Crown Castle
12 Gill Street, Suite 5800
Woburn, MA 01801

December 4, 2017

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

RE: **Notice of Exempt Modification for Sprint PCS / Crown Site BU: 806454**
T-Mobile Site ID: CT03XC039
Located at: 117 Washington Street, North Haven, CT 06473
Latitude: 41° 23' 46.93"/ Longitude: -72° 51' 27.67"

Dear Ms. Bachman,

Sprint PCS ("Sprint") currently maintains three (3) antennas at the 108-foot level of the existing 120-foot monopole tower located at 117 Washington Street, North Haven, CT. The tower is owned by Crown Castle. The property is owned by Commercial Investment Group LLC. Sprint now proposes to add three (3) new antennas, add three (3) remote radio units (non-antennas), and add one (1) cable. All work is to be completed within the existing area and the antennas would be installed at the same 108-foot level of the tower.

This facility was approved by the Connecticut Siting Council on January 16, 1990, Docket Number 117. This approval included the condition(s) that:

1. The self-supporting, monopole tower including antennas and associated equipment shall not exceed a height of 133 feet AGL.
2. The facility shall be constructed in accordance with the State of Connecticut Basic Building Code.
3. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site which shall include detailed plans of the site preparation with specifications for the tower foundation.

4. The Certificate Holder shall comply with any future radio frequency (RF) standard, promulgated by State or federal regulatory agencies. Upon the establishment of any new governmental RF standards, the facility granted in this Decision and Order shall be brought into compliance with such standards.
5. The Certificate Holder or its successor shall provide the Council a recalculated report of power density if and when additional channels over the proposed 90 channels, higher wattage over the proposed 100 watts per channel, or if other circumstances in operation cause a change in power density above the levels originally calculated in the application.
6. The Certificate Holder or its successor shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.
7. If the facility does not initially provide, or permanently ceases to provide cellular service following, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.
8. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the issuance of this Decision and Order, or within three years after the completion of any appeal to this Decision and order
9. The application shall provide a final report to the Council upon completion of construction, including the final construction cost and date of commercial operation.

This modification complies with the aforementioned condition(s).

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to First Selectman Michael J. Freda, the Zoning Enforcement Officer, the property owner and the tower owner..

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

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

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

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

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

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
781-970-0053
Jeff.Barbadora@Crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 4: Exhibit-3: General Power Density Table report (RF Emissions Analysis Report)

cc: First Selectman Michael J. Freda
18 Church Street
North Haven, CT 06473

Zoning Enforcement Officer, Laura Magaraci
18 Church Street
North Haven, CT 06473

Crown Castle (Tower Owner)
12 Gill Street, Suite 5800
Woburn, Ma 01801

COMMERCIAL INVESTMENT GROUP LLC
70 PO BOX 185598
C/O DIVERSIFIED UNLIMITED LLC
HAMDEN, CT 06518

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Resources for Developers (https://www.usps.com/webtools/welcome.htm)

LEGAL INFORMATION

Privacy Policy (http://about.usps.com/who-we-are/privacy-policy/privacy-policy-highlights.htm)

Terms of Use (http://about.usps.com/termsofuse.htm)

FOIA (http://about.usps.com/who-we-are/foia/welcome.htm)

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December 5,2017

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Signed for by:	T.ABRAHAM	**Delivery location:**	18 CHURCH STREET NORTH HAVEN, CT 06473
Service type:	FedEx Priority Overnight	**Delivery date:**	Dec 5, 2017 09:55
Special Handling:	Deliver Weekday		

Shipping Information:

Tracking number:	770898003017	**Ship date:**	Dec 4, 2017
		Weight:	0.5 lbs/0.2 kg

Recipient:
First Selectman Micael Freda
Town of North Haven
18 Church Street
NORTH HAVEN, CT 06473 US

Shipper:
Jeff Barbadora
Crown Castle
12 Gill St
Suite 5800
Woburn, MA 01801 US

Reference 1766.6680
Department number 902167

Thank you for choosing FedEx.

December 5,2017

Dear Customer:

The following is the proof-of-delivery for tracking number 770898039485.

Delivery Information:

Status:	Delivered	**Delivered to:**	Receptionist/Front Desk
Signed for by:	P.MILLER	**Delivery location:**	5 LINSLEY ST NORTH HAVEN, CT 06473
Service type:	FedEx Priority Overnight	**Delivery date:**	Dec 5, 2017 09:57
Special Handling:	Deliver Weekday		

Shipping Information:

Tracking number:	770898039485	**Ship date:**	Dec 4, 2017
		Weight:	1.0 lbs/0.5 kg

Recipient:
Laure Magaraci ZEO
Town of North Haven
18 Church Street
NORTH HAVEN, CT 06473 US

Shipper:
Jeff Barbadora
Crown Castle
12 Gill St
Suite 5800
Woburn, MA 01801 US

Reference 1766.6680
Department number 902167

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DOCKET NO. 117 - An application of Metro Mobile CTS of New Haven, Inc., for a Certificate of Environmental Compatibility and Public Need for the construction, operation, and maintenance of a cellular telephone tower and associated equipment in the Town of North Haven, Connecticut.	:	Connecticut Siting Council January 16, 1990

DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council finds that the effects associated with the construction, operation, and maintenance of cellular telephone facility at the alternate North Haven site, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not significant either alone or cumulatively with other effects, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application, and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by Section 16-50k of the General Statutes of Connecticut (CGS), be issued to Metro Mobile CTS of New Haven, Inc., for the construction, operation, and maintenance of a cellular telecommunications tower, associated equipment, and building at the alternate site in North Haven, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The self-supporting, monopole tower including antennas and associated equipment shall not exceed a height of 133 feet AGL.

2. The facility shall be constructed in accordance with the State of Connecticut Basic Building Code.

3. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site which shall include detailed plans of the site preparation with specifications for the tower foundation.

4. The Certificate Holder shall comply with any future radio frequency (RF) standard, promulgated by State or federal regulatory agencies. Upon the establishment of any new governmental RF standards, the facility granted

in this Decision and Order shall be brought into compliance with such standards.

5. The Certificate Holder or its successor shall provide the Council a recalculated report of power density if and when additional channels over the proposed 90 channels, higher wattage over the proposed 100 watts per channel, or if other circumstances in operation cause a change in power density above the levels originally calculated in the application.

6. The Certificate Holder or its successor shall permit public or private entities to share space on the North Haven tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

7. If this facility does not initially provide, or permanently ceases to provide cellular service following completion of construction, this Decision and Order shall be void, and the tower and all associated equipment in this application shall be dismantled and removed or reapplication of any new use shall be made to the Council before any such new use is made.

8. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the issuance of this Decision and Order, or within three years after the completion of any appeal to this Decision and Order.

9. The Applicant shall provide a final report to the Council upon completion of construction, including the final construction cost and date of commercial operation.

Pursuant to Section 16-50p we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below. A notice of issuance shall be published in the New Haven Register.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with section 16-50j-17 of the Regulations of State Agencies.

The parties or intervenors to this proceeding are:

Metro Mobile CTS of New Haven, Inc. (Applicant)
50 Rockland Road
South Norwalk, CT 06854
ATTN: Phillip Mayberry
General Manager

Robinson and Cole (Its Representative)
One Commercial Plaza
Hartford, CT 06103-3597
ATTN: Earl W. Phillips, Jr., Esq.

Luke and Angelina Camarota and (Party)
Surv Camarota
303 Washington Avenue
North Haven, CT 06473

SNET Cellular, Inc. (Intervenor)
227 Church Street
New Haven, CT 06506

Peter J. Tyrrell (its Representative)
SNET Cellular, Inc.
Room 1021
227 Church Street
New Haven, CT 06506

3999E
cp

CERTIFICATION

The undersigned members of the Connecticut Siting Council hereby certify that they have heard this case in Docket No. 117 or read the record thereof, and that we voted as follows:

Dated at New Britain, Connecticut the 16th day of January, 1990.

Council Members	Vote Cast
Gloria Dibble Pond Chairperson	YES
Commissioner Peter Boucher Designee: Robert A. Pulito	YES
Commissioner Leslie Carothers Designee: Brian Emerick	YES
Harry E. Covey	YES
Mortimer A. Gelston	YES
Daniel P. Lynch, Jr.	ABSENT
Paulann H. Sheets	ABSENT
William H. Smith	ABSENT
Colin C. Tait	ABSENT

117 WASHINGTON AVE

Location	117 WASHINGTON AVE	**Mblu**	073/ / 009/ /
Acct#	201742	**Owner**	COMMERCIAL INVESTMENT GROUP LLC
Assessment	$3,416,280	**Appraisal**	$4,880,400
PID	8732	**Building Count**	3

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$1,740,100	$3,140,300	$4,880,400
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$1,218,070	$2,198,210	$3,416,280

Owner of Record

Owner	COMMERCIAL INVESTMENT GROUP LLC	**Sale Price**	$6,139,443
Co-Owner		**Certificate**	
Address	785 SHERMAN AVE HAMDEN, CT 06514	**Book & Page**	952/ 916
		Sale Date	03/30/2017

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
COMMERCIAL INVESTMENT GROUP LLC	$6,139,443		952/ 916	03/30/2017
NORTH HAVEN SHOPPING CENTER LLC	$0		952/ 912	03/30/2017
NORTH HAVEN SHOPPING CENTER LLC	$0		918/ 751	03/18/2015
LUCIANI REALTY LIMITED PARTNERSHIP	$0		900/ 87	12/30/2013
LUCIANI REALTY LIMITED PARTNERSHIP	$0	1	431/ 862	05/28/1992

Building Information

Building 1 : Section 1

Year Built:	1952
Living Area:	13,800
Replacement Cost:	$872,105

Building Percent Good: 35

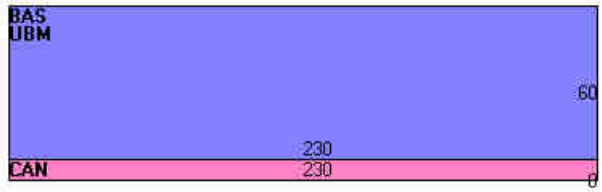
Replacement Cost Less Depreciation: $305,200

Building Attributes	
Field	**Description**
STYLE	Shopping Cntr
MODEL	Comm/Ind
Grade	C -
Stories:	1
Occupancy	12
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Asphalt
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Carpet
Interior Floor 2	Ceram Clay Til
Heating Fuel	Oil
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	SHOPPING CENTER M94
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	HEAT/AC PKGS
Frame Type	FIREPRF STEEL
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	12
% Comn Wall	

Building Photo

(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\01\98

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	13,800	13,800
CAN	Canopy	1,840	0
UBM	Basement, Unfinished	13,800	0
		29,440	13,800

Building 2 : Section 1

Year Built: 1962

Living Area: 41,446

Replacement Cost: $2,429,016

Building Percent Good: 40

Replacement Cost Less Depreciation: $971,600

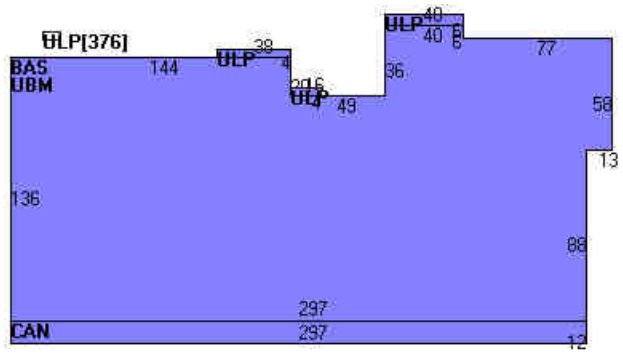
Building Attributes : Bldg 2 of 3

Field	Description
STYLE	Shopping Cntr
MODEL	Comm/Ind
Grade	C -
Stories:	1
Occupancy	6
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	T&G/Rubber
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Linoleum
Interior Floor 2	Carpet
Heating Fuel	Oil
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	SHOPPING CENTER M94
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	HEAT/AC PKGS
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	16
% Comn Wall	

Building Photo

(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\01\98

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	41,446	41,446
CAN	Canopy	3,564	0
UBM	Basement, Unfinished	41,446	0
ULP	Loading Platform, Unfinished	832	0
		87,288	41,446

Building 3 : Section 1

Year Built: 2014
Living Area: 5,100
Replacement Cost: $735,779
Building Percent Good: 75
Replacement Cost Less Depreciation: $551,800

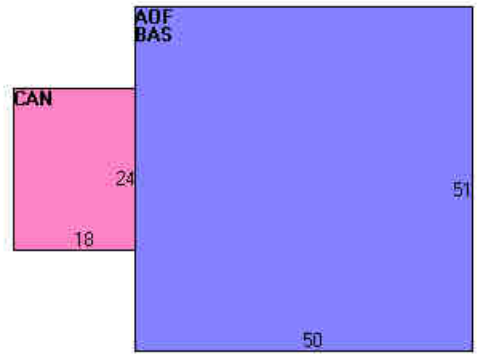
Building Attributes : Bldg 3 of 3	
Field	Description
STYLE	Branch Bank

Building Photo

Building Photo
(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\02\18

MODEL	Comm/Ind
Grade	C +
Stories:	2
Occupancy	1
Exterior Wall 1	Clapboard
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Asphalt
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Carpet
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	BANK BLDG
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	HEAT/AC PKGS
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	SUS-CEIL & WL
Rooms/Prtns	AVERAGE
Wall Height	8
% Comn Wall	

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
AOF	Office	2,550	2,550
BAS	First Floor	2,550	2,550
CAN	Canopy	432	0
		5,532	5,100

Extra Features

Extra Features				Legend
Code	**Description**	**Size**	**Value**	**Bldg #**
CLR1	COOLER	98 S.F.	$700	1
OVHD	OVER HEADDOOR	400 S.F.	$0	2
SPR1	SPRINKLERS-WET	29440 S.F.	$9,300	1
ATM1	ATM	1 UNITS	$6,200	2
SPR1	SPRINKLERS-WET	82892 S.F.	$29,800	2

Land

Land Use

Land Line Valuation

Use Code	3230	**Size (Acres)**	6.09
Description	SHOPPING CENTER M94	**Frontage**	
Zone	IL30	**Depth**	
Neighborhood	301	**Assessed Value**	$2,198,210
Alt Land Appr	No	**Appraised Value**	$3,140,300
Category			

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	PAVING-ASPHALT			128300 S.F.	$86,600	1
PAV1	PAVING-ASPHALT			128300 S.F.	$86,600	2
TWR1	COMMU-TOWER			1 UNITS	$125,000	2

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$2,080,000	$3,045,000	$5,125,000
2008	$2,096,400	$1,982,400	$4,078,800
2007		$1,364,160	$2,750,160

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$1,456,000	$2,131,500	$3,587,500
2008	$1,467,480	$1,387,680	$2,855,160
2007		$1,364,160	$2,750,160

Property Information

Property ID	73/9
Location	117 WASHINGTON AVE
Owner	COMMERCIAL INVESTMENT GROUP LLC

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of North Haven, CT makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated 10/1/2016
Properties updated 12/03/2017

Sprint

2.5 EQUIPMENT DEPLOYMENT

SITE NUMBER:

CT03XC039

SITE NAME:

NORTH HAVEN

SITE ADDRESS:

117 WASHINGTON ST.
NORTH HAVEN, CT 06473

CROWN ID#:	806454
CROWN SITE NAME:	NHV 112 948129

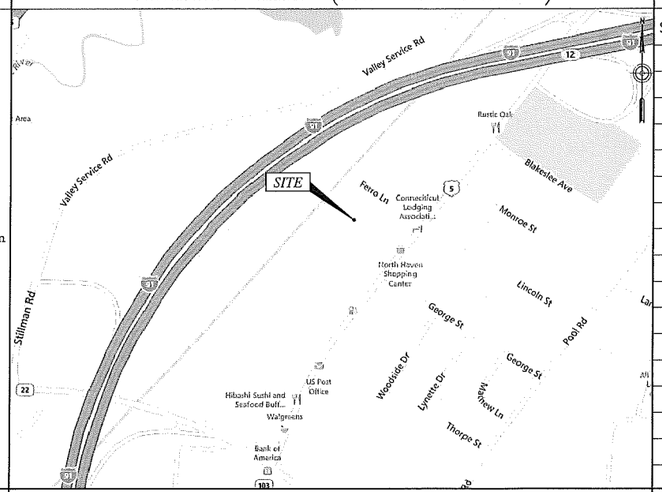
APPROVED
By Craig Koppang at 1:58 pm, Oct 18, 2017

SHEET INFORMATION

SITE NUMBER:	CT03XC039
SITE NAME:	NORTH HAVEN
SITE ADDRESS:	117 WASHINGTON ST. NORTH HAVEN, CT 06473
COUNTY:	NORTH HAVEN
COORDINATES: (NAD 83)	41° 23' 46.93"N 72° 51' 27.67"W
GROUND ELEV:	44'± AMSL
STRUCTURE TYPE:	MONOPOLE
STRUCTURE HEIGHT:	120'-0"± AGL
STRUCTURE RAD CENTER:	106'-0"± AGL
ZONING CLASSIFICATION:	IL30
PARCEL ID:	073//009//

LANDLORD:	CROWN CASTLE USA 2000 CORPORATE DRIVE CANONSBURG, PA
LOCAL POWER COMPANY:	CONNECTICUT LIGHT AND POWER CONTACT CUSTOMER SERVICE (800) 286-2000
APPLICANT:	SPRINT 6580 SPRINT PARKWAY OVERLAND PARK, KANSAS 66251
ENGINEER:	JAMES QUICKSELL (845) 567-6656 EXT. 2835 JQuicksell@tectonicengineering.com
SPRINT CM:	HEATHER CASTAGNARO (617)247-4305 heather.2.castagnaro@sprint.com
CROWN CM:	JEFF BARBADORA (781)970-0065 jeff.barbadora@sprint.com
AAV:	AT&T

VICINITY MAP (NOT TO SCALE)



SHEET INDEX

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SP-2	GENERAL NOTES
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GENERAL NOTES

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION: HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED. FACILITY HAS NO PLUMBING OR REFRIGERANTS. THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATOR REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
3. DEVELOPMENT AND USE OF THIS SITE WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - BUILDING CODE OF CONNECTICUT, LATEST EDITION.
   - ANSI/TIA/EIA-222-F-1996.
   - NATIONAL ELECTRICAL CODE, LATEST EDITION.

PROJECT DESCRIPTION

1. (1) NEW 2.5 EQUIPMENT RACK INSIDE EXIST MMBTS CABINET.
2. (3) NEW RFS APXVTM14-C-120 ANTENNAS.
3. (3) NEW TD-RRH8x20-25 RRH.
4. (1) NEW 1-1/4" HYBRID CABLE.

AERIAL VIEW (NOT TO SCALE)

APPROVALS

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

CONSTRUCTION: _____ DATE: _____

LEASING/
SITE ACQUISITION: _____ DATE: _____

LANDLORD/
PROPERTY OWNER: _____ DATE: _____

R.F. ENGINEER: _____ DATE: _____

CALL TOLL FREE FOR CONNECTICUT
1-800-922-4455 OR DIAL 811
CALL TWO FULL WORKING DAYS IN ADVANCE TO LOCATE BURIED UTILITY PIPES AND CABLES

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

TECTONIC · PLANNING · ENGINEERING · SURVEYING · CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703
www.tectonicengineering.com

SUBMITTALS

PROJECT NO: 8887.CT03XC039

NO	DATE	DESCRIPTION	BY
0	6/19/14	FOR COMMENT	DC
1	1/8/15	FOR CONSTRUCTION	RD
2	10/11/17	FOR CONSTRUCTION	TL

DATE	REVIEWED BY
10/11/17	TMB

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
TITLE SHEET

SHEET NO:
T-1

DIVISION 01000–GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE PROJECT OWNER'S REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. ONCE THE CONTRACTOR HAS RECEIVED AND ACCEPTED THE NOTICE TO PROCEED, CONTRACTOR WILL CONTACT THE CROWN CASTLE CONSTRUCTION MANAGER OF RECORD (NOTED ON THE FIRST PAGE ON THIS CONSTRUCTION DRAWING) A MINIMUM OF 48 HOURS PRIOR TO WORK START. UPON ARRIVAL TO THE JOB SITE, CONTRACTOR CREW IS REQUIRED TO CALL 1–800–788–7011 TO NOTIFY THE CROWN CASTLE NOC WORK HAS BEGUN.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
11. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
12. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
13. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE BASIC STATE BUILDING CODE, LATEST EDITION, AND ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK SHALL BE RELOCATED AS DIRECTED BY THE ARCHITECT/ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. THE CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT LIMITED TO A) FALL PROTECTION, B) CONFINED SPACE, C) ELECTRICAL SAFETY, D) TRENCHING AND EXCAVATION OF ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHICH INTERFERE WITH THE EXECUTION OF THE WORK SHALL BE REMOVED AND OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT THE POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK SUBJECT TO THE APPROVAL OF THE ARCHITECT/ENGINEER.
14. THE CONTRACTOR SHALL NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
15. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
16. THE CONTRACTOR SHALL NOTIFY THE THE RF ENGINEER FOR ANTENNA AZIMUTH VERIFICATION (DURING ANTENNA INSTALLATION) PRIOR TO CONDUCTING SWEEP TESTS.
17. THE CONTRACTOR SHALL SUBMIT AT THE END OF THE PROJECT A COMPLETE SET OF AS–BUILT DRAWINGS TO THE CLIENT REPRESENTATIVE.
18. REFER TO: CONSTRUCTION STANDARDS–SPRINT DOCUMENT EXHIBIT A–STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES REV. 4.0– 02.15.2011.DOCM.
19. REFER TO: WEATHER PROOFING SPECS: EXCERPT EXH A–WIHRPRF–STD CONSTR SPECS._157201110421855492.DOCM.
20. REFER TO: COLOR CODING–SPRINT NEXTEL ANT AND LINE COLOR CODING (DRAFT) V3 09–08–11.PDF
21. REFER TO LATEST DOCUMENTATION REVISION.

DIVISION 03000–CONCRETE

1.03 APPLICABLE STANDARDS (USE LATEST EDITIONS)

A. AC1–301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.
B. AC1–347 GUIDE TO FORM WORK FOR CONCRETE.
C. ASTM C33– CONCRETE AGGREGATE
D. ASTM C94 – READY MIXED CONCRETE e. ASTM C150 – PORTLAND CEMENT.
E. ASTM C260 – AIR–ENTRAINING ADMIXTURES FOR CONCRETE
F. ASTM C309– LIQUID MEMBRANE FORMING COMPOUNDS FOR CURING CONCRETE.
H. ASTM C494 – CHEMICAL ADMIXTURES FOR CONCRETE
I. ASTM A615– DEFORMED AND PLAIN BILLET–STEEL BARS FOR CONCRETE REINFORCEMENT
J. ASTM A185– STEEL WELDED WIRE FABRIC (PLAIN) FOR CONCRETE REINFORCEMENT

1.04 QUALITY ASSURANCE

CONCRETE MATERIALS AND OPERATIONS SHALL BE TESTED AND INSPECTED BY THE ARCHITECT/ENGINEER AS DIRECTED BY THE CLIENT'S REPRESENTATIVE.

3.04 SURFACE FINISHES

A. SURFACES AGAINST WHICH BACKFILL OR CONCRETE SHALL BE PLACED REQUIRE NO TREATMENT EXCEPT REPAIR OF DEFECTIVE AREAS.

B. SURFACES THAT WILL BE PERMANENTLY EXPOSED SHALL PRESENT A UNIFORM FINISH PROVIDED BY THE REMOVAL OF FINS AND THE FILLING HOLES AND OTHER IRREGULARITIES WITH DRY PACK GROUT, OR BY SACKING WITH UTILITY OR ORDINARY GROUT.

C. SURFACES THAT WOULD NORMALLY BE LEVEL AND WHICH WILL BE PERMANENTLY EXPOSED TO THE WEATHER SHALL BE SLOPED FOR DRAINAGE. UNLESS ENGINEER'S DESIGN DRAWING SPECIFIES A HORIZONTAL SURFACE OR SURFACES SUCH AS STAIR TREADS, WALLS, CURBS, AND PARAPETS SHALL BE SLOPED APPROXIMATELY 1/4" PER FOOT.

D. SURFACES THAT WILL BE COVERED BY BACKFILL OR CONCRETE SHALL BE SMOOTH SCREENED.

E. EXPOSED SLAB SURFACES SHALL BE CONSOLIDATED, SCREENED, FLOATED, AND STEEL TROWELED. HAND OR POWER–DRIVEN EQUIPMENT MAY BE USED FOR FLOATING. FLOATING SHALL BE STARTED AS SOON AS THE SCREENED SURFACE HAS ATTAINED A STIFFNESS TO PERMIT FINISHING OPERATIONS. OPERATIONS. ALL EDGES MUST HAVE A 3/4" CHAMFER.

1.04 QUALITY ASSURANCE CONCRETE MATERIALS AND OPERATIONS SHALL BE TESTED AND INSPECTED BY THE ENGINEER.

3.05 PATCHING

THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON REMOVAL OF THE FORMS TO OBSERVE CONCRETE SURFACE CONDITIONS. IMPERFECTIONS SHALL BE PATCHED ACCORDING TO THE ENGINEER'S DIRECTION.

3.06 DEFECTIVE CONCRETE

THE CONTRACTOR SHALL NOTIFY OR REPLACE CONCRETE NOT CONFORMING TO REQUIRED LEVELS AND LINES, DETAILS, AND ELEVATIONS AS SPECIFIED IN ACI 301.

3.07 PROTECTION

A. IMMEDIATELY AFTER PLACEMENT. THE CONTRACTOR SHALL PROTECT THE CONCRETE FROM PREMATURE DRYING, EXCESSIVELY HOT OR COLD TEMPERATURES, AND MECHANICAL INJURY. FINISHED WORK SHALL BE PROTECTED.

B. CONCRETE SHALL BE MAINTAINED WITH MINIMAL MOISTURE LOSS AT RELATIVELY CONSTANT TEMPERATURE FOR PERIOD NECESSARY FOR HYDRATION OF CEMENT AND HARDENING OF CONCRETE.

C. ALL CONCRETE SHALL BE WATER CURED PER ACCEPTABLE PRACTICES SPECIFIED BY ACI CODE (LATEST EDITION)

DIVISION 05000 – METALS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. THE WORK CONSISTS OF THE FABRICATION AND INSTALLATION OF ALL MATERIALS TO BE FURNISHED. AND WITHOUT LIMITING THE GENERALITY THEREOF, INCLUDING ALL EQUIPMENT, LABOR AND SERVICES REQUIRED FOR ALL STRUCTURAL STEEL WORK AND ALL ITEMS INCIDENTAL AS SPECIFIED AND AS SHOWN ON THE DRAWINGS:

1. STEEL FRAMING INCLUDING BEAMS, ANGLES, CHANNELS AND PLATES.
2. WELDING AND BOLTING OF ATTACHMENTS.

1.02 REFERENCE STANDARDS

A. THE WORK SHALL CONFORM TO THE CODES AND STANDARDS OF THE FOLLOWING AGENCIES AS FURTHER CITED HEREIN:

1. ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS AS PUBLISHED IN "COMPILATION OF ASTM STANDARDS IN BUILDING CODES" OR LATEST EDITION.
2. AWS: AMERICAN WELDING SOCIETY CODE OR LATEST EDITION.
3. AISC: AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" (LATEST EDITION).

PART 2 – PRODUCTS

2.01 MATERIALS

A. STRUCTURAL STEEL: SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A36 AND A992 FOR STRUCTURAL STEEL.

ALL PROPOSED STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH AISC CODE AND ASTM SPECIFICATIONS (LATEST EDITION) ALL NEW STEEL SHALL CONFORM TO THE FOLLOWING.

1. STRUCTURAL WIDE FLANGE: ASTM A992 Fy=50KSI.
2. MISCELLANEOUS STEEL (PLATES), CHANNELS, ANGLES, ETC): ASTM A36 (Fy=36KSI).
3. STRUCTURAL TUBING: ASTM A500 Gr. B (Fy=46KSI).
4. STEEL PIPE: ASTM A53 Gr B (Fy=35KSI).

2.02 WELDING

A. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS. CERTIFICATION DOCUMENTS SHALL BE MADE AVAILABLE FOR ENGINEER'S AND/OR OWNER'S REVIEW IF REQUESTED.

B. WELDING ELECTRODES FOR MANUAL SHIELDED METAL ARC WELDING SHALL CONFORM TO ASTM 1–233, E70 SERIES. BARE ELECTRODES AND GRANULAR FLUX USED IN THE SUBMERGED ARC PROCESS SHALL CONFORM TO AISC SPECIFICATIONS.

C. FIELD WELDING SHALL BE DONE AS PER AWS D1.1 REQUIREMENTS VISUAL INSPECTION IS ACCEPTABLE.

D. STUD WELDING SHALL BE ACCOMPLISHED BY CAPACITOR DISCHARGE (CD) WELDING TECHNIQUE USING CAPACITOR DISCHARGE STUD WELDER.

E. PROVIDE STUD FASTENERS OF MATERIALS AND SIZES SHOWN ON DRAWINGS OR AS RECOMMENDED BY THE MANUFACTURER FOR STRUCTURAL LOADINGS REQUIRED.

F. FOLLOW MANUFACTURERS SPECIFICATIONS AND INSTRUCTIONS TO PROPERLY SELECT AND INSTALL STUD WELDS.

2.03 BOLTING

A. BOLTS SHALL BE CONFORMING TO ASTM A35 HIGH STRENGTH HOT DIP GALVANIZED WITH ASTM A153 HEAVY HEX TYPE NUTS.

B. BOLTS SHALL BE 3/4" (MINIMUM) CONFORMING TO ASTM A325, HOT DIP GALVANIZED, ASTM A153 NUTS SHALL BE HEAVY HEX TYPE.

C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.

D. EXCEPT WHERE SHOWN, ALL BEAM TO BEAM AND BEAM TO COLUMN CONNECTIONS TO BE DOUBLE ANGLED CONNECTIONS WITH HIGH STRENGTH BOLTS (THREADS EXCLUDED FROM SHEAR PLANE) AND HARDENED WASHERS.

E. STANDARD, OVERSIZED OR HORIZONTAL SHORT SLOTTED HOLES.

F. SNUG–TIGHT STRENGTH BEARING BOLTS MAY BE USED IN STANDARD HOLES CONFORMING TO ACIS, USING THE TURN OF THE NUT METHOD.

H. FULLY–TENSIONED HIGH STRENGTH (SLIP CRITICAL) SHALL BE USED IN OVERSIZED SLOT HOLES (RESPECTIVE OF SLOT ORIENTATION).

I. ALL BRACED CONNECTION, MOMENT CONNECTION AND CONNECTIONS NOTED AS "SLIP CRITICAL" SHALL BE BE SLIP CRITICAL JOINTS WITH CLASS A SURFACE CONDITIONS, UNLESS OTHERWISE NOTED.

J. EPOXY ANCHOR ASSEMBLIES SHALL BE AS MANUFACTURED BY HILTI OR ENGINEER APPROVED EQUAL, AS FOLLOWS:

BASE MATERIAL	ANCHOR SYSTEM
CONCRETE	HILTI HIT–HY 200
HOLLOW & GROUTED CMU OR BRICK	HILTI HIT–HY 70

2.04 FABRICATION

A. FABRICATION OF STEEL SHALL CONFORM TO THE AISC AND AWS

2.05 FINISH

A. STRUCTURAL STEEL EXPOSED TO WEATHER SHALL BE HOT–DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. (LATEST EDITION) UNLESS OTHERWISE NOTED.

2.06 PROTECTION

A. UPON COMPLETION OF ERECTION, INSPECT ALL GALVANIZED STEEL AND PAINT ANY FIELD CUTS, WELDS OR GALVANIZED BREAKS WITH (2) COATS OF ZINC–RICH COLD GALVANIZING PAINT.

PART 3 – ERECTION

A. PROVIDE ALL ERECTION, EQUIPMENT, BRACING, PLANKING, FIELD BOLTS, NUTS, WASHERS, DRIFT PINS, AND SIMILAR MATERIALS WHICH DO NOT FORM A PART OF THE COMPLETED CONSTRUCTION, BUT ARE NECESSARY FOR ITS PROPER ERECTION.

B. ERECT AND ANCHOR ALL STRUCTURAL STEEL IN ACCORDANCE WITH AISC REFERENCE STANDARDS. ALL WORK SHALL BE ACCURATELY SET TO ESTABLISHED SUITABLE ATTACHMENTS TO THE CONSTRUCTION OF THE BUILDING

C. TEMPORARY BRACING, GUYING, AND SUPPORT SHALL BE PROVIDED TO KEEP THE STRUCTURE SET AND ALIGNED AT ALL TIMES DURING CONSTRUCTION, AND TO PREVENT DANGER TO PERSONS AND PROPERTY. CHECK ALL TEMPORARY LOADS AND STAY WITHIN SAFE CAPACITY OF ALL BUILDING COMPONENTS.

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

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SUBMITTALS

PROJECT NO: 8887.CT03XC039

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10/11/17	

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
GENERAL NOTES

SHEET NO:
SP–1

DIVISION 13000–SPECIAL CONSTRUCTION ANTENNA INSTALLATION

PART 1 – GENERAL

1.01 WORK INCLUDED

A. ANTENNAS AND HYBRIFLEX CABLES ARE FURNISHED BY CLIENT'S REPRESENTATIVE UNDER SEPARATE CONTRACT. THE CONTRACTOR SHALL ASSIST ANTENNA INSTALLATION CONTRACTOR IN TERMS OF COORDINATION AND SITE ACCESS. ERECTION SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPERTY.

B. INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND CLIENT'S REPRESENTATIVE SPECIFICATIONS.

C. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.

D. INSTALL FURNISHED GALVANIZED STEEL OR ALUMINUM WAVEGUIDE AND PROVIDE PRINTOUT OF THAT RESULT

F. INSTALL HYBRIFLEX CABLES AND TERMINATIONS BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS.

G. ANTENNA AND HYBRIFLEX CABLE GROUNDING:

1. ALL EXTERIOR #6 GREEN GROUND WIRE DAISY CHAIN CONNECTIONS ARE TO BE WEATHER SEALED WITH ANDREWS CONNECTOR/SPLICE WEATHERPROOFING KIT TYPE 3221213 OR EQUIVALENT.

2. ALL HYBRIFLEX CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF HYBRIFLEX CABLE (NOT WITHIN BENDS). 1.02 RELATED WORK FURNISH THE FOLLOWING WORK AS SPECIFIED UNDER CONSTRUCTION DOCUMENTS, BUT COORDINATE WITH QOTHER TRADES PRIOR TO BID:

   1. FLASHING OF OPENING INTO OUTSIDE WALLS.
   2. SEALING AND CAULKING ALL OPENINGS.
   3. PAINTING.
   4. CUTTING AND PATCHING.

1.03 REQUIREMENTS OF REGULATOR AGENCIES

A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE. INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.

B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS WORK INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

1. EIA – ELECTRONIC INDUSTRIES ASSOCIATION RS–22. STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.

2. FAA – FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR AC 70/7480–IH, CONSTRUCTION MARKING AND LIGHTING.

3. FCC – FEDERAL COMMUNICATION COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATION FOR ANTENNA STRUCTURES

4. AISC – AMERICAN INSTITUTE OF STEEL CONSTRUCTION FOR STRUCTURAL JOINTS USING ASTM 1325 OR A490 BOLTS.

5. NEC – NATIONAL ELECTRIC CODE – ON TOWER LIGHTING KITS.

6. UL – UNDERWRITER'S LABORATORIES APPROVED ELECTRICAL PRODUCTS.

7. IN ALL CASES, PART 77 OF THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.

8. LIFE SAFETY CODE NFPA, LATEST EDITION.

DIVISION 13000–EARTHWORK

PART 1 GENERAL

1.01 WORK INCLUDED: REFER TO SURVEY AND SITE PLAN FOR WORK INCLUDED.

1.02 RELATED WORK

A. CONSTRUCTION OF EQUIPMENT FOUNDATIONS
B. INSTALLATION OF ANTENNA SYSTEM

PART 2 PRODUCTS

2.01 MATERIALS

A. ROAD AND SITE MATERIALS; FILL MATERIAL SHALL BE ACCEPTABLE, SELECT FILL SHALL BE IN ACCORDANCE WITH LOCAL DEPARTMENT OF HIGHWAY AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS.

B. SOIL STERILIZER SHALL BE EPA REGISTERED OF LIQUID COMPOSITION AND OF PRE–EMERGENCE DESIGN.

C. SOIL STABILIZER FABRIC SHALL BE MIRAFI OR EQUAL – 600X AT ACCESS ROAD AND COMPOUND.

D. GRAVEL FILL; WELL GRADED, HARD, DURABLE, NATURAL SAND AND GRAVEL, FREE FROM ICE AND SNOW, ROOTS, SOD RUBBISH, AND OTHER DELETERIOUS OR ORGANIC MATTER.

MATERIAL SHALL CONFORM TO THE FOLLOWING GRADATION REQUIREMENTS.

GRAVEL FILL TO BE PLACED IN LIFTS OF 9" MAXIMUM THICKNESS AND 90 % DENSITY. COMPACTED TO 95

E. NO FILL OR EMBANKMENT MATERIALS SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OF EMBANKMENT

2.02 EQUIPMENT

A. COMPACTION SHALL BE ACCOMPLISHED BY MECHANICAL MEANS. LARGER AREAS SHALL BE COMPACTED BY SHEEPS FOOT, VIBRATORY OR RUBBER TIED ROLLERS WEIGHING AT LEAST FIVE TONS. SMALLER AREAS SHALL BE COMPACTED BY POWER–DRIVER, HAND HELD TAMPERS.

B. PRIOR TO OTHER EXCAVATION AND CONSTRUCTION EFFORTS GRUB ORGANIC MATERIAL TO A MINIMUM OF 6" BELOW ORIGINAL GROUND LEVEL.

C. UNLESS OTHERWISE INSTRUCTED BY CLIENT'S REPRESENTATIVE. REMOVE TREES, BRUSH AND DEBRIS FROM THE PROPERTY TO AN AUTHORIZED DISPOSAL LOCATION.

D. PRIOR TO PLACEMENT OF FILL OR BASE MATERIALS, ROLL THE SOIL.

E. WHERE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED, LINE THE GRUBBED AREAS WITH STABILIZER MAT PRIOR TO PLACEMENT OF FILL OR BASE MATERIAL.

3.03 INSTALLATION

A. THE SITE AND TURNAROUND AREAS SHALL BE AT THE SUB–BASE COURSE ELEVATION PRIOR TO FORMING FOUNDATIONS. GRADE OR FILL THE SITE AND ACCESS ROAD AS REQUIRED TO PRODUCE EVEN DISTRIBUTION OF SPOILS RESULTING FROM FOUNDATION EXCAVATIONS. THE RESULTING GRADE SHALL CORRESPOND WITH SAID SUB–BASE COURSE, ELEVATIONS ARE TO BE CALCULATED FORM FINISHED GRADES OR SLOPES INDICATED.

B. THE ACCESS ROAD SHALL BE BROUGHT TO BASE COURSE ELEVATION PRIOR TO FOUNDATION CONSTRUCTION.

C. DO NOT CREATE DEPRESSIONS WHERE WATER MAY POND.

D. THE CONTRACT INCLUDES ALL NECESSARY GRADING, BANKING, DITCHING AND COMPLETE SURFACE COURSE FOR ACCESS ROAD. ALL ROADS OR ROUTES UTILIZED FOR ACCESS TO PUBLIC THOROUGHFARE IS INCLUDED IN SCOPE OF WORK UNLESS OTHERWISE INDICATED.

E. WHEN IMPROVING AN EXISTING ACCESS ROAD, GRADE THE EXISTING ROAD TO REMOVE ANY ORGANIC MATTER AND SMOOTH THE SURFACE BEFORE PLACING FILL OR STONE.

F. PLACE FILL OR STONE IN 3" MAXIMUM LIFTS AND COMPACT BEFORE PLACING NEXT LIFT.

G. THE FINISH GRADE, INCLUDING TOP SURFACE COURSE, SHALL EXTEND A MINIMUM OF 12" BEYOND THE SITE FENCE AND SHALL COVER THE AREA AS INDICATED.

H. RIPRAP SHALL BE APPLIED TO THE SIDE SLOPES OF ALL FENCED AREAS, PARKING AREAS AND TO ALL OTHER SLOPES GREATER THAN 2:1.

I. RIPRAP SHALL BE APPLIED TO THE SIDES OF DITCHES OR DRAINAGE SWALES AS INDICATED ON PLANS.

J. RIPRAP ENTIRE DITCH FOR 6'–0" IN ALL DIRECTIONS AT CULVERT OPENINGS.

K. SEED, FERTILIZER AND STRAW COVER SHALL BE APPLIED TO ALL OTHER DISTURBED AREAS AND DITCHES, DRAINAGE, SWALES, NOT OTHERWISE RIP–RAPPED.

L. UNDER NO CIRCUMSTANCES SHALL DITCHES, SWALES OR CULVERTS BE PLACED SO THEY DIRECT WATER TOWARDS, OR PERMIT STANDING WATER IMMEDIATELY ADJACENT TO SITE. IF OWNER DESIGNS OR IF DESIGN ELEVATIONS CONFLICT WITH THIS GUIDANCE ADVISE THE OWNER IMMEDIATELY.

M. IF A DITCH LIES WITH SLOPE GREATER THAN TEN PERCENT, MOUND DIVERSIONARY HEADWALL IN THE DITCH AT CULVERT ENTRANCES. RIP–RAP THE UPSTREAM SIDE OF THE HEADWALL AS WELL AS THE DITCH FOR 6'–0" ABOVE THE CULVERT.

N. IF A DITCH LIES WITH SLOPES GREATER THAN TEN PERCENT, MOUND DIVERSIONARY HEADWALLS IN THE DITCH FOR 6'–0" ABOVE THE CULVERT ENTRANCE.

O. SEED AND FERTILIZER SHALL BE APPLIED TO SURFACE CONDITIONS WHICH WILL ENCOURAGE ROOTING. RAKE AREAS TO BE SEEDED TO EVEN THE SURFACE AND TO LOOSEN THE SOIL.

P. SOW SEED IN TWO DIRECTIONS IN TWICE THE QUANTITY RECOMMENDED BY THE SEED PRODUCER.

Q. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE GROWTH OF SEEDED AND LANDSCAPED AREAS BY WATERING UP TO THE POINT OF RELEASE FROM THE CONTRACT. CONTINUE TO REWORK BARE AREAS UNTIL COMPLETE COVERAGE IS OBTAINED.

3.04 FIELD QUALITY CONTROL

A. COMPACTION SHALL BE D–1557 FOR SITE WORK AND 95 % MAXIMUM DENSITY UNDER SLAB AREAS. AREAS OF SETTLEMENT WILL BE EXCAVATED AND REFILLED AT CONTRACTOR'S EXPENSE. REQUIRED. USE OF EROSION CONTROL MESH OR MULCH NET SHALL BE AN ACCEPTABLE ALTERNATIVE.

B. THE COMPACTION TEST RESULTS SHALL BE AVAILABLE PRIOR TO THE CONCRETE POUR.

3.05 PROTECTION

A. PROTECT SEEDED AREAS FORM EROSION BY SPREADING STRAW TO A UNIFORM LOOSE DEPTH OF 1"–2". STAKE AND TIE DOWN AS REQUIRED. USE OF EROSION CONTROL MESH OR MULCH NET SHALL BE AN ACCEPTABLE ALTERNATIVE.

B. ALL TREES PLACED IN CONJUNCTION WITH A LANDSCAPE CONTRACT SHALL BE WRAPPED, TIED WITH HOSE PROTECTED WIRE AND SECURED TO STAKES EXTENDING 2'–0" INTO THE GROUND ON FOUR SIDES OF THE TREE.

C. ALL EXPOSED AREAS SHALL BE PROTECTED AGAINST WASHOUTS AND SOIL EROSION. STRAW BALES SHALL BE PLACED AT THE INLET APPROACH TO ALL NEW OR EXISTING CULVERTS. REFER TO DETAILS ON DRAWINGS

SYMBOLS	ABBREVIATIONS
— — — G — — — G —	GROUND WIRE
— — — E — — — E —	ELECTRIC
— — — T — — — T —	TELEPHONE
OHW OHW OHW OHW OHW	OVERHEAD WIRE
	PROPERTY LINE
—X——X——X——	CHAIN LINK FENCE
A–1	ANTENNA MARK
(E)	EXISTING
(P)	PROPOSED DETAIL
DET # / SHT #	REFERENCE
	SURFACE ELEVATION

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SUBMITTALS

PROJECT NO: 8887.CT03XC039

NO	DATE	DESCRIPTION	BY
0	6/19/14	FOR COMMENT	DC
1	1/8/15	FOR CONSTRUCTION	RD
2	10/11/17	FOR CONSTRUCTION	TL

DATE	REVIEWED BY
10/17/17	

STATE OF CONNECTICUT · ANTONIO A. GUALTIERI · No. 25406 · LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
GENERAL NOTES

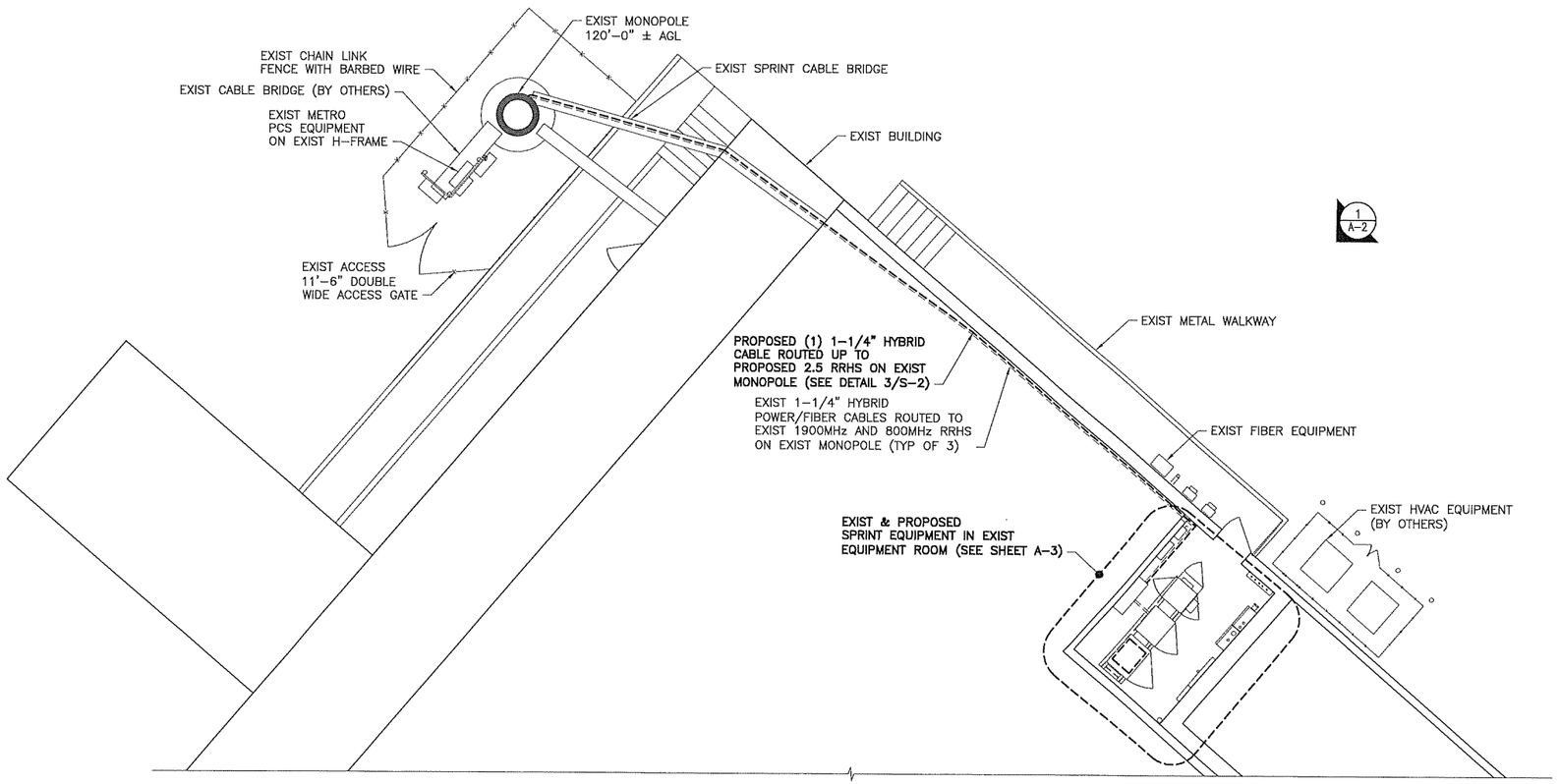
SHEET NO:
SP–2

NORTH NOTE:

NORTH SHOWN HAS BEEN ESTABLISHED USING THE USGS QUADRANGLE 7.5 MINUTE MAPS AND IS APPROXIMATE. VERIFY TRUE NORTH PRIOR TO INSTALLATION OF ANTENNAS.

N

APPROX.



1 / A-1 SITE PLAN

SCALE: 3/16" = 1'-0"

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STATE OF CONNECTICUT
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NORTH HAVEN

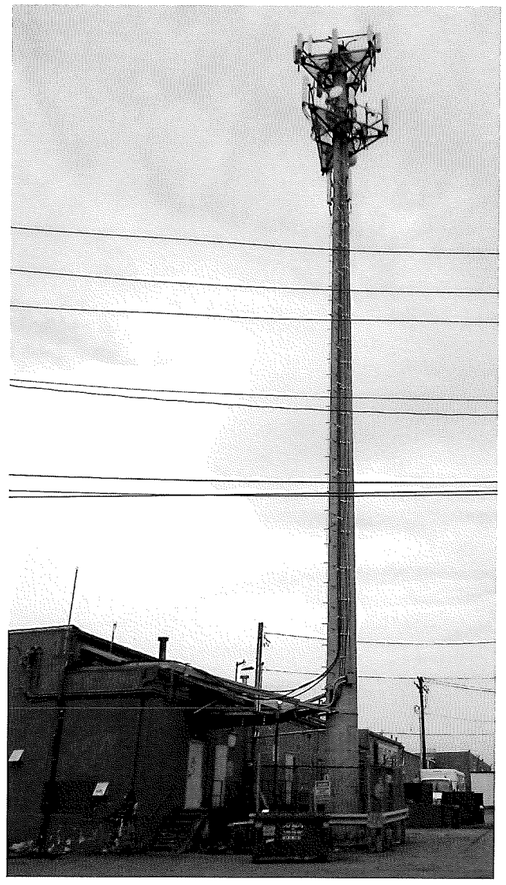
SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

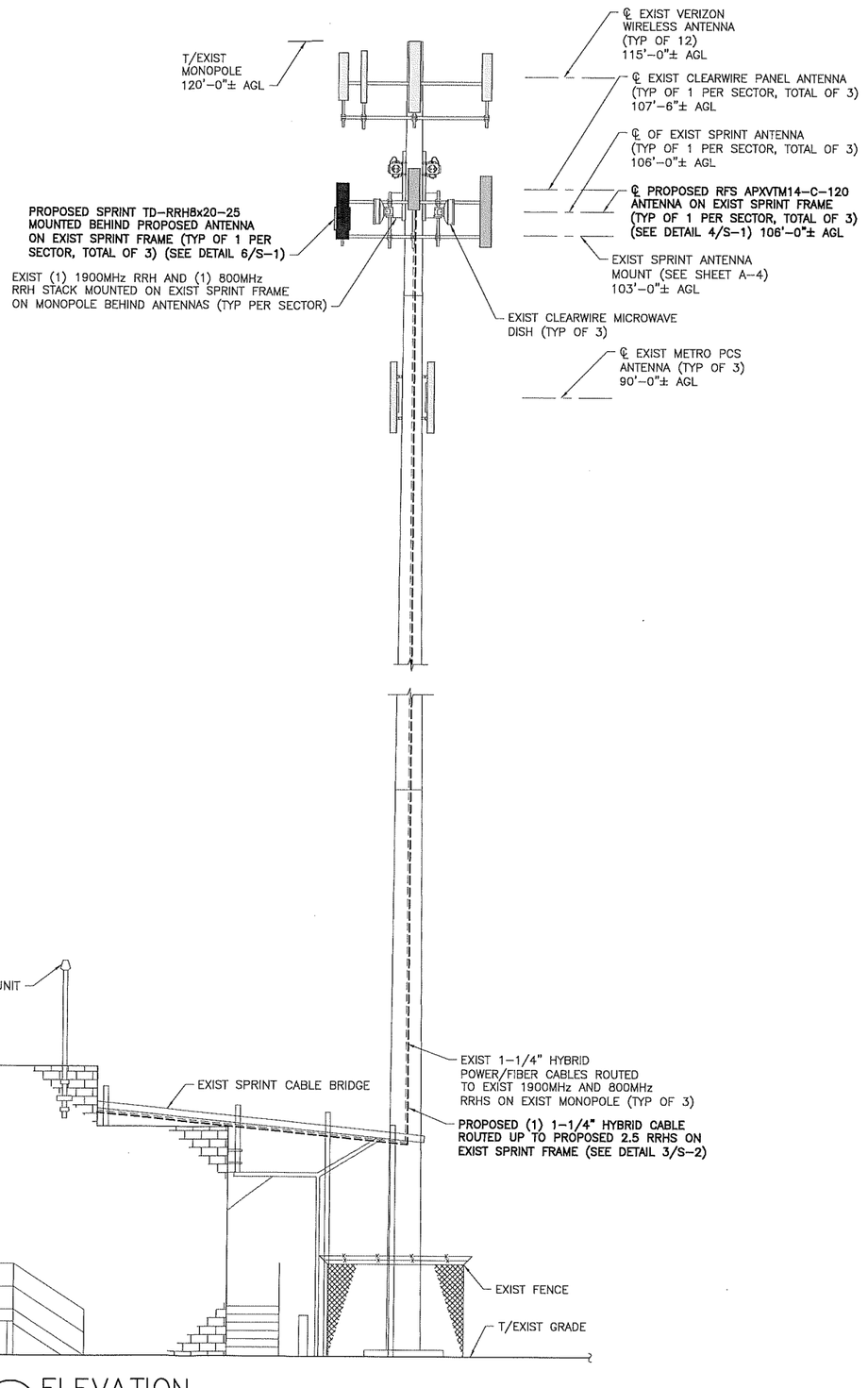
SHEET TITLE:
SITE PLAN

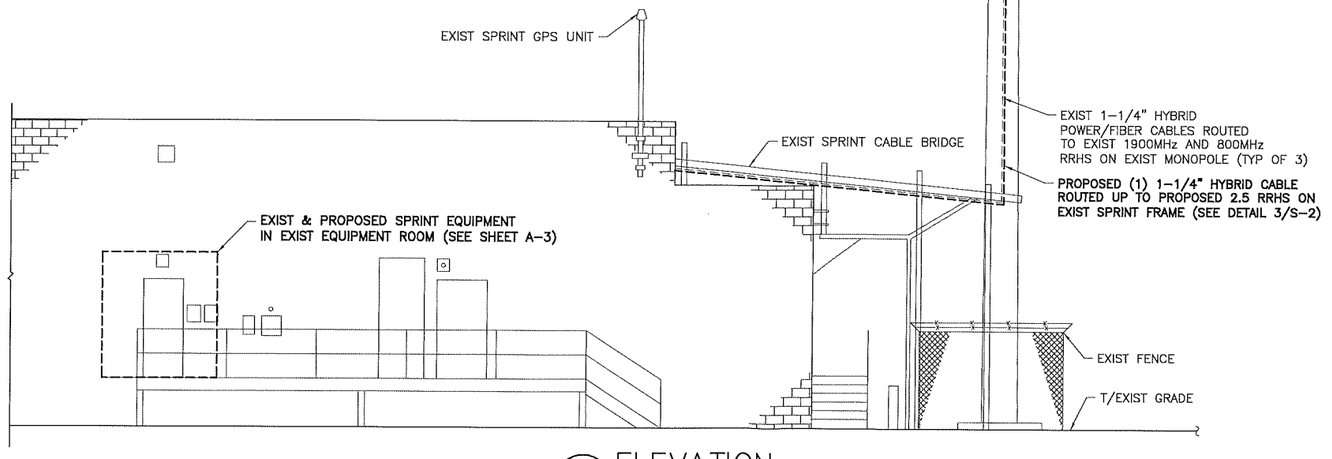
SHEET NO:
A-1

THE EXISTING SELF SUPPORT TOWER SHALL BE ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT (TO BE COORDINATED BY OTHERS).

THE EXISTING MOUNT HAS BEEN ANALYZED BY TECTONIC ENGINEERING AND FOUND TO BE ADEQUATE TO SUPPORT THE PROPOSED SPRINT UPGRADE ONCE THE PROPOSED MODIFICATIONS HAVE BEEN COMPLETED AS DETAILED IN THE STRUCTURAL ANALYSIS EVALUATION LETTER DATED 10/11/17.







1/A-2 ELEVATION

SCALE: 3/16" = 1'-0"

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10/11/17	TJM

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
ELEVATION

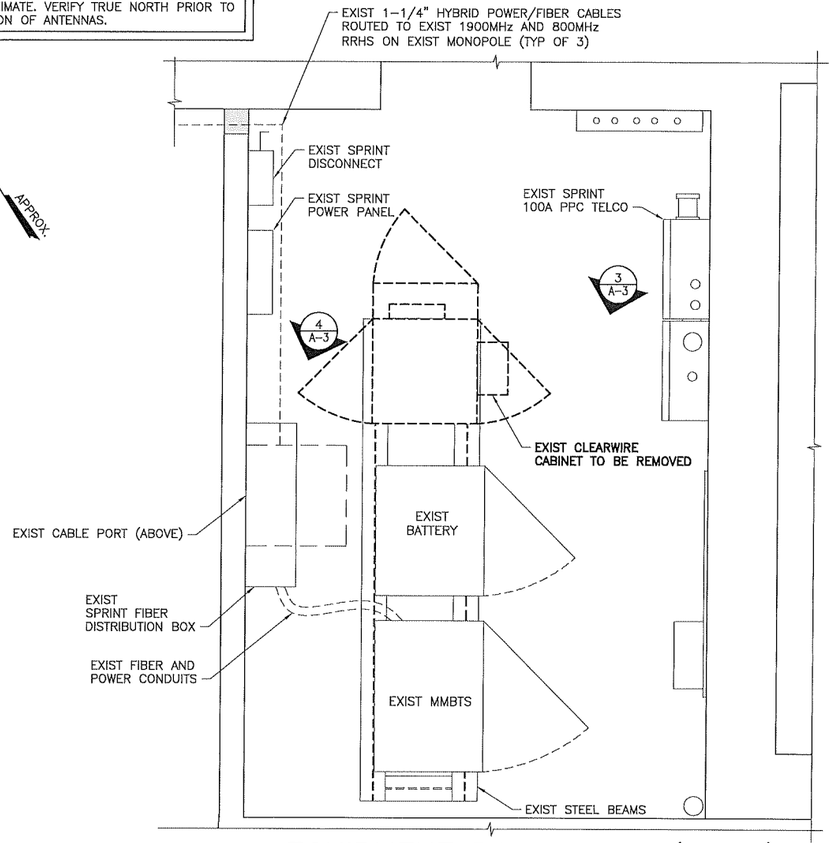
SHEET NO:
A-2

NORTH NOTE:

NORTH SHOWN HAS BEEN ESTABLISHED USING THE USGS QUADRANGLE 7.5 MINUTE MAPS AND IS APPROXIMATE. VERIFY TRUE NORTH PRIOR TO INSTALLATION OF ANTENNAS.

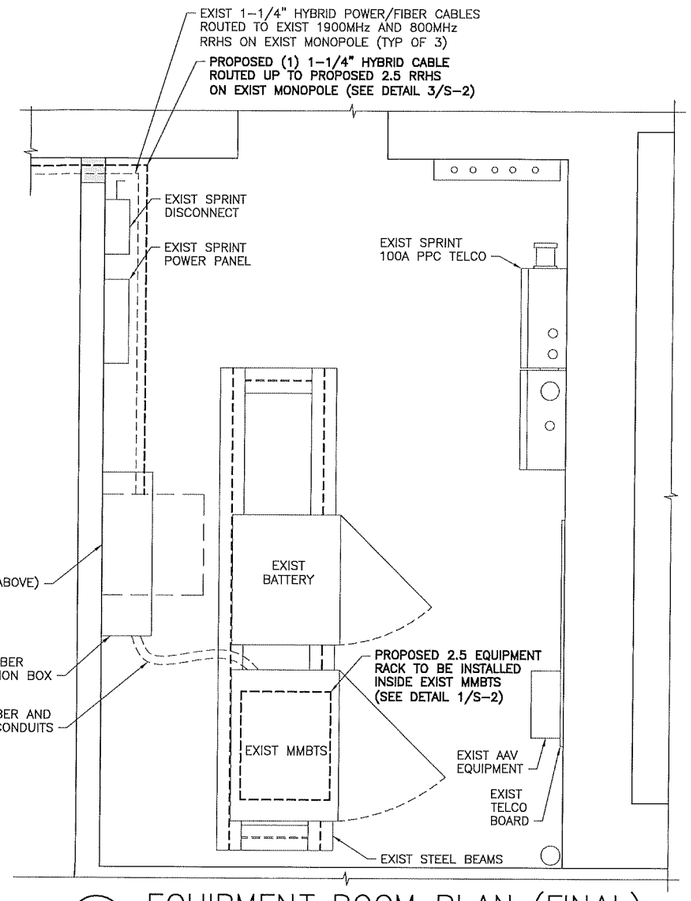
N

APPROX.



1 A-3 EQUIPMENT ROOM PLAN (EXIST)

SCALE: 1/2" = 1'-0"

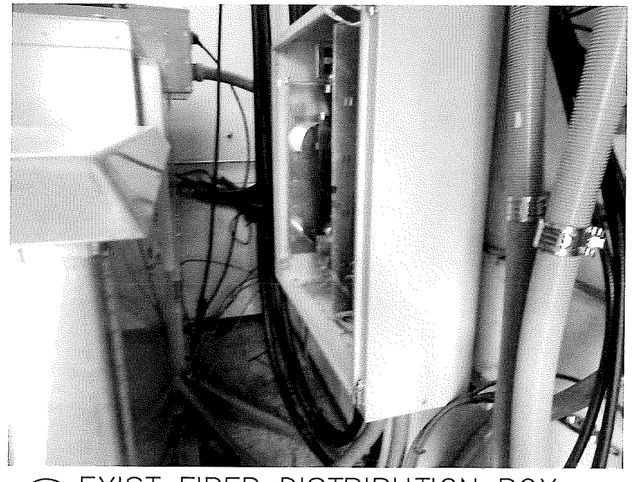


2 A-3 EQUIPMENT ROOM PLAN (FINAL)

SCALE: 1/2" = 1'-0"

3 A-3 EXIST EQUIPMENT ROOM

SCALE: N.T.S.



4 A-3 EXIST FIBER DISTRIBUTION BOX

SCALE: NTS

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No. 25406
LICENSED
PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

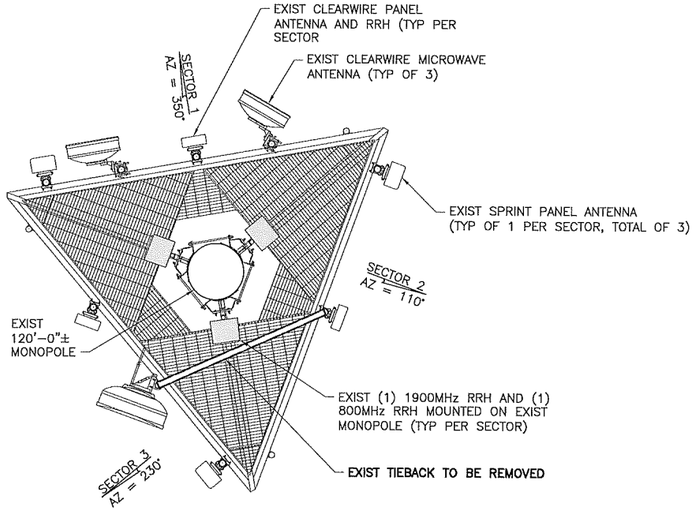
SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
ENLARGED EQUIPMENT LAYOUT PLANS

SHEET NO:
A-3

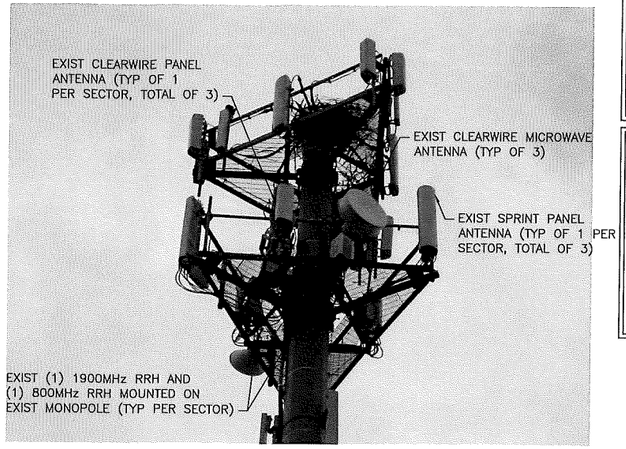
N

APPROX.



1 / A-4 ANTENNA LAYOUT PLAN (EXIST)

SCALE: 3/8" = 1'-0"



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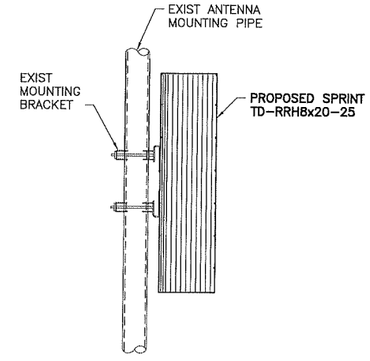
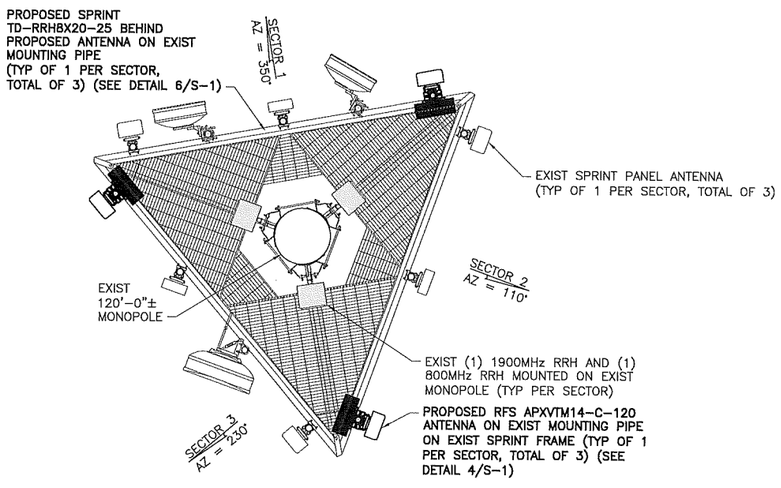


3 / A-4 RRH MOUNTING DETAIL

SCALE: 1 1/2" = 1'-0"



2 / A-4 ANTENNA LAYOUT PLAN (FINAL)

SCALE: 3/8" = 1'-0"

ANTENNA DATA

Status	Exist	Proposed
Antenna Manufacturer	RFS-CELWAVE	RFS-CELWAVE
Antenna Model Number	APXVSPP18-C-A20/APXV9ERR18-C-A20	APXV9TM14-ALV-120
Number of Antennas	3	3
Antenna RAD Center	105'	105'
Antenna Azimuth	350/110/230	350/110/230
Antenna RRH Model Number	800MHz/1900MHz	TD-RRH8x20-25
Number of RRH	6	3

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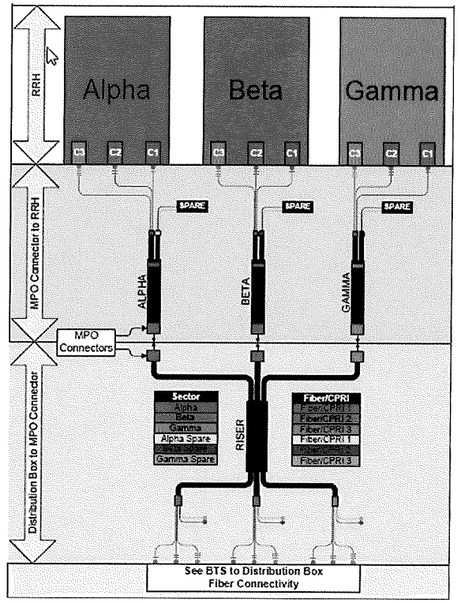
SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

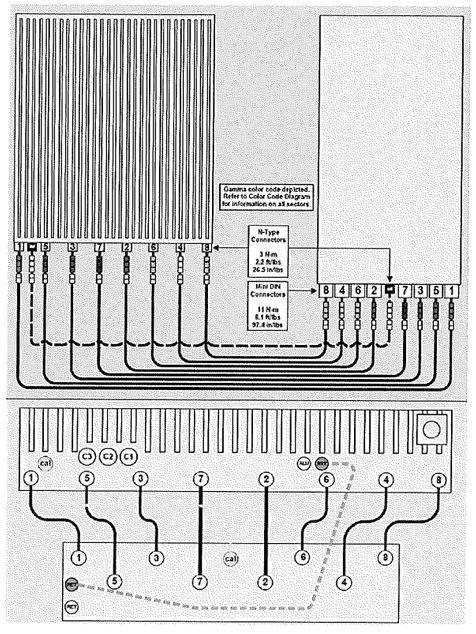
SHEET TITLE:
ANTENNA LAYOUT PLANS

SHEET NO:
A-4



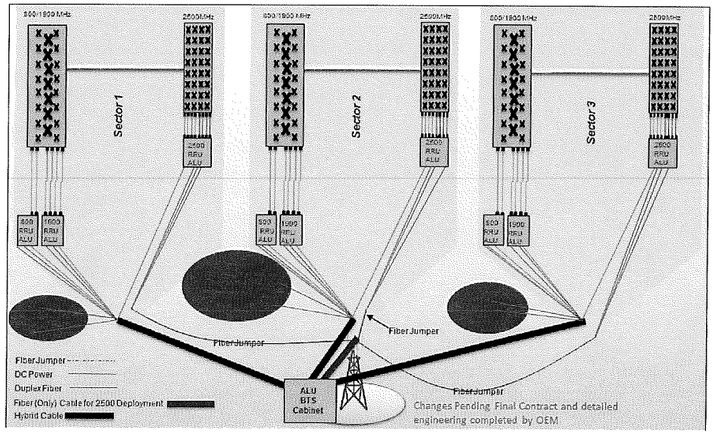
1 A–5 2.5 CABLE COLOR CODING

SCALE: N.T.S.



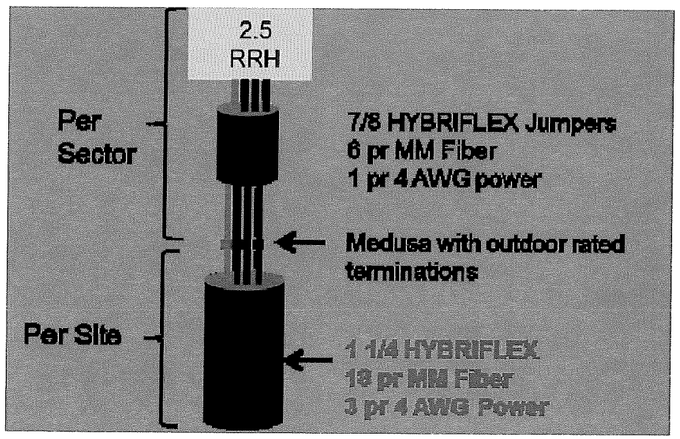
2 A–5 RRH CONNECTIVITY

SCALE: N.T.S.



3 A–5 RAN WIRING

SCALE: N.T.S.



4 A–5 CABLE SCENARIO

SCALE: N.T.S.

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DATE	REVIEWED BY
10/11/17	[illegible]

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

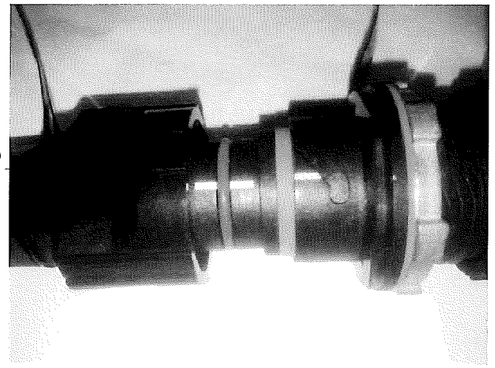
SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

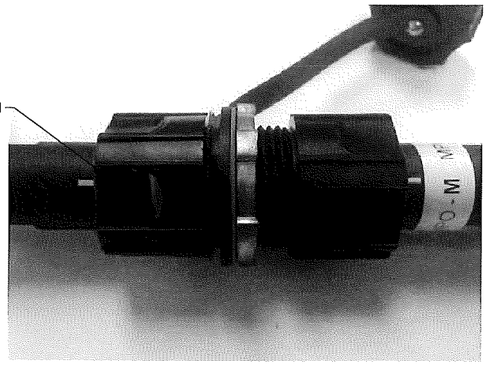
SHEET TITLE:
RAN WIRING DIAGRAM

SHEET NO:
A–5

IMPORTANT!! LINE UP WHITE MARKINGS ON JUMPER AND RISER IP-MPO CONNECTOR. PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAINST THE RED SEAL ON THE RISER CONNECTION

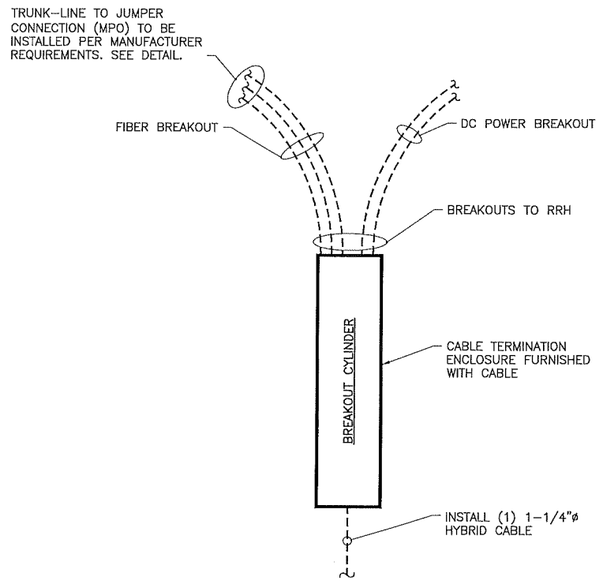


IMPORTANT!! ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL A CLICK SOUND IS HEARD TO ENSURE A GOOD CONNECTION

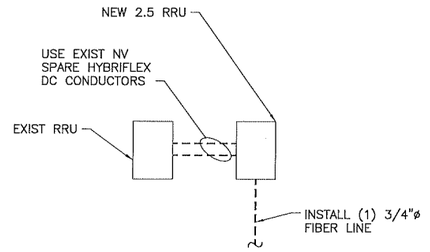


1 A-6 HYBRIFLEX RISER/JUMPER CONNECTION DETAILS

SCALE: N.T.S.



2.5 HYBRID CABLE W/FIBER & DC FEEDERS



FIBER ONLY TRUNK LINES

2 A-6 TRUNK LINE DETAILS (TYPICAL)

SCALE: N.T.S.

SPECIAL NOTES: CABLE MARKINGS AT RAD CENTER AND ALL WALL/BLDG. PENETRATIONS

- ALL COLOR CODE TAPE SHALL BE 3M-35 AND SHALL BE INSTALLED USING A MINIMUM OF (3) WRAPS OF TAPE.
- ALL COLOR BANDS INSTALLED AT THE TOWER TOP SHALL BE A MINIMUM OF 3" WIDE AND SHALL HAVE A MINIMUM OF 3/4" OF SPACING BETWEEN EACH COLOR.
- ALL COLOR BANDS INSTALLED AT OR NEAR THE GROUND MAY BE ONLY 3/4" WIDE. EACH TOP-JUMPER SHALL BE COLOR CORDED WITH (1) SET OF 3" WIDE BANDS.
- EACH MAIN COAX SHALL BE COLOR CODED WITH (1) SET OF 3" BANDS NEAR THE TOP-JUMPER CONNECTION AND WITH 3/4" COLOR BANDS JUST PRIOR TO ENTERING THE BTS OR TRANSMITTER BUILDING.
- ALL BOTTOM JUMPERS SHALL BE COLOR CODED WITH (1) SET OF 3/4" BANDS ON EACH END OF THE BOTTOM JUMPER.
- ALL COLOR CODES SHALL BE INSTALLED SO AS TO ALIGN NEATLY WITH ONE ANOTHER FROM SIDE-TO-SIDE.
- EACH COLOR BAND SHALL HAVE A MINIMUM OF (3) WRAPS AND SHALL BE NEATLY TRIMMED AND SMOOTHED OUT AS TO AVOID UNRAVELING.
- X-POLE ANTENNAS SHOULD USE "XX-1" FOR THE "+45" PORT, "XX-2" FOR THE "-45" PORT.
- COLOR BAND #4 REFERS TO THE FREQUENCY BAND: ORANGE=850, VIOLET=1900. USED ON JUMPERS ONLY.
- RF FEEDLINE SHALL BE IDENTIFIED WITH A METAL TAG (STAINLESS OR BRASS) AND STAMPED WITH THE SECTOR, ANTENNA POSITION, AND CABLE NUMBER.
- ANTENNAS MUST BE IDENTIFIED, USING THE SECTOR LETTER AND ANTENNA NUMBER, WITH A BLACK MARKER PRIOR TO INSTALLATION.

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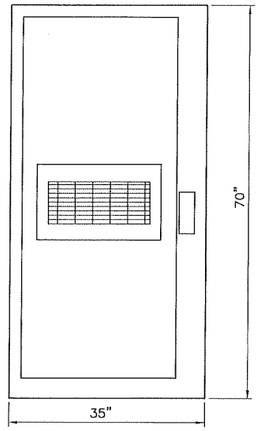
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
CABLE DETAILS

SHEET NO:
A-6

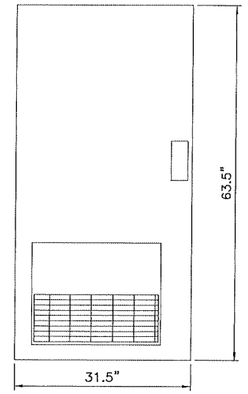


FRONT

CABINET FRONT 9928 MMBTS MODULAR CELL
SPECIFICATIONS:
HEIGHT: 70" WIDTH: 35" DEPTH: 37.8" WEIGHT: 1090 LBS.

1/S-1 (EXIST) MMBTS CABINET

SCALE: 1" = 1'-0"

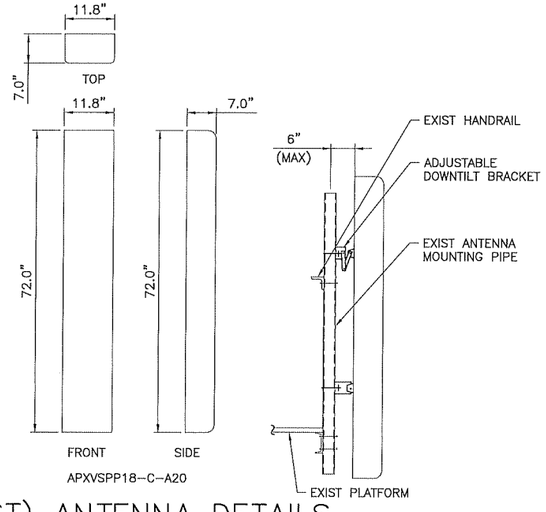


FRONT

BATTERY
SPECIFICATIONS:
HEIGHT: 63.5" WIDTH: 31.5" DEPTH: 28.0"

2/S-1 (EXIST) BATTERY CABINET

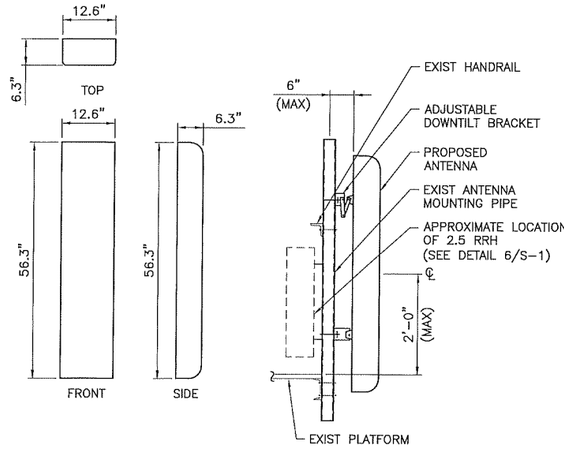
SCALE: 1" = 1'-0"



APXVSPP18-C-A20

3/S-1 (EXIST) ANTENNA DETAILS

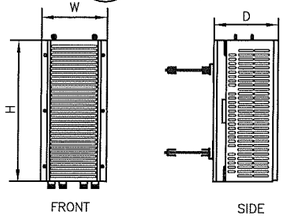
SCALE: 3/4"=1'-0"



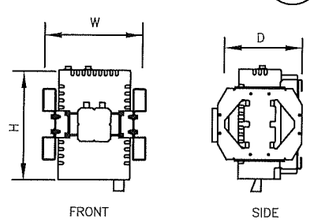
APXVTM14-C-120

4/S-1 (PROPOSED) ANTENNA DETAILS

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



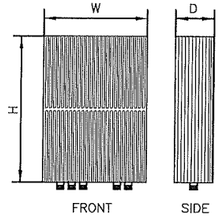
TYPE: 1900 MHz 4x45W MODEL #: RRH 1900 4X45 65MHz HEIGHT: 25.0" WIDTH: 11.1" DEPTH: 11.4" WEIGHT: ±60 LBS.



TYPE: 800 MHz 2x50W MODEL #: FD-RRH-2x50-800 HEIGHT: 19.7" WIDTH: 13" DEPTH: 10.8" WEIGHT: ±53 LBS

5/S-1 (EXIST) RRH DETAILS

SCALE: 1 1/2"=1'-0"



TYPE: 2.5 RRH MODEL #: TD-RRH8x20-25 HEIGHT: 26.1" WIDTH: 18.6" DEPTH: 6.71" WEIGHT: ±70 LBS

6/S-1 (PROPOSED) RRH DETAIL

SCALE: N.T.S.

Sprint

2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

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www.tectonicengineering.com

SUBMITTALS

PROJECT NO: 8887.CT03XC039

NO	DATE	DESCRIPTION	BY
0	6/19/14	FOR COMMENT	DC
1	1/8/15	FOR CONSTRUCTION	RD
2	10/11/17	FOR CONSTRUCTION	TL

DATE	REVIEWED BY
10/4/17	JMG

STATE OF CONNECTICUT
ANTONIO M. GUGLIERI
No. 25406
LICENSED
PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

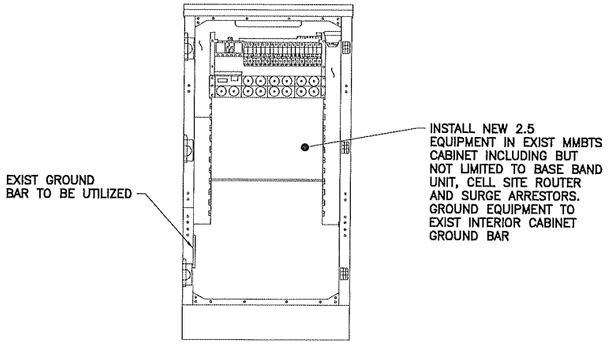
SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
EQUIPMENT DETAILS

SHEET NO:
S-1

NOTE:
LOCATIONS SHOWN FOR INSTALLATION OF NEW EQUIPMENT IN EXISTING CABINET ARE APPROXIMATE. ACTUAL SPACE AVAILABLE TO BE VERIFIED IN FIELD ON A SITE BY SITE BASIS.

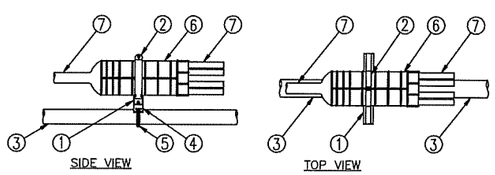


FRONT ELEVATION
(CABINET INTERIOR)

1/S-2 MMBTS INTERIOR DETAIL

SCALE: N.T.S.

LEGEND:
1. P1000T-HG UNISTRUT, 12" LONG.
2. 6" PIPE HANGER.
3. EXISTING SUPPORT PIPE.
4. NEW STANDOFF BRACKET, ANDREW PART# 30848-4.
5. NEW ROUND MEMBER ADAPTER SIZED FOR EXISTING PIPE SUPPORT.
6. BREAKOUT UNIT.
7. CABLE.



3/S-2 MEDUSA HEAD DETAIL

SCALE: NTS

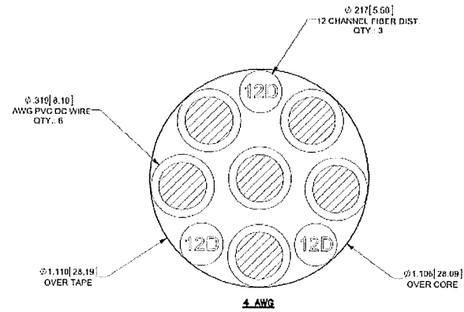
RFS HYBRIFLEX RISER CABLES SCHEDULE

Fiber Only (Existing DC Power)	**Hybrid cable** MN: HB058-M12-050F 12x multi-mode fiber pairs, Top: Outdoor protected connectors, Bottom:LC Connectors, 5/8 cable, 50ft	50 ft
	MN: HB058-M12-075F	75 ft
	MN: HB058-M12-100F	100 ft
	MN:HB058-M12-125F	125 ft
	MN:HB058-M12-150F	150 ft
	MN:HB058-M12-175F	175 ft
	MN:HB058-M12-200F	200 ft
8 AWG Power	**Hybrid cable** MN: HB114-08U3M12-050F 3x 8 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 50ft	50 ft
	MN: HB114-08U3M12-075F	75 ft
	MN: HB114-08U3M12-100F	100 ft
	MN: HB114-08U3M12-125F	125 ft
	MN: HB114-08U3M12-150F	150 ft
	MN: HB114-08U3M12-175F	175 ft
	MN: HB114-08U3M12-200F	200 ft
6 AWG Power	**Hybrid cable** MN: HB114-13U3M12-225F 3x 6 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 225ft	225 ft
	MN: HB114-13U3M12-250F	250 ft
	MN: HB114-13U3M12-275F	275 ft
	MN: HB114-13U3M12-300F	300 ft
4 AWG Power	**Hybrid cable** MN: HB114-21U3M12-325F 3x 6 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 225ft	325 ft
	MN: HB114-21U3M12-350F	350 ft
	MN: HB114-21U3M12-375F	375 ft

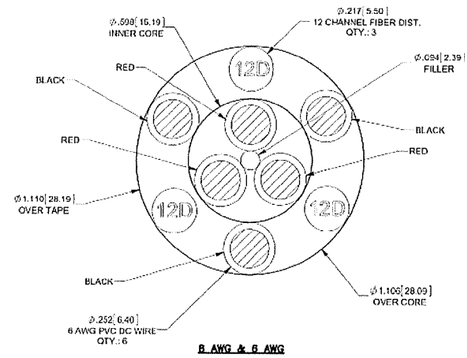
RFS HYBRIFLEX JUMPER CABLE SCHEDULE

Fiber Only	**Hybrid Jumper cable** MN: HBF012-M3-5F1 5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable	5 ft
	MN: HBF012-M3-10F1	10 ft
	MN: HBF012-M3-15F1	15 ft
	MN: HBF012-M3-20F1	20 ft
	MN: HBF012-M3-25F1	25 ft
	MN: HBF012-M3-30F1	30 ft
8 AWG Power	**Hybrid Jumper cable** MN: HBF058-08U1M3-5F1 5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-08U1M3-10F1	10 ft
	MN: HBF058-08U1M3-15F1	15 ft
	MN: HBF058-08U1M3-20F1	20 ft
	MN: HBF058-08U1M3-25F1	25 ft
	MN: HBF058-08U1M3-30F1	30 ft
6 AWG Power	**Hybrid Jumper cable** MN: HBF058-13U1M3-5F1 5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft
	MN: HBF058-13U1M3-10F1	10 ft
	MN: HBF058-13U1M3-15F1	15 ft
	MN: HBF058-13U1M3-20F1	20 ft
	MN: HBF058-13U1M3-25F1	25 ft
	MN: HBF058-13U1M3-30F1	30 ft
4 AWG Power	**Hybrid Jumper cable** MN: HBF078-21U1M3-5F1 5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable	5 ft
	MN: HBF078-21U1M3-10F1	10 ft
	MN: HBF078-21U1M3-15F1	15 ft
	MN: HBF078-21U1M3-20F1	20 ft
	MN: HBF078-21U1M3-25F1	25 ft
	MN: HBF078-21U1M3-30F1	30 ft

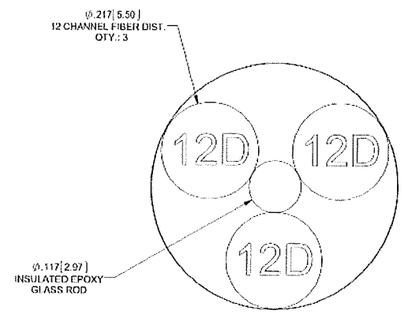
HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE			
MANUF:	RFS		
CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
FIBER ONLY	VARIES	USE NV HYBRIFLEX	7/8"
HYBRIFLEX	<200'	8 AWG	1-1/4"
HYBRIFLEX	225-300'	6 AWG	1-1/4"
HYBRIFLEX	325-375'	4 AWG	1-1/4"



4 AWG



8 AWG & 6 AWG



FIBER ONLY

2/S-2 2.5 HYBRID CABLE X-SECTION AND DATA

SCALE: NTS

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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SUBMITTALS

PROJECT NO: 8887.CT03XC039

NO	DATE	DESCRIPTION	BY
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2	10/11/17	FOR CONSTRUCTION	TL

DATE	REVIEWED BY
10/11/17	JMQ

STATE OF CONNECTICUT
ANTONIO A. QUALITE
No. 25406
LICENSED PROFESSIONAL ENGINEER

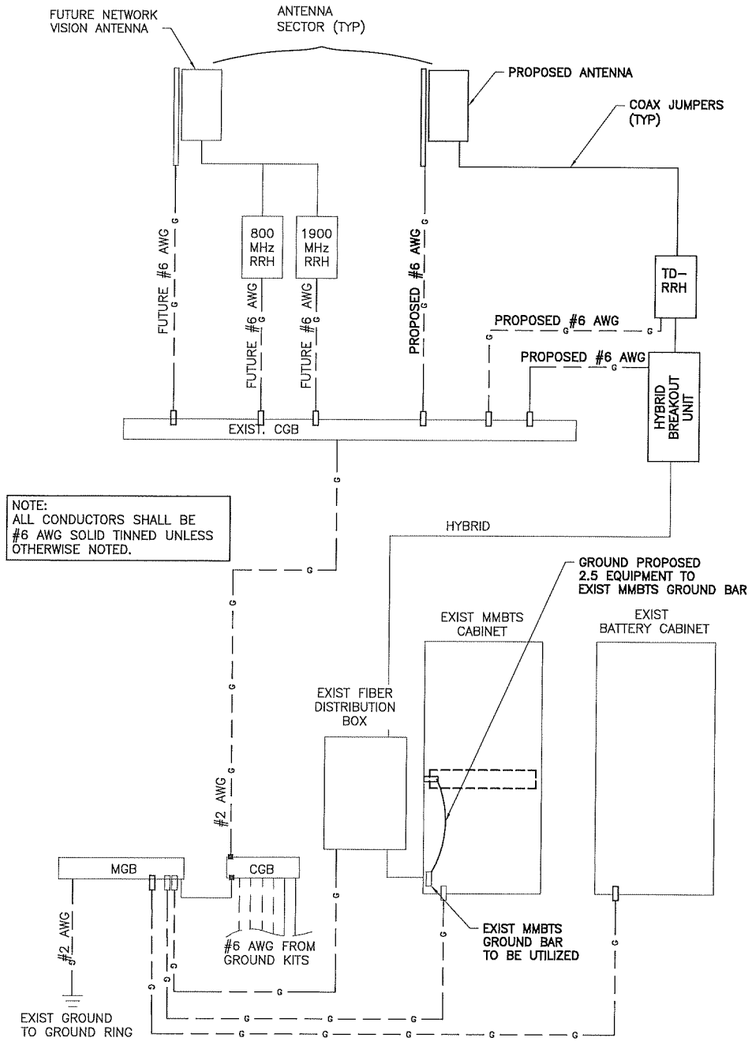
SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

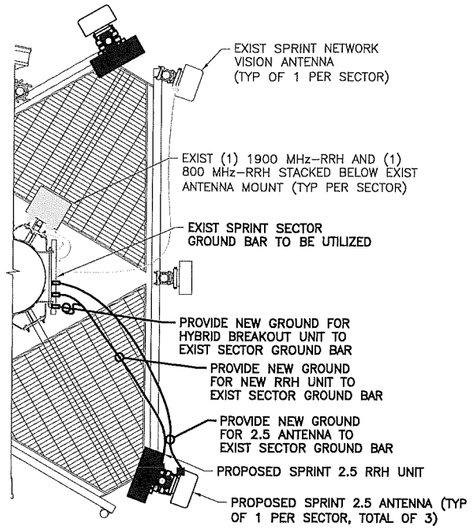
SHEET TITLE:
EQUIPMENT SCHEMATIC DETAILS

SHEET NO:
S-2



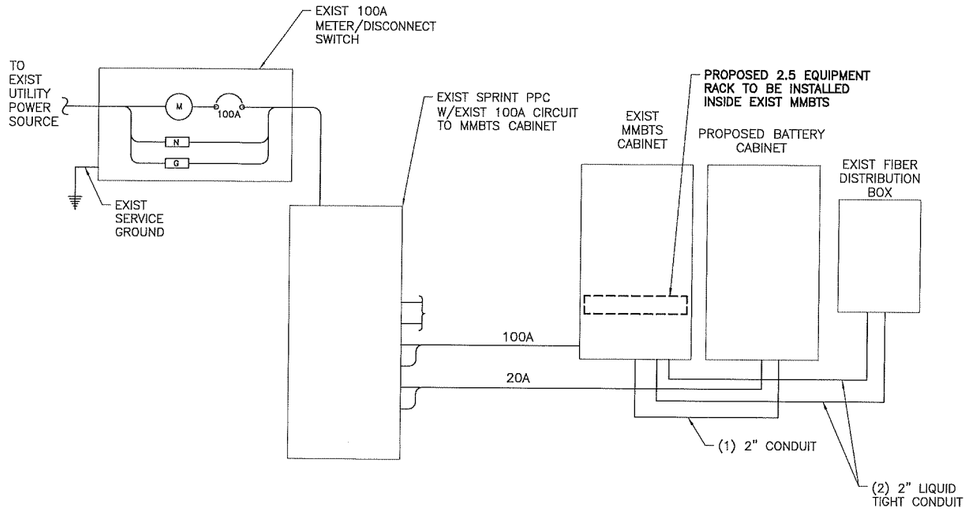
1 E-1 TYPICAL GROUNDING ONE LINE DIAGRAM

SCALE: NTS



2 E-1 TYPICAL ANTENNA GROUNDING PLAN

SCALE: NTS



3 E-1 TYPICAL ELECTRICAL & TELCO PLAN

SCALE: NTS

Sprint

2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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SUBMITTALS

PROJECT NO: 8887.CT03XC039

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0	6/19/14	FOR COMMENT	DC
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2	10/11/17	FOR CONSTRUCTION	TL

DATE	REVIEWED BY
10/11/17	TMQ

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

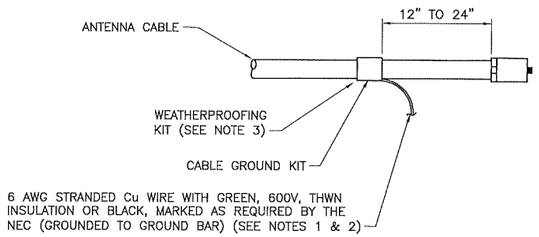
SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
ELECTRICAL & GROUNDING PLANS

SHEET NO:
E-1



CONNECTION OF CABLE GROUND KIT TO ANTENNA CABLE

NOTES:

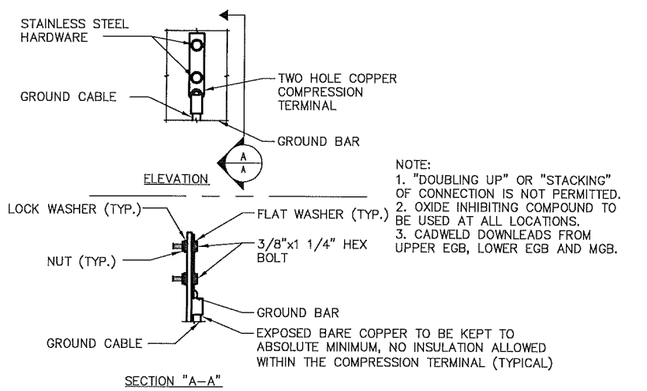
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.

WEATHER PROOFING SHALL BE (TYPE AND PART NUMBER) AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER AND APPROVED BY CONTRACTOR.

1/E-2 CABLE GROUNDING KIT DETAIL

SCALE: N.T.S.

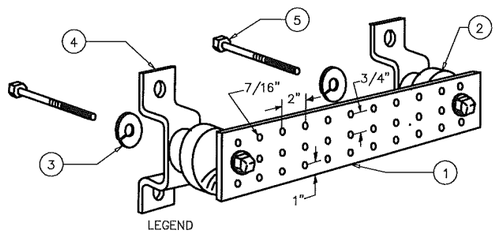


NOTE:
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.

SECTION "A-A"

2/E-2 GROUNDING BAR CONN. DETAIL

SCALE: NTS



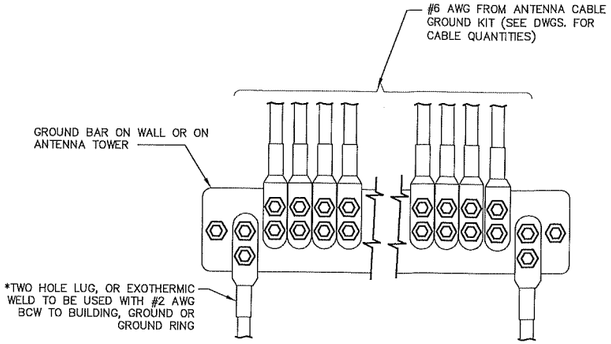
LEGEND

1- COPPER TINNED GROUND BAR, 1/4"X 4"X 20", OR OTHER LENGTH AS REQUIRED, HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION
2- INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4 OR EQUAL
3- 5/8" LOCKWASHERS OR EQUAL
4- WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056 OR EQUAL
5- 5/8-11 X 1" H.H.C.S.BOLTS

NOTE:
ALL BOLTS, NUTS, WASHERS AND LOCK WASHERS SHALL BE 18-8 STAINLESS STEEL.

3/E-2 GROUNDING BAR DETAIL

SCALE: NTS



* - GROUND BARS AT THE BOTTOM OF TOWERS/MONOPOLES SHALL ONLY USE EXOTHERMIC WELDS.

- ATTACH "DO NOT DISCONNECT" LABELS TO GROUND BARS. CAN USE BRASS TAG "DO NOT DISCONNECT" AT EACH HYBRID GROUND POINT OR BACK-A-LITE PLATE LABEL ON GROUND BAR.

- CONNECT SEQUENCE- BOLT/WASHER/NO-OX/GROUND BAR/NO-OX/WASHER/LOCK-WASHER/NUT. THIS IS REPEATED FOR EACH LUG CONNECTION POINT.

4/E-2 ANTENNA GROUND BAR DETAIL

SCALE: NTS

GROUNDING NOTES:

1. GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250-GROUNDING AND BONDING.
2. ALL GROUND WIRES SHALL BE #2 AWG UNLESS NOTED OTHERWISE.
3. ALL GROUNDING WIRES SHALL PROVIDE A STRAIGHT, DOWNWARD PATH TO GROUND WITH GRADUAL BENDS AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
4. EACH EQUIPMENT CABINET SHALL BE CONNECTED TO THE MASTER ISOLATION GROUND BAR (MGB) WITH #2 AWG INSULATED STRANDED COPPER WIRE. EQUIPMENT CABINETS WALL HAVE (2) CONNECTIONS.
5. PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
6. THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
7. ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL AND SHALL BE PROVIDED WITH GROUNDING BUSHINGS.
8. PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
9. WHEN CABLE LENGTH IS OVER 20' THE MANUFACTURERS GROUND KIT MUST BE INSTALLED PER THE MANUFACTURERS SPECIFICATIONS.
10. REFER TO "ANTI-THEFT UPDATE TO SPRINT GROUNDING 082412.PDF" FOR GUIDELINE TO SUSPECTED OR ACTUAL THEFT OF GROUNDING.
11. HOME RUN GROUNDS ARE NOT APPROVED BY CROWN CASTLE CONSTRUCTION STANDARDS AND THAT ANTENNA BUSS BARS SHOULD BE INSTALLED DIRECTLY TO TOWER STEEL WITHOUT INSULATORS OR DOWN CONDUCTORS.

PROTECTIVE GROUNDING SYSTEM GENERAL NOTES:

1. AT ALL TERMINATIONS AT EQUIPMENT ENCLOSURES, PANEL, AND FRAMES OF EQUIPMENT AND WHERE EXPOSED FOR GROUNDING. CONDUCTOR TERMINATION SHALL BE PERFORMED UTILIZING TWO HOLE BOLTED TONGUE COMPRESSION TYPE LUGS WITH STAINLESS STEEL SELF-TAPPING SCREWS.
2. ALL CLAMPS AND SUPPORTS USED TO SUPPORT THE GROUNDING SYSTEM CONDUCTORS AND PVC CONDUITS SHALL BE PVC TYPE (NON CONDUCTIVE). DO NOT USE METAL BRACKETS OR SUPPORTS WHICH WOULD FORM A COMPLETE RING AROUND ANY GROUNDING CONDUCTOR.
3. ALL GROUNDING CONNECTIONS SHALL BE COATED WITH A COPPER SHIELD ANTI-CORROSIVE AGENT SUCH AS T&B KOPR SHIELD. VERIFY PRODUCT WITH PROJECT MANAGER.
4. ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
5. INSTALL GROUND BUSHING ON ALL METALLIC CONDUITS AND BOND TO THE EQUIPMENT GROUND BUS IN THE PANEL BOARD.
6. GROUND ANTENNA BASES, FRAMES, CABLE RACKS, AND OTHER METALLIC COMPONENTS WITH #2 INSULATED TINNED STRANDED COPPER GROUNDING CONDUCTORS AND CONNECT TO INSULATED SURFACE MOUNTED GROUND BARS. CONNECTION DETAILS SHALL FOLLOW MANUFACTURER'S SPECIFICATIONS FOR GROUNDING.
7. GROUND HYBRID CABLE SHIELD AT BOTH ENDS USING MANUFACTURER'S GUIDELINES.

ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
4. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
5. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THNN INSULATION.
6. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
7. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.
8. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
9. GROUNDING SHALL COMPLY WITH NEC ART. 250.
10. GROUND HYBRID CABLE SHIELDS AT 3 LOCATIONS USING MANUFACTURER'S HYBRID CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
11. USE #2 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
12. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
13. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #2 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.
14. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
15. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
16. BOND ANTENNA MOUNTING BRACKETS, HYBRID CABLE GROUND KITS, AND RRHs TO EGB PLACED NEAR THE ANTENNA LOCATION.
17. BOND ANTENNA EGB'S AND MGB TO GROUND RING.
18. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULT FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMS MINIMUM RESISTANCE REQUIRED.
19. CONTRACTOR SHALL CONDUCT ANTENNA, HYBRID CABLES, GPS COAX AND RRH RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.
20. CONTRACTOR SHALL CHECK CAPACITY OF EXISTING SERVICE & PANEL ON SITE TO DETERMINE IF CAPACITY EXISTS TO ACCOMMODATE THE ADDED LOAD OF THIS PROJECT. ADVISE ENGINEER OF ANY DISCREPANCY.
21. LOCATION OF ALL OUTLET, BOXES, ETC, AND THE TYPE OF CONNECTION (PLUG OR DIRECT) SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
22. ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT (NEW AND EXISTING) SHALL BE FIELD VERIFIED WITH THE OWNERS REPRESENTATIVE AND EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN OF CONDUIT AND WIRE. ALL EQUIPMENT SHALL BE PROPERLY CONNECTED ACCORDING TO THE NAMEPLATE DATA FURNISHED ON THE EQUIPMENT.

Sprint
2.5 EQUIPMENT DEPLOYMENT
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

CROWN CASTLE

TECTONIC
• PLANNING
• ENGINEERING
• SURVEYING
• CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703
www.tectonicengineering.com

SUBMITTALS

PROJECT NO: 8887.CT03XC039

NO	DATE	DESCRIPTION	BY
0	6/19/14	FOR COMMENT	DC
1	1/8/15	FOR CONSTRUCTION	RD
2	10/11/17	FOR CONSTRUCTION	TL

DATE	REVIEWED BY
10/11/17	JMO

STATE OF CONNECTICUT
ANTONIO A. QUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE NUMBER:
CT03XC039

SITE NAME:
NORTH HAVEN

SITE ADDRESS:
117 WASHINGTON ST.
NORTH HAVEN, CT 06473

SHEET TITLE:
GROUNDING DETAILS & NOTES

SHEET NO:
E-2

Date: **October 25, 2017**

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

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
9197551012

Subject: **Structural Analysis Report**

Carrier Designation:	***Sprint PCS* Co-Locate**	
	Carrier Site Number:	CT03XC039
	Carrier Site Name:	CT03XC039
Crown Castle Designation:	**Crown Castle BU Number:**	806454
	Crown Castle Site Name:	NHV 112 948129
	Crown Castle JDE Job Number:	447438
	Crown Castle Work Order Number:	1437449
	Crown Castle Application Number:	396863 Rev. 3
Engineering Firm Designation:	**FDH Velocitel Project Number:**	17QJIU1400
Site Data:	**117 WASHINGTON STREET, NORTH HAVEN, New Haven County, CT 06473** **Latitude *41° 23' 46.93"*, Longitude *-72° 51' 27.67"*** **120 Foot - Monopole Tower**	

Dear Charles Trask,

FDH Velocitel is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1064310, in accordance with application 396863, revision 3.

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

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing 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 B with a maximum topographic factor, Kzt, of 1.000 and Risk Category II were used in this analysis.

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

Respectfully submitted by:

Chaitanya Shetti
Project Engineer I

Reviewed by:

Dennis D. Abel, PE
Director of Engineering
CT PE License No. 23247

STATE OF CONNECTICUT
DENNIS D. ABEL
No. 23247
LICENSED PROFESSIONAL ENGINEER

10-25-2017

tnxTower Report - version 7.0.7.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by VALMONT in March of 1990. The tower was originally designed for a wind speed of 90 mph per EIA-222-D.

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 B with topographic category 1 and crest height of 0 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
105.0	106.0	3	rfs celwave	APXVTM14-C-120	1	1-1/4	-
		3	alcatel lucent	TD-RRH8x20-25			

Table 2 - Existing 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
115.0	117.0	3	commscope	HBXX-6516DS-A2M	13	1-5/8	1
		3	commscope	HBXX-6517DS-A2M			
		3	commscope	LNX-6514DS-A1M			
		6	decibel	DB844G65ZAXY			
		3	alcatel lucent	RRH2X60-AWS			
		3	alcatel lucent	RRH2X60-PCS			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
	115.0	1	-	Platform Mount [LP 602-1]			
107.0	108.0	3	alcatel lucent	800MHZ RRH	-	-	1
	107.0	1	-	Side Arm Mount [SO 102-3]			
	106.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		3	alcatel lucent	1900MHz RRH (65MHz)			
105.0	109.0	1	dragonwave	A-ANT-23G-2-C	2 3 6 4	Conduit 1-1/4 5/16 7983A	1
		1	andrew	VHLP2-18			
		1	andrew	VHLP800-11			
	106.0	3	rfs celwave	APXVSPP18-C-A20			
		9	rfs celwave	ACU-A20-N			
	105.0	3	argus tech	LLPX310R			
		3	samsung telecom	FDD_R6_RRH			
		1	-	Platform Mount [LP 602-1]			
90.0	90.0	3	rfs celwave	APXV18-206517S-C	6	1-5/8	1
		1	-	Pipe Mount [PM 601-3]			

Notes:
1) Existing Equipment

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)
-						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering	2294635	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering	253930	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	253972	CCISITES
CONSTRUCTION DRAWINGS	Tectonic Engineering	806454_CT03XC039_CD_Rev2_101117_10-18-17	ON FILE
MOUNT ANALYSIS REPORT	Tectonic Engineering	806454_CT03XC039_AMA_101117	ON FILE

3.1) Analysis Method

tnxTower (version 7.0.7.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 77.33	Pole	TP30.45x21.91x0.22	1	-9.83	1268.88	53.3	Pass
L2	77.33 - 34.33	Pole	TP38.61x29.08x0.31	2	-18.06	2448.70	64.1	Pass
L3	34.33 - 0	Pole	TP44.85x36.85x0.38	3	-28.82	3512.82	67.6	Pass
							Summary	
						Pole (L3)	67.6	Pass
						Rating =	67.6	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	64.2	Pass
1	Base Plate	0	57.7	Pass
1	Base Foundation Structural	0	33.9	Pass
1,2	Base Foundation Soil Interaction	0	OK	Pass

Structure Rating (max from all components) =	67.6%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Foundation determined to be adequate per independent L-PILE analysis.

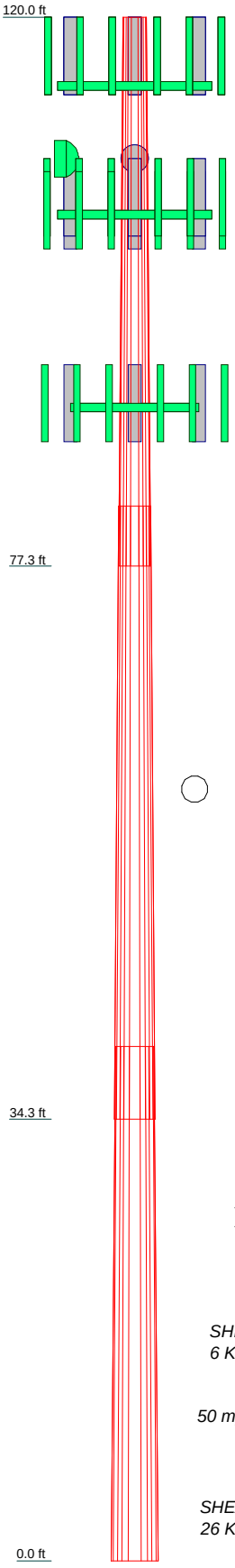
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	42.67	12	0.22	4.67	21.91	30.45		2.7
2	47.67	12	0.31	5.67	29.08	38.61	A572-65	5.5
3	40.00	12	0.38		36.85	44.85		6.7
								14.8



ALL REACTIONS ARE FACTORED

AXIAL 55 K

SHEAR 6 K

MOMENT 546 kip-ft

TORQUE 0 kip-ft

50 mph WIND - 0.75 in ICE

AXIAL 29 K

SHEAR 26 K

MOMENT 2124 kip-ft

TORQUE 1 kip-ft

REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB844G65ZAXY w/ Mount Pipe	115	APXVSPP18-C-A20 w/ Mount Pipe	105
HBXX-6516DS-A2M w/ Mount Pipe	115	APXVSPP18-C-A20 w/ Mount Pipe	105
HBXX-6517DS-A2M w/ Mount Pipe	115	APXVSPP18-C-A20 w/ Mount Pipe	105
LNX-6514DS-A1M w/ Mount Pipe	115	(3) ACU-A20-N	105
RRH2X60-AWS	115	(3) ACU-A20-N	105
DB-T1-6Z-8AB-0Z	115	(3) ACU-A20-N	105
RRH2X60-PCS	115	APXVTM14-C-120 w/ Mount Pipe	105
(2) DB844G65ZAXY w/ Mount Pipe	115	APXVTM14-C-120 w/ Mount Pipe	105
HBXX-6516DS-A2M w/ Mount Pipe	115	APXVTM14-C-120 w/ Mount Pipe	105
HBXX-6517DS-A2M w/ Mount Pipe	115	TD-RRH8x20-25	105
LNX-6514DS-A1M w/ Mount Pipe	115	TD-RRH8x20-25	105
RRH2X60-AWS	115	TD-RRH8x20-25	105
RRH2X60-PCS	115	Pipe Mount	105
(2) DB844G65ZAXY w/ Mount Pipe	115	Pipe Mount	105
HBXX-6516DS-A2M w/ Mount Pipe	115	Pipe Mount	105
HBXX-6517DS-A2M w/ Mount Pipe	115	LLPX310R w/ Mount Pipe	105
LNX-6514DS-A1M w/ Mount Pipe	115	LLPX310R w/ Mount Pipe	105
RRH2X60-AWS	115	LLPX310R w/ Mount Pipe	105
RRH2X60-PCS	115	FDD_R6_RRH	105
Platform Mount [LP 602-1]	115	FDD_R6_RRH	105
1900MHz RRH (65MHz)	107	FDD_R6_RRH	105
800MHZ RRH	107	Platform Mount [LP 602-1]	105
800 EXTERNAL NOTCH FILTER	107	A-ANT-23G-2-C	105
1900MHz RRH (65MHz)	107	VHLP2-18	105
800MHZ RRH	107	VHLP800-11	105
800 EXTERNAL NOTCH FILTER	107	Pipe Mount [PM 601-3]	90
1900MHz RRH (65MHz)	107	APXV18-206517S-C w/ Mount Pipe	90
800MHZ RRH	107	APXV18-206517S-C w/ Mount Pipe	90
800 EXTERNAL NOTCH FILTER	107	APXV18-206517S-C w/ Mount Pipe	90
Side Arm Mount [SO 102-3]	107		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B 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 1 with Crest Height of 0.00 ft
8. TOWER RATING: 67.6%

FDH Velocitel Engineering Innovation

Tower Analysis

FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Job: ***806454, NHV 112 948129***			
Project: ***17QJIU1400***			
Client: Crown Castle	Drawn by: CShetti	App'd:	
Code: TIA-222-G	Date: 10/25/17	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.75 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
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				

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	120.00-77.33	42.67	4.67	12	21.91	30.45	0.22	0.88	A572-65 (65 ksi)
L2	77.33-34.33	47.67	5.67	12	29.08	38.61	0.31	1.25	A572-65

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	34.33-0.00	40.00		12	36.85	44.85	0.38	1.50	(65 ksi) A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.68	15.30	918.60	7.77	11.35	80.94	1861.33	7.53	5.28	24.132
	31.52	21.32	2486.81	10.82	15.77	157.66	5038.96	10.49	7.57	34.583
L2	31.07	28.99	3061.61	10.30	15.06	203.27	6203.65	14.27	6.95	22.217
	39.97	38.60	7225.71	13.71	20.00	361.29	14641.24	19.00	9.51	30.379
L3	39.32	44.04	7479.36	13.06	19.09	391.83	15155.22	21.68	8.87	23.656
	46.43	53.70	13558.79	15.92	23.23	583.62	27473.79	26.43	11.01	29.373

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 120.00-77.33				1	1	1			
L2 77.33-34.33				1	1	1			
L3 34.33-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
level 105									
HB114-1-0813U4-M5J(1 1/4")	A	Surface Ar (CaAa)	105.00 - 12.00	3	3	0.000 0.000	1.54		1.20
HB114-21U3M12-XXXF(1-1/4")	A	Surface Ar (CaAa)	105.00 - 12.00	1	1	0.000 0.000	1.54		1.22
7983A(1/2")	C	Surface Ar (CaAa)	105.00 - 12.00	4	2	0.000 0.000	0.58		0.08
9207(5/16")	C	Surface Af (CaAa)	105.00 - 12.00	2	2	0.000 0.000	0.33	1.04	0.60
2" Rigid Conduit	C	Surface Ar (CaAa)	105.00 - 12.00	1	1	0.000 0.000	2.00		2.80
2" Rigid Conduit	C	Surface Ar (CaAa)	105.00 - 12.00	1	1	0.000 0.000	2.00		2.80
LCF158-50J(1-5/8")	C	Surface Ar (CaAa)	90.00 - 12.00	6	6	0.000 0.000	2.01		0.92
Safety Line 3/8	C	Surface Ar (CaAa)	120.00 - 0.00	1	1	0.000 0.000	0.38		0.22

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
level 115								
561(1-5/8")	B	No	Inside Pole	115.00 - 12.00	13	No Ice	0.00	1.35
						1/2" Ice	0.00	1.35
						1" Ice	0.00	1.35
9207(5/16")	C	No	Inside Pole	105.00 - 12.00	4	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
level 90								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-77.33	A	0.000	0.000	17.045	0.000	0.13
		B	0.000	0.000	0.000	0.000	0.66
		C	0.000	0.000	34.202	0.000	0.34
L2	77.33-34.33	A	0.000	0.000	26.488	0.000	0.21
		B	0.000	0.000	0.000	0.000	0.75
		C	0.000	0.000	80.388	0.000	0.66
L3	34.33-0.00	A	0.000	0.000	13.755	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.39
		C	0.000	0.000	42.196	0.000	0.34

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-77.33	A	1.672	0.000	0.000	41.062	0.000	0.62
		B		0.000	0.000	0.000	0.000	0.66
		C		0.000	0.000	85.423	0.000	1.56
L2	77.33-34.33	A	1.580	0.000	0.000	63.812	0.000	0.96
		B		0.000	0.000	0.000	0.000	0.75
		C		0.000	0.000	168.965	0.000	2.97
L3	34.33-0.00	A	1.401	0.000	0.000	32.212	0.000	0.47
		B		0.000	0.000	0.000	0.000	0.39
		C		0.000	0.000	89.725	0.000	1.50

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120.00-77.33	-0.37	0.66	-0.45	0.83
L2	77.33-34.33	-0.44	1.30	-0.53	1.32
L3	34.33-0.00	-0.35	1.04	-0.48	1.28

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	4	HB114-1-0813U4-M5J(1 1/4")	77.33 - 105.00	1.0000	1.0000
L1	5	HB114-21U3M12-XXXF(1-1 /4")	77.33 - 105.00	1.0000	1.0000
L1	8	7983A(1/2")	77.33 - 105.00	1.0000	1.0000
L1	9	9207(5/16")	77.33 - 105.00	1.0000	1.0000
L1	11	2" Rigid Conduit	77.33 - 105.00	1.0000	1.0000
L1	12	2" Rigid Conduit	77.33 - 105.00	1.0000	1.0000
L1	15	LCF158-50J(1-5/8")	77.33 - 90.00	1.0000	1.0000
L1	16	Safety Line 3/8	77.33 - 120.00	1.0000	1.0000
L2	4	HB114-1-0813U4-M5J(1 1/4")	34.33 - 77.33	1.0000	1.0000
L2	5	HB114-21U3M12-XXXF(1-1 /4")	34.33 - 77.33	1.0000	1.0000
L2	8	7983A(1/2")	34.33 - 77.33	1.0000	1.0000
L2	9	9207(5/16")	34.33 - 77.33	1.0000	1.0000
L2	11	2" Rigid Conduit	34.33 - 77.33	1.0000	1.0000
L2	12	2" Rigid Conduit	34.33 - 77.33	1.0000	1.0000
L2	15	LCF158-50J(1-5/8")	34.33 - 77.33	1.0000	1.0000
L2	16	Safety Line 3/8	34.33 - 77.33	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
level 115									
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.58 4.96 5.34	4.80 5.42 6.04	0.03 0.08 0.13
HBXX-6516DS-A2M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	5.66 6.06 6.47	4.53 5.20 5.86	0.05 0.10 0.15
HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	8.77 9.34 9.89	6.96 8.18 9.14	0.07 0.14 0.21
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	8.41 8.97 9.50	7.08 8.27 9.18	0.06 0.13 0.21
RRH2X60-AWS	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	1.88 2.06 2.24	1.24 1.39 1.54	0.04 0.06 0.08
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
RRH2X60-PCS	A	From Leg	4.00	0.000	115.00	No Ice	2.20	1.65	0.05

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
			0.00			1/2" Ice	2.39	1.83	0.07
			2.00			1" Ice	2.59	2.01	0.09
*									
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00	0.000	115.00	No Ice	4.58	4.80	0.03
			0.00			1/2" Ice	4.96	5.42	0.08
			2.00			1" Ice	5.34	6.04	0.13
HBXX-6516DS-A2M w/ Mount Pipe	B	From Leg	4.00	0.000	115.00	No Ice	5.66	4.53	0.05
			0.00			1/2" Ice	6.06	5.20	0.10
			2.00			1" Ice	6.47	5.86	0.15
HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.00	0.000	115.00	No Ice	8.77	6.96	0.07
			0.00			1/2" Ice	9.34	8.18	0.14
			2.00			1" Ice	9.89	9.14	0.21
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.000	115.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			2.00			1" Ice	9.50	9.18	0.21
RRH2X60-AWS	B	From Leg	4.00	0.000	115.00	No Ice	1.88	1.24	0.04
			0.00			1/2" Ice	2.06	1.39	0.06
			2.00			1" Ice	2.24	1.54	0.08
RRH2X60-PCS	B	From Leg	4.00	0.000	115.00	No Ice	2.20	1.65	0.05
			0.00			1/2" Ice	2.39	1.83	0.07
			2.00			1" Ice	2.59	2.01	0.09
*									
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.00	0.000	115.00	No Ice	4.58	4.80	0.03
			0.00			1/2" Ice	4.96	5.42	0.08
			2.00			1" Ice	5.34	6.04	0.13
HBXX-6516DS-A2M w/ Mount Pipe	C	From Leg	4.00	0.000	115.00	No Ice	5.66	4.53	0.05
			0.00			1/2" Ice	6.06	5.20	0.10
			2.00			1" Ice	6.47	5.86	0.15
HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.00	0.000	115.00	No Ice	8.77	6.96	0.07
			0.00			1/2" Ice	9.34	8.18	0.14
			2.00			1" Ice	9.89	9.14	0.21
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.000	115.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			2.00			1" Ice	9.50	9.18	0.21
RRH2X60-AWS	C	From Leg	4.00	0.000	115.00	No Ice	1.88	1.24	0.04
			0.00			1/2" Ice	2.06	1.39	0.06
			2.00			1" Ice	2.24	1.54	0.08
RRH2X60-PCS	C	From Leg	4.00	0.000	115.00	No Ice	2.20	1.65	0.05
			0.00			1/2" Ice	2.39	1.83	0.07
			2.00			1" Ice	2.59	2.01	0.09
Platform Mount [LP 602-1]	C	None		0.000	115.00	No Ice	32.03	32.03	1.34
						1/2" Ice	38.71	38.71	1.80
						1" Ice	45.39	45.39	2.26
level 107									
1900MHz RRH (65MHz)	A	From Leg	4.00	0.000	107.00	No Ice	2.31	2.38	0.06
			0.00			1/2" Ice	2.52	2.58	0.08
			-1.00			1" Ice	2.73	2.79	0.11
800MHZ RRH	A	From Leg	4.00	0.000	107.00	No Ice	2.13	1.77	0.05
			0.00			1/2" Ice	2.32	1.95	0.07
			1.00			1" Ice	2.51	2.13	0.10
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00	0.000	107.00	No Ice	0.66	0.32	0.01
			0.00			1/2" Ice	0.76	0.40	0.02
			-1.00			1" Ice	0.87	0.48	0.02
1900MHz RRH (65MHz)	B	From Leg	4.00	0.000	107.00	No Ice	2.31	2.38	0.06
			0.00			1/2" Ice	2.52	2.58	0.08
			-1.00			1" Ice	2.73	2.79	0.11
800MHZ RRH	B	From Leg	4.00	0.000	107.00	No Ice	2.13	1.77	0.05

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
			0.00			1/2" Ice	2.32	1.95	0.07
			1.00			1" Ice	2.51	2.13	0.10
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00	0.000	107.00	No Ice	0.66	0.32	0.01
			0.00			1/2" Ice	0.76	0.40	0.02
			-1.00			1" Ice	0.87	0.48	0.02
1900MHz RRH (65MHz)	C	From Leg	4.00	0.000	107.00	No Ice	2.31	2.38	0.06
			0.00			1/2" Ice	2.52	2.58	0.08
			-1.00			1" Ice	2.73	2.79	0.11
800MHZ RRH	C	From Leg	4.00	0.000	107.00	No Ice	2.13	1.77	0.05
			0.00			1/2" Ice	2.32	1.95	0.07
			1.00			1" Ice	2.51	2.13	0.10
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00	0.000	107.00	No Ice	0.66	0.32	0.01
			0.00			1/2" Ice	0.76	0.40	0.02
			-1.00			1" Ice	0.87	0.48	0.02
Side Arm Mount [SO 102-3]	C	None		0.000	107.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14
***									
level 105									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.000	105.00	No Ice	8.26	7.47	0.09
			0.00			1/2" Ice	8.82	8.66	0.16
			1.00			1" Ice	9.35	9.56	0.24
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.000	105.00	No Ice	8.26	7.47	0.09
			0.00			1/2" Ice	8.82	8.66	0.16
			1.00			1" Ice	9.35	9.56	0.24
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.000	105.00	No Ice	8.26	7.47	0.09
			0.00			1/2" Ice	8.82	8.66	0.16
			1.00			1" Ice	9.35	9.56	0.24
(3) ACU-A20-N	A	From Leg	4.00	0.000	105.00	No Ice	0.07	0.12	0.00
			0.00			1/2" Ice	0.10	0.16	0.00
			1.00			1" Ice	0.15	0.21	0.00
(3) ACU-A20-N	B	From Leg	4.00	0.000	105.00	No Ice	0.07	0.12	0.00
			0.00			1/2" Ice	0.10	0.16	0.00
			1.00			1" Ice	0.15	0.21	0.00
(3) ACU-A20-N	C	From Leg	4.00	0.000	105.00	No Ice	0.07	0.12	0.00
			0.00			1/2" Ice	0.10	0.16	0.00
			1.00			1" Ice	0.15	0.21	0.00
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00	0.000	105.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			1.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00	0.000	105.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			1.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00	0.000	105.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			1.00			1" Ice	7.47	6.47	0.19
TD-RRH8x20-25	A	From Leg	4.00	0.000	105.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			1.00			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	B	From Leg	4.00	0.000	105.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			1.00			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	C	From Leg	4.00	0.000	105.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			1.00			1" Ice	4.20	1.64	0.12
Pipe Mount	A	From Leg	4.00	0.000	105.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.00			1" Ice	1.81	1.81	0.04
Pipe Mount	B	From Leg	4.00	0.000	105.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			1.00			1" Ice	1.81	1.81	0.04
Pipe Mount	C	From Leg	4.00	0.000	105.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			1.00			1" Ice	1.81	1.81	0.04
LLPX310R w/ Mount Pipe	A	From Leg	4.00	0.000	105.00	No Ice	4.54	2.98	0.05
			0.00			1/2" Ice	4.89	3.53	0.08
			0.00			1" Ice	5.25	4.09	0.13
LLPX310R w/ Mount Pipe	B	From Leg	4.00	0.000	105.00	No Ice	4.54	2.98	0.05
			0.00			1/2" Ice	4.89	3.53	0.08
			0.00			1" Ice	5.25	4.09	0.13
LLPX310R w/ Mount Pipe	C	From Leg	4.00	0.000	105.00	No Ice	4.54	2.98	0.05
			0.00			1/2" Ice	4.89	3.53	0.08
			0.00			1" Ice	5.25	4.09	0.13
FDD_R6_RRH	A	From Leg	4.00	0.000	105.00	No Ice	1.53	0.68	0.03
			0.00			1/2" Ice	1.69	0.80	0.04
			0.00			1" Ice	1.85	0.92	0.06
FDD_R6_RRH	B	From Leg	4.00	0.000	105.00	No Ice	1.53	0.68	0.03
			0.00			1/2" Ice	1.69	0.80	0.04
			0.00			1" Ice	1.85	0.92	0.06
FDD_R6_RRH	C	From Leg	4.00	0.000	105.00	No Ice	1.53	0.68	0.03
			0.00			1/2" Ice	1.69	0.80	0.04
			0.00			1" Ice	1.85	0.92	0.06
Platform Mount [LP 602-1]	C	None		0.000	105.00	No Ice	32.03	32.03	1.34
						1/2" Ice	38.71	38.71	1.80
						1" Ice	45.39	45.39	2.26
*									
*									
level 90									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00	0.000	90.00	No Ice	5.40	4.70	0.05
			0.00			1/2" Ice	5.96	5.86	0.10
			0.00			1" Ice	6.48	6.73	0.15
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00	0.000	90.00	No Ice	5.40	4.70	0.05
			0.00			1/2" Ice	5.96	5.86	0.10
			0.00			1" Ice	6.48	6.73	0.15
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00	0.000	90.00	No Ice	5.40	4.70	0.05
			0.00			1/2" Ice	5.96	5.86	0.10
			0.00			1" Ice	6.48	6.73	0.15
Pipe Mount [PM 601-3]	C	None		0.000	90.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft^2	Weight K

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
level 105											
A-ANT-23G-2-C	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	0.000		105.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP2-18	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	0.000		105.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP800-11	C	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	0.000		105.00	2.80	No Ice 1/2" Ice 1" Ice	6.16 6.53 6.90	0.05 0.08 0.12

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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 77.33	Pole	Max Tension	20	0.00	-0.00	-0.00
			Max. Compression	26	-25.81	1.47	0.15
			Max. Mx	8	-9.83	-397.78	3.87
			Max. My	14	-9.91	3.20	-391.35
			Max. Vy	8	15.44	-397.78	3.87
			Max. Vx	14	14.94	3.20	-391.35
			Max. Torque	9			1.16
L2	77.33 - 34.33	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-39.84	2.82	-3.42
			Max. Mx	8	-18.06	-1172.92	9.03
			Max. My	14	-18.18	7.88	-1105.50
			Max. Vy	8	21.59	-1172.92	9.03
			Max. Vx	14	18.98	7.88	-1105.50
			Max. Torque	9			1.15
L3	34.33 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-55.30	3.74	-6.13
			Max. Mx	8	-28.82	-2123.76	13.90
			Max. My	14	-28.83	12.19	-1936.62
			Max. Vy	8	25.70	-2123.76	13.90
			Max. Vx	14	22.52	12.19	-1936.62
			Max. Torque	7			1.07

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	55.30	6.30	-0.01
	Max. H_x	20	28.84	25.62	-0.05
	Max. H_z	2	28.84	-0.16	22.44
	Max. M_x	2	1927.42	-0.16	22.44
	Max. M_z	8	2123.76	-25.68	0.13
	Max. Torsion	7	1.07	-19.30	11.34
	Min. Vert	23	21.63	19.24	11.19
	Min. H_x	8	28.84	-25.68	0.13
	Min. H_z	14	28.84	0.10	-22.50
	Min. M_x	14	-1936.62	0.10	-22.50
	Min. M_z	20	-2118.69	25.62	-0.05
	Min. Torsion	19	-0.89	19.23	-11.38

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	24.03	0.00	0.00	0.98	0.79	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	28.84	0.16	-22.44	-1927.42	-16.97	-0.44
0.9 Dead+1.6 Wind 0 deg - No Ice	21.63	0.16	-22.44	-1913.38	-17.07	-0.44
1.2 Dead+1.6 Wind 30 deg - No Ice	28.84	11.20	-19.49	-1675.17	-960.11	-0.75
0.9 Dead+1.6 Wind 30 deg - No Ice	21.63	11.20	-19.49	-1663.00	-953.21	-0.75
1.2 Dead+1.6 Wind 60 deg - No Ice	28.84	19.30	-11.34	-976.70	-1653.51	-1.07
0.9 Dead+1.6 Wind 60 deg - No Ice	21.63	19.30	-11.34	-969.72	-1641.47	-1.07
1.2 Dead+1.6 Wind 90 deg - No Ice	28.84	25.68	-0.13	-13.90	-2123.76	0.25
0.9 Dead+1.6 Wind 90 deg - No Ice	21.63	25.68	-0.13	-14.08	-2108.61	0.25
1.2 Dead+1.6 Wind 120 deg - No Ice	28.84	19.26	11.21	964.93	-1648.57	-0.44
0.9 Dead+1.6 Wind 120 deg - No Ice	21.63	19.26	11.21	957.45	-1636.57	-0.44
1.2 Dead+1.6 Wind 150 deg - No Ice	28.84	11.03	19.51	1680.24	-941.94	0.33
0.9 Dead+1.6 Wind 150 deg - No Ice	21.63	11.03	19.51	1667.44	-935.20	0.33
1.2 Dead+1.6 Wind 180 deg - No Ice	28.84	-0.10	22.50	1936.62	12.19	0.61
0.9 Dead+1.6 Wind 180 deg - No Ice	21.63	-0.10	22.50	1921.91	11.85	0.61
1.2 Dead+1.6 Wind 210 deg - No Ice	28.84	-11.17	19.52	1681.21	958.67	0.77
0.9 Dead+1.6 Wind 210 deg - No Ice	21.63	-11.17	19.52	1668.40	951.30	0.78
1.2 Dead+1.6 Wind 240 deg - No Ice	28.84	-19.23	11.38	983.64	1647.05	0.88
0.9 Dead+1.6 Wind 240 deg - No Ice	21.63	-19.23	11.38	976.01	1634.58	0.89
1.2 Dead+1.6 Wind 270 deg - No Ice	28.84	-25.62	0.05	6.69	2118.69	-0.26
0.9 Dead+1.6 Wind 270 deg - No Ice	21.63	-25.62	0.05	6.34	2103.10	-0.26
1.2 Dead+1.6 Wind 300 deg - No Ice	28.84	-19.24	-11.19	-959.55	1648.20	0.45
0.9 Dead+1.6 Wind 300 deg - No Ice	21.63	-19.24	-11.19	-952.71	1635.71	0.46
1.2 Dead+1.6 Wind 330 deg - No Ice	28.84	-11.06	-19.41	-1666.10	947.26	-0.34
0.9 Dead+1.6 Wind 330 deg - No Ice	21.63	-11.06	-19.41	-1654.00	939.99	-0.34
1.2 Dead+1.0 Ice+1.0 Temp	55.30	-0.00	0.00	6.13	3.74	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	55.30	0.03	-5.16	-463.62	0.03	-0.08
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	55.30	2.57	-4.48	-401.99	-230.47	-0.15
1.2 Dead+1.0 Wind 60 deg+1.0	55.30	4.44	-2.60	-231.62	-399.87	-0.22

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Ice+1.0 Temp 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	55.30	6.31	-0.03	3.00	-539.69	0.10
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	55.30	4.43	2.58	241.14	-398.81	-0.10
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	55.30	2.54	4.48	415.03	-226.69	0.06
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	55.30	-0.02	5.17	477.53	6.13	0.12
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	55.30	-2.57	4.48	415.24	237.35	0.15
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	55.30	-4.42	2.61	245.05	405.65	0.18
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	55.30	-6.30	0.01	7.31	545.78	-0.10
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	55.30	-4.43	-2.57	-228.04	405.91	0.10
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	55.30	-2.55	-4.46	-400.09	234.94	-0.06
Dead+Wind 0 deg - Service	24.03	0.03	-4.80	-409.94	-3.01	-0.10
Dead+Wind 30 deg - Service	24.03	2.40	-4.17	-356.20	-203.97	-0.16
Dead+Wind 60 deg - Service	24.03	4.13	-2.43	-207.37	-351.72	-0.23
Dead+Wind 90 deg - Service	24.03	5.49	-0.03	-2.22	-452.01	-0.25
Dead+Wind 120 deg - Service	24.03	4.12	2.40	206.34	-350.66	-0.10
Dead+Wind 150 deg - Service	24.03	2.36	4.17	358.76	-200.10	0.07
Dead+Wind 180 deg - Service	24.03	-0.02	4.81	413.39	3.20	0.13
Dead+Wind 210 deg - Service	24.03	-2.39	4.18	358.97	204.88	0.17
Dead+Wind 240 deg - Service	24.03	-4.11	2.43	210.33	351.55	0.19
Dead+Wind 270 deg - Service	24.03	-5.48	0.01	2.17	452.13	0.25
Dead+Wind 300 deg - Service	24.03	-4.12	-2.39	-203.71	351.79	0.10
Dead+Wind 330 deg - Service	24.03	-2.37	-4.15	-354.26	202.44	-0.07

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-24.03	0.00	0.00	24.03	0.00	0.000%
2	0.16	-28.84	-22.44	-0.16	28.84	22.44	0.000%
3	0.16	-21.63	-22.44	-0.16	21.63	22.44	0.000%
4	11.20	-28.84	-19.49	-11.20	28.84	19.49	0.000%
5	11.20	-21.63	-19.49	-11.20	21.63	19.49	0.000%
6	19.30	-28.84	-11.34	-19.30	28.84	11.34	0.000%
7	19.30	-21.63	-11.34	-19.30	21.63	11.34	0.000%
8	25.68	-28.84	-0.13	-25.68	28.84	0.13	0.000%
9	25.68	-21.63	-0.13	-25.68	21.63	0.13	0.000%
10	19.26	-28.84	11.21	-19.26	28.84	-11.21	0.000%
11	19.26	-21.63	11.21	-19.26	21.63	-11.21	0.000%
12	11.03	-28.84	19.51	-11.03	28.84	-19.51	0.000%
13	11.03	-21.63	19.51	-11.03	21.63	-19.51	0.000%
14	-0.10	-28.84	22.50	0.10	28.84	-22.50	0.000%
15	-0.10	-21.63	22.50	0.10	21.63	-22.50	0.000%
16	-11.17	-28.84	19.52	11.17	28.84	-19.52	0.000%
17	-11.17	-21.63	19.52	11.17	21.63	-19.52	0.000%
18	-19.23	-28.84	11.38	19.23	28.84	-11.38	0.000%
19	-19.23	-21.63	11.38	19.23	21.63	-11.38	0.000%
20	-25.62	-28.84	0.05	25.62	28.84	-0.05	0.000%
21	-25.62	-21.63	0.05	25.62	21.63	-0.05	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
22	-19.24	-28.84	-11.19	19.24	28.84	11.19	0.000%
23	-19.24	-21.63	-11.19	19.24	21.63	11.19	0.000%
24	-11.06	-28.84	-19.41	11.06	28.84	19.41	0.000%
25	-11.06	-21.63	-19.41	11.06	21.63	19.41	0.000%
26	0.00	-55.30	0.00	0.00	55.30	-0.00	0.000%
27	0.03	-55.30	-5.16	-0.03	55.30	5.16	0.000%
28	2.57	-55.30	-4.48	-2.57	55.30	4.48	0.000%
29	4.44	-55.30	-2.60	-4.44	55.30	2.60	0.000%
30	6.31	-55.30	-0.03	-6.31	55.30	0.03	0.000%
31	4.43	-55.30	2.58	-4.43	55.30	-2.58	0.000%
32	2.54	-55.30	4.48	-2.54	55.30	-4.48	0.000%
33	-0.02	-55.30	5.17	0.02	55.30	-5.17	0.000%
34	-2.57	-55.30	4.48	2.57	55.30	-4.48	0.000%
35	-4.42	-55.30	2.61	4.42	55.30	-2.61	0.000%
36	-6.30	-55.30	0.01	6.30	55.30	-0.01	0.000%
37	-4.43	-55.30	-2.57	4.43	55.30	2.57	0.000%
38	-2.55	-55.30	-4.46	2.55	55.30	4.46	0.000%
39	0.03	-24.03	-4.80	-0.03	24.03	4.80	0.000%
40	2.40	-24.03	-4.17	-2.40	24.03	4.17	0.000%
41	4.13	-24.03	-2.43	-4.13	24.03	2.43	0.000%
42	5.49	-24.03	-0.03	-5.49	24.03	0.03	0.000%
43	4.12	-24.03	2.40	-4.12	24.03	-2.40	0.000%
44	2.36	-24.03	4.17	-2.36	24.03	-4.17	0.000%
45	-0.02	-24.03	4.81	0.02	24.03	-4.81	0.000%
46	-2.39	-24.03	4.18	2.39	24.03	-4.18	0.000%
47	-4.11	-24.03	2.43	4.11	24.03	-2.43	0.000%
48	-5.48	-24.03	0.01	5.48	24.03	-0.01	0.000%
49	-4.12	-24.03	-2.39	4.12	24.03	2.39	0.000%
50	-2.37	-24.03	-4.15	2.37	24.03	4.15	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00006649
3	Yes	4	0.00000001	0.00003182
4	Yes	5	0.00000001	0.00014565
5	Yes	5	0.00000001	0.00006343
6	Yes	5	0.00000001	0.00015583
7	Yes	5	0.00000001	0.00006833
8	Yes	4	0.00000001	0.00028095
9	Yes	4	0.00000001	0.00017126
10	Yes	5	0.00000001	0.00014488
11	Yes	5	0.00000001	0.00006333
12	Yes	5	0.00000001	0.00014549
13	Yes	5	0.00000001	0.00006356
14	Yes	4	0.00000001	0.00026412
15	Yes	4	0.00000001	0.00016186
16	Yes	5	0.00000001	0.00015481
17	Yes	5	0.00000001	0.00006769
18	Yes	5	0.00000001	0.00014572
19	Yes	5	0.00000001	0.00006344
20	Yes	4	0.00000001	0.00017182
21	Yes	4	0.00000001	0.00010365
22	Yes	5	0.00000001	0.00014918

23	Yes	5	0.00000001	0.00006544
24	Yes	5	0.00000001	0.00014873
25	Yes	5	0.00000001	0.00006515
26	Yes	4	0.00000001	0.00002549
27	Yes	5	0.00000001	0.00011518
28	Yes	5	0.00000001	0.00013011
29	Yes	5	0.00000001	0.00013043
30	Yes	5	0.00000001	0.00012830
31	Yes	5	0.00000001	0.00013090
32	Yes	5	0.00000001	0.00013188
33	Yes	5	0.00000001	0.00011791
34	Yes	5	0.00000001	0.00013569
35	Yes	5	0.00000001	0.00013434
36	Yes	5	0.00000001	0.00013040
37	Yes	5	0.00000001	0.00013149
38	Yes	5	0.00000001	0.00013156
39	Yes	4	0.00000001	0.00001193
40	Yes	4	0.00000001	0.00005541
41	Yes	4	0.00000001	0.00006964
42	Yes	4	0.00000001	0.00002398
43	Yes	4	0.00000001	0.00005611
44	Yes	4	0.00000001	0.00005667
45	Yes	4	0.00000001	0.00001526
46	Yes	4	0.00000001	0.00006813
47	Yes	4	0.00000001	0.00005621
48	Yes	4	0.00000001	0.00002247
49	Yes	4	0.00000001	0.00006265
50	Yes	4	0.00000001	0.00006189

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	120 - 77.33	13.67	48	0.948	0.003
L2	82 - 34.33	6.61	48	0.750	0.001
L3	40 - 0	1.59	48	0.358	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
115.00	(2) DB844G65ZAXY w/ Mount Pipe	48	12.69	0.927	0.002	49601
109.00	A-ANT-23G-2-C	48	11.51	0.901	0.002	22546
107.00	1900MHz RRH (65MHz)	48	11.12	0.892	0.002	19077
105.00	APXVSPP18-C-A20 w/ Mount Pipe	48	10.74	0.883	0.002	16533
90.00	APXV18-206517S-C w/ Mount Pipe	48	7.97	0.803	0.001	8266

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 77.33	64.21	8	4.451	0.010
L2	82 - 34.33	31.08	8	3.523	0.004
L3	40 - 0	7.48	8	1.685	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
115.00	(2) DB844G65ZAXY w/ Mount Pipe	8	59.58	4.353	0.011	10697
109.00	A-ANT-23G-2-C	8	54.07	4.233	0.009	4861
107.00	1900MHz RRH (65MHz)	8	52.25	4.191	0.009	4113
105.00	APXVSPP18-C-A20 w/ Mount Pipe	8	50.44	4.148	0.009	3564
90.00	APXV18-206517S-C w/ Mount Pipe	8	37.44	3.775	0.006	1780

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 77.33 (1)	TP30.45x21.91x0.22	42.67	0.00	0.0	20.66	-9.83	1268.88	0.008
L2	77.33 - 34.33 (2)	TP38.61x29.08x0.31	47.67	0.00	0.0	37.46	-18.06	2448.70	0.007
L3	34.33 - 0 (3)	TP44.85x36.85x0.38	40.00	0.00	0.0	53.70	-28.82	3512.82	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	120 - 77.33 (1)	TP30.45x21.91x0.22	397.80	757.66	0.525	0.00	757.66	0.000
L2	77.33 - 34.33 (2)	TP38.61x29.08x0.31	1172.96	1853.02	0.633	0.00	1853.02	0.000
L3	34.33 - 0 (3)	TP44.85x36.85x0.38	2123.81	3181.27	0.668	0.00	3181.27	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	120 - 77.33 (1)	TP30.45x21.91x0.22	15.44	634.44	0.024	1.15	1536.30	0.001
L2	77.33 - 34.33 (2)	TP38.61x29.08x0.31	21.59	1224.35	0.018	0.06	3757.35	0.000
L3	34.33 - 0 (3)	TP44.85x36.85x0.38	25.70	1756.41	0.015	0.25	6450.62	0.000

Pole Interaction Design Data

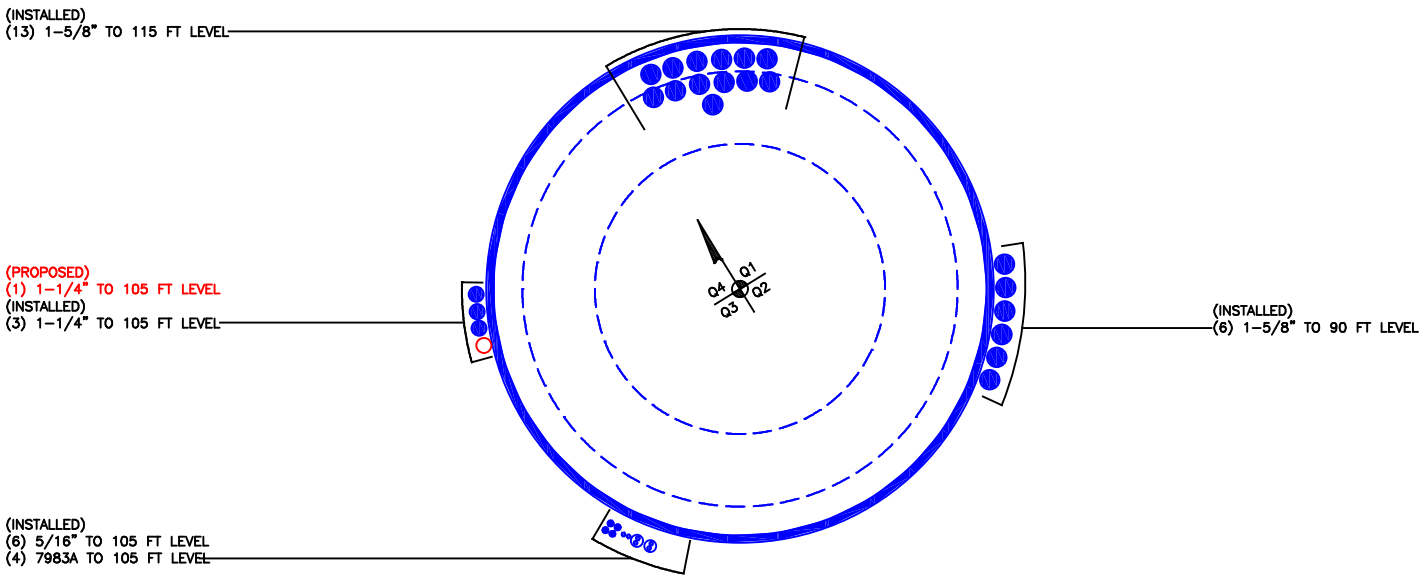
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 77.33 (1)	0.008	0.525	0.000	0.024	0.001	0.533 ✔	1.000	4.8.2 ✔
L2	77.33 - 34.33 (2)	0.007	0.633	0.000	0.018	0.000	0.641 ✔	1.000	4.8.2 ✔
L3	34.33 - 0 (3)	0.008	0.668	0.000	0.015	0.000	0.676 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	120 - 77.33	Pole	TP30.45x21.91x0.22	1	-9.83	1268.88	53.3	Pass
L2	77.33 - 34.33	Pole	TP38.61x29.08x0.31	2	-18.06	2448.70	64.1	Pass
L3	34.33 - 0	Pole	TP44.85x36.85x0.38	3	-28.82	3512.82	67.6	Pass
							Summary	
						Pole (L3)	67.6	Pass
						RATING =	**67.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806454 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	*806454*
Site Name:	*NHV 112 948129*
App #:	*396863 Rev #3*
Pole Manufacturer:	*Other*

Reactions		
Mu:	2124	ft-kips
Axial, Pu:	29	kips
Shear, Vu:	26	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	53	in

Anchor Rod Results

		Rigid
Max Rod (Cu+ Vu/ή):	167.0 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	64.2% **Pass**	

Plate Data		
Diam:	57.16	in
Thick:	2.75	in
Grade:	36	ksi
Single-Rod B-eff:	12.02	in

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	18.7 ksi	AISC LRFD
Allowable Plate Stress:	32.4 ksi	φ*Fy
Base Plate Stress Ratio:	57.7% **Pass**	Y.L. Length: 28.24

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

n/a

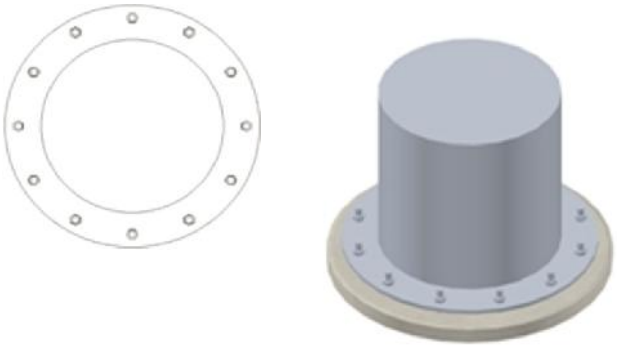
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	44.85	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

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

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

Site Data

BU#: *806454*
Site Name: *NHV 112 948129*
App #: *396863 Rev. 3*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	6	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	3	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	5.30	ft
Vert. Cage Diameter =	63.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	36	
As Total=	56.16	in^2
A s/ Aconc, Rho:	0.0138	1.38%

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

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

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	1.38%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	7076.54	kips
at Mu=(ϕ=0.65)Mn=	3617.71	ft-kips
Max Tu, (φ=0.9) Tn =	3032.64	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	2325	ft-kips **(* Note)**
Max. Factored Shaft Pu:	29	kips
Max Axial Force Type:	Comp.	

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

Load Factor	**Shaft Factored Loads**		
1.00	Mu:	2325	ft-kips
1.00	Pu:	29	kips

Material Properties

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

ACI 318 Code

Select Analysis ACI Code=	2008

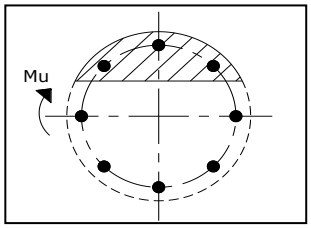
Seismic Properties

Seismic Design Category =	B
Seismic Risk =	**Low**

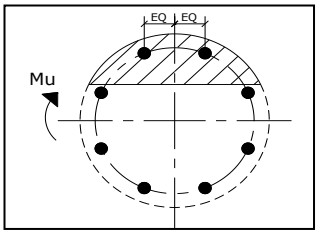
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**17.14**	in
Extreme Steel Strain, ϵt:	**0.0089**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	29.00	kips
Drilled Shaft Moment Capacity, φMn:	**6857.11**	ft-kips
Drilled Shaft Superimposed Mu:	**2325.00**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**33.9%**

FDH Velocitel -- 6521 Meridien Drive, Raleigh, NC 27616 -- Ph. 919.755.1012 -- Fax 919.755.1031

Version	1.5
Issue Date	3/13/2017

LPILE 2016 Foundation Inputs

Project & Site Details	
Project Number:	17QJIU1400
Site Name:	NHV 112 948129
Site ID:	806454
Code	ANSI/TIA-222-G
Water Table Depth (ft)	13
Caisson Diameter (ft)	6
Caisson Length (ft)	59.75
Ext. Above Grade (ft)	0.5
Frost Depth (ft)	Input Manually
Neglected Depth (ft)	3.33
Total # of Soil Layers	5
Boring Log	B-1
Foundation Type	Monopole Caisson

TNX Reactions		
Full Wind		
Moment	2,124	k-ft
Compression	29	k
Shear (comp.)	26	k

LPILE Input Reactions		
Full Wind		
Moment	**25,488,000**	lb-in
Vertical Load Down	**29,000**	lbs
Horizontal Load (comp.)	**26,000**	lbs

*File was last imported on 10-25-2017 at 16:05:48

LPILE Output				
Reaction	Maximum Reaction*	Unit	Allowable Deflection (in)	Pass/Fail
Moment	27,900,000	lb-in		
Axial	29	k		
Tensile		k		
Full Wind Deflection	0.79	in	1.5	PASS

DSMC Inputs		
$Moment_{comp.}$	2,325.00	k-ft
Compression	29	k

Soil Parameters per Geotechnical Investigation					Soil Parameters for LPILE INPUT					
Layer	Thickness (ft)	Unit Weight, g (pcf)	Phi Angle (°)	Cohesion (psf)	Soil Type	Top of Layer (ft)	Bottom of Layer (ft)	Phi Angle (°)	Cohesion (psf)	Effective Unit Weight, g_{eff} (pcf)
1	3.33	105	0	0	Sand (Reese)	0.5	3.83	-	-	105
2	8.67	105	25	0	Sand (Reese)	3.83	12.5	25	0	105
3	1	110	0	1250	Stiff Clay without Free Water (Reese)	12.5	13.5	0	1250	110
4	29	110	0	1250	Stiff Clay without Free Water (Reese)	13.5	42.5	0	1250	47.6
5	59.25	115	0	1500	Stiff Clay without Free Water (Reese)	42.5	59.75	0	1500	52.6

LPile for Windows, Version 2016-09.010

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This copy of LPile is being used by:

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is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\\fdh-server\Projects\2017 Effective - Client Jobs\CROWNC_Crown Castle USA Inc\CT\806454 - NHV 112 948129\17QJIU1400-STAMOO_SPRT\R.0\Analysis\Calcs\FDN\

Name of input data file:
806454, NHV 112 948129.lp9d

Name of output report file:
806454, NHV 112 948129.lp9o

Name of plot output file:
806454, NHV 112 948129.lp9p

Name of runtime message file:
806454, NHV 112 948129.lp9r

Date and Time of Analysis

Date: October 25, 2017 Time: 16:05:18

Problem Title

Project Name: NHV 112 948129

Job Number: 17QJIU1400

Client:

Engineer:

Description:

Program Options and Settings

Computational Options:
 - Use unfactored loads in computations (conventional analysis)
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-04 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	59.750 ft
Depth of ground surface below top of pile	=	0.5000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	72.0000
2	59.750	72.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile

Length of section	=	59.750000 ft
Shaft Diameter	=	72.000000 in
Shear capacity of section	=	0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	0.500000 ft
Distance from top of pile to bottom of layer	=	3.830000 ft
Effective unit weight at top of layer	=	105.000000 pcf
Effective unit weight at bottom of layer	=	105.000000 pcf
Friction angle at top of layer	=	0.0010000 deg.
Friction angle at bottom of layer	=	0.0010000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	3.830000 ft
Distance from top of pile to bottom of layer	=	12.500000 ft
Effective unit weight at top of layer	=	105.000000 pcf
Effective unit weight at bottom of layer	=	105.000000 pcf

```
   Friction angle at top of layer                        =    25.000000 deg.
   Friction angle at bottom of layer                     =    25.000000 deg.
   Subgrade k at top of layer                            =       0.0000 pci
   Subgrade k at bottom of layer                         =       0.0000 pci

   NOTE: Default values for subgrade k will be computed for this layer.

Layer 3 is stiff clay without free water

   Distance from top of pile to top of layer             =    12.500000 ft
   Distance from top of pile to bottom of layer          =    13.500000 ft
   Effective unit weight at top of layer                 =   110.000000 pcf
   Effective unit weight at bottom of layer              =   110.000000 pcf
   Undrained cohesion at top of layer                    =        1250. psf
   Undrained cohesion at bottom of layer                 =        1250. psf
   Epsilon-50 at top of layer                            =       0.0000
   Epsilon-50 at bottom of layer                         =       0.0000

   NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 4 is stiff clay without free water

   Distance from top of pile to top of layer             =    13.500000 ft
   Distance from top of pile to bottom of layer          =    42.500000 ft
   Effective unit weight at top of layer                 =    47.600000 pcf
   Effective unit weight at bottom of layer              =    47.600000 pcf
   Undrained cohesion at top of layer                    =        1250. psf
   Undrained cohesion at bottom of layer                 =        1250. psf
   Epsilon-50 at top of layer                            =       0.0000
   Epsilon-50 at bottom of layer                         =       0.0000

   NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 5 is stiff clay without free water

   Distance from top of pile to top of layer             =    42.500000 ft
   Distance from top of pile to bottom of layer          =    59.750000 ft
   Effective unit weight at top of layer                 =    52.600000 pcf
   Effective unit weight at bottom of layer              =    52.600000 pcf
   Undrained cohesion at top of layer                    =        1500. psf
   Undrained cohesion at bottom of layer                 =        1500. psf
   Epsilon-50 at top of layer                            =       0.0000
   Epsilon-50 at bottom of layer                         =       0.0000

   NOTE: Default values for Epsilon-50 will be computed for this layer.

 (Depth of the lowest soil layer extends 0.000 ft below the pile tip)


--------------------------------------------------------------------------------
                        Summary of Input Soil Properties
--------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective    Undrained    Angle of
 E50
Layer           Name             Depth       Unit Wt.    Cohesion     Friction
 or           kpy
 Num.     (p-y Curve Type)        ft           pcf          psf          deg.
 krm          pci
-----   ------------------   ----------   ----------   ----------   ----------
----------   ----------
  1            Sand              0.5000     105.0000       --          0.00100
```

--	default (Reese, et al.)	3.8300	105.0000	--		0.00100
-- 2	default Sand	3.8300	105.0000	--		25.0000
--	default (Reese, et al.)	12.5000	105.0000	--		25.0000
-- 3	default Stiff Clay	12.5000	110.0000	1250.	-- default	--
	w/o Free Water	13.5000	110.0000	1250.	-- default	--
4	Stiff Clay	13.5000	47.6000	1250.	-- default	--
	w/o Free Water	42.5000	47.6000	1250.	-- default	--
5	Stiff Clay	42.5000	52.6000	1500.	-- default	--
	w/o Free Water	59.7500	52.6000	1500.	-- default	--

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 26000. lbs	M = 25488000. in-lbs	29000.	No

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	59.750000 ft
Shaft Diameter	=	72.000000 in
Concrete Cover Thickness	=	3.000000 in
Number of Reinforcing Bars	=	36 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	4072. sq. in.
Total Area of Reinforcing Steel	=	56.160000 sq. in.
Area Ratio of Steel Reinforcement	=	1.38 percent
Edge-to-Edge Bar Spacing	=	4.219389 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	5.63
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	13608.727 kips
Tensile Load for Cracking of Concrete	=	-1642.497 kips
Nominal Axial Tensile Capacity	=	-3369.600 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.410000	1.560000	32.295000	0.00000
2	1.410000	1.560000	31.804366	5.607968
3	1.410000	1.560000	30.347373	11.045541
4	1.410000	1.560000	27.968290	16.147500
5	1.410000	1.560000	24.739405	20.758826
6	1.410000	1.560000	20.758826	24.739405
7	1.410000	1.560000	16.147500	27.968290
8	1.410000	1.560000	11.045541	30.347373
9	1.410000	1.560000	5.607968	31.804366
10	1.410000	1.560000	0.00000	32.295000
11	1.410000	1.560000	-5.607968	31.804366
12	1.410000	1.560000	-11.045541	30.347373
13	1.410000	1.560000	-16.147500	27.968290
14	1.410000	1.560000	-20.758826	24.739405
15	1.410000	1.560000	-24.739405	20.758826
16	1.410000	1.560000	-27.968290	16.147500
17	1.410000	1.560000	-30.347373	11.045541
18	1.410000	1.560000	-31.804366	5.607968
19	1.410000	1.560000	-32.295000	0.00000
20	1.410000	1.560000	-31.804366	-5.607968
21	1.410000	1.560000	-30.347373	-11.045541
22	1.410000	1.560000	-27.968290	-16.147500
23	1.410000	1.560000	-24.739405	-20.758826
24	1.410000	1.560000	-20.758826	-24.739405
25	1.410000	1.560000	-16.147500	-27.968290
26	1.410000	1.560000	-11.045541	-30.347373
27	1.410000	1.560000	-5.607968	-31.804366
28	1.410000	1.560000	0.00000	-32.295000
29	1.410000	1.560000	5.607968	-31.804366
30	1.410000	1.560000	11.045541	-30.347373

31	1.410000	1.560000	16.147500	-27.968290
32	1.410000	1.560000	20.758826	-24.739405
33	1.410000	1.560000	24.739405	-20.758826
34	1.410000	1.560000	27.968290	-16.147500
35	1.410000	1.560000	30.347373	-11.045541
36	1.410000	1.560000	31.804366	-5.607968

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 4.219 inches
between bars 22 and 23.

Ratio of bar spacing to maximum aggregate size = 5.63

Concrete Properties:

Compressive Strength of Concrete	=	3000. psi
Modulus of Elasticity of Concrete	=	3122019. psi
Modulus of Rupture of Concrete	=	-410.791918 psi
Compression Strain at Peak Stress	=	0.001634
Tensile Strain at Fracture of Concrete	=	-0.0001160
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	29.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 29.000 kips

Bending Curvature rad/in.	Bending Max Conc Stress ksi	Bending Max Steel Stress in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Run Msg
4.16667E-07	2322.	5572440980.	40.2648746	0.00001678	-0.00001322		

0.0607597	0.4821839				
8.33333E-07	4632.	5557963491.	38.1398973	0.00003178	-0.00002822
0.1145225	0.9130142				
0.00000125	6929.	5543315906.	37.4316184	0.00004679	-0.00004321
0.1677893	1.3438462				
0.00000167	9214.	5528625559.	37.0775078	0.00006180	-0.00005820
0.2205599	1.7746795				
0.00000208	11487.	5513918086.	36.8650639	0.00007680	-0.00007320
0.2728345	2.2055142				
0.00000250	13748.	5499202040.	36.7234529	0.00009181	-0.00008819
0.3246131	2.6363503				
0.00000292	15996.	5484481096.	36.6223180	0.0001068	-0.0001032
0.3758955	3.0671877				
0.00000333	15996.	4798920959.	21.5606917	0.00007187	-0.0001681
0.2539500	-4.8409998 C				
0.00000375	15996.	4265707519.	21.3865664	0.00008020	-0.0001898
0.2826222	-5.4650609 C				
0.00000417	15996.	3839136767.	21.2487930	0.00008854	-0.0002115
0.3111660	-6.0889375 C				
0.00000458	15996.	3490124334.	21.1339479	0.00009686	-0.0002331
0.3395254	-6.7130961 C				
0.00000500	15996.	3199280639.	21.0393087	0.0001052	-0.0002548
0.3677528	-7.3371002 C				
0.00000542	15996.	2953182129.	20.9604491	0.0001135	-0.0002765
0.3958523	-7.9609128 C				
0.00000583	15996.	2742240548.	20.8939924	0.0001219	-0.0002981
0.4238236	-8.5845329 C				
0.00000625	15996.	2559424511.	20.8374624	0.0001302	-0.0003198
0.4516663	-9.2079599 C				
0.00000667	15996.	2399460480.	20.7890020	0.0001386	-0.0003414
0.4793804	-9.8311929 C				
0.00000708	15996.	2258315745.	20.7471910	0.0001470	-0.0003630
0.5069654	-10.4542312 C				
0.00000750	15996.	2132853760.	20.7109250	0.0001553	-0.0003847
0.5344210	-11.0770738 C				
0.00000792	15996.	2020598299.	20.6793320	0.0001637	-0.0004063
0.5617471	-11.6997200 C				
0.00000833	15996.	1919568384.	20.6517144	0.0001721	-0.0004279
0.5889433	-12.3221690 C				
0.00000875	15996.	1828160365.	20.6275077	0.0001805	-0.0004495
0.6160094	-12.9444199 C				
0.00000917	15996.	1745062167.	20.6062498	0.0001889	-0.0004711
0.6429449	-13.5664721 C				
0.00000958	15996.	1669189899.	20.5875591	0.0001973	-0.0004927
0.6697498	-14.1883244 C				
0.00001000	16135.	1613477603.	20.5711178	0.0002057	-0.0005143
0.6964236	-14.8099760 C				
0.00001042	16782.	1611051596.	20.5566587	0.0002141	-0.0005359
0.7229662	-15.4314261 C				
0.00001083	17428.	1608768702.	20.5439558	0.0002226	-0.0005574
0.7493771	-16.0526740 C				
0.00001125	18074.	1606612867.	20.5328167	0.0002310	-0.0005790
0.7756561	-16.6737186 C				
0.00001167	18720.	1604570326.	20.5230764	0.0002394	-0.0006006
0.8018029	-17.2945592 C				
0.00001208	19365.	1602629004.	20.5144009	0.0002479	-0.0006221
0.8278100	-17.9152620 C				
0.00001250	20010.	1600778752.	20.5067892	0.0002563	-0.0006437
0.8536811	-18.5357889 C				
0.00001292	20654.	1599010778.	20.5002394	0.0002648	-0.0006652
0.8794201	-19.1561020 C				
0.00001333	21298.	1597317213.	20.4946544	0.0002733	-0.0006867
0.9050265	-19.7762003 C				

0.00001375	21941.	1595691158.	20.4899490	0.0002817	-0.0007083
0.9305000	-20.3960828 C				
0.00001417	22583.	1594126519.	20.4860480	0.0002902	-0.0007298
0.9558404	-21.0157486 C				
0.00001458	23226.	1592617903.	20.4828847	0.0002987	-0.0007513
0.9810474	-21.6351967 C				
0.00001500	23867.	1591160512.	20.4804000	0.0003072	-0.0007728
1.0061205	-22.2544260 C				
0.00001542	24509.	1589750067.	20.4785411	0.0003157	-0.0007943
1.0310595	-22.8734355 C				
0.00001583	25149.	1588382736.	20.4772609	0.0003242	-0.0008158
1.0558641	-23.4922243 C				
0.00001625	25790.	1587055084.	20.4765170	0.0003327	-0.0008373
1.0805339	-24.1107913 C				
0.00001708	27069.	1584506732.	20.4764896	0.0003498	-0.0008802
1.1294679	-25.3472557 C				
0.00001792	28346.	1582083650.	20.4781964	0.0003669	-0.0009231
1.1778589	-26.5828204 C				
0.00001875	29621.	1579768264.	20.4814220	0.0003840	-0.0009660
1.2257042	-27.8174767 C				
0.00001958	30894.	1577545975.	20.4859878	0.0004012	-0.0010088
1.2730010	-29.0512161 C				
0.00002042	32165.	1575404558.	20.4917446	0.0004184	-0.0010516
1.3197467	-30.2840296 C				
0.00002125	33433.	1573333691.	20.4985668	0.0004356	-0.0010944
1.3659385	-31.5159083 C				
0.00002208	34700.	1571324596.	20.5063482	0.0004528	-0.0011372
1.4115734	-32.7468430 C				
0.00002292	35965.	1569369763.	20.5149981	0.0004701	-0.0011799
1.4566486	-33.9768243 C				
0.00002375	37227.	1567462958.	20.5242802	0.0004875	-0.0012225
1.5011515	-35.2059519 C				
0.00002458	38488.	1565598635.	20.5340799	0.0005048	-0.0012652
1.5450754	-36.4342625 C				
0.00002542	39746.	1563771822.	20.5445194	0.0005222	-0.0013078
1.5884282	-37.6616275 C				
0.00002625	41002.	1561978225.	20.5555500	0.0005396	-0.0013504
1.6312070	-38.8880381 C				
0.00002708	42256.	1560214094.	20.5671291	0.0005570	-0.0013930
1.6734088	-40.1134846 C				
0.00002792	43507.	1558476117.	20.5792195	0.0005745	-0.0014355
1.7150304	-41.3379576 C				
0.00002875	44757.	1556761430.	20.5917885	0.0005920	-0.0014780
1.7560690	-42.5614462 C				
0.00002958	46004.	1555067272.	20.6048073	0.0006096	-0.0015204
1.7965211	-43.7839423 C				
0.00003042	47249.	1553391368.	20.6182504	0.0006271	-0.0015629
1.8363838	-45.0054349 C				
0.00003125	48492.	1551731614.	20.6320952	0.0006448	-0.0016052
1.8756537	-46.2259136 C				
0.00003208	49732.	1550086115.	20.6463219	0.0006624	-0.0016476
1.9143276	-47.4453679 C				
0.00003292	50970.	1548453154.	20.6609126	0.0006801	-0.0016899
1.9524022	-48.6637871 C				
0.00003375	52206.	1546831176.	20.6758516	0.0006978	-0.0017322
1.9898740	-49.8811602 C				
0.00003458	53439.	1545218763.	20.6911247	0.0007156	-0.0017744
2.0267397	-51.0974760 C				
0.00003542	54670.	1543614621.	20.7067196	0.0007334	-0.0018166
2.0629957	-52.3127233 C				
0.00003625	55898.	1542017563.	20.7226249	0.0007512	-0.0018588
2.0986385	-53.5268904 C				
0.00003708	57124.	1540426499.	20.7388308	0.0007691	-0.0019009

2.1336645	-54.7399656 C				
0.00003792	58348.	1538840421.	20.7553284	0.0007870	-0.0019430
2.1680701	-55.9519367 C				
0.00003875	59569.	1537258401.	20.7721098	0.0008049	-0.0019851
2.2018515	-57.1627915 C				
0.00003958	60787.	1535679574.	20.7891679	0.0008229	-0.0020271
2.2350050	-58.3725175 C				
0.00004042	62003.	1534103136.	20.8064967	0.0008409	-0.0020691
2.2675266	-59.5811019 C				
0.00004125	63217.	1532528339.	20.8240905	0.0008590	-0.0021110
2.2994125	-60.0000000 CY				
0.00004208	64428.	1530954481.	20.8419445	0.0008771	-0.0021529
2.3306588	-60.0000000 CY				
0.00004292	65636.	1529380902.	20.8600546	0.0008952	-0.0021948
2.3612613	-60.0000000 CY				
0.00004375	66815.	1527206748.	20.8754727	0.0009133	-0.0022367
2.3910029	-60.0000000 CY				
0.00004458	67854.	1521954123.	20.8757239	0.0009307	-0.0022793
2.4189844	-60.0000000 CY				
0.00004542	68783.	1514483919.	20.8647197	0.0009476	-0.0023224
2.4455016	-60.0000000 CY				
0.00004625	69613.	1505154503.	20.8439389	0.0009640	-0.0023660
2.4706739	-60.0000000 CY				
0.00004708	70401.	1495237962.	20.8198767	0.0009803	-0.0024097
2.4949764	-60.0000000 CY				
0.00004792	71150.	1484873025.	20.7931034	0.0009963	-0.0024537
2.5184577	-60.0000000 CY				
0.00004875	71815.	1473122220.	20.7583109	0.0010120	-0.0024980
2.5407544	-60.0000000 CY				
0.00004958	72447.	1461107065.	20.7216726	0.0010274	-0.0025426
2.5623128	-60.0000000 CY				
0.00005292	74742.	1412439092.	20.5664979	0.0010883	-0.0027217
2.6420117	-60.0000000 CY				
0.00005625	76680.	1363191608.	20.3943996	0.0011472	-0.0029028
2.7114490	-60.0000000 CY				
0.00005958	78220.	1312778578.	20.2002976	0.0012036	-0.0030864
2.7709189	-60.0000000 CY				
0.00006292	79661.	1266127695.	20.0223479	0.0012597	-0.0032703
2.8232862	-60.0000000 CY				
0.00006625	80862.	1220553470.	19.8392294	0.0013143	-0.0034557
2.8676905	-60.0000000 CY				
0.00006958	81889.	1176846973.	19.6519996	0.0013675	-0.0036425
2.9046971	-60.0000000 CY				
0.00007292	82904.	1136964826.	19.4843530	0.0014207	-0.0038293
2.9357433	-60.0000000 CY				
0.00007625	83783.	1098793608.	19.3185724	0.0014730	-0.0040170
2.9602793	-60.0000000 CY				
0.00007958	84482.	1061557669.	19.1476719	0.0015238	-0.0042062
2.9784745	-60.0000000 CY				
0.00008292	85168.	1027147022.	18.9888106	0.0015745	-0.0043955
2.9911111	-60.0000000 CY				
0.00008625	85841.	995258831.	18.8420317	0.0016251	-0.0045849
2.9982474	-60.0000000 CY				
0.00008958	86481.	965365993.	18.7058532	0.0016757	-0.0047743
2.9979386	-60.0000000 CY				
0.00009292	86983.	936143083.	18.5634442	0.0017249	-0.0049651
2.9999078	-60.0000000 CY				
0.00009625	87419.	908244527.	18.4251687	0.0017734	-0.0051566
2.9987469	-60.0000000 CY				
0.00009958	87842.	882092810.	18.2944332	0.0018218	-0.0053482
2.9981281	-60.0000000 CY				
0.0001029	88255.	857533886.	18.1707839	0.0018701	-0.0055399
2.9994139	-60.0000000 CY				

0.0001063	88662.	834464265.	18.0574022	0.0019186	-0.0057314
2.9964085	-60.0000000 CY				
0.0001096	89064.	812750010.	17.9532974	0.0019674	-0.0059226
2.9994935	-60.0000000 CY				
0.0001129	89441.	792095354.	17.8539793	0.0020160	-0.0061140
2.9965513	-60.0000000 CY				
0.0001163	89752.	772056921.	17.7516284	0.0020636	-0.0063064
2.9989691	-60.0000000 CY				
0.0001196	90000.	752614582.	17.6461235	0.0021102	-0.0064998
2.9993615	-60.0000000 CY				
0.0001229	90238.	734139242.	17.5406441	0.0021560	-0.0066940
2.9968693	60.0000000 CY				
0.0001263	90473.	716621139.	17.4414472	0.0022020	-0.0068880
2.9994346	60.0000000 CY				
0.0001296	90707.	699986966.	17.3486765	0.0022481	-0.0070819
2.9983194	60.0000000 CY				
0.0001329	90937.	684167264.	17.2620139	0.0022944	-0.0072756
2.9963603	60.0000000 CY				
0.0001363	91166.	669110531.	17.1805601	0.0023409	-0.0074691
2.9990896	60.0000000 CY				
0.0001396	91394.	654761843.	17.1039593	0.0023874	-0.0076626
2.9999752	60.0000000 CY				
0.0001429	91619.	641063736.	17.0323466	0.0024342	-0.0078558
2.9939975	60.0000000 CY				
0.0001462	91840.	627965634.	16.9642969	0.0024810	-0.0080490
2.9974549	60.0000000 CY				
0.0001496	92056.	615418998.	16.8977542	0.0025276	-0.0082424
2.9994858	60.0000000 CY				
0.0001529	92233.	603159082.	16.8242438	0.0025727	-0.0084373
2.9993148	60.0000000 CY				
0.0001562	92385.	591262541.	16.7531588	0.0026177	-0.0086323
2.9942105	60.0000000 CY				
0.0001596	92516.	579732848.	16.6809108	0.0026620	-0.0088280
2.9955219	60.0000000 CY				
0.0001629	92636.	568611377.	16.6098868	0.0027060	-0.0090240
2.9980281	60.0000000 CY				
0.0001662	92739.	557828533.	16.5491820	0.0027513	-0.0092187
2.9995766	60.0000000 CY				
0.0001696	92835.	547428250.	16.4939525	0.0027971	-0.0094129
2.9992541	60.0000000 CY				
0.0001729	92929.	537420626.	16.4418193	0.0028431	-0.0096069
2.9944424	60.0000000 CY				
0.0001762	93023.	527788643.	16.3921075	0.0028891	-0.0098009
2.9933519	60.0000000 CY				
0.0001796	93107.	518458789.	16.3485145	0.0029359	-0.0099941
2.9965636	60.0000000 CY				
0.0001829	93188.	509456200.	16.3076887	0.0029829	-0.0101871
2.9987413	60.0000000 CY				
0.0002029	93608.	461312116.	16.1103761	0.0032691	-0.0113409
2.9977593	60.0000000 CYT				
0.0002229	93907.	421266324.	15.9797292	0.0035621	-0.0124879
2.9932196	60.0000000 CYT				
0.0002429	94070.	387252088.	15.8512981	0.0038505	-0.0136395
2.9936157	60.0000000 CYT				

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	29.000	93213.054	0.00300000

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	93213.	18.850000	60588.	1.5359E+09
1	0.70	93213.	20.300000	65249.	1.5299E+09
1	0.75	93213.	21.750000	69910.	1.5014E+09

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.5000	0.00	N.A.	No	0.00	61.8010
2	3.8300	3.3300	Yes	No	61.8010	281296.
3	12.5000	9.8170	No	No	281358.	36838.
4	13.5000	10.8170	Yes	No	318196.	1470304.
5	42.5000	39.8170	Yes	No	1788500.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 26000.0 lbs
Applied moment at pile head = 25488000.0 in-lbs
Axial thrust load on pile head = 29000.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*h	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	in-lb^2	lb/inch	lb/inch	lb/inch
0.00	0.7858	2.55E+07	26000.	-0.00513	0.00	1.59E+12	0.00	0.00	0.00
0.5975	0.7494	2.57E+07	26000.	-0.00502	0.00	1.59E+12	-3.24E-04	0.00310	0.00
1.1950	0.7139	2.59E+07	26000.	-0.00490	0.00	1.59E+12	-0.00220	0.02208	0.00
1.7925	0.6791	2.61E+07	26000.	-0.00479	0.00	1.59E+12	-0.00389	0.04106	0.00
2.3900	0.6452	2.62E+07	26000.	-0.00467	0.00	1.59E+12	-0.00540	0.06004	0.00
2.9875	0.6122	2.64E+07	26000.	-0.00455	0.00	1.59E+12	-0.00675	0.07903	0.00
3.5850	0.5800	2.66E+07	26000.	-0.00443	0.00	1.59E+12	-0.00793	0.09801	0.00
4.1825	0.5487	2.68E+07	25197.	-0.00431	0.00	1.59E+12	-223.8288	2925.	0.00
4.7800	0.5183	2.70E+07	23514.	-0.00419	0.00	1.58E+12	-245.7102	3399.	0.00
5.3775	0.4887	2.71E+07	21687.	-0.00406	0.00	1.58E+12	-264.0338	3874.	0.00
5.9750	0.4600	2.73E+07	19740.	-0.00394	0.00	1.58E+12	-278.9768	4348.	0.00
6.5725	0.4322	2.74E+07	17698.	-0.00382	0.00	1.58E+12	-290.7174	4823.	0.00
7.1700	0.4053	2.75E+07	15582.	-0.00369	0.00	1.58E+12	-299.4348	5298.	0.00
7.7675	0.3792	2.76E+07	13414.	-0.00357	0.00	1.58E+12	-305.3089	5772.	0.00
8.3650	0.3541	2.77E+07	11213.	-0.00344	0.00	1.58E+12	-308.5204	6247.	0.00
8.9625	0.3299	2.78E+07	8999.	-0.00332	0.00	1.58E+12	-309.2504	6721.	0.00
9.5600	0.3066	2.79E+07	6787.	-0.00319	0.00	1.58E+12	-307.6801	7196.	0.00
10.1575	0.2842	2.79E+07	4594.	-0.00306	0.00	1.58E+12	-303.9909	7670.	0.00
10.7550	0.2626	2.79E+07	2435.	-0.00294	0.00	1.58E+12	-298.3642	8145.	0.00
11.3525	0.2420	2.79E+07	321.8373	-0.00281	0.00	1.58E+12	-290.9808	8620.	0.00
11.9500	0.2224	2.79E+07	-1732.	-0.00268	0.00	1.58E+12	-282.0215	9094.	0.00
12.5475	0.2036	2.79E+07	-6177.	-0.00256	0.00	1.58E+12	-957.8283	33737.	0.00
13.1450	0.1857	2.79E+07	-13038.	-0.00243	0.00	1.58E+12	-955.8903	36911.	0.00
13.7425	0.1687	2.77E+07	-19872.	-0.00230	0.00	1.58E+12	-950.3191	40388.	0.00
14.3400	0.1526	2.76E+07	-26649.	-0.00218	0.00	1.58E+12	-940.2037	44166.	0.00
14.9375	0.1375	2.74E+07	-33350.	-0.00206	0.00	1.58E+12			

-928.9342	48456.	0.00				
15.5350	0.1232	2.71E+07	-39966.	-0.00193	0.00	1.58E+12
-916.4648	53353.	0.00				
16.1325	0.1097	2.68E+07	-46488.	-0.00181	0.00	1.59E+12
-902.7445	58977.	0.00				
16.7300	0.09720	2.64E+07	-52906.	-0.00169	0.00	1.59E+12
-887.7156	65480.	0.00				
17.3275	0.08552	2.60E+07	-59213.	-0.00157	0.00	1.59E+12
-871.3128	73054.	0.00				
17.9250	0.07467	2.56E+07	-65396.	-0.00145	0.00	1.59E+12
-853.4611	81949.	0.00				
18.5225	0.06466	2.51E+07	-71446.	-0.00134	0.00	1.59E+12
-834.0739	92495.	0.00				
19.1200	0.05545	2.46E+07	-77351.	-0.00123	0.00	1.59E+12
-813.0495	105129.	0.00				
19.7175	0.04704	2.40E+07	-83099.	-0.00112	0.00	1.59E+12
-790.2672	120452.	0.00				
20.3150	0.03941	2.34E+07	-88676.	-0.00101	0.00	1.59E+12
-765.5814	139300.	0.00				
20.9125	0.03252	2.27E+07	-94070.	-9.09E-04	0.00	1.59E+12
-738.8135	162870.	0.00				
21.5100	0.02638	2.20E+07	-99263.	-8.08E-04	0.00	1.60E+12
-709.7396	192935.	0.00				
22.1075	0.02094	2.13E+07	-104238.	-7.11E-04	0.00	1.60E+12
-678.0715	232216.	0.00				
22.7050	0.01618	2.05E+07	-108975.	-6.17E-04	0.00	1.60E+12
-643.4270	285093.	0.00				
23.3025	0.01209	1.97E+07	-113452.	-5.27E-04	0.00	1.60E+12
-605.2774	359047.	0.00				
23.9000	0.00863	1.89E+07	-117640.	-4.41E-04	0.00	1.60E+12
-562.8508	467885.	0.00				
24.4975	0.00577	1.80E+07	-121504.	-3.58E-04	0.00	1.61E+12
-514.9295	639986.	0.00				
25.0950	0.00349	1.72E+07	-124996.	-2.80E-04	0.00	1.61E+12
-459.3536	943808.	0.00				
25.6925	0.00176	1.62E+07	-128047.	-2.05E-04	0.00	1.61E+12
-391.4373	1596394.	0.00				
26.2900	5.44E-04	1.53E+07	-129960.	-1.59E-04	0.00	5.49E+12
-142.2266	1873983.	0.00				
26.8875	-5.26E-04	1.44E+07	-129971.	-1.40E-04	0.00	5.49E+12
139.0812	1894737.	0.00				
27.4850	-0.00146	1.35E+07	-128088.	-1.22E-04	0.00	5.50E+12
386.0648	1893032.	0.00				
28.0825	-0.00227	1.25E+07	-125142.	-1.05E-04	0.00	5.51E+12
435.7938	1374987.	0.00				
28.6800	-0.00297	1.17E+07	-121892.	-8.91E-05	0.00	5.51E+12
470.8104	1138278.	0.00				
29.2775	-0.00355	1.08E+07	-118420.	-7.45E-05	0.00	5.52E+12
497.7085	1005212.	0.00				
29.8750	-0.00403	9958086.	-114774.	-6.10E-05	0.00	5.52E+12
519.2700	922961.	0.00				
30.4725	-0.00443	9148517.	-110987.	-4.86E-05	0.00	5.53E+12
536.9540	870025.	0.00				
31.0700	-0.00473	8366550.	-107085.	-3.73E-05	0.00	5.53E+12
551.6283	835972.	0.00				
31.6675	-0.00496	7612938.	-103086.	-2.69E-05	0.00	5.54E+12
563.8528	815150.	0.00				
32.2650	-0.00512	6888312.	-99006.	-1.75E-05	0.00	5.54E+12
574.0112	804261.	0.00				
32.8625	-0.00521	6193193.	-94861.	-9.08E-06	0.00	5.55E+12
582.3783	801292.	0.00				
33.4600	-0.00525	5528012.	-90661.	-1.51E-06	0.00	5.55E+12
589.1567	804991.	0.00				

34.0575	-0.00523	4893118.	-86417.	5.22E-06	0.00	5.56E+12
594.5005	814585.	0.00				
34.6550	-0.00517	4288784.	-82140.	1.11E-05	0.00	5.56E+12
598.5295	829626.	0.00				
35.2525	-0.00507	3715220.	-77839.	1.63E-05	0.00	5.56E+12
601.3378	849901.	0.00				
35.8500	-0.00494	3172568.	-73521.	2.07E-05	0.00	5.56E+12
603.0008	875382.	0.00				
36.4475	-0.00478	2660915.	-69196.	2.45E-05	0.00	5.57E+12
603.5793	906195.	0.00				
37.0450	-0.00459	2180291.	-64870.	2.76E-05	0.00	5.57E+12
603.1231	942602.	0.00				
37.6425	-0.00438	1730672.	-60551.	3.01E-05	0.00	5.57E+12
601.6731	985003.	0.00				
38.2400	-0.00416	1311984.	-56245.	3.21E-05	0.00	5.57E+12
599.2627	1033939.	0.00				
38.8375	-0.00392	924103.	-51960.	3.35E-05	0.00	5.57E+12
595.9192	1090106.	0.00				
39.4350	-0.00367	566858.	-47703.	3.45E-05	0.00	5.57E+12
591.6653	1154373.	0.00				
40.0325	-0.00343	240029.	-43479.	3.50E-05	0.00	5.57E+12
586.5195	1227814.	0.00				
40.6300	-0.00317	-56648.	-39295.	3.51E-05	0.00	5.57E+12
580.4968	1311749.	0.00				
41.2275	-0.00292	-323482.	-35158.	3.49E-05	0.00	5.57E+12
573.6090	1407795.	0.00				
41.8250	-0.00267	-560827.	-31073.	3.43E-05	0.00	5.57E+12
565.8647	1517944.	0.00				
42.4225	-0.00243	-769082.	-27046.	3.35E-05	0.00	5.57E+12
557.2699	1644655.	0.00				
43.0200	-0.00219	-948687.	-22793.	3.23E-05	0.00	5.57E+12
629.1797	2056950.	0.00				
43.6175	-0.00197	-1095948.	-18324.	3.10E-05	0.00	5.57E+12
617.4576	2252316.	0.00				
44.2150	-0.00175	-1211465.	-13942.	2.95E-05	0.00	5.57E+12
604.7458	2480325.	0.00				
44.8125	-0.00154	-1295892.	-9655.	2.79E-05	0.00	5.57E+12
591.0232	2748311.	0.00				
45.4100	-0.00135	-1349935.	-5571.	2.62E-05	0.00	5.57E+12
548.2179	2916837.	0.00				
46.0075	-0.00117	-1375794.	-1892.	2.45E-05	0.00	5.57E+12
478.1864	2941124.	0.00				
46.6050	-9.97E-04	-1377071.	1300.	2.27E-05	0.00	5.57E+12
412.1724	2965411.	0.00				
47.2025	-8.40E-04	-1357157.	4034.	2.09E-05	0.00	5.57E+12
350.3096	2989698.	0.00				
47.8000	-6.96E-04	-1319234.	6339.	1.92E-05	0.00	5.57E+12
292.6500	3013985.	0.00				
48.3975	-5.64E-04	-1266266.	8245.	1.76E-05	0.00	5.57E+12
239.1727	3038272.	0.00				
48.9950	-4.44E-04	-1201002.	9783.	1.60E-05	0.00	5.57E+12
189.7924	3062560.	0.00				
49.5925	-3.35E-04	-1125980.	10981.	1.45E-05	0.00	5.57E+12
144.3688	3086847.	0.00				
50.1900	-2.37E-04	-1043537.	11865.	1.31E-05	0.00	5.57E+12
102.0093	3089786.	0.00				
50.7875	-1.48E-04	-955848.	12458.	1.18E-05	0.00	5.57E+12
63.6610	3089786.	0.00				
51.3850	-6.76E-05	-864887.	12791.	1.06E-05	0.00	5.57E+12
29.1128	3089786.	0.00				
51.9825	4.63E-06	-772429.	12888.	9.57E-06	0.00	5.57E+12
-1.9970	3089786.	0.00				
52.5800	6.97E-05	-680074.	12773.	8.64E-06	0.00	5.57E+12

```
-30.0360   3089786.       0.00
   53.1775   1.28E-04   -589262.     12467.   7.82E-06       0.00   5.57E+12
-55.3712   3089786.       0.00
   53.7750   1.82E-04   -501297.     11988.   7.12E-06       0.00   5.57E+12
-78.3638   3089786.       0.00
   54.3725   2.31E-04   -417361.     11351.   6.53E-06       0.00   5.57E+12
-99.3634   3089786.       0.00
   54.9700   2.75E-04   -338532.     10569.   6.04E-06       0.00   5.57E+12
-118.7037   3089786.       0.00
   55.5675   3.17E-04   -265806.      9653.   5.65E-06       0.00   5.57E+12
-136.6982   3089786.       0.00
   56.1650   3.57E-04   -200107.      8612.   5.35E-06       0.00   5.57E+12
-153.6360   3089786.       0.00
   56.7625   3.94E-04   -142306.      7453.   5.13E-06       0.00   5.57E+12
-169.7782   3089786.       0.00
   57.3600   4.30E-04    -93233.      6180.   4.98E-06       0.00   5.57E+12
-185.3546   3089786.       0.00
   57.9575   4.65E-04    -53690.      4796.   4.89E-06       0.00   5.57E+12
-200.5604   3089786.       0.00
   58.5550   5.00E-04    -24457.      3305.   4.84E-06       0.00   5.57E+12
-215.5528   3089786.       0.00
   59.1525   5.35E-04     -6305.      1706.   4.82E-06       0.00   5.57E+12
-230.4479   3089786.       0.00
   59.7500   5.69E-04       0.00       0.00   4.81E-06       0.00   5.57E+12
-245.3180   1544893.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.78582645 inches
Computed slope at pile head      =    -0.00513436 radians
Maximum bending moment           =      27945450. inch-lbs
Maximum shear force              =       -129971. lbs
Depth of maximum bending moment  =    11.35250000 feet below pile head
Depth of maximum shear force     =    26.88750000 feet below pile head
Number of iterations             =             57
Number of zero deflection points =              2
```

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

```
Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians
```

Load Case	Load Type	Pile-head Loading	Axial Pile-head Deflection	Pile-head Rotation	Max Shear in Pile	Max Moment in Pile

No.	1 Load 1	2 Load 2	lbs	inches	radians	lbs in-lbs
1	V, lb 26000.	M, in-lb 2.55E+07	29000.	0.7858	-0.00513	-129971. 2.79E+07

Maximum pile-head deflection = 0.7858264547 inches
Maximum pile-head rotation = -0.0051343578 radians = -0.294177 deg.

Summary of Warning Messages

The following warning was reported 342 times

**** Warning ****

An unreasonable value was input for friction angle has been specified
for a soil layer defined uisng the sand criteria. The input value is
either smaller than 20 degrees or higher than 48 degrees. The input
data should be checked for correctness.

The analysis ended normally.

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

SPRINT Existing Facility

Site ID: CT03XC039

North Haven
117 Washington Street
North Haven, CT 06473

November 24, 2017

EBI Project Number: 6217005314

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	8.41 %

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

EBI Consulting
environmental | engineering | due diligence

November 24, 2017

SPRINT
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Emissions Analysis for Site: **CT03XC039 – North Haven**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **117 Washington Street, North Haven, CT**, for the purpose of determining whether the emissions from the Proposed SPRINT Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 850 MHz Band is approximately 567 $\mu W/cm^2$. The general population exposure limit for the 1900 MHz (PCS) and 2500 MHz (BRS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed SPRINT Wireless antenna facility located at **117 Washington Street, North Haven, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since SPRINT is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 1 CDMA channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

2) 2 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

3) 5 CDMA channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 16 Watts per Channel.

4) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

5) 8 LTE channels (2500 MHz (BRS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

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

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

8) The antennas used in this modeling are the **RFS APXVSPP18-C-A20 and the RFS APXVTM14-C-120** for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerlines of the proposed antennas are **106 feet** above ground level (AGL) for **Sector A**, **106 feet** above ground level (AGL) for **Sector B** and **106 feet** above ground level (AGL) for Sector C.

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

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

SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXVSPP18-C-A20	Make / Model:	RFS APXVSPP18-C-A20	Make / Model:	RFS APXVSPP18-C-A20
Gain:	13.4 / 15.9 dBd	Gain:	13.4 / 15.9 dBd	Gain:	13.4 / 15.9 dBd
Height (AGL):	**106 feet**	Height (AGL):	**106 feet**	Height (AGL):	**106 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	10	Channel Count	10	Channel Count	10
Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts
ERP (W):	7,537.38	ERP (W):	7,537.38	ERP (W):	7,537.38
Antenna A1 MPE%	**3.07 %**	Antenna B1 MPE%	**3.07 %**	Antenna C1 MPE%	**3.07 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVTM14-C-120	Make / Model:	RFS APXVTM14-C-120	Make / Model:	RFS APXVTM14-C-120
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	**106 feet**	Height (AGL):	**106 feet**	Height (AGL):	**106 feet**
Frequency Bands	2500 MHz (BRS)	Frequency Bands	2500 MHz (BRS)	Frequency Bands	2500 MHz (BRS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power(W):	160 Watts	Total TX Power(W):	160 Watts	Total TX Power(W):	160 Watts
ERP (W):	6,224.72	ERP (W):	6,224.72	ERP (W):	6,224.72
Antenna A2 MPE%	**2.24 %**	Antenna B2 MPE%	**2.24 %**	Antenna C2 MPE%	**2.24 %**

Site Composite MPE%	
Carrier	**MPE%**
SPRINT – Max per sector	**5.31 %**
Clearwire	0.19 %
Verizon Wireless	2.91 %
Site Total MPE %:	**8.41 %**

SPRINT Sector A Total:	5.31 %
SPRINT Sector B Total:	5.31 %
SPRINT Sector C Total:	5.31 %
Site Total:	8.41 %

SPRINT _ Frequency Band / Technology	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
Sprint 850 MHz CDMA	1	437.55	106	1.57	850 MHz	567	0.28%
Sprint 850 MHz LTE	2	437.55	106	3.15	850 MHz	567	0.55%
Sprint 1900 MHz (PCS) CDMA	5	622.47	106	11.19	1900 MHz (PCS)	1000	1.12%
Sprint 1900 MHz (PCS) LTE	2	1,556.18	106	11.19	1900 MHz (PCS)	1000	1.12%
Sprint 2500 MHz (BRS) LTE	8	778.09	106	22.38	2500 MHz (BRS)	1000	2.24%
						Total:	**5.31%**

Summary

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

The anticipated maximum composite contributions from the SPRINT facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

SPRINT Sector	Power Density Value (%)
Sector A:	5.31 %
Sector B:	5.31 %
Sector C:	5.31 %
SPRINT Maximum Total (per sector):	5.31 %
Site Total:	8.41 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **8.41 %** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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