Crown Castle
3530 Toringdon Way Suite 300
Charlotte NC 28277

Tel (704) 405-6600

September 5, 2014

Melanie A. Bachman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: **T-Mobile-Exempt Modification - Crown Site BU: 827050**
T-Mobile Site ID: CT11058C
Located at: 699 Old Main St., Rocky Hill, CT 06067

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their 700MHz technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Henry Vasel, Town Mayor for Town of Rocky Hill and Town of Rocky Hill, Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **699 Old Main Street, Rocky Hill, CT 06067**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile's operations at the site (Exhibit-3).

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") § 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in the R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. T-Mobile's replacement antennas will be located at the same elevation on the existing tower.

2. There will be no proposed modifications to the ground and no extension of boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table report for T-Mobile's modified facility is included as Exhibit-3.

5. A Structural Modification Report confirming that the tower and foundation can support T-Mobile's proposed modifications is included as Exhibit-2.

For the foregoing reasons, T-Mobile respectfully submits the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Jerry Feathers.

Sincerely,

Jerry Feathers
Real Estate Specialist

Enclosure

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: The Honorable Henry Vasel Town Mayor
Town of Rocky Hill
761 Old Main Street
Rocky Hill, CT 06067

cc: Mr. John Mehr Acting Finance Director
Town of Rocky Hill
761 Old Main Street
Rocky Hill, CT 06067

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11058C
CROWN CASTLE BU #:827050
SITE NAME: ROCKY HILL / RTE 160
699 OLD MAIN STREET
ROCKY HILL, CT 06067
HARTFORD COUNTY

SITE CONFIGURATION: 702CU

SITE INFORMATION

KEY MAP
N.T.S.

DIRECTIONS: (FROM PARSIPPANY):

START OUT GOING WEST ON SYLVAN WAY TOWARD CENTURY DR. TURN RIGHT ONTO LITTLETON RD / US-202 N. KEEP LEFT AT THE FORK TO GO ON LITTLETON RD E. MERGE ONTO I-287 N. MERGE ONTO I-87 S / I-287 E / NEW YORK TRWY S TOWARD I-87 S / TAPPAN ZEE BRG /NEW YORK CITY. KEEP LEFT TO TAKE I-287 E / CROSS WESTCHESTER EXPY E VIA EXIT 8 TOWARD WHITE PLAINS / RYE, STAY STRAIGHT ONTO I-95 N / NEW ENGLAND TRWY N. CONTINUE TO FOLLOW I-95 N. MERGE ONTO I-91 N VIA EXIT 48 ON THE LEFT TOWARD HARTFORD. TAKE THE CT-150 / WOODHOUSE AVE EXIT, EXIT 14, TOWARD WALLINGFORD. TURN LEFT ONTO CT-150/ WOOD HOUSE AVE. 316 WOODHOUSE AVE IS ON THE RIGHT.

PROJECT INFORMATION

T-MOBILE SITE #:	CT11058C
CROWN CASTLE BU #:	827050
SITE ADDRESS:	699 OLD MAIN STREET ROCKY HILL, CT 06067 HARTFORD COUNTY
LATITUDE:	N 41° 40' 5.77"
LONGITUDE:	W 72° 38' 16.93"
TOWER OWNER:	CROWN CASTLE 1200 MACARTHUR BLVD., SUITE 200 MAHWAH, NJ 07430
CONTACT:	PETER TISI (201) 236-9224
APPLICANT:	T-MOBILE NORTHEAST, LLC 4 SYLVAN WAY PARSIPPANY, NJ 07054
CONTACT:	PHONE #: (973) 397-4800 FAX #: (973) 292-8893
ENGINEER:	DEWBERRY ENGINEERS INC. 600 PARSIPPANY ROAD, SUITE 301 PARSIPPANY, NJ 07054
CONTACT:	GREG NAWROTZKI (973) 576-9653
SCOPE OF WORK:	ADD (3) NEW ANTENNAS, ADD (3) NEW RRU'S.

SHEET INDEX

SHEET NO.	SHEET DESCRIPTION
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C-2	ANTENNA LAYOUTS & ELEVATIONS
C-3	CONSTRUCTION DETAILS
E-1	GROUNDING NOTES & DETAILS

APPROVALS

T-MOBILE — DATE

OWNER/ LANDLORD — DATE

RF ENGINEER — DATE

ZONING — DATE

CONSTRUCTION — DATE

Dewberry®
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054
PHONE: (973) 397-4800
FAX: (973) 292-8893

ROCKY HILL / RTE 160

CT11058C

699 OLD MAIN STREET
ROCKY HILL, CT 06067
HARTFORD COUNTY

SEAL

STATE OF CONNECTICUT — JIANG LI — No. 23222 — LICENSED PROFESSIONAL ENGINEER — CONNECTICUT LICENSE NO. 23222

SCALE

AS SHOWN

REV.	DATE	BY	DESCRIPTION
0	09/04/14	HMP	ISSUED AS FINAL
A	09/03/14	HMP	ISSUED FOR REVIEW

REVISIONS

DRAWN BY HMP
CHECKED BY BSH
APPROVED BY GHN
DATE 09/03/14
TITLE

TITLE SHEET

PROJECT NO. 50066258/50066271

T - 1

SHEET NO.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   PROJECT MANAGEMENT – CROWN CASTLE
   CONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF PROJECT MANAGEMENT.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
5. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY PROJECT MANAGEMENT.
9. CONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. CONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. CONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH PROJECT MANAGEMENT.
10. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
11. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
14. CONTRACTOR SHALL NOTIFY DEWBERRY 48 HOURS IN ADVANCE OF POURING CONCRETE, OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS & POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEER REVIEW.
15. CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. CONTRACTOR SHALL NOTIFY PROJECT MANAGEMENT OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
16. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY CONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
17. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO:
   A) FALL PROTECTION
   B) CONFINED SPACE
   C) ELECTRICAL SAFETY
   D) TRENCHING & EXCAVATION.
3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.
6. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.
8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.
9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE SOIL COMPACTION NOTES.
11. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.
12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
   CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND ANTENNAS TO BE REPLACED.
2. COORDINATION OF WORK:
   CONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH PROJECT MANAGEMENT.
3. CABLE LADDER RACK:
   CONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.
4. GROUNDING OF ALL EQUIPMENT AND ANTENNAS IS NOT CONSIDERED PART OF THE SCOPE OF THIS PROJECT AND IS THE RESPONSIBILITY OF THE OWNER AND CONTRACTOR AT THE TIME OF CONSTRUCTION. ALL EQUIPMENT AND ANTENNAS TO BE INSTALLED AND GROUNDED IN ACCORDANCE WITH GOVERNING BUILDING CODE, MANUFACTURER RECOMMENDATIONS AND OWNER SPECIFICATIONS.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
2. CONTRACTOR SHALL MODIFY EXISTING CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. CONTRACTOR SHALL SUBMIT MODIFICATIONS TO PROJECT MANAGEMENT FOR APPROVAL.
3. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.
4. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
5. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
6. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.
7. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA, AND MATCH EXISTING INSTALLATION REQUIREMENTS.
8. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).
9. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.
10. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
11. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
12. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL.) PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC & OSHA AND MATCH EXISTING INSTALLATION REQUIREMENTS.
13. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
14. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.
15. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.
16. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).
17. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
18. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
19. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
20. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
21. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
22. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.
23. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
24. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
25. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
26. CABINETS, BOXES, AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
27. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
28. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
29. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
30. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
31. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM PROJECT MANAGEMENT BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
32. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

Dewberry®
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

T-Mobile
T-MOBILE NORTHEAST LLC
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ROCKY HILL / RTE 160

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HARTFORD COUNTY

SEAL

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CHECKED BY BSH
APPROVED BY GHN
DATE 09/03/14

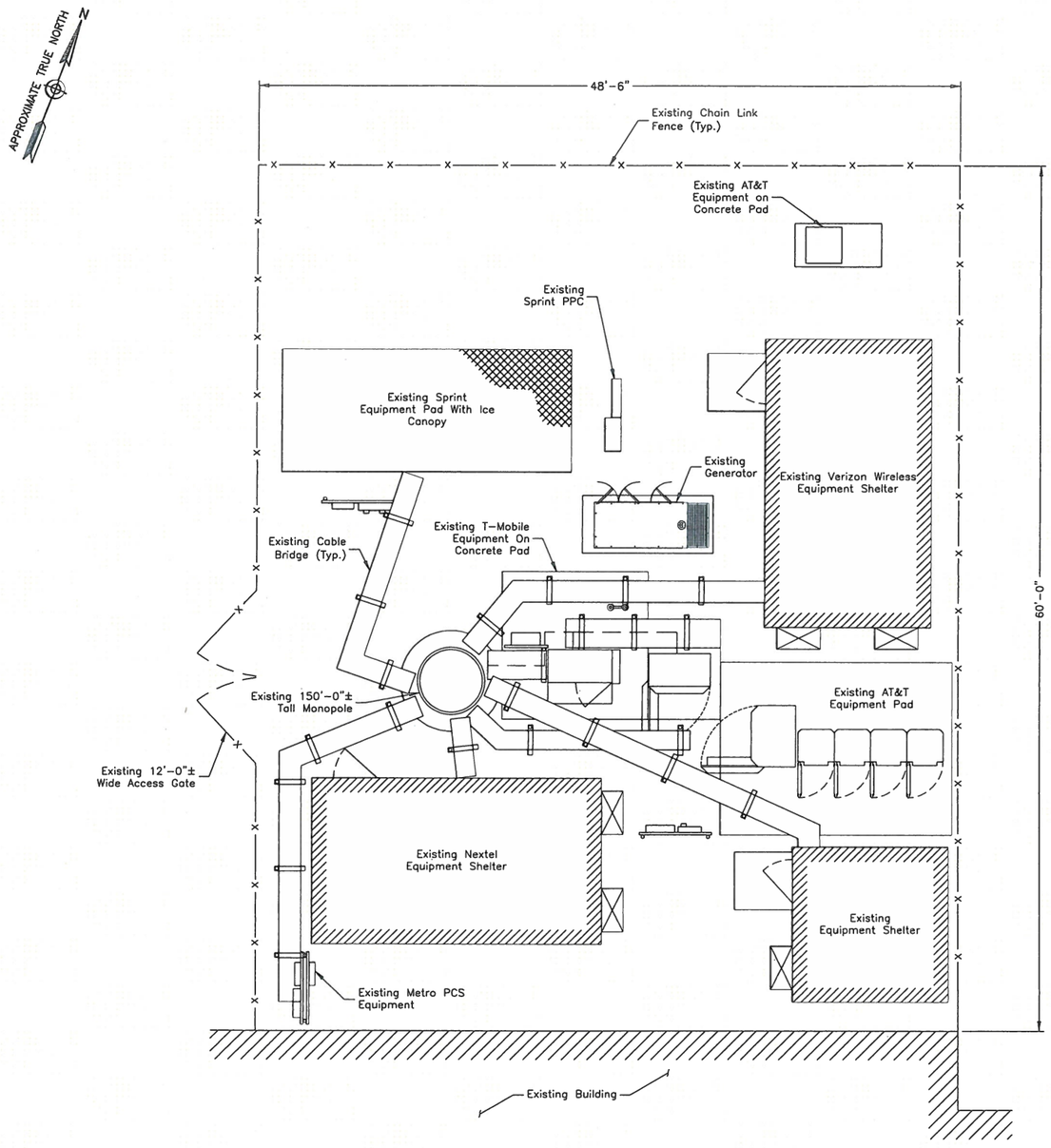
TITLE

GENERAL NOTES

PROJECT NO. 50066258/50066271

G - 1

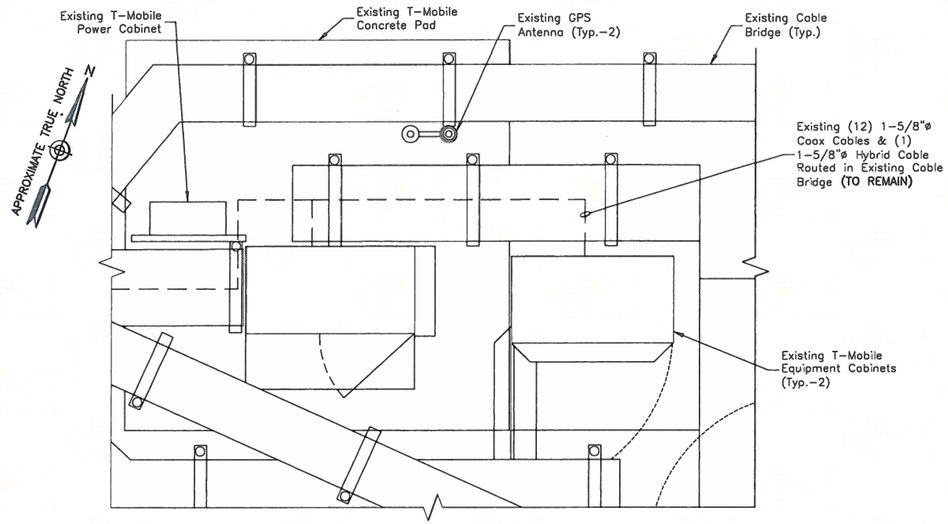
SHEET NO.



COMPOUND PLAN 1

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

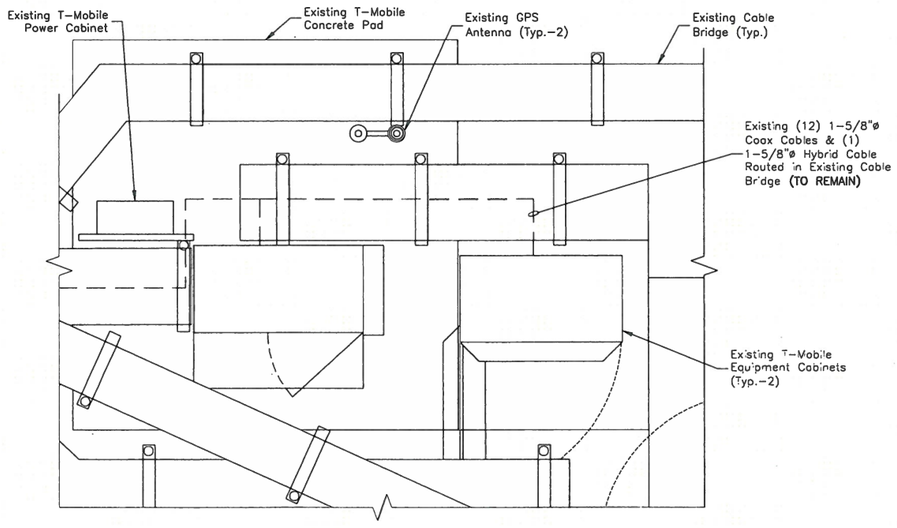
0' 5' 10'



EXISTING EQUIPMENT PLAN 2

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'



PROPOSED EQUIPMENT PLAN 3

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'

NOTES:

1. NORTH SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. MOUNT ALL ANTENNAS, RRU'S, COAX, ETC. IN ACCORDANCE WITH STRUCTURAL ANALYSIS TO BE COMPLETED BY OTHERS.

Dewberry®
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

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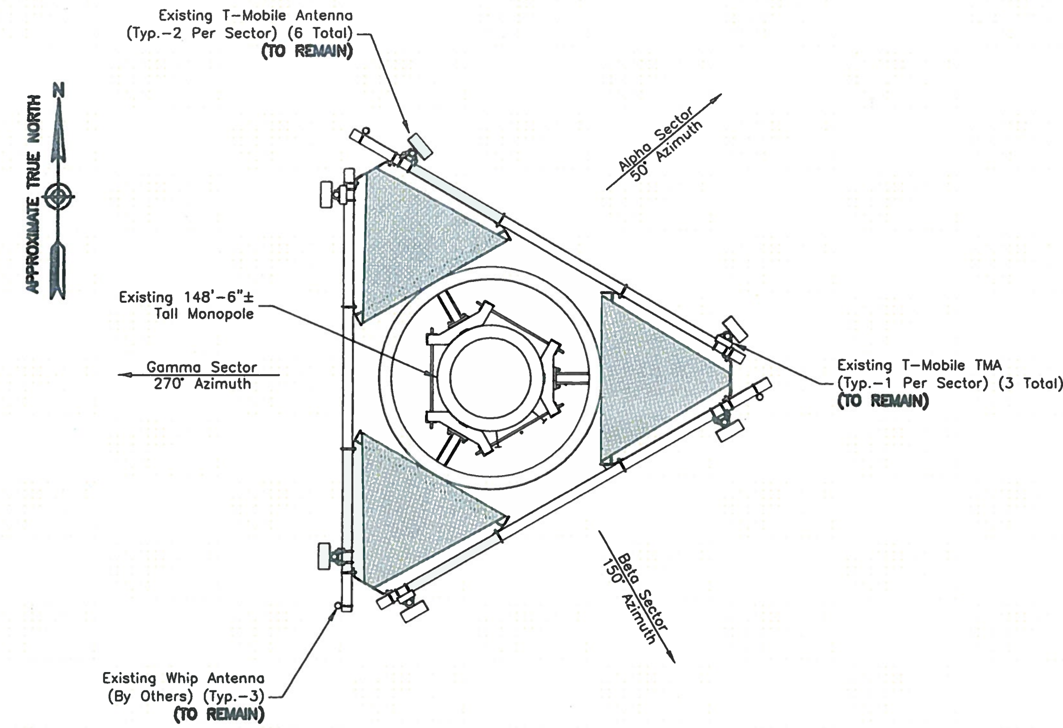
COMPOUND PLAN & EQUIPMENT PLANS

PROJECT NO. 50066258/50066271

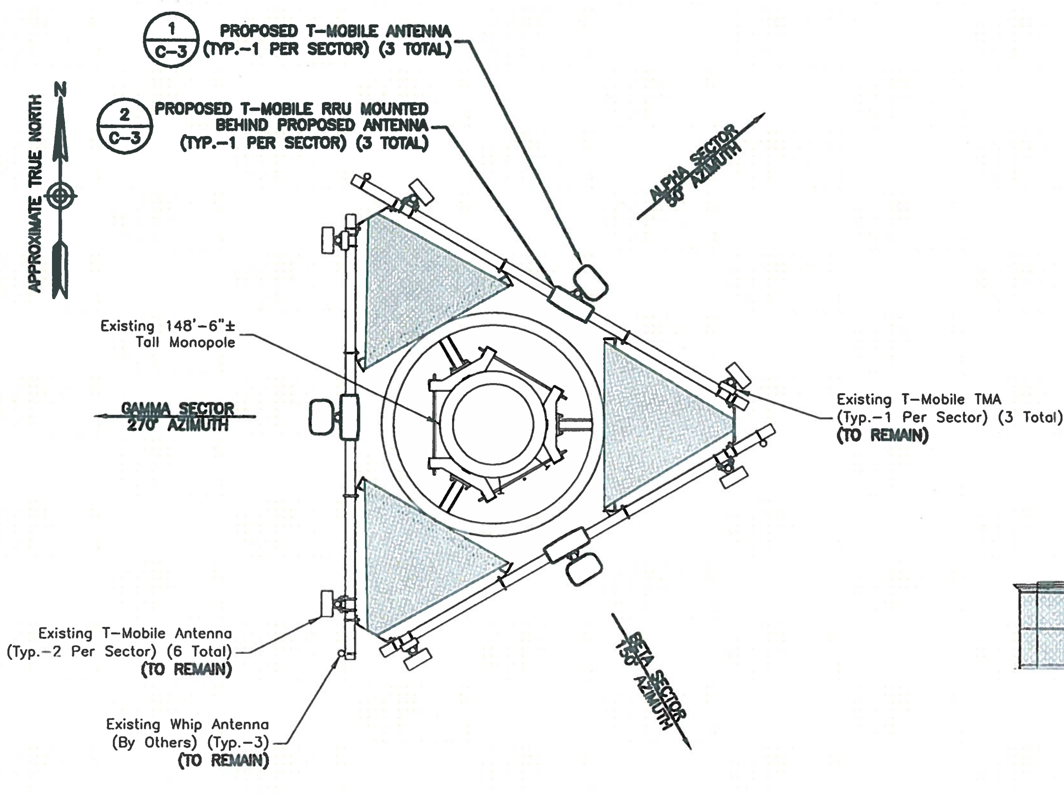
C - 1

SHEET NO.



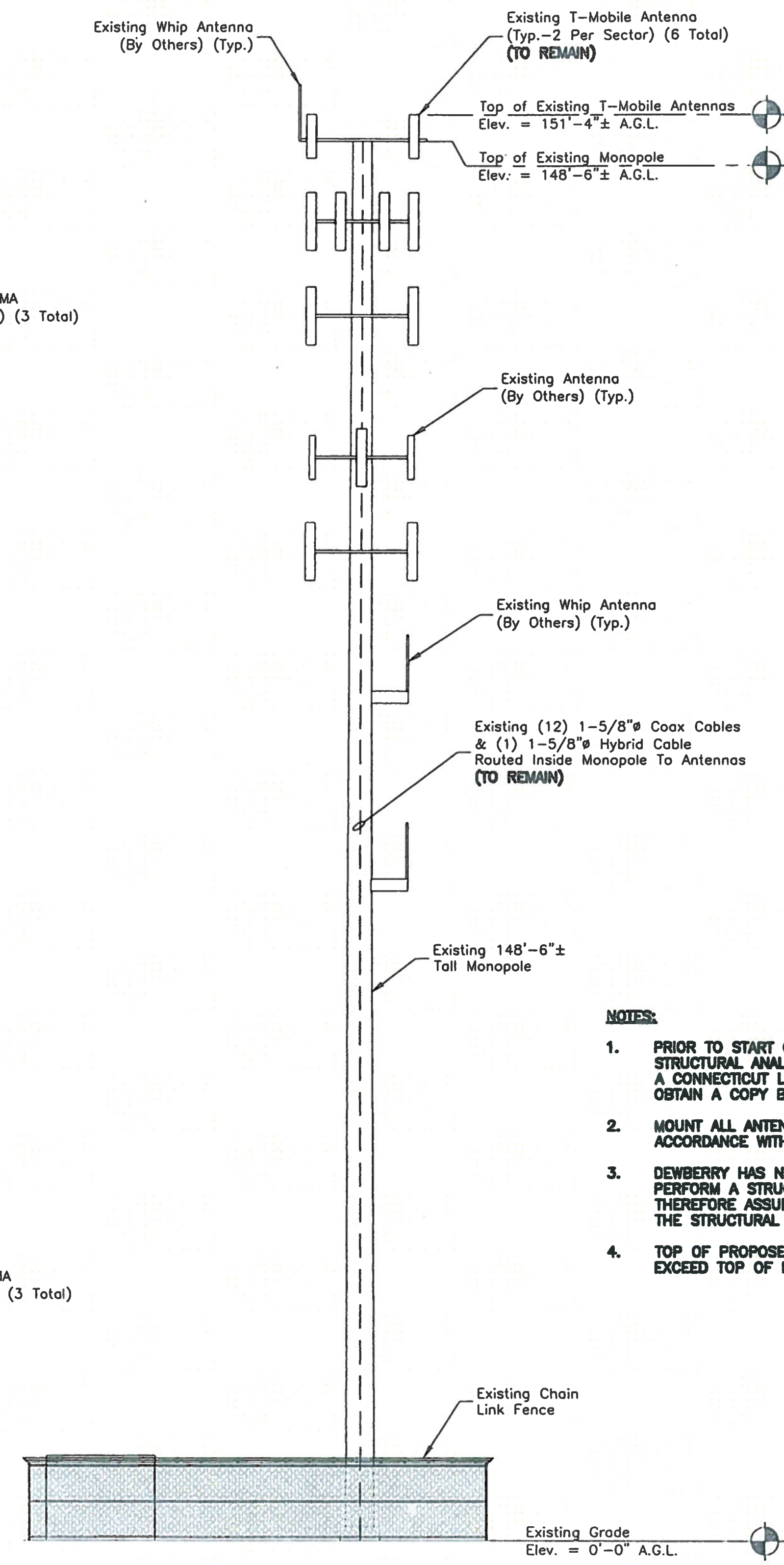
EXISTING ANTENNA LAYOUT (1)

SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT (2)

SCALE: N.T.S.



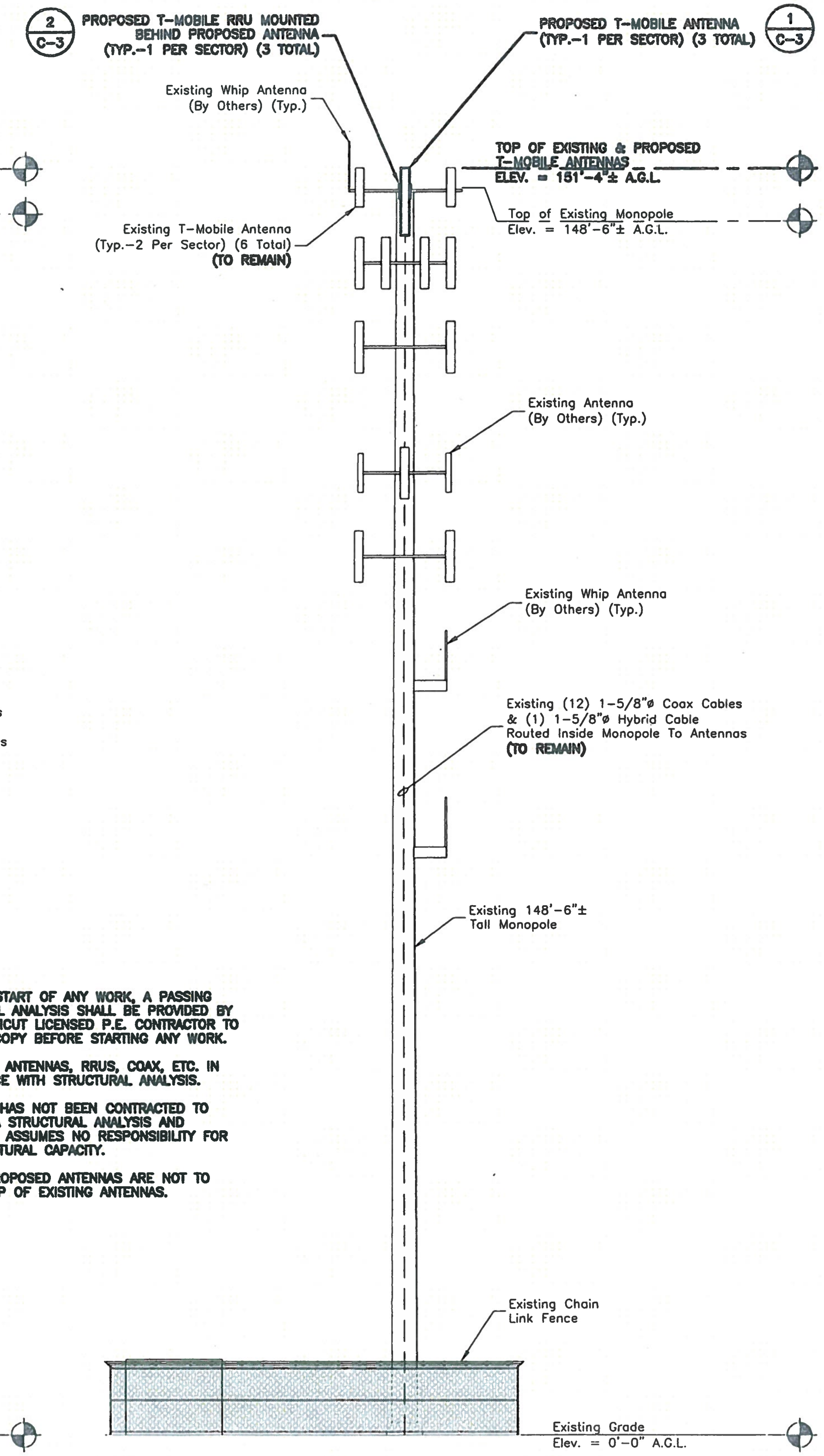
NOTES:

1. PRIOR TO START OF ANY WORK, A PASSING STRUCTURAL ANALYSIS SHALL BE PROVIDED BY A CONNECTICUT LICENSED P.E. CONTRACTOR TO OBTAIN A COPY BEFORE STARTING ANY WORK.
2. MOUNT ALL ANTENNAS, RRUS, COAX, ETC. IN ACCORDANCE WITH STRUCTURAL ANALYSIS.
3. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.
4. TOP OF PROPOSED ANTENNAS ARE NOT TO EXCEED TOP OF EXISTING ANTENNAS.

EXISTING ELEVATION (3)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'



PROPOSED ELEVATION (4)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

T-Mobile
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054
PHONE: (973) 397-4800
FAX: (973) 292-8893

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CONNECTICUT LICENSE NO. 23222

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A	09/03/14	HMP	ISSUED FOR REVIEW

REVISIONS

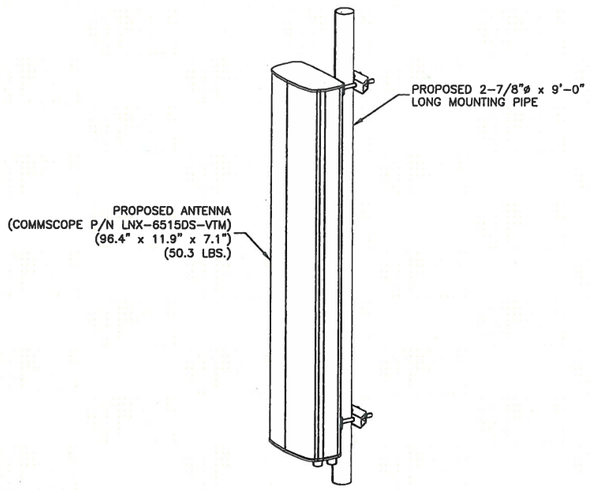
DRAWN BY HMP
CHECKED BY BSH
APPROVED BY GHN
DATE 09/03/14

TITLE

ANTENNA LAYOUTS & ELEVATIONS

PROJECT NO. 50066258/50066271

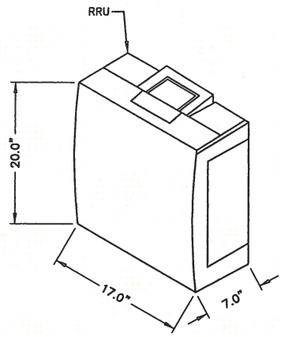
SHEET NO. C-2



NOTE:

1. PLEASE SEE RFDS FOR SPECIFIC ANTENNA MODEL.

ISOMETRIC ANTENNA DETAIL (1)
SCALE: N.T.S.



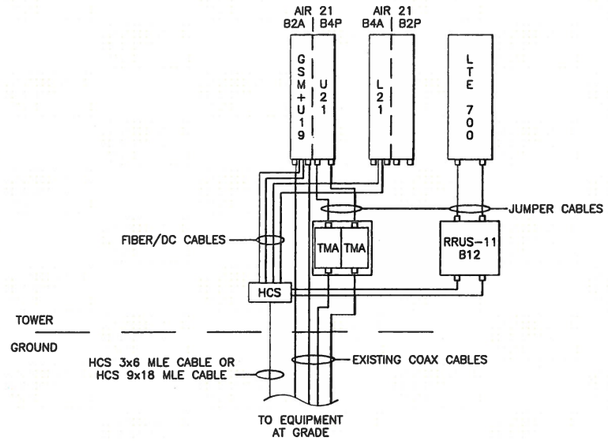
SPECIFICATIONS:
HEIGHT: 20.0"
WIDTH: 17.0"
DEPTH: 7.0"
WEIGHT: 50.7 LBS

ERICSSON RRUS-11 B12

RRU NOTES:

1. MOUNT EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND EQUIPMENT AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED EQUIPMENT WITH LATEST RFDS.

RRUS-11 - REMOTE RADIO UNIT (2)
SCALE: N.T.S.



SITE CONFIGURATION 700MHZ (3)
SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH	HCS LENGTH
	EXISTING	PROPOSED	EXISTING	PROPOSED		
ALPHA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 1-5/8"	(4) 1-5/8"	199'	199'
	——	COMMSCOPE LNX-6515DS-VTM				
	ERICSSON AIR21 B4A B2P	EXISTING TO REMAIN				
BETA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 1-5/8"	(4) 1-5/8"	199'	
	——	COMMSCOPE LNX-6515DS-VTM				
	ERICSSON AIR21 B4A B2P	EXISTING TO REMAIN				
GAMMA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 1-5/8"	(4) 1-5/8"	199'	
	——	COMMSCOPE LNX-6515DS-VTM				
	ERICSSON AIR21 B4A B2P	EXISTING TO REMAIN				

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Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
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4 SYLVAN WAY
PARSIPPANY, NJ 07054
PHONE: (973) 397-4600
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HARTFORD COUNTY

SEAL

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 23222
FINAL REVISION

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DATE 09/03/14

TITLE

CONSTRUCTION DETAILS

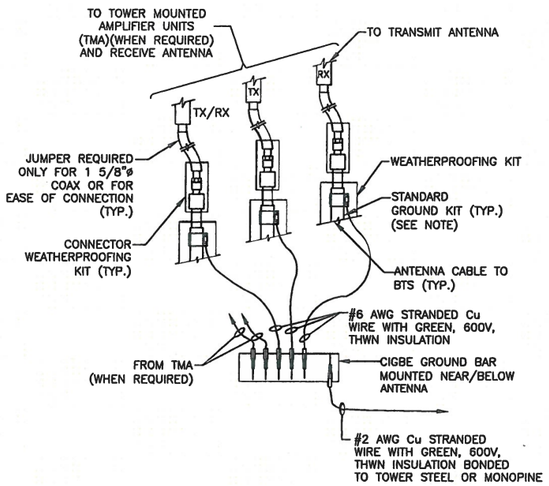
PROJECT NO. 50066258/50066271

C - 3

SHEET NO.

GROUNDING NOTES:

1. THE CONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ). THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE CONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE ENGINEER FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS. ALL AVAILABLE GROUNDING ELECTRODES SHALL BE CONNECTED TOGETHER IN ACCORDANCE WITH THE NEC.
3. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. USE OF OTHER METHODS MUST BE PRE-APPROVED BY THE ENGINEER IN WRITING.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS ON TOWER SITES AND 10 OHMS OR LESS ON ROOFTOP SITES. WHEN ADDING ELECTRODES, CONTRACTOR SHALL MAINTAIN A MINIMUM DISTANCE BETWEEN THE ADDED ELECTRODE AND ANY OTHER EXISTING ELECTRODE EQUAL TO THE BURIED LENGTH OF THE ROD. IDEALLY, CONTRACTOR SHALL STRIVE TO KEEP THE SEPARATION DISTANCE EQUAL TO TWICE THE BURIED LENGTH OF THE RODS.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
6. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE AND UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
7. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO TRANSMISSION EQUIPMENT.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK-TO-BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. IN ALL CASES, BENDS SHALL BE MADE WITH A MINIMUM BEND RADIUS OF 8 INCHES.
11. EACH INTERIOR TRANSMISSION CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH 6 AWG STRANDED, GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRE UNLESS NOTED OTHERWISE IN THE DETAILS. EACH OUTDOOR CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER WIRE UNLESS NOTED OTHERWISE IN THE DETAILS.
12. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE 2 AWG SOLID TIN-PLATED COPPER UNLESS OTHERWISE INDICATED.
13. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE. CONNECTIONS TO ABOVE GRADE UNITS SHALL BE MADE WITH EXOTHERMIC WELDS WHERE PRACTICAL OR WITH 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS. HIGH PRESSURE CRIMP CONNECTORS MAY ONLY BE USED WITH WRITTEN PERMISSION FROM T-MOBILE MARKET REPRESENTATIVE.
14. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
15. ALL WIRE TO WIRE GROUND CONNECTIONS TO THE INTERIOR GROUND RING SHALL BE FORMED USING HIGH PRESS CRIMPS OR SPLIT BOLT CONNECTORS WHERE INDICATED IN THE DETAILS.
16. ON ROOFTOP SITES WHERE EXOTHERMIC WELDS ARE A FIRE HAZARD COPPER COMPRESSION CAP CONNECTORS MAY BE USED FOR WIRE TO WIRE CONNECTORS. 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS SHALL BE USED FOR CONNECTION TO ALL ROOFTOP TRANSMISSION EQUIPMENT AND STRUCTURAL STEEL.
17. COAX BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR USING TWO-HOLE MECHANICAL TYPE BRASS CONNECTORS AND STAINLESS STEEL HARDWARE.
18. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
19. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
20. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
21. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER GROUND CONDUCTOR. DURING EXCAVATION FOR NEW GROUND CONDUCTORS, IF EXISTING GROUND CONDUCTORS ARE ENCOUNTERED, BOND EXISTING GROUND CONDUCTORS TO NEW CONDUCTORS.
22. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT WITH LISTED BONDING FITTINGS.

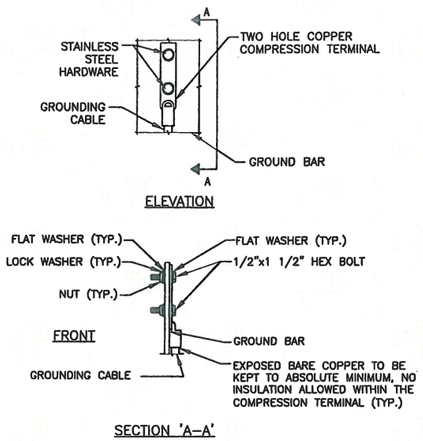


NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) — 1

SCALE: N.T.S.

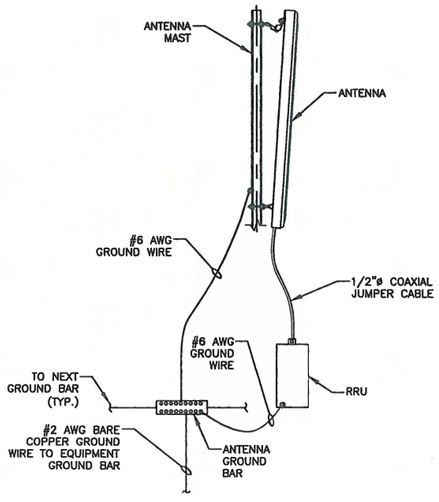


NOTES:

1. DOUBLING UP OR STACKING OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

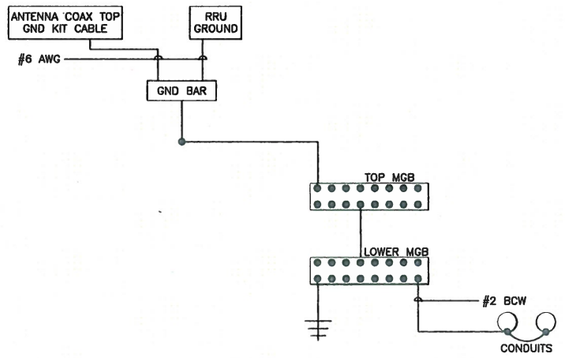
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL — 2

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL — 3

SCALE: N.T.S



NOTES:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE.
3. SCHEMATIC GROUNDING DIAGRAM IS TYPICAL FOR EACH SECTOR.

SCHEMATIC GROUNDING DIAGRAM — 4

SCALE: N.T.S.

Dewberry®
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

T-Mobile
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054
PHONE: (973) 397-4800
FAX: (973) 292-8893

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DATE 09/03/14

TITLE

GROUNDING NOTES & DETAILS

PROJECT NO. 50066258/50066271

E - 1

SHEET NO.

Date: **August 18, 2014**

Veronica Harris
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
(720) 304-6882

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate** **Carrier Site Number:**	 CT11058C
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	827050 Rocky Hill/ Rte 160_1 302370 909192 261521 Rev. 1
Engineering Firm Designation:	**Aero Solutions LLC Project Number:**	003-14-0871
Site Data:	**699 Old Main St., Rocky Hill, Hartford County, CT** **Latitude *41° 40' 5.77"*, Longitude *-72° 38' 16.93"*** **147.5 Foot - Monopole Tower**	

Dear Veronica Harris,

Aero Solutions LLC is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 681765, in accordance with application 261521, revision 1.

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:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 80 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *Aero Solutions LLC* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Marcus Benson, E.I.

Respectfully submitted by:

STATE OF CONNECTICUT
SHRADDHA A. DHARIA
No. 28187
LICENSED
PROFESSIONAL ENGINEER

8.19.2014

Shraddha Dharia, P.E.
Structural Engineer
CT PE#: PEN0028187
Expires: 1/31/2015

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 147.5 ft Monopole tower designed by PIROD MANUFACTURES INC. in July of 1999. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

The tower has been modified per reinforcement drawings prepared by TEP, in July of 2010. Reinforcement consists of bridge stiffeners at elevations 20' and 40'. The tower was later reinforced per reinforcement drawings prepared by TEP, in September of 2012. Reinforcement consists of installing bridge stiffeners at elevation 60'. The tower was modified again in May 2013, by PJF. The reinforcement consists of additional anchor rods, flange connection reinforcement at 20', 40', 60', and 80', and shaft reinforcement from 0' to 95'.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
148.0	149.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	1	1-5/8"	
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
148.0	155.0	1	rfs celwave	1142-2C	1	1/2"	1
	154.0	2	rfs celwave	201-1N	2	7/8"	
	152.0	1	radiowaves	HPD2-4.7	2	7/8"	2
	151.0	1	rfs celwave	APXV18-206516S-C-A20 w/ Mount Pipe			3
		2	rfs celwave	APXV18-209014-C w/ Mount Pipe			
	149.0	1	ems wireless	RR90-17-02DP w/ Mount Pipe			
		2	rfs celwave	APXV18-209014-C w/ Mount Pipe			
	148.0	1	andrew	ATJB200-A01-007			
		1	tower mounts	Platform Mount [LP 405-1]	12	1-5/8"	1
140.0	140.0	3	alcatel lucent	RRH2X40-AWS	1	1-5/8"	2
		3	antel	BXA-171063-12BF-EDIN-X w/ Mount Pipe			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe	12	1-5/8"	1
		3	antel	BXA-70063-6BF-EDIN-0 w/ Mount Pipe			2
		1	antel	BXA-70063/4CF w/ Mount Pipe			1
		1	rfs celwave	DB-T1-6Z-8AB-0Z			2
		6	rfs celwave	FD9R6004/2C-3L			1
		2	swedcom	SLCP 2x6014 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 304-1]			
130.0	130.0	9	decibel	DB980H65E-M w/ Mount Pipe	9	1-5/8"	1
		1	tower mounts	Platform Mount [LP 405-1]			
115.0	115.0	4	andrew	DB844H90E-XY w/ Mount Pipe	12	1-1/4"	1
		8	decibel	844G65VTZASX w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 1201-1]			
105.0	105.0	6	ericsson	RRUS-11	12 1 2	1-5/8" 7/16" 3/8"	1
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21903			
		2	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 304-1]			
95.0	95.0	3	rfs celwave	APXV18-206516S-C w/ Mount Pipe	6	1-5/8"	1
89.0	95.0	1	rfs celwave	1142-2C	1	1/2"	1
	89.0	1	tower mounts	Side Arm Mount [SO 701-1]			
72.0	74.0	1	gps	GPS_A	1	1/2"	1
	72.0	1	tower mounts	Side Arm Mount [SO 701-1]			
54.0	64.0	1	rfs celwave	220-8N	2	7/8"	1
	61.0	1	rfs celwave	201-1N			
	54.0	2	tower mounts	Side Arm Mount [SO 701-1]			
49.0	49.0	1	decibel	DB436-C	1	7/8"	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
45.0	45.0	1	decibel	DB436-C	1	7/8"	1
40.0	40.0	1	decibel	DB436-C	1	7/8"	1
37.0	37.0	1	decibel	DB436-C	1	7/8"	1

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
151	161	3	rfs/celwave	PD201		-
147.5	147.5	12	EMS	RR90-17		-
138	138	12	EMS	RR90-17		-
128	128	12	EMS	RR90-17		-
90	90	1	rfs/celwave	PD1142-30		-
55	55	1	rfs/celwave	PD2220		-
50	50	1	Unknown	YAGI		-
45	45	1	Unknown	YAGI		-
40	40	1	Unknown	YAGI		-
35	35	1	Unknown	YAGI		-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	French And Parrello	3464587	CCISITES
4-POST-MODIFICATION INSPECTION	ETS	4047725	CCISITES
4-POST-MODIFICATION INSPECTION	TEP	4047808	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PiRod	3674483	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiRod	3464619	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF	3846506	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	PJF	4424846	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), 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 specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
5) The flange connection and base plate geometry and material grades were obtained from the previous analysis.
6) Reinforcement was installed per referenced drawings and PMI's.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	147.5 - 125	Pole	P24x3/8	1	-9.03	934.94	44.2	Pass
L2	125 - 100	Pole	P30x3/8	2	-17.61	1166.57	91.4	Pass
L3	100 - 94.25	Pole	P36x3/8	3	-18.88	1325.68	80.3	Pass
L4	94.25 - 80	Pole	P36x3/8 [0.494173]	4	-22.50	1997.10	77.1	Pass
L5	80 - 60	Pole	P42x3/8 [0.580296]	5	-28.80	2067.32	85.1	Pass
L6	60 - 40	Pole	P48x3/8 [0.617642]	6	-36.28	2432.03	85.1	Pass
L7	40 - 20	Pole	P54x3/8 [0.654666]	7	-44.80	2821.71	83.1	Pass
L8	20 - 0	Pole	P60x3/8 [0.62329]	8	-53.46	3222.62	88.1	Pass
							Summary	
						Pole (L2)	91.4	Pass
						Rating =	91.4	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	76.6	Pass
1	Base Plate	0	96.2	Pass
1	Base Foundation	0	46.1	Pass
1	Base Foundation Soil Interaction	0	81.1	Pass
1	Flange Connection	20	55.0	Pass
1	Flange Connection	40	52.0	Pass
1	Flange Connection	60	50.1	Pass
1	Flange Connection	80	55.2	Pass
1	Flange Connection	100	83.2	Pass
1	Flange Connection	125	40.4	Pass

Structure Rating (max from all components) =	96.2%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.

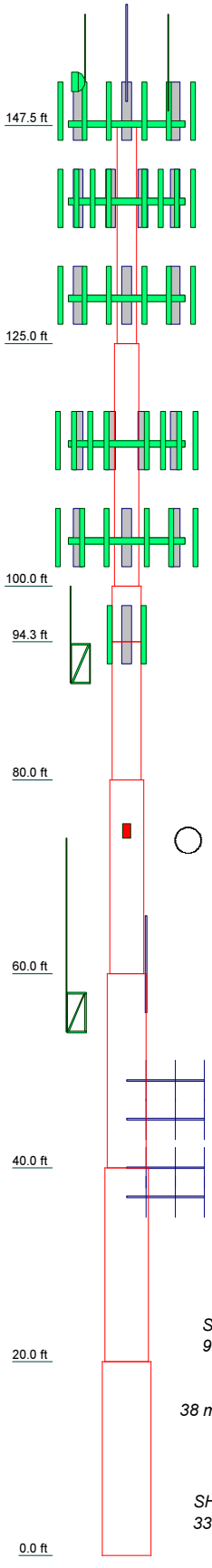
4.1) Recommendations

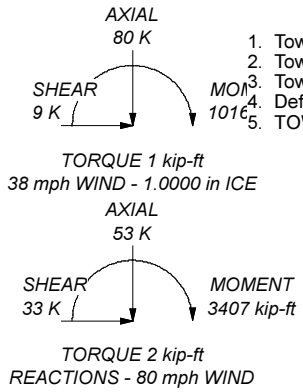
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Size	Length (ft)	Grade	Weight (K)
1	P24x3/8	22.50	A53-B-42	2.1
2	P30x3/8	25.00		3.0
3	P36x3/8	5.75		0.8
4	P36x3/8 [0.494173]	14.25	45.299232ksi	2.6
5	P42x3/8 [0.580296]	20.00	34.23099ksi	5.0
6	P48x3/8 [0.617642]	20.00	33.073831ksi	6.0
7	P54x3/8 [0.654666]	20.00	32.156212ksi	7.2
8	P60x3/8 [0.62329]	20.00	34.790711ksi	7.7
				34.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
1142-2C	148
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	148
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	148
LNX-6515DS-VTM w/ Mount Pipe	148
KRY 112 144/1	148
RRUS 11 B12	148
201-1N	148
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	148
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	148
LNX-6515DS-VTM w/ Mount Pipe	148
KRY 112 144/1	148
RRUS 11 B12	148
201-1N	148
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	148
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	148
LNX-6515DS-VTM w/ Mount Pipe	148
KRY 112 144/1	148
RRUS 11 B12	148
Platform Mount [LP 405-1]	148
6' x 2" Mount Pipe	148
6' x 2" Mount Pipe	148
6' x 2" Mount Pipe	148
HPD2-4.7	148
(2) FD9R6004/2C-3L	140
SLCP 2x6014 w/ Mount Pipe	140
RRH2X40-AWS	140
BXA-171063-12BF-EDIN-X w/ Mount Pipe	140
BXA-70063-6BF-EDIN-0 w/ Mount Pipe	140
SLCP 2x6014 w/ Mount Pipe	140
BXA-171063-12CF-EDIN-X w/ Mount Pipe	140
(2) FD9R6004/2C-3L	140
RRH2X40-AWS	140
BXA-171063-12BF-EDIN-X w/ Mount Pipe	140
BXA-70063-6BF-EDIN-0 w/ Mount Pipe	140
BXA-70063/4CF w/ Mount Pipe	140
BXA-171063-12CF-EDIN-X w/ Mount Pipe	140
(2) FD9R6004/2C-3L	140
RRH2X40-AWS	140

TYPE	ELEVATION
BXA-171063-12BF-EDIN-X w/ Mount Pipe	140
BXA-70063-6BF-EDIN-0 w/ Mount Pipe	140
DB-T1-6Z-8AB-0Z	140
Platform Mount [LP 304-1]	140
BXA-171063-12CF-EDIN-X w/ Mount Pipe	140
(3) DB980H65E-M w/ Mount Pipe	130
(3) DB980H65E-M w/ Mount Pipe	130
Platform Mount [LP 405-1]	130
(3) DB980H65E-M w/ Mount Pipe	130
(4) 844G65VTZASX w/ Mount Pipe	115
(4) DB844H90E-XY w/ Mount Pipe	115
Platform Mount [LP 1201-1]	115
(4) 844G65VTZASX w/ Mount Pipe	115
(2) 7770.00 w/ Mount Pipe	105
(2) LGP21401	105
(2) LGP21903	105
P65-17-XLH-RR w/ Mount Pipe	105
DC6-48-60-18-8F	105
(2) RRUS-11	105
(2) 7770.00 w/ Mount Pipe	105
(2) LGP21401	105
(2) LGP21903	105
P65-17-XLH-RR w/ Mount Pipe	105
(2) RRUS-11	105
AM-X-CD-16-65-00T-RET w/ Mount Pipe	105
(2) 7770.00 w/ Mount Pipe	105
(2) LGP21401	105
(2) LGP21903	105
Platform Mount [LP 304-1]	105
(2) RRUS-11	105
APXV18-206516S-C w/ Mount Pipe	95
APXV18-206516S-C w/ Mount Pipe	95
APXV18-206516S-C w/ Mount Pipe	95
Side Arm Mount [SO 701-1]	89
1142-2C	89
Side Arm Mount [SO 701-1]	72
GPS_A	72
220-8N	54
Side Arm Mount [SO 701-1]	54
Side Arm Mount [SO 701-1]	54
201-1N	54
DB436-C	49
DB436-C	45
DB436-C	40
DB436-C	37

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi	33.073831ksi	33 ksi	48 ksi
45.299232ksi	45 ksi	60 ksi	32.156212ksi	32 ksi	47 ksi
34.23099ksi	34 ksi	49 ksi	34.790711ksi	35 ksi	50 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 91.4%

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
Phone: (720) 304-6882
FAX: (720) 304-6883

Job:	***BU 827050 / Rocky Hill- Rte 160_1***		
Project:	***Existing 148' Monopole***		
Client: CCI	Drawn by: MBenson	App'd:	
Code: TIA/EIA-222-F	Date: 08/18/14	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

4) Tower is located in Hartford County, Connecticut.
5) Basic wind speed of 80 mph.
6) Nominal ice thickness of 1.0000 in.
7) Ice density of 56 pcf.
8) A wind speed of 38 mph is used in combination with ice.
9) Temperature drop of 50 °F.
10) Deflections calculated using a wind speed of 50 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Calculate Redundant Bracing Forces
	Use Moment Magnification	√	Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios		Use Clear Spans For KL/r		SR Leg Bolts Resist Compression
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		All Leg Panels Have Same Allowable
	Escalate Ice	√	Bypass Mast Stability Checks		Offset Girt At Foundation
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Angle Block Shear Check
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends	√	Include Shear-Torsion Interaction
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice Capacity Exemption		

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	147.50-125.00	22.50	P24x3/8	A53-B-42 (42 ksi)	
L2	125.00-100.00	25.00	P30x3/8	A53-B-42 (42 ksi)	
L3	100.00-94.25	5.75	P36x3/8	A53-B-42 (42 ksi)	
L4	94.25-80.00	14.25	P36x3/8 [0.494173]	45.299232ksi (45 ksi)	
L5	80.00-60.00	20.00	P42x3/8 [0.580296]	34.23099ksi (34 ksi)	
L6	60.00-40.00	20.00	P48x3/8 [0.617642]	33.073831ksi (33 ksi)	
L7	40.00-20.00	20.00	P54x3/8 [0.654666]	32.156212ksi (32 ksi)	
L8	20.00-0.00	20.00	P60x3/8 [0.62329]	34.790711ksi	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
				(35 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
L1 147.50-125.00				1	1	1		
L2 125.00-100.00				1	1	1		
L3 100.00-94.25				1	1	1		
L4 94.25-80.00				1	1	0.979583		
L5 80.00-60.00				1	1	0.967752		
L6 60.00-40.00				1	1	0.964237		
L7 40.00-20.00				1	1	0.96367		
L8 20.00-0.00				1	1	0.970192		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	147.50 - 6.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
LCF78-50A(7/8")	C	No	CaAa (Out Of Face)	147.50 - 6.00	2	No Ice	0.00	0.34
						1/2" Ice	0.00	1.31
						1" Ice	0.00	2.89
AVA5-50(7/8")	A	No	CaAa (Out Of Face)	147.50 - 6.00	2	No Ice	0.00	0.30
						1/2" Ice	0.00	1.28
						1" Ice	0.00	2.87
***								
FLC 158-50J(1-5/8")	B	No	Inside Pole	147.50 - 6.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	CaAa (Out Of Face)	147.50 - 6.00	1	No Ice	0.16	1.07
						1/2" Ice	0.26	2.37
						1" Ice	0.36	4.28
***								
LDF7-50A(1-5/8")	B	No	CaAa (Out Of Face)	140.00 - 6.00	1	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
LDF7-50A(1-5/8")	C	No	Inside Pole	140.00 - 6.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
***								
LDF2-50(3/8")	C	No	CaAa (Out Of Face)	105.00 - 6.00	2	No Ice	0.00	0.08
						1/2" Ice	0.00	0.65
						1" Ice	0.00	1.84
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	105.00 - 6.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	105.00 - 6.00	10	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
100266(7/16")	C	No	CaAa (Out Of Face)	105.00 - 6.00	1	No Ice	0.00	0.08
						1/2" Ice	0.00	0.66

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.00	1.84
2" Rigid Conduit	C	No	CaAa (Out Of Face)	105.00 - 6.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	4.33
						1" Ice	0.00	6.47
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	130.00 - 6.00	9	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
***								
FXL-1480(1 1/4")	C	No	Inside Pole	115.00 - 6.00	12	No Ice	0.00	0.45
						1/2" Ice	0.00	0.45
						1" Ice	0.00	0.45
***								
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	95.00 - 6.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	95.00 - 6.00	5	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
LDF5-50A(7/8")	B	No	CaAa (Out Of Face)	54.00 - 6.00	2	No Ice	0.00	0.33
						1/2" Ice	0.00	1.30
						1" Ice	0.00	2.88
LDF5-50A(7/8")	B	No	CaAa (Out Of Face)	49.00 - 6.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	1.30
						1" Ice	0.00	2.88
LDF5-50A(7/8")	B	No	CaAa (Out Of Face)	45.00 - 6.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	1.30
						1" Ice	0.00	2.88
LDF5-50A(7/8")	B	No	CaAa (Out Of Face)	40.00 - 6.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	1.30
						1" Ice	0.00	2.88
LDF5-50A(7/8")	B	No	CaAa (Out Of Face)	37.00 - 6.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	1.30
						1" Ice	0.00	2.88
LDF4P-50A(1/2")	B	No	CaAa (Out Of Face)	72.00 - 6.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
LDF4P-50A(1/2")	B	No	CaAa (Out Of Face)	89.00 - 6.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
***								
2" Solid Rod Reinforcing	C	No	CaAa (Out Of Face)	42.50 - 37.50	1	No Ice	0.20	0.00
						1/2" Ice	0.30	0.00
						1" Ice	0.40	0.00
2" Solid Rod Reinforcing	C	No	CaAa (Out Of Face)	22.50 - 17.50	1	No Ice	0.20	0.00
						1/2" Ice	0.30	0.00
						1" Ice	0.40	0.00
(4) Flat Plate	C	No	CaAa (Out Of Face)	20.00 - 0.00	1	No Ice	0.21	0.00
						1/2" Ice	0.21	0.00
						1" Ice	0.21	0.00
(4) Flat Plate	C	No	CaAa (Out Of Face)	60.00 - 20.00	1	No Ice	0.21	0.00
						1/2" Ice	0.21	0.00
						1" Ice	0.43	0.00
(4) Flat Plate	C	No	CaAa (Out Of Face)	80.00 - 60.00	1	No Ice	0.21	0.00
						1/2" Ice	0.21	0.00
						1" Ice	0.35	0.00
(4) Flat Plate	C	No	CaAa (Out Of Face)	95.25 - 80.00	1	No Ice	0.21	0.00
						1/2" Ice	0.21	0.00
						1" Ice	0.26	0.00

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	147.50-125.00	A	0.000	0.000	0.000	0.000	0.01

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
		B	0.000	0.000	0.000	3.656	0.28
		C	0.000	0.000	0.000	0.000	0.20
L2	125.00-100.00	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	4.063	0.32
		C	0.000	0.000	0.000	1.980	0.60
L3	100.00-94.25	A	0.000	0.000	0.000	0.148	0.01
		B	0.000	0.000	0.000	0.934	0.07
		C	0.000	0.000	0.000	2.485	0.21
L4	94.25-80.00	A	0.000	0.000	0.000	2.821	0.08
		B	0.000	0.000	0.000	2.316	0.19
		C	0.000	0.000	0.000	8.612	0.52
L5	80.00-60.00	A	0.000	0.000	0.000	3.960	0.11
		B	0.000	0.000	0.000	3.250	0.26
		C	0.000	0.000	0.000	12.087	0.73
L6	60.00-40.00	A	0.000	0.000	0.000	3.960	0.11
		B	0.000	0.000	0.000	3.250	0.28
		C	0.000	0.000	0.000	12.587	0.73
L7	40.00-20.00	A	0.000	0.000	0.000	3.960	0.11
		B	0.000	0.000	0.000	3.250	0.30
		C	0.000	0.000	0.000	13.087	0.73
L8	20.00-0.00	A	0.000	0.000	0.000	2.772	0.08
		B	0.000	0.000	0.000	2.275	0.21
		C	0.000	0.000	0.000	10.211	0.51

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	147.50-125.00	A	1.000	0.000	0.000	0.000	0.000	0.13
		B		0.000	0.000	0.000	8.156	0.41
		C		0.000	0.000	0.000	0.000	0.36
L2	125.00-100.00	A	1.000	0.000	0.000	0.000	0.000	0.14
		B		0.000	0.000	0.000	9.062	0.49
		C		0.000	0.000	0.000	3.980	1.04
L3	100.00-94.25	A	1.000	0.000	0.000	0.000	0.299	0.04
		B		0.000	0.000	0.000	2.084	0.11
		C		0.000	0.000	0.000	4.839	0.55
L4	94.25-80.00	A	1.000	0.000	0.000	0.000	5.672	0.20
		B		0.000	0.000	0.000	5.166	0.28
		C		0.000	0.000	0.000	15.077	1.37
L5	80.00-60.00	A	1.000	0.000	0.000	0.000	7.960	0.29
		B		0.000	0.000	0.000	7.250	0.40
		C		0.000	0.000	0.000	22.880	1.92
L6	60.00-40.00	A	1.000	0.000	0.000	0.000	7.960	0.29
		B		0.000	0.000	0.000	7.250	0.52
		C		0.000	0.000	0.000	25.620	1.92
L7	40.00-20.00	A	1.000	0.000	0.000	0.000	7.960	0.29
		B		0.000	0.000	0.000	7.250	0.74
		C		0.000	0.000	0.000	26.620	1.92
L8	20.00-0.00	A	1.000	0.000	0.000	0.000	5.572	0.20
		B		0.000	0.000	0.000	5.075	0.52
		C		0.000	0.000	0.000	16.311	1.34

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	147.50-125.00	0.1952	0.1127	0.3724	0.2150
L2	125.00-100.00	0.0987	0.1653	0.2071	0.3068
L3	100.00-94.25	-0.2903	0.3375	-0.4221	0.5597

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L4	94.25-80.00	-0.4343	0.2104	-0.5437	0.2819
L5	80.00-60.00	-0.4499	0.2180	-0.6378	0.3348
L6	60.00-40.00	-0.4861	0.2380	-0.7688	0.4095
L7	40.00-20.00	-0.5213	0.2575	-0.8377	0.4482
L8	20.00-0.00	-0.4472	0.2259	-0.5601	0.2948

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
***									
1142-2C	A	From Leg	4.00 0.00 7.00	-1.0000	148.00	No Ice 1/2" Ice 1" Ice	2.09 3.37 4.67	2.09 3.37 4.67	0.02 0.04 0.07
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	50.0000	148.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	50.0000	148.00	No Ice 1/2" Ice 1" Ice	6.81 7.33 7.85	5.63 6.47 7.24	0.11 0.17 0.23
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	50.0000	148.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.08 0.17 0.27
KRY 112 144/1	A	From Leg	4.00 0.00 1.00	50.0000	148.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.20 0.27 0.35	0.01 0.01 0.02
RRUS 11 B12	A	From Leg	4.00 0.00 1.00	50.0000	148.00	No Ice 1/2" Ice 1" Ice	3.31 3.55 3.80	1.36 1.54 1.73	0.05 0.07 0.10
201-1N	B	From Leg	4.00 0.00 6.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.49 2.41 3.34	1.49 2.41 3.34	0.01 0.02 0.04
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	6.81 7.33 7.85	5.63 6.47 7.24	0.11 0.17 0.23
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.08 0.17 0.27
KRY 112 144/1	B	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.20 0.27 0.35	0.01 0.01 0.02
RRUS 11 B12	B	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	3.31 3.55 3.80	1.36 1.54 1.73	0.05 0.07 0.10
201-1N	C	From Leg	4.00	0.0000	148.00	No Ice	1.49	1.49	0.01

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
			0.00			1/2" Ice	2.41	2.41	0.02
			6.00			1" Ice	3.34	3.34	0.04
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	6.83 7.35 7.86	5.64 6.48 7.26	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	6.81 7.33 7.85	5.63 6.47 7.24	0.11 0.17 0.23
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.08 0.17 0.27
KRY 112 144/1	C	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.20 0.27 0.35	0.01 0.01 0.02
RRUS 11 B12	C	From Leg	4.00 0.00 1.00	30.0000	148.00	No Ice 1/2" Ice 1" Ice	3.31 3.55 3.80	1.36 1.54 1.73	0.05 0.07 0.10
Platform Mount [LP 405-1]	C	None		0.0000	148.00	No Ice 1/2" Ice 1" Ice	20.80 28.10 35.40	20.80 28.10 35.40	1.80 2.07 2.33
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
***									
BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	60.0000	140.00	No Ice 1/2" Ice 1" Ice	5.03 5.58 6.10	5.29 6.46 7.35	0.04 0.09 0.14
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	60.0000	140.00	No Ice 1/2" Ice 1" Ice	0.37 0.45 0.54	0.08 0.14 0.20	0.00 0.01 0.01
SLCP 2x6014 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	60.0000	140.00	No Ice 1/2" Ice 1" Ice	7.45 7.96 8.47	6.95 7.76 8.52	0.04 0.10 0.18
RRH2X40-AWS	A	From Leg	4.00 0.00 0.00	60.0000	140.00	No Ice 1/2" Ice 1" Ice	2.52 2.75 2.99	1.59 1.80 2.01	0.04 0.06 0.08
BXA-171063-12BF-EDIN-X w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	60.0000	140.00	No Ice 1/2" Ice 1" Ice	5.04 5.59 6.11	5.30 6.47 7.36	0.04 0.08 0.14
BXA-70063-6BF-EDIN-0 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	60.0000	140.00	No Ice 1/2" Ice 1" Ice	7.71 8.33 8.92	5.63 6.72 7.56	0.04 0.10 0.17
SLCP 2x6014 w/ Mount	B	From Leg	4.00	20.0000	140.00	No Ice	7.45	6.95	0.04

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
Pipe			0.00			1/2"	7.96	7.76	0.10
			0.00			Ice	8.47	8.52	0.18
						1" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.00	20.0000	140.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice			
(2) FD9R6004/2C-3L	B	From Leg	4.00	20.0000	140.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice			
RRH2X40-AWS	B	From Leg	4.00	20.0000	140.00	No Ice	2.52	1.59	0.04
			0.00			1/2"	2.75	1.80	0.06
			0.00			Ice	2.99	2.01	0.08
						1" Ice			
BXA-171063-12BF-EDIN-X w/ Mount Pipe	B	From Leg	4.00	20.0000	140.00	No Ice	5.04	5.30	0.04
			0.00			1/2"	5.59	6.47	0.08
			0.00			Ice	6.11	7.36	0.14
						1" Ice			
BXA-70063-6BF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00	20.0000	140.00	No Ice	7.71	5.63	0.04
			0.00			1/2"	8.33	6.72	0.10
			0.00			Ice	8.92	7.56	0.17
						1" Ice			
BXA-70063/4CF w/ Mount Pipe	C	From Leg	4.00	20.0000	140.00	No Ice	5.40	3.62	0.03
			0.00			1/2"	5.84	4.22	0.07
			0.00			Ice	6.30	4.83	0.12
						1" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.00	20.0000	140.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice			
(2) FD9R6004/2C-3L	C	From Leg	4.00	20.0000	140.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice			
RRH2X40-AWS	C	From Leg	4.00	20.0000	140.00	No Ice	2.52	1.59	0.04
			0.00			1/2"	2.75	1.80	0.06
			0.00			Ice	2.99	2.01	0.08
						1" Ice			
BXA-171063-12BF-EDIN-X w/ Mount Pipe	C	From Leg	4.00	20.0000	140.00	No Ice	5.04	5.30	0.04
			0.00			1/2"	5.59	6.47	0.08
			0.00			Ice	6.11	7.36	0.14
						1" Ice			
BXA-70063-6BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00	20.0000	140.00	No Ice	7.71	5.63	0.04
			0.00			1/2"	8.33	6.72	0.10
			0.00			Ice	8.92	7.56	0.17
						1" Ice			
DB-T1-6Z-8AB-0Z	C	From Leg	4.00	20.0000	140.00	No Ice	5.60	2.33	0.04
			0.00			1/2"	5.92	2.56	0.08
			0.00			Ice	6.24	2.79	0.12
						1" Ice			
Platform Mount [LP 304-1]	C	None		0.0000	140.00	No Ice	17.46	17.46	1.35
						1/2"	22.44	22.44	1.62
						Ice	27.42	27.42	1.90
						1" Ice			
***									
(3) DB980H65E-M w/ Mount Pipe	A	From Leg	4.00	50.0000	130.00	No Ice	4.04	3.62	0.03
			0.00			1/2"	4.50	4.48	0.07
			0.00			Ice	4.95	5.22	0.11
						1" Ice			
(3) DB980H65E-M w/ Mount Pipe	B	From Leg	4.00	30.0000	130.00	No Ice	4.04	3.62	0.03
			0.00			1/2"	4.50	4.48	0.07
			0.00			Ice	4.95	5.22	0.11
						1" Ice			
(3) DB980H65E-M w/	C	From Leg	4.00	10.0000	130.00	No Ice	4.04	3.62	0.03

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
Mount Pipe			0.00 0.00			1/2" Ice 1" Ice	4.50 4.95	4.48 5.22	0.07 0.11
Platform Mount [LP 405-1]	C	None		0.0000	130.00	No Ice 1/2" Ice 1" Ice	20.80 28.10 35.40	20.80 28.10 35.40	1.80 2.07 2.33
***									
(4) 844G65VTZASX w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	6.13 6.59 7.06	5.21 5.89 6.59	0.03 0.09 0.14
(4) 844G65VTZASX w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	6.13 6.59 7.06	5.21 5.89 6.59	0.03 0.09 0.14
(4) DB844H90E-XY w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	3.30 3.69 4.12	4.92 5.60 6.28	0.03 0.07 0.12
Platform Mount [LP 1201-1]	C	None		0.0000	115.00	No Ice 1/2" Ice 1" Ice	23.10 26.80 30.50	23.10 26.80 30.50	2.10 2.50 2.90
***									
(2) RRUS-11	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03
(2) LGP21903	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.01 0.01 0.02
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	11.70 12.42 13.15	8.94 10.45 11.99	0.09 0.18 0.27
DC6-48-60-18-8F	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.57 2.80 3.04	2.57 2.80 3.04	0.02 0.04 0.07
(2) RRUS-11	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03
(2) LGP21903	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.01 0.01 0.02

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
P65-17-XLH-RR w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	11.70 12.42 13.15	8.94 10.45 11.99	0.09 0.18 0.27
(2) RRUS-11	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03
(2) LGP21903	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.01 0.01 0.02
Platform Mount [LP 304-1]	C	None		0.0000	105.00	No Ice 1/2" Ice 1" Ice	17.46 22.44 27.42	17.46 22.44 27.42	1.35 1.62 1.90
***									
APXV18-206516S-C w/ Mount Pipe	A	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	3.86 4.27 4.73	3.30 4.00 4.67	0.04 0.07 0.11
APXV18-206516S-C w/ Mount Pipe	B	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	3.86 4.27 4.73	3.30 4.00 4.67	0.04 0.07 0.11
APXV18-206516S-C w/ Mount Pipe	C	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice 1" Ice	3.86 4.27 4.73	3.30 4.00 4.67	0.04 0.07 0.11
***									
1142-2C	C	From Leg	4.00 0.00 6.00	30.0000	89.00	No Ice 1/2" Ice 1" Ice	2.09 3.37 4.67	2.09 3.37 4.67	0.02 0.04 0.07
Side Arm Mount [SO 701-1]	C	From Leg	0.00 0.00 0.00	30.0000	89.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
***									
GPS_A	A	From Leg	4.00 0.00 2.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice	0.30 0.37 0.46	0.30 0.37 0.46	0.00 0.00 0.01
Side Arm Mount [SO 701-1]	C	None		0.0000	72.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
***									
201-1N	A	From Leg	4.00 0.00 7.00	30.0000	54.00	No Ice 1/2" Ice 1" Ice	1.49 2.41 3.34	1.49 2.41 3.34	0.01 0.02 0.04
220-8N	C	From Leg	4.00	30.0000	54.00	No Ice	5.18	5.18	0.02

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
			0.00 10.00			1/2" Ice 1" Ice	7.09 9.03	7.09 9.03	0.06 0.11
Side Arm Mount [SO 701-1]	A	From Leg	0.00 0.00 0.00	30.0000	54.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
Side Arm Mount [SO 701-1]	C	From Leg	0.00 0.00 0.00	30.0000	54.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
***									
DB436-C	A	From Leg	4.00 0.00 0.00	-60.0000	49.00	No Ice 1/2" Ice 1" Ice	0.45 0.81 1.17	0.45 0.81 1.17	0.01 0.01 0.01
DB436-C	A	From Leg	4.00 0.00 0.00	-60.0000	45.00	No Ice 1/2" Ice 1" Ice	0.45 0.81 1.17	0.45 0.81 1.17	0.01 0.01 0.01
DB436-C	A	From Leg	4.00 0.00 0.00	-60.0000	40.00	No Ice 1/2" Ice 1" Ice	0.45 0.81 1.17	0.45 0.81 1.17	0.01 0.01 0.01
DB436-C	A	From Leg	4.00 0.00 0.00	-60.0000	37.00	No Ice 1/2" Ice 1" Ice	0.45 0.81 1.17	0.45 0.81 1.17	0.01 0.01 0.01

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HPD2-4.7	C	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	16.0000		148.00	2.04	No Ice 1/2" Ice 1" Ice	3.27 3.55 3.82	0.03 0.05 0.06

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice

Comb. No.	Description
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	147.5 - 125	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.39	0.56	-0.21
			Max. Mx	5	-9.03	-214.40	1.80
			Max. My	8	-9.09	2.50	-202.28
			Max. Vy	5	13.19	-214.40	1.80
			Max. Vx	8	12.52	2.50	-202.28
			Max. Torque	10			-0.74
L2	125 - 100	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.01	0.16	0.30
			Max. Mx	5	-17.61	-636.07	1.96
			Max. My	8	-17.65	2.91	-610.09
			Max. Vy	5	22.17	-636.07	1.96
			Max. Vx	8	21.71	2.91	-610.09
			Max. Torque	6			1.64
L3	100 - 94.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.14	0.65	-0.00
			Max. Mx	5	-18.88	-765.19	1.48
			Max. My	8	-18.92	2.65	-736.71
			Max. Vy	5	23.08	-765.19	1.48
			Max. Vx	8	22.62	2.65	-736.71
			Max. Torque	6			1.64
L4	94.25 - 80	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38.42	2.27	-0.82
			Max. Mx	5	-22.50	-1105.00	0.27
			Max. My	8	-22.53	2.17	-1070.82
			Max. Vy	5	24.57	-1105.00	0.27
			Max. Vx	8	24.14	2.17	-1070.82
			Max. Torque	6			1.62
L5	80 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.15	4.21	-1.70
			Max. Mx	5	-28.80	-1617.12	-1.30
			Max. My	8	-28.82	1.30	-1574.84
			Max. Vy	5	26.65	-1617.12	-1.30
			Max. Vx	8	26.22	1.30	-1574.84
			Max. Torque	11			-1.37

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L6	60 - 40	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-57.46	6.94	-2.78
			Max. Mx	5	-36.28	-2175.72	-2.95
			Max. My	8	-36.29	0.48	-2125.74
			Max. Vy	5	28.94	-2175.72	-2.95
			Max. Vx	8	28.53	0.48	-2125.74
			Max. Torque	10			-1.73
L7	40 - 20	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-68.97	8.78	-4.23
			Max. Mx	5	-44.80	-2773.28	-4.74
			Max. My	8	-44.81	-0.60	-2715.61
			Max. Vy	5	30.82	-2773.28	-4.74
			Max. Vx	8	30.42	-0.60	-2715.61
			Max. Torque	10			-1.88
L8	20 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-80.21	10.19	-5.47
			Max. Mx	5	-53.46	-3407.35	-6.58
			Max. My	8	-53.46	-1.77	-3342.05
			Max. Vy	5	32.61	-3407.35	-6.58
			Max. Vx	8	32.21	-1.77	-3342.05
			Max. Torque	10			-1.88

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	80.21	-0.00	0.00
	Max. H_x	11	53.47	32.56	0.09
	Max. H_z	2	53.47	0.07	32.20
	Max. M_x	2	3340.46	0.07	32.20
	Max. M_z	5	3407.35	-32.60	-0.09
	Max. Torsion	4	1.81	-28.19	16.02
	Min. Vert	5	53.47	-32.60	-0.09
	Min. H_x	5	53.47	-32.60	-0.09
	Min. H_z	8	53.47	-0.07	-32.20
	Min. M_x	8	-3342.05	-0.07	-32.20
	Min. M_z	11	-3406.24	32.56	0.09
	Min. Torsion	10	-1.88	28.15	-16.01

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	53.47	-0.00	0.00	0.46	2.29	0.00
Dead+Wind 0 deg - No Ice	53.47	-0.07	-32.20	-3340.46	6.03	-1.33
Dead+Wind 30 deg - No Ice	53.47	16.26	-27.83	-2888.28	-1702.37	-1.69
Dead+Wind 60 deg - No Ice	53.47	28.19	-16.02	-1664.23	-2947.92	-1.81
Dead+Wind 90 deg - No Ice	53.47	32.60	0.09	6.58	-3407.35	-1.36
Dead+Wind 120 deg - No Ice	53.47	28.30	16.15	1673.03	-2957.55	-0.55
Dead+Wind 150 deg - No Ice	53.47	16.40	27.92	2895.39	-1711.27	0.52
Dead+Wind 180 deg - No Ice	53.47	0.07	32.20	3342.05	-1.77	1.39
Dead+Wind 210 deg - No Ice	53.47	-16.23	27.82	2887.71	1702.35	1.80
Dead+Wind 240 deg - No Ice	53.47	-28.15	16.01	1663.39	2946.89	1.88
Dead+Wind 270 deg - No Ice	53.47	-32.56	-0.09	-6.83	3406.24	1.39
Dead+Wind 300 deg - No Ice	53.47	-28.27	-16.16	-1672.69	2957.32	0.54
Dead+Wind 330 deg - No Ice	53.47	-16.39	-27.92	-2895.57	1715.06	-0.57
Dead+Ice+Temp	80.21	0.00	-0.00	5.47	10.19	0.00
Dead+Wind 0 deg+Ice+Temp	80.21	-0.03	-9.45	-994.62	12.59	-0.58

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 30 deg+Ice+Temp	80.21	4.72	-8.16	-858.81	-492.12	-0.56
Dead+Wind 60 deg+Ice+Temp	80.21	8.19	-4.70	-492.00	-860.57	-0.45
Dead+Wind 90 deg+Ice+Temp	80.21	9.48	0.03	8.33	-996.83	-0.19
Dead+Wind 120 deg+Ice+Temp	80.21	8.23	4.74	507.21	-864.22	0.12
Dead+Wind 150 deg+Ice+Temp	80.21	4.77	8.19	872.75	-496.40	0.42
Dead+Wind 180 deg+Ice+Temp	80.21	0.03	9.45	1006.00	8.30	0.59
Dead+Wind 210 deg+Ice+Temp	80.21	-4.71	8.16	869.61	511.89	0.58
Dead+Wind 240 deg+Ice+Temp	80.21	-8.18	4.69	502.74	880.08	0.46
Dead+Wind 270 deg+Ice+Temp	80.21	-9.47	-0.03	2.56	1016.31	0.20
Dead+Wind 300 deg+Ice+Temp	80.21	-8.22	-4.74	-496.17	883.94	-0.12
Dead+Wind 330 deg+Ice+Temp	80.21	-4.77	-8.20	-861.84	517.17	-0.43
Dead+Wind 0 deg - Service	53.47	-0.03	-12.57	-1304.78	3.78	-0.52
Dead+Wind 30 deg - Service	53.47	6.35	-10.87	-1128.21	-663.72	-0.67
Dead+Wind 60 deg - Service	53.47	11.01	-6.26	-649.96	-1150.39	-0.71
Dead+Wind 90 deg - Service	53.47	12.73	0.03	2.86	-1329.81	-0.53
Dead+Wind 120 deg - Service	53.47	11.05	6.31	653.97	-1154.15	-0.21
Dead+Wind 150 deg - Service	53.47	6.40	10.90	1131.56	-667.20	0.20
Dead+Wind 180 deg - Service	53.47	0.03	12.58	1305.98	0.73	0.54
Dead+Wind 210 deg - Service	53.47	-6.34	10.87	1128.56	666.56	0.70
Dead+Wind 240 deg - Service	53.47	-11.00	6.25	650.21	1152.83	0.74
Dead+Wind 270 deg - Service	53.47	-12.72	-0.04	-2.38	1332.22	0.55
Dead+Wind 300 deg - Service	53.47	-11.04	-6.31	-653.26	1156.91	0.21
Dead+Wind 330 deg - Service	53.47	-6.40	-10.91	-1131.05	671.52	-0.22

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-53.47	0.00	0.00	53.47	-0.00	0.000%
2	-0.07	-53.47	-32.20	0.07	53.47	32.20	0.003%
3	16.26	-53.47	-27.83	-16.26	53.47	27.83	0.000%
4	28.19	-53.47	-16.02	-28.19	53.47	16.02	0.000%
5	32.60	-53.47	0.09	-32.60	53.47	-0.09	0.003%
6	28.30	-53.47	16.15	-28.30	53.47	-16.15	0.000%
7	16.40	-53.47	27.92	-16.40	53.47	-27.92	0.000%
8	0.07	-53.47	32.20	-0.07	53.47	-32.20	0.003%
9	-16.23	-53.47	27.82	16.23	53.47	-27.82	0.000%
10	-28.15	-53.47	16.01	28.15	53.47	-16.01	0.000%
11	-32.56	-53.47	-0.09	32.56	53.47	0.09	0.003%
12	-28.27	-53.47	-16.16	28.27	53.47	16.16	0.000%
13	-16.39	-53.47	-27.92	16.39	53.47	27.92	0.000%
14	0.00	-80.21	0.00	-0.00	80.21	0.00	0.001%
15	-0.03	-80.21	-9.45	0.03	80.21	9.45	0.000%
16	4.72	-80.21	-8.16	-4.72	80.21	8.16	0.000%
17	8.19	-80.21	-4.70	-8.19	80.21	4.70	0.000%
18	9.48	-80.21	0.03	-9.48	80.21	-0.03	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
19	8.23	-80.21	4.74	-8.23	80.21	-4.74	0.000%
20	4.77	-80.21	8.19	-4.77	80.21	-8.19	0.000%
21	0.03	-80.21	9.45	-0.03	80.21	-9.45	0.000%
22	-4.71	-80.21	8.16	4.71	80.21	-8.16	0.000%
23	-8.18	-80.21	4.69	8.18	80.21	-4.69	0.000%
24	-9.47	-80.21	-0.03	9.47	80.21	0.03	0.000%
25	-8.22	-80.21	-4.74	8.22	80.21	4.74	0.000%
26	-4.77	-80.21	-8.20	4.77	80.21	8.20	0.000%
27	-0.03	-53.47	-12.58	0.03	53.47	12.57	0.004%
28	6.35	-53.47	-10.87	-6.35	53.47	10.87	0.001%
29	11.01	-53.47	-6.26	-11.01	53.47	6.26	0.001%
30	12.73	-53.47	0.03	-12.73	53.47	-0.03	0.004%
31	11.05	-53.47	6.31	-11.05	53.47	-6.31	0.001%
32	6.40	-53.47	10.90	-6.40	53.47	-10.90	0.001%
33	0.03	-53.47	12.58	-0.03	53.47	-12.58	0.004%
34	-6.34	-53.47	10.87	6.34	53.47	-10.87	0.001%
35	-11.00	-53.47	6.25	11.00	53.47	-6.25	0.001%
36	-12.72	-53.47	-0.04	12.72	53.47	0.04	0.004%
37	-11.04	-53.47	-6.31	11.04	53.47	6.31	0.001%
38	-6.40	-53.47	-10.91	6.40	53.47	10.91	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	12	0.00004774	0.00005819
3	Yes	15	0.00000001	0.00005236
4	Yes	15	0.00000001	0.00005677
5	Yes	12	0.00004773	0.00010084
6	Yes	15	0.00000001	0.00005264
7	Yes	15	0.00000001	0.00005398
8	Yes	12	0.00004774	0.00005958
9	Yes	15	0.00000001	0.00005524
10	Yes	15	0.00000001	0.00005185
11	Yes	12	0.00004773	0.00010830
12	Yes	15	0.00000001	0.00005605
13	Yes	15	0.00000001	0.00005344
14	Yes	6	0.00000001	0.00004250
15	Yes	14	0.00000001	0.00008547
16	Yes	14	0.00000001	0.00008927
17	Yes	14	0.00000001	0.00008965
18	Yes	14	0.00000001	0.00008604
19	Yes	14	0.00000001	0.00009035
20	Yes	14	0.00000001	0.00009009
21	Yes	14	0.00000001	0.00008610
22	Yes	14	0.00000001	0.00009081
23	Yes	14	0.00000001	0.00009123
24	Yes	14	0.00000001	0.00008737
25	Yes	14	0.00000001	0.00009123
26	Yes	14	0.00000001	0.00009060
27	Yes	11	0.00013909	0.00006203
28	Yes	12	0.00000001	0.00007108
29	Yes	12	0.00000001	0.00008930
30	Yes	11	0.00013928	0.00007312
31	Yes	12	0.00000001	0.00007141
32	Yes	12	0.00000001	0.00007820
33	Yes	11	0.00013910	0.00006238
34	Yes	12	0.00000001	0.00008427
35	Yes	12	0.00000001	0.00006909
36	Yes	11	0.00013926	0.00007447
37	Yes	12	0.00000001	0.00008655
38	Yes	12	0.00000001	0.00007572

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147.5 - 125	19.292	36	1.2746	0.0029
L2	125 - 100	13.463	36	1.1547	0.0020
L3	100 - 94.25	8.052	36	0.8619	0.0011
L4	94.25 - 80	7.053	36	0.7948	0.0009
L5	80 - 60	4.920	36	0.6246	0.0006
L6	60 - 40	2.669	36	0.4382	0.0004
L7	40 - 20	1.159	36	0.2750	0.0002
L8	20 - 0	0.290	36	0.1341	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.00	HPD2-4.7	36	19.292	1.2746	0.0029	29194
148.00	1142-2C	36	19.292	1.2746	0.0029	29194
140.00	BXA-171063-12CF-EDIN-X w/ Mount Pipe	36	17.302	1.2460	0.0026	19463
130.00	(3) DB980H65E-M w/ Mount Pipe	36	14.710	1.1932	0.0022	8341
115.00	(4) 844G65VTZASX w/ Mount Pipe	36	11.112	1.0487	0.0017	5024
105.00	(2) RRUS-11	36	9.001	0.9235	0.0013	4094
95.00	APXV18-206516S-C w/ Mount Pipe	36	7.178	0.8036	0.0009	4749
89.00	1142-2C	36	6.213	0.7313	0.0008	5215
72.00	GPS_A	36	3.921	0.5433	0.0005	5779
54.00	201-1N	36	2.145	0.3877	0.0004	6902
49.00	DB436-C	36	1.756	0.3463	0.0003	7260
45.00	DB436-C	36	1.475	0.3140	0.0003	7575
40.00	DB436-C	36	1.159	0.2750	0.0002	7870
37.00	DB436-C	36	0.988	0.2525	0.0002	7771

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147.5 - 125	49.340	5	3.2608	0.0076
L2	125 - 100	34.432	5	2.9549	0.0053
L3	100 - 94.25	20.591	5	2.2050	0.0029
L4	94.25 - 80	18.036	5	2.0330	0.0023
L5	80 - 60	12.580	5	1.5974	0.0016
L6	60 - 40	6.826	5	1.1205	0.0011
L7	40 - 20	2.964	5	0.7031	0.0006
L8	20 - 0	0.743	5	0.3428	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.00	HPD2-4.7	5	49.340	3.2608	0.0076	11484
148.00	1142-2C	5	49.340	3.2608	0.0076	11484
140.00	BXA-171063-12CF-EDIN-X w/ Mount Pipe	5	44.252	3.1882	0.0068	7655
130.00	(3) DB980H65E-M w/ Mount Pipe	5	37.622	3.0533	0.0058	3280
115.00	(4) 844G65VTZASX w/ Mount Pipe	5	28.420	2.6836	0.0043	1970
105.00	(2) RRUS-11	5	23.019	2.3628	0.0033	1605
95.00	APXV18-206516S-C w/ Mount Pipe	5	18.357	2.0555	0.0024	1860
89.00	1142-2C	5	15.888	1.8706	0.0020	2041
72.00	GPS_A	5	10.027	1.3894	0.0013	2261
54.00	201-1N	5	5.485	0.9914	0.0009	2700
49.00	DB436-C	5	4.491	0.8855	0.0008	2840
45.00	DB436-C	5	3.772	0.8028	0.0007	2964
40.00	DB436-C	5	2.964	0.7031	0.0006	3079
37.00	DB436-C	5	2.525	0.6456	0.0006	3040

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	147.5 - 125 (1)	P24x3/8	22.50	0.00	0.0	25.200	27.8325	-9.03	701.38	0.013
L2	125 - 100 (2)	P30x3/8	25.00	0.00	0.0	25.075	34.9011	-17.61	875.15	0.020
L3	100 - 94.25 (3)	P36x3/8	5.75	0.00	0.0	23.696	41.9697	-18.88	994.51	0.019
L4	94.25 - 80 (4)	P36x3/8 [0.494173]	14.25	0.00	0.0	27.180	55.1225	-22.50	1498.20	0.015
L5	80 - 60 (5)	P42x3/8 [0.580296]	20.00	0.00	0.0	20.539	75.5103	-28.80	1550.88	0.019
L6	60 - 40 (6)	P48x3/8 [0.617642]	20.00	0.00	0.0	19.844	91.9398	-36.28	1824.48	0.020
L7	40 - 20 (7)	P54x3/8 [0.654666]	20.00	0.00	0.0	19.294	109.7150	-44.80	2116.81	0.021
L8	20 - 0 (8)	P60x3/8 [0.62329]	20.00	0.00	0.0	20.793	116.2670	-53.46	2417.57	0.022

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	147.5 - 125 (1)	P24x3/8	214.40	15.896	27.720	0.573	0.00	0.000	27.720	0.000
L2	125 - 100 (2)	P30x3/8	636.07	29.898	25.075	1.192	0.00	0.000	25.075	0.000
L3	100 - 94.25 (3)	P36x3/8	765.19	24.821	23.696	1.047	0.00	0.000	23.696	0.000
L4	94.25 - 80 (4)	P36x3/8 [0.494173]	1105.00	27.472	27.180	1.011	0.00	0.000	27.180	0.000
L5	80 - 60 (5)	P42x3/8 [0.580296]	1617.12	25.161	22.593	1.114	0.00	0.000	22.593	0.000
L6	60 - 40 (6)	P48x3/8 [0.617642]	2175.72	24.282	21.829	1.112	0.00	0.000	21.829	0.000
L7	40 - 20 (7)	P54x3/8 [0.654666]	2773.28	23.020	21.223	1.085	0.00	0.000	21.223	0.000
L8	20 - 0 (8)	P60x3/8 [0.62329]	3407.36	23.937	20.793	1.151	0.00	0.000	20.793	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	147.5 - 125 (1)	P24x3/8	13.19	0.948	16.800	0.056	0.69	0.026	16.800	0.002
L2	125 - 100 (2)	P30x3/8	22.17	1.271	16.800	0.076	1.58	0.037	15.644	0.002
L3	100 - 94.25 (3)	P36x3/8	23.08	1.100	16.800	0.065	1.56	0.025	11.901	0.002
L4	94.25 - 80 (4)	P36x3/8 [0.494173]	24.57	0.891	18.120	0.049	1.30	0.016	18.120	0.001
L5	80 - 60 (5)	P42x3/8 [0.580296]	26.65	0.706	13.692	0.052	1.32	0.010	13.692	0.001
L6	60 - 40 (6)	P48x3/8 [0.617642]	28.94	0.630	13.230	0.048	1.29	0.007	13.230	0.001
L7	40 - 20 (7)	P54x3/8 [0.654666]	30.82	0.562	12.863	0.044	1.40	0.006	12.863	0.000
L8	20 - 0 (8)	P60x3/8 [0.62329]	32.61	0.561	13.916	0.040	1.36	0.005	13.916	0.000

Pole Interaction Design Data

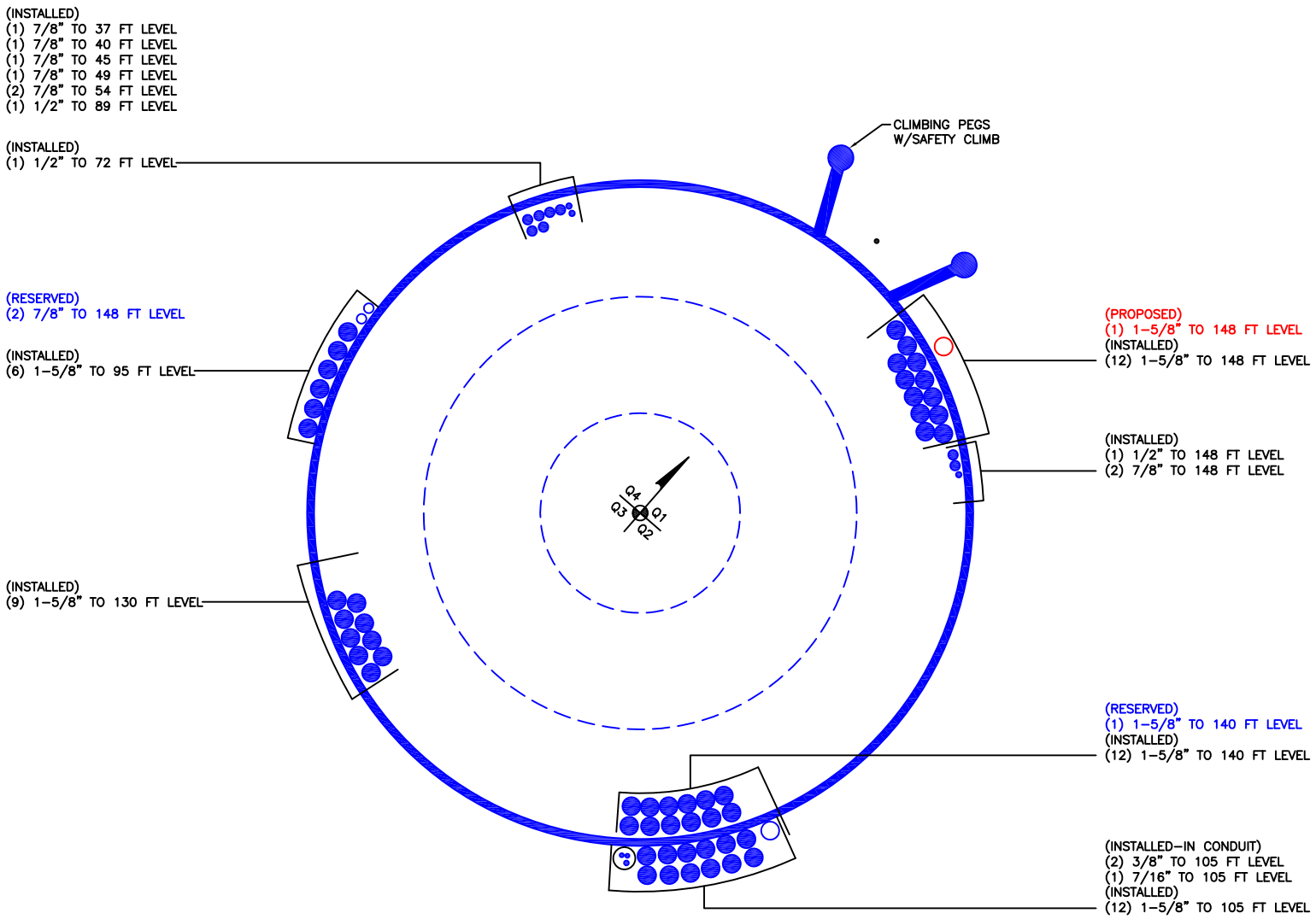
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147.5 - 125 (1)	0.013	0.573	0.000	0.056	0.002	0.590 ✔	1.333	H1-3+VT ✔
L2	125 - 100 (2)	0.020	1.192	0.000	0.076	0.002	1.219 ✔	1.333	H1-3+VT ✔
L3	100 - 94.25 (3)	0.019	1.047	0.000	0.065	0.002	1.071 ✔	1.333	H1-3+VT ✔
L4	94.25 - 80 (4)	0.015	1.011	0.000	0.049	0.001	1.028 ✔	1.333	H1-3+VT ✔
L5	80 - 60 (5)	0.019	1.114	0.000	0.052	0.001	1.135 ✔	1.333	H1-3+VT ✔
L6	60 - 40 (6)	0.020	1.112	0.000	0.048	0.001	1.135 ✔	1.333	H1-3+VT ✔
L7	40 - 20 (7)	0.021	1.085	0.000	0.044	0.000	1.108 ✔	1.333	H1-3+VT ✔
L8	20 - 0 (8)	0.022	1.151	0.000	0.040	0.000	1.175 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	147.5 - 125	Pole	P24x3/8	1	-9.03	934.94	44.2	Pass
L2	125 - 100	Pole	P30x3/8	2	-17.61	1166.57	91.4	Pass
L3	100 - 94.25	Pole	P36x3/8	3	-18.88	1325.68	80.3	Pass
L4	94.25 - 80	Pole	P36x3/8 [0.494173]	4	-22.50	1997.10	77.1	Pass
L5	80 - 60	Pole	P42x3/8 [0.580296]	5	-28.80	2067.32	85.1	Pass
L6	60 - 40	Pole	P48x3/8 [0.617642]	6	-36.28	2432.03	85.1	Pass
L7	40 - 20	Pole	P54x3/8 [0.654666]	7	-44.80	2821.71	83.1	Pass
L8	20 - 0	Pole	P60x3/8 [0.62329]	8	-53.46	3222.62	88.1	Pass
							Summary	
						Pole (L2)	91.4	Pass
						RATING =	**91.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED)
(1) 7/8" TO 37 FT LEVEL
(1) 7/8" TO 40 FT LEVEL
(1) 7/8" TO 45 FT LEVEL
(1) 7/8" TO 49 FT LEVEL
(2) 7/8" TO 54 FT LEVEL
(1) 1/2" TO 89 FT LEVEL
(INSTALLED)
(1) 1/2" TO 72 FT LEVEL
CLIMBING PEGS
W/SAFETY CLIMB
(RESERVED)
(2) 7/8" TO 148 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 95 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 148 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 148 FT LEVEL
(INSTALLED)
(1) 1/2" TO 148 FT LEVEL
(2) 7/8" TO 148 FT LEVEL
Q4
Q1
Q3
Q2
(INSTALLED)
(9) 1-5/8" TO 130 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 140 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 140 FT LEVEL
(INSTALLED-IN CONDUIT)
(2) 3/8" TO 105 FT LEVEL
(1) 7/16" TO 105 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 105 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforced Pole Stress and Effective Thickness Check

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Section		Loads				Pole																Unreinforced Pole - Rev. F					Reinforced Pole						Rev. F	Reinforcement 1										Composite							
Section	Elevation (ft)	Moment (ft-kip)	Compressi on (kip)	Shear (kip)	Torsion (kip-ft)	Number of Sides	OD (in)	Thickness (in)	Yield Strength (ksi)	Flat Width (in)	Area (in^2)	Moment of Inertia (in^4)	Percent of Composite Moment of Inertia	Angle Offset to Pole Flat	Distance to Extreme Fiber (in)	Section Modulus (in^3)	Torsion Constant (in^4)	Polygonal Compact Criterion	Allowable Bending Stress (ksi)	Allowable Bending Moment Strength (ft-kip)	Allowable Axial Stress (ksi)	Allowable Shear Stress (ksi)	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	**Stress Ratio**	Moment in Pole when Reinforced	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	**Reinforced Pole Stress Ratio**	**Rev. F**	Qty	**Model**	Position (F-Flat, C Corner)	Gap Between Pole and Back of Rein. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in^4)	Axial Force (kip)	**Stress Ratio**	Centroid Offset (in)	Area (in^2)	Moment of Inertia (in^4)	**Controlling Stress Ratio**	**Thickness (in)**	**Weight Multiplier**	**Derated Yield Stress (ksi)**	**% Error in Derated Yield Stress**
Section	*Elevation*	*Moment*	*Compressior*	*Shear*	*Torsion*	*PoleSides*	*PoleOD*	*PoleT*	*PoleFy*	*PoleW*	*PoleA*	*PoleI*	*PoleIPer*	*PoleCPoint*	*PoleC*	*PoleS*	*PoleJ*	*PoleWTJ*	*PoleFb*	*PoleMall*	*PoleFa*	*PoleFv*	*PoleFbAct*	*PoleFaAct*	*PoleFvAct*	*PoleFvtAct*	***PoleSR***	*PoleMomer*	*RPoleFbAct*	*RPoleFaAct*	*RPoleFvAct*	*RPoleFvtAct*	***RPoleSR***		*Rein1Qty*	***Rein1Model***	*Rein1Pos*	*Rein1Gap*	*Rein1TC*	*Rein1ITotal*	*Rein1P*	***Rein1SR***	*CompYBar*	*CompA*	*CompI*	***CompSR***	***EPoleT***	***EPoleWM***	***EDPoleFy***	***EDPoleSRCheck***
1	147.5	7.9	3.0	4.8	0.3	Round	24.0000	0.5000	42	0.00	36.9	2549	100%	TRUE	12.00	212	5099	0	37.0	654.2	33.6	22.4	0.4	0.08	0.00	0.01	**0.014**	7.9	0.4	0.08	0.00	0.00	**0.014**										0.000	36.9	2549	**0.014**	**0.5000**	**1.00**	**42.0**	**29.8%**
2	125	214.4	9.0	13.2	0.7	Round	24.0000	0.3750	42	0.00	27.8	1942	100%	TRUE	12.00	162	3885	0	37.0	498.4	33.6	22.4	15.9	0.32	0.00	0.03	**0.440**	214.4	15.9	0.32	0.00	0.00	**0.440**										0.000	27.8	1942	**0.440**	**0.3750**	**1.00**	**42.0**	**0.3%**
3	100	636.1	17.6	22.2	1.6	Round	30.0000	0.3750	42	0.00	34.9	3829	100%	TRUE	15.00	255	7659	0	33.4	711.1	33.6	22.4	29.9	0.50	0.00	0.04	**0.910**	636.1	29.9	0.50	0.00	0.00	**0.910**										0.000	34.9	3829	**0.910**	**0.3750**	**1.00**	**42.0**	**0.2%**
4	94.25	765.2	18.9	23.1	1.6	Round	36.0000	0.3750	42	0.00	42.0	6659	100%	TRUE	18.00	370	13318	0	31.6	973.8	33.6	22.4	24.8	0.45	0.00	0.03	**0.799**	765.2	24.8	0.45	0.00	0.00	**0.799**										0.000	42.0	6659	**0.799**	**0.3750**	**1.00**	**42.0**	**0.3%**
5	80	1105.0	22.5	24.6	1.3	Round	36.0000	0.3750	42	0.00	42.0	6659	77%	TRUE	18.00	370	13318	0	31.6	973.8	33.6	22.4	35.8	0.54	0.00	0.02	**1.151**	846.4	27.5	0.54	0.00	0.00	**0.885**		**4**	**PL0.75x4-16**	**F**	0	T&C	2034	84.1	**0.774**	0.000	54.0	8693	**0.885**	**0.4942**	**0.98**	**35.9**	**0.2%**
6	60	1617.1	28.8	26.6	1.3	Round	42.0000	0.3750	42	0.00	49.0	10622	66%	TRUE	21.00	506	21243	0	30.3	1276.0	33.6	22.4	38.4	0.59	0.00	0.02	**1.285**	1059.9	25.1	0.59	0.00	0.00	**0.848**		**4**	**PL1x6-16**	**F**	0	T&C	5584	154.5	**0.614**	0.000	73.0	16206	**0.848**	**0.5803**	**0.97**	**34.4**	**0.5%**
7	40	2175.7	36.3	28.9	1.3	Round	48.0000	0.3750	42	0.00	56.1	15908	62%	TRUE	24.00	663	31817	0	29.3	1617.8	33.6	22.4	39.4	0.65	0.00	0.01	**1.364**	1340.4	24.3	0.65	0.00	0.00	**0.848**		**4**	**PL1.25x6.5-19**	**F**	0	T&C	9913	202.3	**0.583**	0.000	88.6	25821	**0.848**	**0.6176**	**0.96**	**33.3**	**0.6%**
8	20	2773.3	44.8	30.8	1.4	Round	54.0000	0.3750	42	0.00	63.2	22710	58%	TRUE	27.00	841	45420	0	28.5	1999.2	33.6	22.4	39.6	0.71	0.00	0.01	**1.408**	1612.5	23.0	0.71	0.00	0.00	**0.828**		**4**	**PL1.25x8.5-17**	**F**	0	T&C	16347	250.1	**0.535**	0.000	105.7	39057	**0.828**	**0.6547**	**0.96**	**36.2**	**11.1%**
9	0	3407.4	53.5	32.6	1.4	Round	60.0000	0.3750	42	0.00	70.2	31217	61%	TRUE	30.00	1041	62434	0	27.9	2420.2	33.6	22.4	39.3	0.76	0.00	0.01	**1.431**	2074.3	23.9	0.76	0.00	0.00	**0.880**		**4**	**PL1.25x8.5-17**	**F**	0	T&C	20061	259.5	**0.555**	0.000	112.7	51278	**0.880**	**0.6233**	**0.97**	**37.1**	**4.3%**
																										1.431						**0.910**								**0.774**				**0.910**				

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^4)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
Model	*Wt*	*A*	*Ix*	*Iy*	*Y*	*X*	*Tw*	*W*	*Wf*	*Tf*	*Dh*	*Fy*	*Fu*	*Kx*	*Lx*	*Ky*	*Ly*	*PAll*	*Pall.inc*	*Ptype.ASD*	*phiPn*	*Ptype.LRFD*
PL0.75x4-16	10.2	3.00	0.14	4.00	0.375	0	0.75	4	0	0	1.21875	65	80	0.80	16	1.00	16	81.6	108.8	Rupture	122.3	Rupture
PL1x6-16	20.4	6.00	0.50	18.00	0.5	0	1	6	0	0	1.21875	65	80	0.80	16	1.00	16	188.8	251.7	Rupture	283.1	Rupture
PL1.25x6.5-19	27.6	8.13	1.06	28.61	0.625	0	1.25	6.5	0	0	1.21875	65	80	0.80	19	1.00	19	260.4	347.2	Compress.	391.4	Rupture
PL1.25x8.5-17	36.2	10.63	1.38	63.97	0.625	0	1.25	8.5	0	0	1.21875	65	80	0.80	17	1.00	17	350.9	467.9	Compress.	541.4	Rupture

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	20	4	..25x8.5-17	F	T&C
20	40	4	..25x8.5-17	F	T&C
40	60	4	..25x6.5-19	F	T&C
60	80	4	PL1x6-16	F	T&C
80	94.25	4	L0.75x4-16	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	1	1														
1	1	1	1														
1	1	1	1														
1	1	1	1														
1	1	1	1														

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Pole Manufacturer:	Pirod

Reactions		
Moment:	214.40264	ft-kips
Axial:	9.0304	kips
Shear:	13.18899	kips
Elevation:	125	feet

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffe

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	27		

Plate Data		
Diam:	30	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

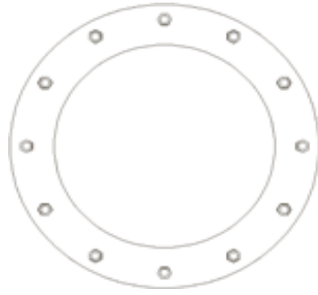
Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07	kips
Max Bolt directly applied T:	18.61	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.427	in
Min PL "treq" for actual **T w/ Pry**:	0.692	in
Min PL "t1" for actual **T w/o Pry**:	0.907	in
T allowable with Prying:	42.49	kips
Prying Force, Q:	0.00	kips
Total Bolt Tension=T+Q:	18.61	kips
Prying Bolt Stress Ratio=(T+Q)/(B):	40.4%	**Pass**

Exterior Flange Plate Results	Flexural Check
Compression Side Plate Stress:	Rohn/Pirod, OK
Allowable Plate Stress:	36.0 ksi
Compression Plate Stress Ratio:	Rohn/Pirod, OK
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	30.6% **Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A
Pole Results	
Pole Punching Shear Check:	N/A



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Manufacturer:	Pirod

Reactions		
Moment:	214.40264	ft-kips
Axial:	9.0304	kips
Shear:	13.18899	kips
Exterior Flange Run, T+Q:	18.606492	kips

Elevation: 125 feet

Bolt Data			
Qty:	20		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	27	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	18.6	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	40.4%	**Pass**

Plate Data		
Plate Outer Diam:	29.25	in
Plate Inner Diam:	23.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.59	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	19.5	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

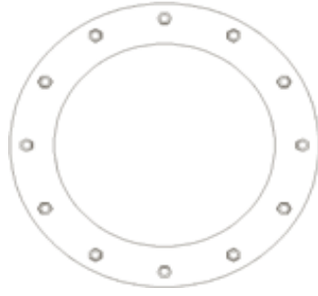
Stiffener Results N/A for Rohn / Pirod

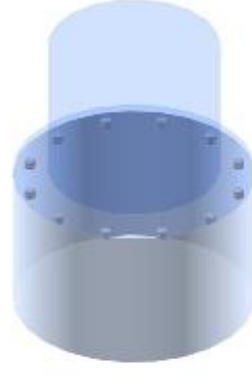
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Pole OuterDiam:	30	in
Thick:	0.375	in
Pole Inner Diam:	29.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi





Stress Increase Factor		
ASIF:	1.333	

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Pole Manufacturer:	Pirod

Reactions		
Moment:	636.06992	ft-kips
Axial:	17.614	kips
Shear:	22.174217	kips
Elevation:	100	feet

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffe

Bolt Data			
Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	33		

Plate Data		
Diam:	36	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.93	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

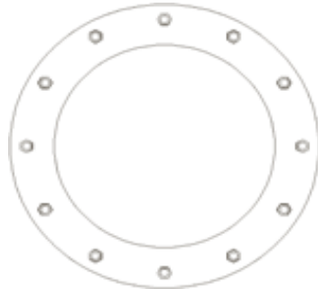
Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07	kips
Max Bolt directly applied T:	37.82	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.398	in
Min PL "treq" for actual **T w/ Pry**:	0.963	in
Min PL "t1" for actual **T w/o Pry**:	1.267	in
T allowable with Prying:	42.98	kips
Prying Force, Q:	0.50	kips
Total Bolt Tension=T+Q:	38.32	kips
Prying Bolt Stress Ratio=(T+Q)/(B):	83.2%	**Pass**

Exterior Flange Plate Results	Flexural Check
Compression Side Plate Stress:	Rohn/Pirod, OK
Allowable Plate Stress:	36.0 ksi
Compression Plate Stress Ratio:	Rohn/Pirod, OK
Prying Occurs, PL Check:	
Tension Side Stress Ratio, (treq/t)^2:	59.4% **Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A
Pole Results	
Pole Punching Shear Check:	N/A



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Manufacturer:	Pirod

Reactions		
Moment:	636.06992	ft-kips
Axial:	17.614	kips
Shear:	22.174217	kips
Exterior Flange Run, T+Q:	38.320496	kips

Elevation: 100 feet

Bolt Data			
Qty:	24		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	33	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	38.3	Kips, Ext. Flange T+Q
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	83.2%	**Pass**

Plate Data		
Plate Outer Diam:	35.25	in
Plate Inner Diam:	29.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.61	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	39.3	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results N/A for Rohn / Pirod

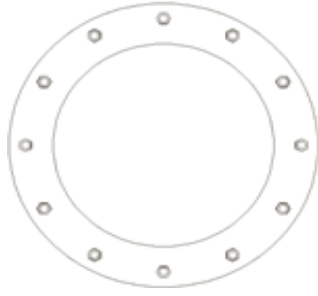
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

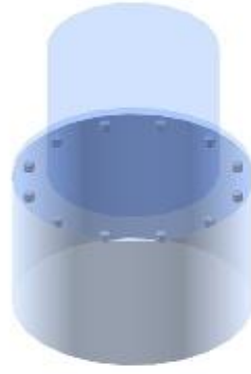
Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Pole OuterDiam:	36	in
Thick:	0.375	in
Pole Inner Diam:	35.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi

Stress Increase Factor		
ASIF:	1.333	





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	827050
Name:	Rocky Hill- Rte 160_1
App. #:	261521 R1

Flange Height:	80	ft

System Reactions		
Moment:	1105.0	kip-ft
Axial:	22.5	kip
Shear:	24.6	kip

Pole Geometry		
Upper Pole OD:	36.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	42.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	42.00	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	105%

Outer Bolt Group Data

Quantity:	28	
Diameter:	1	in
Material:	A325	
Bolt Circle:	39.00	in
Bolt Group Area:	21.99	in^2
Bolt Group MOIx:	4181	in^4

Reactions Seen by Outer Bolt Group

Moment:	416.5	kip-ft
Axial:	22.5	kip
Shear:	24.6	kip

Outer Bolt Capacity Check

Max Tension:	17.5	kip
Allowable Tension:	46.0	kip
Max Shear:	0.9	kip
Allowable Shear:	23.0	kip
Bolt Capacity	**38.0%**	Pass

Inner Bolt Group Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Inner Bolt Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check

Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

Bridge Stiffener #1 Data

Quantity:	4	
Type:	Write In	
Circle:	48.00	in
Individual Area:	6.00	in^2
BS #1 Group Area:	24.00	in^2
BS #1 Group MOIx:	6912	in^4

Reactions Seen by BS #1 Group

Moment:	688.5	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #1 Capacity Check

Max Tension:	172.1	kip
Max Compression:	172.1	kip
Allowable Axial:	311.9	kip
Max Shear:	0.0	kip
Allowable Shear:	156.0	kip
Bolt Capacity	**55.2%**	Pass

BS #1 Upper Weld Capacity

Eccentricity (ex):	6.000	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #1 Lower Weld Capacity

Eccentricity (ex):	3.000	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #2 Data

Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #2 Group Area:	0.00	in^2
BS #2 Group MOIx:	0	in^4

Reactions Seen by BS #2 Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #2 Capacity Check

Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

BS #2 Upper Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #2 Lower Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #3 Data

Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4

Reactions Seen by BS #3 Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check

Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

BS #3 Upper Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #3 Lower Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Pole Manufacturer:	Other

Reactions		
Moment:	416.48409	ft-kips
Axial:	22.4981	kips
Shear:	24.568807	kips
Elevation:	80	feet

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffe

Bolt Data			
Qty:	28		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	39		

Plate Data		
Diam:	42	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.04	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07	kips
Max Bolt directly applied T:	17.50	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.379	in
Min PL "treq" for actual **T w/ Pry**:	0.645	in
Min PL "t1" for actual **T w/o Pry**:	0.850	in
T allowable with Prying:	43.33	kips
Prying Force, Q:	0.00	kips
Total Bolt Tension=T+Q:	17.50	kips
Prying Bolt Stress Ratio=(T+Q)/(B):	38.0%	**Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	17.2	ksi
Allowable Plate Stress:	36.0	ksi
Compression Plate Stress Ratio:	47.7%	**Pass**
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	26.6%	**Pass**

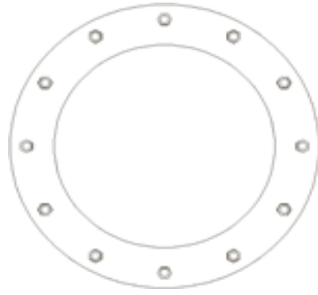
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Manufacturer:	Other

Reactions		
Moment:	416.48409	ft-kips
Axial:	22.4981	kips
Shear:	24.568807	kips
Exterior Flange Run, T+Q:	17.50349	kips

Elevation: 80 feet

Bolt Data			
Qty:	28		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	39	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	17.5	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	38.0%	**Pass**

Plate Data		
Plate Outer Diam:	41.25	in
Plate Inner Diam:	35.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.63	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	19.1	Kips, Ext. C= Interior C
Plate Stress:	17.8	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	49.6%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

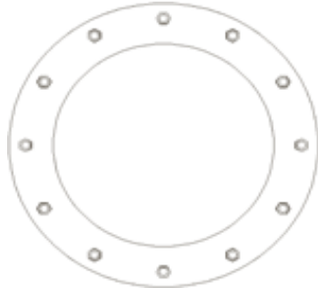
Stiffener Results

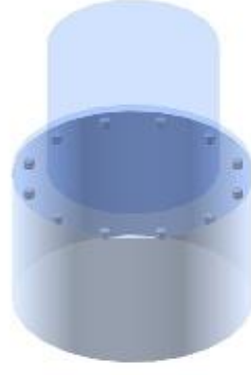
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check:	n/a

Pole Data		
Pole OuterDiam:	42	in
Thick:	0.375	in
Pole Inner Diam:	41.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi





Stress Increase Factor		
ASIF:	1.333	

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	827050
Name:	Rocky Hill- Rte 160_1
App. #:	261521 R1

Flange Height:	60	ft

System Reactions		
Moment:	1617.1	kip-ft
Axial:	28.8	kip
Shear:	26.6	kip

Pole Geometry		
Upper Pole OD:	42.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	48.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	48.00	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	105%

Outer Bolt Group Data

Quantity:	32	
Diameter:	1	in
Material:	A325	
Bolt Circle:	45.00	in
Bolt Group Area:	25.13	in^2
Bolt Group MOIx:	6362	in^4

Reactions Seen by Outer Bolt Group

Moment:	431.7	kip-ft
Axial:	28.8	kip
Shear:	26.6	kip

Outer Bolt Capacity Check

Max Tension:	13.5	kip
Allowable Tension:	46.0	kip
Max Shear:	0.8	kip
Allowable Shear:	23.0	kip
Bolt Capacity	**29.3%**	Pass

Inner Bolt Group Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Inner Bolt Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check

Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

Bridge Stiffener #1 Data

Quantity:	3	
Type:	Write In	
Circle:	49.25	in
Individual Area:	5.94	in^2
BS #1 Group Area:	17.81	in^2
BS #1 Group MOIx:	5401	in^4

Reactions Seen by BS #1 Group

Moment:	366.5	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #1 Capacity Check

Max Tension:	119.1	kip
Max Compression:	59.5	kip
Allowable Axial:	237.4	kip
Max Shear:	0.0	kip
Allowable Shear:	118.7	kip
Bolt Capacity	**50.1%**	Pass

BS #1 Upper Weld Capacity

Eccentricity (ex):	3.625	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #1 Lower Weld Capacity

Eccentricity (ex):	0.625	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #2 Data

Quantity:	4	
Type:	Write In	
Circle:	54.50	in
Individual Area:	8.13	in^2
BS #2 Group Area:	32.50	in^2
BS #2 Group MOIx:	12067	in^4

Reactions Seen by BS #2 Group

Moment:	818.9	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #2 Capacity Check

Max Tension:	180.3	kip
Max Compression:	180.3	kip
Allowable Axial:	422.4	kip
Max Shear:	0.0	kip
Allowable Shear:	211.2	kip
Bolt Capacity	**42.7%**	Pass

BS #2 Upper Weld Capacity

Eccentricity (ex):	6.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #2 Lower Weld Capacity

Eccentricity (ex):	3.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #3 Data

Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4

Reactions Seen by BS #3 Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check

Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

BS #3 Upper Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #3 Lower Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Rev.4.1

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Pole Manufacturer:	Other

Reactions		
Moment:	431.72821	ft-kips
Axial:	28.7994	kips
Shear:	26.648401	kips
Elevation:	60	feet

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffe

Bolt Data			
Qty:	32		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	45		

Plate Data		
Diam:	48	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.12	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	42	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07 kips
Max Bolt directly applied T:	13.49 Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.365 in
Min PL "treq" for actual **T w/ Pry**:	0.560 in
Min PL "t1" for actual **T w/o Pry**:	0.739 in
T allowable with Prying:	43.59 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	13.49 kips
Prying Bolt Stress Ratio=(T+Q)/(B):	29.3% **Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	13.8 ksi
Allowable Plate Stress:	36.0 ksi
Compression Plate Stress Ratio:	38.3% **Pass**
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	20.0% **Pass**

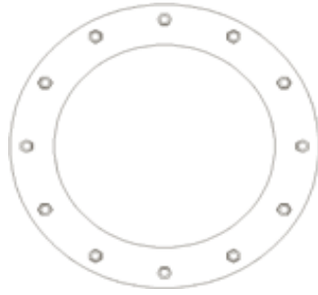
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Manufacturer:	Other

Reactions		
Moment:	431.72821	ft-kips
Axial:	28.7994	kips
Shear:	26.648401	kips
Exterior Flange Run, T+Q:	13.490959	kips

Elevation: 60 feet

Bolt Data			
Qty:	32		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	45	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	13.5	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	29.3%	**Pass**

Plate Data		
Plate Outer Diam:	47.25	in
Plate Inner Diam:	41.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.64	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	15.3	Kips, Ext. C= Interior C
Plate Stress:	14.2	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	39.6%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

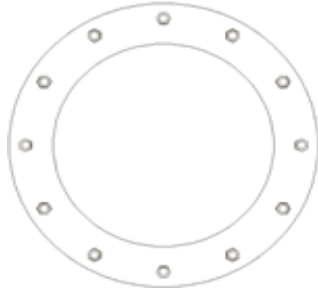
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

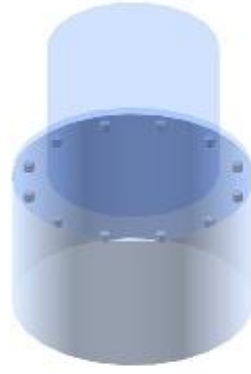
Pole Results

Pole Punching Shear Check:	n/a

Pole Data		
Pole OuterDiam:	48	in
Thick:	0.375	in
Pole Inner Diam:	47.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi

Stress Increase Factor		
ASIF:	1.333	





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	827050
Name:	Rocky Hill- Rte 160_1
App. #:	261521 R1

Flange Height:	40	ft

System Reactions		
Moment:	2175.7	kip-ft
Axial:	36.3	kip
Shear:	28.9	kip

Pole Geometry		
Upper Pole OD:	48.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	54.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	54.00	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	105%

Outer Bolt Group Data

Quantity:	36	
Diameter:	1	in
Material:	A325	
Bolt Circle:	51.00	in
Bolt Group Area:	28.27	in^2
Bolt Group MOIx:	9193	in^4

Reactions Seen by Outer Bolt Group

Moment:	730.9	kip-ft
Axial:	36.3	kip
Shear:	28.9	kip

Outer Bolt Capacity Check

Max Tension:	18.1	kip
Allowable Tension:	46.0	kip
Max Shear:	0.8	kip
Allowable Shear:	23.0	kip
Bolt Capacity	**39.3%**	Pass

Inner Bolt Group Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Inner Bolt Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check

Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

Bridge Stiffener #1 Data

Quantity:	3	
Type:	Write In	
Circle:	60.50	in
Individual Area:	2.41	in^2
BS #1 Group Area:	7.22	in^2
BS #1 Group MOIx:	3301	in^4

Reactions Seen by BS #1 Group

Moment:	262.5	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #1 Capacity Check

Max Tension:	69.4	kip
Max Compression:	34.7	kip
Allowable Axial:	245.3	kip
Max Shear:	0.0	kip
Allowable Shear:	122.6	kip
Bolt Capacity	**28.3%**	Pass

BS #1 Upper Weld Capacity

Eccentricity (ex):	6.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #1 Lower Weld Capacity

Eccentricity (ex):	3.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #2 Data

Quantity:	4	
Type:	Write In	
Circle:	60.50	in
Individual Area:	8.13	in^2
BS #2 Group Area:	32.50	in^2
BS #2 Group MOIx:	14870	in^4

Reactions Seen by BS #2 Group

Moment:	1182.3	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #2 Capacity Check

Max Tension:	234.5	kip
Max Compression:	234.5	kip
Allowable Axial:	422.4	kip
Max Shear:	0.0	kip
Allowable Shear:	211.2	kip
Bolt Capacity	**55.5%**	Pass

BS #2 Upper Weld Capacity

Eccentricity (ex):	6.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #2 Lower Weld Capacity

Eccentricity (ex):	3.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #3 Data

Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4

Reactions Seen by BS #3 Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check

Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

BS #3 Upper Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #3 Lower Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Pole Manufacturer:	Other

Reactions		
Moment:	730.91764	ft-kips
Axial:	36.2818	kips
Shear:	28.940626	kips
Elevation:	40	feet

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffe

Bolt Data			
Qty:	36		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	51		

Plate Data		
Diam:	54	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.19	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	48	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07 kips
Max Bolt directly applied T:	18.10 Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.354 in
Min PL "treq" for actual **T w/ Pry**:	0.642 in
Min PL "t1" for actual **T w/o Pry**:	0.849 in
T allowable with Prying:	43.80 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	18.10 kips
Prying Bolt Stress Ratio=(T+Q)/(B):	39.3% **Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	18.0 ksi
Allowable Plate Stress:	36.0 ksi
Compression Plate Stress Ratio:	50.0% **Pass**
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	26.4% **Pass**

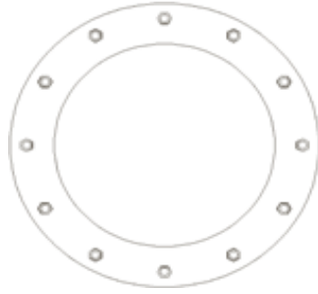
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Manufacturer:	Other

Reactions		
Moment:	730.91764	ft-kips
Axial:	36.2818	kips
Shear:	28.940626	kips
Exterior Flange Run, T+Q:	18.10113	kips

Elevation: 40 feet

Bolt Data			
Qty:	36		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	51	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	18.1	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	39.3%	**Pass**

Plate Data		
Plate Outer Diam:	53.25	in
Plate Inner Diam:	47.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.65	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	20.1	Kips, Ext. C= Interior C
Plate Stress:	18.7	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	52.0%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

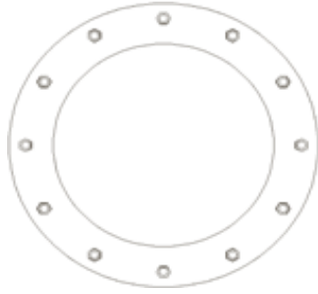
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

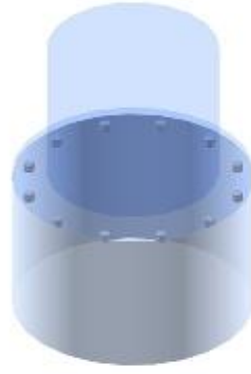
Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Pole OuterDiam:	54	in
Thick:	0.375	in
Pole Inner Diam:	53.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi

Stress Increase Factor		
ASIF:	1.333	





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Flange Bolt Information for TIA/EIA-222-F and TIA-222-G-2

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Information	
ID #:	827050
Name:	Rocky Hill- Rte 160_1
App. #:	261521 R1

Flange Height:	20	ft

System Reactions		
Moment:	2773.3	kip-ft
Axial:	44.8	kip
Shear:	30.8	kip

Pole Geometry		
Upper Pole OD:	54.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	60.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	60.00	in

Design Information	
TIA Code:	F
ASIF:	1.33
Failure At:	105%

Outer Bolt Group Data

Quantity:	48	
Diameter:	1	in
Material:	A325	
Bolt Circle:	57.00	in
Bolt Group Area:	37.70	in^2
Bolt Group MOIx:	15311	in^4

Reactions Seen by Outer Bolt Group

Moment:	960.1	kip-ft
Axial:	44.8	kip
Shear:	30.8	kip

Outer Bolt Capacity Check

Max Tension:	15.9	kip
Allowable Tension:	46.0	kip
Max Shear:	0.6	kip
Allowable Shear:	23.0	kip
Bolt Capacity	**34.6%**	Pass

Inner Bolt Group Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Inner Bolt Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Inner Bolt Capacity Check

Max Tension:	0.0	kip
Allowable Tension:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

Bridge Stiffener #1 Data

Quantity:	3	
Type:	Write In	
Circle:	66.50	in
Individual Area:	2.41	in^2
BS #1 Group Area:	7.22	in^2
BS #1 Group MOIx:	3989	in^4

Reactions Seen by BS #1 Group

Moment:	250.1	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #1 Capacity Check

Max Tension:	60.2	kip
Max Compression:	30.1	kip
Allowable Axial:	245.3	kip
Max Shear:	0.0	kip
Allowable Shear:	122.6	kip
Bolt Capacity	**24.5%**	Pass

BS #1 Upper Weld Capacity

Eccentricity (ex):	6.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #1 Lower Weld Capacity

Eccentricity (ex):	3.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #2 Data

Quantity:	4	
Type:	Write In	
Circle:	68.50	in
Individual Area:	10.63	in^2
BS #2 Group Area:	42.50	in^2
BS #2 Group MOIx:	24928	in^4

Reactions Seen by BS #2 Group

Moment:	1563.1	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #2 Capacity Check

Max Tension:	273.8	kip
Max Compression:	273.8	kip
Allowable Axial:	552.4	kip
Max Shear:	0.0	kip
Allowable Shear:	276.2	kip
Bolt Capacity	**49.6%**	Pass

BS #2 Upper Weld Capacity

Eccentricity (ex):	7.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #2 Lower Weld Capacity

Eccentricity (ex):	4.250	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Bridge Stiffener #3 Data

Quantity:		
Type:		
Circle:	0.00	in
Individual Area:	0.00	in^2
BS #3 Group Area:	0.00	in^2
BS #3 Group MOIx:	0	in^4

Reactions Seen by BS #3 Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #3 Capacity Check

Max Tension:	0.0	kip
Max Compression:	0.0	kip
Allowable Axial:	0.0	kip
Max Shear:	0.0	kip
Allowable Shear:	0.0	kip
Bolt Capacity	**0.0%**	

BS #3 Upper Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

BS #3 Lower Weld Capacity

Eccentricity (ex):	N/A	in
Weld Length (l):	N/A	in
Weld Factor (a):	N/A	
Weld Size (D):	N/A	16TH
Weld Coef. (C):	N/A	
Electrode Coef. (C_1):	N/A	
Weld Capacity:	**N/A**	

Rev.4.1

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Re

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Pole Manufacturer:	Other

Reactions		
Moment:	960.05947	ft-kips
Axial:	44.8009	kips
Shear:	30.820119	kips
Elevation:	20	feet

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffe

Bolt Data			
Qty:	48		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	57		

Plate Data		
Diam:	60	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.53	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	54	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07	kips
Max Bolt directly applied T:	15.91	Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.474	in
Min PL "treq" for actual **T w/ Pry**:	0.665	in
Min PL "t1" for actual **T w/o Pry**:	0.866	in
T allowable with Prying:	41.75	kips
Prying Force, Q:	0.00	kips
Total Bolt Tension=T+Q:	15.91	kips
Prying Bolt Stress Ratio=(T+Q)/(B):	34.5%	**Pass**

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	18.8	ksi
Allowable Plate Stress:	36.0	ksi
Compression Plate Stress Ratio:	52.1%	**Pass**
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	28.3%	**Pass**

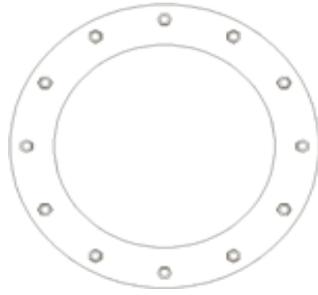
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Manufacturer:	Other

Reactions		
Moment:	960.05947	ft-kips
Axial:	44.8009	kips
Shear:	30.820119	kips
Exterior Flange Run, T+Q:	15.909797	kips

Elevation: 20 feet

Bolt Data				
Qty:	48			
Diam:	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:		<-- Disregard	Bolt Fty:	
N/A:		<-- Disregard	44.00	
Circle:	57	in		

Interior Flange Bolt Results

Maximum Bolt Tension:	15.9	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	34.5%	**Pass**

Plate Data		
Plate Outer Diam:	59.25	in
Plate Inner Diam:	53.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	3.88	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	17.8	Kips, Ext. C= Interior C
Plate Stress:	19.8	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	55.0%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

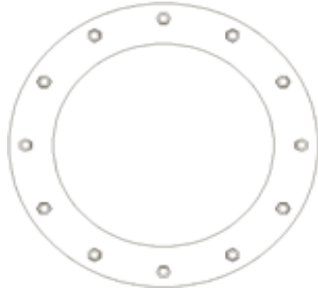
Stiffener Results

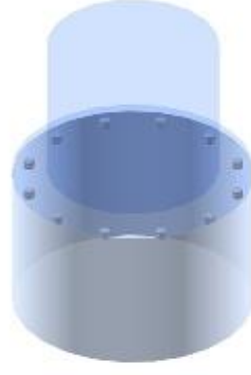
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check:	n/a

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.375	in
Pole Inner Diam:	59.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi





Stress Increase Factor		
ASIF:	1.333	

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#:	*827050*
Site Name:	*Rocky Hill- Rte 160_1*
App #:	*261521 R1*
Pole Manufacturer:	*Other*

Reactions		
Moment:	2218.5927	ft-kips
Axial:	53.4601	kips
Shear:	32.607413	kips

Anchor Rod Data		
Qty:	48	
Diam:	1	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	63	in

If No stiffeners, Criteria: AISC ASD <-Only Applcable to Unstiffened Cases

Anchor Rod Results

Maximum Rod Tension:	34.1 Kips	Rigid
Allowable Tension:	51.8 Kips	Service, ASD
Anchor Rod Stress Ratio:	65.8% **Pass**	Fty*ASIF

Plate Data		
Diam:	66	in
Thick:	1.25	in
Grade:	36	ksi
Single-Rod B-eff:	3.93	in

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	34.6 ksi	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	96.2% **Pass**	Y.L. Length: 19.21

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

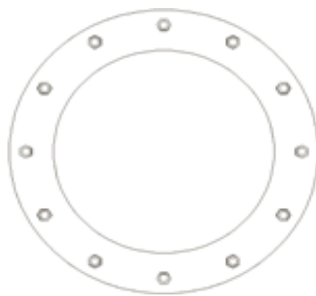
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check:	n/a

Pole Data		
Diam:	60	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	57	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	827050
Name:	Rocky Hill- Rte 160_1
App. #:	261521 R1

AeroSolutions LLC
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Base Reactions		
Moment:	3407	ft-kip
Axial:	53	kip
Shear:	33	kip
Base Plate Type:	Circular	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	105%
eta Factor:	0.50

Original Anchor Rod Data

Quantity:	48	
Diameter:	1.00	in
Material:	A687	
Bolt Circle:	63.0	in
Bolt Spacing:		in
Bolt Group Area:	37.70	in^2
Bolt Group MOIx:	18703	in^4

Reactions Seen by Original AR Group

Moment:	2218.6	kip-ft
Axial:	53.5	kip
Shear:	32.6	kip

Original AR Capacity Check

Tension Load:	34.1	kip
Allowable load:	50.9	kip
AR Capacity:	67.0%	**Pass**

First Added Anchor Rod Data

Quantity:	4	
Diameter:	2.25	in
Material:	A772	
Bolt Circle:	71.0	in
Bolt Group Area:	15.90	in^2
Bolt Group MOIx:	10022	in^4

Reactions Seen by First Added AR Group

Moment:	1188.8	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

First Added AR Capacity Check

Tension Load:	200.9	kip
Allowable load:	262.4	kip
AR Capacity:	76.6%	**Pass**

Second Added Anchor Rod Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check

Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Third Added Anchor Rod Data

Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group

Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check

Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Rev.4.1

Rev.4.1

AeroSolutions LLC
Optimizing Your Tower Infrastructure

5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
720-304-6882
www.AeroSolutionsLLC.com

Anchor Rod Embedment (v1.2)

Analysis Standard					
TIA Code:	*TIACode*	F			
Allowable Stress Increase:	*ASIF*	1.333			
Dimensions and Properties					
Pier Diameter:	*PierDia*	84	in		
Concrete Strength:	*Fc*	3000	psi		
Clear Cover, Side:	*cc.side*	3	in		
Clear Cover, Top:	*cc.top*	3	in		
Rebar Yield Strength:	*BarFy*	60	ksi		
Rebar Tie Size:	*TieSize*	5			
Rebar Tie Diameter:	*TieDia*	0.63	in		
Vertical Bar Quantity:	*BarQty*	28			
Vertical Bar Size:	*BarSize*	9			
Vertical Bar Diameter:	*BarDia*	1.128	in		
Vertical Bar Area:	*BarArea*	1.00	in		
Vertical Bar Circle Diameter:	*BarBC*	75.6	in		
Vertical Bar Spacing:	*BarSp*	8.5	in		
Vertical Bar Radial Angle Between:	*BarAngle*	12.9	deg		
Anchor Rod Type:	*RodType*	A772			
Anchor Rod Diameter:	*RodDia*	2.25	in		
Anchor Rod Threads per Inch:	*RodThreads*	4.5			
Anchor Rod Net Area Through Threads:	*RodArea*	3.25	sq in		
Anchor Rod Circle Diameter:	*RodBC*	71	in		
Anchor Rod Material:	*RodMatl*	A722			
Anchor Rod Yield Strength:	*RodFy*	120	ksi		
Anchor Rod Ultimate Strength:	*RodFu*	150	ksi		
Anchor Rod Loading					
Anchor Rod Tensile Requirement:	*RodP*	262.4	kip		
Anchor Rod Design Criteria:	*DesCrit*	Analysis			
Development Length of Vertical Rebar					
Reinforcement Location Factor(1):	*Alpha*	1.0		ACI 12.2.4	
Coating Factor(1):	*Beta*	1.0		ACI 12.2.4	
Lightweight Aggregate Concrete Factor(1):	*Lambda*	1.0		ACI 12.2.4	
Reinforcement Size Factor(1):	*Gamma*	1.0		ACI 12.2.4	
Transverse Reinforcement Ratio(2):	*Ktr*	0.0	in	ACI 12.2.4	
Maximum Spacing or Cover Dimension:	*Cover*	4.19	in	ACI 12.2.4	
Development Length:	*Ld*	37.1	in	ACI 12.2.3	
Reinforcment Stress Ratio(3):	*SR*	0.00			
Reduced Development Length:	*Ld.red*	0.0	in	ACI 12.2.5	Used only if DesCrit = "Analysis"
Force Transfer Length					
Angle to Vertical Bar:	*Angle*	6.4	deg		
Distance to Farthest Bar:	*BarDist*	4.7	in		
Epoxy Bond					
Epoxy Ultimate Bond Stress:	*EpoxyBond*	1800	psi		
Factor of Safety:	*EpoxyFS*	3			
Strength Resistance Factor:	*EpoxyPhi*	0.5			
Bond Length Required:	*EpoxyL*	61.9	in		
Embedment Length					
Total Required Embedment Length:	*EmbedIn*	**68**	**in**	**Epoxy Length Controls**	
	EmbedFt	**5.7**	**ft**		
Actual Embedment length:	*ActEmbed*	23.0	ft		
Embedment Capacity	*EmbedCap*	**24.6%**			

Notes:
(1) These factors are typically 1.0 for most tower foundations.
(2) This factor is typically 0 inches for most tower foundations.
(3) Stress ratio of reinforcement can be entered to reduce required development length. Only to be used in already installed desperate situations.
(4) This is consistent with on CCI Foundations Criteria Item AC-1, dated 06/01/2010.

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	827050
Site Name	Rocky Hill- Rte 160_1

Caisson Analysis

Pier Properties		
Moment	3407	kip-ft
Shear	33	kip
Pier Diameter	7.0	ft
Height Above Grade	0.50	ft
Depth Below Grade	36.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	10.0	ft
Ignored Soil Depth	3.5	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	110%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	12	12.00	125	1000	
2	12.00	24	36.00	110	500	
3						
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	16.94	ft
Zero Shear	36.00	ft

Results		
Soil Capacity	81.1%	**OK**
Max Pier Moment	0	kip-ft

Moment At User Defined Depths Below Grade		
Moment @ 19.0'	1634	kip-ft
		kip-ft

	kip-ft
	kip-ft

V1.0

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties		
Concrete:		
Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2
Reinforcement:		
Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.30	ft
Vert. Cage Diameter =	75.62	in
Vertical Bar Size =	9	
Bar Diameter =	1.13	in
Bar Area =	1	in^2
Number of Bars =	28	
As Total=	28	in^2
A s/ Aconc, Rho:	0.0051	0.51%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:
Actual Req'd Min. Rho: 0.33% Flexural
Provided Rho: 0.51% **OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8184.86	kips
at Mu=(ϕ=0.65)Mn=	5002.55	ft-kips
Max Tu, (φ=0.9) Tn =	1512	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	1634.192	ft-kips **(* Note)**
Max. Service Shaft P:	53.4601	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

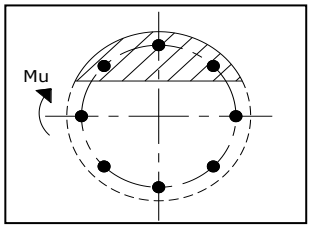
Load Factor	Shaft Factored Loads		
1.30	Mu:	2124.449	ft-kips
1.30	Pu:	69.49813	kips

Material Properties		
Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	
ACI 318 Code		
Select Analysis ACI Code=	2002	
Seismic Properties		
Seismic Design Category =	D	
Seismic Risk =	**High**	

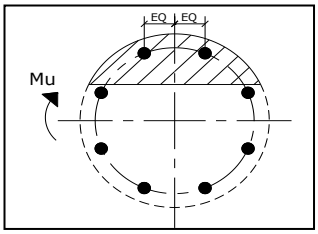
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis: **12.79** in
Extreme Steel Strain, ϵt: **0.0157**
ϵt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	69.50	kips
Drilled Shaft Moment Capacity, φMn:	**4609.43**	ft-kips
Drilled Shaft Superimposed Mu:	**2124.45**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**46.1%**

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *827050*
Site Name: *Rocky Hill- Rte 160_1*
App #: *261521 R1*

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =		ft
Vert. Cage Diameter =		in
Vertical Bar Size =	0	
Bar Diameter =	#N/A	in
Bar Area =	#N/A	in^2
Number of Bars =	0	
As Total=	0	in^2
A s/ Aconc, Rho:	0.0000	0.00%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Compression
Provided Rho:	0.00%	
Adjusted Rho:	0.00%	**ACI 318, section 10.5.3 Check Applied**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	7348.39	kips
at Mu=(ϕ=0.65)Mn=	4502.92	ft-kips
Max Tu, (φ=0.9) Tn =	0	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	0.031843	ft-kips **(* Note)**
Max. Service Shaft P:	53.4601	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	0.041395	ft-kips
1.30	Pu:	69.49813	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2002

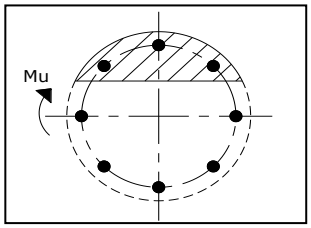
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

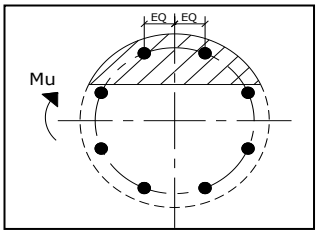
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**2.69**	in
Extreme Steel Strain, ϵt:	**0.0000**	
ϵt < 0.0020, Compression Controlled		
Reduction Factor,φ:	**0.650**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	69.50	kips
Drilled Shaft Moment Capacity, φMn:	**235.31**	ft-kips
Drilled Shaft Superimposed Mu:	**0.04**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**0.0%**

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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11058C

Rocky Hill / RTE 160-1
699 Old Main Street
Rocky Hill, CT 06067

August 28, 2014

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general public allowable limit:	**77.13 %**

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

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August 28, 2014

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11058C – Rocky Hill / RTE 160-1**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **699 Old Main Street, Rocky Hill, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (µW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **699 Old Main Street, Rocky Hill, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) **2** UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

6) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **145 feet** above ground level (AGL).

9) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	145	Height (AGL):	145	Height (AGL):	145
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A1 MPE%	0.87	Antenna B1 MPE%	0.87	Antenna C1 MPE%	0.87
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	145	Height (AGL):	145	Height (AGL):	145
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A2 MPE%	0.87	Antenna B2 MPE%	0.87	Antenna C2 MPE%	0.87
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	145	Height (AGL):	145	Height (AGL):	145
Frequency Bands	700 Mhz	Frequency Bands	700 Mhz	Frequency Bands	700 Mhz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	445.37	ERP (W):	445.37	ERP (W):	445.37
Antenna A3 MPE%	0.34	Antenna B3 MPE%	0.34	Antenna C3 MPE%	0.34

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**6.25**
Rocky Hill PD	9.61 %
Rocky Hill FD	0.19 %
Rocky Hill PW	0.81 %
Rocky Hill Hotline	3.62 %
Rocky Hill Intercity	3.87 %
Wethersfield	7.37 %
Sprint	12.50 %
AT&T	3.97 %
Verizon Wireless	20.18 %
Verizon Wireless	5.75 %
RAFS	3.01 %
Site Total MPE %:	**77.13 %**

T-Mobile Sector 1 Total:	2.08 %
T-Mobile Sector 2 Total:	2.08 %
T-Mobile Sector 3 Total:	2.08 %
Site Total:	77.13 %

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Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector 1:	2.08 %
Sector 2:	2.08 %
Sector 3 :	2.08 %
T-Mobile Total:	6.25 %
Site Total:	77.13 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **77.13%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803`