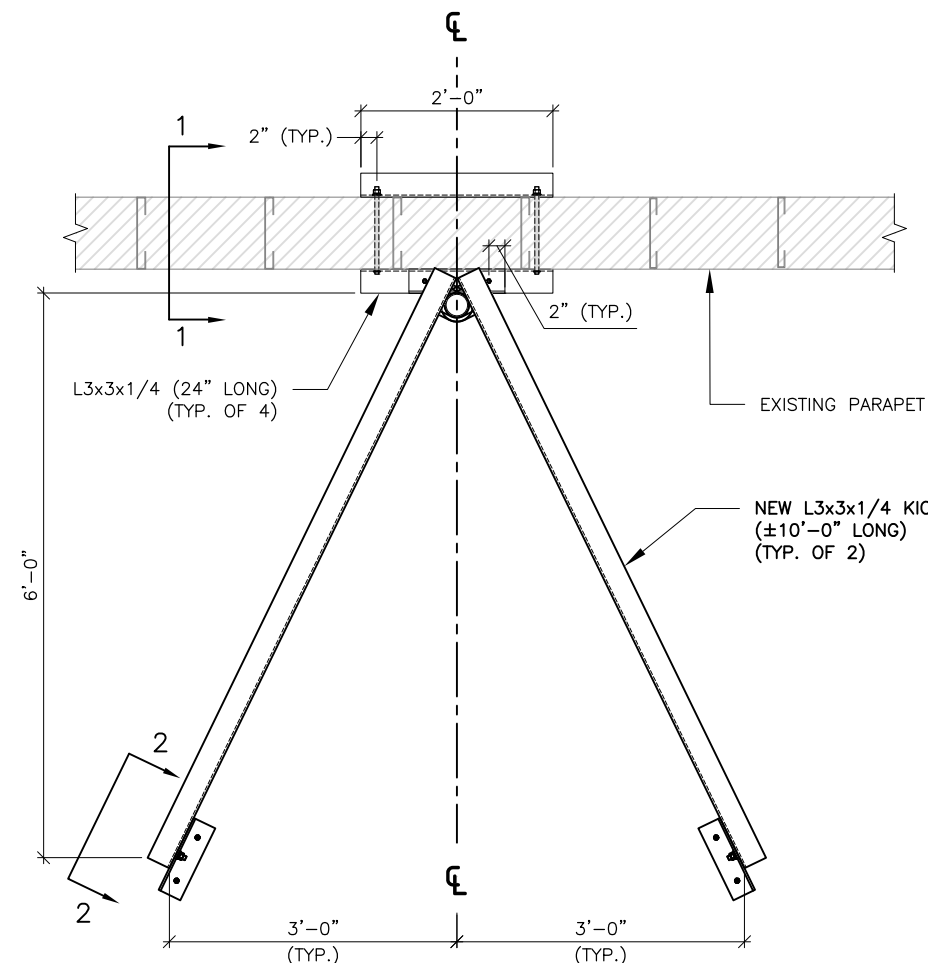
Joint Reactions (Continued)

LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
238	24 N23	.115	-1.105	-.057	LOCKED	LOCKED	0
239	24 Totals:	.166	1.534	-.096			
240	24 COG (ft):	X: .07	Y: 7.201	Z: 4.279			
241	25 N1	-.161	.292	.016	0	-.027	0
242	25 N2	.07	.391	-.004	0	.001	0
243	25 N11	-.239	.701	.113	0	-.084	0
244	25 N12	.083	.436	-.014	0	.003	0
245	25 N26	-.1	.145	-.05	LOCKED	0	LOCKED
246	25 N24	.32	-.344	-.16	LOCKED	0	LOCKED
247	25 N25	-.006	.035	-.003	0	LOCKED	LOCKED
248	25 N23	.129	-.122	-.064	LOCKED	LOCKED	0
249	25 Totals:	.096	1.534	-.166			
250	25 COG (ft):	X: .07	Y: 7.201	Z: 4.279			

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

Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc...	phi*Pnt...	phi*Mn...	phi*Mn...	Cb	Eqn	
1	M7	PIPE 3.0	.453	6.5	11	.122	8.125	11	26.387	65.205	5.749	5.749	2...	H1-1b	
2	M14	L3X3X4	.380	5.05	12	.002	0	y	1	8.225	46.656	1.688	2.83	1...	H2-1
3	M13	L3X3X4	.380	4.646	4	.002	0	y	1	8.225	46.656	1.688	2.83	1...	H2-1
4	M20	PIPE 2.0	.215	4.063	8	.112	4.063	11	9.837	32.13	1.872	1.872	2...	H1-1b	
5	M16	L3X3X4	.134	5.05	12	.002	0	y	1	8.225	46.656	1.688	2.83	1...	H2-1
6	M15	L3X3X4	.134	4.646	4	.002	9.695	y	1	8.225	46.656	1.688	2.83	1...	H2-1

CHECKED BY:	ST		
APPROVED BY:	JMB		
REV.	DATE	BY	DESCRIPTION
A	04/14/21	LJ	PRELIMINARY CD
B	05/04/21	LJ	PRELIMINARY CD
D	08/17/21	LJ	PERMIT/CONSTRUCTION

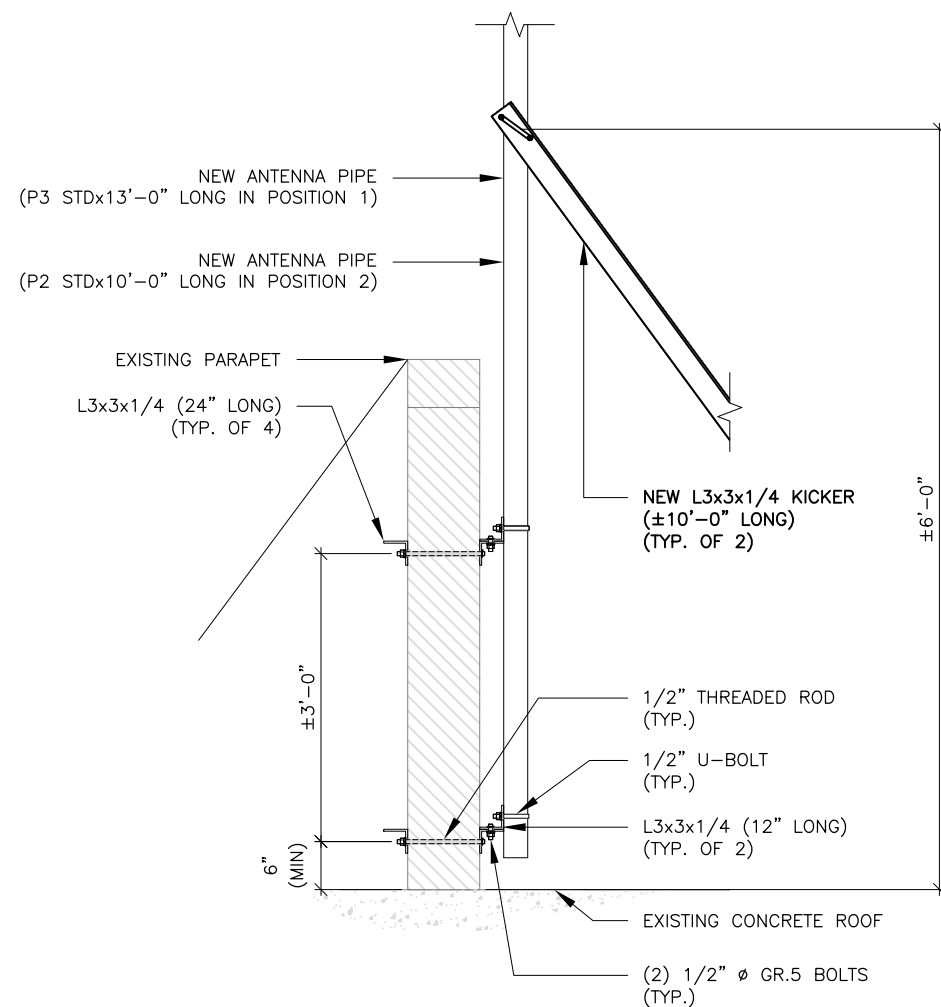


PLAN VIEW

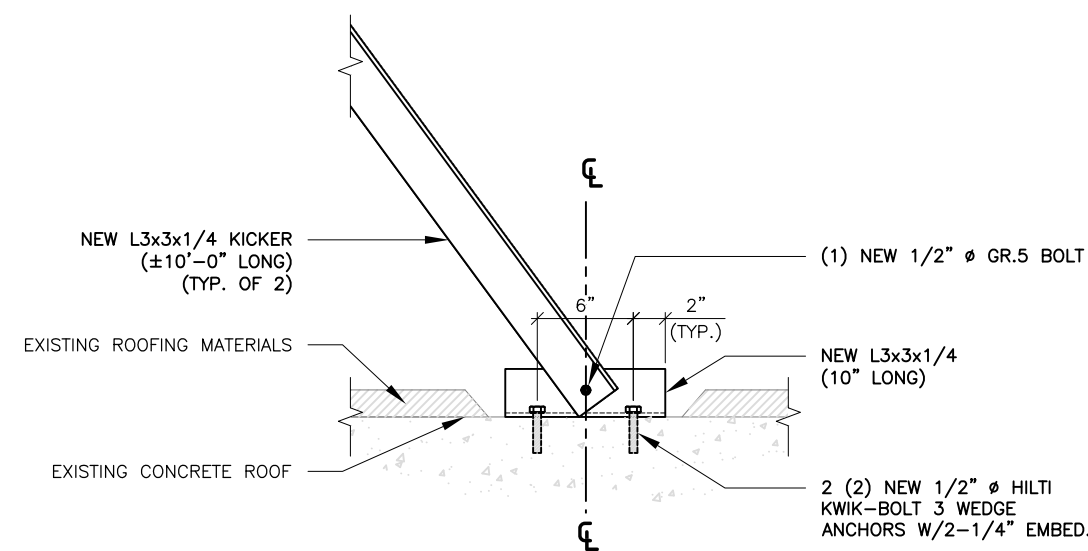
NOTE:
 • ALL BEAMS SHALL BE A53 GRADE B STEEL
 • ALL ANGLES & RODS SHALL BE A36 STEEL
 • ALL STEEL SHALL BE GALVANIZED PER ASTM 123

NOTE:
 CONTRACTOR TO OPEN PARAPET WALL AS NECESSARY
 THEN REPAIR AFTER INSTALLATION

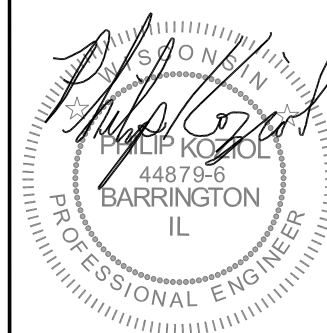
NOTE:
 CONTRACTOR TO OPEN PARAPET WALL AS NECESSARY
 THEN REPAIR AFTER INSTALLATION



SECTION 1 - 1



SECTION 2 - 2



SIGNED: 08/17/21 EXP DATE: 07/31/22

ML22218E
 SHOREHAVEN RT
 1306 W. WISCONSIN AVE.
 OCONOMOWOC, WI 53066

SHEET TITLE
**NEW EQUIPMENT
 SPECIFICATIONS**

SHEET NUMBER

S-1