Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

November 4, 2019

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of an Existing Tower at 30 Short Hills Road (a/k/a 1 Gouvna Hills Road), Old Lyme, Connecticut**

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Connecticut Siting Council ("Council") to approve the shared use by Cellco of an existing telecommunications tower on a 4.45-acre parcel at 30 Short Hills Road in Old Lyme, Connecticut (the "Property"). The Property is owned by Gouvna Group LLC. Cellco identifies this site as its "Old Lyme 2 Relo Facility".[1]

The existing 180-foot monopole tower was approved by the Old Lyme Planning Commission on March 13, 1997. (*See* Attachment 1). The tower is owned by Crown Castle ("Crown") and according to the Council's telecommunications data base, supports wireless communications antennas owned and operated by Sprint.

[1] Cellco currently maintains a wireless facility at 36 Hatchetts Hill Road in Old Lyme, consisting of antennas at the 175-foot level on a monopole tower and associated equipment at the base of the tower. If Cellco's proposed tower share request at 30 Short Hills Road is approved, Cellco would remove its equipment from the 36 Hatchetts Hill Road tower site.

Cellco requests that the Council find that the proposed shared use of the Crown tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving the proposed shared use. A copy of this filing is being sent to Old Lyme First Selectman, Bonnie Reemsnyder; Kim Groves, Old Lyme's Land Use Administrator; Gouvna Group LLC, the owner of the Property; and Crown, the tower owner.

Background

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and Crown have agreed to the proposed shared use of the 30 Short Hills Road tower pursuant to mutually acceptable terms and conditions. Likewise, Crown and Cellco have agreed to the proposed installation of equipment on the ground within an existing fenced compound area. Crown has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (*See* Owner's authorization letter included in Attachment 2).

Cellco proposes to install twelve (12) antennas and nine (9) remote radio heads ("RRHs") on the tower at a height of 161 feet above ground level ("AGL"). Cellco's radio equipment will be located inside an existing abandoned equipment shelter in the northwest corner of the compound. A 500 gallon propane tank and a 30 kW propane-fueled backup generator will be located on the ground adjacent to the tower and also within the fenced compound. Included in Attachment 3 are Cellco's project plans showing the location of all proposed site improvements. Attachment 4 contains specifications for Cellco's proposed antennas, RRHs and backup generator.

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use." Cellco respectfully submits that the shared use of the tower satisfies these criteria.

A. **Technical Feasibility.** The existing Crown tower is structurally capable of supporting Cellco's antennas, RRHs and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis Report ("Structural Report") prepared for this project confirms that the tower can support all existing and Cellco's proposed tower loading. A copy of the Structural Analysis Report is included in Attachment 5.

During the course of a maintenance inspection in 2012, Crown observed cracks in the east and north faces of the foundation. Cellco asked Crown to investigate these cracks and determine if they might impact the conclusions in the Structural Report. The foundation was inspected on August 27, 2019, by Bradley Byron, P.E., who determined that the cracks do not impact the structural capacity of the tower foundation. A copy of Mr. Byron's letter is included in Attachment 6.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower such as the Crown tower. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. In addition, § 16-50x(a) directs the Council to "give such consideration to other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing tower facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested shared use would permit the Applicant to obtain a building permit for the proposed installations.

C. Environmental Feasibility. The proposed shared use of the Crown tower would have minimal environmental effects, for the following reasons:

1. The proposed installation of twelve (12) antennas and nine (9) remote radio heads at a height of 161 feet AGL on the existing 180-foot tower in this industrial area would have an insignificant incremental visual impact on the area around the existing tower. As mentioned above, Cellco intends to use an existing equipment shelter located within the fenced compound area for its equipment. A backup generator and propane fuel tank will also be installed within the fenced compound. Cellco's shared use of this tower facility would therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing site.

2. Noise associated with Cellco's emergency backup generator is exempt from State and local noise standards.

3. Operation of Cellco's antennas at this site would not exceed the RF emissions standards adopted by the Federal Communications Commission ("FCC"). Included in Attachment 7 of this filing is a worst case General

Power Density table that demonstrates that the facility will operate well within the FCC RF emissions safety standards.

4. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the Crown facility other than periodic maintenance visits to the cell site.

The proposed shared use of the Crown tower would, therefore, have a minimal environmental effect, and is environmentally feasible.

D. Economic Feasibility. As previously mentioned, Cellco has entered into an agreement with Crown for the shared use of the existing facility subject to mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible.

E. Public Safety Concerns. As discussed above, the tower is structurally capable of supporting Cellco's antennas, RRHs and all related equipment. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing Crown tower. In fact, the provision of new and improved wireless service through shared use of the existing tower is expected to enhance the safety and welfare of area residents and members of the general public traveling through the Town of Old Lyme.

Conclusion

A Certificate of Mailing verifying that this filing was sent to the Property owner and municipal officials is included in Attachment 8.

For the reasons discussed above, the proposed shared use of the existing Crown tower at 30 Short Hills Road satisfies the criteria stated in C.G.S. § 16-50aa and advances the General Assembly's and the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The Applicant, therefore, respectfully requests that the Council issue an order approving the proposed shared use.

Robinson+Cole

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Bonnie Reemsnyder, First Selectman
Kim Groves, Land Use Administrator
Gouvna Group LLC
Crown Castle
Aleksey Tyurin

ATTACHMENT 1

Town of Old Lyme, Old Lyme, CT 06371-0160

PLANNING COMMISSION
52 Lyme Street
P.O. Box 160
(860) 434-9174
FAX (860) 434-9283

CERTIFICATE OF DECISION

SPECIAL EXCEPTION

Application of: Gary A. & Elizabeth L. Yuknat, 30 Short Hills Road, Old Lyme, CT. Map 19, Lot 21 in a LI-80S Zone.

Request for a Site Plan/Special Exception approval for the proposed telecommunications utility building and monopole and septage storage facility. The Public Hearing was held on March 13, 1997, pursuant to due notice March 3rd and March 10th, 1997.1996.

Commission Members Present and Voting: Vice Chairman Jeff Flower, Secretary Alan Bayreuther, Connie Kastelowitz, Linda Cotton and Alternate Nancy Strohla.

Decision on March 13, 1997.

In this application, the Commission members voted unanimously to approve the Site Plan/Special Exception.

The Planning Commission concluded that this proposal, as approved, will not adversely affect the public health, safety, welfare or property values of the Town of Old Lyme.

This Certificate of Decision must be recorded in the land records of the Town of Old Lyme, Connecticut. The Town Clerk shall index the same in the grantor's index under the name of the record owner or owners, and the record owner shall pay the fee for such recording.

Dated at Old Lyme, Connecticut this 31st day of March, 1997.

Jeff Flower
Vice Chairman
Old Lyme Planning Commission

For Record 4-14-97 at 2 h 50 m pm
Attest ... Asst Town Clerk

Received 4-14-97
ATC

ATTACHMENT 2

Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Crown Castle, does hereby authorize **Cellco Partnership d/b/a Verizon Wireless** and its authorized contractors/agents to act as "Applicant" in the processing of all applications, permits, research and other related activities associated with the processing, planning, design review, permitting, entitlement and construction of additional equipment, antennas and site improvements for the Crown Castle existing wireless communications facility described as follows:

Customer Site Name:	**Old Lyme Relo 2**	**Crown Castle Site ID Number:**	**876337**
Site Address:	**30 Short Hills Rd. Old Lyme CT06371**	**Crown Castle Site Name:**	**SHORELINE SANITATION**

This authorization is fully contingent upon **Verizon Wireless** authorized contractors/agents' compliance with the following conditions:

1. Crown Castle must review the application prior to submittal. Crown Castle must be provided all applications, narratives, drawings and attachments at least 72 hours in advance of their submittal to the locality. Use of email and electronic attachments is encouraged. A Crown Castle Zoning Subject Matter Expert (SME) will review and provide written comment to the customer within 48 hours of receipt of a complete set of application materials. If Crown Castle indicates that changes are required, submissions shall be altered in accordance with Crown Castle comments prior to submission to the locality. Verification of corrections should also be accomplished via emails and attachments.
2. In no event may **Verizon Wireless** encourage, suggest, participate in, or permit the imposition of any restrictions or additional obligations whatsoever on the tower site or Crown Castle's current or future use or ability to license space at the tower site as part of or in exchange for obtaining any approval, permit, exception or variance.
3. A copy of the final permit and/or a written summary of the zoning/entitlement decision rendered by the locality and any/all conditions placed on that decision shall be communicated in detail to Crown Castle well within the appeal period provided by the locality (typically 10-15 days).
4. All conditions of approval pertinent to the construction of the proposed project must be included in the construction drawings for the project. The conditions of approval pertinent to the construction of the project shall be copied verbatim from the zoning permit approval language, and shall be present in the drawings prior to submission for building permits and contractor bidding. Crown Castle shall verify the inclusion of appropriate conditions of approval in the construction drawing redline process.
5. Crown Castle will provide a Notice To Proceed (NTP) to construction to the customer upon receipt of the final approved zoning permit and the approved Building Permit.

By Crown Castle:

Signature: _____

Printed Name: Zachary Plummer

Title: Real Estate Specialist

Date: July 22, 2019

ATTACHMENT 3

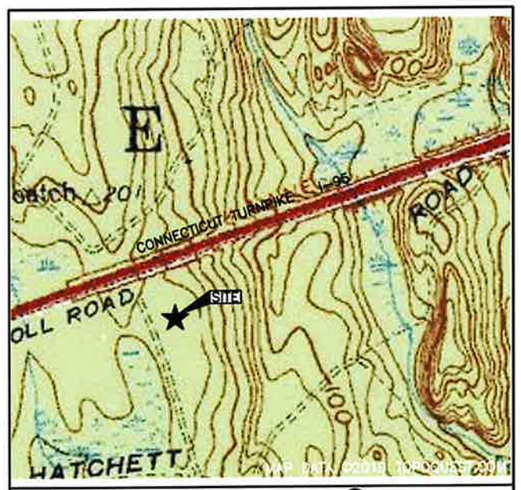
CELLCO PARTNERSHIP

d.b.a. verizon

WIRELESS COMMUNICATIONS FACILITY

OLD LYME RELO 2 CT

30 SHORT HILLS ROAD
OLD LYME, CT 06371



VICINITY MAP — SCALE: 1"=500'-0"

DIRECTIONS TO SITE:

GET ON CT-9 S IN MIDDLETOWN FROM CT-68 E AND CT-17 N/MAIN ST
HEAD NORTH ON ALEXANDER DR TOWARD BARNES INDUSTRIAL RD S
TURN RIGHT ONTO BARNES INDUSTRIAL RD S, TURN RIGHT ONTO CT-68 E
TURN LEFT ONTO CT-17 N/MAIN ST, TURN RIGHT ONTO RANDOLPH RD
TURN RIGHT TO MERGE ONTO CT-9 S
CONTINUE ON CT-9 S TO NEW LONDON COUNTY. TAKE EXIT 71 FROM I-95 N
MERGE ONTO CT-9 S
USE THE LEFT 2 LANES TO MERGE ONTO I-95 N/US-1 N TOWARD NEW LONDON/PROVIDENCE
TAKE EXIT 71 FOR 4 MILE RIVER ROAD, TAKE HATCHETTS HILL RD TO SHORT HILLS RD
TURN RIGHT ONTO 4 MILE RIVER RD
TURN LEFT ONTO HATCHETTS HILL RD
TURN RIGHT ONTO SHORT HILLS RD

DESTINATION IS ON THE RIGHT
30 SHORT HILLS ROAD, OLD LYME, CT 06371

CONSULTANT TEAM

PROJECT ENGINEER

HUDSON DESIGN GROUP, LLC
45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: 1-(978)-557-5553
FAX: 1-(978)-336-5586

MEP ENGINEER

HUDSON DESIGN GROUP, LLC
45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: 1-(978)-557-5553
FAX: 1-(978)-336-5586

PROJECT SUMMARY

SITE NAME:	OLD LYME RELO 2 CT
SITE ADDRESS:	30 SHORT HILLS ROAD OLD LYME, CT 06371
PROPERTY OWNER:	GOUVNA GROUP LLC Q/C 79-2 ROWLAND ROAD OLD LYME, CT 06371
APPLICANT:	CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
SITE ACQUISITION CONTACT:	ALEKSEY TYURIN STRUCTURE CONSULTING GROUP (860)933-1534
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN ESQ. ROBINSON + COLE LLP (860)275-8345
LATITUDE:	N41° 19' 07.62"
LONGITUDE:	W72° 16' 14.55"

VERIZON WIRELESS IS PROPOSING TO INSTALL THE FOLLOWING IMPROVEMENTS:

- NEW ANTENNA: (12) PANEL ANTENNAS
- NEW RRH: (9) RRH
- NEW OVP: (2) OVP

ITEMS LISTED ABOVE TO BE MOUNTED ON EXISTING MONOPOLE.

- NEW EQUIPMENT CABINETS WITHIN EXISTING EQUIPMENT SHELTER
- NEW (1) 500 GALLON PROPANE TANKS ON 4'-0"x10'-0" NEW CONCRETE PAD
- NEW (1) GAS GENERATOR ON EXISTING CONCRETE PAD

ITEMS LISTED ABOVE TO BE INSTALLED WITHIN EXISTING FENCED COMPOUND

POWER AND TELCO SERVICES SHALL BE ROUTED IN EXISTING ABANDONED CONDUITS TO VERIZON SHELTER.
FINAL DEMARK LOCATION TO BE VERIFIED/DETERMINED BY UTILITY COMPANIES.

SHEET INDEX

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT — DANIEL P. HAMM — No. 24178 — LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

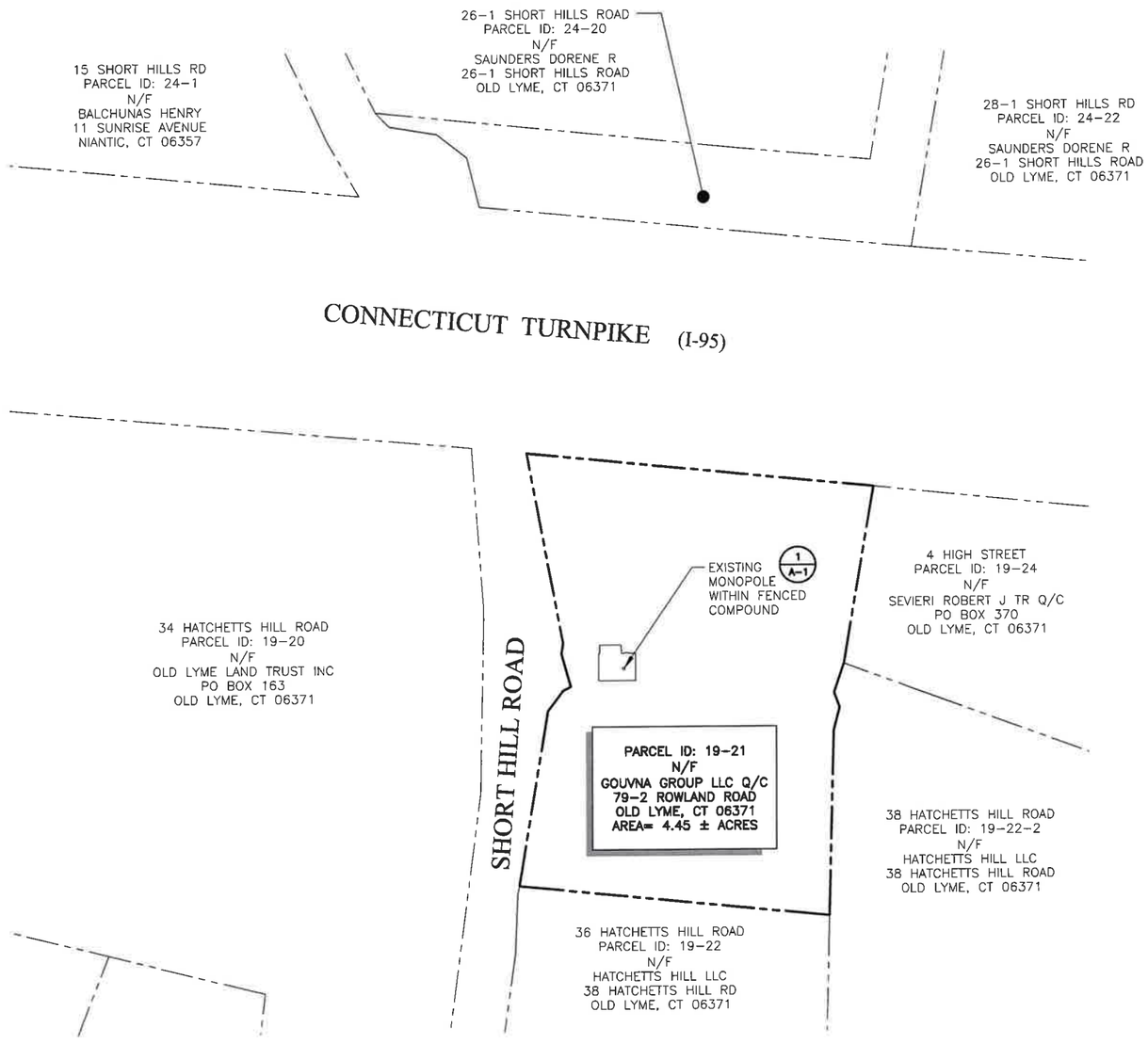
REV.	DATE	DESCRIPTION	BY
3	10/29/19	REVISED GENERATOR & TANK LOCATIONS	SLY
2	09/20/19	REVISED PROPANE TANK LAYOUT	JS
1	07/30/19	REVISED PER COMMENTS	KAM
0	07/11/19	ISSUED FOR REVIEW	KAM

SITE NAME:
OLD LYME
RELO 2 CT
(CROWN CASTLE BU # 876337)

SITE ADDRESS:
30 SHORT HILLS ROAD
OLD LYME, CT 06371

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



ABUTTERS PLAN 1 C-1

22x34 SCALE: 1"=80'-0"
11x17 SCALE: 1"=160'-0"

GRAPHIC SCALE
0 40 80 160 240 FEET

SOURCE:

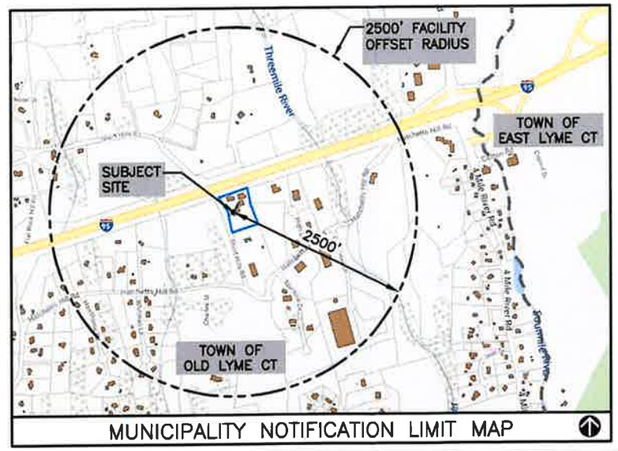
PLAN REFERENCE: PLAN ENTITLED "AS-BUILT SURVEY", SITE NAME "SHORELINE SANITATION"
DATED: 2/6/13 BY GEOLINE SURVEYING, INC. AND ONLINE GIS ASSESSORS MAP FROM THE TOWN OF OLD LYME, CT ACCESSED ON 7/10/19

SITE SPECIFIC NOTES:

1. PROPERTY LINE INFORMATION IS COMPILED FROM ASSESSORS PLAN AND RECORD DOCUMENTS AND IS NOT TO BE CONSTRUED AS HAVING BEEN OBTAINED AS THE RESULT OF A FIELD BOUNDARY SURVEY, AND IS SUBJECT TO CHANGE AS AN ACCURATE FIELD SURVEY MAY DISCLOSE. **A FULL BOUNDARY SURVEY WAS NOT PERFORMED.**
2. VERIFY AZIMUTHS W/ RF ENGINEER.

LEGEND

- PROPERTY LINE-SUBJECT PARCEL
- PROPERTY LINE-ABUTTERS
- TOWN BOUNDARY LINE
- CONTOUR LINE
- DELINEATED WETLAND LINE
- (E) BUILDING
- XXX-XX ASSESSORS MAP-BLOCK-LOT NO.
- (E) TREE LINE



MUNICIPALITY NOTIFICATION LIMIT MAP

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.

verizon

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT · DANIEL P. HAMM · No. 24178 · LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

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APPROVED BY: DPH

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SITE NAME:
OLD LYME
RELO 2 CT
(CROWN CASTLE BU # 876337)

SITE ADDRESS:
30 SHORT HILLS ROAD
OLD LYME, CT 06371

SHEET TITLE
ABUTTERS MAP

SHEET NUMBER
C-1

LOCUS MAP **SCALE: N.T.S.** N

NOTE:
A STRUCTURAL ANALYSIS OF THE CAPACITY OF THE EXISTING TOWER TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY B+T GROUP FOR CROWN CASTLE
DATED: JANUARY 7, 2019

MAGNETIC NORTH 13°36' TRUE NORTH

PORTION OF EXISTING FENCE AND GATE TO BE REMOVED

17'-1"±
PROPOSED 12'-0"± WIDE GATE

PROPOSED CHAIN LINK FENCE EXTENSION

PROPOSED EQUIPMENT CABINET (TYP.)

EXISTING EQUIPMENT SHELTER TO BE RETROFITTED AND UTILIZED

AC PANEL

NEW CABLE ENTRY PORT

10'-0"± NO SPARK RADIUS ZONE

10'-0"±

10'-5"±

PROPOSED 500 GALLON PROPANE TANK ON 4'x10' CONCRETE PAD

5'-1"±

EXISTING CONCRETE STOOP (TYP)

PROPOSED ICE BRIDGE (TYP.) (8FT. ABOVE GRADE)

PORTION OF HANDRAIL TO BE REMOVED

PROPOSED RELOCATED LADDER

EXISTING HANDHOLE ACCESS

EXISTING LADDER TO BE RELOCATED

3'-4"±

PROPOSED GENERATOR

3'-4"±

12'-6"± (GENERATOR LEASE AREA)

PROPOSED HANDRAIL SECTION TO CLOSE OFF ABANDONED PLATFORM ACCESS

3'-0"± MIN. FLOOR SPACE CLEARANCE

PROPOSED (1) 2"ø AND (1) 1"ø RGS CONDUITS ROUTED UNDERGROUND FROM PROPANE TANK TO GENERATOR

EXISTING H-FRAME (TYP.)

EXISTING MULTI-CARRIER HOFFMAN BOX

EXISTING FIBER DEVICE ENCLOSURE (TYP.)

EXISTING SPRINT EQUIPMENT SHELTER

EXISTING PPC (ABANDONED)

EXISTING 180'-0" MONOPOLE

EXISTING ICE BRIDGE TO BE REMOVED (TYP.)

EXISTING 200A ABANDONED METER TO BE TO UTILIZED BY VERIZON

8'-9"± (GENERATOR LEASE AREA)

EXISTING CABINET (ABANDONED)

EXISTING CABINET (ABANDONED)

EXISTING FOUNDATION PAD

EXISTING EQUIPMENT SHELTER

EXISTING 50'x50' LEASE AREA

EXISTING CARRIER METER (TYP.)

EXISTING HANDRAIL

LEGEND

— x — x — x — x — EXISTING CHAIN LINK FENCE

EXISTING BUILDING

NOTE:
ALL LINES AND ANTENNAS TO BE INSTALLED IN ACCORDANCE WITH PASSING STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND VERIZON WIRELESS ANTENNA DESIGN SHEET RECOMMENDATION.

COMPOUND PLAN (1 / A-1)
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

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TEL: (978) 557-5553
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STATE OF CONNECTICUT — DANIEL P. HAMM — No. 21178 — LICENSED PROFESSIONAL ENGINEER

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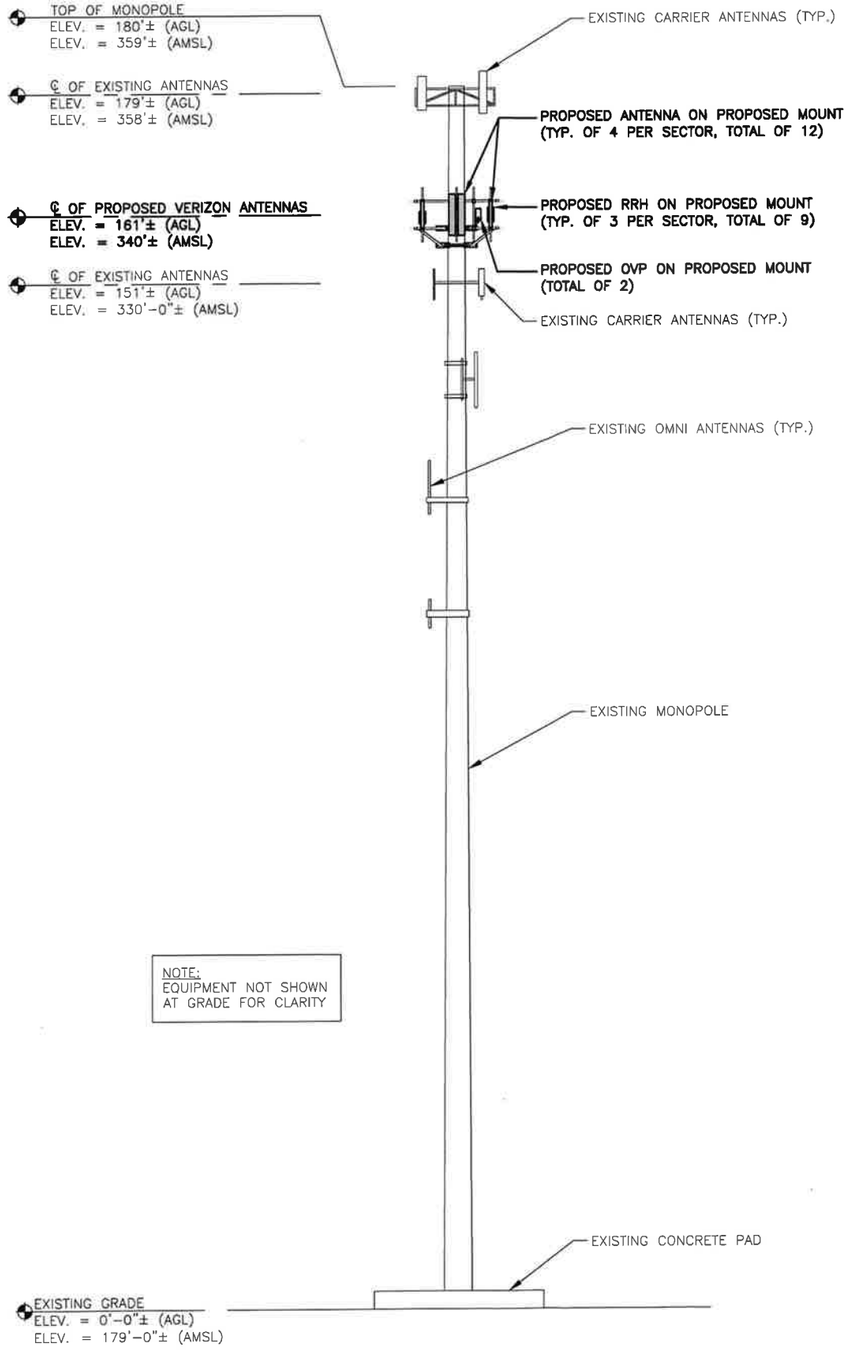

NOTE:
EQUIPMENT NOT SHOWN AT GRADE FOR CLARITY

ELEVATION 1/A-2
22x34 SCALE: 3/32"=1'-0"
11x17 SCALE: 3/64"=1'-0"

GRAPHIC SCALE
0 5'-4" 10'-8" 21'-4" 32'-0"

NOTE:
A STRUCTURAL ANALYSIS OF THE CAPACITY OF THE EXISTING TOWER TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY B+T GROUP FOR CROWN CASTLE
DATED: JANUARY 7, 2019

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PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
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SHEET TITLE
ELEVATION

SHEET NUMBER
A-2

ATTACHMENT 4

Product Specifications

COMMSCOPE®

SBNHH-1D65B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
Gain by Beam Tilt, average, dBi	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

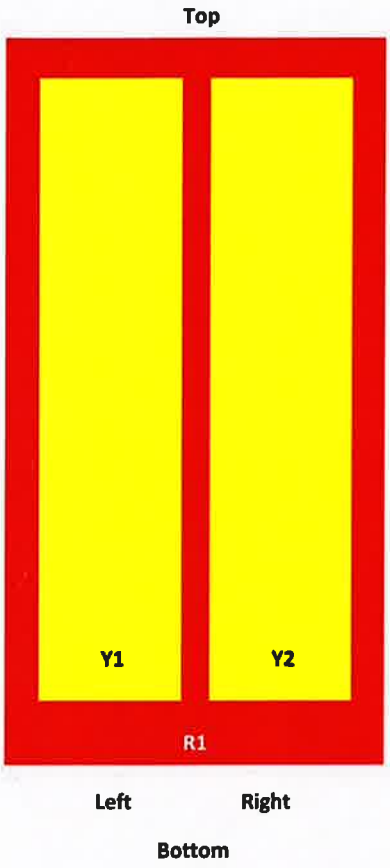
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

SBNHH-1D65B

SBNHH 65



Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	ANxxxxxxxxxxxxxxxx.1
Y1	1695-2360	3-4	2	ANxxxxxxxxxxxxxxxx.2
Y2	1695-2360	5-6		

View from the front of the antenna

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

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female

Product Specifications

SBNHH-1D65B

Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Depth	180.0 mm | 7.1 in
Net Weight, without mounting kit	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (1) | Low band (1)
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

Packed Dimensions

Length	2025.0 mm | 79.7 in
Width	390.0 mm | 15.4 in
Depth	296.0 mm | 11.7 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Product Specifications

SBNHH-1D65B

Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Vertically Polarized, Log Periodic 63° / 13 dBd

LPA-80063/4CF ___ 5°

When ordering, replace "___" with connector type.

Mechanical specifications

	Length	1205 mm	47.44 in
	Width	386 mm	15.2 in
	Depth	335 mm	13.19 in
[4]	Weight	9.07 kg	20 lbs
	Wind Area		
	Front	0.465 m^2	5.01 ft^2
	Side	0.404 m^2	4.35 ft^2
	Rated Wind Velocity (Safety factor 2.0)		
		>351 km/hr	>218 mph
	Wind load @ 100 mph (161 km/hr)		
	Front	665 N	149.5 lbs
	Side	577 N	129.6 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting & Downtilting:
Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in).

Mounting bracket kit #21699999

Downtilt bracket kit #21699999
The downtilt bracket kit includes the mounting bracket kit.

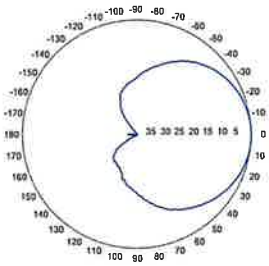
Electrical specifications

	Frequency Range	806-960 MHz
	Impedance	50Ω
[3]	Connector	NE, E-DIN
[1]	VSWR	≤1.4:1
	Polarization	Vertical
[1]	Gain	13 dBd
[2]	Power Rating	500 W
[1]	Half Power Angle	
	H-Plane	63°
	E-Plane	15°
[1]	Electrical Downtilt	5°
[1]	Null Fill	10%
	Lightning Protection	Direct Ground

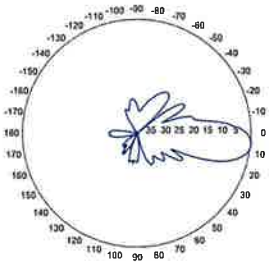
[1] Typical Values
[2] Power Rating limited by connector only.
[3] NE indicates an elongated N Connector.
E-DIN indicates an elongated DIN Connector.
[4] The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern[1]



Horizontal



Vertical

Featuring upper side lobe suppression.

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back Ratio.

CF Denotes a Center-Fed Connector.

806-960 MHz

Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Every Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connector only.

Amphenol Antel, Inc.
The Antenna Technology Company

1300 Capital Drive Rockford, IL 61109 Toll-Free (888) 417-9562 Tel. (815) 399-0001
Fax. (815) 399-0156 Email: antel@antelinc.com www.antelinc.com

Revision Date: 12/1/05

Vertically Polarized, Log Periodic 80° / 12.5 dBd

LPA-80080/4CF ___

When ordering, replace "___" with connector type.

Mechanical specifications

	Length	1200 mm	47.2 in
	Width	140 mm	5.5 in
	Depth	335 mm	13.2 in
[4]	Weight	5.44 kg	12 lbs
	Wind Area		
	Front	0.168 m^2	1.8 ft^2
	Side	0.402 m^2	4.3 ft^2
	Rated Wind Velocity (Safety factor 2.0)		
		>369 km/hr	>229 mph
	Wind load @ 100 mph (161 km/hr)		
	Front	254 N	57.1 lbs
	Side	574 N	129.0 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting & Downtilting:
Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in).

Mounting bracket kit #21699999

Downtilt bracket kit #21699999
The downtilt bracket kit includes the mounting bracket kit.

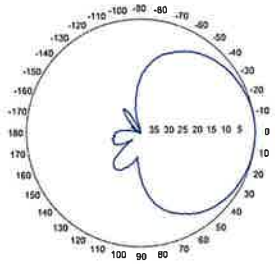
Electrical specifications

	Frequency Range	806-960 MHz
	Impedance	50Ω
[3]	Connector	NE, E-DIN
[1]	VSWR	≤1.4:1
	Polarization	Vertical
[1]	Gain	12.5 dBd
[2]	Power Rating	500 W
[1]	Half Power Angle	
	H-Plane	80°
	E-Plane	15°
[1]	Electrical Downtilt	0°
[1]	Null Fill	15%
	Lightning Protection	Direct Ground

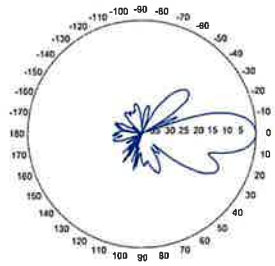
[1] Typical Values
[2] Power Rating limited by connector only.
[3] NE indicates an elongated N Connector.
E-DIN indicates an elongated DIN Connector.
[4] The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern[1]



Horizontal



Vertical

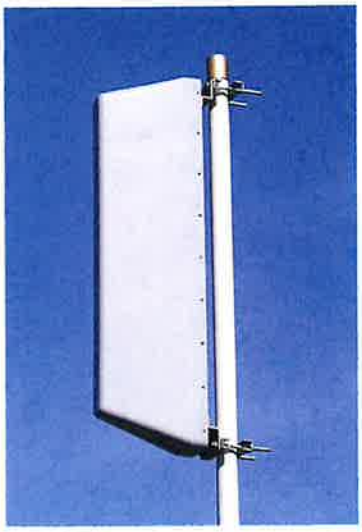
Featuring upper side lobe suppression.

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back Ratio.

CF Denotes a Center-Fed Connector.

806-960 MHz



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Antenna available with center-fed connector only.

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Revision Date: 12/1/05

ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

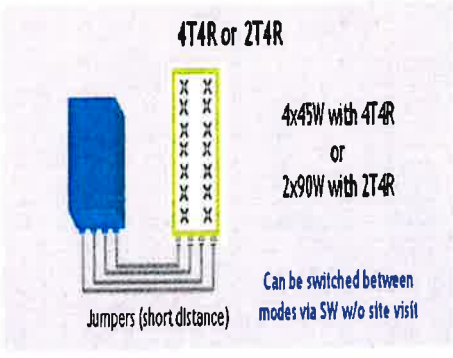
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports



BENEFITS

- Compact to reduce additional footprint when adding LTE in AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme Receiver Sensivity (FRC A1-3)	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.) Volume in Liters Weight in kg (lb) (w/o mounting HW)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield) 35.5 (with solar shield) 29.7 (without solar shield) 25.8kg (56.8lb) (with solar shield)
DC voltage range DC power consumption	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) UL50E Type 4 Enclosure 250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

Alcatel·Lucent

ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

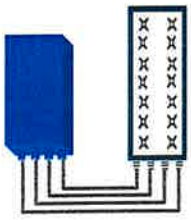
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options (Pole or Wall)



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 2) RX Diversity scheme	2.0 dB typ. (<2.5 dB max) 2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.) Volume (w/ solar shield) in L Weight (w/ solar shield) in kg (lb)	538 x 304 x 182 (21.2" x 12.0" x 7.2") 30 24 (53)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 580W typical @100% RF load
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 4 RF Tx & 4 RF Rx monitor ports 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT B13 RRH 4X30

Alcatel-Lucent B13 Remote Radio Head 4x30 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH 4x30 allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH 4x30 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It also supports 4-way Rx diversity at 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH 4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

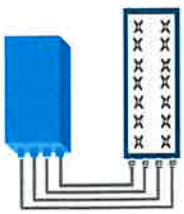
Its compactness and slim design makes the Alcatel-Lucent B13 RRH 4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	530 x 300 x 190 (20.9" x 11.8" x 7.5") (with solar shield); 525 x 290 x 175 (20.7" x 11.4" x 6.9") (w/o solar shield) 30.2 (with solar shield) 25.2kg (55.6lb) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 520W typical @100% RF load (in 2Tx or 4TX mode); 380W @50% RF load; Add 50W for 2A*24V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

KOHLER.

Model: 30CCL

208-600 V **Gas**

ISO 9001 KOHLER. NATIONALLY REGISTERED

EPA-Certified for Stationary Emergency Applications

Ratings Range

		60 Hz
Standby:	**kW**	30
	kVA	30–38

The Kohler® Advantage

- **High Quality Power**
  Kohler generators provide advanced voltage and frequency regulation along with ultra-low levels of harmonic distortion for excellent generator power quality to protect your valuable electronics.
- **Extraordinary Reliability**
  Kohler is known for extraordinary reliability and performance and backs that up with a premium five-year or 2000 hour limited warranty.
- **All-Aluminum Sound Enclosure**
  Durable aluminum sound-attenuating enclosure.

Generator Set Ratings

				Natural Gas 130°C Rise Standby Rating		LP Gas 130°C Rise Standby Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
4D8.3	120/208	3	60	30/38	106	30/38	106
	127/220	3	60	30/38	100	30/38	100
	120/240	3	60	30/38	92	30/38	92
	120/240	1	60	30/30	125	30/30	125
	139/240	3	60	30/38	92	30/38	92
	220/380	3	60	30/38	58	30/38	58
	277/480	3	60	30/38	46	30/38	46
	347/600	3	60	30/38	37	30/38	37
4P7BX	120/208	3	60	30/38	106	30/38	106
	127/220	3	60	30/38	100	30/38	100
	120/240	3	60	30/38	92	30/38	92
	120/240	1	60	30/30	125	30/30	125
	139/240	3	60	30/38	92	30/38	92
	220/380	3	60	30/38	58	30/38	58
	277/480	3	60	30/38	46	30/38	46
4E8.3	120/240	1	60	30/30	125	30/30	125
4Q7BX	120/240	1	60	30/30	125	30/30	125

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The generator set accepts rated load in one step.
- A five-year/2000 hour limited warranty covers all generator set systems and components. A five-year extended comprehensive limited warranty is also available.
- Engine Features
  - Powerful and reliable 2.2 L turbocharged liquid-cooled engine
  - Electronic engine management system.
  - Simple field conversion between natural gas and LPG fuels while maintaining emission certification.
- Innovative Cooling System
  - Electronically controlled fan speeds minimize generator set sound signature.
- Alternator features:
  - Kohler's wound field excitation system with its unique PowerBoost™ design delivers great voltage response and short-circuit capability.
  - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Kohler designed controller for one-source system integration and remote communication. See Controller on page 3.
- Certifications
  - The generator set engine is certified by the Environmental Protection Agency (EPA) to conform to the New Source Performance Standard (NSPS) for stationary spark-ignited emissions.
  - UL 2200/cUL listing is available.
  - The generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
  - CSA certification is available.
  - Accepted by the Massachusetts Board of Registration of Plumbers and Gas Fitters.
- Approved for stationary standby applications in locations served by a reliable utility source.

Alternator Specifications

Specifications		Alternator
Manufacturer		Kohler
Exciter type		Brushless, Wound-Field
Leads: quantity, type		
4D		12, Reconnectable
4E		4, 110-120/220-240 V
4PX		12, Reconnectable
4QX		4, 110-120/220-240 V
Voltage regulator		Solid State, Volts/Hz
Insulation:		NEMA MG1
Material		Class H
Temperature rise		130°C, Standby
Bearing: quantity, type		1, Sealed
Coupling		Flexible Disc
Amortisseur windings		Full
Voltage regulation, no-load to full-load		Controller Dependent
One-step load acceptance		100% of Rating
Unbalanced load capability		100% of Rated Standby Current
Peak motor starting kVA:		(35% dip for voltages below)
480 V	4D8.3 (12 lead)	120
240 V	4E8.3 (4 lead)	74
480 V	4P7BX (12 lead)	180
240 V	4Q7BX (4 lead)	113

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Application Data

Engine

Engine Specifications	
Manufacturer	Kohler
Engine: model, type	KG2204T, 2.2 L, 4-Cycle Turbocharged
Cylinder arrangement	In-line 4
Displacement, L (cu. in.)	2.2 (134.25)
Bore and stroke, mm (in.)	91 x 86 (3.5 x 3.4)
Compression ratio	10.5:1
Piston speed, m/min. (ft./min.)	340 (1016)
Main bearings: quantity, type	5, plain alloy steel
Rated rpm	1800
Max power at rated RPM, kW (HP)	
LPG	47.8 (64.1)
Natural Gas	47.6 (63.9)
Cylinder head material	Cast Iron
Piston type and material	High Silicon Aluminum
Crankshaft material	Nodular Iron
Valve (exhaust) material	Forged Steel
Governor type	Electronic
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±1.0%
Frequency	Fixed
Air cleaner type, all models	Dry

Engine Electrical

Engine Electrical System	
Ignition system	Electronic
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	14
Ampere rating	90
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA):	
Qty., rating for -18°C (0°F)	One, 630
Battery voltage (DC)	12
Battery group size	24

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust temperature at rated kW, dry exhaust, °C (°F)	610 (1130)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)

Fuel

Fuel System	
Fuel type	Natural Gas or LPG
Fuel supply line inlet	1 NPTF
Natural gas fuel supply pressure, kPa (in. H_2O)	1.24-2.74 (5-11)
LPG vapor withdrawal fuel supply pressure, kPa (in. H_2O)	1.24-2.74 (5-11)

Fuel Composition Limits *	Nat. Gas	LP Gas
Methane, % by volume	90 min.	—
Ethane, % by volume	4.0 max.	—
Propane, % by volume	1.0 max.	85 min.
Propene, % by volume	0.1 max.	5.0 max.
C_4 and higher, % by volume	0.3 max.	2.5 max.
Sulfur, ppm mass	25 max.	
Lower heating value, MJ/m^3 (Btu/ft^3), min.	33.2 (890)	84.2 (2260)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Application Data

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.) §	4.2 (4.4)
Oil added during oil change (on average), L (qt.) §	3.3 (3.5)
Oil pan capacity with filter, L (qt.) §	8.5 (9.0)
Oil filter: quantity, type §	1, Cartridge

§ Kohler recommends the use of Kohler Genuine oil and filters.

Cooling

Radiator System	
Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	2.65 (0.7)
Radiator system capacity, including engine, L (gal.)	13.2 (3.5)
Engine jacket water flow, Lpm (gpm)	62 (16.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	22.5 (1280)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	qty. 3 @ 406 (16)
Fan power requirements (powered by engine battery charging alternator)	12 VDC, 18 amps each

Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m^3/min. (scfm)‡	51 (1800)
Combustion air, m^3/min. (cfm)	1.6 (57)
Air over engine m^3/min. (cfm)	25 (883)

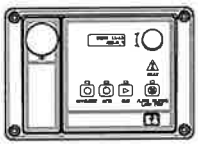
† Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption ‡	
Natural Gas, m^3/hr. (cfh) at % load	**Standby Ratings**
100%	11.9 (421)
75%	10.0 (355)
50%	8.2 (289)
25%	6.3 (223)
0%	4.5 (158)
LP Gas, m^3/hr. (cfh) at % load	**Standby Ratings**
100%	4.6 (164)
75%	3.7 (131)
50%	2.8 (99)
25%	1.9 (66)
0%	1.0 (34)

‡ Nominal fuel rating: Natural gas, 37 MJ/m^3 (1000 Btu/$ft.^3$)
LP vapor, 93 MJ/m^3 (2500 Btu/$ft.^3$)

LP vapor conversion factors:
8.58 $ft.^3$ = 1 lb.
0.535 m^3 = 1 kg.
36.39 $ft.^3$ = 1 gal.

Controller



APM402 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-161 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

Sound Enclosure

- Durable aluminum, sound-attenuating enclosure with quiet operation of 57 dB(A) log average @ 7 m (23 ft.) at no load.
- Internally mounted silencer.
- Fade-, scratch, and corrosion-resistant Kohler® Power Armor™ automotive-grade textured finish.
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.

KOHLER.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Standard Features

- Alternator Protection
- Aluminum Sound Enclosure with Enclosed Silencer
- Battery Rack and Cables
- Flexible Fuel Line
- Gas Fuel System (includes fuel mixer, electronic secondary gas regulator, gas solenoid valve, and flexible fuel line between the engine and the skid-mounted fuel system components)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Low Fuel Pressure Switch (with NFPA fuel module)
- Oil Drain Extension
- Operation and Installation Literature
- Standard 5-Year Limited Warranty

Available Options

Approvals and Listings

- ❑ CSA Certified
- ❑ UL 2200 Listing

Controller

- ❑ 15-Relay Dry Contact Board
- ❑ Communication Products
- ❑ Input/Output Module (2 inputs, 5 outputs)
- ❑ Lockable Emergency Stop (lockout/tagout)
- ❑ Manual Key Switch
- ❑ Manual Speed Adjust
- ❑ Remote Annunciator Panel
- ❑ Remote Emergency Stop
- ❑ Run Relay

Enclosure Accessories

- ❑ Enclosure Doors for 291 kph (181 mph) Wind Load

Starting Aids*

- ❑ Block Heater, 110-120 V
- ❑ Block Heater, 220-240 V

Oil Pan Heater*

- ❑ Oil Pan Heater, 110-120 V
- ❑ Oil Pan Heater, 190-240 V

* One block heater or oil pan heater is required for ambient temperatures below 0°C (32°F). At temperatures below -18°C (0°F) installation of both heaters is required.

Electrical System

- ❑ Alternator Strip Heater
- ❑ Battery
- ❑ Battery Charger, 6 Amp
- ❑ Battery Charger, 10 Amp w/Alarms
- ❑ Battery Heater
- ❑ Temperature Compensation for 10 Amp Battery Charger

Miscellaneous

- ❑ Air Cleaner Restriction Indicator
- ❑ Certified Test Report
- ❑ Engine Fluids Added
- ❑ Maintenance Kit (filters, spark plugs, oil)
- ❑ Rated Power Factor Testing

Literature

- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

Warranty

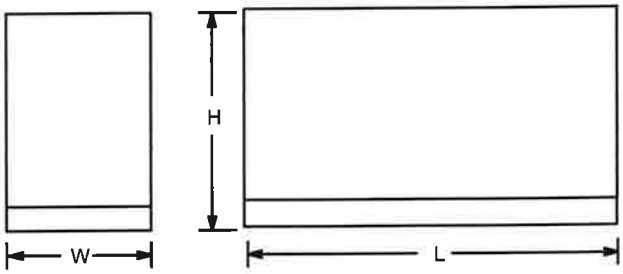
- ❑ Optional Extended 5-Year/2000 Hour Comprehensive Limited Warranty

Other Options

- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____

Dimensions and Weights

Overall Size, L x W x H, mm (in.):	2280 x 830 x 1182 (89.8 x 32.7 x 46.5)
Weight, with engine fluids, kg (lb.):	635 (1432)



NOTE: This drawing is provided for reference only and should not be used for planning. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

ATTACHMENT 5

Date: **January 07, 2019**

James Klein
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

B+T Group
1717 S, Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	Old Lyme Relo 2
Crown Castle Designation:	**Crown Castle BU Number:**	876337
	Crown Castle Site Name:	Shoreline Sanitation
	Crown Castle JDE Job Number:	541832
	Crown Castle Work Order Number:	1656850
	Crown Castle Order Number:	465673 Rev. 1
Engineering Firm Designation:	**B+T Group Project Number:**	85773.005.01
Site Data:	**30 Short Hills Road, Old Lymen, New London County, CT** **Latitude *41° 19' 7.6"*, Longitude *-72° 16' 14.6"*** **180 Foot - Monopole Tower**	

Dear James Klein,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above-mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Jacob Johnson, E.I.T.

Respectfully submitted by: B+T Engineering, Inc.
COA: PEC.0001564; Expires: 2/10/2019

1/7/19

Scott S. Vance, P.E.

tnxTower Report - version 8.0.4.0

TABLE OF CONTENTS

1) INTRODUCTION

This is a 180 ft. monopole designed by Rohn in January of 1997 and mapped by Tower Engineering Professionals in December of 2007. The monopole was originally designed for a wind speed of 85 mph per TIA/EIA-222-E. This monopole has been modified by B+T Engineering Inc. in May of 2009 and those modifications were incorporated in this analysis.

2) ANALYSIS CRITERIA

TIA-222 Revision: TIA-222-H
Risk Category: II
Wind Speed: 135 mph
Exposure Category: B
Topographic Factor: 1
Ice Thickness: 1.5 in
Wind Speed with Ice: 50 mph
Service Wind Speed: 60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
161.0	161.0	3	Alcatel Lucent	PCS B25 RRH4X30	8	1-5/8
		3	Alcatel Lucent	RRH2X60-700		
		3	Alcatel Lucent	RRH4X45-AWS4 B66		
		2	Antel	LPA-80063/4CF-5		
		4	Antel	LPA-80080/4CF		
		2	Commscope	RC3DC-3315-PF-48		
		6	Commscope	SBNHH-1D65B		
		1	--	RMQP-496-HK		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
177.0	179.0	3	Alcatel Lucent	800MHZ 2X50W RRH W/Filter	4	1-1/4
		3	Alcatel Lucent	PCS 1900MHZ 4X45W-65MHZ		
		3	Alcatel Lucent	TD-RRH8X20-25		
		3	Alcatel Lucent	TME-PCS 1900MHZ 4X45W-65MHZ		
		3	Rfs Celwave	APXVSPP18-C-A20		
		3	Rfs Celwave	APXVTM14-C-120		
	177.0	1	--	Platform Mount [LP 502-1]		
151.0	151.0	3	Kathrein	800 10504	6	1-5/8
		1	--	T-Arm Mount [TA 601-3]		
136.0	136.0	1	ShivelyLabs	6812B-1	1	1/2
		1	--	Side Arm Mount [SO 701-1]		
118.0	121.0	1	Decibel	DB806-XT	1	7/8
	118.0	1	--	Side Arm Mount [SO 701-1]		
101.0	101.0	1	Lucent	KS24019-L112A	1	1/2
		1	--	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Online Order Information	Verizon Wireless Co-Locate, Rev# 1	465673	CCI Sites
Tower Manufacturer Drawing	Rohn Engg. File No-347385W	2172538	CCI Sites
Tower Mapping	TEP, Project No. 072115		
Tower Modification Drawing	B+T Group & Aero Solutions, Project No. 79934	2434696	CCI Sites
Post Modification Inspection		2434695	CCI Sites
Foundation Mapping	Vertical Solutions, Project No. 070986	2259251	CCI Sites
Geotech Report	CHA, Project No.5835.07.19	1531891	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 11/02/2018	CCI Sites

3.1) Analysis Method

tnxTower (version 8.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specs.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Mount areas and weights are assumed based on photographs provided.
5) The existing base plate grout was not considered in this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	180 - 175	Pole	TP24x24x0.25	1	-2.570	695.378	4.6	Pass
L2	175 - 170	Pole	TP24x24x0.25	2	-2.949	695.378	11.6	Pass
L3	170 - 165	Pole	TP24x24x0.25	3	-3.333	695.378	19.0	Pass
L4	165 - 160	Pole	TP24x24x0.25	4	-7.202	695.378	29.4	Pass
L5	160 - 155	Pole	TP24x24x0.25	5	-7.676	695.378	46.6	Pass
L6	155 - 150	Pole	TP24x24x0.25	6	-9.224	695.378	64.7	Pass
L7	150 - 145	Pole	TP30x30x0.375	7	-10.059	1376.613	35.4	Pass
L8	145 - 140	Pole	TP30x30x0.375	8	-10.900	1376.613	43.9	Pass
L9	140 - 135	Pole	TP30x30x0.375	9	-11.829	1376.613	52.6	Pass
L10	135 - 130	Pole	TP30x30x0.375	10	-12.696	1376.613	61.5	Pass
L11	130 - 125	Pole	TP30x30x0.375	11	-13.576	1376.613	70.6	Pass
L12	125 - 120	Pole	TP30x30x0.375	12	-14.470	1376.613	79.9	Pass
L13	120 - 115	Pole	TP36x36x0.375	13	-15.571	1564.605	63.6	Pass
L14	115 - 110	Pole	TP36x36x0.375	14	-16.591	1564.605	70.6	Pass
L15	110 - 107.58	Pole	TP36x36x0.375	15	-17.086	1564.605	74.1	Pass
L16	107.58 - 107.33	Pole + Reinf.	TP36x36x0.525	16	-17.162	2322.274	53.3	Pass
L17	107.33 - 102.33	Pole + Reinf.	TP36x36x0.525	17	-18.517	2322.274	58.5	Pass
L18	102.33 - 97.33	Pole + Reinf.	TP36x36x0.525	18	-19.968	2322.274	63.9	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L19	97.33 - 92.33	Pole + Reinf.	TP36x36x0.525	19	-21.346	2322.274	69.3	Pass
L20	92.33 - 90	Pole + Reinf.	TP36x36x0.525	20	-21.991	2322.274	71.9	Pass
L21	90 - 89.75	Pole + Reinf.	TP42x42x0.6125	21	-22.086	3160.867	46.4	Pass
L22	89.75 - 84.75	Pole + Reinf.	TP42x42x0.6125	22	-23.864	3160.867	50.0	Pass
L23	84.75 - 79.75	Pole + Reinf.	TP42x42x0.6125	23	-25.651	3160.867	53.8	Pass
L24	79.75 - 74.75	Pole + Reinf.	TP42x42x0.6125	24	-27.445	3160.867	57.6	Pass
L25	74.75 - 69.75	Pole + Reinf.	TP42x42x0.6125	25	-29.246	3160.867	61.5	Pass
L26	69.75 - 64.75	Pole + Reinf.	TP42x42x0.6125	26	-31.053	3160.867	65.4	Pass
L27	64.75 - 60	Pole + Reinf.	TP42x42x0.6125	27	-32.775	3160.867	69.2	Pass
L28	60 - 59.75	Pole	TP48x48x0.5	28	-32.868	2781.513	63.8	Pass
L29	59.75 - 54.75	Pole	TP48x48x0.5	29	-34.560	2781.513	67.6	Pass
L30	54.75 - 49.75	Pole	TP48x48x0.5	30	-36.262	2781.513	71.4	Pass
L31	49.75 - 46.58	Pole	TP48x48x0.5	31	-37.343	2781.513	73.9	Pass
L32	46.58 - 46.33	Pole + Reinf.	TP48x48x0.675	32	-37.460	3983.143	55.6	Pass
L33	46.33 - 41.33	Pole + Reinf.	TP48x48x0.675	33	-39.669	3983.143	58.6	Pass
L34	41.33 - 36.33	Pole + Reinf.	TP48x48x0.675	34	-41.887	3983.143	61.6	Pass
L35	36.33 - 31.33	Pole + Reinf.	TP48x48x0.675	35	-44.110	3983.143	64.7	Pass
L36	31.33 - 30	Pole + Reinf.	TP48x48x0.675	36	-44.702	3983.143	65.5	Pass
L37	30 - 29.75	Pole + Reinf.	TP48x48x0.7125	37	-44.831	4201.092	62.2	Pass
L38	29.75 - 24.75	Pole + Reinf.	TP48x48x0.7125	38	-47.166	4201.092	65.2	Pass
L39	24.75 - 19.75	Pole + Reinf.	TP48x48x0.7125	39	-49.511	4201.092	68.1	Pass
L40	19.75 - 14.75	Pole + Reinf.	TP48x48x0.7125	40	-51.862	4201.092	71.2	Pass
L41	14.75 - 9.75	Pole + Reinf.	TP48x48x0.7125	41	-54.217	4201.092	74.2	Pass
L42	9.75 - 4.75	Pole + Reinf.	TP48x48x0.7125	42	-56.578	4201.092	77.3	Pass
L43	4.75 - 0	Pole + Reinf.	TP48x48x0.7125	43	-58.824	4201.092	80.2	Pass
							Summary	
						Pole (L43)	80.2	Pass
						Rating =	80.2	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Connections	150	35.9	Pass
1	Flange Connections	120	73.0	Pass
1	Flange Connections	90	97.9	Pass
1	Bridge Stiffeners	60	91.0	Pass
1	Flange Connections	60	98.9	Pass
1	Bridge Stiffeners	30	98.1	Pass
1	Flange Connections	30	79.0	Pass
1	Anchor Rods	Base	68.8	Pass
1	Base Plate	Base	72.3	Pass
1	Base Foundation (Structure)	Base	11.7	Pass
1	Base Foundation (Soil Interaction)	Base	47.8	Pass

Structure Rating (max from all components) =	**98.9%**

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Rating per TIA-222-H Section 15.5

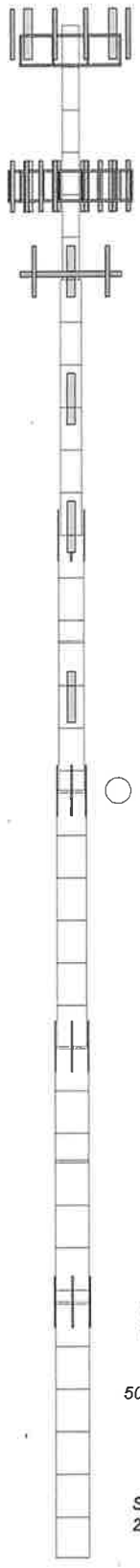
4.1) Recommendations

The tower and its base foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Size	Length (ft)	Grade	Weight (K)
1	P48x0.375	5.000	A53-B-42	0.3
2	P48x0.375	5.000		0.3
3	P48x0.375	5.000		0.3
4	P48x0.375	5.000		0.3
5	P48x0.375	5.000		0.3
6	P48x0.375	5.000		0.3
7	P48x0.375	5.000		0.6
8	P48x0.375	5.000		0.6
9	P48x0.375	5.000		0.6
10	P48x0.375	5.000		0.6
11	P48x0.375	5.000		0.6
12	P48x0.375	5.000		0.6
13	P48x0.375	5.000		0.7
14	P48x0.375	5.000		0.7
15	P48x0.375	2.500		0.3
16	P48x0.375	5.000		1.0
17	P48x0.375	5.000		1.0
18	P48x0.375	5.000		1.0
19	P48x0.375	5.000		1.0
20	P48x0.375	2.500		0.5
21	P48x0.375	5.000		1.4
22	P48x0.375	5.000		1.4
23	P48x0.375	5.000		1.4
24	P48x0.375	5.000		1.4
25	P48x0.375	5.000		1.4
26	P48x0.375	5.000		1.4
27	P48x0.375	2.500		1.3
28	P48x0.375	5.000		1.3
29	P48x0.375	2.500		1.3
30	P48x0.375	5.000		1.3
31	P48x0.375	2.500		0.8
32	P48x0.375	2.500		0.8
33	P48x0.375	5.000		1.7
34	P48x0.375	5.000		1.7
35	P48x0.375	5.000		1.7
36	P48x0.375	2.500		0.8
37	P48x0.375	2.500		0.8
38	P48x0.375	5.000		1.8
39	P48x0.375	5.000		1.8
40	P48x0.375	5.000		1.8
41	P48x0.375	5.000		1.8
42	P48x0.375	5.000		1.8
43	P48x0.375	4.750		1.7
				36.6



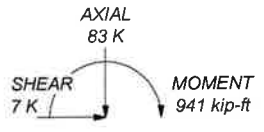
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

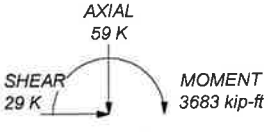
TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TIA-222-H Annex S
9. TOWER RATING: 80.2%

ALL REACTIONS ARE FACTORED



TORQUE 0 kip-ft
50 mph WIND - 1.500 in ICE



TORQUE 1 kip-ft
REACTIONS - 135 mph WIND

B+T Group
1717 S, Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

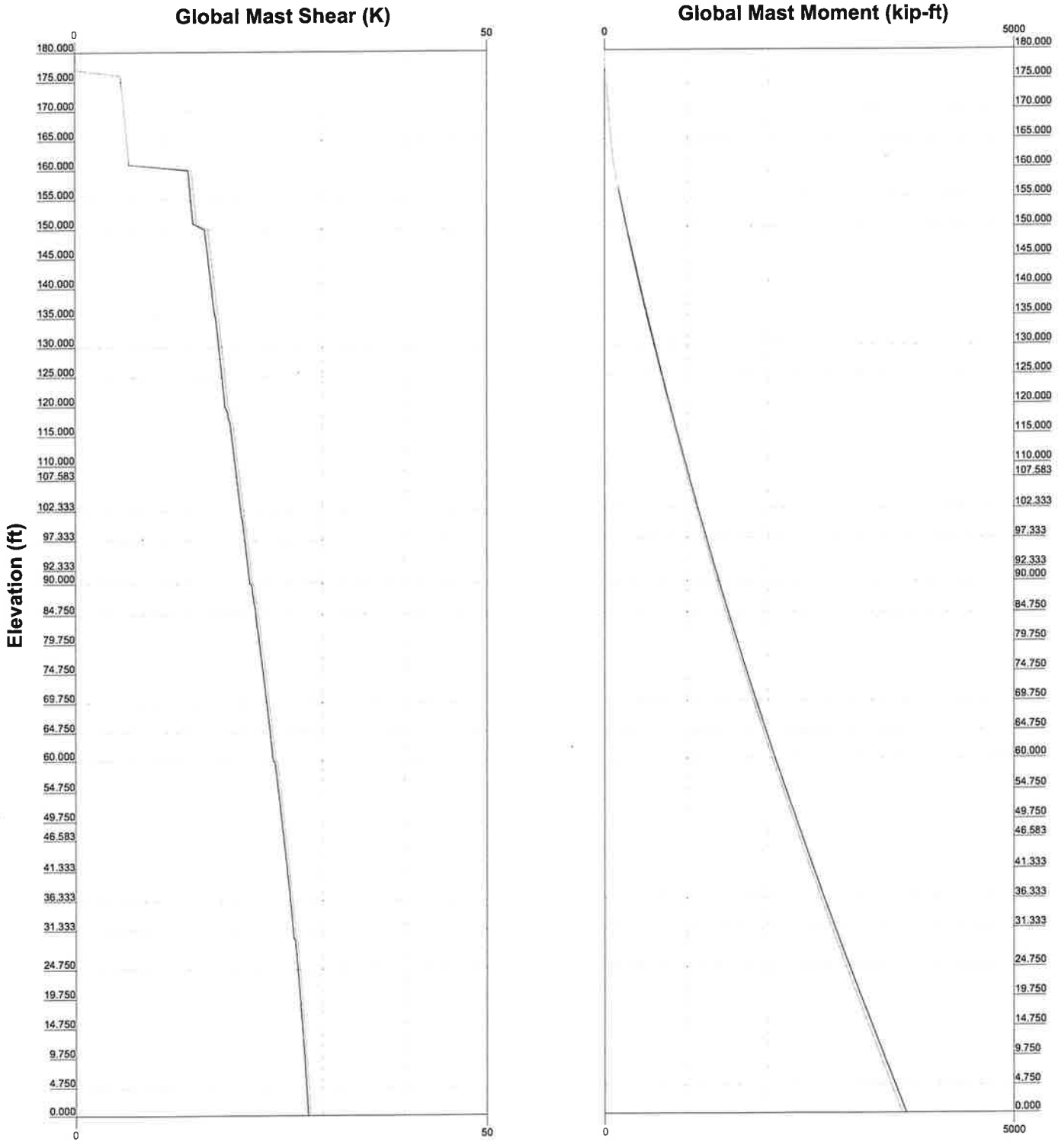
Job: 85773.005.01 - Shoreline Sanitation, CT (BU# 876337			
Project:			
Client: Crown Castle	Drawn by: Jayadev Prabhu K	App'd:	
Code: TIA-222-H	Date: 01/03/19	Scale: NTS	
Path:		Dwg No. E-1	

TIA-222-H - 135 mph/50 mph 1.500 in Ice Exposure B

Vx Vz

Maximum Values

Mx Mz



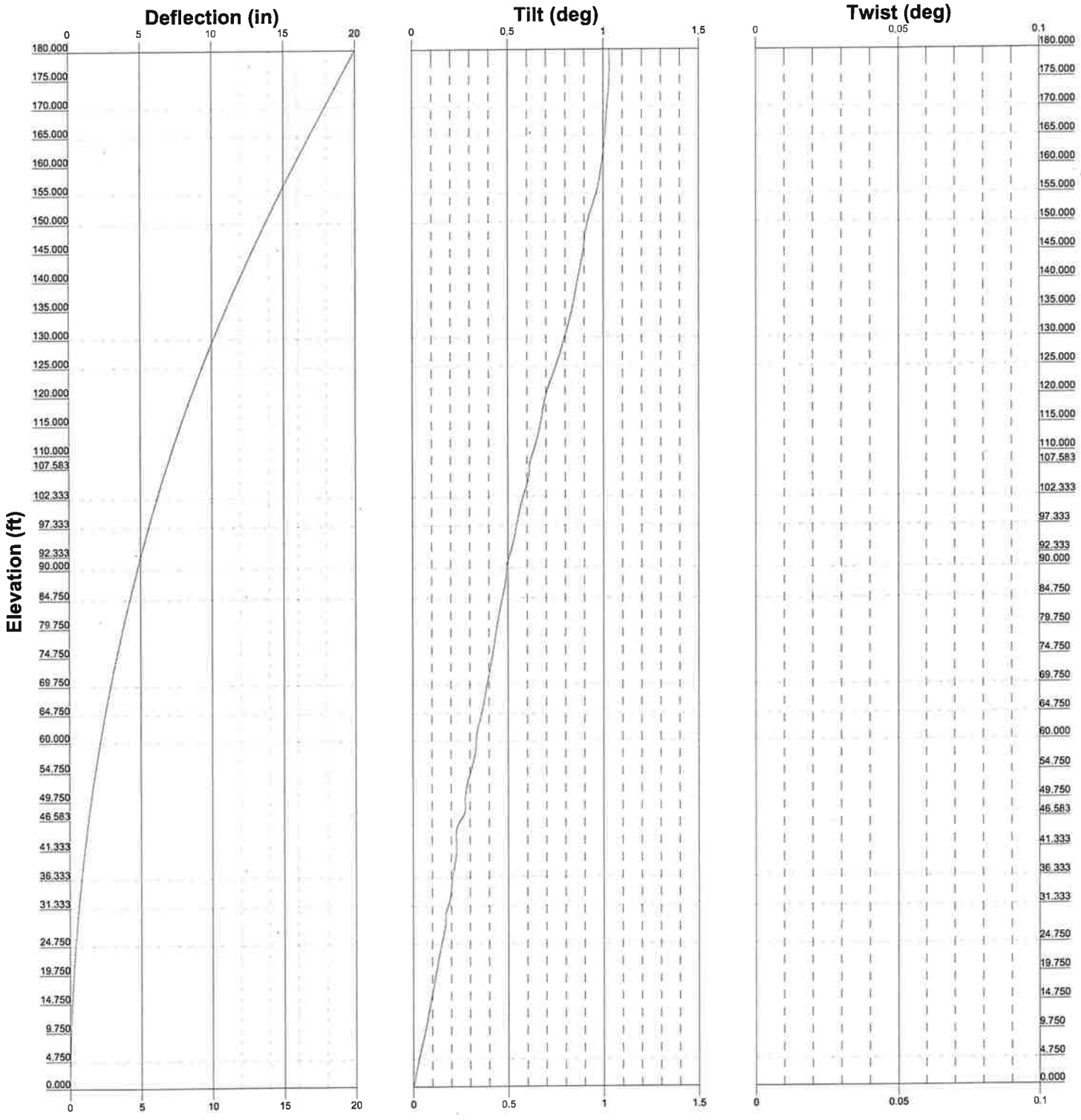
B+T GRP

B+T Group
1717 S, Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: *85773.005.01 - Shoreline Sanitation, CT (BU# 876337*			
Project:			
Client: Crown Castle	Drawn by: Jayadev Prabhu K	App'd:	
Code: TIA-222-H	Date: 01/03/19	Scale: NTS	
Path:		Dwg No. E-4	

TIA-222-H - Service - 60 mph

Maximum Values



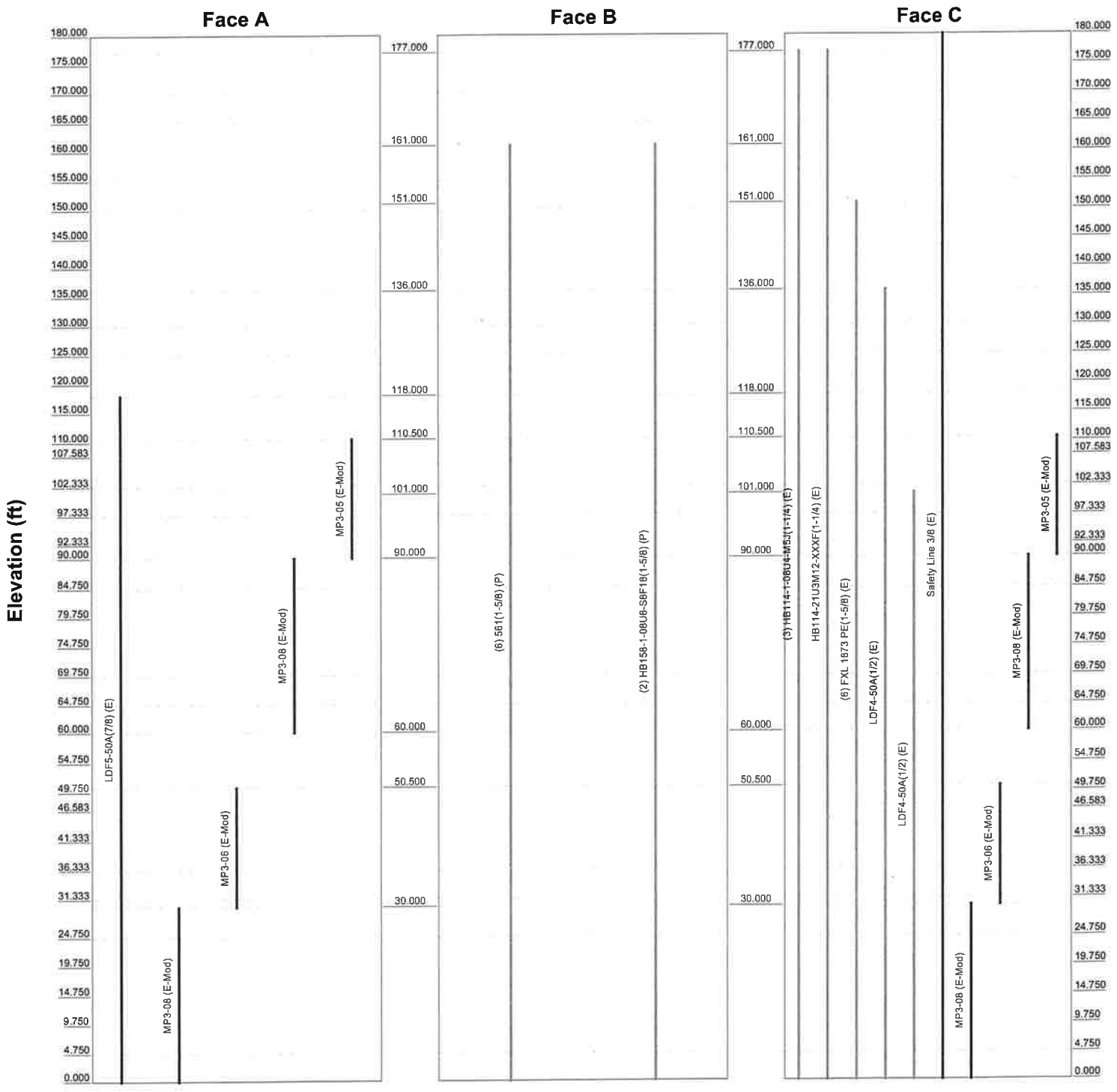
B+T GRP

B+T Group
1717 S, Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: *85773.005.01 - Shoreline Sanitation, CT (BU# 87633*			
Project:			
Client: Crown Castle	Drawn by: Jayadev Prabhu K	App'd:	
Code: TIA-222-H	Date: 01/03/19	Scale: NTS	
Path:		Dwg No. E-5	

Feed Line Distribution Chart
0' - 180'

_____ Round _____ Flat _____ App In Face _____ App Out Face _____ Truss Leg



B+T Group
1717 S, Boulder, Suite 300
Tulsa, OK 74119
Phone: (918) 587-4630
FAX: (918) 295-0265

Job: 85773.005.01 - Shoreline Sanitation, CT (BU# 87633			
Project:			
Client: Crown Castle	Drawn by: Jayadev Prabhu K	App'd:	
Code: TIA-222-H	Date: 01/03/19	Scale: NTS	
Path:		Dwg No. E-7	

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in New London County, Connecticut.
Tower base elevation above sea level: 173.000 ft.
Basic wind speed of 135 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.000 ft.
Nominal ice thickness of 1.500 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
TIA-222-H Annex S.
TOWER RATING: 80.2%.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	180.000-175.000	5.000	P24x0.25	A53-B-42 (42 ksi)	
L2	175.000-170.000	5.000	P24x0.25	A53-B-42 (42 ksi)	
L3	170.000-165.000	5.000	P24x0.25	A53-B-42 (42 ksi)	
L4	165.000-160.000	5.000	P24x0.25	A53-B-42 (42 ksi)	
L5	160.000-155.000	5.000	P24x0.25	A53-B-42 (42 ksi)	
L6	155.000-150.000	5.000	P24x0.25	A53-B-42 (42 ksi)	
L7	150.000-145.000	5.000	P30x0.375	A53-B-42 (42 ksi)	
L8	145.000-140.000	5.000	P30x0.375	A53-B-42 (42 ksi)	
L9	140.000-135.000	5.000	P30x0.375	A53-B-42 (42 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L10	135.000-130.000	5.000	P30x0.375	A53-B-42 (42 ksi)	
L11	130.000-125.000	5.000	P30x0.375	A53-B-42 (42 ksi)	
L12	125.000-120.000	5.000	P30x0.375	A53-B-42 (42 ksi)	
L13	120.000-115.000	5.000	P36x0.375	A53-B-42 (42 ksi)	
L14	115.000-110.000	5.000	P36x0.375	A53-B-42 (42 ksi)	
L15	110.000-107.583	2.417	P36x0.375	A53-B-42 (42 ksi)	
L16	107.583-107.333	0.250	P36x0.525	A53-B-42 (42 ksi)	
L17	107.333-102.333	5.000	P36x0.525	A53-B-42 (42 ksi)	
L18	102.333-97.333	5.000	P36x0.525	A53-B-42 (42 ksi)	
L19	97.333-92.333	5.000	P36x0.525	A53-B-42 (42 ksi)	
L20	92.333-90.000	2.333	P36x0.525	A53-B-42 (42 ksi)	
L21	90.000-89.750	0.250	P42x0.6125	A53-B-42 (42 ksi)	
L22	89.750-84.750	5.000	P42x0.6125	A53-B-42 (42 ksi)	
L23	84.750-79.750	5.000	P42x0.6125	A53-B-42 (42 ksi)	
L24	79.750-74.750	5.000	P42x0.6125	A53-B-42 (42 ksi)	
L25	74.750-69.750	5.000	P42x0.6125	A53-B-42 (42 ksi)	
L26	69.750-64.750	5.000	P42x0.6125	A53-B-42 (42 ksi)	
L27	64.750-60.000	4.750	P42x0.6125	A53-B-42 (42 ksi)	
L28	60.000-59.750	0.250	P48x0.5	A53-B-42 (42 ksi)	
L29	59.750-54.750	5.000	P48x0.5	A53-B-42 (42 ksi)	
L30	54.750-49.750	5.000	P48x0.5	A53-B-42 (42 ksi)	
L31	49.750-46.583	3.167	P48x0.5	A53-B-42 (42 ksi)	
L32	46.583-46.333	0.250	P48x0.675	A53-B-42 (42 ksi)	
L33	46.333-41.333	5.000	P48x0.675	A53-B-42 (42 ksi)	
L34	41.333-36.333	5.000	P48x0.675	A53-B-42 (42 ksi)	
L35	36.333-31.333	5.000	P48x0.675	A53-B-42 (42 ksi)	
L36	31.333-30.000	1.333	P48x0.675	A53-B-42 (42 ksi)	
L37	30.000-29.750	0.250	P48x0.7125	A53-B-42 (42 ksi)	
L38	29.750-24.750	5.000	P48x0.7125	A53-B-42 (42 ksi)	
L39	24.750-19.750	5.000	P48x0.7125	A53-B-42 (42 ksi)	
L40	19.750-14.750	5.000	P48x0.7125	A53-B-42	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L41	14.750-9.750	5.000	P48x0.7125	A53-B-42 (42 ksi)	
L42	9.750-4.750	5.000	P48x0.7125	A53-B-42 (42 ksi)	
L43	4.750-0.000	4.750	P48x0.7125	A53-B-42 (42 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	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
L1 180.000-175.000				1	1	1			
L2 175.000-170.000				1	1	1			
L3 170.000-165.000				1	1	1			
L4 165.000-160.000				1	1	1			
L5 160.000-155.000				1	1	1			
L6 155.000-150.000				1	1	1			
L7 150.000-145.000				1	1	1			
L8 145.000-140.000				1	1	1			
L9 140.000-135.000				1	1	1			
L10 135.000-130.000				1	1	1			
L11 130.000-125.000				1	1	1			
L12 125.000-120.000				1	1	1			
L13 120.000-115.000				1	1	1			
L14 115.000-110.000				1	1	1			
L15 110.000-107.583				1	1	1			

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	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft^2	in					in	in	in
L16 107.583-107.333				1	1	1.007			
L17 107.333-102.333				1	1	1.007			
L18 102.333-97.333				1	1	1.007			
L19 97.333-92.333				1	1	1.007			
L20 92.333-90.000				1	1	1.007			
L21 90.000-89.750				1	1	1.00451			
L22 89.750-84.750				1	1	1.00451			
L23 84.750-79.750				1	1	1.00451			
L24 79.750-74.750				1	1	1.00451			
L25 74.750-69.750				1	1	1.00451			
L26 69.750-64.750				1	1	1.00451			
L27 64.750-60.000				1	1	1.00451			
L28 60.000-59.750				1	1	1			
L29 59.750-54.750				1	1	1			
L30 54.750-49.750				1	1	1			
L31 49.750-46.583				1	1	1			
L32 46.583-46.333				1	1	0.996678			
L33 46.333-41.333				1	1	0.996678			
L34 41.333-36.333				1	1	0.996678			
L35 36.333-31.333				1	1	0.996678			
L36 31.333-30.000				1	1	0.996678			
L37 30.000-29.750				1	1	0.997404			
L38 29.750-24.750				1	1	0.997404			
L39 24.750-19.750				1	1	0.997404			
L40 19.750-14.750				1	1	0.997404			
L41 14.750-9.750				1	1	0.997404			
L42 9.750-4.750				1	1	0.997404			
L43 4.750-0.000				1	1	0.997404			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
JD										
LDF5-50A(7/8) (E)	A	No	Surface Af (CaAa)	118.000 - 0.000	1	1	-0.120 -0.100	0.000	2.180	0.000
JD										
Safety Line 3/8 (E)	C	No	Surface Af (CaAa)	180.000 - 0.000	1	1	0.000 0.000	0.000	0.750	0.000
JD										
MP3-08 (E-Mod)	C	No	Surface Af (CaAa)	30.000 - 0.000	1	1	0.000 0.000	7.933	21.472	0.000
MP3-06 (E-Mod)	C	No	Surface Af (CaAa)	50.500 - 30.000	1	1	0.000 0.000	6.890	18.992	0.000
MP3-08 (E-Mod)	C	No	Surface Af (CaAa)	90.000 - 60.000	1	1	0.000 0.000	0.000	0.000	0.000
MP3-05 (E-Mod)	C	No	Surface Af (CaAa)	110.500 - 90.000	1	1	0.000 0.000	5.330	14.840	0.000
JD										
MP3-08 (E-Mod)	A	No	Surface Af (CaAa)	30.000 - 0.000	1	1	0.000 0.000	0.000	0.000	0.000
MP3-06 (E-Mod)	A	No	Surface Af (CaAa)	50.500 - 30.000	1	1	0.000 0.000	0.000	0.000	0.000
MP3-08 (E-Mod)	A	No	Surface Af (CaAa)	90.000 - 60.000	1	1	0.000 0.000	0.000	0.000	0.000
MP3-05 (E-Mod)	A	No	Surface Af (CaAa)	110.500 - 90.000	1	1	0.000 0.000	0.000	0.000	0.000
JD										
JD										
JD										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HB114-1-08U4-M5J (1-1/4) (E)	C	No	No	Inside Pole	177.000 - 0.000	3	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
HB114-21U3M12-XXXF(1-1/4) (E)	C	No	No	Inside Pole	177.000 - 0.000	1	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
JD 561(1-5/8) (P)	B	No	No	Inside Pole	161.000 - 0.000	6	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
HB158-1-08U8-S8F 18(1-5/8) (P)	B	No	No	Inside Pole	161.000 - 0.000	2	No Ice	0.000	0.002
							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002
							2" Ice	0.000	0.002

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
JD FXL 1873 PE(1-5/8) (E)	C	No	No	Inside Pole	151.000 - 0.000	6	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
JD LDF4-50A(1/2) (E)	C	No	No	Inside Pole	136.000 - 0.000	1	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
JD LDF4-50A(1/2) (E)	C	No	No	Inside Pole	101.000 - 0.000	1	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
JD									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	180.000-175.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.010
L2	175.000-170.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.023
L3	170.000-165.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.023
L4	165.000-160.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.012
		C	0.000	0.000	0.000	0.000	0.023
L5	160.000-155.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.023
L6	155.000-150.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.027
L7	150.000-145.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.043
L8	145.000-140.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.043
L9	140.000-135.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.044
L10	135.000-130.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.044
L11	130.000-125.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	0.000	0.044
L12	125.000-120.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.044
L13	120.000-115.000	A	0.000	0.000	0.000	0.000	0.001
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.044
L14	115.000-110.000	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.444	0.000	0.044
L15	110.000-107.583	A	0.000	0.000	0.000	0.000	0.001
		B	0.000	0.000	0.000	0.000	0.028
		C	0.000	0.000	2.147	0.000	0.021
L16	107.583-107.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.003
		C	0.000	0.000	0.222	0.000	0.002
L17	107.333-102.333	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	4.442	0.000	0.044
L18	102.333-97.333	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	4.442	0.000	0.045
L19	97.333-92.333	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	4.442	0.000	0.045
L20	92.333-90.000	A	0.000	0.000	0.000	0.000	0.001
		B	0.000	0.000	0.000	0.000	0.027
		C	0.000	0.000	2.072	0.000	0.021
L21	90.000-89.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.003
		C	0.000	0.000	0.000	0.000	0.002
L22	89.750-84.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.045
L23	84.750-79.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.045
L24	79.750-74.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.045
L25	74.750-69.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.045
L26	69.750-64.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.045
L27	64.750-60.000	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.055
		C	0.000	0.000	0.000	0.000	0.043
L28	60.000-59.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.003
		C	0.000	0.000	0.000	0.000	0.002
L29	59.750-54.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.000	0.000	0.045
L30	54.750-49.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	0.861	0.000	0.045
L31	49.750-46.583	A	0.000	0.000	0.000	0.000	0.001
		B	0.000	0.000	0.000	0.000	0.036
		C	0.000	0.000	3.637	0.000	0.029

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L32	46.583-46.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.003
		C	0.000	0.000	0.287	0.000	0.002
L33	46.333-41.333	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	5.742	0.000	0.045
L34	41.333-36.333	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	5.742	0.000	0.045
L35	36.333-31.333	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	5.742	0.000	0.045
L36	31.333-30.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.015
		C	0.000	0.000	1.531	0.000	0.012
L37	30.000-29.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.003
		C	0.000	0.000	0.331	0.000	0.002
L38	29.750-24.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	6.611	0.000	0.045
L39	24.750-19.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	6.611	0.000	0.045
L40	19.750-14.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	6.611	0.000	0.045
L41	14.750-9.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	6.611	0.000	0.045
L42	9.750-4.750	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.058
		C	0.000	0.000	6.611	0.000	0.045
L43	4.750-0.000	A	0.000	0.000	0.000	0.000	0.002
		B	0.000	0.000	0.000	0.000	0.055
		C	0.000	0.000	6.280	0.000	0.043

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_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	180.000-175.000	A	1.509	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	1.509	0.000	0.029
L2	175.000-170.000	A	1.504	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	1.504	0.000	0.042
L3	170.000-165.000	A	1.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	1.500	0.000	0.042
L4	165.000-160.000	A	1.495	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.012
		C		0.000	0.000	1.495	0.000	0.042
L5	160.000-155.000	A	1.491	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.491	0.000	0.042
L6	155.000-150.000	A	1.486	0.000	0.000	0.000	0.000	0.000

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.486	0.000	0.046
L7	150.000-145.000	A	1.481	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.481	0.000	0.062
L8	145.000-140.000	A	1.476	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.476	0.000	0.062
L9	140.000-135.000	A	1.471	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.471	0.000	0.062
L10	135.000-130.000	A	1.465	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.465	0.000	0.062
L11	130.000-125.000	A	1.460	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.460	0.000	0.062
L12	125.000-120.000	A	1.454	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.454	0.000	0.062
L13	120.000-115.000	A	1.448	0.000	0.000	0.869	0.000	0.014
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.448	0.000	0.062
L14	115.000-110.000	A	1.441	0.000	0.000	1.586	0.000	0.025
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	2.030	0.000	0.067
L15	110.000-107.583	A	1.437	0.000	0.000	1.389	0.000	0.018
		B		0.000	0.000	0.000	0.000	0.028
		C		0.000	0.000	3.536	0.000	0.057
L16	107.583-107.333	A	1.435	0.000	0.000	0.143	0.000	0.002
		B		0.000	0.000	0.000	0.000	0.003
		C		0.000	0.000	0.366	0.000	0.006
L17	107.333-102.333	A	1.431	0.000	0.000	2.862	0.000	0.038
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	7.304	0.000	0.118
L18	102.333-97.333	A	1.424	0.000	0.000	2.848	0.000	0.038
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	7.290	0.000	0.118
L19	97.333-92.333	A	1.417	0.000	0.000	2.834	0.000	0.037
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	7.276	0.000	0.118
L20	92.333-90.000	A	1.411	0.000	0.000	1.317	0.000	0.017
		B		0.000	0.000	0.000	0.000	0.027
		C		0.000	0.000	3.390	0.000	0.055
L21	90.000-89.750	A	1.409	0.000	0.000	0.141	0.000	0.002
		B		0.000	0.000	0.000	0.000	0.003
		C		0.000	0.000	0.141	0.000	0.004
L22	89.750-84.750	A	1.405	0.000	0.000	2.810	0.000	0.037
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	2.810	0.000	0.076
L23	84.750-79.750	A	1.397	0.000	0.000	2.794	0.000	0.036
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	2.794	0.000	0.076
L24	79.750-74.750	A	1.388	0.000	0.000	2.776	0.000	0.036
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	2.776	0.000	0.075
L25	74.750-69.750	A	1.379	0.000	0.000	2.758	0.000	0.035
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	2.758	0.000	0.075
L26	69.750-64.750	A	1.369	0.000	0.000	2.738	0.000	0.035
		B		0.000	0.000	0.000	0.000	0.058

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		0.000	0.000	2.738	0.000	0.075
L27	64.750-60.000	A	1.359	0.000	0.000	2.582	0.000	0.033
		B		0.000	0.000	0.000	0.000	0.055
		C		0.000	0.000	2.582	0.000	0.070
L28	60.000-59.750	A	1.353	0.000	0.000	0.068	0.000	0.001
		B		0.000	0.000	0.000	0.000	0.003
		C		0.000	0.000	0.068	0.000	0.003
L29	59.750-54.750	A	1.347	0.000	0.000	1.347	0.000	0.021
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	1.347	0.000	0.060
L30	54.750-49.750	A	1.335	0.000	0.000	1.535	0.000	0.022
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	2.396	0.000	0.069
L31	49.750-46.583	A	1.324	0.000	0.000	1.677	0.000	0.021
		B		0.000	0.000	0.000	0.000	0.036
		C		0.000	0.000	5.312	0.000	0.077
L32	46.583-46.333	A	1.319	0.000	0.000	0.132	0.000	0.002
		B		0.000	0.000	0.000	0.000	0.003
		C		0.000	0.000	0.419	0.000	0.006
L33	46.333-41.333	A	1.312	0.000	0.000	2.623	0.000	0.033
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	8.362	0.000	0.121
L34	41.333-36.333	A	1.296	0.000	0.000	2.592	0.000	0.032
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	8.333	0.000	0.119
L35	36.333-31.333	A	1.278	0.000	0.000	2.556	0.000	0.031
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	8.298	0.000	0.118
L36	31.333-30.000	A	1.266	0.000	0.000	0.675	0.000	0.008
		B		0.000	0.000	0.000	0.000	0.015
		C		0.000	0.000	2.206	0.000	0.031
L37	30.000-29.750	A	1.262	0.000	0.000	0.126	0.000	0.002
		B		0.000	0.000	0.000	0.000	0.003
		C		0.000	0.000	0.457	0.000	0.006
L38	29.750-24.750	A	1.251	0.000	0.000	2.502	0.000	0.030
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	9.112	0.000	0.122
L39	24.750-19.750	A	1.226	0.000	0.000	2.451	0.000	0.029
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	9.062	0.000	0.120
L40	19.750-14.750	A	1.195	0.000	0.000	2.390	0.000	0.028
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	9.001	0.000	0.118
L41	14.750-9.750	A	1.155	0.000	0.000	2.309	0.000	0.026
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	8.920	0.000	0.115
L42	9.750-4.750	A	1.096	0.000	0.000	2.191	0.000	0.024
		B		0.000	0.000	0.000	0.000	0.058
		C		0.000	0.000	8.802	0.000	0.110
L43	4.750-0.000	A	0.980	0.000	0.000	1.862	0.000	0.019
		B		0.000	0.000	0.000	0.000	0.055
		C		0.000	0.000	8.142	0.000	0.096

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	180.000-175.000	0.000	0.000	0.000	1.224
L2	175.000-170.000	0.000	0.000	0.000	1.222
L3	170.000-165.000	0.000	0.000	0.000	1.219
L4	165.000-160.000	0.000	0.000	0.000	1.216
L5	160.000-155.000	0.000	0.000	0.000	1.213
L6	155.000-150.000	0.000	0.000	0.000	1.210
L7	150.000-145.000	0.000	0.000	0.000	1.252
L8	145.000-140.000	0.000	0.000	0.000	1.249
L9	140.000-135.000	0.000	0.000	0.000	1.245
L10	135.000-130.000	0.000	0.000	0.000	1.241
L11	130.000-125.000	0.000	0.000	0.000	1.237
L12	125.000-120.000	0.000	0.000	0.000	1.233
L13	120.000-115.000	0.000	0.000	-0.754	1.147
L14	115.000-110.000	0.000	0.896	-1.279	1.469
L15	110.000-107.583	0.000	6.293	-1.672	4.148
L16	107.583-107.333	0.000	6.293	-1.671	4.148
L17	107.333-102.333	0.000	6.293	-1.668	4.147
L18	102.333-97.333	0.000	6.293	-1.661	4.146
L19	97.333-92.333	0.000	6.293	-1.655	4.145
L20	92.333-90.000	0.000	6.293	-1.650	4.143
L21	90.000-89.750	0.000	0.000	-2.017	1.502
L22	89.750-84.750	0.000	0.000	-2.013	1.498
L23	84.750-79.750	0.000	0.000	-2.004	1.492
L24	79.750-74.750	0.000	0.000	-1.995	1.485
L25	74.750-69.750	0.000	0.000	-1.985	1.477
L26	69.750-64.750	0.000	0.000	-1.974	1.469
L27	64.750-60.000	0.000	0.000	-1.963	1.461
L28	60.000-59.750	0.000	0.000	-1.207	1.068
L29	59.750-54.750	0.000	0.000	-1.202	1.064
L30	54.750-49.750	0.000	1.694	-1.284	1.845
L31	49.750-46.583	0.000	8.189	-1.668	5.284
L32	46.583-46.333	0.000	8.189	-1.663	5.283
L33	46.333-41.333	0.000	8.189	-1.655	5.282
L34	41.333-36.333	0.000	8.189	-1.639	5.279
L35	36.333-31.333	0.000	8.189	-1.620	5.275
L36	31.333-30.000	0.000	8.189	-1.607	5.272
L37	30.000-29.750	0.000	9.023	-1.566	5.763
L38	29.750-24.750	0.000	9.023	-1.554	5.761
L39	24.750-19.750	0.000	9.023	-1.528	5.757
L40	19.750-14.750	0.000	9.023	-1.496	5.751
L41	14.750-9.750	0.000	9.023	-1.454	5.744
L42	9.750-4.750	0.000	9.023	-1.391	5.732
L43	4.750-0.000	0.000	9.023	-1.264	5.710

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	15	Safety Line 3/8	175.00 - 180.00	1.0000	1.0000
L2	15	Safety Line 3/8	170.00 - 175.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L3	15	Safety Line 3/8	165.00 - 170.00	1.0000	1.0000
L4	15	Safety Line 3/8	160.00 - 165.00	1.0000	1.0000
L5	15	Safety Line 3/8	155.00 - 160.00	1.0000	1.0000
L6	15	Safety Line 3/8	150.00 - 155.00	1.0000	1.0000
L7	15	Safety Line 3/8	145.00 - 150.00	1.0000	1.0000
L8	15	Safety Line 3/8	140.00 - 145.00	1.0000	1.0000
L9	15	Safety Line 3/8	135.00 - 140.00	1.0000	1.0000
L10	15	Safety Line 3/8	130.00 - 135.00	1.0000	1.0000
L11	15	Safety Line 3/8	125.00 - 130.00	1.0000	1.0000
L12	15	Safety Line 3/8	120.00 - 125.00	1.0000	1.0000
L13	11	LDF5-50A(7/8)	115.00 - 118.00	1.0000	1.0000
L13	15	Safety Line 3/8	115.00 - 120.00	1.0000	1.0000
L14	11	LDF5-50A(7/8)	110.00 - 115.00	1.0000	1.0000
L14	15	Safety Line 3/8	110.00 - 115.00	1.0000	1.0000
L14	20	MP3-05	110.00 - 110.50	1.0000	1.0000
L14	25	MP3-05	110.00 - 110.50	1.0000	1.0000
L15	11	LDF5-50A(7/8)	107.58 - 110.00	1.0000	1.0000
L15	15	Safety Line 3/8	107.58 - 110.00	1.0000	1.0000
L15	20	MP3-05	107.58 - 110.00	1.0000	1.0000
L15	25	MP3-05	107.58 - 110.00	1.0000	1.0000
L16	11	LDF5-50A(7/8)	107.33 - 107.58	1.0000	1.0000
L16	15	Safety Line 3/8	107.33 - 107.58	1.0000	1.0000
L16	20	MP3-05	107.33 - 107.58	1.0000	1.0000
L16	25	MP3-05	107.33 - 107.58	1.0000	1.0000
L17	11	LDF5-50A(7/8)	102.33 - 107.33	1.0000	1.0000
L17	15	Safety Line 3/8	102.33 - 107.33	1.0000	1.0000
L17	20	MP3-05	102.33 - 107.33	1.0000	1.0000
L17	25	MP3-05	102.33 - 107.33	1.0000	1.0000
L18	11	LDF5-50A(7/8)	97.33 - 102.33	1.0000	1.0000
L18	15	Safety Line 3/8	97.33 - 102.33	1.0000	1.0000
L18	20	MP3-05	97.33 - 102.33	1.0000	1.0000
L18	25	MP3-05	97.33 - 102.33	1.0000	1.0000
L19	11	LDF5-50A(7/8)	92.33 - 97.33	1.0000	1.0000
L19	15	Safety Line 3/8	92.33 - 97.33	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L19	20	MP3-05	92.33 - 97.33	1.0000	1.0000
L19	25	MP3-05	92.33 - 97.33	1.0000	1.0000
L20	11	LDF5-50A(7/8)	90.00 - 92.33	1.0000	1.0000
L20	15	Safety Line 3/8	90.00 - 92.33	1.0000	1.0000
L20	20	MP3-05	90.00 - 92.33	1.0000	1.0000
L20	25	MP3-05	90.00 - 92.33	1.0000	1.0000
L21	11	LDF5-50A(7/8)	89.75 - 90.00	1.0000	1.0000
L21	15	Safety Line 3/8	89.75 - 90.00	1.0000	1.0000
L21	19	MP3-08	89.75 - 90.00	1.0000	1.0000
L21	24	MP3-08	89.75 - 90.00	1.0000	1.0000
L22	11	LDF5-50A(7/8)	84.75 - 89.75	1.0000	1.0000
L22	15	Safety Line 3/8	84.75 - 89.75	1.0000	1.0000
L22	19	MP3-08	84.75 - 89.75	1.0000	1.0000
L22	24	MP3-08	84.75 - 89.75	1.0000	1.0000
L23	11	LDF5-50A(7/8)	79.75 - 84.75	1.0000	1.0000
L23	15	Safety Line 3/8	79.75 - 84.75	1.0000	1.0000
L23	19	MP3-08	79.75 - 84.75	1.0000	1.0000
L23	24	MP3-08	79.75 - 84.75	1.0000	1.0000
L24	11	LDF5-50A(7/8)	74.75 - 79.75	1.0000	1.0000
L24	15	Safety Line 3/8	74.75 - 79.75	1.0000	1.0000
L24	19	MP3-08	74.75 - 79.75	1.0000	1.0000
L24	24	MP3-08	74.75 - 79.75	1.0000	1.0000
L25	11	LDF5-50A(7/8)	69.75 - 74.75	1.0000	1.0000
L25	15	Safety Line 3/8	69.75 - 74.75	1.0000	1.0000
L25	19	MP3-08	69.75 - 74.75	1.0000	1.0000
L25	24	MP3-08	69.75 - 74.75	1.0000	1.0000
L26	11	LDF5-50A(7/8)	64.75 - 69.75	1.0000	1.0000
L26	15	Safety Line 3/8	64.75 - 69.75	1.0000	1.0000
L26	19	MP3-08	64.75 - 69.75	1.0000	1.0000
L26	24	MP3-08	64.75 - 69.75	1.0000	1.0000
L27	11	LDF5-50A(7/8)	60.00 - 64.75	1.0000	1.0000
L27	15	Safety Line 3/8	60.00 - 64.75	1.0000	1.0000
L27	19	MP3-08	60.00 - 64.75	1.0000	1.0000
L27	24	MP3-08	60.00 - 64.75	1.0000	1.0000
L28	11	LDF5-50A(7/8)	59.75 - 60.00	1.0000	1.0000
L28	15	Safety Line 3/8	59.75 - 60.00	1.0000	1.0000
L29	11	LDF5-50A(7/8)	54.75 - 59.75	1.0000	1.0000
L29	15	Safety Line 3/8	54.75 - 59.75	1.0000	1.0000
L30	11	LDF5-50A(7/8)	49.75 - 54.75	1.0000	1.0000
L30	15	Safety Line 3/8	49.75 - 54.75	1.0000	1.0000
L30	18	MP3-06	49.75 - 50.50	1.0000	1.0000
L30	23	MP3-06	49.75 - 50.50	1.0000	1.0000
L31	11	LDF5-50A(7/8)	46.58 - 49.75	1.0000	1.0000
L31	15	Safety Line 3/8	46.58 - 49.75	1.0000	1.0000
L31	18	MP3-06	46.58 - 49.75	1.0000	1.0000
L31	23	MP3-06	46.58 - 49.75	1.0000	1.0000
L32	11	LDF5-50A(7/8)	46.33 - 46.58	1.0000	1.0000
L32	15	Safety Line 3/8	46.33 - 46.58	1.0000	1.0000
L32	18	MP3-06	46.33 - 46.58	1.0000	1.0000
L32	23	MP3-06	46.33 - 46.58	1.0000	1.0000
L33	11	LDF5-50A(7/8)	41.33 - 46.33	1.0000	1.0000
L33	15	Safety Line 3/8	41.33 - 46.33	1.0000	1.0000
L33	18	MP3-06	41.33 - 46.33	1.0000	1.0000
L33	23	MP3-06	41.33 - 46.33	1.0000	1.0000
L34	11	LDF5-50A(7/8)	36.33 - 41.33	1.0000	1.0000
L34	15	Safety Line 3/8	36.33 - 41.33	1.0000	1.0000
L34	18	MP3-06	36.33 - 41.33	1.0000	1.0000
L34	23	MP3-06	36.33 - 41.33	1.0000	1.0000
L35	11	LDF5-50A(7/8)	31.33 - 36.33	1.0000	1.0000
L35	15	Safety Line 3/8	31.33 - 36.33	1.0000	1.0000
L35	18	MP3-06	31.33 - 36.33	1.0000	1.0000
L35	23	MP3-06	31.33 - 36.33	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L36	11	LDF5-50A(7/8)	30.00 - 31.33	1.0000	1.0000
L36	15	Safety Line 3/8	30.00 - 31.33	1.0000	1.0000
L36	18	MP3-06	30.00 - 31.33	1.0000	1.0000
L36	23	MP3-06	30.00 - 31.33	1.0000	1.0000
L37	11	LDF5-50A(7/8)	29.75 - 30.00	1.0000	1.0000
L37	15	Safety Line 3/8	29.75 - 30.00	1.0000	1.0000
L37	17	MP3-08	29.75 - 30.00	1.0000	1.0000
L37	22	MP3-08	29.75 - 30.00	1.0000	1.0000
L38	11	LDF5-50A(7/8)	24.75 - 29.75	1.0000	1.0000
L38	15	Safety Line 3/8	24.75 - 29.75	1.0000	1.0000
L38	17	MP3-08	24.75 - 29.75	1.0000	1.0000
L38	22	MP3-08	24.75 - 29.75	1.0000	1.0000
L39	11	LDF5-50A(7/8)	19.75 - 24.75	1.0000	1.0000
L39	15	Safety Line 3/8	19.75 - 24.75	1.0000	1.0000
L39	17	MP3-08	19.75 - 24.75	1.0000	1.0000
L39	22	MP3-08	19.75 - 24.75	1.0000	1.0000
L40	11	LDF5-50A(7/8)	14.75 - 19.75	1.0000	1.0000
L40	15	Safety Line 3/8	14.75 - 19.75	1.0000	1.0000
L40	17	MP3-08	14.75 - 19.75	1.0000	1.0000
L40	22	MP3-08	14.75 - 19.75	1.0000	1.0000
L41	11	LDF5-50A(7/8)	9.75 - 14.75	1.0000	1.0000
L41	15	Safety Line 3/8	9.75 - 14.75	1.0000	1.0000
L41	17	MP3-08	9.75 - 14.75	1.0000	1.0000
L41	22	MP3-08	9.75 - 14.75	1.0000	1.0000
L42	11	LDF5-50A(7/8)	4.75 - 9.75	1.0000	1.0000
L42	15	Safety Line 3/8	4.75 - 9.75	1.0000	1.0000
L42	17	MP3-08	4.75 - 9.75	1.0000	1.0000
L42	22	MP3-08	4.75 - 9.75	1.0000	1.0000
L43	11	LDF5-50A(7/8)	0.00 - 4.75	1.0000	1.0000
L43	15	Safety Line 3/8	0.00 - 4.75	1.0000	1.0000
L43	17	MP3-08	0.00 - 4.75	1.0000	1.0000
L43	22	MP3-08	0.00 - 4.75	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVSPP18-C-A20 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 2.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice	8.262 8.822 9.346 10.418	6.946 8.127 9.021 10.844	0.083 0.151 0.227 0.406
APXVSPP18-C-A20 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 2.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice	8.262 8.822 9.346 10.418	6.946 8.127 9.021 10.844	0.083 0.151 0.227 0.406
APXVSPP18-C-A20 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 2.000	0.000	177.000	No Ice 1/2" Ice 1" Ice 2" Ice	8.262 8.822 9.346 10.418	6.946 8.127 9.021 10.844	0.083 0.151 0.227 0.406
APXVTM14-C-120 w/	A	From Leg	4.000	0.000	177.000	No Ice	6.580	4.959	0.077

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.000				1/2" Ice	7.031	5.754	0.131
(E)			2.000				1" Ice	7.473	6.472	0.193
							2" Ice	8.385	7.941	0.338
APXVTM14-C-120 w/	B	From Leg	4.000		0.000	177.000	No Ice	6.580	4.959	0.077
Mount Pipe			0.000				1/2" Ice	7.031	5.754	0.131
(E)			2.000				1" Ice	7.473	6.472	0.193
							2" Ice	8.385	7.941	0.338
APXVTM14-C-120 w/	C	From Leg	4.000		0.000	177.000	No Ice	6.580	4.959	0.077
Mount Pipe			0.000				1/2" Ice	7.031	5.754	0.131
(E)			2.000				1" Ice	7.473	6.472	0.193
							2" Ice	8.385	7.941	0.338
TME-PCS 1900MHZ	A	From Leg	4.000		0.000	177.000	No Ice	2.322	2.238	0.060
4X45W-65MHZ			0.000				1/2" Ice	2.527	2.441	0.083
(E)			2.000				1" Ice	2.739	2.651	0.110
							2" Ice	3.185	3.093	0.173
TME-PCS 1900MHZ	B	From Leg	4.000		0.000	177.000	No Ice	2.322	2.238	0.060
4X45W-65MHZ			0.000				1/2" Ice	2.527	2.441	0.083
(E)			2.000				1" Ice	2.739	2.651	0.110
							2" Ice	3.185	3.093	0.173
TME-PCS 1900MHZ	C	From Leg	4.000		0.000	177.000	No Ice	2.322	2.238	0.060
4X45W-65MHZ			0.000				1/2" Ice	2.527	2.441	0.083
(E)			2.000				1" Ice	2.739	2.651	0.110
							2" Ice	3.185	3.093	0.173
800MHZ 2X50W RRH	A	From Leg	4.000		0.000	177.000	No Ice	2.058	1.932	0.064
W/FILTER			0.000				1/2" Ice	2.240	2.109	0.086
(E)			2.000				1" Ice	2.429	2.293	0.111
							2" Ice	2.829	2.684	0.172
800MHZ 2X50W RRH	B	From Leg	4.000		0.000	177.000	No Ice	2.058	1.932	0.064
W/FILTER			0.000				1/2" Ice	2.240	2.109	0.086
(E)			2.000				1" Ice	2.429	2.293	0.111
							2" Ice	2.829	2.684	0.172
800MHZ 2X50W RRH	C	From Leg	4.000		0.000	177.000	No Ice	2.058	1.932	0.064
W/FILTER			0.000				1/2" Ice	2.240	2.109	0.086
(E)			2.000				1" Ice	2.429	2.293	0.111
							2" Ice	2.829	2.684	0.172
PCS 1900MHZ	A	From Leg	4.000		0.000	177.000	No Ice	2.322	2.238	0.060
4X45W-65MHZ			0.000				1/2" Ice	2.527	2.441	0.083
(E)			2.000				1" Ice	2.739	2.651	0.110
							2" Ice	3.185	3.093	0.173
PCS 1900MHZ	B	From Leg	4.000		0.000	177.000	No Ice	2.322	2.238	0.060
4X45W-65MHZ			0.000				1/2" Ice	2.527	2.441	0.083
(E)			2.000				1" Ice	2.739	2.651	0.110
							2" Ice	3.185	3.093	0.173
PCS 1900MHZ	C	From Leg	4.000		0.000	177.000	No Ice	2.322	2.238	0.060
4X45W-65MHZ			0.000				1/2" Ice	2.527	2.441	0.083
(E)			2.000				1" Ice	2.739	2.651	0.110
							2" Ice	3.185	3.093	0.173
TD-RRH8X20-25	A	From Leg	4.000		0.000	177.000	No Ice	4.045	1.535	0.070
(E)			0.000				1/2" Ice	4.298	1.714	0.097
			2.000				1" Ice	4.557	1.901	0.128
							2" Ice	5.098	2.295	0.201
TD-RRH8X20-25	B	From Leg	4.000		0.000	177.000	No Ice	4.045	1.535	0.070
(E)			0.000				1/2" Ice	4.298	1.714	0.097
			2.000				1" Ice	4.557	1.901	0.128
							2" Ice	5.098	2.295	0.201
TD-RRH8X20-25	C	From Leg	4.000		0.000	177.000	No Ice	4.045	1.535	0.070
(E)			0.000				1/2" Ice	4.298	1.714	0.097

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.000				1" Ice	4.557	1.901	0.128
							2" Ice	5.098	2.295	0.201
4' x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	0.000	177.000	No Ice	0.785	0.785	0.029
			0.000				1/2" Ice	1.028	1.028	0.035
			0.000				1" Ice	1.281	1.281	0.044
							2" Ice	1.814	1.814	0.072
4' x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	0.000	177.000	No Ice	0.785	0.785	0.029
			0.000				1/2" Ice	1.028	1.028	0.035
			0.000				1" Ice	1.281	1.281	0.044
							2" Ice	1.814	1.814	0.072
4' x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	0.000	177.000	No Ice	0.785	0.785	0.029
			0.000				1/2" Ice	1.028	1.028	0.035
			0.000				1" Ice	1.281	1.281	0.044
							2" Ice	1.814	1.814	0.072
Platform Mount [LP 502-1] (E)	C	None			0.000	177.000	No Ice	32.347	32.347	0.925
							1/2" Ice	45.668	45.668	1.193
							1" Ice	58.988	58.988	1.460
							2" Ice	85.629	85.629	1.995
**JD*										
(2) SBNHH-1D65B w/ Mount Pipe (P)	A	From Leg	4.000	0.000	0.000	161.000	No Ice	8.397	7.071	0.066
			0.000				1/2" Ice	8.960	8.260	0.135
			0.000				1" Ice	9.490	9.170	0.212
							2" Ice	10.569	11.006	0.394
(2) SBNHH-1D65B w/ Mount Pipe (P)	B	From Leg	4.000	0.000	0.000	161.000	No Ice	8.397	7.071	0.066
			0.000				1/2" Ice	8.960	8.260	0.135
			0.000				1" Ice	9.490	9.170	0.212
							2" Ice	10.569	11.006	0.394
(2) SBNHH-1D65B w/ Mount Pipe (P)	C	From Leg	4.000	0.000	0.000	161.000	No Ice	8.397	7.071	0.066
			0.000				1/2" Ice	8.960	8.260	0.135
			0.000				1" Ice	9.490	9.170	0.212
							2" Ice	10.569	11.006	0.394
(2) LPA-80063/4CF-5 w/ Mount Pipe (P)	A	From Leg	4.000	0.000	0.000	161.000	No Ice	6.385	6.603	0.038
			0.000				1/2" Ice	6.784	7.232	0.104
			0.000				1" Ice	7.192	7.876	0.176
							2" Ice	8.035	9.214	0.344
(2) LPA-80080/4CF w/ Mount Pipe (P)	B	From Leg	4.000	0.000	0.000	161.000	No Ice	2.856	6.569	0.030
			0.000				1/2" Ice	3.220	7.195	0.076
			0.000				1" Ice	3.592	7.837	0.128
							2" Ice	4.337	9.170	0.253
(2) LPA-80080/4CF w/ Mount Pipe (P)	C	From Leg	4.000	0.000	0.000	161.000	No Ice	2.856	6.569	0.030
			0.000				1/2" Ice	3.220	7.195	0.076
			0.000				1" Ice	3.592	7.837	0.128
							2" Ice	4.337	9.170	0.253
(3) RRH2X60-700 (P)	A	From Leg	4.000	0.000	0.000	161.000	No Ice	3.500	1.816	0.060
			0.000				1/2" Ice	3.761	2.052	0.083
			0.000				1" Ice	4.029	2.289	0.109
							2" Ice	4.585	2.785	0.173
PCS B25 RRH4X30 (P)	A	From Leg	4.000	0.000	0.000	161.000	No Ice	2.200	1.742	0.055
			0.000				1/2" Ice	2.393	1.920	0.075
			0.000				1" Ice	2.593	2.106	0.099
							2" Ice	3.015	2.501	0.156
(2) PCS B25 RRH4X30 (P)	B	From Leg	4.000	0.000	0.000	161.000	No Ice	2.200	1.742	0.055
			0.000				1/2" Ice	2.393	1.920	0.075
			0.000				1" Ice	2.593	2.106	0.099
							2" Ice	3.015	2.501	0.156
(2) RRH4X45-AWS4 B66 (P)	B	From Leg	4.000	0.000	0.000	161.000	No Ice	2.660	1.586	0.064
			0.000				1/2" Ice	2.878	1.769	0.084

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			1" Ice	3.104	1.959	0.108
						2" Ice	3.577	2.359	0.165
RRH4X45-AWS4 B66 (P)	C	From Leg	4.000 0.000 0.000	0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.660 2.878 3.104 3.577	1.586 1.769 1.959 2.359	0.064 0.084 0.108 0.165
(2) RC3DC-3315-PF-48 (P)	C	From Leg	4.000 0.000 0.000	0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.792 4.044 4.303 4.844	2.512 2.725 2.945 3.414	0.032 0.063 0.099 0.181
(4) 8' x 2.375" Mount Pipe (P-RMQP-496-HK)	A	From Leg	4.000 0.000 0.000	0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.061 0.075 0.095 0.150
(4) 8' x 2.375" Mount Pipe (P-RMQP-496-HK)	B	From Leg	4.000 0.000 0.000	0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.061 0.075 0.095 0.150
(4) 8' x 2.375" Mount Pipe (P-RMQP-496-HK)	C	From Leg	4.000 0.000 0.000	0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.900 2.728 3.401 4.396	1.900 2.728 3.401 4.396	0.061 0.075 0.095 0.150
Platform Mount [LP 303-1] (P-RMQP-496-HK)	C	None		0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	14.660 18.870 23.080 31.500	14.660 18.870 23.080 31.500	1.250 1.481 1.713 2.175
Miscellaneous [NA 509-3] (P-RMQP-496-HK)	C	None		0.000	161.000	No Ice 1/2" Ice 1" Ice 2" Ice	11.840 16.960 22.080 32.320	11.840 16.960 22.080 32.320	0.275 0.296 0.317 0.360
JD									
800 10504 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.589 4.007 4.422 5.258	3.178 3.905 4.581 5.982	0.038 0.070 0.109 0.207
800 10504 w/ Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.589 4.007 4.422 5.258	3.178 3.905 4.581 5.982	0.038 0.070 0.109 0.207
800 10504 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.589 4.007 4.422 5.258	3.178 3.905 4.581 5.982	0.038 0.070 0.109 0.207
6' x 2" Mount Pipe (E)	A	From Leg	4.000 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.425 1.925 2.294 3.060	1.425 1.925 2.294 3.060	0.022 0.033 0.048 0.090
6' x 2" Mount Pipe (E)	B	From Leg	4.000 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.425 1.925 2.294 3.060	1.425 1.925 2.294 3.060	0.022 0.033 0.048 0.090
6' x 2" Mount Pipe (E)	C	From Leg	4.000 0.000 0.000	0.000	151.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.425 1.925 2.294 3.060	1.425 1.925 2.294 3.060	0.022 0.033 0.048 0.090
T-Arm Mount [TA 602-3] (E)	C	None		0.000	151.000	No Ice 1/2" Ice	11.590 15.440	11.590 15.440	0.774 0.990

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	19.290	19.290	1.206
						2" Ice	26.990	26.990	1.639
JD									
6812B-1 (E)	A	From Leg	1.000 0.000 0.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.200 0.220 0.240 0.280	0.200 0.220 0.240 0.280	0.003 0.006 0.010 0.017
Side Arm Mount [SO 701-1] (E)	A	From Leg	0.500 0.000 0.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.850 1.140 1.430 2.010	1.670 2.340 3.010 4.350	0.065 0.079 0.093 0.121
JD									
DB806-XT (E)	A	From Leg	1.000 0.000 3.000	0.000	118.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.140 1.675 2.025 2.753	1.140 1.675 2.025 2.753	0.021 0.030 0.043 0.080
Side Arm Mount [SO 701-1] (E)	A	From Leg	0.500 0.000 0.000	0.000	118.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.850 1.140 1.430 2.010	1.670 2.340 3.010 4.350	0.065 0.079 0.093 0.121
JD									
KS24019-L112A (E)	A	From Leg	1.000 0.000 0.000	0.000	101.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.141 0.198 0.262 0.415	0.141 0.198 0.262 0.415	0.005 0.007 0.009 0.018
Side Arm Mount [SO 701-1] (E)	A	From Leg	0.500 0.000 0.000	0.000	101.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.850 1.140 1.430 2.010	1.670 2.340 3.010 4.350	0.065 0.079 0.093 0.121
JD									
Bridge Stiffener (E)	A	From Leg	0.500 0.000 0.000	0.000	30.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.827 4.109 4.399 4.999	0.288 0.683 1.061 1.585	0.002 0.018 0.038 0.091
Bridge Stiffener (E)	B	From Leg	0.500 0.000 0.000	0.000	30.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.827 4.109 4.399 4.999	0.288 0.683 1.061 1.585	0.002 0.018 0.038 0.091
Bridge Stiffener (E)	C	From Leg	0.500 0.000 0.000	0.000	30.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.827 4.109 4.399 4.999	0.288 0.683 1.061 1.585	0.002 0.018 0.038 0.091
JD									
Bridge Stiffener (E)	A	From Leg	0.500 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.827 4.109 4.399 4.999	0.288 0.683 1.061 1.585	0.002 0.018 0.038 0.091
Bridge Stiffener (E)	B	From Leg	0.500 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.827 4.109 4.399 4.999	0.288 0.683 1.061 1.585	0.002 0.018 0.038 0.091
Bridge Stiffener (E)	C	From Leg	0.500 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.827 4.109 4.399 4.999	0.288 0.683 1.061 1.585	0.002 0.018 0.038 0.091
JD									
Bridge Stiffener	A	From Leg	0.500	0.000	90.000	No Ice	3.827	0.288	0.002

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(E)			0.000 0.000			1/2" Ice	4.109	0.683	0.018
						1" Ice	4.399	1.061	0.038
						2" Ice	4.999	1.585	0.091
Bridge Stiffener	B	From Leg	0.500	0.000	90.000	No Ice	3.827	0.288	0.002
(E)			0.000			1/2" Ice	4.109	0.683	0.018
			0.000			1" Ice	4.399	1.061	0.038
						2" Ice	4.999	1.585	0.091
Bridge Stiffener	C	From Leg	0.500	0.000	90.000	No Ice	3.827	0.288	0.002
(E)			0.000			1/2" Ice	4.109	0.683	0.018
			0.000			1" Ice	4.399	1.061	0.038
						2" Ice	4.999	1.585	0.091
JD									
Bridge Stiffener	A	From Leg	0.500	0.000	120.000	No Ice	3.827	0.288	0.002
(E)			0.000			1/2" Ice	4.109	0.683	0.018
			0.000			1" Ice	4.399	1.061	0.038
						2" Ice	4.999	1.585	0.091
Bridge Stiffener	B	From Leg	0.500	0.000	120.000	No Ice	3.827	0.288	0.002
(E)			0.000			1/2" Ice	4.109	0.683	0.018
			0.000			1" Ice	4.399	1.061	0.038
						2" Ice	4.999	1.585	0.091
Bridge Stiffener	C	From Leg	0.500	0.000	120.000	No Ice	3.827	0.288	0.002
(E)			0.000			1/2" Ice	4.109	0.683	0.018
			0.000			1" Ice	4.399	1.061	0.038
						2" Ice	4.999	1.585	0.091
JD									

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice

Comb. No.	Description
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 175	Pole	Max Tension	39	0.000	0.000	-0.000
			Max. Compression	26	-6.531	-0.001	-0.019
			Max. Mx	8	-2.578	-17.633	0.000
			Max. My	14	-2.570	-0.000	-17.642
			Max. Vy	8	5.583	-17.633	0.000
			Max. Vx	2	-5.587	-0.001	17.640
			Max. Torque	24			0.005
L2	175 - 170	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-7.193	-0.003	-0.035
			Max. Mx	8	-2.958	-46.433	0.002
			Max. My	14	-2.949	-0.001	-46.463
			Max. Vy	8	5.937	-46.433	0.002
			Max. Vx	2	-5.942	-0.003	46.460
			Max. Torque	24			0.005
L3	170 - 165	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-7.855	-0.005	-0.050
			Max. Mx	8	-3.342	-76.993	0.005
			Max. My	14	-3.333	-0.001	-77.047
			Max. Vy	8	6.287	-76.993	0.005
			Max. Vx	2	-6.292	-0.005	77.044
			Max. Torque	24			0.005
L4	165 - 160	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-17.547	-0.584	1.087
			Max. Mx	8	-7.247	-116.962	0.413

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-7.190	-0.587	117.262
			Max. Vy	8	13.733	-116.962	0.413
			Max. Vx	2	-14.124	-0.587	117.262
			Max. Torque	10			0.179
L5	160 - 155	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-18.276	-0.588	1.078
			Max. Mx	8	-7.733	-186.451	0.471
			Max. My	2	-7.676	-0.643	188.707
			Max. Vy	8	14.065	-186.451	0.471
			Max. Vx	2	-14.457	-0.643	188.707
			Max. Torque	10			0.179
L6	155 - 150	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-21.288	-0.591	1.065
			Max. Mx	8	-9.281	-258.876	0.529
			Max. My	2	-9.224	-0.699	263.093
			Max. Vy	8	15.702	-258.876	0.529
			Max. Vx	2	-16.096	-0.699	263.093
			Max. Torque	10			0.179
L7	150 - 145	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-22.425	-0.591	1.040
			Max. Mx	8	-10.115	-338.442	0.588
			Max. My	2	-10.059	-0.755	344.630
			Max. Vy	8	16.130	-338.442	0.588
			Max. Vx	2	-16.525	-0.755	344.630
			Max. Torque	10			0.179
L8	145 - 140	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-23.561	-0.591	1.016
			Max. Mx	8	-10.954	-420.132	0.646
			Max. My	2	-10.900	-0.812	428.294
			Max. Vy	8	16.549	-420.132	0.646
			Max. Vx	2	-16.945	-0.812	428.294
			Max. Torque	10			0.179
L9	140 - 135	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-24.828	-0.591	1.230
			Max. Mx	8	-11.879	-503.977	0.836
			Max. My	2	-11.829	-0.868	514.222
			Max. Vy	8	17.053	-503.977	0.836
			Max. Vx	2	-17.409	-0.868	514.222
			Max. Torque	20			-0.345
L10	135 - 130	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-25.963	-0.591	1.206
			Max. Mx	8	-12.744	-590.199	0.894
			Max. My	2	-12.696	-0.925	602.222
			Max. Vy	8	17.442	-590.199	0.894
			Max. Vx	2	-17.798	-0.925	602.222
			Max. Torque	20			-0.345
L11	130 - 125	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-27.096	-0.591	1.182
			Max. Mx	8	-13.621	-678.318	0.953
			Max. My	2	-13.576	-0.981	692.120
			Max. Vy	8	17.814	-678.318	0.953
			Max. Vx	2	-18.170	-0.981	692.120
			Max. Torque	20			-0.345
L12	125 - 120	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-28.227	-0.591	1.157
			Max. Mx	8	-14.513	-768.240	1.011
			Max. My	2	-14.470	-1.038	783.822
			Max. Vy	8	18.166	-768.240	1.011
			Max. Vx	2	-18.522	-1.038	783.822
			Max. Torque	20			-0.344
L13	120 - 115	Pole	Max Tension	1	0.000	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	26	-29.939	-0.570	1.533
			Max. Mx	8	-15.610	-861.916	1.268
			Max. My	2	-15.571	-1.092	879.381
			Max. Vy	8	18.985	-861.916	1.268
			Max. Vx	2	-19.303	-1.092	879.381
			Max. Torque	20			-0.654
L14	115 - 110	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-31.295	-0.532	1.508
			Max. Mx	8	-16.628	-957.887	1.326
			Max. My	2	-16.591	-1.145	976.940
			Max. Vy	8	19.413	-957.887	1.326
			Max. Vx	2	-19.730	-1.145	976.940
			Max. Torque	20			-0.653
L15	110 - 107.583	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-31.982	-0.506	1.462
			Max. Mx	8	-17.122	-1005.034	1.354
			Max. My	2	-17.086	-1.170	1024.855
			Max. Vy	8	19.615	-1005.034	1.354
			Max. Vx	2	-19.932	-1.170	1024.855
			Max. Torque	20			-0.653
L16	107.583 - 107.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-32.070	-0.503	1.457
			Max. Mx	8	-17.197	-1009.939	1.357
			Max. My	2	-17.162	-1.173	1029.839
			Max. Vy	8	19.631	-1009.939	1.357
			Max. Vx	2	-19.949	-1.173	1029.839
			Max. Torque	20			-0.653
L17	107.333 - 102.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-33.834	-0.449	1.362
			Max. Mx	8	-18.551	-1109.179	1.415
			Max. My	2	-18.517	-1.226	1130.668
			Max. Vy	8	20.071	-1109.179	1.415
			Max. Vx	2	-20.389	-1.226	1130.668
			Max. Torque	20			-0.653
L18	102.333 - 97.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-35.728	-0.395	1.538
			Max. Mx	8	-19.998	-1210.874	1.634
			Max. My	2	-19.968	-1.279	1233.986
			Max. Vy	8	20.577	-1210.874	1.634
			Max. Vx	2	-20.857	-1.279	1233.986
			Max. Torque	20			-0.818
L19	97.333 - 92.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-37.488	-0.342	1.445
			Max. Mx	8	-21.375	-1314.723	1.691
			Max. My	2	-21.346	-1.331	1339.237
			Max. Vy	8	20.975	-1314.723	1.691
			Max. Vx	2	-21.255	-1.331	1339.237
			Max. Torque	20			-0.818
L20	92.333 - 90	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-38.308	-0.317	1.401
			Max. Mx	8	-22.019	-1363.847	1.718
			Max. My	2	-21.991	-1.356	1389.016
			Max. Vy	8	21.155	-1363.847	1.718
			Max. Vx	2	-21.435	-1.356	1389.016
			Max. Torque	20			-0.818
L21	90 - 89.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-38.599	-0.314	1.400

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	8	-22.113	-1369.191	1.721
			Max. My	2	-22.086	-1.359	1394.430
			Max. Vy	8	21.391	-1369.191	1.721
			Max. Vx	2	-21.671	-1.359	1394.430
			Max. Torque	20			-0.817
L22	89.75 - 84.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-40.796	-0.252	1.368
			Max. Mx	8	-23.890	-1477.360	1.777
			Max. My	2	-23.864	-1.411	1504.001
			Max. Vy	8	21.883	-1477.360	1.777
			Max. Vx	2	-22.164	-1.411	1504.001
			Max. Torque	20			-0.817
L23	84.75 - 79.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-42.990	-0.192	1.337
			Max. Mx	8	-25.677	-1587.928	1.834
			Max. My	2	-25.652	-1.463	1615.974
			Max. Vy	8	22.355	-1587.928	1.834
			Max. Vx	2	-22.635	-1.463	1615.974
			Max. Torque	20			-0.817
L24	79.75 - 74.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-45.181	-0.132	1.306
			Max. Mx	8	-27.470	-1700.798	1.890
			Max. My	2	-27.445	-1.515	1730.248
			Max. Vy	8	22.805	-1700.798	1.890
			Max. Vx	2	-23.086	-1.515	1730.248
			Max. Torque	20			-0.817
L25	74.75 - 69.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-47.368	-0.072	1.275
			Max. Mx	8	-29.269	-1815.864	1.947
			Max. My	2	-29.246	-1.567	1846.719
			Max. Vy	8	23.235	-1815.864	1.947
			Max. Vx	2	-23.515	-1.567	1846.719
			Max. Torque	20			-0.817
L26	69.75 - 64.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-49.552	-0.014	1.245
			Max. Mx	8	-31.075	-1933.015	2.002
			Max. My	2	-31.053	-1.619	1965.272
			Max. Vy	8	23.641	-1933.015	2.002
			Max. Vx	2	-23.921	-1.619	1965.272
			Max. Torque	20			-0.817
L27	64.75 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-51.624	0.041	1.217
			Max. Mx	8	-32.795	-2046.130	2.055
			Max. My	2	-32.775	-1.668	2079.717
			Max. Vy	8	24.006	-2046.130	2.055
			Max. Vx	2	-24.285	-1.668	2079.717
			Max. Torque	20			-0.817
L28	60 - 59.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-51.900	0.043	1.216
			Max. Mx	8	-32.888	-2052.180	2.058
			Max. My	2	-32.868	-1.671	2085.837
			Max. Vy	8	24.214	-2052.180	2.058
			Max. Vx	2	-24.494	-1.671	2085.837
			Max. Torque	20			-0.817
L29	59.75 - 54.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-53.989	0.085	1.196
			Max. Mx	8	-34.578	-2174.308	2.113
			Max. My	2	-34.560	-1.722	2209.363
			Max. Vy	8	24.649	-2174.308	2.113
			Max. Vx	2	-24.928	-1.722	2209.363
			Max. Torque	20			-0.817

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L30	54.75 - 49.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-56.085	0.130	1.158
			Max. Mx	8	-36.278	-2298.521	2.168
			Max. My	2	-36.262	-1.773	2334.970
			Max. Vy	8	25.054	-2298.521	2.168
			Max. Vx	2	-25.332	-1.773	2334.970
			Max. Torque	20			-0.816
L31	49.75 - 46.583	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-57.450	0.170	1.072
			Max. Mx	8	-37.358	-2378.219	2.202
			Max. My	2	-37.343	-1.805	2415.548
			Max. Vy	8	25.297	-2378.219	2.202
			Max. Vx	2	-25.575	-1.805	2415.548
			Max. Torque	20			-0.816
L32	46.583 - 46.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-57.584	0.173	1.065
			Max. Mx	8	-37.475	-2384.543	2.205
			Max. My	2	-37.460	-1.808	2421.941
			Max. Vy	8	25.310	-2384.543	2.205
			Max. Vx	2	-25.587	-1.808	2421.941
			Max. Torque	20			-0.816
L33	46.333 - 41.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-60.252	0.235	0.930
			Max. Mx	8	-39.683	-2512.070	2.259
			Max. My	2	-39.669	-1.858	2550.856
			Max. Vy	8	25.712	-2512.070	2.259
			Max. Vx	2	-25.989	-1.858	2550.856
			Max. Torque	20			-0.816
L34	41.333 - 36.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-62.915	0.296	0.796
			Max. Mx	8	-41.899	-2641.508	2.313
			Max. My	2	-41.887	-1.909	2681.678
			Max. Vy	8	26.081	-2641.508	2.313
			Max. Vx	2	-26.357	-1.909	2681.678
			Max. Torque	20			-0.816
L35	36.333 - 31.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-65.569	0.356	0.665
			Max. Mx	8	-44.121	-2772.708	2.366
			Max. My	2	-44.110	-1.959	2814.258
			Max. Vy	8	26.419	-2772.708	2.366
			Max. Vx	2	-26.694	-1.959	2814.258
			Max. Torque	20			-0.816
L36	31.333 - 30	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-66.275	0.371	0.631
			Max. Mx	8	-44.712	-2807.965	2.380
			Max. My	2	-44.702	-1.972	2849.882
			Max. Vy	8	26.507	-2807.965	2.380
			Max. Vx	2	-26.782	-1.972	2849.882
			Max. Torque	20			-0.816
L37	30 - 29.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-66.571	0.374	0.624
			Max. Mx	8	-44.841	-2814.630	2.383
			Max. My	2	-44.831	-1.975	2856.616
			Max. Vy	8	26.671	-2814.630	2.383
			Max. Vx	2	-26.946	-1.975	2856.616
			Max. Torque	20			-0.816
L38	29.75 - 24.75	Pole	Max Tension	1	0.000	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	26	-69.334	0.432	0.483
			Max. Mx	8	-47.175	-2948.742	2.436
			Max. My	2	-47.166	-2.025	2992.100
			Max. Vy	8	26.988	-2948.742	2.436
			Max. Vx	2	-27.262	-2.025	2992.100
			Max. Torque	20			-0.816
L39	24.75 - 19.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-72.085	0.487	0.345
			Max. Mx	8	-49.519	-3084.359	2.488
			Max. My	2	-49.511	-2.074	3129.083
			Max. Vy	8	27.282	-3084.359	2.488
			Max. Vx	2	-27.554	-2.074	3129.083
			Max. Torque	20			-0.816
L40	19.75 - 14.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-74.823	0.540	0.212
			Max. Mx	8	-51.868	-3221.394	2.540
			Max. My	2	-51.862	-2.123	3267.478
			Max. Vy	8	27.558	-3221.394	2.540
			Max. Vx	2	-27.829	-2.123	3267.478
			Max. Torque	20			-0.816
L41	14.75 - 9.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-77.544	0.590	0.084
			Max. Mx	8	-54.221	-3359.758	2.591
			Max. My	2	-54.217	-2.172	3407.193
			Max. Vy	8	27.815	-3359.758	2.591
			Max. Vx	2	-28.084	-2.172	3407.193
			Max. Torque	20			-0.816
L42	9.75 - 4.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-80.241	0.637	-0.037
			Max. Mx	8	-56.580	-3499.356	2.642
			Max. My	2	-56.578	-2.220	3548.131
			Max. Vy	8	28.054	-3499.356	2.642
			Max. Vx	2	-28.321	-2.220	3548.131
			Max. Torque	20			-0.816
L43	4.75 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-82.757	0.673	-0.137
			Max. Mx	8	-58.824	-3633.026	2.689
			Max. My	2	-58.824	-2.266	3683.065
			Max. Vy	8	28.265	-3633.026	2.689
			Max. Vx	2	-28.529	-2.266	3683.065
			Max. Torque	20			-0.816

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	82.757	-0.000	0.000
	Max. H_x	20	58.834	28.243	-0.010
	Max. H_z	2	58.834	-0.010	28.508
	Max. M_x	2	3683.065	-0.010	28.508
	Max. M_z	8	3633.026	-28.243	0.010
	Max. Torsion	8	0.815	-28.243	0.010
	Min. Vert	23	44.125	24.454	14.245
	Min. H_x	8	58.834	-28.243	0.010
	Min. H_z	14	58.834	0.010	-28.508
	Min. M_x	14	-3681.152	0.010	-28.508

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_z	20	-3631.968	28.243	-0.010
	Min. Torsion	20	-0.816	28.243	-0.010

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	49.028	0.000	0.000	-0.745	-0.406	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	58.834	0.010	-28.508	-3683.065	-2.266	0.061
0.9 Dead+1.0 Wind 0 deg - No Ice	44.125	0.010	-28.508	-3644.071	-2.104	0.047
1.2 Dead+1.0 Wind 30 deg - No Ice	58.834	14.131	-24.694	-3190.650	-1818.225	-0.351
0.9 Dead+1.0 Wind 30 deg - No Ice	44.125	14.131	-24.694	-3156.835	-1798.996	-0.355
1.2 Dead+1.0 Wind 60 deg - No Ice	58.834	24.465	-14.263	-1843.564	-3147.197	-0.671
0.9 Dead+1.0 Wind 60 deg - No Ice	44.125	24.465	-14.263	-1823.921	-3114.012	-0.665
1.2 Dead+1.0 Wind 90 deg - No Ice	58.834	28.243	-0.010	-2.689	-3633.026	-0.815
0.9 Dead+1.0 Wind 90 deg - No Ice	44.125	28.243	-0.010	-2.417	-3594.740	-0.800
1.2 Dead+1.0 Wind 120 deg - No Ice	58.834	24.454	14.245	1838.654	-3145.470	-0.740
0.9 Dead+1.0 Wind 120 deg - No Ice	44.125	24.454	14.245	1819.550	-3112.305	-0.720
1.2 Dead+1.0 Wind 150 deg - No Ice	58.834	14.113	24.683	3187.012	-1815.226	-0.465
0.9 Dead+1.0 Wind 150 deg - No Ice	44.125	14.113	24.683	3153.721	-1796.031	-0.445
1.2 Dead+1.0 Wind 180 deg - No Ice	58.834	-0.010	28.508	3681.152	1.201	-0.061
0.9 Dead+1.0 Wind 180 deg - No Ice	44.125	-0.010	28.508	3642.663	1.323	-0.048
1.2 Dead+1.0 Wind 210 deg - No Ice	58.834	-14.131	24.694	3188.741	1817.161	0.359
0.9 Dead+1.0 Wind 210 deg - No Ice	44.125	-14.131	24.694	3155.430	1798.216	0.363
1.2 Dead+1.0 Wind 240 deg - No Ice	58.834	-24.465	14.263	1841.655	3146.136	0.680
0.9 Dead+1.0 Wind 240 deg - No Ice	44.125	-24.465	14.263	1822.516	3113.235	0.673
1.2 Dead+1.0 Wind 270 deg - No Ice	58.834	-28.243	0.010	0.778	3631.968	0.816
0.9 Dead+1.0 Wind 270 deg - No Ice	44.125	-28.243	0.010	1.010	3593.964	0.800
1.2 Dead+1.0 Wind 300 deg - No Ice	58.834	-24.454	-14.245	-1840.568	3144.411	0.733
0.9 Dead+1.0 Wind 300 deg - No Ice	44.125	-24.454	-14.245	-1820.959	3111.528	0.713
1.2 Dead+1.0 Wind 330 deg - No Ice	58.834	-14.113	-24.683	-3188.926	1814.164	0.456
0.9 Dead+1.0 Wind 330 deg - No Ice	44.125	-14.113	-24.683	-3155.131	1795.252	0.437

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.0 Ice+1.0 Temp	82.757	0.000	-0.000	0.137	0.673	-0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	82.757	0.002	-7.339	-940.867	0.409	0.024
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	82.757	3.663	-6.357	-814.943	-467.717	-0.108
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	82.757	6.343	-3.671	-470.651	-810.339	-0.210
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	82.757	7.323	-0.002	-0.242	-935.652	-0.256
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	82.757	6.342	3.668	470.236	-810.077	-0.234
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	82.757	3.660	6.355	814.720	-467.263	-0.149
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	82.757	-0.002	7.339	940.905	0.933	-0.024
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	82.757	-3.663	6.357	814.982	469.059	0.108
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	82.757	-6.343	3.671	470.690	811.681	0.210
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	82.757	-7.323	0.002	0.281	936.994	0.256
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	82.757	-6.342	-3.668	-470.198	811.420	0.234
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	82.757	-3.660	-6.355	-814.682	468.606	0.149
Dead+Wind 0 deg - Service	49.028	0.002	-5.304	-681.775	-0.758	0.010
Dead+Wind 30 deg - Service	49.028	2.629	-4.594	-590.702	-336.610	-0.067
Dead+Wind 60 deg - Service	49.028	4.551	-2.653	-341.562	-582.385	-0.126
Dead+Wind 90 deg - Service	49.028	5.254	-0.002	-1.112	-672.226	-0.151
Dead+Wind 120 deg - Service	49.028	4.550	2.650	339.424	-582.065	-0.136
Dead+Wind 150 deg - Service	49.028	2.626	4.592	588.799	-336.055	-0.084
Dead+Wind 180 deg - Service	49.028	-0.002	5.304	680.193	-0.117	-0.010
Dead+Wind 210 deg - Service	49.028	-2.629	4.594	589.120	335.735	0.067
Dead+Wind 240 deg - Service	49.028	-4.551	2.653	339.979	581.511	0.126
Dead+Wind 270 deg - Service	49.028	-5.254	0.002	-0.471	671.352	0.151
Dead+Wind 300 deg - Service	49.028	-4.550	-2.650	-341.007	581.190	0.135
Dead+Wind 330 deg - Service	49.028	-2.626	-4.592	-590.382	335.180	0.084

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-49.028	0.000	0.000	49.028	0.000	0.000%
2	0.010	-58.834	-28.508	-0.010	58.834	28.508	0.000%
3	0.010	-44.125	-28.508	-0.010	44.125	28.508	0.000%
4	14.131	-58.834	-24.694	-14.131	58.834	24.694	0.000%
5	14.131	-44.125	-24.694	-14.131	44.125	24.694	0.000%
6	24.465	-58.834	-14.263	-24.465	58.834	14.263	0.000%
7	24.465	-44.125	-14.263	-24.465	44.125	14.263	0.000%
8	28.243	-58.834	-0.010	-28.243	58.834	0.010	0.000%
9	28.243	-44.125	-0.010	-28.243	44.125	0.010	0.000%
10	24.454	-58.834	14.245	-24.454	58.834	-14.245	0.000%
11	24.454	-44.125	14.245	-24.454	44.125	-14.245	0.000%
12	14.113	-58.834	24.683	-14.113	58.834	-24.683	0.000%
13	14.113	-44.125	24.683	-14.113	44.125	-24.683	0.000%
14	-0.010	-58.834	28.508	0.010	58.834	-28.508	0.000%
15	-0.010	-44.125	28.508	0.010	44.125	-28.508	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
16	-14.131	-58.834	24.694	14.131	58.834	-24.694	0.000%
17	-14.131	-44.125	24.694	14.131	44.125	-24.694	0.000%
18	-24.465	-58.834	14.263	24.465	58.834	-14.263	0.000%
19	-24.465	-44.125	14.263	24.465	44.125	-14.263	0.000%
20	-28.243	-58.834	0.010	28.243	58.834	-0.010	0.000%
21	-28.243	-44.125	0.010	28.243	44.125	-0.010	0.000%
22	-24.454	-58.834	-14.245	24.454	58.834	14.245	0.000%
23	-24.454	-44.125	-14.245	24.454	44.125	14.245	0.000%
24	-14.113	-58.834	-24.683	14.113	58.834	24.683	0.000%
25	-14.113	-44.125	-24.683	14.113	44.125	24.683	0.000%
26	0.000	-82.757	0.000	-0.000	82.757	0.000	0.000%
27	0.002	-82.757	-7.339	-0.002	82.757	7.339	0.000%
28	3.663	-82.757	-6.357	-3.663	82.757	6.357	0.000%
29	6.343	-82.757	-3.671	-6.343	82.757	3.671	0.000%
30	7.323	-82.757	-0.002	-7.323	82.757	0.002	0.000%
31	6.341	-82.757	3.668	-6.342	82.757	-3.668	0.000%
32	3.660	-82.757	6.355	-3.660	82.757	-6.355	0.000%
33	-0.002	-82.757	7.339	0.002	82.757	-7.339	0.000%
34	-3.663	-82.757	6.357	3.663	82.757	-6.357	0.000%
35	-6.343	-82.757	3.671	6.343	82.757	-3.671	0.000%
36	-7.323	-82.757	0.002	7.323	82.757	-0.002	0.000%
37	-6.341	-82.757	-3.668	6.342	82.757	3.668	0.000%
38	-3.660	-82.757	-6.355	3.660	82.757	6.355	0.000%
39	0.002	-49.028	-5.304	-0.002	49.028	5.304	0.000%
40	2.629	-49.028	-4.594	-2.629	49.028	4.594	0.000%
41	4.551	-49.028	-2.653	-4.551	49.028	2.653	0.000%
42	5.254	-49.028	-0.002	-5.254	49.028	0.002	0.000%
43	4.550	-49.028	2.650	-4.550	49.028	-2.650	0.000%
44	2.626	-49.028	4.592	-2.626	49.028	-4.592	0.000%
45	-0.002	-49.028	5.304	0.002	49.028	-5.304	0.000%
46	-2.629	-49.028	4.594	2.629	49.028	-4.594	0.000%
47	-4.551	-49.028	2.653	4.551	49.028	-2.653	0.000%
48	-5.254	-49.028	0.002	5.254	49.028	-0.002	0.000%
49	-4.550	-49.028	-2.650	4.550	49.028	2.650	0.000%
50	-2.626	-49.028	-4.592	2.626	49.028	4.592	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00013424
3	Yes	5	0.00000001	0.00004869
4	Yes	6	0.00000001	0.00038357
5	Yes	6	0.00000001	0.00012741
6	Yes	6	0.00000001	0.00038834
7	Yes	6	0.00000001	0.00012941
8	Yes	5	0.00000001	0.00025245
9	Yes	5	0.00000001	0.00011230
10	Yes	6	0.00000001	0.00037833
11	Yes	6	0.00000001	0.00012596
12	Yes	6	0.00000001	0.00038724
13	Yes	6	0.00000001	0.00012888
14	Yes	5	0.00000001	0.00013096
15	Yes	5	0.00000001	0.00004714
16	Yes	6	0.00000001	0.00038700

17	Yes	6	0.00000001	0.00012884
18	Yes	6	0.00000001	0.00037914
19	Yes	6	0.00000001	0.00012621
20	Yes	5	0.00000001	0.00023522
21	Yes	5	0.00000001	0.00010369
22	Yes	6	0.00000001	0.00038743
23	Yes	6	0.00000001	0.00012918
24	Yes	6	0.00000001	0.00038163
25	Yes	6	0.00000001	0.00012689
26	Yes	4	0.00000001	0.00003575
27	Yes	6	0.00000001	0.00041189
28	Yes	6	0.00000001	0.00045988
29	Yes	6	0.00000001	0.00045902
30	Yes	6	0.00000001	0.00040802
31	Yes	6	0.00000001	0.00045572
32	Yes	6	0.00000001	0.00045741
33	Yes	6	0.00000001	0.00040923
34	Yes	6	0.00000001	0.00045730
35	Yes	6	0.00000001	0.00045557
36	Yes	6	0.00000001	0.00040744
37	Yes	6	0.00000001	0.00045823
38	Yes	6	0.00000001	0.00045913
39	Yes	4	0.00000001	0.00048310
40	Yes	5	0.00000001	0.00006958
41	Yes	5	0.00000001	0.00007263
42	Yes	4	0.00000001	0.00050275
43	Yes	5	0.00000001	0.00006742
44	Yes	5	0.00000001	0.00007160
45	Yes	4	0.00000001	0.00048082
46	Yes	5	0.00000001	0.00007106
47	Yes	5	0.00000001	0.00006743
48	Yes	4	0.00000001	0.00050009
49	Yes	5	0.00000001	0.00007226
50	Yes	5	0.00000001	0.00006868

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 175	19.985	39	1.030	0.001
L2	175 - 170	18.906	39	1.029	0.001
L3	170 - 165	17.832	39	1.023	0.001
L4	165 - 160	16.767	39	1.010	0.001
L5	160 - 155	15.718	39	0.991	0.001
L6	155 - 150	14.695	39	0.960	0.001
L7	150 - 145	13.712	39	0.915	0.001
L8	145 - 140	12.764	39	0.894	0.001
L9	140 - 135	11.841	39	0.868	0.000
L10	135 - 130	10.949	39	0.835	0.000
L11	130 - 125	10.095	39	0.797	0.000
L12	125 - 120	9.283	39	0.752	0.000
L13	120 - 115	8.522	39	0.701	0.000
L14	115 - 110	7.804	39	0.668	0.000
L15	110 - 107.583	7.124	39	0.632	0.000
L16	107.583 - 107.333	6.809	39	0.612	0.000
L17	107.333 - 102.333	6.777	39	0.611	0.000
L18	102.333 - 97.333	6.153	39	0.580	0.000
L19	97.333 - 92.333	5.563	39	0.546	0.000
L20	92.333 - 90	5.010	39	0.509	0.000

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L21	90 - 89.75	4.765	39	0.491	0.000
L22	89.75 - 84.75	4.740	39	0.490	0.000
L23	84.75 - 79.75	4.238	39	0.468	0.000
L24	79.75 - 74.75	3.761	39	0.444	0.000
L25	74.75 - 69.75	3.309	39	0.418	0.000
L26	69.75 - 64.75	2.886	39	0.390	0.000
L27	64.75 - 60	2.493	39	0.361	0.000
L28	60 - 59.75	2.148	39	0.331	0.000
L29	59.75 - 54.75	2.131	39	0.330	0.000
L30	54.75 - 49.75	1.799	39	0.303	0.000
L31	49.75 - 46.583	1.497	39	0.275	0.000
L32	46.583 - 46.333	1.321	39	0.256	0.000
L33	46.333 - 41.333	1.307	39	0.255	0.000
L34	41.333 - 36.333	1.053	39	0.231	0.000
L35	36.333 - 31.333	0.823	39	0.207	0.000
L36	31.333 - 30	0.620	39	0.181	0.000
L37	30 - 29.75	0.570	39	0.174	0.000
L38	29.75 - 24.75	0.561	39	0.173	0.000
L39	24.75 - 19.75	0.394	39	0.147	0.000
L40	19.75 - 14.75	0.254	39	0.120	0.000
L41	14.75 - 9.75	0.144	39	0.091	0.000
L42	9.75 - 4.75	0.064	39	0.061	0.000
L43	4.75 - 0	0.015	39	0.031	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.000	APXVSPP18-C-A20 w/ Mount Pipe	39	19.337	1.030	0.001	81153
161.000	(2) SBNHH-1D65B w/ Mount Pipe	39	15.927	0.996	0.001	13073
151.000	800 10504 w/ Mount Pipe	39	13.905	0.923	0.001	7939
136.000	6812B-1	39	11.125	0.842	0.000	8320
120.000	Bridge Stiffener	39	8.522	0.701	0.000	6814
118.000	DB806-XT	39	8.230	0.687	0.000	7491
101.000	KS24019-L112A	39	5.992	0.571	0.000	8643
90.000	Bridge Stiffener	39	4.765	0.491	0.000	9439
60.000	Bridge Stiffener	39	2.148	0.331	0.000	9882
30.000	Bridge Stiffener	39	0.570	0.174	0.000	11016

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 175	107.854	2	5.558	0.003
L2	175 - 170	102.043	2	5.553	0.003
L3	170 - 165	96.252	2	5.519	0.003
L4	165 - 160	90.514	2	5.452	0.003
L5	160 - 155	84.863	2	5.350	0.003
L6	155 - 150	79.347	2	5.185	0.003
L7	150 - 145	74.045	2	4.942	0.003

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L8	145 - 140	68.933	2	4.829	0.003
L9	140 - 135	63.954	2	4.685	0.003
L10	135 - 130	59.142	2	4.510	0.003
L11	130 - 125	54.529	2	4.303	0.002
L12	125 - 120	50.150	2	4.063	0.002
L13	120 - 115	46.039	2	3.789	0.002
L14	115 - 110	42.166	2	3.611	0.002
L15	110 - 107.583	38.489	2	3.413	0.002
L16	107.583 - 107.333	36.788	2	3.309	0.002
L17	107.333 - 102.333	36.615	2	3.301	0.002
L18	102.333 - 97.333	33.246	2	3.135	0.002
L19	97.333 - 92.333	30.059	2	2.952	0.001
L20	92.333 - 90	27.072	2	2.753	0.001
L21	90 - 89.75	25.751	2	2.655	0.001
L22	89.75 - 84.75	25.612	2	2.649	0.001
L23	84.75 - 79.75	22.901	2	2.528	0.001
L24	79.75 - 74.75	20.322	2	2.398	0.001
L25	74.75 - 69.75	17.884	2	2.258	0.001
L26	69.75 - 64.75	15.597	2	2.109	0.001
L27	64.75 - 60	13.470	2	1.950	0.001
L28	60 - 59.75	11.609	2	1.790	0.001
L29	59.75 - 54.75	11.516	2	1.783	0.001
L30	54.75 - 49.75	9.724	2	1.638	0.001
L31	49.75 - 46.583	8.089	2	1.484	0.001
L32	46.583 - 46.333	7.138	2	1.383	0.000
L33	46.333 - 41.333	7.066	2	1.377	0.000
L34	41.333 - 36.333	5.690	2	1.251	0.000
L35	36.333 - 31.333	4.449	2	1.118	0.000
L36	31.333 - 30	3.350	2	0.979	0.000
L37	30 - 29.75	3.082	2	0.941	0.000
L38	29.75 - 24.75	3.033	2	0.934	0.000
L39	24.75 - 19.75	2.128	2	0.794	0.000
L40	19.75 - 14.75	1.373	2	0.646	0.000
L41	14.75 - 9.75	0.776	2	0.493	0.000
L42	9.75 - 4.75	0.344	2	0.332	0.000
L43	4.75 - 0	0.083	2	0.165	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.000	APXVSPP18-C-A20 w/ Mount Pipe	2	104.366	5.558	0.003	15319
161.000	(2) SBNHH-1D65B w/ Mount Pipe	2	85.984	5.374	0.003	2488
151.000	800 10504 w/ Mount Pipe	2	75.088	4.983	0.003	1501
136.000	6812B-1	2	60.089	4.548	0.003	1562
120.000	Bridge Stiffener	2	46.039	3.789	0.002	1273
118.000	DB806-XT	2	44.464	3.709	0.002	1399
101.000	KS24019-L112A	2	32.377	3.087	0.002	1610
90.000	Bridge Stiffener	2	25.751	2.655	0.001	1755
60.000	Bridge Stiffener	2	11.609	1.790	0.001	1832
30.000	Bridge Stiffener	2	3.082	0.941	0.000	2039

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	180 - 175 (1)	P24x0.25	5.000	0.000	0.0	18.653	-2.570	662.2650.004	
L2	175 - 170 (2)	P24x0.25	5.000	0.000	0.0	18.653	-2.949	662.2650.004	
L3	170 - 165 (3)	P24x0.25	5.000	0.000	0.0	18.653	-3.333	662.2650.005	
L4	165 - 160 (4)	P24x0.25	5.000	0.000	0.0	18.653	-7.202	662.2650.011	
L5	160 - 155 (5)	P24x0.25	5.000	0.000	0.0	18.653	-7.676	662.2650.012	
L6	155 - 150 (6)	P24x0.25	5.000	0.000	0.0	18.653	-9.224	662.2650.014	
L7	150 - 145 (7)	P30x0.375	5.000	0.000	0.0	34.901	-10.059	1311.060	0.008
L8	145 - 140 (8)	P30x0.375	5.000	0.000	0.0	34.901	-10.900	1311.060	0.008
L9	140 - 135 (9)	P30x0.375	5.000	0.000	0.0	34.901	-11.829	1311.060	0.009
L10	135 - 130 (10)	P30x0.375	5.000	0.000	0.0	34.901	-12.696	1311.060	0.010
L11	130 - 125 (11)	P30x0.375	5.000	0.000	0.0	34.901	-13.576	1311.060	0.010
L12	125 - 120 (12)	P30x0.375	5.000	0.000	0.0	34.901	-14.470	1311.060	0.011
L13	120 - 115 (13)	P36x0.375	5.000	0.000	0.0	41.970	-15.571	1490.100	0.010
L14	115 - 110 (14)	P36x0.375	5.000	0.000	0.0	41.970	-16.591	1490.100	0.011
L15	110 - 107.583 (15)	P36x0.375	2.417	0.000	0.0	41.970	-17.086	1490.100	0.011
L16	107.583 - 107.333 (16)	P36x0.525	0.250	0.000	0.0	58.510	-17.162	2211.690	0.008
L17	107.333 - 102.333 (17)	P36x0.525	5.000	0.000	0.0	58.510	-18.517	2211.690	0.008
L18	102.333 - 97.333 (18)	P36x0.525	5.000	0.000	0.0	58.510	-19.968	2211.690	0.009
L19	97.333 - 92.333 (19)	P36x0.525	5.000	0.000	0.0	58.510	-21.346	2211.690	0.010
L20	92.333 - 90 (20)	P36x0.525	2.333	0.000	0.0	58.510	-21.991	2211.690	0.010
L21	90 - 89.75 (21)	P42x0.6125	0.250	0.000	0.0	79.639	-22.086	3010.350	0.007
L22	89.75 - 84.75 (22)	P42x0.6125	5.000	0.000	0.0	79.639	-23.864	3010.350	0.008
L23	84.75 - 79.75 (23)	P42x0.6125	5.000	0.000	0.0	79.639	-25.651	3010.350	0.009
L24	79.75 - 74.75 (24)	P42x0.6125	5.000	0.000	0.0	79.639	-27.445	3010.350	0.009
L25	74.75 - 69.75 (25)	P42x0.6125	5.000	0.000	0.0	79.639	-29.246	3010.350	0.010
L26	69.75 - 64.75 (26)	P42x0.6125	5.000	0.000	0.0	79.639	-31.053	3010.350	0.010
L27	64.75 - 60 (27)	P42x0.6125	4.750	0.000	0.0	79.639	-32.775	3010.350	0.011
L28	60 - 59.75 (28)	P48x0.5	0.250	0.000	0.0	74.613	-32.868	2649.060	0.012
L29	59.75 - 54.75 (29)	P48x0.5	5.000	0.000	0.0	74.613	-34.560	2649.060	0.013
L30	54.75 - 49.75 (30)	P48x0.5	5.000	0.000	0.0	74.613	-36.262	2649.060	0.014
L31	49.75 - 46.583 (31)	P48x0.5	3.167	0.000	0.0	74.613	-37.343	2649.060	0.014
L32	46.583 - 46.333 (32)	P48x0.675	0.250	0.000	0.0	100.356	-37.460	3793.470	0.010
L33	46.333 - 41.333 (33)	P48x0.675	5.000	0.000	0.0	100.356	-39.669	3793.470	0.010
L34	41.333 - 36.333 (34)	P48x0.675	5.000	0.000	0.0	100.356	-41.887	3793.470	0.011
L35	36.333 - 31.333 (35)	P48x0.675	5.000	0.000	0.0	100.356	-44.110	3793.470	0.012

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L36	31.333 - 30 (36)	P48x0.675	1.333	0.000	0.0	100.356	-44.702	3793.470	0.012
L37	30 - 29.75 (37)	P48x0.7125	0.250	0.000	0.0	105.848	-44.831	4001.040	0.011
L38	29.75 - 24.75 (38)	P48x0.7125	5.000	0.000	0.0	105.848	-47.166	4001.040	0.012
L39	24.75 - 19.75 (39)	P48x0.7125	5.000	0.000	0.0	105.848	-49.511	4001.040	0.012
L40	19.75 - 14.75 (40)	P48x0.7125	5.000	0.000	0.0	105.848	-51.862	4001.040	0.013
L41	14.75 - 9.75 (41)	P48x0.7125	5.000	0.000	0.0	105.848	-54.217	4001.040	0.014
L42	9.75 - 4.75 (42)	P48x0.7125	5.000	0.000	0.0	105.848	-56.578	4001.040	0.014
L43	4.75 - 0 (43)	P48x0.7125	4.750	0.000	0.0	105.848	-58.824	4001.040	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	180 - 175 (1)	P24x0.25	17.642	396.683	0.044	0.000	396.683	0.000
L2	175 - 170 (2)	P24x0.25	46.463	396.683	0.117	0.000	396.683	0.000
L3	170 - 165 (3)	P24x0.25	77.047	396.683	0.194	0.000	396.683	0.000
L4	165 - 160 (4)	P24x0.25	117.389	396.683	0.296	0.000	396.683	0.000
L5	160 - 155 (5)	P24x0.25	188.708	396.683	0.476	0.000	396.683	0.000
L6	155 - 150 (6)	P24x0.25	263.094	396.683	0.663	0.000	396.683	0.000
L7	150 - 145 (7)	P30x0.375	344.631	947.858	0.364	0.000	947.858	0.000
L8	145 - 140 (8)	P30x0.375	428.295	947.858	0.452	0.000	947.858	0.000
L9	140 - 135 (9)	P30x0.375	514.223	947.858	0.543	0.000	947.858	0.000
L10	135 - 130 (10)	P30x0.375	602.223	947.858	0.635	0.000	947.858	0.000
L11	130 - 125 (11)	P30x0.375	692.121	947.858	0.730	0.000	947.858	0.000
L12	125 - 120 (12)	P30x0.375	783.822	947.858	0.827	0.000	947.858	0.000
L13	120 - 115 (13)	P36x0.375	879.383	1338.808	0.657	0.000	1338.808	0.000
L14	115 - 110 (14)	P36x0.375	976.942	1338.808	0.730	0.000	1338.808	0.000
L15	110 - 107.583 (15)	P36x0.375	1024.858	1338.808	0.765	0.000	1338.808	0.000
L16	107.583 - 107.333 (16)	P36x0.525	1029.842	1946.900	0.529	0.000	1946.900	0.000
L17	107.333 - 102.333 (17)	P36x0.525	1130.667	1946.900	0.581	0.000	1946.900	0.000
L18	102.333 - 97.333 (18)	P36x0.525	1233.983	1946.900	0.634	0.000	1946.900	0.000
L19	97.333 - 92.333 (19)	P36x0.525	1339.242	1946.900	0.688	0.000	1946.900	0.000
L20	92.333 - 90 (20)	P36x0.525	1389.017	1946.900	0.713	0.000	1946.900	0.000
L21	90 - 89.75 (21)	P42x0.6125	1394.433	3091.608	0.451	0.000	3091.608	0.000
L22	89.75 - 84.75 (22)	P42x0.6125	1504.000	3091.608	0.486	0.000	3091.608	0.000
L23	84.75 - 79.75 (23)	P42x0.6125	1615.975	3091.608	0.523	0.000	3091.608	0.000
L24	79.75 - 74.75 (24)	P42x0.6125	1730.250	3091.608	0.560	0.000	3091.608	0.000
L25	74.75 - 69.75 (25)	P42x0.6125	1846.717	3091.608	0.597	0.000	3091.608	0.000
L26	69.75 - 64.75 (26)	P42x0.6125	1965.275	3091.608	0.636	0.000	3091.608	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L27	64.75 - 60 (27)	P42x0.6125	2079.717	3091.608	0.673	0.000	3091.608	0.000
L28	60 - 59.75 (28)	P48x0.5	2085.842	3173.467	0.657	0.000	3173.467	0.000
L29	59.75 - 54.75 (29)	P48x0.5	2209.367	3173.467	0.696	0.000	3173.467	0.000
L30	54.75 - 49.75 (30)	P48x0.5	2334.967	3173.467	0.736	0.000	3173.467	0.000
L31	49.75 - 46.583 (31)	P48x0.5	2415.550	3173.467	0.761	0.000	3173.467	0.000
L32	46.583 - 46.333 (32)	P48x0.675	2421.942	4429.592	0.547	0.000	4429.592	0.000
L33	46.333 - 41.333 (33)	P48x0.675	2550.858	4429.592	0.576	0.000	4429.592	0.000
L34	41.333 - 36.333 (34)	P48x0.675	2681.683	4429.592	0.605	0.000	4429.592	0.000
L35	36.333 - 31.333 (35)	P48x0.675	2814.258	4429.592	0.635	0.000	4429.592	0.000
L36	31.333 - 30 (36)	P48x0.675	2849.883	4429.592	0.643	0.000	4429.592	0.000
L37	30 - 29.75 (37)	P48x0.7125	2856.617	4708.058	0.607	0.000	4708.058	0.000
L38	29.75 - 24.75 (38)	P48x0.7125	2992.100	4708.058	0.636	0.000	4708.058	0.000
L39	24.75 - 19.75 (39)	P48x0.7125	3129.083	4708.058	0.665	0.000	4708.058	0.000
L40	19.75 - 14.75 (40)	P48x0.7125	3267.475	4708.058	0.694	0.000	4708.058	0.000
L41	14.75 - 9.75 (41)	P48x0.7125	3407.192	4708.058	0.724	0.000	4708.058	0.000
L42	9.75 - 4.75 (42)	P48x0.7125	3548.133	4708.058	0.754	0.000	4708.058	0.000
L43	4.75 - 0 (43)	P48x0.7125	3683.067	4708.058	0.782	0.000	4708.058	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	180 - 175 (1)	P24x0.25	5.586	201.861	0.028	0.000	324.229	0.000
L2	175 - 170 (2)	P24x0.25	5.942	201.861	0.029	0.000	324.229	0.000
L3	170 - 165 (3)	P24x0.25	6.292	201.861	0.031	0.000	324.229	0.000
L4	165 - 160 (4)	P24x0.25	14.037	201.861	0.070	0.026	324.229	0.000
L5	160 - 155 (5)	P24x0.25	14.457	201.861	0.072	0.061	324.229	0.000
L6	155 - 150 (6)	P24x0.25	16.096	201.861	0.080	0.061	324.229	0.000
L7	150 - 145 (7)	P30x0.375	16.525	395.779	0.042	0.061	994.725	0.000
L8	145 - 140 (8)	P30x0.375	16.945	395.779	0.043	0.061	994.725	0.000
L9	140 - 135 (9)	P30x0.375	17.409	395.779	0.044	0.061	994.725	0.000
L10	135 - 130 (10)	P30x0.375	17.798	395.779	0.045	0.061	994.7250.000	
L11	130 - 125 (11)	P30x0.375	18.170	395.779	0.046	0.061	994.7250.000	
L12	125 - 120 (12)	P30x0.375	18.522	395.779	0.047	0.061	994.7250.000	
L13	120 - 115 (13)	P36x0.375	19.302	454.187	0.042	0.061	1094.275	0.000
L14	115 - 110 (14)	P36x0.375	19.730	454.187	0.043	0.061	1094.275	0.000
L15	110 - 107.583 (15)	P36x0.375	19.932	454.187	0.044	0.061	1094.275	0.000
L16	107.583 - 107.333 (16)	P36x0.525	19.949	663.506	0.030	0.061	2069.408	0.000
L17	107.333 - 102.333 (17)	P36x0.525	20.389	663.506	0.031	0.061	2069.408	0.000
L18	102.333 -	P36x0.525	20.857	663.506	0.031	0.061	2069.408	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L19	97.333 (18) 97.333 - 92.333 (19)	P36x0.525	21.256	663.506	0.032	0.061	2069.408	0.000
L20	92.333 - 90 (20)	P36x0.525	21.435	663.506	0.032	0.061	2069.408	0.000
L21	90 - 89.75 (21)	P42x0.6125	21.671	903.105	0.024	0.061	3286.150	0.000
L22	89.75 - 84.75 (22)	P42x0.6125	22.164	903.105	0.025	0.061	3286.150	0.000
L23	84.75 - 79.75 (23)	P42x0.6125	22.635	903.105	0.025	0.061	3286.150	0.000
L24	79.75 - 74.75 (24)	P42x0.6125	23.086	903.105	0.026	0.061	3286.150	0.000
L25	74.75 - 69.75 (25)	P42x0.6125	23.515	903.105	0.026	0.061	3286.150	0.000
L26	69.75 - 64.75 (26)	P42x0.6125	23.921	903.105	0.026	0.061	3286.150	0.000
L27	64.75 - 60 (27)	P42x0.6125	24.285	903.105	0.027	0.061	3286.150	0.000
L28	60 - 59.75 (28)	P48x0.5	24.494	807.443	0.030	0.061	2593.8330.000	
L29	59.75 - 54.75 (29)	P48x0.5	24.928	807.443	0.031	0.061	2593.833	0.000
L30	54.75 - 49.75 (30)	P48x0.5	25.332	807.443	0.031	0.061	2593.833	0.000
L31	49.75 - 46.583 (31)	P48x0.5	25.575	807.443	0.032	0.061	2593.833	0.000
L32	46.583 - 46.333 (32)	P48x0.675	25.587	1138.040	0.022	0.061	4735.083	0.000
L33	46.333 - 41.333 (33)	P48x0.675	25.989	1138.040	0.023	0.061	4735.083	0.000
L34	41.333 - 36.333 (34)	P48x0.675	26.357	1138.040	0.023	0.061	4735.083	0.000
L35	36.333 - 31.333 (35)	P48x0.675	26.694	1138.040	0.023	0.061	4735.083	0.000
L36	31.333 - 30 (36)	P48x0.675	26.782	1138.040	0.024	0.061	4735.083	0.000
L37	30 - 29.75 (37)	P48x0.7125	26.946	1200.310	0.022	0.061	4990.225	0.000
L38	29.75 - 24.75 (38)	P48x0.7125	27.262	1200.310	0.023	0.061	4990.225	0.000
L39	24.75 - 19.75 (39)	P48x0.7125	27.554	1200.310	0.023	0.061	4990.225	0.000
L40	19.75 - 14.75 (40)	P48x0.7125	27.828	1200.310	0.023	0.061	4990.225	0.000
L41	14.75 - 9.75 (41)	P48x0.7125	28.084	1200.310	0.023	0.061	4990.225	0.000
L42	9.75 - 4.75 (42)	P48x0.7125	28.320	1200.310	0.024	0.061	4990.225	0.000
L43	4.75 - 0 (43)	P48x0.7125	28.529	1200.310	0.024	0.061	4990.225	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 175 (1)	0.004	0.044	0.000	0.028	0.000	0.049 ✓	1.050	4.8.2 ✓
L2	175 - 170 (2)	0.004	0.117	0.000	0.029	0.000	0.122	1.050	4.8.2 ✓

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	170 - 165 (3)	0.005	0.194	0.000	0.031	0.000	0.200	1.050	4.8.2
L4	165 - 160 (4)	0.011	0.296	0.000	0.070	0.000	0.312	1.050	4.8.2
L5	160 - 155 (5)	0.012	0.476	0.000	0.072	0.000	0.492	1.050	4.8.2
L6	155 - 150 (6)	0.014	0.663	0.000	0.080	0.000	0.684	1.050	4.8.2
L7	150 - 145 (7)	0.008	0.364	0.000	0.042	0.000	0.373	1.050	4.8.2
L8	145 - 140 (8)	0.008	0.452	0.000	0.043	0.000	0.462	1.050	4.8.2
L9	140 - 135 (9)	0.009	0.543	0.000	0.044	0.000	0.553	1.050	4.8.2
L10	135 - 130 (10)	0.010	0.635	0.000	0.045	0.000	0.647	1.050	4.8.2
L11	130 - 125 (11)	0.010	0.730	0.000	0.046	0.000	0.743	1.050	4.8.2
L12	125 - 120 (12)	0.011	0.827	0.000	0.047	0.000	0.840	1.050	4.8.2
L13	120 - 115 (13)	0.010	0.657	0.000	0.042	0.000	0.669	1.050	4.8.2
L14	115 - 110 (14)	0.011	0.730	0.000	0.043	0.000	0.743	1.050	4.8.2
L15	110 - 107.583 (15)	0.011	0.765	0.000	0.044	0.000	0.779	1.050	4.8.2
L16	107.583 - 107.333 (16)	0.008	0.529	0.000	0.030	0.000	0.538	1.050	4.8.2
L17	107.333 - 102.333 (17)	0.008	0.581	0.000	0.031	0.000	0.590	1.050	4.8.2
L18	102.333 - 97.333 (18)	0.009	0.634	0.000	0.031	0.000	0.644	1.050	4.8.2
L19	97.333 - 92.333 (19)	0.010	0.688	0.000	0.032	0.000	0.699	1.050	4.8.2
L20	92.333 - 90 (20)	0.010	0.713	0.000	0.032	0.000	0.724	1.050	4.8.2
L21	90 - 89.75 (21)	0.007	0.451	0.000	0.024	0.000	0.459	1.050	4.8.2
L22	89.75 - 84.75 (22)	0.008	0.486	0.000	0.025	0.000	0.495	1.050	4.8.2
L23	84.75 - 79.75 (23)	0.009	0.523	0.000	0.025	0.000	0.532	1.050	4.8.2
L24	79.75 - 74.75 (24)	0.009	0.560	0.000	0.026	0.000	0.569	1.050	4.8.2
L25	74.75 - 69.75 (25)	0.010	0.597	0.000	0.026	0.000	0.608	1.050	4.8.2
L26	69.75 - 64.75 (26)	0.010	0.636	0.000	0.026	0.000	0.647	1.050	4.8.2
L27	64.75 - 60 (27)	0.011	0.673	0.000	0.027	0.000	0.684	1.050	4.8.2
L28	60 - 59.75 (28)	0.012	0.657	0.000	0.030	0.000	0.671	1.050	4.8.2

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L29	59.75 - 54.75 (29)	0.013	0.696	0.000	0.031	0.000	0.710	1.050	4.8.2
L30	54.75 - 49.75 (30)	0.014	0.736	0.000	0.031	0.000	0.750	1.050	4.8.2
L31	49.75 - 46.583 (31)	0.014	0.761	0.000	0.032	0.000	0.776	1.050	4.8.2
L32	46.583 - 46.333 (32)	0.010	0.547	0.000	0.022	0.000	0.557	1.050	4.8.2
L33	46.333 - 41.333 (33)	0.010	0.576	0.000	0.023	0.000	0.587	1.050	4.8.2
L34	41.333 - 36.333 (34)	0.011	0.605	0.000	0.023	0.000	0.617	1.050	4.8.2
L35	36.333 - 31.333 (35)	0.012	0.635	0.000	0.023	0.000	0.648	1.050	4.8.2
L36	31.333 - 30 (36)	0.012	0.643	0.000	0.024	0.000	0.656	1.050	4.8.2
L37	30 - 29.75 (37)	0.011	0.607	0.000	0.022	0.000	0.618	1.050	4.8.2
L38	29.75 - 24.75 (38)	0.012	0.636	0.000	0.023	0.000	0.648	1.050	4.8.2
L39	24.75 - 19.75 (39)	0.012	0.665	0.000	0.023	0.000	0.678	1.050	4.8.2
L40	19.75 - 14.75 (40)	0.013	0.694	0.000	0.023	0.000	0.708	1.050	4.8.2
L41	14.75 - 9.75 (41)	0.014	0.724	0.000	0.023	0.000	0.738	1.050	4.8.2
L42	9.75 - 4.75 (42)	0.014	0.754	0.000	0.024	0.000	0.768	1.050	4.8.2
L43	4.75 - 0 (43)	0.015	0.782	0.000	0.024	0.000	0.798	1.050	4.8.2

Section Capacity Table

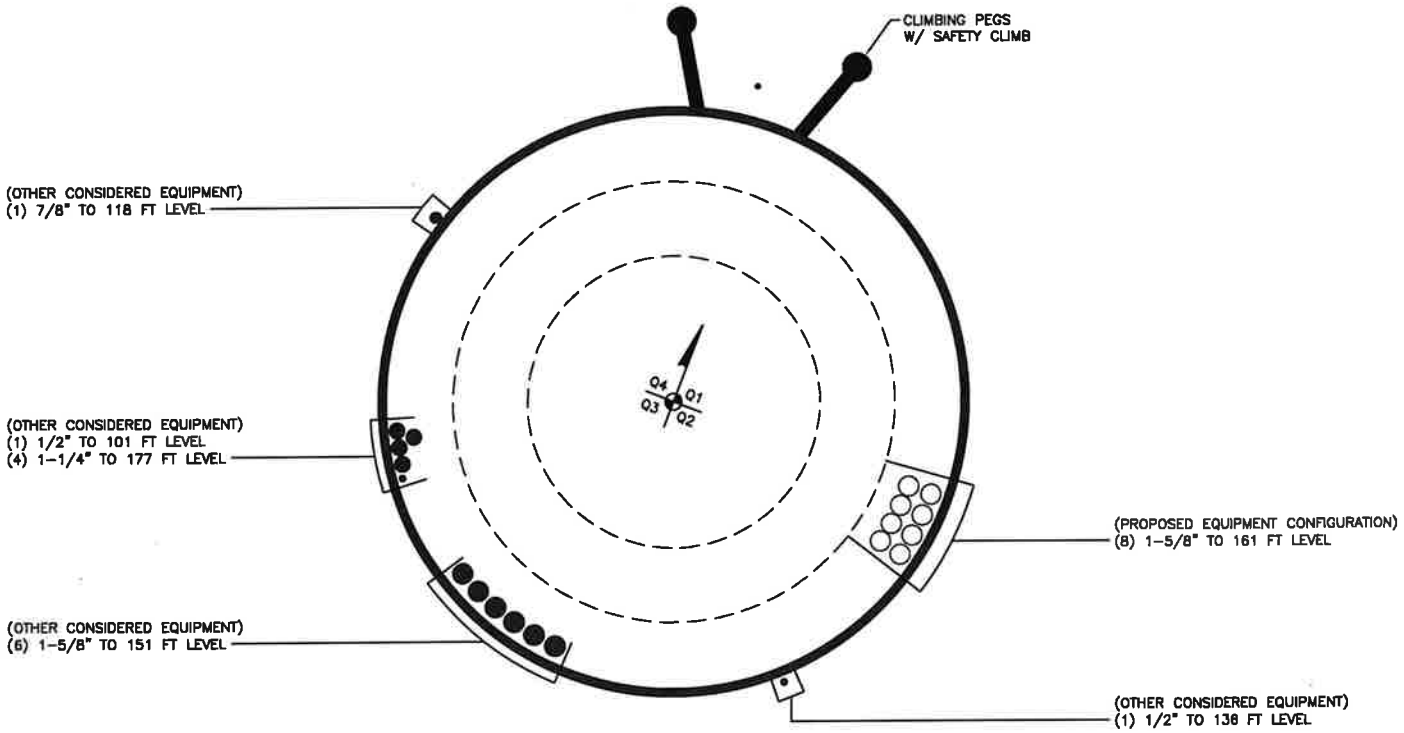
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	180 - 175	Pole	P24x0.25	1	-2.570	695.378	**	**
L2	175 - 170	Pole	P24x0.25	2	-2.949	695.378	**	**
L3	170 - 165	Pole	P24x0.25	3	-3.333	695.378	**	**
L4	165 - 160	Pole	P24x0.25	4	-7.202	695.378	**	**
L5	160 - 155	Pole	P24x0.25	5	-7.676	695.378	**	**
L6	155 - 150	Pole	P24x0.25	6	-9.224	695.378	**	**
L7	150 - 145	Pole	P30x0.375	7	-10.059	1376.613	**	**
L8	145 - 140	Pole	P30x0.375	8	-10.900	1376.613	**	**
L9	140 - 135	Pole	P30x0.375	9	-11.829	1376.613	**	**
L10	135 - 130	Pole	P30x0.375	10	-12.696	1376.613	**	**
L11	130 - 125	Pole	P30x0.375	11	-13.576	1376.613	**	**
L12	125 - 120	Pole	P30x0.375	12	-14.470	1376.613	**	**

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L13	120 - 115	Pole	P36x0.375	13	-15.571	1564.605	**	**
L14	115 - 110	Pole	P36x0.375	14	-16.591	1564.605	**	**
L15	110 - 107.583	Pole	P36x0.375	15	-17.086	1564.605	**	**
L16	107.583 - 107.333	Pole	P36x0.525	16	-17.162	2322.274	**	**
L17	107.333 - 102.333	Pole	P36x0.525	17	-18.517	2322.274	**	**
L18	102.333 - 97.333	Pole	P36x0.525	18	-19.968	2322.274	**	**
L19	97.333 - 92.333	Pole	P36x0.525	19	-21.346	2322.274	**	**
L20	92.333 - 90	Pole	P36x0.525	20	-21.991	2322.274	**	**
L21	90 - 89.75	Pole	P42x0.6125	21	-22.086	3160.867	**	**
L22	89.75 - 84.75	Pole	P42x0.6125	22	-23.864	3160.867	**	**
L23	84.75 - 79.75	Pole	P42x0.6125	23	-25.651	3160.867	**	**
L24	79.75 - 74.75	Pole	P42x0.6125	24	-27.445	3160.867	**	**
L25	74.75 - 69.75	Pole	P42x0.6125	25	-29.246	3160.867	**	**
L26	69.75 - 64.75	Pole	P42x0.6125	26	-31.053	3160.867	**	**
L27	64.75 - 60	Pole	P42x0.6125	27	-32.775	3160.867	**	**
L28	60 - 59.75	Pole	P48x0.5	28	-32.868	2781.513	**	**
L29	59.75 - 54.75	Pole	P48x0.5	29	-34.560	2781.513	**	**
L30	54.75 - 49.75	Pole	P48x0.5	30	-36.262	2781.513	**	**
L31	49.75 - 46.583	Pole	P48x0.5	31	-37.343	2781.513	**	**
L32	46.583 - 46.333	Pole	P48x0.675	32	-37.460	3983.143	**	**
L33	46.333 - 41.333	Pole	P48x0.675	33	-39.669	3983.143	**	**
L34	41.333 - 36.333	Pole	P48x0.675	34	-41.887	3983.143	**	**
L35	36.333 - 31.333	Pole	P48x0.675	35	-44.110	3983.143	**	**
L36	31.333 - 30	Pole	P48x0.675	36	-44.702	3983.143	**	**
L37	30 - 29.75	Pole	P48x0.7125	37	-44.831	4201.092	**	**
L38	29.75 - 24.75	Pole	P48x0.7125	38	-47.166	4201.092	**	**
L39	24.75 - 19.75	Pole	P48x0.7125	39	-49.511	4201.092	**	**
L40	19.75 - 14.75	Pole	P48x0.7125	40	-51.862	4201.092	**	**
L41	14.75 - 9.75	Pole	P48x0.7125	41	-54.217	4201.092	**	**
L42	9.75 - 4.75	Pole	P48x0.7125	42	-56.578	4201.092	**	**
L43	4.75 - 0	Pole	P48x0.7125	43	-58.824	4201.092	**	**
							Summary	
						Pole (L12)	**	**
						RATING =	**	**

** Check Additional Calculations

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876337

APPENDIX C

ADDITIONAL CALCULATIONS

CCIpole

per TIA-222- H

Site BU: 876337

Work Order: 1656850

CROWN CASTLE

Pole Geometry

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	180	30		0	24	24	0.25		A53-B-42
2	150	30		0	30.00	30	0.375		A53-B-42
3	120	30		0	36.00	36	0.375		A53-B-42
4	90	30		0	42.00	42	0.375		A53-B-42
5	60	30		0	48.00	48	0.5		A53-B-42
6	30	30		0	48.00	48	0.5		A53-B-42

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	30	channel	MP3-08 (1.1875in)	3	0						126						234					
2	30	46.583	channel	MP3-06 (1.1875in)	3	0						126						234					
3	60	90	channel	MP3-08 (1.1875in)	3	0						126						234					
4	90	107.583	channel	MP3-05 (1.1875in)	3	0						126						234					
5																							
6																							
7																							
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	Bottom Termination Length (in)	Top Termination Length (in)	L_u (in)	Net Area (in^2)	Bolt Hole Size (in)	Reinforcement Material
1	7.93	2.8	10.32	0.95	47.000	44.000	24.000	9.370	1.1875	A572-65
2	6.89	2.61	8.47	0.93	41.000	41.000	24.000	7.670	1.1875	A572-65
3	7.93	2.8	10.32	0.95	47.000	44.000	24.000	9.370	1.1875	A572-65
4	5.33	2.09	5.65	0.79	29.000	29.000	18.000	5.025	1.1875	A572-65

TNX Geometry Input

Increment (ft): 5

	Section Height (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Tapered Pole Grade	Weight Multiplier
1	180 - 175	5		0	24.000	24.000	0.25	A53-B-42	1.000
2	175 - 170	5		0	24.000	24.000	0.25	A53-B-42	1.000
3	170 - 165	5		0	24.000	24.000	0.25	A53-B-42	1.000
4	165 - 160	5		0	24.000	24.000	0.25	A53-B-42	1.000
5	160 - 155	5		0	24.000	24.000	0.25	A53-B-42	1.000
6	155 - 150	5	0	0	24.000	24.000	0.25	A53-B-42	1.000
7	150 - 145	5		0	30.000	30.000	0.375	A53-B-42	1.000
8	145 - 140	5		0	30.000	30.000	0.375	A53-B-42	1.000
9	140 - 135	5		0	30.000	30.000	0.375	A53-B-42	1.000
10	135 - 130	5		0	30.000	30.000	0.375	A53-B-42	1.000
11	130 - 125	5		0	30.000	30.000	0.375	A53-B-42	1.000
12	125 - 120	5	0	0	30.000	30.000	0.375	A53-B-42	1.000
13	120 - 115	5		0	36.000	36.000	0.375	A53-B-42	1.000
14	115 - 110	5		0	36.000	36.000	0.375	A53-B-42	1.000
15	110 - 107.583	2.417		0	36.000	36.000	0.375	A53-B-42	1.000
16	107.583 - 107.333	0.25		0	36.000	36.000	0.525	A53-B-42	1.007
17	107.333 - 102.333	5		0	36.000	36.000	0.525	A53-B-42	1.007
18	102.333 - 97.333	5		0	36.000	36.000	0.525	A53-B-42	1.007
19	97.333 - 92.333	5		0	36.000	36.000	0.525	A53-B-42	1.007
20	92.333 - 90	2.333	0	0	36.000	36.000	0.525	A53-B-42	1.007
21	90 - 89.75	0.25		0	42.000	42.000	0.6125	A53-B-42	1.005
22	89.75 - 84.75	5		0	42.000	42.000	0.6125	A53-B-42	1.005
23	84.75 - 79.75	5		0	42.000	42.000	0.6125	A53-B-42	1.005
24	79.75 - 74.75	5		0	42.000	42.000	0.6125	A53-B-42	1.005
25	74.75 - 69.75	5		0	42.000	42.000	0.6125	A53-B-42	1.005
26	69.75 - 64.75	5		0	42.000	42.000	0.6125	A53-B-42	1.005
27	64.75 - 60	4.75	0	0	42.000	42.000	0.6125	A53-B-42	1.005
28	60 - 59.75	0.25		0	48.000	48.000	0.5	A53-B-42	1.000
29	59.75 - 54.75	5		0	48.000	48.000	0.5	A53-B-42	1.000
30	54.75 - 49.75	5		0	48.000	48.000	0.5	A53-B-42	1.000
31	49.75 - 46.583	3.167		0	48.000	48.000	0.5	A53-B-42	1.000
32	46.583 - 46.333	0.25		0	48.000	48.000	0.675	A53-B-42	0.997
33	46.333 - 41.333	5		0	48.000	48.000	0.675	A53-B-42	0.997
34	41.333 - 36.333	5		0	48.000	48.000	0.675	A53-B-42	0.997
35	36.333 - 31.333	5		0	48.000	48.000	0.675	A53-B-42	0.997
36	31.333 - 30	1.333	0	0	48.000	48.000	0.675	A53-B-42	0.997
37	30 - 29.75	0.25		0	48.000	48.000	0.7125	A53-B-42	0.997
38	29.75 - 24.75	5		0	48.000	48.000	0.7125	A53-B-42	0.997
39	24.75 - 19.75	5		0	48.000	48.000	0.7125	A53-B-42	0.997
40	19.75 - 14.75	5		0	48.000	48.000	0.7125	A53-B-42	0.997
41	14.75 - 9.75	5		0	48.000	48.000	0.7125	A53-B-42	0.997
42	9.75 - 4.75	5		0	48.000	48.000	0.7125	A53-B-42	0.997
43	4.75 - 0	4.75		0	48.000	48.000	0.7125	A53-B-42	0.997

TNX Section Forces

Increment (ft): 5

	Section Height (ft)	TNX Output P_u (K)	M_{ux} (kip-ft)	V_u (K)
1	180 - 175	2.57	17.64	5.59
2	175 - 170	2.95	46.46	5.94
3	170 - 165	3.33	77.05	6.29
4	165 - 160	7.20	117.39	14.04
5	160 - 155	7.68	188.71	14.46
6	155 - 150	9.22	263.09	16.10
7	150 - 145	10.06	344.63	16.53
8	145 - 140	10.90	428.30	16.95
9	140 - 135	11.83	514.22	17.41
10	135 - 130	12.70	602.22	17.80
11	130 - 125	13.58	692.12	18.17
12	125 - 120	14.47	783.82	18.52
13	120 - 115	15.57	879.38	19.30
14	115 - 110	16.59	976.94	19.73
15	110 - 107.583	17.09	1024.86	19.93
16	107.583 - 107.333	17.16	1029.84	19.95
17	107.333 - 102.333	18.52	1130.67	20.39
18	102.333 - 97.333	19.97	1233.99	20.86
19	97.333 - 92.333	21.35	1339.24	21.26
20	92.333 - 90	21.99	1389.02	21.44
21	90 - 89.75	22.09	1394.43	21.67
22	89.75 - 84.75	23.86	1504.00	22.16
23	84.75 - 79.75	25.65	1615.97	22.64
24	79.75 - 74.75	27.45	1730.25	23.09
25	74.75 - 69.75	29.25	1846.72	23.52
26	69.75 - 64.75	31.05	1965.27	23.92
27	64.75 - 60	32.78	2079.72	24.29
28	60 - 59.75	32.87	2085.84	24.49
29	59.75 - 54.75	34.56	2209.36	24.93
30	54.75 - 49.75	36.26	2334.97	25.33
31	49.75 - 46.583	37.34	2415.55	25.57
32	46.583 - 46.333	37.46	2421.94	25.59
33	46.333 - 41.333	39.67	2550.86	25.99
34	41.333 - 36.333	41.89	2681.68	26.36
35	36.333 - 31.333	44.11	2814.26	26.69
36	31.333 - 30	44.70	2849.88	26.78
37	30 - 29.75	44.83	2856.62	26.95
38	29.75 - 24.75	47.17	2992.10	27.26
39	24.75 - 19.75	49.51	3129.08	27.55
40	19.75 - 14.75	51.86	3267.48	27.83
41	14.75 - 9.75	54.22	3407.19	28.08
42	9.75 - 4.75	56.58	3548.13	28.32
43	4.75 - 0	58.82	3683.07	28.53

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
180 - 175	Pole	TP24x24x0.25	Pole	4.6%	Pass
175 - 170	Pole	TP24x24x0.25	Pole	11.6%	Pass
170 - 165	Pole	TP24x24x0.25	Pole	19.0%	Pass
165 - 160	Pole	TP24x24x0.25	Pole	29.4%	Pass
160 - 155	Pole	TP24x24x0.25	Pole	46.6%	Pass
155 - 150	Pole	TP24x24x0.25	Pole	64.7%	Pass
150 - 145	Pole	TP30x30x0.375	Pole	35.4%	Pass
145 - 140	Pole	TP30x30x0.375	Pole	43.9%	Pass
140 - 135	Pole	TP30x30x0.375	Pole	52.6%	Pass
135 - 130	Pole	TP30x30x0.375	Pole	61.5%	Pass
130 - 125	Pole	TP30x30x0.375	Pole	70.6%	Pass
125 - 120	Pole	TP30x30x0.375	Pole	79.9%	Pass
120 - 115	Pole	TP36x36x0.375	Pole	63.6%	Pass
115 - 110	Pole	TP36x36x0.375	Pole	70.6%	Pass
110 - 107.58	Pole	TP36x36x0.375	Pole	74.1%	Pass
107.58 - 107.33	Pole + Reinf.	TP36x36x0.525	Pole	53.3%	Pass
107.33 - 102.33	Pole + Reinf.	TP36x36x0.525	Pole	58.5%	Pass
102.33 - 97.33	Pole + Reinf.	TP36x36x0.525	Pole	63.9%	Pass
97.33 - 92.33	Pole + Reinf.	TP36x36x0.525	Pole	69.3%	Pass
92.33 - 90	Pole + Reinf.	TP36x36x0.525	Pole	71.9%	Pass
90 - 89.75	Pole + Reinf.	TP42x42x0.6125	Pole	46.4%	Pass
89.75 - 84.75	Pole + Reinf.	TP42x42x0.6125	Pole	50.0%	Pass
84.75 - 79.75	Pole + Reinf.	TP42x42x0.6125	Pole	53.8%	Pass
79.75 - 74.75	Pole + Reinf.	TP42x42x0.6125	Pole	57.6%	Pass
74.75 - 69.75	Pole + Reinf.	TP42x42x0.6125	Pole	61.5%	Pass
69.75 - 64.75	Pole + Reinf.	TP42x42x0.6125	Pole	65.4%	Pass
64.75 - 60	Pole + Reinf.	TP42x42x0.6125	Pole	69.2%	Pass
60 - 59.75	Pole	TP48x48x0.5	Pole	63.8%	Pass
59.75 - 54.75	Pole	TP48x48x0.5	Pole	67.6%	Pass
54.75 - 49.75	Pole	TP48x48x0.5	Pole	71.4%	Pass
49.75 - 46.58	Pole	TP48x48x0.5	Pole	73.9%	Pass
46.58 - 46.33	Pole + Reinf.	TP48x48x0.675	Pole	55.6%	Pass
46.33 - 41.33	Pole + Reinf.	TP48x48x0.675	Pole	58.6%	Pass
41.33 - 36.33	Pole + Reinf.	TP48x48x0.675	Pole	61.6%	Pass
36.33 - 31.33	Pole + Reinf.	TP48x48x0.675	Pole	64.7%	Pass
31.33 - 30	Pole + Reinf.	TP48x48x0.675	Pole	65.5%	Pass
30 - 29.75	Pole + Reinf.	TP48x48x0.7125	Pole	62.2%	Pass
29.75 - 24.75	Pole + Reinf.	TP48x48x0.7125	Pole	65.2%	Pass
24.75 - 19.75	Pole + Reinf.	TP48x48x0.7125	Pole	68.1%	Pass
19.75 - 14.75	Pole + Reinf.	TP48x48x0.7125	Pole	71.2%	Pass
14.75 - 9.75	Pole + Reinf.	TP48x48x0.7125	Pole	74.2%	Pass
9.75 - 4.75	Pole + Reinf.	TP48x48x0.7125	Pole	77.3%	Pass
4.75 - 0	Pole + Reinf.	TP48x48x0.7125	Pole	80.2%	Pass
				Summary	
			Pole	80.2%	Pass
			Reinforcement	65.8%	Pass
			Overall	80.2%	Pass

Additional Calculations

Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity*				
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1	R2	R3	R4
180 - 175	1315	n/a	1315	18.65	n/a	18.65	4.6%				
175 - 170	1315	n/a	1315	18.65	n/a	18.65	11.6%				
170 - 165	1315	n/a	1315	18.65	n/a	18.65	19.0%				
165 - 160	1315	n/a	1315	18.65	n/a	18.65	29.4%				
160 - 155	1315	n/a	1315	18.65	n/a	18.65	46.6%				
155 - 150	1315	n/a	1315	18.65	n/a	18.65	64.7%				
150 - 145	3829	n/a	3829	34.90	n/a	34.90	35.4%				
145 - 140	3829	n/a	3829	34.90	n/a	34.90	43.9%				
140 - 135	3829	n/a	3829	34.90	n/a	34.90	52.6%				
135 - 130	3829	n/a	3829	34.90	n/a	34.90	61.5%				
130 - 125	3829	n/a	3829	34.90	n/a	34.90	70.6%				
125 - 120	3829	n/a	3829	34.90	n/a	34.90	79.9%				
120 - 115	6659	n/a	6659	41.97	n/a	41.97	63.6%				
115 - 110	6659	n/a	6659	41.97	n/a	41.97	70.6%				
110 - 107.58	6659	n/a	6659	41.97	n/a	41.97	74.1%				
107.58 - 107.33	6659	2629	9288	41.97	16.95	58.92	53.3%				45.2%
107.33 - 102.33	6659	2629	9288	41.97	16.95	58.92	58.5%				49.6%
102.33 - 97.33	6659	2629	9288	41.97	16.95	58.92	63.9%				54.1%
97.33 - 92.33	6659	2629	9288	41.97	16.95	58.92	69.3%				58.7%
92.33 - 90	6659	2629	9288	41.97	16.95	58.92	71.9%				60.9%
90 - 89.75	10622	6570	17191	49.04	30.96	80.00	46.4%			37.2%	
89.75 - 84.75	10622	6570	17191	49.04	30.96	80.00	50.0%			40.1%	
84.75 - 79.75	10622	6570	17191	49.04	30.96	80.00	53.8%			43.1%	
79.75 - 74.75	10622	6570	17191	49.04	30.96	80.00	57.6%			46.1%	
74.75 - 69.75	10622	6570	17191	49.04	30.96	80.00	61.5%			49.2%	
69.75 - 64.75	10622	6570	17191	49.04	30.96	80.00	65.4%			52.4%	
64.75 - 60	10622	6570	17191	49.04	30.96	80.00	69.2%			55.5%	
60 - 59.75	21045	n/a	21045	74.61	n/a	74.61	63.8%				
59.75 - 54.75	21045	n/a	21045	74.61	n/a	74.61	67.6%				
54.75 - 49.75	21045	n/a	21045	74.61	n/a	74.61	71.4%				
49.75 - 46.58	21045	n/a	21045	74.61	n/a	74.61	73.9%				
46.58 - 46.33	21046	6934	27979	74.61	25.41	100.02	55.6%		46.0%		
46.33 - 41.33	21046	6934	27979	74.61	25.41	100.02	58.6%		48.5%		
41.33 - 36.33	21046	6934	27979	74.61	25.41	100.02	61.6%		51.0%		
36.33 - 31.33	21046	6934	27979	74.61	25.41	100.02	64.7%		53.5%		
31.33 - 30	21046	6934	27979	74.61	25.41	100.02	65.5%		54.2%		
30 - 29.75	21046	8475	29520	74.61	30.96	105.57	62.2%	51.0%			
29.75 - 24.75	21046	8475	29520	74.61	30.96	105.57	65.2%	53.4%			
24.75 - 19.75	21046	8475	29520	74.61	30.96	105.57	68.1%	55.9%			
19.75 - 14.75	21046	8475	29520	74.61	30.96	105.57	71.2%	58.4%			
14.75 - 9.75	21046	8475	29520	74.61	30.96	105.57	74.2%	60.9%			
9.75 - 4.75	21046	8475	29520	74.61	30.96	105.57	77.3%	63.4%			
4.75 - 0	21046	8475	29520	74.61	30.96	105.57	80.2%	65.8%			

Note: Section capacity checked in 5 degree increments.
Rating per TIA-222-H Section 15.5.

Monopole Flange Plate Connection

Elevation = 150 ft.

CROWN CASTLE

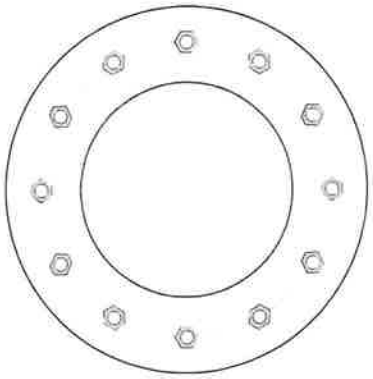
BU #	876337
Site Name	ORELINE SANITATION,
Order #	465673, Rev. 1

TIA-222 Revision	H

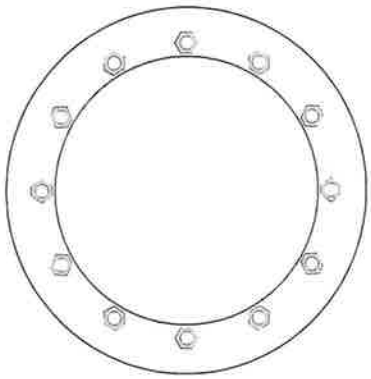
Applied Loads	
Moment (kip-ft)	263.09
Axial Force (kips)	9.22
Shear Force (kips)	16.10

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(12) 1-1/2" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 33" BC

Top Plate Data

41" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Top Pole Data

24" x 0.25" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Plate Data

41" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

30" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	31.10	
Allowable (kips)	111.02	
Stress Rating:	**26.7%**	Pass

Top Plate Capacity

Max Stress (ksi):	12.22	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**35.9%**	Pass
Tension Side Stress Rating:	**19.3%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	4.30	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**12.7%**	Pass
Tension Side Stress Rating:	**3.2%**	Pass

Monopole Flange Plate Connection

Elevation = 120 ft.

CROWN CASTLE

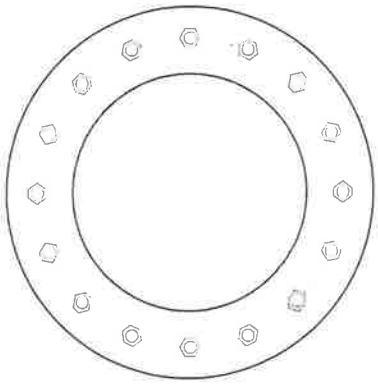
BU #	876337
Site Name	ORELINE SANITATION,
Order #	465673, Rev. 1

TIA-222 Revision	H

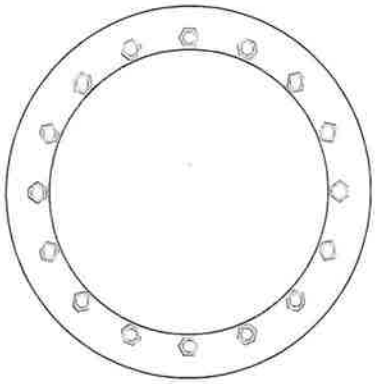
Applied Loads	
Moment (kip-ft)	783.82
Axial Force (kips)	14.47
Shear Force (kips)	18.52

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(16) 1-1/2" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 39" BC

Top Plate Data

47" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Top Pole Data

30" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Plate Data

47" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

36" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	59.35	
Allowable (kips)	111.02	
Stress Rating:	**50.9%**	Pass

Top Plate Capacity

Max Stress (ksi):	24.84	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**73.0%**	Pass
Tension Side Stress Rating:	**39.7%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	9.00	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**26.5%**	Pass
Tension Side Stress Rating:	**6.5%**	Pass

Monopole Flange Plate Connection

Elevation = 90 ft.

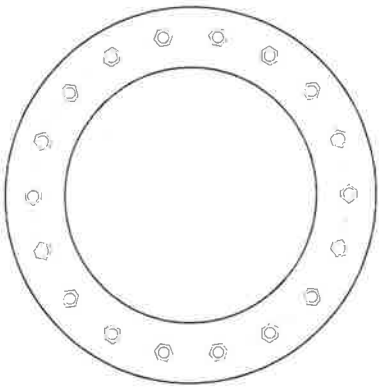
CROWN CASTLE

BU #	876337
Site Name	ORELINE SANITATION,
Order #	465673, Rev. 1
TIA-222 Revision	H

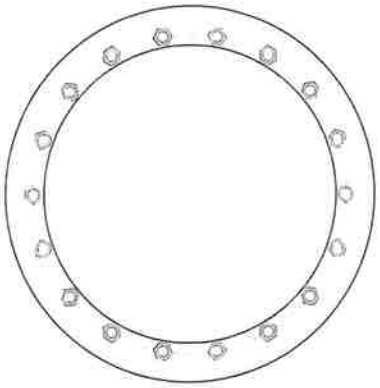
Applied Loads	
Moment (kip-ft)	1389.02
Axial Force (kips)	21.99
Shear Force (kips)	21.44

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(18) 1-1/2" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 45" BC

Top Plate Data

53" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Top Pole Data

36" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Plate Data

53" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

42" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	81.05	
Allowable (kips)	111.02	
Stress Rating:	**69.5%**	Pass

Top Plate Capacity

Max Stress (ksi):	33.31	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**97.9%**	Pass
Tension Side Stress Rating:	**50.3%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	11.79	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**34.7%**	Pass
Tension Side Stress Rating:	**8.5%**	Pass

Welded-Plate Monopole Bridge Stiffeners
per TIA-222-H

CROWN CASTLE

Site Data

BU#: *876337*
Site Name: *SHORELINE SANITATION,CT*
Order #: *465673, Rev. 1*

Factored Loads at Splice Elevation		
Moment:	2079.72	ft-kips
Axial:	32.78	kips
Shear:	24.29	kips

Elevation:	60	ft

Splice Bolt Data		
Quantity:	20	
Bolt Diameter:	1.5	in
Bolt Circle:	51	in

Pole Data		
Upper Diam:	42	in
Upper Thickness	0.375	in
Lower Diam:	48	in
Lower Thickness	0.5	in
Pipe Steel (Fy):	42	ksi

Bridge Stiffener Data		
Quantity:	3	
Total Length:	54.0	in
Plate Thickness:	1.250	in
Steel Grade (Fy):	65.0	ksi
Steel Ultimate (Fu):	80.0	ksi
Weld Type:	Fillet (both sides)	
Weld Size:	0.375	in
Weld Strength:	70	ksi
Upper Weld Length:	18	in
Upper Weld, C:	2.409	Table 8-4
Upper Plate Width:	6	in
Lower Weld Length:	18	in
Lower Weld, C:	2.409	Table 8-4
Lower Plate Width:	6	in
Gap PL Length:	18.0	in
Gap PL Width:	3	in

Stress Increase Factor		
ASIF:	1.000	

Stiffener Results	91.0%	
Maximum Compression:	157.5	kips
Allowable Compression:	173.2	kips
Compression Stress Ratio:	91.0%	
Maximum Tension:	157.5	kips
Allowable Tension:	219.4	kips
Tension Stress Ratio:	71.8%	
Maximum Flexure:	708.9	in.kips
Allowable Flexure:	3948.8	in.kips
Bending&Shear Stress Ratio:	15.9%	

Weld Results	80.7%	
Upper Weld Eccentric Load:	157.54	kip
Allowable Weld Strength:	195.13	kip
Upper Weld Strength Ratio:	80.7%	
Upper Weld Eccentric Load:	157.54	kip
Allowable Weld Strength:	195.13	kip
Lower Weld Strength Ratio:	80.7%	

Pole Results	46.3%	
Punching Shear Stress:	13.13	kip/in
Allowable Punching Stress:	28.35	kip/in
Punching Shear Stress Ratio:	46.3%	

Loads to Use to Check Flange and Bolts w / CCIPlate		
Moment:	1578	ft.kips
Axial:	32.8	kips
Shear:	24.3	kips

Monopole Flange Plate Connection

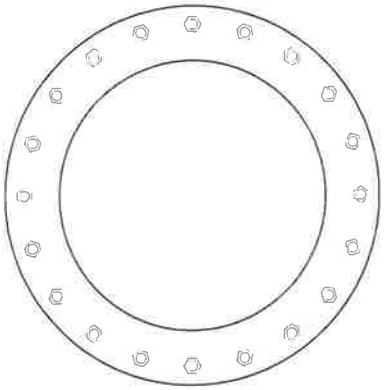
Elevation = 60 ft.

BU #	876337
Site Name	ORELINE SANITATION,
Order #	465673, Rev. 1
TIA-222 Revision	H

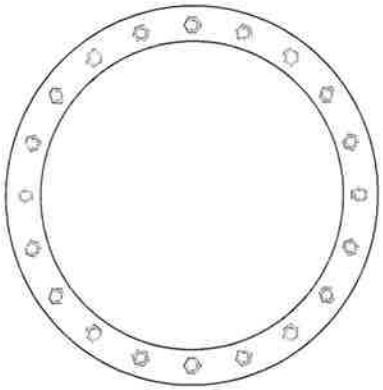
Applied Loads	
Moment (kip-ft)	1578.00
Axial Force (kips)	32.80
Shear Force (kips)	24.30

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(20) 1-1/2" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 53" BC

Top Plate Data

59" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Top Pole Data

42" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Plate Data

59" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

48" x 0.5" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	69.79	
Allowable (kips)	111.02	
Stress Rating:	**59.9%**	Pass

Top Plate Capacity

Max Stress (ksi):	33.66	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**98.9%**	Pass
Tension Side Stress Rating:	**51.9%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	15.58	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**45.8%**	Pass
Tension Side Stress Rating:	**16.5%**	Pass

Welded-Plate Monopole Bridge Stiffeners
per TIA-222-H

CROWN CASTLE

Site Data

BU#: *876337*
Site Name: *SHORELINE SANITATION,CT*
Order #: *465673, Rev. 1*

Factored Loads at Splice Elevation		
Moment:	2849.88	ft-kips
Axial:	44.7	kips
Shear:	26.78	kips

Elevation:	30	ft

Splice Bolt Data		
Quantity:	20	
Bolt Diameter:	1.5	in
Bolt Circle:	53	in

Pole Data		
Upper Diam:	48	in
Upper Thickness	0.5	in
Lower Diam:	48	in
Lower Thickness	0.5	in
Pipe Steel (Fy):	42	ksi

Bridge Stiffener Data		
Quantity:	3	
Total Length:	48.0	in
Plate Thickness:	1.250	in
Steel Grade (Fy):	65.0	ksi
Steel Ultimate (Fu):	80.0	ksi
Weld Type:	Fillet (both sides)	
Weld Size:	0.375	in
Weld Strength:	70	ksi
Upper Weld Length:	24	in
Upper Weld, C:	2.734	Table 8-4
Upper Plate Width:	6	in
Lower Weld Length:	24	in
Lower Weld, C:	2.734	Table 8-4
Lower Plate Width:	6	in
Gap PL Length:	0.0	in
Gap PL Width:	3	in

Stress Increase Factor		
ASIF:	1.000	

Stiffener Results	98.1%	
Maximum Compression:	215.3	kips
Allowable Compression:	219.4	kips
Compression Stress Ratio:	98.1%	
Maximum Tension:	215.3	kips
Allowable Tension:	219.4	kips
Tension Stress Ratio:	98.1%	
Maximum Flexure:	968.7	in.kips
Allowable Flexure:	7020.0	in.kips
Bending&Shear Stress Ratio:	13.4%	

Weld Results	72.9%	
Upper Weld Eccentric Load:	215.27	kip
Allowable Weld Strength:	295.27	kip
Upper Weld Strength Ratio:	72.9%	
Upper Weld Eccentric Load:	215.27	kip
Allowable Weld Strength:	295.27	kip
Lower Weld Strength Ratio:	72.9%	

Pole Results	26.7%	
Punching Shear Stress:	10.09	kip/in
Allowable Punching Stress:	37.80	kip/in
Punching Shear Stress Ratio:	26.7%	

Loads to Use to Check Flange and Bolts w / CCIPlate		
Moment:	2083	ft.kips
Axial:	44.7	kips
Shear:	26.8	kips

Monopole Flange Plate Connection

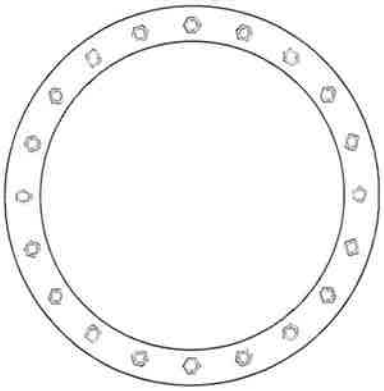
Elevation = 30 ft.

BU #	876337
Site Name	ORELINE SANITATION,
Order #	465673, Rev. 1
TIA-222 Revision	H

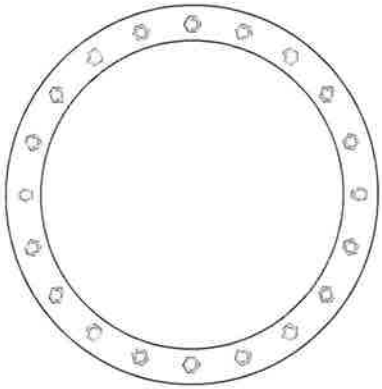
Applied Loads	
Moment (kip-ft)	2083.00
Axial Force (kips)	44.70
Shear Force (kips)	26.80

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(20) 1-1/2" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 53" BC

Top Plate Data

59" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

59" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

48" x 0.5" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data

48" x 0.5" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	92.06	
Allowable (kips)	111.02	
Stress Rating:	**79.0%**	Pass

Top Plate Capacity

Max Stress (ksi):	20.58	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**60.5%**	Pass
Tension Side Stress Rating:	**21.8%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	20.58	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**60.5%**	Pass
Tension Side Stress Rating:	**21.8%**	Pass

Monopole Base Plate Connection

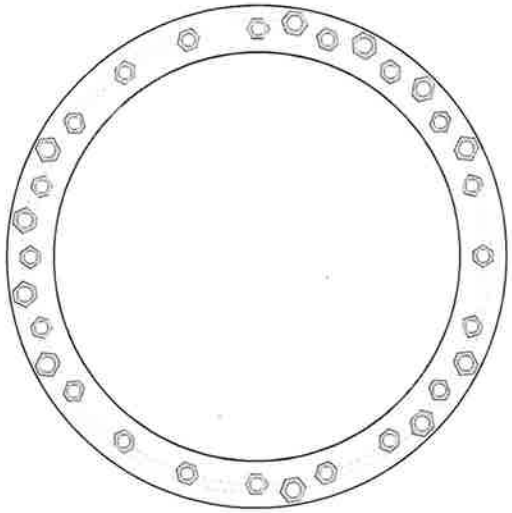
CROWN CASTLE

Site Info	
BU #	876337
Site Name	ORELINE SANITATION,
Order #	465673, Rev. 1

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{gr} (in)	0

Applied Loads	
Moment (kip-ft)	3683.07
Axial Force (kips)	58.82
Shear Force (kips)	28.53

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

GROUP 1: (20) 1-1/2" ø bolts (A354-BC N; Fy=109 ksi, Fu=125 ksi) on 53.5" BC
GROUP 2: (11) 1-3/4" ø bolts (A687 N; Fy=105 ksi, Fu=125 ksi) on 55.5" BC
pos. (deg): 27, 45, 63, 81, 153, 171, 189, 207, 279, 315, 333

Base Plate Data

59" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Stiffener Data

N/A

Pole Data

48" x 0.5" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

GROUP 1:		
Pu_c = 105.9	ϕPn_c = 153.69	**Stress Rating**
Vu = 1.43	ϕVn = 46.11	**65.7%**
Mu = n/a	ϕMn = n/a	Pass
GROUP 2:		
Pu_c = 144.16	ϕPn_c = 199.5	**Stress Rating**
Vu = 0	ϕVn = 59.85	**68.8%**
Mu = n/a	ϕMn = n/a	Pass

Base Plate Summary

Max Stress (ksi):	24.59	(Flexural)
Allowable Stress (ksi):	32.4	
Stress Rating:	**72.3%**	Pass

Pier and Pad Foundation

BU # :	876337
Site Name:	SHORELINE SANI
App. Number:	465673, Rev. 1

TIA-222 Revision:	H
Tower Type:	Monopole

Top & Bot. Pad Rein. Different?:	☐
Block Foundation?:	☑

Superstructure Analysis Reactions

Compression, P_{comp}:	59	kips
Base Shear, Vu_comp:	29	kips
Moment, M_u:	3683	ft-kips
Tower Height, **H**:	180	ft
BP Dist. Above Fdn, bp_{dist}:	3	in
Bolt Circle / Bearing Plate Width, **BC**:	53.5	in

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	216.96	29.00	**12.7%**	**Pass**
Bearing Pressure (ksf)	90.00	3.60	**3.8%**	**Pass**
*Overturning (kip*ft)*	8170.61	3902.91	**47.8%**	**Pass**
*Pad Flexure (kip*ft)*	13114.70	1611.49	**11.7%**	**Pass**
Pad Shear - 1-way (kips)	2341.76	124.05	**5.0%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.190	0.001	**0.7%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	22734.15	0.00	**0.0%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**47.8%**
Structural Rating*:	**11.7%**

Pad Properties

Depth, **D**:	4.666	ft
Pad Width, **W**:	25	ft
Pad Thickness, **T**:	7.333	ft
Pad Rebar Size (Bottom), **Sp**:	11	
Pad Rebar Quantity (Bottom), **mp**:	23	
Pad Clear Cover, cc_{pad}:	3.6	in

Material Properties

Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	4000	psi
Dry Concrete Density, δc:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	120	pcf
Ultimate Gross Bearing, Qult:	120.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:		
Neglected Depth, **N**:	3.33	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, **gw**:	N/A	ft

<--Toggle between Gross and Net

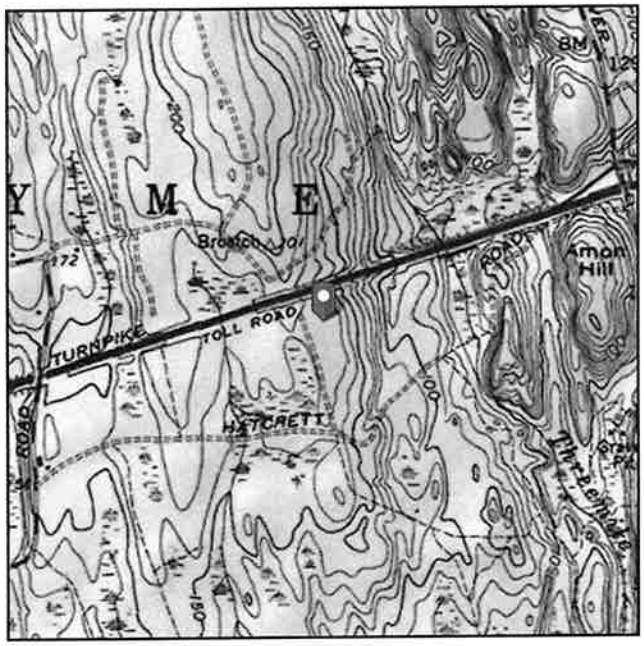
Version 3.1.0

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 172.73 ft (NAVD 88)
Latitude: 41.318778
Longitude: -72.270722



Wind

Results:	**79 Vmph**
Wind Speed:	133 Vmph
10-year MRI	79 Vmph
25-year MRI	89 Vmph
50-year MRI	98 Vmph
100-year MRI	108 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Wed Dec 19 2018

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 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed Dec 19 2018

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 50-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.

ATTACHMENT 6

Bradley E. Byrom, P.E., S.E.
Senior Project Engineer
Engineering & Operations
Tel: (724) 416-9657
Bradley.Byrom@crowncastle.com

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317

Date: **September 11, 2019**

Attn. Anthony Befera
Principal Engineer – Real Estate/Regulatory
Verizon Wireless
20 Alexander Drive, 2nd Floor
Wallingford, CT 06492

Subject: **Foundation Cracks**

Crown Castle Designation:

Crown Castle BU Number: 876337
Crown Castle Site Name: Shoreline Sanitation

Site Data:

30 Short Hills Road, Old Lymen, New London County, CT
Latitude 41° 19' 7.6", Longitude -72° 16' 14.6"
180 Foot – Monopole Tower

Dear Anthony Befera,

This letter is being written to address the existing foundation cracking that was reported to Crown Castle on Tuesday, August 27, 2019. Foundation cracks were observed during a maintenance inspection in October 2012 (NOC Ticket# 658602) on the exposed north and east faces of the foundation. The cracks were subsequently repaired and monitored with crack gauges. The cracking on the edge of this 7'-4" thick foundation pad may be caused by a cold joint or improper consolidation of the concrete during construction, delamination of the surface layer of concrete from weathering, and/or corrosion of embedded steel near the surface. In my opinion, the cracking pattern is not consistent with structural overstress, and does not impact the structural capacity of the foundation. As such, the foundation cracking should be repaired in the course of normal maintenance in accordance with the Crown Castle Standard ENG-BUL-10118 to reduce the likelihood of water infiltration and additional deterioration.

It is therefore acceptable to proceed with Verizon's equipment installation.

Sincerely,

STATE OF CONNECTICUT
BRADLEY E. BYROM
No. 31144
LICENSED PROFESSIONAL ENGINEER

9/11/2019

Bradley E. Byrom, P.E., S.E.
Senior Project Engineer

ATTACHMENT 7

Site Name: Old Lyme Relo 2 CT

Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissible Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW 700	746	2	1055	2109.24	161	0.0293	0.497333333	5.88%
VZW AWS	2145	4	1766	7062.52	161	0.0980	1.0	9.80%
VZW Cellular CDMA	869	3	294	883.44	161	0.0123	0.579333333	2.12%
VZW PCS	1970	4	1200	4799.08	161	0.0666	1.0	6.66%

Total Percentage of Maximum Permissible Exposure 24.46%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Section 1.13101 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used, including the following assumptions:
1. closest accessible point is distance from antenna to base of pole;
2. continuous transmission from all available channels at full power for indefinite time period; and,
3. all RF energy is assumed to be directed solely to the base of the pole.

ATTACHMENT 8

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 11/04/2019 US POSTAGE $002.79⁰ ZIP 06103 041L12203937
	Postmaster, per *(name of receiving employee)* V.P.		

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1.	Bonnie Reemsnyder, First Selectman Town of Old Lyme 52 Old Lyme Street Old Lyme, CT 06371				
2.	Kim Groves, Land Use Administrator Town of Old Lyme 52 Old Lyme Street Old Lyme, CT 06371				
3.	Gouvna Group LLC 79-2 Rowland Road Old Lyme, CT 06371				
4.					
5.					
6.					

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