Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

November 17, 2020

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

RE: **Notice of Exempt Modification for T-Mobile:**
828257 - T-Mobile Site ID: CT11307C
82 Mechanic Street, Pawcatuck (Stonington), CT 06379
Latitude: 41° 22′ 18.91″ / Longitude: -71° 49′ 58.01″

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 147-foot mount on the existing 151-foot Monopole Stealth Flagpole Tower, located at 82 Mechanic Street, Stonington, CT. The tower is owned by Crown Castle and the property is owned by Whittaker Technical Products Inc. T-Mobile now intends to replace three (3) existing antennas with three (3) new 600/700 MHz antennas. The new antennas will be installed at the 147-ft level of the tower. T-Mobile is also proposing tower structural modifications. T-Mobile is proposing to increase the diameter of the canisters on the stealth monopole from the 126' levels to the 150' from 36" to 42" canisters to accommodate larger antennas.

Planned Modifications:
Tower:

Remove:
(3) Twin style 1B-TMA
(3) Twin style 1A-TMA

Remove and Replace:
(3) RFS-APXV18-209014-C-A20 Antenna **(REMOVE)** - (3) RFS-APXVA18_43-C-A20 Antenna 600/700 MHz **(REPLACE)**

Existing to Remain:
(12) 1 5/8" Coax
(3) RFS-APXV18-206516S-C-A20 Antenna 1900/2100 MHz

Ground:

(3) Radio 4449 B71/B12
(3) twin style TMAs
(6) diplexers
Remove (1) RUW30 & (1) DUS31

The facility was approved by the Town of Stonington Planning and Zoning Commission in Application Number PZ0028SPA on June 20, 2000. The approval was given with conditions which this exempt modification follows.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Danielle Chesebrough, First Selectwoman for the Town of Stonington, Keith Brynes, Town Planner, Crown Castle as the tower owner, and Whittaker Technical Products, Inc., the property owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, T-Mobile respectfully submits that 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: Anne Marie Zsamba.

Sincerely,

Anne Marie Zsamba
Site Acquisition Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
(201) 236-9224
AnneMarie.Zsamba@crowncastle.com

Attachments
cc:

Danielle Chesebrough, First Selectwoman
Town of Stonington
Town Hall – Selectwoman's Office
152 Elm Street

Stonington, CT 06378
860.535.5050

Keith Brynes, AICP, CZET, Town Planner
Town of Stonington
Planning Department
152 Elm Street
Stonington, CT 06378
860.535.5095

Whittaker Technical Products, Inc.
ATTN: Eric Lardiere
1955 N Surveyor Avenue
Simi Valley, CA 93063

Crown Castle, Tower Owner

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ORIGIN ID:SCHA (518) 350-3639
ANNE MARIE ZSAMBA
CROWN CASTLE
21 HEATHER DRIVE

GANSEVOORT, NY 12831
UNITED STATES US

SHIP DATE: 17NOV20
ACTWGT: 1.00 LB
CAD: 104924194/INET4280

BILL SENDER

TO **KEITH BRYNES, TOWN PLANNER**
TOWN OF STONINGTON
PLANNING DEPARTMENT
152 ELM STREET
STONINGTON CT 06378
(860) 535-5095

REF: 1734.7680
INV:
PO:
DEPT:

56BJ5/BAB9/B766

J202020071401uv

FedEx Express

WED - 18 NOV 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7721 0047 2126**

EB GONA

06378
BDL
CT-US

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
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Exhibit A

Original Facility Approval

The Planning and Zoning Commission
152 Elm Street, P.O. Box 352
Stonington, Connecticut 06378
(860) 535-5095

June 22, 2000

Omnipoint Communications, Inc.
100 Filley St.
Bloomfield, CT 06002

Dear Sir:

The Planning and Zoning Commission at their meeting of June 20, 2000 voted to APPROVE your application - **#PZ0028SPA OMNIPOINT COMMUNICATIONS, INC.** - Application for Site Plan Approval to construct a 150' flag pole telecommunications tower. Property located at 82 Mechanics St., Pawcatuck. Assessor's Map 4 Block 7 Lot 15 Zone M-1. Your application was approved with the following stipulations:

1) The flag pole shall be similar to the flag pole at Valenti's Auto Mall without the cross arm.
2) The flag be raised and lowered at the appropriate time each day so no lighting will be required (no lighting is permitted).
3) The flag should be of the appropriate size for the flag pole.

Please bring to the Planning and Zoning Office for the Chairman's signature one (1) set of bluelines. If you require a signed copy of the site plan for your files, please provide the Planning office with the additional copy.

If you have any questions, please feel free to contact the Planning Office.

Sincerely,

Edward C. Donnelly

Edward Donnelly, AICP
Planning Director

TOWN OF STONINGTON
Planning & Zoning Commission

COMMENT SHEET

Department: BOARD OF POLICE COMMISSIONERS Date: 4/24/00

APPLICATION: **#PZ0028SPA OMNIPOINT COMMUNICATIONS, INC.** - Application for Site Plan Approval to construct a 150' flag pole telecommunications tower. Property located at 82 Mechanics St., Pawcatuck. Assessor's Map 4 Block 7 Lot 15 Zone M-1.

Return Comments By: **5/12/00**

Note:

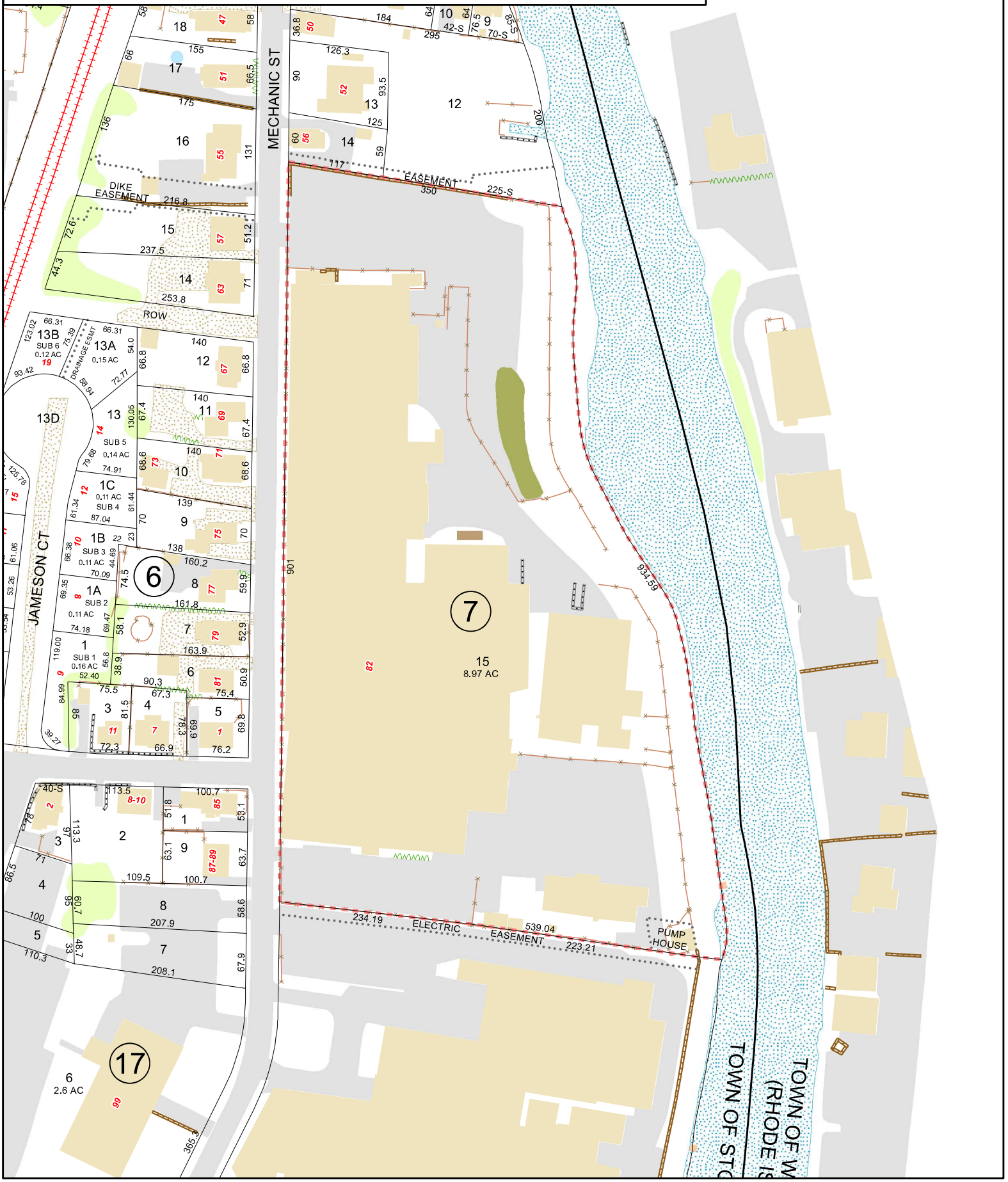
5/8/00
"NO comment"
Michele Crowley,
Secretary

Exhibit B

Property Card

Town of Stonington, Connecticut - Assessment Parcel Map

Parcel: 4-7-15 Address: 82 MECHANIC ST



Approximate Scale:

1 inch = 150 feet

0 90 180 270 360 Feet

Revised To Grand List: October 2019 **Map Produced: May 2020**

Town of Stonington, CT

Property Listing Report

Map Block Lot	4-7-15	Building #	1	Section #	1	Account	00902700

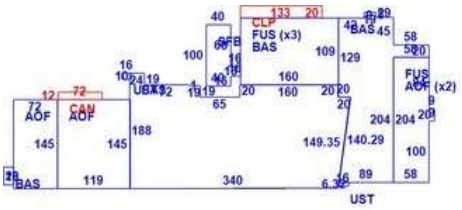
Property Information

Property Location	82 MECHANIC ST
Owner	WHITTAKER TECHNICAL PRODUCTS INC
Co-Owner	ATTN: ERIC LARDIERE
Mailing Address	1955 N SURVEYOR AVE SIMI VALLEY CA 93063
Land Use	4000 INDUSTRIAL M-96
Land Class	I
Zoning Code	HM
Census Tract	7051

Street Index	3000
Acreage	8.97
Utilities	
Lot Setting/Desc	Suburban Level
Survey Map #	NA
School District	
Fire District	Pawcatuck
Trash Day	F
Polling Place (District)	2

Photo

Sketch



Primary Construction Details

Year Built	1896
Stories	4
Building Style	Mill bldg.
Building Use	Ind/Comm
Building Condition	P
Occupancy	2
Extra Fixtures	
Bath Style	NA
Kitchen Style	NA
AC Type	None
Heating Type	Steam
Heating Fuel	Gas

Bedrooms	0
Full Bathrooms	0
Half Bathrooms	0
Total Rooms	0
Roof Style	Flat
Roof Cover	Tar & Gravel
Interior Floors 1	Pine/Soft Wood
Interior Floors 2	Concr Abv Grad
Exterior Walls	Brick/Masonry
Exterior Walls 2	Concr/Cinder
Interior Walls	Minim/Masonry
Interior Walls 2	Wall Brd/Wood

(*Industrial / Commercial Details)

Building Desc.	INDUSTRIAL M-96
Building Grade	Average
Heat / AC	NONE
Frame Type	MASONRY
Baths / Plumbing	AVERAGE
Ceiling / Wall	NONE
Rooms / Prtns	AVERAGE
Wall Height	14
First Floor Use	4000

Report Created On 11/16/2020

Town of Stonington, CT

Property Listing Report

Map Block Lot	4-7-15	Building #	1	Section #	1	Account	00902700

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	455900	319200
Extras	15100	10700
Improvements		
Outbuildings	139400	97600
Land	285900	200100
Total	896300	627600

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Office, (Average)	51719	51719
First Floor	99832	99832
Canopy	864	0
Loading Platform, Finished	2660	0
Upper Story, Finished	64332	64332
Base, Semi-Finished	4256	4256
Utility, Storage, Unfinished	256	128
Total Area	223919	220267

Outbuilding and Extra Features

Type	Description
PAVING-ASPHALT	200000.00 S.F.
FENCE-6' CHAIN	1800.00 L.F.
W/LIGHTS ETC	64.00 S.F.
SHED FRAME	616.00 S.F.
ELEV PASS	3.00 STOPS
ELEV PASS	4.00 STOPS
ELEV PASS	3.00 STOPS
DRY	218202.00 S.F.
AIR CONDITION	46000.00 UNITS
CELL TOWER	1.00 UNIT

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
WHITTAKER TECHNICAL PRODUCTS INC	0757/0684	11/4/2016	0
WHITTAKER TECHNICAL PRODUCTS INC	0128/0386	1/27/1961	0
YARDNEY ELECTRIC CORP	0133/0568	1/1/1950	0
YARDNEY ELECTRIC CORP	0133/0401	1/1/1949	0

Report Created On 11/16/2020

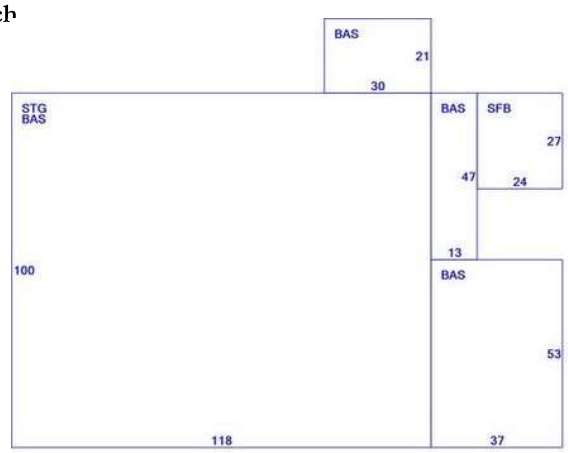
Town of Stonington, CT

Property Listing Report

Map Block Lot	4-7-15	Building #	2	Section #	1	Account	00902700

Photo

Sketch



Primary Construction Details

					(*Industrial / Commercial Details)
Year Built	1920	Bedrooms	0	Building Desc.	INDUSTRIAL M-96
Stories	2	Full Bathrooms	0	Building Grade	Average
Building Style	Mill bldg.	Half Bathrooms	0	Heat / AC	NONE
Building Use	Ind/Comm	Total Rooms	0	Frame Type	MASONRY
Building Condition	P	Roof Style	Flat	Baths / Plumbing	AVERAGE
Occupancy	1	Roof Cover	Tar & Gravel	Ceiling / Wall	NONE
Extra Fixtures		Interior Floors 1	Concr-Finished	Rooms / Prtns	AVERAGE
Bath Style	NA	Interior Floors2		Wall Height	14
Kitchen Style	NA	Exterior Walls	Brick/Masonry	First Floor Use	4000
AC Type	None	Exterior Walls 2	Pre-finsh Metl		
Heating Type	Hot Air-no Duc	Interior Walls	Minim/Masonry		
Heating Fuel	Gas	Interior Walls 2	NA		

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	15002	15002
Base, Semi-Finished	648	648
Storage Area	11800	11800

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	27450	27450

Report Created On

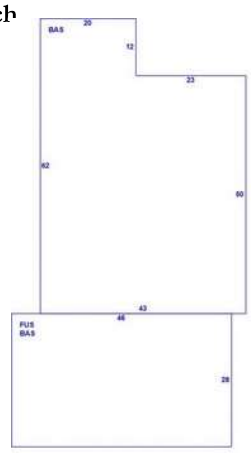
Town of Stonington, CT

Property Listing Report

Map Block Lot	4-7-15	Building #	3	Section #	1	Account	00902700

Photo

Sketch



Primary Construction Details

					(*Industrial / Commercial Details)
Year Built	1896	Bedrooms	0	Building Desc.	INDUSTRIAL M-96
Stories	2	Full Bathrooms	0	Building Grade	Average
Building Style	Mill bldg.	Half Bathrooms	0	Heat / AC	NONE
Building Use	Ind/Comm	Total Rooms	0	Frame Type	MASONRY
Building Condition	P	Roof Style	Flat	Baths / Plumbing	AVERAGE
Occupancy	1	Roof Cover	Tar & Gravel	Ceiling / Wall	NONE
Extra Fixtures		Interior Floors 1	Concr-Finished	Rooms / Prtns	AVERAGE
Bath Style	NA	Interior Floors2		Wall Height	14
Kitchen Style	NA	Exterior Walls	Brick/Masonry	First Floor Use	4000
AC Type	None	Exterior Walls 2	NA		
Heating Type	None	Interior Walls	Minim/Masonry		
Heating Fuel	None	Interior Walls 2	NA		

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	3678	3678
Upper Story, Finished	1288	1288

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	4966	4966

Report Created On

Exhibit C

Construction Drawings

T-MOBILE SITE NAME:

STONINGTON

T-MOBILE SITE NUMBER:

CT11307C

CROWN BU: 828257 / APP#: 479826

67D94BRL2 CONFIGURATION

82 MECHANIC STREET
PAWCATUCK, CT 06379

EXISTING 150'-0" FLAGPOLE

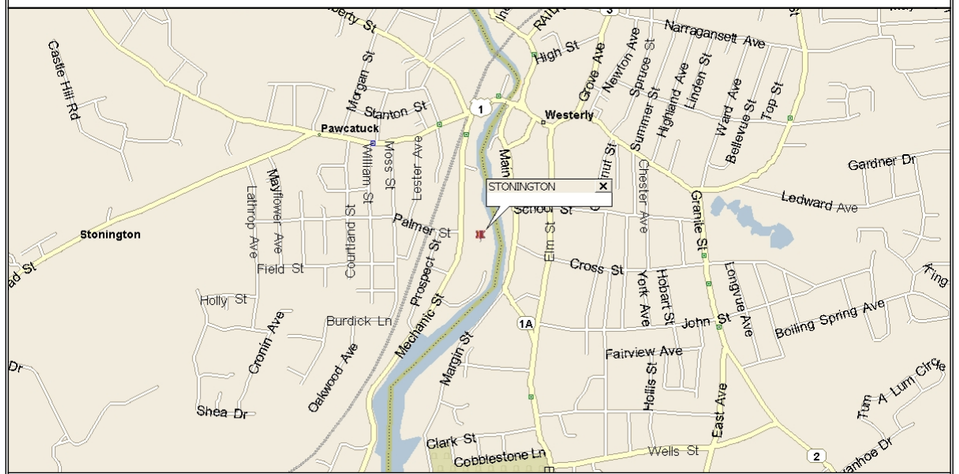
PROJECT SUMMARY

SITE TYPE:	EXISTING EQUIPMENT UPGRADE
SITE ADDRESS:	82 MECHANIC STREET PAWCATUCK, CT 06379
JURISDICTION:	NEW LONDON COUNTY

NAD83

LATITUDE:	41.371939° N
LONGITUDE:	71.832764° W
TOWER OWNER:	CROWN CASTLE 3200 HORIZON DRIVE, SUITE 150 KING OF PRUSSIA, PA 19406 JASON SMITH (610) 635-3225
CUSTOMER/APPLICANT:	T-MOBILE 4 SYLVAN WAY PARSIPPANY, NJ 07054 (973) 397-4800
OCCUPANCY TYPE:	UNMANNED
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION

LOCATION MAP



NO SCALE

DRAWING INDEX

SHEET #	SHEET DESCRIPTION	REV. #
T-1	TITLE SHEET	1
A-1	OVERALL SITE PLAN	1
A-2	ANTENNA/CABLE SCHEDULE AND AZIMUTH PLANS	1
A-3	TOWER ELEVATION	1
A-4	ANTENNA AND EQUIPMENT DETAILS	1
A-4.1	ANTENNA AND EQUIPMENT DETAILS	1
A-4.2	TMA/DIPLEXER/RRH MOUNTING DETAILS	1
E-1	PANEL SCEHDULE AND ONE-LINE DIAGRAM	1

CONTACT INFORMATION

A&E FIRM:	B+T GROUP 1717 S. BOULDER, STE. 300 TULSA, OK 74119	ELECTRIC PROVIDER:	BOZRAH LIGHT & POWER CO 860-889-7388
CONTACT:	MIKE OAKES	TELCO PROVIDER:	COMCAST 800-934-6489
PHONE:	(918) 587-4630		

DRIVING DIRECTIONS

DEPART BRADLEY INTERNATIONAL AIRPORT ON TERMINAL RD. ROAD NAME CHANGES TO BRADLEY FIELD CONNECTOR. ROAD NAME CHANGES TO CT-20 [BRADLEY FIELD CONNECTOR]. TAKE RAMP (RIGHT) ONTO I-91 [RICHARD P HORAN MEMORIAL HWY]. AT EXIT 30, TAKE RAMP ONTO I-84 [US-44]. AT EXIT 55, TAKE RAMP (RIGHT) ONTO CT-2 [VETERANS OF FOREIGN WARS MEM'L HWY]. AT EXIT 19, KEEP RIGHT ONTO RAMP. ROAD NAME CHANGES TO CT-11. AT EXIT 4, KEEP STRAIGHT ONTO RAMP. TURN LEFT ONTO CT-82 [E HADDAM RD]. TURN RIGHT ONTO CT-85 [NEW LONDON RD]. TAKE RAMP (LEFT) ONTO I-95. AT EXIT 91, TURN RIGHT ONTO RAMP. KEEP STRAIGHT ONTO CT-234 [PEQUOT TRAIL]. BEAR LEFT ONTO US-1 [W BROAD ST]. TURN RIGHT ONTO MECHANIC ST. TURN LEFT ONTO LOCAL ROAD(S). ARRIVE AT STONINGTON.

A/E DOCUMENT REVIEW STATUS

TITLE	SIGNATURE	DATE
T-MOBILE PROP:		
T-MOBILE R.F. MGR.:		
T-MOBILE NetOps:		
T-MOBILE CONST. MGR.:		
INTERCONNECT:		
T-MOBILE SITE DEV. MGR.:		
PROPERTY OWNER:		
PLANNING:		

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING/DWELLING	2018 CT SBC
STRUCTURAL	2018 CT SBC
MECHANICAL	2018 CT SBC
ELECTRICAL	2018 CT SBC

PROJECT DESCRIPTION

THE PROPOSED PROJECT INCLUDES:

- REMOVE & REPLACE (3) EXISTING ANTENNAS AT 147'-0"
- REMOVE (6) EXISTING TMAS ON GROUND MOUNT.
- REMOVE (1) DUW30 & (1) DUS31.
- INSTALL (3) NEW TMAS ON GROUND MOUNT.
- INSTALL (3) NEW RRUS ON GROUND MOUNT.
- INSTALL (6) NEW DIPLEXERS AT RBS 6102 CABINET.
- MODIFY EXISTING TOWER PER STRUCTURAL MODIFICATION REPORT BY GPD ENGINEERING & ARCHITECTURE PROFESSIONAL CORPORATION DATED 7/27/19.

DO NOT SCALE DRAWINGS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 11X17.
CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CALL CONNECTICUT ONE CALL
(800) 922-4455
CALL 3 WORKING DAYS
BEFORE YOU DIG!

811

B+T GRP

CROWN CASTLE

T-Mobile

CT11307C
BU #: 828257

STONINGTON

82 MECHANIC STREET
PAWCATUCK, CT 06379

EXISTING 150'-0" FLAGPOLE

PROJECT NO:	137128.001.01
CHECKED BY:	RMC

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	7/29/19	RFC	CONSTRUCTION
1	9/26/19	JJD	CONSTRUCTION

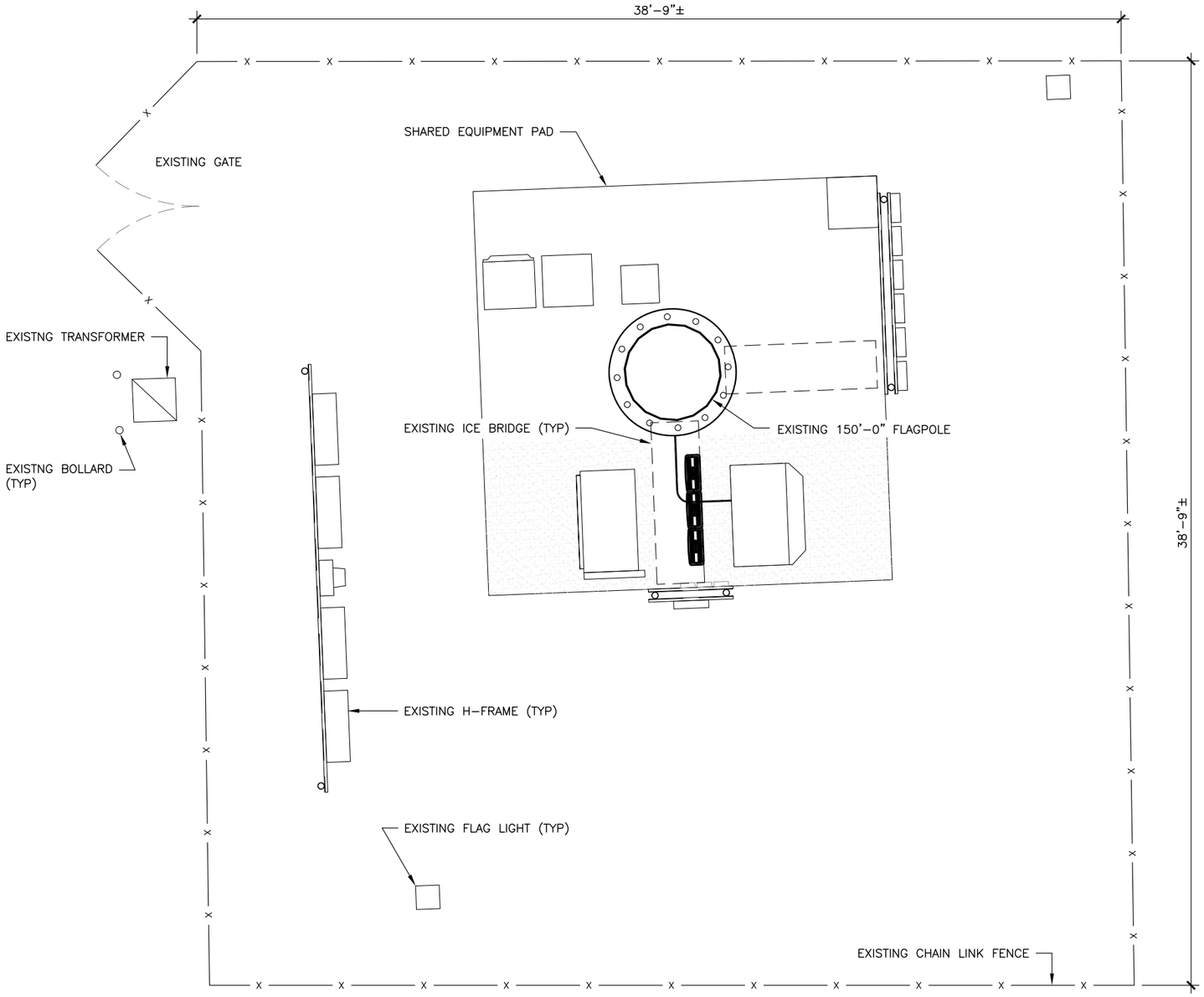
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER

9/26/19

SHEET NUMBER: T-1

REVISION: 1



1 OVERALL SITE PLAN
SCALE: 0' 1' 4' 8' 16'

N

GENERAL NOTES:

1. SUBJECT PROPERTY IS SITUATED AT 82 MECHANIC STREET, PAWCATUCK, CT 06379.
2. APPLICANT: T-MOBILE
   A DELAWARE LIMITED LIABILITY COMPANY
   4 SYLVAN WAY
   PARSIPPANY, NEW JERSEY 07054
   (973) 397-4800

   TOWER OWNER: CROWN CASTLE INTERNATIONAL

- THE APPLICANT IS TO UPDATE THEIR NETWORK BY INSTALLING THREE (3) NEW PANEL ANTENNAS MOUNTED ON AN EXISTING FLAGPOLE.

3. THIS FACILITY SHALL BE VISITED ON THE AVERAGE OF ONCE A MONTH FOR MAINTENANCE AND SHALL BE MONITORED FROM A REMOTE FACILITY.
4. THE EXISTING SITE IS LOCATED AT LATITUDE OF 41.371939° N± AND LONGITUDE OF 71.832764° W±. THE HORIZONTAL DATUM ARE IN TERMS OF NORTH AMERICAN DATUM OF 1983 (NAD 83).
5. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND EACH OF THE DRAWINGS HAVE BEEN REVISED TO INDICATED "ISSUED FOR CONSTRUCTION"
6. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION FOR THE SITE IMPROVEMENTS SHOWN HEREON SHALL BE IN ACCORDANCE WITH:

   6.A. CURRENT PREVAILING MUNICIPAL AND/OR COUNTY SPECIFICATIONS, STANDARDS, AND REQUIREMENTS.
   6.B. CURRENT PREVAILING UTILITY COMPANY AUTHORITY SPECIFICATIONS, STANDARDS AND REQUIREMENTS.

7. THE CONTRACTOR SHALL NOTIFY B+T GROUP, P.A. IMMEDIATELY IF ANY FIELD-CONDITIONS ENCOUNTERED DIFFER FROM THOSE REPRESENTED HEREON, AND/OR IF SUCH CONDITIONS WOULD OR COULD RENDER THE DESIGNS SHOWN HEREON INAPPROPRIATE AND/OR INEFFECTIVE.
8. THE CONTRACTOR IS RESPONSIBLE TO PROTECT, REPAIR AND/OR REPLACE ANY DAMAGED STRUCTURES, UTILITIES OR LANDSCAPED AREA WHICH MAY BE DISTURBED DURING THE CONSTRUCTION OF THIS FACILITY.
9. THE CONSTRUCTION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL CONSTRUCTION MEANS AND METHODS. THE CONSTRUCTION CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
10. SITE INFORMATION SHOWN TAKEN FROM CROWN CASTLE SITE PLANS AND FROM CROWN CASTLE INSPECTION PHOTOS.
11. NO GUARANTEE IS MADE NOR SHOULD BE ASSUMED AS TO THE COMPLETENESS OR ACCURACY OF THE HORIZONTAL OR VERTICAL LOCATIONS. ALL PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN PRIOR TO CONSTRUCTION ACTIVITIES.
12. ALL IMPROVEMENTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE TOWNSHIP ENGINEER WHO WILL BE GIVEN PROPER NOTIFICATION PRIOR TO THE START OF ANY CONSTRUCTION.

B+T GRP

CROWN CASTLE

T-Mobile

CT11307C
BU #: 828257

STONINGTON

82 MECHANIC STREET
PAWCATUCK, CT 06379

EXISTING 150'-0" FLAGPOLE

PROJECT NO:	137128.001.01
CHECKED BY:	RMC

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	7/29/19	RFC	CONSTRUCTION
1	9/26/19	JJD	CONSTRUCTION

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Expires 2/10/20

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31627
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PROFESSIONAL ENGINEER
9/26/19

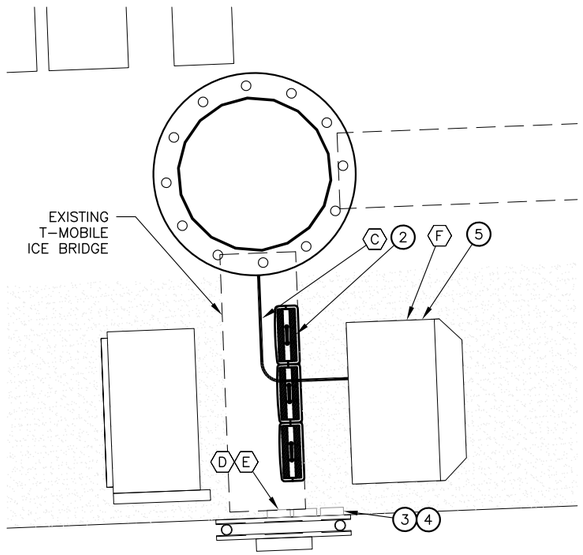
SHEET NUMBER:	REVISION:
A-1	1

LEGEND

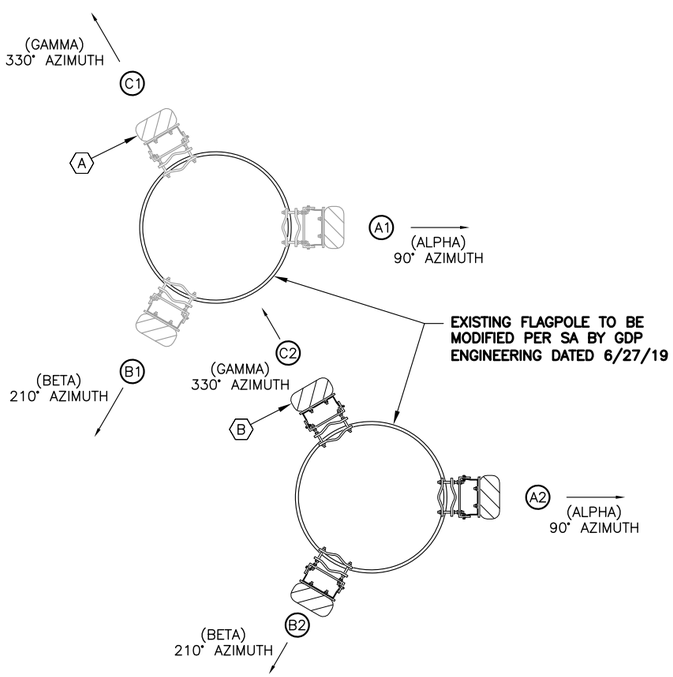
EXISTING/DEMOLITION NOTES		INSTALLATION NOTES	
A	EXISTING RFS APXV18–209014–C–A20 ANTENNA TO BE REMOVED (TOTAL OF 3)	1	INSTALL RFS APXVA18_43–C–A20 ANTENNA ON EXISTING MOUNT (TYP OF 1 PER SECTOR, TOTAL OF 3)
B	EXISTING RFS APXV18–206516S–C–A20 ANTENNA TO REMAIN (TOTAL OF 3)	2	INSTALL RADIO 4449 B71/B12 ON GROUND (TOTAL OF 3)
C	EXISTING 1 5/8" COAX CABLES TO REMAIN (TOTAL OF 12)	3	INSTALL NEW TWIN STYLE 3CX – PCS/AWS3+600/700BP ON GROUND (TOTAL OF 3)
D	EXISTING TWIN STYLE 1B–AWS TMA TO BE REMOVED (TOTAL OF 3)	4	INSTALL NEW AWS/PCS DIPLEXER ON GROUND (TOTAL OF 6)
E	EXISTING TWIN STYLE 1A–PCS TMA TO BE REMOVED (TOTAL OF 3)	5	INSTALL (2) BB 6630
F	REMOVE (1) DUW30 & (1) DUS31		

ANTENNA AND CABLE SCHEDULE

SECTOR	POSITION	EXISTING ANTENNAS	PROPOSED ANTENNA CONFIGURATION		E-TILT	M-TILT	ANTENNA CENTERLINE	TMA/RRU	CABLES	JUMPER TYPE	CABLE LENGTH
90° – ALPHA	**A1**	**RFS APXVA18_43–C–A20**	**LTE**	**B71 B12**	**2°/2°**	**2°**	**147'–0"**	**0/1**	(2) 1 5/8" COAX	–	197'–0"
	A2	RFS APXV18–206516S–C–A20	UMTS LTE GSM	B2 B4	2°/2°/2°	2°	139'–0"	1/2	(2) 1 5/8" COAX	–	192'–0"
210° – BETA	**B1**	**RFS APXVA18_43–C–A20**	**LTE**	**B71 B12**	**2°/2°**	**2°**	**147'–0"**	**0/1**	(2) 1 5/8" COAX	–	197'–0"
	B2	RFS APXV18–206516S–C–A20	UMTS LTE GSM	B2 B4	2°/2°/2°	2°	139'–0"	1/2	(2) 1 5/8" COAX	–	192'–0"
330° – GAMMA	**C1**	**RFS APXVA18_43–C–A20**	**LTE**	**B71 B12**	**2°/2°**	**2°**	**147'–0"**	**0/1**	(2) 1 5/8" COAX	–	197'–0"
	C2	RFS APXV18–206516S–C–A20	UMTS LTE GSM	B2 B4	2°/2°/2°	2°	139'–0"	1/2	(2) 1 5/8" COAX	–	192'–0"

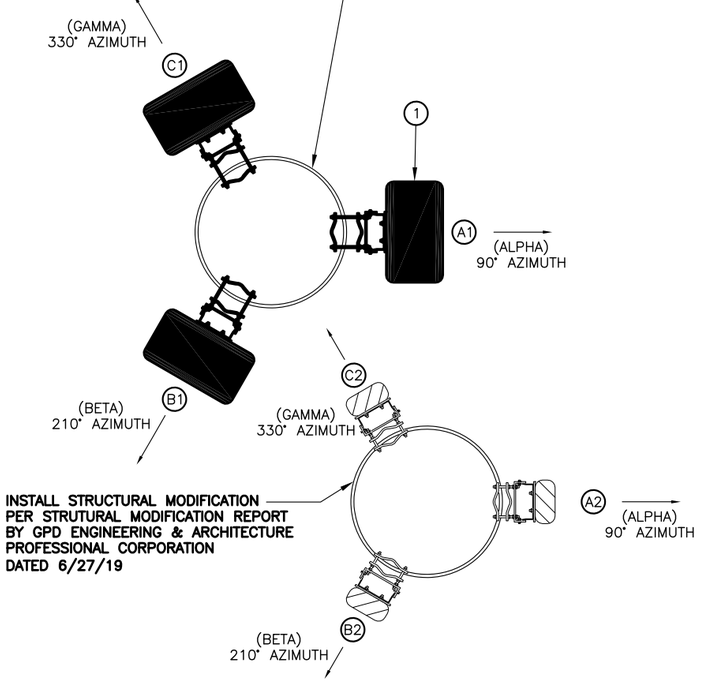


1 ENLARGED AREA PLAN
SCALE: 0' 1' 2' 4' 10'



2 EXISTING ANTENNA ORIENTATION
SCALE: 0' 1' 2' 3' 4' 5'

N



3 PROPOSED ANTENNA ORIENTATION
SCALE: 0' 1' 2' 3' 4' 5'

N

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BU #: 828257

STONINGTON

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LEGEND			
EXISTING/DEMOLITION NOTES		INSTALLATION NOTES	
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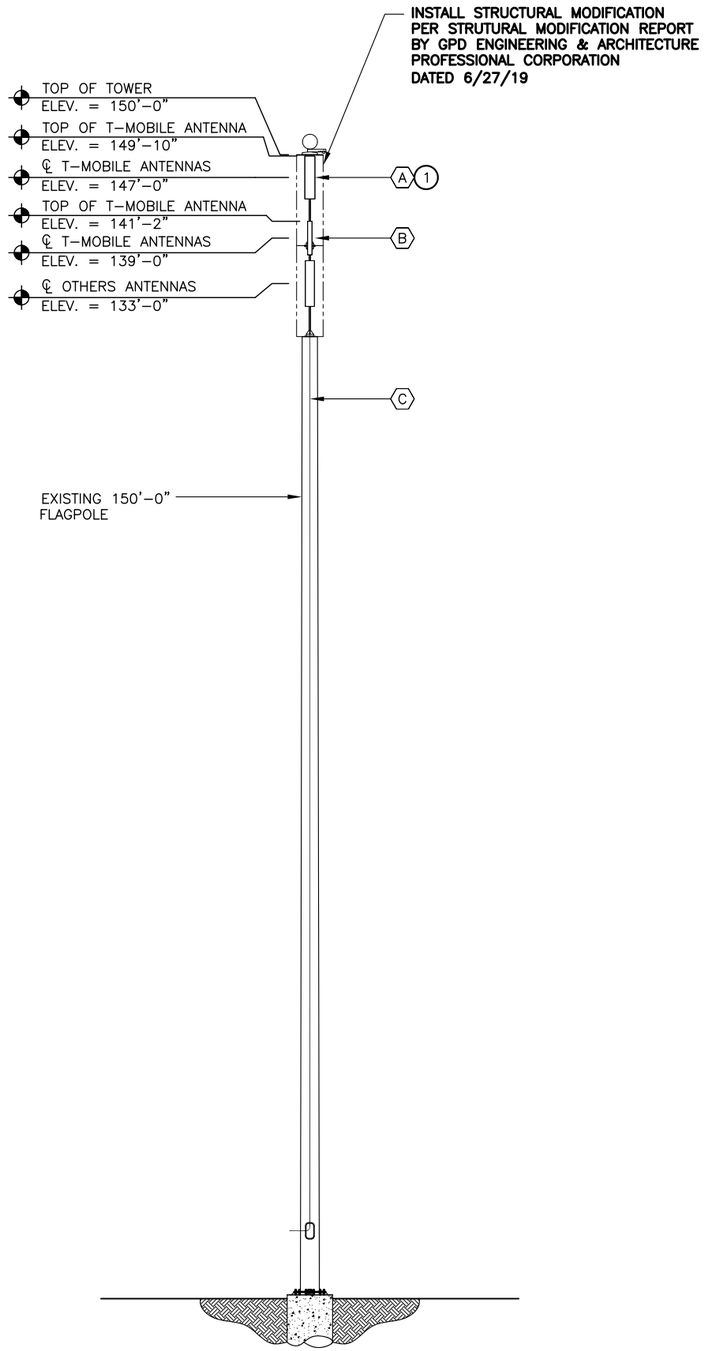
B	EXISTING RFS APXV18-206516S-C-A20 ANTENNA TO REMAIN (TOTAL OF 3)		
C	EXISTING 1 5/8" COAX CABLES TO REMAIN (TOTAL OF 12)		

EXISTING STRUCTURE TO BE MODIFIED PER STRUCTURAL MODIFICATION REPORT BY GPD ENGINEERING & ARCHITECTURE PROFESSIONAL CORPORATION DATED 6/27/19

LEGEND:

NEW

EXISTING



1 TOWER ELEVATION

SCALE: 0' 10' 20' 30' 40' 1"=20'

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BU #: 828257

STONINGTON

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31627
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PROFESSIONAL ENGINEER
9/26/19

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER:	REVISION:
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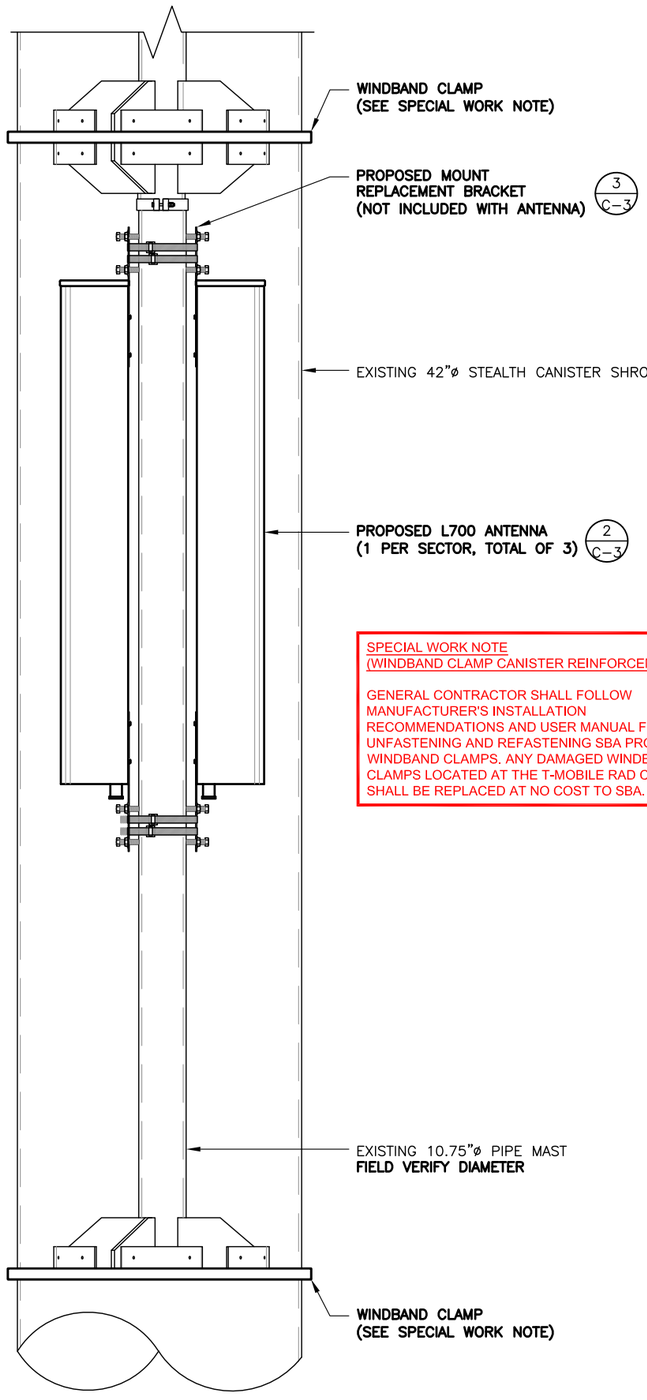


SPECIAL WORK NOTE
(WINDBAND CLAMP CANISTER REINFORCEMENT):

GENERAL CONTRACTOR SHALL FOLLOW MANUFACTURER'S INSTALLATION RECOMMENDATIONS AND USER MANUAL FOR UNFASTENING AND REFASTENING SBA PROVIDED WINDBAND CLAMPS. ANY DAMAGED WINDBAND CLAMPS LOCATED AT THE T-MOBILE RAD CENTER SHALL BE REPLACED AT NO COST TO SBA.

1 PROPOSED L700 ANTENNA MOUNTING DETAIL

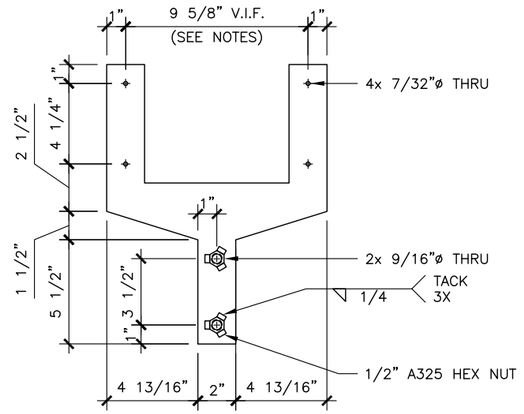
SCALE: 0' 6" 1' 2' 4'

STRUCTURAL NOTES:

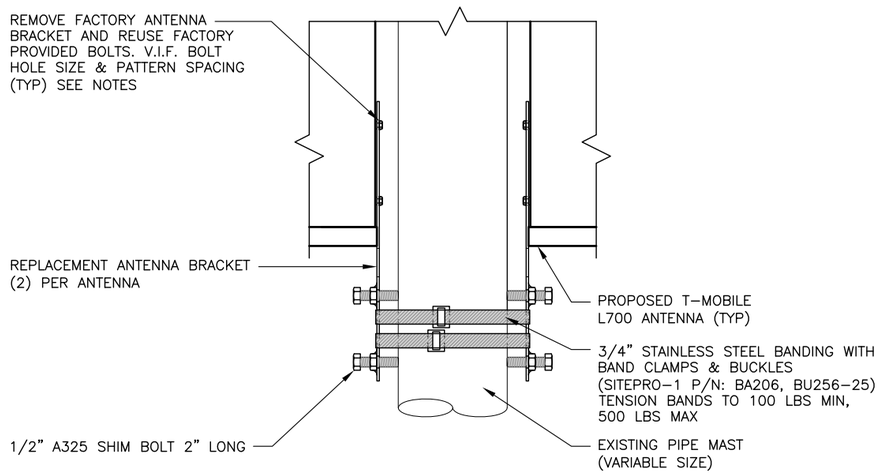
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO TOWER STRUCTURAL ANALYSIS PROVIDED BY SBA TO DETERMINE IF THERE ARE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS FOR TOWER TOP EQUIPMENT AND FOR CABLE BUNDLING, SHIELDING, MOUNTING OR RELOCATION ARRANGEMENTS.

ANTENNA MOUNT STRUCTURAL ASSESSMENT REQUIREMENT:

ENGINEER OF RECORD HAD MADE A VISUAL ASSESSMENT ONLY AND DETERMINED THAT THE EXISTING ANTENNA MOUNT SHALL BE REPLACED OR MODIFIED TO ACCOMMODATE ANY ADDITIONAL EQUIPMENT LOADS. STRUCTURAL DESIGNS AND DETAILS AS SHOWN HEREIN FOR STRUCTURAL MODIFICATIONS OF THE EXISTING ANTENNA MOUNT ARE PRELIMINARY ONLY AND FINAL CONSTRUCTION DETAILS ARE SUBJECT TO CHANGE PENDING THE COMPLETION OF AN ANTENNA MOUNT STRUCTURAL ASSESSMENT.



FRONT VIEW



SIDE VIEW

GENERAL NOTES:

1. REPLACEMENT BRACKET DESIGNED FOR USE WITH COMMSCOPE ANTENNAS DBX, LNX AND SBN-SERIES, INSTALLED IN A TRI-SECTOR CLUSTERED ARRANGEMENT, 120 DEGREE AZIMUTH SEPARATION.
2. ANTENNA BRACKET INTENDED FOR USE INSIDE ENCLOSED CANISTERS AND HAS NOT BEEN DESIGNED FOR HIGH-SPEED WIND OR ICE LOAD.
3. MAX. ALLOWABLE ANTENNA WEIGHT IS 65 LBS.
4. ANTENNA BRACKET INTENDED FOR USE ONLUY ON SBA TOWERS, CANISTER DIAMETER 24"-36" AND SUPPORTING PIPE MAST DIAMETERS 4"-10".

INSTALLATION NOTES:

1. GC TO VERIFY BOLT HOLE SIZE AND SPACING FROM THE ANTENNA BACK PLANE.
2. FACTORY INSTALLED MOUNTING BRACKET TO BE REMOVED, EXISTING INSTALLATION BOLTS TO BE RE-INSTALLED ON REPLACEMENT BRACKET.
3. ADJUST SHIM BOLTS EQUALLY TO CENTER ANTENNA CLUSTER ON EXISTING PIPE MAST. SHIM BOLTS NOT REQUIRED FOR PIPE MASTS OVER 6 7/8" O.D.

2 L700 ANTENNA CLOSE MOUNT ANTENNA BRACKET

SCALE: N.T.S.

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BU #: 828257

STONINGTON

82 MECHANIC STREET
PAWCATUCK, CT 06379

EXISTING 150'-0" FLAGPOLE

PROJECT NO:	137128.001.01
CHECKED BY:	RMC

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9/26/19

SHEET NUMBER:	REVISION:
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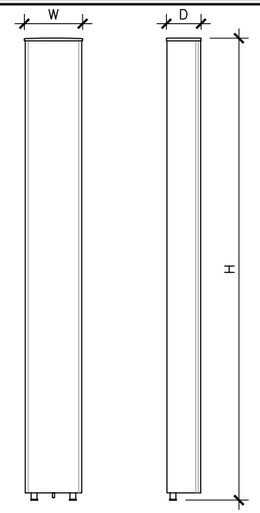
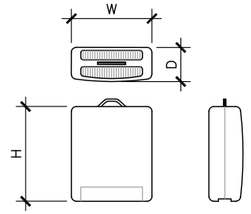


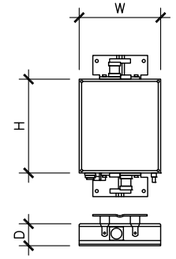
ANTENNA SPECS	
MANUFACTURER	RFS
MODEL #	APXVA18_43-C-A20
WIDTH	16.0"
DEPTH	9.0"
HEIGHT	68.0"
WEIGHT	45.4 LBS

1 L7/L6 ANTENNA DETAIL
SCALE: 3/8" = 1'-0"



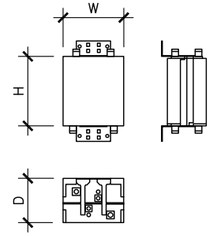
RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	4449
WIDTH	13.2"
DEPTH	10.4"
HEIGHT	14.9"
WEIGHT	74 LBS

2 REMOTE RADIO UNIT (RRU)
SCALE: 3/8" = 1'-0"



TMA SPECIFICATIONS	
MANUFACTURER	COMMSCOPE
MODEL #	E15S09P45
WIDTH	8.6"
DEPTH	4.7"
HEIGHT	10"
WEIGHT	22 LBS

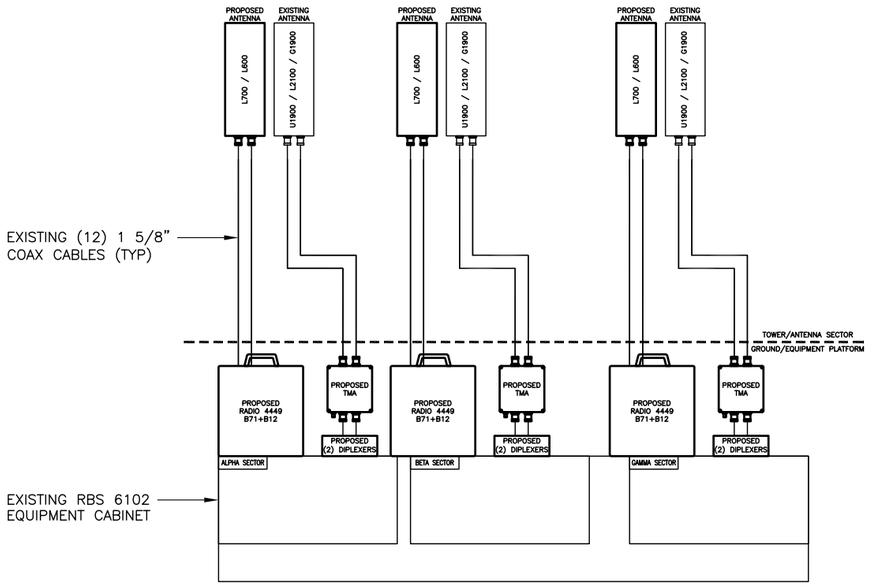
3 TMA DETAIL
SCALE: 3/4" = 1'-0"



DIPLEXER SPECIFICATIONS	
MANUFACTURER	KAELUS
MODEL #	DBC0061F1V51-2
WIDTH	3.2"
DEPTH	6.2"
HEIGHT	8"
WEIGHT	9.5 LBS

4 DIPLEXER DETAIL
SCALE: 3/4" = 1'-0"

NOTES:
1. TAG ALL EXISTING AND PROPOSED CABLES/JUMPERS PER T-MOBILE SPECIFICATIONS.
2. SEE RF SCHEDULE FOR CABLE AND JUMPER LENGTHS.
3. REFER TO ANTENNA ORIENTATION ON SHEET A-2 FOR EXACT ANTENNA POSITIONING.



5 ANTENNA & CABLING SCHEMATIC
SCALE: N.T.S.

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STONINGTON

82 MECHANIC STREET
PAWCATUCK, CT 06379

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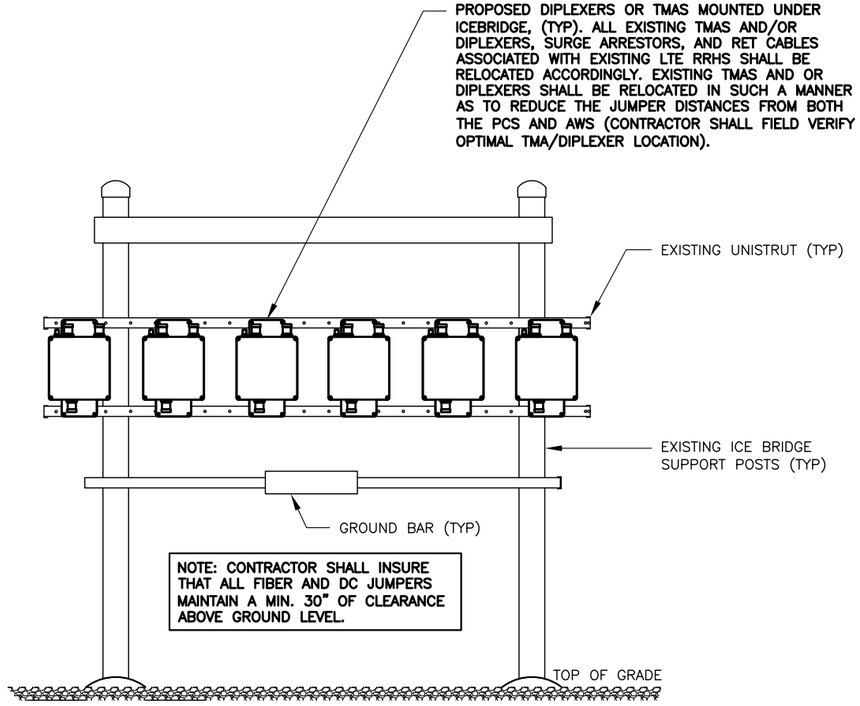
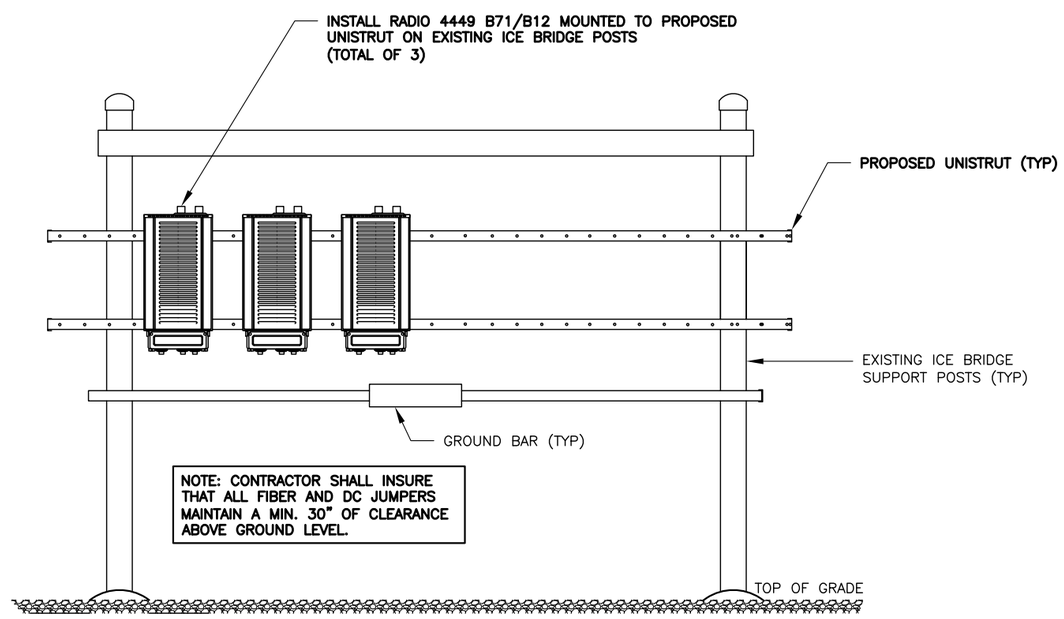


1 DIPLEXER/TMA TO ICE BRIDGE POST MOUNTING DETAIL
SCALE: N.T.S.



2 RRH TO ICE BRIDGE POST MOUNTING DETAIL
SCALE: N.T.S.

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SHEET NUMBER:	REVISION:
A-4.2	1

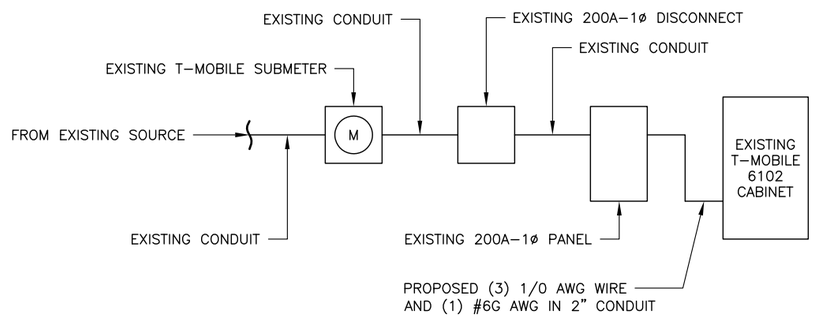
FINAL PANEL SCHEDULE							
LOAD	POLES	AMPS	BUS L1	BUS L2	AMPS	POLES	LOAD
RBS 6102 CABINET	2	**100A**	1	2	20A	1	EQUIPMENT
			3	4	20A	1	EQUIPMENT
			5	6	20A	1	EQUIPMENT
			7	8	60A	2	RBS 3106
			9	10			

RATED VOLTAGE: ■120/240 □_____. 1 PHASE, 3 WIRE		BRANCH POLES: □12 □24 ■30 □42	APPROVED MF'RS
RATED AMPS: □100 ■200 □400 □_____.		CABINET: ■SURFACE □FLUSH	NEMA □1 ■3R □4X
□MAIN LUGS ONLY	MAIN 200 AMPS ■BREAKER □FUSED SWITCH	■HINGED DOOR	■KEYED DOOR LATCH
□FUSED ■CIRCUIT BREAKER	BRANCH DEVICES	□_____ TO BE GFCI BREAKERS	FULL NEUTRAL BUS / GROUND BAR
ALL BREAKERS MUST BE RATED TO INTERRUPT A SHORT CIRCUIT ISC OF 10,000 AMPS SYMMETRICAL			

REPLACE EXISTING BREAKER IN POSITION 1 AND 3 WITH A NEW 2P 100A BREAKER
REPLACE EXISTING WIRES FOR EXISTING 6102 CABINET WITH (3) 1/0 AWG THWN (COPPER) AND (1) #6G AWG. MINIMUM CONDUIT SIZE TO BE 2".
IF 100A BREAKER WILL NOT PROPERLY FIT IN EXISTING PANEL, REPLACE (E) PANEL WITH SQUARE D PANEL QO12040M200RB (OR APPROVED EQUAL).
UPGRADE FEEDER WIRES TO MEET AMPACITY IF NEW PANEL IS REQUIRED.
FINAL PANEL DESIGN AND CALCULATIONS FOR WIRE SIZE WERE BASED OFF OF EXISTING PHOTOS

1 FINAL T-MOBILE PANEL DETAIL

SCALE: N.T.S.



2 ONE-LINE DIAGRAM

SCALE: N.T.S.

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STONINGTON

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9/26/19

SHEET NUMBER:	REVISION:
E-1	1

Exhibit D

Structural Analysis Report

Date: **June 27, 2019**

GPD Engineering and Architecture
Professional Corporation
520 South Main Street Suite 2531
Akron, Ohio 44311
(216) 927-8663

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

Subject:	**Structural Modification Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11307C
	Carrier Site Name:	STONINGTON
Crown Castle Designation:	**Crown Castle BU Number:**	828257
	Crown Castle Site Name:	STONINGTON
	Crown Castle JDE Job Number:	559257
	Crown Castle Work Order Number:	1751629
	Crown Castle Order Number:	479826 Rev. 4
Engineering Firm Designation:	**GPD Project Number:**	2019777.828257.02
Site Data:	**82 Mechanic Street, Pawcatuck, CT 06379, New London County Latitude *41° 22' 18.91"*, Longitude *-71° 49' 58.01"* 150 Foot – Modified PiROD Concealment Tower w/ Proposed Canister Expansion**	

Dear Cheryl Schultz,

We are pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower.

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

LC4.5: Proposed Equipment Configuration with Proposed Modifications **Sufficient Capacity** - 95.4%

This analysis utilizes an ultimate 3-second gust wind speed of 140 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

All modifications designed by GPD (Project #: 2019777.828257.02, dated 6/27/2019, see Appendix D) and equipment proposed in this report shall be installed in accordance with the attached design drawings for the determined available structural capacity to be effective.

Structural analysis prepared by: Brendan Kelly

Respectfully submitted by:

Christopher J. Scheks, P.E. 6/27/2019
Connecticut #: 0030026

TABLE OF CONTENTS

1) INTRODUCTION

The existing 150' concealment tower has six sections, each with a constant diameter. The base section has a diameter of 30" and the top section has a diameter of 10.75" and is surrounded by concealment canisters. Each section is connected by bolted flanges. The structure is painted and has no tower lighting.

This tower is a 150 ft concealment tower designed by PiROD, Inc. in October of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

Modifications designed by Paul J. Ford (Project #: 37515-2530.001.7700, dated 8/26/2015) consist of replacing the existing concealment assembly from 126'-150' with a new assembly and 36"ø canisters, installing reinforcement to the tower shaft from 0'-62', adding anchor rods with bracket assemblies to the tower base, and adding transition stiffeners to the tower base. These modifications have been considered in this analysis.

Proposed modifications designed by GPD (Project #: 2019777.828257.02, dated 6/27/2019, see Appendix D) consist of expanding the existing canisters from 36"ø to 42"ø from 126'-150', adding reinforcement to the tower shaft around the existing 60' flange connection, and adding anchor rods on bracket assemblies to the tower base. These modifications have been considered in this analysis.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	140 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	147.0	3	RFS Celwave	APXVA18_43-C-A20	12	1-5/8	
	142.0	3	RFS Celwave	APXV18-206516S-C-A20			
144.0	144.0	1		42"ø x 12' Concealment Canister			
132.0	132.0	1		42"ø x 12' Concealment Canister			

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
133.0	135.0	3	CCI Antennas	OPA-65R-LCUU-H6	12	1-1/4	
	129.0	6	CCI Antennas	TMABPDB7823VG12A			

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-TOWER MAPPING REPORT	TEP Project #: 61185_32839, dated 6/29/2015	3487587	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiROD File #: A-117709, dated 10/12/2000	3487587	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PiROD File #: A-117709, dated 10/12/2000	3946752	CCISITES
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc., Inc. dated 9/14/2000	3487586	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF Project #: 37515-2530.001.7700, dated 8/26/2015	5876049	CCISITES
4-POST-MODIFICATION INSPECTION	TEP Project #: 61185.36697, dated 5/23/2016	6269721	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	GPD Project #: 2019777.828257.02, dated 6/27/2019	D. Palkovic	GPD

3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) The tower and structures were built and have been maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 145	Pole	P10.75x0.465	Pole	-0.39	-	4.6	Pass
L2	145 - 140	Pole	P10.75x0.465	Pole	-1.01	-	9.5	Pass
L3	140 - 135	Pole	P10.75x0.465	Pole	-1.67	-	17.1	Pass
L4	135 - 130	Pole	P10.75x0.465	Pole	-2.47	-	26.7	Pass
L5	130 - 126	Pole	P10.75x0.465	Pole	-2.81	-	34.5	Pass
L6	126 - 121	Pole	P24x0.375	Pole	-3.77	-	12.0	Pass
L7	121 - 116	Pole	P24x0.375	Pole	-4.40	-	15.5	Pass
L8	116 - 111	Pole	P24x0.375	Pole	-5.04	-	19.5	Pass
L9	111 - 110	Pole	P24x0.375	Pole	-5.17	-	20.3	Pass
L10	110 - 105	Pole	P24x0.375	Pole	-5.81	-	24.7	Pass
L11	105 - 100	Pole	P24x0.375	Pole	-6.46	-	29.5	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L12	100 - 95	Pole	P24x0.375	Pole	-7.12	-	34.6	Pass
L13	95 - 90	Pole	P24x0.375	Pole	-7.78	-	40.1	Pass
L14	90 - 85	Pole	P24x0.375	Pole	-8.44	-	45.9	Pass
L15	85 - 80	Pole	P24x0.375	Pole	-9.12	-	52.1	Pass
L16	80 - 75	Pole	P24x0.375	Pole	-9.80	-	58.5	Pass
L17	75 - 70	Pole	P24x0.375	Pole	-10.49	-	65.3	Pass
L18	70 - 65	Pole	P24x0.375	Pole	-11.19	-	72.3	Pass
L19	65 - 61	Pole	P24x0.375	Pole	-11.76	-	78.2	Pass
L20	61 - 60.75	Pole + Reinf.	P24x0.7125	Reinf.	-11.82	-	50.6	Pass
L21	60.75 - 60.5	Pole + Reinf.	P24x0.7125	Reinf.	-11.87	-	50.8	Pass
L22	60.5 - 60.25	Pole + Reinf.	P24x0.75	Reinf.	-11.94	-	48.3	Pass
L23	60.25 - 60	Pole + Reinf.	P24x0.75	Reinf.	-12.00	-	48.6	Pass
L24	60 - 58.5	Pole + Reinf.	P24x0.75	Reinf.	-12.38	-	49.9	Pass
L25	58.5 - 58.25	Pole + Reinf.	P24x0.675	Reinf.	-12.44	-	52.9	Pass
L26	58.25 - 53.25	Pole + Reinf.	P24x0.675	Reinf.	-13.50	-	57.9	Pass
L27	53.25 - 48.25	Pole + Reinf.	P24x0.675	Reinf.	-14.57	-	63.0	Pass
L28	48.25 - 43.25	Pole + Reinf.	P24x0.675	Reinf.	-15.65	-	68.3	Pass
L29	43.25 - 38.25	Pole + Reinf.	P24x0.675	Reinf.	-16.74	-	73.8	Pass
L30	38.25 - 33.25	Pole + Reinf.	P24x0.675	Reinf.	-17.83	-	79.5	Pass
L31	33.25 - 30	Pole + Reinf.	P24x0.675	Reinf.	-19.30	-	83.3	Pass
L32	30 - 29.75	Pole + Reinf.	P30x0.6	Reinf.	-19.55	-	58.2	Pass
L33	29.75 - 24.75	Pole + Reinf.	P30x0.6	Reinf.	-20.77	-	62.5	Pass
L34	24.75 - 19.75	Pole + Reinf.	P30x0.6	Reinf.	-22.00	-	66.9	Pass
L35	19.75 - 14.75	Pole + Reinf.	P30x0.6	Reinf.	-23.23	-	71.4	Pass
L36	14.75 - 9.75	Pole + Reinf.	P30x0.6	Reinf.	-24.48	-	76.0	Pass
L37	9.75 - 4.75	Pole + Reinf.	P30x0.6	Reinf.	-25.65	-	80.7	Pass
L38	4.75 - 2.5	Pole + Reinf.	P30x0.6	Reinf.	-26.17	-	82.8	Pass
L39	2.5 - 2.25	Pole + Reinf.	P30x0.625	Reinf.	-26.24	-	76.2	Pass
L40	2.25 - 0	Pole + Reinf.	P30x0.625	Reinf.	-26.83	-	78.2	Pass
						Summary	ELC:	Load Case 4.5
						Pole =	78.2	Pass
						Reinf. =	83.3	Pass
						Rating =	83.3	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC4.5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Flange Connection	126	27.0	Pass
1,2	Flange Connection	110	39.4	Pass
1,2	Flange Connection	90	77.8	Pass
1,2	Flange Connection	60	82.2	Pass
1,2	Flange Connection	30	95.4	Pass
1,2	Anchor Rods	0	75.2	Pass
1,2	Base Plate	0	0	Pass
1,2	Base Foundation (Soil Interaction)	0	88.4	Pass
1,2	Base Foundation (Reinforcement)	0	33.8	Pass

Structure Rating (max from all components) =	95.4%

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

4.1) Recommendations

The tower and its foundation will be sufficient for the proposed loading configuration once the modifications designed by GPD (Project #: 2019777.805873.01, dated 6/12/2019, see Appendix D) are installed.

5) DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

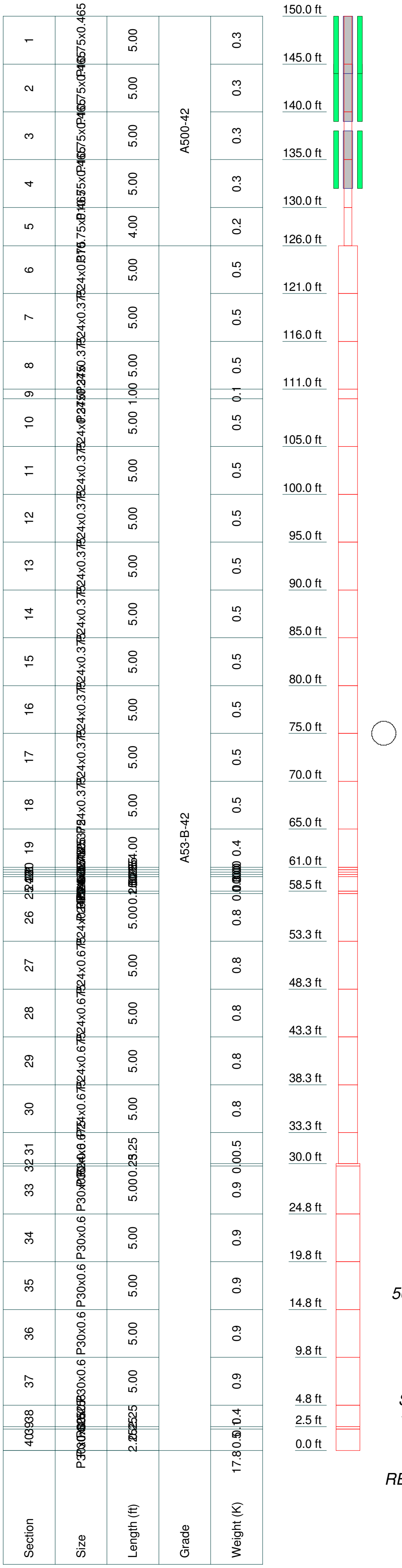
Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

TNXTOWER OUTPUT

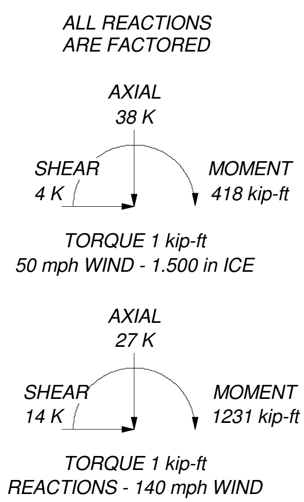


MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A53-B-42	42 ksi	63 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 140 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft

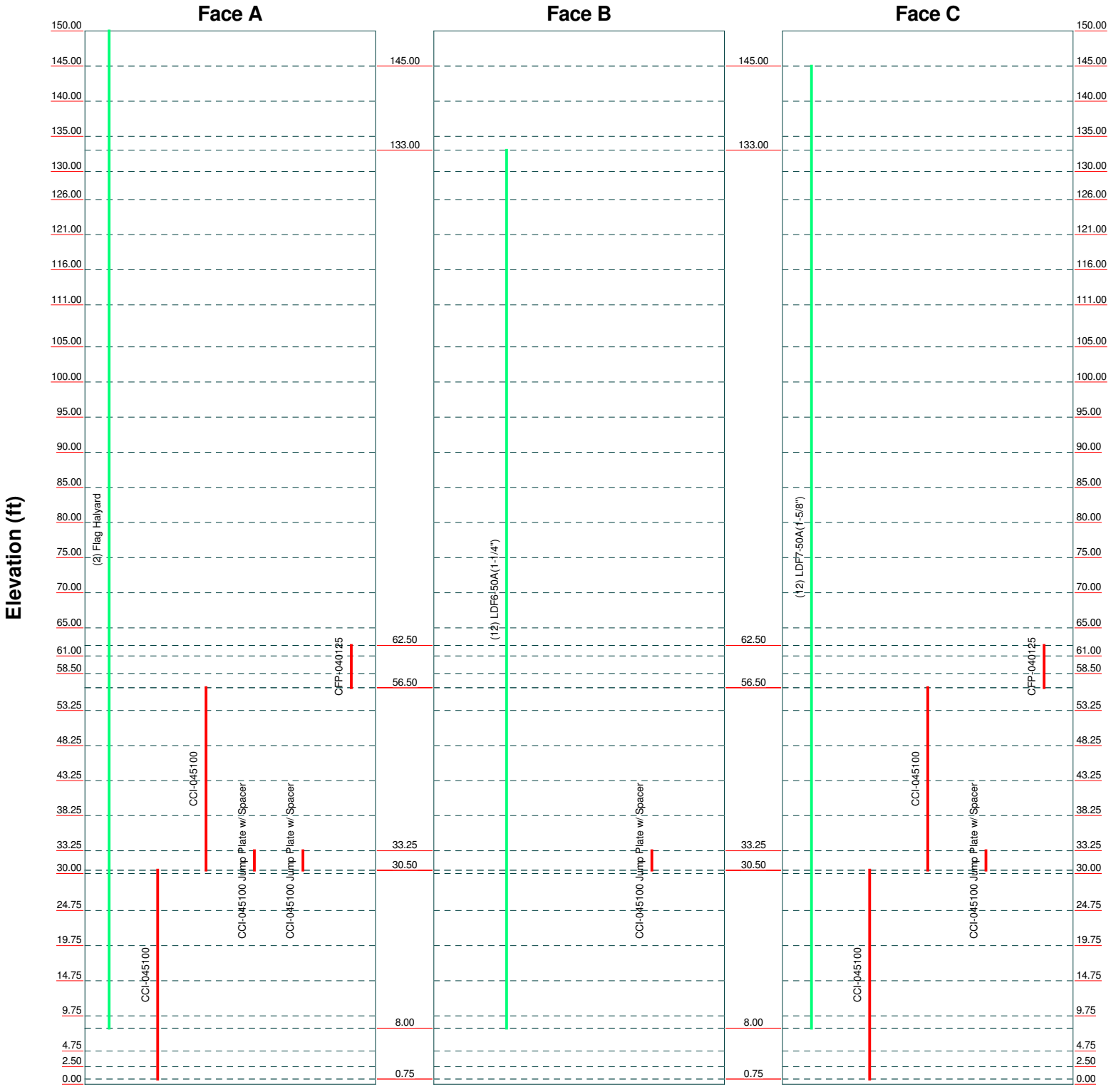


GPD
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (330) 572-2222
FAX: (330) 572-3722

Job: **Stonington (BU #: 828257)**		
Project: **2019777.828257.02**		
Client: Crown Castle	Drawn by: bk	App'd:
Code: TIA-222-H	Date: 06/27/19	Scale: NTS
Path: T:\Crown\828257\02 Mods\Rev. 0\tnx\828257 MOD.eri		Dwg No. E-1

Feed Line Distribution Chart
0' - 150'

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



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Job: ***Stonington (BU #: 828257)***			
Project: ***2019777.828257.02***			
Client: Crown Castle	Drawn by: bk	App'd:	
Code: TIA-222-H	Date: 06/27/19	Scale: NTS	
Path: T:\Crown\828257\02 Mods\Rev. 0\tnx\828257 MOD.er		Dwg No. E-7	

Tower Input Data

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

Tower is located in New London County, Connecticut.
Tower base elevation above sea level: 7.00 ft.
Basic wind speed of 140 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-H Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-H Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		√ Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
***										
CCI-045100	A	No	Surface Af (CaAa)	30.50 - 0.75	1	1	0.500 0.500	4.500	11.000	0.000
CCI-045100	C	No	Surface Af (CaAa)	30.50 - 0.75	1	1	0.000 0.000	4.500	11.000	0.000
***										
CCI-045100	A	No	Surface Af (CaAa)	56.50 - 30.50	1	1	0.500 0.500	4.500	11.000	0.000
CCI-045100	C	No	Surface Af (CaAa)	56.50 - 30.50	1	1	0.000 0.000	4.500	11.000	0.000
***										
CCI-045100 Jump Plate w/ Spacer	A	No	Surface Af (CaAa)	33.25 - 30.50	1	1	-0.250 -0.250	0.000	0.000	57.422
CCI-045100 Jump Plate w/ Spacer	A	No	Surface Af (CaAa)	33.25 - 30.50	1	1	0.500 0.500	4.500	15.500	57.422
CCI-045100 Jump Plate w/ Spacer	B	No	Surface Af (CaAa)	33.25 - 30.50	1	1	0.250 0.250	0.000	0.000	57.422
CCI-045100 Jump Plate w/ Spacer	C	No	Surface Af (CaAa)	33.25 - 30.50	1	1	0.000 0.000	4.500	15.500	57.422
***										
CFP-040125	A	No	Surface Af (CaAa)	62.50 - 56.50	1	1	0.500 0.500	4.000	10.500	0.000
CFP-040125	C	No	Surface Af (CaAa)	62.50 - 56.50	1	1	0.000 0.000	4.000	10.500	0.000
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Flag Halyard	A	No	No	CaAa (Out Of Face)	150.00 - 8.00	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.04 0.14 0.24 0.44	0.110 0.375 0.640 1.170
** 145 **									
LDF7-50A(1-5/8")	C	No	No	Inside Pole	145.00 - 8.00	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.820 0.820 0.820 0.820
** 133 **									
LDF6-50A(1-1/4")	B	No	No	Inside Pole	133.00 - 8.00	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.660 0.660 0.660 0.660
***									

User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle		Weight	F_x	F_z	Wind Force	C_AA_C
	ft	ft	°		K	K	K	K	ft^2
Flag (12'x20')	150.00	0.000	0.000	No Ice	0.03	0.00	0.00	0.67	**9.24**
				Ice	0.69	0.00	0.00	0.09	**9.55**
				Service	0.03	0.00	0.00	0.12	**10.33**

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
APXV18-206516S-C-A20	A	From Leg	1.00 0.000 -3.000	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.02 0.04 0.06 0.13
APXV18-206516S-C-A20	B	From Leg	1.00 0.000 -3.000	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.02 0.04 0.06 0.13
APXV18-206516S-C-A20	C	From Leg	1.00 0.000 -3.000	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.02 0.04 0.06 0.13
APXVA18_43-C-A20	A	From Leg	1.00 0.000 2.000	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.05 0.11 0.18 0.33
APXVA18_43-C-A20	B	From Leg	1.00 0.000 2.000	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.05 0.11 0.18 0.33
APXVA18_43-C-A20	C	From Leg	1.00 0.000 2.000	0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.05 0.11 0.18 0.33
***									
OPA-65R-LCUU-H6	A	From Leg	1.00 0.000 2.000	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.07 0.13 0.20 0.36
OPA-65R-LCUU-H6	B	From Leg	1.00 0.000 2.000	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.07 0.13 0.20 0.36
OPA-65R-LCUU-H6	C	From Leg	1.00 0.000 2.000	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.07 0.13 0.20 0.36
(2) TMABPDB7823VG12A	A	From Leg	1.00 0.000 -4.000	0.000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.02 0.03 0.04 0.06
(2) TMABPDB7823VG12A	B	From Leg	1.00	0.000	133.00	No Ice	0.00	0.00	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			1/2" Ice	0.00	0.00	0.03
			-4.000			1" Ice	0.00	0.00	0.04
						2" Ice	0.00	0.00	0.06
(2) TMABPDB7823VG12A	C	From Leg	1.00	0.000	133.00	No Ice	0.00	0.00	0.02
			0.000			1/2" Ice	0.00	0.00	0.03
			-4.000			1" Ice	0.00	0.00	0.04
						2" Ice	0.00	0.00	0.06
***									
828257 Bridge Stiffeners	A	From Leg	0.25	0.000	30.00	No Ice	0.69	1.27	0.04
			0.000			1/2" Ice	0.00	0.00	0.05
			0.000			1" Ice	0.00	0.00	0.06
						2" Ice	0.00	0.00	0.08
828257 Bridge Stiffeners	A	From Face	0.25	0.000	30.00	No Ice	0.69	1.27	0.04
			0.000			1/2" Ice	0.00	0.00	0.05
			0.000			1" Ice	0.00	0.00	0.06
						2" Ice	0.00	0.00	0.08
828257 Bridge Stiffeners	B	From Leg	0.25	0.000	30.00	No Ice	0.69	1.27	0.04
			0.000			1/2" Ice	0.00	0.00	0.05
			0.000			1" Ice	0.00	0.00	0.06
						2" Ice	0.00	0.00	0.08
828257 Bridge Stiffeners	C	From Face	0.25	0.000	30.00	No Ice	0.69	1.27	0.04
			0.000			1/2" Ice	0.00	0.00	0.05
			0.000			1" Ice	0.00	0.00	0.06
						2" Ice	0.00	0.00	0.08
***									
Truck Ball	C	None		0.000	150.75	No Ice	0.88	0.88	0.05
						1/2" Ice	1.38	1.38	0.07
						1" Ice	1.53	1.53	0.09
						2" Ice	1.85	1.85	0.13
Canister Load1	C	None		0.000	150.00	No Ice	9.45	9.45	0.13
						1/2" Ice	23.65	23.65	0.29
						1" Ice	24.20	24.20	0.45
						2" Ice	25.30	25.30	0.78
Canister Load2	C	None		0.000	138.00	No Ice	18.90	18.90	0.37
						1/2" Ice	47.30	47.30	0.68
						1" Ice	48.40	48.40	1.00
						2" Ice	50.60	50.60	1.66
Canister Load3	C	None		0.000	126.00	No Ice	9.45	9.45	0.32
						1/2" Ice	23.65	23.65	0.48
						1" Ice	24.20	24.20	0.63
						2" Ice	25.30	25.30	0.96
***									

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 145	19.086	48	1.051	0.001
L2	145 - 140	17.987	48	1.047	0.001
L3	140 - 135	16.897	48	1.033	0.001
L4	135 - 130	15.827	48	1.008	0.001
L5	130 - 126	14.792	48	0.965	0.001
L6	126 - 121	14.002	48	0.918	0.001
L7	121 - 116	13.045	48	0.910	0.001
L8	116 - 111	12.098	48	0.899	0.001
L9	111 - 110	11.163	48	0.885	0.001
L10	110 - 105	10.978	48	0.882	0.001
L11	105 - 100	10.063	48	0.865	0.001
L12	100 - 95	9.168	48	0.844	0.001
L13	95 - 90	8.297	48	0.819	0.001
L14	90 - 85	7.455	48	0.790	0.001
L15	85 - 80	6.645	48	0.756	0.001
L16	80 - 75	5.873	48	0.718	0.001
L17	75 - 70	5.144	48	0.675	0.001
L18	70 - 65	4.462	48	0.627	0.001
L19	65 - 61	3.833	48	0.573	0.000
L20	61 - 60.75	3.373	48	0.526	0.000
L21	60.75 - 60.5	3.345	48	0.524	0.000
L22	60.5 - 60.25	3.318	48	0.523	0.000
L23	60.25 - 60	3.290	48	0.521	0.000
L24	60 - 58.5	3.263	48	0.520	0.000
L25	58.5 - 58.25	3.102	48	0.510	0.000
L26	58.25 - 53.25	3.075	48	0.508	0.000
L27	53.25 - 48.25	2.563	48	0.469	0.000
L28	48.25 - 43.25	2.094	48	0.427	0.000
L29	43.25 - 38.25	1.671	48	0.381	0.000
L30	38.25 - 33.25	1.297	48	0.331	0.000
L31	33.25 - 30	0.978	48	0.278	0.000
L32	30 - 29.75	0.802	48	0.241	0.000
L33	29.75 - 24.75	0.789	48	0.239	0.000
L34	24.75 - 19.75	0.557	48	0.205	0.000
L35	19.75 - 14.75	0.361	48	0.168	0.000
L36	14.75 - 9.75	0.205	48	0.129	0.000
L37	9.75 - 4.75	0.091	48	0.088	0.000
L38	4.75 - 2.5	0.022	48	0.044	0.000
L39	2.5 - 2.25	0.006	48	0.023	0.000
L40	2.25 - 0	0.005	48	0.021	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.75	Truck Ball	48	19.086	1.051	0.001	31235
150.00	Canister Load1	48	19.086	1.051	0.001	31235
145.00	APXV18-206516S-C-A20	48	17.987	1.047	0.001	31235
138.00	Canister Load2	48	16.466	1.024	0.001	12106
133.00	OPA-65R-LCUU-H6	48	15.407	0.994	0.001	6769
126.00	Canister Load3	48	14.002	0.918	0.001	8473
30.00	828257 Bridge Stiffeners	48	0.802	0.241	0.000	6343

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 145	115.601	20	6.348	0.007
L2	145 - 140	108.977	20	6.322	0.007
L3	140 - 135	102.407	20	6.241	0.007
L4	135 - 130	95.952	20	6.096	0.007
L5	130 - 126	89.701	20	5.845	0.006
L6	126 - 121	84.925	20	5.564	0.006
L7	121 - 116	79.131	20	5.516	0.006
L8	116 - 111	73.395	20	5.452	0.006
L9	111 - 110	67.735	20	5.371	0.005
L10	110 - 105	66.613	20	5.352	0.005
L11	105 - 100	61.070	20	5.247	0.005
L12	100 - 95	55.648	20	5.119	0.005
L13	95 - 90	50.371	20	4.969	0.005
L14	90 - 85	45.264	20	4.793	0.005
L15	85 - 80	40.354	20	4.590	0.004
L16	80 - 75	35.670	20	4.359	0.004
L17	75 - 70	31.243	20	4.099	0.004
L18	70 - 65	27.104	20	3.806	0.003
L19	65 - 61	23.288	20	3.481	0.003
L20	61 - 60.75	20.490	20	3.197	0.003
L21	60.75 - 60.5	20.323	20	3.187	0.003
L22	60.5 - 60.25	20.157	20	3.176	0.003
L23	60.25 - 60	19.991	20	3.167	0.003
L24	60 - 58.5	19.825	20	3.157	0.003
L25	58.5 - 58.25	18.844	20	3.097	0.003
L26	58.25 - 53.25	18.682	20	3.086	0.003
L27	53.25 - 48.25	15.573	20	2.850	0.002
L28	48.25 - 43.25	12.722	20	2.594	0.002
L29	43.25 - 38.25	10.151	20	2.315	0.002
L30	38.25 - 33.25	7.883	20	2.013	0.002
L31	33.25 - 30	5.944	20	1.687	0.001
L32	30 - 29.75	4.872	20	1.462	0.001
L33	29.75 - 24.75	4.796	20	1.452	0.001
L34	24.75 - 19.75	3.382	20	1.245	0.001
L35	19.75 - 14.75	2.193	20	1.024	0.001
L36	14.75 - 9.75	1.244	20	0.786	0.001
L37	9.75 - 4.75	0.551	20	0.534	0.000
L38	4.75 - 2.5	0.132	20	0.265	0.000
L39	2.5 - 2.25	0.036	20	0.139	0.000
L40	2.25 - 0	0.030	20	0.125	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.75	Truck Ball	20	115.601	6.348	0.007	5535
150.00	Canister Load1	20	115.601	6.348	0.007	5535
145.00	APXV18-206516S-C-A20	20	108.977	6.322	0.007	5535
138.00	Canister Load2	20	99.807	6.191	0.007	2127
133.00	OPA-65R-LCUU-H6	20	93.419	6.016	0.006	1176
126.00	Canister Load3	20	84.925	5.564	0.006	1459
30.00	828257 Bridge Stiffeners	20	4.872	1.462	0.001	1045

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u
	ft		ft	ft		in^2	K
L1	150 - 145 (1)	P10.75x0.465	5.00	0.00	0.0	15.025	-0.39
L2	145 - 140 (2)	P10.75x0.465	5.00	0.00	0.0	15.025	-1.01
L3	140 - 135 (3)	P10.75x0.465	5.00	0.00	0.0	15.025	-1.67
L4	135 - 130 (4)	P10.75x0.465	5.00	0.00	0.0	15.025	-2.47
L5	130 - 126 (5)	P10.75x0.465	4.00	0.00	0.0	15.025	-2.81
L6	126 - 121 (6)	P24x0.375	5.00	0.00	0.0	27.833	-3.77
L7	121 - 116 (7)	P24x0.375	5.00	0.00	0.0	27.833	-4.40
L8	116 - 111 (8)	P24x0.375	5.00	0.00	0.0	27.833	-5.04
L9	111 - 110 (9)	P24x0.375	1.00	0.00	0.0	27.833	-5.17
L10	110 - 105 (10)	P24x0.375	5.00	0.00	0.0	27.833	-5.81
L11	105 - 100 (11)	P24x0.375	5.00	0.00	0.0	27.833	-6.46
L12	100 - 95 (12)	P24x0.375	5.00	0.00	0.0	27.833	-7.12
L13	95 - 90 (13)	P24x0.375	5.00	0.00	0.0	27.833	-7.78
L14	90 - 85 (14)	P24x0.375	5.00	0.00	0.0	27.833	-8.44
L15	85 - 80 (15)	P24x0.375	5.00	0.00	0.0	27.833	-9.12
L16	80 - 75 (16)	P24x0.375	5.00	0.00	0.0	27.833	-9.80
L17	75 - 70 (17)	P24x0.375	5.00	0.00	0.0	27.833	-10.49
L18	70 - 65 (18)	P24x0.375	5.00	0.00	0.0	27.833	-11.19
L19	65 - 61 (19)	P24x0.375	4.00	0.00	0.0	27.833	-11.76
L20	61 - 60.75 (20)	P24x0.7125	0.25	0.00	0.0	52.126	-11.82
L21	60.75 - 60.5 (21)	P24x0.7125	0.25	0.00	0.0	52.126	-11.87
L22	60.5 - 60.25 (22)	P24x0.75	0.25	0.00	0.0	54.782	-11.94
L23	60.25 - 60 (23)	P24x0.75	0.25	0.00	0.0	54.782	-12.00
L24	60 - 58.5 (24)	P24x0.75	1.50	0.00	0.0	54.782	-12.38
L25	58.5 - 58.25 (25)	P24x0.675	0.25	0.00	0.0	49.462	-12.44
L26	58.25 - 53.25 (26)	P24x0.675	5.00	0.00	0.0	49.462	-13.50
L27	53.25 - 48.25 (27)	P24x0.675	5.00	0.00	0.0	49.462	-14.57
L28	48.25 - 43.25 (28)	P24x0.675	5.00	0.00	0.0	49.462	-15.65
L29	43.25 - 38.25 (29)	P24x0.675	5.00	0.00	0.0	49.462	-16.74
L30	38.25 - 33.25 (30)	P24x0.675	5.00	0.00	0.0	49.462	-17.83
L31	33.25 - 30 (31)	P24x0.675	3.25	0.00	0.0	49.462	-19.30
L32	30 - 29.75 (32)	P30x0.6	0.25	0.00	0.0	55.418	-19.55
L33	29.75 - 24.75 (33)	P30x0.6	5.00	0.00	0.0	55.418	-20.77
L34	24.75 - 19.75 (34)	P30x0.6	5.00	0.00	0.0	55.418	-22.00
L35	19.75 - 14.75 (35)	P30x0.6	5.00	0.00	0.0	55.418	-23.23
L36	14.75 - 9.75 (36)	P30x0.6	5.00	0.00	0.0	55.418	-24.48
L37	9.75 - 4.75 (37)	P30x0.6	5.00	0.00	0.0	55.418	-25.65
L38	4.75 - 2.5 (38)	P30x0.6	2.25	0.00	0.0	55.418	-26.17
L39	2.5 - 2.25 (39)	P30x0.625	0.25	0.00	0.0	57.678	-26.24
L40	2.25 - 0 (40)	P30x0.625	2.25	0.00	0.0	57.678	-26.83

Pole Bending Design Data

Section No.	Elevation	Size	M_{ux}	M_{uy}
	ft		kip-ft	kip-ft
L1	150 - 145 (1)	P10.75x0.465	7.37	0.00
L2	145 - 140 (2)	P10.75x0.465	15.14	0.00
L3	140 - 135 (3)	P10.75x0.465	27.39	0.00
L4	135 - 130 (4)	P10.75x0.465	42.82	0.00
L5	130 - 126 (5)	P10.75x0.465	55.43	0.00
L6	126 - 121 (6)	P24x0.375	76.01	0.00

Section No.	Elevation ft	Size	M_{ux} kip-ft	M_{uy} kip-ft
L7	121 - 116 (7)	P24x0.375	99.09	0.00
L8	116 - 111 (8)	P24x0.375	124.63	0.00
L9	111 - 110 (9)	P24x0.375	130.03	0.00
L10	110 - 105 (10)	P24x0.375	158.48	0.00
L11	105 - 100 (11)	P24x0.375	189.31	0.00
L12	100 - 95 (12)	P24x0.375	222.47	0.00
L13	95 - 90 (13)	P24x0.375	257.90	0.00
L14	90 - 85 (14)	P24x0.375	295.55	0.00
L15	85 - 80 (15)	P24x0.375	335.35	0.00
L16	80 - 75 (16)	P24x0.375	377.21	0.00
L17	75 - 70 (17)	P24x0.375	421.07	0.00
L18	70 - 65 (18)	P24x0.375	466.83	0.00
L19	65 - 61 (19)	P24x0.375	504.73	0.00
L20	61 - 60.75 (20)	P24x0.7125	507.14	0.00
L21	60.75 - 60.5 (21)	P24x0.7125	509.55	0.00
L22	60.5 - 60.25 (22)	P24x0.75	511.97	0.00
L23	60.25 - 60 (23)	P24x0.75	514.39	0.00
L24	60 - 58.5 (24)	P24x0.75	529.03	0.00
L25	58.5 - 58.25 (25)	P24x0.675	531.49	0.00
L26	58.25 - 53.25 (26)	P24x0.675	581.63	0.00
L27	53.25 - 48.25 (27)	P24x0.675	633.59	0.00
L28	48.25 - 43.25 (28)	P24x0.675	687.26	0.00
L29	43.25 - 38.25 (29)	P24x0.675	742.51	0.00
L30	38.25 - 33.25 (30)	P24x0.675	799.21	0.00
L31	33.25 - 30 (31)	P24x0.675	837.48	0.00
L32	30 - 29.75 (32)	P30x0.6	840.53	0.00
L33	29.75 - 24.75 (33)	P30x0.6	902.51	0.00
L34	24.75 - 19.75 (34)	P30x0.6	966.17	0.00
L35	19.75 - 14.75 (35)	P30x0.6	1031.34	0.00
L36	14.75 - 9.75 (36)	P30x0.6	1097.88	0.00
L37	9.75 - 4.75 (37)	P30x0.6	1165.64	0.00
L38	4.75 - 2.5 (38)	P30x0.6	1196.50	0.00
L39	2.5 - 2.25 (39)	P30x0.625	1199.94	0.00
L40	2.25 - 0 (40)	P30x0.625	1231.03	0.00

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	Actual T_u kip-ft
L1	150 - 145 (1)	P10.75x0.465	1.49	0.01
L2	145 - 140 (2)	P10.75x0.465	1.59	0.01
L3	140 - 135 (3)	P10.75x0.465	3.03	0.02
L4	135 - 130 (4)	P10.75x0.465	3.13	0.05
L5	130 - 126 (5)	P10.75x0.465	3.17	0.06
L6	126 - 121 (6)	P24x0.375	4.37	0.08
L7	121 - 116 (7)	P24x0.375	4.86	0.11
L8	116 - 111 (8)	P24x0.375	5.35	0.13
L9	111 - 110 (9)	P24x0.375	5.45	0.14
L10	110 - 105 (10)	P24x0.375	5.93	0.16
L11	105 - 100 (11)	P24x0.375	6.40	0.19
L12	100 - 95 (12)	P24x0.375	6.86	0.21
L13	95 - 90 (13)	P24x0.375	7.31	0.24
L14	90 - 85 (14)	P24x0.375	7.75	0.26
L15	85 - 80 (15)	P24x0.375	8.17	0.29
L16	80 - 75 (16)	P24x0.375	8.58	0.31
L17	75 - 70 (17)	P24x0.375	8.97	0.33
L18	70 - 65 (18)	P24x0.375	9.34	0.35

Section No.	Elevation ft	Size	Actual V_u K	Actual T_u kip-ft
L19	65 - 61 (19)	P24x0.375	9.62	0.37
L20	61 - 60.75 (20)	P24x0.7125	9.64	0.37
L21	60.75 - 60.5 (21)	P24x0.7125	9.66	0.37
L22	60.5 - 60.25 (22)	P24x0.75	9.68	0.38
L23	60.25 - 60 (23)	P24x0.75	9.70	0.38
L24	60 - 58.5 (24)	P24x0.75	9.83	0.38
L25	58.5 - 58.25 (25)	P24x0.675	9.84	0.38
L26	58.25 - 53.25 (26)	P24x0.675	10.22	0.41
L27	53.25 - 48.25 (27)	P24x0.675	10.57	0.43
L28	48.25 - 43.25 (28)	P24x0.675	10.90	0.45
L29	43.25 - 38.25 (29)	P24x0.675	11.21	0.47
L30	38.25 - 33.25 (30)	P24x0.675	11.49	0.49
L31	33.25 - 30 (31)	P24x0.675	12.03	0.50
L32	30 - 29.75 (32)	P30x0.6	12.22	0.50
L33	29.75 - 24.75 (33)	P30x0.6	12.58	0.53
L34	24.75 - 19.75 (34)	P30x0.6	12.90	0.55
L35	19.75 - 14.75 (35)	P30x0.6	13.19	0.57
L36	14.75 - 9.75 (36)	P30x0.6	13.45	0.59
L37	9.75 - 4.75 (37)	P30x0.6	13.68	0.60
L38	4.75 - 2.5 (38)	P30x0.6	13.78	0.60
L39	2.5 - 2.25 (39)	P30x0.625	13.78	0.60
L40	2.25 - 0 (40)	P30x0.625	13.88	0.60

Section Capacity Table

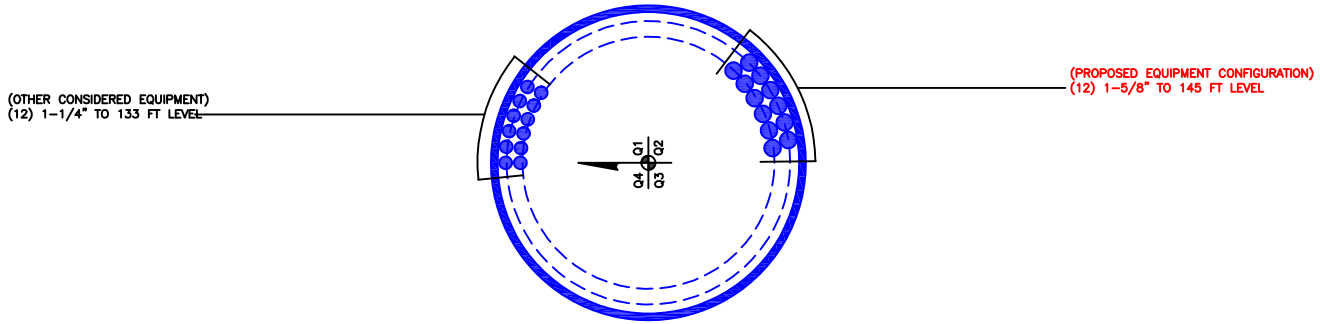
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 145	Pole	P10.75x0.465	Pole	-0.39	-	4.6	Pass
L2	145 - 140	Pole	P10.75x0.465	Pole	-1.01	-	9.5	Pass
L3	140 - 135	Pole	P10.75x0.465	Pole	-1.67	-	17.1	Pass
L4	135 - 130	Pole	P10.75x0.465	Pole	-2.47	-	26.7	Pass
L5	130 - 126	Pole	P10.75x0.465	Pole	-2.81	-	34.5	Pass
L6	126 - 121	Pole	P24x0.375	Pole	-3.77	-	12.0	Pass
L7	121 - 116	Pole	P24x0.375	Pole	-4.40	-	15.5	Pass
L8	116 - 111	Pole	P24x0.375	Pole	-5.04	-	19.5	Pass
L9	111 - 110	Pole	P24x0.375	Pole	-5.17	-	20.3	Pass
L10	110 - 105	Pole	P24x0.375	Pole	-5.81	-	24.7	Pass
L11	105 - 100	Pole	P24x0.375	Pole	-6.46	-	29.5	Pass
L12	100 - 95	Pole	P24x0.375	Pole	-7.12	-	34.6	Pass
L13	95 - 90	Pole	P24x0.375	Pole	-7.78	-	40.1	Pass
L14	90 - 85	Pole	P24x0.375	Pole	-8.44	-	45.9	Pass
L15	85 - 80	Pole	P24x0.375	Pole	-9.12	-	52.1	Pass
L16	80 - 75	Pole	P24x0.375	Pole	-9.80	-	58.5	Pass
L17	75 - 70	Pole	P24x0.375	Pole	-10.49	-	65.3	Pass
L18	70 - 65	Pole	P24x0.375	Pole	-11.19	-	72.3	Pass
L19	65 - 61	Pole	P24x0.375	Pole	-11.76	-	78.2	Pass
L20	61 - 60.75	Pole + Reinf.	P24x0.7125	Reinf.	-11.82	-	50.6	Pass
L21	60.75 - 60.5	Pole + Reinf.	P24x0.7125	Reinf.	-11.87	-	50.8	Pass
L22	60.5 - 60.25	Pole + Reinf.	P24x0.75	Reinf.	-11.94	-	48.3	Pass
L23	60.25 - 60	Pole + Reinf.	P24x0.75	Reinf.	-12.00	-	48.6	Pass
L24	60 - 58.5	Pole + Reinf.	P24x0.75	Reinf.	-12.38	-	49.9	Pass
L25	58.5 - 58.25	Pole + Reinf.	P24x0.675	Reinf.	-12.44	-	52.9	Pass
L26	58.25 - 53.25	Pole + Reinf.	P24x0.675	Reinf.	-13.50	-	57.9	Pass
L27	53.25 - 48.25	Pole + Reinf.	P24x0.675	Reinf.	-14.57	-	63.0	Pass
L28	48.25 - 43.25	Pole + Reinf.	P24x0.675	Reinf.	-15.65	-	68.3	Pass
L29	43.25 - 38.25	Pole + Reinf.	P24x0.675	Reinf.	-16.74	-	73.8	Pass
L30	38.25 - 33.25	Pole + Reinf.	P24x0.675	Reinf.	-17.83	-	79.5	Pass
L31	33.25 - 30	Pole + Reinf.	P24x0.675	Reinf.	-19.30	-	83.3	Pass
L32	30 - 29.75	Pole + Reinf.	P30x0.6	Reinf.	-19.55	-	58.2	Pass
L33	29.75 - 24.75	Pole + Reinf.	P30x0.6	Reinf.	-20.77	-	62.5	Pass
L34	24.75 - 19.75	Pole + Reinf.	P30x0.6	Reinf.	-22.00	-	66.9	Pass
L35	19.75 - 14.75	Pole + Reinf.	P30x0.6	Reinf.	-23.23	-	71.4	Pass
L36	14.75 - 9.75	Pole + Reinf.	P30x0.6	Reinf.	-24.48	-	76.0	Pass
L37	9.75 - 4.75	Pole + Reinf.	P30x0.6	Reinf.	-25.65	-	80.7	Pass
L38	4.75 - 2.5	Pole + Reinf.	P30x0.6	Reinf.	-26.17	-	82.8	Pass
L39	2.5 - 2.25	Pole + Reinf.	P30x0.625	Reinf.	-26.24	-	76.2	Pass
L40	2.25 - 0	Pole + Reinf.	P30x0.625	Reinf.	-26.83	-	78.2	Pass
						Summary	ELC:	Load Case 4.5
						Pole =	78.2	Pass
						Reinf. =	83.3	Pass
						Rating =	83.3	Pass

APPENDIX B

BASE LEVEL DRAWING

CROWN REGION ADDRESS

USA



BUSINESS UNIT: 828257 TOWER ID:C_BASELEVEL

09/08/13	NEW BUILD PER WORK ORDER # 837605	KT	
09/08/13	AS-BUILT INFORMATION ADDED PER WORK ORDER #837605	KT	
10/04/14	UPDATED PER WORK ORDER # 744060	JP	
10/04/14	UPDATED PER WORK ORDER # 744652	JP	
10/5/2015	UPDATED PER WORK ORDER 10622880 1044455	CRM	
10/5/2015	UPDATED PER WORK ORDER 1107284	BMT	
21/12/17	UPDATED PER WORK ORDER 1500704	EJB	

DRAWN BY: JP
CHECKED BY: KT
DRAWING DATE: 09/08/2013

SITE NUMBER:
SITE NAME:

SITE NAME

STONINGTON

BUSINESS UNIT NUMBER

828257

SITE ADDRESS

82 MECHANIC STREET
PAWCATUCK, CT 06379
NEW LONDON COUNTY
USA

SHEET TITLE

BASE LEVEL DRAWING

SHEET NUMBER

A1-0

N.T.S.

PLOT DATE: 10/17/2016 FILE NAME: 828257_BASELEVEL.dwg

APPENDIX C

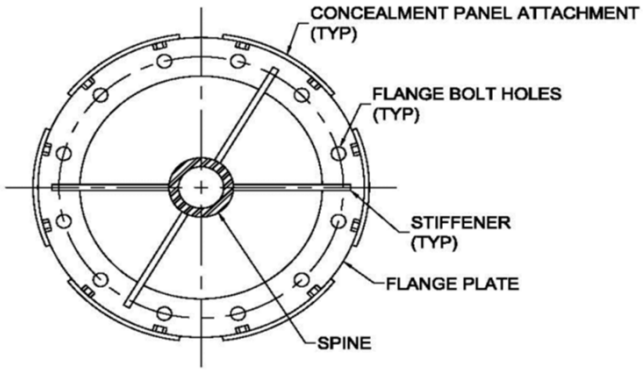
ADDITIONAL CALCULATIONS

CCI Flagpole Tool

Site Data	
BU#:	828257
Site Name:	STONINGTON
Order #:	479826 Rev. 4

Code		
Code:	TIA-222-H	
Ice Thickness:	1.275	in
Windspeed (V):	140	mph
Ice Wind Speed (V):	50	mph
Exposure Category:	C	
Topographic Feature:	N/A	
Risk Category:	II	

Tower Information		
Total Tower Height:	150	ft
Base Tower Height:	126	ft
Total Canister Length:	24	ft
Number of Canister Assembly Sections:	2	



FLANGE PLATE
(TYPE 1: SOLIDITY RATIO 0.45)

Canister Section Number *:	Canister Assembly Length (ft):	Canister Assembly Diameter (in):	Number of Sides Canister Section	Plate Type:	Mating Flange Plate Thickness (in)**:	Mating Flange Plate Diameter (in):	Solidity Ratio	Plate Weight (Kip):	Canister Weight (Kip)	Vent Length (ft):
1	12	42	Round	3	0.38	35.625	0.5	0.106	0.264	0-0
2	12	42	Round	1	1.63	24	0.45	0.188	0.264	0-0

* Sections are numbered from the top of the tower down ** Mating Flange Plate Thickness at the bottom of canister section

Flag on Tower:	Yes	
Flag Width:	20	ft
Flag Height:	12	ft
Flag Elevation(z):	150	ft

Truck Ball on Tower:	Yes	
Diameter of Ball:	18	in

Geometry : Base Tower + Spine 828257.eri *(last saved 06/07 6:29 am)*

Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material	Delete
150	24		0	10.75	10.75	0.465	n/a	A500-42	[x]
126	16		0	24	24	0.375	n/a	A53-B-42	[x]
110	20		0	24	24	0.375	n/a	A53-B-42	[x]
90	30		0	24	24	0.375	n/a	A53-B-42	[x]
60	30		0	24	24	0.375	n/a	A53-B-42	[x]
30	30		0	30	30	0.375	n/a	A53-B-42	[x]

Discrete Loads: Truck Ball	Apply C_aA_A at Elevation(z) (ft)	C_aA_A No Ice (ft^2)	C_aA_A 1/2" Ice (ft^2)	C_aA_A 1" Ice (ft^2)	C_aA_A 2" Ice (ft^2)	C_aA_A 4" Ice (ft^2)	Weight No Ice (Kip)	Weight 1/2" Ice (Kip)
	150.75	0.884	1.378	1.527	1.848	2.581	0.05	0.067

Discrete Loads : C_FA_F for Canister Assembly								
Canister Loading	Apply C_FA_F at Elevation(z) (ft)	C_FA_F No Ice (ft^2)	C_FA_F 1/2" Ice (ft^2)	C_FA_F 1" Ice (ft^2)	C_FA_F 2" Ice (ft^2)	C_FA_F 4" Ice (ft^2)	Canister Assembly Weight No Ice (Kip)	Canister Assembly Weight 1/2" Ice (Kip)
Canister Load 1	150	9.450	23.650	24.200	25.300	27.500	0.132	0.288
Canister Load 2	138	18.900	47.300	48.400	50.600	55.000	0.370	0.681
Canister Load 3	126	9.450	23.650	24.200	25.300	27.500	0.320	0.475

User Forces: Flag Force Calculation Per ANSI/NAAMM FP 1001-07	
$Wind_{FORCE}$=	0.668 Kip
Weight=	0.025 Kip
$Wind_{FORCE, ICE}$=	0.088 Kip
$Weight_{ICE}$=	0.690 Kip
$W_{FORCE, SERVICE WIND}$=	0.123 Kip
Weight=	0.025 Kip

←Flag force should be included at the top of the flag attachment elevation. If the attachment of the flag to the halyard distributes forces equally to the pole, apply flag forces accordingly in tnx file.

Deflection Check Required:	**Yes**	Import Deflection Results
3% Spine Deflection Check		
Allowable (3%) Horizontal Spine Deflection (inches)	Actual Deflection ***(inches)	Sufficient/ Insufficient
8.640	5.084	Sufficient

*** Relative deflection under service level wind speed

CCIpole

per TIA-222- H

Site BU: 828257

Work Order: 1751629

Pole Geometry

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	150	24		0	10.75	10.75	0.465		A500-42
2	126	16		0	24.00	24	0.375		A53-B-42
3	110	20		0	24.00	24	0.375		A53-B-42
4	90	30		0	24.00	24	0.375		A53-B-42
5	60	30		0	24.00	24	0.375		A53-B-42
6	30	30		0	30.00	30	0.375		A53-B-42

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	2.5	plate	TS 6"x1.25"	4	59	122	237	302														
2	2.5	30	plate	CFP (#1) 4.5x1	4					44	137	222	317										
3	30	58.5	plate	CFP (#2) 4.5x1	4					44	137	222	317										
4	58.5	60.5	plate	CFP (#2) 4.5x1	2					44		222											
5																							
6	58.5	61	plate	CCI-SFP-040125	4									71	161	251	341						
7																							
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	Bottom Termination Length (in)	Top Termination Length (in)	L_u (in)	Net Area (in^2)	Bolt Hole Size (in)	Reinforcement Material
1	1.25	5.25	6.5625	3	n/a	n/a	0.000	6.563	0.0000	A572-65
2	4.5	1	4.5	0.5	18.000	30.000	20.000	3.250	1.1875	A572-65
3	4.5	1	4.5	0.5	30.000	18.000	20.000	3.250	1.1875	A572-65
4	4.5	1	4.5	0.5	30.000	18.000	20.000	3.250	1.1875	A572-65
6	4	1.25	5	0.625	18.000	18.000	27.000	3.438	1.1875	A572-65

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
150 - 145	Pole	TP10.75x10.75x0.465	Pole	4.6%	Pass
145 - 140	Pole	TP10.75x10.75x0.465	Pole	9.5%	Pass
140 - 135	Pole	TP10.75x10.75x0.465	Pole	17.1%	Pass
135 - 130	Pole	TP10.75x10.75x0.465	Pole	26.7%	Pass
130 - 126	Pole	TP10.75x10.75x0.465	Pole	34.5%	Pass
126 - 121	Pole	TP24x24x0.375	Pole	12.0%	Pass
121 - 116	Pole	TP24x24x0.375	Pole	15.5%	Pass
116 - 111	Pole	TP24x24x0.375	Pole	19.5%	Pass
111 - 110	Pole	TP24x24x0.375	Pole	20.3%	Pass
110 - 105	Pole	TP24x24x0.375	Pole	24.7%	Pass
105 - 100	Pole	TP24x24x0.375	Pole	29.5%	Pass
100 - 95	Pole	TP24x24x0.375	Pole	34.6%	Pass
95 - 90	Pole	TP24x24x0.375	Pole	40.1%	Pass
90 - 85	Pole	TP24x24x0.375	Pole	45.9%	Pass
85 - 80	Pole	TP24x24x0.375	Pole	52.1%	Pass
80 - 75	Pole	TP24x24x0.375	Pole	58.5%	Pass
75 - 70	Pole	TP24x24x0.375	Pole	65.3%	Pass
70 - 65	Pole	TP24x24x0.375	Pole	72.3%	Pass
65 - 61	Pole	TP24x24x0.375	Pole	78.2%	Pass
61 - 60.75	Pole + Reinf.	TP24x24x0.7125	Reinf. 6 Tension Rupture	50.6%	Pass
60.75 - 60.5	Pole + Reinf.	TP24x24x0.7125	Reinf. 6 Tension Rupture	50.8%	Pass
60.5 - 60.25	Pole + Reinf.	TP24x24x0.75	Reinf. 6 Tension Rupture	48.3%	Pass
60.25 - 60	Pole + Reinf.	TP24x24x0.75	Reinf. 6 Tension Rupture	48.6%	Pass
60 - 58.5	Pole + Reinf.	TP24x24x0.75	Reinf. 6 Tension Rupture	49.9%	Pass
58.5 - 58.25	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	52.9%	Pass
58.25 - 53.25	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	57.9%	Pass
53.25 - 48.25	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	63.0%	Pass
48.25 - 43.25	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	68.3%	Pass
43.25 - 38.25	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	73.8%	Pass
38.25 - 33.25	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	79.5%	Pass
33.25 - 30	Pole + Reinf.	TP24x24x0.675	Reinf. 3 Tension Rupture	83.3%	Pass
30 - 29.75	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	58.2%	Pass
29.75 - 24.75	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	62.5%	Pass
24.75 - 19.75	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	66.9%	Pass
19.75 - 14.75	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	71.4%	Pass
14.75 - 9.75	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	76.0%	Pass
9.75 - 4.75	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	80.7%	Pass
4.75 - 2.5	Pole + Reinf.	TP30x30x0.6	Reinf. 2 Tension Rupture	82.8%	Pass
2.5 - 2.25	Pole + Reinf.	TP30x30x0.625	Pole	76.2%	Pass
2.25 - 0	Pole + Reinf.	TP30x30x0.625	Pole	78.2%	Pass
				Summary	
			Pole	78.2%	Pass
			Reinforcement	83.3%	Pass
			Overall	83.3%	Pass

Additional Calculations

Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity*					
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1	R2	R3	R4	R6
150 - 145	199	n/a	199	15.02	n/a	15.02	4.6%					
145 - 140	199	n/a	199	15.02	n/a	15.02	9.5%					
140 - 135	199	n/a	199	15.02	n/a	15.02	17.1%					
135 - 130	199	n/a	199	15.02	n/a	15.02	26.7%					
130 - 126	199	n/a	199	15.02	n/a	15.02	34.5%					
126 - 121	1942	n/a	1942	27.83	n/a	27.83	12.0%					
121 - 116	1942	n/a	1942	27.83	n/a	27.83	15.5%					
116 - 111	1942	n/a	1942	27.83	n/a	27.83	19.5%					
111 - 110	1942	n/a	1942	27.83	n/a	27.83	20.3%					
110 - 105	1942	n/a	1942	27.83	n/a	27.83	24.7%					
105 - 100	1942	n/a	1942	27.83	n/a	27.83	29.5%					
100 - 95	1942	n/a	1942	27.83	n/a	27.83	34.6%					
95 - 90	1942	n/a	1942	27.83	n/a	27.83	40.1%					
90 - 85	1942	n/a	1942	27.83	n/a	27.83	45.9%					
85 - 80	1942	n/a	1942	27.83	n/a	27.83	52.1%					
80 - 75	1942	n/a	1942	27.83	n/a	27.83	58.5%					
75 - 70	1942	n/a	1942	27.83	n/a	27.83	65.3%					
70 - 65	1942	n/a	1942	27.83	n/a	27.83	72.3%					
65 - 61	1942	n/a	1942	27.83	n/a	27.83	78.2%					
61 - 60.75	1942	1609	3551	27.83	20.00	47.83	43.0%					50.6%
60.75 - 60.5	1942	1609	3551	27.83	20.00	47.83	43.2%					50.8%
60.5 - 60.25	1942	1743	3685	27.83	29.00	56.83	41.8%				34.6%	48.3%
60.25 - 60	1942	1743	3685	27.83	29.00	56.83	42.0%				34.7%	48.6%
60 - 58.5	1942	1743	3685	27.83	29.00	56.83	43.2%				35.7%	49.9%
58.5 - 58.25	1942	1422	3365	27.83	18.00	45.83	47.7%			52.9%		
58.25 - 53.25	1942	1422	3365	27.83	18.00	45.83	52.2%			57.9%		
53.25 - 48.25	1942	1422	3365	27.83	18.00	45.83	56.8%			63.0%		
48.25 - 43.25	1942	1422	3365	27.83	18.00	45.83	61.6%			68.3%		
43.25 - 38.25	1942	1422	3365	27.83	18.00	45.83	66.6%			73.8%		
38.25 - 33.25	1942	1422	3365	27.83	18.00	45.83	71.6%			79.5%		
33.25 - 30	1942	1422	3365	27.83	18.00	45.83	75.1%			83.3%		
30 - 29.75	3830	2179	6008	34.90	18.00	52.90	54.9%		58.2%			
29.75 - 24.75	3830	2179	6008	34.90	18.00	52.90	58.9%		62.5%			
24.75 - 19.75	3830	2179	6008	34.90	18.00	52.90	63.1%		66.9%			
19.75 - 14.75	3830	2179	6008	34.90	18.00	52.90	67.3%		71.4%			
14.75 - 9.75	3830	2179	6008	34.90	18.00	52.90	71.6%		76.0%			
9.75 - 4.75	3830	2179	6008	34.90	18.00	52.90	76.1%		80.7%			
4.75 - 2.5	3830	2179	6008	34.90	18.00	52.90	78.1%		82.8%			
2.5 - 2.25	3830	2408	6238	34.90	26.25	61.15	76.2%	54.2%				
2.25 - 0	3830	2408	6238	34.90	26.25	61.15	78.2%	55.6%				

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

Monopole Flange Plate Connection

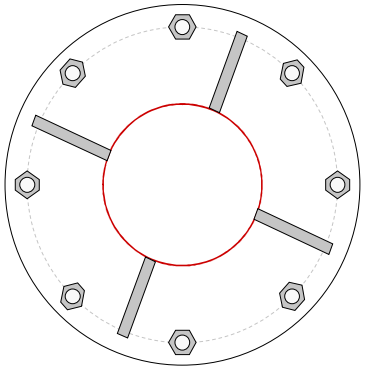
Elevation = 126 ft.

BU #	828257
Site Name	STONINGTON
Order #	479826 Rev. 4
TIA-222 Revision	H

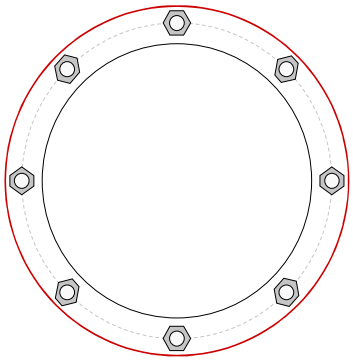
Applied Loads	
Moment (kip-ft)	55.43
Axial Force (kips)	2.81
Shear Force (kips)	3.17

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(8) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 21" BC

Top Plate Data

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

Bottom Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

(4) 11"H x 5.5"W x 0.75"T, Notch: 0"
plate: Fy= 36 ksi ; weld: Fy= 80 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Bottom Stiffener Data

N/A

Top Pole Data

10.75" x 0.465" round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Bottom Pole Data

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

Analysis Results

Bolt Capacity

Max Load (kips)	15.47	
Allowable (kips)	54.54	
Stress Rating:	**27.0%**	Pass

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**N/A**
Tension Side Stress Rating:	**N/A**

Bottom Plate Capacity

Max Stress (ksi):	8.47	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**24.9%**	Pass
Tension Side Stress Rating:	**N/A**	

Top Stiffener Capacity

Horizontal Weld:	**N/A**
Vertical Weld:	**N/A**
Plate Flexure+Shear:	**N/A**
Plate Tension+Shear:	**N/A**
Plate Compression:	**N/A**

Bottom Stiffener Capacity

Horizontal Weld:	**N/A**
Vertical Weld:	**N/A**
Plate Flexure+Shear:	**N/A**
Plate Tension+Shear:	**N/A**
Plate Compression:	**N/A**

Top Pole Capacity

Punching Shear:	**N/A**

Bottom Pole Capacity

Punching Shear:	**N/A**

Monopole Flange Plate Connection

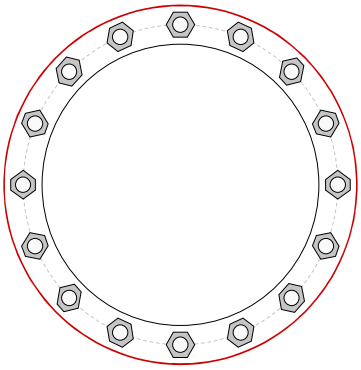
Elevation = 110 ft.

BU #	828257
Site Name	STONINGTON
Order #	479826 Rev. 4
TIA-222 Revision	H

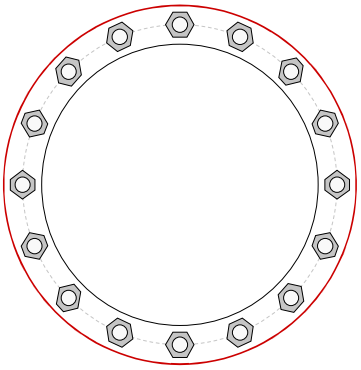
Applied Loads	
Moment (kip-ft)	130.03
Axial Force (kips)	5.17
Shear Force (kips)	5.45

**TIA-222-H Section 15.5 Applied*

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

(16) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 20.75" BC

Top Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

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

Bottom Pole Data

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

Analysis Results

Bolt Capacity

Max Load (kips)	18.46	
Allowable (kips)	54.54	
Stress Rating:	**32.2%**	Pass

Top Plate Capacity

Max Stress (ksi):	13.39	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**39.4%**	Pass
Tension Side Stress Rating:	**8.0%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	13.39	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**39.4%**	Pass
Tension Side Stress Rating:	**8.0%**	Pass

Monopole Flange Plate Connection

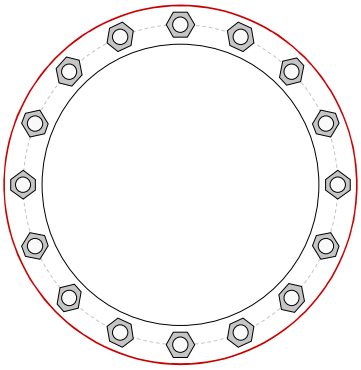
Elevation = 90 ft.

BU #	828257
Site Name	STONINGTON
Order #	479826 Rev. 4
TIA-222 Revision	H

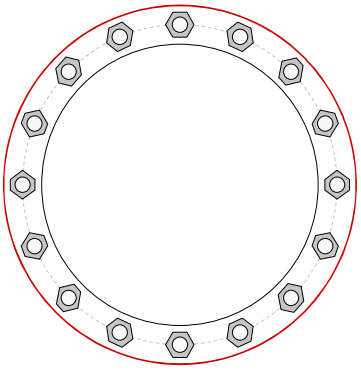
Applied Loads	
Moment (kip-ft)	257.90
Axial Force (kips)	7.78
Shear Force (kips)	7.31

**TIA-222-H Section 15.5 Applied*

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

(16) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 20.75" BC

Top Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

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

Bottom Pole Data

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

Analysis Results

Bolt Capacity

Max Load (kips)	36.77	
Allowable (kips)	54.54	
Stress Rating:	**64.2%**	Pass

Top Plate Capacity

Max Stress (ksi):	26.45	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**77.8%**	Pass
Tension Side Stress Rating:	**15.9%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	26.45	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**77.8%**	Pass
Tension Side Stress Rating:	**15.9%**	Pass

Monopole Flange Plate Connection

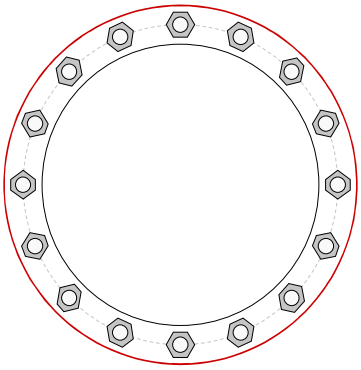
Elevation = 60 ft.

BU #	828257
Site Name	STONINGTON
Order #	479826 Rev. 4
TIA-222 Revision	H

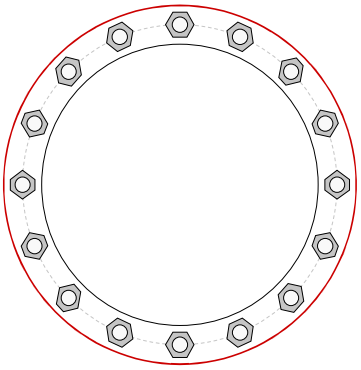
Applied Loads	
Moment (kip-ft)	271.08
Axial Force (kips)	12.00
Shear Force (kips)	9.70

**TIA-222-H Section 15.5 Applied*

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

(16) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 20.75" BC

Top Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

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

Bottom Pole Data

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

Analysis Results

Bolt Capacity

Max Load (kips)	38.41	
Allowable (kips)	54.53	
Stress Rating:	**67.1%**	Pass

Top Plate Capacity

Max Stress (ksi):	27.97	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**82.2%**	Pass
Tension Side Stress Rating:	**16.7%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	27.97	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**82.2%**	Pass
Tension Side Stress Rating:	**16.7%**	Pass

Flange Bolt Information for TIA-222-H

Site Information	
ID #:	828257
Name:	STONINGTON
App. #:	479826 Rev. 4

Pole Geometry		
Upper Pole OD:	24.00	in
Upper Pole Thick:	0.3750	in
Lower Pole OD:	30.00	in
Lower Pole Thick:	0.3750	in
Flange Plate OD:	30.00	in

Outer Bolt Group Data

Quantity:	20	
Diameter:	1	in
Material:	A325	
Bolt Circle:	27.00	in
Bolt Group Area:	15.71	in^2
Bolt Group MOIx:	1431	in^4

Reactions Seen by Outer Bolt Group

Moment:	328.5	kip-ft
Axial:	19.3	kip
Shear:	12.0	kip

Flange Height:	30	ft

System Reactions

Moment:	837.48	kip-ft
Axial:	19.30	kip
Shear:	12.03	kip

Design Information

TIA Code:	H
ASIF:	1.00
Failure At:	100%
Apply TIA-222-H Section 15.5?	Yes

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
Design Tension	0.0	kip
Max Shear:	0.0	kip
Design Shear	0.0	kip
Bolt Capacity	0.0%	

Bridge Stiffener #1 Data

Quantity:	4	
Type:	Write In	
Circle:	31.50	in
Individual Area:	4.50	in^2
BS #1 Group Area:	18.00	in^2
BS #1 Group MOIx:	2217	in^4

Reactions Seen by BS #1 Group

Moment:	508.9	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

BS #1 Max Forces

Max Tension:	195.4	kip
Max Compression:	193.6	kip
Design Axial	195.0	kip
Max Shear:	0.0	kip
Design Shear	158.0	kip
Bolt Capacity	95.4%	Pass

BS #1 Upper Weld Capacity

Eccentricity (ex):	3.750	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):	0.750	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:	5.00	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
Design Axial	0.0	kip
Max Shear:	0.0	kip
Design 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
Design Axial	0.0	kip
Max Shear:	0.0	kip
Design 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	

Monopole Flange Plate Connection

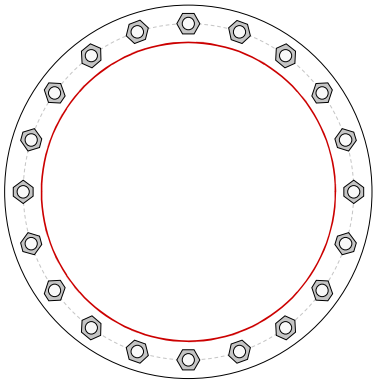
Elevation = 30 ft.

BU #	828257
Site Name	STONINGTON
Order #	479826 Rev. 4
TIA-222 Revision	H

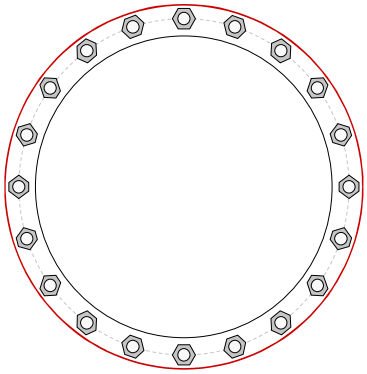
Applied Loads	
Moment (kip-ft)	328.50
Axial Force (kips)	19.30
Shear Force (kips)	12.03

**TIA-222-H Section 15.5 Applied*

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(20) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 27" BC

Top Plate Data

30" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

24.25" ID x 1" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

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

Bottom Pole Data

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

Analysis Results

Bolt Capacity

Max Load (kips)	28.22	
Allowable (kips)	54.53	
Stress Rating:	**49.3%**	Pass

Top Plate Capacity

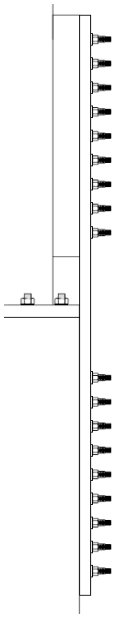
Max Stress (ksi):	19.34	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**56.8%**	Pass
Tension Side Stress Rating:	**20.3%**	Pass

Bottom Plate Capacity

Max Stress (ksi):	29.53	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	**86.8%**	Pass
Tension Side Stress Rating:	**N/A**	

BOLTED JUMP PLATE CALCULATIONS - TIA-222-H

Site Name:	**STONINGTON / BU #: 828257**
GPD Project No:	**2019777.828257.02**
Sheet Application:	Analysis
Max Capacity:	100%
Apply TIA-222-H Section 15.5?	Yes
Seismic Design Category:	A



Loading Information		
Elevation =	30	ft
Plate Compression Force =	193.5	kips
Plate Tension Force =	195.4	kips

Tower Information		
Upper Shaft Thickness, t =	0.375	in
Upper Shaft Fu =	60	ksi
Lower Shaft Thickness, t =	0.375	in
Lower Shaft Fu =	60	ksi

Jump Plate Properties		
Width =	4.5	in
Thickness =	1	in
Fy =	65	ksi
Fu =	80	ksi
Eccentricity, e =	3.75	in
Unbraced Length, Lu =	14	in

Jump Plate Compression		
Plate K Factor =	1	
Gross Area, A_g =	4.5	in^2
Moment of Inertia, I =	0.375	in^4
Radius of Gyration, r =	0.289	in
KL/r =	48.5	
F_e =	121.7	ksi
F_{cr} =	51.98	ksi
$\Phi_{buckling}$ =	0.9	
$\phi P_{n,\ buckling}$ =	210.5	kips
Capacity =	87.5%	OK

Jump Plate Tension		
Gross Area, A_g =	4.50	in^2
Net Area, A_{en} =	3.250	in^2
Φ_{yield} =	0.9	
$\Phi_{rupture}$ =	0.75	
$\phi P_{n,\ yield}$ =	263.3	kips
$\phi P_{n,\ rupture}$ =	195.0	kips
Capacity =	95.4%	OK

Bolted Connection Capacities		
Blind Bolt =	Legacy AJAX	
# Bolts in Upper Connection (Eccentric) =	10	
# Bolts in Lower Connection (Not Eccentric) =	10	
Bolt C-C Spacing =	3	in
Bolts Above Neutral Axis, n' =	5	
Moment Arm, dm =	15	in
Bolt/Shear Sleeve ø =	1.14173	in
Bolt Hole Size =	1.1875	in
Bolt Head Diameter (tip-tip) =	1.142	in
Washer Diameter =	1.65	in
$\phi R_{n,\ shear,\ upper}$ =	35.91	kips/bolt
$\phi R_{n,\ bearing,\ upper}$ =	45.32	kips/bolt
$\phi R_{n,\ shear,\ lower}$ =	35.91	kips/bolt
$\phi R_{n,\ bearing,\ lower}$ =	45.32	kips/bolt
$\phi R_{n,\ tension,\ upper}$ =	32.83	kips/bolt
$\phi R_{n,\ pull\text{-}out,\ upper}$ =	46.89	kips/bolt
$V_{u,\ bolt,\ upper}$ =	19.54	kips/bolt
$T_{u,\ bolt,\ upper}$ =	9.77	kips/bolt
$V_{u,\ bolt,\ lower}$ =	19.54	kips/bolt
Upper Connection Capacity =	51.8%	OK
Lower Connection Capacity =	51.8%	OK

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

Site Information	
ID:	828257
Name:	STONINGTON
App. #:	479826 Rev. 4

Base Reactions		
Moment:	1231	ft-kip
Axial:	27	kip
Shear:	0	kip
Base Plate Type:	Circular	

Original Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Spacing:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4
Reactions Seen by Original AR Group		
Moment:	0.0	kip-ft
Axial:	26.8	kip
Shear:	0.0	kip
Original AR Capacity Check		
Combined Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

First Added Anchor Rod Data		
Quantity:	4	
Diameter:	1.75	in
Material:	A193 B7	
Bolt Circle:	40.0	in
Bolt Group Area:	9.62	in^2
Bolt Group MOIx:	1132	in^4
Reactions Seen by First Added AR Group		
Moment:	92.9	kip-ft
Axial:	10.7	kip
Shear:	0.0	kip
First Added AR Capacity Check		
Combined Load:	38.4	kip

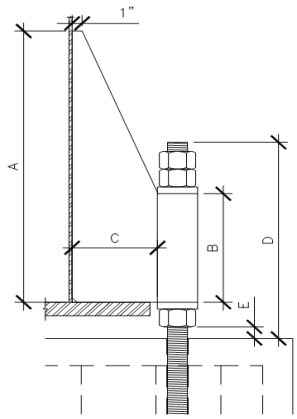
Second Added Anchor Rod Data		
Quantity:	6	
Diameter:	1.75	in
Material:	A193 B7	
Bolt Circle:	89.0	in
Bolt Group Area:	14.43	in^2
Bolt Group MOIx:	13865	in^4
Reactions Seen by Second Added AR Group		
Moment:	1138.1	kip-ft
Axial:	16.1	kip
Shear:	0.0	kip
Second Added AR Capacity Check		
Combined Load:	106.7	kip

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

Rev.4.1

ANCHOR ROD BRACKET CALCULATIONS - TIA-222-H

Site Name:	STONINGTON / BU #: 828257
GPD Project No:	2019777.828257.02 - 2015 Mods
Sheet Application:	Analysis
Max Capacity:	100%
Apply TIA-222-H Section 15.5?	Yes



Anchor Rod Properties		
F_u =	125	ksi
F_y =	105	ksi
Diameter =	1.75	in
Rod Tension Force =	38.4	kips
Rod Compression Force =	38.4	kips

Bracket Plate Properties		
A =	24	in
B =	24	in
C =	3	in
Unbraced Length of Anchor Rod, E =	4.625	in
Bracket Thickness =	1.25	in
F_y =	65	ksi
Fu =	80	ksi
ARB connected to flat plate?	No	

Anchor Rod Buckling			
Buckling K Factor =	1.2		
Net Area =	1.9	in^2	
Adjusted Diameter =	1.555	in	
Moment of Inertia, I =	0.287	in^4	
Radius of Gyration, r =	0.389	in	
KL/r =	14.27		
F_e =	1404.9	ksi	
F_{cr} =	101.8	ksi	
$\phi_{buckling}$ =	1		
Capacity =	lar <= 4d		OK

Tube Yielding		
Tube Size =	HSS4x4x1/2	
Outer Diameter =	4	in
Inner Diameter =	3	in
Area =	6.02	in^2
Yield Stress, F_y =	46	ksi
Ultimate Stress, F_u =	62	ksi
ϕ =	0.9	
ϕP_n =	249.23	kips
Capacity =	14.7%	OK

Flexure and Combined Flexure & Shear (Tube-to-Bracket)			
Plastic Modulus, Z =	180.00	in^3	
Elastic Modulus, S =	120.00	in^3	
ϕM =	0.9		
ϕV =	1.0		
$\phi M_{n,\ yield,\ LTB}$ =	10471.7	kip-in	
ϕV_n =	1170.0	kips	
M_u =	76.8	kip-in	
V_u =	38.4	kips	
Capacity =	0.7%		OK

Shear Strength (Tube-to-Bracket)		
A_w =	30	in^2
F_y =	65	ksi
Fu =	80	ksi
ϕ_{yield} =	1.0	
$\phi_{rupture}$ =	0.75	
$\phi V_{n,\ yield}$ =	1170.0	kips
$\phi V_{n,\ rupture}$ =	1080.0	kips
V_u =	38.4	kips
Capacity =	3.4%	OK

Rupture Strength at Welds (Bracket-to-Tower)		
Pole Thickness =	0.375	in
Pole Fy =	42	ksi
Pole Fu =	60	ksi
Applied Force =	1.20	k/in
Rupture Strength of Pole =	13.5	k/in
Capacity =	8.9%	OK

Tube Punching Shear		
Eccentricity, e =	2	in
Induced Moment, M =	76.80	k-in
ϕ =	0.75	
$\phi M_{n,\ punching}$ =	2678.4	k-in
Capacity =	2.7%	OK

Flexure and Combined Flexure & Shear (Bracket-to-Tower)			
Plastic Modulus, Z =	180.00	in^3	
Elastic Modulus, S =	120.00	in^3	
ϕM =	0.9		
ϕV =	1.0		
$\phi M_{n,\ yield,\ LTB}$ =	10471.7	kip-in	
ϕV_n =	1170	kips	
M_u =	192.0	kip-in	
V_u =	38.4	kips	
Capacity =	1.7%		OK

Shear Strength (Bracket-to-Tower)		
A_w =	30	in^2
F_y =	65	ksi
Fu =	80	ksi
ϕ_{yield} =	1.0	
$\phi_{rupture}$ =	0.75	
$\phi V_{n,\ yield}$ =	1170.0	kips
$\phi V_{n,\ rupture}$ =	1080.0	kips
V_u =	38.4	kips
Capacity =	3.4%	OK

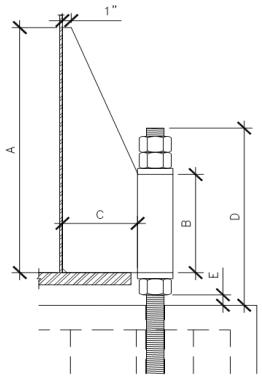
Pole Punching Shear (max per unit length)		
Eccentricity, e =	5	in
Induced Moment, M =	192.00	k-in
Elastic Modulus, S =	120.00	in^3
Shear Force, fv =	2.00	kips
ϕ yield =	1.0	
ϕ rupture =	0.75	
ϕFv, yield =	18.90	kips
ϕFv, rupture =	20.25	kips
Capacity =	10.1%	OK

Weld Check (Tube-to-Bracket)					
Weld Length =	24	in	D =	8	
Fillet Weld Size =	0.5	in	C1 =	1.03	
Weld Strength =	80	ksi	C =	3.72	
e =	2	in	ϕ =	0.75	
a =	0.083		ϕR_n =	551.50	kips
			Capacity =	6.6%	OK

Weld Check (Bracket-to-Tower)					
Weld Length =	24	in	D =	6	
Fillet Weld Size =	0.375	in	C1 =	1.03	
Weld Strength =	80	ksi	C =	3.48	
e =	5	in	ϕ =	0.75	
a =	0.208		ϕR_n =	386.74	kips
			Capacity =	9.5%	OK

ANCHOR ROD BRACKET CALCULATIONS - TIA-222-H

Site Name:	STONINGTON / BU #: 828257
GPD Project No:	2019777.828257.02 - Proposed off Stiffener
Sheet Application:	Analysis
Max Capacity:	100%
Apply TIA-222-H Section 15.5?	Yes



Anchor Rod Properties		
F_u =	125	ksi
F_y =	105	ksi
Diameter =	1.75	in
Rod Tension Force =	106.7	kips
Rod Compression Force =	106.7	kips

Bracket Plate Properties		
A =	36	in
B =	18	in
C =	21.5	in
Unbraced Length of Anchor Rod, E =	5.25	in
Bracket Thickness =	1.25	in
F_y =	65	ksi
Fu =	80	ksi
ARB connected to flat plate?	Yes	
Flat Plate Width =	1.25	in
Flat Plate Thickness =	6	in
Flat Plate Weld Length =	54	in

Anchor Rod Buckling		
Buckling K Factor =	1.2	
Net Area =	1.9	in^2
Adjusted Diameter =	1.555	in
Moment of Inertia, I =	0.287	in^4
Radius of Gyration, r =	0.389	in
KL/r =	16.20	
F_e =	1090.3	ksi
F_{cr} =	100.9	ksi
$\phi_{buckling}$ =	1	
Capacity =	lar <= 4d	OK

Tube Yielding		
Tube Size =	HSS4x4x1/2	
Outer Diameter =	4	in
Inner Diameter =	3	in
Area =	6.02	in^2
Yield Stress, F_y =	50	ksi
Ultimate Stress, F_u =	65	ksi
ϕ =	0.9	
ϕP_n =	270.90	kips
Capacity =	37.5%	OK

Flexure and Combined Flexure & Shear (Tube-to-Bracket)		
Plastic Modulus, Z =	101.25	in^3
Elastic Modulus, S =	67.50	in^3
ϕM =	0.9	
ϕV =	1.0	
$\phi M_{n,\ yield,\ LTB}$ =	5401.5	kip-in
ϕV_n =	877.5	kips
M_u =	213.4	kip-in
V_u =	106.7	kips
Capacity =	3.8%	OK

Shear Strength (Tube-to-Bracket)		
A_w =	22.5	in^2
F_y =	65	ksi
Fu =	80	ksi
ϕ_{yield} =	1.0	
$\phi_{rupture}$ =	0.75	
$\phi V_{n,\ yield}$ =	877.5	kips
$\phi V_{n,\ rupture}$ =	810.0	kips
V_u =	106.7	kips
Capacity =	12.5%	OK

Rupture Strength at Welds (Flat Plate-to-Tower)		
Pole Thickness =	0.375	in
Pole Fy =	42	ksi
Pole Fu =	60	ksi
Applied Force =	2.16	k/in
Rupture Strength of Pole =	13.5	k/in
Capacity =	16.0%	OK

Tube Punching Shear		
Eccentricity, e =	2	in
Induced Moment, M =	213.40	k-in
ϕ =	0.75	
$\phi M_{n,\ punching}$ =	1579.5	k-in
Capacity =	12.9%	OK

Flexure and Combined Flexure & Shear (Bracket-to-Flat Plate)		
Plastic Modulus, Z =	405.00	in^3
Elastic Modulus, S =	270.00	in^3
ϕM =	0.9	
ϕV =	1.0	
$\phi M_{n,\ yield,\ LTB}$ =	19203.3	kip-in
ϕV_n =	1755	kips
M_u =	2507.5	kip-in
V_u =	106.7	kips
Capacity =	12.4%	OK

Shear Strength (Bracket-to-Flat Plate)		
A_w =	45	in^2
F_y =	65	ksi
Fu =	80	ksi
ϕ_{yield} =	1.0	
$\phi_{rupture}$ =	0.75	
$\phi V_{n,\ yield}$ =	1755.0	kips
$\phi V_{n,\ rupture}$ =	1620.0	kips
V_u =	106.7	kips
Capacity =	6.3%	OK

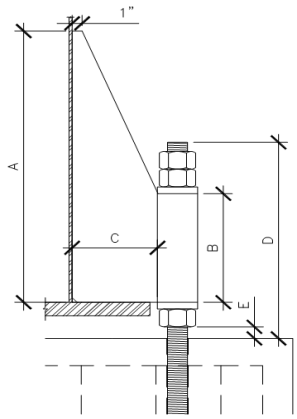
Weld Check (Tube-to-Bracket)					
Weld Length =	18	in	D =	5	
Fillet Weld Size =	0.3125	in	C1 =	1.03	
Weld Strength =	80	ksi	C =	3.71	
e =	2	in	ϕ =	0.75	
a =	0.111		ϕR_n =	257.86	kips
			Capacity =	39.4%	OK

Weld Check (Bracket-to-Flat Plate)					
Weld Length =	36	in	D =	4.24	
Fillet Weld Size =	0.265	in	C1 =	1.03	
Weld Strength =	80	ksi	C =	1.87	
e =	23.5	in	ϕ =	0.75	
a =	0.653		ϕR_n =	220.89	kips
			Capacity =	46.0%	OK

Weld Check (Flat Plate-to-Tower)					
Weld Length =	54	in	D =	6	
Fillet Weld Size =	0.375	in	C1 =	1	
Weld Strength =	70	ksi	C =	2.16	
e =	29.5	in	ϕ =	0.75	
a =	0.546		ϕR_n =	525.15	kips
			Capacity =	19.4%	OK

ANCHOR ROD BRACKET CALCULATIONS - TIA-222-H

Site Name:	STONINGTON / BU #: 828257
GPD Project No:	2019777.828257.02 - Proposed Off Pole
Sheet Application:	Analysis
Max Capacity:	100%
Apply TIA-222-H Section 15.5?	Yes



Anchor Rod Properties		
F_u =	125	ksi
F_y =	105	ksi
Diameter =	1.75	in
Rod Tension Force =	106.7	kips
Rod Compression Force =	106.7	kips

Bracket Plate Properties		
A =	48	in
B =	18	in
C =	27.5	in
Unbraced Length of Anchor Rod, E =	5.25	in
Bracket Thickness =	1.25	in
F_y =	65	ksi
Fu =	80	ksi
ARB connected to flat plate?	No	

Anchor Rod Buckling			
Buckling K Factor =	1.2		
Net Area =	1.9	in^2	
Adjusted Diameter =	1.555	in	
Moment of Inertia, I =	0.287	in^4	
Radius of Gyration, r =	0.389	in	
KL/r =	16.20		
F_e =	1090.3	ksi	
F_{cr} =	100.9	ksi	
$\phi_{buckling}$ =	1		
Capacity =	lar <= 4d		OK

Tube Yielding			
Tube Size =	HSS4x4x1/2		
Outer Diameter =	4	in	
Inner Diameter =	3	in	
Area =	6.02	in^2	
Yield Stress, F_y =	50	ksi	
Ultimate Stress, F_u =	65	ksi	
ϕ =	0.9		
ϕP_n =	270.90	kips	
Capacity =	37.5%		OK

Flexure and Combined Flexure & Shear (Tube-to-Bracket)			
Plastic Modulus, Z =	101.25	in^3	
Elastic Modulus, S =	67.50	in^3	
ϕM =	0.9		
ϕV =	1.0		
$\phi M_{n,\ yield,\ LTB}$ =	5233.8	kip-in	
ϕV_n =	877.5	kips	
M_u =	213.4	kip-in	
V_u =	106.7	kips	
Capacity =	3.9%		OK

Shear Strength (Tube-to-Bracket)			
A_w =	22.5	in^2	
F_y =	65	ksi	
Fu =	80	ksi	
ϕ_{yield} =	1.0		
$\phi_{rupture}$ =	0.75		
$\phi V_{n,\ yield}$ =	877.5	kips	
$\phi V_{n,\ rupture}$ =	810.0	kips	
V_u =	106.7	kips	
Capacity =	12.5%		OK

Rupture Strength at Welds (Bracket-to-Tower)		
Pole Thickness =	0.375	in
Pole Fy =	42	ksi
Pole Fu =	60	ksi
Applied Force =	2.96	k/in
Rupture Strength of Pole =	13.5	k/in
Capacity =	21.9%	OK

Tube Punching Shear		
Eccentricity, e =	2	in
Induced Moment, M =	213.40	k-in
ϕ =	0.75	
$\phi M_{n,\ punching}$ =	1579.5	k-in
Capacity =	12.9%	OK

Flexure and Combined Flexure & Shear (Bracket-to-Tower)			
Plastic Modulus, Z =	720.00	in^3	
Elastic Modulus, S =	480.00	in^3	
ϕM =	0.9		
ϕV =	1.0		
$\phi M_{n,\ yield,\ LTB}$ =	28113.0	kip-in	
ϕV_n =	2340	kips	
M_u =	3147.7	kip-in	
V_u =	106.7	kips	
Capacity =	10.7%		OK

Shear Strength (Bracket-to-Tower)			
A_w =	60	in^2	
F_y =	65	ksi	
Fu =	80	ksi	
ϕ_{yield} =	1.0		
$\phi_{rupture}$ =	0.75		
$\phi V_{n,\ yield}$ =	2340.0	kips	
$\phi V_{n,\ rupture}$ =	2160.0	kips	
V_u =	106.7	kips	
Capacity =	4.7%		OK

Pole Punching Shear (max per unit length)		
Eccentricity, e =	29.5	in
Induced Moment, M =	3147.65	k-in
Elastic Modulus, S =	480.00	in^3
Shear Force, fv =	8.20	kips
ϕ yield =	1.0	
ϕ rupture =	0.75	
ϕFv, yield =	18.90	kips
ϕFv, rupture =	20.25	kips
Capacity =	41.3%	OK

Weld Check (Tube-to-Bracket)					
Weld Length =	18	in	D =	5	
Fillet Weld Size =	0.3125	in	C1 =	1.03	
Weld Strength =	80	ksi	C =	3.71	
e =	2	in	ϕ =	0.75	
a =	0.111		ϕR_n =	257.86	kips
			Capacity =	39.4%	OK

Weld Check (Bracket-to-Tower)					
Weld Length =	48	in	D =	5	
Fillet Weld Size =	0.3125	in	C1 =	1.03	
Weld Strength =	80	ksi	C =	1.97	
e =	29.5	in	ϕ =	0.75	
a =	0.615		ϕR_n =	364.31	kips
			Capacity =	27.9%	OK

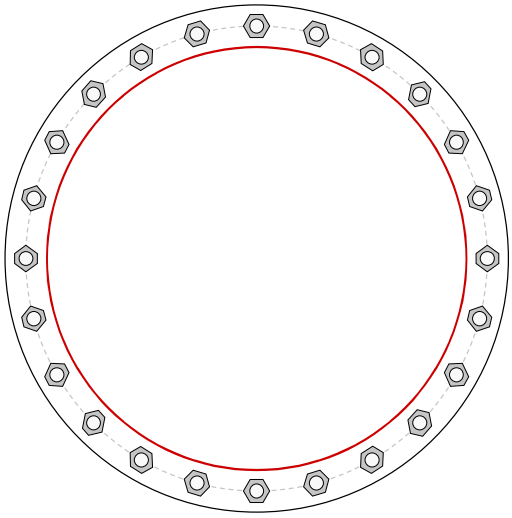
Monopole Base Plate Connection

Site Info	
BU #	828257
Site Name	STONINGTON
Order #	479826 Rev. 4

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.25

Applied Loads	
Moment (kip-ft)	0.00
Axial Force (kips)	0.00
Shear Force (kips)	13.88

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(24) 1" ø bolts (A687 N; Fy=105 ksi, Fu=125 ksi) on 33" BC

Base Plate Data

36" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Stiffener Data

N/A

Pole Data

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

Analysis Results

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

Pu_c = 0	ϕPn_c = 63.63	**Stress Rating**
Vu = 0.58	ϕVn = 19.09	**4.3%**
Mu = 0.47	ϕMn = 10.67	**Pass**

Base Plate Summary

Max Stress (ksi):	0	(Flexural)
Allowable Stress (ksi):	32.4	
Stress Rating:	**0.0%**	**Pass**

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Job 828257
Sheet No. 1 of 3
Calculated by ____ Date ____
Checked by ____ Date ____

Concrete Breakout Calculations for Post-Installed Epoxy Anchors

* Anchor Rod Diameter = 1.75"
* Embedment Depth = 46"
* Epoxy Development Length = 39.2"

* Effective Embedment For Breakout, h_{ef} = ED - 0.25 Epoxy Length
  = 46" - 0.25(39.2") = 36.2"
  = Say 35.75" to match Existing Mop Anchors

* ACI 318-14 - 17.5.3

$\phi_{breakout} = 0.65$

* ACI 318-14 - 17.4.2.1b

$$N_{cbg} = \frac{A_{Nc}}{A_{Nco}} \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$$

* ACI 318-14 - 17.4.2.1c

$A_{Nco} = 9 h_{ef}^2 = 9(35.75")^2 = 11502.56 in^2$

$A_{Nc} = 23830.07 in^2$ (From AutoCAD)

* ACI 318-14 - 17.4.2.2

$$N_b = k_c \lambda_a \sqrt{f'_c}\, h_{ef}^{1.5} \qquad k_c = 17 \text{ (uncracked concrete)}$$
$$= 17(1.0)(\sqrt{4000 psi})(35.75")^{1.5}$$

$N_b = 229.82$ kips

* ACI 318-14 - 17.4.2.4

$$\psi_{ec,N} = \frac{1}{\left(1 + \frac{2e'_N}{3h_{ef}}\right)} = \frac{1}{1 + \frac{2(9.942")}{3(35.75")}} \Rightarrow \psi_{ec,N} = 0.8436$$

Resultant of Tension Group = 30.685"
Centroid of Tension Group = 20.743"

e'_N = Resultant − Centroid = 9.942"

* ACI 318-14 - 17.4.2.5

$c_{a,min} = 64.26"$
$1.5h_{ef} = 53.63"$ $\quad 1.5h_{ef} \geq c_{a,min} \Rightarrow \psi_{ed,N} = 1.0$

* ACI 318-14 - 17.4.2.6

* Uncracked Concrete $\Rightarrow \psi_{c,N} = 1.4$
* $k_c = 17$ in NbE on

* ACI 318-14 - 17.4.2.7

c_{ac} (From ESR-3814) $= h_{ef}\left(\frac{\psi_{c,N}}{1160psi}\right)^{0.4}\left[3.1 - 0.7\frac{h}{h_{ef}}\right]$ $\quad \frac{h}{h_{ef}} = 2.4,\ \frac{54"}{35.75"} = 1.51$ ✓

$$c_{ac} = (35.75")\left(\frac{1130psi}{1160psi}\right)^{0.4}\left[3.1 - 0.7\left(\frac{54"}{35.75"}\right)\right] \Rightarrow c_{ac} = 72.26"$$

$c_{ac} > c_{a,min} \Rightarrow \psi_{cp,N} = \frac{c_{a,min}}{c_{ac}} = \frac{57.5"}{72.26"} = 0.7957$

$$\phi N_{cbg} = 0.65\left(\frac{2388007in^2}{11502.56in^2}\right)(0.8436)(1.0)(1.4)(0.7957)(229.82kips)$$

$\phi N_{cbg} = 290.835$ kips

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Job 826257

Sheet No. 3 of 3

Calculated by _____ Date _____

Checked by _____ Date _____

BREAKOUT CAPACITY OF TENSION ROD GROUP

TOTAL P_{NC} = 229.6 kips

CAPACITY (PER TIA-222-H SECTION 15.5) = $\frac{229.6 \text{ kips}}{290.835 \text{ kips}}$ = 75.2%

Pier and Pad Foundation

BU # :	828257
Site Name:	STONINGTON
App. Number:	479826 Rev. 4

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp}:	26.83	kips
Base Shear, Vu_comp:	13.88	kips
Moment, M_u:	1231.03	ft-kips
Tower Height, **H**:	150	ft
BP Dist. Above Fdn, bp_{dist}:	2	in
Bolt Circle / Bearing Plate Width, **BC**:	33	in

Foundation Analysis Checks	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	71.86	13.88	**18.4%**	**Pass**
Bearing Pressure (ksf)	5.63	3.34	**59.4%**	**Pass**
*Overturning (kip*ft)*	1465.68	1295.80	**88.4%**	**Pass**
*Pad Flexure (kip*ft)*	2154.32	764.59	**33.8%**	**Pass**
Pad Shear - 1-way (kips)	965.24	121.22	**12.0%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.190	0.002	**0.8%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3378.17	0.00	**0.0%**	**Pass**

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

Soil Rating*:	**88.4%**
Structural Rating*:	**33.8%**

Pad Properties		
Depth, **D**:	4	ft
Pad Width, **W**:	17	ft
Pad Thickness, **T**:	4.5	ft
Pad Rebar Size (Bottom), **Sp**:	6	
Pad Rebar Quantity (Bottom), **mp**:	22	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	4	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	125	pcf
Ultimate Gross Bearing, Qult:	7.500	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:	34	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:		
Neglected Depth, **N**:	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	7	ft

<--Toggle between Gross and Net

APPENDIX D

MODIFICATION DRAWINGS

MONOPOLE REINFORCEMENT DRAWINGS
PREPARED FOR CROWN CASTLE

SITE NAME: STONINGTON
BU NUMBER: 828257

SITE ADDRESS:
82 MECHANIC STREET
PAWCATUCK, CT 06379
NEW LONDON COUNTY, USA

DIRECTIONS: I-95 N TO EXIT 91, TURN LEFT ONTO TAUGWONK RD.. TAKE THE 1ST RIGHT ONTO CT-234 E/PEQUOT TRAIL, TURN LEFT ONTO W BROAD ST., TURN RIGHT ONTO MECHANIC ST. (SITE WILL BE ON THE LEFT)

SAFETY CLIMB: 'LOOK UP'
THE INTEGRITY OF THE WIRE ROPE SAFETY CLIMB SYSTEM SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER REINFORCEMENT AND EQUIPMENT INSTALLATION SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF ANY WIRE ROPE SAFETY CLIMB ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, OR IMPACT THE ANCHORAGE POINTS IN ANY WAY. ANY COMPROMISED SAFETY CLIMB MUST BE REPORTED TO YOUR CROWN POC FOR RESOLUTION, INCLUDING EXISTING CONDITIONS.

ATTENTION ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT 800-788-7011.

QUALIFIED ENGINEERING SERVICES ARE AVAILABLE FROM GPD TO ASSIST CONTRACTORS IN CLASS IV RIGGING PLAN REVIEWS. FOR REQUESTING QUALIFIED ENGINEERING SERVICES PLEASE CONTACT GPD AT CROWNMODS@GPDGROUP.COM.

HOT WORK INCLUDED	
NA	BASE GRINDING ONLY
X	BASE WELDING (AND GRINDING)
NA	AERIAL GRINDING ONLY
X	AERIAL WELDING (AND GRINDING)

PROJECT CONTACTS:

1. CROWN PROJECT MANAGER
   DAN VADNEY
   (518) 373-3510
   DAN.VADNEY@CROWNCASTLE.COM
   3 CORPORATE PARK DRIVE, SUITE 101
   CLIFTON PARK, NY 12065

2. ENGINEER OF RECORD:
   GPD ENGINEERING AND ARCHITECTURE PROFESSIONAL CORPORATION
   520 SOUTH MAIN STREET, SUITE 2531
   AKRON, OH 44311
   FOR QUESTIONS PLEASE EMAIL:
   CROWNMODS@GPDGROUP.COM

DRAWINGS INCLUDED

SHEET NUMBER	DESCRIPTION
S-1	TITLE PAGE
S-2	MODIFICATION INSPECTION CHECKLIST
S-3	GENERAL NOTES
S-4	TOWER ELEVATION
S-5	TOWER SECTIONS
S-6	ADDITIONAL SECTIONS
S-7	ADDITIONAL SECTIONS
S-8	ADDITIONAL SECTIONS
S-9	ADDITIONAL SECTIONS
S-10	ADDITIONAL SECTIONS
OPS-PRC-10127	CROWN CASTLE CONCEALMENT REINFORCEMENT SOLUTION

TOWER INFORMATION

TOWER MAPPING :	DOC ID #: 3487587
TOWER HEIGHT / TYPE:	150 FT MODIFIED CONCEALMENT MONOPOLE
TOWER LOCATION:	LAT: 41° 22' 18.91"
DATUM: (NAD 1983)	LONG: -71° 49' 58.01"
	ELEV: 7 FT AMSL
STRUCTURAL DESIGN DRAWING:	CCI/WO #: 1751629
STRUCTURAL ANALYSIS REPORT:	TEP/WO #: 1742452
STRUCTURAL ANALYSIS DATE:	5/24/19
CCI ORDER NUMBER:	479826 REV #: 4
CCISITES DOCUMENT ID:	8429807

CODE COMPLIANCE

GOVERNING CODES:	TIA-222-H & 2018 CSBC
WIND SPEEDS:	140 MPH 3 SECOND GUST
	50 MPH 3 SECOND GUST (W/ ICE)
ICE THICKNESS:	1 1/2"
RISK CATEGORY:	II
EXPOSURE CATEGORY:	C
TOPO CATEGORY:	1

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
LICENSED
PROFESSIONAL ENGINEER
6/27/19

GPD Engineering and Architecture Professional Corporation
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 330.572.2101

GPD PROJECT NUMBER
2019777.828257.02

SITE NAME: STONINGTON
BU NUMBER: 828257
WO NUMBER: 1751629
SITE ADDRESS:
82 MECHANIC STREET
PAWCATUCK, CT 06379
NEW LONDON COUNTY, USA

ENG/QA BY: BK DATE: 6/27/19
DFT BY: MJS DATE: 6/27/19
DFT/QA BY: CB DATE: 6/27/19
APRV'D BY: CJS DATE: 6/27/19
SCALE: N.T.S.

TITLE PAGE

S-1 REV 0

MI CHECKLIST

REQUIRED	REPORT ITEM	APPLICABLE CROWN DOC #	BRIEF DESCRIPTION
PRE-CONSTRUCTION			
X	MI CHECKLIST DRAWING	CED-SOW-10007	THIS CHECKLIST SHALL BE INCLUDED IN THE MI REPORT.
X	EOR APPROVED SHOP DRAWINGS	CED-SOW-10007	ONCE THE PRE-MODIFICATION MAPPING IS COMPLETE AND PRIOR TO FABRICATION, THE CONTRACTOR SHALL PROVIDE DETAILED ASSEMBLY DRAWINGS AND/OR SHOP DRAWINGS. THESE ARE TO INCLUDE, BUT ARE NOT LIMITED TO, A VISUAL LAYOUT OF NEW REINFORCEMENT, EXISTING REINFORCEMENT CONFIGURATION, PORTHOLES, MOUNTS, STEP PEGS, SAFETY CLIMBS AND ANY OTHER MISCELLANEOUS ITEMS WHICH MAY AFFECT SUCCESSFUL INSTALLATION OF MODIFICATIONS ON THE TOWER. THESE DRAWINGS SHALL BE SUBMITTED TO THE EOR FOR APPROVAL. APPROVED ASSEMBLY/SHOP DRAWINGS SHALL BE SUBMITTED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	FABRICATION INSPECTION	CED-SOW-10007	A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS, SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	FABRICATOR CERTIFIED WELD INSPECTION	CED-SOW-10007 CED-STD-10069	A CWI SHALL INSPECT ALL WELDING PERFORMED ON STRUCTURAL MEMBERS DURING FABRICATION. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	MATERIAL TEST REPORTS (MTR)	CED-SOW-10007	MATERIAL TEST REPORTS SHALL BE PROVIDED FOR MATERIAL USED AS REQUIRED PER SECTION 9.2.5 OF CED-SOW-10007. MTRS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	FABRICATOR NDE INSPECTION REPORT	CED-SOW-10066 CED-STD-10069	CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED NDT INSPECTOR SHALL PERFORM NON-DESTRUCTIVE EXAMINATION AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	NDE OF MONOPOLE BASE PLATE	ENG-SOW-10033	A NDE OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
X	PACKING SLIPS	CED-SOW-10007	THE MATERIAL SHIPPING LIST SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
ADDITIONAL TESTING AND INSPECTIONS:			
NA			
CONSTRUCTION			
NA	FOUNDATION INSPECTIONS	CED-SOW-10144	A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A VISUAL OBSERVATION OF THE REBAR SHALL BE PERFORMED BEFORE PLACING THE EPOXY. A SEALED WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	CONCRETE COMP. STRENGTH AND SLUMP TEST	CED-SOW-10144	THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED AS PART OF THE FOUNDATION REPORT.
NA	EARTHWORK	CED-SOW-10144	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY AN APPROVED FOUNDATION INSPECTOR AND RESULTS INCLUDED AS PART OF THE FOUNDATION REPORT.
NA	MICROPILE/ROCK ANCHOR	CED-SOW-10144	MICROPILES/ROCK ANCHORS SHALL BE INSPECTED BY THE FOUNDATION INSPECTION VENDOR AND SHALL BE INCLUDED AS PART OF THE FOUNDATION INSPECTION REPORT, ADDITIONAL TESTING AND/OR INSPECTION REQUIREMENTS ARE NOTED IN THESE CONTRACT DOCUMENTS.
X	POST-INSTALLED ANCHOR ROD VERIFICATION	CED-SOW-10007	POST INSTALLED ANCHOR ROD VERIFICATION SHALL BE PERFORMED IN ACCORDANCE WITH CROWN REQUIREMENTS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT.
NA	BASE PLATE GROUT VERIFICATION	ENG-STD-10323	THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS REMOVED AND/OR INSTALLED IN ACCORDANCE WITH CROWN REQUIREMENTS FOR INCLUSION IN THE MI REPORT.
X	FIELD CERTIFIED WELD INSPECTION	CED-SOW-10066 CED-STD-10069	A CROWN APPROVED CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST FIELD WELDS, FOLLOWING ALL PROCEDURES SPECIFIED IN CROWN STANDARD DOCUMENTS APPLICABLE TO WELD INSPECTIONS. A REPORT SHALL BE PROVIDED. NDE OF FIELD WELDS SHALL BE PERFORMED AS REQUIRED BY CROWN STANDARDS AND CONTRACT DOCUMENTS. THE NDE REPORT SHALL BE INCLUDED IN THE CWI REPORT.
X	ON-SITE COLD GALVANIZING VERIFICATION	ENG-STD-10149E NG-BUL-10149	THE GENERAL CONTRACTOR SHALL PROVIDE WRITTEN AND PHOTOGRAPHIC DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED PER MANUFACTURER SPECIFICATIONS AND APPLICABLE STANDARDS.
NA	TENSION TWIST AND PLUMB	CED-PRC-10182 CED-STD-10261	THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT IN ACCORDANCE WITH APPLICABLE STANDARDS DOCUMENTING TENSION TWIST AND PLUMB.
X	GC AS-BUILT DRAWINGS	CED-SOW-10007	THE GENERAL CONTRACTOR SHALL SUBMIT A LEGIBLE COPY OF THE ORIGINAL DESIGN DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD. EOR/RFI FORMS APPROVING ALL CHANGES SHALL BE SUBMITTED WHEN THE EOR IS SPECIFYING ADDITIONAL INSPECTIONS DESCRIPTION AND APPLICABLE STANDARDS SHALL BE APPLIED.
ADDITIONAL TESTING AND INSPECTIONS:			
NA			
POST-CONSTRUCTION			
X	CONSTRUCTION COMPLIANCE LETTER	CED-SOW-10007	A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS, INCLUDING LISTING ADDITIONAL PARTIES TO THE MODIFICATION PROCESS.
X	POST-INSTALLED ANCHOR ROD PULL TESTS	CED-PRC-10119	POST-INSTALLED ANCHOR RODS SHALL BE TESTED BY A CROWN APPROVED PULL TEST INSPECTOR AND A REPORT SHALL BE PROVIDED INDICATING TESTING RESULTS.
X	PHOTOGRAPHS	CED-SOW-10007	PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI. PHOTOS SHALL DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO.
NA	BOLT INSTALLATION VERIFICATION REPORT	CED-SOW-10007	THE MI INSPECTOR SHALL VERIFY THE INSTALLATION AND TIGHTNESS 10% OF ALL NON PRE-TENSIONED BOLTS INSTALLED AS PART OF THE MODIFICATION. THE MI INSPECTOR SHALL LOOSEN THE NUT AND VERIFY THE BOLT HOLE SIZE AND CONDITION. THE MI REPORT SHALL CONTAIN THE COMPLETED BOLT INSTALLATION VERIFICATION REPORT, INCLUDING THE SUPPORTING PHOTOGRAPHS.
X	PUNCHLIST DEVELOPMENT AND CORRECTION DOCUMENTATION	CED-PRC-10283 CED-FRM-10285	FINAL PUNCHLIST INDICATING ALL NONCONFORMANCE(S) IDENTIFIED AND THE FINAL RESOLUTION AND APPROVAL.
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)	CED-SOW-10007	THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTOR'S REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION.
ADDITIONAL TESTING AND INSPECTIONS:			
X	**FACT TIA INSPECTION & CROWN CASTLE CONCEALMENT REINFORCEMENT SOLUTION**	(OPS-SOW-10127 REV. C & OPS-PRC-10127 REV. C)	UNLESS EXPLICITLY WAIVED BY THE CROWN CASTLE MOD PM, ALL NEW CANISTER SHROUDS ARE TO BE INSTALLED WITH THE STANDARD REINFORCING SOLUTION (I.E. BANDING KIT) AND INSPECTED PER FACT TIA REQUIREMENTS.

MODIFICATION INSPECTION NOTES

GENERAL

THE MI IS AN ON-SITE VISUAL AND HANDS-ON INSPECTION OF TOWER MODIFICATIONS INCLUDING A REVIEW OF CONSTRUCTION REPORTS AND ADDITIONAL PERTINENT DOCUMENTATION PROVIDED BY THE GENERAL CONTRACTOR (GC), AS WELL AS ANY INSPECTION DOCUMENTS PROVIDED BY 3RD PARTY INSPECTORS. THE MI IS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS; IN ACCORDANCE WITH APPLICABLE CROWN STANDARDS; AND AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

NO DOCUMENT, CODE OR POLICY CAN ANTICIPATE EVERY SITUATION THAT MAY ARISE. ACCORDINGLY, THIS CHECKLIST IS INTENDED TO SERVE AS A SOURCE OF GUIDING PRINCIPLES IN ESTABLISHING GUIDELINES FOR MODIFICATION INSPECTION.

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, AND THE MI INSPECTOR DOES NOT TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES. THE MI INSPECTOR SHALL INSPECT AND NOTE CONFORMANCE/NONCONFORMANCE AND PROVIDE TO THE CROWN POINT OF CONTACT (CROWN POC) FOR EVALUATION.

ALL MI'S SHALL BE CONDUCTED BY A CROWN APPROVED MI INSPECTOR, WORKING FOR A CROWN APPROVED MI VENDOR. SEE CROWN CED-LST-10173, "APPROVED MI VENDORS".

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PURCHASE ORDER (PO) IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN THE GC AND/OR INSPECTOR SHALL CONTACT THE CROWN POINT OF CONTACT (POC).

REFER TO CROWN CED-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

SERVICE LEVEL COMMITMENT

THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:

- THE GC SHALL PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY MINOR DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

REQUIRED PHOTOS

BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN ONLY FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO CROWN DOCUMENT # CED-SOW-10007.

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
LICENSED
PROFESSIONAL ENGINEER

6/27/19

GPD Engineering and Architecture Professional Corporation
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 330.572.2101

GPD PROJECT NUMBER
2019777.828257.02

SITE NAME: STONINGTON

BU NUMBER: 828257

WO NUMBER: 1751629

SITE ADDRESS:
82 MECHANIC STREET
PAWCATUCK, CT 06379
NEW LONDON COUNTY, USA

ENG/QA BY: BK DATE: 6/27/19

DFT BY: MJS DATE: 6/27/19

DFT/QA BY: CB DATE: 6/27/19

APRV'D BY: CJS DATE: 6/27/19

SCALE: N.T.S.

MODIFICATION INSPECTION CHECKLIST

S-2 REV 0

GENERAL NOTES:

1. The General Contractor (GC) shall reference CED-STD-10159, "Tower Modification Construction Specifications", as a continuation of the following General Notes. The GC shall keep a copy of this document with the Structural Design Drawings (SDD) at all times, and shall ensure that all Contractor Personnel are aware of the information enclosed within the General Notes and CED-STD-10159.
2. The Contract Documents are the property of Crown Castle (Crown). They are provided to the GC and its Lower Tier Contractors and material suppliers for the limited purpose of use in completing the Work for this Site, and shall be kept in strict confidence and not disclosed to any third parties. The Contract Documents shall not be used for any other purpose whatsoever without the prior written consent of Crown.
3. Detail drawings, including notes and tables, shall govern over general notes and typical details. Contact the Crown Point of Contact (POC) and Engineer of Record (EOR) for clarification as needed.
4. Do not scale drawings.
5. Any Work performed without a prefabrication mapping is done at the risk of the GC and/or fabricator. All dimensions of existing structural elements are assumed based on the available documentation and are preliminary until field-verified by the GC, unless noted otherwise (UNO). Where discrepancies are found, GC shall contact the Crown POC and EOR through RFI.
6. For this analysis and modification, the tower has been assumed to be in good condition without any structural defects, UNO. If the GC discovers any indication of an existing structural defect, contact the Crown POC and EOR immediately.
7. All construction means and methods, including but not limited to erection plans, rigging plans, climbing plans, and rescue plans, shall be the responsibility of the GC responsible for the execution of the Work contained herein, and shall meet ANSI/ASSE A10.48 (latest edition); federal, state, and local regulations; and any applicable industry consensus standards related to the construction activities being performed. All rigging plans shall adhere to ANSI/ASSE A10.48 (latest edition) and Crown standard CED-STD-10253, "Rigging Program", including the required involvement of a qualified engineer for class IV construction to certify the supporting structure(s) in accordance with the ANSI/TIA-322 (latest edition).
8. The structural integrity of the modification design extends to the complete condition only. The GC must be cognizant that the removal of any structural component of an existing tower has the potential to cause the partial or complete collapse of the structure. All necessary precautions must be taken to ensure structural integrity, including, but not limited to, engineering assessment of construction stresses with installation maximum wind speed and/or temporary bracing and shoring.
9. Aerial and underground utilities and facilities may or may not be shown on the drawings. The GC shall take every precaution to preserve and protect these items, which may include aerial or underground power lines, telephone lines, water lines, sewer lines, cable television facilities, pipelines, structures and other public and private improvements within or adjacent to the Work area. The responsibility for determining the actual on-site location of these items shall rest exclusively with the GC.
10. All manufacturer's hardware assembly instructions shall be followed, UNO. Conflicting notes shall be brought to the attention of the EOR and the Crown POC.
11. The GC shall fabricate all required items per the materials specified below, UNO on the detail drawing sheets. If the GC finds for any component that the materials have not been clearly specified, the GC shall submit an RFI to the EOR to confirm the required material.

    All structural elements shall be new and shall conform to the following requirements, UNO:

    Monopoles:
    - Structural shapes and plates: ASTM A572 Grade 65 (FY = 65 KSI)
    - Welding electrodes, SMAW: E80XX
    - Welding electrodes, FCAW: E8XT-XX

    Self-Support and Guyed Towers:
    - Structural shapes and plates: ASTM A572 Grade 50 (FY = 50 KSI)
    - Welding electrodes, SMAW: E70XX
    - Welding electrodes, FCAW: E7XT-XX

    All tower types:
    - Steel angle: ASTM A572 Grade 50 (FY = 50 KSI)
    - Solid rod: ASTM A36 (FY = 36 KSI)
    - Pipe/tube (round): ASTM A500 Grade C (FY = 46 KSI)
    - Pipe/tube (square): ASTM A500 Grade C (FY = 50 KSI)
    - Bolts: ASTM F3125 Grade A325 Type 1
    - U-bolts: ASTM A307 Grade A, or SAE J429 Grade 2
    - Nuts: ASTM A563 Grade DH
    - Washers: ASTM F436 Type 1
    - Guy Wires: ASTM A475 Grade EHS
    - Bridge Strand: ASTM A586 Grade 1
12. After fabrication, hot-dip galvanize all steel items, UNO. Galvanize per ASTM A123, ASTM A153/A153M, or ASTM A653 G90, as applicable. ASTM A490 bolts shall not be hot-dip galvanized, but shall instead be coated with Magni 565 or EOR approved equivalent, per ASTM F2833.
13. Contractor Personnel shall not drill holes in any new or existing structural members, other than those drilled holes shown on structural drawings, without the approval of the EOR.
14. For a list of Crown-approved cold galvanizing compounds, refer to ENG-STD-10149, “Tower Protective Coatings Guidelines”.
15. All exposed structural steel as the result of this scope of Work including welds (after final inspection of the weld by the CWI), field drilled holes, and shaft interiors (where accessible), shall be cleaned and two (2) coats cold galvanizing shall be applied by brush in accordance with ENG-STD-10149, “Tower Protective Coatings Guidelines”. Photo documentation is required to be submitted to the MI Inspector.
16. If removal of existing modifications is required per the modification scope, the GC shall clean and cold galvanize any existing empty bolt holes, UNO. If additional unexpected, oversized, or slotted holes are found, the GC shall contact the EOR and Crown POC for guidance prior to proceeding with the modifications.
17. All Work involving base plate grout scope items or resulting in disturbance of base plate grout shall reference ENG-STD-10323, "Base Plate Grout", and shall follow any Base Plate Grout Removal Notes contained herein.
18. All tower grounding affected by the Work shall be repaired or replaced in accordance with OPS-STD-10090, "Tower Grounding", and OPS-BUL-10133, "Grounding Repair Recommendation".
19. If scope of modification requires removal or covering of tower ID tag, the tag must be replaced.
20. Any hardware removed from the existing tower shall be replaced with new hardware of equal size and quality, UNO. No existing fasteners shall be reused.
21. All joints using ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods shall be snug tightened, UNO.
22. A nut locking device shall be installed on all proposed and/or replaced snug tightened ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods.
23. All joints are bearing type connections UNO. If no bolt length is given in the Bill of Materials, the connection may include threads in the shear planes, and the GC is responsible for sizing the length of the bolt.
24. Blind bolts shall be installed per the installation specifications on the corresponding Approved Fastener sheets contained in CED-CAT-10300, "Monopole Standard Drawings and Approved Reinforcement Components".
25. If ASTM A325 or A490 bolts, and/or threaded rods are specified to be pre-tensioned, these shall be installed and tightened to the pretensioned condition according to the requirements of the RCSC Specification for Structural Joints Using ASTM High Strength Bolts.
26. All proposed and/or replaced bolts shall be of sufficient length such that the end of the bolt be at least flush with the face of the nut. It is not permitted for the bolt end to be below the face of the nut after tightening is completed.

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
PROFESSIONAL ENGINEER
6/27/19

GPD Engineering and Architecture Professional Corporation
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 330.572.2101

GPD PROJECT NUMBER
2019777.828257.02

SITE NAME: STONINGTON

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WO NUMBER: 1751629

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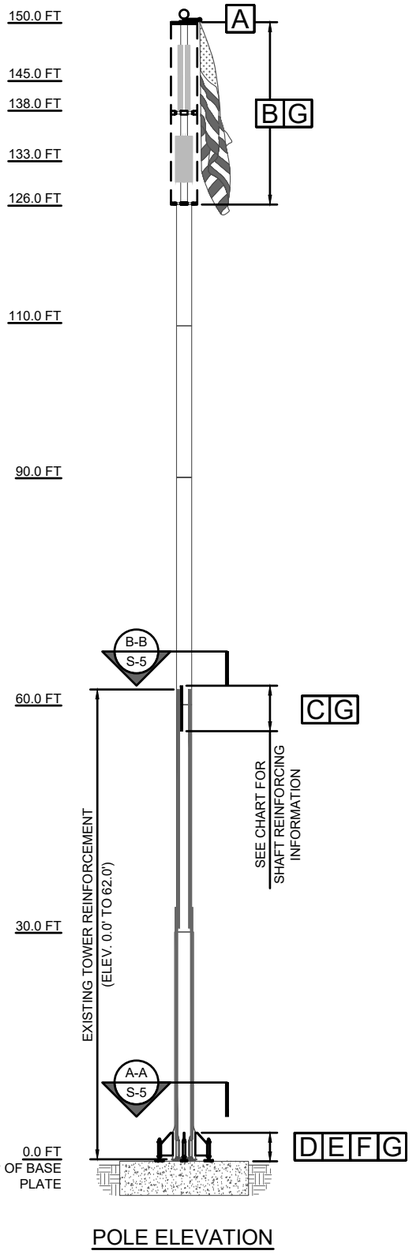
APRV'D BY: CJS	DATE: 6/27/19	

SCALE: N.T.S.

GENERAL NOTES

S-3 REV 0



POLE ELEVATION

MANUFACTURER POLE SPECIFICATIONS

POLE SHAPE TYPE:	ROUND
TAPER:	NA
SHAFT STEEL:	ASTM A53 GRADE B (Fy=42 KSI) & ASTM A500 GRADE B (Fy=42 KSI)
BASE PL STEEL:	ASTM A36
ANCHOR RODS:	1"Ø ASTM A687 (Fy=105 KSI)

MANUFACTURER SHAFT SECTION DATA

SHAFT SECTION	SECTION LENGTH (FT)	POLE THICKNESS (IN)	LAP SPLICE (IN)	DIAMETER (IN)	
				@ TOP	@ BOTTOM
1	24.00	0.4650		10.75	10.75
2	16.00	0.3750		24.00	24.00
3	20.00	0.3750		24.00	24.00
4	30.00	0.3750		24.00	24.00
5	30.00	0.3750		24.00	24.00
6	30.00	0.3750		30.00	30.00

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

POLE MODIFICATION SCHEDULE

	ELEVATION (FT)	MODIFICATION	REFERENCE SHEET
A	150.0	**REPLACE EXISTING TRUCK & BALL ASSEMBLY WITH NEW.**	S-7
B	126.0 - 150.0	**REMOVE THE EXISTING CONCEALMENT CANISTER ASSEMBLIES AND ALL ASSOCIATED HARDWARE.**	-
		INSTALL NEW CONCEALMENT CANISTER ASSEMBLIES.	S-7 & S-8
		INSTALL CROWN CASTLE CONCEALMENT REINFORCEMENT SOLUTION.	OPS-PRC-10127
C	56.5 - 62.5	**INSTALL NEW FLAT PLATE REINFORCEMENT.**	S-5 & S-6
D	0.0 - 4.5	**INSTALL NEW ANCHOR RODS WITH BRACKETS TO THE TOWER BASE.**	S-5
E	0.0	**RELOCATE EQUIPMENT AT THE BASE OF THE TOWER TO ALLOW FOR INSTALLATION OF NEW ANCHOR RODS. COORDINATE WITH TOWER OWNER.**	S-5
F	0.0	**REMOVE EXISTING TOP HEX NUTS FROM ANCHOR RODS AND PROVIDE CAULKING AROUND PERIMETER TO PREVENT WATER ENTRY**	S-5
G	VARIES	**PAINT NEW/ EXISTING MATERIAL IN MODIFIED REGIONS TO MATCH THE EXISTING TOWER FINISH.**	-

FOR PARTS NOT DETAILED WITHIN THE DRAWING AND STARTING WITH "CCI-", SEE THE FOLLOWING CATALOG FOR DETAILS: CED-CAT-10300, MONOPOLE STANDARD DRAWINGS AND APPROVED REINFORCEMENT COMPONENTS.

NOTE:
1. ALL EXISTING MATERIAL REMOVED FROM THE TOWER SHALL BE DISPOSED OF BY THE CONTRACTOR OFF SITE.
2. IF A NEW FLAG IS BEING INSTALLED, CROWN CASTLE REQUESTS THE FLAG AND ALL ASSOCIATED HARDWARE BE PURCHASED FROM THE FOLLOWING SUPPLIER

   THE FLAG LOFT
   1900 DELMAR STREET
   ST. LOUIS, MO 63103
   (800)-995-3524 (ATTN. RICK KELLY)

CCI FLAT PLATE (65 KSI) REINFORCING SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	PART NUMBER	FLAT / DEGREES (°)	TERMINATION BOLTS (BOTTOM)	TERMINATION BOLTS (TOP)	MAX INTERMEDIATE BOLT SPACING	BOLT QUANTITY PER PLATE	STEEL WEIGHT PER PLATE (BLACK)	TOTAL BOLT QUANTITY	TOTAL STEEL WEIGHT (BLACK)
56.5'	62.5'	CCI-CFP-04012506*	71°, 161°, 251°, & 341°	6	6	1'-6"	13	102.0	52	408.0
								TOTAL	52	408.0

*SEE SHEET S-6 FOR CUSTOM PLATE DETAILS.

NOTES FOR CROWN (65 KSI) FLAT PLATES:

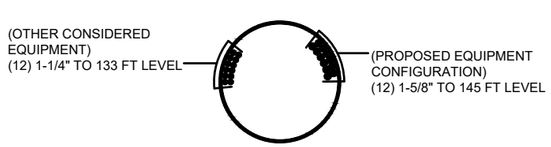
1. APPROVED FASTENERS MAY BE USED ON THIS PROJECT AS INDICATED IN THE FOLLOWING TABLE:

FORGBOLT	APPROVED
NEXGEN2	APPROVED
AJAX ONESIDE	APPROVED

   ORDERING INFORMATION AND INSTALLATION DETAILS FOR APPROVED FASTENERS CAN BE FOUND IN CED-CAT-10300.
2. ALL FLAT PLATE REINFORCEMENT IS TO BE INSTALLED CENTERED ON ITS DESIGNATED FLAT OR AZIMUTH, UNO, WITH A TOLERANCE FROM CENTER OF THE FLAT OR AZIMUTH AS FOLLOWS:

ALLOWABLE FLAT PLATE CENTERING TOLERANCE	3/8"

   GC SHALL REDLINE ALL DEVIATIONS FROM CENTER, INCLUDING THOSE WITHIN TOLERANCE.
3. GC SHALL REPLACE ANY STEP BOLTS AND STEP BOLT CLIPS THAT INTERFERE WITH THE INSTALLATION OF FLAT PLATE. REFERENCE CED-CAT-10300 FOR APPROVED OPTIONS. CCI-SB-0100 IS THE DEFAULT OPTION; OTHER OPTIONS MAY BE REQUIRED FOR FIT-UP.
4. FOR PLATES STARTING AT 6", THE BOTTOM OF THE FLAT PLATE SHALL BEGIN AT 6" +/- 1". FOR SINGLE PLATES OR MULTIPLE PLATES SPLICED TOGETHER, THE BOTTOM OF THE FLAT PLATE RUN SHALL BEGIN AT THE PROPOSED ELEVATION +/- 3". FOR MULTIPLE PLATES SPLICED TOGETHER, THE TOP OF THE FLAT PLATE IS TO BE PLACED SUCH THAT THERE IS NO MORE THAN 3" DIFFERENCE BETWEEN THE ACTUAL OVERALL LENGTH OF THE SPAN AND THE PROPOSED OVERALL LENGTH OF THE SPAN, FROM THE BOTTOM OF THE BOTTOM PLATE TO THE TOP OF THE TOP PLATE.
5. SHIMS FOR MONOPOLE REINFORCEMENT MEMBER SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. SHIM THICKNESSES SHALL BE NO LESS THAN 1/16". STACKING OF SHIMS IS PERMITTED. FINGER SHIMS AND HORSESHOE SHIMS ARE PERMITTED. SINGLE AND STACKED SHIMS IN BOLT TERMINATION REGIONS SHALL BE NO GREATER THAN A TOTAL OF ¼" WITHOUT EOR APPROVAL. SINGLE AND STACKED SHIMS AT INTERMEDIATE CONNECTIONS SHALL BE NO GREATER THAN A TOTAL OF 5/8" WITHOUT EOR APPROVAL.
6. SHIM MATERIAL SHALL BE STEEL GRADE A36 OR GREATER IF WELDED, UNO, AND SHALL REQUIRE MTR; IF SHIMS ARE NOT WELDED, THERE IS NO MINIMUM REQUIRED STEEL GRADE.
7. IF UNEXPECTED HOLES ARE FOUND IN A LOCATION WHERE FLAT PLATE IS PROPOSED TO BE INSTALLED, THE GC SHALL NOT PLACE NEW BOLT HOLES WITHIN A CENTER-TO-CENTER DISTANCE OF 3 TIMES THE DIAMETER OF THE LARGER OF THE TWO HOLES, WITHOUT EOR APPROVAL. EXISTING HOLES MAY INCLUDE BUT ARE NOT LIMITED TO EMPTY BOLT HOLES AND JACKING NUTS WITH CENTER HOLES.



COAX LAYOUT

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
PROFESSIONAL ENGINEER

6/27/19

GPD Engineering and Architecture Professional Corporation
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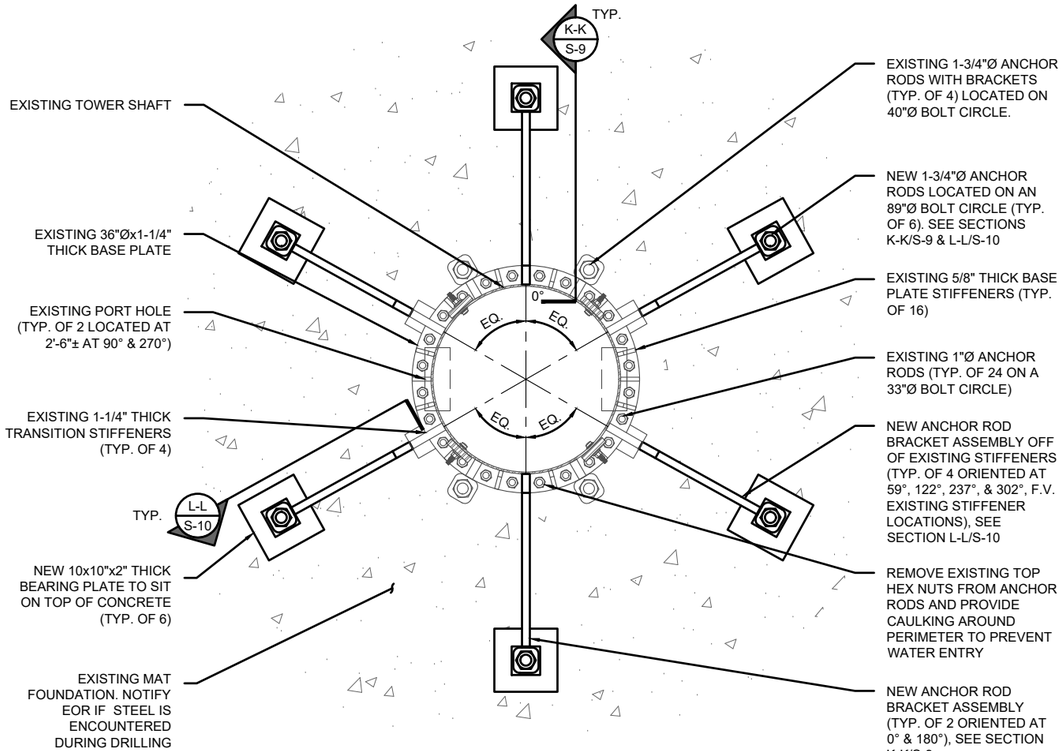
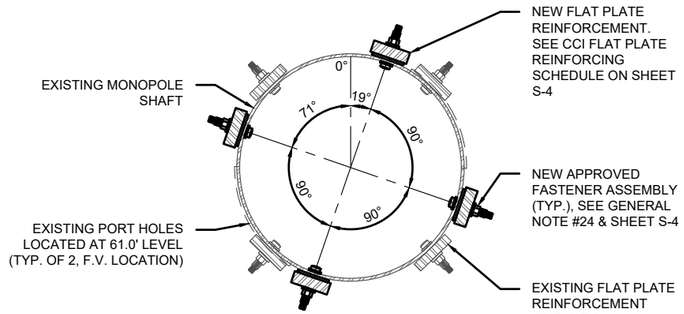
SCALE: N.T.S.

TOWER ELEVATION

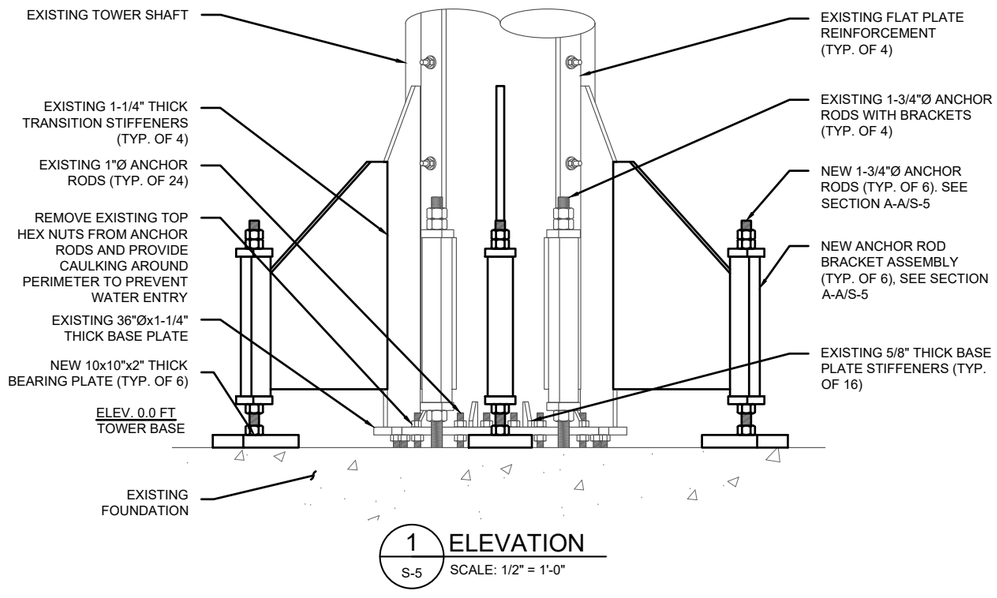
S-4 REV 0



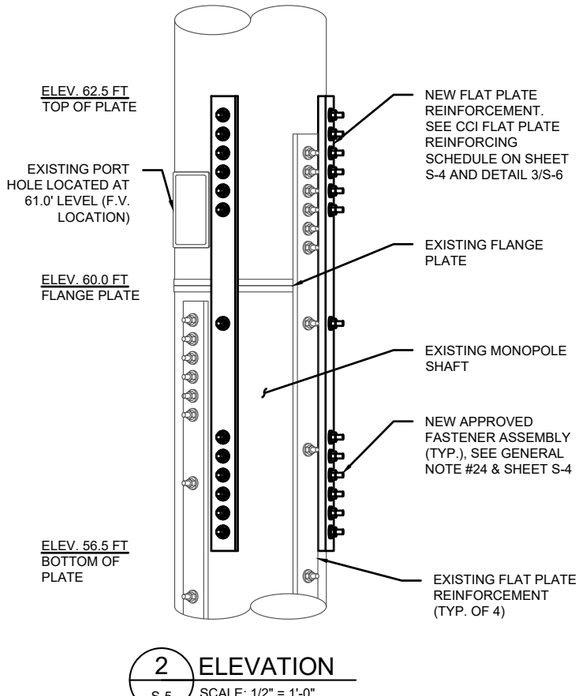
A-A S-5 TOWER SECTION
SCALE: 1/2" = 1'-0"



B-B S-5 TOWER SECTION
SCALE: 3/4" = 1'-0"



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



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

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
LICENSED
PROFESSIONAL ENGINEER
6/27/19

GPD Engineering and Architecture Professional Corporation
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 330.572.2101

GPD PROJECT NUMBER
2019777.828257.02

SITE NAME: STONINGTON

BU NUMBER: 828257

WO NUMBER: 1751629

SITE ADDRESS:
82 MECHANIC STREET
PAWCATUCK, CT 06379
NEW LONDON COUNTY, USA

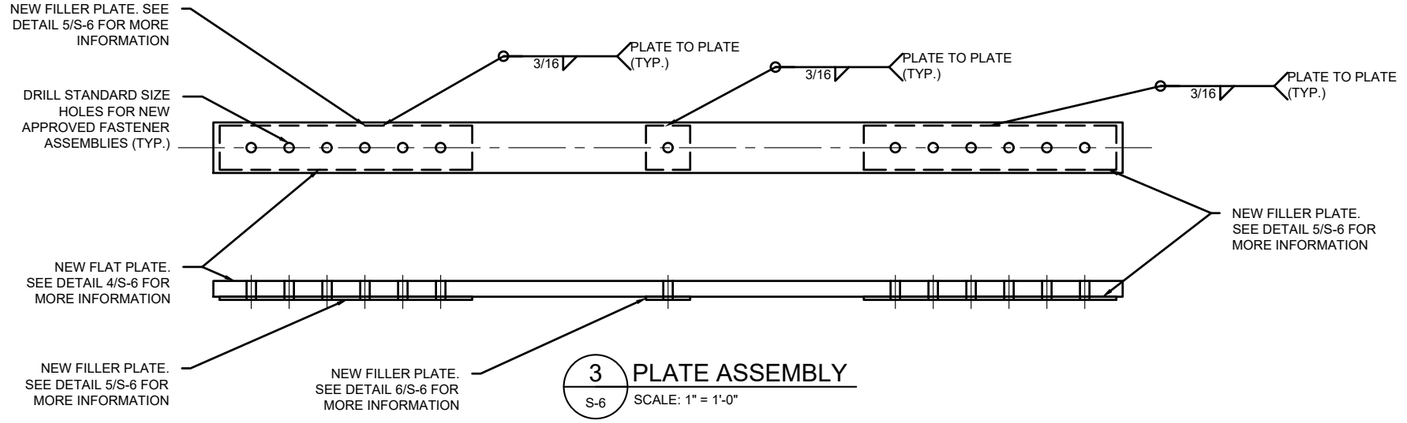
ENG/QA BY: BK	DATE: 6/27/19
DFT BY: MJS	DATE: 6/27/19
DFT/QA BY: CB	DATE: 6/27/19
APRV'D BY: CJS	DATE: 6/27/19

SCALE: N.T.S.

TOWER SECTIONS

S-5

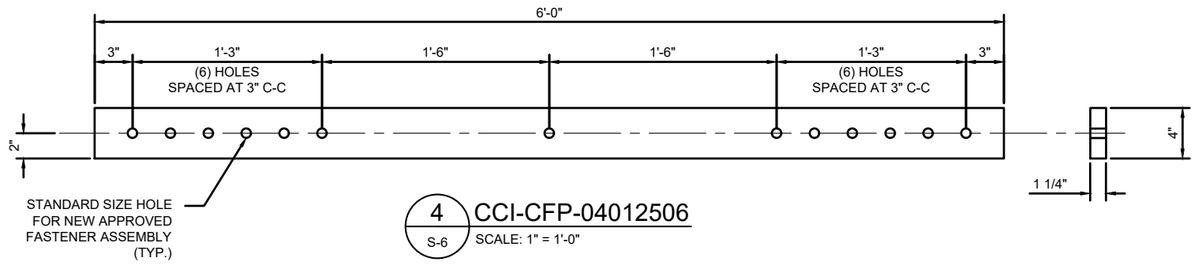
REV 0



3 S-6 PLATE ASSEMBLY

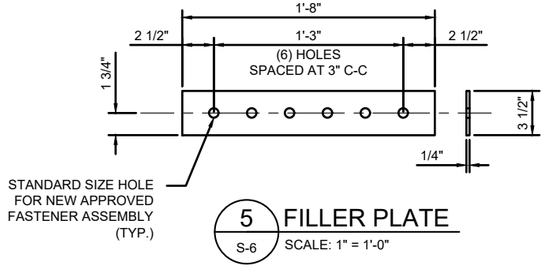
SCALE: 1" = 1'-0"

NOTES
1. DETAIL IS TYPICAL FOR THE FLAT PLATE ASSEMBLIES ORIENTED AT 71°, 161°, 251°, & 341° FROM 56.5' TO 62.5'



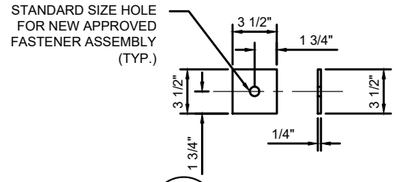
4 S-6 CCI-CFP-04012506

SCALE: 1" = 1'-0"



5 S-6 FILLER PLATE

SCALE: 1" = 1'-0"



6 S-6 FILLER PLATE

SCALE: 1" = 1'-0"

FILLER PLATE SCHEDULE

BOTTOM ELEVATION	TOP ELEVATION	FILLER PLATE DIMENSIONS	FLAT / DEGREES (°)	QUANTITY OF BOLT HOLES PER PLATE	STEEL WEIGHT PER PLATE (BLACK)	TOTAL BOLT HOLE QUANTITY	TOTAL STEEL WEIGHT (BLACK)
60.79'	62.46'	20.0"x3.5"x0.25"	71°, 161°, 251°, & 341°	6	4.96	24	19.8
59.35'	59.65'	3.5"x3.5"x0.25"	71°, 161°, 251°, & 341°	1	0.87	4	3.5
56.54'	58.21'	20.0"x3.5"x0.25"	71°, 161°, 251°, & 341°	6	4.96	24	19.8
					TOTAL	52	43.2

NOTE.
1. ALL FILLER PLATE SHALL BE ASTM A572 GRADE 50 MATERIAL. MATERIAL TEST REPORTS ARE REQUIRED.
2. ALL EXPOSED STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED PER ASTM A153 / A153MOR A123, AS APPLICABLE. FIELD DRILLED OR CUT MATERIAL TO BE COATED WITH TWO BRUSH COATS OF CROWN APPROVED ZINC RICH PAINT IN ACCORDANCE WITH ENG-BUL-10149 TOWER PROTECTIVE COATINGS BULLETIN.

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SCALE: N.T.S.

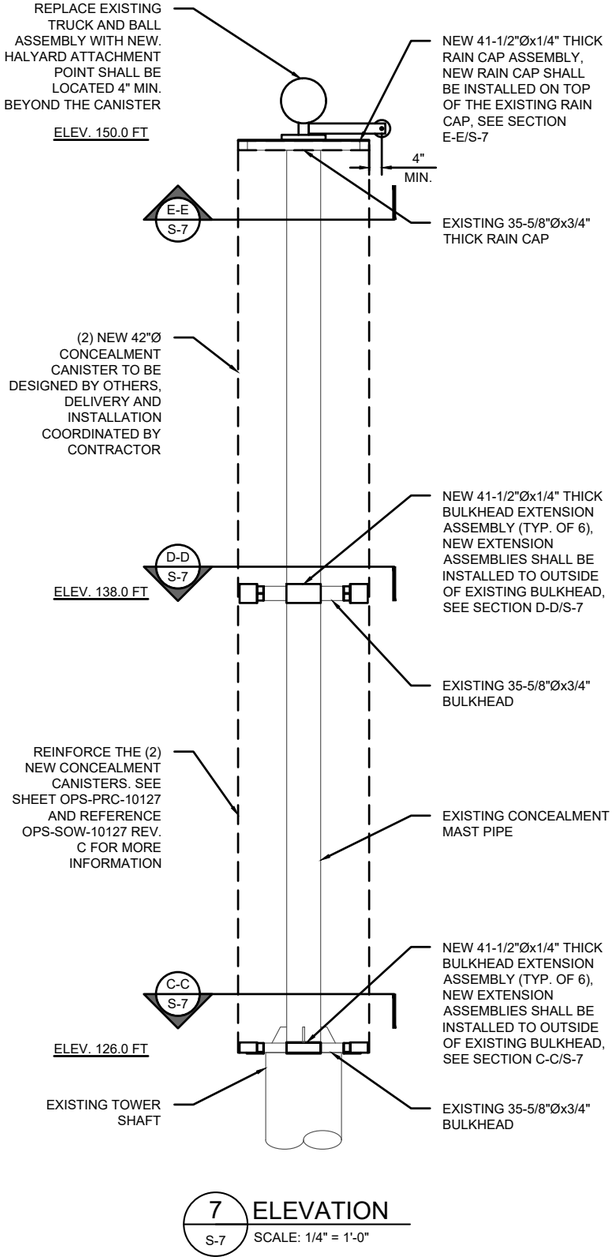
STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
REGISTERED
PROFESSIONAL ENGINEER

6/27/19

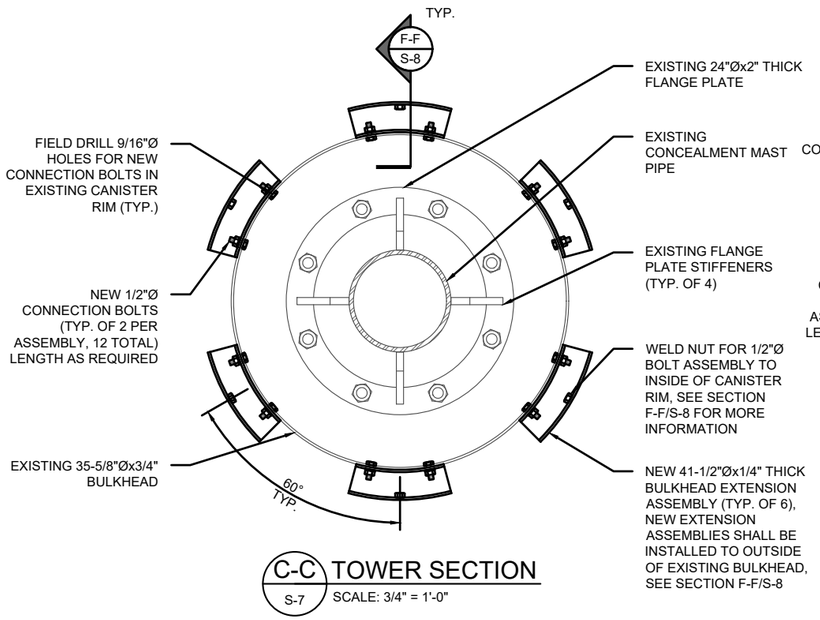
ADDITIONAL SECTIONS

S-6

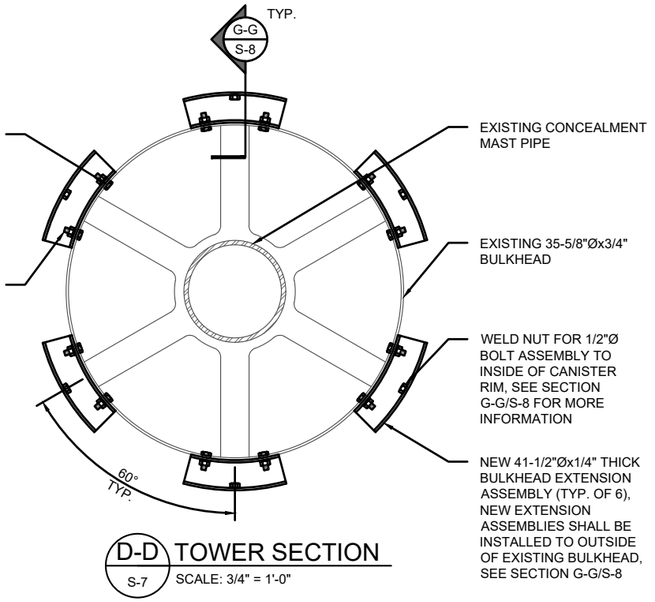
REV 0



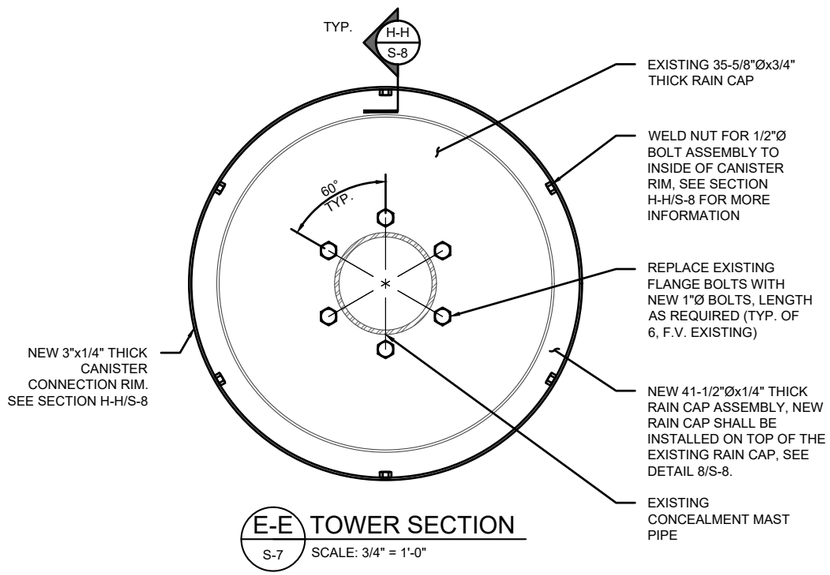
7 S-7 ELEVATION
SCALE: 1/4" = 1'-0"



C-C S-7 TOWER SECTION
SCALE: 3/4" = 1'-0"



D-D S-7 TOWER SECTION
SCALE: 3/4" = 1'-0"



E-E S-7 TOWER SECTION
SCALE: 3/4" = 1'-0"

NOTE:
1. ALL STEEL PLATE SHALL BE ASTM A572 GRADE 50 MATERIAL. MATERIAL TEST REPORTS ARE REQUIRED.
2. ALL EXPOSED STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED PER ASTM A153 / A153MOR A123, AS APPLICABLE. FIELD DRILLED OR CUT MATERIAL TO BE COATED WITH TWO BRUSH COATS OF CROWN APPROVED ZINC RICH PAINT IN ACCORDANCE WITH ENG-BUL-10149 TOWER PROTECTIVE COATINGS BULLETIN.

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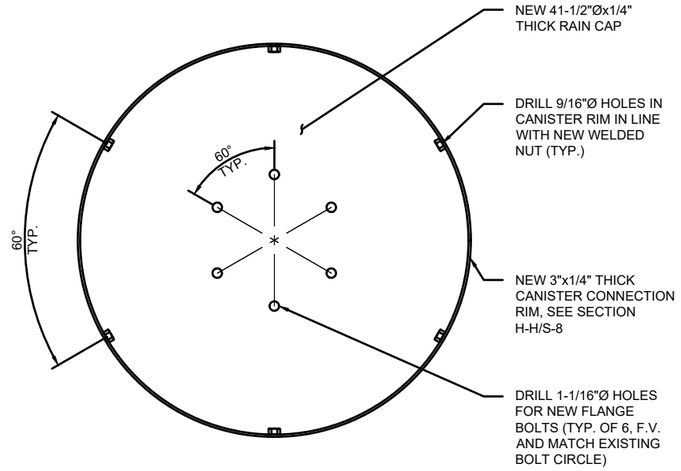
SCALE: N.T.S.

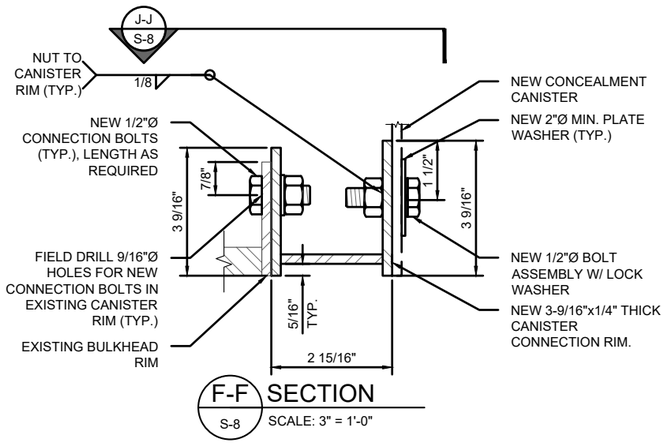
STATE OF CONNECTICUT
CHRISTOPHER J. SCHEKS
No. 30026
LICENSED PROFESSIONAL ENGINEER
6/27/19

ADDITIONAL SECTIONS

S-7 REV 0

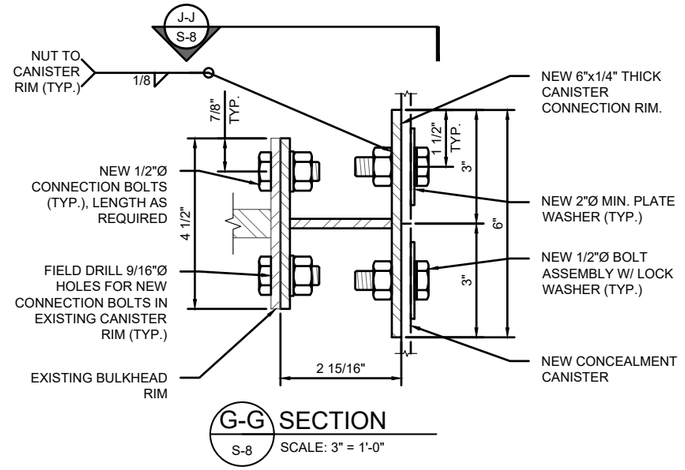


8 / S-8 RAIN CAP
SCALE: 3/4" = 1'-0"



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

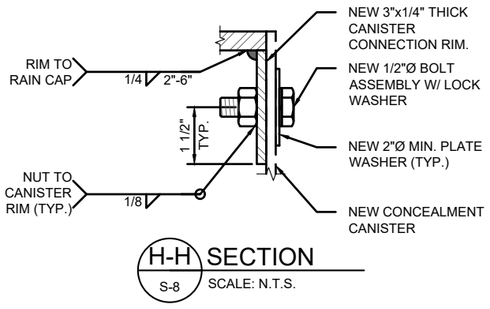
NOTE:
1. CANISTER CONNECTION ALTERNATIVE MUST BE APPROVED PRIOR TO FABRICATION.
2. DETAIL IS TYPICAL FOR THE BULKHEAD EXTENSION ASSEMBLIES AT 126.0'



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

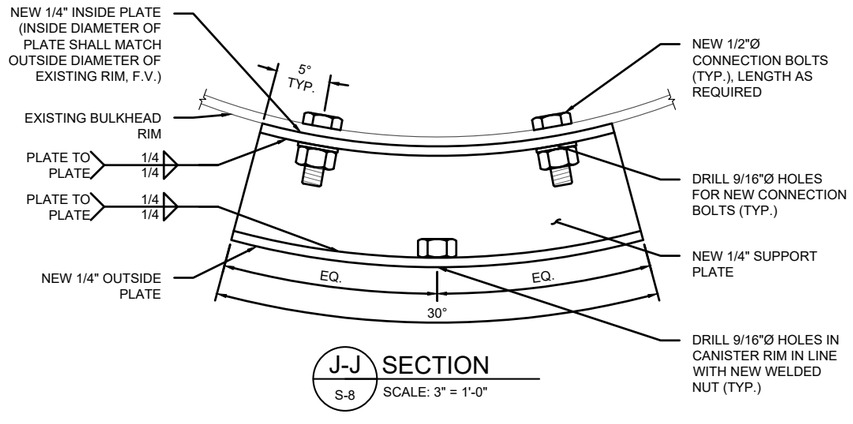
NOTE:
1. CANISTER CONNECTION ALTERNATIVE MUST BE APPROVED PRIOR TO FABRICATION.
2. DETAIL IS TYPICAL FOR THE BULKHEAD EXTENSION ASSEMBLIES AT 138.0'.

NOTE.
1. ALL STEEL PLATE SHALL BE ASTM A572 GRADE 50 MATERIAL. MATERIAL TEST REPORTS ARE REQUIRED.
2. ALL CANISTER CONNECTION HARDWARE SHALL BE ATTACHED WITH GRADE A307 BOLTS WITH GRADE F844 WASHERS . MATERIAL TEST REPORTS ARE REQUIRED.
3. ALL EXPOSED STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED PER ASTM A153 / A153MOR A123, AS APPLICABLE. FIELD DRILLED OR CUT MATERIAL TO BE COATED WITH TWO BRUSH COATS OF CROWN APPROVED ZINC RICH PAINT IN ACCORDANCE WITH ENG-BUL-10149 TOWER PROTECTIVE COATINGS BULLETIN.



H-H / S-8 SECTION
SCALE: N.T.S.

NOTE:
1. CANISTER CONNECTION ALTERNATIVE MUST BE APPROVED PRIOR TO FABRICATION.
2. DETAIL IS TYPICAL FOR THE RAIN CAP AT 150.0'.



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

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REVISIONS

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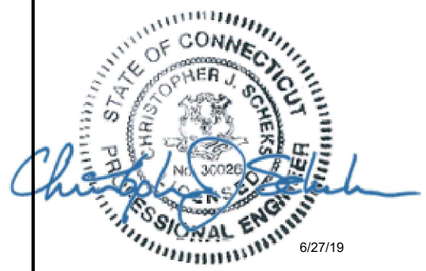
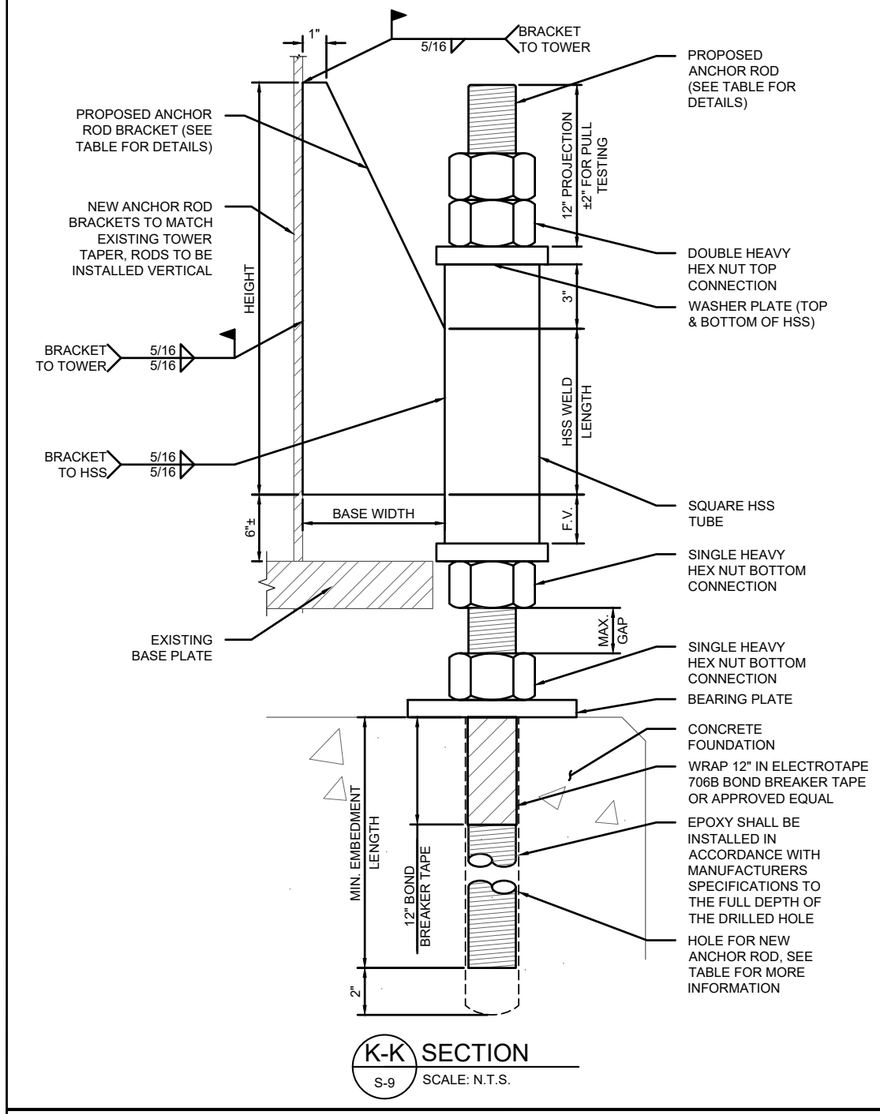


6/27/19

ADDITIONAL SECTIONS

S-8

REV 0



K-K / S-9 SECTION

SCALE: N.T.S.

ANCHOR ROD NOTES

1. THE GC SHALL ATTEMPT TO CENTER THE ROD IN THE BRACKET. HOWEVER, THE ROD MAY BE INSTALLED ANYWHERE WITHIN THE BRACKET SO LONG AS THE PLATE WASHER IS FULLY BEARING ON THE BRACKET.
2. REFERENCE CC APPROVED COMPONENTS (CURRENT VERSION) FOR ANCHOR ROD DIMENSIONS.
3. RODS MUST BE GALVANIZED FROM THE TOP OF THE PROJECTION TO 15" BELOW THE CONCRETE SURFACE AT A MINIMUM.
4. CORED HOLES MUST BE MECHANICALLY ROUGHENED USING A CARBIDE HOLE ROUGHENER OR EQUIVALENT. BRUSHING WITH A NYLON OR WIRE BRUSH SHALL BE USED IN THE PROCESS OF HOLE CLEANING, BUT DOES NOT SATISFY THE HOLE ROUGHENING REQUIREMENT.
5. FOLLOW EPOXY MANUFACTURER'S RECOMMENDATIONS FOR HOLE CLEANING.
6. ALL HOLES MUST BE DRY PRIOR TO PLACING EPOXY.
7. FOLLOW EPOXY MANUFACTURER'S RECOMMENDATIONS REGARDING HANDLING OF THREADED ROD AND EPOXY, AS WELL AS ALL INSTALLATION INSTRUCTIONS AND REQUIREMENTS.
8. TAKE ALL MEASUREMENTS NECESSARY TO AVOID DAMAGING EXISTING REINFORCING BARS DURING CORING OPERATIONS. NOTIFY EOR IMMEDIATELY IF EXISTING REINFORCING BARS ARE ENCOUNTERED AND INTERFERE WITH PLACEMENT OF NEW ANCHORS. MINOR ADJUSTMENT TO PROPOSED LOCATION OF NEW ANCHORS MAY BE REQUIRED.
9. ONCE ALL RESIN AND GROUT HAVE CURED, NEW ANCHOR ROD REINFORCING SHALL BE TARGET TENSIONED TO THE VALUE LISTED IN THE TABLE ON THIS SHEET. SEE ENG-PRC-10119; PULL-OUT TESTING POST-INSTALLED ANCHOR RODS, FOR SPECIFICATIONS.
10. CONTRACTOR TO VERIFY THAT A PULL TEST IS ABLE TO BE PERFORMED USING THE ANCHOR ROD PROJECTION SHOWN.
11. WHEN COMPLETED WITH EPOXY INSTALLATION, THE TOP OF THE EPOXY SHALL BE EQUAL TO OR HIGHER THAN THE TOP OF THE FOUNDATION, SUCH THAT WATER IS NOT ABLE TO COLLECT IN THE ANNULAR AREA AROUND THE EXPOSED PORTION OF THE ANCHOR ROD.
12. CONTRACTOR SHALL INSTALL RODS AND BRACKETS AT LOCATIONS INDICATED ON DRAWINGS.
13. CONTRACTOR SHALL VERIFY THAT TOWER IS PLUMB PRIOR TO THE INSTALLATION OF ANY TOWER MODIFICATIONS.
14. PULL TESTING RESULTS SHALL BE SUPPLIED TO THE TOWER OWNER AND THE MODIFICATION INSPECTOR FOR REFERENCE IN THE POST INSTALLATION OBSERVATION REPORT.
15. INSTALLATION OF GROUT AND/OR BOTTOM NUT FLUSH TO BASE PLATE IS PROHIBITED PRIOR TO COMPLETION OF ANCHOR ROD PULL TEST.
16. THE ADHESIVE ANCHOR SYSTEM USED FOR POST-INSTALLED ANCHORAGE TO CONCRETE SHALL CONFORM TO THE MOST RECENTLY PUBLISHED ACI 355.4, ACCEPTANCE CRITERIA FOR QUALIFICATION OF POST-INSTALLED ADHESIVE ANCHORS IN CONCRETE AND COMMENTARY. THE ANCHOR SYSTEM SHALL BE AS LISTED WITHIN THE ANCHOR ROD SPECIFICATIONS OR AN ENGINEER APPROVED EQUAL MEETING ACI 355.4 AND THE MINIMUM BOND STRESS VALUES BELOW. BULK MIXED ADHESIVES ARE NOT PERMITTED.
17. THE ADHESIVE ANCHORS SELECTED FROM THE PARAGRAPH ABOVE SHALL BE SUPPLIED AS AN ENTIRE SYSTEM. THE SYSTEM SHALL INCLUDE, BUT NOT BE LIMITED TO, THE NEW ADHESIVE CARTRIDGE, A CLEAN MIXING NOZZLE, EXTENSION TUBE, A DISPENSING GUN, AND ALL MANUFACTURER RECOMMENDED SUPPLIES FOR PROPERLY CLEANING THE HOLE. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL EQUIPMENT REQUIRED FOR INSTALLATION OF THE ADHESIVE ANCHOR SYSTEM.
18. ANCHORAGE DESIGN IS IN ACCORDANCE WITH APPENDIX D OF ACI 318-11. FOR ADHESIVE ANCHORS, THE FOLLOWING MINIMUM VALUES FOR BOND STRESS WERE ASSUMED FOR THE DESIGN USING THE ABOVE ADHESIVE ANCHOR ASSEMBLIES:

    A. HILTI RE-500 V3 UNCRACKED CONCRETE BOND STRESS (BASED ON HAMMER DRILLING):
    T_{CR} = 1130 PSI
19. ANCHOR ROD THREADS SHALL BE UNC COARSE THREADS, UNLESS NOTED OTHERWISE. COMPATIBLE NUTS AND WASHERS SHALL BE FURNISHED WITH ALL THE ALL-THREAD ROD AND CONSIDERED PART OF THE ASSEMBLY. THE COST OF HARDWARE SHALL BE CONSIDERED INCIDENTAL TO THE ADHESIVE ANCHOR ASSEMBLY.
20. NUTS, WASHERS, AND OTHER HARDWARE USED WITH AN ALL-THREADED BAR ADHESIVE ANCHOR SYSTEM SHALL HAVE A MATERIAL OR AN ALLOY DESIGNATION THAT MATCHES THE ALL-THREAD MATERIAL/ALLOY. GALVANIZED ASSEMBLIES SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C. ELECTROPLATE GALVANIZING IS NOT ACCEPTABLE. DISSIMILAR METAL ASSEMBLIES SHALL BE SEPARATED BY NYLON, EPDM, OR OTHER APPROVED NON-METALLIC WASHERS.
21. ADHESIVE ANCHORS SHALL BE INSTALLED BY QUALIFIED PERSONNEL TRAINED TO INSTALL ADHESIVE ANCHORS IN ACCORDANCE WITH THE SPECIFICATIONS. POST-INSTALLED ADHESIVE ANCHORS SHALL BE INSTALLED AND CLEANED IN ACCORDANCE WITH THE MANUFACTURERS PRINTED INSTALLATION INSTRUCTIONS (MPII).
22. INSTALLATION OF ADHESIVE ANCHORS HORIZONTALLY OR UPWARDLY INCLINED TO SUPPORT SUSTAINED TENSION LOADS SHALL BE PERFORMED BY PERSONNEL CERTIFIED BY THE ACI/CRSI ADHESIVE ANCHOR INSTALLER CERTIFICATION PROGRAM. THESE ANCHORS ARE DESIGNATED WITH A (CERT) AFTER THE ANCHOR CALL-OUT. THESE ANCHORS SHALL BE CONTINUOUSLY INSPECTED DURING INSTALLATION BY AN INSPECTOR SPECIALLY APPROVED FOR THAT PURPOSE BY THE BUILDING OFFICIAL.
23. THE INSTALLERS QUALIFICATIONS SHALL BE SUBMITTED AND APPROVED IN ACCORDANCE WITH THE SPECIFICATIONS.
24. INSTALLED ADHESIVE ANCHORS SHALL BE SECURELY FIXED IN-PLACE TO PREVENT DISPLACEMENT WHILE THE ADHESIVE CURES. UNLESS SHOWN OTHERWISE WITHIN THE DRAWINGS, ANCHORS SHALL BE INSTALLED PERPENDICULAR TO THE CONCRETE SURFACE. ANCHORS DISPLACED PRIOR TO ADHESIVE CURING SHALL BE CONSIDERED DAMAGED AND ARE THE RESPONSIBILITY OF THE CONTRACTOR.
25. REINFORCING BARS OR ALL-THREADED BARS SHALL NOT BE BENT AFTER BEING ADHESIVELY EMBEDDED IN HARDENED, SOUND CONCRETE, UNLESS PERMITTED BY THE ENGINEER.

ANCHOR ROD SPECIFICATIONS

CCI PART #	DIAMETER (IN.)	QUANTITY	MATERIAL	HOLE DIAMETER (IN.)	TARGET TENSION LOAD (KIPS)
CCI-AR-0175	1 3/4	2	A193 GR B7	2	111

EPOXY	HILTI RE-500 V3
EMBEDMENT DEPTH (IN.)[3]	46
INSTALLED LENGTH (IN.)[5]	89

BRACKET DIMENSIONS

HEIGHT (IN.)	BASE WIDTH (IN.)	BRACKET QUANTITY	PLATE THICKNESS (IN.)	HSS SIZE	HSS WELD LENGTH (IN.)	WASHER PLATE SIZE (IN.)	BEARING PLATE SIZE (IN.)	MAX. GAP (IN.)
48	27 1/2	2	1 1/4	4x4x1/2	18	4-1/2x4-1/2x1-1/4	10x10x2	5 1/4

NOTES:
1. ALL SIZES AND QUANTITIES SHALL BE VERIFIED PRIOR TO FABRICATION. CONTRACTOR IS REQUIRED TO PROVIDE FINAL SHOP DRAWINGS TO ENGINEER FOR APPROVAL.
2. ALL DIMENSIONS/MEASUREMENTS ARE SHOWN IN INCHES.
3. ALL CORE DRILLED HOLES SHALL BE MECHANICALLY ROUGHENED PRIOR TO INSTALLATION OF THE NEW ANCHOR RODS.
4. AFTER ANCHOR ROD PROOF TESTING IS COMPLETE, INSTALL NUTS TO SNUG TIGHT PLUS 1/4 TURN BEFORE INSTALLING SECOND NUT FOR TOP CONNECTION.
5. CONTRACTOR SHALL FIELD VERIFY THE TOTAL REQUIRED LENGTH PRIOR TO INSTALLATION.

NO.	DATE	DESCRIPTION	BY

REVISIONS

STATE OF CONNECTICUT · CHRISTOPHER J. SCHEKS · No. 30026 · LICENSED PROFESSIONAL ENGINEER

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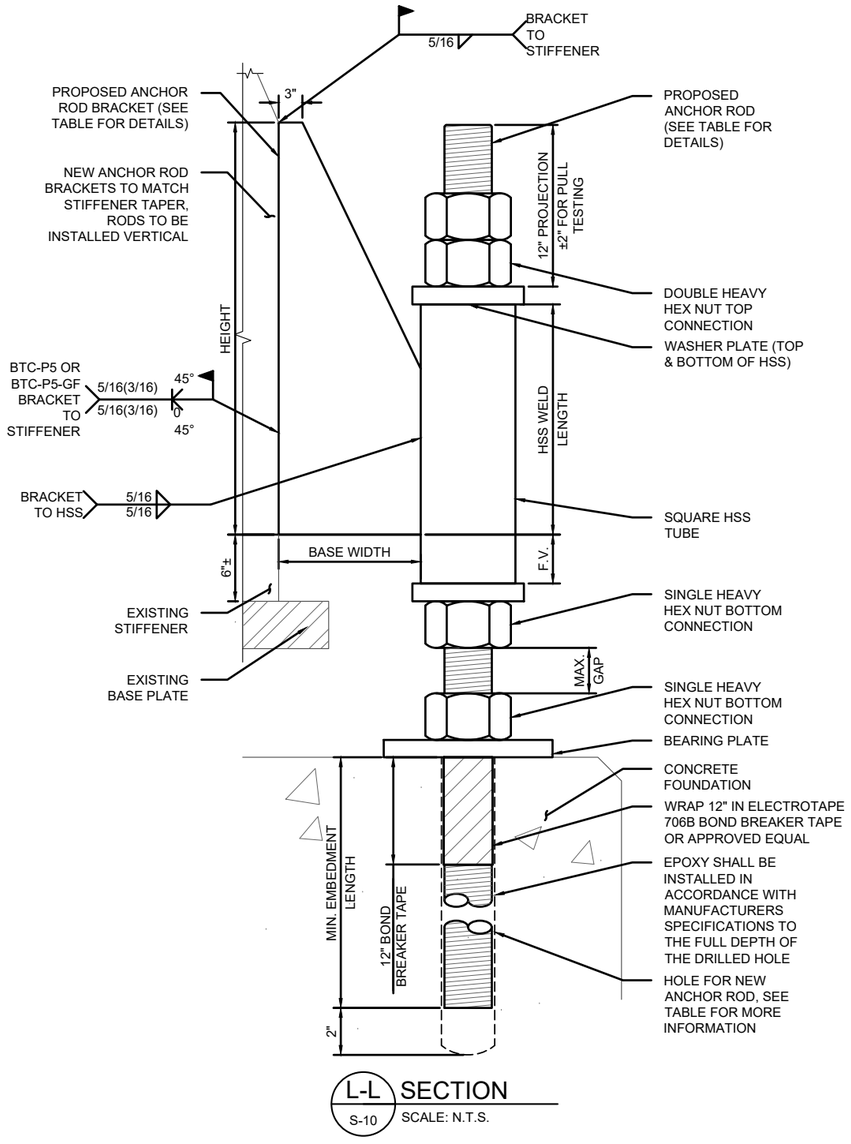
ADDITIONAL SECTIONS

S-9

REV 0



L-L / S-10 SECTION

SCALE: N.T.S.

ANCHOR ROD SPECIFICATIONS

CCI PART #	DIAMETER (IN.)	QUANTITY	MATERIAL	HOLE DIAMETER (IN.)	TARGET TENSION LOAD (KIPS)
CCI-AR-0175	1 3/4	4	A193 GR B7	2	111

EPOXY	HILTI RE-500 V3
EMBEDMENT DEPTH (IN.)[3]	46
INSTALLED LENGTH (IN.)[5]	89

BRACKET DIMENSIONS

HEIGHT (IN.)	BASE WIDTH (IN.)	BRACKET QUANTITY	PLATE THICKNESS (IN.)	HSS SIZE	HSS WELD LENGTH (IN.)	WASHER PLATE SIZE (IN.)	BEARING PLATE SIZE (IN.)	MAX. GAP (IN.)
36	21 1/2	4	1 1/4	4x4x1/2	18	4-1/2x4-1/2x1-1/4	10x10x2	5 1/4

NOTES:
1. ALL SIZES AND QUANTITIES SHALL BE VERIFIED PRIOR TO FABRICATION. CONTRACTOR IS REQUIRED TO PROVIDE FINAL SHOP DRAWINGS TO ENGINEER FOR APPROVAL.
2. ALL DIMENSIONS/MEASUREMENTS ARE SHOWN IN INCHES.
3. ALL CORE DRILLED HOLES SHALL BE MECHANICALLY ROUGHENED PRIOR TO INSTALLATION OF THE NEW ANCHOR RODS.
4. AFTER ANCHOR ROD PROOF TESTING IS COMPLETE, INSTALL NUTS TO SNUG TIGHT PLUS 1/4 TURN BEFORE INSTALLING SECOND NUT FOR TOP CONNECTION.
5. CONTRACTOR SHALL FIELD VERIFY THE TOTAL REQUIRED LENGTH PRIOR TO INSTALLATION.

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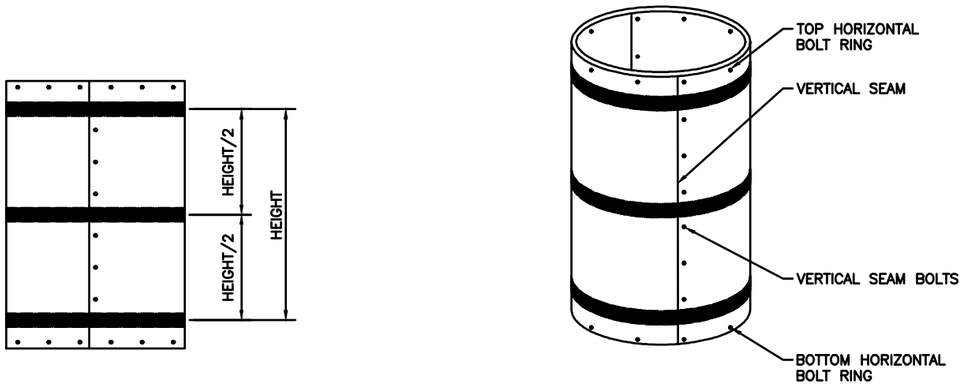
ADDITIONAL SECTIONS

S-10

REV 0

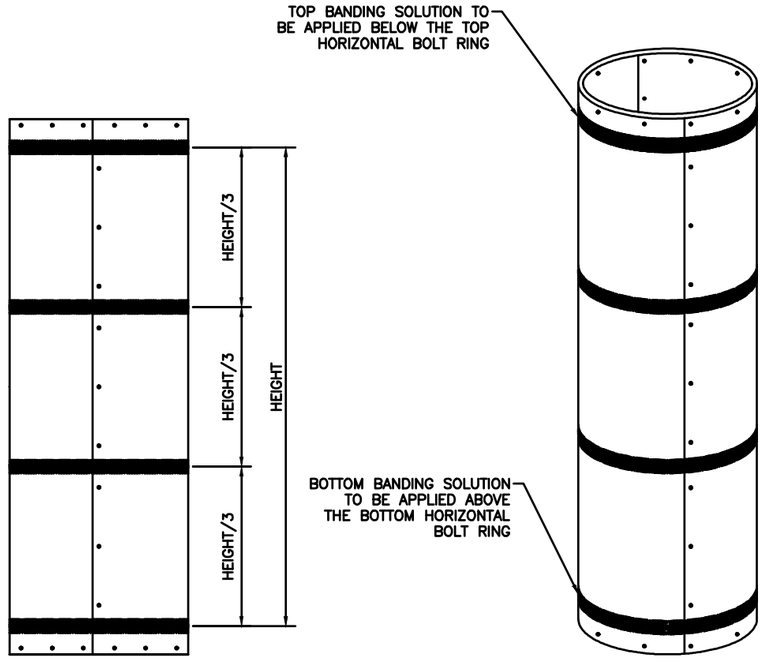
CONCEALMENT REINFORCEMENT SOLUTION – PARTS LIST

NO.	MANUFACTURER	DESCRIPTION	SIZE	PRODUCT NO.
(1)	USA STRAPPING	WOVEN POLYESTER STRAPPING	3/4"x250 FT. COIL	2700–34
(2)	MCNETT GEAR AID	DUAL–ADJUST BUCKLE	3/4" SIZE	80355
(3)	BUNKER INDUSTRIES	HURRICANE TAPE	3"x60 YD. ROLL	00101
(4)	RUST–OLEUM	GLOSS CLEAR SPRAY	12 OZ.	249117



≤ 10'–0" CONCEALMENT COVER LEVEL HEIGHT

NOT TO SCALE



> 10'–0" CONCEALMENT COVER LEVEL HEIGHT

NOT TO SCALE

NOTES:

1.) THE REINFORCEMENT SOLUTION IS ONLY TO BE APPLIED TO VERTICALLY-FASTENED MULTI-PANEL OR "SECTORIZED" CONCEALMENT COVERS. SOLID ONE-PIECE CONCEALMENT COVERS ARE NOT TO BE TREATED WITH THIS SOLUTION.

2.) FOR CONCEALMENT COVER LEVELS MEASURING 10 FT. IN HEIGHT OR LESS, (3) EQUALLY-SPACED BANDING APPLICATIONS ARE TO BE INSTALLED AT THE TOP, MID-SPAN, AND BOTTOM REGIONS. FOR LEVELS GREATER THAN 10 FT. IN HEIGHT, (4) EQUALLY-SPACED BANDING APPLICATIONS ARE TO BE INSTALLED, AT THE TOP, UPPER MIDDLE, LOWER MIDDLE, AND BOTTOM REGIONS.

3.) FOR CONCEALMENT COVERS OF ALL HEIGHTS, THE TOP BANDING APPLICATION IS TO BE POSITIONED DIRECTLY BELOW THE TOP CONCEALMENT COVER HORIZONTAL BOLT RING AND THE BOTTOM BANDING APPLICATION DIRECTLY ABOVE THE BOTTOM HORIZONTAL BOLT RING.

4.) BANDING APPLICATION SHALL NOT COVER ANY VERTICAL OR HORIZONTAL FASTENERS.

INSTALLATION:

1.) STRAPPING IS TO BE LOOPED AROUND THE CONCEALMENT COVER AND EACH CUT END OF THE STRAPPING FED AROUND A CROSS BAR ON EACH END OF THE DUAL-ADJUST BUCKLE.

2.) STRAPPING IS TO BE HAND-TIGHTENED USING THE BUCKLE SUCH THAT THE STRAPPING LIES FLAT, UNTWISTED, AND SQUARE TO THE CONCEALMENT COVER.

3.) AT LEAST (2) CONTINUOUS LAYERS OF HURRICANE TAPE ARE TO BE APPLIED ON TOP OF THE TIGHTENED STRAPPING SUCH THAT NO TAIL OF THE STRAPPING IS SHOWING OUTSIDE THE LAYERS OF TAPE.

4.) THE CURRENT DATE IS TO BE MARKED WITH PERMANENT INK ON THE TOP LAYER OF TAPE TO RECORD INSTALLATION DATE.

5.) ENSURE THAT THE SURFACE OF THE CANISTER IS FREE FROM OIL, GREASE, SOIL, DIRT, AND OTHER FOREIGN MATTER. THE SURFACE SHALL BE CLEAN, DRY AND SMOOTH TO RECEIVE THE STRAPPING AND THE TAPE.

6.) HURRICANE TAPE SHALL BE TACKED DOWN BY APPLYING (2) COATS OF NON-YELLOWING CLEAR COAT SPRAY OVER THE TAIL END OF THE TAPE AFTER IT IS SECURELY TAPED DOWN. SECOND COAT SHALL BE APPLIED ONCE THE FIRST COAT IS DRY TO TOUCH

PAINTING HURRICANE TAPE [IF REQUIRED]:

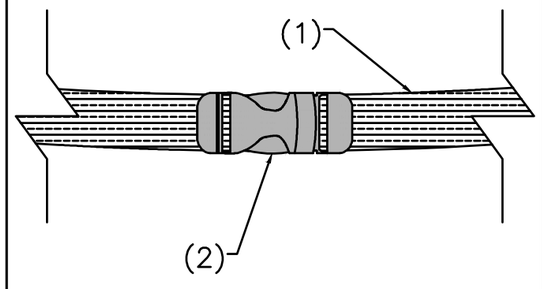
1.) AFTER FULL INSTALLATION OF THE THE REINFORCEMENT SOLUTION, THE TAPE SHALL BE COATED TO MATCH THE COLOR OF THE EXISTING CONCEALMENT CANISTER

1.1) AS AN EXAMPLE, IF THE EXISTING CONCEALMENT CANISTER IS WHITE, PAINTING WOULD NOT BE REQUIRED SINCE THE TAPE COLOR IS ALSO WHITE. HOWEVER, IF THE CANISTER IS BLACK, PAINT THE TAPE TO MATCH THE CANISTER COLOR.

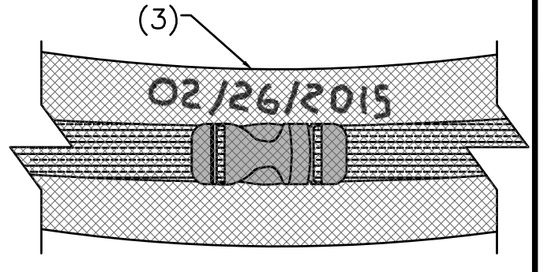
2.) PAINT SHALL BE APPLIED WITH A BRUSH FOR A CLEAN EDGE ON THE TAPE. SPRAY PAINT IS PERMISSIBLE PROVIDED THAT PAINTER'S TAPE IS UTILIZED TO AVOID PAINTING THE CANISTER. SECOND COAT SHALL BE APPLIED AFTER THE FIRST COAT IS DRY. THE SHEEN OF THE PAINT SHALL MATCH THE CANISTER

3.) THE INSTALLATION DATE SHALL BE MARKED ON TOP OF THE COATED SURFACE.

STRAPPING INSTALLATION DETAIL



TAPE INSTALLATION DETAIL



CROWN CASTLE CONCEALMENT REINFORCEMENT SOLUTION

SCALE: N.T.S. REV C

CARRIERS LOGO

CROWN CASTLE

2000 CORPORATE DRIVE
CANONSBURG PA, 15317

SPACE RESERVED FOR PROFESSIONAL SEALS

FOR REFERENCE ONLY

REVISIONS			
NO.	DATE	DESCRIPTION	BY
1	02/06/15	CONCEALMENT SOLUTION	MJ
2	02/04/16	CONCEALMENT SOLUTION	MJ
3	01/06/17	CONCEALMENT SOLUTION	MJ

DRAWN BY: MAJ
CHECKED BY:
DRAWING DATE: 02/04/16

SHEET TITLE

TYPE

SHEET NUMBER

OPS-PRC-10127

PLOT DATE: PLOTDATE FILE NAME: FILEN

Exhibit E

Power Density/RF Emissions Report

Radio Frequency Emissions Analysis Report

T-MOBILE Existing Facility

Site ID: CT11307C

Stonington
82 Mechanic Street
Pawcatuck, CT 06379

June 13, 2019

Transcom Engineering Project Number: 737001-0160

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**2.16 %**

June 13, 2019

T-MOBILE
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 6009

Emissions Analysis for Site: **CT11307C – Stonington**

Transcom Engineering, Inc ("Transcom") was directed to analyze the proposed upgrades to the T-MOBILE facility located at **82 Mechanic Street, Pawcatuck, 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 population 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 population 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.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz & 700 MHz bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (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 performed for the proposed upgrades to the T-MOBILE antenna facility located at **82 Mechanic Street, Pawcatuck, 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 for directional panel antennas, 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.

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. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	1900 MHz (PCS)	1	40
LTE	2100 MHz (AWS)	2	60
GSM	1900 MHz (PCS)	1	15
LTE / 5G NR	600 MHz	2	40
LTE	700 MHz	2	20

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 600 MHz, 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, 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.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	RFS APXVA18_43-C-NA20	147
A	2	RFS APXV18-206516S-C-A20	139
B	1	RFS APXVA18_43-C-NA20	147
B	2	RFS APXV18-206516S-C-A20	139
C	1	RFS APXVA18_43-C-NA20	147
C	2	RFS APXV18-206516S-C-A20	139

Table 2: Antenna Data

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

Cable losses were factored in the calculations for this site. Since all of the proposed radios are ground mounted the following cable loss values were used. For each ground mounted **600 MHz** radio there was **0.93 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **700 MHz** radio there was **1.01 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **1900 MHz (PCS)** radio there was **1.85 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **2100 MHz (AWS)** radio there was **1.91 dB** of cable loss calculated into the system gains / losses for this site. These values were calculated based upon the manufacturers specifications for **180 feet** of **1-5/8”** coax.

RESULTS

Per the calculations completed for the proposed T-MOBILE configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	RFS APXVA18_43-C-NA20	600 MHz / 700 MHz	12.05 / 12.55	4	120	1,605.60	0.69
Antenna A2	RFS APXV18-206516S-C-A20	1900 MHz (PCS) / 2100 MHz (AWS)	16.3 / 16.3	4	175	4,829.84	0.98
						Sector A Composite MPE%	**1.67**
Antenna B1	RFS APXVA18_43-C-NA20	600 MHz / 700 MHz	12.05 / 12.55	4	120	1,605.60	0.69
Antenna B2	RFS APXV18-206516S-C-A20	1900 MHz (PCS) / 2100 MHz (AWS)	16.3 / 16.3	4	175	4,829.84	0.98
						Sector B Composite MPE%	**1.67**
Antenna C1	RFS APXVA18_43-C-NA20	600 MHz / 700 MHz	12.05 / 12.55	4	120	1,605.60	0.69
Antenna C2	RFS APXV18-206516S-C-A20	1900 MHz (PCS) / 2100 MHz (AWS)	16.3 / 16.3	4	175	4,829.84	0.98
						Sector C Composite MPE%	**1.67**

Table 3: T-MOBILE Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum T-MOBILE MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each T-MOBILE Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	**MPE%**
T-MOBILE – Max Per Sector Value	**1.67 %**
AT&T	0.49 %
Site Total MPE %:	**2.16 %**

Table 4: All Carrier MPE Contributions

T-MOBILE Sector A Total:	1.67 %
T-MOBILE Sector B Total:	1.67 %
T-MOBILE Sector C Total:	1.67 %
Site Total:	2.16 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated T-MOBILE sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

T-MOBILE _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile 600 MHz LTE / 5G NR	2	517.68	147	1.87	600 MHz	400	0.47%
T-Mobile 700 MHz LTE	2	285.12	147	1.03	700 MHz	467	0.22%
T-Mobile 1900 MHz (PCS) UMTS	1	1,114.45	139	2.26	1900 MHz (PCS)	1000	0.23%
T-Mobile 2100 MHz (AWS) LTE	2	1,648.74	139	6.70	2100 MHz (AWS)	1000	0.67%
T-Mobile 1900 MHz (PCS) GSM	1	417.92	139	0.85	1900 MHz (PCS)	1000	0.08%
						Total:	**1.67%**

Table 6: T-MOBILE Maximum Sector MPE Power Values

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population 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 population exposure to RF Emissions are shown here:

T-MOBILE Sector	Power Density Value (%)
Sector A:	1.67 %
Sector B:	1.67 %
Sector C:	1.67 %
T-MOBILE Maximum Total (per sector):	1.67 %
Site Total:	2.16 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **2.16 %** of the allowable FCC established general population 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
Transcom Engineering, Inc
PO Box 1048
Sterling, MA 01564