



ADDENDUM NO. 4

TO: Interested Parties

FROM: Jessica Spring, Project Manager
Division of Engineering

DATE: Tuesday, May 4, 2021

PROJECT: 33/35 WEST WASHINGTON STREET
COMMUNICATION TOWER EXTENSION
COUNTY CONTRACT NO.: MS-CT-083-18

Acknowledge receipt of this **Addendum No. 4** by signing in the space provided below and returning with your Bid.

Failure to sign and return with your Bid may subject the Bidder to disqualification. This **Addendum No. 4** forms a part of the Bid Documents, it supplements and modifies them as outlined herein.

This **Addendum No. 4** consists of **eighty-five (85) pages**, including this page.

I hereby acknowledge receipt of **Addendum No. 4**:

By: _____ Date _____
Signed Name

Typed Name

Title

For (Firm): _____

Phone Number: _____

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ADDENDUM NO. 4

**33/35 WEST WASHINGTON STREET
COMMUNICATION TOWER EXTENSION**

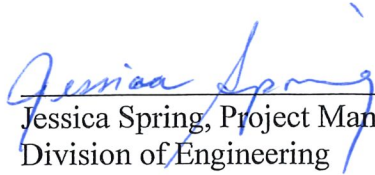
COUNTY CONTRACT NO. MS-CT-083-18

Date Issued: Tuesday, May 4, 2021

Bids Due: Wednesday, May 12, 2021, 2:00 PM EST

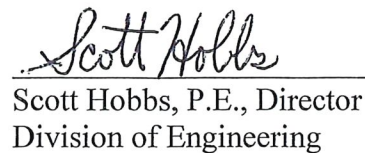
The following addendum material is hereby made a part of the Bid Documents.

Please note the following changes, information, and/or instructions in connection with the proposed work and submit proposals accordingly.



Jessica Spring, Project Manager
Division of Engineering

By Authority of:
Board of County Commissioners
Washington County, Maryland



Scott Hobbs, P.E., Director
Division of Engineering

ADDENDUM NO. 4

33/35 WEST WASHINGTON STREET COMMUNICATION TOWER EXTENSION

COUNTY CONTRACT NO. MS-CT-083-18

TO: All prime Contractors and all others to whom specifications have been issued:

ITEM 4.01 **EXISTING TOWER TYPE:**

The existing tower is a Rohn 55G tower. The proposed extension shall be a Rohn 55G tower section as shown in the Bid Document. Please note that Addendum No. 2, Item 2.02, Q1/R1 incorrectly identified the existing communication tower type as a 45g steel tower.

The photograph copied below was taken on site, looking down at the existing tower base plate which shows "55G".



ITEM 4.02 **PRE-BID QUESTIONS:**

The question period was extended until 4:00 p.m. on Friday, April 30, 2021. The following additional question was submitted via e-mail at: ecbidquestions@washco-md.net; or via Fax at (240) 313-2401:

Q: Is there a requirement to use a particular roofing contractor to handle the roof penetrations and repairs for the tower extension project at 33/35 West Washington Street? I don't see one specified in the invitation to bid, so I assume that we are free to use a qualified contractor with the requisite experience. Can you please confirm for me?

A: There is no requirement to use a particular roofing contractor. Refer to General Condition GC-8.01 Subcontracting as found in the Bid Document.

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COUNTY CONTRACT NO. MS-CT-083-18

ITEM 4.03 **OMIT Q1/R1 FROM ADDENDUM NO. 2, ITEM 2.02 PRE-BID QUESTIONS & RESPONSES, AND REPLACE WITH THE FOLLOWING (UPDATED LANGUAGE IS NOTED IN ITALICS):**

Q1: We have a couple of questions regarding the material. Are you providing the tower, coax and new antennas or do we have to figure that into our cost? The SOW doesn't really say.

R1: The existing communication tower is a Rohn 55G tower. The materials necessary to extend the tower, including but not limited to steel, brackets, *coax feedline/hardline* and anchoring materials, shall be furnished and installed by the contractor.

With the exception of the Telewave ANT150D6-9 antenna as noted below, the feedlines for all existing antennas identified for relocation may be spliced with back-to-back connectors in order to extend the coax. All materials required for coax feedline extension shall be furnished and installed by the contractor.

All new coax feedlines required for added antennas shall be furnished and installed by the contractor. The new feedlines shall extend to the 4th floor server/*radio* room located on the top floor of the building. Access to the server room is available through an existing *Qwikport* located on the rooftop.

The bid document identifies three (3) new antennas and associated mounts to be added to the tower. The two (2) new Diamond antennas will be furnished by the County. Contractor shall furnish mounting hardware. The Telewave ANT150D6-9 antenna is currently on the rooftop and attached to the side of the elevator shaft. The contractor shall relocate this existing antenna onto the tower as noted in the Bid Document. *Before remounting the Telewave ANT150D6-9 onto the extended tower, the Contractor shall remove the existing coax feedline from the antenna surge arrester located in the 4th floor server/*radio* room and replace with all new 7/8" RF feedline.*

All antenna identified by the Bid Document for removal shall be salvaged and returned to the County.

ITEM 4.04 **PLAN MODIFICATIONS:**

Note the following plan modifications:

- a.) The existing feedline for the Telewave ANT150D6-9 antenna shall be removed and replaced with all new 7/8" RF hardline from the 4th floor server/*radio* room to the remounted location as noted in Item 4.03 above.
- b.) The existing coax feedline serving all appurtenance identified in the Bid Document for removal shall be removed by the Contractor with the exception of any appurtenance listed showing a "UHF consolette" frequency. The feedline for all appurtenances showing a "UHF consolette" frequency shall remain in place and be end-capped by the Contractor to waterproof.

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COUNTY CONTRACT NO. MS-CT-083-18

- c.) Appurtenance/Feedline Table, Plan Sheet C-3: Replace this table as shown on existing Plan Sheet C-3 with the updated table provided on page 12/80 of the attached Tower & Building Analysis Report noted in Item 4.05 below.
- d.) Ex Feedline Layout, Plan Sheet S-3: Replace this diagram as shown on existing Plan Sheet S-3 with the updated diagram provided on page 13/80 of the attached Tower & Building Analysis Report noted in Item 4.05 below.
- e.) Prop Feedline Layout, Plan Sheet S-3: Replace this diagram as shown on existing Plan Sheet S-3 with the updated diagram provided on page 14/80 of the attached, updated Tower & Building Analysis Report noted in Item 4.05 below.

ITEM 4.05 **UPDATED TOWER & BUILDING ANALYSIS REPORT (80-PAGES):**

Attached please find an updated Tower & Building Analysis Report dated April 29, 2021. The updated report was prepared due to the Bid Document modifications noted in Item 4.03 and Item 4.04 above.

The loading configuration changes increased the critical demand-capacity ratio slightly but is still within the 5% tolerance allowed per TIA-222-H. There were also some changes required regarding the feedline layout to best minimize the tower loading.

Attachments: Tower & Building Analysis Report dated April 29, 2021 (80 pages)

END OF ADDENDUM NO. 4



Tower &
Building Analysis

West Washington Street

33/35 West Washington Street
Hagerstown, Maryland 21740
(Washington County)
Proposed Tower Extension & Appurtenance Relocation

April 29, 2021

Revision 2

Prepared For:

Wallace, Montgomery & Associates, LLP
10150 York Road
Hunt Valley, Maryland 21030

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
License No. 32384, Expiration Date: November 10, 2021.

MRA Job Number: 21018.001

**Extended Tower &
Existing Building:**

Result of Analysis: Failing

**Extended Tower Critical
Demand- Capacity Ratio: 228%**

**Existing Building Critical
Demand- Capacity Ratio: 139%**

**Extended Tower &
Existing Building:**

Result of Analysis: Passing

**Extended Tower Critical
Demand- Capacity Ratio: 105%**

**Existing Building Critical
Demand- Capacity Ratio: 102%**



MORRIS & RITCHIE ASSOCIATES, INC.

ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS,
AND LANDSCAPE ARCHITECTS



April 29, 2021

Mr. David A. LaBella, P.E.
Vice President
Wallace, Montgomery & Associates, LLP
10150 York Road
Hunt Valley, Maryland 21030

Re: West Washington Street
33/35 West Washington Street
Hagerstown, Washington County, Maryland 21740
Latitude: 39° 38' 32.14" N, Longitude: 77° 43' 17.34" W
MRA Job No. 21018.001
Structural Analysis for Proposed Tower Extension & Appurtenance Relocation – Revision 2

Dear Dave:

As requested, Morris & Ritchie Associates, Inc. (MRA) has completed our structural analysis of the proposed 40' tower extension atop an existing 70' guyed rooftop tower and its supporting building structure at the above referenced site. The objective of MRA's analysis was to determine if the existing rooftop tower, tower base, guy anchors, and supporting building structure can structurally support the proposed 40' tower extension, additional guy wire hardware / attachments, proposed Washington County installation / existing appurtenance relocation, in addition to the existing appurtenances, and meet the requirements of the 2018 Building Code of Washington County (2018 International Building Code [IBC] with Amendments), the ANSI/TIA-222-H-2017 Standard (2nd Printing), and the AISC Manual of Steel Construction, Load and Resistance Factored Design.

The structural analysis of the tower, tower base, guy anchors, and supporting building structure have been based upon the following information:

- Tower / building modification design drawings, prepared by MRA for the proposed Washington County installation, Revision 1, MRA Project No.: 21018.001, to be completed in near future.
- Appurtenance list markup, prepared by representative of Washington County Maryland's Division of Engineering, provided to MRA via email on April 22, 2021.
- Appurtenance list markup and explanation, prepared by representatives of Washington County Maryland's Division of Engineering, provided to MRA via email on October 30, 2020.
- Original tower base and guy anchor support design sketches, prepared by C.O.B., Sheets 1 thru 3, undated, provided to MRA via email on October 5, 2020.
- Original guyed tower elevation sketches and calculations, presumably also prepared by C.O.B., undated, provided to MRA via email on October 5, 2020.
- Photos and information from site visit performed by MRA, dated July 2, 2020.
- Structural design drawings for building alterations/modifications, entitled, "District Court (Former Montgomery Ward Building)", prepared by Consulting Engineer, Inc., Job #: 74-1, Sheets S-1 thru S-4, dated August 12, 1974.

1220-C East Joppa Road, Suite 505, Towson, MD 21286 (410) 821-1690 Fax: (410) 821-1748 www.mragta.com

Abingdon, MD ♦ Baltimore, MD ♦ Laurel, MD ♦ Towson, MD ♦ Georgetown, DE ♦ New Castle, DE ♦ Leesburg, VA ♦ Raleigh, NC
(410) 515-9000 (410) 935-5050 (410) 792-9792 (410) 821-1690 (302) 855-5734 (302) 326-2200 (703) 994-4047 (984) 200-2103

For a complete list of all existing, relocated and proposed appurtenances used in this analysis, refer to the table on page 4, appended to this report. All appurtenances listed as “to be removed” shall be removed from the tower prior to the relocation of any existing appurtenances or installation of any proposed appurtenances. Several assumptions were made in order to perform the analysis. Each of these is considered by MRA to be both reasonable and consistent with current standards of practice.

- All tower and building structure information and existing loading was obtained from the original design drawings and/or documents described in the information provided above, and is assumed to be accurate. MRA did not perform a tower mapping for the current analysis.
- The tower was manufactured and constructed in accordance with the referenced Rohn drawings / information provided.
- Material properties for the original tower design are in accordance with ROHN standard fabrication practice ($F_y = 50$ ksi for pipes and $F_y = 36$ ksi for all bracing members and plates).
- The tower base and guy anchor supports were constructed in accordance with the referenced details prepared by C.O.B.
- All steel members used for the tower base and guy anchor supports were constructed with steel that has a minimum yield strength (F_y) of 36 ksi.
- All connection bolts are constructed with steel conforming to ASTM F3125, Grade A325.
- All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
- All guy wires are ASTM A475 type EHS.
- The guys are pretensioned to 10% of their published breaking strength.
- All existing building steel members were constructed with steel conforming to ASTM A7 ($F_y = 33$ ksi). ASTM A7 steel was commonly used in 1936, the year in which the building structure was built.
- All guy anchor support beam sizes were assumed based on the partial structural plans provided in the referenced structural design drawings. We will require the contractor performing the tower modification work to verify the size in the field prior to modifying the tower to ensure the building's structural capacity is not exceeded.
- Guy anchor's A and B support beams are anchored to the existing 16" thick multi-wythe masonry bearing wall at the bottom flange of the existing beams. The masonry wall is assumed to have a density of 120 pounds per cubic foot and will act monolithically when the support beams undergo uplift. Similar to the above assumption, we will require the contractor to field verify the connection end connection at the bearing wall in the field prior to modifying the tower.
- The assumed feedline configuration considered in the analysis is summarized in the appurtenance list on pages 4, 5a and 5b, appended to this report.
- The antenna configuration is as supplied and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
- Some assumptions are made regarding antennas and mount sizes and their projected areas based on best interpretation of data supplied and of best knowledge of antenna type and industry practice.
- The tower, tower base, and guy anchors have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
- The analysis provided in this report only addresses the capacity of the tower, tower base, guy anchors, and supporting building structure; capacities of individual standoffs, mounting frames, etc. are not included in this analysis and are assumed to have adequate capacity to resist loads applied by the appurtenances they support.
- Any and all documentation regarding any previous tower, tower base, guy anchor, and/or supporting building structure modifications has been provided to MRA.

The results of this analysis are influenced by the assumptions listed above. MRA should be notified of any additional information that potentially contradicts the above assumptions to determine the effect on the analysis results.

The wind speed required by TIA-222-H for this specific location and risk category is an ultimate 3-second gust wind speed (V_{ult}) of 119 mph. The TIA-222-H Standard, which incorporates the latest wind speed and radial ice thickness maps from ASCE 7-16, states in Section 2.6.4 that, "It shall be permissible to determine site-specific basic wind speeds and design ice thicknesses from the ASCE 7 online Hazard tool based on ASCE 7-16" to assist in automated interpolation of the wind speed and radial ice thickness maps provided in Annex B of TIA-222-H.

Due to lack of detailed information provided in TIA-222-H, MRA used the provisions of ASCE 7-16 Chapter C26.7 for exposure category determination. In addition, since TIA-222-H does not recognize wind sectors, but rather defines a wind exposure category for the entire site for all wind directions, it is MRA's professional opinion that a sector of 45 degrees or more of a specific surface roughness, evaluated throughout the extended upwind fetch (greater of 20 times the height of the tower and 2,600 ft), be used for determining the overall site exposure category. Based on this evaluation, we determined that this site is Exposure Category B.

Since this structure represents a substantial risk to human life and/or damage to surrounding facilities in the event of failure and is used for essential communications, we have determined this tower to be a Risk Category III structure. Additionally, because the structure is Risk Category III, Existing Structure Load Modification Factors, K_{es} , may not be utilized.

Based on the surrounding topography using satellite imagery and guidelines provided in TIA-222-H, the Topographic Category was determined to be Category 1 due to no abrupt changes in the general topography.

The building is, neither isolated and unobstructed for a continuous 90-degree quadrant by other buildings of comparable height for a distance from the windward wall equal to 2,600 ft or 20 times height of the building nor protrudes 50 ft above the average height of immediately adjacent buildings in a continuous 90-degree quadrant. Based on this assessment, we have determined the rooftop wind speed-up factor (K_s) to be 1.0.

In addition to wind and ice, TIA-222-H requires consideration of earthquake loading effects based on site-specific seismic parameters, aside from Risk Category I structures (earthquake effects could be ignored if S_s was less than or equal to 1.00 in the TIA-222-G Standard).

Since the soil properties are not known in sufficient detail to determine the site-specific site class, the default Site Class D was used.

In accordance with TIA-222-H, the following loading conditions were considered:

Basic Wind Speed without Ice:	119 mph Wind (3-second gust) + No Ice
Basic Wind Speed with Ice:	40 mph Wind (3-second gust) + 1" Radial Ice
Exposure Category:	B
Risk Category:	III
Topographic Category:	1
Spectral Response Accelerations:	$S_s = 0.122g$ & $S_1 = 0.042g$
Site Class:	D (by default)
Seismic Response Coefficient:	0.163g
Ground Elevation (AMSL):	543 ft

The total weight of the existing / proposed structure and existing / proposed appurtenances (W) times the seismic response coefficient (C_s) is considerably smaller than the effective projected wind area (EPA) times the wind pressure ($q_z G_h$); therefore, by inspection, we have determined a complete detailed seismic analysis of the existing / proposed structure is not necessary as wind loading effects will vastly exceed earthquake loading effects.

As described in the referenced document from Washington County Maryland's Division of Engineering, the existing rooftop guyed tower has been analyzed for a proposed 40' tower extension, in addition to the removal, relocation, and installation of several appurtenances and their associated mounts and feedlines. Due to the existing guy anchors having limitations in their reserve uplift capacity and after some preliminary analysis, it was determined the best and most viable option for the tower extension was to provide new guy wires near the top of the structure and attach these new guy wires to new guy anchors located atop existing building columns. The new anchors atop the existing building columns will provide the structural resistance required to support these new guy wire uplift and shear forces.

In addition to the new tower extension and guy anchors, one structural component of the existing tower will now be overloaded. Therefore, in order to strengthen the existing structure to the point that it can safely support the proposed tower extension and appurtenance alternations, the existing tower will require structural modifications. The member exhibiting overload and its recommended modification is as follows:

**TOWER MODIFICATION TABLE					
MEMBER TYPE	ELEVATION (ARL)	MEMBER SIZE	DEMAND-CAPACITY RATIO BEFORE MODIFICATION	MODIFICATION	DEMAND-CAPACITY RATIO AFTER MODIFICATION
Tower Base	2'	1/4" Thick Steel Plate	228%	Provide Stiffener Angles Around Perimeter of Base Plate	<<100%

**** Please note that modifications at the existing guy anchor locations may be required based upon the contractor's field verified information, as described in the assumptions listed above.**

As a result of our tower analysis, we have determined the following in regards to the tower structure, tower base, and guy anchors, after the new tower extension, new guy anchors / wires, and existing base plate modifications have been installed:

CRITICAL TOWER COMPONENT (INCLUDING CONNECTIONS)	DEMAND-CAPACITY RATIO
Legs	85%
Diagonals	105%
Horizontals / Girts	34%
Guy Pull-Off	9%
Guy Wires	75%
Modified Tower Base	<<100%
Existing Guy Anchor Support Posts	82%
New Guy Anchor Support Posts	51%

In addition, as a result of our building analysis, we have determined the following in regards to the existing building structure, after the new tower extension, new guy anchors / wires, and existing base plate modifications have been installed:

CRITICAL BUILDING COMPONENT	DEMAND-CAPACITY RATIO
Existing Guy Anchor A Support Beam	85%
Existing Guy Anchor A Wall Uplift	~102%
Existing Guy Anchor B Support Beam	80%
Existing Guy Anchor B Wall Uplift	~102%
Existing Guy Anchor C Support Frame	94%

As stated in TIA-222-H, the standard allows a comprehensive structural analysis to be limited to a maximum demand-capacity ratio of 105%. This is primarily due to the statistical probability of attaining the maximum wind loading condition, the variability associated with non-linear analysis, and the conservatism in the wind load calculations from the standard.

We would like to note that the “Existing Guy Anchor Wall Uplift” Demand-Capacity Ratios in the table above are dependent on assumptions, previously defined, and are critical to the structural integrity of the proposed tower and building structure. Therefore, we’d like to stress that the awarded contractor to complete the proposed work involving, but not limited to, installing additional tower section, new guy wire anchors, guy wire re-tensioning, etc. shall field verify existing tower and building conditions prior to the start of construction and before ordering any new parts / hardware to ensure the tower and building assumptions contained herein are acceptable and to ensure the structural integrity of the tower and building structure. In addition, the contractor shall provide all of this information to the structural engineer of record prior to the start of construction and before ordering any new parts / hardware.

Upon complete installation of the new tower extension, new guy anchors / wires, and existing base plate modifications, in the professional opinion and judgment of MRA, the modified tower, tower base, guy anchors, and supporting building structure will have sufficient structural capacity to support the proposed Washington County installation / existing appurtenance relocation, in addition to the existing appurtenances. No problems for the modified tower, tower base, guy anchors, or its supporting building structure are anticipated.

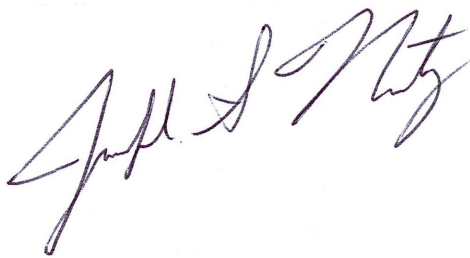
To ensure that the new tower extension, new guy anchors / wires, and existing base plate modifications are properly staged, sequenced, and installed, we recommend a rigging plan be developed in accordance with the TIA-322 Standard for "Loading, Analysis, and Design Criteria Related to the Installation, Alteration and Maintenance of Communication Structures" with a qualified engineer and qualified person.

Following this analysis, MRA will provide detailed construction documents for the new tower extension, new guy anchors / wires, and existing base plate modifications, which may be used for bidding, permitting, and construction.

Any further changes to the antenna configuration or other appurtenances should be reviewed with respect to their effect on structural loads prior to implementation.

We appreciate the opportunity to be of service on this project. If you should have any questions or require any additional information, please do not hesitate to call our office.

Sincerely,
MORRIS & RITCHIE ASSOCIATES, INC.



Joseph S. Novotny, P.E., S.E.
Structural Engineer



Richard J. Dyer, P.E., S.E., S.E.C.B.
Principal

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
License No. 32384, Expiration Date: November 10, 2021

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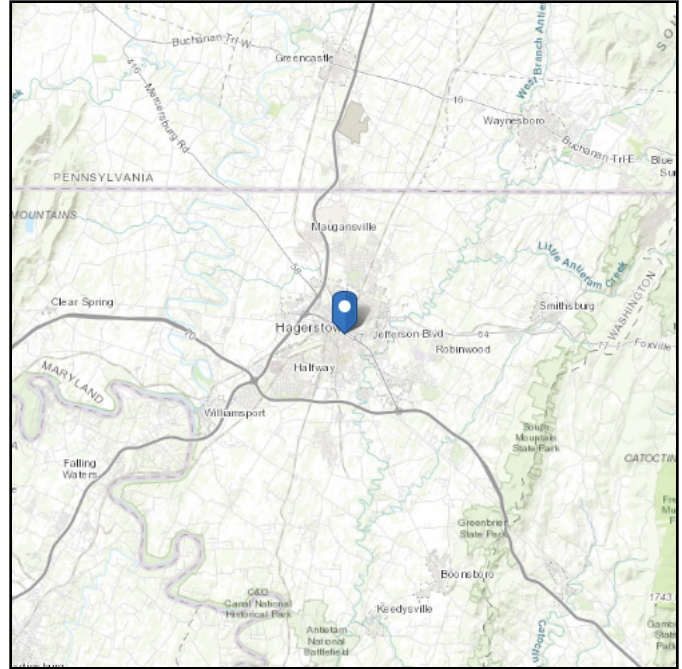
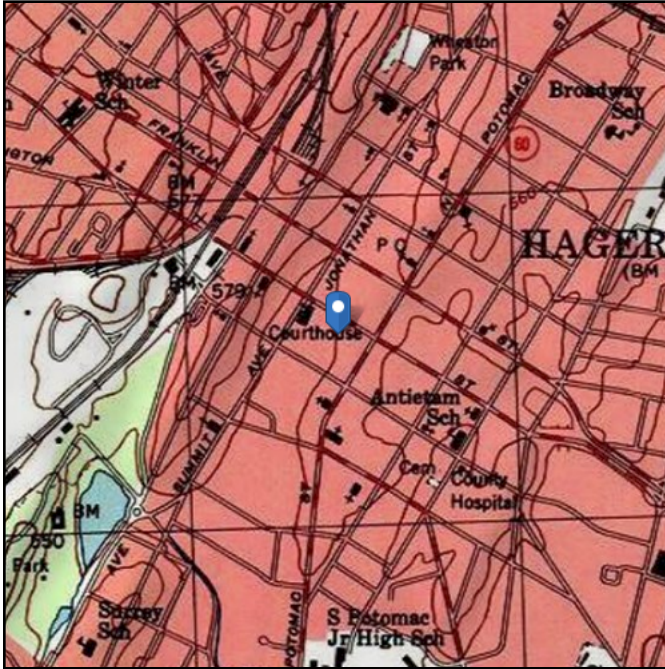


ASCE 7 Hazards Report

Address:
35 W Washington St
Hagerstown, Maryland
21740

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: D - Default (see
Section 11.4.3)

Elevation: 543.28 ft (NAVD 88)
Latitude: 39.64214
Longitude: -77.72155



Wind

Results:

Wind Speed:	119 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1C and Figs. CC.2-1–CC.2-4

Date Accessed: Mon Nov 16 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

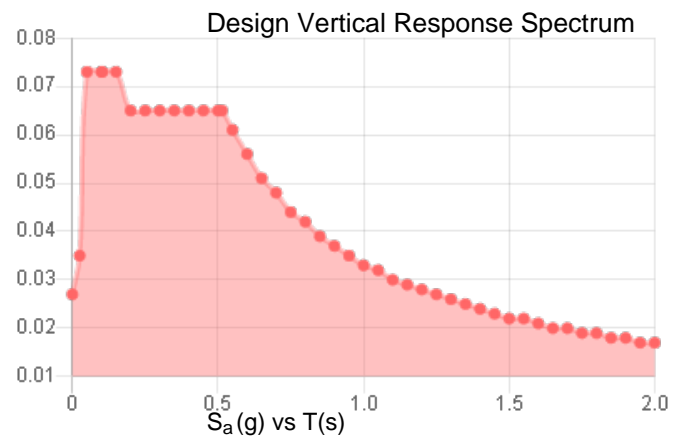
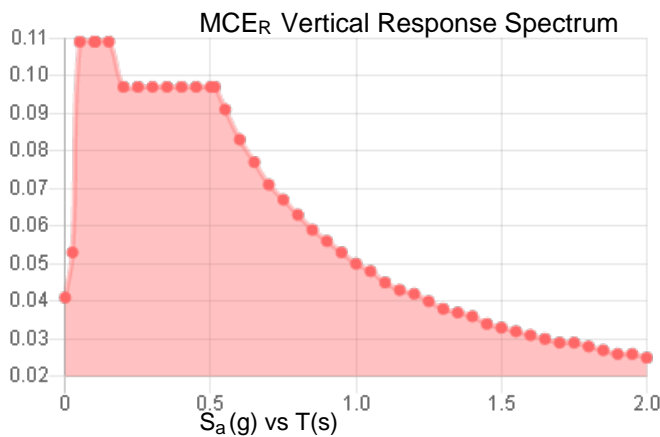
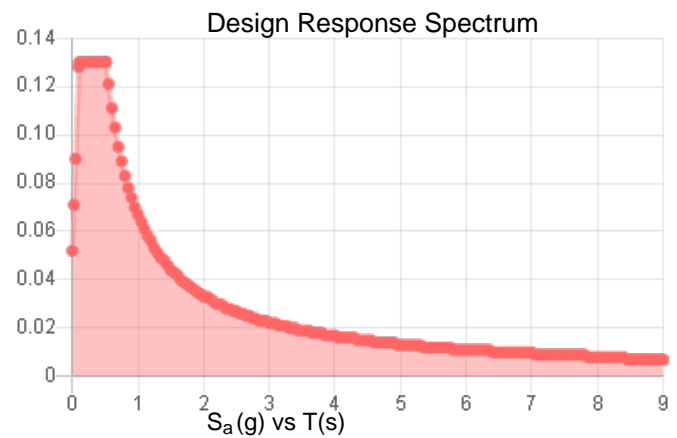
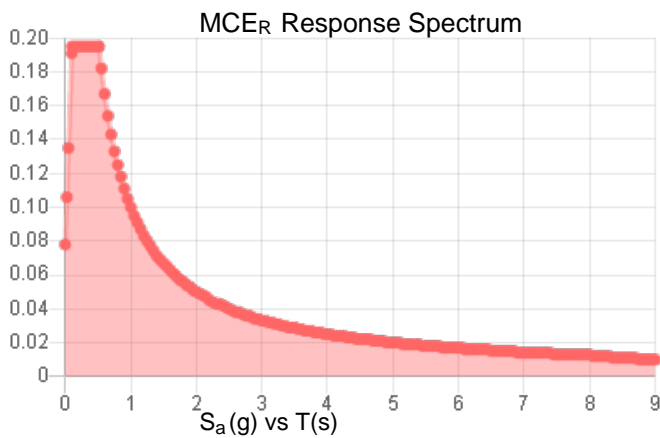
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_s :	0.122	S_{D1} :	0.067
S_1 :	0.042	T_L :	8
F_a :	1.6	PGA :	0.062
F_v :	2.4	PGA _M :	0.099
S_{MS} :	0.195	F_{PGA} :	1.6
S_{M1} :	0.1	I_e :	1.25
S_{DS} :	0.13	C_v :	0.7

Seismic Design Category A



Data Accessed: Mon Nov 16 2020
Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.



Ice

Results:

Ice Thickness: 1.00 in.

Concurrent Temperature: 15 F

Gust Speed: 40 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Mon Nov 16 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.



Morris and Ritchie Associates
1220-C East Joppa Road, Suite 505
Towson, Maryland 21286
(410) 821-1690
(410) 821-1748 (fax)

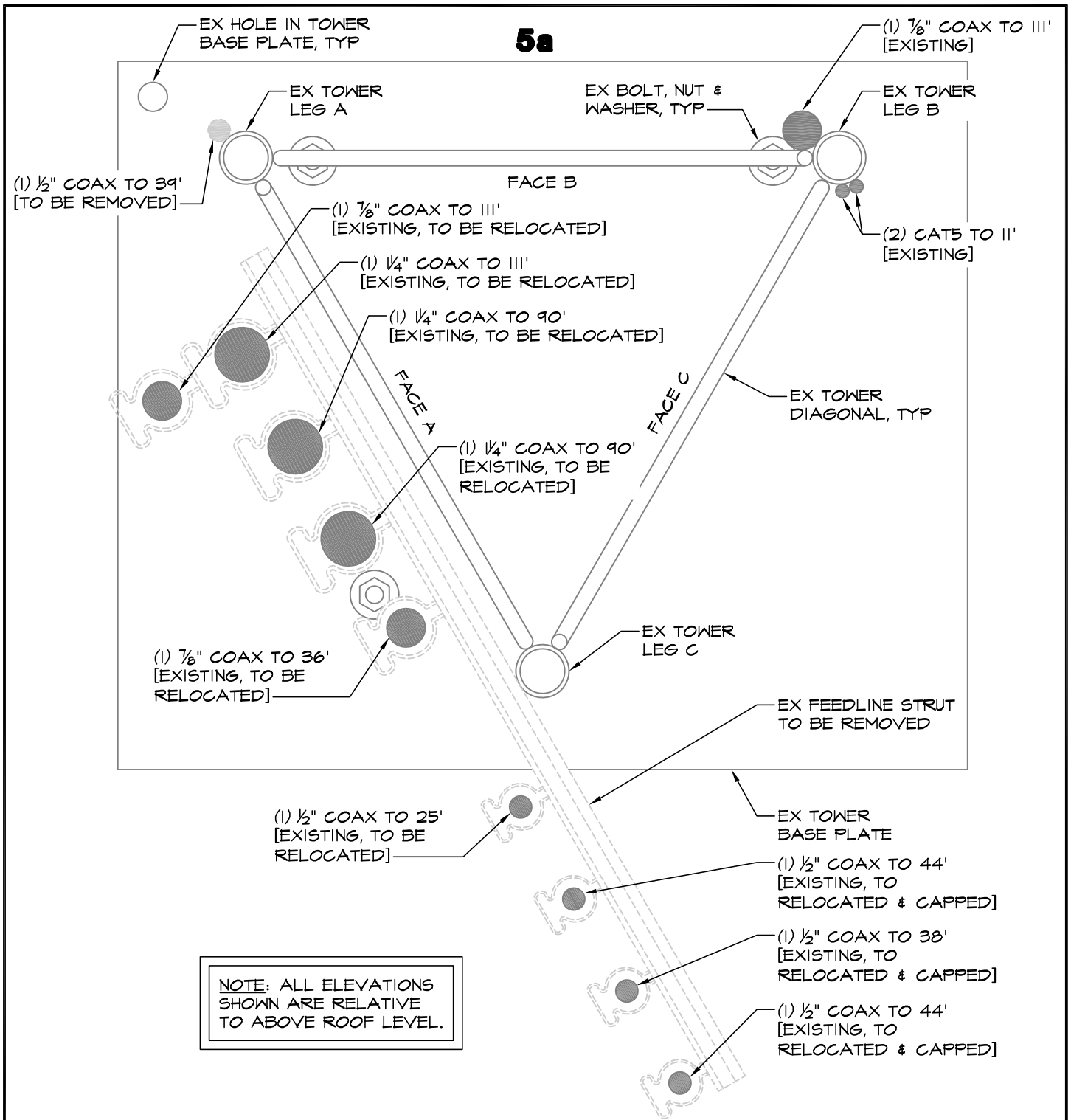
Project Name: West Washington Street
Project Location: Hagerstown, Washington County, Maryland

LEGEND
Existing
To Be Removed
Proposed
Existing / Relocated

APPURTENANCES

* Appurtenance types and elevations are approximations used for obtaining gravity & wind loads only. *

Appurtenance	Frequency	Approximate Elevation (Above Base of Tower)	Approximate Elevation (Above Grade Level)	Mount	Feedline Size	Installation Status	Tower Leg / Face
(1) Laird Technologies "Ringo" BR3	33.86 MHz	108' (Base)	154' (Base)	(1) 2' Side Arm	(1) 7/8" Coax (Band Mounted to Leg B)	Existing / Relocated	Leg A
(1) CommScope DB420-B (or Similar)	450-470 MHz			Direct	(1) 1-1/4" Coax (Band Mounted to Leg B)		Leg B
(1) Andrew ASP-705	450-470 MHz			(1) 3' Side Arm	(1) 7/8" Coax (Band Mounted to Leg B)		Leg C
(1) Telewave ANT150D6-9	138-174 MHz	100' (Base)	146' (Base)	(3) 3' Side Arms (or Similar)	(3) CommScope LDF5-50A ((1) Band Mounted to Leg A & (2) Band Mounted to Leg C)	Proposed (Relocated From Elevator Shaft)	Leg B
(1) Diamond X50A	450 MHz					Proposed	Leg A
(1) Diamond X50C2	450 MHz					Proposed	Leg A
(2) Andrew ASP-705	450-470 MHz	90' (Base)	136' (Base)	(2) 3' Side Arms	(2) 1-1/4" Coax (Band Mounted to Leg B)	Existing / Relocated	Legs A & C
(2) 4' Omni Antennas	UHF Consolettes	41' (Base)	87' (Base)	(2) 3' Side Arms	(2) 1/2" Coax to Remain (Band Mounted to Leg C / Cap End of Coax to Water Proof)	To Be Removed	Legs A & C
(1) 2' Dish w/o Radome	Unknown	36' (CL)	82' (CL)	Direct	(1) 1/2" Coax	To Be Removed	Leg B
(1) 4' Omni Antenna	UHF Consolette	35' (Base)	81' (Base)	(1) 3' Side Arm	(1) 1/2" Coax to Remain (Band Mounted to Leg C / Cap End of Coax to Water Proof)	To Be Removed	Leg C
(1) TMA	Unknown	34' (CL)	80' (CL)	Direct	(1) 1/2" Coax [Shared With Dish Above]	To Be Removed	Leg B
(1) 10' Omni Antenna	453.65 MHz	33' (Base)	79' (Base)	(1) 2' Side Arm	(1) 7/8" Coax (Band Mounted to Leg C)	Existing	Leg B
(1) Laird Technologies "Ringo" BR3	33.86 MHz	22' (Base)	68' (Base)	(1) 3' Side Arm	(1) 1/2" Coax (Band Mounted to Leg C)	Existing	Leg A
(1) 30"x8"x4" Panel Antenna	LG WiFi	8' (CL)	54' (CL)	(1) 1' Side Arm	(2) Cat5 Cables [Direct From Rooftop Cable Tray]	Existing	Leg B
(1) TMA		7' (CL)	53' (CL)	Direct			Leg B
(1) Tower Climber Warning Sign	N/A	3' (CL)	49' (CL)			N/A	Existing



EXISTING FEEDLINE LAYOUT

SCALE: 3" = 1'-0"



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Towson, Maryland 21286
(410) 821-1690
Fax (410) 821-1748

WEST WASHINGTON STREET

33/35 WEST WASHINGTON STREET
HAGERSTOWN, MARYLAND 21740
(WASHINGTON COUNTY)

SCALE:

AS NOTED

DATE:

4/29/21

DRAWN BY:

JSN

DESIGN BY:

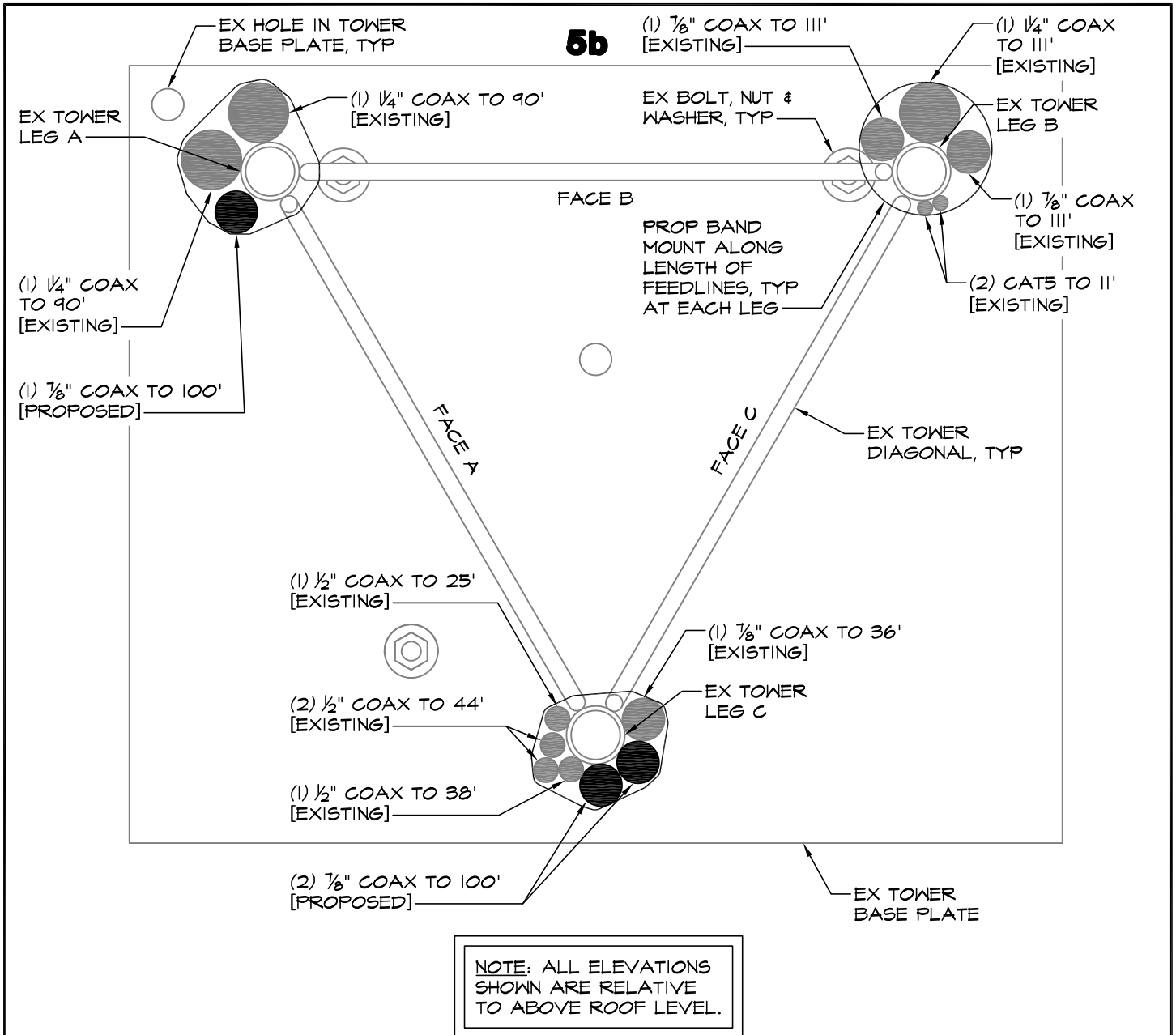
JSN

REVIEW BY:

RJD

JOB NO.:

21018.001



PROPOSED FEEDLINE LAYOUT

SCALE: 3" = 1'-0"



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Towson, Maryland 21286
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Fax (410) 821-1748

WEST WASHINGTON STREET

33/35 WEST WASHINGTON STREET
HAGERSTOWN, MARYLAND 21740
(WASHINGTON COUNTY)

SCALE: AS NOTED	DATE: 4/29/21	DRAWN BY: JSN	DESIGN BY: JSN	REVIEW BY: RJD	JOB NO.: 21018.001
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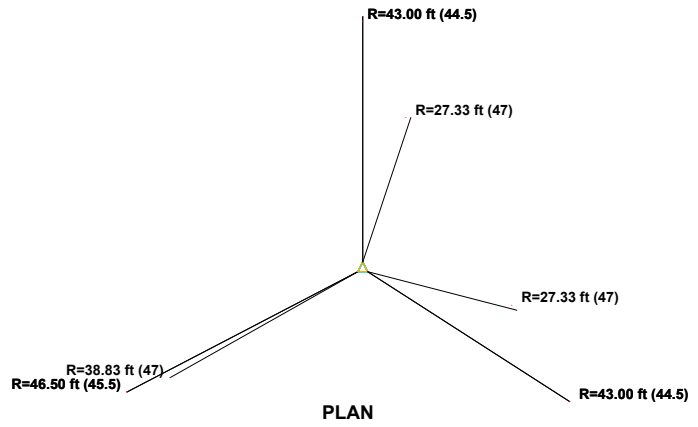


TOWER **ANALYSIS**

1220-C East Joppa Road, Suite 505, Towson, MD 21286 (410) 821-1690 Fax: (410) 821-1748 www.mragta.com

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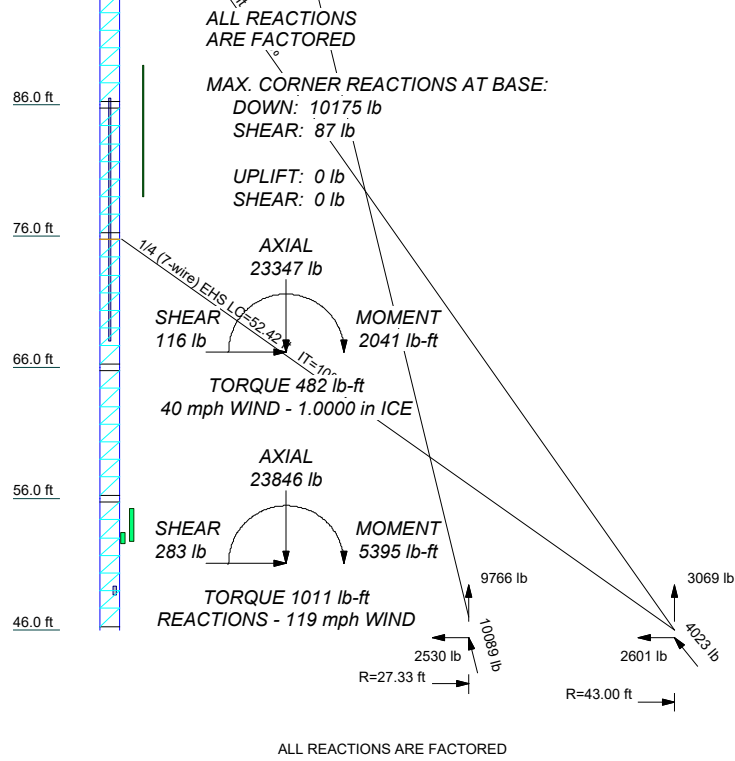
Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	
Legs												
Leg Grade												
Diagonals												
Diagonal Grade												
Top Girts												
Bottom Girts												
Horizontals												
Top Guy Pull-Offs												
# Panels @ (ft)												
Weight (lb)												




MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

- TOWER DESIGN NOTES**
1. Tower is located in Washington County, Maryland.
 2. Tower designed for Exposure B to the TIA-222-H Standard.
 3. Tower designed for a 119 mph basic wind in accordance with the TIA-222-H Standard.
 4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
 5. Deflections are based upon a 60 mph wind.
 6. Tower Risk Category III.
 7. Topographic Category 1 with Crest Height of 0.00 ft
 8. TOWER RATING: 105.3%



 <p>Morris & Ritchie Associates, Inc. 1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</p>	Job: West Washington Street - 110' Guyed Tower		
	Project: 21018.001		
	Client: Wallace, Montgomery & Associates, LLP	Drawn by: Joseph S. Novotny	App'd:
	Code: TIA-222-H	Date: 04/28/21	Scale: NTS
	Path:		Dwg No. E-1

<i>tnxTower</i> <i>Morris & Ritchie Associates, Inc.</i> <i>1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</i>	Job West Washington Street - 110' Guyed Tower	Page 7
	Project 21018.001	Date 22:25:13 04/28/21
	Client Wallace, Montgomery & Associates, LLP	Designed by Joseph S. Novotny

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 156.00 ft above the ground line.

The base of the tower is set at an elevation of 46.00 ft above the ground line.

The face width of the tower is 1.58 ft at the top and 1.58 ft at the base.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

Tower is located in Washington County, Maryland.

Tower base elevation above sea level: 589.00 ft.

Basic wind speed of 119 mph.

Risk Category III.

Exposure Category B.

Simplified Topographic Factor Procedure for wind speed-up calculations is used.

Topographic Category: 1.

Crest Height: 0.00 ft.

Nominal ice thickness of 1.0000 in.

Custom ice parameters have been used.

* Ice thickness multiplier: 1.000.

Ice density of 56 pcf.

A wind speed of 40 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

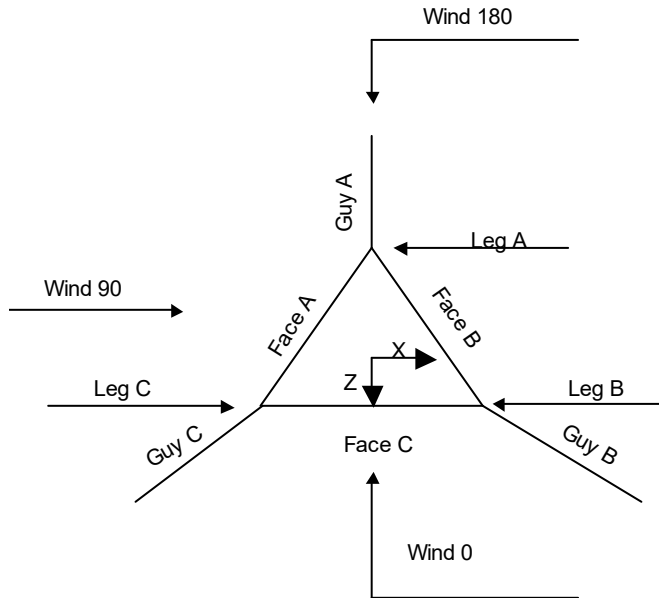
Pressures are calculated at each section.

Stress ratio used in tower member design is 1.

Safety factor used in guy design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

<p>tnxTower</p> <p><i>Morris & Ritchie Associates, Inc.</i></p> <p>1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</p>	Job West Washington Street - 110' Guyed Tower	Page 8
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Corner & Starmount Guyed Tower

Tower Section Geometry

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Assembly Database</i>	<i>Description</i>	<i>Section Width</i>	<i>Number of Sections</i>	<i>Section Length</i>
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	156.00-146.00			1.58	1	10.00
T2	146.00-136.00			1.58	1	10.00
T3	136.00-126.00			1.58	1	10.00
T4	126.00-116.00			1.58	1	10.00
T5	116.00-106.00			1.58	1	10.00
T6	106.00-96.00			1.58	1	10.00
T7	96.00-86.00			1.58	1	10.00
T8	86.00-76.00			1.58	1	10.00
T9	76.00-66.00			1.58	1	10.00
T10	66.00-56.00			1.58	1	10.00
T11	56.00-46.00			1.58	1	10.00

Tower Section Geometry (cont'd)

tnxTower Morris & Ritchie Associates, Inc. 1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748	Job	West Washington Street - 110' Guyed Tower	Page	9
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Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	156.00-146.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T2	146.00-136.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T3	136.00-126.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T4	126.00-116.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T5	116.00-106.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T6	106.00-96.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T7	96.00-86.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T8	86.00-76.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T9	76.00-66.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T10	66.00-56.00	1.35	Z Brace	No	Yes	3.0938	3.3750
T11	56.00-46.00	1.35	Z Brace	No	Yes	3.0938	3.3750

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 156.00-146.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T2 146.00-136.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T3 136.00-126.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T4 126.00-116.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T5 116.00-106.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T6 106.00-96.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T7 96.00-86.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T8 86.00-76.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T9 76.00-66.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T10 66.00-56.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)
T11 56.00-46.00	Pipe	ROHN TS1.5x11 ga	A572-50 (50 ksi)	Solid Round	7/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 156.00-146.00	Solid Round	7/16	A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T2 146.00-136.00	Solid Round	7/16	A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T3 136.00-126.00	Solid Round	7/16	A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T4 126.00-116.00	Solid Round	7/16	A36	Solid Round	7/16	A36

<p style="text-align: center;"><i>tnxTower</i></p> <p><i>Morris & Ritchie Associates, Inc.</i> 1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</p>	Job	West Washington Street - 110' Guyed Tower	Page	10
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	Client	Wallace, Montgomery & Associates, LLP	Designed by	Joseph S. Novotny

<i>Tower Elevation</i> <i>ft</i>	<i>Top Girt Type</i>	<i>Top Girt Size</i>	<i>Top Girt Grade</i>	<i>Bottom Girt Type</i>	<i>Bottom Girt Size</i>	<i>Bottom Girt Grade</i>
T5 116.00-106.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36
T6 106.00-96.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36
T7 96.00-86.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36
T8 86.00-76.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36
T9 76.00-66.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36
T10 66.00-56.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36
T11 56.00-46.00	Solid Round	7/16	(36 ksi) A36	Solid Round	7/16	(36 ksi) A36

Tower Section Geometry (cont'd)

<i>Tower Elevation</i> <i>ft</i>	<i>No. of Mid Girts</i>	<i>Mid Girt Type</i>	<i>Mid Girt Size</i>	<i>Mid Girt Grade</i>	<i>Horizontal Type</i>	<i>Horizontal Size</i>	<i>Horizontal Grade</i>
T1 156.00-146.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T2 146.00-136.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T3 136.00-126.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T4 126.00-116.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T5 116.00-106.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T6 106.00-96.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T7 96.00-86.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T8 86.00-76.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T9 76.00-66.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T10 66.00-56.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)
T11 56.00-46.00	None	Flat Bar		A36 (36 ksi)	Solid Round	7/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Morris & Ritchie Associates, Inc.</p> <p style="text-align: center;">1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</p>	<p>Job</p> <p style="text-align: center;">West Washington Street - 110' Guyed Tower</p>	<p>Page</p> <p style="text-align: center;">11</p>
	<p>Project</p> <p style="text-align: center;">21018.001</p>	<p>Date</p> <p style="text-align: center;">22:25:13 04/28/21</p>
	<p>Client</p> <p style="text-align: center;">Wallace, Montgomery & Associates, LLP</p>	<p>Designed by</p> <p style="text-align: center;">Joseph S. Novotny</p>

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
ft	ft ²	in							
T1 156.00-146.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T2 146.00-136.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T3 136.00-126.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T4 126.00-116.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T5 116.00-106.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T6 106.00-96.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T7 96.00-86.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T8 86.00-76.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T9 76.00-66.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T10 66.00-56.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000
T11 56.00-46.00	0.00	0.0000	A36 (36 ksi)	1.02	1.02	1.05	36.0000	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	<i>K Factors</i> ¹							
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace	
											X Y
ft											
T1	Yes	Yes	1	1	1	1	1	1	1	1	1
156.00-146.00				1	1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1	1
146.00-136.00				1	1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1	1
136.00-126.00				1	1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1	1
126.00-116.00				1	1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1	1
116.00-106.00				1	1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1	1
106.00-96.00				1	1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1	1
96.00-86.00				1	1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1	1
86.00-76.00				1	1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1	1
76.00-66.00				1	1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1	1
66.00-56.00				1	1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1	1
56.00-46.00				1	1	1	1	1	1	1	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

tnxTower Morris & Ritchie Associates, Inc. 1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748	Job West Washington Street - 110' Guyed Tower	Page 13
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	Client Wallace, Montgomery & Associates, LLP	Designed by Joseph S. Novotny

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 156.00-146.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T2 146.00-136.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T3 136.00-126.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T4 126.00-116.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T5 116.00-106.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T6 106.00-96.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T7 96.00-86.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T8 86.00-76.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T9 76.00-66.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T10 66.00-56.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T11 56.00-46.00	Sleeve DS	0.4375 A325N	4	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L _u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
155.742	EHS	A 1/2 (7-wire)	2690.00	10%	23000	0.517	111.83	27.33	18.0000	47.00	100%
		B 1/2 (7-wire)	2690.00	10%	23000	0.517	111.82	27.33	-15.0000	47.00	100%
		C 1/2 (7-wire)	2690.00	10%	23000	0.517	115.07	38.83	0.0000	47.00	100%
105.742	EHS	A 1/4 (7-wire)	665.00	10%	23000	0.121	74.25	43.00	0.0000	44.50	100%
		B 1/4 (7-wire)	665.00	10%	23000	0.121	74.25	43.00	3.0000	44.50	100%
		C 1/4 (7-wire)	665.00	10%	23000	0.121	75.48	46.50	2.0000	45.50	100%
75.7422	EHS	A 1/4 (7-wire)	665.00	10%	23000	0.121	52.37	43.00	0.0000	44.50	100%
		B 1/4 (7-wire)	665.00	10%	23000	0.121	52.37	43.00	3.0000	44.50	100%
		C 1/4 (7-wire)	665.00	10%	23000	0.121	54.66	46.50	2.0000	45.50	100%

Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
155.742	Corner						

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Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
105.742	Corner						
75.7422	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
155.74	A36 (36 ksi)	Solid Round			Yes	A36 (36 ksi)	Flat Bar	2x1/2
105.74	A36 (36 ksi)	Solid Round			Yes	A36 (36 ksi)	Flat Bar	2x1/2
75.74	A36 (36 ksi)	Solid Round			Yes	A36 (36 ksi)	Flat Bar	2x1/2

Guy Data (cont'd)

Guy Elevation ft	Cable Weight		Cable Weight		Tower Intercept		Tower Intercept	
	A lb	B lb	C lb	D lb	A ft	B ft	C ft	D ft
155.742	57.81	57.81	59.49		1.19	1.19	1.26	
105.742	8.98	8.98	9.13		1.9 sec/pulse	1.9 sec/pulse	1.9 sec/pulse	
75.7422	6.34	6.34	6.61		0.50	0.50	0.52	
					1.2 sec/pulse	1.2 sec/pulse	1.2 sec/pulse	
					0.25	0.25	0.27	
					0.9 sec/pulse	0.9 sec/pulse	0.9 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
155.742	No	No			1	1	1	1
105.742	No	No			1	1	1	1
75.7422	No	No			1	1	1	1

Guy Data (cont'd)

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Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
155.742	0.0000 A325N	0	0.0000	1	0.6250 A325N	2	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
105.742	0.0000 A325N	0	0.0000	1	0.6250 A325N	2	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
75.7422	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	2	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q _z psf	q _z Ice psf	Ice Thickness in
155.742	A	101.37	30	3	1.2866
	B	101.37	30	3	1.2866
	C	101.37	30	3	1.2866
105.742	A	75.12	28	3	1.2486
	B	75.12	28	3	1.2486
	C	75.62	28	3	1.2494
75.7422	A	60.12	26	3	1.2211
	B	60.12	26	3	1.2211
	C	60.62	26	3	1.2221

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom lb	F _x lb	F _y lb	F _z lb	M _x lb-ft	M _y lb-ft	M _z lb-ft
155.742	A	76.3230	2746.18 2690.00	198.60	2669.92	-611.22	-2440.16	-181.51	0.00
	B	76.3295	2746.18 2690.00	620.48	2669.99	166.26	1220.11	151.95	-2113.30
	C	70.7760	2746.18 2690.00	-775.03	2596.26	447.46	1186.42	-0.00	2054.94
105.742	A	55.5029	Sum: 672.40 665.00	44.05 0.00	7936.17 555.60	2.50 -378.72	-33.62 -507.79	-29.56 0.00	-58.35 0.00
	B	55.5021	672.40 665.00	317.63	555.60	206.27	253.89	-18.12	-439.76
	C	52.8844	672.28 665.00	-356.24	537.75	189.42	245.74	-12.87	425.63
75.7422	A	36.5880	Sum: 668.78 665.00	-38.61 0.00	1648.96 400.67	16.97 -535.47	-8.16 -366.19	-30.98 0.00	-14.13 0.00
	B	36.5872	668.78 665.00	449.09	400.66	291.64	183.09	-25.61	-317.12
	C	33.5603	668.66 665.00	-490.63	371.93	260.87	169.96	-17.72	294.39
			Sum:	-41.54	1173.26	17.04	-13.13	-43.34	-22.74

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Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft
155.742	A	76.3230	4088.79 3727.48	285.33	3983.16	-878.17	-3640.39	-260.78	0.00
	B	76.3295	4088.72 3727.42	891.46	3983.20	238.87	1820.21	218.31	-3152.70
	C	70.7760	4156.33 3795.04	-1132.74	3945.16	653.99	1802.83	-0.00	3122.59
			Sum:	44.05	11911.52	14.69	-17.35	-42.47	-30.11
105.742	A	55.5029	1253.89 1106.65	0.00	1061.78	-666.98	-970.41	0.00	0.00
	B	55.5021	1253.90 1106.66	559.39	1061.78	363.27	485.21	-31.90	-840.40
	C	52.8844	1282.19 1137.18	-643.08	1055.24	341.93	482.22	-23.23	835.23
			Sum:	-83.68	3178.81	38.22	-2.99	-55.14	-5.17
75.7422	A	36.5880	1201.46 1129.19	0.00	755.03	-934.57	-690.06	0.00	0.00
	B	36.5872	1201.47 1129.20	783.81	755.03	509.01	345.03	-44.70	-597.61
	C	33.5603	1228.74 1158.69	-877.18	723.07	466.40	330.42	-31.69	572.31
			Sum:	-93.37	2233.13	40.85	-14.61	-76.39	-25.30

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft
155.742	A	76.3230	2746.18 2690.00	198.60	2669.92	-611.22	-2440.16	-181.51	0.00
	B	76.3295	2746.18 2690.00	620.48	2669.99	166.26	1220.11	151.95	-2113.30
	C	70.7760	2746.18 2690.00	-775.03	2596.26	447.46	1186.42	-0.00	2054.94
			Sum:	44.05	7936.17	2.50	-33.62	-29.56	-58.35
105.742	A	55.5029	672.40 665.00	0.00	555.60	-378.72	-507.79	0.00	0.00
	B	55.5021	672.40 665.00	317.63	555.60	206.27	253.89	-18.12	-439.76
	C	52.8844	672.28 665.00	-356.24	537.75	189.42	245.74	-12.87	425.63
			Sum:	-38.61	1648.96	16.97	-8.16	-30.98	-14.13
75.7422	A	36.5880	668.78 665.00	0.00	400.67	-535.47	-366.19	0.00	0.00
	B	36.5872	668.78 665.00	449.09	400.66	291.64	183.09	-25.61	-317.12
	C	33.5603	668.66	-490.63	371.93	260.87	169.96	-17.72	294.39

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft
			665.00						
			Sum:	-41.54	1173.26	17.04	-13.13	-43.34	-22.74

Guy-Tensioning Information

Temperature At Time Of Tensioning																	
Guy Elevation	H	V	0 F		20 F		40 F		60 F		80 F		100 F		120 F		
			Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	
155.742	A	26.46	108.74	2765	1.16	2740	1.17	2715	1.18	2690	1.19	2665	1.20	2640	1.21	2615	1.22
	B	26.45	108.74	2765	1.16	2740	1.17	2715	1.18	2690	1.19	2665	1.20	2640	1.21	2615	1.22
	C	37.92	108.74	2835	1.20	2787	1.22	2738	1.24	2690	1.26	2642	1.28	2593	1.31	2545	1.33
105.742	A	42.09	61.24	765.940	0.43	732.260	0.45	698.612	0.48	665.000	0.50	631.429	0.53	597.906	0.55	564.439	0.59
	B	42.09	61.24	765.944	0.43	732.263	0.45	698.613	0.48	665.000	0.50	631.428	0.53	597.903	0.56	564.435	0.59
	C	45.59	60.24	779.504	0.44	741.291	0.46	703.121	0.49	665.000	0.52	626.936	0.55	588.941	0.58	551.031	0.62
75.7422	A	42.09	31.24	868.020	0.19	800.259	0.21	732.577	0.23	665.000	0.25	597.561	0.28	530.376	0.31	463.467	0.36
	B	42.09	31.24	868.024	0.19	800.261	0.21	732.579	0.23	665.000	0.25	597.560	0.28	530.373	0.31	463.463	0.36
	C	45.59	30.24	883.538	0.20	810.583	0.22	737.727	0.24	665.000	0.27	592.502	0.30	520.250	0.35	448.456	0.40

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
LDF5-50A (7/8 FOAM) (N/A)	C	No	No	Ar (CaAa)	79.00 - 46.00	0.0000	-0.375	1	1	0.5000	1.0900		0.00
LDF4-50A (1/2 FOAM) (N/A)	C	No	No	Ar (CaAa)	68.00 - 46.00	0.0000	-0.5	1	1	0.5000	0.6300		0.00
LDF6-50A (1-1/4 FOAM) (N/A)	B	No	No	Ar (CaAa)	154.00 - 46.00	0.0000	0.5	1	1	0.5000	1.5500		0.00
LDF6-50A (1-1/4 FOAM) (N/A)	A	No	No	Ar (CaAa)	136.00 - 46.00	0.0000	0.5	1	1	0.5000	1.5500		0.00
LDF5-50A (7/8 FOAM) (N/A)	C	No	No	Ar (CaAa)	87.00 - 46.00	0.0000	0.5	1	1	0.5000	1.0900		0.00
LDF5-50A (7/8 FOAM) (N/A)	C	No	No	Ar (CaAa)	146.00 - 87.00	0.0000	0.5	1	1	0.5000	1.0900		0.00
LDF5-50A (7/8 FOAM) (N/A)	A	No	No	Ar (CaAa)	146.00 - 136.00	0.0000	0.5	1	1	0.5000	1.0900		0.00

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T1	156.00-146.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	1.240	0.000	10.56
		C	0.000	0.000	0.000	0.000	0.00
T2	146.00-136.00	A	0.000	0.000	1.090	0.000	3.30
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.090	0.000	9.90
T3	136.00-126.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.090	0.000	9.90
T4	126.00-116.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.090	0.000	9.90
T5	116.00-106.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.090	0.000	9.90
T6	106.00-96.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.090	0.000	9.90
T7	96.00-86.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.090	0.000	10.50
T8	86.00-76.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	1.417	0.000	16.89
T9	76.00-66.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	2.306	0.000	19.50
T10	66.00-56.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	2.810	0.000	20.70
T11	56.00-46.00	A	0.000	0.000	1.550	0.000	16.50
		B	0.000	0.000	1.550	0.000	13.20
		C	0.000	0.000	2.810	0.000	20.70

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T1	156.00-146.00	A	1.339	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	3.382	0.000	48.36
		C		0.000	0.000	0.000	0.000	0.00
T2	146.00-136.00	A	1.330	0.000	0.000	3.749	0.000	42.61
		B		0.000	0.000	4.209	0.000	59.98
		C		0.000	0.000	3.749	0.000	49.21
T3	136.00-126.00	A	1.320	0.000	0.000	4.190	0.000	62.78
		B		0.000	0.000	4.190	0.000	59.48
		C		0.000	0.000	3.730	0.000	48.77
T4	126.00-116.00	A	1.310	0.000	0.000	4.169	0.000	62.25
		B		0.000	0.000	4.169	0.000	58.95
		C		0.000	0.000	3.709	0.000	48.29
T5	116.00-106.00	A	1.298	0.000	0.000	4.147	0.000	61.68
		B		0.000	0.000	4.147	0.000	58.38
		C		0.000	0.000	3.687	0.000	47.78
T6	106.00-96.00	A	1.286	0.000	0.000	4.122	0.000	61.06

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
		B		0.000	0.000	4.122	0.000	57.76
		C		0.000	0.000	3.662	0.000	47.24
T7	96.00-86.00	A	1.273	0.000	0.000	4.096	0.000	60.39
		B		0.000	0.000	4.096	0.000	57.09
		C		0.000	0.000	3.636	0.000	47.24
T8	86.00-76.00	A	1.258	0.000	0.000	4.066	0.000	59.66
		B		0.000	0.000	4.066	0.000	56.36
		C		0.000	0.000	4.688	0.000	63.81
T9	76.00-66.00	A	1.242	0.000	0.000	4.033	0.000	58.84
		B		0.000	0.000	4.033	0.000	55.54
		C		0.000	0.000	7.769	0.000	95.91
T10	66.00-56.00	A	1.223	0.000	0.000	3.996	0.000	57.93
		B		0.000	0.000	3.996	0.000	54.63
		C		0.000	0.000	10.147	0.000	117.49
T11	56.00-46.00	A	1.201	0.000	0.000	3.952	0.000	56.87
		B		0.000	0.000	3.952	0.000	53.57
		C		0.000	0.000	10.017	0.000	114.82

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	156.00-146.00	1.1682	0.5941	0.3957	0.1989
T2	146.00-136.00	0.3962	0.1796	0.0679	0.0240
T3	136.00-126.00	0.3410	-0.2442	0.0554	-0.0473
T4	126.00-116.00	0.3410	-0.2442	0.0564	-0.0482
T5	116.00-106.00	0.3410	-0.2442	0.0575	-0.0491
T6	106.00-96.00	0.3179	-0.2303	0.0507	-0.0433
T7	96.00-86.00	0.3410	-0.2442	0.0601	-0.0511
T8	86.00-76.00	0.5097	-0.0881	0.1679	0.0391
T9	76.00-66.00	0.8911	0.2819	0.4284	0.2578
T10	66.00-56.00	1.2466	0.4882	0.8013	0.4834
T11	56.00-46.00	1.2466	0.4882	0.8188	0.4931

Shielding Factor K_a

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	17	LDF6-50A (1-1/4 FOAM)	146.00 - 154.00	0.6000	0.2583
T2	17	LDF6-50A (1-1/4 FOAM)	136.00 - 146.00	0.6000	0.2913
T2	20	LDF5-50A (7/8 FOAM)	136.00 - 146.00	0.6000	0.2913
T2	21	LDF5-50A (7/8 FOAM)	136.00 - 146.00	0.6000	0.2913
T3	17	LDF6-50A (1-1/4 FOAM)	126.00 - 136.00	0.6000	0.2946
T3	18	LDF6-50A (1-1/4 FOAM)	126.00 - 136.00	0.6000	0.2946

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	20	LDF5-50A (7/8 FOAM)	126.00 - 136.00	0.6000	0.2946
T4	17	LDF6-50A (1-1/4 FOAM)	116.00 - 126.00	0.6000	0.2981
T4	18	LDF6-50A (1-1/4 FOAM)	116.00 - 126.00	0.6000	0.2981
T4	20	LDF5-50A (7/8 FOAM)	116.00 - 126.00	0.6000	0.2981
T5	17	LDF6-50A (1-1/4 FOAM)	106.00 - 116.00	0.6000	0.3019
T5	18	LDF6-50A (1-1/4 FOAM)	106.00 - 116.00	0.6000	0.3019
T5	20	LDF5-50A (7/8 FOAM)	106.00 - 116.00	0.6000	0.3019
T6	17	LDF6-50A (1-1/4 FOAM)	96.00 - 106.00	0.6000	0.2766
T6	18	LDF6-50A (1-1/4 FOAM)	96.00 - 106.00	0.6000	0.2766
T6	20	LDF5-50A (7/8 FOAM)	96.00 - 106.00	0.6000	0.2766
T7	17	LDF6-50A (1-1/4 FOAM)	86.00 - 96.00	0.6000	0.3106
T7	18	LDF6-50A (1-1/4 FOAM)	86.00 - 96.00	0.6000	0.3106
T7	19	LDF5-50A (7/8 FOAM)	86.00 - 87.00	0.6000	0.3106
T7	20	LDF5-50A (7/8 FOAM)	87.00 - 96.00	0.6000	0.3106
T8	6	LDF5-50A (7/8 FOAM)	76.00 - 79.00	0.6000	0.3156
T8	17	LDF6-50A (1-1/4 FOAM)	76.00 - 86.00	0.6000	0.3156
T8	18	LDF6-50A (1-1/4 FOAM)	76.00 - 86.00	0.6000	0.3156
T8	19	LDF5-50A (7/8 FOAM)	76.00 - 86.00	0.6000	0.3156
T9	6	LDF5-50A (7/8 FOAM)	66.00 - 76.00	0.6000	0.2922
T9	7	LDF4-50A (1/2 FOAM)	66.00 - 68.00	0.6000	0.2922
T9	17	LDF6-50A (1-1/4 FOAM)	66.00 - 76.00	0.6000	0.2922
T9	18	LDF6-50A (1-1/4 FOAM)	66.00 - 76.00	0.6000	0.2922
T9	19	LDF5-50A (7/8 FOAM)	66.00 - 76.00	0.6000	0.2922
T10	6	LDF5-50A (7/8 FOAM)	56.00 - 66.00	0.6000	0.3276
T10	7	LDF4-50A (1/2 FOAM)	56.00 - 66.00	0.6000	0.3276
T10	17	LDF6-50A (1-1/4 FOAM)	56.00 - 66.00	0.6000	0.3276
T10	18	LDF6-50A (1-1/4 FOAM)	56.00 - 66.00	0.6000	0.3276
T10	19	LDF5-50A (7/8 FOAM)	56.00 - 66.00	0.6000	0.3276
T11	6	LDF5-50A (7/8 FOAM)	46.00 - 56.00	0.6000	0.3350
T11	7	LDF4-50A (1/2 FOAM)	46.00 - 56.00	0.6000	0.3350
T11	17	LDF6-50A (1-1/4 FOAM)	46.00 - 56.00	0.6000	0.3350
T11	18	LDF6-50A (1-1/4 FOAM)	46.00 - 56.00	0.6000	0.3350
T11	19	LDF5-50A (7/8 FOAM)	46.00 - 56.00	0.6000	0.3350

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	$C_A A_A$ Front	$C_A A_A$ Side	Weight
			Horz Lateral	Vert					
			ft	ft	°	ft	ft ²	ft ²	lb
"Ringo" BR3 (FRC Main)	A	From Leg	2.00	0.0000	155.00	No Ice	3.47	3.47	8.00
			0.00			1/2" Ice	5.34	5.34	35.05
			9.25			1" Ice	7.23	7.23	73.75
2' Side Arm (FRC Main)	A	From Leg	1.00	0.0000	155.00	No Ice	0.50	1.76	60.00
			0.00			1/2" Ice	0.50	2.64	74.00

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	lb	
DB 420 (Task Force)	B	From Leg	0.00		0.0000	155.00	1" Ice	1.00	3.52	88.00
			0.25				No Ice	3.88	3.88	34.50
			0.00				1/2" Ice	5.85	5.85	64.38
			9.71				1" Ice	7.83	7.83	106.48
ASP705 (P-25 System)	C	From Leg	3.00		0.0000	155.00	No Ice	5.50	5.50	22.00
			0.00				1/2" Ice	7.37	7.37	61.60
			9.17				1" Ice	9.25	9.25	112.87
			1.50				No Ice	0.67	2.50	50.00
3' Side Arm (P-25 System)	C	From Leg	0.00		0.0000	155.00	1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
			3.00				No Ice	1.12	1.12	3.00
			0.00				1/2" Ice	1.63	1.63	11.78
X50A (VHF/UHF Broadband)	A	From Leg	2.80		45.0000	146.00	1" Ice	1.98	1.98	24.34
			1.50				No Ice	0.67	2.50	50.00
			0.00				1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
3' Side Arm (VHF/UHF Broadband)	A	From Leg	3.00		-45.0000	146.00	No Ice	1.12	1.12	3.00
			0.00				1/2" Ice	1.63	1.63	11.78
			2.80				1" Ice	1.98	1.98	24.34
			1.50				No Ice	0.67	2.50	50.00
X50C2 (VHF/UHF Broadband)	A	From Leg	0.00		-45.0000	146.00	1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
			3.00				No Ice	3.96	3.96	28.00
			0.00				1/2" Ice	5.62	5.62	57.49
3' Side Arm (VHF/UHF Broadband)	B	From Leg	8.13		0.0000	146.00	1" Ice	7.29	7.29	97.30
			1.50				No Ice	0.67	2.50	50.00
			0.00				1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
ASP705K (P-25 System)	A	From Leg	3.00		0.0000	136.00	No Ice	5.50	5.50	22.00
			0.00				1/2" Ice	7.37	7.37	61.60
			9.71				1" Ice	9.25	9.25	112.87
			1.50				No Ice	0.67	2.50	50.00
3' Side Arm (P-25 System)	A	From Leg	0.00		0.0000	136.00	1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
			3.00				No Ice	5.50	5.50	22.00
			0.00				1/2" Ice	7.37	7.37	61.60
ASP705K (P-25 System)	C	From Leg	9.71		0.0000	136.00	1" Ice	9.25	9.25	112.87
			1.50				No Ice	0.67	2.50	50.00
			0.00				1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
3' Side Arm (P-25 System)	C	From Leg	3.00		0.0000	136.00	No Ice	0.67	2.50	50.00
			0.00				1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
			2.00				No Ice	2.50	2.50	10.00
10' Omni (UHF Paging)	B	From Leg	0.00		0.0000	79.00	1/2" Ice	3.53	3.53	28.64
			5.00				1" Ice	4.58	4.58	53.79
			1.00				No Ice	0.50	1.76	60.00
			0.00				1/2" Ice	0.50	2.64	74.00
"Ringo" BR3 (FRC Backup)	A	From Leg	0.00		0.0000	68.00	1" Ice	1.00	3.52	88.00
			3.00				No Ice	3.47	3.47	8.00
			0.00				1/2" Ice	5.34	5.34	35.05
			9.25				1" Ice	7.23	7.23	73.75
3' Side Arm (FRC Backup)	A	From Leg	1.50		0.0000	68.00	No Ice	0.67	2.50	50.00
			0.00				1/2" Ice	1.00	3.00	70.00
			0.00				1" Ice	1.34	3.50	90.00
			1.00				No Ice	2.09	1.18	40.00
30"x8"x4" Panel Antenna (LG WiFi)	B	From Leg	0.00		0.0000	54.00	1/2" Ice	2.30	1.37	54.10
			0.00				1" Ice	2.51	1.57	71.11
			0.50				No Ice	0.25	0.88	15.00
			0.00				1/2" Ice	0.38	1.25	25.00

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	lb	
TMA 4 (LG WiFi)	B	From Leg	0.00	0.00	0.0000	53.00	1" Ice	0.50	1.63	35.00
			0.25	0.00			No Ice	0.55	0.45	0.02
			0.00	0.00			1/2" Ice	0.65	0.53	5.82
			0.00	0.00			1" Ice	0.75	0.63	13.24
Tower Climber Warning Sign (N/A)	B	From Face	0.00	0.00	0.0000	49.00	No Ice	0.40	0.01	2.00
			0.00	0.00			1/2" Ice	0.48	0.07	4.07
			0.00	0.00			1" Ice	0.57	0.13	7.25
			0.00	0.00						

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face	C _{AA} Out Face
ft	ft		psf	ft ²	e	ft ²	ft ²	ft ²		ft ²	ft ²
T1 156.00-146.00	151.00	1.112	34	17.080	A	0.248	3.483	2.500	67.01	0.000	0.000
					B	0.248	3.483	67.01	1.240	0.000	
					C	0.248	3.483	67.01	0.000	0.000	
T2 146.00-136.00	141.00	1.09	33	17.080	A	0.000	3.483	2.500	71.78	1.090	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	1.090	0.000	
T3 136.00-126.00	131.00	1.067	32	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	1.090	0.000	
T4 126.00-116.00	121.00	1.044	32	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	1.090	0.000	
T5 116.00-106.00	111.00	1.018	31	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	1.090	0.000	
T6 106.00-96.00	101.00	0.991	30	17.080	A	0.248	3.483	2.500	67.01	1.550	0.000
					B	0.248	3.483	67.01	1.550	0.000	
					C	0.248	3.483	67.01	1.090	0.000	
T7 96.00-86.00	91.00	0.962	29	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	1.090	0.000	
T8 86.00-76.00	81.00	0.93	28	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	1.417	0.000	
T9 76.00-66.00	71.00	0.896	27	17.080	A	0.248	3.483	2.500	67.01	1.550	0.000
					B	0.248	3.483	67.01	1.550	0.000	
					C	0.248	3.483	67.01	2.306	0.000	
T10 66.00-56.00	61.00	0.858	26	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	2.810	0.000	
T11 56.00-46.00	51.00	0.815	25	17.080	A	0.000	3.483	2.500	71.78	1.550	0.000
					B	0.000	3.483	71.78	1.550	0.000	
					C	0.000	3.483	71.78	2.810	0.000	

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Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	K_Z	q_z <i>psf</i>	t_z <i>in</i>	A_G <i>ft</i> ²	F_{ac} <i>e</i>	A_F <i>ft</i> ²	A_R <i>ft</i> ²	A_{leg} <i>ft</i> ²	Leg %	C_{AA} In Face <i>ft</i> ²	C_{AA} Out Face <i>ft</i> ²
T1 156.00-146.00	151.00	1.112	4	1.3389	19.311	A	0.248	14.076	6.963	48.61	0.000	0.000
						B	0.248	14.076		48.61	3.382	0.000
						C	0.248	14.076		48.61	0.000	0.000
T2 146.00-136.00	141.00	1.09	4	1.3297	19.296	A	0.000	13.674	6.932	50.70	3.749	0.000
						B	0.000	13.674		50.70	4.209	0.000
						C	0.000	13.674		50.70	3.749	0.000
T3 136.00-126.00	131.00	1.067	4	1.3200	19.280	A	0.000	13.600	6.900	50.74	4.190	0.000
						B	0.000	13.600		50.74	4.190	0.000
						C	0.000	13.600		50.74	3.730	0.000
T4 126.00-116.00	121.00	1.044	4	1.3096	19.263	A	0.000	13.520	6.865	50.78	4.169	0.000
						B	0.000	13.520		50.78	4.169	0.000
						C	0.000	13.520		50.78	3.709	0.000
T5 116.00-106.00	111.00	1.018	3	1.2983	19.244	A	0.000	13.433	6.828	50.83	4.147	0.000
						B	0.000	13.433		50.83	4.147	0.000
						C	0.000	13.433		50.83	3.687	0.000
T6 106.00-96.00	101.00	0.991	3	1.2861	19.224	A	0.248	13.659	6.787	48.80	4.122	0.000
						B	0.248	13.659		48.80	4.122	0.000
						C	0.248	13.659		48.80	3.662	0.000
T7 96.00-86.00	91.00	0.962	3	1.2728	19.201	A	0.000	13.238	6.743	50.93	4.096	0.000
						B	0.000	13.238		50.93	4.096	0.000
						C	0.000	13.238		50.93	3.636	0.000
T8 86.00-76.00	81.00	0.93	3	1.2580	19.177	A	0.000	13.125	6.693	51.00	4.066	0.000
						B	0.000	13.125		51.00	4.066	0.000
						C	0.000	13.125		51.00	4.688	0.000
T9 76.00-66.00	71.00	0.896	3	1.2416	19.149	A	0.248	13.306	6.639	48.98	4.033	0.000
						B	0.248	13.306		48.98	4.033	0.000
						C	0.248	13.306		48.98	7.769	0.000
T10 66.00-56.00	61.00	0.858	3	1.2229	19.118	A	0.000	12.855	6.576	51.16	3.996	0.000
						B	0.000	12.855		51.16	3.996	0.000
						C	0.000	12.855		51.16	10.147	0.000
T11 56.00-46.00	51.00	0.815	3	1.2012	19.082	A	0.000	12.689	6.504	51.26	3.952	0.000
						B	0.000	12.689		51.26	3.952	0.000
						C	0.000	12.689		51.26	10.017	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	K_Z	q_z <i>psf</i>	A_G <i>ft</i> ²	F_{ac} <i>e</i>	A_F <i>ft</i> ²	A_R <i>ft</i> ²	A_{leg} <i>ft</i> ²	Leg %	C_{AA} In Face <i>ft</i> ²	C_{AA} Out Face <i>ft</i> ²
T1 156.00-146.00	151.00	1.112	9	17.080	A	0.248	3.483	2.500	67.01	0.000	0.000
					B	0.248	3.483		67.01	1.240	0.000
					C	0.248	3.483		67.01	0.000	0.000
T2 146.00-136.00	141.00	1.09	8	17.080	A	0.000	3.483	2.500	71.78	1.090	0.000
					B	0.000	3.483		71.78	1.550	0.000
					C	0.000	3.483		71.78	1.090	0.000

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Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F _a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
T3 136.00-126.00	131.00	1.067	8	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 1.090	0.000 0.000 0.000
T4 126.00-116.00	121.00	1.044	8	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 1.090	0.000 0.000 0.000
T5 116.00-106.00	111.00	1.018	8	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 1.090	0.000 0.000 0.000
T6 106.00-96.00	101.00	0.991	8	17.080	A B C	0.248 0.248 0.248	3.483 3.483 3.483	2.500	67.01 67.01 67.01	1.550 1.550 1.090	0.000 0.000 0.000
T7 96.00-86.00	91.00	0.962	7	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 1.090	0.000 0.000 0.000
T8 86.00-76.00	81.00	0.93	7	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 1.417	0.000 0.000 0.000
T9 76.00-66.00	71.00	0.896	7	17.080	A B C	0.248 0.248 0.248	3.483 3.483 3.483	2.500	67.01 67.01 67.01	1.550 1.550 2.306	0.000 0.000 0.000
T10 66.00-56.00	61.00	0.858	7	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 2.810	0.000 0.000 0.000
T11 56.00-46.00	51.00	0.815	6	17.080	A B C	0.000 0.000 0.000	3.483 3.483 3.483	2.500	71.78 71.78 71.78	1.550 1.550 2.810	0.000 0.000 0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F _a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T1 156.00-146.00	10.56	116.62	A B C	0.218 0.218 0.218	2.536 2.536 2.536	34	1 1 1	1 1 1	2.261 2.261 2.261	184.91	0.02	C
T2 146.00-136.00	26.40	99.65	A B C	0.204 0.204 0.204	2.583 2.583 2.583	33	1 1 1	1 1 1	2.003 2.003 2.003	207.53	0.02	C
T3 136.00-126.00	39.60	99.65	A B C	0.204 0.204 0.204	2.583 2.583 2.583	32	1 1 1	1 1 1	2.003 2.003 2.003	210.78	0.02	C
T4 126.00-116.00	39.60	99.65	A B C	0.204 0.204 0.204	2.583 2.583 2.583	32	1 1 1	1 1 1	2.003 2.003 2.003	206.05	0.02	C
T5 116.00-106.00	39.60	99.65	A B C	0.204 0.204 0.204	2.583 2.583 2.583	31	1 1 1	1 1 1	2.003 2.003 2.003	201.04	0.02	C
T6 106.00-96.00	39.60	116.62	A B C	0.218 0.218 0.218	2.536 2.536 2.536	30	1 1 1	1 1 1	2.261 2.261 2.261	209.89	0.02	C
T7 96.00-86.00	40.20	99.65	A B C	0.204 0.204 0.204	2.583 2.583 2.583	29	1 1 1	1 1 1	2.003 2.003 2.003	189.94	0.02	C
T8 86.00-76.00	46.59	99.65	A B C	0.204 0.204 0.204	2.583 2.583 2.583	28	1 1 1	1 1 1	2.003 2.003 2.003	188.42	0.02	C

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T9 76.00-66.00	49.20	116.62	C	0.204	2.583	27	1	1	2.003	206.58	0.02	C
			A	0.218	2.536		1	1	2.261			
			B	0.218	2.536		1	1	2.261			
T10 66.00-56.00	50.40	99.65	C	0.218	2.536	26	1	1	2.261	192.17	0.02	C
			A	0.204	2.583		1	1	2.003			
			B	0.204	2.583		1	1	2.003			
T11 56.00-46.00	50.40	99.65	C	0.204	2.583	25	1	1	2.003	182.59	0.02	C
			A	0.204	2.583		1	1	2.003			
			B	0.204	2.583		1	1	2.003			
Sum Weight:	432.15	1147.04								2179.90		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T1 156.00-146.00	10.56	116.62	A	0.218	2.536	34	0.8	1	2.211	181.32	0.02	C
			B	0.218	2.536		0.8	1	2.211			
			C	0.218	2.536		0.8	1	2.211			
T2 146.00-136.00	26.40	99.65	A	0.204	2.583	33	0.8	1	2.003	207.53	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T3 136.00-126.00	39.60	99.65	A	0.204	2.583	32	0.8	1	2.003	210.78	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T4 126.00-116.00	39.60	99.65	A	0.204	2.583	32	0.8	1	2.003	206.05	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T5 116.00-106.00	39.60	99.65	A	0.204	2.583	31	0.8	1	2.003	201.04	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T6 106.00-96.00	39.60	116.62	A	0.218	2.536	30	0.8	1	2.211	206.69	0.02	C
			B	0.218	2.536		0.8	1	2.211			
			C	0.218	2.536		0.8	1	2.211			
T7 96.00-86.00	40.20	99.65	A	0.204	2.583	29	0.8	1	2.003	189.94	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T8 86.00-76.00	46.59	99.65	A	0.204	2.583	28	0.8	1	2.003	188.42	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T9 76.00-66.00	49.20	116.62	A	0.218	2.536	27	0.8	1	2.211	203.68	0.02	C
			B	0.218	2.536		0.8	1	2.211			
			C	0.218	2.536		0.8	1	2.211			
T10 66.00-56.00	50.40	99.65	A	0.204	2.583	26	0.8	1	2.003	192.17	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
T11 56.00-46.00	50.40	99.65	A	0.204	2.583	25	0.8	1	2.003	182.59	0.02	C
			B	0.204	2.583		0.8	1	2.003			
			C	0.204	2.583		0.8	1	2.003			
Sum Weight:	432.15	1147.04								2170.22		

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Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	klf	
T1 156.00-146.00	10.56	116.62	A	0.218	2.536	34	0.85	1	2.224	182.22	0.02	C
			B	0.218	2.536		0.85	1	2.224			
			C	0.218	2.536		0.85	1	2.224			
T2 146.00-136.00	26.40	99.65	A	0.204	2.583	33	0.85	1	2.003	207.53	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T3 136.00-126.00	39.60	99.65	A	0.204	2.583	32	0.85	1	2.003	210.78	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T4 126.00-116.00	39.60	99.65	A	0.204	2.583	32	0.85	1	2.003	206.05	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T5 116.00-106.00	39.60	99.65	A	0.204	2.583	31	0.85	1	2.003	201.04	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T6 106.00-96.00	39.60	116.62	A	0.218	2.536	30	0.85	1	2.224	207.49	0.02	C
			B	0.218	2.536		0.85	1	2.224			
			C	0.218	2.536		0.85	1	2.224			
T7 96.00-86.00	40.20	99.65	A	0.204	2.583	29	0.85	1	2.003	189.94	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T8 86.00-76.00	46.59	99.65	A	0.204	2.583	28	0.85	1	2.003	188.42	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T9 76.00-66.00	49.20	116.62	A	0.218	2.536	27	0.85	1	2.224	204.41	0.02	C
			B	0.218	2.536		0.85	1	2.224			
			C	0.218	2.536		0.85	1	2.224			
T10 66.00-56.00	50.40	99.65	A	0.204	2.583	26	0.85	1	2.003	192.17	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T11 56.00-46.00	50.40	99.65	A	0.204	2.583	25	0.85	1	2.003	182.59	0.02	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
Sum Weight:	432.15	1147.04								2172.64		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	klf	
T1 156.00-146.00	48.36	519.75	A	0.742	1.784	4	1	1	12.091	72.42	0.01	C
			B	0.742	1.784		1	1	12.091			
			C	0.742	1.784		1	1	12.091			
T2 146.00-136.00	151.81	472.14	A	0.709	1.777	4	1	1	11.175	73.60	0.01	C
			B	0.709	1.777		1	1	11.175			
			C	0.709	1.777		1	1	11.175			
T3 136.00-126.00	171.03	467.65	A	0.705	1.776	4	1	1	11.083	72.04	0.01	C
			B	0.705	1.776		1	1	11.083			
			C	0.705	1.776		1	1	11.083			

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T4 126.00-116.00	169.49	462.88	C	0.705	1.776	4	1	1	11.083	69.95	0.01	C
			A	0.702	1.776		1	1	10.983			
			B	0.702	1.776		1	1	10.983			
T5 116.00-106.00	167.84	457.76	C	0.702	1.776	3	1	1	10.983	67.76	0.01	C
			A	0.698	1.776		1	1	10.877			
			B	0.698	1.776		1	1	10.877			
T6 106.00-96.00	166.06	494.21	C	0.698	1.776	3	1	1	10.877	68.60	0.01	C
			A	0.723	1.779		1	1	11.556			
			B	0.723	1.779		1	1	11.556			
T7 96.00-86.00	164.73	446.28	C	0.723	1.779	3	1	1	11.556	62.98	0.01	C
			A	0.689	1.776		1	1	10.638			
			B	0.689	1.776		1	1	10.638			
T8 86.00-76.00	179.82	439.74	C	0.689	1.776	3	1	1	10.638	61.28	0.01	C
			A	0.684	1.776		1	1	10.501			
			B	0.684	1.776		1	1	10.501			
T9 76.00-66.00	210.30	473.26	C	0.684	1.776	3	1	1	10.501	63.38	0.01	C
			A	0.708	1.777		1	1	11.115			
			B	0.708	1.777		1	1	11.115			
T10 66.00-56.00	230.05	424.36	C	0.708	1.777	3	1	1	11.115	59.83	0.01	C
			A	0.672	1.777		1	1	10.178			
			B	0.672	1.777		1	1	10.178			
T11 56.00-46.00	225.27	415.04	C	0.672	1.777	3	1	1	10.178	56.19	0.01	C
			A	0.665	1.778		1	1	9.981			
			B	0.665	1.778		1	1	9.981			
Sum Weight:	1884.76	5073.08	C	0.665	1.778		1	1	9.981	728.02		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T1 156.00-146.00	48.36	519.75	A	0.742	1.784	4	0.8	1	12.042	72.13	0.01	C
			B	0.742	1.784		0.8	1	12.042			
			C	0.742	1.784		0.8	1	12.042			
T2 146.00-136.00	151.81	472.14	A	0.709	1.777	4	0.8	1	11.175	73.60	0.01	C
			B	0.709	1.777		0.8	1	11.175			
			C	0.709	1.777		0.8	1	11.175			
T3 136.00-126.00	171.03	467.65	A	0.705	1.776	4	0.8	1	11.083	72.04	0.01	C
			B	0.705	1.776		0.8	1	11.083			
			C	0.705	1.776		0.8	1	11.083			
T4 126.00-116.00	169.49	462.88	A	0.705	1.776	4	0.8	1	11.083	69.95	0.01	C
			B	0.702	1.776		0.8	1	10.983			
			C	0.702	1.776		0.8	1	10.983			
T5 116.00-106.00	167.84	457.76	A	0.702	1.776	3	0.8	1	10.983	67.76	0.01	C
			B	0.698	1.776		0.8	1	10.877			
			C	0.698	1.776		0.8	1	10.877			
T6 106.00-96.00	166.06	494.21	A	0.698	1.776	3	0.8	1	10.877	68.35	0.01	C
			B	0.723	1.779		0.8	1	11.507			
			C	0.723	1.779		0.8	1	11.507			
T7 96.00-86.00	164.73	446.28	A	0.723	1.779	3	0.8	1	11.507	62.98	0.01	C
			B	0.689	1.776		0.8	1	10.638			
			C	0.689	1.776		0.8	1	10.638			

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T8 86.00-76.00	179.82	439.74	A	0.684	1.776	3	0.8	1	10.501	61.28	0.01	C
			B	0.684	1.776		0.8	1	10.501			
			C	0.684	1.776		0.8	1	10.501			
T9 76.00-66.00	210.30	473.26	A	0.708	1.777	3	0.8	1	11.065	63.15	0.01	C
			B	0.708	1.777		0.8	1	11.065			
			C	0.708	1.777		0.8	1	11.065			
T10 66.00-56.00	230.05	424.36	A	0.672	1.777	3	0.8	1	10.178	59.83	0.01	C
			B	0.672	1.777		0.8	1	10.178			
			C	0.672	1.777		0.8	1	10.178			
T11 56.00-46.00	225.27	415.04	A	0.665	1.778	3	0.8	1	9.981	56.19	0.01	C
			B	0.665	1.778		0.8	1	9.981			
			C	0.665	1.778		0.8	1	9.981			
Sum Weight:	1884.76	5073.08								727.25		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T1 156.00-146.00	48.36	519.75	A	0.742	1.784	4	0.85	1	12.054	72.21	0.01	C
			B	0.742	1.784		0.85	1	12.054			
			C	0.742	1.784		0.85	1	12.054			
T2 146.00-136.00	151.81	472.14	A	0.709	1.777	4	0.85	1	11.175	73.60	0.01	C
			B	0.709	1.777		0.85	1	11.175			
			C	0.709	1.777		0.85	1	11.175			
T3 136.00-126.00	171.03	467.65	A	0.705	1.776	4	0.85	1	11.083	72.04	0.01	C
			B	0.705	1.776		0.85	1	11.083			
			C	0.705	1.776		0.85	1	11.083			
T4 126.00-116.00	169.49	462.88	A	0.702	1.776	4	0.85	1	10.983	69.95	0.01	C
			B	0.702	1.776		0.85	1	10.983			
			C	0.702	1.776		0.85	1	10.983			
T5 116.00-106.00	167.84	457.76	A	0.698	1.776	3	0.85	1	10.877	67.76	0.01	C
			B	0.698	1.776		0.85	1	10.877			
			C	0.698	1.776		0.85	1	10.877			
T6 106.00-96.00	166.06	494.21	A	0.723	1.779	3	0.85	1	11.519	68.41	0.01	C
			B	0.723	1.779		0.85	1	11.519			
			C	0.723	1.779		0.85	1	11.519			
T7 96.00-86.00	164.73	446.28	A	0.689	1.776	3	0.85	1	10.638	62.98	0.01	C
			B	0.689	1.776		0.85	1	10.638			
			C	0.689	1.776		0.85	1	10.638			
T8 86.00-76.00	179.82	439.74	A	0.684	1.776	3	0.85	1	10.501	61.28	0.01	C
			B	0.684	1.776		0.85	1	10.501			
			C	0.684	1.776		0.85	1	10.501			
T9 76.00-66.00	210.30	473.26	A	0.708	1.777	3	0.85	1	11.077	63.21	0.01	C
			B	0.708	1.777		0.85	1	11.077			
			C	0.708	1.777		0.85	1	11.077			
T10 66.00-56.00	230.05	424.36	A	0.672	1.777	3	0.85	1	10.178	59.83	0.01	C
			B	0.672	1.777		0.85	1	10.178			
			C	0.672	1.777		0.85	1	10.178			
T11 56.00-46.00	225.27	415.04	A	0.665	1.778	3	0.85	1	9.981	56.19	0.01	C
			B	0.665	1.778		0.85	1	9.981			
			C	0.665	1.778		0.85	1	9.981			
Sum Weight:	1884.76	5073.08								727.44		

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Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	klf	
T1 156.00-146.00	10.56	116.62	A	0.218	2.536	9	1	1	2.261	47.01	0.00	C
			B	0.218	2.536		1	1	2.261			
			C	0.218	2.536		1	1	2.261			
T2 146.00-136.00	26.40	99.65	A	0.204	2.583	8	1	1	2.003	52.76	0.01	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T3 136.00-126.00	39.60	99.65	A	0.204	2.583	8	1	1	2.003	53.58	0.01	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T4 126.00-116.00	39.60	99.65	A	0.204	2.583	8	1	1	2.003	52.38	0.01	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T5 116.00-106.00	39.60	99.65	A	0.204	2.583	8	1	1	2.003	51.11	0.01	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T6 106.00-96.00	39.60	116.62	A	0.218	2.536	8	1	1	2.261	53.36	0.01	C
			B	0.218	2.536		1	1	2.261			
			C	0.218	2.536		1	1	2.261			
T7 96.00-86.00	40.20	99.65	A	0.204	2.583	7	1	1	2.003	48.29	0.00	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T8 86.00-76.00	46.59	99.65	A	0.204	2.583	7	1	1	2.003	47.90	0.00	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T9 76.00-66.00	49.20	116.62	A	0.218	2.536	7	1	1	2.261	52.52	0.01	C
			B	0.218	2.536		1	1	2.261			
			C	0.218	2.536		1	1	2.261			
T10 66.00-56.00	50.40	99.65	A	0.204	2.583	7	1	1	2.003	48.85	0.00	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
T11 56.00-46.00	50.40	99.65	A	0.204	2.583	6	1	1	2.003	46.42	0.00	C
			B	0.204	2.583		1	1	2.003			
			C	0.204	2.583		1	1	2.003			
Sum Weight:	432.15	1147.04								554.17		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	klf	
T1 156.00-146.00	10.56	116.62	A	0.218	2.536	9	0.8	1	2.211	46.10	0.00	C
			B	0.218	2.536		0.8	1	2.211			
			C	0.218	2.536		0.8	1	2.211			
T2 146.00-136.00	26.40	99.65	A	0.204	2.583	8	0.8	1	2.003	52.76	0.01	C
			B	0.204	2.583		0.8	1	2.003			

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T3 136.00-126.00	39.60	99.65	C	0.204	2.583	8	0.8	1	2.003	53.58	0.01	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
T4 126.00-116.00	39.60	99.65	C	0.204	2.583	8	0.8	1	2.003	52.38	0.01	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
T5 116.00-106.00	39.60	99.65	C	0.204	2.583	8	0.8	1	2.003	51.11	0.01	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
T6 106.00-96.00	39.60	116.62	C	0.204	2.583	8	0.8	1	2.003	52.54	0.01	C
			A	0.218	2.536		0.8	1	2.211			
			B	0.218	2.536		0.8	1	2.211			
T7 96.00-86.00	40.20	99.65	C	0.204	2.583	7	0.8	1	2.003	48.29	0.00	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
T8 86.00-76.00	46.59	99.65	C	0.204	2.583	7	0.8	1	2.003	47.90	0.00	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
T9 76.00-66.00	49.20	116.62	C	0.204	2.583	7	0.8	1	2.003	51.78	0.01	C
			A	0.218	2.536		0.8	1	2.211			
			B	0.218	2.536		0.8	1	2.211			
T10 66.00-56.00	50.40	99.65	C	0.204	2.583	7	0.8	1	2.003	48.85	0.00	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
T11 56.00-46.00	50.40	99.65	C	0.204	2.583	6	0.8	1	2.003	46.42	0.00	C
			A	0.204	2.583		0.8	1	2.003			
			B	0.204	2.583		0.8	1	2.003			
Sum Weight:	432.15	1147.04								551.71		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T1 156.00-146.00	10.56	116.62	C	0.218	2.536	9	0.85	1	2.224	46.32	0.00	C
			A	0.218	2.536		0.85	1	2.224			
			B	0.218	2.536		0.85	1	2.224			
T2 146.00-136.00	26.40	99.65	C	0.204	2.583	8	0.85	1	2.003	52.76	0.01	C
			A	0.204	2.583		0.85	1	2.003			
			B	0.204	2.583		0.85	1	2.003			
T3 136.00-126.00	39.60	99.65	C	0.204	2.583	8	0.85	1	2.003	53.58	0.01	C
			A	0.204	2.583		0.85	1	2.003			
			B	0.204	2.583		0.85	1	2.003			
T4 126.00-116.00	39.60	99.65	C	0.204	2.583	8	0.85	1	2.003	52.38	0.01	C
			A	0.204	2.583		0.85	1	2.003			
			B	0.204	2.583		0.85	1	2.003			
T5 116.00-106.00	39.60	99.65	C	0.204	2.583	8	0.85	1	2.003	51.11	0.01	C
			A	0.204	2.583		0.85	1	2.003			
			B	0.204	2.583		0.85	1	2.003			
T6 106.00-96.00	39.60	116.62	C	0.204	2.583	8	0.85	1	2.003	52.75	0.01	C
			A	0.218	2.536		0.85	1	2.224			
			B	0.218	2.536		0.85	1	2.224			

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w klf	Ctrl. Face
T7 96.00-86.00	40.20	99.65	A	0.204	2.583	7	0.85	1	2.003	48.29	0.00	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T8 86.00-76.00	46.59	99.65	A	0.204	2.583	7	0.85	1	2.003	47.90	0.00	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T9 76.00-66.00	49.20	116.62	A	0.218	2.536	7	0.85	1	2.224	51.96	0.01	C
			B	0.218	2.536		0.85	1	2.224			
			C	0.218	2.536		0.85	1	2.224			
T10 66.00-56.00	50.40	99.65	A	0.204	2.583	7	0.85	1	2.003	48.85	0.00	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
T11 56.00-46.00	50.40	99.65	A	0.204	2.583	6	0.85	1	2.003	46.42	0.00	C
			B	0.204	2.583		0.85	1	2.003			
			C	0.204	2.583		0.85	1	2.003			
Sum Weight:	432.15	1147.04								552.33		

Discrete Appurtenance Pressures - No Ice G_H = 0.850

Description	Aiming Azimuth °	Weight lb	Offset _x ft	Offset _z ft	z ft	K _z	q _z psf	C _{AAC} Front ft ²	C _{AAC} Side ft ²
"Ringo" BR3	0.0000	8.00	0.00	-2.91	164.25	1.139	34	3.47	3.47
2' Side Arm	0.0000	60.00	0.00	-1.91	155.00	1.120	34	0.50	1.76
DB 420	120.0000	34.50	1.01	0.58	164.71	1.140	34	3.88	3.88
ASP705	240.0000	22.00	-3.39	1.96	164.17	1.139	34	5.50	5.50
3' Side Arm	240.0000	50.00	-2.09	1.21	155.00	1.120	34	0.67	2.50
X50A	45.0000	3.00	0.00	-3.91	148.80	1.107	33	1.12	1.12
3' Side Arm	45.0000	50.00	0.00	-2.41	146.00	1.101	33	0.67	2.50
X50C2	-45.0000	3.00	0.00	-3.91	148.80	1.107	33	1.12	1.12
3' Side Arm	-45.0000	50.00	0.00	-2.41	146.00	1.101	33	0.67	2.50
ANT150D6-9	120.0000	28.00	3.39	1.96	154.13	1.118	34	3.96	3.96
3' Side Arm	120.0000	50.00	2.09	1.21	146.00	1.101	33	0.67	2.50
ASP705K	0.0000	22.00	0.00	-3.91	145.71	1.100	33	5.50	5.50
3' Side Arm	0.0000	50.00	0.00	-2.41	136.00	1.079	33	0.67	2.50
ASP705K	240.0000	22.00	-3.39	1.96	145.71	1.100	33	5.50	5.50
3' Side Arm	240.0000	50.00	-2.09	1.21	136.00	1.079	33	0.67	2.50
10' Omni	120.0000	10.00	2.52	1.46	84.00	0.940	28	2.50	2.50
2' Side Arm	120.0000	60.00	1.66	0.96	79.00	0.924	28	0.50	1.76
"Ringo" BR3	0.0000	8.00	0.00	-3.91	77.25	0.918	28	3.47	3.47
3' Side Arm	0.0000	50.00	0.00	-2.41	68.00	0.885	27	0.67	2.50
30"x8"x4" Panel Antenna	120.0000	40.00	1.66	0.96	54.00	0.829	25	2.09	1.18
1' Side Arm	120.0000	15.00	1.22	0.71	54.00	0.829	25	0.25	0.88
TMA 4	120.0000	0.02	1.01	0.58	53.00	0.824	25	0.55	0.45
Tower Climber Warning Sign	60.0000	2.00	0.40	-0.23	49.00	0.806	24	0.40	0.01
Sum Weight:		687.52							

Discrete Appurtenance Pressures - With Ice G_H = 0.850

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Description	Aiming Azimuth °	Weight lb	Offset _x ft	Offset _z ft	z ft	K _z	q _z psf	C _{AAc} Front ft ²	C _{AAc} Side ft ²	t _z in
"Ringo" BR3	0.0000	113.29	0.00	-2.91	164.25	1.139	4	8.58	8.58	1.3502
2' Side Arm	0.0000	97.59	0.00	-1.91	155.00	1.120	4	1.17	4.12	1.3424
DB 420	120.0000	149.06	1.01	0.58	164.71	1.140	4	9.24	9.24	1.3506
ASP705	240.0000	161.22	-3.39	1.96	164.17	1.139	4	10.59	10.59	1.3501
3' Side Arm	240.0000	103.70	-2.09	1.21	155.00	1.120	4	1.56	3.84	1.3424
X50A	45.0000	36.83	0.00	-3.91	148.80	1.107	4	2.22	2.22	1.3369
3' Side Arm	45.0000	103.38	0.00	-2.41	146.00	1.101	4	1.55	3.83	1.3344
X50C2	-45.0000	36.83	0.00	-3.91	148.80	1.107	4	2.22	2.22	1.3369
3' Side Arm	-45.0000	103.38	0.00	-2.41	146.00	1.101	4	1.55	3.83	1.3344
ANT150D6-9	120.0000	135.29	3.39	1.96	154.13	1.118	4	8.45	8.45	1.3416
3' Side Arm	120.0000	103.38	2.09	1.21	146.00	1.101	4	1.55	3.83	1.3344
ASP705K	0.0000	159.01	0.00	-3.91	145.71	1.100	4	10.53	10.53	1.3341
3' Side Arm	0.0000	103.00	0.00	-2.41	136.00	1.079	4	1.55	3.82	1.3250
ASP705K	240.0000	159.01	-3.39	1.96	145.71	1.100	4	10.53	10.53	1.3341
3' Side Arm	240.0000	103.00	-2.09	1.21	136.00	1.079	4	1.55	3.82	1.3250
10' Omni	120.0000	72.30	2.52	1.46	84.00	0.940	3	4.94	4.94	1.2626
2' Side Arm	120.0000	95.14	1.66	0.96	79.00	0.924	3	1.13	3.97	1.2549
"Ringo" BR3	0.0000	102.22	0.00	-3.91	77.25	0.918	3	8.20	8.20	1.2521
3' Side Arm	0.0000	99.45	0.00	-2.41	68.00	0.885	3	1.49	3.74	1.2362
30"x8"x4" Panel Antenna	120.0000	80.17	1.66	0.96	54.00	0.829	3	2.61	1.65	1.2081
1' Side Arm	120.0000	39.16	1.22	0.71	54.00	0.829	3	0.55	1.78	1.2081
TMA 4	120.0000	17.45	1.01	0.58	53.00	0.824	3	0.80	0.67	1.2058
Tower Climber Warning Sign	60.0000	9.30	0.40	-0.23	49.00	0.806	3	0.61	0.15	1.1964
Sum Weight:		2183.14								

Discrete Appurtenance Pressures - Service

G_H = 0.850

Description	Aiming Azimuth °	Weight lb	Offset _x ft	Offset _z ft	z ft	K _z	q _z psf	C _{AAc} Front ft ²	C _{AAc} Side ft ²
"Ringo" BR3	0.0000	8.00	0.00	-2.91	164.25	1.139	9	3.47	3.47
2' Side Arm	0.0000	60.00	0.00	-1.91	155.00	1.120	9	0.50	1.76
DB 420	120.0000	34.50	1.01	0.58	164.71	1.140	9	3.88	3.88
ASP705	240.0000	22.00	-3.39	1.96	164.17	1.139	9	5.50	5.50
3' Side Arm	240.0000	50.00	-2.09	1.21	155.00	1.120	9	0.67	2.50
X50A	45.0000	3.00	0.00	-3.91	148.80	1.107	9	1.12	1.12
3' Side Arm	45.0000	50.00	0.00	-2.41	146.00	1.101	8	0.67	2.50
X50C2	-45.0000	3.00	0.00	-3.91	148.80	1.107	9	1.12	1.12
3' Side Arm	-45.0000	50.00	0.00	-2.41	146.00	1.101	8	0.67	2.50
ANT150D6-9	120.0000	28.00	3.39	1.96	154.13	1.118	9	3.96	3.96
3' Side Arm	120.0000	50.00	2.09	1.21	146.00	1.101	8	0.67	2.50
ASP705K	0.0000	22.00	0.00	-3.91	145.71	1.100	8	5.50	5.50
3' Side Arm	0.0000	50.00	0.00	-2.41	136.00	1.079	8	0.67	2.50
ASP705K	240.0000	22.00	-3.39	1.96	145.71	1.100	8	5.50	5.50
3' Side Arm	240.0000	50.00	-2.09	1.21	136.00	1.079	8	0.67	2.50
10' Omni	120.0000	10.00	2.52	1.46	84.00	0.940	7	2.50	2.50
2' Side Arm	120.0000	60.00	1.66	0.96	79.00	0.924	7	0.50	1.76
"Ringo" BR3	0.0000	8.00	0.00	-3.91	77.25	0.918	7	3.47	3.47
3' Side Arm	0.0000	50.00	0.00	-2.41	68.00	0.885	7	0.67	2.50
30"x8"x4" Panel Antenna	120.0000	40.00	1.66	0.96	54.00	0.829	6	2.09	1.18
1' Side Arm	120.0000	15.00	1.22	0.71	54.00	0.829	6	0.25	0.88
TMA 4	120.0000	0.02	1.01	0.58	53.00	0.824	6	0.55	0.45
Tower Climber Warning Sign	60.0000	2.00	0.40	-0.23	49.00	0.806	6	0.40	0.01
Sum Weight:		687.52							

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Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Leg Weight	613.41			
Bracing Weight	533.63			
Total Member Self-Weight	1147.04			
Guy Weight	221.51			
Total Weight	2488.22			
Wind 0 deg - No Ice		-9.54	-3588.93	-307.64
Wind 30 deg - No Ice		1804.73	-3097.05	-639.57
Wind 60 deg - No Ice		3133.33	-1781.36	-800.13
Wind 90 deg - No Ice		3625.98	9.54	-746.30
Wind 120 deg - No Ice		3151.25	1802.73	-492.50
Wind 150 deg - No Ice		1821.25	3106.59	-106.73
Wind 180 deg - No Ice		9.54	3579.25	307.64
Wind 210 deg - No Ice		-1804.73	3097.05	639.57
Wind 240 deg - No Ice		-3141.71	1786.20	800.13
Wind 270 deg - No Ice		-3625.98	-9.54	746.30
Wind 300 deg - No Ice		-3142.87	-1797.89	492.50
Wind 330 deg - No Ice		-1821.25	-3106.59	106.73
Member Ice	3926.04			
Guy Ice	1813.49			
Total Weight Ice	11175.98			
Wind 0 deg - Ice		0.77	-1046.19	-53.68
Wind 30 deg - Ice		527.54	-905.92	-136.95
Wind 60 deg - Ice		912.79	-523.38	-183.53
Wind 90 deg - Ice		1053.74	-0.77	-180.93
Wind 120 deg - Ice		912.68	522.43	-129.85
Wind 150 deg - Ice		526.20	905.15	-43.98
Wind 180 deg - Ice		-0.77	1045.43	53.68
Wind 210 deg - Ice		-527.54	905.92	136.95
Wind 240 deg - Ice		-913.45	523.77	183.53
Wind 270 deg - Ice		-1053.74	0.77	180.93
Wind 300 deg - Ice		-912.01	-522.04	129.85
Wind 330 deg - Ice		-526.20	-905.15	43.98
Total Weight	2488.22			
Wind 0 deg - Service		-2.43	-912.38	-78.21
Wind 30 deg - Service		458.80	-787.33	-162.59
Wind 60 deg - Service		796.55	-452.86	-203.41
Wind 90 deg - Service		921.79	2.43	-189.72
Wind 120 deg - Service		801.11	458.29	-125.20
Wind 150 deg - Service		463.00	789.75	-27.13
Wind 180 deg - Service		2.43	909.91	78.21
Wind 210 deg - Service		-458.80	787.33	162.59
Wind 240 deg - Service		-798.68	454.09	203.41
Wind 270 deg - Service		-921.79	-2.43	189.72
Wind 300 deg - Service		-798.98	-457.06	125.20
Wind 330 deg - Service		-463.00	-789.75	27.13

Load Combinations

<p style="text-align: center;">tnxTower</p> <p>Morris & Ritchie Associates, Inc.</p> <p>1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</p>	<p>Job</p> <p style="text-align: center;">West Washington Street - 110' Guyed Tower</p>	<p>Page</p> <p style="text-align: center;">34</p>
	<p>Project</p> <p style="text-align: center;">21018.001</p>	<p>Date</p> <p style="text-align: center;">22:25:13 04/28/21</p>
	<p>Client</p> <p style="text-align: center;">Wallace, Montgomery & Associates, LLP</p>	<p>Designed by</p> <p style="text-align: center;">Joseph S. Novotny</p>

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.0 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.0 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.0 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.0 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.0 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.0 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.0 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.0 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.0 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.0 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.0 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	156 - 146	Leg	Max Tension	10	4144.69	43.46	-50.94
			Max. Compression	7	-12049.66	42.64	25.56
			Max. Mx	9	-4971.43	-72.57	-11.65
			Max. My	8	-3126.60	-6.15	103.64
			Max. Vy	11	306.90	45.45	-12.25
			Max. Vx	2	299.08	-1.31	23.94
		Diagonal	Max Tension	3	1194.66	0.00	0.00
			Max. Compression	9	-1500.01	0.00	0.00
			Max. Mx	22	53.86	1.47	0.00
			Max. My	24	272.68	0.00	-0.06
			Max. Vy	22	-2.82	0.00	0.00
			Max. Vx	24	-0.12	0.00	0.00
		Horizontal	Max Tension	9	892.43	0.00	0.00
			Max. Compression	11	-703.52	0.00	0.00
			Max. Mx	19	0.23	1.11	0.00

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	13	632.72	0.00	0.00
			Max. Vy	19	2.81	0.00	0.00
			Max. Vx	13	-0.00	0.00	0.00
		Top Girt	Max Tension	7	262.44	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	20	113.81	1.11	0.00
			Max. My	24	61.97	0.00	-0.00
			Max. Vy	20	2.81	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Bottom Girt	Max Tension	4	412.15	0.00	0.00
			Max. Compression	10	-356.92	0.00	0.00
			Max. Mx	14	41.02	1.11	0.00
			Max. My	13	324.96	0.00	0.00
			Max. Vy	14	2.81	0.00	0.00
			Max. Vx	13	-0.00	0.00	0.00
		Guy A	Bottom Tension	7	10090.19		
			Top Tension	7	10143.74		
			Top Cable Vert	7	9845.46		
			Top Cable Norm	7	2439.64		
			Top Cable Tan	7	103.18		
			Bot Cable Vert	7	-9766.04		
			Bot Cable Norm	7	2528.49		
			Bot Cable Tan	7	207.70		
		Guy B	Bottom Tension	13	9675.33		
			Top Tension	13	9729.15		
			Top Cable Vert	13	9445.72		
			Top Cable Norm	13	2329.81		
			Top Cable Tan	13	82.04		
			Bot Cable Vert	13	-9365.12		
			Bot Cable Norm	13	2423.56		
			Bot Cable Tan	13	181.34		
		Guy C	Bottom Tension	6	7381.02		
			Top Tension	6	7434.65		
			Top Cable Vert	6	7022.76		
			Top Cable Norm	6	2439.50		
			Top Cable Tan	6	61.91		
			Bot Cable Vert	6	-6940.80		
			Bot Cable Norm	6	2503.94		
			Bot Cable Tan	6	187.11		
		Top Guy Pull-Off	Max Tension	7	1745.73	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	20	757.07	3.09	0.00
			Max. My	13	675.61	0.00	0.00
			Max. Vy	20	-7.80	0.00	0.00
			Max. Vx	13	-0.00	0.00	0.00
T2	146 - 136	Leg	Max Tension	10	6804.52	3.87	16.73
			Max. Compression	12	-13143.70	-9.76	-35.82
			Max. Mx	10	-7166.87	-86.90	47.77
			Max. My	8	281.70	-3.63	83.11
			Max. Vy	11	304.95	-40.74	2.45
			Max. Vx	8	-312.78	-3.63	83.11
		Diagonal	Max Tension	3	748.75	0.00	0.00
			Max. Compression	8	-1093.78	0.00	0.00
			Max. Mx	26	56.76	1.45	0.00
			Max. My	24	144.46	0.00	-0.06
			Max. Vy	26	2.79	0.00	0.00
			Max. Vx	24	-0.12	0.00	0.00
		Horizontal	Max Tension	8	731.20	0.00	0.00
			Max. Compression	3	-486.44	0.00	0.00
			Max. Mx	21	252.20	1.10	0.00
			Max. My	12	-137.14	0.00	0.00

tnxTower Morris & Ritchie Associates, Inc. 1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748	Job	West Washington Street - 110' Guyed Tower	Page	36
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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft	
T3	136 - 126	Top Girt	Max. Vy	21	-2.78	0.00	0.00	
			Max. Vx	12	-0.00	0.00	0.00	
			Max Tension	9	433.89	0.00	0.00	
			Max. Compression	3	-316.81	0.00	0.00	
			Max. Mx	19	152.19	1.10	0.00	
			Max. My	13	40.84	0.00	0.00	
		Bottom Girt	Max. Vy	19	-2.78	0.00	0.00	
			Max. Vx	13	-0.00	0.00	0.00	
			Max Tension	7	366.97	0.00	0.00	
			Max. Compression	12	-158.59	0.00	0.00	
			Max. Mx	17	31.52	1.10	0.00	
			Max. My	12	-55.26	0.00	0.00	
		Leg	Max. Vy	14	-2.78	0.00	0.00	
			Max. Vx	12	-0.00	0.00	0.00	
			Max Tension	10	6803.81	-10.22	51.90	
			Max. Compression	12	-12990.22	-29.42	-6.32	
			Max. Mx	5	-2496.89	120.08	14.10	
			Max. My	3	-9266.02	-1.37	-95.95	
			Diagonal	Max. Vy	5	415.26	3.43	-2.58
				Max. Vx	6	354.15	3.69	-10.10
				Max Tension	11	855.54	0.00	0.00
				Max. Compression	6	-1415.40	0.00	0.00
				Max. Mx	26	155.18	1.44	0.00
				Max. My	24	36.16	0.00	-0.06
		Horizontal	Max. Vy	26	-2.77	0.00	0.00	
			Max. Vx	24	0.11	0.00	0.00	
			Max Tension	6	911.65	0.00	0.00	
			Max. Compression	11	-540.62	0.00	0.00	
			Max. Mx	23	-60.52	1.09	0.00	
			Max. My	12	-535.92	0.00	0.00	
		Top Girt	Max. Vy	23	-2.75	0.00	0.00	
			Max. Vx	12	-0.00	0.00	0.00	
			Max Tension	6	437.81	0.00	0.00	
			Max. Compression	11	-207.46	0.00	0.00	
			Max. Mx	14	37.23	1.09	0.00	
			Max. My	12	-189.86	0.00	0.00	
		Bottom Girt	Max. Vy	14	2.75	0.00	0.00	
			Max. Vx	12	-0.00	0.00	0.00	
			Max Tension	6	591.24	0.00	0.00	
			Max. Compression	11	-375.78	0.00	0.00	
			Max. Mx	17	136.15	1.09	0.00	
			Max. My	12	-352.60	0.00	0.00	
T4	126 - 116	Leg	Max. Vy	17	-2.75	0.00	0.00	
			Max. Vx	12	-0.00	0.00	0.00	
			Max Tension	10	2926.82	-10.85	6.41	
			Max. Compression	7	-10741.32	-6.30	-16.98	
			Max. Mx	5	-1815.15	130.55	10.29	
			Max. My	3	-5991.21	10.28	-106.99	
		Diagonal	Max. Vy	5	486.52	-6.15	-4.31	
			Max. Vx	3	-391.94	3.48	3.13	
			Max Tension	9	1074.53	0.00	0.00	
			Max. Compression	6	-1593.54	0.00	0.00	
			Max. Mx	26	175.99	1.42	0.00	
			Max. My	25	-78.97	0.00	-0.05	
		Horizontal	Max. Vy	26	-2.74	0.00	0.00	
			Max. Vx	25	0.10	0.00	0.00	
			Max Tension	6	1028.47	0.00	0.00	
			Max. Compression	9	-696.99	0.00	0.00	
			Max. Mx	17	205.07	1.08	0.00	
			Max. My	12	-591.76	0.00	0.00	
			Max. Vy	17	-2.72	0.00	0.00	

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft				
T5	116 - 106	Top Girt	Max. Vx	12	-0.00	0.00	0.00				
			Max Tension	6	502.71	0.00	0.00				
			Max. Compression	10	-355.28	0.00	0.00				
			Max. Mx	17	92.59	1.08	0.00				
			Max. My	12	-304.20	0.00	0.00				
			Max. Vy	17	-2.72	0.00	0.00				
		Bottom Girt	Max. Vx	12	-0.00	0.00	0.00				
			Max Tension	6	690.71	0.00	0.00				
			Max. Compression	11	-465.58	0.00	0.00				
			Max. Mx	14	57.85	1.08	0.00				
			Max. My	12	-452.89	0.00	0.00				
			Max. Vy	14	-2.72	0.00	0.00				
		Leg	Leg	Max. Vx	Max. Vx	12	-0.00	0.00	0.00		
					Max Tension	7	4997.33	51.92	55.61		
					Max. Compression	6	-17562.89	-26.49	-33.59		
				Max. Mx	Max. Mx	5	-1816.56	-131.68	-17.68		
					Max. My	6	-10403.95	-50.76	-118.49		
					Max. Vy	5	547.87	-32.97	-4.57		
				Diagonal	Diagonal	Max. Vx	Max. Vx	7	432.86	-20.05	-39.67
							Max Tension	9	1263.03	0.00	0.00
							Max. Compression	6	-1650.26	0.00	0.00
						Max. Mx	Max. Mx	26	249.48	1.41	0.00
							Max. My	25	-154.69	0.00	-0.04
							Max. Vy	26	-2.70	0.00	0.00
				Horizontal	Horizontal	Max. Vx	Max. Vx	25	-0.08	0.00	0.00
							Max Tension	6	1084.56	0.00	0.00
							Max. Compression	9	-843.54	0.00	0.00
						Max. Mx	Max. Mx	14	70.45	1.06	0.00
							Max. My	12	-731.05	0.00	0.00
							Max. Vy	14	-2.69	0.00	0.00
		Top Girt	Top Girt	Max. Vx	Max. Vx	12	-0.00	0.00	0.00		
					Max Tension	4	597.44	0.00	0.00		
					Max. Compression	10	-471.50	0.00	0.00		
				Max. Mx	Max. Mx	14	54.72	1.06	0.00		
					Max. My	12	-364.96	0.00	0.00		
					Max. Vy	14	-2.69	0.00	0.00		
				Bottom Girt	Bottom Girt	Max. Vx	Max. Vx	12	-0.00	0.00	0.00
							Max Tension	6	700.86	0.00	0.00
							Max. Compression	11	-505.01	0.00	0.00
						Max. Mx	Max. Mx	23	-50.53	1.06	0.00
							Max. My	12	-486.34	0.00	0.00
							Max. Vy	23	-2.69	0.00	0.00
T6	106 - 96	Leg	Leg	Max. Vx	Max. Vx	12	-0.00	0.00			
					Max Tension	7	4996.44	-22.97	-32.10		
					Max. Compression	6	-17563.62	-78.91	-141.64		
				Max. Mx	Max. Mx	5	-1358.64	-174.22	-5.97		
					Max. My	7	-17233.13	-61.65	-149.65		
					Max. Vy	5	548.32	-174.22	-5.97		
		Diagonal	Diagonal	Max. Vx	Max. Vx	7	426.99	-61.65	-149.65		
					Max Tension	11	455.35	0.00	0.00		
					Max. Compression	5	-937.26	0.00	0.00		
				Max. Mx	Max. Mx	26	-149.99	1.39	0.00		
					Max. My	24	-59.20	0.00	-0.04		
					Max. Vy	26	-2.66	0.00	0.00		
		Horizontal	Horizontal	Max. Vx	Max. Vx	24	0.07	0.00	0.00		
					Max Tension	5	632.22	0.00	0.00		
					Max. Compression	9	-297.14	0.00	0.00		
				Max. Mx	Max. Mx	23	65.81	1.05	0.00		
					Max. My	12	92.09	0.00	0.00		
					Max. Vy	23	-2.65	0.00	0.00		
				Max. Vx	Max. Vx	12	-0.00	0.00	0.00		

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
		Top Girt	Max Tension	6	170.66	0.00	0.00
			Max. Compression	12	-24.17	0.00	0.00
			Max. Mx	23	71.74	1.05	0.00
			Max. My	12	75.55	0.00	0.00
			Max. Vy	23	-2.65	0.00	0.00
			Max. Vx	12	-0.00	0.00	0.00
		Bottom Girt	Max Tension	4	350.47	0.00	0.00
			Max. Compression	11	-183.45	0.00	0.00
			Max. Mx	23	36.34	1.05	0.00
			Max. My	11	-67.45	0.00	-0.00
			Max. Vy	23	-2.65	0.00	0.00
			Max. Vx	11	0.00	0.00	0.00
		Guy A	Bottom Tension	7	2974.67		
			Top Tension	7	2981.85		
			Top Cable Vert	7	2459.55		
			Top Cable Norm	7	1685.84		
			Top Cable Tan	7	3.76		
			Bot Cable Vert	7	-2435.27		
			Bot Cable Norm	7	1708.09		
			Bot Cable Tan	7	22.67		
		Guy B	Bottom Tension	13	2929.58		
			Top Tension	13	2936.78		
			Top Cable Vert	13	2422.72		
			Top Cable Norm	13	1659.85		
			Top Cable Tan	13	4.05		
			Bot Cable Vert	13	-2398.15		
			Bot Cable Norm	13	1682.53		
			Bot Cable Tan	13	21.06		
		Guy C	Bottom Tension	5	2419.41		
			Top Tension	5	2426.54		
			Top Cable Vert	5	1940.24		
			Top Cable Norm	5	1457.25		
			Top Cable Tan	5	0.63		
			Bot Cable Vert	5	-1915.22		
			Bot Cable Norm	5	1478.25		
			Bot Cable Tan	5	16.94		
		Top Guy Pull-Off	Max Tension	6	1135.25	0.00	0.00
			Max. Compression	12	-160.80	0.00	0.00
			Max. Mx	23	477.20	2.99	0.00
			Max. My	12	502.57	0.00	0.00
			Max. Vy	23	-7.56	0.00	0.00
			Max. Vx	12	-0.00	0.00	0.00
T7	96 - 86	Leg	Max Tension	7	878.05	-40.44	10.18
			Max. Compression	6	-16557.06	28.20	-49.76
			Max. Mx	5	-2718.49	-70.32	-2.88
			Max. My	6	-4470.55	-42.00	-77.80
			Max. Vy	5	272.08	-11.76	-3.14
			Max. Vx	5	-252.41	-5.37	-3.50
		Diagonal	Max Tension	10	552.31	0.00	0.00
			Max. Compression	5	-919.10	0.00	0.00
			Max. Mx	26	-226.50	1.36	0.00
			Max. My	24	-110.27	0.00	-0.03
			Max. Vy	26	2.62	0.00	0.00
			Max. Vx	24	0.06	0.00	0.00
		Horizontal	Max Tension	5	608.00	0.00	0.00
			Max. Compression	10	-365.22	0.00	0.00
			Max. Mx	25	24.81	1.03	0.00
			Max. My	11	-141.20	0.00	-0.00
			Max. Vy	25	-2.62	0.00	0.00
			Max. Vx	11	0.00	0.00	0.00
		Top Girt	Max Tension	5	361.33	0.00	0.00

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft	
T8	86 - 76	Bottom Girt	Max. Compression	10	-167.55	0.00	0.00	
			Max. Mx	23	45.12	1.03	0.00	
			Max. My	11	-122.29	0.00	-0.00	
			Max. Vy	23	-2.62	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Max Tension	5	352.99	0.00	0.00	
			Max. Compression	11	-198.10	0.00	0.00	
			Max. Mx	21	115.78	1.03	0.00	
			Max. My	11	2.01	0.00	-0.00	
			Max. Vy	21	-2.62	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Max Tension	1	0.00	0.00	0.00	
		Leg	Max. Compression	6	-15604.38	22.89	-48.60	
			Max. Mx	5	-3208.44	-81.92	2.29	
			Max. My	6	-3710.06	-40.22	-70.20	
			Max. Vy	5	293.16	-23.41	-1.27	
			Max. Vx	5	-252.62	22.40	61.63	
			Max Tension	10	570.42	0.00	0.00	
			Diagonal	Max. Compression	5	-931.46	0.00	0.00
				Max. Mx	22	-78.17	1.34	0.00
				Max. My	24	-83.51	0.00	-0.02
				Max. Vy	22	-2.58	0.00	0.00
				Max. Vx	24	0.05	0.00	0.00
				Max Tension	5	629.44	0.00	0.00
		Horizontal	Max. Compression	10	-391.09	0.00	0.00	
			Max. Mx	23	120.18	1.02	0.00	
			Max. My	11	-28.14	0.00	-0.00	
			Max. Vy	23	-2.57	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Max Tension	5	357.18	0.00	0.00	
		Top Girt	Max. Compression	10	-248.16	0.00	0.00	
			Max. Mx	21	107.08	1.02	0.00	
			Max. My	11	-58.30	0.00	-0.00	
Max. Vy	21		-2.57	0.00	0.00			
Max. Vx	11		0.00	0.00	0.00			
Max Tension	5		357.18	0.00	0.00			
Bottom Girt	Max. Compression	10	-248.16	0.00	0.00			
	Max. Mx	21	107.08	1.02	0.00			
	Max. My	11	-58.30	0.00	-0.00			
	Max. Vy	21	-2.57	0.00	0.00			
	Max. Vx	11	0.00	0.00	0.00			
	Max Tension	6	315.84	0.00	0.00			
T9	76 - 66	Leg	Max. Compression	11	-138.91	0.00	0.00	
			Max. Mx	23	35.34	1.02	0.00	
			Max. My	11	151.74	0.00	-0.00	
			Max. Vy	23	-2.57	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Max Tension	6	315.84	0.00	0.00	
		Diagonal	Max. Compression	6	-15599.76	-1.44	-55.31	
			Max. Mx	6	-11888.80	-102.25	61.54	
			Max. My	6	-6016.90	-89.71	-116.01	
			Max. Vy	6	-343.49	-102.25	61.54	
			Max. Vx	6	-410.66	-89.71	-116.01	
			Max Tension	11	704.70	0.00	0.00	
		Horizontal	Max. Compression	6	-1642.04	0.00	0.00	
			Max. Mx	22	-363.85	1.32	0.00	
			Max. My	24	-282.30	0.00	-0.02	
			Max. Vy	22	-2.53	0.00	0.00	
			Max. Vx	24	0.04	0.00	0.00	
			Max Tension	6	1015.39	0.00	0.00	
Top Girt	Max. Compression	11	-384.16	0.00	0.00			
	Max. Mx	17	241.15	1.00	0.00			
	Max. My	11	-228.20	0.00	-0.00			
	Max. Vy	17	-2.53	0.00	0.00			
	Max. Vx	11	0.00	0.00	0.00			
	Max Tension	5	105.79	0.00	0.00			
		Max. Compression	1	0.00	0.00	0.00		

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft	
T10	66 - 56	Bottom Girt	Max. Mx	23	98.99	1.00	0.00	
			Max. My	11	18.93	0.00	-0.00	
			Max. Vy	23	-2.53	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Max Tension	6	572.60	0.00	0.00	
			Max. Compression	11	-265.93	0.00	0.00	
			Max. Mx	26	39.53	1.00	0.00	
			Max. My	11	-265.92	0.00	-0.00	
			Max. Vy	26	-2.53	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Guy A	Bottom Tension	9	1401.78		
				Top Tension	9	1405.53		
		Top Cable Vert		9	843.21			
		Top Cable Norm		9	1124.50			
		Top Cable Tan		9	3.02			
		Bot Cable Vert		9	-828.32			
		Bot Cable Norm		9	1130.85			
		Bot Cable Tan		9	7.30			
		Guy B		Bottom Tension	11	1383.81		
				Top Tension	11	1387.57		
			Top Cable Vert	11	832.49			
			Top Cable Norm	11	1110.09			
			Top Cable Tan	11	4.88			
			Bot Cable Vert	11	-817.63			
			Bot Cable Norm	11	1116.41			
			Bot Cable Tan	11	6.68			
		Guy C	Bottom Tension	4	1346.07			
			Top Tension	4	1349.71			
			Top Cable Vert	4	751.56			
			Top Cable Norm	4	1121.11			
			Top Cable Tan	4	0.19			
			Bot Cable Vert	4	-737.28			
			Bot Cable Norm	4	1126.19			
			Bot Cable Tan	4	0.77			
		Top Guy Pull-Off	Max Tension	5	703.71	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	23	658.47	2.91	0.00	
			Max. My	11	125.95	0.00	-0.00	
			Max. Vy	23	-7.36	0.00	0.00	
			Max. Vx	11	0.00	0.00	0.00	
			Leg	Max Tension	1	0.00	0.00	0.00
				Max. Compression	6	-11889.99	82.83	-66.20
				Max. Mx	5	-5591.55	93.71	-10.23
				Max. My	6	-7172.70	-73.08	-107.97
				Max. Vy	5	360.47	-7.58	3.08
				Max. Vx	6	-410.52	-0.09	-0.56
		Diagonal		Max Tension	11	671.83	0.00	0.00
Max. Compression	6			-1616.47	0.00	0.00		
Max. Mx	22			-294.34	1.29	0.00		
Max. My	24			-153.36	0.00	-0.01		
Max. Vy	22			-2.48	0.00	0.00		
Max. Vx	24			0.02	0.00	0.00		
Horizontal	Max Tension	6		1053.38	0.00	0.00		
	Max. Compression	11		-435.56	0.00	0.00		
	Max. Mx	26		83.42	0.98	0.00		
	Max. My	11		-435.56	0.00	-0.00		
	Max. Vy	26		2.47	0.00	0.00		
	Max. Vx	11		0.00	0.00	0.00		
Top Girt	Max Tension	6	671.70	0.00	0.00			
	Max. Compression	11	-261.58	0.00	0.00			
	Max. Mx	26	54.15	0.98	0.00			

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T11	56 - 46	Bottom Girt	Max. My	11	-261.58	0.00	-0.00
			Max. Vy	26	2.47	0.00	0.00
			Max. Vx	11	0.00	0.00	0.00
			Max Tension	6	545.03	0.00	0.00
			Max. Compression	12	-215.08	0.00	0.00
			Max. Mx	23	58.67	0.98	0.00
		Leg	Max. My	11	-192.78	0.00	-0.00
			Max. Vy	23	2.47	0.00	0.00
			Max. Vx	11	0.00	0.00	0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-10175.35	0.00	0.00
			Max. Mx	5	-7452.06	117.99	-27.40
		Diagonal	Max. My	6	-6349.47	74.15	104.07
			Max. Vy	5	419.86	-0.00	-0.00
			Max. Vx	6	-393.35	3.84	2.70
			Max Tension	11	615.04	0.00	0.00
			Max. Compression	6	-1475.36	0.00	0.00
			Max. Mx	23	-120.64	1.26	0.00
		Horizontal	Max. My	24	-127.84	0.00	-0.01
			Max. Vy	23	-2.42	0.00	0.00
			Max. Vx	24	0.01	0.00	0.00
			Max Tension	6	946.22	0.00	0.00
			Max. Compression	11	-420.28	0.00	0.00
			Max. Mx	17	295.40	0.96	0.00
		Top Girt	Max. My	11	-293.38	0.00	-0.00
			Max. Vy	17	-2.41	0.00	0.00
			Max. Vx	11	0.00	0.00	0.00
			Max Tension	6	600.58	0.00	0.00
			Max. Compression	11	-218.32	0.00	0.00
			Max. Mx	23	83.71	0.96	0.00
Bottom Girt	Max. My	11	-189.09	0.00	-0.00		
	Max. Vy	23	-2.41	0.00	0.00		
	Max. Vx	11	0.00	0.00	0.00		
	Max Tension	5	480.70	0.00	0.00		
	Max. Compression	11	-250.48	0.00	0.00		
	Max. Mx	14	235.99	0.96	0.00		
		Max. Vy	14	-2.41	0.00	0.00	
		Max. Vx	11	0.00	0.00	0.00	

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	10	10175.49	40.38	-77.45
	Max. H _x	6	7507.62	231.88	318.83
	Max. H _z	5	4718.86	160.96	326.30
	Min. Vert	4	2446.54	64.01	261.52
	Min. H _x	15	7618.36	-85.42	162.87
	Min. H _z	11	9251.45	12.19	-106.33
Leg B	Max. Vert	6	8126.65	159.79	-313.51
	Max. H _x	21	7669.59	211.44	-60.93
	Max. H _z	11	3412.81	22.91	137.40
	Min. Vert	11	3412.81	22.91	137.40
	Min. H _x	3	7320.02	14.82	-144.93
	Min. H _z	6	8126.65	159.79	-313.51
Leg A	Max. Vert	2	8353.39	-84.80	-2.20

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<i>Location</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Vertical lb</i>	<i>Horizontal, X lb</i>	<i>Horizontal, Z lb</i>
	Max. H _x	11	5104.77	206.66	-28.13
	Max. H _z	5	7454.09	-395.34	91.57
	Min. Vert	9	3441.74	20.84	-75.09
	Min. H _x	5	7454.09	-395.34	91.57
	Min. H _z	23	6874.66	-35.65	-182.61
Guy C @ 38.833 ft Elev 47 ft Azimuth 240 deg	Max. Vert	10	-634.50	-138.63	79.66
	Max. H _x	10	-634.50	-138.63	79.66
	Max. H _z	2	-6559.58	-1967.08	1324.68
	Min. Vert	6	-6940.80	-2262.03	1089.93
	Min. H _x	6	-6940.80	-2262.03	1089.93
	Min. H _z	10	-634.50	-138.63	79.66
Guy B @ 27.333 ft Elev 47 ft Azimuth 105 deg	Max. Vert	6	-397.24	35.81	-12.56
	Max. H _x	13	-9365.12	2294.04	802.42
	Max. H _z	13	-9365.12	2294.04	802.42
	Min. Vert	13	-9365.12	2294.04	802.42
	Min. H _x	6	-397.24	35.81	-12.56
	Min. H _z	7	-430.56	68.05	-37.08
Guy A @ 27.333 ft Elev 47 ft Azimuth 17 deg	Max. Vert	2	-440.99	37.17	-33.45
	Max. H _x	8	-8547.11	598.40	-2142.89
	Max. H _z	2	-440.99	37.17	-33.45
	Min. Vert	7	-9766.04	583.81	-2468.92
	Min. H _x	3	-571.20	11.28	-73.92
	Min. H _z	7	-9766.04	583.81	-2468.92
Guy C @ 46.5 ft Elev 45.5 ft Azimuth 242 deg	Max. Vert	10	-88.29	-53.66	27.42
	Max. H _x	10	-88.29	-53.66	27.42
	Max. H _z	3	-2537.05	-2196.12	1196.77
	Min. Vert	5	-2618.12	-2264.66	1179.32
	Min. H _x	5	-2618.12	-2264.66	1179.32
	Min. H _z	10	-88.29	-53.66	27.42
Guy B @ 43 ft Elev 44.5 ft Azimuth 123 deg	Max. Vert	6	-124.86	84.38	56.38
	Max. H _x	12	-2987.44	2178.39	1417.23
	Max. H _z	13	-3069.07	2166.61	1438.83
	Min. Vert	13	-3069.07	2166.61	1438.83
	Min. H _x	6	-124.86	84.38	56.38
	Min. H _z	6	-124.86	84.38	56.38
Guy A @ 43 ft Elev 44.5 ft Azimuth 0 deg	Max. Vert	2	-112.77	0.06	-83.84
	Max. H _x	24	-1416.48	46.69	-1529.12
	Max. H _z	2	-112.77	0.06	-83.84
	Min. Vert	7	-3077.14	-28.43	-2586.95
	Min. H _x	6	-2565.06	-45.26	-2140.84
	Min. H _z	8	-3013.12	-2.54	-2612.70

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Morris & Ritchie Associates, Inc.</p> <p style="text-align: center;">1220-C East Joppa Road, Suite 505 Towson, MD 21286 Phone: (410) 821-1690 FAX: (410) 821-1748</p>	<p>Job</p> <p style="text-align: center;">West Washington Street - 110' Guyed Tower</p>	<p>Page</p> <p style="text-align: center;">43</p>
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Tower Mast Reaction Summary

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	13042.36	-11.26	3.91	117.61	175.67	-185.26
1.2 Dead+1.0 Wind 0 deg - No Ice+1.0 Guy	22985.34	29.84	32.51	-948.14	-883.19	-211.75
1.2 Dead+1.0 Wind 30 deg - No Ice+1.0 Guy	19520.03	172.18	-56.76	-1946.07	-2411.08	-462.30
1.2 Dead+1.0 Wind 60 deg - No Ice+1.0 Guy	15540.32	247.82	-136.79	-1879.12	-3242.32	-734.30
1.2 Dead+1.0 Wind 90 deg - No Ice+1.0 Guy	19972.24	131.15	-130.75	-1092.18	-2438.15	-967.76
1.2 Dead+1.0 Wind 120 deg - No Ice+1.0 Guy	23845.71	-29.12	-73.64	-360.37	-489.96	-1010.97
1.2 Dead+1.0 Wind 150 deg - No Ice+1.0 Guy	23245.15	-123.61	36.56	979.78	878.95	-813.91
1.2 Dead+1.0 Wind 180 deg - No Ice+1.0 Guy	18674.66	-140.08	168.86	2528.38	1698.01	-423.62
1.2 Dead+1.0 Wind 210 deg - No Ice+1.0 Guy	17421.54	-133.66	191.28	3242.83	3378.95	-75.83
1.2 Dead+1.0 Wind 240 deg - No Ice+1.0 Guy	18724.43	-203.72	101.61	2567.15	4745.40	171.63
1.2 Dead+1.0 Wind 270 deg - No Ice+1.0 Guy	17769.03	-241.76	-2.94	1121.74	4621.29	365.67
1.2 Dead+1.0 Wind 300 deg - No Ice+1.0 Guy	18160.92	-226.84	-9.71	-81.72	2949.91	331.22
1.2 Dead+1.0 Wind 330 deg - No Ice+1.0 Guy	22281.59	-118.77	51.16	-311.73	1004.97	51.23
1.2 Dead+1.0 Ice+1.0 Temp+Guy	22681.19	-32.50	15.75	408.36	496.41	-294.22
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	22958.27	-16.43	-35.50	-469.00	216.33	-238.39
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	22800.10	16.42	-36.52	-484.39	-389.80	-323.23
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	22791.10	35.50	-23.25	-295.44	-712.55	-414.79
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	22766.18	36.11	0.07	88.40	-680.32	-476.26
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	22867.99	17.56	28.46	630.48	-334.60	-481.95
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	23190.70	-18.76	49.84	1056.45	308.48	-441.20
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	23257.67	-54.19	63.35	1310.92	888.20	-370.54
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	23135.17	-83.10	65.84	1337.39	1359.05	-280.02
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	23073.09	-101.79	54.97	1119.18	1707.14	-186.03
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	23195.14	-100.06	32.21	677.38	1677.13	-126.68
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	23347.26	-82.05	7.19	242.16	1379.62	-127.76
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	23289.27	-52.62	-16.24	-138.49	874.89	-173.45
Dead+Wind 0 deg - Service+Guy	13114.48	-3.57	-59.89	-605.38	37.84	-150.44
Dead+Wind 30 deg - Service+Guy	13085.92	34.55	-55.40	-579.89	-401.00	-243.48
Dead+Wind 60 deg - Service+Guy	13067.10	60.15	-35.46	-373.41	-676.53	-324.26
Dead+Wind 90 deg -	13052.94	66.62	-5.08	-35.66	-719.40	-368.46

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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
Service+Guy						
Dead+Wind 120 deg - Service+Guy	13053.27	52.45	28.20	354.92	-522.54	-361.13
Dead+Wind 150 deg - Service+Guy	13078.48	20.54	54.57	680.11	-134.03	-306.43
Dead+Wind 180 deg - Service+Guy	13102.80	-19.33	67.26	851.36	325.00	-221.77
Dead+Wind 210 deg - Service+Guy	13115.89	-56.89	63.24	824.42	739.72	-127.47
Dead+Wind 240 deg - Service+Guy	13130.98	-82.86	43.41	606.42	1018.32	-46.76
Dead+Wind 270 deg - Service+Guy	13155.33	-89.04	12.51	255.00	1068.93	-4.15
Dead+Wind 300 deg - Service+Guy	13169.54	-74.65	-20.26	-121.92	886.03	-12.99
Dead+Wind 330 deg - Service+Guy	13152.64	-43.64	-46.61	-432.91	511.95	-67.36

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-2488.17	0.00	0.24	2488.19	0.25	0.014%
2	-17.32	-2950.01	-4154.04	17.12	2949.96	4152.92	0.022%
3	2074.51	-2941.49	-3578.60	-2074.65	2941.46	3577.75	0.017%
4	3606.15	-2931.71	-2054.54	-3605.97	2931.70	2054.19	0.008%
5	4177.23	-2939.19	16.19	-4176.55	2939.16	-15.59	0.018%
6	3635.80	-2948.41	2091.80	-3634.79	2948.35	-2090.91	0.026%
7	2106.68	-2941.26	3601.72	-2105.80	2941.21	-3600.92	0.023%
8	17.32	-2933.02	4144.36	-16.57	2932.99	-4143.83	0.018%
9	-2074.51	-2941.54	3578.60	2073.82	2941.53	-3578.35	0.014%
10	-3614.53	-2951.32	2059.38	3613.86	2951.31	-2059.03	0.015%
11	-4177.23	-2943.84	-16.19	4176.54	2943.82	16.61	0.016%
12	-3627.41	-2934.62	-2086.96	3627.45	2934.60	2086.08	0.017%
13	-2106.68	-2941.77	-3601.72	2106.47	2941.72	3600.63	0.022%
14	0.00	-11628.96	0.00	-0.02	11628.96	0.60	0.005%
15	-5.02	-11639.08	-1520.09	4.77	11639.08	1519.32	0.007%
16	755.26	-11629.90	-1310.44	-755.39	11629.90	1309.83	0.005%
17	1311.24	-11618.95	-753.65	-1310.76	11618.94	753.67	0.004%
18	1517.12	-11627.76	3.67	-1516.64	11627.75	-3.15	0.006%
19	1319.02	-11638.24	764.11	-1318.50	11638.23	-763.53	0.007%
20	765.04	-11629.28	1319.76	-764.53	11629.28	-1319.25	0.006%
21	5.02	-11618.84	1519.32	-4.59	11618.83	-1518.84	0.006%
22	-755.26	-11628.02	1310.44	755.38	11628.02	-1309.87	0.005%
23	-1311.90	-11638.98	754.04	1311.47	11638.97	-753.67	0.005%
24	-1517.12	-11630.17	-3.67	1516.51	11630.16	3.55	0.005%
25	-1318.36	-11619.69	-763.73	1318.01	11619.68	763.09	0.006%
26	-765.04	-11628.64	-1319.76	764.79	11628.63	1318.95	0.007%
27	-4.40	-2490.34	-1056.04	4.25	2490.33	1055.72	0.013%
28	527.38	-2488.17	-909.75	-527.43	2488.17	909.40	0.013%
29	916.75	-2485.68	-522.30	-916.49	2485.68	522.26	0.010%
30	1061.93	-2487.58	4.11	-1061.67	2487.58	-3.85	0.014%
31	924.29	-2489.93	531.77	-924.08	2489.93	-531.48	0.013%
32	535.56	-2488.11	915.63	-535.31	2488.11	-915.23	0.017%
33	4.40	-2486.01	1053.58	-4.20	2486.01	-1053.21	0.016%
34	-527.38	-2488.18	909.75	527.53	2488.18	-909.38	0.015%
35	-918.88	-2490.67	523.53	918.95	2490.67	-523.10	0.016%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
36	-1061.93	-2488.76	-4.11	1061.70	2488.77	4.27	0.010%
37	-922.16	-2486.42	-530.54	921.91	2486.42	530.28	0.014%
38	-535.56	-2488.24	-915.63	535.34	2488.24	915.27	0.016%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	18	0.0000001	0.00007340
2	Yes	52	0.00009023	0.00008032
3	Yes	48	0.00009830	0.00007218
4	Yes	24	0.0000001	0.00006822
5	Yes	51	0.00009673	0.00007265
6	Yes	56	0.00009968	0.00009014
7	Yes	56	0.00008937	0.00008056
8	Yes	49	0.00009841	0.00007333
9	Yes	36	0.0000001	0.00008437
10	Yes	38	0.0000001	0.00008207
11	Yes	36	0.0000001	0.00009160
12	Yes	44	0.00009589	0.00007509
13	Yes	51	0.00008887	0.00007952
14	Yes	20	0.0000001	0.00008225
15	Yes	26	0.0000001	0.00009858
16	Yes	24	0.0000001	0.00008031
17	Yes	22	0.0000001	0.00007552
18	Yes	25	0.0000001	0.00009026
19	Yes	27	0.0000001	0.00009691
20	Yes	30	0.0000001	0.00007954
21	Yes	29	0.0000001	0.00007333
22	Yes	26	0.0000001	0.00007454
23	Yes	25	0.0000001	0.00008877
24	Yes	25	0.0000001	0.00008956
25	Yes	27	0.0000001	0.00008267
26	Yes	28	0.0000001	0.00009373
27	Yes	21	0.0000001	0.00007421
28	Yes	19	0.0000001	0.00007809
29	Yes	18	0.0000001	0.00007430
30	Yes	20	0.0000001	0.00008253
31	Yes	22	0.0000001	0.00007735
32	Yes	22	0.0000001	0.00009899
33	Yes	22	0.0000001	0.00008825
34	Yes	21	0.0000001	0.00008574
35	Yes	19	0.0000001	0.00009712
36	Yes	18	0.0000001	0.00007936
37	Yes	20	0.0000001	0.00007667
38	Yes	21	0.0000001	0.00008671

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
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Section No.	Elevation <i>ft</i>	Horz. Deflection <i>in</i>	Gov. Load Comb.	Tilt °	Twist °
T1	156 - 146	2.803	32	0.1271	2.7314
T2	146 - 136	2.664	32	0.1218	2.6053
T3	136 - 126	2.354	32	0.2019	2.4399
T4	126 - 116	1.872	32	0.2497	2.1807
T5	116 - 106	1.318	32	0.2564	1.9133
T6	106 - 96	0.812	32	0.1986	1.6417
T7	96 - 86	0.511	34	0.1312	1.3826
T8	86 - 76	0.332	35	0.0863	1.1221
T9	76 - 66	0.190	35	0.0551	0.8675
T10	66 - 56	0.101	35	0.0372	0.6335
T11	56 - 46	0.035	35	0.0241	0.3143

Critical Deflections and Radius of Curvature - Service Wind

Elevation <i>ft</i>	Appurtenance	Gov. Load Comb.	Deflection <i>in</i>	Tilt °	Twist °	Radius of Curvature <i>ft</i>
155.74	Guy	32	2.801	0.1265	2.7283	11402
155.00	"Ringo" BR3	32	2.793	0.1249	2.7192	11402
146.00	X50A	32	2.664	0.1218	2.6053	6285
136.00	ASP705K	32	2.354	0.2019	2.4399	6100
105.74	Guy	32	0.801	0.1967	1.6349	5952
79.00	10' Omni	35	0.227	0.0629	0.9400	14154
75.74	Guy	35	0.187	0.0545	0.8616	14541
68.00	"Ringo" BR3	35	0.116	0.0399	0.6856	39982
54.00	30"x8"x4" Panel Antenna	35	0.026	0.0202	0.2492	34163
53.00	TMA 4	35	0.022	0.0180	0.2173	37919
49.00	Tower Climber Warning Sign	35	0.008	0.0081	0.0922	52314

Maximum Tower Deflections - Design Wind

Section No.	Elevation <i>ft</i>	Horz. Deflection <i>in</i>	Gov. Load Comb.	Tilt °	Twist °
T1	156 - 146	24.510	6	1.3322	6.2760
T2	146 - 136	21.633	6	1.5513	6.1103
T3	136 - 126	18.146	6	1.8523	5.8057
T4	126 - 116	14.115	6	1.9842	5.1643
T5	116 - 106	9.993	6	1.8883	4.5008
T6	106 - 96	6.309	6	1.5226	3.8312
T7	96 - 86	3.668	10	1.0925	3.2529
T8	86 - 76	2.361	10	0.7180	2.6746
T9	76 - 66	1.258	10	0.4230	2.1298
T10	66 - 56	0.573	10	0.2617	1.6331
T11	56 - 46	0.164	10	0.1364	0.8007

Critical Deflections and Radius of Curvature - Design Wind

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Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.74	Guy	6	24.439	1.3371	6.2721	3037
155.00	"Ringo" BR3	6	24.234	1.3513	6.2608	3037
146.00	X50A	6	21.633	1.5513	6.1103	1666
136.00	ASP705K	6	18.146	1.8523	5.8057	1362
105.74	Guy	6	6.226	1.5115	3.8151	1064
79.00	10' Omni	10	1.549	0.4752	2.2797	1603
75.74	Guy	10	1.235	0.4185	2.1178	1667
68.00	"Ringo" BR3	10	0.683	0.2908	1.7545	2988
54.00	30"x8"x4" Panel Antenna	10	0.115	0.1107	0.6309	4849
53.00	TMA 4	10	0.095	0.0974	0.5486	5427
49.00	Tower Climber Warning Sign	10	0.035	0.0424	0.2311	7518

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load Allowable	Allowable Ratio	Criteria
T1	156	Leg	A325N	0.4375	4	6024.83	13104.00	0.460 ✓	1	Bearing
		Top Guy Pull-Off@155.74	A325N	0.6250	2	872.87	13805.80	0.063 ✓	1	Bolt Shear
T2	146	Leg	A325N	0.4375	4	6495.11	13104.00	0.496 ✓	1	Bearing
T3	136	Leg	A325N	0.4375	4	4633.26	13104.00	0.354 ✓	1	Bearing
T4	126	Leg	A325N	0.4375	4	5370.66	13104.00	0.410 ✓	1	Bearing
T5	116	Leg	A325N	0.4375	4	8781.44	13104.00	0.670 ✓	1	Bearing
T6	106	Leg	A325N	0.4375	4	8278.26	13104.00	0.632 ✓	1	Bearing
		Top Guy Pull-Off@105.74	A325N	0.6250	2	567.63	13805.80	0.041 ✓	1	Bolt Shear
T7	96	Leg	A325N	0.4375	4	7801.94	13104.00	0.595 ✓	1	Bearing
T8	86	Leg	A325N	0.4375	4	7799.60	13104.00	0.595 ✓	1	Bearing
T9	76	Leg	A325N	0.4375	4	5944.71	13104.00	0.454 ✓	1	Bearing
		Top Guy Pull-Off@75.742	A325N	0.6250	2	351.86	13805.80	0.025 ✓	1	Bolt Shear
T10	66	Leg	A325N	0.4375	4	4634.28	13104.00	0.354 ✓	1	Bearing
T11	56	Leg	A325N	0.4375	4	5087.68	13104.00	0.388 ✓	1	Bearing

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T1	155.74 (A)	1/2 (7-wire)	2690.00	26900.04	10143.70	16140.00	1.000	1.591 ✓

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Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T6	(534) 155.74 (B)	EHS 1/2 (7-wire)	2690.00	26900.04	9729.15	16140.00	1.000	1.659 ✓
	(533) 155.74 (C)	EHS 1/2 (7-wire)	2690.00	26900.04	7434.65	16140.00	1.000	2.171 ✓
	(529) 105.74 (A)	EHS 1/4 (7-wire)	665.00	6649.98	2981.85	3990.00	1.000	1.338 ✓
	(540) 105.74 (B)	EHS 1/4 (7-wire)	665.00	6649.98	2936.78	3990.00	1.000	1.359 ✓
	(539) 105.74 (C)	EHS 1/4 (7-wire)	665.00	6649.98	2426.54	3990.00	1.000	1.644 ✓
	(535) 75.74 (A)	EHS 1/4 (7-wire)	665.00	6649.98	1405.53	3990.00	1.000	2.839 ✓
T9	(546) 75.74 (B) (545)	EHS 1/4 (7-wire)	665.00	6649.98	1387.57	3990.00	1.000	2.876 ✓
	(541) 75.74 (C) (541)	EHS 1/4 (7-wire)	665.00	6649.98	1349.71	3990.00	1.000	2.956 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	Mast Stability Index	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	0.89	-11694.70	19165.70	0.610 ¹ ✓
T2	146 - 136	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	0.89	-13143.70	19305.50	0.681 ¹ ✓
T3	136 - 126	ROHN TS1.5x11 ga	10.00	0.26	6.3 K=1.00	0.5202	0.87	-12990.20	20205.30	0.643 ¹ ✓
T4	126 - 116	ROHN TS1.5x11 ga	10.00	0.28	6.9 K=1.00	0.5202	0.84	-10741.30	19517.40	0.550 ¹ ✓
T5	116 - 106	ROHN TS1.5x11 ga	10.00	0.28	6.9 K=1.00	0.5202	0.89	-17562.90	20759.60	0.846 ¹ ✓
T6	106 - 96	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	0.98	-17265.10	21132.90	0.817 ¹ ✓
T7	96 - 86	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	0.98	-16041.20	21100.80	0.760 ¹ ✓
T8	86 - 76	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	0.97	-15261.00	21054.30	0.725 ¹ ✓
T9	76 - 66	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	1.00	-14880.70	21607.10	0.689 ¹ ✓
T10	66 - 56	ROHN TS1.5x11 ga	10.00	0.26	6.3 K=1.00	0.5202	0.97	-11890.00	22578.60	0.527 ¹ ✓
T11	56 - 46	ROHN TS1.5x11 ga	10.00	1.35	33.1 K=1.00	0.5202	1.00	-10170.70	21607.10	0.471 ¹ ✓

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¹ $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	2.08	1.92	147.2 K=0.70	0.1503	-1500.01	1566.61	0.957 ¹ ✓
T2	146 - 136	7/16	2.08	1.92	147.2 K=0.70	0.1503	-1093.78	1566.61	0.698 ¹ ✓
T3	136 - 126	7/16	2.08	1.92	147.2 K=0.70	0.1503	-1415.40	1566.61	0.903 ¹ ✓
T4	126 - 116	7/16	2.08	1.92	147.2 K=0.70	0.1503	-1593.54	1566.61	1.017 ¹ ✗
T5	116 - 106	4.8.1 (1.02 CR) - 155 7/16	2.08	1.92	147.2 K=0.70	0.1503	-1650.26	1566.61	1.053 ¹ ✗
T6	106 - 96	4.8.1 (1.05 CR) - 203 7/16	2.08	1.92	147.2 K=0.70	0.1503	-937.26	1566.61	0.598 ¹ ✓
T7	96 - 86	7/16	2.08	1.92	147.2 K=0.70	0.1503	-919.10	1566.61	0.587 ¹ ✓
T8	86 - 76	7/16	2.08	1.92	147.2 K=0.70	0.1503	-931.46	1566.61	0.595 ¹ ✓
T9	76 - 66	7/16	2.08	1.92	147.2 K=0.70	0.1503	-1642.04	1566.61	1.048 ¹ ✗
T10	66 - 56	4.8.1 (1.05 CR) - 394 7/16	2.08	1.92	147.2 K=0.70	0.1503	-1616.47	1566.61	1.032 ¹ ✗
T11	56 - 46	4.8.1 (1.03 CR) - 478 7/16	2.08	1.92	147.2 K=0.70	0.1503	-1475.36	1566.61	0.942 ¹ ✓

¹ $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	1.58	1.46	112.0 K=0.70	0.1503	-703.52	2517.25	0.279 ¹ ✓
T2	146 - 136	7/16	1.58	1.46	112.0 K=0.70	0.1503	-486.44	2517.25	0.193 ¹ ✓
T3	136 - 126	7/16	1.58	1.46	112.0 K=0.70	0.1503	-540.62	2517.25	0.215 ¹ ✓
T4	126 - 116	7/16	1.58	1.46	112.0 K=0.70	0.1503	-696.99	2517.25	0.277 ¹ ✓
T5	116 - 106	7/16	1.58	1.46	112.0 K=0.70	0.1503	-843.54	2517.25	0.335 ¹ ✓
T6	106 - 96	7/16	1.58	1.46	112.0	0.1503	-304.21	2517.25	0.121 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T7	96 - 86	7/16	1.58	1.46	K=0.70 112.0	0.1503	-365.22	2517.25	0.145 ¹ ✓
T8	86 - 76	7/16	1.58	1.46	K=0.70 112.0	0.1503	-391.09	2517.25	0.155 ¹ ✓
T9	76 - 66	7/16	1.58	1.46	K=0.70 112.0	0.1503	-384.17	2517.25	0.153 ¹ ✓
T10	66 - 56	7/16	1.58	1.46	K=0.70 112.0	0.1503	-435.56	2517.25	0.173 ¹ ✓
T11	56 - 46	7/16	1.58	1.46	K=0.70 112.0	0.1503	-420.28	2517.25	0.167 ¹ ✓

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	146 - 136	7/16	1.58	1.46	K=0.70 112.0	0.1503	-316.81	2517.25	0.126 ¹ ✓
T3	136 - 126	7/16	1.58	1.46	K=0.70 112.0	0.1503	-225.00	2517.25	0.089 ¹ ✓
T4	126 - 116	7/16	1.58	1.46	K=0.70 112.0	0.1503	-355.27	2517.25	0.141 ¹ ✓
T5	116 - 106	7/16	1.58	1.46	K=0.70 112.0	0.1503	-471.50	2517.25	0.187 ¹ ✓
T6	106 - 96	7/16	1.58	1.46	K=0.70 112.0	0.1503	-304.21	2517.25	0.121 ¹ ✓
T7	96 - 86	7/16	1.58	1.46	K=0.70 112.0	0.1503	-286.78	2517.25	0.114 ¹ ✓
T8	86 - 76	7/16	1.58	1.46	K=0.70 112.0	0.1503	-270.28	2517.25	0.107 ¹ ✓
T9	76 - 66	7/16	1.58	1.46	K=0.70 112.0	0.1503	-270.20	2517.25	0.107 ¹ ✓
T10	66 - 56	7/16	1.58	1.46	K=0.70 112.0	0.1503	-261.58	2517.25	0.104 ¹ ✓
T11	56 - 46	7/16	1.58	1.46	K=0.70 112.0	0.1503	-218.32	2517.25	0.087 ¹ ✓

¹ P_u / φP_n controls

Bottom Girt Design Data (Compression)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	1.58	1.46	112.0 K=0.70	0.1503	-356.92	2517.25	0.142 ¹ ✓
T2	146 - 136	7/16	1.58	1.46	112.0 K=0.70	0.1503	-227.66	2517.25	0.090 ¹ ✓
T3	136 - 126	7/16	1.58	1.46	112.0 K=0.70	0.1503	-375.78	2517.25	0.149 ¹ ✓
T4	126 - 116	7/16	1.58	1.46	112.0 K=0.70	0.1503	-465.58	2517.25	0.185 ¹ ✓
T5	116 - 106	7/16	1.58	1.46	112.0 K=0.70	0.1503	-505.01	2517.25	0.201 ¹ ✓
T6	106 - 96	7/16	1.58	1.46	112.0 K=0.70	0.1503	-304.21	2517.25	0.121 ¹ ✓
T7	96 - 86	7/16	1.58	1.46	112.0 K=0.70	0.1503	-286.78	2517.25	0.114 ¹ ✓
T8	86 - 76	7/16	1.58	1.46	112.0 K=0.70	0.1503	-270.28	2517.25	0.107 ¹ ✓
T9	76 - 66	7/16	1.58	1.46	112.0 K=0.70	0.1503	-270.20	2517.25	0.107 ¹ ✓
T10	66 - 56	7/16	1.58	1.46	112.0 K=0.70	0.1503	-215.09	2517.25	0.085 ¹ ✓
T11	56 - 46	7/16	1.58	1.46	112.0 K=0.70	0.1503	-250.49	2517.25	0.100 ¹ ✓

¹ P_u / φP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T6	106 - 96	2x1/2	1.58	1.46	121.2 K=1.00	1.0000	-160.80	14948.90	0.011 ¹ ✓

¹ P_u / φP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	ROHN TS1.5x11 ga	10.00	0.28	6.9	0.5202	4144.69	23411.10	0.177 ¹ ✓
T2	146 - 136	ROHN TS1.5x11 ga	10.00	0.28	6.9	0.5202	6804.52	23411.10	0.291 ¹

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	136 - 126	ROHN TS1.5x11 ga	10.00	0.26	6.3	0.5202	6803.81	23411.10	0.291 ¹ ✓
T4	126 - 116	ROHN TS1.5x11 ga	10.00	0.26	6.3	0.5202	2926.82	23411.10	0.125 ¹ ✓
T5	116 - 106	ROHN TS1.5x11 ga	10.00	0.28	6.9	0.5202	4997.33	23411.10	0.213 ¹ ✓
T6	106 - 96	ROHN TS1.5x11 ga	10.00	0.26	6.3	0.5202	4996.44	23411.10	0.213 ¹ ✓
T7	96 - 86	ROHN TS1.5x11 ga	10.00	1.35	33.1	0.5202	878.05	23411.10	0.038 ¹ ✓

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	2.08	1.92	210.3	0.1503	1194.66	4870.70	0.245 ¹ ✓
T2	146 - 136	7/16	2.08	1.92	210.3	0.1503	748.76	4870.70	0.154 ¹ ✓
T3	136 - 126	7/16	2.08	1.92	210.3	0.1503	855.54	4870.70	0.176 ¹ ✓
T4	126 - 116	7/16	2.08	1.92	210.3	0.1503	1074.53	4870.70	0.221 ¹ ✓
T5	116 - 106	7/16	2.08	1.92	210.3	0.1503	1263.03	4870.70	0.259 ¹ ✓
T6	106 - 96	7/16	2.08	1.92	210.3	0.1503	455.35	4870.70	0.093 ¹ ✓
T7	96 - 86	7/16	2.08	1.92	210.3	0.1503	552.31	4870.70	0.113 ¹ ✓
T8	86 - 76	7/16	2.08	1.92	210.3	0.1503	570.42	4870.70	0.117 ¹ ✓
T9	76 - 66	7/16	2.08	1.92	210.3	0.1503	704.70	4870.70	0.145 ¹ ✓
T10	66 - 56	4.8.1 (1.05 CR) - 394 7/16	2.08	1.92	210.3	0.1503	671.83	4870.70	0.138 ¹ ✓
T11	56 - 46	4.8.1 (1.03 CR) - 478 7/16	2.08	1.92	210.3	0.1503	615.04	4870.70	0.126 ¹ ✓

¹ P_u / φP_n controls

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Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	1.58	1.46	160.0	0.1503	892.43	4870.70	0.183 ¹
T2	146 - 136	7/16	1.58	1.46	160.0	0.1503	731.20	4870.70	0.150 ¹
T3	136 - 126	7/16	1.58	1.46	160.0	0.1503	911.65	4870.70	0.187 ¹
T4	126 - 116	7/16	1.58	1.46	160.0	0.1503	1028.47	4870.70	0.211 ¹
T5	116 - 106	7/16	1.58	1.46	160.0	0.1503	1084.56	4870.70	0.223 ¹
T6	106 - 96	7/16	1.58	1.46	160.0	0.1503	632.22	4870.70	0.130 ¹
T7	96 - 86	7/16	1.58	1.46	160.0	0.1503	608.00	4870.70	0.125 ¹
T8	86 - 76	7/16	1.58	1.46	160.0	0.1503	629.45	4870.70	0.129 ¹
T9	76 - 66	7/16	1.58	1.46	160.0	0.1503	1015.39	4870.70	0.208 ¹
T10	66 - 56	7/16	1.58	1.46	160.0	0.1503	1053.38	4870.70	0.216 ¹
T11	56 - 46	7/16	1.58	1.46	160.0	0.1503	946.22	4870.70	0.194 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	1.58	1.46	160.0	0.1503	262.44	4870.70	0.054 ¹
T2	146 - 136	7/16	1.58	1.46	160.0	0.1503	433.89	4870.70	0.089 ¹
T3	136 - 126	7/16	1.58	1.46	160.0	0.1503	437.81	4870.70	0.090 ¹
T4	126 - 116	7/16	1.58	1.46	160.0	0.1503	502.71	4870.70	0.103 ¹
T5	116 - 106	7/16	1.58	1.46	160.0	0.1503	597.44	4870.70	0.123 ¹
T6	106 - 96	7/16	1.58	1.46	160.0	0.1503	304.21	4870.70	0.062 ¹
T7	96 - 86	7/16	1.58	1.46	160.0	0.1503	361.33	4870.70	0.074 ¹
T8	86 - 76	7/16	1.58	1.46	160.0	0.1503	357.18	4870.70	0.073 ¹
T9	76 - 66	7/16	1.58	1.46	160.0	0.1503	270.20	4870.70	0.055 ¹

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T10	66 - 56	7/16	1.58	1.46	160.0	0.1503	671.70	4870.70	0.138 ¹
T11	56 - 46	7/16	1.58	1.46	160.0	0.1503	600.58	4870.70	0.123 ¹

¹ P_u / φP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	7/16	1.58	1.46	160.0	0.1503	412.14	4870.70	0.085 ¹
T2	146 - 136	7/16	1.58	1.46	160.0	0.1503	366.97	4870.70	0.075 ¹
T3	136 - 126	7/16	1.58	1.46	160.0	0.1503	591.24	4870.70	0.121 ¹
T4	126 - 116	7/16	1.58	1.46	160.0	0.1503	690.71	4870.70	0.142 ¹
T5	116 - 106	7/16	1.58	1.46	160.0	0.1503	700.86	4870.70	0.144 ¹
T6	106 - 96	7/16	1.58	1.46	160.0	0.1503	350.47	4870.70	0.072 ¹
T7	96 - 86	7/16	1.58	1.46	160.0	0.1503	352.99	4870.70	0.072 ¹
T8	86 - 76	7/16	1.58	1.46	160.0	0.1503	315.84	4870.70	0.065 ¹
T9	76 - 66	7/16	1.58	1.46	160.0	0.1503	572.60	4870.70	0.118 ¹
T10	66 - 56	7/16	1.58	1.46	160.0	0.1503	545.03	4870.70	0.112 ¹
T11	56 - 46	7/16	1.58	1.46	160.0	0.1503	480.70	4870.70	0.099 ¹

¹ P_u / φP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	156 - 146	2x1/2	1.58	1.46	121.2	0.4688	1745.73	20390.60	0.086 ¹
T6	106 - 96	2x1/2	1.58	1.46	121.2	0.4688	1135.25	20390.60	0.056 ¹

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T9	76 - 66	2x1/2	1.58	1.46	121.2	0.4688	703.71	20390.60	0.035 ¹ ✓ ✓

¹ P_u / φP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	φP _{allow} lb	% Capacity	Pass Fail
T1	156 - 146	Leg	ROHN TS1.5x11 ga	3	-11694.70	19165.70	61.0	Pass
		Diagonal	7/16	48	-1500.01	1566.61	95.7	Pass
		Horizontal	7/16	43	-703.52	2517.25	27.9	Pass
		Top Girt	7/16	6	262.44	4870.70	5.4	Pass
		Bottom Girt	7/16	7	-356.92	2517.25	14.2	Pass
		Guy A@155.742 (18 deg)	1/2 (7-wire)	534	10143.70	16140.00	62.8	Pass
		Guy B@155.742 (18 deg)	1/2 (7-wire)	533	9729.15	16140.00	60.3	Pass
		Guy C@155.742 (-15 deg)	1/2 (7-wire)	529	7434.65	16140.00	46.1	Pass
T2	146 - 136	Top Guy	2x1/2	532	1745.73	20390.60	8.6	Pass
		Pull-Off@155.742						
		Leg	ROHN TS1.5x11 ga	50	-13143.70	19305.50	68.1	Pass
		Diagonal	7/16	96	-1093.78	1566.61	69.8	Pass
		Horizontal	7/16	93	-486.44	2517.25	19.3	Pass
		Top Girt	7/16	54	-316.81	2517.25	12.6	Pass
		Bottom Girt	7/16	55	-227.66	2517.25	9.0	Pass
		T3	136 - 126	Leg	ROHN TS1.5x11 ga	98	-12990.20	20205.30
T4	126 - 116	Diagonal	7/16	107	-1415.40	1566.61	90.3	Pass
		Horizontal	7/16	110	-540.62	2517.25	21.5	Pass
		Top Girt	7/16	101	437.81	4870.70	9.0	Pass
		Bottom Girt	7/16	104	-375.78	2517.25	14.9	Pass
T5	116 - 106	Leg	ROHN TS1.5x11 ga	146	-10741.30	19517.40	55.0	Pass
		Diagonal	7/16	155	-1593.54	1566.61	101.7	Fail ✗
		Horizontal	7/16	159	-696.99	2517.25	27.7	Pass
		Top Girt	7/16	150	-355.27	2517.25	14.1	Pass
		Bottom Girt	7/16	152	-465.58	2517.25	18.5	Pass
T6	106 - 96	Leg	ROHN TS1.5x11 ga	194	-17562.90	20759.60	84.6	Pass
		Diagonal	7/16	203	-1650.26	1566.61	105.3	Fail ✗
		Horizontal	7/16	207	-843.54	2517.25	33.5	Pass
		Top Girt	7/16	198	-471.50	2517.25	18.7	Pass
		Bottom Girt	7/16	200	-505.01	2517.25	20.1	Pass
T7	96 - 86	Leg	ROHN TS1.5x11 ga	242	-17265.10	21132.90	81.7	Pass
		Diagonal	7/16	250	-937.26	1566.61	59.8	Pass
		Horizontal	7/16	283	632.22	4870.70	13.0	Pass
		Top Girt	7/16	244	-304.21	2517.25	12.1	Pass
		Bottom Girt	7/16	247	-304.21	2517.25	12.1	Pass
		Guy A@105.742	1/4 (7-wire)	540	2981.85	3990.00	74.7	Pass
		Guy B@105.742	1/4 (7-wire)	539	2936.78	3990.00	73.6	Pass
		Guy C@105.742 (3 deg)	1/4 (7-wire)	535	2426.54	3990.00	60.8	Pass
		Top Guy	2x1/2	538	1135.25	20390.60	5.6	Pass
		Pull-Off@105.742						

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail	
T8	86 - 76	Diagonal	7/16	334	-919.10	1566.61	58.7	Pass	
		Horizontal	7/16	303	-365.22	2517.25	14.5	Pass	
		Top Girt	7/16	292	-286.78	2517.25	11.4	Pass	
		Bottom Girt	7/16	295	-286.78	2517.25	11.4	Pass	
		Leg	ROHN TS1.5x11 ga	338	-15261.00	21054.30	72.5	Pass	
		Diagonal	7/16	384	-931.46	1566.61	59.5	Pass	
		Horizontal	7/16	363	-391.09	2517.25	15.5	Pass	
T9	76 - 66	Top Girt	7/16	340	-270.28	2517.25	10.7	Pass	
		Bottom Girt	7/16	343	-270.28	2517.25	10.7	Pass	
		Leg	ROHN TS1.5x11 ga	386	-14880.70	21607.10	68.9	Pass	
		Diagonal	7/16	394	-1642.04	1566.61	104.8	Fail X	
		Horizontal	7/16	397	1015.39	4870.70	20.8	Pass	
		Top Girt	7/16	388	-270.20	2517.25	10.7	Pass	
		Bottom Girt	7/16	391	572.60	4870.70	11.8	Pass	
T10	66 - 56	Guy A@75.7422	1/4 (7-wire)	546	1405.53	3990.00	35.2	Pass	
		Guy B@75.7422	1/4 (7-wire)	545	1387.57	3990.00	34.8	Pass	
		Guy C@75.7422 (3 deg)	1/4 (7-wire)	541	1349.71	3990.00	33.8	Pass	
		Top Guy	2x1/2	542	703.71	20390.60	3.5	Pass	
		Pull-Off@75.7422							
		Leg	ROHN TS1.5x11 ga	434	-11890.00	22578.60	52.7	Pass	
		Diagonal	7/16	478	-1616.47	1566.61	103.2	Fail X	
T11	56 - 46	Horizontal	7/16	475	1053.38	4870.70	21.6	Pass	
		Top Girt	7/16	436	671.70	4870.70	13.8	Pass	
		Bottom Girt	7/16	441	545.03	4870.70	11.2	Pass	
		Leg	ROHN TS1.5x11 ga	481	-10170.70	21607.10	47.1	Pass	
		Diagonal	7/16	526	-1475.36	1566.61	94.2	Pass	
		Horizontal	7/16	523	946.22	4870.70	19.4	Pass	
		Top Girt	7/16	484	600.58	4870.70	12.3	Pass	
		Bottom Girt	7/16	488	-250.49	2517.25	10.0	Pass	
						Summary			
						Leg (T5)	84.6	Pass	
						Diagonal (T5)	105.3	Fail X	
						Horizontal (T5)	33.5	Pass	
						Top Girt (T5)	18.7	Pass	
						Bottom Girt (T5)	20.1	Pass	
						Guy A (T6)	74.7	Pass	
						Guy B (T6)	73.6	Pass	
						Guy C (T6)	60.8	Pass	
						Top Guy	8.6	Pass	
						Pull-Off (T1)			
						Bolt Checks	67.0	Pass	
						RATING =	105.3	Fail X	

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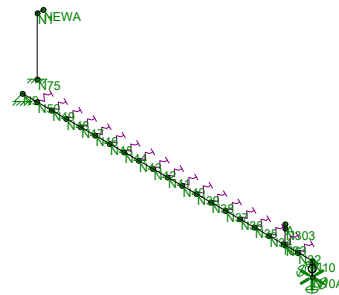
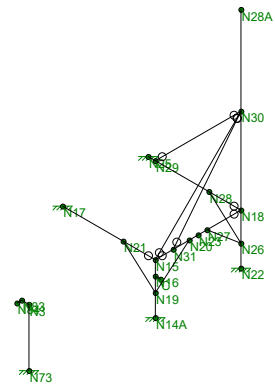
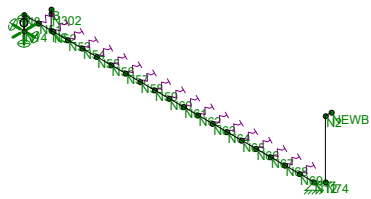
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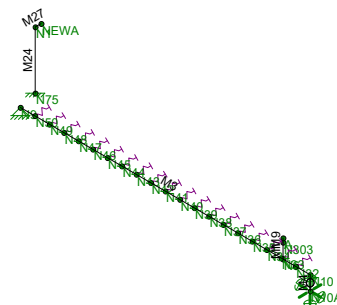
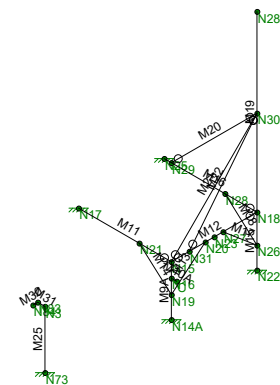
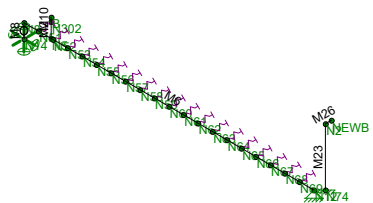
21018.001

West Washington Street - 110' Guyed Tower

SK - 1

Apr 29, 2021 at 12:00 AM

WestWashingtonStreet_Proposed.rt3



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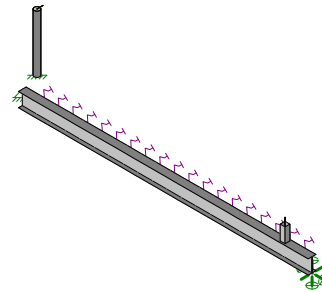
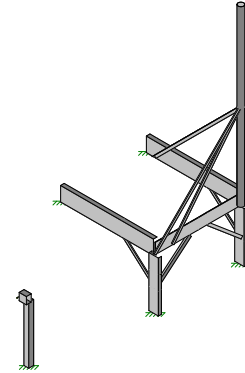
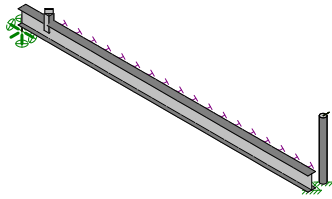
21018.001

West Washington Street - 110' Guyed Tower

SK - 2

Apr 29, 2021 at 12:00 AM

WestWashingtonStreet_Proposed.rt3



Envelope Only Solution

Morris & Ritchie Associates, Inc.

Joseph S. Novotny

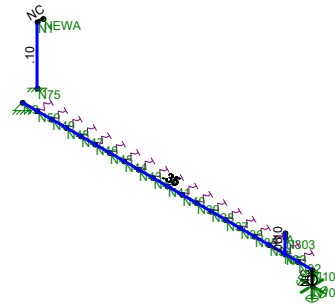
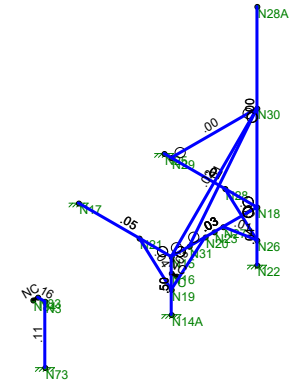
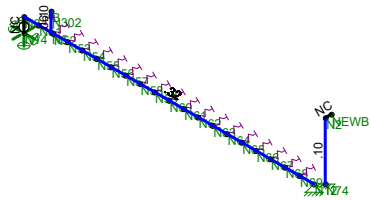
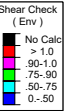
21018.001

West Washington Street - 110' Guyed Tower

SK - 3

Apr 29, 2021 at 12:01 AM

WestWashingtonStreet_Proposed.rt3



Member Shear Checks Displayed (Enveloped)
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21018.001

West Washington Street - 110' Guyed Tower

SK - 5

Apr 29, 2021 at 12:01 AM

WestWashingtonStreet_Proposed.rt3



Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A572-50	29000	11200	.2946	.65	.49	50	1.1	58	1.2
2	A36	29000	11200	.2946	.65	.49	36	1.5	58	1.2
3	A7	29000	11154	.3	.65	.49	33	1.5	60	1.2
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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Guy Anchor Post (A ...	HSS4X4X6	Column	None	A36	Typical	4.78	10.3	10.3	17.5
2	Guy Anchor Plate (A...	5X0.375	Column	None	A36	Typical	1.875	.022	3.9063	.0837
3	Rooftop Beam (A / B)	12WF_B12x25...	Beam	None	A7	Typical	7.39	14.5	183.4	.3
4	Guy Anchor Post (C)	C8X18.75	Column	None	A36	Typical	5.51	1.97	43.9	.434
5	Guy Anchor Post Br...	L2x2x4	HBrace	None	A36	Typical	.944	.346	.346	.0209
6	Guy Anchor Beam (C)	C12X20.7	Beam	None	A36	Typical	6.08	3.86	129	.369
7	Guy Anchor Girt (C)	9x0.25	Beam	None	A36	Typical	2.25	.0117	15.18...	.0461
8	Dish Post (C)	PIPE 4.0	Column	None	A36	Typical	2.96	6.82	6.82	13.6
9	Dish Brace 1 (C)	L2x2x4	HBrace	None	A36	Typical	.944	.346	.346	.0209
10	Dish Brace 2 (C)	LL2x2x4x6	HBrace	None	A36	Typical	1.89	2.46	.692	.0418
11	New Guy Anchor Po...	HSS4.500X0.3...	Column	None	A500 Gr. B (RND)	Typical	4.55	9.87	9.87	19.7
12	New Guy Anchor Po...	HSS4X4X6	Column	None	A500 Gr. B (Rect)	Typical	4.78	10.3	10.3	17.5

Joint Coordinates and Temperatures

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
1	C	19.091393	546	-557.673308	0	
2	N302	-459.498498	528.0625	234.770379	0	
3	N303	446.869108	528.0625	258	0	
4	N5	-459.4985	515.8125	234.770372	0	
5	N6	446.869108	515.8125	258	0	
6	N8	-482.2485	515.8125	234.770372	0	
7	N10	469.619108	515.8125	258	0	
8	N9	226.119108	515.8125	258	0	
9	N10A	469.619108	503.9375	258	0	
10	N12	-238.7485	515.8125	234.770372	0	
11	N14	-482.2485	503.9375	234.770372	0	
12	A	446.869108	531.1875	258	0	
13	B	-459.498498	531.1875	234.770379	0	
14	N14A	14.591393	515.8125	-557.673308	0	
15	N15	14.591393	558	-557.673308	0	
16	N16	14.591393	546	-557.673308	0	
17	N17	-63.408607	558	-557.673308	0	
18	N18	14.591393	558	-629.673308	0	
19	N19	14.591393	534	-557.673308	0	
20	N20	14.591393	558	-586.173308	0	
21	N21	-12.408607	558	-557.673308	0	
22	N22	14.591393	515.8125	-629.673308	0	
23	N23	14.591393	558	-593.673308	0	
24	N25	-63.408607	558	-629.673308	0	
25	N26	14.591393	534	-629.673308	0	
26	N27	14.591393	558	-601.173308	0	
27	N28	-12.408607	558	-629.673308	0	
28	N28A	14.591393	704	-629.673308	0	
29	N29	-57.408607	558	-629.673308	0	
30	N30	14.591393	630	-629.673308	0	



Joint Coordinates and Temperatures (Continued)

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diap...
31	N31	14.591393	558	-572.673308	0	
32	N32	457.444108	515.8125	258	0	
33	N33	445.269108	515.8125	258	0	
34	N34	433.094108	515.8125	258	0	
35	N35	420.919108	515.8125	258	0	
36	N36	408.744108	515.8125	258	0	
37	N37	396.569108	515.8125	258	0	
38	N38	384.394108	515.8125	258	0	
39	N39	372.219108	515.8125	258	0	
40	N40	360.044108	515.8125	258	0	
41	N41	347.869108	515.8125	258	0	
42	N42	335.694108	515.8125	258	0	
43	N43	323.519108	515.8125	258	0	
44	N44	311.344108	515.8125	258	0	
45	N45	299.169108	515.8125	258	0	
46	N46	286.994108	515.8125	258	0	
47	N47	274.819108	515.8125	258	0	
48	N48	262.644108	515.8125	258	0	
49	N49	250.469108	515.8125	258	0	
50	N50	238.294108	515.8125	258	0	
51	N51	-470.0735	515.8125	234.770372	0	
52	N52	-457.8985	515.8125	234.770372	0	
53	N53	-445.7235	515.8125	234.770372	0	
54	N54	-433.5485	515.8125	234.770372	0	
55	N55	-421.3735	515.8125	234.770372	0	
56	N56	-409.1985	515.8125	234.770372	0	
57	N57	-397.0235	515.8125	234.770372	0	
58	N58	-384.8485	515.8125	234.770372	0	
59	N59	-372.6735	515.8125	234.770372	0	
60	N60	-360.4985	515.8125	234.770372	0	
61	N61	-348.3235	515.8125	234.770372	0	
62	N62	-336.1485	515.8125	234.770372	0	
63	N63	-323.9735	515.8125	234.770372	0	
64	N64	-311.7985	515.8125	234.770372	0	
65	N65	-299.6235	515.8125	234.770372	0	
66	N66	-287.4485	515.8125	234.770372	0	
67	N67	-275.2735	515.8125	234.770372	0	
68	N68	-263.0985	515.8125	234.770372	0	
69	N69	-250.9235	515.8125	234.770372	0	
70	N3	0	564	-465.996	0	
71	N2	-233.926674	564	229.912347	0	
72	N1	221.979035	564	241.46777	0	
73	N73	0	515.8125	-465.996	0	
74	N74	-233.926674	515.8125	229.912347	0	
75	N75	221.979035	515.8125	241.46777	0	
76	NEWB	-233.926674	564	224.912347	0	
77	NEWA	221.979035	564	236.46777	0	
78	N83	-6	564	-465.996	0	
79	N84	-6	564	-461.996	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	C						
2	N302						
3	N303						



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]
4	N5						
5	N6						
6	N8						
7	N10						
8	N9	Reaction	Reaction	Reaction			
9	N10A	Reaction	Reaction	Reaction	Reaction	Reaction	
10	N12	Reaction	Reaction	Reaction			
11	N14	Reaction	Reaction	Reaction	Reaction	Reaction	
12	A						
13	B						
14	N14A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
15	N15						
16	N16						
17	N17	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
18	N18						
19	N19						
20	N20						
21	N21						
22	N22	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
23	N25	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
24	N26						
25	N27						
26	N28						
27	N28A						
28	N29						
29	N30						
30	N31						
31	N32			S1			
32	N33			S1			
33	N34			S1			
34	N35			S1			
35	N36			S1			
36	N37			S1			
37	N38			S1			
38	N39			S1			
39	N40			S1			
40	N41			S1			
41	N42			S1			
42	N43			S1			
43	N44			S1			
44	N45			S1			
45	N46			S1			
46	N47			S1			
47	N48			S1			
48	N49			S1			
49	N50			S1			
50	N51			S1			
51	N52			S1			
52	N53			S1			
53	N54			S1			
54	N55			S1			
55	N56			S1			
56	N57			S1			
57	N58			S1			
58	N59			S1			
59	N60			S1			
60	N61			S1			



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]
61	N62			S1			
62	N63			S1			
63	N64			S1			
64	N65			S1			
65	N66			S1			
66	N67			S1			
67	N68			S1			
68	N69			S1			
69	N3						
70	N2						
71	N1						
72	N73	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
73	N74	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
74	N75	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
75	NEWB						
76	NEWA						
77	N83						
78	N84						

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N6	N303			Guy Anchor P...	Column	None	A36	Typical
2	M2	N5	N302			Guy Anchor P...	Column	None	A36	Typical
3	M3	N10	N9			Rooftop Beam...	Beam	None	A7	Typical
4	M4	N10A	N10			RIGID	None	None	RIGID	DR1
5	M6	N8	N12			Rooftop Beam...	Beam	None	A7	Typical
6	M8	N14	N8			RIGID	None	None	RIGID	DR1
7	M9	N303	A		135	Guy Anchor Pl...	Column	None	A36	Typical
8	M10	N302	B		45	Guy Anchor Pl...	Column	None	A36	Typical
9	M9A	N14A	N15		180	Guy Anchor P...	Column	None	A36	Typical
10	M10A	N16	C			RIGID	None	None	RIGID	DR1
11	M11	N15	N17			Guy Anchor B...	Beam	None	A36	Typical
12	M12	N15	N18			Guy Anchor Gi...	Beam	None	A36	Typical
13	M13	N19	N20			Guy Anchor P...	HBrace	None	A36	Typical
14	M14	N19	N21			Guy Anchor P...	HBrace	None	A36	Typical
15	M15	N22	N18		180	Guy Anchor P...	Column	None	A36	Typical
16	M16	N18	N25			Guy Anchor B...	Beam	None	A36	Typical
17	M17	N26	N27			Guy Anchor P...	HBrace	None	A36	Typical
18	M18	N26	N28			Guy Anchor P...	HBrace	None	A36	Typical
19	M19	N18	N28A			Dish Post (C)	Column	None	A36	Typical
20	M20	N30	N29			Dish Brace 2 (...)	HBrace	None	A36	Typical
21	M21	N30	N15			Dish Brace 1 (...)	HBrace	None	A36	Typical
22	M22	N30	N31			Dish Brace 1 (...)	HBrace	None	A36	Typical
23	M23	N74	N2			New Guy Anch...	Column	None	A500 Gr. ...	Typical
24	M24	N75	N1			New Guy Anch...	Column	None	A500 Gr. ...	Typical
25	M25	N73	N3			New Guy Anch...	Column	None	A500 Gr. ...	Typical
26	M26	N2	NEWB			RIGID	None	None	RIGID	DR1
27	M27	N1	NEWA			RIGID	None	None	RIGID	DR1
28	M30	N83	N84			RIGID	None	None	RIGID	DR1
29	M31	N3	N83			HSS6X4X6	Beam	Wide Flange	A500 Gr. ...	Typical



Joint Loads and Enforced Displacements (BLC 2 : Guy Anchor A - Reactions (1.2D))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	A	L	Y	3.077
2	A	L	X	-2.3011
3	A	L	Z	-1.1822
4	NEWA	L	Y	9.766
5	NEWA	L	X	-2.2504
6	NEWA	L	Z	-1.1561

Joint Loads and Enforced Displacements (BLC 3 : Guy Anchor B - Reactions (1.2D))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	B	L	Y	3.069
2	B	L	X	2.3137
3	B	L	Z	-1.1882
4	NEWB	L	Y	9.365
5	NEWB	L	X	-2.157
6	NEWB	L	Z	-1.108

Joint Loads and Enforced Displacements (BLC 4 : Guy Anchor C - Reactions (1.2D))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	C	L	Y	2.618
2	C	L	Z	2.553
3	N84	L	Y	6.941
4	N84	L	Z	2.504

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Selfweight	DL		-1.05						
2	Guy Anchor A - Reactions (1.2D)	None				6				
3	Guy Anchor B - Reactions (1.2D)	None				6				
4	Guy Anchor C - Reactions (1.2D)	None				4				
5	Metal Decking	DL						2		
6	Roofing / Ballast	DL						2		

Load Combinations

	Description	S...	PDelta	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fact...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2 Dead+1.0 Wind	Yes	Y	DL	1.2	2	1	3	1	4	1									
2	0.9 Dead+1.0 Wind	Yes	Y	DL	.9	2	1	3	1	4	1									

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N9	max	2.299	2	.643	1	-.033	2	0	2	0	2	0	2
2		min	2.299	1	.447	2	-.033	1	0	1	0	1	0	1
3	N10A	max	.002	1	-2.129	1	.226	2	1.513	1	0	2	0	2
4		min	.002	2	-2.331	2	.226	1	1.513	2	0	1	0	1
5	N12	max	-2.313	2	.645	1	-.026	2	0	2	0	2	0	2
6		min	-2.313	1	.449	2	-.026	1	0	1	0	1	0	1
7	N14	max	0	1	-2.123	1	.779	2	2.087	1	0	2	0	2
8		min	0	2	-2.324	2	.779	1	2.087	2	0	1	0	1
9	N14A	max	-.287	2	-1.798	1	-1.575	2	-1.853	2	.589	1	.254	1
10		min	-.293	1	-1.859	2	-1.579	1	-1.857	1	.589	2	.248	2
11	N17	max	.329	1	.109	1	.038	2	.006	1	-.013	1	-.063	1



Envelope Joint Reactions (Continued)

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC	
12		min	.323	2	.086	2	.038	1	.006	2	-.013	2	-.089	2
13	N22	max	-.035	2	-.149	1	-.978	1	-1.004	1	-.023	2	.043	1
14		min	-.041	1	-.258	2	-.982	2	-1.007	2	-.023	1	.038	2
15	N25	max	.005	1	.121	1	-.034	1	-.014	2	.161	2	.12	1
16		min	-.001	2	.089	2	-.034	2	-.014	1	.161	1	.089	2
17	N32	max	0	2	0	2	.148	1	0	2	0	2	0	2
18		min	0	1	0	1	.148	2	0	1	0	1	0	1
19	N33	max	0	2	0	2	.273	1	0	2	0	2	0	2
20		min	0	1	0	1	.273	2	0	1	0	1	0	1
21	N34	max	0	2	0	2	.204	1	0	2	0	2	0	2
22		min	0	1	0	1	.204	2	0	1	0	1	0	1
23	N35	max	0	2	0	2	.149	1	0	2	0	2	0	2
24		min	0	1	0	1	.149	2	0	1	0	1	0	1
25	N36	max	0	2	0	2	.105	1	0	2	0	2	0	2
26		min	0	1	0	1	.105	2	0	1	0	1	0	1
27	N37	max	0	2	0	2	.071	1	0	2	0	2	0	2
28		min	0	1	0	1	.071	2	0	1	0	1	0	1
29	N38	max	0	2	0	2	.045	1	0	2	0	2	0	2
30		min	0	1	0	1	.045	2	0	1	0	1	0	1
31	N39	max	0	2	0	2	.026	1	0	2	0	2	0	2
32		min	0	1	0	1	.026	2	0	1	0	1	0	1
33	N40	max	0	2	0	2	.013	2	0	2	0	2	0	2
34		min	0	1	0	1	.013	1	0	1	0	1	0	1
35	N41	max	0	2	0	2	.004	2	0	2	0	2	0	2
36		min	0	1	0	1	.004	1	0	1	0	1	0	1
37	N42	max	0	2	0	2	-.002	2	0	2	0	2	0	2
38		min	0	1	0	1	-.002	1	0	1	0	1	0	1
39	N43	max	0	2	0	2	-.006	2	0	2	0	2	0	2
40		min	0	1	0	1	-.006	1	0	1	0	1	0	1
41	N44	max	0	2	0	2	-.008	2	0	2	0	2	0	2
42		min	0	1	0	1	-.008	1	0	1	0	1	0	1
43	N45	max	0	2	0	2	-.008	2	0	2	0	2	0	2
44		min	0	1	0	1	-.008	1	0	1	0	1	0	1
45	N46	max	0	2	0	2	-.008	2	0	2	0	2	0	2
46		min	0	1	0	1	-.008	1	0	1	0	1	0	1
47	N47	max	0	2	0	2	-.007	2	0	2	0	2	0	2
48		min	0	1	0	1	-.007	1	0	1	0	1	0	1
49	N48	max	0	2	0	2	-.005	2	0	2	0	2	0	2
50		min	0	1	0	1	-.005	1	0	1	0	1	0	1
51	N49	max	0	2	0	2	-.004	2	0	2	0	2	0	2
52		min	0	1	0	1	-.004	1	0	1	0	1	0	1
53	N50	max	0	2	0	2	-.002	2	0	2	0	2	0	2
54		min	0	1	0	1	-.002	1	0	1	0	1	0	1
55	N51	max	0	2	0	2	.021	2	0	2	0	2	0	2
56		min	0	1	0	1	.021	1	0	1	0	1	0	1
57	N52	max	0	2	0	2	.037	2	0	2	0	2	0	2
58		min	0	1	0	1	.037	1	0	1	0	1	0	1
59	N53	max	0	2	0	2	.047	2	0	2	0	2	0	2
60		min	0	1	0	1	.047	1	0	1	0	1	0	1
61	N54	max	0	2	0	2	.05	2	0	2	0	2	0	2
62		min	0	1	0	1	.05	1	0	1	0	1	0	1
63	N55	max	0	2	0	2	.05	2	0	2	0	2	0	2
64		min	0	1	0	1	.05	1	0	1	0	1	0	1
65	N56	max	0	2	0	2	.046	2	0	2	0	2	0	2
66		min	0	1	0	1	.046	1	0	1	0	1	0	1
67	N57	max	0	2	0	2	.041	2	0	2	0	2	0	2
68		min	0	1	0	1	.041	1	0	1	0	1	0	1



Envelope Joint Reactions (Continued)

Joint	X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC		
69	N58	max	0	2	0	2	.035	2	0	2	0	2		
70		min	0	1	0	1	.035	1	0	1	0	1		
71	N59	max	0	2	0	2	.029	2	0	2	0	2		
72		min	0	1	0	1	.029	1	0	1	0	1		
73	N60	max	0	2	0	2	.023	2	0	2	0	2		
74		min	0	1	0	1	.023	1	0	1	0	1		
75	N61	max	0	2	0	2	.018	2	0	2	0	2		
76		min	0	1	0	1	.018	1	0	1	0	1		
77	N62	max	0	2	0	2	.013	2	0	2	0	2		
78		min	0	1	0	1	.013	1	0	1	0	1		
79	N63	max	0	2	0	2	.009	2	0	2	0	2		
80		min	0	1	0	1	.009	1	0	1	0	1		
81	N64	max	0	2	0	2	.006	2	0	2	0	2		
82		min	0	1	0	1	.006	1	0	1	0	1		
83	N65	max	0	2	0	2	.004	2	0	2	0	2		
84		min	0	1	0	1	.004	1	0	1	0	1		
85	N66	max	0	2	0	2	.002	2	0	2	0	2		
86		min	0	1	0	1	.002	1	0	1	0	1		
87	N67	max	0	2	0	2	.001	2	0	2	0	2		
88		min	0	1	0	1	.001	1	0	1	0	1		
89	N68	max	0	2	0	2	0	2	0	2	0	2		
90		min	0	1	0	1	0	1	0	1	0	1		
91	N69	max	0	2	0	2	0	2	0	2	0	2		
92		min	0	1	0	1	0	1	0	1	0	1		
93	N73	max	0	2	-6.838	1	-2.504	2	-7.59	2	-1.249	2	3.354	2
94		min	0	1	-6.864	2	-2.504	1	-7.591	1	-1.249	1	3.354	1
95	N74	max	2.157	2	-9.281	1	1.108	2	.591	2	-.898	2	-8.394	2
96		min	2.157	1	-9.302	2	1.108	1	.591	1	-.898	1	-8.394	1
97	N75	max	2.25	2	-9.682	1	1.156	2	.62	2	-.936	2	-8.746	2
98		min	2.25	1	-9.703	2	1.156	1	.62	1	-.936	1	-8.746	1
99	Totals:	max	4.395	2	-30.481	1	-.423	2						
100		min	4.395	1	-31.57	2	-.423	1						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn	
1	M1	HSS4X4X6	.255	0	2	.057	0	y	2	154.305	154.872	17.253	17.253	1...	H1-1b
2	M2	HSS4X4X6	.258	0	2	.058	0	y	2	154.305	154.872	17.253	17.253	1...	H1-1b
3	M3	12WF_B12x2...	.848	0	1	.351	20.292	z	1	195.582	219.483	17.668	55.714	1...	H1-1b
4	M6	12WF_B12x2...	.797	0	1	.319	20.292	z	1	55.247	219.483	17.668	75.303	1...	H1-1b
5	M9	5X0.375	.613	0	2	.096	0	y	2	58.143	60.75	.475	6.328	1...	H1-1b
6	M10	5X0.375	.611	0	2	.097	0	y	2	58.143	60.75	.475	6.328	1...	H1-1b
7	M9A	C8X18.75	.823	0	1	.497	21.094	z	2	137.368	178.524	4.331	37.53	1...	H1-1b
8	M11	C12X20.7	.027	26.813	1	.054	0	y	1	60.557	196.992	7.438	47.543	1	H1-1b
9	M12	9x0.25	.942	43.5	1	.033	28.5	y	1	.511	72.9	.38	1.345	1	H1-1b
10	M13	L2x2x4	.329	0	1	.028	0	y	1	18.776	30.586	.691	1.523	1...	H2-1
11	M14	L2x2x4	.358	0	2	.040	1.129	z	1	19.333	30.586	.691	1.577	1...	H2-1
12	M15	C8X18.75	.250	0	2	.038	18.018	z	2	137.368	178.524	4.331	37.53	1...	H1-1b
13	M16	C12X20.7	.024	78	1	.008	0	y	1	60.557	196.992	7.438	69.12	2...	H1-1b
14	M17	L2x2x4	.166	0	1	.006	37.259	y	1	18.776	30.586	.691	1.577	1...	H2-1
15	M18	L2x2x4	.095	0	1	.004	0	z	2	19.333	30.586	.691	1.577	1...	H2-1
16	M19	PIPE 4.0	.005	0	1	.000	0		1	58.927	95.904	10.935	10.935	4...	H1-1b*
17	M20	LL2x2x4x6	.025	51.972	1	.002	0	y	1	15.078	61.236	4.475	2.079	1	H1-1b
18	M21	L2x2x4	.212	53.033	1	.023	0	y	1	3.081	30.586	.691	1.22	1...	H2-1
19	M22	L2x2x4	.049	45.916	1	.007	0	y	1	3.787	30.586	.691	1.26	1...	H2-1
20	M23	HSS4.500X0...	.470	0	2	.100	0		1	161.046	171.99	18.995	18.995	1...	H1-1b



Company : Morris & Ritchie Associates, Inc.
 Designer : Joseph S. Novotny
 Job Number : 21018.001
 Model Name : West Washington Street - 110' Guyed Tower

Apr 29, 2021
 12:01 AM
 Checked By: _____

Envelope AISC 15th(360-16): LFRD Steel Code Checks (Continued)

Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
21	M24	HSS4.500X0...	.490	0	2	.104	0	1	161.046	171.99	18.995	18.995	1...	H1-1b
22	M25	HSS4X4X6	.514	0	2	.113	0	z	184.055	197.892	22.046	22.046	1...	H1-1b
23	M31	HSS6X4X6	.125	0	2	.159	6	y	255.595	255.852	30.843	41.055	1...	H1-1b