STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

VIA ELECTRONIC MAIL

August 27, 2018

Romina Kirchmaier
Real Estate Specialist for Smartlink
85 Rangeway Road
Building 3, Suite 102
Billerica, MA 01862

RE: **EM-AT&T-166-180412** – AT&T notice of intent to modify an existing telecommunications facility located at 347 East Street, Wolcott, Connecticut.

Dear Ms. Kirchmaier:

The Connecticut Siting Council (Council) is in receipt of your correspondence of August 20 and 21, 2018 submitted in response to the Council's August 3 and 16, 2018 notifications of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/MP/emr

Robidoux, Evan

From: Romina Kirchmaier <romina.kirchmaier@smartlinkllc.com>
Sent: Tuesday, August 21, 2018 4:08 PM
To: Perrone, Michael
Cc: CSC-DL Siting Council; Sharon Keefe
Subject: RE: Council Incomplete Letter for EM-AT&T-166-180412-EastSt-Wolcott

Hi Michael,

Crown has advised that Verizon did not install the equipment that they had initially filed with, and instead went with the following configuration:

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
177.0	177.0	3	Alcatel Lucent	RRH2X60-AWS	2	1-5/8	1
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2x60-700			
		6	Commscope	SBNHH-1D45B			
		3	Commscope	SBNHH-1D65B			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Unfortunately, I cannot provide any additional documentation in regards to Verizon's equipment as Crown will not release this information to me, however, if you'd like, I can put you in touch with the POC I've been communicating with regarding this issue directly.

Please let me know if there is anything else I can do to assist.

Thanks!

Romina Kirchmaier | Real Estate Specialist
Smartlink
85 Rangeway Road
Building 3, Suite 102
Billerica, MA 01862
(m) 617.908.4296
smartlinkllc.com

From: Perrone, Michael
Sent: Monday, August 20, 2018 3:02 PM
To: Romina Kirchmaier
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-AT&T-166-180412-EastSt-Wolcott

Ms. Kirchmaier:

Verizon's approved loading/inventory for EM-VER-166-150709 is noted below.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model
177.0	177.0	3	alcatel lucent	RRH2X60-AWS
		3	alcatel lucent	RRH2X60-PCS
		3	alcatel lucent	RRH2x60-700
		3	commscope	HBXX-6517DS-A2M Mount Pipe
		6	commscope	SBNHH-1D65B w/ Mo Pipe
		1	rfs/celwave	DB-T1-6Z-8AB-0Z

However, the structural analysis that AT&T has provided (dated July 10, 2018 and listed below) shows the following loading for Verizon at 177 feet. The remote radio head inventory is perfectly consistent. However, Verizon's HBXX-6517DS antennas (quantity 3) do not appear in the inventory listed below. Also, Verizon's SBNHH-1D65B antennas (quantity 6) do not exactly match, as only three SBNHH-1D65Bs are listed below.

177.0	177.0	3	alcatel lucent	RRH2X60-AWS
		3	alcatel lucent	RRH2X60-PCS
		3	alcatel lucent	RRH2x60-700
		2	andrew	DB846F65ZAXY w/ Mou Pipe
		2	antel	LPA-80063/6CFx5 w/ Mount Pipe
		6	commscope	SBNHH-1D45B w/ Mou Pipe
		3	commscope	SBNHH-1D65B w/ Mou Pipe
		2	rfs celwave	DB-T1-6Z-8AB-0Z
		2	swedcom	SC-E 6014 rev2 w/ Mou Pipe
		1	tower mounts	Sector Mount [SM 504-

If you could please check on this and email a response to the Council, it would be much appreciated.

Thank you.

Michael Perrone
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051
Phone: 860-827-2943
Fax: 860-827-2950
Email: Michael.perrone@ct.gov

From: Romina Kirchmaier [mailto:romina.kirchmaier@smartlinkllc.com]
Sent: Monday, August 20, 2018 2:21 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-AT&T-166-180412-EastSt-Wolcott

Hi Evan,

I've reached out to Crown regarding this issue, and they advised that Verizon decided to swap the antennas and that the CSC approved this modification. Verizon's antennas on this structural are indeed accurate. Please see the attached CSC approval for Verizon's project.

Thanks!

Romina Kirchmaier | Real Estate Specialist
Smartlink
85 Rangeway Road
Building 3, Suite 102
Billerica, MA 01862
(m) 617.908.4296
smartlinkllc.com

From: Robidoux, Evan <Evan.Robidoux@ct.gov>
Sent: Monday, August 20, 2018 12:50 PM
To: Romina Kirchmaier <romina.kirchmaier@smartlinkllc.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for EM-AT&T-166-180412-EastSt-Wolcott

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Robidoux, Evan

From: Romina Kirchmaier <romina.kirchmaier@smartlinkllc.com>
Sent: Monday, August 20, 2018 2:21 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-AT&T-166-180412-EastSt-Wolcott
Attachments: em-ver-166-150709-dcltr-eastst.pdf; em-at&t-166-180412_3rdincompleteltr_eastst.pdf; 10035040_DE113_180720_CTL01060 - Passing SA.PDF

Hi Evan,

I've reached out to Crown regarding this issue, and they advised that Verizon decided to swap the antennas and that the CSC approved this modification. Verizon's antennas on this structural are indeed accurate. Please see the attached CSC approval for Verizon's project.

Thanks!

Romina Kirchmaier | Real Estate Specialist
Smartlink
85 Rangeway Road
Building 3, Suite 102
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(m) 617.908.4296
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From: Robidoux, Evan
Sent: Monday, August 20, 2018 12:50 PM
To: Romina Kirchmaier
Cc: CSC-DL Siting Council
Subject: Council Incomplete Letter for EM-AT&T-166-180412-EastSt-Wolcott

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

STATE OF CONNECTICUT

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www.ct.gov/csc

August 3, 2015

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-166-150709 –** Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at East Street (aka Route 322), Wolcott, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- Any nonfunctioning antenna and associated antenna mounting equipment on this facility owned and operated by Cellco shall be removed within 60 days of the date the antenna ceased to function;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration.

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated July 8, 2015. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site by any dimension, increase noise levels at the tower site boundary by six decibels or more, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standards adopted by the Federal Communications Commission pursuant to Section 704 of the Telecommunications Act of 1996 and by the state Department of Energy and Environmental Protection pursuant to Connecticut General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below state and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CMW/lm

c: The Honorable Thomas G. Dunn, Mayor, Town of Wolcott
David Kalinowski, Zoning Enforcement Officer, Town of Wolcott
Crown Castle USA, Inc.
Augostinho and Joanne Rodrigues, Property Owners

STATE OF CONNECTICUT
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August 16, 2018

Romina Kirchmaier
Smartlink LLC
85 Rangeway Road
Building 3, Suite 102
Billerica, MA 08132

RE: **EM-AT&T-166-180412** – AT&T notice of intent to modify an existing telecommunications facility located at 347 East Street, Wolcott, Connecticut.

Dear Ms. Kirchmaier:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on April 12, 2018. On August 3, 2018, the Council issued a letter stating that your filing was incomplete because the Structural Analysis Report provided in the response to the first incomplete letter referred to modification drawings and appendices which were not included in the filing. On August 14, 2018 the Council received the requested modification drawings and appendices. However, staff has identified an additional deficiency in the filing.

The Council acknowledged a Verizon exempt modification on August 3, 2015 with a Structural Analysis Report dated June 22, 2015. The July 10, 2018 Structural Analysis Report provided with your filing does not fully account for Verizon's equipment. Please refer to Verizon's July 8, 2015 request for exempt modification for this facility (EM-VER-166-150709) available on the Council's website at the following link:

http://www.ct.gov/csc/lib/csc/ems/wolcott/eastst/verizon/em-ver-166-150709_filing_eastst.pdf

Therefore, the exempt modification filing remains incomplete at this time. The Council recommends that Smartlink provide an updated structural analysis report accounting for Verizon's approved equipment, as well as any required tower/mount modifications on or before September 19, 2018. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to September 19, 2018.

This notice of incompletion shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

Melanie Bachman
Executive Director

MAB/MP/IN

c: The Honorable Thomas G. Dunn, Mayor, Town of Wolcott
David Kalinowski, Zoning Inspector, Town of Wolcott

Date: **July 10, 2018**

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

Jacobs Engineering Group, Inc.
5449 Bells Ferry Road
Acworth, GA 30102
770-701-2500

Subject: **Structural Modification Report**

Carrier Designation: ***AT&T Mobility* Co-Locate**
Carrier Site Number: 10035040
Carrier Site Name: WOLCOTT - EAST ST.

Crown Castle Designation:
Crown Castle BU Number: 806362
Crown Castle Site Name: NHV 108 943133
Crown Castle JDE Job Number: 508676
Crown Castle Work Order Number: 1588046
Crown Castle Order Number: 443181 Rev. 0

Engineering Firm Designation: **Jacobs Engineering Group, Inc. Project Number:** 1588046

Site Data: **INTERSECTION OF RTE 322/MERIDIAN RDWOLCOTT SITE, WOLCOTT, New Haven County, CT**
Latitude *41° 33' 34.41"*, Longitude *-72° 56' 49.1"*
180 Foot - Self Support Tower

Dear Timothy Howell,

Jacobs Engineering Group, Inc. is pleased to submit this **"Structural Modification Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the *Crown Castle* Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1202724, in accordance with order 443181, revision 0.

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

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, Kzt of 1.624 and Risk Category II were used in this analysis.

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

Jacobs Engineering Group, Inc. appreciates the opportunity to provide continuing professional services to you and *Crown Castle*. If you have any questions or need further assistance on this or any other projects, please give us a call.

Structural modification prepared by:

Philip Lin
Tower Structural Engineer

tnxTower Report - version 8.0.2.1

Engineer of Record:
2018-07-10
T14:13:41-04:00

Paul L. Mucci, P.E.
Senior Project Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by ROHN in September of 1986. The tower was originally designed per EIA-222-E. The original design wind speed is unavailable.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas using a 3-second gust wind speed of 97 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category C with topographic category 5 and crest height of 530 feet.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
158.0	160.0	3	ericsson	RRUS 32 B2	-	-	-
		6	kaelus	DBC0061F1V51-2			
		2	quintel technology	QS66512-2 w/ Mount Pipe			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
180.0	186.0	3	rfs celwave	ATMAA1412D-1A20	12	1-5/8	1
		3	commscope	ATBT-BOTTOM-24V	6	1-5/8	2
		3	commscope	SBNHH-1D65A w/ Mount Pipe			
	182.0	3	rfs celwave	ATMAA1412D-1A20			
177.0	177.0	3	alcatel lucent	RRH2X60-AWS	13	1-5/8	1
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		2	andrew	DB846F65ZAXY w/ Mount Pipe			
		2	antel	LPA-80063/6CFx5 w/ Mount Pipe			
		6	commscope	SBNHH-1D45B w/ Mount Pipe			
		3	commscope	SBNHH-1D65B w/ Mount Pipe			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			
		2	swedcom	SC-E 6014 rev2 w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 504-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
168.0	168.0	1	dragonwave	A-ANT-18G-2-C	1	7983A	1
		1	andrew	VHLP2-18			
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	4	1-1/4	2
		6	alcatel lucent	RRH2x50-800			
		3	commscope	NNVV-65B-R4			
		3	nokia	AAHC			
		1	tower mounts	Sector Mount [SM 402-3]			
158.0	160.0	1	andrew	SBNH-1D6565C w/ Mount Pipe	12 4 2	1-1/4 3/4 3/8	1
		1	cci antennas	TPA-65R-LCUUUU-H8 w/ Mount Pipe			
		3	ericsson	RRUS 32			
		2	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		6	cci antennas	TPX-070821	-	-	3
		3	ericsson	RRU-12			
		2	quintel technology	QS66512-3 w/ Mount Pipe			
	158.0	3	ericsson	RRUS-11			
		3	communication components inc.	DTMABP7819VG12A	-	-	1
		3	ericsson	RRUS 11			
		3	powerwave technologies	7020.00			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Sector Mount [SM 504-3]			
40.0	40.0	1	gps	GPS_A	1	1/2	1
		1	tower mounts	Side Arm Mount [SO 306-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed; Not Considered In This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180.0	180.0	4	rfs celwave	PD10017	-	-
170.0	170.0	3	rfs celwave	PD1132D	-	-
160.0	160.0	2	generic	6' STD Dish	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering, Inc.	2303630	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn	217670	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn	529684	CCISITES
4-EXPOSURE CATEGORY / TOPOGRAPHIC FACTOR	Crown Castle	5965877	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.2.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) The existing base plate grout was not considered in this analysis.
5) Tower modifications outlined in Appendix D must be installed for this analysis to be valid.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 160	Leg	ROHN 2.5 STD	1	-22.458	45.528	49.3	Pass
T2	160 - 140	Leg	ROHN 3 X-STR	42	-81.342	94.336	86.2	Pass
T3	140 - 133.333	Leg	ROHN 4 X-STR	81	-100.965	159.904	63.1	Pass
T4	133.333 - 126.667	Leg	ROHN 4 X-STR	96	-120.272	159.904	75.2	Pass
T5	126.667 - 120	Leg	ROHN 4 X-STR	111	-139.314	159.904	87.1	Pass
T6	120 - 100	Leg	ROHN 5 X-STR	126	-184.503	201.195	91.7	Pass
T7	100 - 90	Leg	P 5 XS w HSS 6.625x0.500 Half Pipe	153	-210.843	311.932	67.6	Pass
T8	90 - 80	Leg	P 5 XS w HSS 6.625x0.500 Half Pipe	168	-234.339	311.932	75.1	Pass
T9	80 - 70	Leg	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	183	-257.413	348.724	73.8	Pass
T10	70 - 60	Leg	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	198	-280.946	348.724	80.6 82.0 (b)	Pass
T11	60 - 50	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	213	-304.309	403.375	75.4	Pass
T12	50 - 40	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	228	-327.692	403.375	81.2 95.3 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T13	40 - 30	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	243	-350.932	403.328	87.0	Pass
T14	30 - 20	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	258	-372.908	403.328	92.5	Pass
T15	20 - 0	Leg	Rohn 8 EHS w HSS9.625x0.375 Half Pipe	273	-393.171	547.818	71.8	Pass
T1	180 - 160	Diagonal	ROHN 2 STD	12	-11.437	17.637	64.8	Pass
T2	160 - 140	Diagonal	ROHN 2 STD	48	-14.149	15.187	93.2	Pass
T3	140 - 133.333	Diagonal	ROHN 2 STD	87	-14.205	14.601	97.3	Pass
T4	133.333 - 126.667	Diagonal	P 2 STD w HSS 2.875x0.250 Half Pipe	103	-14.319	18.3712	74.1	Pass
T5	126.667 - 120	Diagonal	P 2 STD w HSS 2.875x0.250 Half Pipe	118	-14.387	17.702	77.8	Pass
T6	120 - 100	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	132	-17.921	24.746	81.3	Pass
T7	100 - 90	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	159	-16.729	23.802	72.3	Pass
T8	90 - 80	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	175	-16.960	22.221	76.3	Pass
T9	80 - 70	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	189	-17.765	20.246	83.6	Pass
T10	70 - 60	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	204	-18.105	20.246	91.1	Pass
T11	60 - 50	Diagonal	P 2.5 XS w HSS 3.500x0.300 Half Pipe	219	-18.675	22.664	82.4	Pass
T12	50 - 40	Diagonal	P 2.5 XS w HSS 3.500x0.300 Half Pipe	234	-19.024	21.226	89.6	Pass
T13	40 - 30	Diagonal	ROHN 3 STD	249	-18.781	20.586	91.2	Pass
T14	30 - 20	Diagonal	ROHN 3 STD	264	-19.024	19.246	98.8	Pass
T15	20 - 0	Diagonal	ROHN 3 STD	285	-30.066	32.170	93.5	Pass
T1	180 - 160	Horizontal	ROHN 1.5 STD	10	-6.119	22.564	27.1	Pass
T2	160 - 140	Horizontal	ROHN 1.5 STD	46	-8.759	19.143	45.8	Pass
T3	140 - 133.333	Horizontal	ROHN 2 STD	85	-9.131	30.720	29.7 36.8 (b)	Pass
T6	120 - 100	Horizontal	ROHN 2 STD	130	-11.053	22.627	48.8	Pass
T7	100 - 90	Horizontal	ROHN 2 STD	157	-11.169	19.805	56.4	Pass
T9	80 - 70	Horizontal	ROHN 2.5 STD	187	-12.331	32.891	37.5 49.6 (b)	Pass
T10	70 - 60	Horizontal	ROHN 2.5 STD	202	-13.025	29.084	44.8 52.4 (b)	Pass
T11	60 - 50	Horizontal	ROHN 2.5 STD	217	-13.781	25.460	54.1 55.5 (b)	Pass
T12	50 - 40	Horizontal	ROHN 2.5 STD	232	-14.313	22.473	63.7	Pass
T13	40 - 30	Horizontal	ROHN 2.5 STD	247	-14.729	19.983	73.7	Pass
T14	30 - 20	Horizontal	ROHN 2.5 STD	262	-14.651	17.780	82.4	Pass
T15	20 - 0	Horizontal	ROHN 3 STD	281	-16.598	31.409	52.8	Pass
T1	180 - 160	Top Girt	ROHN 1.5 STD	5	-2.395	22.635	10.6	Pass
T4	133.333 - 126.667	Top Girt	ROHN 2 STD	98	-9.571	29.069	32.9 38.5 (b)	Pass
T5	126.667 - 120	Top Girt	ROHN 2 STD	113	-9.937	27.195	36.5 40.0 (b)	Pass
T8	90 - 80	Top Girt	ROHN 2 STD	170	-11.474	16.954	67.7	Pass
T15	20 - 0	Redund Horz 1 Bracing	ROHN 1.5 x 11GA	292	-1.355	5.637	24.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T15	20 - 0	Redund Diag 1 Bracing	ROHN 1.5 STD	293	-1.272	4.141	30.7	Pass
T15	20 - 0	Redund Hip 1 Bracing	ROHN 1.5 x 11GA	288	-0.035	4.941	0.7	Pass
T15	20 - 0	Redund Hip Diagonal 1 Bracing	ROHN 2.5 STD	289	-0.102	10.600	1.0	Pass
T1	180 - 160	Inner Bracing	L2x2x1/8	18	-0.007	6.529	0.6	Pass
T2	160 - 140	Inner Bracing	L2x2x1/8	54	-0.007	4.871	0.7	Pass
T3	140 - 133.333	Inner Bracing	L2x2x1/8	93	-0.010	4.255	0.8	Pass
T4	133.333 - 126.667	Inner Bracing	L2x2x1/8	108	-0.009	3.749	0.8	Pass
T5	126.667 - 120	Inner Bracing	L2x2x1/8	123	-0.009	3.328	0.8	Pass
T6	120 - 100	Inner Bracing	L2x2x1/8	138	-0.010	2.510	1.0	Pass
T7	100 - 90	Inner Bracing	L2 1/2x2 1/2x3/16	165	-0.012	6.199	0.7	Pass
T8	90 - 80	Inner Bracing	L2 1/2x2 1/2x3/16	180	-0.012	5.252	0.7	Pass
T9	80 - 70	Inner Bracing	L3x3x3/16	195	-0.014	7.896	0.5	Pass
T10	70 - 60	Inner Bracing	L3x3x3/16	210	-0.014	6.881	0.6	Pass
T11	60 - 50	Inner Bracing	L3 1/2x3 1/2x1/4	225	-0.016	12.717	0.5	Pass
T12	50 - 40	Inner Bracing	L3 1/2x3 1/2x1/4	240	-0.017	11.267	0.5	Pass
T13	40 - 30	Inner Bracing	L3 1/2x3 1/2x1/4	255	-0.019	10.052	0.5	Pass
T14	30 - 20	Inner Bracing	L3 1/2x3 1/2x1/4	270	-0.020	8.973	0.5	Pass
T15	20 - 0	Inner Bracing	ROHN 3 STD	301	-0.022	29.869	0.3	Pass
							Summary	
						Leg (T12)	95.3	Pass
						Diagonal (T14)	98.8	Pass
						Horizontal (T14)	82.4	Pass
						Top Girt (T8)	67.7	Pass
						Redund Horz 1 Bracing (T15)	24.0	Pass
						Redund Diag 1 Bracing (T15)	30.7	Pass
						Redund Hip 1 Bracing (T15)	0.7	Pass
						Redund Hip Diagonal 1 Bracing (T15)	1.0	Pass
						Inner Bracing (T6)	1.0	Pass
						Bolt Checks	95.3	Pass
						Rating =	98.8	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC4

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	74.6	Pass
1	Base Foundation Structural	0	74.2	Pass
1	Base Foundation Soil Interaction	0	43.3	Pass

Structure Rating (max from all components) =	98.8%

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

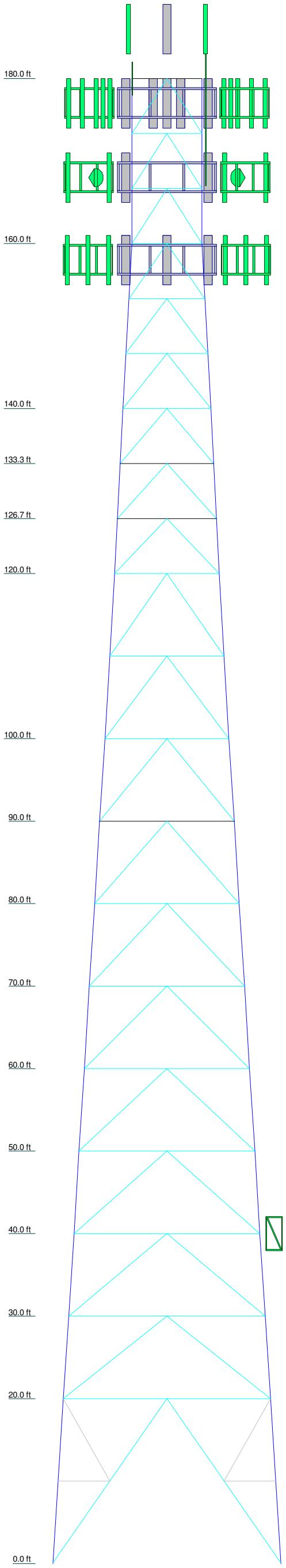
4.1) Recommendations

Perform the modifications detailed in "Appendix D" to remedy the deficiencies identified in Crown Castle Work Order No. 1575608.

APPENDIX A

TNXTOWER OUTPUT

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15
Legs	ROHN 2.5 STD	ROHN 3 X-STR		ROHN 4 X-STR		ROHN 5 X-STR	P 5 XS w HSS 6.625x0.500 Half Pipe		P 5 XS w HSS 7.500x0.375 Half Pipe	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe		P 6 XS w HSS 7.500x0.375 Half Pipe			Rohn 8 EHS w HSS9.625x0.375 Half Pipe
Leg Grade	A572-50							A500-46							
Diagonals	ROHN 2 STD			A			P 2.5 STD w HSS 3.500x0.300 Half Pipe				P 2.5 XS w HSS 3.500x0.300 Half Pipe				
Diagonal Grade	A572-50							A500-46							
Top Girts	N.A.			ROHN 2 STD			N.A.								
Horizontals	ROHN 1.5 STD			N.A.			ROHN 2 STD								
Red. Horizontals	ROHN 1.5 STD			ROHN 2 STD			ROHN 1.5 STD								
Red. Diagonals	L2x2x1/8						L2 1/2x2 1/2x3/16		L3x3x3/16			L3 1/2x3 1/2x1/4			
Red. Hips	8.5	8.54167	10.625	11.3194	12.0139	12.7083	14.9583	16.25	17.5417	18.7917	20.0417	21.2917	22.5417	23.8594	25.1771
Inner Bracing	9 @ 6.66667									10 @ 10				1 @ 19.9167	
Face Width (ft)	1.2	1.5	0.7	0.7	0.7	2.6	1.9	1.9	2.1	2.1	2.6	2.7	2.7	2.8	5.9
# Panels @ (ft)															
Weight (K)	27.6771														32.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8"x4'	180	(3) RRH2x50-800	168
SBNHH-1D65A w/ Mount Pipe	180	(3) PCS 1900MHz 4x45W-65MHz	168
SBNHH-1D65A w/ Mount Pipe	180	Sector Mount [SM 402-3]	168
SBNHH-1D65A w/ Mount Pipe	180	A-ANT-18G-2-C	168
ATBT-BOTTOM-24V	180	VHLP2-18	168
ATBT-BOTTOM-24V	180	(2) DBC0061F1V51-2	158
ATBT-BOTTOM-24V	180	(2) DBC0061F1V51-2	158
ATMAA1412D-1A20	180	(2) DBC0061F1V51-2	158
ATMAA1412D-1A20	180	RRUS 32 B2	158
ATMAA1412D-1A20	180	RRUS 32 B2	158
ATMAA1412D-1A20	180	RRUS 32 B2	158
ATMAA1412D-1A20	180	7770.00 w/ Mount Pipe	158
ATMAA1412D-1A20	180	7770.00 w/ Mount Pipe	158
18' x 2 1/2" Mount Pipe	180	7770.00 w/ Mount Pipe	158
(2) DB846F65ZAXY w/ Mount Pipe	177	AM-X-CD-16-65-00T-RET w/ Mount Pipe	158
(2) LPA-80063/6CFx5 w/ Mount Pipe	177	AM-X-CD-16-65-00T-RET w/ Mount Pipe	158
(2) SC-E 6014 rev2 w/ Mount Pipe	177	TPA-65R-LCUUUU-H8 w/ Mount Pipe	158
(2) SBNHH-1D45B w/ Mount Pipe	177	SBNH-1D6565C w/ Mount Pipe	158
(2) SBNHH-1D45B w/ Mount Pipe	177	DTMABP7819VG12A	158
(2) SBNHH-1D45B w/ Mount Pipe	177	DTMABP7819VG12A	158
SBNHH-1D65B w/ Mount Pipe	177	DTMABP7819VG12A	158
SBNHH-1D65B w/ Mount Pipe	177	7020.00	158
SBNHH-1D65B w/ Mount Pipe	177	7020.00	158
RRH2x60-700	177	7020.00	158
RRH2x60-700	177	RRUS 32	158
RRH2x60-700	177	RRUS 32	158
RRH2X60-AWS	177	RRUS 32	158
RRH2X60-AWS	177	RRUS 11	158
RRH2X60-AWS	177	RRUS 11	158
RRH2X60-PCS	177	RRUS 11	158
RRH2X60-PCS	177	DC6-48-60-18-8F	158
RRH2X60-PCS	177	DC6-48-60-18-8F	158
(2) DB-T1-6Z-8AB-0Z	177	(2) 5' x 2' Pipe Mount	158
Sector Mount [SM 504-3]	177	(2) 5' x 2' Pipe Mount	158
NNVV-65B-R4	168	(2) 5' x 2' Pipe Mount	158
NNVV-65B-R4	168	Sector Mount [SM 504-3]	158
NNVV-65B-R4	168	QS66512-2 w/ Mount Pipe	158
AAHC	168	QS66512-2 w/ Mount Pipe	158
AAHC	168	GPS_A	40
AAHC	168	Side Arm Mount [SO 306-1]	40
(3) RRH2x50-800	168		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P 2 STD w HSS 2.875x0.250 Half Pipe		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A500-46	46 ksi	62 ksi

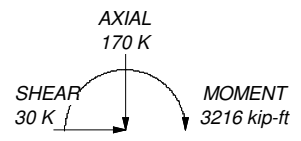
TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 5 with Crest Height of 530.000 ft
8. TOWER RATING: 98.8%

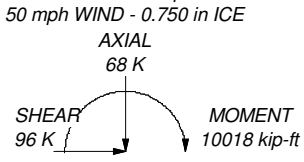
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 437 K
SHEAR: 56 K

UPLIFT: -401 K
SHEAR: 53 K



TORQUE 28 kip-ft
50 mph WIND - 0.750 in ICE



TORQUE 129 kip-ft
REACTIONS - 97 mph WIND

Jacobs Engineering Group, Inc.
5449 Bells Ferry Road
Acworth, GA 30102
Phone: 770-701-2500
FAX: 770-701-2501

Job: ***NHV 108 943133***			
Project: ***BU806362_WO1588046***			
Client: Crown Castle	Drawn by: P Lin		App'd:
Code: TIA-222-G	Date: 06/28/18		Scale: NTS
Path: C:\Users\linp\Documents\My Projects\806362 NHV 108 943133\WO 1588046\Analysis\LC4\Model\BU806362_WO1588046.eri			Dwg No. E-1

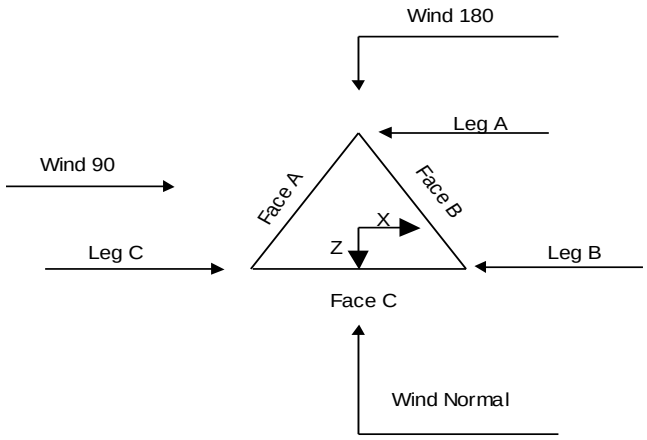
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.000 ft above the ground line.
The base of the tower is set at an elevation of 0.000 ft above the ground line.
The face width of the tower is 8.500 ft at the top and 27.677 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 5.
Crest Height 530.000 ft.
SEAW RSM-03 procedures for wind speed-up calculations are used.
Topographic Feature: Flat Topped Ridge.
Slope Distance L: 4870.000 ft.
Distance from Crest x: 0.000 ft.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
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-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G 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		Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.000-160.000			8.500	1	20.000
T2	160.000-140.000			8.542	1	20.000
T3	140.000-133.333			10.625	1	6.667
T4	133.333-126.667			11.319	1	6.667
T5	126.667-120.000			12.014	1	6.667
T6	120.000-100.000			12.708	1	20.000
T7	100.000-90.000			14.958	1	10.000
T8	90.000-80.000			16.250	1	10.000
T9	80.000-70.000			17.542	1	10.000
T10	70.000-60.000			18.792	1	10.000
T11	60.000-50.000			20.042	1	10.000
T12	50.000-40.000			21.292	1	10.000
T13	40.000-30.000			22.542	1	10.000
T14	30.000-20.000			23.859	1	10.000
T15	20.000-0.000			25.177	1	20.000

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.000-160.000	6.667	K Brace Down	No	Yes	0.000	0.000
T2	160.000-140.000	6.667	K Brace Down	No	Yes	0.000	0.000
T3	140.000-133.333	6.667	K Brace Down	No	Yes	0.000	0.000
T4	133.333-126.667	6.667	K Brace Down	No	Yes	0.000	0.000
T5	126.667-120.000	6.667	K Brace Down	No	Yes	0.000	0.000
T6	120.000-100.000	10.000	K Brace Down	No	Yes	0.000	0.000
T7	100.000-90.000	10.000	K Brace Down	No	Yes	0.000	0.000
T8	90.000-80.000	10.000	K Brace Down	No	Yes	0.000	0.000
T9	80.000-70.000	10.000	K Brace Down	No	Yes	0.000	0.000
T10	70.000-60.000	10.000	K Brace Down	No	Yes	0.000	0.000
T11	60.000-50.000	10.000	K Brace Down	No	Yes	0.000	0.000
T12	50.000-40.000	10.000	K Brace Down	No	Yes	0.000	0.000
T13	40.000-30.000	10.000	K Brace Down	No	Yes	0.000	0.000
T14	30.000-20.000	10.000	K Brace Down	No	Yes	0.000	0.000
T15	20.000-0.000	19.917	K1 Down	No	Yes	0.000	1.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.000-160.000	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T2 160.000-140.000	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T3 140.000-133.333	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 133.333-126.667	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Arbitrary Shape	P 2 STD w HSS 2.875x0.250 Half Pipe	A500-46 (46 ksi)
T5 126.667-120.000	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Arbitrary Shape	P 2 STD w HSS 2.875x0.250 Half Pipe	A500-46 (46 ksi)
T6 120.000-100.000	Pipe	ROHN 5 X-STR	A572-50 (50 ksi)	Arbitrary Shape	P 2.5 STD w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T7 100.000-90.000	Arbitrary Shape	P 5 XS w HSS 6.625x0.500 Half Pipe	A500-46 (46 ksi)	Arbitrary Shape	P 2.5 STD w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T8 90.000-80.000	Arbitrary Shape	P 5 XS w HSS 6.625x0.500 Half Pipe	A500-46 (46 ksi)	Arbitrary Shape	P 2.5 STD w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T9 80.000-70.000	Arbitrary Shape	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	A500-46 (46 ksi)	Arbitrary Shape	P 2.5 STD w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T10 70.000-60.000	Arbitrary Shape	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	A500-46 (46 ksi)	Arbitrary Shape	P 2.5 STD w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T11 60.000-50.000	Arbitrary Shape	P 6 XS w HSS 7.500x0.375 Half Pipe	A500-46 (46 ksi)	Arbitrary Shape	P 2.5 XS w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T12 50.000-40.000	Arbitrary Shape	P 6 XS w HSS 7.500x0.375 Half Pipe	A500-46 (46 ksi)	Arbitrary Shape	P 2.5 XS w HSS 3.500x0.300 Half Pipe	A500-46 (46 ksi)
T13 40.000-30.000	Arbitrary Shape	P 6 XS w HSS 7.500x0.375 Half Pipe	A500-46 (46 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T14 30.000-20.000	Arbitrary Shape	P 6 XS w HSS 7.500x0.375 Half Pipe	A500-46 (46 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T15 20.000-0.000	Arbitrary Shape	Rohn 8 EHS w HSS9.625x0.375 Half Pipe	A500-46 (46 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T4 133.333-126.667	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe		A572-50 (50 ksi)
T5 126.667-120.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe		A572-50 (50 ksi)
T8 90.000-80.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.000-160.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T2 160.000-140.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T3 140.000-133.333	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 133.333-126.667	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 126.667-120.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T6 120.000-100.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T7 100.000-90.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T8 90.000-80.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T9 80.000-70.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T10 70.000-60.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T11 60.000-50.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T12 50.000-40.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T13 40.000-30.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T14 30.000-20.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T15 20.000-0.000	None	Pipe		A618-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 180.000-160.000	Pipe		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T2 160.000-140.000	Pipe		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T3 140.000-133.333	Pipe		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T4 133.333-126.667	Pipe		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 126.667-120.000	Pipe		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 120.000-100.000	Pipe		A572-50 (50 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T7 100.000-90.000	Pipe		A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 90.000-80.000	Pipe		A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 80.000-70.000	Pipe		A572-50 (50 ksi)	Single Angle	L3x3x3/16	A572-50 (50 ksi)
T10 70.000-60.000	Pipe		A572-50 (50 ksi)	Single Angle	L3x3x3/16	A572-50 (50 ksi)
T11 60.000-50.000	Pipe		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T12 50.000-40.000	Pipe		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T13 40.000-30.000	Pipe		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T14 30.000-20.000	Pipe		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T15 20.000-0.000	Pipe		A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T15 20.000-0.000	A572-50 (50 ksi)	Horizontal (1)	Pipe	ROHN 1.5 x 11GA	1
		Diagonal (1)	Pipe	ROHN 1.5 STD	1
		Hip (1)	Pipe	ROHN 1.5 x 11GA	1
		Hip Diagonal (1)	Pipe	ROHN 2.5 STD	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.000-160.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T2 160.000-140.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T3 140.000-133.333	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T4 133.333-126.667	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T5 126.667-120.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T6 120.000-100.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T7 100.000-90.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T8 90.000-80.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T9 80.000-70.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T10 70.000-60.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T11 60.000-50.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T12 50.000-40.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T13 40.000-30.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T14 30.000-20.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000
T15 20.000-0.000	0.000	0.000	A36 (36 ksi)	1	1.03	1.05	0.000	0.000	36.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.000-160.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.000-140.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.000-133.333	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 133.333-126.667	Yes	No	1	1 1	1.13068 1.13068	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T5	Yes	No	1	1	1.12403	1	1	1	1	1
126.667-120.000				1	1.12403	1	1	1	1	1
T6	Yes	No	1	1	1.08434	1	1	1	1	1
120.000-100.000				1	1.08434	1	1	1	1	1
T7	Yes	No	1.10473	1	1.07475	1	1	1	1	1
100.000-90.000				1	1.07475	1	1	1	1	1
T8	Yes	No	1.10473	1	1.07475	1	1	1	1	1
90.000-80.000				1	1.07475	1	1	1	1	1
T9	Yes	No	1.11344	1	1.06742	1	1	1	1	1
80.000-70.000				1	1.06742	1	1	1	1	1
T10	Yes	No	1.11344	1	1.06742	1	1	1	1	1
70.000-60.000				1	1.06742	1	1	1	1	1
T11	Yes	No	1.11419	1	1.05233	1	1	1	1	1
60.000-50.000				1	1.05233	1	1	1	1	1
T12	Yes	No	1.11419	1	1.05233	1	1	1	1	1
50.000-40.000				1	1.05233	1	1	1	1	1
T13	Yes	No	1.11412	1	1	1	1	1	1	1
40.000-30.000				1	1	1	1	1	1	1
T14	Yes	No	1.11412	1	1	1	1	1	1	1
30.000-20.000				1	1	1	1	1	1	1
T15	Yes	No	1.12023	1	1	1	1	1	1	1
20.000-0.000				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
180.000-160.000														
T2	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
160.000-140.000														
T3	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
140.000-133.333														
T4	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
133.333-126.667														
T5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
126.667-120.000														

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T6 120.000-100.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.75	0.000	1	0.000	0.75
T7 100.000-90.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T8 90.000-80.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T9 80.000-70.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T10 70.000-60.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T11 60.000-50.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T12 50.000-40.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T13 40.000-30.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T14 30.000-20.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1
T15 20.000-0.000	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.000-160.000	Flange	0.750 A325N	4	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T2 160.000-140.000	Flange	0.875 A325N	4	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.625 A325N	2	0.000 A325N	0
T3 140.000-133.333	Flange	1.000 A325N	0	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.000 A325N	0	0.625 A325N	2	0.000 A325N	0
T4 133.333-126.667	Flange	1.000 A325N	0	0.625 A325N	3	0.625 A325N	2	0.000 A325N	0	0.000 A325N	0	0.625 A325N	2	0.000 A325N	0
T5 126.667-120.000	Flange	1.000 A325N	4	0.625 A325N	3	0.625 A325N	2	0.000 A325N	0	0.000 A325N	0	0.625 A325N	2	0.000 A325N	0
T6 120.000-100.000	Flange	1.000 A325N	4	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T7 100.000-90.000	Flange	1.000 A325N	0	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T8 90.000-80.000	Flange	1.000 A325N	6	0.625 A325N	3	0.625 A325N	2	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T9 80.000-70.000	Flange	1.000 A325N	0	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T10 70.000-60.000	Flange	1.000 A325N	6	0.625 A325N	3	0.625 A325N	2	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T11 60.000-50.000	Flange	1.000 A325N	0	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T12 50.000-40.000	Flange	1.000 A325N	6	0.625 A325N	3	0.625 A325N	2	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T13 40.000-30.000	Flange	1.000 A325N	0	0.625 A325N	3	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T14 30.000-20.000	Flange	1.000 A325N	8	0.625 A325N	3	0.625 A325N	2	0.000 A325N	0	0.625 A325N	0	0.625 A325N	2	0.625 A325N	0
T15 20.000-0.000	Flange	1.000 A449	0	0.750 A325N	3	0.000 A325N	0	0.000 A325N	0	0.750 A325N	0	0.750 A325N	2	0.625 A325N	1

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
Safety Line 3/8 *** FACE A *** LDF4-50A(1/2")	C A	No No	Ar (CaAa) Ar (CaAa)	180.000 - 0.000 40.000 - 0.000	0.000 0.000	0.5 -0.44	1 1	1 1	0.500 0.500	0.375 0.630		0.000 0.000
561(1-5/8")	A	No	Ar (CaAa)	177.000 - 0.000	0.000	-0.4	12	2	0.500	1.625		0.001
561(1-5/8")	A	No	Ar (CaAa)	177.000 - 0.000	0.000	-0.41	1	1	0.500	1.625		0.001
Feedline Ladder (Af) *	A	No	Af (CaAa)	177.000 - 0.000	0.000	-0.4	1	1	3.000	3.000		0.008
HB114-1-0813U4-M5J(1-1/4)	A	No	Ar (CaAa)	168.000 - 0.000	0.000	0.45	4	4	0.500	1.540		0.001
7983A(ELLIPTICAL)	A	No	Ar (CaAa)	168.000 - 0.000	0.000	0.41	1	1	0.500	0.573		0.000
Feedline Ladder (Af) *** FACE C *** HJ7-50A(1-5/8") *	A C	No No	Af (CaAa) Ar (CaAa)	168.000 - 0.000 180.000 - 0.000	0.000 -0.500	0.41 -0.3	1 18	1 12	3.000 0.500	3.000 1.980		0.008 0.001
2" Rigid Conduit	C	No	Ar (CaAa)	158.000 - 0.000	0.000	-0.2	2	2	0.500	2.000		0.003
FB-L98B-034-XXX(3/8")	C	No	Ar (CaAa)	158.000 - 0.000	0.000	-0.2	2	2	0.500	0.000		0.000
WR-VG86ST-BRD(3/4")	C	No	Ar (CaAa)	158.000 - 0.000	0.000	-0.2	4	4	0.500	0.000		0.001
HB114-1-0813U4-M5J(1-1/4)	C	No	Ar (CaAa)	158.000 - 0.000	0.000	-0.35	12	12	0.500	1.540		0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
Feedline Ladder (Af)	C	No	Af (CaAa)	180.000 - 0.000	0.000	-0.3	1	1	3.000	3.000		0.008
**********												
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Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight klf
**********							
***							

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.000-160.000	A	0.000	0.000	53.799	0.000	0.547
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	82.030	0.000	0.547
T2	160.000-140.000	A	0.000	0.000	75.716	0.000	0.785
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	122.494	0.000	0.951
T3	140.000-133.333	A	0.000	0.000	25.239	0.000	0.262
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	42.330	0.000	0.332
T4	133.333-126.667	A	0.000	0.000	25.239	0.000	0.262
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	42.330	0.000	0.332
T5	126.667-120.000	A	0.000	0.000	25.239	0.000	0.262
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	42.330	0.000	0.332
T6	120.000-100.000	A	0.000	0.000	75.716	0.000	0.785
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	126.990	0.000	0.996
T7	100.000-90.000	A	0.000	0.000	37.858	0.000	0.392
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T8	90.000-80.000	A	0.000	0.000	37.858	0.000	0.392
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T9	80.000-70.000	A	0.000	0.000	37.858	0.000	0.392
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T10	70.000-60.000	A	0.000	0.000	37.858	0.000	0.392
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T11	60.000-50.000	A	0.000	0.000	37.858	0.000	0.392
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T12	50.000-40.000	A	0.000	0.000	37.858	0.000	0.392
		B	0.000	0.000	0.000	0.000	0.000

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	63.495	0.000	0.498
T13	40.000-30.000	A	0.000	0.000	38.488	0.000	0.394
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T14	30.000-20.000	A	0.000	0.000	38.488	0.000	0.394
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	63.495	0.000	0.498
T15	20.000-0.000	A	0.000	0.000	76.976	0.000	0.788
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	126.990	0.000	0.996

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.000-160.000	A	2.034	0.000	0.000	87.510	0.000	1.937
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	113.026	0.000	2.394
T2	160.000-140.000	A	2.015	0.000	0.000	134.119	0.000	2.841
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	229.558	0.000	4.167
T3	140.000-133.333	A	2.001	0.000	0.000	44.566	0.000	0.941
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	80.649	0.000	1.446
T4	133.333-126.667	A	1.993	0.000	0.000	44.489	0.000	0.938
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	80.542	0.000	1.442
T5	126.667-120.000	A	1.985	0.000	0.000	44.408	0.000	0.935
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	80.429	0.000	1.437
T6	120.000-100.000	A	1.966	0.000	0.000	132.689	0.000	2.781
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	240.540	0.000	4.277
T7	100.000-90.000	A	1.943	0.000	0.000	65.997	0.000	1.376
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	119.784	0.000	2.117
T8	90.000-80.000	A	1.924	0.000	0.000	65.730	0.000	1.365
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	119.411	0.000	2.101
T9	80.000-70.000	A	1.904	0.000	0.000	65.427	0.000	1.353
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	118.988	0.000	2.083
T10	70.000-60.000	A	1.880	0.000	0.000	65.079	0.000	1.338
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	118.502	0.000	2.061
T11	60.000-50.000	A	1.852	0.000	0.000	64.670	0.000	1.322
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	117.931	0.000	2.037
T12	50.000-40.000	A	1.818	0.000	0.000	64.178	0.000	1.302
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	117.245	0.000	2.007
T13	40.000-30.000	A	1.776	0.000	0.000	67.747	0.000	1.331
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	116.388	0.000	1.971
T14	30.000-20.000	A	1.721	0.000	0.000	66.822	0.000	1.296
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	115.251	0.000	1.923

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T15	20.000-0.000	A	1.574	0.000	0.000	128.783	0.000	2.412
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	224.535	0.000	3.598

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.000-160.000	4.543	4.811	-0.484	4.703
T2	160.000-140.000	8.737	1.453	5.774	3.320
T3	140.000-133.333	10.192	1.790	7.108	4.036
T4	133.333-126.667	10.582	1.837	7.466	4.191
T5	126.667-120.000	11.140	1.932	7.872	4.379
T6	120.000-100.000	12.579	2.207	8.910	4.904
T7	100.000-90.000	13.728	2.374	9.836	5.282
T8	90.000-80.000	14.740	2.545	10.584	5.601
T9	80.000-70.000	15.229	2.578	11.134	5.772
T10	70.000-60.000	16.118	2.721	11.834	6.034
T11	60.000-50.000	16.976	2.856	12.535	6.273
T12	50.000-40.000	17.806	2.984	13.244	6.487
T13	40.000-30.000	18.012	3.496	11.875	7.798
T14	30.000-20.000	18.798	3.630	12.632	7.984
T15	20.000-0.000	19.985	3.839	14.108	8.098

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Safety Line 3/8	160.00 - 180.00	0.6000	0.6000
T1	4	561(1-5/8")	160.00 - 177.00	0.6000	0.6000
T1	5	561(1-5/8")	160.00 - 177.00	0.6000	0.6000
T1	6	Feedline Ladder (Af)	160.00 - 177.00	0.6000	0.6000
T1	9	HB114-1-0813U4-M5J(1-1/4)	160.00 - 168.00	0.6000	0.6000
T1	12	7983A(ELLIPTICAL)	160.00 - 168.00	0.6000	0.6000
T1	13	Feedline Ladder (Af)	160.00 - 168.00	0.6000	0.6000
T1	16	HJ7-50A(1-5/8")	160.00 - 180.00	0.6000	0.6000
T1	23	Feedline Ladder (Af)	160.00 - 180.00	0.6000	0.6000
T2	1	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T2	4	561(1-5/8")	140.00 - 160.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	5	561(1-5/8")	140.00 - 160.00	0.6000	0.6000
T2	6	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T2	9	HB114-1-0813U4-M5J(1-1/4)	140.00 - 160.00	0.6000	0.6000
T2	12	7983A(ELLIPTICAL)	140.00 - 160.00	0.6000	0.6000
T2	13	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T2	16	HJ7-50A(1-5/8")	140.00 - 160.00	0.6000	0.6000
T2	19	2" Rigid Conduit	140.00 - 158.00	0.6000	0.6000
T2	20	FB-L98B-034-XXX(3/8")	140.00 - 158.00	0.6000	0.6000
T2	21	WR-VG86ST-BRD(3/4")	140.00 - 158.00	0.6000	0.6000
T2	22	HB114-1-0813U4-M5J(1-1/4)	140.00 - 158.00	0.6000	0.6000
T2	23	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	1	Safety Line 3/8	133.33 - 140.00	0.6000	0.6000
T3	4	561(1-5/8")	133.33 - 140.00	0.6000	0.6000
T3	5	561(1-5/8")	133.33 - 140.00	0.6000	0.6000
T3	6	Feedline Ladder (Af)	133.33 - 140.00	0.6000	0.6000
T3	9	HB114-1-0813U4-M5J(1-1/4)	133.33 - 140.00	0.6000	0.6000
T3	12	7983A(ELLIPTICAL)	133.33 - 140.00	0.6000	0.6000
T3	13	Feedline Ladder (Af)	133.33 - 140.00	0.6000	0.6000
T3	16	HJ7-50A(1-5/8")	133.33 - 140.00	0.6000	0.6000
T3	19	2" Rigid Conduit	133.33 - 140.00	0.6000	0.6000
T3	20	FB-L98B-034-XXX(3/8")	133.33 - 140.00	0.6000	0.6000
T3	21	WR-VG86ST-BRD(3/4")	133.33 - 140.00	0.6000	0.6000
T3	22	HB114-1-0813U4-M5J(1-1/4)	133.33 - 140.00	0.6000	0.6000
T3	23	Feedline Ladder (Af)	133.33 - 140.00	0.6000	0.6000
T4	1	Safety Line 3/8	126.67 - 133.33	0.6000	0.6000
T4	4	561(1-5/8")	126.67 - 133.33	0.6000	0.6000
T4	5	561(1-5/8")	126.67 - 133.33	0.6000	0.6000
T4	6	Feedline Ladder (Af)	126.67 - 133.33	0.6000	0.6000
T4	9	HB114-1-0813U4-M5J(1-1/4)	126.67 - 133.33	0.6000	0.6000
T4	12	7983A(ELLIPTICAL)	126.67 - 133.33	0.6000	0.6000
T4	13	Feedline Ladder (Af)	126.67 - 133.33	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	16	HJ7-50A(1-5/8")	126.67 - 133.33	0.6000	0.6000
T4	19	2" Rigid Conduit	126.67 - 133.33	0.6000	0.6000
T4	20	FB-L98B-034-XXX(3/8")	126.67 - 133.33	0.6000	0.6000
T4	21	WR-VG86ST-BRD(3/4")	126.67 - 133.33	0.6000	0.6000
T4	22	HB114-1-0813U4-M5J(1-1/4")	126.67 - 133.33	0.6000	0.6000
T4	23	Feedline Ladder (Af)	126.67 - 133.33	0.6000	0.6000
T5	1	Safety Line 3/8	120.00 - 126.67	0.6000	0.6000
T5	4	561(1-5/8")	120.00 - 126.67	0.6000	0.6000
T5	5	561(1-5/8")	120.00 - 126.67	0.6000	0.6000
T5	6	Feedline Ladder (Af)	120.00 - 126.67	0.6000	0.6000
T5	9	HB114-1-0813U4-M5J(1-1/4")	120.00 - 126.67	0.6000	0.6000
T5	12	7983A(ELLIPTICAL)	120.00 - 126.67	0.6000	0.6000
T5	13	Feedline Ladder (Af)	120.00 - 126.67	0.6000	0.6000
T5	16	HJ7-50A(1-5/8")	120.00 - 126.67	0.6000	0.6000
T5	19	2" Rigid Conduit	120.00 - 126.67	0.6000	0.6000
T5	20	FB-L98B-034-XXX(3/8")	120.00 - 126.67	0.6000	0.6000
T5	21	WR-VG86ST-BRD(3/4")	120.00 - 126.67	0.6000	0.6000
T5	22	HB114-1-0813U4-M5J(1-1/4")	120.00 - 126.67	0.6000	0.6000
T5	23	Feedline Ladder (Af)	120.00 - 126.67	0.6000	0.6000
T6	1	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T6	4	561(1-5/8")	100.00 - 120.00	0.6000	0.6000
T6	5	561(1-5/8")	100.00 - 120.00	0.6000	0.6000
T6	6	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T6	9	HB114-1-0813U4-M5J(1-1/4")	100.00 - 120.00	0.6000	0.6000
T6	12	7983A(ELLIPTICAL)	100.00 - 120.00	0.6000	0.6000
T6	13	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T6	16	HJ7-50A(1-5/8")	100.00 - 120.00	0.6000	0.6000
T6	19	2" Rigid Conduit	100.00 - 120.00	0.6000	0.6000
T6	20	FB-L98B-034-XXX(3/8")	100.00 - 120.00	0.6000	0.6000
T6	21	WR-VG86ST-BRD(3/4")	100.00 - 120.00	0.6000	0.6000
T6	22	HB114-1-0813U4-M5J(1-1/4")	100.00 - 120.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	23	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T7	1	Safety Line 3/8	90.00 - 100.00	0.6000	0.6000
T7	4	561(1-5/8")	90.00 - 100.00	0.6000	0.6000
T7	5	561(1-5/8")	90.00 - 100.00	0.6000	0.6000
T7	6	Feedline Ladder (Af)	90.00 - 100.00	0.6000	0.6000
T7	9	HB114-1-0813U4-M5J(1-1/4)	90.00 - 100.00	0.6000	0.6000
T7	12	7983A(ELLIPTICAL)	90.00 - 100.00	0.6000	0.6000
T7	13	Feedline Ladder (Af)	90.00 - 100.00	0.6000	0.6000
T7	16	HJ7-50A(1-5/8")	90.00 - 100.00	0.6000	0.6000
T7	19	2" Rigid Conduit	90.00 - 100.00	0.6000	0.6000
T7	20	FB-L98B-034-XXX(3/8")	90.00 - 100.00	0.6000	0.6000
T7	21	WR-VG86ST-BRD(3/4")	90.00 - 100.00	0.6000	0.6000
T7	22	HB114-1-0813U4-M5J(1-1/4)	90.00 - 100.00	0.6000	0.6000
T7	23	Feedline Ladder (Af)	90.00 - 100.00	0.6000	0.6000
T8	1	Safety Line 3/8	80.00 - 90.00	0.6000	0.6000
T8	4	561(1-5/8")	80.00 - 90.00	0.6000	0.6000
T8	5	561(1-5/8")	80.00 - 90.00	0.6000	0.6000
T8	6	Feedline Ladder (Af)	80.00 - 90.00	0.6000	0.6000
T8	9	HB114-1-0813U4-M5J(1-1/4)	80.00 - 90.00	0.6000	0.6000
T8	12	7983A(ELLIPTICAL)	80.00 - 90.00	0.6000	0.6000
T8	13	Feedline Ladder (Af)	80.00 - 90.00	0.6000	0.6000
T8	16	HJ7-50A(1-5/8")	80.00 - 90.00	0.6000	0.6000
T8	19	2" Rigid Conduit	80.00 - 90.00	0.6000	0.6000
T8	20	FB-L98B-034-XXX(3/8")	80.00 - 90.00	0.6000	0.6000
T8	21	WR-VG86ST-BRD(3/4")	80.00 - 90.00	0.6000	0.6000
T8	22	HB114-1-0813U4-M5J(1-1/4)	80.00 - 90.00	0.6000	0.6000
T8	23	Feedline Ladder (Af)	80.00 - 90.00	0.6000	0.6000
T9	1	Safety Line 3/8	70.00 - 80.00	0.6000	0.6000
T9	4	561(1-5/8")	70.00 - 80.00	0.6000	0.6000
T9	5	561(1-5/8")	70.00 - 80.00	0.6000	0.6000
T9	6	Feedline Ladder (Af)	70.00 - 80.00	0.6000	0.6000
T9	9	HB114-1-0813U4-M5J(1-1/4)	70.00 - 80.00	0.6000	0.6000
T9	12	7983A(ELLIPTICAL)	70.00 - 80.00	0.6000	0.6000
T9	13	Feedline Ladder (Af)	70.00 - 80.00	0.6000	0.6000
T9	16	HJ7-50A(1-5/8")	70.00 - 80.00	0.6000	0.6000
T9	19	2" Rigid Conduit	70.00 - 80.00	0.6000	0.6000
T9	20	FB-L98B-034-XXX(3/8")	70.00 - 80.00	0.6000	0.6000
T9	21	WR-VG86ST-BRD(3/4")	70.00 - 80.00	0.6000	0.6000
T9	22	HB114-1-0813U4-M5J(1-1/4)	70.00 - 80.00	0.6000	0.6000
T9	23	Feedline Ladder (Af)	70.00 - 80.00	0.6000	0.6000
T10	1	Safety Line 3/8	60.00 - 70.00	0.6000	0.6000
T10	4	561(1-5/8")	60.00 - 70.00	0.6000	0.6000
T10	5	561(1-5/8")	60.00 - 70.00	0.6000	0.6000
T10	6	Feedline Ladder (Af)	60.00 - 70.00	0.6000	0.6000
T10	9	HB114-1-0813U4-M5J(1-1/4)	60.00 - 70.00	0.6000	0.6000
T10	12	7983A(ELLIPTICAL)	60.00 - 70.00	0.6000	0.6000
T10	13	Feedline Ladder (Af)	60.00 - 70.00	0.6000	0.6000
T10	16	HJ7-50A(1-5/8")	60.00 - 70.00	0.6000	0.6000
T10	19	2" Rigid Conduit	60.00 - 70.00	0.6000	0.6000
T10	20	FB-L98B-034-XXX(3/8")	60.00 - 70.00	0.6000	0.6000
T10	21	WR-VG86ST-BRD(3/4")	60.00 - 70.00	0.6000	0.6000
T10	22	HB114-1-0813U4-M5J(1-1/4)	60.00 - 70.00	0.6000	0.6000
T10	23	Feedline Ladder (Af)	60.00 - 70.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	1	Safety Line 3/8	50.00 - 60.00	0.6000	0.6000
T11	4	561(1-5/8")	50.00 - 60.00	0.6000	0.6000
T11	5	561(1-5/8")	50.00 - 60.00	0.6000	0.6000
T11	6	Feedline Ladder (Af)	50.00 - 60.00	0.6000	0.6000
T11	9	HB114-1-0813U4-M5J(1-1/4)	50.00 - 60.00	0.6000	0.6000
T11	12	7983A(ELLIPTICAL)	50.00 - 60.00	0.6000	0.6000
T11	13	Feedline Ladder (Af)	50.00 - 60.00	0.6000	0.6000
T11	16	HJ7-50A(1-5/8")	50.00 - 60.00	0.6000	0.6000
T11	19	2" Rigid Conduit	50.00 - 60.00	0.6000	0.6000
T11	20	FB-L98B-034-XXX(3/8")	50.00 - 60.00	0.6000	0.6000
T11	21	WR-VG86ST-BRD(3/4")	50.00 - 60.00	0.6000	0.6000
T11	22	HB114-1-0813U4-M5J(1-1/4)	50.00 - 60.00	0.6000	0.6000
T11	23	Feedline Ladder (Af)	50.00 - 60.00	0.6000	0.6000
T12	1	Safety Line 3/8	40.00 - 50.00	0.6000	0.6000
T12	4	561(1-5/8")	40.00 - 50.00	0.6000	0.6000
T12	5	561(1-5/8")	40.00 - 50.00	0.6000	0.6000
T12	6	Feedline Ladder (Af)	40.00 - 50.00	0.6000	0.6000
T12	9	HB114-1-0813U4-M5J(1-1/4)	40.00 - 50.00	0.6000	0.6000
T12	12	7983A(ELLIPTICAL)	40.00 - 50.00	0.6000	0.6000
T12	13	Feedline Ladder (Af)	40.00 - 50.00	0.6000	0.6000
T12	16	HJ7-50A(1-5/8")	40.00 - 50.00	0.6000	0.6000
T12	19	2" Rigid Conduit	40.00 - 50.00	0.6000	0.6000
T12	20	FB-L98B-034-XXX(3/8")	40.00 - 50.00	0.6000	0.6000
T12	21	WR-VG86ST-BRD(3/4")	40.00 - 50.00	0.6000	0.6000
T12	22	HB114-1-0813U4-M5J(1-1/4)	40.00 - 50.00	0.6000	0.6000
T12	23	Feedline Ladder (Af)	40.00 - 50.00	0.6000	0.6000
T13	1	Safety Line 3/8	30.00 - 40.00	0.6000	0.6000
T13	3	LDF4-50A(1/2")	30.00 - 40.00	0.6000	0.6000
T13	4	561(1-5/8")	30.00 - 40.00	0.6000	0.6000
T13	5	561(1-5/8")	30.00 - 40.00	0.6000	0.6000
T13	6	Feedline Ladder (Af)	30.00 - 40.00	0.6000	0.6000
T13	9	HB114-1-0813U4-M5J(1-1/4)	30.00 - 40.00	0.6000	0.6000
T13	12	7983A(ELLIPTICAL)	30.00 - 40.00	0.6000	0.6000
T13	13	Feedline Ladder (Af)	30.00 - 40.00	0.6000	0.6000
T13	16	HJ7-50A(1-5/8")	30.00 - 40.00	0.6000	0.6000
T13	19	2" Rigid Conduit	30.00 - 40.00	0.6000	0.6000
T13	20	FB-L98B-034-XXX(3/8")	30.00 - 40.00	0.6000	0.6000
T13	21	WR-VG86ST-BRD(3/4")	30.00 - 40.00	0.6000	0.6000
T13	22	HB114-1-0813U4-M5J(1-1/4)	30.00 - 40.00	0.6000	0.6000
T13	23	Feedline Ladder (Af)	30.00 - 40.00	0.6000	0.6000
T14	1	Safety Line 3/8	20.00 - 30.00	0.6000	0.6000
T14	3	LDF4-50A(1/2")	20.00 - 30.00	0.6000	0.6000
T14	4	561(1-5/8")	20.00 - 30.00	0.6000	0.6000
T14	5	561(1-5/8")	20.00 - 30.00	0.6000	0.6000
T14	6	Feedline Ladder (Af)	20.00 - 30.00	0.6000	0.6000
T14	9	HB114-1-0813U4-M5J(1-1/4)	20.00 - 30.00	0.6000	0.6000
T14	12	7983A(ELLIPTICAL)	20.00 - 30.00	0.6000	0.6000
T14	13	Feedline Ladder (Af)	20.00 - 30.00	0.6000	0.6000
T14	16	HJ7-50A(1-5/8")	20.00 - 30.00	0.6000	0.6000
T14	19	2" Rigid Conduit	20.00 - 30.00	0.6000	0.6000
T14	20	FB-L98B-034-XXX(3/8")	20.00 - 30.00	0.6000	0.6000
T14	21	WR-VG86ST-BRD(3/4")	20.00 - 30.00	0.6000	0.6000
T14	22	HB114-1-0813U4-M5J(1-1/4)	20.00 - 30.00	0.6000	0.6000
T14	23	Feedline Ladder (Af)	20.00 - 30.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T15	1	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T15	3	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T15	4	561(1-5/8")	0.00 - 20.00	0.6000	0.6000
T15	5	561(1-5/8")	0.00 - 20.00	0.6000	0.6000
T15	6	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T15	9	HB114-1-0813U4-M5J(1-1/4)	0.00 - 20.00	0.6000	0.6000
T15	12	7983A(ELLIPTICAL)	0.00 - 20.00	0.6000	0.6000
T15	13	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T15	16	HJ7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T15	19	2" Rigid Conduit	0.00 - 20.00	0.6000	0.6000
T15	20	FB-L98B-034-XXX(3/8")	0.00 - 20.00	0.6000	0.6000
T15	21	WR-VG86ST-BRD(3/4")	0.00 - 20.00	0.6000	0.6000
T15	22	HB114-1-0813U4-M5J(1-1/4)	0.00 - 20.00	0.6000	0.6000
T15	23	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000

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
Lightning Rod 5/8"x4'	C	From Leg	0.000 0.000 0.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	0.250 0.664 0.973	0.250 0.664 0.973	0.031 0.034 0.039
*** L180 ***									
SBNHH-1D65A w/ Mount Pipe	A	From Leg	0.500 0.000 6.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	6.457 7.072 7.592	5.527 6.611 7.397	0.059 0.117 0.181
SBNHH-1D65A w/ Mount Pipe	B	From Leg	0.500 0.000 6.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	6.457 7.072 7.592	5.527 6.611 7.397	0.059 0.117 0.181
SBNHH-1D65A w/ Mount Pipe	C	From Leg	0.500 0.000 6.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	6.457 7.072 7.592	5.527 6.611 7.397	0.059 0.117 0.181
ATBT-BOTTOM-24V	A	From Leg	0.500 0.000 6.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	0.104 0.148 0.199	0.065 0.102 0.147	0.003 0.004 0.006
ATBT-BOTTOM-24V	B	From Leg	0.500 0.000 6.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	0.104 0.148 0.199	0.065 0.102 0.147	0.003 0.004 0.006
ATBT-BOTTOM-24V	C	From Leg	0.500 0.000 6.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	0.104 0.148 0.199	0.065 0.102 0.147	0.003 0.004 0.006
ATMAA1412D-1A20	A	From Leg	0.500 0.000 2.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	1.000 1.126 1.259	0.407 0.497 0.593	0.013 0.021 0.030
ATMAA1412D-1A20	B	From Leg	0.500 0.000 2.000	0.000	180.000	No Ice 1/2" Ice 1" Ice	1.000 1.126 1.259	0.407 0.497 0.593	0.013 0.021 0.030
ATMAA1412D-1A20	C	From Leg	0.500	0.000	180.000	No Ice	1.000	0.407	0.013

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	1.126	0.497	0.021
			2.000			1" Ice	1.259	0.593	0.030
ATMAA1412D-1A20	A	From Leg	0.500	0.000	180.000	No Ice	1.000	0.407	0.013
			0.000			1/2" Ice	1.126	0.497	0.021
			6.000			1" Ice	1.259	0.593	0.030
ATMAA1412D-1A20	B	From Leg	0.500	0.000	180.000	No Ice	1.000	0.407	0.013
			0.000			1/2" Ice	1.126	0.497	0.021
			6.000			1" Ice	1.259	0.593	0.030
ATMAA1412D-1A20	C	From Leg	0.500	0.000	180.000	No Ice	1.000	0.407	0.013
			0.000			1/2" Ice	1.126	0.497	0.021
			6.000			1" Ice	1.259	0.593	0.030
18' x 2 1/2" Mount Pipe	B	From Leg	0.500	0.000	180.000	No Ice	4.500	4.500	0.100
			0.000			1/2" Ice	6.329	6.329	0.133
			-3.000			1" Ice	8.175	8.175	0.178
*** L177 ***									
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.000	0.000	177.000	No Ice	7.271	7.821	0.047
			0.000			1/2" Ice	7.832	9.010	0.114
			0.000			1" Ice	8.348	9.912	0.189
(2) LPA-80063/6CFx5 w/ Mount Pipe	B	From Leg	4.000	0.000	177.000	No Ice	9.805	10.195	0.052
			0.000			1/2" Ice	10.373	11.363	0.144
			0.000			1" Ice	10.907	12.246	0.245
(2) SC-E 6014 rev2 w/ Mount Pipe	C	From Leg	4.000	0.000	177.000	No Ice	3.564	4.223	0.032
			0.000			1/2" Ice	3.905	4.780	0.071
			0.000			1" Ice	4.256	5.353	0.116
(2) SBNHH-1D45B w/ Mount Pipe	A	From Leg	4.000	0.000	177.000	No Ice	11.637	6.946	0.088
			0.000			1/2" Ice	12.228	8.127	0.172
			0.000			1" Ice	12.784	9.021	0.265
(2) SBNHH-1D45B w/ Mount Pipe	B	From Leg	4.000	0.000	177.000	No Ice	11.637	6.946	0.088
			0.000			1/2" Ice	12.228	8.127	0.172
			0.000			1" Ice	12.784	9.021	0.265
(2) SBNHH-1D45B w/ Mount Pipe	C	From Leg	4.000	0.000	177.000	No Ice	11.637	6.946	0.088
			0.000			1/2" Ice	12.228	8.127	0.172
			0.000			1" Ice	12.784	9.021	0.265
SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.000	0.000	177.000	No Ice	8.289	7.004	0.076
			0.000			1/2" Ice	8.849	8.185	0.145
			0.000			1" Ice	9.374	9.081	0.221
SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.000	0.000	177.000	No Ice	8.289	7.004	0.076
			0.000			1/2" Ice	8.849	8.185	0.145
			0.000			1" Ice	9.374	9.081	0.221
SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.000	0.000	177.000	No Ice	8.289	7.004	0.076
			0.000			1/2" Ice	8.849	8.185	0.145
			0.000			1" Ice	9.374	9.081	0.221
RRH2x60-700	A	From Leg	4.000	0.000	177.000	No Ice	3.500	1.816	0.060
			0.000			1/2" Ice	3.761	2.052	0.083
			0.000			1" Ice	4.029	2.289	0.109
RRH2x60-700	B	From Leg	4.000	0.000	177.000	No Ice	3.500	1.816	0.060
			0.000			1/2" Ice	3.761	2.052	0.083
			0.000			1" Ice	4.029	2.289	0.109
RRH2x60-700	C	From Leg	4.000	0.000	177.000	No Ice	3.500	1.816	0.060
			0.000			1/2" Ice	3.761	2.052	0.083
			0.000			1" Ice	4.029	2.289	0.109
RRH2X60-AWS	A	From Leg	4.000	0.000	177.000	No Ice	3.500	1.816	0.060
			0.000			1/2" Ice	3.761	2.052	0.083
			0.000			1" Ice	4.029	2.289	0.109
RRH2X60-AWS	B	From Leg	4.000	0.000	177.000	No Ice	3.500	1.816	0.060
			0.000			1/2" Ice	3.761	2.052	0.083
			0.000			1" Ice	4.029	2.289	0.109

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
RRH2X60-AWS	C	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice	3.500 3.761 4.029	1.816 2.052 2.289	0.060 0.083 0.109
RRH2X60-PCS	A	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice	2.200 2.393 2.593	1.723 1.901 2.087	0.055 0.075 0.099
RRH2X60-PCS	B	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice	2.200 2.393 2.593	1.723 1.901 2.087	0.055 0.075 0.099
RRH2X60-PCS	C	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice	2.200 2.393 2.593	1.723 1.901 2.087	0.055 0.075 0.099
(2) DB-T1-6Z-8AB-0Z	C	From Leg	4.000 0.000 0.000	0.000	177.000	No Ice 1/2" Ice 1" Ice	4.800 5.070 5.348	2.000 2.193 2.393	0.044 0.080 0.120
Sector Mount [SM 504-3]	C	None		0.000	177.000	No Ice 1/2" Ice 1" Ice	34.250 48.980 63.710	34.250 48.980 63.710	1.708 2.286 2.864
*** L168 ***									
NNVV-65B-R4	A	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	12.271 12.766 13.268	5.750 6.207 6.671	0.077 0.150 0.228
NNVV-65B-R4	B	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	12.271 12.766 13.268	5.750 6.207 6.671	0.077 0.150 0.228
NNVV-65B-R4	C	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	12.271 12.766 13.268	5.750 6.207 6.671	0.077 0.150 0.228
AAHC	A	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	4.212 4.468 4.731	2.073 2.265 2.468	0.104 0.136 0.172
AAHC	B	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	4.212 4.468 4.731	2.073 2.265 2.468	0.104 0.136 0.172
AAHC	C	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	4.212 4.468 4.731	2.073 2.265 2.468	0.104 0.136 0.172
(3) RRH2x50-800	A	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	2.134 2.320 2.512	1.789 1.963 2.144	0.050 0.071 0.096
(3) RRH2x50-800	B	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	2.134 2.320 2.512	1.789 1.963 2.144	0.050 0.071 0.096
(3) PCS 1900MHz 4x45W-65MHz	C	From Leg	4.000 0.000 0.000	0.000	168.000	No Ice 1/2" Ice 1" Ice	2.322 2.527 2.739	2.238 2.441 2.651	0.060 0.083 0.110
Sector Mount [SM 402-3]	C	None		0.000	168.000	No Ice 1/2" Ice 1" Ice	18.910 26.780 34.650	18.910 26.780 34.650	0.851 1.233 1.616
*** L158 ***									
QS66512-2 w/ Mount Pipe	A	From Leg	4.000 0.000 2.000	0.000	158.000	No Ice 1/2" Ice 1" Ice	8.371 8.931 9.457	8.463 9.657 10.548	0.137 0.212 0.296
QS66512-2 w/ Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	158.000	No Ice 1/2" Ice 1" Ice	8.371 8.931 9.457	8.463 9.657 10.548	0.137 0.212 0.296
(2) DBC0061F1V51-2	A	From Leg	4.000	0.000	158.000	No Ice	0.433	0.413	0.025

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000				1/2" Ice	0.518	0.496	0.031
			2.000				1" Ice	0.609	0.586	0.038
(2) DBC0061F1V51-2	B	From Leg	4.000	0.000	0.000	158.000	No Ice	0.433	0.413	0.025
			0.000				1/2" Ice	0.518	0.496	0.031
			2.000				1" Ice	0.609	0.586	0.038
(2) DBC0061F1V51-2	C	From Leg	4.000	0.000	0.000	158.000	No Ice	0.433	0.413	0.025
			0.000				1/2" Ice	0.518	0.496	0.031
			2.000				1" Ice	0.609	0.586	0.038
RRUS 32 B2	A	From Leg	4.000	0.000	0.000	158.000	No Ice	2.731	1.668	0.053
			0.000				1/2" Ice	2.953	1.855	0.074
			2.000				1" Ice	3.182	2.049	0.098
RRUS 32 B2	B	From Leg	4.000	0.000	0.000	158.000	No Ice	2.731	1.668	0.053
			0.000				1/2" Ice	2.953	1.855	0.074
			2.000				1" Ice	3.182	2.049	0.098
RRUS 32 B2	C	From Leg	4.000	0.000	0.000	158.000	No Ice	2.731	1.668	0.053
			0.000				1/2" Ice	2.953	1.855	0.074
			2.000				1" Ice	3.182	2.049	0.098
7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	158.000	No Ice	5.746	4.254	0.055
			0.000				1/2" Ice	6.179	5.014	0.103
			2.000				1" Ice	6.607	5.711	0.157
7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	158.000	No Ice	5.746	4.254	0.055
			0.000				1/2" Ice	6.179	5.014	0.103
			2.000				1" Ice	6.607	5.711	0.157
7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	158.000	No Ice	5.746	4.254	0.055
			0.000				1/2" Ice	6.179	5.014	0.103
			2.000				1" Ice	6.607	5.711	0.157
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	158.000	No Ice	8.262	6.304	0.074
			0.000				1/2" Ice	8.822	7.479	0.139
			2.000				1" Ice	9.346	8.368	0.212
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	158.000	No Ice	8.262	6.304	0.074
			0.000				1/2" Ice	8.822	7.479	0.139
			2.000				1" Ice	9.346	8.368	0.212
TPA-65R-LCUUUU-H8 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	158.000	No Ice	13.535	10.960	0.114
			0.000				1/2" Ice	14.238	12.486	0.218
			2.000				1" Ice	14.949	14.037	0.331
SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	158.000	No Ice	11.683	9.842	0.099
			0.000				1/2" Ice	12.404	11.366	0.189
			2.000				1" Ice	13.135	12.914	0.288
DTMABP7819VG12A	A	From Leg	4.000	0.000	0.000	158.000	No Ice	0.976	0.339	0.019
			0.000				1/2" Ice	1.100	0.419	0.026
			0.000				1" Ice	1.232	0.510	0.036
DTMABP7819VG12A	B	From Leg	4.000	0.000	0.000	158.000	No Ice	0.976	0.339	0.019
			0.000				1/2" Ice	1.100	0.419	0.026
			0.000				1" Ice	1.232	0.510	0.036
DTMABP7819VG12A	C	From Leg	4.000	0.000	0.000	158.000	No Ice	0.976	0.339	0.019
			0.000				1/2" Ice	1.100	0.419	0.026
			0.000				1" Ice	1.232	0.510	0.036
7020.00	A	From Leg	4.000	0.000	0.000	158.000	No Ice	0.102	0.175	0.002
			0.000				1/2" Ice	0.147	0.239	0.005
			0.000				1" Ice	0.199	0.311	0.009
7020.00	B	From Leg	4.000	0.000	0.000	158.000	No Ice	0.102	0.175	0.002
			0.000				1/2" Ice	0.147	0.239	0.005
			0.000				1" Ice	0.199	0.311	0.009
7020.00	C	From Leg	4.000	0.000	0.000	158.000	No Ice	0.102	0.175	0.002
			0.000				1/2" Ice	0.147	0.239	0.005
			0.000				1" Ice	0.199	0.311	0.009
RRUS 32	A	From Leg	4.000	0.000	0.000	158.000	No Ice	2.857	1.777	0.055

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	3.083	1.968	0.077
			2.000			1" Ice	3.316	2.166	0.103
RRUS 32	B	From Leg	4.000	0.000	158.000	No Ice	2.857	1.777	0.055
			0.000			1/2" Ice	3.083	1.968	0.077
			2.000			1" Ice	3.316	2.166	0.103
RRUS 32	C	From Leg	4.000	0.000	158.000	No Ice	2.857	1.777	0.055
			0.000			1/2" Ice	3.083	1.968	0.077
			2.000			1" Ice	3.316	2.166	0.103
RRUS 11	A	From Leg	4.000	0.000	158.000	No Ice	2.784	1.187	0.051
			0.000			1/2" Ice	2.992	1.334	0.072
			0.000			1" Ice	3.207	1.490	0.095
RRUS 11	B	From Leg	4.000	0.000	158.000	No Ice	2.784	1.187	0.051
			0.000			1/2" Ice	2.992	1.334	0.072
			0.000			1" Ice	3.207	1.490	0.095
RRUS 11	C	From Leg	4.000	0.000	158.000	No Ice	2.784	1.187	0.051
			0.000			1/2" Ice	2.992	1.334	0.072
			0.000			1" Ice	3.207	1.490	0.095
DC6-48-60-18-8F	A	From Leg	4.000	0.000	158.000	No Ice	0.917	0.917	0.033
			0.000			1/2" Ice	1.458	1.458	0.051
			2.000			1" Ice	1.643	1.643	0.071
DC6-48-60-18-8F	A	From Leg	4.000	0.000	158.000	No Ice	0.917	0.917	0.033
			0.000			1/2" Ice	1.458	1.458	0.051
			0.000			1" Ice	1.643	1.643	0.071
(2) 5' x 2' Pipe Mount	A	From Leg	4.000	0.000	158.000	No Ice	1.188	1.188	0.018
			0.000			1/2" Ice	1.496	1.496	0.027
			0.000			1" Ice	1.807	1.807	0.040
(2) 5' x 2' Pipe Mount	B	From Leg	4.000	0.000	158.000	No Ice	1.188	1.188	0.018
			0.000			1/2" Ice	1.496	1.496	0.027
			0.000			1" Ice	1.807	1.807	0.040
(2) 5' x 2' Pipe Mount	C	From Leg	4.000	0.000	158.000	No Ice	1.188	1.188	0.018
			0.000			1/2" Ice	1.496	1.496	0.027
			0.000			1" Ice	1.807	1.807	0.040
Sector Mount [SM 504-3]	C	None		0.000	158.000	No Ice	34.250	34.250	1.708
						1/2" Ice	48.980	48.980	2.286
						1" Ice	63.710	63.710	2.864
***									
GPS_A	B	From Leg	4.000	0.000	40.000	No Ice	0.255	0.255	0.001
			0.000			1/2" Ice	0.320	0.320	0.005
			0.000			1" Ice	0.393	0.393	0.010
Side Arm Mount [SO 306-1]	B	From Leg	2.000	0.000	40.000	No Ice	0.980	2.180	0.042
			0.000			1/2" Ice	1.700	3.800	0.062
			0.000			1" Ice	2.420	5.420	0.083
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Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
***											
A-ANT-18G-2-C	C	Paraboloid w/Radome	From Leg	4.000 0.000 0.000	67.000		168.000	2.175	No Ice 1/2" Ice 1" Ice	3.720 4.010 4.300	0.027 0.050 0.070
VHLP2-18	B	Paraboloid w/Radome	From Leg	4.000 0.000 0.000	0.000		168.000	2.175	No Ice 1/2" Ice 1" Ice	3.720 4.010 4.300	0.031 0.050 0.070
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Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service

Comb. No.	Description
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	3.790	45	0.198	0.082
T2	160 - 140	2.941	45	0.187	0.076
T3	140 - 133.333	2.165	45	0.157	0.063
T4	133.333 - 126.667	1.938	45	0.147	0.058
T5	126.667 - 120	1.727	45	0.135	0.054
T6	120 - 100	1.534	45	0.122	0.050
T7	100 - 90	1.066	45	0.090	0.039
T8	90 - 80	0.870	45	0.081	0.034
T9	80 - 70	0.694	45	0.071	0.029
T10	70 - 60	0.539	45	0.061	0.025
T11	60 - 50	0.404	45	0.051	0.020
T12	50 - 40	0.292	45	0.042	0.017
T13	40 - 30	0.198	39	0.033	0.014
T14	30 - 20	0.123	39	0.024	0.010
T15	20 - 0	0.066	39	0.015	0.007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.000	Lightning Rod 5/8"x4'	45	3.790	0.198	0.082	290398
177.000	(2) DB846F65ZAXY w/ Mount Pipe	45	3.661	0.197	0.082	290398
168.000	A-ANT-18G-2-C	45	3.277	0.194	0.079	120999
158.000	QS66512-2 w/ Mount Pipe	45	2.859	0.185	0.075	62483
40.000	GPS_A	39	0.198	0.033	0.014	64438

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	15.653	14	0.812	0.345
T2	160 - 140	12.164	14	0.770	0.316
T3	140 - 133.333	8.961	14	0.646	0.262
T4	133.333 - 126.667	8.025	14	0.604	0.244

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T5	126.667 - 120	7.154	14	0.555	0.226
T6	120 - 100	6.357	14	0.501	0.208
T7	100 - 90	4.424	14	0.371	0.163
T8	90 - 80	3.614	14	0.333	0.142
T9	80 - 70	2.881	14	0.293	0.121
T10	70 - 60	2.241	14	0.253	0.103
T11	60 - 50	1.683	14	0.211	0.086
T12	50 - 40	1.217	14	0.174	0.072
T13	40 - 30	0.826	2	0.137	0.058
T14	30 - 20	0.511	2	0.099	0.043
T15	20 - 0	0.271	2	0.061	0.030

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.000	Lightning Rod 5/8"x4'	14	15.653	0.812	0.345	73407
177.000	(2) DB846F65ZAXY w/ Mount Pipe	14	15.124	0.809	0.341	73407
168.000	A-ANT-18G-2-C	14	13.544	0.795	0.331	30586
158.000	QS66512-2 w/ Mount Pipe	14	11.824	0.760	0.312	15614
40.000	GPS_A	2	0.826	0.137	0.058	15669

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.750	4	4.383	29.821	0.147	1	Bolt Tension
		Diagonal	A325N	0.625	3	3.812	12.425	0.307	1	Bolt Shear
		Horizontal	A325N	0.625	2	3.080	12.425	0.248	1	Bolt Shear
T2	160	Leg	A325N	0.875	4	18.191	40.589	0.448	1	Bolt Tension
		Diagonal	A325N	0.625	3	4.896	12.425	0.394	1	Bolt Shear
		Horizontal	A325N	0.625	2	4.414	12.425	0.355	1	Bolt Shear
T3	140	Diagonal	A325N	0.625	3	4.735	12.425	0.381	1	Bolt Shear
		Horizontal	A325N	0.625	2	4.577	12.425	0.368	1	Bolt Shear
T4	133.333	Diagonal	A325N	0.625	3	4.773	12.425	0.384	1	Bolt Shear
		Top Girt	A325N	0.625	2	4.786	12.425	0.385	1	Bolt Shear
T5	126.667	Leg	A325N	1.000	4	32.135	53.014	0.606	1	Bolt Tension
		Diagonal	A325N	0.625	3	4.796	12.425	0.386	1	Bolt Shear
		Top Girt	A325N	0.625	2	4.968	12.425	0.400	1	Bolt Shear
T6	120	Leg	A325N	1.000	4	42.882	53.014	0.809	1	Bolt Tension
		Diagonal	A325N	0.625	3	5.974	12.425	0.481	1	Bolt Shear
		Horizontal	A325N	0.625	2	5.526	12.425	0.445	1	Bolt Shear
T7	100	Diagonal	A325N	0.625	3	5.576	12.425	0.449	1	Bolt Shear
		Horizontal	A325N	0.625	2	5.584	12.425	0.449	1	Bolt Shear
T8	90	Leg	A325N	1.000	6	36.330	53.014	0.685	1	Bolt Tension
		Diagonal	A325N	0.625	3	5.653	12.425	0.455	1	Bolt Shear
		Top Girt	A325N	0.625	2	5.737	12.425	0.462	1	Bolt Shear
T9	80	Diagonal	A325N	0.625	3	5.922	12.425	0.477	1	Bolt Shear
		Horizontal	A325N	0.625	2	6.166	12.425	0.496	1	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T10	70	Leg	A325N	1.000	6	43.467	53.014	0.820	1	Bolt Tension
		Diagonal	A325N	0.625	3	6.035	12.425	0.486	1	Bolt Shear
		Horizontal	A325N	0.625	2	6.514	12.425	0.524	1	Bolt Shear
T11	60	Diagonal	A325N	0.625	3	6.225	12.425	0.501	1	Bolt Shear
		Horizontal	A325N	0.625	2	6.898	12.425	0.555	1	Bolt Shear
T12	50	Leg	A325N	1.000	6	50.534	53.014	0.953	1	Bolt Tension
		Diagonal	A325N	0.625	3	6.341	12.425	0.510	1	Bolt Shear
		Horizontal	A325N	0.625	2	7.198	12.425	0.579	1	Bolt Shear
T13	40	Diagonal	A325N	0.625	3	6.260	12.425	0.504	1	Bolt Shear
		Horizontal	A325N	0.625	2	7.376	12.425	0.594	1	Bolt Shear
T14	30	Leg	A325N	1.000	8	42.962	53.014	0.810	1	Bolt Tension
		Diagonal	A325N	0.625	3	6.341	12.425	0.510	1	Bolt Shear
		Horizontal	A325N	0.625	2	7.411	12.425	0.596	1	Bolt Shear
T15	20	Diagonal	A325N	0.750	3	10.022	17.892	0.560	1	Bolt Shear
		Horizontal	A325N	0.750	2	8.315	17.892	0.465	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 2.5 STD	20.000	6.667	84.4 K=1.00	1.704	-22.458	45.528	0.493 [1]
T2	160 - 140	ROHN 3 X-STR	20.036	6.679	70.5 K=1.00	3.016	-81.342	94.336	0.862 [1]
T3	140 - 133.333	ROHN 4 X-STR	6.679	6.679	54.3 K=1.00	4.407	-100.965	159.904	0.631 [1]
T4	133.333 - 126.667	ROHN 4 X-STR	6.679	6.679	54.3 K=1.00	4.407	-120.272	159.904	0.752 [1]
T5	126.667 - 120	ROHN 4 X-STR	6.679	6.679	54.3 K=1.00	4.407	-139.314	159.904	0.871 [1]
T6	120 - 100	ROHN 5 X-STR	20.042	10.021	65.4 K=1.00	6.112	-184.503	201.195	0.917 [1]
T7	100 - 90	P 5 XS w HSS 6.625x0.500 Half Pipe	10.028	10.028	74.3 K=1.10	10.922	-210.843	311.932	0.676 [1]
T8	90 - 80	P 5 XS w HSS 6.625x0.500 Half Pipe	10.028	10.028	74.3 K=1.10	10.922	-234.339	311.932	0.751 [1]
T9	80 - 70	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	10.026	10.026	62.0 K=1.11	10.910	-257.413	348.724	0.738 [1]
T10	70 - 60	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	10.026	10.026	62.0 K=1.11	10.910	-280.946	348.724	0.806 [1]
T11	60 - 50	P 6 XS w HSS 7.500x0.375 Half Pipe	10.026	10.026	61.8 K=1.11	12.602	-304.309	403.375	0.754 [1]
T12	50 - 40	P 6 XS w HSS 7.500x0.375 Half Pipe	10.026	10.026	61.8 K=1.11	12.602	-327.692	403.375	0.812 [1]
T13	40 - 30	P 6 XS w HSS 7.500x0.375 Half Pipe	10.029	10.029	61.9 K=1.11	12.602	-350.932	403.328	0.870 [1]
T14	30 - 20	P 6 XS w HSS 7.500x0.375 Half Pipe	10.029	10.029	61.9 K=1.11	12.602	-372.908	403.328	0.925 [1]
T15	20 - 0	Rohn 8 EHS w	20.052	9.984	46.6	15.315	-393.171	547.818	0.718 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
		HSS9.625x0.375 Half Pipe			K=1.12				

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 2 STD	7.917	7.695	117.3 K=1.00	1.075	-11.437	17.637	0.648 [1]
T2	160 - 140	ROHN 2 STD	8.527	8.293	126.4 K=1.00	1.075	-14.149	15.187	0.932 [1]
T3	140 - 133.333	ROHN 2 STD	8.747	8.458	128.9 K=1.00	1.075	-14.205	14.601	0.973 [1]
T4	133.333 - 126.667	P 2 STD w HSS 2.875x0.250 Half Pipe	8.976	8.696	111.3 K=1.13	1.075	-14.319	19.329	0.741 [1]
T5	126.667 - 120	P 2 STD w HSS 2.875x0.250 Half Pipe	9.212	8.940	113.8 K=1.12	1.075	-14.387	18.624	0.772 [1]
T6	120 - 100	P 2.5 STD w HSS 3.500x0.300 Half Pipe	12.492	12.105	124.7 K=1.08	1.704	-17.921	24.746	0.724 [1]
T7	100 - 90	P 2.5 STD w HSS 3.500x0.300 Half Pipe	12.890	12.453	127.2 K=1.07	1.704	-16.729	23.802	0.703 [1]
T8	90 - 80	P 2.5 STD w HSS 3.500x0.300 Half Pipe	13.307	12.888	131.6 K=1.07	1.704	-16.960	22.221	0.763 [1]
T9	80 - 70	P 2.5 STD w HSS 3.500x0.300 Half Pipe	13.726	13.270	134.6 K=1.07	1.704	-17.765	21.249	0.836 [1]
T10	70 - 60	P 2.5 STD w HSS 3.500x0.300 Half Pipe	14.162	13.720	139.2 K=1.07	1.704	-18.105	19.878	0.911 [1]
T11	60 - 50	P 2.5 XS w HSS 3.500x0.300 Half Pipe	14.610	14.182	149.9 K=1.05	2.254	-18.675	22.664	0.824 [1]
T12	50 - 40	P 2.5 XS w HSS 3.500x0.300 Half Pipe	15.072	14.654	154.9 K=1.05	2.254	-19.024	21.226	0.896 [1]
T13	40 - 30	ROHN 3 STD	15.571	15.164	156.4 K=1.00	2.228	-18.781	20.586	0.912 [1]
T14	30 - 20	ROHN 3 STD	16.082	15.683	161.7 K=1.00	2.228	-19.024	19.246	0.988 [1]
T15	20 - 0	ROHN 3 STD	24.260	12.130	125.1 K=1.00	2.228	-30.066	32.170	0.935 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 1.5 STD	8.528	4.144	79.9 K=1.00	0.799	-6.119	22.564	0.271 [1]
T2	160 - 140	ROHN 1.5 STD	9.931	4.819	92.9 K=1.00	0.799	-8.759	19.143	0.458 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	140 - 133.333	ROHN 2 STD	10.625	5.167	78.8 K=1.00	1.075	-9.131	30.720	0.297 [1]
T6	120 - 100	ROHN 2 STD	13.833	6.685	101.9 K=1.00	1.075	-11.053	22.627	0.488 [1]
T7	100 - 90	ROHN 2 STD	14.958	7.247	110.5 K=1.00	1.075	-11.169	19.805	0.564 [1]
T9	80 - 70	ROHN 2.5 STD	17.542	8.495	107.6 K=1.00	1.704	-12.331	32.891	0.375 [1]
T10	70 - 60	ROHN 2.5 STD	18.792	9.083	115.1 K=1.00	1.704	-13.025	29.084	0.448 [1]
T11	60 - 50	ROHN 2.5 STD	20.042	9.708	123.0 K=1.00	1.704	-13.781	25.460	0.541 [1]
T12	50 - 40	ROHN 2.5 STD	21.292	10.333	130.9 K=1.00	1.704	-14.313	22.473	0.637 [1]
T13	40 - 30	ROHN 2.5 STD	22.542	10.958	138.8 K=1.00	1.704	-14.729	19.983	0.737 [1]
T14	30 - 20	ROHN 2.5 STD	23.859	11.617	147.1 K=1.00	1.704	-14.651	17.780	0.824 [1]
T15	20 - 0	ROHN 3 STD	25.177	12.276	126.6 K=1.00	2.228	-16.598	31.409	0.528 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 1.5 STD	8.500	4.130	79.6 K=1.00	0.799	-2.395	22.635	0.106 [1]
T4	133.333 - 126.667	ROHN 2 STD	11.319	5.472	83.4 K=1.00	1.075	-9.571	29.069	0.329 [1]
T5	126.667 - 120	ROHN 2 STD	12.014	5.819	88.7 K=1.00	1.075	-9.937	27.195	0.365 [1]
T8	90 - 80	ROHN 2 STD	16.250	7.849	119.7 K=1.00	1.075	-11.474	16.954	0.677 [1]

[1] $P_u / \phi P_n$ controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	20 - 0	ROHN 1.5 x 11GA	6.294	5.893	144.4 K=1.00	0.520	-1.355	5.637	0.240 [1]

[1] $P_u / \phi P_n$ controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T15	20 - 0	ROHN 1.5 STD	11.466	10.836	208.8 K=1.00	0.799	-1.272	4.141	0.307 [1]

[1] $P_u / \phi P_n$ controls

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T15	20 - 0	ROHN 1.5 x 11GA	6.294	6.294	154.2 K=1.00	0.520	-0.035	4.941	0.007 [1]

[1] $P_u / \phi P_n$ controls

Redundant Hip Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T15	20 - 0	ROHN 2.5 STD	15.046	15.046	190.6 K=1.00	1.704	-0.102	10.600	0.010 [1]

[1] $P_u / \phi P_n$ controls

Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	L2x2x1/8	4.264	4.264	128.7 K=1.00	0.484	-0.007	6.529	0.001 [1]
T2	160 - 140	L2x2x1/8	4.618	4.618	139.4 K=1.00	0.484	-0.010	5.631	0.002 [1]
T3	140 - 133.333	L2x2x1/8	5.313	5.313	160.4 K=1.00	0.484	-0.011	4.255	0.003 [1]
T4	133.333 - 126.667	L2x2x1/8	5.660	5.660	170.8 K=1.00	0.484	-0.011	3.749	0.003 [1]
T5	126.667 - 120	L2x2x1/8	6.007	6.007	181.3 K=1.00	0.484	-0.010	3.328	0.003 [1]
T6	120 - 100	L2x2x1/8	6.917	6.917	208.8 K=1.00	0.484	-0.010	2.510	0.004 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	100 - 90	L2 1/2x2 1/2x3/16	7.479	7.479	181.3 K=1.00	0.902	-0.012	6.199	0.002 [1]
T8	90 - 80	L2 1/2x2 1/2x3/16	8.125	8.125	197.0 K=1.00	0.902	-0.012	5.252	0.002 [1]
T9	80 - 70	L3x3x3/16	8.771	8.771	176.6 K=1.00	1.090	-0.014	7.896	0.002 [1]
T10	70 - 60	L3x3x3/16	9.396	9.396	189.2 K=1.00	1.090	-0.014	6.881	0.002 [1]
T11	60 - 50	L3 1/2x3 1/2x1/4	10.021	10.021	173.3 K=1.00	1.690	-0.016	12.717	0.001 [1]
T12	50 - 40	L3 1/2x3 1/2x1/4	10.646	10.646	184.1 K=1.00	1.690	-0.017	11.267	0.001 [1]
T13	40 - 30	L3 1/2x3 1/2x1/4	11.271	11.271	194.9 K=1.00	1.690	-0.020	10.052	0.002 [1]
T14	30 - 20	L3 1/2x3 1/2x1/4	11.930	11.930	206.3 K=1.00	1.690	-0.020	8.973	0.002 [1]
T15	20 - 0	ROHN 3 STD	12.589	12.589	129.8 K=1.00	2.228	-0.022	29.869	0.001 [1]

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 2.5 STD	20.000	6.667	84.4	1.704	17.532	76.682	0.229 [1]
T2	160 - 140	ROHN 3 X-STR	20.036	6.679	70.5	3.016	72.763	135.717	0.536 [1]
T3	140 - 133.333	ROHN 4 X-STR	6.679	6.679	54.3	4.407	91.697	198.335	0.462 [1]
T4	133.333 - 126.667	ROHN 4 X-STR	6.679	6.679	54.3	4.407	110.259	198.335	0.556 [1]
T5	126.667 - 120	ROHN 4 X-STR	6.679	6.679	54.3	4.407	128.542	198.335	0.648 [1]
T6	120 - 100	ROHN 5 X-STR	20.042	10.021	65.4	6.112	171.528	275.039	0.624 [1]
T7	100 - 90	P 5 XS w HSS 6.625x0.500 Half Pipe	10.028	10.028	67.3	10.922	196.282	452.193	0.434 [1]
T8	90 - 80	P 5 XS w HSS 6.625x0.500 Half Pipe	10.028	10.028	67.3	10.922	217.983	452.193	0.482 [1]
T9	80 - 70	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	10.026	10.026	55.7	10.910	239.207	451.684	0.530 [1]
T10	70 - 60	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	10.026	10.026	55.7	10.910	260.800	451.684	0.577 [1]
T11	60 - 50	P 6 XS w HSS 7.500x0.375 Half Pipe	10.026	10.026	55.5	12.602	282.118	521.719	0.541 [1]
T12	50 - 40	P 6 XS w HSS 7.500x0.375 Half Pipe	10.026	10.026	55.5	12.602	303.202	521.719	0.581 [1]
T13	40 - 30	P 6 XS w HSS 7.500x0.375 Half Pipe	10.029	10.029	55.5	12.602	324.094	521.719	0.621 [1]
T14	30 - 20	P 6 XS w HSS 7.500x0.375 Half Pipe	10.029	10.029	55.5	12.602	343.694	521.719	0.659 [1]
T15	20 - 0	Rohn 8 EHS w HSS9.625x0.375 Half Pipe	20.052	0.084	0.3	15.315	403.304	634.052	0.636 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 2 STD	7.917	7.695	117.3	1.075	11.365	48.354	0.235 [1]
T2	160 - 140	ROHN 2 STD	8.315	8.081	123.2	1.075	14.605	48.354	0.302 [1]
T3	140 - 133.333	ROHN 2 STD	8.747	8.458	128.9	1.075	14.100	48.354	0.292 [1]
T4	133.333 - 126.667	P 2 STD w HSS 2.875x0.250 Half Pipe	8.976	8.696	98.5	1.075	14.206	44.486	0.319 [1]
T5	126.667 - 120	P 2 STD w HSS 2.875x0.250 Half Pipe	9.212	8.940	101.2	1.075	14.266	44.486	0.321 [1]
T6	120 - 100	P 2.5 STD w HSS 3.500x0.300 Half Pipe	12.492	12.105	115.0	1.704	17.740	70.548	0.251 [1]
T7	100 - 90	P 2.5 STD w HSS 3.500x0.300 Half Pipe	12.890	12.453	118.3	1.704	16.513	70.548	0.234 [1]
T8	90 - 80	P 2.5 STD w HSS 3.500x0.300 Half Pipe	13.307	12.888	122.5	1.704	16.728	70.548	0.237 [1]
T9	80 - 70	P 2.5 STD w HSS 3.500x0.300 Half Pipe	13.726	13.270	126.1	1.704	17.466	70.548	0.248 [1]
T10	70 - 60	P 2.5 STD w HSS 3.500x0.300 Half Pipe	14.162	13.720	130.4	1.704	17.783	70.548	0.252 [1]
T11	60 - 50	P 2.5 XS w HSS 3.500x0.300 Half Pipe	14.610	14.182	142.4	2.254	18.250	93.297	0.196 [1]
T12	50 - 40	P 2.5 XS w HSS 3.500x0.300 Half Pipe	15.072	14.654	147.2	2.254	18.567	93.297	0.199 [1]
T13	40 - 30	ROHN 3 STD	15.571	15.164	156.4	2.228	18.291	100.281	0.182 [1]
T14	30 - 20	ROHN 3 STD	16.082	15.683	161.7	2.228	18.497	100.281	0.184 [1]
T15	20 - 0	ROHN 3 STD	24.260	12.130	125.1	2.228	29.102	100.281	0.290 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 1.5 STD	8.528	4.144	79.9	0.799	6.161	35.976	0.171 [1]
T2	160 - 140	ROHN 1.5 STD	9.931	4.819	92.9	0.799	8.790	35.976	0.244 [1]
T3	140 - 133.333	ROHN 2 STD	10.625	5.167	78.8	1.075	9.154	48.354	0.189 [1]
T6	120 - 100	ROHN 2 STD	13.833	6.685	101.9	1.075	11.005	48.354	0.228 [1]
T7	100 - 90	ROHN 2 STD	14.958	7.247	110.5	1.075	11.027	48.354	0.228 [1]
T9	80 - 70	ROHN 2.5 STD	17.542	8.495	107.6	1.704	12.317	76.682	0.161 [1]
T10	70 - 60	ROHN 2.5 STD	18.792	9.083	115.1	1.704	13.028	76.682	0.170 [1]
T11	60 - 50	ROHN 2.5 STD	20.042	9.708	123.0	1.704	13.797	76.682	0.180 [1]
T12	50 - 40	ROHN 2.5 STD	21.292	10.333	130.9	1.704	14.396	76.682	0.188 [1]
T13	40 - 30	ROHN 2.5 STD	22.542	10.958	138.8	1.704	14.751	76.682	0.192 [1]
T14	30 - 20	ROHN 2.5 STD	23.859	11.617	147.1	1.704	14.821	76.682	0.193 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	20 - 0	ROHN 3 STD	25.177	12.276	126.6	2.228	16.630	100.281	0.166 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 1.5 STD	8.500	4.130	79.6	0.799	2.395	35.976	0.067 [1]
T4	133.333 - 126.667	ROHN 2 STD	11.319	5.472	83.4	1.075	9.549	48.354	0.197 [1]
T5	126.667 - 120	ROHN 2 STD	12.014	5.819	88.7	1.075	9.908	48.354	0.205 [1]
T8	90 - 80	ROHN 2 STD	16.250	7.849	119.7	1.075	11.418	48.354	0.236 [1]

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	20 - 0	ROHN 1.5 x 11GA	6.294	5.893	144.4	0.520	1.469	23.411	0.063 [1]

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	20 - 0	ROHN 1.5 STD	11.466	10.836	208.8	0.799	1.398	35.976	0.039 [1]

[1] P_u / ϕP_n controls

Redundant Hip (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	20 - 0	ROHN 1.5 x 11GA	6.294	6.294	154.2	0.520	0.024	23.411	0.001 [1]

[1] P_u / ϕP_n controls

Redundant Hip Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	20 - 0	ROHN 2.5 STD	15.046	15.046	190.6	1.704	0.091	76.682	0.001 [1]

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	4.264	4.264	81.7	0.484	0.007	15.694	0.000 [1]
T2	160 - 140	L2x2x1/8	4.271	4.271	81.8	0.484	0.009	15.694	0.001 [1]
T3	140 - 133.333	L2x2x1/8	5.313	5.313	101.8	0.484	0.009	15.694	0.001 [1]
T4	133.333 - 126.667	L2x2x1/8	5.660	5.660	108.5	0.484	0.008	15.694	0.001 [1]
T5	126.667 - 120	L2x2x1/8	6.007	6.007	115.1	0.484	0.007	15.694	0.000 [1]
T6	120 - 100	L2x2x1/8	6.354	6.354	121.8	0.484	0.006	15.694	0.000 [1]
T7	100 - 90	L2 1/2x2 1/2x3/16	7.479	7.479	115.4	0.902	0.003	29.225	0.000 [1]
T8	90 - 80	L2 1/2x2 1/2x3/16	8.125	8.125	125.3	0.902	0.002	29.225	0.000 [1]
T9	80 - 70	L3x3x3/16	8.771	8.771	112.1	1.090	0.003	49.050	0.000 [1]
T10	70 - 60	L3x3x3/16	9.396	9.396	120.1	1.090	0.003	49.050	0.000 [1]
T11	60 - 50	L3 1/2x3 1/2x1/4	10.021	10.021	110.3	1.690	0.001	76.050	0.000 [1]
T12	50 - 40	L3 1/2x3 1/2x1/4	10.646	10.646	117.2	1.690	0.000	76.050	0.000 [1]
T15	20 - 0	ROHN 3 STD	12.589	12.589	129.8	2.228	0.006	100.281	0.000 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

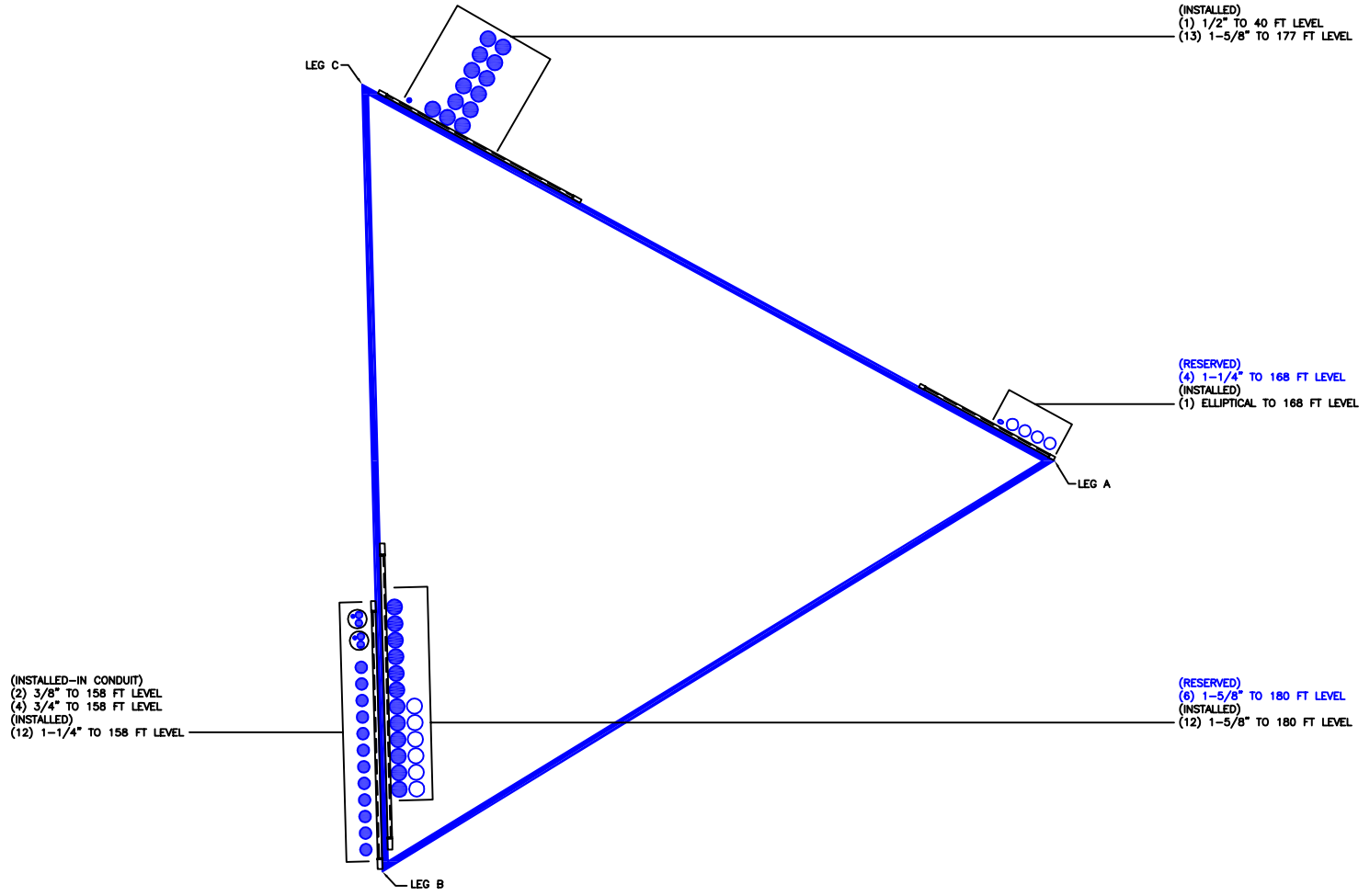
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 2.5 STD	1	-22.458	45.528	49.3	Pass
T2	160 - 140	Leg	ROHN 3 X-STR	42	-81.342	94.336	86.2	Pass
T3	140 - 133.333	Leg	ROHN 4 X-STR	81	-100.965	159.904	63.1	Pass
T4	133.333 - 126.667	Leg	ROHN 4 X-STR	96	-120.272	159.904	75.2	Pass
T5	126.667 - 120	Leg	ROHN 4 X-STR	111	-139.314	159.904	87.1	Pass
T6	120 - 100	Leg	ROHN 5 X-STR	126	-184.503	201.195	91.7	Pass
T7	100 - 90	Leg	P 5 XS w HSS 6.625x0.500 Half Pipe	153	-210.843	311.932	67.6	Pass
T8	90 - 80	Leg	P 5 XS w HSS 6.625x0.500 Half Pipe	168	-234.339	311.932	75.1	Pass
T9	80 - 70	Leg	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	183	-257.413	348.724	73.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T10	70 - 60	Leg	Rohn 6 EHS w HSS 7.500x0.375 Half Pipe	198	-280.946	348.724	80.6 82.0 (b)	Pass
T11	60 - 50	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	213	-304.309	403.375	75.4	Pass
T12	50 - 40	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	228	-327.692	403.375	81.2 95.3 (b)	Pass
T13	40 - 30	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	243	-350.932	403.328	87.0	Pass
T14	30 - 20	Leg	P 6 XS w HSS 7.500x0.375 Half Pipe	258	-372.908	403.328	92.5	Pass
T15	20 - 0	Leg	Rohn 8 EHS w HSS9.625x0.375 Half Pipe	273	-393.171	547.818	71.8	Pass
T1	180 - 160	Diagonal	ROHN 2 STD	12	-11.437	17.637	64.8	Pass
T2	160 - 140	Diagonal	ROHN 2 STD	48	-14.149	15.187	93.2	Pass
T3	140 - 133.333	Diagonal	ROHN 2 STD	87	-14.205	14.601	97.3	Pass
T4	133.333 - 126.667	Diagonal	P 2 STD w HSS 2.875x0.250 Half Pipe	103	-14.319	19.329	74.1	Pass
T5	126.667 - 120	Diagonal	P 2 STD w HSS 2.875x0.250 Half Pipe	118	-14.387	18.624	77.2	Pass
T6	120 - 100	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	132	-17.921	24.746	72.4	Pass
T7	100 - 90	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	159	-16.729	23.802	70.3	Pass
T8	90 - 80	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	175	-16.960	22.221	76.3	Pass
T9	80 - 70	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	189	-17.765	21.249	83.6	Pass
T10	70 - 60	Diagonal	P 2.5 STD w HSS 3.500x0.300 Half Pipe	204	-18.105	19.878	91.1	Pass
T11	60 - 50	Diagonal	P 2.5 XS w HSS 3.500x0.300 Half Pipe	219	-18.675	22.664	82.4	Pass
T12	50 - 40	Diagonal	P 2.5 XS w HSS 3.500x0.300 Half Pipe	234	-19.024	21.226	89.6	Pass
T13	40 - 30	Diagonal	ROHN 3 STD	249	-18.781	20.586	91.2	Pass
T14	30 - 20	Diagonal	ROHN 3 STD	264	-19.024	19.246	98.8	Pass
T15	20 - 0	Diagonal	ROHN 3 STD	285	-30.066	32.170	93.5	Pass
T1	180 - 160	Horizontal	ROHN 1.5 STD	10	-6.119	22.564	27.1	Pass
T2	160 - 140	Horizontal	ROHN 1.5 STD	46	-8.759	19.143	45.8	Pass
T3	140 - 133.333	Horizontal	ROHN 2 STD	85	-9.131	30.720	29.7 36.8 (b)	Pass
T6	120 - 100	Horizontal	ROHN 2 STD	130	-11.053	22.627	48.8	Pass
T7	100 - 90	Horizontal	ROHN 2 STD	157	-11.169	19.805	56.4	Pass
T9	80 - 70	Horizontal	ROHN 2.5 STD	187	-12.331	32.891	37.5 49.6 (b)	Pass
T10	70 - 60	Horizontal	ROHN 2.5 STD	202	-13.025	29.084	44.8 52.4 (b)	Pass
T11	60 - 50	Horizontal	ROHN 2.5 STD	217	-13.781	25.460	54.1 55.5 (b)	Pass
T12	50 - 40	Horizontal	ROHN 2.5 STD	232	-14.313	22.473	63.7	Pass
T13	40 - 30	Horizontal	ROHN 2.5 STD	247	-14.729	19.983	73.7	Pass
T14	30 - 20	Horizontal	ROHN 2.5 STD	262	-14.651	17.780	82.4	Pass
T15	20 - 0	Horizontal	ROHN 3 STD	281	-16.598	31.409	52.8	Pass
T1	180 - 160	Top Girt	ROHN 1.5 STD	5	-2.395	22.635	10.6	Pass
T4	133.333 - 126.667	Top Girt	ROHN 2 STD	98	-9.571	29.069	32.9 38.5 (b)	Pass
T5	126.667 - 120	Top Girt	ROHN 2 STD	113	-9.937	27.195	36.5 40.0 (b)	Pass
T8	90 - 80	Top Girt	ROHN 2 STD	170	-11.474	16.954	67.7	Pass
T15	20 - 0	Redund Horz 1 Bracing	ROHN 1.5 x 11GA	292	-1.355	5.637	24.0	Pass
T15	20 - 0	Redund Diag 1	ROHN 1.5 STD	293	-1.272	4.141	30.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T15	20 - 0	Bracing Redund Hip 1 Bracing	ROHN 1.5 x 11GA	288	-0.035	4.941	0.7	Pass
T15	20 - 0	Redund Hip Diagonal 1 Bracing	ROHN 2.5 STD	289	-0.102	10.600	1.0	Pass
T1	180 - 160	Inner Bracing	L2x2x1/8	18	-0.007	6.529	0.6	Pass
T2	160 - 140	Inner Bracing	L2x2x1/8	54	-0.007	4.871	0.7	Pass
T3	140 - 133.333	Inner Bracing	L2x2x1/8	93	-0.010	4.255	0.8	Pass
T4	133.333 - 126.667	Inner Bracing	L2x2x1/8	108	-0.009	3.749	0.8	Pass
T5	126.667 - 120	Inner Bracing	L2x2x1/8	123	-0.009	3.328	0.8	Pass
T6	120 - 100	Inner Bracing	L2x2x1/8	138	-0.010	2.510	1.0	Pass
T7	100 - 90	Inner Bracing	L2 1/2x2 1/2x3/16	165	-0.012	6.199	0.7	Pass
T8	90 - 80	Inner Bracing	L2 1/2x2 1/2x3/16	180	-0.012	5.252	0.7	Pass
T9	80 - 70	Inner Bracing	L3x3x3/16	195	-0.014	7.896	0.5	Pass
T10	70 - 60	Inner Bracing	L3x3x3/16	210	-0.014	6.881	0.6	Pass
T11	60 - 50	Inner Bracing	L3 1/2x3 1/2x1/4	225	-0.016	12.717	0.5	Pass
T12	50 - 40	Inner Bracing	L3 1/2x3 1/2x1/4	240	-0.017	11.267	0.5	Pass
T13	40 - 30	Inner Bracing	L3 1/2x3 1/2x1/4	255	-0.019	10.052	0.5	Pass
T14	30 - 20	Inner Bracing	L3 1/2x3 1/2x1/4	270	-0.020	8.973	0.5	Pass
T15	20 - 0	Inner Bracing	ROHN 3 STD	301	-0.022	29.869	0.3	Pass
							Summary	
						Leg (T12)	95.3	Pass
						Diagonal (T14)	98.8	Pass
						Horizontal (T14)	82.4	Pass
						Top Girt (T8)	67.7	Pass
						Redund Horz 1 Bracing (T15)	24.0	Pass
						Redund Diag 1 Bracing (T15)	30.7	Pass
						Redund Hip 1 Bracing (T15)	0.7	Pass
						Redund Hip Diagonal 1 Bracing (T15)	1.0	Pass
						Inner Bracing (T6)	1.0	Pass
						Bolt Checks	95.3	Pass
						RATING =	**98.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806362 TOWER ID: C_BASELEVEL

CROWN REGION ADDRESS

USA

A	01/07/16	UPDATED PER WORK ORDER 1222700	ALM
B	01/07/16	UPDATED PER WORK ORDER 1239408	ALM
C	01/07/16	UPDATED PER WORK ORDER 1246442	ALM
D	29/11/16	UPDATED PER WORK ORDER 1319731	JG
E	15/09/17	UPDATED PER WORK ORDER 1412355	CJK
F	10/11/17	UPDATED PER WORK ORDER 1465226	SLW
G	26/04/18	UPDATED PER WORK ORDER 1564669	BM
H	14/05/18	UPDATED PER WORK ORDER 1573657	SMM
I	16/05/18	UPDATED PER WORK ORDER 1575805	SV

DRAWN BY: JW
CHECKED BY: SL
DRAWING DATE: 03/05/06

SITE NUMBER:
SITE NAME:

SITE NAME

NHV 108 943133

BUSINESS UNIT NUMBER

806362

SITE ADDRESS

INTERSECTION OF RTE 322/MERIDIAN RD WOLCOTT SITE
WOLCOTT, CT 06716
NEW HAVEN COUNTY
USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

A1-0

BASE LEVEL DRAWING

SCALE: N.T.S.

1

APPENDIX C

ADDITIONAL CALCULATIONS

Project Name:	NHV 108 943133	JACOBS® Jacobs Engineering Group, Inc.	Site Notes:
Project Number:	806362		
Job Number:	1588046		
Date:	7/10/2018		

Created On: 4/30/2015
Checked By: DMC / SR
Revised On: 2/13/2018
Revision No.: 2.2

Built-Up Member Compression Capacity

Code:	G
Controlling Loadcase:	Wind Load
New Design:	Yes

	Material Properties		Original Member Properties						Additional Member Properties						
Elevation	**Fy (ksi)**	**E (ksi)**	**Member Type**	**Member Size**	**Area (in^2)**	**Moment of Inertia (in^4)**	**Radius of Gyration (in)**	**(K*a) / r**	**Member Type**	**Member Size**	**Area (in^2)**	**Moment of Inertia (in^4)**	**Radius of Gyration (in)**	**(K*a) r**	**Root Opening**
100.0 - 80.0	46	29000	Pipe	P 5 XS	6.1120	20.6707	1.8390	16.3130	Half Pipe	HSS 6.625 x 0.500	4.8106	4.3424	0.9501	31.5760	0.0310
80.0 - 60.0	46	29000	Pipe	Rohn 6 EHS	6.7133	33.2448	2.2253	13.4811	Half Pipe	HSS 7.500 x 0.375	4.1970	5.0789	1.1001	27.2711	0.0625
60.0 - 40.0	46	29000	Pipe	P 6 XS	8.4049	40.4907	2.1949	13.6682	Half Pipe	HSS 7.500 x 0.375	4.1970	5.0789	1.1001	27.2711	0.0625
40.0 - 20.0	46	29000	Pipe	P 6 XS	8.4049	40.4907	2.1949	13.6682	Half Pipe	HSS 7.500 x 0.375	4.1970	5.0789	1.1001	27.2711	0.0625
20.0 - 0.0	46	29000	Pipe	Rohn 8 EHS	9.8666	86.6793	2.9640	10.1215	Half Pipe	HSS 9.625 x 0.375	5.4487	11.0832	1.4262	21.0347	0.0625

	Bracing Properties			Built-Up Member Properties					Compression Capacity Analysis					
Elevation	**Connection Type**	**Connection Spacing (in)**	**Built-Up Member L_u (in)**	**Area (in^2)**	**Moment of Inertia (in^4)**	**Radius of Gyration (in)**	**$(K*L_u) / r$**	**$(K*a)/r \le 0.75*(K*L_u)/r$**	**$(K*L/r)_m$**	**F_a (ksi)**	**F_e (ksi)**	**$4.71*\sqrt{(E/F_y)}$**	**F_{cr} (ksi)**	**φP_n (kip)**
100.0 - 80.0	Bolted	30	120.336	10.9225	34.9671	1.7892	67.2554	Design Sufficient	74.2989	19.0461	51.8480	118.2608	31.7312	311.9265
80.0 - 60.0	Bolted	30	120.312	10.9102	50.9089	2.1601	55.6967	Design Sufficient	62.0148	20.9812	74.4230	118.2608	35.5145	348.7243
60.0 - 40.0	Bolted	30	120.312	12.6019	59.2109	2.1676	55.5043	Design Sufficient	61.8420	21.0071	74.8394	118.2608	35.5656	403.3755
40.0 - 20.0	Bolted	30	120.348	12.6019	59.2109	2.1676	55.5209	Design Sufficient	61.8569	21.0048	74.8034	118.2608	35.5612	403.3255
20.0 - 0.0	Bolted	30	119.808	15.3153	126.9480	2.8791	41.6136	Design Sufficient	46.6277	23.1395	131.6464	118.2608	39.7413	547.7838

		Termination Weld Analysis			Leg Crushing Analysis		Analysis Summary		
Elevation	**Applied P_u (kip)**	**Termination Present?**	**Fillet Weld Thickness (in)**	**Required Weld Length (in)**	**Area Welded to Flange (ratio)**	**φT_n (kip)**	**Section Capacity**	**Controlling Component**	**TNX K Factor**
100.0 - 80.0	234	Yes	0.3125	9.8699	1	452.1928	75.0%	Buckling	1.10473
80.0 - 60.0	280.9	Yes	0.3125	9.6377	1	451.6840	80.6%	Buckling	1.11344
60.0 - 40.0	327.7	Yes	0.3125	9.6516	1	521.7192	81.2%	Buckling	1.11419
40.0 - 20.0	372.9	Yes	0.3125	9.6504	1	521.7192	92.5%	Buckling	1.11412
20.0 - 0.0	393.1	Yes	0.3125	14.0013	1	634.0519	71.8%	Buckling	1.12049

Show TNX Properties For:		**20.0 - 0.0**	
Height (in):	9.12500	Area (in^2):	15.31526
Width (in):	9.62500	Moment of Inertia (in^4):	126.94805
Wind Projection (in):	9.62500	Section Modulus (in^3):	23.50518
Perimeter (in):	28.86338	Radius of Gyration (in):	2.87906
Modulus (ksi):	29000	(C_w) Warping Constant (in^6):	0
Density (pcf):	490	(J) Torsional Constant (in^4):	271.99868

Project Name:	NHV 108 943133	Site Notes:	Created On: 4/30/2015
Project Number:	806362		Checked By: DMC / SR
Job Number:	1588046		Revised On: 2/13/2018
Date:	7/10/2018		Revision No.: 2.2

JACOBS®
Jacobs Engineering Group, Inc.

Built-Up Member Compression Capacity

Code:	G
Controlling Loadcase:	Wind Load
New Design:	Yes

	Material Properties		Original Member Properties						Additional Member Properties						
Elevation	**Fy (ksi)**	**E (ksi)**	**Member Type**	**Member Size**	**Area (in^2)**	**Moment of Inertia (in^4)**	**Radius of Gyration (in)**	**(K*a) / r**	**Member Type**	**Member Size**	**Area (in^2)**	**Moment of Inertia (in^4)**	**Radius of Gyration (in)**	**(K*a) r**	**Root Opening**
133.3 - 126.7	46	29000	Pipe	P 2 STD	1.0745	0.6657	0.7871	30.4906	Half Pipe	HSS 2.875 x 0.250	1.0308	0.1719	0.4083	58.7737	0.0000
126.7 - 120.0	46	29000	Pipe	P 2 STD	1.0745	0.6657	0.7871	30.4906	Half Pipe	HSS 2.875 x 0.250	1.0308	0.1719	0.4083	58.7737	0.0000
120.0 - 100.0	46	29000	Pipe	P 2.5 STD	1.7041	1.5296	0.9474	25.3320	Half Pipe	HSS 3.5 x 0.300	1.5080	0.3734	0.4976	48.2289	0.0125
100.0 - 80.0	46	29000	Pipe	P 2.5 STD	1.7041	1.5296	0.9474	25.3320	Half Pipe	HSS 3.5 x 0.300	1.5080	0.3734	0.4976	48.2289	0.0125
80.0 - 60.0	46	29000	Pipe	P 2.5 STD	1.7041	1.5296	0.9474	25.3320	Half Pipe	HSS 3.5 x 0.300	1.5080	0.3734	0.4976	48.2289	0.0125
60.0 - 40.0	46	29000	Pipe	P 2.5 XS	2.2535	1.9242	0.9241	25.9726	Half Pipe	HSS 3.5 x 0.300	1.5080	0.3734	0.4976	48.2289	0.0125

	Bracing Properties			Built-Up Member Properties					Compression Capacity Analysis					
Elevation	**Connection Type**	**Connection Spacing (in)**	**Built-Up Member L_u (in)**	**Area (in^2)**	**Moment of Inertia (in^4)**	**Radius of Gyration (in)**	**(K*L_u) / r**	**(K*a)/r ≤ 0.75*(K*L_u)/r**	**$(K*L/r)_m$**	**F_a (ksi)**	**F_e (ksi)**	**4.71*√(E/F_y)**	**F_{cr} (ksi)**	**φP_n (kip)**
133.3 - 126.7	Bolted	24	104.352	1.0745	1.2072	1.0599	98.4522	Design Sufficient	114.6611	11.3584	21.7703	118.2608	18.9966	18.3712
126.7 - 120.0	Bolted	24	107.28	1.0745	1.2072	1.0599	101.2146	Design Sufficient	117.0416	10.9011	20.8938	118.2608	18.3047	17.7020
120.0 - 100.0	Bolted	24	145.26	1.7041	2.7176	1.2628	115.0261	Design Sufficient	124.7278	9.5990	18.3980	118.2608	16.1351	24.7454
100.0 - 80.0	Bolted	24	154.656	1.7041	2.7176	1.2628	122.4665	Design Sufficient	131.6209	8.6199	16.5214	118.2608	14.4893	22.2215
80.0 - 60.0	Bolted	24	163.14	1.7041	2.7176	1.2628	129.1847	Design Sufficient	137.8938	7.8535	15.0525	118.2608	13.2010	20.2457
60.0 - 40.0	Bolted	24	175.848	2.2535	3.2176	1.1949	147.1657	Design Sufficient	154.8670	6.2264	11.9338	118.2608	10.4660	21.2269

		Termination Weld Analysis			Leg Crushing Analysis		Analysis Summary		
Elevation	**Applied P_u (kip)**	**Termination Present?**	**Fillet Weld Thickness (in)**	**Required Weld Length (in)**	**Area Welded to Flange (ratio)**	**φT_n (kip)**	**Section Capacity**	**Controlling Component**	**TNX K Factor**
133.3 - 126.7	14.3	No			0	44.4856	77.8%	Buckling	1.16464
126.7 - 120.0	14.4	No			0	44.4856	81.3%	Buckling	1.15637
120.0 - 100.0	17.9	No			0	70.5477	72.3%	Buckling	1.08434
100.0 - 80.0	17	No			0	70.5477	76.5%	Buckling	1.07475
80.0 - 60.0	18.1	No			0	70.5477	89.4%	Buckling	1.06742
60.0 - 40.0	19	No			0	93.2965	89.5%	Buckling	1.05233

Show TNX Properties For:		**133.3 - 126.7**	
Height (in):	2.62500	Area (in^2):	1.07453
Width (in):	2.87500	Moment of Inertia (in^4):	1.20718
Wind Projection (in):	2.87500	Section Modulus (in^3):	0.75550
Perimeter (in):	8.24668	Radius of Gyration (in):	1.05993
Modulus (ksi):	29000	(C_w) Warping Constant (in^6):	0
Density (pcf):	490	(J) Torsional Constant (in^4):	2.76886

Project Name:	NHV 108 943133	JACOBS® Jacobs Engineering Group, Inc.	Created On: 1/8/2015
Project Number:	BU# 806362		Checked By:
Job Number:	WO# 1588046		Revised On: 8/6/2015
Date:	7/10/2018		Revision No.: 0.3

SST Additional Anchor Bolts In Drilled Shaft

Code:	G	
Compression Axial (P_c)	437	kip
Compression Shear (V_c)	56	kip
Uplift Axial (P_u)	401	kip
Uplift Shear (V_u)	53	kip
Calculation Method	New Design	

Pullout Test Target Tension		
Load Factor	1.6	
R_{nt}	176.25	kip
φR_{nt}	132.19	kip
Target Tension	**82.62**	**kip**

Existing Anchor Rod Analysis		
Number of Bolts	8	
Bolt Grade	A449 (0.25-1)	
Diameter (d)	1	in
η	0.5	
Thread Type	Non-Upset	
A_g	0.785	in^2
A_e	0.606	in^2
F_y	92	ksi
F_u	120	ksi
Max Rod (Cu+ Vu/η)	43.39	kip
Allowable	58.2	kip
Capacity	**74.6%**	**Pass**

New Anchor Rod Analysis		
Number of Bolts	2	
Bolt Grade	A193 B7	
Diameter (d)	1.5	in
η	0.5	
Thread Type	Non-Upset	
A_g	1.77	in^2
A_e	1.41	in^2
F_y	105	ksi
F_u	125	ksi
Max Rod (Cu+ Vu/η)	100.95	kip
Allowable	141.0	kip
Capacity	**71.6%**	**Pass**

Transfer Plate Design		
Plate Height	18.0	in
Plate Thickness	0.75	in
Plate Length	4.75	in
F_y	50.0	ksi
E	29000	ksi
Leg Diameter	8.75	in
Anchor Sleeve Width	3	in
Elastic Section Modulus	40.5	in^3
Plastic Section Modulus	60.8	in^3
Controlling Case	Lateral-Torsional Buckling	
M_n	3037.5	kip-in
φM_n	2733.8	kip-in
M_u	1498.1	kip-in
Capacity	**54.8%**	**Pass**

Required Embedment Length		
Epoxy Bond Strength	1.7	ksi
f_c'	3000	psi
Pier Width	36	in
Existing Rebar Cage Dia.	25.7	in
Existing Rebar Quantity	16	
Existing Rebar Size	10	
New Anchor Circle Dia.	21.25	in
φE_{dev}	32.0	in
l_d	41.7	in
Required Embedment	**54.2**	**in**

Anchor Sleeve Bearing Design		
Sleeve Fy	50	ksi
Cross-Sectional Area	3.39	in^2
Allowable	228.8	k
Capacity	**61.6%**	**Pass**

Eccentric Weld Design		
Weld Thickness	5	(1/16ths) in
Weld Strength	70	ksi
Weld Length	18.0	in
e_x	6.25	in
a	0.35	
C	2.89	
C_1	1	
φR_n	194.9	
Capacity	**72.4%**	**Pass**

Pier and Pad Foundation

BU # :	806362
Site Name:	NHV 108 943133
App. Number:	443181 Rev. 0

TIA-222 Revision:	G
Tower Type:	Self Support

Block Foundation?: ☐

Superstructure Analysis Reactions

Compression, P_{comp}:	437	kips
Compression Shear, Vu_comp:	56	kips
Uplift, P_{uplift}:	401	kips
Uplift Shear, V_{u_uplift}:	53	kips
Tower Height, **H**:	180	ft
Base Face Width, **BW**:	27.67	ft
BP Dist. Above Fdn, bp_{dist}:	0	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	3.0	ft
Ext. Above Grade, **E**:	0.50	ft
Pier Rebar Size, **Sc**:	10	
Pier Rebar Quantity, **mc**:	16	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	13	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	12.5	ft
Pad Width, **W**:	8.8	ft
Pad Thickness, **T**:	2.0	ft
Pad Rebar Size, **Sp**:	7	
Pad Rebar Quantity, **mp**:	10	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	135	pcf
Ultimate Gross Bearing, Qult:	24.000	ksf
Cohesion, **Cu**:	7.000	ksf
Friction Angle, φ:	0	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.4	
Neglected Depth, **N**:	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	n/a	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating	Check
Uplift (kips)	944.35	401.00	**42.5%**	**Pass**
Lateral (Sliding) (kips)	445.04	53.00	**11.9%**	**Pass**
Bearing Pressure (ksf)	18.00	7.80	**43.3%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	1143.89	616.00	**53.9%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	785.30	583.00	**74.2%**	**Pass**
Pier Compression (kip)	2325.54	454.82	**19.6%**	**Pass**
*Pad Flexure (kip*ft)*	513.41	207.59	**40.4%**	**Pass**
Pad Shear - 1-way (kips)	169.84	62.00	**36.5%**	**Pass**
Pad Shear - 2-way (ksi)	0.16	0.09	**56.8%**	**Pass**

Soil Rating:	**43.3%**
Structural Rating:	**74.2%**

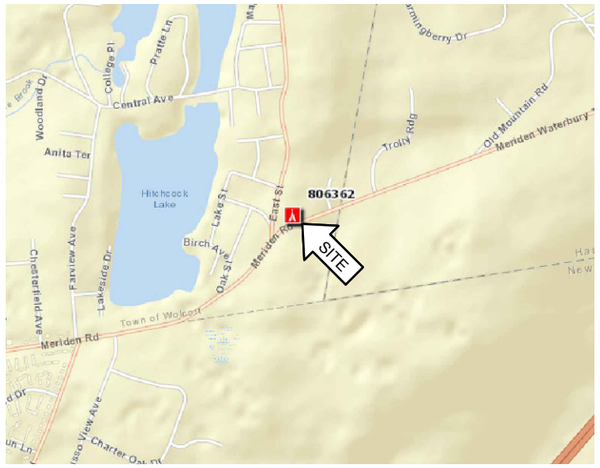
APPENDIX D

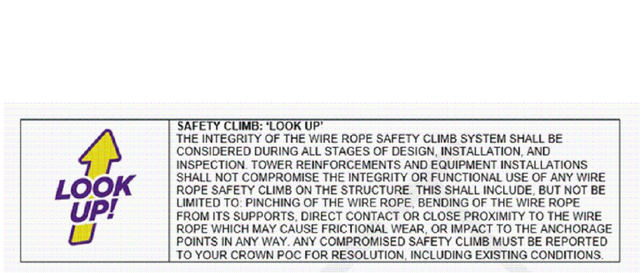
MODIFICATION DRAWINGS

TOWER REINFORCEMENT DRAWINGS PREPARED FOR CROWN CASTLE

SITE NAME: NHV 108 943133
BU NUMBER: 806362

SITE ADDRESS:
INTERSECTION OF RTE 322/ MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA





PROJECT CONTACTS:

1. CROWN PROJECT MANAGER
   DAN VADNEY
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2. CROWN CONSTRUCTION MANAGER
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   Jason.DAmico@crowncastle.com

3. DESIGN ENGINEER - MAIN RFI CONTACT
   PHILIP LIN
   919-859-5758
   Philip.Lin@jacobs.com

4. ENGINEER OF RECORD
   PAUL L. MUCCI, PE
   120 ST JAMES AVENUE,
   5TH FLOOR
   BOSTON, MA 02116
   Paul.Mucci@jacobs.com

5. FOR FABRICATION AND CONSTRUCTION RELATED INQUIRIES: CONTACT **MOD_NTP@JACOBS.COM,** DESIGN ENGINEER, AND ENGINEER OF RECORD.

DRAWINGS INCLUDED

SHEET NO.	DESCRIPTION	SHEET NO.	DESCRIPTION
T-1	TITLE SHEET	S-7	HALF-PIPE END CONNECTION WELD PROCEDURE DETAILS
N-1	MODIFICATION INSPECTION CHECKLIST	S-8	DIAGONAL REINFORCEMENT DETAILS
N-2	NOTES		
N-2A	NOTES (CONTINUED)		
S-1	TOWER MODIFICATION SCHEDULE		
S-2	ANCHOR ROD DETAILS I		
S-3	ANCHOR ROD DETAILS II		
S-4	HALF PIPE LEG REINFORCEMENT		
S-5	U-BOLT BRACKET ASSEMBLY		
S-6	HALF-PIPE END CONNECTION DETAILS		

TOWER INFORMATION

TOWER MANUFACTURER / DWG #: ROHN / DWG #: A861188

TOWER HEIGHT / TYPE:		180 FT SELF SUPPORT TOWER
TOWER LOCATION:	LAT:	41° 33′ 34.41″
DATUM: (NAD 1983)	LONG:	-72° 56′ 49.10″
STRUCTURAL DESIGN DRAWING:		JACOBS / WO # 1588046
STRUCTURAL ANALYSIS REPORT:		JACOBS / WO # 1575608
STRUCTURAL ANALYSIS DATE:		05/23/18
ORDER NUMBER:		443181 REV. 0
CCISITES DOCUMENT ID:		7563563

CODE COMPLIANCE

ANSI/TIA-222-G-2005 WITH ADDENDA 1 THROUGH 4

2016 CONNECTICUT STATE BUILDING CODE

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.

NO.	DATE	DESCRIPTION	BY
0	07/09/18	FIRST ISSUE	JMB

REVISIONS

JACOBS
Jacobs Engineering Group. Inc.

STATE OF CONNECTICUT
PAUL L MUCCI
24103
LICENSED
PROFESSIONAL ENGINEER

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CONNECTICUT.

SITE NAME: NHV 108 943133
BU NUMBER: 806362
WO NUMBER: 1588046
SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

DRAWN BY: JMB
CHECKED BY: PL
APPROVED BY: PLM
SCALE: N.T.S

TITLE SHEET

T-1

REV 0

REQUIRED	REPORT ITEM	APPLICABLE CROWN DOC #	BRIEF DESCRIPTION
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.
N/A	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.
N/A	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:			
"X" OR "N/A"			
N/A	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.
N/A	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.
N/A	EARTHWORK	CED-SOW-10144	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER AND RESULTS INCLUDED AS PART OF THE FOUNDATION REPORT.
N/A	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.
N/A	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-10149 ENG-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.
N/A	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:			
"X" OR "N/A"			
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.
X	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" OR "N/A"			

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.

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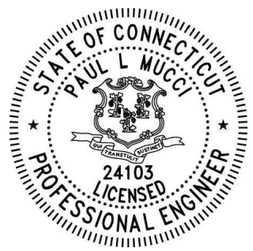

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CONNECTICUT.

SITE NAME: NHV 108 943133

BU NUMBER: 806362

WO NUMBER: 1588046

SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

DRAWN BY: JMB

CHECKED BY: PL

APPROVED BY: PLM

SCALE: N.T.S

MODIFICATION INSPECTION CHECKLIST

N-1

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GENERAL NOTES:

1. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE (UNO). THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED, THAT HE IS PROPERLY LICENSED, AND THAT HE IS PROPERLY REGISTERED TO DO THIS WORK IN THE STATE AND/OR COUNTY IN WHICH THE WORK IS TO BE PERFORMED.

2. 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 GENERAL CONTRACTOR 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 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).

3. THE NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE STRUCTURE AND SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS. STRUCTURAL DRAWINGS SHALL GOVERN OVER ANY VARIANCE FROM THIS SHEET.

4. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVALS FROM ALL AUTHORITIES HAVING JURISDICTION FOR THIS PROJECT AND SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION. FOR JURISDICTIONS THAT LICENSE INDIVIDUAL TRADES, THE TRADESMAN OR SUBCONTRACTORS PERFORMING THOSE TRADES SHALL BE LICENSED, RESEARCH AND COMPLY WITH LICENSING LAWS, PAY LICENSE FEES, AND SELECT AND INFORM SUBCONTRACTORS REGARDING THESE LAWS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.

5. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, POSSIBLE INTERFERENCES, AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO THE JACOBS ENGINEERING ENGINEER OF RECORD (EOR) AND TOWER OWNER FIELD PERSONNEL IMMEDIATELY. ANY AND ALL FIELD CHANGES SHALL BE APPROVED AND DOCUMENTED BY THE EOR PRIOR TO FIELD IMPLEMENTATION. NO EXTRA CHARGE OR COMPENSATION WILL BE ALLOWED DUE TO DIFFERENCES BETWEEN ACTUAL DIMENSIONS OR DIMENSIONS SHOWN ON PLANS. NO PLEA OF IGNORANCE OF CONDITIONS THAT EXIST OR OF DIFFICULTIES OF CONDITIONS THAT MAY BE ENCOUNTERED, OR OF ANY OTHER RELEVANT MATTER CONCERNING THE EXECUTION OF THE WORK WILL BE ACCEPTED AS AN EXCUSE FOR ANY FAILURE OR OMISSION ON THE PART OF THE CONTRACTOR TO FULFILL EVERY DETAIL OF ALL THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS GOVERNING THE WORK.

6. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR TWO (2) YEARS FROM THE DATE OF COMPLETED CONSTRUCTION.

7. ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH ANSI, ASTM, ACI, TIA, AND AISC STANDARDS AS REFERENCED IN THE APPLICABLE CODES. USE ONLY THE LATEST ISSUES OF ANY APPLICABLE CODES, STANDARDS, OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES AND SPECIFICATIONS, UNO.

8. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS, AND IN CONFORMANCE WITH THE DRAWINGS. ANY AND ALL SUBSTITUTIONS MUST BE DULY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER OF RECORD PRIOR TO FABRICATION AND INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

9. ALL MANUFACTURER'S HARDWARE ASSEMBLY INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION PROCEDURES MEET THE REQUIREMENTS OF OSHA, THE OWNER, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS. THESE REGULATIONS INCLUDE BUT ARE NOT LIMITED TO REGULATIONS DEALING WITH TOWER CONSTRUCTION AND SAFETY, EXCAVATIONS AND TRENCHING, ERECTION OF GUARDS AND BARRIERS, AND WORK IN CONFINED SPACES. ENSURE THAT EMPLOYEES AND SUBCONTRACTORS WEAR HARD HATS AT ALL TIMES DURING CONSTRUCTION.

11. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIAL ACCESS, WITH THE RESIDENT LEASING AGENT.

12. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES OR BURIED SERVICES AFFECTED BY THIS CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR TEMPORARILY RELOCATING ANY LINES OR STRUTS AS NECESSARY TO COMPLETE THE REQUIRED WORK. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR CONTAINMENT OF SEDIMENT AND CONTROL OF EROSION AT THE SITE. ANY DAMAGE TO ADJACENT OR DOWNSTREAM PROPERTIES WILL BE CORRECTED BY THE CONTRACTOR. THE CONTRACTOR IS TO MAINTAIN ADEQUATE DRAINAGE AT ALL TIMES. DO NOT ALLOW WATER TO STAND OR POND. ANY DAMAGE TO STRUCTURES OR WORK ON THE SITE CAUSED BY INADEQUATE MAINTENANCE OF DRAINAGE PROVISIONS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND ANY COST ASSOCIATED WITH REPAIRS FOR SUCH DAMAGE WILL BE AT THE CONTRACTOR'S EXPENSE.

13. STRUCTURAL DESIGN IS FOR THE COMPLETE CONDITION ONLY. THE CONTRACTOR 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 THE STRUCTURAL INTEGRITY, INCLUDING, BUT NOT LIMITED TO, ENGINEERING ASSESSMENT OF CONSTRUCTION STRESSES WITH INSTALLATION MAXIMUM WIND SPEED AND/OR TEMPORARY BRACING AND SHORING.

14. DO NOT SCALE DRAWINGS.

15. FOR THIS ANALYSIS AND MODIFICATION, THE TOWER HAS BEEN ASSUMED TO BE IN GOOD CONDITION WITHOUT ANY DEFECTS. IF THE CONTRACTOR DISCOVERS ANY INDICATION OF AN EXISTING STRUCTURAL DEFECT, CONTACT THE ENGINEER OF RECORD IMMEDIATELY.

16. MODIFICATION WORK SHALL BE COMPLETED IN CALM WIND CONDITIONS / OR APPROPRIATE WIND SPEED FOR THE TYPE OF MODIFICATION WORK TO BE INSTALLED.

17. THE CLIMBING FACILITIES, SAFETY CLIMB, AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED, OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF YOUR CROWN POC. ALL ALTERATIONS TO A SAFETY CLIMB'S ORIGINAL MANUFACTURER'S CONFIGURATION MUST BE DESIGNED BY THE ENGINEER OF RECORD. IF THE GENERAL CONTRACTOR FINDS THAT THE CLIMBING FACILITIES ARE IMPEDED, EITHER DURING BIDDING, DURING PRE-FABRICATION MAPPING, OR WHILE ON-SITE, THE GENERAL CONTRACTOR SHALL CONTACT THE CROWN POC TO DETERMINE A METHOD OF RESOLUTION.

18. ANY WORK PERFORMED WITHOUT A PREFABRICATION MAPPING IS DONE AT THE RISK OF THE GENERAL CONTRACTOR AND/OR FABRICATOR.

19. AT THE TIME OF NTP, THE CONTRACTOR IS RESPONSIBLE FOR ENGAGING A MODIFICATION INSPECTOR TO COORDINATE AN INSPECTION SCHEDULE AND ENSURE PROPER DOCUMENTATION IS MAINTAINED THROUGHOUT THE LIFE OF THE PROJECT. FOUNDATION WORK REQUIRES INSPECTION PRIOR TO POURING CONCRETE. SHOP DRAWINGS ARE TO BE SUBMITTED TO THE EOR PRIOR TO FABRICATION.

20. IF, DURING THE COURSE OF A FOUNDATION MODIFICATION, THE GC ENCOUNTERS EXISTING CONDUIT LOCATED WITHIN THE CONFINES OF THE EXISTING OR PROPOSED FOUNDATION CONCRETE, AND THIS CONDUIT IS NOT IN A LOCATION THAT IS SPECIFIED WITHIN THESE DESIGN DRAWINGS, THE GC SHALL IMMEDIATELY CONTACT THE EOR FOR GUIDANCE BEFORE PROCEEDING WITH THE INSTALLATION OF THE PROPOSED FOUNDATION MODIFICATION. IF CONDUIT IS TO BE INSTALLED THROUGH THE EXISTING FOUNDATION OR PROPOSED FOUNDATION MODIFICATION AND HASN'T BEEN SPECIFIED WITHIN THESE DESIGN DRAWINGS THEN THE GC SHALL IMMEDIATELY CONTACT THE EOR FOR GUIDANCE PRIOR TO PROCEEDING WITH THE INSTALLATION OF THE PROPOSED FOUNDATION MODIFICATIONS.

STRUCTURAL STEEL NOTES:

1. DESIGN, FABRICATION, ERECTION, ALTERATION, AND MAINTENANCE SHALL CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE (UNO):

   A. TIA-222: STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

   B. TIA-1019-A: INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS

   C. AISC: MANUAL OF STEEL CONSTRUCTION

2. ALL STRUCTURAL STEEL IS TO BE NEW AND CONFORM TO THE FOLLOWING:

   A. MONOPOLE: ASTM A572-65 (FY = 65 KSI), UNO

   B. SELF SUPPORT TOWER AND GUYED TOWER: ASTM A572-50 (FY = 50 KSI), UNO

3. ALL BOLTS SHALL BE HOT-DIP GALVANIZED ASTM A325 ASSEMBLIES, TO INCLUDE BOLT, ASTM A563 HEAVY HEX NUT, F436 FLAT WASHER, AND SPLIT LOCK WASHER, UNO. BOLT THREADS ARE TO BE EXCLUDED FROM THE SHEAR PLANES. USE BEARING TYPE CONNECTIONS. 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.

4. ALL FASTENERS SHALL NOT BE REUSED.

5. DRILL NO HOLES IN ANY NEW OR EXISTING STRUCTURAL STEEL MEMBERS OTHER THAN THOSE SHOWN ON STRUCTURAL DRAWINGS WITHOUT THE APPROVAL OF THE ENGINEER OF RECORD.

6. ALL EXPOSED EXTERIOR STRUCTURAL STEEL (INCLUDING BOLTS, LOCK WASHERS, PINS, ETC.) SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153 AND A123. FOR ALL FABRICATED WELDED ASSEMBLIES TO BE HOT-DIP GALVANIZED, PROVIDE WELDS ALL AROUND OR ADD SEAL WELDS WHERE STRUCTURAL WELDS ARE NOT SPECIFIED. FOR HIGH STRENGTH STEEL FASTENERS WHERE HOT-DIP GALVANIZATION IS NOT PERMITTED, MAGNI 565 COATING SHALL BE USED. ALL NEW STEEL SHALL BE PAINTED TO MATCH EXISTING TOWER STEEL.

7. WHERE SPECIFIED, THE SEALANT BETWEEN STEEL COMPONENTS IS TO BE SILICONE CAULKING THAT IS EXTERIOR GRADE, ABLE TO BE PAINTED, AND ACCEPTABLE TO THE ENGINEER OF RECORD.

8. FOR A LIST OF CROWN APPROVED COLD GALVANIZING COMPOUNDS, REFER TO CROWN ENG-BUL-10149, " TOWER PROTECTIVE COATINGS BULLETIN".

9. AFTER FINAL INSPECTION, ALL EXPOSED STRUCTURAL STEEL AS THE RESULT OF THIS SCOPE OF WORK INCLUDING WELDS, FIELD DRILLED HOLES, AND SHAFT INTERIORS (WHERE ACCESSIBLE), SHALL BE CLEANED AND COLD GALVANIZING APPLIED BY BRUSH IN ACCORDANCE WITH CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN". PHOTO DOCUMENTATION IS REQUIRED TO BE SUBMITTED TO THE MI INSPECTOR.

10. NO WELDING, TORCH CUTTING, OR OPEN FLAME IS PERMITTED ON THIS CONSTRUCTION SITE UNLESS DIRECTLY SPECIFIED IN THE DRAWINGS.

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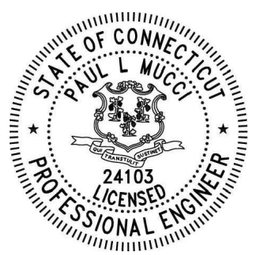

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BU NUMBER: 806362

WO NUMBER: 1588046

SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

DRAWN BY: JMB

CHECKED BY: PL

APPROVED BY: PLM

SCALE: N.T.S

NOTES

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WELDING NOTES:

1. ALL WELDING SHALL BE CARRIED OUT UNDER GOOD OPERATOR CONDITIONS AS DEFINED IN SECTION 5.12 OF AWS D1.1

2. ALL ARC WELDING ON CROWN STRUCTURES SHALL BE DONE IN ACCORDANCE WITH THE CROWN ENG-PLN-10015, "CUTTING AND WELDING SAFETY PLAN" AND AWS D1.1 (LATEST EDITION). THIS SHALL INCLUDE A CERTIFIED WELDING INSPECTOR (CWI) FOR ACCEPTANCE OR REJECTION OF ALL WELDING OPERATIONS, PRE-DURING-POST, USING THE ACCEPTANCE CRITERIA OF AWS D1.1. THE CWI SHALL WORK WITH THE GC ON THE LEVEL OF INTERACTION NEEDED TO CONDUCT THE WELDING INSPECTION. THE CERTIFIED WELDING INSPECTION IS THE RESPONSIBILITY OF THE GC.

3. THE CWI SHALL INDICATE, IN A WRITTEN WELDING REPORT, THAT ALL WELDING OPERATIONS, PRE-DURING-POST, WERE CONDUCTED IN ACCORDANCE WITH AWS D1.1 INCLUDING PHOTOGRAPHS AND DOCUMENTATION SUPPORTING THE ACCEPTANCE OR REJECTION OF ALL WELDING. FOR INFORMATION, SEE CROWN ENG-STD-10069, "GC INSPECTION STANDARD FOR FABRICATION AND FIELD WELDING OF STRUCTURAL STEEL" AND CROWN ENG-SOW-10007, "MODIFICATION INSPECTION SOW". ALL CWI WELDING INSPECTION DOCUMENTATION AND PHOTOS SHALL BE SUBMITTED TO THE MI INSPECTOR.

4. FOR ALL WELDING, USE E70XX ELECTRODES, UNO.

5. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING.

6. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0°F. WHEN THE TEMPERATURE IS BETWEEN 0°F AND 32°F, PREHEAT AND MAINTAIN THE STEEL IN THE VICINITY OF THE WELD AREA AT 70°F DURING THE WELDING PROCESS.

7. DO NOT WELD ON WET OR FROST-COVERED SURFACES AND PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.

8. WELDING NDE NOTES: “FIELD NDE MINIMUM REQUIREMENTS:

   A. ALL NDE SHALL BE IN ACCORDANCE WITH AWS D1.1.

   B. FOR NEW BASE STIFFENERS (INCLUSIVE OF TRANSITION STIFFENERS) AND ANCHOR ROD BRACKETS, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT.

   C. FOR NEW FLAT PLATE REINFORCEMENT AT THE BASE OF THE TOWER, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT, BUT MAY BE LIMITED TO A HEIGHT OF 10’-0”.

   D. FOR NDE OF THE EXISTING BASE PLATE CIRCUMFERENTIAL WELD, GC SHALL REFERENCE THE MI CHECKLIST FOR APPLICABILITY. PLEASE SEE ENG-SOW-10033: TOWER BASE PLATE NDE, AND ENG-BUL-10051: NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING MODIFICATIONS THAT HAVE BEEN WELDED TO THE BASE PLATE.

   E. ALL TESTING LIMITATIONS SHALL BE DETAILED IN THE NDE REPORT.”

PULLOUT TESTING OF POST INSTALLED ANCHOR RODS:

1. EPOXY AGENTS SHOULD BE ALLOWED TO CURE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
2. CONTRACTOR SHALL ENSURE THAT CONSTRUCTION DOES NOT GO BEYOND POINT WHERE THE ANCHOR RODS CAN BE EFFECTIVELY TESTED. CONSTRUCTION MAY PROCEED AFTER TESTING IS COMPLETED.
3. 50% OF POST INSTALLED ANCHOR RODS SHALL BE TESTED OR TOTAL OF 4, WHICHEVER IS GREATER.
4. ANCHOR ROD PULL OUT TESTING IS TO BE DONE IN ACCORDANCE WITH CROWN ENG-PRC-10119.
5. MAINTAIN COMPLETE LOAD-DISPLACEMENT RECORDS THROUGHOUT THE TEST. LOAD THE ANCHOR IN INCREMENTS OF UP TO 15% OF THE TARGET TENSION.
6. IF A DISPLACEMENT GREATER THAN 0.010" REMAINS AFTER THE INITIAL TEST CYCLE, ADDITIONAL TEST SHALL BE PERFORMED UP TO A MAXIMUM OF 3 TEST CYCLES TO DETERMINE IF THE MOVEMENT CONTINUES TO ACCUMULATE. INCREMENTAL RESIDUAL MOVEMENT RECORDED FROM EACH TEST CYCLE MUST BE DECREASING IN VALUE AND STABILIZE TO A VALUE NO MORE THAN 0.010" OR THE ANCHOR SHALL BE CONSIDERED TO FAIL THE TEST.
7. THIS INFORMATION SHALL BE DOCUMENTED AND INCLUDED IN THE MODIFICATION INSPECTION REPORT.
8. CONTACT JACOBS ENGINEERING GROUP IF ANY OF THE ANCHORS FAIL THE PULL TEST.

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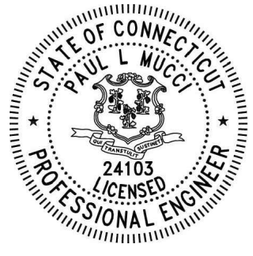

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NOTES (CONTINUED)

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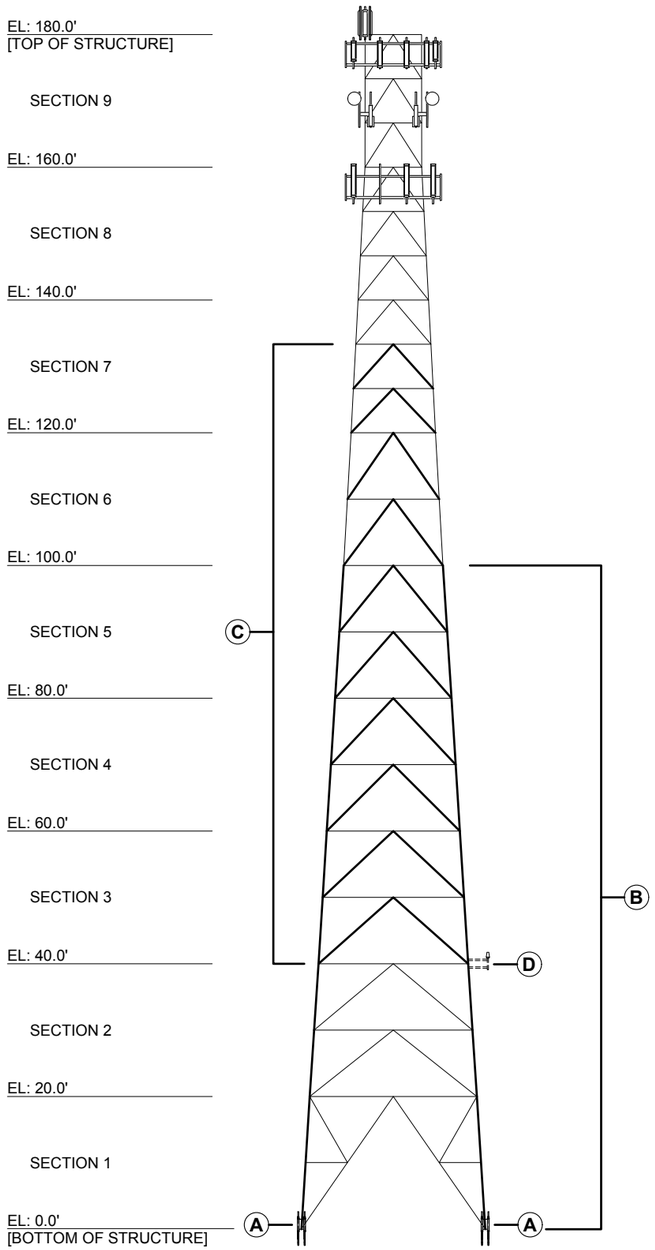
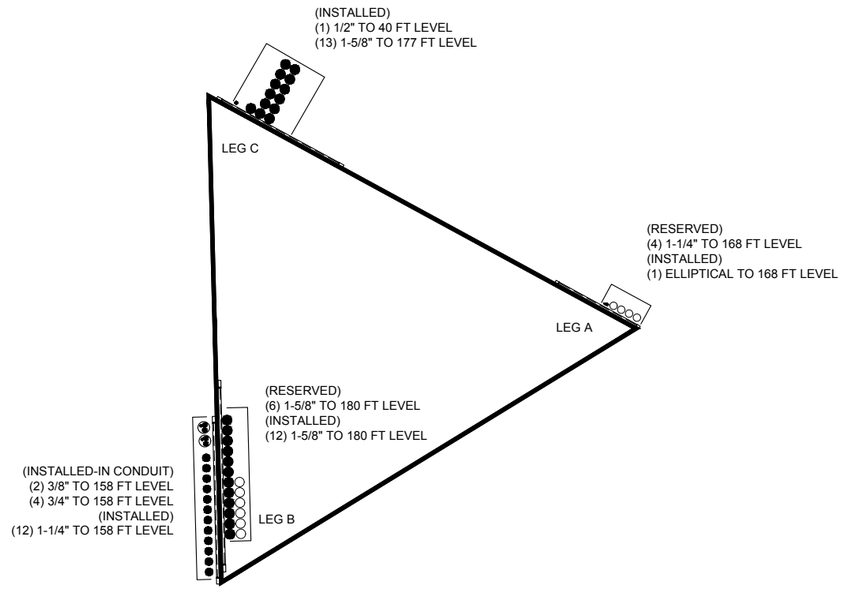


TOWER ELEVATION VIEW



TOWER BASE LEVEL VIEW

MODIFICATION SCHEDULE

LETTER	ELEVATION (FT)	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEET
(A)	BASE PLATE	**INSTALL ANCHOR RODS W/ ANCHOR ROD BRACKETS TO EACH TOWER LEG**	S-2, S-3 & S-6
(B)	100.0 TO 0.0	**INSTALL NEW HALF-PIPE LEG REINFORCEMENT.**	S-4 TO S-7
(C)	133.3 TO 40.0	**INSTALL HALF PIPE REINFORCEMENT TO EXISTING DIAGONALS**	S-5 & S-8
(D)	40.0'	**TEMPORARILY RELOCATE GPS & MOUNT TO ALLOW FOR HALF PIPE LEG REINFORCEMENT.**	S-1
(E)	100.0 TO 0.0	**WHERE INTERFERENCE EXISTS, RELOCATE EXISTING STEP BOLTS TO NEW HALF PIPE LEG REINFORCEMENT.**	S-4

PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTHS AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY, AND SHALL NOT BE USED FOR FABRICATION.

NOTES:

1. MODIFICATIONS TYPICAL FOR ALL TOWER FACES.
2. COAXIAL CABLES AND ANTENNAS CONFLICTING WITH PROPOSED REINFORCEMENT TO BE TEMPORARY RELOCATED. THE CONTRACTOR SHALL COORDINATE THE WORK WITH CROWN AND THE OWNER OF THE APPURTENANCES INVOLVED.

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BU NUMBER: 806362

WO NUMBER: 1588046

SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

STATE OF CONNECTICUT
PAUL L MUCCI
24103
LICENSED PROFESSIONAL ENGINEER

DRAWN BY: JMB

CHECKED BY: PL

APPROVED BY: PLM

SCALE: N.T.S

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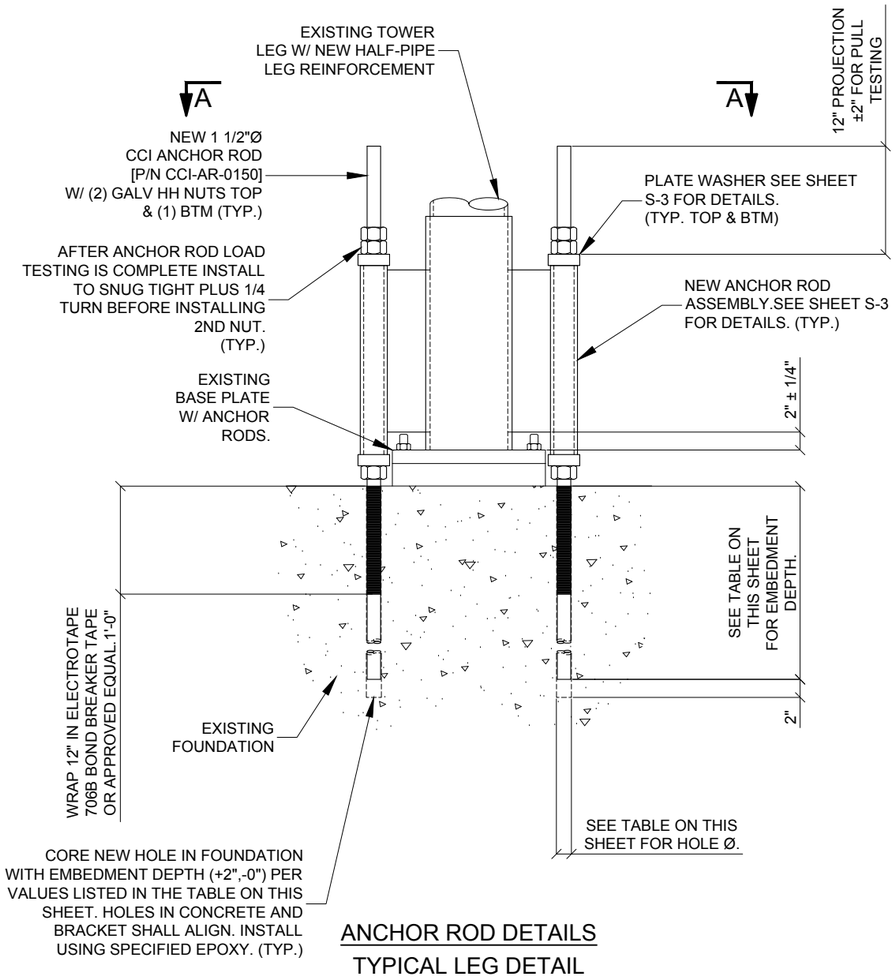
TOWER MODIFICATION SCHEDULE

S-1

REV 0



ANCHOR ROD DETAILS

TYPICAL LEG DETAIL

NOTES:

1. PLATE WASHER SHALL FULLY BEAR ON TUBE.
2. REFERENCE CC APPROVED COMPONENTS (CURRENT VERSION) FOR ANCHOR ROD DIMENSIONS.
3. RODS SHALL BE GALVANIZED FROM THE TOP OF THE PROJECTION TO 15" BELOW SURFACE OF CONCRETE, AT A MINIMUM.
4. CORED HOLES SHALL 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 SHALL 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. IF BASE PLATE GROUT REPAIR IS REQUIRED FOR ANCHOR ROD INSTALLATION, SEE ENG-PRC-10012: BASE PLATE GROUT REPAIR, FOR PROCEDURES AND RECOMMENDED MANUFACTURERS. CONTRACTOR TO DETERMINE QUANTITY REQUIRED.
10. ONCE ALL RESIN AND GROUT HAVE CURED, NEW ANCHOR ROD REINFORCING SHALL BE TARGET TENSIONED TO THE VALUES LISTED IN THE TABLE SEEN ON THIS SHEET. SEE ENG-PRC-10119: PULL-OUT TESTING POST-INSTALLED ANCHOR RODS FOR SPECIFICATIONS.
11. CONTRACTOR SHALL VERIFY THAT A PULL TEST IS ABLE TO BE PERFORMED USING THE ANCHOR ROD PROJECTION SHOWN.
12. 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.

SECTION "A-A"

ANCHOR ROD SPECIFICATIONS

CCI PART NO.	DIAMETER	QUANTITY	INSTALLED LENGTH	MATERIAL	EMBEDMENT DEPTH	FOUNDATION HOLE Ø	EPOXY	TARGET TENSION LOAD
CCI-AR-0150	1 1/2"Ø	6	8'-1 3/4"	A193-B7 ALL THREADED ROD	5'-0"	1 3/4"	HILTI HIT-RE 500 V3	83.0 K

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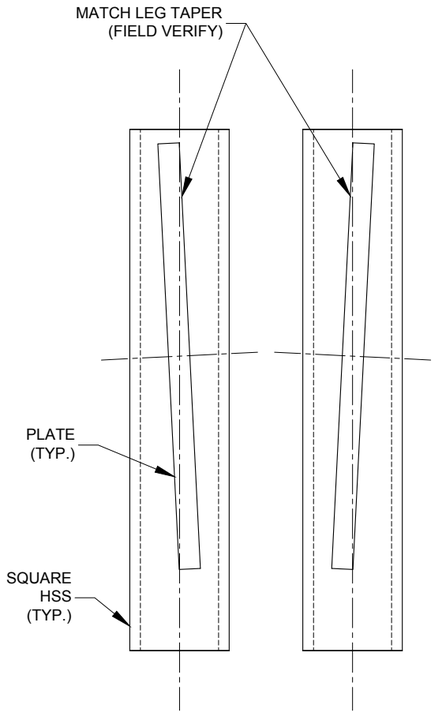
ANCHOR ROD DETAILS I

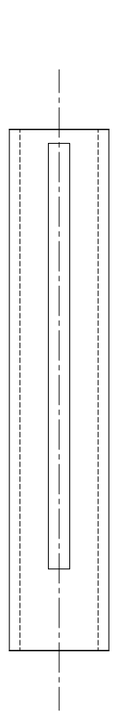
S-2

REV 0

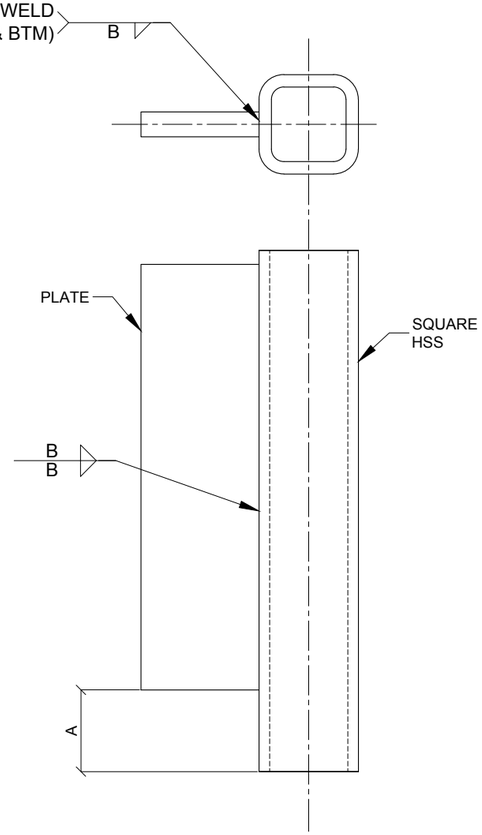


TYPICAL
LEFT

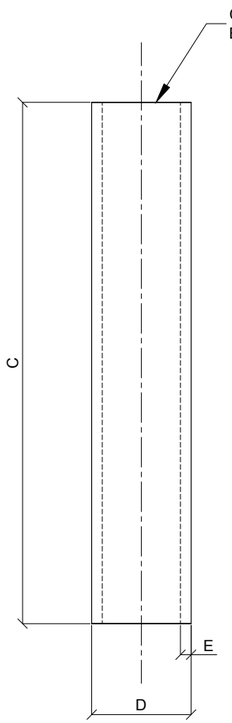
TYPICAL
RIGHT



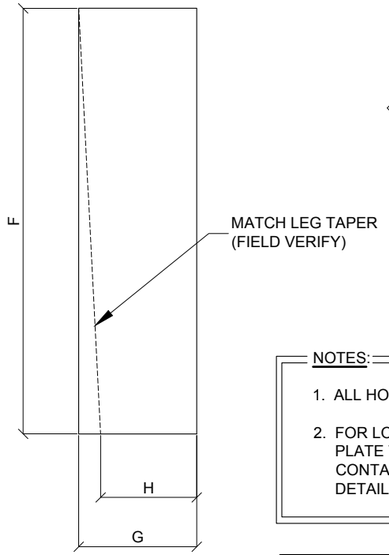
TYPICAL
CENTER
(IF NEEDED)



ANCHOR ROD
BRACKET ASSEMBLY



SQUARE HSS



PLATE

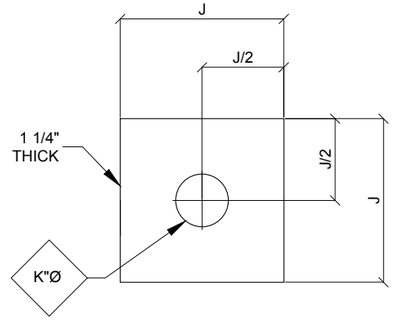


PLATE WASHER

NOTES:

1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. FOR LOCATIONS WHERE THE TOWER TAPER CAUSES THE BRACKET PLATE TO EXTEND BEYOND THE WORKABLE FLAT OF THE HSS TUBE, CONTACT THE EOR FOR REVISED WELD DETAILS PRIOR TO FABRICATION.

ANCHOR BRACKET SPECIFICATIONS

	ASSEMBLY		SQUARE HSS			PLATE				PLATE WASHER	
	A	B	C	D	E	F	G	H	I	J	K
	2 1/2"	3/16"	1'-9"	3"	3/8"	1'-6"	4 3/4"	FIELD VERIFY	3/4"	3 1/2"	1 5/8"
TOTAL QUANTITY	6		6			6				12	
MATERIAL	----		A500 GR. C (Fy = 50 KSI)			A572-50				A572-50	

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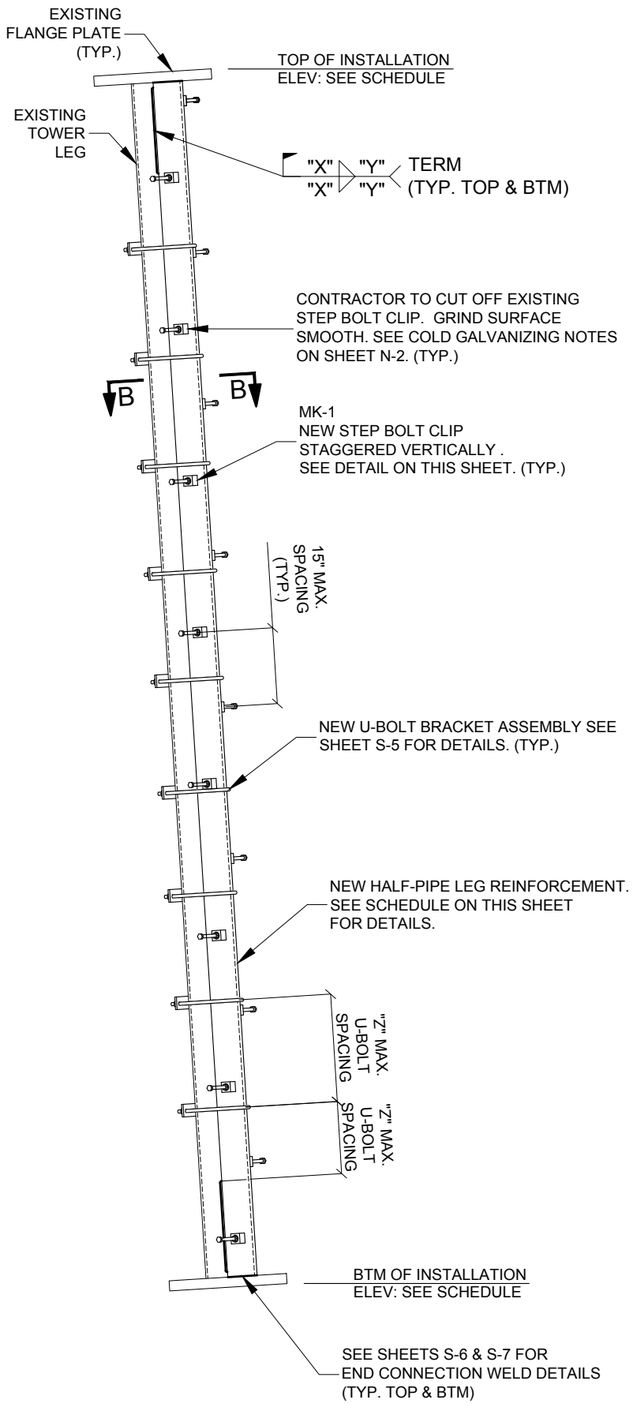
ANCHOR ROD
DETAILS II

S-3

REV
0

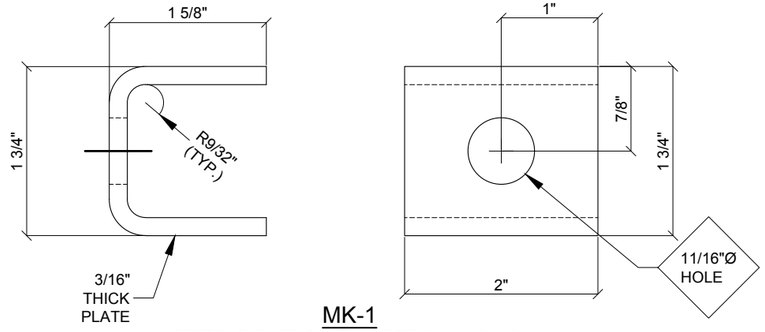


HALF PIPE LEG REINFORCEMENT
ELEVATION VIEW
(TYPICAL LEG DETAIL)

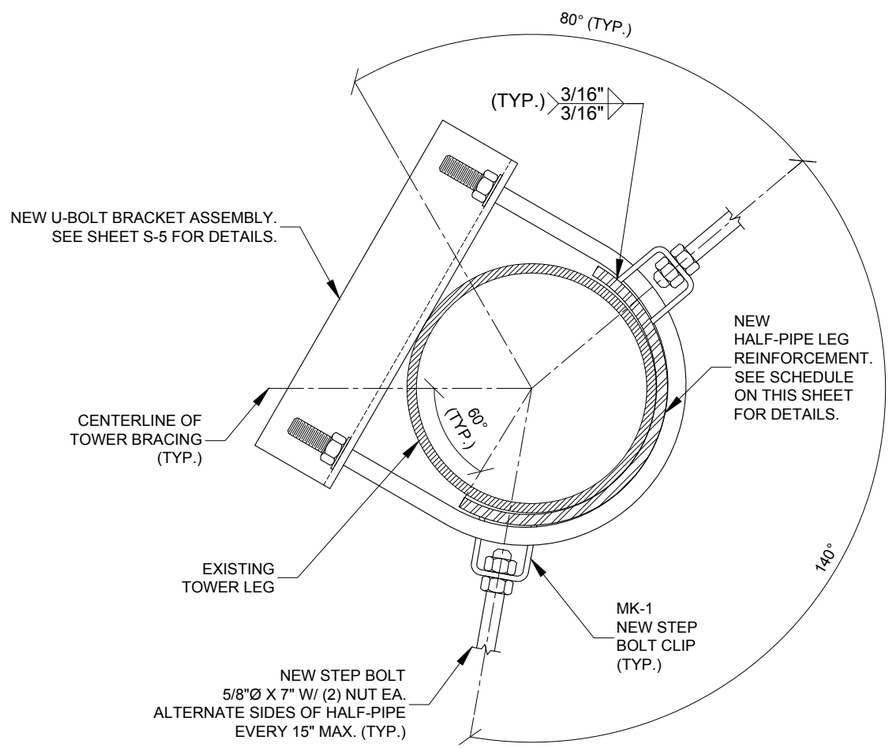
HALF-PIPE LEG REINFORCEMENT INSTALLATION SCHEDULE

ELEVATION (FT.)	EXISTING LEG SIZE	NEW HALF PIPE REINFORCEMENT	PRELIMINARY LENGTH	REQUIRED TERM WELD SIZE "X" (IN)	BTM END TERM WELD LENGTH "Y" (IN)	MAX. U-BOLT SPACING "Z" (IN)	ESTIMATED TOTAL U-BOLT ASSEMBLIES REQUIRED	STEP BOLT CLIP	STEP BOLT
100.0 TO 80.0	PIPE 5.563" OD X 0.375"	(3) HSS 6.625" OD X 0.500"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
80.0 TO 60.0	PIPE 6.625" OD X 0.340"	(3) HSS 7.5" OD X 0.375"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
60.0 TO 40.0	PIPE 6.625" OD X 0.432"	(3) HSS 7.5" OD X 0.375"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
40.0 TO 20.0	PIPE 6.625" OD X 0.432"	(3) HSS 7.5" OD X 0.375"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
20.0 TO 0.0	PIPE 8.750" OD X 0.375"	(3) HSS 9.625" OD X 0.375"	20'-6"	5/16	**	30	24	(48) MK-1	(48) 5/8"Ø X 7"

** 18" TOP / SEE SHEETS S-2 & S-6 FOR BOTTOM WELD DETAILS.



MK-1
STEP BOLT CLIP (ASTM A572-50)
(FRONT & TOP VIEW)



SECTION "B-B
TYPICAL DETAIL

NOTES:
1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES, UNLESS NOTED OTHERWISE: FRACTIONS ± 1/16"
   ANGLES ± 1/2 DEGREE
   DECIMALS ± .010"
   HOLES ± 1/32"
3. ANGLES TO BE ASTM A572-50.
4. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 *BENT BOLTS*.
5. U-BOLTS TO BE ASTM A36/A307, SAE 429 GR 2. U-BOLTS TO BE TIGHTENED PER AISC "SNUG-TIGHT" REQUIREMENTS.
6. STANDARD 9/16"Ø HOLES IN PLACE OF SLOTTED HORIZONTAL HOLES ON THE ANGLE ARE PERMITTED. WHEN STANDARD HOLES ARE USED, FLAT WASHERS ARE NOT REQUIRED.
7. U-BOLT ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), FLAT WASHERS (ASTM F436) AND LOCK WASHERS.
8. FULL ASSEMBLY TO BE HOT-DIP GALVANIZED PER ASTM A153 / A153M OR A123, AS APPLICABLE.
9. ALL HSS STEEL, ASTM DESIGNATION A500 GR. C (FY = 46 KSI)
10. USE E70XX FOR ELECTRODES FOR WELDING.
11. STEP BOLT CLIPS SHALL BE SHOP WELDED. STEP BOLT CLIP WELDS ARE SUBJECT TO AWS D1.1 AND MUST BE INSPECTED BY A CWI. REFER TO DOCUMENT "ENG-STD-10069 GC CWI REQUIREMENT STANDARD" FOR CWI REQUIREMENTS. STEP BOLT CLIPS SHALL BE WELDED IN PLACE PRIOR TO HOT DIP GALVANIZING THE WELDMENT.
12. CONTRACTOR SHALL USE ALL NEW STEP BOLTS AND HARDWARE. STEP BOLT MATERIAL SHALL MEET THE REQUIREMENTS OF ASTM A449. STEP BOLTS SHALL BE INSTALLED USING DOUBLE NUTS. A STEP BOLT INSTALLED IN A STEP BOLT CLIP SHALL BE TURNED WITH THE OUTER NUT LOOSE UNTIL THE END OF THE STEP BOLT MAKES CONTACT WITH THE SUPPORTING MEMBER. THE OUTER STEP BOLT NUT SHALL THEN BE TIGHTENED TO A SNUG TIGHT CONDITION AND PRETENSIONED BY ROTATING THE OUTER NUT 1/3 TURN.

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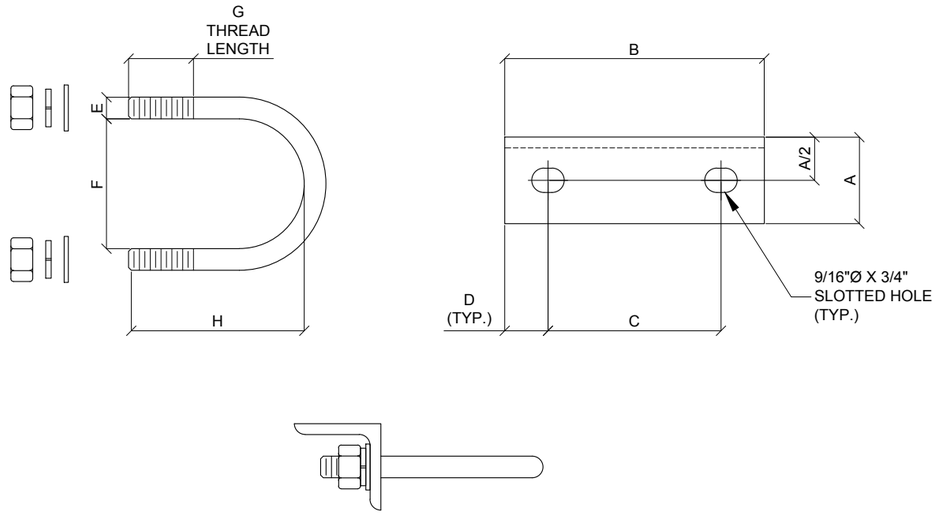
HALF-PIPE LEG REINFORCEMENT

S-4 REV 0

HALF PIPE LEG U-BOLT BRACKET ASSEMBLY SCHEDULE								
ELEVATION (FT)	ANGLE SIZE	ANGLE LENGTH	C/C DISTANCE	MIN. EDGE DISTANCE	U-BOLT DIAMETER	INSIDE DISTANCE	THREAD LENGTH	U-BOLT LENGTH
	A	B	C	D	E	F	G	H
100.0 TO 80.0	L 3" X 3" X 1/4"	9 1/4"	7 1/4"	1"	1/2"	6 3/4"	1 1/2"	7 13/16"
80.0 TO 20.0	L 3" X 3" X 1/4"	10 1/8"	8 1/8"	1"	1/2"	7 5/8"	1 1/2"	8 3/4"
20.0 TO 0.0	L 3" X 3" X 1/4"	1'-0 1/4"	10 1/4"	1"	1/2"	9 3/4"	1 1/2"	10 7/8"
REFERENCE NOTES ON HALF-PIPE LEG REINFORCEMENT SHEET.								

HALF PIPE DIAGONAL U-BOLT BRACKET ASSEMBLY SCHEDULE								
ELEVATION (FT)	ANGLE SIZE	ANGLE LENGTH	C/C DISTANCE	MIN. EDGE DISTANCE	U-BOLT DIAMETER	INSIDE DISTANCE	THREAD LENGTH	U-BOLT LENGTH
	A	B	C	D	E	F	G	H
133.3 TO 120.0	L 2" X 2" X 1/4"	5 1/2"	3 1/2"	1"	1/2"	3"	1 1/2"	4 3/8"
120.0 TO 40.0	L 2" X 2" X 1/4"	6 1/8"	4 1/8"	1"	1/2"	3 5/8"	1 1/2"	5"
REFERENCE NOTES ON DIAGONAL REINFORCEMENT DETAILS SHEET.								



U-BOLT BRACKET ASSEMBLY

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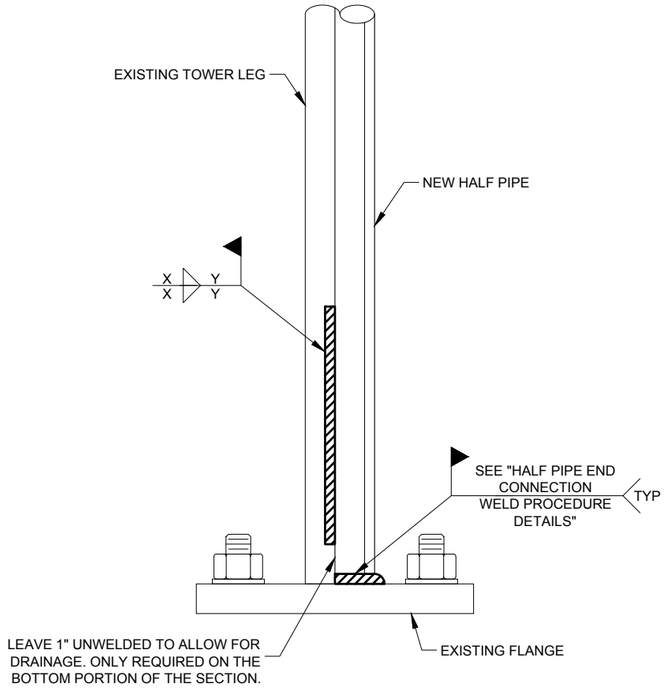
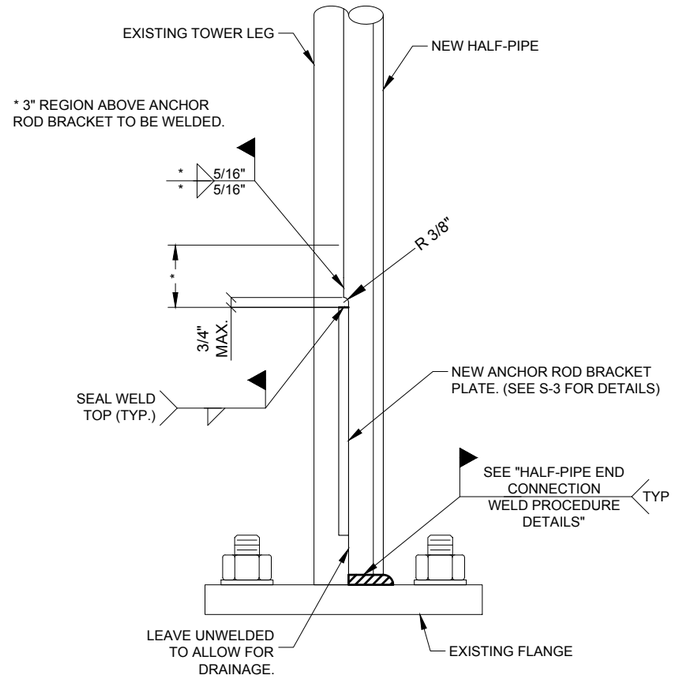
U-BOLT BRACKET ASSEMBLY

S-5

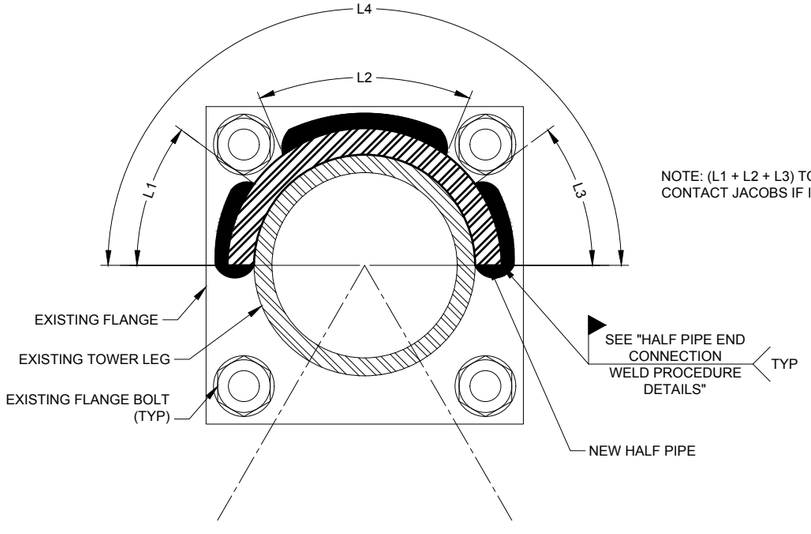
REV 0



BASE OF LEG FLANGE CONNECTION



HALF-PIPE FLANGE CONNECTION
(TOWER BASE ONLY)



NOTE: (L1 + L2 + L3) TO BE EQUAL TO 100% OF L4.
CONTACT JACOBS IF INTERFERENCES EXIST.

FLANGE CONNECTION INTERFERENCE

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HALF-PIPE END CONNECTION DETAILS

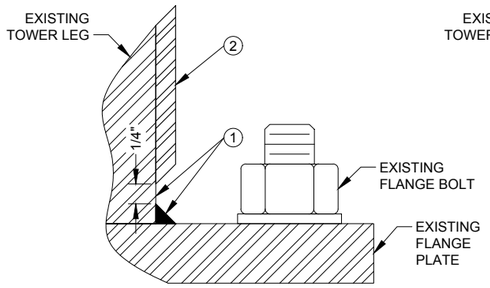
S-6

REV 0

NOTES:

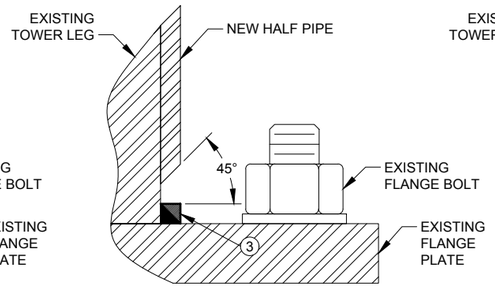
(1) CLEAN GALVANIZING FROM EXISTING WELD AND ALL WELD CONTACT SURFACES.

(2) INSTALL PROPOSED HALF PIPE.



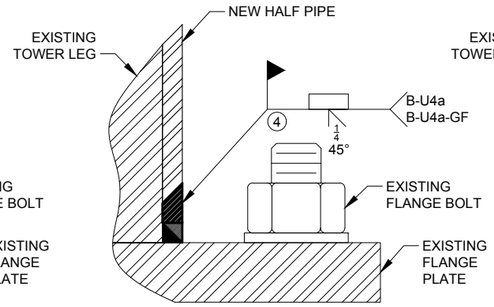
NOTES:

(3) BUILD A PLATFORM WITH WELD (BUTTER) TO MATCH THE HEIGHT OF THE EXISTING FILLET WELD PER SECTION 5.22.4.3 OF AWS D1.1/D1.1M: 2010. ENGINEERING APPROVAL IS PROVIDED FOR CORRECTING ROOT OPENINGS GREATER THAN THOSE PERMITTED IN SECTION 5.22.4.3 IN ACCORDANCE WITH SECTION 5.22.4.4.



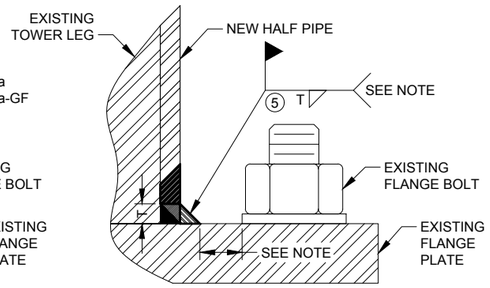
NOTES:

(4) PERFORM A CJP WELD USING THE EXISTING TOWER LEG AS A BACKING BAR.



NOTES:

(5) REINFORCING FILLET WELD SIZED TO MATCH EXISTING FILLET WELD. PRIOR TO CONSTRUCTION CONTRACTOR SHALL VERIFY THAT THERE IS ADEQUATE CLEARANCE BETWEEN THE PROPOSED WELD AND THE EXISTING FLANGE BOLTS. IF INTERFERENCE OCCURS AN ALTERNATIVE SLEEVE TERMINATION DETAIL MAY BE REQUIRED.

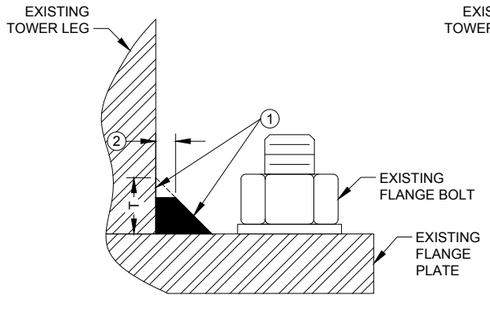


WELD DETAIL (OPTION 1)

NOTES:

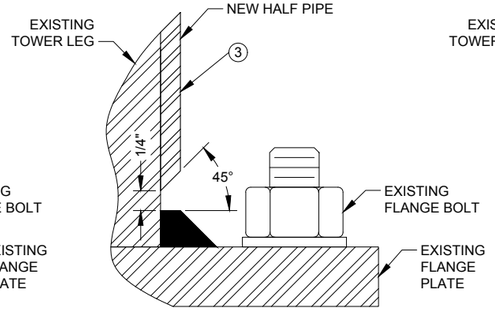
(1) CLEAN GALVANIZING FROM EXISTING WELD AND ALL WELD CONTACT SURFACES.

(2) PARTIALLY GRIND THE HEIGHT OF THE EXISTING FILLET WELD TO FORM A PLATFORM WITH TOP WIDTH TO MATCH THE HALF PIPE THICKNESS.



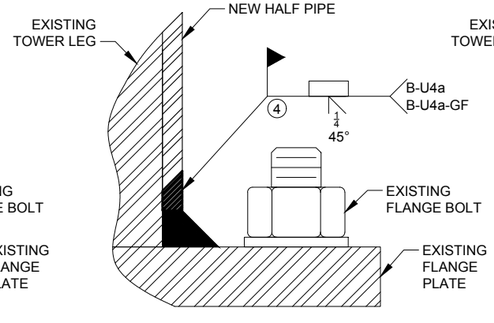
NOTES:

(3) INSTALL PROPOSED HALF PIPE.



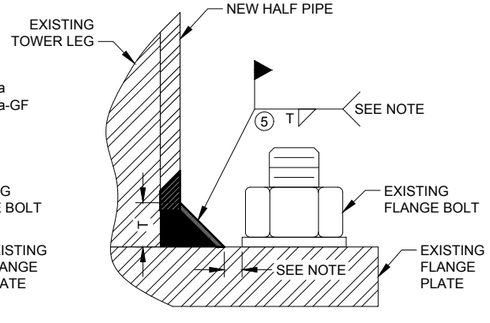
NOTES:

(4) PERFORM A CJP WELD USING THE EXISTING TOWER LEG AS A BACKING BAR.



NOTES:

(5) BUILD UP FILLET WELD TO MATCH EXISTING FILLET WELD. PRIOR TO CONSTRUCTION CONTRACTOR SHALL VERIFY THAT THERE IS ADEQUATE CLEARANCE BETWEEN THE PROPOSED WELD AND THE EXISTING FLANGE BOLTS. IF INTERFERENCE OCCURS AN ALTERNATIVE SLEEVE TERMINATION DETAIL MAY BE REQUIRED.



WELD DETAIL (OPTION 2)

NO.	DATE	DESCRIPTION	BY
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STATE OF CONNECTICUT · PAUL L MUCCI · 24103 · LICENSED PROFESSIONAL ENGINEER

JACOBS
Jacobs Engineering Group. Inc.

SITE NAME: NHV 108 943133

BU NUMBER: 806362

WO NUMBER: 1588046

SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

DRAWN BY: JMB

CHECKED BY: PL

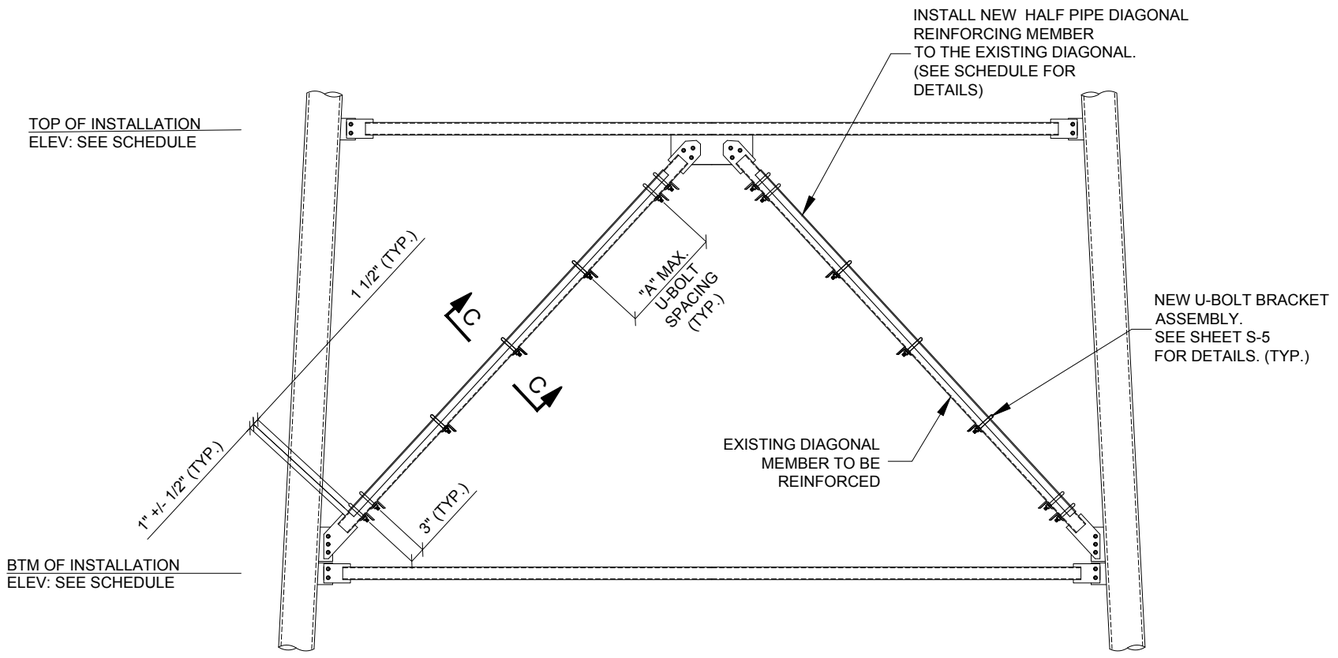
APPROVED BY: PLM

SCALE: N.T.S

HALF-PIPE END CONNECTION WELD PROCEDURE DETAILS

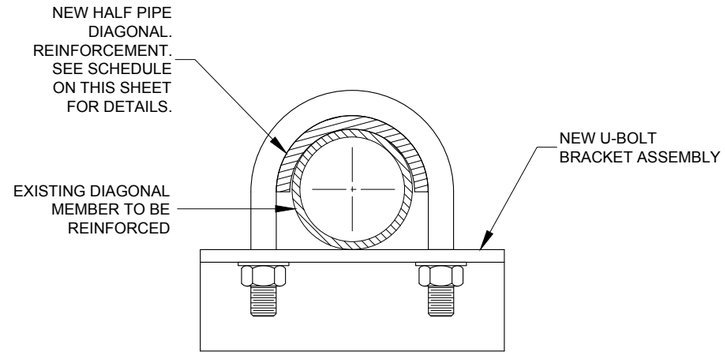
S-7

REV 0



HALF PIPE DIAGONAL REINFORCEMENT
ELEVATION VIEW

NOTES:
1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES, UNLESS NOTED OTHERWISE: FRACTIONS ± 1/16"
   ANGLES ± 1/2 DEGREE
   DECIMALS ± .010"
   HOLES ± 1/32"
3. ANGLES TO BE ASTM A572-50.
4. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 *BENT BOLTS*.
5. U-BOLTS TO BE ASTM A36/A307, SAE 429 GR 2. U-BOLTS TO BE TIGHTENED PER AISC "SNUG-TIGHT" REQUIREMENTS.
6. STANDARD 9/16"Ø HOLES IN PLACE OF SLOTTED HORIZONTAL HOLES ON THE ANGLE ARE PERMITTED. WHEN STANDARD HOLES ARE USED, FLAT WASHERS ARE NOT REQUIRED.
7. U-BOLT ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), FLAT WASHERS (ASTM F436) AND LOCK WASHERS.
8. FULL ASSEMBLY TO BE HOT-DIP GALVANIZED PER ASTM A153 / A153M OR A123, AS APPLICABLE.
9. ALL HSS STEEL, ASTM DESIGNATION A500 GR. C (FY = 46 KSI).



SECTION "C-C"
TYPICAL DETAIL

HALF PIPE DIAGONAL REINFORCEMENT INSTALLATION SCHEDULE

ELEVATION	EXISTING DIAGONAL SIZE	NEW HALF PIPE DIAGONAL REINFORCEMENT	PRELIMINARY LENGTH	MAX. U-BOLT SPACING "A" (IN)	ESTIMATED QTY U-BOLT BRACKET ASSEMBLY
133.3' TO 126.7'	PIPE 2.375" OD X 0.154"	(6) HSS 2.875" O.D. X 0.250"	9'-0"	24	42
126.7' TO 120.0'	PIPE 2.375" OD X 0.154"	(6) HSS 2.875" O.D. X 0.250"	9'-3"	24	42
120.0' TO 110.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	12'-2"	24	54
110.0' TO 100.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	12'-6"	24	54
100.0' TO 90.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	12'-11"	24	54
90.0' TO 80.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	13'-4"	24	60
80.0' TO 70.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	13'-9"	24	60
70.0' TO 60.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	14'-2"	24	60
60.0' TO 50.0'	PIPE 2.875" OD X 0.276"	(6) HSS 3.5" O.D. X 0.300"	14'-8"	24	60
50.0' TO 40.0'	PIPE 2.875" OD X 0.276"	(6) HSS 3.5" O.D. X 0.300"	15'-1"	24	60

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NEW HAVEN COUNTY, USA

DRAWN BY: JMB
CHECKED BY: PL
APPROVED BY: PLM
SCALE: N.T.S

DIAGONAL REINFORCEMENT DETAILS

S-8 | REV 0

TOWER REINFORCEMENT DRAWINGS PREPARED FOR CROWN CASTLE

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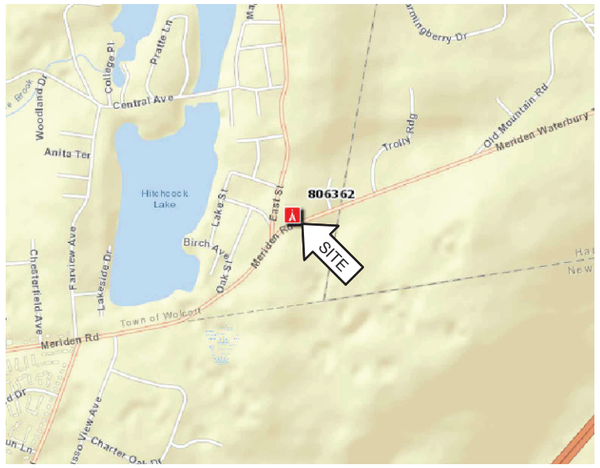

PROJECT CONTACTS:

1. CROWN PROJECT MANAGER
   DAN VADNEY
   518-373-3510
   Dan.Vadney@crowncastle.com

2. CROWN CONSTRUCTION MANAGER
   JASON D'AMICO
   860-209-0104
   Jason.DAmico@crowncastle.com

3. DESIGN ENGINEER - MAIN RFI CONTACT
   PHILIP LIN
   919-859-5758
   Philip.Lin@jacobs.com

4. ENGINEER OF RECORD
   PAUL L. MUCCI, PE
   120 ST JAMES AVENUE,
   5TH FLOOR
   BOSTON, MA 02116
   Paul.Mucci@jacobs.com

5. FOR FABRICATION AND CONSTRUCTION RELATED INQUIRIES: CONTACT **MOD_NTP@JACOBS.COM,** DESIGN ENGINEER, AND ENGINEER OF RECORD.

TOWER INFORMATION

TOWER MANUFACTURER / DWG #:	ROHN / DWG #: A861188	
TOWER HEIGHT / TYPE:	180 FT SELF SUPPORT TOWER	
TOWER LOCATION:	LAT:	41° 33′ 34.41″
DATUM: (NAD 1983)	LONG:	-72° 56′ 49.10″
STRUCTURAL DESIGN DRAWING:	JACOBS / WO # 1588046	
STRUCTURAL ANALYSIS REPORT:	JACOBS / WO # 1575608	
STRUCTURAL ANALYSIS DATE:	05/23/18	
ORDER NUMBER:	443181 REV. 0	
CCISITES DOCUMENT ID:	7563563	

CODE COMPLIANCE

ANSI/TIA-222-G-2005 WITH ADDENDA 1 THROUGH 4

2016 CONNECTICUT STATE BUILDING CODE

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.

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 REINFORCEMENTS AND EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF ANY WIRE ROPE SAFETY CLIMB ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE 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 TO THE ANCHORAGE POINTS IN ANY WAY. ANY COMPROMISED SAFETY CLIMB MUST BE REPORTED TO YOUR CROWN POC FOR RESOLUTION, INCLUDING EXISTING CONDITIONS.

DRAWINGS INCLUDED

SHEET NO.	DESCRIPTION	SHEET NO.	DESCRIPTION
T-1	TITLE SHEET	S-7	HALF-PIPE END CONNECTION WELD PROCEDURE DETAILS
N-1	MODIFICATION INSPECTION CHECKLIST	S-8	DIAGONAL REINFORCEMENT DETAILS
N-2	NOTES		
N-2A	NOTES (CONTINUED)		
S-1	TOWER MODIFICATION SCHEDULE		
S-2	ANCHOR ROD DETAILS I		
S-3	ANCHOR ROD DETAILS II		
S-4	HALF PIPE LEG REINFORCEMENT		
S-5	U-BOLT BRACKET ASSEMBLY		
S-6	HALF-PIPE END CONNECTION DETAILS		

NO.	DATE	DESCRIPTION	BY
0	07/09/18	FIRST ISSUE	JMB

REVISIONS

JACOBS
Jacobs Engineering Group. Inc.

STATE OF CONNECTICUT
PAUL L MUCCI
24103
REGISTERED
PROFESSIONAL ENGINEER

2018.07.10 14:14:42 -04'00'

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TITLE SHEET

T-1

REV 0

REQUIRED	REPORT ITEM	APPLICABLE CROWN DOC #	BRIEF DESCRIPTION
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.
N/A	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.
N/A	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:			
"X" OR "N/A"			
N/A	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.
N/A	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.
N/A	EARTHWORK	CED-SOW-10144	FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER AND RESULTS INCLUDED AS PART OF THE FOUNDATION REPORT.
N/A	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.
N/A	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-10149 ENG-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.
N/A	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:			
"X" OR "N/A"			
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.
X	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" OR "N/A"			

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.

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REVISIONS

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Jacobs Engineering Group. Inc.

STATE OF CONNECTICUT
PAUL L MUCCI
PROFESSIONAL ENGINEER

2018.07.10 14:15:00-04'00'

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MODIFICATION INSPECTION CHECKLIST

N-1

REV 0

GENERAL NOTES:

1. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE (UNO). THE CONTRACTOR MUST BE EXPERIENCED IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED, THAT HE IS PROPERLY LICENSED, AND THAT HE IS PROPERLY REGISTERED TO DO THIS WORK IN THE STATE AND/OR COUNTY IN WHICH THE WORK IS TO BE PERFORMED.

2. 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 GENERAL CONTRACTOR 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 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).

3. THE NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE STRUCTURE AND SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS. STRUCTURAL DRAWINGS SHALL GOVERN OVER ANY VARIANCE FROM THIS SHEET.

4. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVALS FROM ALL AUTHORITIES HAVING JURISDICTION FOR THIS PROJECT AND SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION. FOR JURISDICTIONS THAT LICENSE INDIVIDUAL TRADES, THE TRADESMAN OR SUBCONTRACTORS PERFORMING THOSE TRADES SHALL BE LICENSED, RESEARCH AND COMPLY WITH LICENSING LAWS, PAY LICENSE FEES, AND SELECT AND INFORM SUBCONTRACTORS REGARDING THESE LAWS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.

5. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, POSSIBLE INTERFERENCES, AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO THE JACOBS ENGINEERING ENGINEER OF RECORD (EOR) AND TOWER OWNER FIELD PERSONNEL IMMEDIATELY. ANY AND ALL FIELD CHANGES SHALL BE APPROVED AND DOCUMENTED BY THE EOR PRIOR TO FIELD IMPLEMENTATION. NO EXTRA CHARGE OR COMPENSATION WILL BE ALLOWED DUE TO DIFFERENCES BETWEEN ACTUAL DIMENSIONS OR DIMENSIONS SHOWN ON PLANS. NO PLEA OF IGNORANCE OF CONDITIONS THAT EXIST OR OF DIFFICULTIES OF CONDITIONS THAT MAY BE ENCOUNTERED, OR OF ANY OTHER RELEVANT MATTER CONCERNING THE EXECUTION OF THE WORK WILL BE ACCEPTED AS AN EXCUSE FOR ANY FAILURE OR OMISSION ON THE PART OF THE CONTRACTOR TO FULFILL EVERY DETAIL OF ALL THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS GOVERNING THE WORK.

6. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR TWO (2) YEARS FROM THE DATE OF COMPLETED CONSTRUCTION.

7. ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH ANSI, ASTM, ACI, TIA, AND AISC STANDARDS AS REFERENCED IN THE APPLICABLE CODES. USE ONLY THE LATEST ISSUES OF ANY APPLICABLE CODES, STANDARDS, OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES AND SPECIFICATIONS, UNO.

8. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS, AND IN CONFORMANCE WITH THE DRAWINGS. ANY AND ALL SUBSTITUTIONS MUST BE DULY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER OF RECORD PRIOR TO FABRICATION AND INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

9. ALL MANUFACTURER'S HARDWARE ASSEMBLY INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT ALL CONSTRUCTION PROCEDURES MEET THE REQUIREMENTS OF OSHA, THE OWNER, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS. THESE REGULATIONS INCLUDE BUT ARE NOT LIMITED TO REGULATIONS DEALING WITH TOWER CONSTRUCTION AND SAFETY, EXCAVATIONS AND TRENCHING, ERECTION OF GUARDS AND BARRIERS, AND WORK IN CONFINED SPACES. ENSURE THAT EMPLOYEES AND SUBCONTRACTORS WEAR HARD HATS AT ALL TIMES DURING CONSTRUCTION.

11. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIAL ACCESS, WITH THE RESIDENT LEASING AGENT.

12. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES OR BURIED SERVICES AFFECTED BY THIS CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR TEMPORARILY RELOCATING ANY LINES OR STRUTS AS NECESSARY TO COMPLETE THE REQUIRED WORK. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR CONTAINMENT OF SEDIMENT AND CONTROL OF EROSION AT THE SITE. ANY DAMAGE TO ADJACENT OR DOWNSTREAM PROPERTIES WILL BE CORRECTED BY THE CONTRACTOR. THE CONTRACTOR IS TO MAINTAIN ADEQUATE DRAINAGE AT ALL TIMES. DO NOT ALLOW WATER TO STAND OR POND. ANY DAMAGE TO STRUCTURES OR WORK ON THE SITE CAUSED BY INADEQUATE MAINTENANCE OF DRAINAGE PROVISIONS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND ANY COST ASSOCIATED WITH REPAIRS FOR SUCH DAMAGE WILL BE AT THE CONTRACTOR'S EXPENSE.

13. STRUCTURAL DESIGN IS FOR THE COMPLETE CONDITION ONLY. THE CONTRACTOR 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 THE STRUCTURAL INTEGRITY, INCLUDING, BUT NOT LIMITED TO, ENGINEERING ASSESSMENT OF CONSTRUCTION STRESSES WITH INSTALLATION MAXIMUM WIND SPEED AND/OR TEMPORARY BRACING AND SHORING.

14. DO NOT SCALE DRAWINGS.

15. FOR THIS ANALYSIS AND MODIFICATION, THE TOWER HAS BEEN ASSUMED TO BE IN GOOD CONDITION WITHOUT ANY DEFECTS. IF THE CONTRACTOR DISCOVERS ANY INDICATION OF AN EXISTING STRUCTURAL DEFECT, CONTACT THE ENGINEER OF RECORD IMMEDIATELY.

16. MODIFICATION WORK SHALL BE COMPLETED IN CALM WIND CONDITIONS / OR APPROPRIATE WIND SPEED FOR THE TYPE OF MODIFICATION WORK TO BE INSTALLED.

17. THE CLIMBING FACILITIES, SAFETY CLIMB, AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED, OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF YOUR CROWN POC. ALL ALTERATIONS TO A SAFETY CLIMB'S ORIGINAL MANUFACTURER'S CONFIGURATION MUST BE DESIGNED BY THE ENGINEER OF RECORD. IF THE GENERAL CONTRACTOR FINDS THAT THE CLIMBING FACILITIES ARE IMPEDED, EITHER DURING BIDDING, DURING PRE-FABRICATION MAPPING, OR WHILE ON-SITE, THE GENERAL CONTRACTOR SHALL CONTACT THE CROWN POC TO DETERMINE A METHOD OF RESOLUTION.

18. ANY WORK PERFORMED WITHOUT A PREFABRICATION MAPPING IS DONE AT THE RISK OF THE GENERAL CONTRACTOR AND/OR FABRICATOR.

19. AT THE TIME OF NTP, THE CONTRACTOR IS RESPONSIBLE FOR ENGAGING A MODIFICATION INSPECTOR TO COORDINATE AN INSPECTION SCHEDULE AND ENSURE PROPER DOCUMENTATION IS MAINTAINED THROUGHOUT THE LIFE OF THE PROJECT. FOUNDATION WORK REQUIRES INSPECTION PRIOR TO POURING CONCRETE. SHOP DRAWINGS ARE TO BE SUBMITTED TO THE EOR PRIOR TO FABRICATION.

20. IF, DURING THE COURSE OF A FOUNDATION MODIFICATION, THE GC ENCOUNTERS EXISTING CONDUIT LOCATED WITHIN THE CONFINES OF THE EXISTING OR PROPOSED FOUNDATION CONCRETE, AND THIS CONDUIT IS NOT IN A LOCATION THAT IS SPECIFIED WITHIN THESE DESIGN DRAWINGS, THE GC SHALL IMMEDIATELY CONTACT THE EOR FOR GUIDANCE BEFORE PROCEEDING WITH THE INSTALLATION OF THE PROPOSED FOUNDATION MODIFICATION. IF CONDUIT IS TO BE INSTALLED THROUGH THE EXISTING FOUNDATION OR PROPOSED FOUNDATION MODIFICATION AND HASN'T BEEN SPECIFIED WITHIN THESE DESIGN DRAWINGS THEN THE GC SHALL IMMEDIATELY CONTACT THE EOR FOR GUIDANCE PRIOR TO PROCEEDING WITH THE INSTALLATION OF THE PROPOSED FOUNDATION MODIFICATIONS.

STRUCTURAL STEEL NOTES:

1. DESIGN, FABRICATION, ERECTION, ALTERATION, AND MAINTENANCE SHALL CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE (UNO):

   A. TIA-222: STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

   B. TIA-1019-A: INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS

   C. AISC: MANUAL OF STEEL CONSTRUCTION

2. ALL STRUCTURAL STEEL IS TO BE NEW AND CONFORM TO THE FOLLOWING:

   A. MONOPOLE: ASTM A572-65 (FY = 65 KSI), UNO

   B. SELF SUPPORT TOWER AND GUYED TOWER: ASTM A572-50 (FY = 50 KSI), UNO

3. ALL BOLTS SHALL BE HOT-DIP GALVANIZED ASTM A325 ASSEMBLIES, TO INCLUDE BOLT, ASTM A563 HEAVY HEX NUT, F436 FLAT WASHER, AND SPLIT LOCK WASHER, UNO. BOLT THREADS ARE TO BE EXCLUDED FROM THE SHEAR PLANES. USE BEARING TYPE CONNECTIONS. 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.

4. ALL FASTENERS SHALL NOT BE REUSED.

5. DRILL NO HOLES IN ANY NEW OR EXISTING STRUCTURAL STEEL MEMBERS OTHER THAN THOSE SHOWN ON STRUCTURAL DRAWINGS WITHOUT THE APPROVAL OF THE ENGINEER OF RECORD.

6. ALL EXPOSED EXTERIOR STRUCTURAL STEEL (INCLUDING BOLTS, LOCK WASHERS, PINS, ETC.) SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153 AND A123. FOR ALL FABRICATED WELDED ASSEMBLIES TO BE HOT-DIP GALVANIZED, PROVIDE WELDS ALL AROUND OR ADD SEAL WELDS WHERE STRUCTURAL WELDS ARE NOT SPECIFIED. FOR HIGH STRENGTH STEEL FASTENERS WHERE HOT-DIP GALVANIZATION IS NOT PERMITTED, MAGNI 565 COATING SHALL BE USED. ALL NEW STEEL SHALL BE PAINTED TO MATCH EXISTING TOWER STEEL.

7. WHERE SPECIFIED, THE SEALANT BETWEEN STEEL COMPONENTS IS TO BE SILICONE CAULKING THAT IS EXTERIOR GRADE, ABLE TO BE PAINTED, AND ACCEPTABLE TO THE ENGINEER OF RECORD.

8. FOR A LIST OF CROWN APPROVED COLD GALVANIZING COMPOUNDS, REFER TO CROWN ENG-BUL-10149, " TOWER PROTECTIVE COATINGS BULLETIN".

9. AFTER FINAL INSPECTION, ALL EXPOSED STRUCTURAL STEEL AS THE RESULT OF THIS SCOPE OF WORK INCLUDING WELDS, FIELD DRILLED HOLES, AND SHAFT INTERIORS (WHERE ACCESSIBLE), SHALL BE CLEANED AND COLD GALVANIZING APPLIED BY BRUSH IN ACCORDANCE WITH CROWN ENG-BUL-10149, "TOWER PROTECTIVE COATINGS BULLETIN". PHOTO DOCUMENTATION IS REQUIRED TO BE SUBMITTED TO THE MI INSPECTOR.

10. NO WELDING, TORCH CUTTING, OR OPEN FLAME IS PERMITTED ON THIS CONSTRUCTION SITE UNLESS DIRECTLY SPECIFIED IN THE DRAWINGS.

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PAUL L MUCCI
PROFESSIONAL ENGINEER

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SITE NAME: NHV 108 943133

BU NUMBER: 806362

WO NUMBER: 1588046

SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

DRAWN BY: JMB

CHECKED BY: PL

APPROVED BY: PLM

SCALE: N.T.S

NOTES

N-2

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WELDING NOTES:

1. ALL WELDING SHALL BE CARRIED OUT UNDER GOOD OPERATOR CONDITIONS AS DEFINED IN SECTION 5.12 OF AWS D1.1

2. ALL ARC WELDING ON CROWN STRUCTURES SHALL BE DONE IN ACCORDANCE WITH THE CROWN ENG-PLN-10015, "CUTTING AND WELDING SAFETY PLAN" AND AWS D1.1 (LATEST EDITION). THIS SHALL INCLUDE A CERTIFIED WELDING INSPECTOR (CWI) FOR ACCEPTANCE OR REJECTION OF ALL WELDING OPERATIONS, PRE-DURING-POST, USING THE ACCEPTANCE CRITERIA OF AWS D1.1. THE CWI SHALL WORK WITH THE GC ON THE LEVEL OF INTERACTION NEEDED TO CONDUCT THE WELDING INSPECTION. THE CERTIFIED WELDING INSPECTION IS THE RESPONSIBILITY OF THE GC.

3. THE CWI SHALL INDICATE, IN A WRITTEN WELDING REPORT, THAT ALL WELDING OPERATIONS, PRE-DURING-POST, WERE CONDUCTED IN ACCORDANCE WITH AWS D1.1 INCLUDING PHOTOGRAPHS AND DOCUMENTATION SUPPORTING THE ACCEPTANCE OR REJECTION OF ALL WELDING. FOR INFORMATION, SEE CROWN ENG-STD-10069, "GC INSPECTION STANDARD FOR FABRICATION AND FIELD WELDING OF STRUCTURAL STEEL" AND CROWN ENG-SOW-10007, "MODIFICATION INSPECTION SOW". ALL CWI WELDING INSPECTION DOCUMENTATION AND PHOTOS SHALL BE SUBMITTED TO THE MI INSPECTOR.

4. FOR ALL WELDING, USE E70XX ELECTRODES, UNO.

5. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING.

6. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0°F. WHEN THE TEMPERATURE IS BETWEEN 0°F AND 32°F, PREHEAT AND MAINTAIN THE STEEL IN THE VICINITY OF THE WELD AREA AT 70°F DURING THE WELDING PROCESS.

7. DO NOT WELD ON WET OR FROST-COVERED SURFACES AND PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.

8. WELDING NDE NOTES: “FIELD NDE MINIMUM REQUIREMENTS:

   A. ALL NDE SHALL BE IN ACCORDANCE WITH AWS D1.1.

   B. FOR NEW BASE STIFFENERS (INCLUSIVE OF TRANSITION STIFFENERS) AND ANCHOR ROD BRACKETS, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT.

   C. FOR NEW FLAT PLATE REINFORCEMENT AT THE BASE OF THE TOWER, COMPLETE JOINT PENETRATION WELDS SHALL BE 100% INSPECTED BY UT. ALL PARTIAL JOINT PENETRATION AND FILLET WELDS SHALL BE 100% INSPECTED BY MT, BUT MAY BE LIMITED TO A HEIGHT OF 10’-0”.

   D. FOR NDE OF THE EXISTING BASE PLATE CIRCUMFERENTIAL WELD, GC SHALL REFERENCE THE MI CHECKLIST FOR APPLICABILITY. PLEASE SEE ENG-SOW-10033: TOWER BASE PLATE NDE, AND ENG-BUL-10051: NDE REQUIREMENTS FOR MONOPOLE BASE PLATE TO PREVENT CONNECTION FAILURE. NOTIFY THE EOR AND CROWN ENGINEERING IMMEDIATELY IF ANY CRACKS ARE SUSPECTED OR HAVE BEEN IDENTIFIED. THE NDE SHALL INCLUDE ALL EXISTING MODIFICATIONS THAT HAVE BEEN WELDED TO THE BASE PLATE.

   E. ALL TESTING LIMITATIONS SHALL BE DETAILED IN THE NDE REPORT.”

PULLOUT TESTING OF POST INSTALLED ANCHOR RODS:

1. EPOXY AGENTS SHOULD BE ALLOWED TO CURE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
2. CONTRACTOR SHALL ENSURE THAT CONSTRUCTION DOES NOT GO BEYOND POINT WHERE THE ANCHOR RODS CAN BE EFFECTIVELY TESTED. CONSTRUCTION MAY PROCEED AFTER TESTING IS COMPLETED.
3. 50% OF POST INSTALLED ANCHOR RODS SHALL BE TESTED OR TOTAL OF 4, WHICHEVER IS GREATER.
4. ANCHOR ROD PULL OUT TESTING IS TO BE DONE IN ACCORDANCE WITH CROWN ENG-PRC-10119.
5. MAINTAIN COMPLETE LOAD-DISPLACEMENT RECORDS THROUGHOUT THE TEST. LOAD THE ANCHOR IN INCREMENTS OF UP TO 15% OF THE TARGET TENSION.
6. IF A DISPLACEMENT GREATER THAN 0.010" REMAINS AFTER THE INITIAL TEST CYCLE, ADDITIONAL TEST SHALL BE PERFORMED UP TO A MAXIMUM OF 3 TEST CYCLES TO DETERMINE IF THE MOVEMENT CONTINUES TO ACCUMULATE. INCREMENTAL RESIDUAL MOVEMENT RECORDED FROM EACH TEST CYCLE MUST BE DECREASING IN VALUE AND STABILIZE TO A VALUE NO MORE THAN 0.010" OR THE ANCHOR SHALL BE CONSIDERED TO FAIL THE TEST.
7. THIS INFORMATION SHALL BE DOCUMENTED AND INCLUDED IN THE MODIFICATION INSPECTION REPORT.
8. CONTACT JACOBS ENGINEERING GROUP IF ANY OF THE ANCHORS FAIL THE PULL TEST.

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STATE OF CONNECTICUT
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PROFESSIONAL ENGINEER

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NEW HAVEN COUNTY, USA

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CHECKED BY: PL

APPROVED BY: PLM

SCALE: N.T.S

NOTES (CONTINUED)

N-2A

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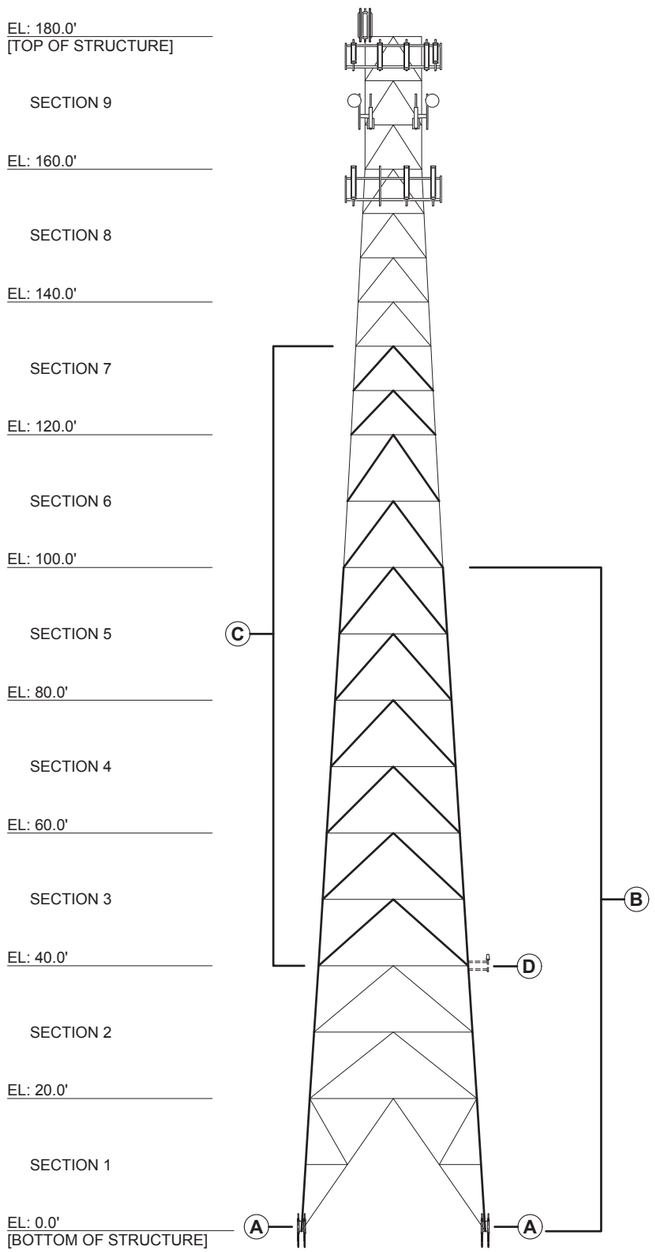
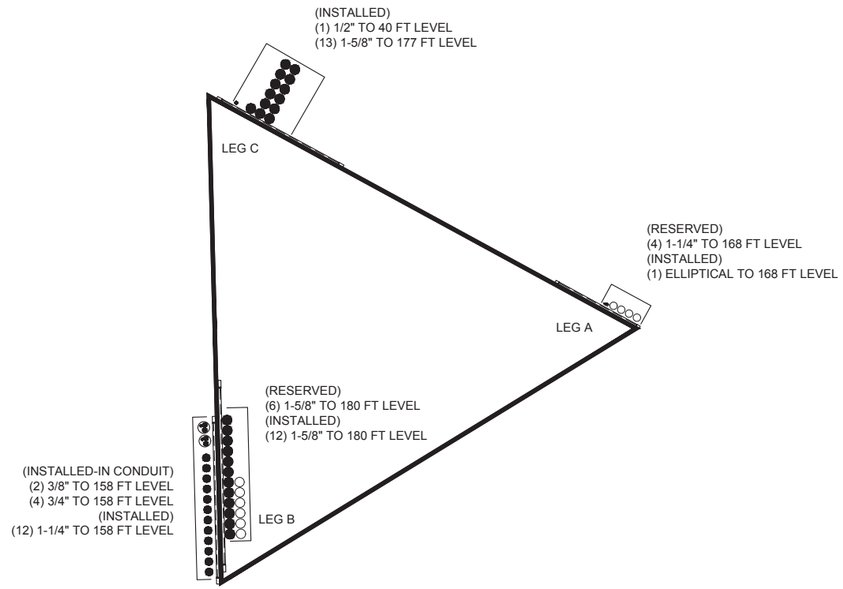


TOWER ELEVATION VIEW



TOWER BASE LEVEL VIEW

MODIFICATION SCHEDULE

LETTER	ELEVATION (FT)	TOWER MODIFICATION DESCRIPTION	REFERENCE SHEET
(A)	BASE PLATE	**INSTALL ANCHOR RODS W/ ANCHOR ROD BRACKETS TO EACH TOWER LEG**	S-2, S-3 & S-6
(B)	100.0 TO 0.0	**INSTALL NEW HALF-PIPE LEG REINFORCEMENT.**	S-4 TO S-7
(C)	133.3 TO 40.0	**INSTALL HALF PIPE REINFORCEMENT TO EXISTING DIAGONALS**	S-5 & S-8
(D)	40.0'	**TEMPORARILY RELOCATE GPS & MOUNT TO ALLOW FOR HALF PIPE LEG REINFORCEMENT.**	S-1
(E)	100.0 TO 0.0	**WHERE INTERFERENCE EXISTS, RELOCATE EXISTING STEP BOLTS TO NEW HALF PIPE LEG REINFORCEMENT.**	S-4

PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTHS AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY, AND SHALL NOT BE USED FOR FABRICATION.

NOTES:

1. MODIFICATIONS TYPICAL FOR ALL TOWER FACES.
2. COAXIAL CABLES AND ANTENNAS CONFLICTING WITH PROPOSED REINFORCEMENT TO BE TEMPORARY RELOCATED. THE CONTRACTOR SHALL COORDINATE THE WORK WITH CROWN AND THE OWNER OF THE APPURTENANCES INVOLVED.

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TOWER MODIFICATION SCHEDULE

S-1

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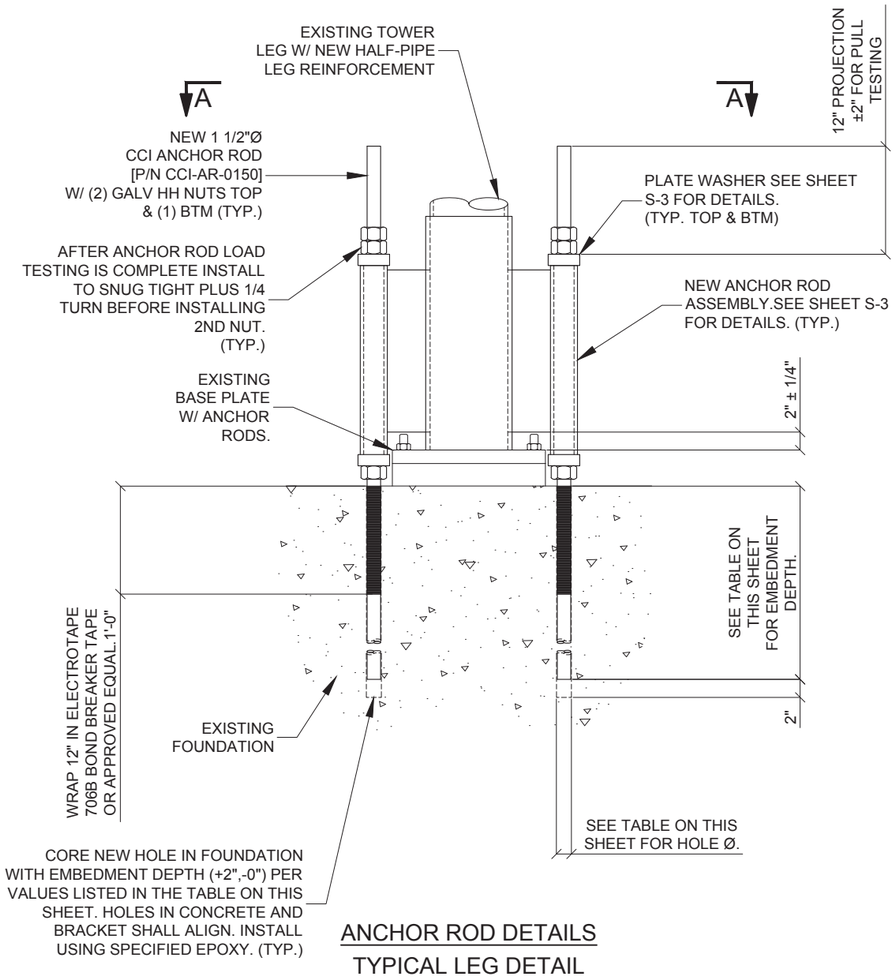

ANCHOR ROD DETAILS

TYPICAL LEG DETAIL

NOTES:

1. PLATE WASHER SHALL FULLY BEAR ON TUBE.
2. REFERENCE CC APPROVED COMPONENTS (CURRENT VERSION) FOR ANCHOR ROD DIMENSIONS.
3. RODS SHALL BE GALVANIZED FROM THE TOP OF THE PROJECTION TO 15" BELOW SURFACE OF CONCRETE, AT A MINIMUM.
4. CORED HOLES SHALL 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 SHALL 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. IF BASE PLATE GROUT REPAIR IS REQUIRED FOR ANCHOR ROD INSTALLATION, SEE ENG-PRC-10012: BASE PLATE GROUT REPAIR, FOR PROCEDURES AND RECOMMENDED MANUFACTURERS. CONTRACTOR TO DETERMINE QUANTITY REQUIRED.
10. ONCE ALL RESIN AND GROUT HAVE CURED, NEW ANCHOR ROD REINFORCING SHALL BE TARGET TENSIONED TO THE VALUES LISTED IN THE TABLE SEEN ON THIS SHEET. SEE ENG-PRC-10119: PULL-OUT TESTING POST-INSTALLED ANCHOR RODS FOR SPECIFICATIONS.
11. CONTRACTOR SHALL VERIFY THAT A PULL TEST IS ABLE TO BE PERFORMED USING THE ANCHOR ROD PROJECTION SHOWN.
12. 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.

SECTION "A-A"

ANCHOR ROD SPECIFICATIONS

CCI PART NO.	DIAMETER	QUANTITY	INSTALLED LENGTH	MATERIAL	EMBEDMENT DEPTH	FOUNDATION HOLE Ø	EPOXY	TARGET TENSION LOAD
CCI-AR-0150	1 1/2"Ø	6	8'-1 3/4"	A193-B7 ALL THREADED ROD	5'-0"	1 3/4"	HILTI HIT-RE 500 V3	83.0 K

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STATE OF CONNECTICUT
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24103
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ANCHOR ROD DETAILS I

S-2

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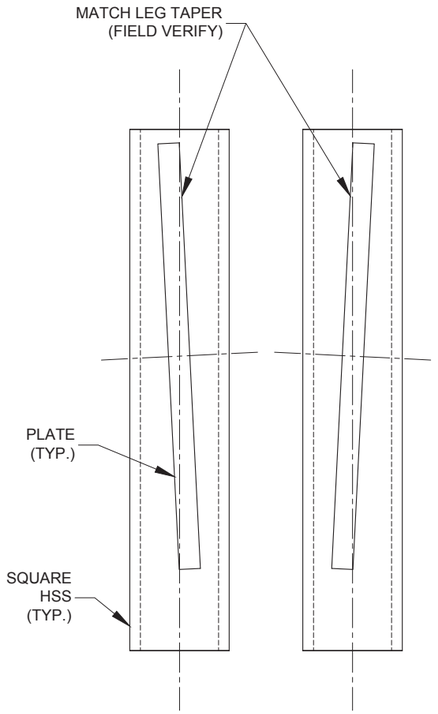
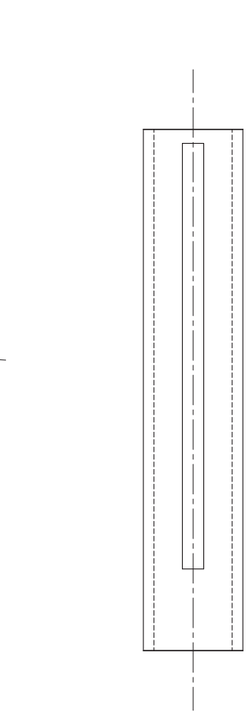


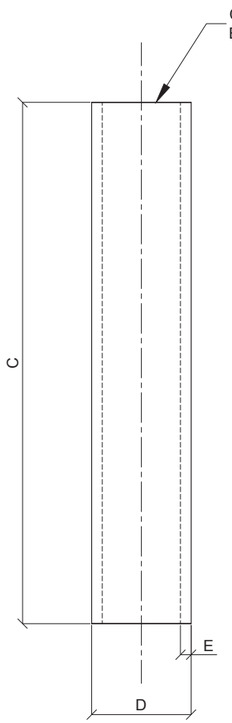
TYPICAL
LEFT



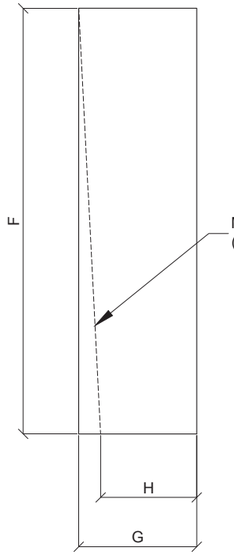
TYPICAL
RIGHT

TYPICAL
CENTER
(IF NEEDED)

ANCHOR ROD
BRACKET ASSEMBLY



SQUARE HSS



PLATE

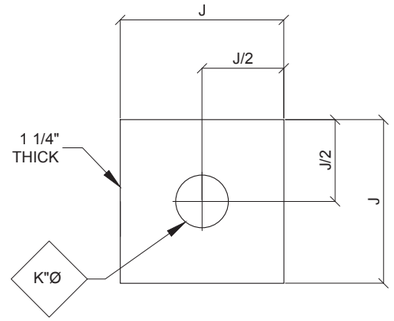


PLATE WASHER

NOTES:

1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. FOR LOCATIONS WHERE THE TOWER TAPER CAUSES THE BRACKET PLATE TO EXTEND BEYOND THE WORKABLE FLAT OF THE HSS TUBE, CONTACT THE EOR FOR REVISED WELD DETAILS PRIOR TO FABRICATION.

ANCHOR BRACKET SPECIFICATIONS

	ASSEMBLY		SQUARE HSS			PLATE				PLATE WASHER	
	A	B	C	D	E	F	G	H	I	J	K
	2 1/2"	3/16"	1'-9"	3"	3/8"	1'-6"	4 3/4"	FIELD VERIFY	3/4"	3 1/2"	1 5/8"
TOTAL QUANTITY	6		6			6				12	
MATERIAL	----		A500 GR. C (Fy = 50 KSI)			A572-50				A572-50	

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PROFESSIONAL ENGINEER
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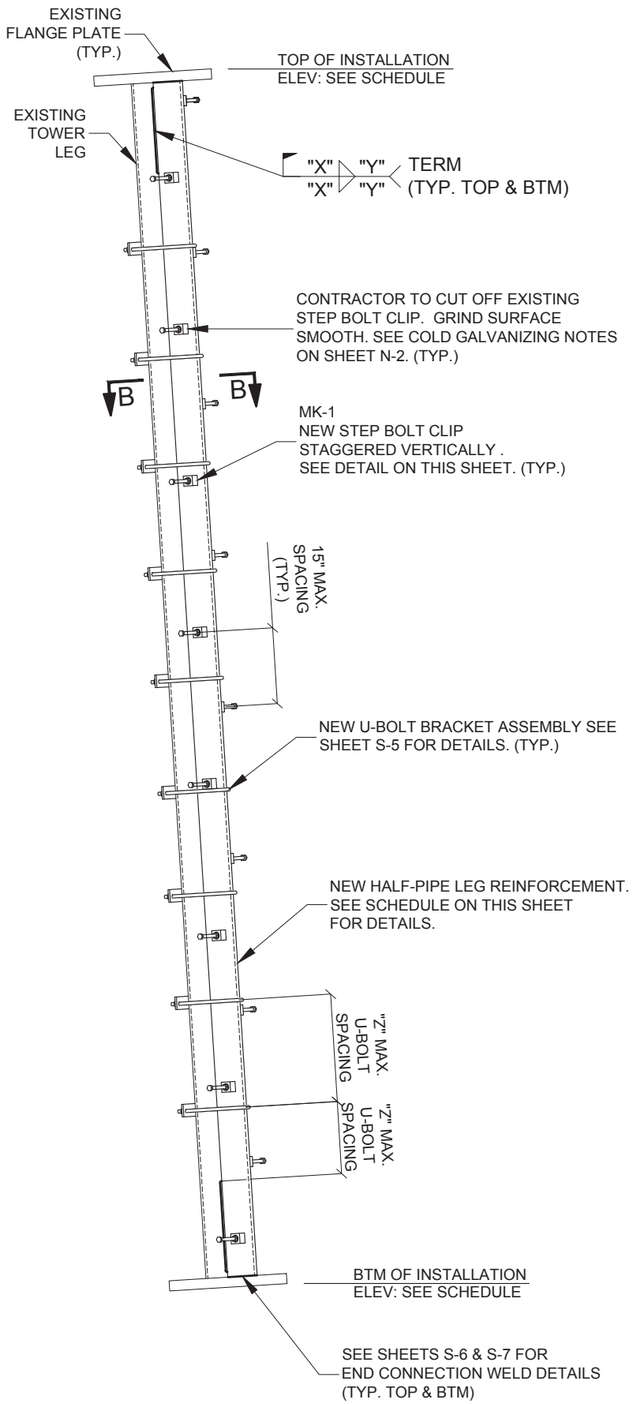
SITE NAME: NHV 108 943133
BU NUMBER: 806362
WO NUMBER: 1588046
SITE ADDRESS:
INTERSECTION OF RTE
322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

DRAWN BY: JMB
CHECKED BY: PL
APPROVED BY: PLM
SCALE: N.T.S

ANCHOR ROD
DETAILS II

S-3 | REV 0

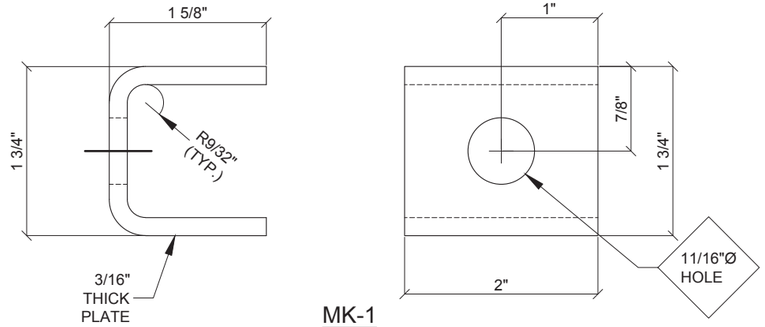


HALF PIPE LEG REINFORCEMENT
ELEVATION VIEW
(TYPICAL LEG DETAIL)

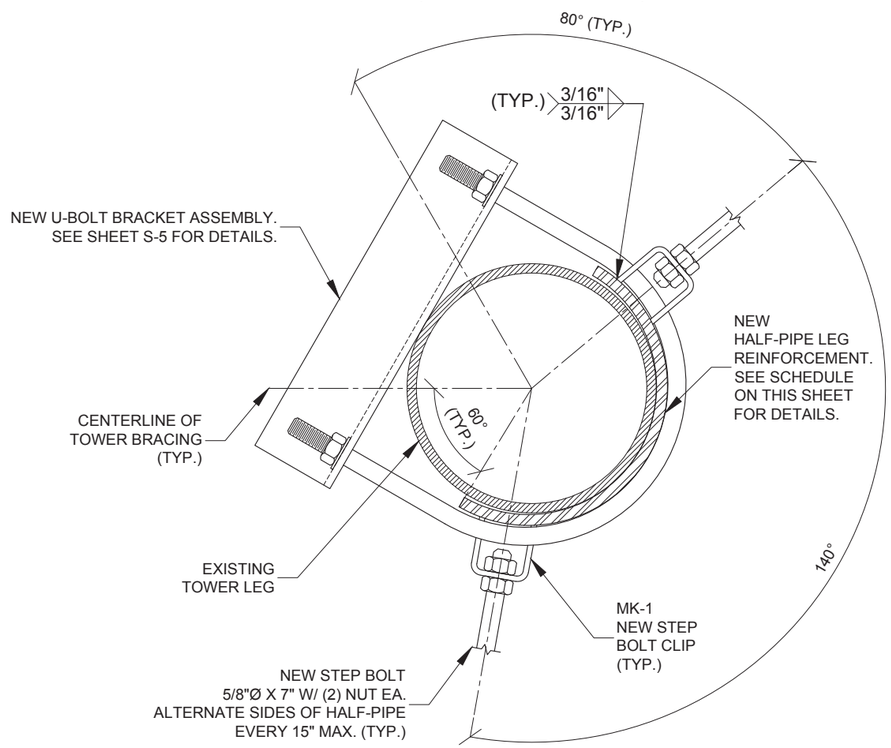
HALF-PIPE LEG REINFORCEMENT INSTALLATION SCHEDULE

ELEVATION (FT.)	EXISTING LEG SIZE	NEW HALF PIPE REINFORCEMENT	PRELIMINARY LENGTH	REQUIRED TERM WELD SIZE "X" (IN)	BTM END TERM WELD LENGTH "Y" (IN)	MAX. U-BOLT SPACING "Z" (IN)	ESTIMATED TOTAL U-BOLT ASSEMBLIES REQUIRED	STEP BOLT CLIP	STEP BOLT
100.0 TO 80.0	PIPE 5.563" OD X 0.375"	(3) HSS 6.625" OD X 0.500"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
80.0 TO 60.0	PIPE 6.625" OD X 0.340"	(3) HSS 7.5" OD X 0.375"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
60.0 TO 40.0	PIPE 6.625" OD X 0.432"	(3) HSS 7.5" OD X 0.375"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
40.0 TO 20.0	PIPE 6.625" OD X 0.432"	(3) HSS 7.5" OD X 0.375"	20'-6"	5/16	12	30	24	(48) MK-1	(48) 5/8"Ø X 7"
20.0 TO 0.0	PIPE 8.750" OD X 0.375"	(3) HSS 9.625" OD X 0.375"	20'-6"	5/16	**	30	24	(48) MK-1	(48) 5/8"Ø X 7"

** 18" TOP / SEE SHEETS S-2 & S-6 FOR BOTTOM WELD DETAILS.



MK-1
STEP BOLT CLIP (ASTM A572-50)
(FRONT & TOP VIEW)



SECTION "B-B
TYPICAL DETAIL

NOTES:
1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES, UNLESS NOTED OTHERWISE: FRACTIONS ± 1/16"
   ANGLES ± 1/2 DEGREE
   DECIMALS ± .010"
   HOLES ± 1/32"
3. ANGLES TO BE ASTM A572-50.
4. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 *BENT BOLTS*.
5. U-BOLTS TO BE ASTM A36/A307, SAE 429 GR 2. U-BOLTS TO BE TIGHTENED PER AISC "SNUG-TIGHT" REQUIREMENTS.
6. STANDARD 9/16"Ø HOLES IN PLACE OF SLOTTED HORIZONTAL HOLES ON THE ANGLE ARE PERMITTED. WHEN STANDARD HOLES ARE USED, FLAT WASHERS ARE NOT REQUIRED.
7. U-BOLT ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), FLAT WASHERS (ASTM F436) AND LOCK WASHERS.
8. FULL ASSEMBLY TO BE HOT-DIP GALVANIZED PER ASTM A153 / A153M OR A123, AS APPLICABLE.
9. ALL HSS STEEL, ASTM DESIGNATION A500 GR. C (FY = 46 KSI)
10. USE E70XX FOR ELECTRODES FOR WELDING.
11. STEP BOLT CLIPS SHALL BE SHOP WELDED. STEP BOLT CLIP WELDS ARE SUBJECT TO AWS D1.1 AND MUST BE INSPECTED BY A CWI. REFER TO DOCUMENT "ENG-STD-10069 GC CWI REQUIREMENT STANDARD" FOR CWI REQUIREMENTS. STEP BOLT CLIPS SHALL BE WELDED IN PLACE PRIOR TO HOT DIP GALVANIZING THE WELDMENT.
12. CONTRACTOR SHALL USE ALL NEW STEP BOLTS AND HARDWARE. STEP BOLT MATERIAL SHALL MEET THE REQUIREMENTS OF ASTM A449. STEP BOLTS SHALL BE INSTALLED USING DOUBLE NUTS. A STEP BOLT INSTALLED IN A STEP BOLT CLIP SHALL BE TURNED WITH THE OUTER NUT LOOSE UNTIL THE END OF THE STEP BOLT MAKES CONTACT WITH THE SUPPORTING MEMBER. THE OUTER STEP BOLT NUT SHALL THEN BE TIGHTENED TO A SNUG TIGHT CONDITION AND PRETENSIONED BY ROTATING THE OUTER NUT 1/3 TURN.

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PHIL L MUCCI
LICENSED PROFESSIONAL ENGINEER

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SITE NAME: NHV 108 943133
BU NUMBER: 806362
WO NUMBER: 1588046
SITE ADDRESS:
INTERSECTION OF RTE 322/MERIDIAN RD
WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

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APPROVED BY: PLM
SCALE: N.T.S

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HALF-PIPE LEG REINFORCEMENT

S-4 | REV 0

HALF PIPE LEG U-BOLT BRACKET ASSEMBLY SCHEDULE

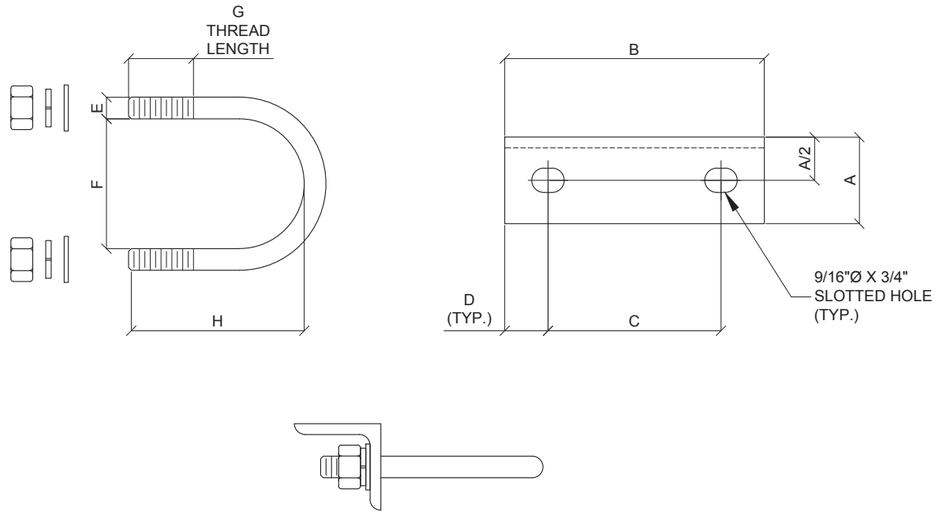
ELEVATION (FT)	ANGLE SIZE	ANGLE LENGTH	C/C DISTANCE	MIN. EDGE DISTANCE	U-BOLT DIAMETER	INSIDE DISTANCE	THREAD LENGTH	U-BOLT LENGTH
	A	B	C	D	E	F	G	H
100.0 TO 80.0	L 3" X 3" X 1/4"	9 1/4"	7 1/4"	1"	1/2"	6 3/4"	1 1/2"	7 13/16"
80.0 TO 20.0	L 3" X 3" X 1/4"	10 1/8"	8 1/8"	1"	1/2"	7 5/8"	1 1/2"	8 3/4"
20.0 TO 0.0	L 3" X 3" X 1/4"	1'-0 1/4"	10 1/4"	1"	1/2"	9 3/4"	1 1/2"	10 7/8"

REFERENCE NOTES ON HALF-PIPE LEG REINFORCEMENT SHEET.

HALF PIPE DIAGONAL U-BOLT BRACKET ASSEMBLY SCHEDULE

ELEVATION (FT)	ANGLE SIZE	ANGLE LENGTH	C/C DISTANCE	MIN. EDGE DISTANCE	U-BOLT DIAMETER	INSIDE DISTANCE	THREAD LENGTH	U-BOLT LENGTH
	A	B	C	D	E	F	G	H
133.3 TO 120.0	L 2" X 2" X 1/4"	5 1/2"	3 1/2"	1"	1/2"	3"	1 1/2"	4 3/8"
120.0 TO 40.0	L 2" X 2" X 1/4"	6 1/8"	4 1/8"	1"	1/2"	3 5/8"	1 1/2"	5"

REFERENCE NOTES ON DIAGONAL REINFORCEMENT DETAILS SHEET.



U-BOLT BRACKET ASSEMBLY

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WO NUMBER: 1588046

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WOLCOTT, CT 06716
NEW HAVEN COUNTY, USA

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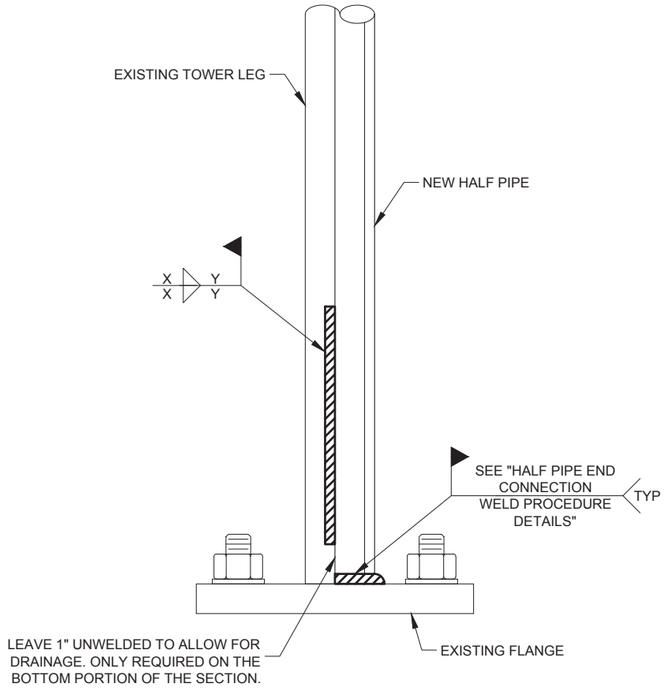
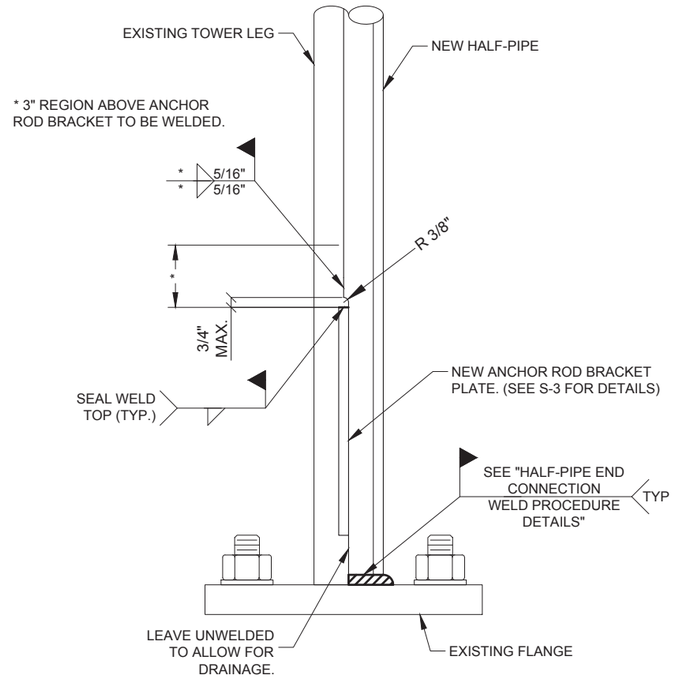
U-BOLT BRACKET ASSEMBLY

S-5

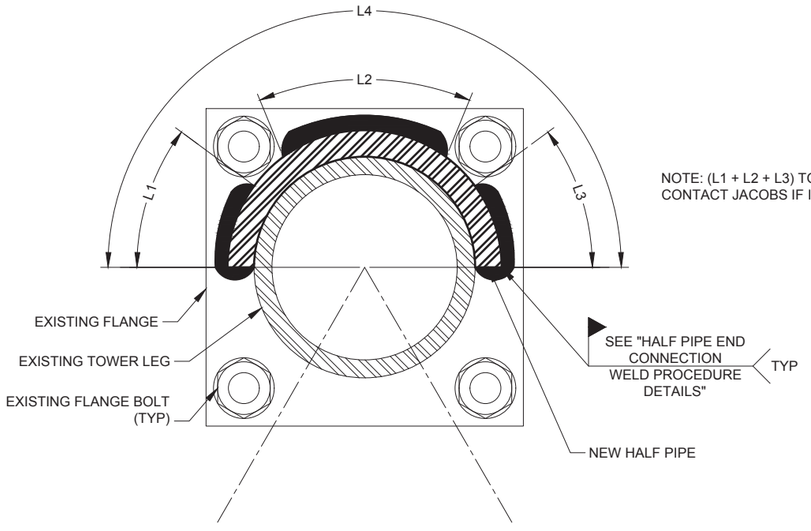
REV 0



BASE OF LEG FLANGE CONNECTION



HALF-PIPE FLANGE CONNECTION (TOWER BASE ONLY)



NOTE: (L1 + L2 + L3) TO BE EQUAL TO 100% OF L4. CONTACT JACOBS IF INTERFERENCES EXIST.

FLANGE CONNECTION INTERFERENCE

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HALF-PIPE END CONNECTION DETAILS

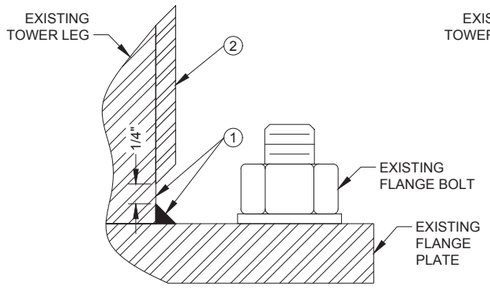
S-6

REV 0

NOTES:

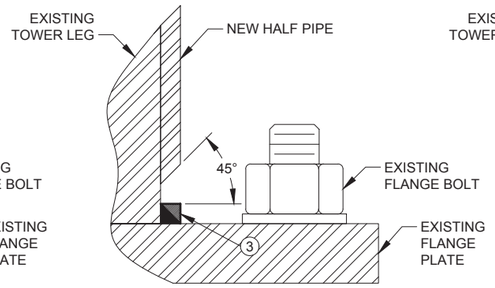
(1) CLEAN GALVANIZING FROM EXISTING WELD AND ALL WELD CONTACT SURFACES.

(2) INSTALL PROPOSED HALF PIPE.



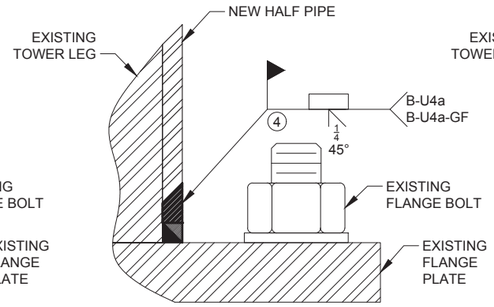
NOTES:

(3) BUILD A PLATFORM WITH WELD (BUTTER) TO MATCH THE HEIGHT OF THE EXISTING FILLET WELD PER SECTION 5.22.4.3 OF AWS D1.1/D1.1M: 2010. ENGINEERING APPROVAL IS PROVIDED FOR CORRECTING ROOT OPENINGS GREATER THAN THOSE PERMITTED IN SECTION 5.22.4.3 IN ACCORDANCE WITH SECTION 5.22.4.4.



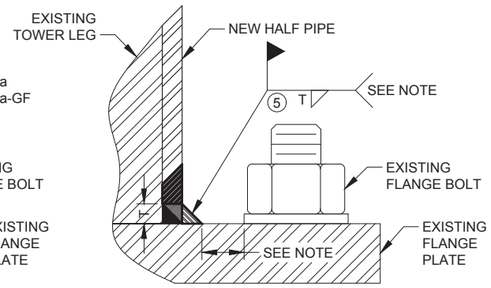
NOTES:

(4) PERFORM A CJP WELD USING THE EXISTING TOWER LEG AS A BACKING BAR.



NOTES:

(5) REINFORCING FILLET WELD SIZED TO MATCH EXISTING FILLET WELD. PRIOR TO CONSTRUCTION CONTRACTOR SHALL VERIFY THAT THERE IS ADEQUATE CLEARANCE BETWEEN THE PROPOSED WELD AND THE EXISTING FLANGE BOLTS. IF INTERFERENCE OCCURS AN ALTERNATIVE SLEEVE TERMINATION DETAIL MAY BE REQUIRED.

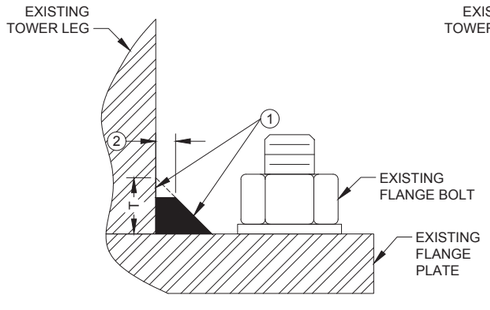


WELD DETAIL (OPTION 1)

NOTES:

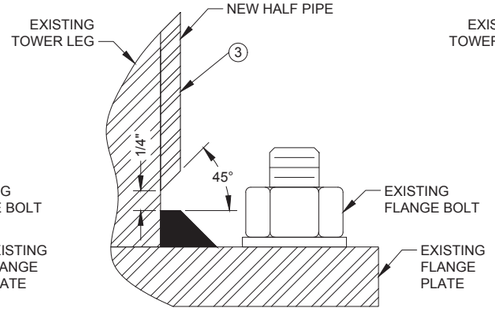
(1) CLEAN GALVANIZING FROM EXISTING WELD AND ALL WELD CONTACT SURFACES.

(2) PARTIALLY GRIND THE HEIGHT OF THE EXISTING FILLET WELD TO FORM A PLATFORM WITH TOP WIDTH TO MATCH THE HALF PIPE THICKNESS.



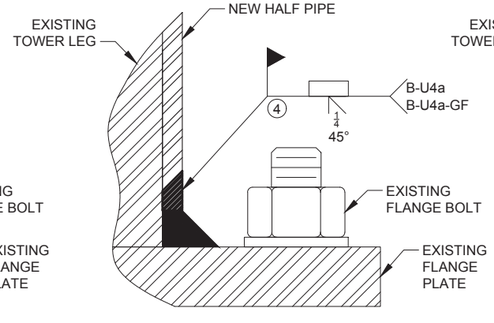
NOTES:

(3) INSTALL PROPOSED HALF PIPE.



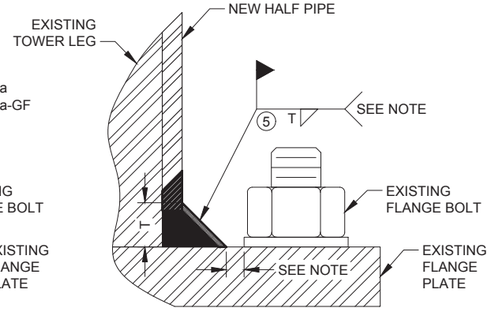
NOTES:

(4) PERFORM A CJP WELD USING THE EXISTING TOWER LEG AS A BACKING BAR.



NOTES:

(5) BUILD UP FILLET WELD TO MATCH EXISTING FILLET WELD. PRIOR TO CONSTRUCTION CONTRACTOR SHALL VERIFY THAT THERE IS ADEQUATE CLEARANCE BETWEEN THE PROPOSED WELD AND THE EXISTING FLANGE BOLTS. IF INTERFERENCE OCCURS AN ALTERNATIVE SLEEVE TERMINATION DETAIL MAY BE REQUIRED.



WELD DETAIL (OPTION 2)

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WO NUMBER: 1588046

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NEW HAVEN COUNTY, USA

DRAWN BY: JMB

CHECKED BY: PL

APPROVED BY: PLM

SCALE: N.T.S

STATE OF CONNECTICUT
PAUL L. MUCCI
LICENSED
PROFESSIONAL ENGINEER

2018.07.10
114.17842-04000

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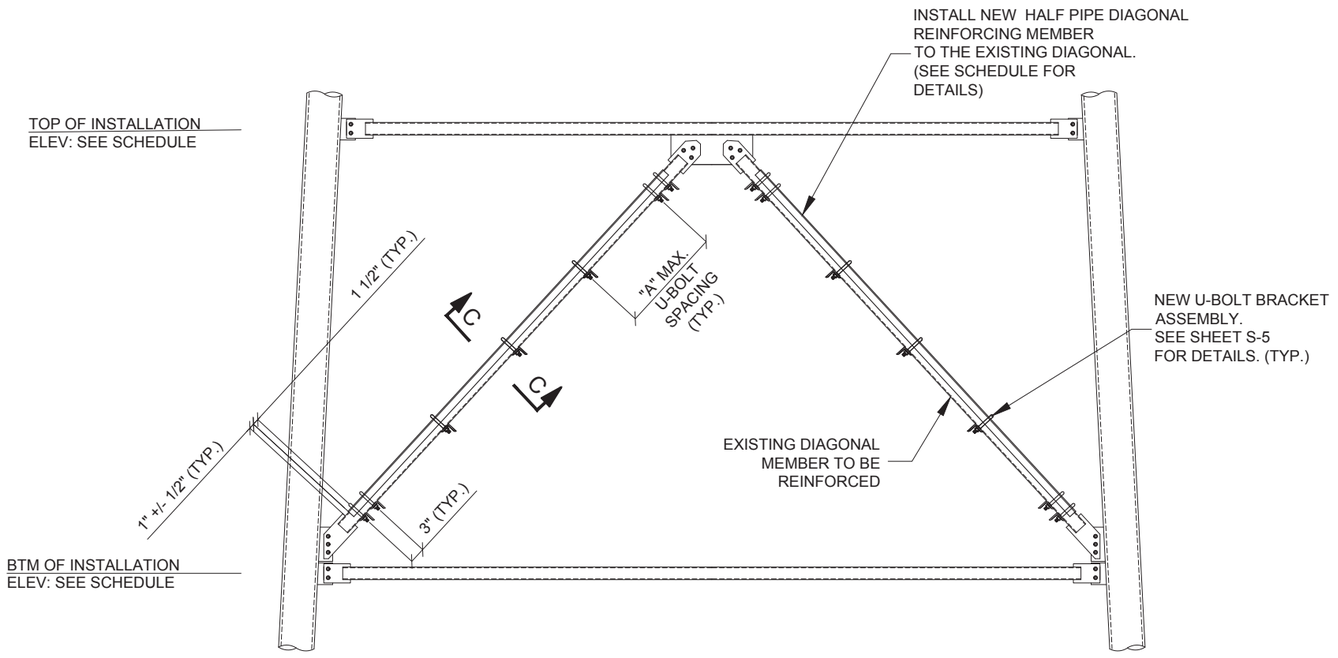
HALF-PIPE END CONNECTION WELD PROCEDURE DETAILS

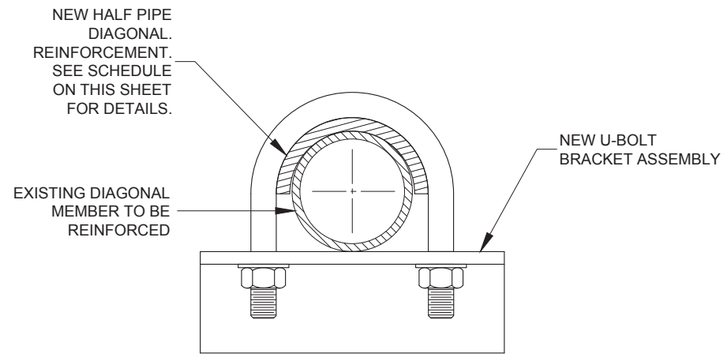
S-7

REV 0



HALF PIPE DIAGONAL REINFORCEMENT
ELEVATION VIEW

NOTES:
1. ALL HOLES TO BE SHOP FABRICATED, UNLESS NOTED OTHERWISE.
2. TOLERANCES, UNLESS NOTED OTHERWISE: FRACTIONS ± 1/16"
   ANGLES ± 1/2 DEGREE
   DECIMALS ± .010"
   HOLES ± 1/32"
3. ANGLES TO BE ASTM A572-50.
4. U-BOLTS SHALL MEET REQUIREMENTS OF ASME B18.31.5-2011 *BENT BOLTS*.
5. U-BOLTS TO BE ASTM A36/A307, SAE 429 GR 2. U-BOLTS TO BE TIGHTENED PER AISC "SNUG-TIGHT" REQUIREMENTS.
6. STANDARD 9/16"Ø HOLES IN PLACE OF SLOTTED HORIZONTAL HOLES ON THE ANGLE ARE PERMITTED. WHEN STANDARD HOLES ARE USED, FLAT WASHERS ARE NOT REQUIRED.
7. U-BOLT ASSEMBLY, COMPLETE WITH NUTS (ASTM A563), FLAT WASHERS (ASTM F436) AND LOCK WASHERS.
8. FULL ASSEMBLY TO BE HOT-DIP GALVANIZED PER ASTM A153 / A153M OR A123, AS APPLICABLE.
9. ALL HSS STEEL, ASTM DESIGNATION A500 GR. C (FY = 46 KSI).



SECTION "C-C"
TYPICAL DETAIL

HALF PIPE DIAGONAL REINFORCEMENT INSTALLATION SCHEDULE

ELEVATION	EXISTING DIAGONAL SIZE	NEW HALF PIPE DIAGONAL REINFORCEMENT	PRELIMINARY LENGTH	MAX. U-BOLT SPACING "A" (IN)	ESTIMATED QTY U-BOLT BRACKET ASSEMBLY
133.3' TO 126.7'	PIPE 2.375" OD X 0.154"	(6) HSS 2.875" O.D. X 0.250"	9'-0"	24	42
126.7' TO 120.0'	PIPE 2.375" OD X 0.154"	(6) HSS 2.875" O.D. X 0.250"	9'-3"	24	42
120.0' TO 110.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	12'-2"	24	54
110.0' TO 100.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	12'-6"	24	54
100.0' TO 90.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	12'-11"	24	54
90.0' TO 80.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	13'-4"	24	60
80.0' TO 70.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	13'-9"	24	60
70.0' TO 60.0'	PIPE 2.875" OD X 0.203"	(6) HSS 3.5" O.D. X 0.300"	14'-2"	24	60
60.0' TO 50.0'	PIPE 2.875" OD X 0.276"	(6) HSS 3.5" O.D. X 0.300"	14'-8"	24	60
50.0' TO 40.0'	PIPE 2.875" OD X 0.276"	(6) HSS 3.5" O.D. X 0.300"	15'-1"	24	60

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STATE OF CONNECTICUT
PAUL L. MARCHAND
24103
LICENSED
PROFESSIONAL ENGINEER
2018.07.10 14:18:00 -04:00

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DIAGONAL REINFORCEMENT DETAILS

S-8 | REV 0