Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

April 5, 2019

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

Notice of Exempt Modification
100 Reef Road, Fairfield, CT 06824
Latitude- 41.139444
Longitude- -73.257222

Dear Ms. Bachman,

Sprint currently maintains (3) existing antennas at the 110' level of the existing 145' monopole at 100 Reef Road in Fairfield, Connecticut. The tower and property are owned by the Town of Fairfield. Sprint now intends to remove the (3) existing antennas and add (6) 800/1900/2500 MHz antennas. These antennas would be installed at the same 110' level of the tower. Sprint also intends to add (3) remote radio heads, and (3) hybrid cables.

This tower facility was originally approved on January 11, 1994 by the Town of Fairfield's Zoning Board of Appeals. The approval came with a restriction prohibiting "directional panels". Sprint was subsequently to add panel antennas through the issuance of a building permit dated April 30, 1998. Correspondence pertaining to these approvals are enclosed in this filing. This proposed modification complies with previous approvals from the Town of Fairfield.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. 16-50j-72(b)(2). In accordance with R.C.S.A. 16-50j-73, a copy of this letter is being sent to Mike Tetreau, First Selectmen of the Town of Fairfield, and Jim Wendt, Planning Director for the Town of Fairfield.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-72(b)(2).

1. The proposed modification will not result in an increase in the height of the existing structure

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

3. The proposed modifications 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 Communications Commission safety standard.

5. The proposed modification 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 constitute an exempt modification under R.C.S.A. 16-50j-72(b)(2).

Sincerely,

Kyle Richers

Kyle Richers
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey 07430
908-447-4716
krichers@transcendwireless.com

cc: Mike Tetreau- as elected official
Jim Wendt- as zoning official

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Friday, April 5, 2019 8:53 AM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT03XC354 CSC ZO

You have a package coming.

Scheduled Delivery Date: Monday, 04/08/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424290396628
Ship To:	Jim Wendt Town of Fairfield 725 Old Post Road FAIRFIELD, CT 068246684 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	04/08/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT03XC354 CSC ZO

Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Friday, April 5, 2019 8:54 AM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT03XC354 CSC EO

You have a package coming.

Scheduled Delivery Date: Monday, 04/08/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424294050636
Ship To:	Mike Tetreau Town of Fairfield 725 Old Post Road FAIRFIELD, CT 068246684 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	04/08/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT03XC354 CSC EO

Download the UPS mobile app

Town of Fairfield

Stephen Verbil
Director

Fairfield, Connecticut 06430
Emergency Communications Center

100 Reef Road
(203) 254-4888
FAX (203) 254-4887

January 5, 1998

Zoning Board of Appeals
Attn.: Chairman, ZBA
Town of Fairfield
725 Old Post Road
Fairfield, CT 06430

Dear Chairman:

The Emergency Communications Center is the agency of the Town of Fairfield which answers emergency and non-emergency calls for service, and dispatches Police, Fire and Emergency Medical help to citizens in need. We provide and maintain the radio systems used by the Public Safety departments in the day-to-day performance of their duties. These systems include the structures to which the antennas for these radio systems are attached. There are currently five locations in use: Police Headquarters, St. Vincent's Hospital, the Jewish Home for the Elderly, the Burr Street water tank and Fire Station #5. This letter concerns two towers owned by the Town:

Site 1: 3965 Congress Street (Fire Station #5), Assessor's Map #170, Parcel #41
Site 2: 100 Reef Road (Police Headquarters), Assessor's Map #182, Parcel #670

On January 11, 1994, the Zoning Board of Appeals approved the Town's Applications for Variance for these two locations, allowing an increase in height to 173' at *Site 1*, and 168' at *Site 2*, with additional permission for an equipment shed on the roof at *Site 2*. Both variances contain a restriction prohibiting "directional panels", and allowing only "whip antennas."

The two towers were built by Nextel Communications, which entered into a contract with the Town after a bid process. Because of that contract, the Town owns the two towers and the equipment shelters, and currently leases space to Nextel. Nextel installed only whip antennas, in accordance with the zoning restriction. The Town also installed whip antennas servicing the Police and Fire Department systems.

At this time, the Town is requesting the removal of the restriction regarding "directional panels" at both *Site 1* and *Site 2*. The Town has two completely separate reasons for its request.

The first reason impacts our Police radio system. The Fairfield Police Department has severe interference problems on its Police radio system, which have the effect of making communications

from officers in the field impossible at times, in an unpredictable manner. This interference, which has been extensively documented both in internal Town correspondence and also in the press, is the result of the scarcity of available frequencies in the New York Metropolitan area. This has forced us to share channels with Police Departments in New Rochelle, New York, and Bay Shore (Long Island), New York. These other Police departments are so close as to completely "cover up" our Police portable radios at times.

With the cooperation of the designated frequency coordinator at the Office of Statewide Emergency Telecommunications (a division of the State Department of Public Safety), the Town has been diligently searching for alternative frequencies for more than 12 years, with no success, until now.

On December 9, 1997, we were notified by the frequency coordinator that our application for new frequencies had been approved and was being submitted to the Federal Communications Commission. We expect to have our license in hand within 90 days. This approval occurred after negotiations with the City of New York, which concluded last October. The negotiations were necessary because the frequencies we wanted are currently in use by New York City. We received a waiver from them to use these frequencies; however, the conditions of the waiver require us to use panel antennas for our transmitters in order to protect New York from interference by us. Only panel antennas give sufficient suppression of unwanted signal in the direction of New York. For that reason, the only way to resolve the complaints of the Police Department and provide reliable communications on these frequencies will be to install panel antennas at both Site #1 and Site #2.

In our budget request for F.Y. 1998-99, the ECC Capital Replacement Item #1 is the replacement of the existing Police radio system with the new frequencies and antennas. In the interest of officer safety, and the provision of routine and emergency services by the Police Department, it is imperative that the Town receive the modification of the variance that we need.

The second reason that the Town is requesting the lifting of the restriction on "directional panels" is a result of the successful completion of negotiations between the Town and Sprint PCS. Sprint PCS is a provider of Personal Communications Services, which are the next generation of portable phones. Sprint received their licenses to provide PCS from the Federal Communications Commission in an auction proceeding.

Section 704 of the Telecommunications Act of 1996 (the "1996 Act") governs federal, state and local government oversight of siting of "personal wireless service" facilities. The 1996 Act establishes a comprehensive framework for the exercise of jurisdiction by state and local zoning authorities over the construction, modification and placement of facilities such as towers for cellular, personal communications service (PCS), and specialized mobile radio (SMR) transmitters:

- The new law preserves local zoning authority, but clarifies when the exercise of local zoning authority may be preempted by the FCC.
- Section 704 prohibits any action that would discriminate between different providers of personal wireless services, such as cellular, wide-area SMR and broadband PCS. It also prohibits any action that would ban altogether the construction, modification or placement of these kinds of facilities in a particular area.

- The law also specifies procedures which must be followed for acting on a request to place these kinds of facilities, and provides for review in the courts or the FCC of any decision by a zoning authority that is inconsistent with Section 704.

- Finally, Section 704 requires the federal government to take steps to help licensees in spectrum-based services, such as PCS and cellular, get access to preferred sites for their facilities. Federal agencies and departments will work directly with licensees to make federal property available for this purpose, and the FCC is directed to work with the states to find ways for states to accommodate licensees who wish to erect towers on state property, or use state easements and rights-of-way.

Because of the wide-ranging effect of the 1996 Act, it is clear that PCS providers have the right to locate their antennae somewhere in our town, at as many sites as is necessary for them to provide the coverage they are required to provide in exchange for their licenses. We believe that it is in the Town's interest to limit the proliferation of communications towers. By judicious use of the zoning authority preserved for us in the 1996 Act, we can and should require co-location of the facilities of new personal wireless service providers with existing providers (such as Nextel), wherever it is technically possible. There will be instances where, due to technical incompatibilities or structural limitations, such co-location is not possible.

Further, the Town believes that where we own facilities which are suitable for the attachment of personal wireless service antennas, we should pursue agreements to provide such space, whenever possible. This increases the pool of potential existing sites for the new providers, thus reducing tower proliferation; and provides income to the Town. Evidence of this is our agreement in 1994 with Nextel, which resulted in two towers and shelters becoming the property of the Town, at no cost to us, replacing older structures owned by the Town. And at the end of more than one year of negotiations, we have reached an agreement with Sprint PCS which has been approved by the Board of Selectmen.

However, due to differences in the technical requirements of PCS, the only types of antennae that will work in their system here are panel antennas. Whip antennas are not an option on these systems, as they were for Nextel. This means that if we are unable to allow panel antennas on our tower, they will simply be installed somewhere else in town. The Town will lose the income, but the panel antennas will still be here.

I trust that my explanation of our needs for the change in the restriction regarding panel antennas has been as clear and complete as necessary. I am prepared to appear before the Board to answer questions at your next scheduled meeting, if necessary. If you have any questions prior to that, I can be reached at my office at 254-1888. I look forward to hearing from you, and I thank you for your time.

Sincerely,

Stephen Verbil, Director
Emergency Communications Center

Cc: Chief Sambrook, Police Department
Al Blank, Executive Assistant to the First Selectman

Memorandum

To: Steven Paisner

cc.: Steve Kotfila
Scott Chasse
Steve Crotty
Justin Darrow
Karen Johnson
Christine Rosenthal

From: John Knuff

Date: 1/8/98

Re.: Fairfield 354 and 385

I thought you might be interested in reading the letter Steve Verbil has drafted and will send to the ZBA. This letter will also be attached to our handout to the P&Z for its § 8-24 review.

BUILDING PERMIT
TOWN OF FAIRFIELD
BUILDING DEPARTMENT
(203) 256-3036

POST
NSPICUOUSLY

Permit No. 28563 BUI
Issued Date 30-APR-98

p: 182 Lot: 670 Location: 0100 REEF ROAD

ner s Name & address: FAIRFIELD POLICE DEPT
100 REEF ROAD
FAIRFIELD CT 06430

ass of Work - Alteration
pe of Occupancy - NON RES. & NON-HOUSEKEEPING BUILDINGS
nstruction Type -

scription: INSTALLATION OF TELECOMMUNICATIONS ANTENNAS & EQUIPMENT

ntractor: SPRINT PCS
9 BARNES IND.RD

K TO BE DONE ACCORDING TO PLANS AND SPECIFICATIONS FILED WITH THE BUILDING T. ALL TOWN ORDINANCES AND BUILDING REGULATIONS AND STATE LAWS SHALL BE PLIED WITH.

imated value of work by Building Official $49,000.00 Fee $394.00
Pen $.00
Total $394.00

RECORD OF PERMITS AND INSPECTIONS

ting/Foundation Inspection.. Date. .....approved Yes No

mbing Inspection..... Date.....approved Yes No

ctrical Inspection..... Date.....approved Yes No

ming Inspection..... Date.....approved Yes No

ting Inspection..... Date.....approved Yes No

ulation Inspection..... Date.....approved Yes No

roved for Covering..... Date.....approved Yes No

AL INSPECTION MUST BE CALLED FOR AND A CERTIFICATE OF OCCUPANCY OBTAINED ORE THIS BUILDING IS OCCUPIED.

PER SEC. 29-265 STATE BUILDING CODE

JAMES GILLERAN
BUILDING OFFICIAL

100 REEF ROAD

Location	100 REEF ROAD	**Mblu**	182/ 670/ / /
Acct#	05288	**Owner**	FAIRFIELD TOWN OF
Assessment	$4,450,390	**Appraisal**	$6,357,700
PID	16390	**Building Count**	2

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$4,826,700	$1,531,000	$6,357,700
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$3,378,690	$1,071,700	$4,450,390

Owner of Record

Owner	FAIRFIELD TOWN OF	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	725 OLD POST ROAD FAIRFIELD, CT 06824	**Book & Page**	137/ 640
		Sale Date	

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
FAIRFIELD TOWN OF	$0		137/ 640	

Building Information

Building 1 : Section 1

Year Built:	1975
Living Area:	24,580
Replacement Cost:	$5,708,959
Building Percent Good:	68
Replacement Cost Less Depreciation:	$3,882,100

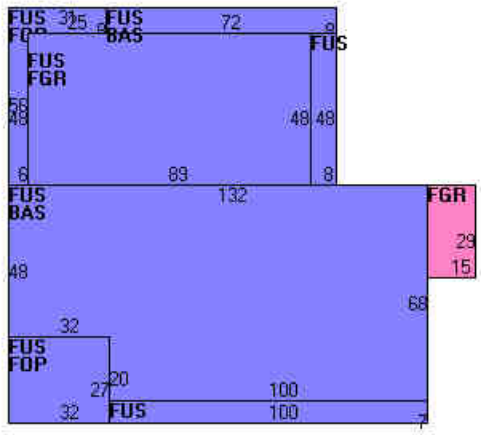
Building Attributes	
Field	**Description**

STYLE	Police Station
MODEL	Ind/Comm
Stories:	2
Occupancy	1
Exterior Wall 1	Brick/Masonry
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Rolled Compos
Interior Wall 1	Minim/Masonry
Interior Wall 2	Drywall
Interior Floor 1	Vinyl/Asphalt
Interior Floor 2	Carpet
Heating Fuel	Gas
Heating Type	Hot Water
AC Type	Central
Bldg Use	Police Dept
Total Rooms	
Total Bedrms	00
Total Baths	0
Liv Area	
Effect Area	
1st Floor Use:	9031
Heat/AC	Heat/AC Split
Frame Type	Fireprf Steel
Baths/Plumbing	Average

Building Photo

(http://images.vgsi.com/photos2/FairfieldCTPhotos//\02\05\41/5

Building Layout



(http://images.vgsi.com/photos2/FairfieldCTPhotos//Sketches/16

Building Sub-Areas (sq ft)			
Code	**Description**	**Gross Area**	**Living Area**
FUS	Upper Story, Finished	15,668	15,668
BAS	First Floor	8,912	8,912
FGR	Garage	4,707	0
FOP	Porch, Open, Finished	1,400	0
		30,687	24,580

Building 2 : Section 1

Year Built: 1953
Living Area: 8,000
Replacement Cost: $1,119,760
Building Percent Good: 56
Replacement Cost Less Depreciation: $627,100

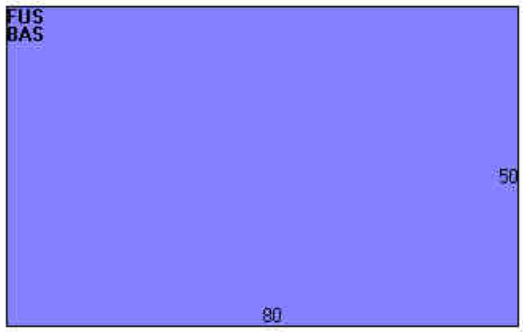
Building Attributes : Bldg 2 of 2	
Field	**Description**

STYLE	Office
MODEL	Ind/Comm
Stories:	2
Occupancy	1
Exterior Wall 1	Brick/Masonry
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Rolled Compos
Interior Wall 1	Plastered
Interior Wall 2	Minim/Masonry
Interior Floor 1	Vinyl/Asphalt
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Water
AC Type	Central
Bldg Use	Police Dept
Total Rooms	
Total Bedrms	00
Total Baths	0
Liv Area	
Effect Area	
1st Floor Use:	9031
Heat/AC	None
Frame Type	Masonry
Baths/Plumbing	Average

Building Photo

(http://images.vgsi.com/photos2/FairfieldCTPhotos//\00\00\14/6

Building Layout



(http://images.vgsi.com/photos2/FairfieldCTPhotos//Sketches/16

Building Sub-Areas (sq ft)			
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	4,000	4,000
FUS	Upper Story, Finished	4,000	4,000
		8,000	8,000

Extra Features

Extra Features				
Code	**Description**	**Size**	**Value**	**Bldg #**
MEZ1	MEZZANINE-UNF	1760 S.F.	$27,500	1
SPR1	SPRINKLERS-WET	8000 S.F.	$10,300	2
ELV1	PASS ELEV	2 STOPS	$39,200	2
VLT1	VAULT-AVG	84 S.F.	$19,100	1
ELV1	PASS ELEV	2 STOPS	$47,600	1
ELV2	FREIGHT ELEV	2 STOPS	$34,000	1

Land

Land Use

Use Code	9031
Description	Police Dept
Zone	R3
Neighborhood	C3
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	1.50
Depth	0
Assessed Value	$1,071,700
Appraised Value	$1,531,000

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
LT1	LIGHTS-IN W/PL			9 UNITS	$6,500	1
FN3	FENCE-6' CHAIN			300 L.F.	$2,700	1
PAV1	PAVING-ASPHALT			40000 S.F.	$126,000	1
SHD2	W/LIGHTS ETC			300 S.F.	$4,600	1

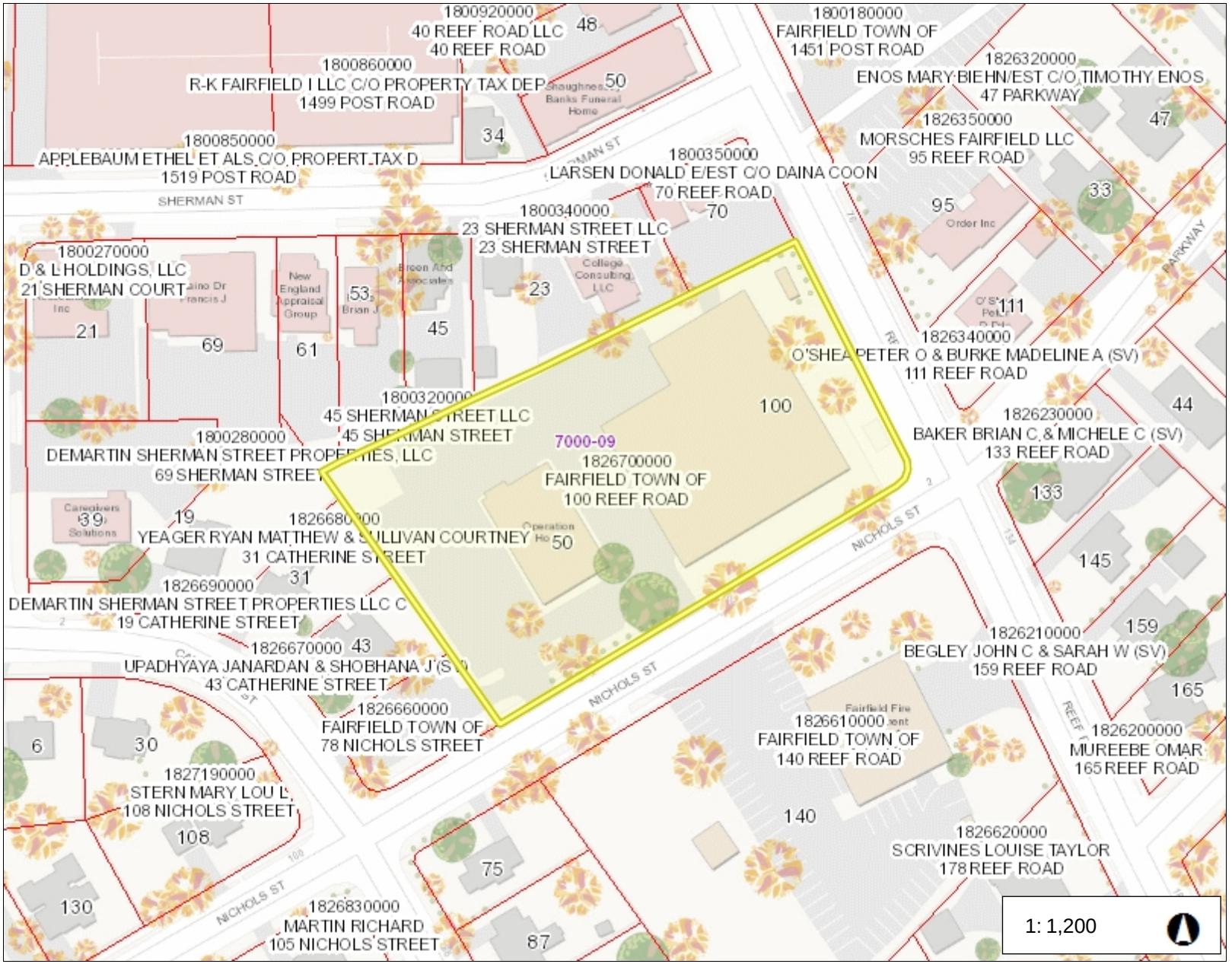
Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$4,826,700	$1,531,000	$6,357,700
2017	$4,826,700	$1,531,000	$6,357,700
2016	$4,826,700	$1,531,000	$6,357,700

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$3,378,690	$1,071,700	$4,450,390
2017	$3,378,690	$1,071,700	$4,450,390
2016	$3,378,690	$1,071,700	$4,450,390

Town of Fairfield

Title



Legend

- Parcels
- Local Basin Boundary
  - Major
  - Regional
  - Subregional
  - Local
- Local Basin Area

200.0 0 100.00 200.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Created by Greater Bridgeport Regional Council

METROCOG
Connecticut Metropolitan Council of Governments

EBI Consulting
environmental | engineering | due diligence

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

SPRINT Existing Facility

Site ID: CT03XC354

Fairfield
100 Reef Road
Fairfield, CT 06824

March 28, 2019

EBI Project Number: 6219000806

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	12.61 %

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

EBI Consulting
environmental | engineering | due diligence

March 28, 2019

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

Emissions Analysis for Site: **CT03XC354 – Fairfield**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **100 Reef Road, Fairfield, 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 population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

General population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 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 **100 Reef Road, Fairfield, 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 for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 4 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 50 Watts per Channel.

2) 4 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.

3) 3 LTE channels (2500 MHz (BRS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 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.

5) 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 for directional panel antennas, 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.

6) The antennas used in this modeling are the **Commscope NNVV-65B-R4 and the Nokia AAHC** for transmission in the 850 MHz, 1900 MHz (PCS) and 2500 MHz (BRS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antenna mounting height centerlines of the proposed panel antennas are **110.33 feet** above ground level (AGL) for **Sector A**, **110.33 feet** above ground level (AGL) for **Sector B** and **110.33 feet** above ground level (AGL) for Sector C.

8) 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 population threshold limits.

SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Commscope NNVV-65B-R4	Make / Model:	Commscope NNVV-65B-R4	Make / Model:	Commscope NNVV-65B-R4
Gain:	12.75 / 15.05 dBd	Gain:	12.75 / 15.05 dBd	Gain:	12.75 / 15.05 dBd
Height (AGL):	**110.33 feet**	Height (AGL):	**110.33 feet**	Height (AGL):	**110.33 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power(W):	360 Watts	Total TX Power(W):	360 Watts	Total TX Power(W):	360 Watts
ERP (W):	8,885.53	ERP (W):	8,885.53	ERP (W):	8,885.53
Antenna A1 MPE%	**3.89 %**	Antenna B1 MPE%	**3.89 %**	Antenna C1 MPE%	**3.89 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Nokia AAHC	Make / Model:	Nokia AAHC	Make / Model:	Nokia AAHC
Gain:	15.05 dBd	Gain:	15.05 dBd	Gain:	15.05 dBd
Height (AGL):	**110.33 feet**	Height (AGL):	**110.33 feet**	Height (AGL):	**110.33 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):	5,118.23	ERP (W):	5,118.23	ERP (W):	5,118.23
Antenna A2 MPE%	**1.69 %**	Antenna B2 MPE%	**1.69 %**	Antenna C2 MPE%	**1.69 %**

Site Composite MPE%	
Carrier	**MPE%**
SPRINT – Max per sector	**5.58 %**
T-Mobile	0.02 %
Clearwire	0.10 %
AT&T	6.89 %
Nextel	0.01 %
Fairfield	0.01 %
Site Total MPE %:	**12.61 %**

SPRINT Sector A Total:	5.58 %
SPRINT Sector B Total:	5.58 %
SPRINT Sector C Total:	5.58 %
Site Total:	12.61 %

SPRINT _ Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
Sprint 850 MHz LTE	4	941.82	110.33	12.45	850 MHz	567	2.20%
Sprint 1900 MHz (PCS) LTE	4	1,279.56	110.33	16.90	1900 MHz (PCS)	1000	1.69%
Sprint 2500 MHz (BRS) LTE	8	639.78	110.33	16.90	2500 MHz (BRS)	1000	1.69%
						Total:	**5.58%**

Summary

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

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

SPRINT Sector	Power Density Value (%)
Sector A:	5.58 %
Sector B:	5.58 %
Sector C:	5.58 %
SPRINT Maximum MPE % (per sector):	5.58 %
Site Total:	12.61 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **12.61 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

April 2, 2019

Mike Kithcart
Transcend Wireless
10 Industrial Avenue, Suite 3
Mahwah, NJ 07430

Ramaker & Associates, Inc.
855 Community Drive
Sauk City, WI 53583

SUBJECT: **MOUNT ASSESSMENT**

CARRIER: **SPRINT**

SITE: **CT03XC354**
100 REEF ROAD
FAIRFIELD, FARFIELD COUNTY, CONNECTICUT 06824
RAMAKER & ASSOCIATES PROJECT NUMBER: 39391

RESULTS: **MOUNT:** **PASS**

Dear Mike Kithcart:

Ramaker & Associates, Inc. (RAMAKER) respectfully submits this mount assessment for the above mentioned site. The purpose of this report is to determine the structural integrity of the mounting structure with the proposed loading configurations. Engineering recommendations regarding the analysis results are provided in the following pages.

RAMAKER developed a finite element model of the mount(s) using RISA analysis software. All information contained herein is valid only for the described structure configuration and loading conditions. RAMAKER reserves the right to modify our recommendations should alterations to the mount loading occur.

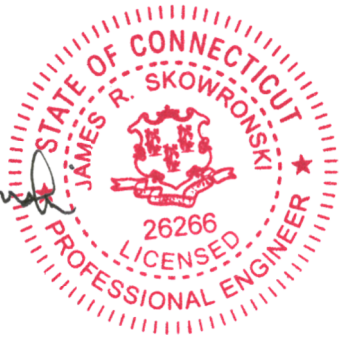
If you have any questions or comments, please do not hesitate to contact our office.

Sincerely,

RAMAKER & ASSOCIATES, INC.

Tucker Schwab
Structural Designer

James R. Skowronski, P.E.
Supervising Engineer



ANALYSIS CRITERIA

State Building Code	2018 CT State Building Code
Adopted Building Code	2015 IBC
Referenced Standard	TIA-222-G
Risk Category	II
Ultimate Design Wind Speed, V_{ult}	125 mph (3 sec. gust)
Nominal Design Wind Speed, V_{asd}	97 mph (3 sec. gust)
Design Wind Speed w/ Ice	50 mph (3 sec. gust)
Ice Thickness	3/4 inch
Exposure Category	B
Topographic Feature	None

SUPPORTING DOCUMENTATION

- Construction drawings by RAMAKER, project number 39391
- Site visit(s) conducted by RAMAKER
- Other pertinent data procured or assumed by RAMAKER during site due diligence activities

MOUNT LOADING

RAMAKER understands that the loading to be used for this analysis will consist of the antennas and equipment configurations as shown in the following chart(s):

Antenna Mount – Alpha & Beta Sectors				
Elevation	**Position**	**Appurtenance**	**Mount Type**	**Status**
110.33	1	**(1) Nokia AAHC**	Low profile Platform **w/ handrail**	**Proposed**
		(1) ALU 800MHz 2x50W RRH		
	2	**(1) RFS APXVSPP18-C-A20**		**Remove**
		(1) CommScope NNVV-65B-R4		**Proposed**
	3	--		--
	4	--		--
	--	(1) ALU 1900 MHz 4x45W RRH	Collar Mount	Existing
		(1) ALU 800 MHz 2x50W RRH		
		(1) 800 MHz Filter		

Antenna Mount – Gamma Sector				
Elevation	**Position**	**Appurtenance**	**Mount Type**	**Status**
110.33	1	**(1) Nokia AAHC**	Low profile Platform **w/ handrail**	**Proposed**
		(1) ALU 800MHz 2x50W RRH		
	2	**(1) RFS APXVSPP18-C-A20**		**Remove**
		(1) CommScope NNVV-65B-R4		**Proposed**
	3	--		--
	4	Omni 20'		Existing
	--	(1) ALU 1900 MHz 4x45W RRH	Collar Mount	
		(1) ALU 800 MHz 2x50W RRH		
		(1) 800 MHz Filter		

MOUNT RESULTS

By engineering calculation and inspection, the antenna and equipment mounting structure(s) are capable of supporting the proposed loading configurations without causing an overstress condition in the antenna and equipment mounting structure(s).

LIMITATIONS

The recommendations contained within this report were developed using the supporting documentation as previously described. All recommendations pertain only to the proposed antenna installation activities as described in this report. RAMAKER assumes no responsibility for failures caused by factors beyond our control. These include but are not limited to the following:

- Missing, corroding, and/or deteriorating members
- Improper manufacturing and/or construction
- Improper maintenance
- Member grades less than assumed grades show below:

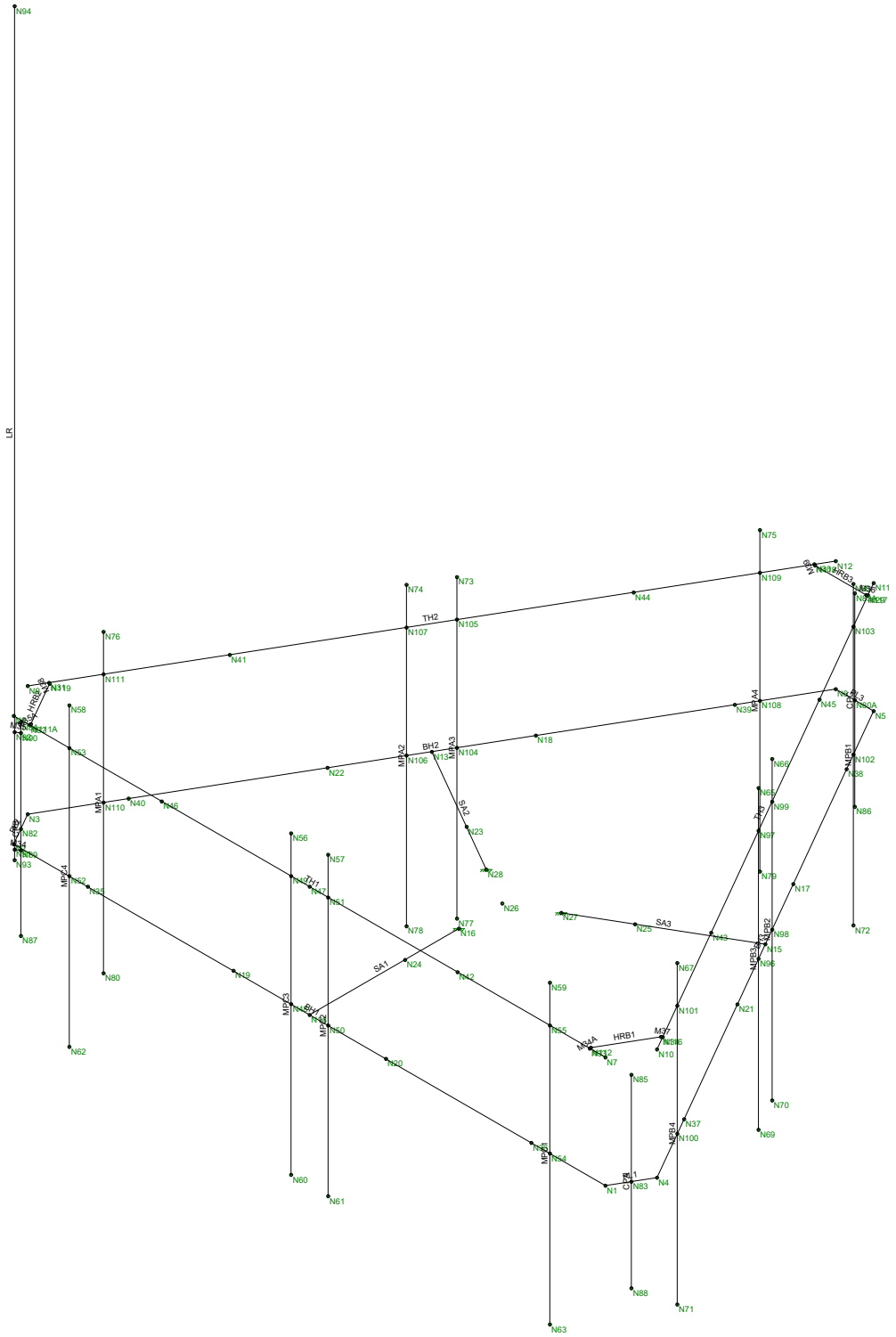
Assumed Steel Member Grades	
Angles/Plates/Channels/Solid Rods	ASTM A36, 36 ksi
Pipes	ASTM A53 Gr. B, 35 ksi
HSS (Square Tube)	ASTM A36, 36 ksi

RAMAKER is not responsible for verifying that the loading on the structure is consistent with the loading applied to the structure within this report. If there is any information contrary to that contained herein, or if there are any defects arising from the original design, material, fabrication and erection deficiencies, this report should be disregarded and RAMAKER should be contacted immediately. RAMAKER is not liable for any representation, recommendation, or conclusion not expressly stated herein.

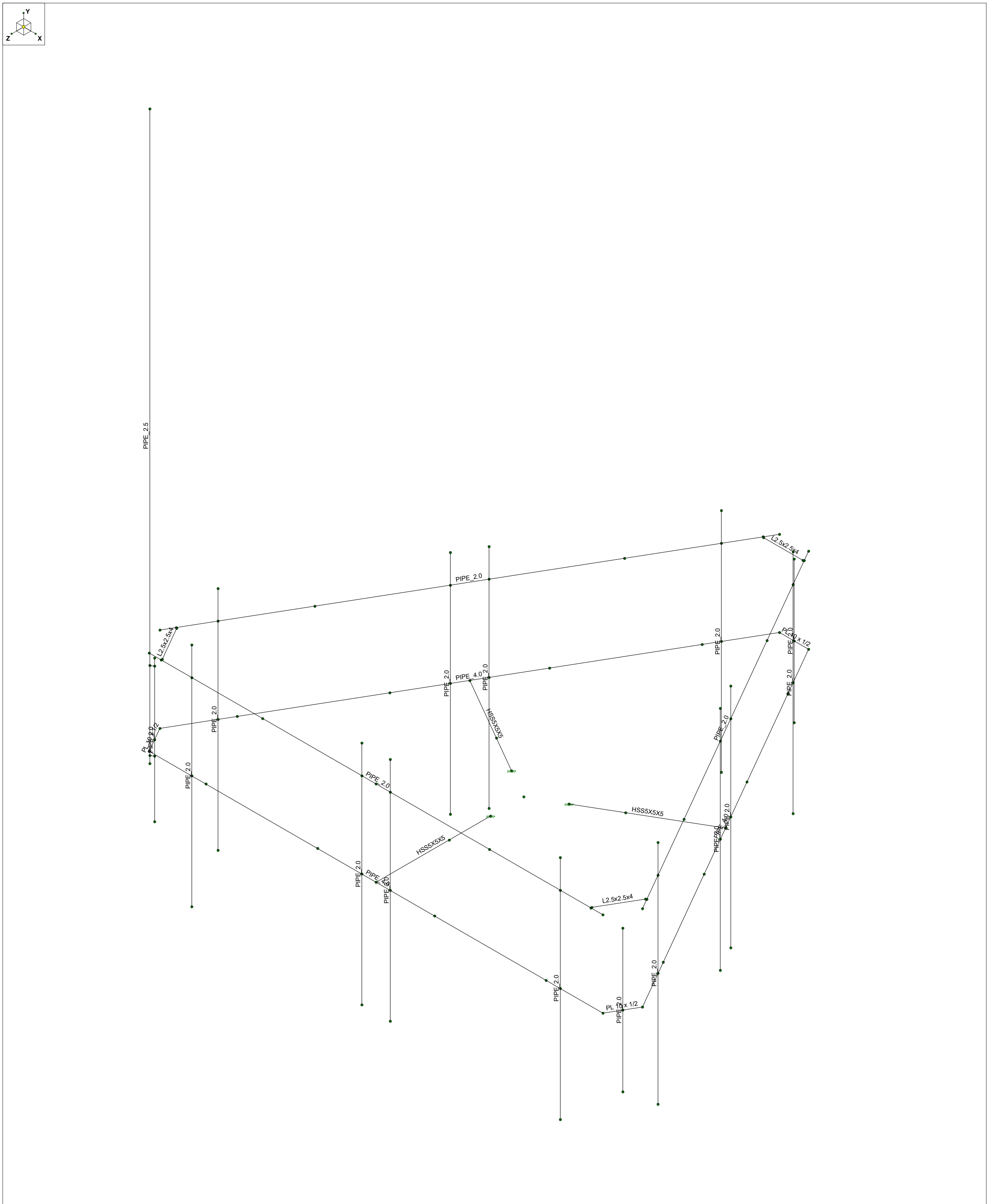
This analysis pertains only to the mounting structure, and no analyses or conclusions were made regarding the supporting structure. Analysis and certification of the supporting structure is performed and submitted separately.

ATTACHMENTS

- Analysis Figures
- Analysis Calculations



Ramaker & Associates, Inc.	CT03XC354	SK - 1
TJS		Apr 2, 2019 at 10:14 AM
39391		39391 Rev1 Mount.r3d



Ramaker & Associates, Inc.	CT03XC354	SK - 2
TJS		Apr 2, 2019 at 10:14 AM
39391		39391 Rev1 Mount.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E..Density[k/f...		Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3
6	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	60	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Pipe_4.0	PIPE_4.0	Beam	Pipe	A53 Gr. B	Typical	2.96	6.82	6.82	13.6
2	HSS5x5x5	HSS5X5X5	Beam	SquareTube	A36 Gr.36	Typical	5.26	19	19	31.2
3	PIpe_2.0	PIPE_2.0	Beam	Pipe	A53 Gr. B	Typical	1.02	.627	.627	1.25
4	Pipe_2.5	PIPE_2.5	Beam	Pipe	A53 Gr. B	Typical	1.61	1.45	1.45	2.89
5	PL10x1/2	PL 10 x 1/2	Beam	RECT	A36 Gr.36	Typical	5	.104	41.667	.404
6	L2.5x2.5x1/4	L2.5x2.5x4	Beam	Single Angle	A36 Gr.36	Typical	1.19	.692	.692	.026
7	Pipe 1.0	PIPE_1.0	Beam	Single Angle	A53 Gr. B	Typical	.469	.083	.083	.166

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	BH1	N1	N2			Pipe_4.0	Beam	Pipe	A53 Gr. B	Typical
2	PL2	N2	N3			PL10x1/2	Beam	RECT	A36 Gr.36	Typical
3	PL1	N1	N4			PL10x1/2	Beam	RECT	A36 Gr.36	Typical
4	BH3	N4	N5			Pipe_4.0	Beam	Pipe	A53 Gr. B	Typical
5	BH2	N3	N6			Pipe_4.0	Beam	Pipe	A53 Gr. B	Typical
6	PL3	N6	N5			PL10x1/2	Beam	RECT	A36 Gr.36	Typical
7	TH1	N7	N8			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
8	TH3	N10	N11			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
9	TH2	N9	N12			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
10	SA2	N13	N28			HSS5x5x5	Beam	SquareTube	A36 Gr.36	Typical
11	SA3	N15	N27			HSS5x5x5	Beam	SquareTube	A36 Gr.36	Typical
12	SA1	N16	N14			HSS5x5x5	Beam	SquareTube	A36 Gr.36	Typical
13	B3	N46	N41			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
14	B1	N44	N45			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
15	B2	N42	N43			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
16	MPC4	N62	N58			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
17	MPC3	N60	N56			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
18	MPC2	N61	N57			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
19	MPC1	N63	N59			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
20	MPB4	N71	N67			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
21	MPB3	N69	N65			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
22	MPB2	N70	N66			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
23	MPB1	N72	N68			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
24	MPA4	N79	N75			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
25	MPA3	N77	N73			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
26	MPA2	N78	N74			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
27	MPA1	N80	N76			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
28	CPB	N87	N84			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
29	CPA	N88	N85			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
30	CPC	N86	N83A			PIpe_2.0	Beam	Pipe	A53 Gr. B	Typical
31	M34	N91	N89			RIGID	None	None	RIGID	Typical
32	M35	N92	N90			RIGID	None	None	RIGID	Typical
33	LR	N93	N94			Pipe_2.5	Beam	Pipe	A53 Gr. B	Typical
34	M34A	N33	N112			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
35	M35A	N32	N111A			RIGID	None	None	RIGID	Typical
36	M36	N29	N117			RIGID	None	None	RIGID	Typical
37	M37	N34	N116			RIGID	None	None	RIGID	Typical
38	M38	N31	N119			RIGID	None	None	RIGID	Typical
39	M39	N30	N118			RIGID	None	None	RIGID	Typical
40	HRB2	N111A	N119		180	L2.5x2.5x1/4	Beam	Single Angle	A36 Gr.36	Typical
41	HRB1	N116	N112		180	L2.5x2.5x1/4	Beam	Single Angle	A36 Gr.36	Typical
42	HRB3	N118	N117		180	L2.5x2.5x1/4	Beam	Single Angle	A36 Gr.36	Typical

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface(...
1	Dead Load	None		-1			15		6	
2	Antenna Wind 0	None					30			
3	Antenna Wind 30	None					30			
4	Antenna Wind 45	None					30			
5	Antenna Wind 60	None					30			
6	Antenna Wind 90	None					30			
7	Antenna Wind 120	None					30			
8	Antenna Wind 135	None					30			
9	Antenna Wind 150	None					30			
10	Antenna Wind 180	None					30			
11	Antenna Wind 210	None					30			
12	Antenna Wind 225	None					30			
13	Antenna Wind 240	None					30			
14	Antenna Wind 270	None					30			
15	Antenna Wind 300	None					30			
16	Antenna Wind 315	None					30			
17	Antenna Wind 330	None					30			
18	Antenna Ice Dead Load	None					15			
19	Antenna Wind w/Ice 0	None					30			
20	Antenna Wind w/Ice 30	None					30			
21	Antenna Wind w/Ice 45	None					30			
22	Antenna Wind w/Ice 60	None					30			
23	Antenna Wind w/Ice 90	None					30			
24	Antenna Wind w/Ice 120	None					30			
25	Antenna Wind w/Ice 135	None					30			
26	Antenna Wind w/Ice 150	None					30			
27	Antenna Wind w/Ice 180	None					30			
28	Antenna Wind w/Ice 210	None					30			
29	Antenna Wind w/Ice 225	None					30			
30	'Antenna Wind w/Ice 240	None					30			
31	Antenna Wind w/Ice 270	None					30			
32	Antenna Wind w/Ice 300	None					30			
33	Antenna Wind w/Ice 315	None					30			
34	Antenna Wind w/Ice 330	None					30			
35	Member Wind 0	None						62		
36	Member Wind 30	None						62		
37	Member Wind 45	None						62		
38	Member Wind 60	None						62		
39	Member Wind 90	None						62		
40	Member Wind 120	None						62		
41	Member Wind 135	None						62		
42	Member Wind 150	None						62		
43	Member Wind 180	None						62		
44	Member Wind 210	None						62		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface(...
45	Member Wind 225	None						62		
46	Member Wind 240	None						62		
47	Member Wind 270	None						62		
48	Member Wind 300	None						62		
49	Member Wind 315	None						62		
50	Member Wind 330	None						62		
51	Member Ice Dead Load	None						31	6	
52	Member Wind w/Ice 0	None						62		
53	Member Wind w/Ice 30	None						62		
54	Member Wind w/Ice 45	None						62		
55	Member Wind w/Ice 60	None						62		
56	Member Wind w/Ice 90	None						62		
57	Member Wind w/Ice 120	None						62		
58	Member Wind w/Ice 135	None						62		
59	Member Wind w/Ice 150	None						62		
60	Member Wind w/Ice 180	None						62		
61	Member Wind w/Ice 210	None						62		
62	Member Wind w/Ice 225	None						62		
63	Member Wind w/Ice 240	None						62		
64	Member Wind w/Ice 270	None						62		
65	Member Wind w/Ice 300	None						62		
66	Member Wind w/Ice 315	None						62		
67	Member Wind w/Ice 330	None						62		
68	LV-1	None					1			
69	LV-2	None					1			
70	LV-3	None					1			
71	LV-4	None					1			
72	LV-5	None					1			
73	LV-6	None					1			
74	LV-7	None					1			
75	LV-8	None					1			
76	LV-9	None					1			
77	LV-10	None								
78	LV-11	None								
79	LV-12	None								
80	LV-13	None								
81	LV-14	None								
82	LV-15	None								
83	LM-1	None					1			
84	LM-2	None					1			
85	LM-3	None					1			
86	LM-4	None					1			
87	LM-5	None					1			
88	LM-6	None					1			
89	LM-7	None					1			
90	LM-8	None					1			
91	LM-9	None					1			
92	LM-10	None					1			
93	LM-11	None					1			
94	LM-12	None					1			
95	LM-13	None					1			
96	LM-14	None					1			
97	LM-15	None					1			
98	BLC 1 Transient Area L...	None						43		
99	BLC 51 Transient Area ...	None						43		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4D	Yes	Y		1	1.4																		
2	0.9D + 1.6 (0-Wind)	Yes	Y		1	.9	2	1.6	35	1.6														
3	0.9D + 1.6 (30-Wind)	Yes	Y		1	.9	3	1.6	36	1.6														
4	0.9D + 1.6 (45-Wind)	Yes	Y		1	.9	4	1.6	37	1.6														
5	0.9D + 1.6 (60-Wind)	Yes	Y		1	.9	5	1.6	38	1.6														
6	0.9D + 1.6 (90-Wind)	Yes	Y		1	.9	6	1.6	39	1.6														
7	0.9D + 1.6 (120-Wind)	Yes	Y		1	.9	7	1.6	40	1.6														
8	0.9D + 1.6 (135-Wind)	Yes	Y		1	.9	8	1.6	41	1.6														
9	0.9D + 1.6 (150-Wind)	Yes	Y		1	.9	9	1.6	42	1.6														
10	0.9D + 1.6 (180-Wind)	Yes	Y		1	.9	10	1.6	43	1.6														
11	0.9D + 1.6 (210-Wind)	Yes	Y		1	.9	11	1.6	44	1.6														
12	0.9D + 1.6 (225-Wind)	Yes	Y		1	.9	12	1.6	45	1.6														
13	0.9D + 1.6 (240-Wind)	Yes	Y		1	.9	13	1.6	46	1.6														
14	0.9D + 1.6 (270-Wind)	Yes	Y		1	.9	14	1.6	47	1.6														
15	0.9D + 1.6 (300-Wind)	Yes	Y		1	.9	15	1.6	48	1.6														
16	0.9D + 1.6 (315-Wind)	Yes	Y		1	.9	16	1.6	49	1.6														
17	0.9D + 1.6 (330-Wind)	Yes	Y		1	.9	17	1.6	50	1.6														
18	1.2D + 1.6 (0-Wind)	Yes	Y		1	1.2	2	1.6	35	1.6														
19	1.2D + 1.6 (30-Wind)	Yes	Y		1	1.2	3	1.6	36	1.6														
20	1.2D + 1.6 (45-Wind)	Yes	Y		1	1.2	4	1.6	37	1.6														
21	1.2D + 1.6 (60-Wind)	Yes	Y		1	1.2	5	1.6	38	1.6														
22	1.2D + 1.6 (90-Wind)	Yes	Y		1	1.2	6	1.6	39	1.6														
23	1.2D + 1.6 (120-Wind)	Yes	Y		1	1.2	7	1.6	40	1.6														
24	1.2D + 1.6 (135-Wind)	Yes	Y		1	1.2	8	1.6	41	1.6														
25	1.2D + 1.6 (150-Wind)	Yes	Y		1	1.2	9	1.6	42	1.6														
26	1.2D + 1.6 (180-Wind)	Yes	Y		1	1.2	10	1.6	43	1.6														
27	1.2D + 1.6 (210-Wind)	Yes	Y		1	1.2	11	1.6	44	1.6														
28	1.2D + 1.6 (225-Wind)	Yes	Y		1	1.2	12	1.6	45	1.6														
29	1.2D + 1.6 (240-Wind)	Yes	Y		1	1.2	13	1.6	46	1.6														
30	1.2D + 1.6 (270-Wind)	Yes	Y		1	1.2	14	1.6	47	1.6														
31	1.2D + 1.6 (300-Wind)	Yes	Y		1	1.2	15	1.6	48	1.6														
32	1.2D + 1.6 (315-Wind)	Yes	Y		1	1.2	16	1.6	49	1.6														
33	1.2D + 1.6 (330-Wind)	Yes	Y		1	1.2	17	1.6	50	1.6														
34	1.2D + 1.0Di + 1.0 (0-Wind Ice)	Yes	Y		1	1.2	18	1	51	1	19	1	52	1										
35	1.2D + 1.0Di + 1.0 (30-Wind I...	Yes	Y		1	1.2	18	1	51	1	20	1	53	1										
36	1.2D + 1.0Di + 1.0 (45-Wind I...	Yes	Y		1	1.2	18	1	51	1	21	1	54	1										
37	1.2D + 1.0Di + 1.0 (60-Wind I...	Yes	Y		1	1.2	18	1	51	1	22	1	55	1										
38	1.2D + 1.0Di + 1.0 (90-Wind I...	Yes	Y		1	1.2	18	1	51	1	23	1	56	1										
39	1.2D + 1.0Di + 1.0 (120-Wind ...	Yes	Y		1	1.2	18	1	51	1	24	1	57	1										
40	1.2D + 1.0Di + 1.0 (135-Wind ...	Yes	Y		1	1.2	18	1	51	1	25	1	58	1										
41	1.2D + 1.0Di + 1.0 (150-Wind ...	Yes	Y		1	1.2	18	1	51	1	26	1	59	1										
42	1.2D + 1.0Di + 1.0 (180-Wind ...	Yes	Y		1	1.2	18	1	51	1	27	1	60	1										
43	1.2D + 1.0Di + 1.0 (210-Wind ...	Yes	Y		1	1.2	18	1	51	1	28	1	61	1										
44	1.2D + 1.0Di + 1.0 (225-Wind ...	Yes	Y		1	1.2	18	1	51	1	29	1	62	1										
45	1.2D + 1.0Di + 1.0 (240-Wind ...	Yes	Y		1	1.2	18	1	51	1	30	1	63	1										
46	1.2D + 1.0Di + 1.0 (270-Wind ...	Yes	Y		1	1.2	18	1	51	1	31	1	64	1										
47	1.2D + 1.0Di + 1.0 (300-Wind ...	Yes	Y		1	1.2	18	1	51	1	32	1	65	1										
48	1.2D + 1.0Di + 1.0 (315-Wind ...	Yes	Y		1	1.2	18	1	51	1	33	1	66	1										
49	1.2D + 1.0Di + 1.0 (330-Wind ...	Yes	Y		1	1.2	18	1	51	1	34	1	67	1										
50	1.2D + 1.5LV-1	Yes	Y		1	1.2	68	1.5																
51	1.2D + 1.5LV-2	Yes	Y		1	1.2	69	1.5																
52	1.2D + 1.5LV-3	Yes	Y		1	1.2	70	1.5																
53	1.2D + 1.5LV-4	Yes	Y		1	1.2	71	1.5																
54	1.2D + 1.5LV-5	Yes	Y		1	1.2	72	1.5																
55	1.2D + 1.5LV-6	Yes	Y		1	1.2	73	1.5																
56	1.2D + 1.5LV-7	Yes	Y		1	1.2	74	1.5																

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
57	1.2D + 1.5LV-8	Yes	Y		1	1.2	75	1.5																
58	1.2D + 1.5LV-9	Yes	Y		1	1.2	76	1.5																
59	1.2D + 1.5LV-10	Yes	Y		1	1.2	77	1.5																
60	1.2D + 1.5LV-11	Yes	Y		1	1.2	78	1.5																
61	1.2D + 1.5LV-12	Yes	Y		1	1.2	79	1.5																
62	1.2D + 1.5LV-13	Yes	Y		1	1.2	80	1.5																
63	1.2D + 1.5LV-14	Yes	Y		1	1.2	81	1.5																
64	1.2D + 1.5LV-15	Yes	Y		1	1.2	82	1.5																
65	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	2	.096	35	.096												
66	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	3	.096	36	.096												
67	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	4	.096	37	.096												
68	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	5	.096	38	.096												
69	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	6	.096	39	.096												
70	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	7	.096	40	.096												
71	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	8	.096	41	.096												
72	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	9	.096	42	.096												
73	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	10	.096	43	.096												
74	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	11	.096	44	.096												
75	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	12	.096	45	.096												
76	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	13	.096	46	.096												
77	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	14	.096	47	.096												
78	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	15	.096	48	.096												
79	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	16	.096	49	.096												
80	1.2D + 1.5LM-1 + Maintenanc...	Yes	Y		1	1.2	83	1.5	17	.096	50	.096												
81	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	2	.096	35	.096												
82	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	3	.096	36	.096												
83	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	4	.096	37	.096												
84	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	5	.096	38	.096												
85	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	6	.096	39	.096												
86	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	7	.096	40	.096												
87	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	8	.096	41	.096												
88	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	9	.096	42	.096												
89	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	10	.096	43	.096												
90	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	11	.096	44	.096												
91	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	12	.096	45	.096												
92	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	13	.096	46	.096												
93	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	14	.096	47	.096												
94	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	15	.096	48	.096												
95	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	16	.096	49	.096												
96	1.2D + 1.5LM-2 + Maintenanc...	Yes	Y		1	1.2	84	1.5	17	.096	50	.096												
97	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	2	.096	35	.096												
98	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	3	.096	36	.096												
99	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	4	.096	37	.096												
100	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	5	.096	38	.096												
101	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	6	.096	39	.096												
102	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	7	.096	40	.096												
103	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	8	.096	41	.096												
104	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	9	.096	42	.096												
105	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	10	.096	43	.096												
106	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	11	.096	44	.096												
107	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	12	.096	45	.096												
108	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	13	.096	46	.096												
109	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	14	.096	47	.096												
110	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	15	.096	48	.096												
111	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	16	.096	49	.096												
112	1.2D + 1.5LM-3 + Maintenanc...	Yes	Y		1	1.2	85	1.5	17	.096	50	.096												
113	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	2	.096	35	.096												

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
114	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	3	.096	36	.096												
115	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	4	.096	37	.096												
116	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	5	.096	38	.096												
117	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	6	.096	39	.096												
118	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	7	.096	40	.096												
119	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	8	.096	41	.096												
120	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	9	.096	42	.096												
121	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	10	.096	43	.096												
122	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	11	.096	44	.096												
123	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	12	.096	45	.096												
124	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	13	.096	46	.096												
125	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	14	.096	47	.096												
126	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	15	.096	48	.096												
127	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	16	.096	49	.096												
128	1.2D + 1.5LM-4 + Maintenanc...	Yes	Y		1	1.2	86	1.5	17	.096	50	.096												
129	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	2	.096	35	.096												
130	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	3	.096	36	.096												
131	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	4	.096	37	.096												
132	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	5	.096	38	.096												
133	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	6	.096	39	.096												
134	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	7	.096	40	.096												
135	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	8	.096	41	.096												
136	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	9	.096	42	.096												
137	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	10	.096	43	.096												
138	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	11	.096	44	.096												
139	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	12	.096	45	.096												
140	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	13	.096	46	.096												
141	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	14	.096	47	.096												
142	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	15	.096	48	.096												
143	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	16	.096	49	.096												
144	1.2D + 1.5LM-5 + Maintenanc...	Yes	Y		1	1.2	87	1.5	17	.096	50	.096												
145	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	2	.096	35	.096												
146	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	3	.096	36	.096												
147	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	4	.096	37	.096												
148	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	5	.096	38	.096												
149	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	6	.096	39	.096												
150	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	7	.096	40	.096												
151	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	8	.096	41	.096												
152	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	9	.096	42	.096												
153	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	10	.096	43	.096												
154	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	11	.096	44	.096												
155	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	12	.096	45	.096												
156	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	13	.096	46	.096												
157	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	14	.096	47	.096												
158	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	15	.096	48	.096												
159	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	16	.096	49	.096												
160	1.2D + 1.5LM-6 + Maintenanc...	Yes	Y		1	1.2	88	1.5	17	.096	50	.096												
161	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	2	.096	35	.096												
162	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	3	.096	36	.096												
163	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	4	.096	37	.096												
164	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	5	.096	38	.096												
165	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	6	.096	39	.096												
166	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	7	.096	40	.096												
167	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	8	.096	41	.096												
168	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	9	.096	42	.096												
169	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	10	.096	43	.096												
170	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	11	.096	44	.096												

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
171	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	12	.096	45	.096												
172	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	13	.096	46	.096												
173	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	14	.096	47	.096												
174	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	15	.096	48	.096												
175	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	16	.096	49	.096												
176	1.2D + 1.5LM-7 + Maintenanc...	Yes	Y		1	1.2	89	1.5	17	.096	50	.096												
177	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	2	.096	35	.096												
178	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	3	.096	36	.096												
179	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	4	.096	37	.096												
180	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	5	.096	38	.096												
181	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	6	.096	39	.096												
182	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	7	.096	40	.096												
183	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	8	.096	41	.096												
184	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	9	.096	42	.096												
185	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	10	.096	43	.096												
186	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	11	.096	44	.096												
187	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	12	.096	45	.096												
188	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	13	.096	46	.096												
189	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	14	.096	47	.096												
190	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	15	.096	48	.096												
191	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	16	.096	49	.096												
192	1.2D + 1.5LM-8 + Maintenanc...	Yes	Y		1	1.2	90	1.5	17	.096	50	.096												
193	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	2	.096	35	.096												
194	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	3	.096	36	.096												
195	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	4	.096	37	.096												
196	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	5	.096	38	.096												
197	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	6	.096	39	.096												
198	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	7	.096	40	.096												
199	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	8	.096	41	.096												
200	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	9	.096	42	.096												
201	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	10	.096	43	.096												
202	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	11	.096	44	.096												
203	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	12	.096	45	.096												
204	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	13	.096	46	.096												
205	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	14	.096	47	.096												
206	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	15	.096	48	.096												
207	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	16	.096	49	.096												
208	1.2D + 1.5LM-9 + Maintenanc...	Yes	Y		1	1.2	91	1.5	17	.096	50	.096												
209	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	2	.096	35	.096												
210	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	3	.096	36	.096												
211	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	4	.096	37	.096												
212	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	5	.096	38	.096												
213	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	6	.096	39	.096												
214	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	7	.096	40	.096												
215	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	8	.096	41	.096												
216	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	9	.096	42	.096												
217	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	10	.096	43	.096												
218	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	11	.096	44	.096												
219	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	12	.096	45	.096												
220	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	13	.096	46	.096												
221	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	14	.096	47	.096												
222	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	15	.096	48	.096												
223	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	16	.096	49	.096												
224	1.2D + 1.5LM-10 + Maintenan...	Yes	Y		1	1.2	92	1.5	17	.096	50	.096												
225	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	2	.096	35	.096												
226	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	3	.096	36	.096												
227	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	4	.096	37	.096												

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
228	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	5	.096	38	.096												
229	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	6	.096	39	.096												
230	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	7	.096	40	.096												
231	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	8	.096	41	.096												
232	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	9	.096	42	.096												
233	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	10	.096	43	.096												
234	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	11	.096	44	.096												
235	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	12	.096	45	.096												
236	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	13	.096	46	.096												
237	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	14	.096	47	.096												
238	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	15	.096	48	.096												
239	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	16	.096	49	.096												
240	1.2D + 1.5LM-11 + Maintenan...	Yes	Y		1	1.2	93	1.5	17	.096	50	.096												
241	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	2	.096	35	.096												
242	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	3	.096	36	.096												
243	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	4	.096	37	.096												
244	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	5	.096	38	.096												
245	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	6	.096	39	.096												
246	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	7	.096	40	.096												
247	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	8	.096	41	.096												
248	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	9	.096	42	.096												
249	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	10	.096	43	.096												
250	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	11	.096	44	.096												
251	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	12	.096	45	.096												
252	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	13	.096	46	.096												
253	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	14	.096	47	.096												
254	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	15	.096	48	.096												
255	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	16	.096	49	.096												
256	1.2D + 1.5LM-12 + Maintenan...	Yes	Y		1	1.2	94	1.5	17	.096	50	.096												
257	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	2	.096	35	.096												
258	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	3	.096	36	.096												
259	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	4	.096	37	.096												
260	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	5	.096	38	.096												
261	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	6	.096	39	.096												
262	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	7	.096	40	.096												
263	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	8	.096	41	.096												
264	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	9	.096	42	.096												
265	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	10	.096	43	.096												
266	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	11	.096	44	.096												
267	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	12	.096	45	.096												
268	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	13	.096	46	.096												
269	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	14	.096	47	.096												
270	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	15	.096	48	.096												
271	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	16	.096	49	.096												
272	1.2D + 1.5LM-13 + Maintenan...	Yes	Y		1	1.2	95	1.5	17	.096	50	.096												
273	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	2	.096	35	.096												
274	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	3	.096	36	.096												
275	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	4	.096	37	.096												
276	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	5	.096	38	.096												
277	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	6	.096	39	.096												
278	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	7	.096	40	.096												
279	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	8	.096	41	.096												
280	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	9	.096	42	.096												
281	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	10	.096	43	.096												
282	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	11	.096	44	.096												
283	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	12	.096	45	.096												
284	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	13	.096	46	.096												

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
285	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	14	.096	47	.096												
286	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	15	.096	48	.096												
287	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	16	.096	49	.096												
288	1.2D + 1.5LM-14 + Maintenan...	Yes	Y		1	1.2	96	1.5	17	.096	50	.096												
289	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	2	.096	35	.096												
290	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	3	.096	36	.096												
291	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	4	.096	37	.096												
292	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	5	.096	38	.096												
293	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	6	.096	39	.096												
294	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	7	.096	40	.096												
295	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	8	.096	41	.096												
296	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	9	.096	42	.096												
297	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	10	.096	43	.096												
298	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	11	.096	44	.096												
299	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	12	.096	45	.096												
300	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	13	.096	46	.096												
301	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	14	.096	47	.096												
302	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	15	.096	48	.096												
303	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	16	.096	49	.096												
304	1.2D + 1.5LM-15 + Maintenan...	Yes	Y		1	1.2	97	1.5	17	.096	50	.096												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N16	max	1378.399	31	2794.995	42	1111.56	18	-1287.706	2	4133.063	31	1360.304	292
2		min	-1378.002	23	632.051	2	-1045.148	10	-10380.678	42	-4129.04	23	-1808.306	268
3	N27	max	1025.207	30	2305.282	37	1108.755	2	4251.073	35	3013.201	26	6791.974	37
4		min	-965.923	6	544.543	13	-1144.698	26	609.885	11	-3012.189	18	1185.259	13
5	N28	max	1224.886	14	2968.363	47	1345.797	2	4737.281	49	4366.517	4	-1101.446	7
6		min	-1284.011	22	635.034	7	-1376.652	26	489.181	10	-4368.773	28	-10126.157	47
7	Totals:	max	3556.746	14	7865.787	39	3556.876	2						
8		min	-3556.775	22	2418.277	15	-3556.878	26						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Che...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
1	BH1	PIPE_4.0	.364	8	44	.151	8		18	73999.854	93240	10631.25	10631.25	1....	H1-1b
2	PL2	PL 10 x 1/2	.129	0	24	.795	0	y	29	102974.3...	162000	1687.5	33469.728	1.1	H1-1b
3	PL1	PL 10 x 1/2	.080	0	26	.029	1.023	y	26	102974.3...	162000	1687.5	33750	1....	H1-1b
4	BH3	PIPE_4.0	.279	8	277	.112	8		45	73999.854	93240	10631.25	10631.25	1....	H1-1b
5	BH2	PIPE_4.0	.382	8	46	.125	8		40	73999.854	93240	10631.25	10631.25	1....	H1-1b
6	PL3	PL 10 x 1/2	.090	0	30	.036	0	y	268	102974.3...	162000	1687.5	33750	1....	H1-1b
7	TH1	PIPE_2.0	.310	8.5	43	.071	7.5		28	5018.672	32130	1871.625	1871.625	2....	H1-1b
8	TH3	PIPE_2.0	.233	8.5	277	.078	15.5		45	5018.672	32130	1871.625	1871.625	2....	H1-1b
9	TH2	PIPE_2.0	.320	7.5	46	.074	8.5		30	5018.672	32130	1871.625	1871.625	2....	H1-1b
10	SA2	HSS5X5X5	.486	4.041	34	.127	4.041	y	268	164681.7...	170424	24732	24732	1....	H1-1b
11	SA3	HSS5X5X5	.349	4.041	34	.110	4.041	y	273	164681.7...	170424	24732	24732	1....	H1-1b
12	SA1	HSS5X5X5	.460	0	40	.121	0	y	268	164681.7...	170424	24732	24732	1....	H1-1b
13	MPC4	PIPE_2.0	.590	4	43	.105	7		42	14916.096	32130	1871.625	1871.625	1....	H1-1b
14	MPC3	PIPE_2.0	.251	4	18	.033	4		21	14916.096	32130	1871.625	1871.625	2....	H1-1b
15	MPC2	PIPE_2.0	.412	4	18	.045	4		29	14916.096	32130	1871.625	1871.625	1....	H1-1b
16	MPC1	PIPE_2.0	.481	4	45	.087	7		42	14916.096	32130	1871.625	1871.625	1....	H1-1b
17	MPB4	PIPE_2.0	.442	4	290	.081	7		37	14916.096	32130	1871.625	1871.625	1....	H1-1b
18	MPB3	PIPE_2.0	.238	4	29	.038	4		19	14916.096	32130	1871.625	1871.625	1....	H1-1b
19	MPB2	PIPE_2.0	.407	4	21	.041	4		28	14916.096	32130	1871.625	1871.625	1....	H1-1b
20	MPB1	PIPE_2.0	.432	4	278	.086	7		37	14916.096	32130	1871.625	1871.625	1....	H1-1b

Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Che...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
21	MPA4	PIPE_2.0	.510	4	45	.085	7		47	14916.096	32130	1871.625	1871.625	1....	H1-1b
22	MPA3	PIPE_2.0	.260	4	24	.055	4		30	14916.096	32130	1871.625	1871.625	1....	H1-1b
23	MPA2	PIPE_2.0	.413	4	31	.053	4		22	14916.096	32130	1871.625	1871.625	1....	H1-1b
24	MPA1	PIPE_2.0	.569	4	46	.111	7		31	14916.096	32130	1871.625	1871.625	1....	H1-1b
25	CPB	PIPE_2.0	.738	2.5	21	.069	2.5		32	23808.54	32130	1871.625	1871.625	1....	H1-1a
26	CPA	PIPE_2.0	.015	2.5	24	.002	2.5		24	23808.54	32130	1871.625	1871.625	1....	H1-1b
27	CPC	PIPE_2.0	.015	2.5	18	.002	2.5		18	23808.54	32130	1871.625	1871.625	1....	H1-1b
28	HRB2	L2.5x2.5x4	.211	0	31	.035	0	z	24	36209.473	38556	1113.554	2537.388	1....	H2-1
29	HRB1	L2.5x2.5x4	.139	1.387	47	.030	1.387	y	27	36209.473	38556	1113.554	2537.388	1....	H2-1
30	HRB3	L2.5x2.5x4	.160	0	42	.032	0	y	30	36209.473	38556	1113.554	2537.388	1....	H2-1

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

Job	CT03XC354
Project	39391
By	TJS
Date	4/2/19

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	B		Exposure Category
V :	97	mph	Basic Wind Speed (Annex B)
z :	110.333	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.02		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	23.3	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
AAHC	25.6	19.7	1.3	Flat	1.200	3.51	98.0	
800MHz 2x50W RRH	19.0	13.0	1.5	Flat	1.200	1.72	47.9	
NNVV-65B-R4	72.0	19.6	3.7	Flat	1.252	9.80	285.4	
Pipe4STD x 16 ft	192.0	4.5	42.7	Round	1.047	6.00	146.1	9.1
Pipe2STD x 16 ft	192.0	2.4	80.8	Round	1.200	3.17	88.4	5.5
Pipe2STD x 7.5 ft	90.0	2.4	37.9	Round	1.200	1.48	41.4	5.5
HSS5X5X5/16 x 4.041 ft	48.5	5.0	9.7	Flat	1.490	1.68	58.3	14.4
PL 10x1/2 x 1.023 ft	12.3	10.0	1.2	Flat	1.200	0.85	23.8	23.3
L2-1/2X2-1/2X1/4 x 1.446 ft	17.4	2.5	6.9	Flat	1.397	0.30	9.8	6.8
Pipe2STD x 5 ft	60.0	2.4	25.3	Round	1.200	0.99	27.6	5.5
Pipe2-1/2STD x 20 ft	240.0	2.9	83.5	Round	1.200	4.79	133.7	6.7

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

Job	CT03XC354
Project	39391
By	TJS
Date	4/2/19

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	B		Exposure Category
V :	97	mph	Basic Wind Speed (Annex B)
z :	110.333	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.02		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	23.3	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
AAHC	25.6	9.7	2.7	Flat	1.207	1.72	48.2	
800MHz 2x50W RRH	19.0	12.2	1.6	Flat	1.200	1.61	44.9	
NNVV-65B-R4	72.0	7.8	9.2	Flat	1.474	3.90	133.7	
Pipe4STD x 16 ft	192.0	4.5	42.7	Round	1.047	6.00	146.1	9.1
Pipe2STD x 16 ft	192.0	2.4	80.8	Round	1.200	3.17	88.4	5.5
Pipe2STD x 7.5 ft	90.0	2.4	37.9	Round	1.200	1.48	41.4	5.5
HSS5X5X5/16 x 4.041 ft	48.5	5.0	9.7	Flat	1.490	1.68	58.3	14.4
PL 10x1/2 x 1.023 ft	12.3	0.5	24.6	Flat	1.985	0.04	2.0	1.9
L2-1/2X2-1/2X1/4 x 1.446 ft	17.4	2.5	6.9	Flat	1.397	0.30	9.8	6.8
Pipe2STD x 5 ft	60.0	2.4	25.3	Round	1.200	0.99	27.6	5.5
Pipe2-1/2STD x 20 ft	240.0	2.9	83.5	Round	1.200	4.79	133.7	6.7

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

Job	CT03XC354
Project	39391
By	TJS
Date	4/2/19

Ice Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	B		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	110.333	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.02		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	6.18	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections
t_{iz} :	1.69	in	Design Thickness of Radial Ice at Height z (2.6.8)

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
AAHC	29.0	23.1	1.3	Flat	1.200	4.66	34.5	
800MHz 2x50W RRH	22.4	16.4	1.4	Flat	1.200	2.55	18.9	
NNVV-65B-R4	75.4	23.0	3.3	Flat	1.235	12.03	91.8	
Pipe4STD x 16 ft	195.4	7.9	24.8	Round	1.195	10.70	79.0	4.9
Pipe2STD x 16 ft	195.4	5.8	33.9	Round	1.200	7.82	58.0	3.6
Pipe2STD x 7.5 ft	93.4	5.8	16.2	Round	1.005	3.74	23.2	3.0
HSS5X5X5/16 x 4.041 ft	51.9	8.4	6.2	Flat	1.364	3.02	25.5	5.9
PL 10x1/2 x 1.023 ft	15.7	13.4	1.2	Flat	1.200	1.46	10.8	8.3
L2-1/2X2-1/2X1/4 x 1.446 ft	20.7	5.9	3.5	Flat	1.246	0.85	6.5	3.8
Pipe2STD x 5 ft	63.4	5.8	11.0	Round	0.889	2.54	13.9	2.6
Pipe2-1/2STD x 20 ft	243.4	6.3	38.9	Round	1.200	10.58	78.5	3.9

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

Job	CT03XC354
Project	39391
By	TJS
Date	4/2/19

Ice Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	B		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	110.333	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.02		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	6.18	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections
t_{iz} :	1.69	in	Design Thickness of Radial Ice at Height z (2.6.8)

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
AAHC	29.0	13.0	2.2	Flat	1.200	2.63	19.5	
800MHz 2x50W RRH	22.4	15.6	1.4	Flat	1.200	2.42	18.0	
NNVV-65B-R4	75.4	11.2	6.7	Flat	1.388	5.86	50.2	
Pipe4STD x 16 ft	195.4	7.9	24.8	Round	1.195	10.70	79.0	4.9
Pipe2STD x 16 ft	195.4	5.8	33.9	Round	1.200	7.82	58.0	3.6
Pipe2STD x 7.5 ft	93.4	5.8	16.2	Round	1.005	3.74	23.2	3.0
HSS5X5X5/16 x 4.041 ft	51.9	8.4	6.2	Flat	1.364	3.02	25.5	5.9
PL 10x1/2 x 1.023 ft	15.7	3.9	4.0	Flat	1.268	0.42	3.3	2.5
L2-1/2X2-1/2X1/4 x 1.446 ft	20.7	5.9	3.5	Flat	1.246	0.85	6.5	3.8
Pipe2STD x 5 ft	63.4	5.8	11.0	Round	0.889	2.54	13.9	2.6
Pipe2-1/2STD x 20 ft	243.4	6.3	38.9	Round	1.200	10.58	78.5	3.9

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

Job	CT03XC354
Project	39391
By	TJS
Date	4/2/19

Ice Load on Antennas TIA-222-G

Ice Weight :	56	pcf	Ice Density
t_i :	0.75		Design Ice Thickness
Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	B		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	110.333	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_{iz} :	1.13		Height Escalation Factor for Ice Thickness
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
t_{iz} :	1.69	in	Design Thickness of Radial Ice at Height z (2.6.8)

Platform Grating :	Expanded	
Ice Load :	7.9	psf

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Width	Depth	Diam.	Area	Perim.	Ice Weight	
	in	*in*	*in*	*in*	*sq in*	*in*	*lb*	*plf*
AAHC	29.0	23.1	13.0	21.95	125.73	65.51	104.4	
800MHz 2x50W RRH	22.4	16.4	15.6	17.83	103.79	57.17	63.9	
NNVV-65B-R4	75.4	23.0	11.2	21.10	121.16	61.57	282.7	
Pipe4STD x 16 ft	195.4	7.9	7.9	4.50	32.92	19.45	204.9	12.8
Pipe2STD x 16 ft	195.4	5.8	5.8	2.38	21.63	12.78	134.6	8.4
Pipe2STD x 7.5 ft	93.4	5.8	5.8	2.38	21.63	12.78	63.1	8.4
HSS5X5X5/16 x 4.041 ft	51.9	8.4	8.4	6.49	43.50	30.76	68.4	16.9
PL 10x1/2 x 1.023 ft	15.7	13.4	3.9	10.01	62.23	27.77	24.8	24.2
L2-1/2X2-1/2X1/4 x 1.446 ft	20.7	5.9	5.9	3.54	27.80	16.77	15.6	10.8
Pipe2STD x 5 ft	63.4	5.8	5.8	2.38	21.63	12.78	42.1	8.4
Pipe2-1/2STD x 20 ft	243.4	6.3	6.3	2.88	24.28	14.35	188.9	9.4

RAMAKER & ASSOCIATES, INC.
100% EMPLOYEE-OWNED

April 1, 2019

Mike Kithcart
Transcend Wireless
10 Industrial Avenue, Suite 3
Mahwah, NJ 07430

Ramaker & Associates, Inc.
855 Community Drive
Sauk City, WI 53583

SUBJECT: **STRUCTURAL ASSESSMENT**
145-FOOT MONOPOLE TOWER

CARRIER: **SPRINT**

SITE: **CT03XC354**
100 REEF ROAD
FAIRFIELD, FAIRFIELD COUNTY, CONNECTICUT 06824
RAMAKER & ASSOCIATES PROJECT NUMBER: 39391

RESULTS:	**TOWER:**	**85.1%**	**PASS**
	FOUNDATION:	**69.7%**	**PASS**

Dear Mike Kithcart:

Ramaker & Associates, Inc. (RAMAKER) respectfully submits this structural assessment for the above-mentioned site. The purpose of this report is to determine the structural integrity of the existing structure with the existing and proposed loading. Engineering recommendations regarding the analysis results are provided in the following pages.

RAMAKER developed a finite element model of the tower using tnxTower analysis software. All information contained herein is valid only for the described structure configuration and loading conditions. RAMAKER reserves the right to modify our recommendations should alterations to the tower loading occur.

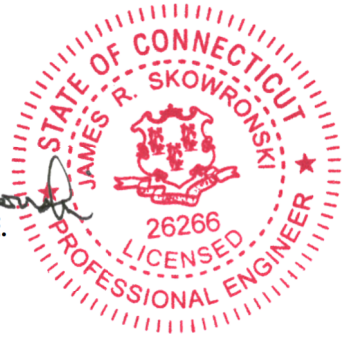
If you have any questions or comments, please do not hesitate to contact our office.

Sincerely,

RAMAKER & ASSOCIATES, INC.

Thomas E. Moore
Project Engineer

James R. Skowronski, P.E.
Supervising Engineer



ANALYSIS CRITERIA

State Building Code	2018 CT State Building Code
Adopted Building Code	2015 IBC
Referenced Standard	TIA-222-G
Risk Category	II
Ultimate Design Wind Speed, V_{ult}	125 mph (3 sec. gust)
Nominal Design Wind Speed, V_{asd}	97 mph (3 sec. gust)
Design Wind Speed w/ Ice	50 mph (3 sec. gust)
Ice Thickness	3/4 inch
Exposure Category	B
Topographic Feature	None

SUPPORTING DOCUMENTATION

- Structural analysis by Destek Engineering, job number 1629043, dated October 17, 2016
- Structural analysis by Destek Engineering, job number 1629043, dated August 19, 2016
- Structural analysis by Fullerton Engineering, site number CT03XC354, dated May 13, 2015
- Structural analysis by KMB Design Group, project number 332.1475, dated February 26, 2014
- Structural modification by Hudson Design Group, job number 5022.01, dated March 14, 2012
- Construction drawings by RAMAKER, project number 39391
- Site visit(s) conducted by RAMAKER
- Other pertinent data procured or assumed by RAMAKER during site due diligence activities

TOWER LOADING

RAMAKER understands that the loading to be used for this analysis will consist of the antenna equipment, mount, and cable configurations as shown in the following chart:

Elevation	Appurtenance	Mount	Coax	Owner	Status
143	(1) 18' Omni	(3) T-Arm	(6) 1-5/8 (10) 7/8	Nextel	Existing
	(2) 10' Dipole				
	(9) 5' Panel Antenna				
135	(6) 5' Panel Antenna	(3) T-Arm	(6) 1-5/8 (6) 1-1/4 (2) 1	T-Mobile	Existing
	(6) TMA				
	(1) 2'x2' Panel Antenna				
130	(6) Powerwave 7770.00	(3) T-Arm	(12) 1-5/8 (1) 7/8 (1) 3/8	AT&T	Existing
	(3) Powerwave P65-16-XLH-RR				
	(3) Ericsson RRUS-11				
	(3) Ericsson RRUS-12				
	(12) TMA				
	(1) Raycap DC6-48-60-18-8F				
110.33	(1) 20' Omni	(1) Platform **w/Handrail**	(1) 5/8	Sprint	Existing
	(3) RFS APXVSPP18-C-A20		(3) Hybrid **(1) Hybrid**		**Remove**
	(3) Commscope NNVV-65B-R4				**Proposed**
	(3) Nokia AAHC				
	(3) ALU 800MHz 2x50W RRH				
	(3) ALU 800MHz 2x50W RRH	Collar Mount			Existing
	(3) ALU 1900MHz 4x45W RRH				
	(3) Filter				

TOWER RESULTS

The maximum tower member stress capacities under the loading conditions previously described are as follows:

Component Type	Percent Capacity	Pass/Fail
Section 1	54.4	Pass
Section 2	75.6	Pass
Section 3	85.1	Pass
Anchor Rod	79.9	Pass
Base Plate	52.0	Pass
RATING	**85.1**	**PASS**

The existing flat plate reinforcement (from 0 to 66 feet) was determined by RAMAKER to be generally ineffective. As a result, it was not considered to provide any additional strength in the tower.

Results of the analysis show that the existing tower will be stressed to a maximum of 85.1 percent of capacity. Therefore, the existing tower will pass the TIA-222-G analysis requirements under proposed loading conditions.

FOUNDATION RESULTS

The maximum foundation stress capacities are as follows:

Component Type	Percent Capacity	Pass/Fail
Caisson - Soil Interaction	69.7	Pass
Caisson - Structural	54.2	Pass
RATING	**69.7**	**PASS**

The foundation was analyzed utilizing the structural reports referenced above. Results of the analysis show that the existing foundation will be stressed to a maximum of 69.7 percent of capacity. Therefore, the existing foundation will pass the TIA-222-G analysis requirements under proposed loading conditions.

LIMITATIONS

The recommendations contained within this report were developed using the supporting documentation as previously described. All recommendations pertain only to the proposed antenna installation activities as described in this report. RAMAKER assumes no responsibility for failures caused by factors beyond our control. These include but are not limited to the following:

- Missing, corroding, and/or deteriorating members
- Improper manufacturing and/or construction
- Improper maintenance

RAMAKER assumes no responsibility for modifications completed prior to or hereafter in which RAMAKER was not directly involved. These modifications include but are not limited to the following:

- Replacing or strengthening bracing members
- Reinforcing or extending vertical members
- Installing or removing antenna mounting gates or side arms
- Changing loading configurations

The tower owner is responsible for verifying that the existing loading on the structure is consistent with the loading applied to the structure within this report. If there is any information contrary to that contained herein, or if there are any defects arising from the original design, material, fabrication and erection deficiencies, this report should be disregarded and RAMAKER should be contacted immediately. RAMAKER is not liable for any representation, recommendation, or conclusion not expressly stated herein.

This analysis pertains only to the tower structure, and no analyses or conclusions were made regarding the antenna and equipment mounting structure(s). Analysis and certification of the antenna and equipment mounting structure(s) is performed and submitted separately.

ATTACHMENTS

- Analysis Figures
- Analysis Calculations

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	54.17	12	0.2813	5.17	23.6100	33.4800		4717.9
2	53.17	12	0.3750	6.17	31.9760	41.6400	A572-65	7959.0
3	49.00	12	0.4375		39.7691	48.6900		10286.3
								22963.2

ALL REACTIONS ARE FACTORED

AXIAL 94397 lb

SHEAR 8647 lb *MOMENT 939116 lb-ft*

TORQUE 905 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 52143 lb

SHEAR 37899 lb *MOMENT 3787655 lb-ft*

TORQUE 2061 lb-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	143	RRUS-12	130
(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	143	6' x 2" Pipe Mount	130
(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	143	6' x 2" Pipe Mount	130
10' Dipole	143	6' x 2" Pipe Mount	130
10' Dipole	143	(4) LGP214nn	130
18' Omni	143	(4) LGP214nn	130
3' x 2" Pipe Mount	143	(4) LGP214nn	130
6' x 2" Pipe Mount	143	DC6-48-60-18-8F	130
6' x 2" Pipe Mount	143	T-Arm Mount [TA 602-1] (ATT)	130
6' x 2" Pipe Mount	143	T-Arm Mount [TA 602-1] (ATT)	130
Side Arm Mount [SO 202-1] (Nextel)	143	T-Arm Mount [TA 602-1] (ATT)	130
Side Arm Mount [SO 202-1] (Nextel)	143	20' Omni	110.33
T-Arm Mount [TA 602-1] (Nextel)	143	NNVV-65B-R4 w/Mount Pipe	110.33
T-Arm Mount [TA 602-1] (Nextel)	143	NNVV-65B-R4 w/Mount Pipe	110.33
T-Arm Mount [TA 602-1] (Nextel)	143	NNVV-65B-R4 w/Mount Pipe	110.33
(2) AIR 21 B2A/B4P w/Mount Pipe	135	AAHC	110.33
(2) AIR 21 B2A/B4P w/Mount Pipe	135	AAHC	110.33
(2) AIR 21 B2A/B4P w/Mount Pipe	135	AAHC	110.33
(2) LGP214nn	135	800MHz 2x50W RRH	110.33
(2) LGP214nn	135	800MHz 2x50W RRH	110.33
(2) LGP214nn	135	800MHz 2x50W RRH	110.33
2'x2' Antenna	135	FIM800CAB-A1D	110.33
4' x 2" Pipe Mount	135	FIM800CAB-A1D	110.33
T-Arm Mount [TA 602-1] (TMO)	135	FIM800CAB-A1D	110.33
T-Arm Mount [TA 602-1] (TMO)	135	(3) 7' x 2" Pipe Mount	110.33
T-Arm Mount [TA 602-1] (TMO)	135	(3) 7' x 2" Pipe Mount	110.33
(2) 7770.00 w/Mount Pipe	130	(3) 7' x 2" Pipe Mount	110.33
(2) 7770.00 w/Mount Pipe	130	5' x 2" Pipe Mount	110.33
(2) 7770.00 w/Mount Pipe	130	5' x 2" Pipe Mount	110.33
P65-16-XLH-RR w/Mount Pipe	130	5' x 2" Pipe Mount	110.33
P65-16-XLH-RR w/Mount Pipe	130	Miscellaneous [NA 510-1] (Sprint)	110.33
P65-16-XLH-RR w/Mount Pipe	130	Platform Mount [LP 405-1] (Sprint)	110.33
RRUS-11	130	800MHz 2x50W RRH	107
RRUS-11	130	800MHz 2x50W RRH	107
RRUS-11	130	800MHz 2x50W RRH	107
RRUS-12	130	1900MHz 4x45W RRH	107
RRUS-12	130	1900MHz 4x45W RRH	107
		1900MHz 4x45W RRH	107
		(3) 6'x2" Pipe Mount (Sprint)	107
		Collar Mount (Sprint)	107

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 85.1%

Ramaker & Associates, Inc
855 Community Drive
Sauk City, WI 53583
Phone: (608) 643-4100
FAX:

Job: *CT03XC354*			
Project: *39391*			
Client: Sprint	Drawn by: TEM	App'd:	
Code: TIA-222-G	Date: 07/11/18	Scale: NTS	
Path: I:\39300\39391\Stuctural\tnx\39391.eri		Dwg No. E-1	

Tower Input Data

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

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 0.7500 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.

Tapered Pole Section Geometry

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
L1	145.00-90.83	54.17	5.17	12	23.6100	33.4800	0.2813	1.1250	A572-65 (65 ksi)
L2	90.83-42.83	53.17	6.17	12	31.9760	41.6400	0.3750	1.5000	A572-65 (65 ksi)
L3	42.83-0.00	49.00		12	39.7691	48.6900	0.4375	1.7500	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	24.3437	21.1271	1467.6036	8.3517	12.2300	120.0005	2973.7627	10.3981	5.5737	19.818
	34.5618	30.0656	4229.6024	11.8852	17.3426	243.8846	8570.3213	14.7974	8.2189	29.223
L2	33.9440	38.1583	4863.8207	11.3132	16.5636	293.6453	9855.4195	18.7803	7.5646	20.172
	42.9766	49.8275	10829.7552	14.7729	21.5695	502.0861	21944.0200	24.5236	10.1545	27.079
L3	42.1800	55.4084	10940.6881	14.0807	20.6004	531.0912	22168.8002	27.2703	9.4856	21.681
	50.2533	67.9757	20201.3009	17.2744	25.2214	800.9581	40933.3125	33.4556	11.8764	27.146

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 145.00-90.83				1	1	1			
L2 90.83-42.83				1	1	1			
L3 42.83-0.00				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
**********									
1 5/8 (Nextel)	A	Surface Ar (CaAa)	143.00 - 30.00	6	3	-0.100 0.100	1.9800		1.04
**********									
1 5/8 (TMO)	B	Surface Ar (CaAa)	135.00 - 30.00	6	2	-0.200 0.000	1.9800		1.04
1 1/4 (TMO)	B	Surface Ar (CaAa)	135.00 - 30.00	6	2	0.000 0.200	1.5500		0.66
1 (TMO)	B	Surface Ar (CaAa)	135.00 - 30.00	2	1	0.200 0.300	1.2500		0.58
**********									
1 1/4 (Sprint)	C	Surface Ar (CaAa)	110.33 - 30.00	3	3	-0.100 0.100	1.5500		0.66
1 1/4 (Sprint)	C	Surface Ar (CaAa)	110.33 - 30.00	1	1	-0.200 0.100	1.5500		0.66
5/8 (Sprint)	C	Surface Ar (CaAa)	110.33 - 30.00	1	1	0.100 0.200	0.8800		0.40
**********									
5/8x10 Flat Plate	A	Surface Af (CaAa)	38.00 - 0.00	1	1	0.000 0.000	10.0000	21.2500	21.27
5/8x10 Flat Plate	B	Surface Af (CaAa)	38.00 - 0.00	1	1	0.000 0.000	10.0000	21.2500	21.27
5/8x10 Flat Plate	C	Surface Af (CaAa)	38.00 - 0.00	1	1	0.000 0.000	10.0000	21.2500	21.27
5/8x10 Flat Plate	A	Surface Af (CaAa)	47.50 - 0.00	1	1	0.500 0.500	10.0000	21.2500	21.27
5/8x10 Flat Plate	B	Surface Af (CaAa)	47.50 - 0.00	1	1	0.500 0.500	10.0000	21.2500	21.27
5/8x10 Flat Plate	C	Surface Af (CaAa)	47.50 - 0.00	1	1	0.500 0.500	10.0000	21.2500	21.27
5/8x7 Flat Plate	A	Surface Af (CaAa)	66.50 - 38.00	1	1	0.000 0.000	7.0000	15.2500	14.89
5/8x7 Flat Plate	B	Surface Af (CaAa)	66.50 - 38.00	1	1	0.000 0.000	7.0000	15.2500	14.89
5/8x7 Flat Plate	C	Surface Af (CaAa)	66.50 - 38.00	1	1	0.000 0.000	7.0000	15.2500	14.89
5/8x7 Flat Plate	A	Surface Af (CaAa)	66.50 - 47.50	1	1	0.500 0.500	7.0000	15.2500	14.89
5/8x7 Flat Plate	B	Surface Af (CaAa)	66.50 - 47.50	1	1	0.500 0.500	7.0000	15.2500	14.89
5/8x7 Flat Plate	C	Surface Af (CaAa)	66.50 - 47.50	1	1	0.500 0.500	7.0000	15.2500	14.89
**********									

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
7/8 (Nextel)	A	No	Inside Pole	143.00 - 30.00	10	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
**********								
1 5/8 (ATT)	C	No	Inside Pole	130.00 - 30.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
7/8 (ATT)	C	No	Inside Pole	130.00 - 30.00	1	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
3/8 (ATT)	C	No	Inside Pole	130.00 - 30.00	1	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
**********								

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 lb
L1	145.00-90.83	A	0.000	0.000	30.987	0.000	607.22
		B	0.000	0.000	36.703	0.000	501.73
		C	0.000	0.000	13.804	0.000	572.35
L2	90.83-42.83	A	0.000	0.000	86.068	0.000	1293.15
		B	0.000	0.000	97.444	0.000	1279.71
		C	0.000	0.000	91.540	0.000	1509.15
L3	42.83-0.00	A	0.000	0.000	147.984	0.000	1940.44
		B	0.000	0.000	151.025	0.000	1936.85
		C	0.000	0.000	149.447	0.000	1998.19

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 lb
L1	145.00-90.83	A	1.702	0.000	0.000	60.932	0.000	1597.00
		B		0.000	0.000	97.121	0.000	2654.79
		C		0.000	0.000	37.640	0.000	1028.57
L2	90.83-42.83	A	1.609	0.000	0.000	129.442	0.000	2902.08
		B		0.000	0.000	178.928	0.000	4317.84
		C		0.000	0.000	166.047	0.000	3330.54
L3	42.83-0.00	A	1.433	0.000	0.000	182.618	0.000	3617.53
		B		0.000	0.000	195.310	0.000	3969.91
		C		0.000	0.000	191.926	0.000	3722.60

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	145.00-90.83	0.4398	-1.3154	1.2177	-1.2133
L2	90.83-42.83	0.4607	-0.0518	1.1086	0.3414
L3	42.83-0.00	0.1016	-0.0081	0.3096	0.0995

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	2	1 5/8	90.83 - 143.00	1.0000	1.0000
L1	5	1 5/8	90.83 - 135.00	1.0000	1.0000
L1	6	1 1/4	90.83 - 135.00	1.0000	1.0000
L1	7	1	90.83 - 135.00	1.0000	1.0000
L1	13	1 1/4	90.83 - 110.33	1.0000	1.0000
L1	14	1 1/4	90.83 - 110.33	1.0000	1.0000
L1	15	5/8	90.83 - 110.33	1.0000	1.0000
L1	20	5/8x10 Flat Plate	90.83 - 47.50	1.0000	1.0000
L1	21	5/8x10 Flat Plate	90.83 - 47.50	1.0000	1.0000
L1	22	5/8x10 Flat Plate	90.83 - 47.50	1.0000	1.0000
L1	23	5/8x7 Flat Plate	90.83 - 66.50	1.0000	1.0000
L1	24	5/8x7 Flat Plate	90.83 - 66.50	1.0000	1.0000
L1	25	5/8x7 Flat Plate	90.83 - 66.50	1.0000	1.0000
L1	26	5/8x7 Flat Plate	90.83 - 66.50	1.0000	1.0000
L1	27	5/8x7 Flat Plate	90.83 - 66.50	1.0000	1.0000
L1	28	5/8x7 Flat Plate	90.83 - 66.50	1.0000	1.0000
L2	2	1 5/8	42.83 - 90.83	1.0000	1.0000
L2	5	1 5/8	42.83 - 90.83	1.0000	1.0000
L2	6	1 1/4	42.83 - 90.83	1.0000	1.0000
L2	7	1	42.83 - 90.83	1.0000	1.0000
L2	13	1 1/4	42.83 - 90.83	1.0000	1.0000
L2	14	1 1/4	42.83 - 90.83	1.0000	1.0000
L2	15	5/8	42.83 - 90.83	1.0000	1.0000
L2	17	5/8x10 Flat Plate	42.83 - 38.00	1.0000	1.0000
L2	18	5/8x10 Flat Plate	42.83 - 38.00	1.0000	1.0000
L2	19	5/8x10 Flat Plate	42.83 - 38.00	1.0000	1.0000
L2	20	5/8x10 Flat Plate	42.83 - 47.50	1.0000	1.0000
L2	21	5/8x10 Flat Plate	42.83 - 47.50	1.0000	1.0000
L2	22	5/8x10 Flat Plate	42.83 - 47.50	1.0000	1.0000
L2	23	5/8x7 Flat Plate	42.83 - 66.50	1.0000	1.0000
L2	24	5/8x7 Flat Plate	42.83 - 66.50	1.0000	1.0000
L2	25	5/8x7 Flat Plate	42.83 - 66.50	1.0000	1.0000

Discrete Tower Loads

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 lb
**********									
(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	A	From Face	3.00 2.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	4.58 5.13 5.65	10.29 11.48 12.37	46.55 113.30 187.93
(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	B	From Face	3.00 2.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	4.58 5.13 5.65	10.29 11.48 12.37	46.55 113.30 187.93
(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	C	From Face	3.00 2.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	4.58 5.13 5.65	10.29 11.48 12.37	46.55 113.30 187.93
10' Dipole	B	From Face	3.00 6.00 5.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	3.00 4.03 5.03	3.00 4.03 5.03	30.00 51.79 80.14
10' Dipole	C	From Face	3.00 6.00 5.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	3.00 4.03 5.03	3.00 4.03 5.03	30.00 51.79 80.14
18' Omni	C	From Leg	1.00 0.00 9.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	4.95 6.78 8.63	4.95 6.78 8.63	50.00 86.09 133.62
3' x 2" Pipe Mount	C	From Leg	0.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	0.58 0.77 0.97	0.58 0.77 0.97	10.98 16.54 24.32
6' x 2" Pipe Mount	A	From Face	3.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	21.90 32.73 47.61
6' x 2" Pipe Mount	B	From Face	3.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	21.90 32.73 47.61
6' x 2" Pipe Mount	C	From Face	3.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	21.90 32.73 47.61
Side Arm Mount [SO 202-1] (Nextel)	A	From Face	3.00 -6.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	2.96 4.10 5.24	2.53 3.51 4.49	110.00 133.55 157.10
Side Arm Mount [SO 202-1] (Nextel)	B	From Face	3.00 -6.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	2.96 4.10 5.24	2.53 3.51 4.49	110.00 133.55 157.10
T-Arm Mount [TA 602-1] (Nextel)	A	From Face	3.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	7.28 9.52 11.76	3.02 4.20 5.38	258.10 330.12 402.14
T-Arm Mount [TA 602-1] (Nextel)	B	From Face	3.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	7.28 9.52 11.76	3.02 4.20 5.38	258.10 330.12 402.14
T-Arm Mount [TA 602-1] (Nextel)	C	From Face	3.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice 1" Ice	7.28 9.52 11.76	3.02 4.20 5.38	258.10 330.12 402.14
**********									
(2) AIR 21 B2A/B4P w/Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	6.37 6.85 7.30	5.74 6.59 7.31	104.90 162.47 226.82
(2) AIR 21 B2A/B4P w/Mount Pipe	B	From Leg	3.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	6.37 6.85 7.30	5.74 6.59 7.31	104.90 162.47 226.82
(2) AIR 21 B2A/B4P w/Mount Pipe	C	From Leg	3.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	6.37 6.85 7.30	5.74 6.59 7.31	104.90 162.47 226.82
(2) LGP214nn	A	From Leg	3.00	0.0000	135.00	No Ice	1.11	0.21	14.10

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 lb
			0.00			1/2" Ice	1.25	0.28	21.30
			1.00			1" Ice	1.39	0.35	30.39
(2) LGP214nn	B	From Leg	3.00	0.0000	135.00	No Ice	1.11	0.21	14.10
			0.00			1/2" Ice	1.25	0.28	21.30
			1.00			1" Ice	1.39	0.35	30.39
(2) LGP214nn	C	From Leg	3.00	0.0000	135.00	No Ice	1.11	0.21	14.10
			0.00			1/2" Ice	1.25	0.28	21.30
			1.00			1" Ice	1.39	0.35	30.39
2'x2' Antenna	C	From Leg	1.50	0.0000	135.00	No Ice	4.80	0.52	20.00
			0.00			1/2" Ice	5.07	0.67	43.43
			1.50			1" Ice	5.35	0.83	70.30
4' x 2" Pipe Mount	C	From Leg	1.50	0.0000	135.00	No Ice	0.87	0.87	14.60
			0.00			1/2" Ice	1.11	1.11	21.91
			0.00			1" Ice	1.36	1.36	32.07
T-Arm Mount [TA 602-1] (TMO)	A	From Leg	3.00	0.0000	135.00	No Ice	7.28	3.02	258.10
			0.00			1/2" Ice	9.52	4.20	330.12
			0.00			1" Ice	11.76	5.38	402.14
T-Arm Mount [TA 602-1] (TMO)	B	From Leg	3.00	0.0000	135.00	No Ice	7.28	3.02	258.10
			0.00			1/2" Ice	9.52	4.20	330.12
			0.00			1" Ice	11.76	5.38	402.14
T-Arm Mount [TA 602-1] (TMO)	C	From Leg	3.00	0.0000	135.00	No Ice	7.28	3.02	258.10
			0.00			1/2" Ice	9.52	4.20	330.12
			0.00			1" Ice	11.76	5.38	402.14
**********									
(2) 7770.00 w/Mount Pipe	A	From Face	3.00	0.0000	130.00	No Ice	5.66	4.11	30.35
			0.00			1/2" Ice	6.04	4.76	76.38
			0.00			1" Ice	6.44	5.43	128.70
(2) 7770.00 w/Mount Pipe	B	From Face	3.00	0.0000	130.00	No Ice	5.66	4.11	30.35
			0.00			1/2" Ice	6.04	4.76	76.38
			0.00			1" Ice	6.44	5.43	128.70
(2) 7770.00 w/Mount Pipe	C	From Face	3.00	0.0000	130.00	No Ice	5.66	4.11	30.35
			0.00			1/2" Ice	6.04	4.76	76.38
			0.00			1" Ice	6.44	5.43	128.70
P65-16-XLH-RR w/Mount Pipe	A	From Face	3.00	0.0000	130.00	No Ice	8.13	6.13	85.90
			0.00			1/2" Ice	8.59	7.07	149.07
			0.00			1" Ice	9.05	7.90	219.94
P65-16-XLH-RR w/Mount Pipe	B	From Face	3.00	0.0000	130.00	No Ice	8.13	6.13	85.90
			0.00			1/2" Ice	8.59	7.07	149.07
			0.00			1" Ice	9.05	7.90	219.94
P65-16-XLH-RR w/Mount Pipe	C	From Face	3.00	0.0000	130.00	No Ice	8.13	6.13	85.90
			0.00			1/2" Ice	8.59	7.07	149.07
			0.00			1" Ice	9.05	7.90	219.94
RRUS-11	A	From Face	0.50	0.0000	130.00	No Ice	2.78	1.19	50.71
			0.00			1/2" Ice	2.99	1.33	71.49
			3.00			1" Ice	3.21	1.49	95.32
RRUS-11	B	From Face	0.50	0.0000	130.00	No Ice	2.78	1.19	50.71
			0.00			1/2" Ice	2.99	1.33	71.49
			3.00			1" Ice	3.21	1.49	95.32
RRUS-11	C	From Face	0.50	0.0000	130.00	No Ice	2.78	1.19	50.71
			0.00			1/2" Ice	2.99	1.33	71.49
			3.00			1" Ice	3.21	1.49	95.32
RRUS-12	A	From Face	0.50	0.0000	130.00	No Ice	3.14	1.26	57.98
			0.00			1/2" Ice	3.36	1.42	81.02
			1.00			1" Ice	3.59	1.57	107.26
RRUS-12	B	From Face	0.50	0.0000	130.00	No Ice	3.14	1.26	57.98
			0.00			1/2" Ice	3.36	1.42	81.02
			1.00			1" Ice	3.59	1.57	107.26

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
RRUS-12	C	From Face	0.50	0.0000	130.00	No Ice	3.14	1.26	57.98
			0.00			1/2" Ice	3.36	1.42	81.02
			1.00			1" Ice	3.59	1.57	107.26
6' x 2" Pipe Mount	A	From Face	0.50	0.0000	130.00	No Ice	1.43	1.43	21.90
			0.00			1/2" Ice	1.92	1.92	32.73
			3.00			1" Ice	2.29	2.29	47.61
6' x 2" Pipe Mount	B	From Face	0.50	0.0000	130.00	No Ice	1.43	1.43	21.90
			0.00			1/2" Ice	1.92	1.92	32.73
			3.00			1" Ice	2.29	2.29	47.61
6' x 2" Pipe Mount	C	From Face	0.50	0.0000	130.00	No Ice	1.43	1.43	21.90
			0.00			1/2" Ice	1.92	1.92	32.73
			3.00			1" Ice	2.29	2.29	47.61
(4) LGP214nn	A	From Face	3.00	0.0000	130.00	No Ice	1.11	0.21	14.10
			0.00			1/2" Ice	1.25	0.28	21.30
			0.00			1" Ice	1.39	0.35	30.39
(4) LGP214nn	B	From Face	3.00	0.0000	130.00	No Ice	1.11	0.21	14.10
			0.00			1/2" Ice	1.25	0.28	21.30
			0.00			1" Ice	1.39	0.35	30.39
(4) LGP214nn	C	From Face	3.00	0.0000	130.00	No Ice	1.11	0.21	14.10
			0.00			1/2" Ice	1.25	0.28	21.30
			0.00			1" Ice	1.39	0.35	30.39
DC6-48-60-18-8F	C	From Face	0.50	0.0000	130.00	No Ice	0.92	0.92	32.80
			0.00			1/2" Ice	1.46	1.46	50.52
			2.00			1" Ice	1.64	1.64	70.72
T-Arm Mount [TA 602-1] (ATT)	A	From Face	3.00	0.0000	130.00	No Ice	7.28	3.02	258.10
			0.00			1/2" Ice	9.52	4.20	330.12
			0.00			1" Ice	11.76	5.38	402.14
T-Arm Mount [TA 602-1] (ATT)	B	From Face	3.00	0.0000	130.00	No Ice	7.28	3.02	258.10
			0.00			1/2" Ice	9.52	4.20	330.12
			0.00			1" Ice	11.76	5.38	402.14
T-Arm Mount [TA 602-1] (ATT)	C	From Face	3.00	0.0000	130.00	No Ice	7.28	3.02	258.10
			0.00			1/2" Ice	9.52	4.20	330.12
			0.00			1" Ice	11.76	5.38	402.14
**********									
20' Omni	C	From Leg	6.00	0.0000	110.33	No Ice	5.50	5.50	55.00
			0.00			1/2" Ice	7.53	7.53	95.06
			10.00			1" Ice	9.58	9.58	147.78
**********									
NNVV-65B-R4 w/Mount Pipe	A	From Face	3.00	0.0000	110.33	No Ice	12.51	7.41	102.95
			0.00			1/2" Ice	13.11	8.60	193.58
			0.00			1" Ice	13.67	9.50	292.74
NNVV-65B-R4 w/Mount Pipe	B	From Face	3.00	0.0000	110.33	No Ice	12.51	7.41	102.95
			0.00			1/2" Ice	13.11	8.60	193.58
			0.00			1" Ice	13.67	9.50	292.74
NNVV-65B-R4 w/Mount Pipe	C	From Face	3.00	0.0000	110.33	No Ice	12.51	7.41	102.95
			0.00			1/2" Ice	13.11	8.60	193.58
			0.00			1" Ice	13.67	9.50	292.74
AAHC	A	From Face	3.00	0.0000	110.33	No Ice	4.20	2.07	103.70
			-6.00			1/2" Ice	4.46	2.26	136.01
			0.00			1" Ice	4.72	2.46	172.07
AAHC	B	From Face	3.00	0.0000	110.33	No Ice	4.20	2.07	103.70
			-6.00			1/2" Ice	4.46	2.26	136.01
			0.00			1" Ice	4.72	2.46	172.07
AAHC	C	From Face	3.00	0.0000	110.33	No Ice	4.20	2.07	103.70
			-6.00			1/2" Ice	4.46	2.26	136.01
			0.00			1" Ice	4.72	2.46	172.07
800MHz 2x50W RRH	A	From Face	3.00	0.0000	110.33	No Ice	2.06	1.93	64.00

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 lb
			-6.00			1/2" Ice	2.24	2.11	86.12
			1.00			1" Ice	2.43	2.29	111.30
800MHz 2x50W RRH	B	From Face	3.00	0.0000	110.33	No Ice	2.06	1.93	64.00
			-6.00			1/2" Ice	2.24	2.11	86.12
			1.00			1" Ice	2.43	2.29	111.30
800MHz 2x50W RRH	C	From Face	3.00	0.0000	110.33	No Ice	2.06	1.93	64.00
			-6.00			1/2" Ice	2.24	2.11	86.12
			1.00			1" Ice	2.43	2.29	111.30
FIM800CAB-A1D	A	From Face	3.00	0.0000	110.33	No Ice	1.22	1.04	53.00
			0.00			1/2" Ice	1.36	1.17	65.42
			-1.00			1" Ice	1.51	1.31	80.18
FIM800CAB-A1D	B	From Face	3.00	0.0000	110.33	No Ice	1.22	1.04	53.00
			0.00			1/2" Ice	1.36	1.17	65.42
			-1.00			1" Ice	1.51	1.31	80.18
FIM800CAB-A1D	C	From Face	3.00	0.0000	110.33	No Ice	1.22	1.04	53.00
			0.00			1/2" Ice	1.36	1.17	65.42
			-1.00			1" Ice	1.51	1.31	80.18
(3) 7' x 2" Pipe Mount	A	From Face	3.00	0.0000	110.33	No Ice	1.66	1.66	25.55
			0.00			1/2" Ice	2.39	2.39	38.13
			0.00			1" Ice	2.83	2.83	55.39
(3) 7' x 2" Pipe Mount	B	From Face	3.00	0.0000	110.33	No Ice	1.66	1.66	25.55
			0.00			1/2" Ice	2.39	2.39	38.13
			0.00			1" Ice	2.83	2.83	55.39
(3) 7' x 2" Pipe Mount	C	From Face	3.00	0.0000	110.33	No Ice	1.66	1.66	25.55
			0.00			1/2" Ice	2.39	2.39	38.13
			0.00			1" Ice	2.83	2.83	55.39
5' x 2" Pipe Mount	A	From Leg	6.00	0.0000	110.33	No Ice	1.19	1.19	29.00
			0.00			1/2" Ice	1.50	1.50	38.07
			0.00			1" Ice	1.81	1.81	50.59
5' x 2" Pipe Mount	B	From Leg	6.00	0.0000	110.33	No Ice	1.19	1.19	29.00
			0.00			1/2" Ice	1.50	1.50	38.07
			0.00			1" Ice	1.81	1.81	50.59
5' x 2" Pipe Mount	C	From Leg	6.00	0.0000	110.33	No Ice	1.19	1.19	29.00
			0.00			1/2" Ice	1.50	1.50	38.07
			0.00			1" Ice	1.81	1.81	50.59
Miscellaneous [NA 510-1] (Sprint)	C	None		0.0000	110.33	No Ice	6.00	6.00	255.70
						1/2" Ice	8.50	8.50	339.50
						1" Ice	11.00	11.00	423.30
Platform Mount [LP 405-1] (Sprint)	C	None		0.0000	110.33	No Ice	20.80	20.80	1800.00
						1/2" Ice	28.10	28.10	2066.00
						1" Ice	35.40	35.40	2332.00
**********									
800MHz 2x50W RRH	A	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	64.00
			0.00			1/2" Ice	2.24	2.11	86.12
			-1.50			1" Ice	2.43	2.29	111.30
800MHz 2x50W RRH	B	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	64.00
			0.00			1/2" Ice	2.24	2.11	86.12
			-1.50			1" Ice	2.43	2.29	111.30
800MHz 2x50W RRH	C	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	64.00
			0.00			1/2" Ice	2.24	2.11	86.12
			-1.50			1" Ice	2.43	2.29	111.30
1900MHz 4x45W RRH	A	From Face	0.50	0.0000	107.00	No Ice	2.32	2.24	59.50
			0.00			1/2" Ice	2.53	2.44	82.62
			1.50			1" Ice	2.74	2.65	108.98
1900MHz 4x45W RRH	B	From Face	0.50	0.0000	107.00	No Ice	2.32	2.24	59.50
			0.00			1/2" Ice	2.53	2.44	82.62
			1.50			1" Ice	2.74	2.65	108.98

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 lb
1900MHz 4x45W RRH	C	From Face	0.50 0.00 1.50	0.0000	107.00	No Ice 1/2" Ice 1" Ice	2.32 2.53 2.74	2.24 2.44 2.65	59.50 82.62 108.98
(3) 6'x2" Pipe Mount (Sprint)	C	None		0.0000	107.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	21.96 32.79 47.67
Collar Mount (Sprint)	C	None		0.0000	107.00	No Ice 1/2" Ice 1" Ice	3.00 3.50 4.00	3.00 3.50 4.00	85.00 115.00 145.00

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	22963.19					
Bracing Weight	0.00					
Total Member Self-Weight	22963.19			-1021.34	455.25	
Total Weight	43452.69			-1021.34	455.25	
Wind 0 deg - No Ice		40.29	-23687.12	-2272429.57	-5044.07	-1200.88
Wind 30 deg - No Ice		10261.46	-17684.58	-1729086.19	-1004271.17	-889.12
Wind 60 deg - No Ice		16270.98	-9389.31	-909778.98	-1574732.87	177.96
Wind 90 deg - No Ice		18727.90	-40.29	-6520.66	-1797976.48	1121.11
Wind 120 deg - No Ice		19290.34	11086.02	1060470.14	-1850274.29	1215.10
Wind 150 deg - No Ice		11652.45	20174.42	1921659.92	-1110282.94	1313.60
Wind 180 deg - No Ice		-40.29	23687.12	2270386.89	5954.57	1200.88
Wind 210 deg - No Ice		-10261.46	17684.58	1727043.51	1005181.67	889.12
Wind 240 deg - No Ice		-16270.98	9389.31	907736.30	1575643.37	-177.96
Wind 270 deg - No Ice		-18727.90	40.29	4477.98	1798886.97	-1121.11
Wind 300 deg - No Ice		-19290.34	-11086.02	-1062512.82	1851184.78	-1215.10
Wind 330 deg - No Ice		-11652.45	-20174.42	-1923702.60	1111193.44	-1313.60
Member Ice	10805.43					
Total Weight Ice	84790.26			-1472.14	-1572.57	
Wind 0 deg - Ice		11.76	-8597.00	-852320.92	-3177.18	-728.01
Wind 30 deg - Ice		3978.41	-6862.29	-682901.76	-397261.77	-495.62
Wind 60 deg - Ice		6624.43	-3821.73	-381791.70	-661020.34	57.22
Wind 90 deg - Ice		7476.15	-11.76	-3076.74	-735170.31	623.57
Wind 120 deg - Ice		7127.94	4098.86	402827.65	-705764.53	872.51
Wind 150 deg - Ice		4325.78	7487.48	720739.19	-418954.26	925.20
Wind 180 deg - Ice		-11.76	8597.00	849376.64	32.03	728.01
Wind 210 deg - Ice		-3978.41	6862.29	679957.48	394116.62	495.62
Wind 240 deg - Ice		-6624.43	3821.73	378847.42	657875.19	-57.22
Wind 270 deg - Ice		-7476.15	11.76	132.46	732025.17	-623.57
Wind 300 deg - Ice		-7127.94	-4098.86	-405771.93	702619.38	-872.51
Wind 330 deg - Ice		-4325.78	-7487.48	-723683.47	415809.12	-925.20
Total Weight	43452.69			-1021.34	455.25	
Wind 0 deg - Service		13.79	-8108.99	-777457.83	-713.83	-411.10
Wind 30 deg - Service		3512.88	-6054.09	-591451.07	-342786.64	-304.38
Wind 60 deg - Service		5570.16	-3214.31	-310971.56	-538077.01	60.92
Wind 90 deg - Service		6411.26	-13.79	-1752.46	-614501.65	383.80

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 120 deg - Service		6603.80	3795.16	363518.40	-632405.15	415.97
Wind 150 deg - Service		3989.07	6906.46	658335.88	-379078.43	449.70
Wind 180 deg - Service		-13.79	8108.99	777718.16	3051.42	411.10
Wind 210 deg - Service		-3512.88	6054.09	591711.40	345124.23	304.38
Wind 240 deg - Service		-5570.16	3214.31	311231.89	540414.61	-60.92
Wind 270 deg - Service		-6411.26	13.79	2012.79	616839.24	-383.80
Wind 300 deg - Service		-6603.80	-3795.16	-363258.07	634742.74	-415.97
Wind 330 deg - Service		-3989.07	-6906.46	-658075.55	381416.03	-449.70

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
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service

Comb. No.	Description
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	145 - 90.8333	Pole	Max Tension	14	0.02	-2.76	0.02
			Max. Compression	26	-38926.88	2119.03	-80.34
			Max. Mx	20	-16196.65	581594.52	-2265.34
			Max. My	2	-15538.32	-1664.53	682840.00
			Max. Vy	22	-19429.02	567290.38	323835.26
			Max. Vx	2	-23679.57	-1664.53	682840.00
			Max. Torque	25			2548.18
L2	90.8333 - 42.8333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-62322.92	-363.68	1169.68
			Max. Mx	22	-29610.96	1657355.87	949831.54
			Max. My	2	-29433.17	-5199.23	2024460.21
			Max. Vy	22	-26876.14	1657355.87	949831.54
			Max. Vx	2	-33225.56	-5199.23	2024460.21
			Max. Torque	25			2252.84
L3	42.8333 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-94397.08	-1445.83	1685.87
			Max. Mx	22	-52107.91	3086737.75	1771295.22
			Max. My	2	-52103.22	-8640.56	3787644.91
			Max. Vy	22	-30909.36	3086737.75	1771295.22
			Max. Vx	2	-37954.39	-8640.56	3787644.91
			Max. Torque	25			2063.93

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	94397.08	-11.76	8597.12
	Max. H_x	22	52143.22	30864.54	17737.63
	Max. H_z	2	52143.23	-64.46	37899.41
	Max. M_x	2	3787644.91	-64.46	37899.41
	Max. M_z	10	3085554.19	-30864.54	-17737.63
	Max. Torsion	25	2060.59	18643.91	32279.07
	Min. Vert	19	39107.42	26033.56	-15022.90
	Min. H_x	10	52143.22	-30864.54	-17737.63
	Min. H_z	14	52143.23	64.46	-37899.41
	Min. M_x	14	-3785069.15	64.46	-37899.41
	Min. M_z	22	-3086737.48	30864.54	17737.63
	Min. Torsion	13	-2060.32	-18643.91	-32279.07

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	43452.69	0.00	0.00	-1022.95	458.18	0.02
1.2 Dead+1.6 Wind 0 deg - No Ice	52143.23	64.46	-37899.41	-3787644.91	-8641.13	-1871.24
0.9 Dead+1.6 Wind 0 deg - No Ice	39107.42	64.46	-37899.39	-3746316.52	-8684.37	-1877.02
1.2 Dead+1.6 Wind 30 deg - No Ice	52143.22	16418.33	-28295.33	-2885020.32	-1676125.76	-1391.05
0.9 Dead+1.6 Wind 30 deg - No Ice	39107.42	16418.33	-28295.33	-2852845.55	-1657756.49	-1394.68
1.2 Dead+1.6 Wind 60 deg - No Ice	52143.22	26033.56	-15022.90	-1518203.71	-2628720.55	284.93
0.9 Dead+1.6 Wind 60 deg - No Ice	39107.42	26033.56	-15022.90	-1501095.98	-2599815.95	284.28
1.2 Dead+1.6 Wind 90 deg - No Ice	52143.23	29964.66	-64.46	-10546.87	-3000954.06	1768.45
0.9 Dead+1.6 Wind 90 deg - No Ice	39107.42	29964.65	-64.46	-10087.98	-2968073.75	1770.43
1.2 Dead+1.6 Wind 120 deg - No Ice	52143.22	30864.54	17737.63	1768681.37	-3085554.19	1901.10
0.9 Dead+1.6 Wind 120 deg - No Ice	39107.42	30864.54	17737.63	1749794.69	-3052152.51	1905.69
1.2 Dead+1.6 Wind 150 deg - No Ice	52143.22	18643.91	32279.08	3203929.21	-1851092.32	2054.35
0.9 Dead+1.6 Wind 150 deg - No Ice	39107.42	18643.91	32279.07	3169567.90	-1831202.58	2060.32
1.2 Dead+1.6 Wind 180 deg - No Ice	52143.23	-64.46	37899.41	3785069.15	9817.34	1881.00
0.9 Dead+1.6 Wind 180 deg - No Ice	39107.42	-64.46	37899.39	3744412.18	9540.86	1886.59
1.2 Dead+1.6 Wind 210 deg - No Ice	52143.22	-16418.33	28295.33	2882445.67	1677323.69	1400.04
0.9 Dead+1.6 Wind 210 deg - No Ice	39107.42	-16418.33	28295.33	2850942.25	1658628.85	1403.45
1.2 Dead+1.6 Wind 240 deg - No Ice	52143.22	-26033.56	15022.90	1515605.82	2629939.32	-284.74
0.9 Dead+1.6 Wind 240 deg - No Ice	39107.42	-26033.56	15022.90	1499175.84	2600703.60	-284.06
1.2 Dead+1.6 Wind 270 deg - No Ice	52143.23	-29964.66	64.46	7925.88	3002164.43	-1775.95
0.9 Dead+1.6 Wind 270 deg - No Ice	39107.42	-29964.65	64.46	8150.90	2968955.41	-1777.84
1.2 Dead+1.6 Wind 300 deg - No Ice	52143.22	-30864.54	-17737.63	-1771295.69	3086737.48	-1910.15
0.9 Dead+1.6 Wind 300 deg - No Ice	39107.42	-30864.54	-17737.63	-1751727.08	3053014.55	-1914.72
1.2 Dead+1.6 Wind 330 deg - No Ice	52143.22	-18643.91	-32279.08	-3206524.49	1852262.71	-2054.67
0.9 Dead+1.6 Wind 330 deg - No Ice	39107.42	-18643.91	-32279.07	-3171486.55	1832055.07	-2060.59
1.2 Dead+1.0 Ice+1.0 Temp	94397.08	-0.01	-0.00	-1685.87	-1445.83	0.04
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	94397.08	11.76	-8597.12	-939110.47	-3248.11	-709.58
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	94397.08	3978.46	-6862.39	-752959.67	-437641.21	-485.01
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	94397.08	6624.52	-3821.78	-421200.41	-728587.84	58.12
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	94397.08	7476.26	-11.76	-3647.12	-809861.45	615.26
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	94397.08	7128.04	4098.91	443539.31	-777286.11	855.85
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	94397.08	4325.84	7487.58	793372.20	-461040.21	905.27
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	94397.08	-11.76	8597.12	935413.01	340.59	710.13
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	94397.08	-3978.46	6862.39	749264.51	434738.74	485.56
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	94397.08	-6624.52	3821.78	417501.25	725690.53	-58.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	94397.08	-7476.26	11.76	-58.31	806963.45	-615.54
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	94397.08	-7128.04	-4098.91	-447246.61	774382.20	-856.19
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	94397.08	-4325.84	-7487.58	-797075.59	458131.68	-905.20
Dead+Wind 0 deg - Service	43452.69	13.79	-8108.99	-806651.93	-1461.01	-407.17
Dead+Wind 30 deg - Service	43452.69	3512.88	-6054.09	-614363.50	-356091.12	-301.88
Dead+Wind 60 deg - Service	43452.69	5570.17	-3214.31	-323598.49	-558551.34	61.44
Dead+Wind 90 deg - Service	43452.69	6411.26	-13.79	-3033.66	-637689.08	382.47
Dead+Wind 120 deg - Service	43452.69	6603.81	3795.16	375435.22	-655970.80	412.88
Dead+Wind 150 deg - Service	43452.69	3989.07	6906.46	680817.75	-393429.67	445.88
Dead+Wind 180 deg - Service	43452.69	-13.79	8108.99	804510.75	2463.30	407.61
Dead+Wind 210 deg - Service	43452.69	-3512.88	6054.09	612222.37	357094.23	302.29
Dead+Wind 240 deg - Service	43452.69	-5570.17	3214.31	321456.49	559555.25	-61.41
Dead+Wind 270 deg - Service	43452.69	-6411.26	13.79	890.79	638692.67	-382.78
Dead+Wind 300 deg - Service	43452.69	-6603.81	-3795.16	-377577.85	656973.37	-413.26
Dead+Wind 330 deg - Service	43452.69	-3989.07	-6906.46	-682959.66	394431.75	-445.87

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-43452.69	0.00	0.00	43452.69	0.00	0.000%
2	64.46	-52143.22	-37899.39	-64.46	52143.23	37899.41	0.000%
3	64.46	-39107.42	-37899.39	-64.46	39107.42	37899.39	0.000%
4	16418.33	-52143.22	-28295.33	-16418.33	52143.22	28295.33	0.000%
5	16418.33	-39107.42	-28295.33	-16418.33	39107.42	28295.33	0.000%
6	26033.56	-52143.22	-15022.90	-26033.56	52143.22	15022.90	0.000%
7	26033.56	-39107.42	-15022.90	-26033.56	39107.42	15022.90	0.000%
8	29964.65	-52143.22	-64.46	-29964.66	52143.23	64.46	0.000%
9	29964.65	-39107.42	-64.46	-29964.65	39107.42	64.46	0.000%
10	30864.54	-52143.22	17737.63	-30864.54	52143.22	-17737.63	0.000%
11	30864.54	-39107.42	17737.63	-30864.54	39107.42	-17737.63	0.000%
12	18643.91	-52143.22	32279.07	-18643.91	52143.22	-32279.08	0.000%
13	18643.91	-39107.42	32279.07	-18643.91	39107.42	-32279.07	0.000%
14	-64.46	-52143.22	37899.39	64.46	52143.23	-37899.41	0.000%
15	-64.46	-39107.42	37899.39	64.46	39107.42	-37899.39	0.000%
16	-16418.33	-52143.22	28295.33	16418.33	52143.22	-28295.33	0.000%
17	-16418.33	-39107.42	28295.33	16418.33	39107.42	-28295.33	0.000%
18	-26033.56	-52143.22	15022.90	26033.56	52143.22	-15022.90	0.000%
19	-26033.56	-39107.42	15022.90	26033.56	39107.42	-15022.90	0.000%
20	-29964.65	-52143.22	64.46	29964.66	52143.23	-64.46	0.000%
21	-29964.65	-39107.42	64.46	29964.65	39107.42	-64.46	0.000%
22	-30864.54	-52143.22	-17737.63	30864.54	52143.22	17737.63	0.000%
23	-30864.54	-39107.42	-17737.63	30864.54	39107.42	17737.63	0.000%
24	-18643.91	-52143.22	-32279.07	18643.91	52143.22	32279.08	0.000%
25	-18643.91	-39107.42	-32279.07	18643.91	39107.42	32279.07	0.000%
26	0.00	-94397.08	0.00	0.01	94397.08	0.00	0.000%
27	11.76	-94397.08	-8597.00	-11.76	94397.08	8597.12	0.000%
28	3978.41	-94397.08	-6862.29	-3978.46	94397.08	6862.39	0.000%
29	6624.43	-94397.08	-3821.73	-6624.52	94397.08	3821.78	0.000%
30	7476.15	-94397.08	-11.76	-7476.26	94397.08	11.76	0.000%
31	7127.94	-94397.08	4098.86	-7128.04	94397.08	-4098.91	0.000%
32	4325.78	-94397.08	7487.48	-4325.84	94397.08	-7487.58	0.000%
33	-11.76	-94397.08	8597.00	11.76	94397.08	-8597.12	0.000%
34	-3978.41	-94397.08	6862.29	3978.46	94397.08	-6862.39	0.000%
35	-6624.43	-94397.08	3821.73	6624.52	94397.08	-3821.78	0.000%
36	-7476.15	-94397.08	11.76	7476.26	94397.08	-11.76	0.000%
37	-7127.94	-94397.08	-4098.86	7128.04	94397.08	4098.91	0.000%
38	-4325.78	-94397.08	-7487.48	4325.84	94397.08	7487.58	0.000%
39	13.79	-43452.69	-8108.99	-13.79	43452.69	8108.99	0.000%
40	3512.88	-43452.69	-6054.09	-3512.88	43452.69	6054.09	0.000%
41	5570.16	-43452.69	-3214.31	-5570.17	43452.69	3214.31	0.000%
42	6411.26	-43452.69	-13.79	-6411.26	43452.69	13.79	0.000%
43	6603.80	-43452.69	3795.16	-6603.81	43452.69	-3795.16	0.000%
44	3989.07	-43452.69	6906.46	-3989.07	43452.69	-6906.46	0.000%
45	-13.79	-43452.69	8108.99	13.79	43452.69	-8108.99	0.000%
46	-3512.88	-43452.69	6054.09	3512.88	43452.69	-6054.09	0.000%
47	-5570.16	-43452.69	3214.31	5570.17	43452.69	-3214.31	0.000%
48	-6411.26	-43452.69	13.79	6411.26	43452.69	-13.79	0.000%
49	-6603.80	-43452.69	-3795.16	6603.81	43452.69	3795.16	0.000%
50	-3989.07	-43452.69	-6906.46	3989.07	43452.69	6906.46	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	0.00074973
3	Yes	4	0.00000001	0.00042937
4	Yes	5	0.00000001	0.00063382
5	Yes	5	0.00000001	0.00027959
6	Yes	5	0.00000001	0.00052697
7	Yes	5	0.00000001	0.00023992
8	Yes	4	0.00000001	0.00060576
9	Yes	4	0.00000001	0.00036966
10	Yes	5	0.00000001	0.00071711
11	Yes	5	0.00000001	0.00031284
12	Yes	5	0.00000001	0.00072325
13	Yes	5	0.00000001	0.00030916
14	Yes	4	0.00000001	0.00095673
15	Yes	4	0.00000001	0.00056497
16	Yes	5	0.00000001	0.00066103
17	Yes	5	0.00000001	0.00029284
18	Yes	5	0.00000001	0.00053288
19	Yes	5	0.00000001	0.00024283
20	Yes	4	0.00000001	0.00076476
21	Yes	4	0.00000001	0.00047837
22	Yes	5	0.00000001	0.00067878
23	Yes	5	0.00000001	0.00029384
24	Yes	5	0.00000001	0.00077003
25	Yes	5	0.00000001	0.00033107
26	Yes	4	0.00000001	0.00000577
27	Yes	5	0.00000001	0.00029581
28	Yes	5	0.00000001	0.00034980
29	Yes	5	0.00000001	0.00033614
30	Yes	5	0.00000001	0.00025593
31	Yes	5	0.00000001	0.00036755
32	Yes	5	0.00000001	0.00036926
33	Yes	5	0.00000001	0.00029482
34	Yes	5	0.00000001	0.00035407
35	Yes	5	0.00000001	0.00033612
36	Yes	5	0.00000001	0.00025668
37	Yes	5	0.00000001	0.00036062
38	Yes	5	0.00000001	0.00038241
39	Yes	4	0.00000001	0.00005116
40	Yes	4	0.00000001	0.00015908
41	Yes	4	0.00000001	0.00012820
42	Yes	4	0.00000001	0.00003733
43	Yes	4	0.00000001	0.00021203
44	Yes	4	0.00000001	0.00019188
45	Yes	4	0.00000001	0.00005331
46	Yes	4	0.00000001	0.00018442
47	Yes	4	0.00000001	0.00013342
48	Yes	4	0.00000001	0.00003906
49	Yes	4	0.00000001	0.00017696
50	Yes	4	0.00000001	0.00023868

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	145 - 90.8333	22.895	39	1.2665	0.0037
L2	96 - 42.8333	10.703	39	1.0171	0.0016
L3	49 - 0	2.865	39	0.5283	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
143.00	(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	39	22.368	1.2591	0.0036	63715
135.00	(2) AIR 21 B2A/B4P w/Mount Pipe	39	20.263	1.2291	0.0032	31857
130.00	(2) 7770.00 w/Mount Pipe	39	18.958	1.2094	0.0030	21238
110.33	20' Omni	39	14.007	1.1145	0.0021	9188
107.00	800MHz 2x50W RRH	39	13.212	1.0945	0.0020	8382

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	145 - 90.8333	107.457	2	5.9475	0.0172
L2	96 - 42.8333	50.264	2	4.7797	0.0073
L3	49 - 0	13.460	2	2.4826	0.0023

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
143.00	(3) LPA-80080-6CF-EDIN-X w/Mount Pipe	2	104.982	5.9132	0.0167	13839
135.00	(2) AIR 21 B2A/B4P w/Mount Pipe	2	95.109	5.7732	0.0149	6919
130.00	(2) 7770.00 w/Mount Pipe	2	88.991	5.6808	0.0138	4611
110.33	20' Omni	2	65.769	5.2368	0.0098	1991
107.00	800MHz 2x50W RRH	2	62.035	5.1430	0.0092	1815

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	145 - 90.8333 (1)	TP33.48x23.61x0.2813	54.17	0.00	0.0	29.2130	-15538.30	1940890.00	0.008
L2	90.8333 - 42.8333 (2)	TP41.64x31.976x0.375	53.17	0.00	0.0	48.4740	-29433.20	3318020.00	0.009
L3	42.8333 - 0 (3)	TP48.69x39.7691x0.4375	49.00	0.00	0.0	67.9757	-52103.20	4594960.00	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	145 - 90.8333 (1)	TP33.48x23.61x0.2813	682841.67	1274483.33	0.536	0.00	1274483.33	0.000
L2	90.8333 - 42.8333 (2)	TP41.64x31.976x0.375	2024466.67	2709800.00	0.747	0.00	2709800.00	0.000
L3	42.8333 - 0 (3)	TP48.69x39.7691x0.4375	3787658.33	4511866.67	0.839	0.00	4511866.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	145 - 90.8333 (1)	TP33.48x23.61x0.2813	23679.70	970445.00	0.024	2159.33	2591883.33	0.001
L2	90.8333 - 42.8333 (2)	TP41.64x31.976x0.375	33225.60	1659010.00	0.020	1914.07	5512016.67	0.000
L3	42.8333 - 0 (3)	TP48.69x39.7691x0.4375	37954.40	2297480.00	0.017	1871.26	9176750.00	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	145 - 90.8333 (1)	0.008	0.536	0.000	0.024	0.001	0.544 ✔	1.000	4.8.2 ✔
L2	90.8333 - 42.8333 (2)	0.009	0.747	0.000	0.020	0.000	0.756 ✔	1.000	4.8.2 ✔
L3	42.8333 - 0 (3)	0.011	0.839	0.000	0.017	0.000	0.851 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	145 - 90.8333	Pole	TP33.48x23.61x0.2813	1	-15538.30	1940890.00	54.4	Pass
L2	90.8333 - 42.8333	Pole	TP41.64x31.976x0.375	2	-29433.20	3318020.00	75.6	Pass
L3	42.8333 - 0	Pole	TP48.69x39.7691x0.4375	3	-52103.20	4594960.00	85.1	Pass
							Summary	
						Pole (L3)	85.1	Pass
						RATING =	**85.1**	**Pass**

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

Project #: *39391*
Site Name: *CT03XC354*

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	56.91	in

Plate Data		
Diam:	62.91	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	9.78	in

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

Pole Data		
Diam:	48.69	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions		
Mu:	3787.7	ft-kips
Axial, Pu:	52.1	kips
Shear, Vu:	37.9	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Results

Max Rod (Cu+ Vu/ή):	207.7	Kips
Allowable Axial, Φ*Fu*Anet:	260.0	Kips
Anchor Rod Stress Ratio:	79.9%	**Pass**

Rigid
AISC LRFD
φ*Tn

Base Plate Results Flexural Check

Base Plate Stress:	28.1	ksi
Allowable Plate Stress:	54.0	ksi
Base Plate Stress Ratio:	52.0%	**Pass**

Rigid
AISC LRFD
φ*Fy
Y.L. Length: 29.46

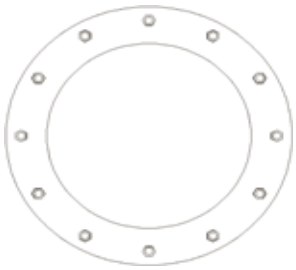
n/a

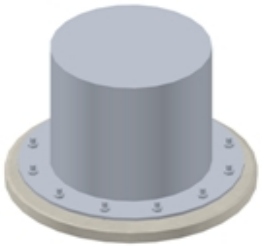
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a





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

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

Drilled Pier Foundation

Project #:	39391
Site Name:	CT03XC354

TIA-222 Revison:	G
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	3787.7	
Axial Force (kips)	52.1	
Shear Force (kips)	37.9	

Material Properties		
Concrete Strength, f'c:	3	ksi
Rebar Strength, Fy:	60	ksi

Pier Design Data		
Depth	24	ft
Ext. Above Grade	1	ft
Pier Section 1		
From 1' above grade to 24' below grade		
Pier Diameter	6.5	ft
Rebar Quantity	34	
Rebar Size	11	
Clear Cover to Ties	3	in
Tie Size	4	

Analysis Results		
Soil Lateral Capacity	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	5.64	-
Soil Safety Factor	1.91	-
Max Moment (kip-ft)	3969.34	-
Rating	*69.7%*	-
Soil Vertical Capacity	*Compression*	*Uplift*
Skin Friction (kips)	0.00	-
End Bearing (kips)	289.19	-
Weight of Concrete (kips)	114.54	-
Total Capacity (kips)	289.19	-
Axial (kips)	166.64	-
Rating	*57.6%*	-
Reinforced Concrete Capacity	*Compression*	*Uplift*
Critical Depth (ft from TOC)	5.38	-
Critical Moment (kip-ft)	3968.79	-
Critical Moment Capacity	7323.35	-
Rating	*54.2%*	-

Soil Interaction Rating	**69.7%**
Structural Foundation Rating	**54.2%**

Soil Profile			
Groundwater Depth	10	ft	# of Layers: 4

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.33	3.33	125	150		28	0.000	0.000	0.000	0.000			Cohesionless
2	3.33	10	6.67	125	150		28	0.000	0.000	0.000	0.000			Cohesionless
3	10	10.5	0.5	63	87.6		28	0.000	0.000	0.000	0.000			Cohesionless
4	10.5	24	13.5	58	87.6		32	0.000	0.000	0.000	0.000	11.62		Cohesionless

PROJECT INFORMATION:

TOWER INFORMATION

CASCADE: CT03XC354

ADDRESS: 100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

LAT: 41.139444°

LONG: --73.257222°

SITE TYPE: 145' MONOPOLE

LANDLORD

FAIRFIELD TOWN
725 OLD POST RD
FAIRFIELD CT 06824 6684

APPLICANT

SPRINT
1 INTERNATIONAL BLVD., SUITE 800
MAHWAH, NJ 07495
CONTACT: TBD
PHONE: TBD
EMAIL: TBD

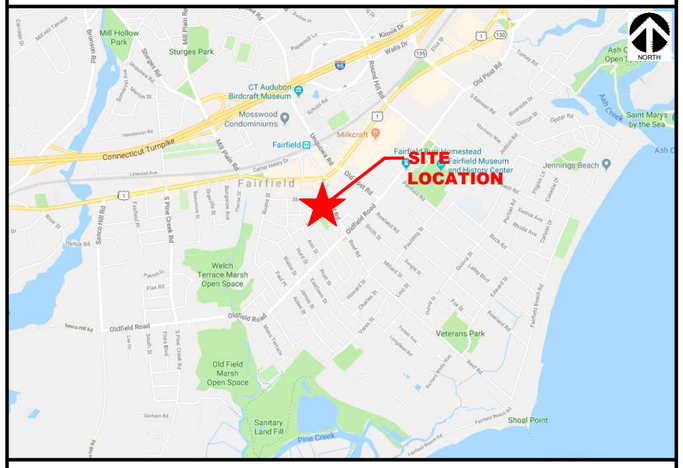
A&E FIRM

RAMAKER & ASSOCIATES, INC.
CONTACT: KEITH BOHNSACK
PROJECT MANAGER
PHONE: (608) 643-4100
EMAIL: kbohnsack@ramaker.com

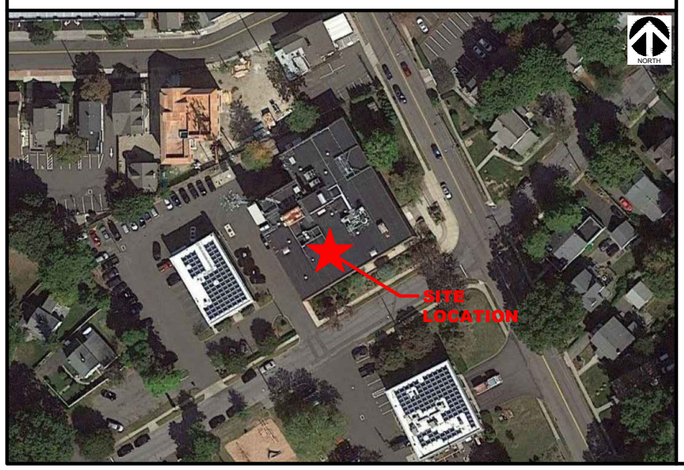
SCOPE OF WORK:

- REPLACE (3) EXISTING ANTENNAS WITH (3) NEW 800/1900 PANEL AND (3) NEW 2500 MIMO ANTENNAS ON EXISTING MOUNTS
- ADD (3) NEW 800 RRHS
- ADD (1) NEW TOP HAT CABINET EXTENSION
- ADD (1) NEW DC/FIBER DISTRIBUTION BOX
- ADD (3) HYBRIFLEX CABLES

VICINITY MAP:



AERIAL MAP:



SHEET INDEX:

SHEET #	SHEET DESCRIPTION	REVISION
T-1	COVER SHEET & SITE PLAN	1
A-1	ANTENNA LAYOUTS & EQUIPMENT LAYOUT	-
A-2	TOWER ELEVATION	-
A-3	ANTENNA DETAILS	-
A-4	ANTENNA SCHEDULE & DETAILS	-
A-5	PLUMBING DIAGRAM	-
A-6	STRUCTURAL DETAILS	-

CODE COMPLIANCE:

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

1. 2015 INTERNATIONAL BUILDING CODE
2. 2018 CT STATE BUILDING CODE
3. ANSI/TIA-222 STRUCTURAL STANDARD FOR ANTENNA STRUCTURES
4. NFPA 780 - LIGHTNING PROTECTION CODE
5. NATIONAL ELECTRIC CODE

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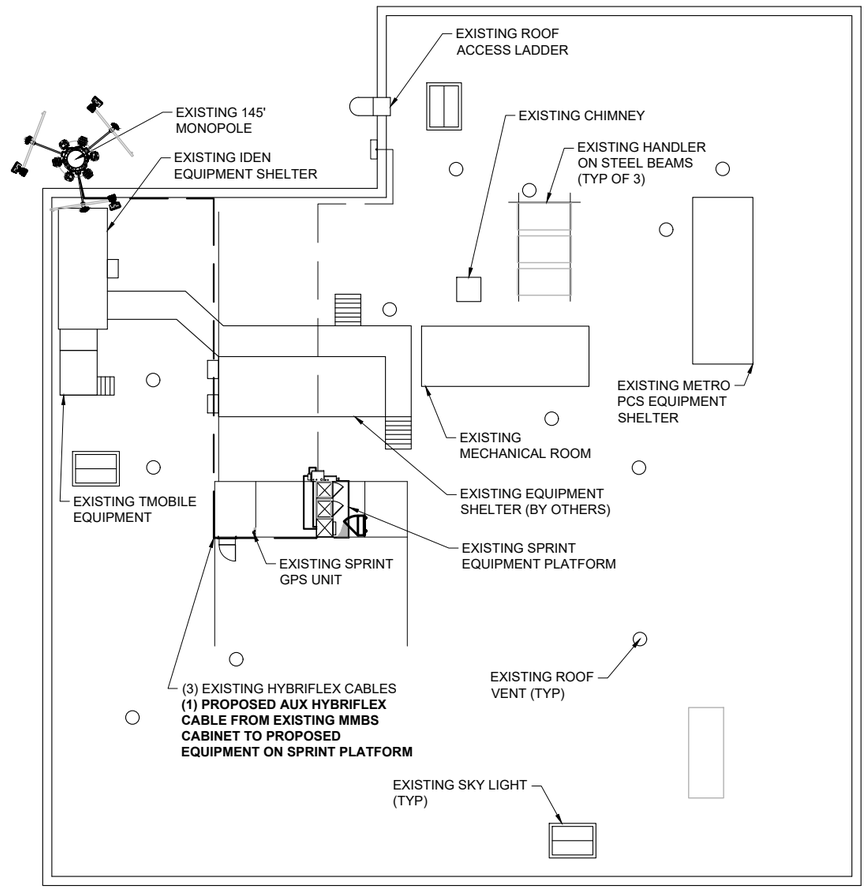
MIMO UPGRADE

SITE CASCADE:
CT03XC354

NORTH



OVERALL SITE PLAN (1)
SCALE: 1" = 25'

Sprint
1 INTERNATIONAL BLVD, SUITE 800
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STATE OF CONNECTICUT · JAMES R. SKOWRONSKI · 26266 · LICENSED PROFESSIONAL ENGINEER

Signature: 4/04/2019 Date:

MARK	DATE	DESCRIPTION
1	04/04/19	REVISED CODE COMPLIANCE

ISSUE PHASE: FINAL
DATE ISSUED: 07/17/2018

PROJECT TITLE:
CT03XC354

PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

SHEET TITLE:
COVER SHEET & SITE PLAN

0 12.5' 25' 50'
11" x 17" - 1" = 25'
22" x 34" - 1" = 12.5'

PROJECT NUMBER: 39391
SHEET NUMBER: T-1

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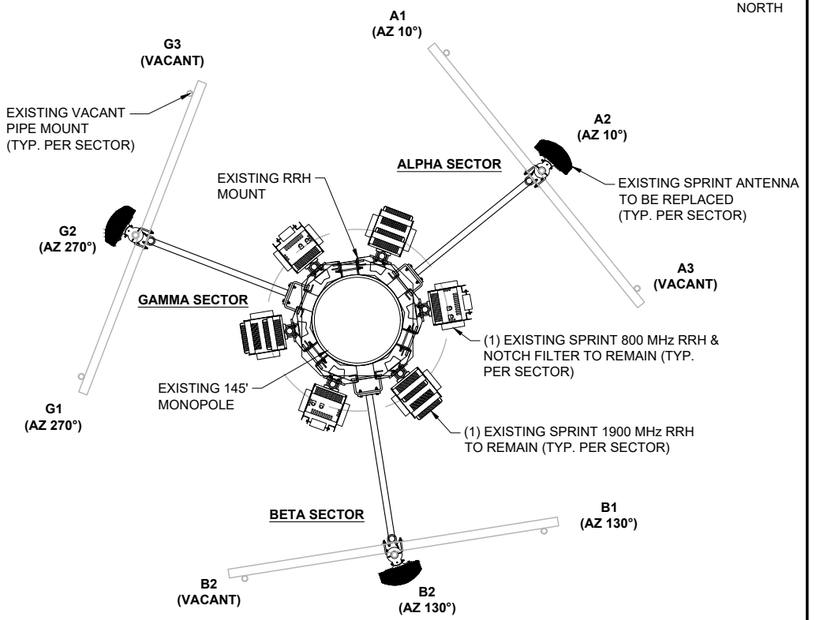
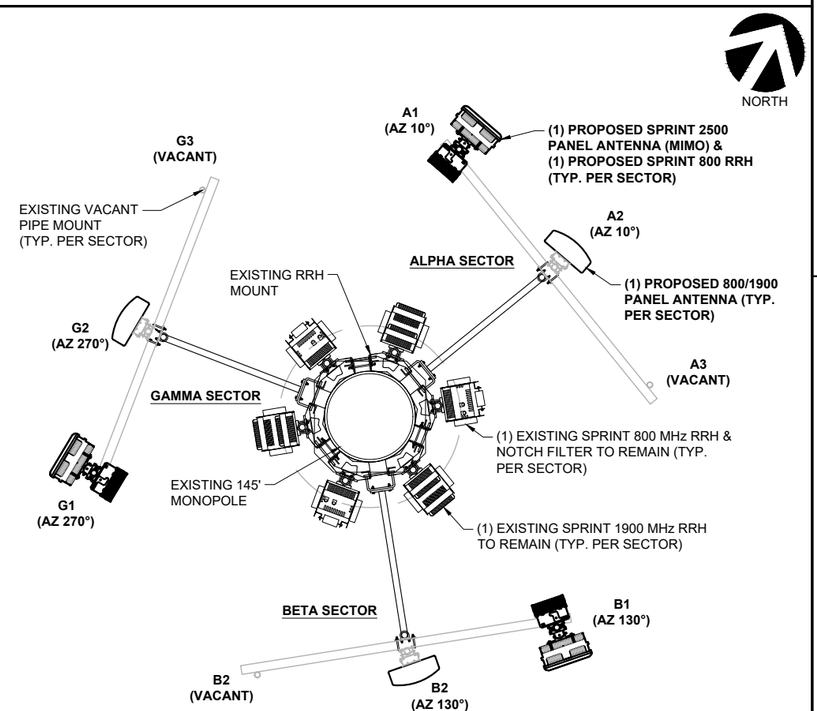


EXISTING ANTENNA PLAN

SCALE: NTS

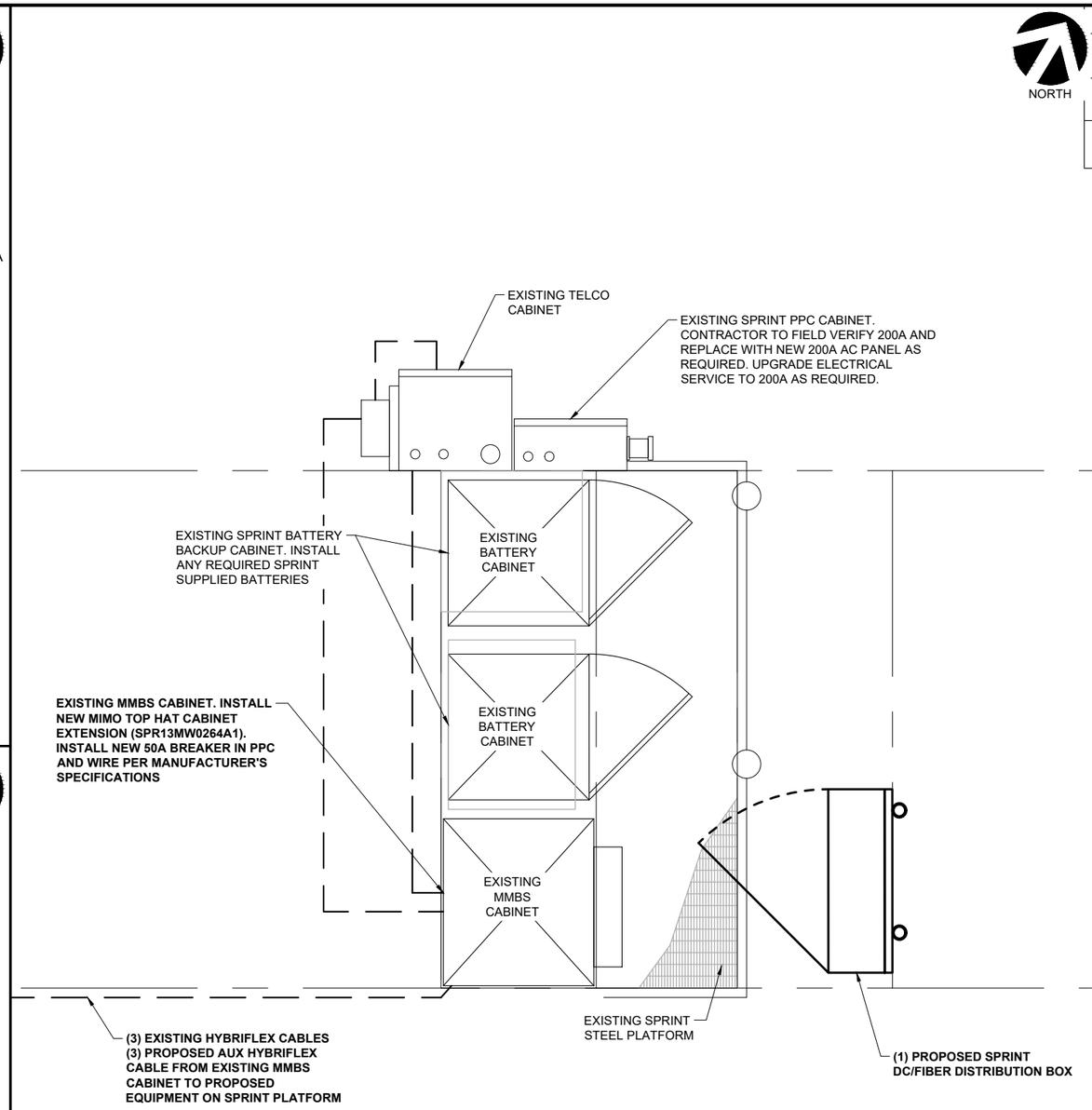
1



PROPOSED ANTENNA PLAN

SCALE: NTS

2



EQUIPMENT PLAN

SCALE: 1" = 2.5'

3

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PROJECT TITLE:

CT03XC354

PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

SHEET TITLE:

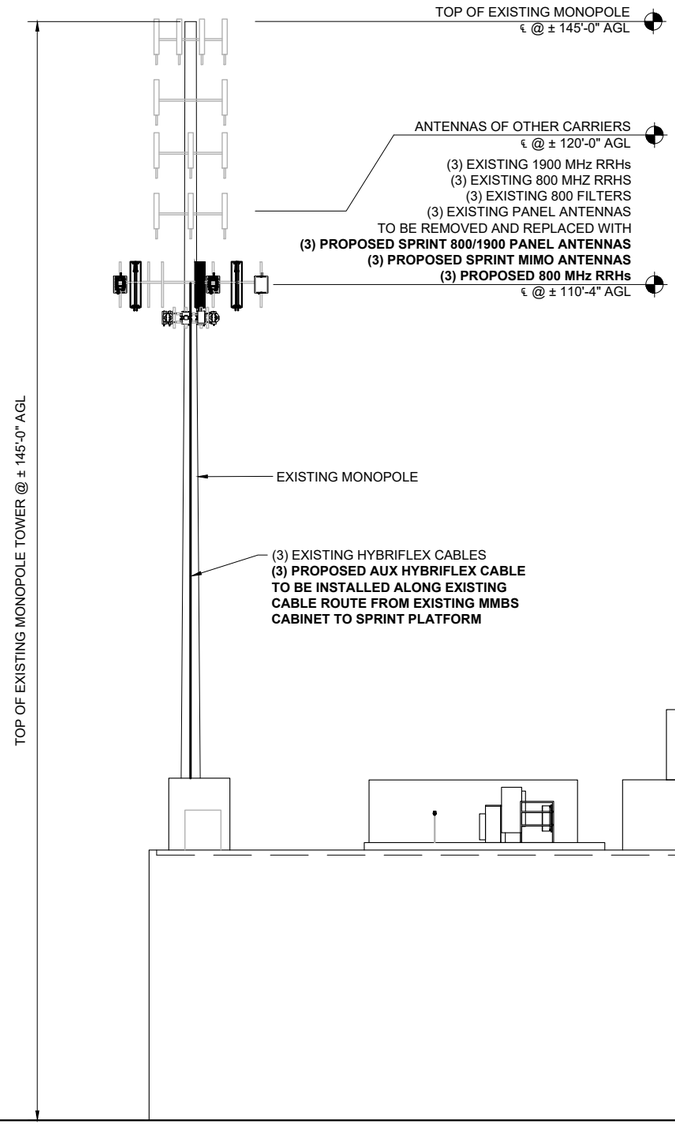
ANTENNA LAYOUTS &
EQUIPMENT LAYOUT

0 1.25' 2.5' 5'

11" x 17" - 1" = 2.5'
22" x 34" - 1" = 1.25'

PROJECT NUMBER: 39391

SHEET NUMBER: A-1



TOWER ELEVATION (SOUTHEAST) 1

SCALE: 1" = 20'

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DATE ISSUED: 07/17/2018

PROJECT TITLE:

CT03XC354

PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

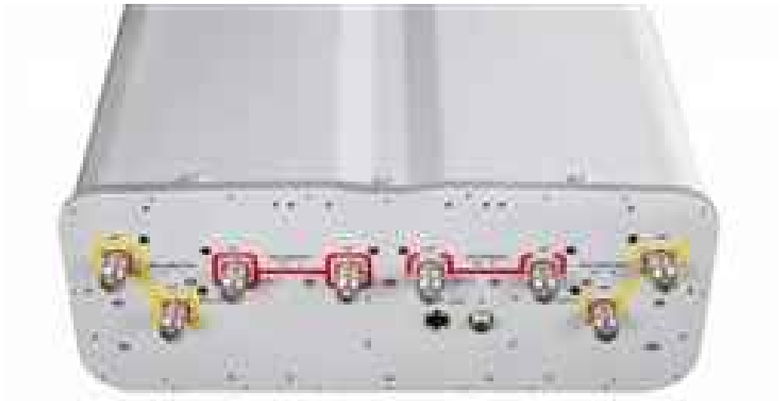
SHEET TITLE:

TOWER ELEVATION

0 10' 20' 40'

11" x 17" - 1" = 20'
22" x 34" - 1" = 10'

PROJECT NUMBER: 39391
SHEET NUMBER: A-2



MECHANICAL	
DIMENSION (HxWxD)	72.0" x 19.6" x 7.8"
WEIGHT	77.4 lbs

ANTENNA MODEL: COMMSCOPE #NNVV-65B-R4 - ANTENNA SPECS

800MHz 2X50W Remote Radio Head (RRH)

Simultaneous CDMA & LTE Multi technology RRH 862-869 MHz

- Any combination of CDMA and LTE carriers supported by 100W RF Power

2 CPRI-like Optical Connections for daisy chaining

Software Switchable External Filter for use before Public Safety is cleared

Dimensions:	w/o Filter	w/ Filter
Height:	480 mm (19")	480 mm (19")
Width:	330 mm (13")	330 mm (13")
Depth:	218 mm (8.6")	310 (12.2")
Weight:	24 kg (53 lbs)	29 kg (64 lbs)
	49 liters, <29kg	

Power Supply: -48 VDC

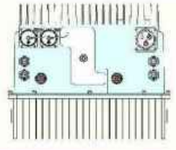
Power Consumption: <400W Typical

Operating Temp range -40° C to +55° C

Option to mount on Ground at tower base

Front/Top View

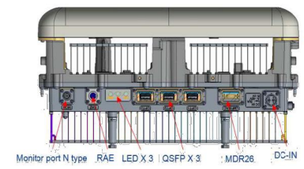
Bottom View



Alcatel-Lucent's 800 RRH satisfies Sprint's requirements.

MECHANICAL	
DIMENSION (HxWxD)	19" x 13" x 12.2"
WEIGHT	64 lbs

RRH MODEL: ALU #800 MHz 2x50W - RADIO SPECS



MECHANICAL	
DIMENSION (HxWxD)	25.6" x 19.7" x 9.64"
WEIGHT	103.7 lbs

ANTENNA MODEL: NOKIA #AAHC - ANTENNA SPECS

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PROJECT TITLE:

CT03XC354

PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

SHEET TITLE:

ANTENNA DETAILS

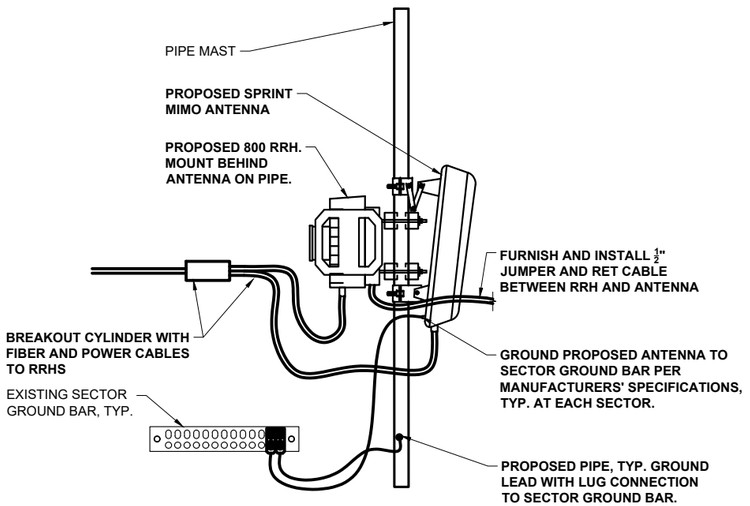
SCALE: NONE

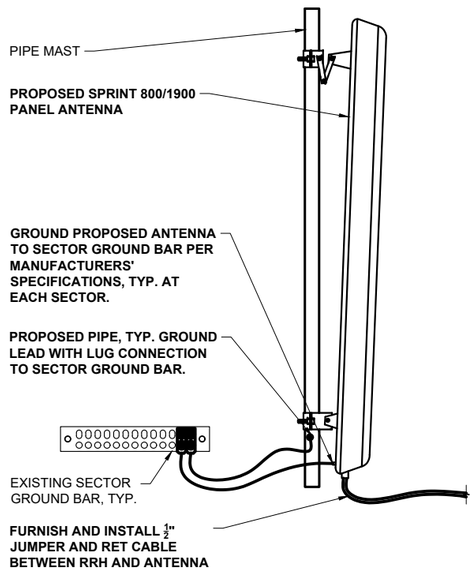
PROJECT NUMBER: 39391
SHEET NUMBER: A-3

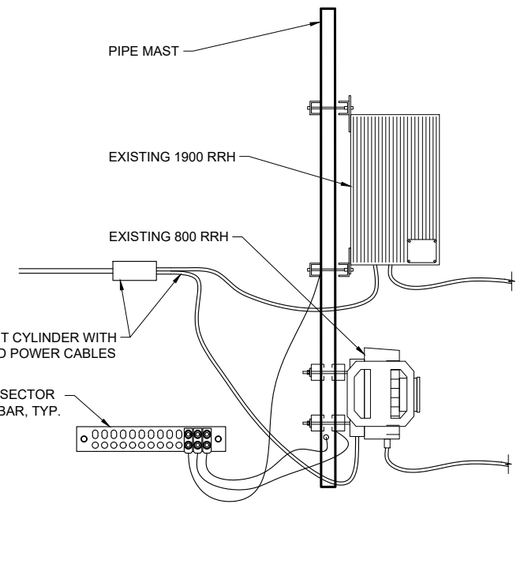
800/1900/2.5 EQUIPMENT SCHEDULE

SECTOR	POSITION	ANTENNA MAKE/MODEL	AZIMUTH	CENTERLINE	RRH	CABLE TYPE	CABLE LENGTH	JUMPER TYPE
ALPHA	1	PROPOSED SPRINT MIMO ANTENNA (NOKIA AAHC)	10°	110'-4"	INTEGRATED WITHIN PROPOSED ANTENNA	(1) PROPOSED HYBRIFLEX	200'	8' HYBRID
	2	PROPOSED SPRINT 800/1900 PANEL ANTENNA (COMMSCOPE NNVV-65B-R4)	10°	110'-4"	(1) EXISTING RRH 1900 4X45 65 MHz	EXISTING HYBRIFLEX	200'	EXISTING
					(1) EXISTING RRH 800 MHz 2x50W			
					(1) EXISTING FILTER			
					(1) PROPOSED RRH 800 MHz 2x50W			8' HYBRID
	3	-	-	-	-	-	-	-
BETA	1	PROPOSED SPRINT MIMO ANTENNA (NOKIA AAHC)	130°	110'-4"	INTEGRATED WITHIN PROPOSED ANTENNA	(1) PROPOSED HYBRIFLEX	200'	8' HYBRID
	2	PROPOSED SPRINT 800/1900 PANEL ANTENNA (COMMSCOPE NNVV-65B-R4)	130°	110'-4"	(1) EXISTING RRH 1900 4X45 65 MHz	EXISTING HYBRIFLEX	200'	EXISTING
					(1) EXISTING RRH 800 MHz 2x50W			
					(1) EXISTING FILTER			
					(1) PROPOSED RRH 800 MHz 2x50W			8' HYBRID
	3	-	-	-	-	-	-	-
GAMMA	1	PROPOSED SPRINT MIMO ANTENNA (NOKIA AAHC)	270°	110'-4"	INTEGRATED WITHIN PROPOSED ANTENNA	(1) PROPOSED HYBRIFLEX	200'	8' HYBRID
	2	PROPOSED SPRINT 800/1900 PANEL ANTENNA (COMMSCOPE NNVV-65B-R4)	270°	110'-4"	(1) EXISTING RRH 1900 4X45 65 MHz	EXISTING HYBRIFLEX	200'	EXISTING
					(1) EXISTING RRH 800 MHz 2x50W			
					(1) EXISTING FILTER			
					(1) PROPOSED RRH 800 MHz 2x50W			8' HYBRID
	3	-	-	-	-	-	-	-

EQUIPMENT & CABLE SCHEDULE (1)
SCALE: NTS







ANTENNA & RRH MOUNTING DETAIL (2)
SCALE: NTS

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DATE ISSUED: 07/17/2018

PROJECT TITLE:
CT03XC354

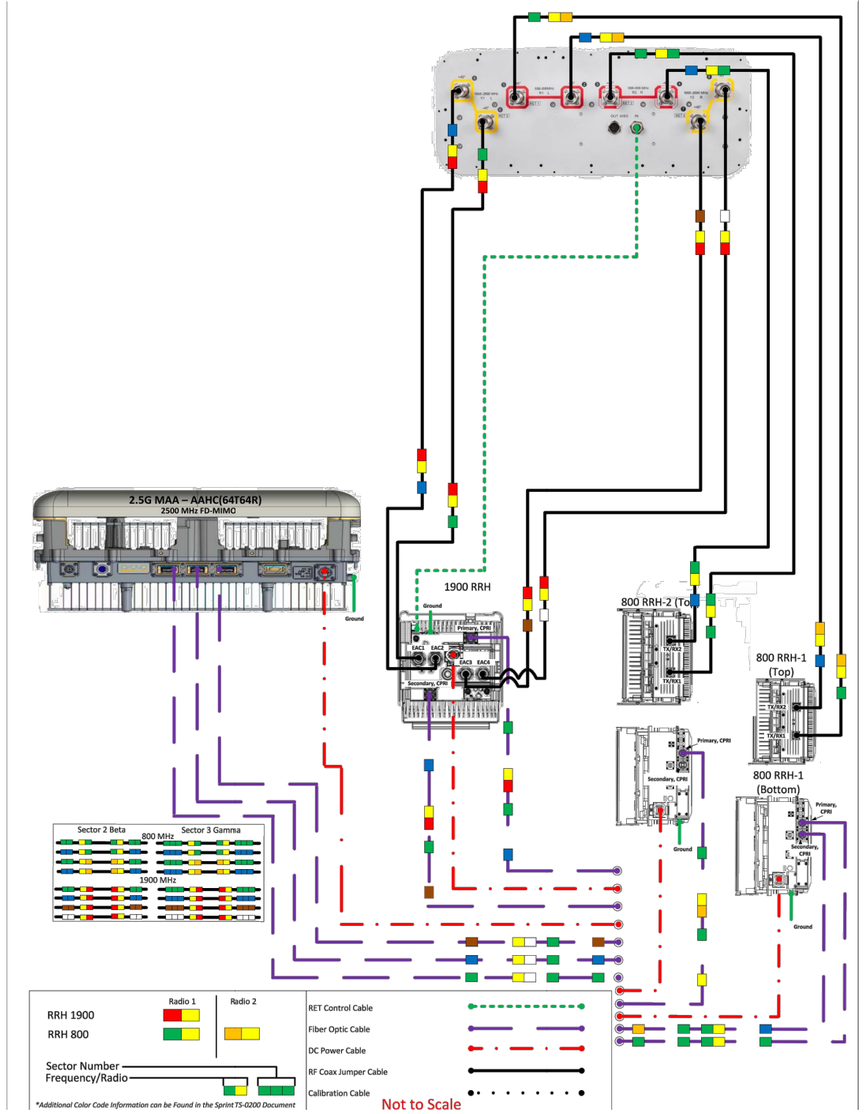
PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

SHEET TITLE:
ANTENNA SCHEDULE & DETAIL

SCALE: NONE

PROJECT NUMBER: 39391
SHEET NUMBER: A-4

ALU 21-MIMO NNVV-65B-R4 wo Filters



ANTENNA COLOR CODING CHART

SCALE: NTS

1

Sprint

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PROJECT TITLE:

CT03XC354

PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

SHEET TITLE:

PLUMBING DIAGRAM

SCALE: NONE

PROJECT NUMBER: 39391

SHEET NUMBER: A-5

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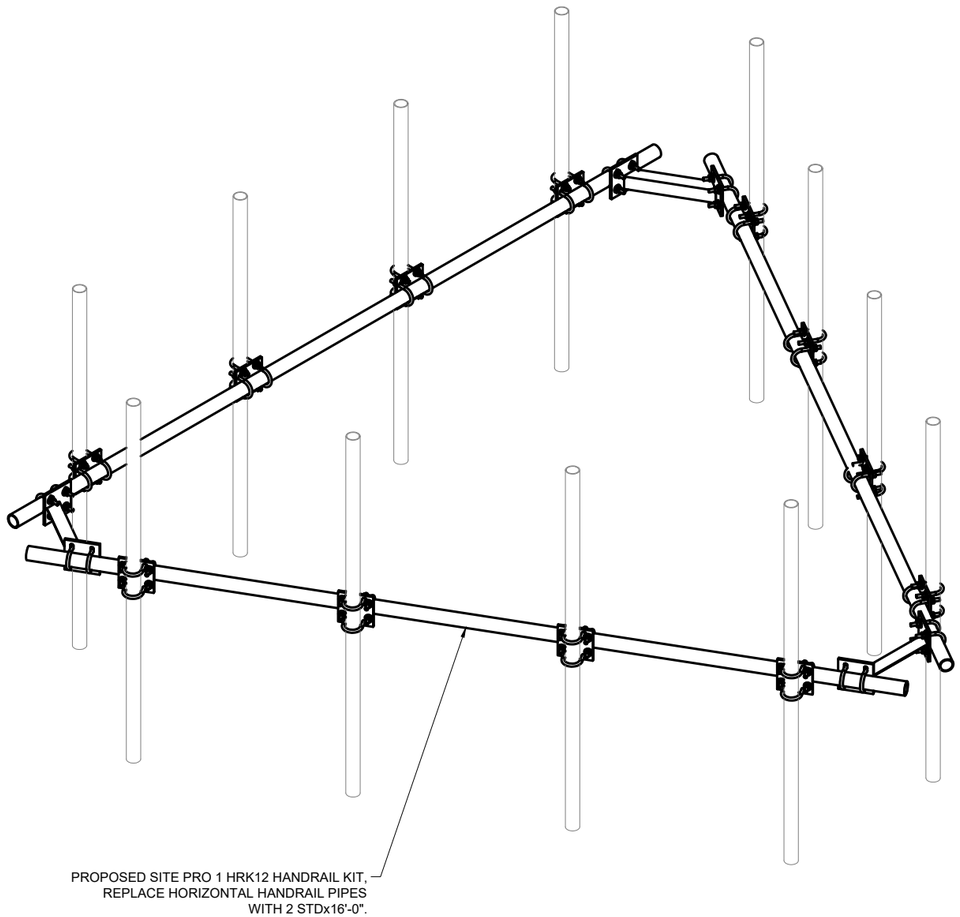

PROPOSED HANDRAIL DETAIL (1)
SCALE: NTS

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PROJECT TITLE:
CT03XC354

PROJECT INFORMATION:
100 REEF ROAD
FAIRFIELD, CT 06824
FAIRFIELD COUNTY

SHEET TITLE:
STRUCTURAL DETAILS

SCALE: NONE

PROJECT NUMBER: 39391
SHEET NUMBER: S-1

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