



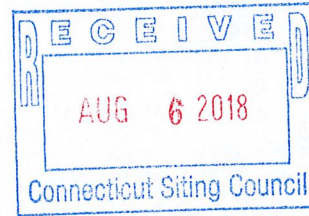
1280 Route 46 West, Suite 9, Parsippany NJ, 07054

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

EM-SPRINT-135-180806

Re: Notice of Exempt Modification Application
650 Glenbrook Rd, Stamford, CT 06905

Latitude: N41.07542
Longitude: W73.5193



Dear Ms. Bachman:

Sprint currently maintains 6 existing panel antennas, 1 microwave and 3 remote radio units at the 93' centerline level of the existing water tank. Sprint proposes to remove all 9 existing panel antennas and 3 remote radio heads and replace them with 6 panel antennas and 9 remote radio unit at the 93' centerline on the tower. Sprint further proposes to remove 12 existing cables and replace them with 6 hybrid cable. Sprint is performing a new high-performance upgrade for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

Please accept this letter as notification to the Council, pursuant to R.C.S.A. Section 16-50j-73, for construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter is being sent to Mayor David Martin of the City of Stamford as well as David Woods, Principal Planner for the City of Stamford and Spinnaker Real Estate partners, owner of the water tank.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in Sprint's operations at the site. Also included is documentation of the structural sufficiency of the tower with proposed modifications to accommodate the revised antenna configuration as well as the latest CSC decision, tax sheet and tax map.

Existing Facility

CSC Summary Statement – CT52XC012 – 650
Glenbrook Rd, Stamford, CT 06905

The Communications Tower facility is located at 650 Glenbrook Rd, Stamford CT and is owned by Spinnaker Real Estate Partners, the Site coordinates are: N41.0754 W73.5193.

The existing facility consists of a 106' Water Tank. Sprint currently operates wireless communications equipment inside the building at the facility and has 9 antennas, 1 microwave and 3 RRU's mounted on at centerline of 93' feet.

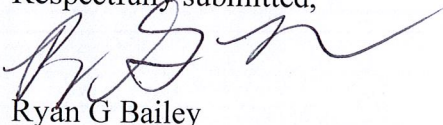
Statutory Considerations

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

1. The height of the overall structure will be unaffected.
2. The proposed changes will not require an extension of the property boundaries.
3. The proposed additions will not increase the noise level at the existing facility by six decibels or more, or to levels that exceed state and/or local criteria
4. The changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, Sprint respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A Section §16-50j-72(b)(2).

Respectfully submitted,



Ryan G Bailey

Charles Cherundolo Consulting

856-625-1596

ryan@mackenzierealtyconsulting.com

Additional Recipients:

Mayor David Martin for the City of Stamford– Via FedEx

David Woods, Principal Planner for the City of Shelton - Via FedEx

Spinnaker Real Estate Partners, owner of the tank – Via FedEx

650 GLENBROOK ROAD

Location 650 GLENBROOK ROAD

Mblu 003/ 8507/ / /

Acct# 003-8507

Owner GLENBROOK INDUSTRIAL
PARK LLC

Assessment \$7,641,150

Appraisal \$10,915,890

PID 35719

Building Count 5

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2017	\$5,175,490	\$5,740,400	\$10,915,890
Assessment			
Valuation Year	Improvements	Land	Total
2017	\$3,622,870	\$4,018,280	\$7,641,150

Owner of Record

Owner GLENBROOK INDUSTRIAL PARK LLC
Co-Owner C/O SPINNAKER RE PARTNERS
Address 1 N WATER STREET
SUITE 100
NORWALK, CT 06854

Sale Price \$0
Book & Page 7365/ 192
Sale Date 01/29/2004
Instrument 25

Ownership History

Ownership History				
Owner	Sale Price	Book & Page	Instrument	Sale Date
GLENBROOK INDUSTRIAL PARK LLC	\$0	7365/ 192	25	01/29/2004
GLENBROOK INDUSTRIAL PARK ASC	\$0	5077/ 267		09/01/1998
GLENBROOK INDUSTRIAL PARK ASC	\$0	5077/ 267		08/31/1998
GLENBROOK INDUSTRIAL PARK ASC	\$0	1691/ 178	25	11/04/1997

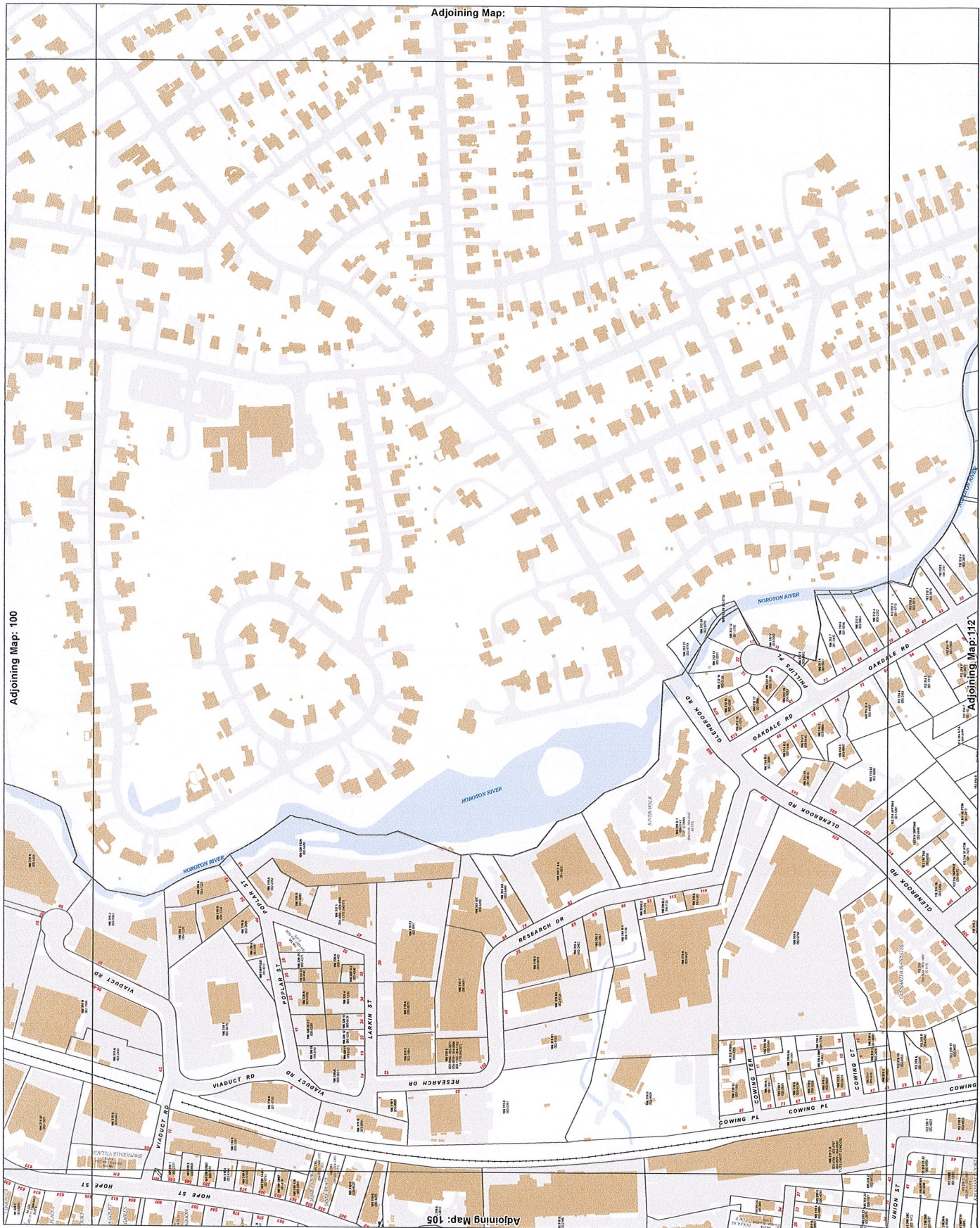
Building Information

Building 1 : Section 1

Year Built: 1943
Living Area: 134,160

Building Photo

Building Attributes	
Field	Description
STYLE	Industry Light
Stories:	2



Adjoining Map: 100

Adjoining Map:

Adjoining Map: 105

Map: 106

11	12
13	14

Buildings

City Boundaries

Map Book Lot

Address

Parcel ID

Parcel

Water Bodies

Streets and Roads

Parks

Railroad

Power Lines

City of Stamford, Connecticut

Assessment Parcel Map

Parcel data current as of October 2016 2016 parcel list
Building and Paved Roads based on aerial flight from Spring 2013.
Map Coordinates based on NAD 83 Connecticut State Plane Feet.

1 inch = 100 feet

0 100 200 300 400 500 Feet

Map Produced July 2017



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso

Chairman

June 4, 2010

Thomas J. Regan, Esq.
Brown Rudnick LLP
CityPlace I, 185 Asylum Street
Hartford, CT 06103

RE: **EM-CLEARWIRE-135-100521** – Clearwire Corporation notice of intent to modify an existing telecommunications facility located at 650 Glenbrook Road, Stamford, Connecticut.

Dear Attorney Regan:

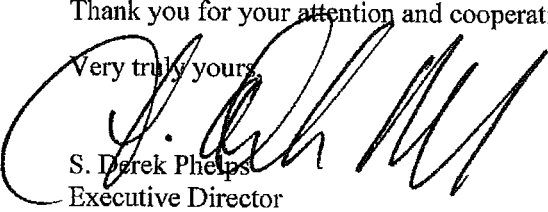
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated May 21, 2010, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

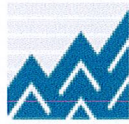
Thank you for your attention and cooperation.

Very truly yours,


S. Derek Phelps
Executive Director

SDP/CDM/laf

c: The Honorable Michael A. Pavia, Mayor, City of Stamford
Robert Stein, Planning and Zoning Director, City of Stamford
Glenbrook Industrial Park Association



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: CT52XC012

Stamford
650 Glenbrook Road
Stamford, CT 06905

July 30, 2018

EBI Project Number: 6218005221

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	21.31 %



EBI Consulting

environmental | engineering | due diligence

July 30, 2018

SPRINT

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

Emissions Analysis for Site: **CT52XC012 – Stamford**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **650 Glenbrook Road, Stamford, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ 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 ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 850 MHz Band is approximately $567 \mu\text{W}/\text{cm}^2$. The general population exposure limit for the 1900 MHz (PCS), 2500 MHz (BRS) and 23 GHz microwave bands is $1000 \mu\text{W}/\text{cm}^2$. 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.

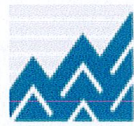
Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed SPRINT Wireless antenna facility located at **650 Glenbrook Road, Stamford, 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 and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

- 1) 1 CDMA channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.
- 2) 2 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 50 Watts per Channel.
- 3) 5 CDMA channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 16 Watts per Channel.
- 4) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 5) 8 LTE channels (2500 MHz (BRS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.
- 6) 1 microwave channel (23 GHz) was considered for Sector B of the proposed installation. This channel has a transmit power of 1 Watt.



- 7) 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.
- 8) 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 and 20 dB for highly focused parabolic microwave dishes, 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.
- 9) 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 as well as the Dragonwave A-ANT-23G-2-C for microwave transmission in the 23 GHz band. 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 and 20 dB for highly focused parabolic microwave dishes, 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.
- 10) The antenna mounting height centerlines of the proposed panel antennas and microwave dish are **93 feet** above ground level (AGL) for **Sector A**, **93 feet** above ground level (AGL) for **Sector B** and **93 feet** above ground level (AGL) for Sector C.
- 11) 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):	93 feet	Height (AGL):	93 feet	Height (AGL):	93 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	10	Channel Count	10	Channel Count	10
Total TX Power(W):	280 Watts	Total TX Power(W):	280 Watts	Total TX Power(W):	280 Watts
ERP (W):	7,378.61	ERP (W):	7,378.61	ERP (W):	7,378.61
Antenna A1 MPE%	4.33 %	Antenna B1 MPE%	4.33 %	Antenna C1 MPE%	4.33 %
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):	93 feet	Height (AGL):	93 feet	Height (AGL):	93 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%	2.43 %	Antenna B2 MPE%	2.43 %	Antenna C2 MPE%	2.43 %

Microwave Backhaul Data

Antenna Type:	Gain (dBd)	Height (feet AGL):	Frequency Bands	Channel Count	Total TX Power(W)	ERP (W)	MPE %	Sector
Dragonwave A- ANT-23G-2-C	38.95 dBd	93	23 GHz	1	1	7,852.36	0.37	B

Site Composite MPE%	
Carrier	MPE%
SPRINT – Sector B	7.13 %
T-Mobile	6.45 %
MetroPCS	2.41 %
Clearwire	0.24 %
Nextel	0.76 %
AT&T	4.32 %
Site Total MPE %:	21.31 %

SPRINT Sector A Total:	6.76 %
SPRINT Sector B Total:	7.13 %
SPRINT Sector C Total:	6.76 %
Site Total:	21.31 %

SPRINT Frequency Band / Technology (Sector B)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm ²)	Frequency (MHz)	Allowable MPE (μW/cm ²)	Calculated % MPE
Sprint 850 MHz CDMA	1	376.73	93	1.79	850 MHz	567	0.31%
Sprint 850 MHz LTE	2	941.82	93	8.95	850 MHz	567	1.58%
Sprint 1900 MHz (PCS) CDMA	5	511.82	93	12.16	1900 MHz (PCS)	1000	1.22%
Sprint 1900 MHz (PCS) LTE	2	1,279.56	93	12.16	1900 MHz (PCS)	1000	1.22%
Sprint 2500 MHz (BRS) LTE	8	639.78	93	24.31	2500 MHz (BRS)	1000	2.43%
Sprint 11 GHz Microwave	1	7,852.36	93	3.73	11 GHz	1000	0.37%
						Total:	7.13%



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:	6.76 %
Sector B:	7.13 %
Sector C:	6.76 %
SPRINT Maximum MPE % (Sector B):	7.13 %
Site Total:	21.31 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **21.31 %** 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.

Date: **July 10, 2018**

ARCHITECTURE & ENGINEERING DIVISION

604 FOX GLEN . BARRINGTON, IL 60010

847/277-0070 . FAX: 847/277-0080

AE@westchesterservices.com / www.westchesterservices.com

Tom Jupin
Charles Cherundolo Consulting, Inc.
1280 Rt. 46 West
Parsippany, NJ 07054

Subject: Structural Analysis Report

Sprint Co-Locate

Site Number: CT52XC012-A

Site Name: Stamford

Engineering Firm Designation: Westchester Services, LLC

Site Data: 650 Glenbrook Rd, Stamford, CT 06905
Fairfield County – 60' Water Tower on 41' Rooftop

Tom Jupin,

Westchester Services, LLC is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned water tower.

The purpose of the analysis is to determine acceptability of the water tower stress levels. Based on our analysis we have determined the stress levels under the following load case to be:

Existing and Proposed Equipment

Note: See Table 2-1 for the existing and proposed loading.

Sufficient Capacity

The analysis has been performed in accordance with the TIA-222-G standard and local code requirements based upon a wind speed of 119 mph 3-second gust, exposure category B with topographic category 1 and crest height of 0 feet.

We at Westchester Services, LLC appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this or any other projects please give us a call.

I certify that this report was prepared by me or under my direct supervision and that I am a licensed Structural Engineer under the laws of the State of Connecticut.

Philip Koziol, PE
Professional Engineer

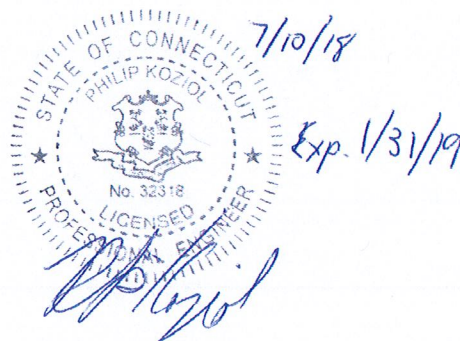


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Calculations

1) INTRODUCTION

This structure is a 60' water tower on a 41' rooftop located in Fairfield County, CT. The proposed antennas will be mounted on existing antenna frames.

2) ANALYSIS CRITERIA

The structural analysis was performed in accordance with the requirements of TIA-222-G Structural Standards for Antenna Supporting Structures and Antennas using a ultimate gust wind speed of 119 mph (converted to 91 mph 3-second gust) with no ice, 50 mph with 0.75 inch ice thickness, Structure Class III, exposure category B with topographic category 1 and crest height of 0 feet.

Table 2-1 – Proposed Final Antenna Configuration
(New antennas in **bold**)

Center Line Elevation (ft)	Sector	Pos.	Antenna	Radio(s)	Note
93	Alpha	1			
		2	(1) Nokia MiMO AAHC		
		3		(1) 1900MHz RRH (2) 800MHZ RRH	
		4	(1) Commscope NNVV-65B-R4		
93	Beta	1	(1) Nokia MiMO AAHC	(1) 1900MHz RRH	
		2	(1) 24" dish		
		3		(1) 800MHZ RRH	
		4	(1) Commscope NNVV-65B-R4	(1) 800MHZ RRH	
93	Gamma	1			
		2	(1) Nokia MiMO AAHC		
		3		(1) 1900MHz RRH (2) 800MHZ RRH	
		4	(1) Commscope NNVV-65B-R4		

For full tower loading, please refer to attached Mathcad calculations.

3) ANALYSIS PROCEDURE

Table 3-1 – Documents Provided

Document	Remarks	Reference	Date	Source
Structural Analysis	WSLLC	N/A	1/23/18	WSLLC
Structural Analysis	Atlantis Group	N/A	2/25/15	Sprint

3.1) Analysis Method

Mathcad 15 is a mathematics software program used for creating hand calc templates. The output of these calculations can be found in Appendix A.

4) ANALYSIS RESULTS

Table 4-1 – Critical Section Capacity (Summary)

Member Type	Elevation (ft)	% Capacity	Pass/Fail
Water Tower	41	36.0	Pass
Overall		36.0	Pass

4.1) Recommendations

The existing water tower has sufficient capacity to carry the existing and proposed loads. No underlying structure information was available at the time of this analysis. This report makes no statement regarding the water tower's impact on the structure below it.

5) ASSUMPTIONS

- The analysis performed is to the theoretical capacity of the members and connections. No accommodations are taken for any damaged, rusted, deteriorated, or otherwise compromised member conditions. To this, the tower or structure is assumed to be properly maintained and monitored and this analysis cannot be considered to be a condition assessment of the structure.
- The analysis is performed to the minimum design wind, ice, and other environmental loading prescribed by the governing building codes and standards. Any higher loading conditions required by the local jurisdiction or structure owner should be made known to Westchester immediately for analysis. No lesser conditions will be accommodated.
- Member sizes are assumed to be of standard AISC or manufacturer designations unless explicitly specified otherwise. The geometry of the tower or structure is assumed as schematic. Steel grade and concrete strength are assumed to be conservative standard and fully developed unless otherwise specified.
- The information provided to Westchester for analysis is assumed accurate and up to date as supplied. No independent efforts were taken by Westchester to verify the validity of the information supplied. If any additional information is presented at any time that contradicts what is referenced in the analysis, the analysis is invalid and must be performed again with the new information.
- Any reinforcement or modifications are assumed to be fully installed and functional.
- All welds are assumed to have been performed to current welding standards and are assumed to develop their full capacity and to be in good condition. In addition, all bolts and bolt-like anchors are assumed to be fully tightened, fastened, or bonded to the manufacturers' specifications and are assumed to have full capacity.
- Numerous connection details of large-scale structures are unobtainable and are omitted from the structural analysis. This includes, but is not limited to: bolts, welds, flanges, and plates. These connections are considered adequate and are therefore neglected from the analysis. In addition, in the absence of building plans, many wall, floor, and ceiling constructions can only be determined from observable field data and are supplemented by best judgment and experience.
- Antennas, dishes, feedlines, and any other such appurtenances are assumed adequate through manufacturer testing. No analysis is provided for the structural strength or stability of these items unless otherwise specified.
- Equipment mounting systems are assumed structurally sound unless specifically called for in the analysis.
- Soil conditions and foundations are not considered unless specified in the analysis and have no deterioration or defects. For sites located on a building, only local effects of the equipment is considered unless otherwise specified. The overall structure of the building and its foundation are assumed to be unaffected by the telecom equipment.
- Any changes or differences to the site or site plans at any time prior to installation must be brought to the attention of Westchester immediately.

APPENDIX A
CALCULATIONS

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

Stamford
CT52XC012-A
Client: Cherundolo - Sprint

Date: 7/10/2018

By: PK

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References:

- 1) *2015 International Building Code*
- 2) *ANSI TIA-222-G, Structural Standard for Antenna Supporting Structures and Antennas*
- 3) *AISC 360-10 Specification for Structural Steel Buildings*
- 4) *Structural Analysis by Westchester Services dated 1/23/18*

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

Stamford
CT52XC012-A
Client: Cherundolo - Sprint

Date: 7/10/2018
By: PK
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Input**Tank Geometry**

$$d_{\text{tank}} := \frac{83}{\pi} \text{ ft} = 26.42 \text{ ft}$$

Diameter of tank

$$h_{\text{tank}} := 60 \text{ ft}$$

Overall height of structure

$$h_{\text{main}} := 15 \text{ ft}$$

Height of flat-sided cylindrical part of tank

$$h_{\text{top}} := 4 \text{ ft}$$

Height from top of cylindrical part to topmost part of tank.

$$h_{\text{bottom}} := 5 \text{ ft}$$

Height from bottom of cylindrical part to bottommost part of tank.

$$h_{\text{balcony}} := 41 \text{ ft}$$

*Elevation of top of legs***Columns**

$$n_{\text{legs}} := 4$$

*Number of perimeter columns**Leg Shape*

$$d_{\text{col}} := 18 \text{ in}$$

Depth of column

LEG := ☐ Round
☒ Flat

$$\text{Dist}_{\text{col}} := 19.5 \text{ ft}$$

*Distance between column feet***Center Riser**

$$d_{\text{riser}} := \frac{26}{\pi} \text{ ft} = 8.276 \text{ ft}$$

*Diameter of the riser***Diagonal Rods**

$$n_{\text{bays}} := 1$$

Number of bays per side

$$n_{\text{rods}} := 2$$

Rods per bay

$$d_{\text{rod}} := 1.25 \text{ in}$$

*Diameter of rods***Roof Height**

$$z_{\text{roof}} := 40.583 \text{ ft}$$

Height of roof

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PH: 847.277.0070
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Wind Factors (as per TIA-222-G)

$V := 91$ mph	V_{ult} from Ref. (1) converted to V_{3sec} for use with Ref. (2)
$V_i := 50$ mph	Basic wind speed with ice
$t_i := 0.75 \cdot \text{in}$	Design ice thickness
$G_H := 1$	Ref. (2), Section 2.6.7.3
$i_m := 1.15$	Importance Factor
$K_d := 0.95$	Wind Direction Probability Factor, Ref. (2), Table 2-2
$E_x := \text{"B"}$	Exposure category. See Ref. (2), Table 2-4
$TC := 1$	Topographic Category. See Ref. (2), Table 2-5
$H := 0 \cdot \text{ft}$	Crest Height

Equipment Properties**Antennas**

Antenna name/model

Number of
antennas

Height of antennas

Width of antennas

"MiMO AAHC"	3	25.6	19.7
"NNVV-65B-R4"	3	72	19.6
"RRH-2x50-800"	6	16	12.9
"RRH 1900 4x45 65MHz"	3	25	10.7
"ATT 8ft panel"	3	96	12
"ATT 6ft panel"	6	72	12
"ATT TMA"	6	10	7
"ATT RRH"	3	18	18
"ATT Raycap"	3	24	10
"TM LNX-6515DS-A1M"	3	96.6	11.9
"TM AIR21 B4A/B2P"	6	56.2	12.1
"TM RRUS11 B12"	6	20	17
"Screen"	1	120	240
"not used"	0	0	1

Depth of antennas

Elevation of
antennas

Weight of antennas

9.6	93	103.7
7.8	93	77.4
10.7	93	60
11.1	93	68
6	100	60
6	100	40
5	100	20
8	100	60
10	100	30
7.1	85	43.7
6	85	91.5
7	85	50.7
12	97	300
1	50	0

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
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Shape of antenna

1 = Flat

0 = Round

Azimuth adjustment for entire antenna

group rotated about structure

(in cases where azimuths are unknown,
0 for all yields most conservative result)

Shielding factor

0 = NO shielding - Full wind load

1 = Partial shielding* - due to structure

2 = Full shielding - NO WIND WILL BE APPLIED

SHAPE := $\begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 0 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$

AZ := $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ · deg

SHIELD := $\begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 0 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$

**Note: Partial shielding is considered for the noted antennas. Shielding is detailed in Ref. (2), Section 2.6.9.4. For the purposes of the analysis, each antenna group is even spaced about the shielding structure, yielding a result where the wind can act upon two of the three sectors.*

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
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Dishes, Mounts, and Other Equipment

$$N_{\text{equip}} := 3$$

Number of appurtenance groups

Name/model

Number of appurtenances

Elevation

"antenna mount frame"
"antenna mount frame"
"24" dish"
"not used"

$$n_{\text{equip}} := \begin{pmatrix} 3 \\ 3 \\ 1 \\ 0 \end{pmatrix}$$

$$z_{\text{equip}} := \begin{pmatrix} 85 \\ 93 \\ 93 \\ 0 \end{pmatrix} \cdot \text{ft}$$

CaAa of equipment

CaAa with ice

$$CaAa_{\text{equip}} := \begin{pmatrix} 12.5 \\ 12.5 \\ 3.14 \\ 0 \end{pmatrix} \cdot \text{ft}^2$$

$$CaAa_{\text{equip.ice}} := \begin{pmatrix} 22 \\ 22 \\ 3.41 \\ 0 \end{pmatrix} \cdot \text{ft}^2$$

Weight

Weight with ice

$$\text{weight}_{\text{equip}} := \begin{pmatrix} 300 \\ 300 \\ 30 \\ 0 \end{pmatrix} \cdot \text{lbf}$$

$$\text{weight}_{\text{equip.ice}} := \begin{pmatrix} 450 \\ 450 \\ 45 \\ 0 \end{pmatrix} \cdot \text{lbf}$$

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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Pipes*Nominal pipe size (AISC STD pipes)*

$$\text{Pipe} := \begin{pmatrix} 2 \\ 2 \\ 2 \\ 0 \end{pmatrix}$$

Number of pipe groups

$$N_{\text{pipe}} := 3$$

$$\text{length}_{\text{pipe}} := \begin{pmatrix} 96 \\ 96 \\ 96 \\ 0 \end{pmatrix} \cdot \text{in}$$

Length of pipes

$$n_{\text{pipe}} := \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

Number of pipes

$$z_{\text{pipe}} := \begin{pmatrix} 100 \\ 93 \\ 85 \\ 0 \end{pmatrix} \cdot \text{ft}$$

Elevation

*Note: Shielding is considered for all of the above pipes. Shielding is detailed in Ref. (2), Section 2.6.9.4. For the purposes of the analysis, each antenna group is even spaced about the tank, yielding a result where the wind can act upon only two of the three sectors. In addition, the pipes are located closely enough to their respect antennas that they can also be considered shielded.

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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Feedlines*Number of coaxial
cables*

$$N_{\text{feed}} := \begin{pmatrix} 3 \\ 3 \\ 1 \\ 9 \\ 9 \\ 0 \end{pmatrix}$$

$$N_{\text{Feed}} := 5$$

$$n_{\text{feed}} := 3$$

Nominal coaxial size

$$\text{Size}_{\text{feed}} := \begin{pmatrix} 1.5 \\ 1.25 \\ .5 \\ 1.625 \\ 1.625 \\ 0 \end{pmatrix} \cdot \text{in}$$

*Number of feedline groups**Number of feedlines exposed to wind loading**Length of coaxial
cables*

$$L_{\text{feed}} := \begin{pmatrix} 52 \\ 52 \\ 52 \\ 44 \\ 59 \\ 0 \end{pmatrix} \cdot \text{ft}$$

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PH: 847.277.0070
AE@westchesterservices.com

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Calculations**Wind Factors**

$$z := \max(z_{\text{ant}}, z_{\text{equip}})$$

$$z = 100 \text{ ft}$$

Maximum equipment elevation

$$z_g := \begin{cases} 1200 \text{ ft} & \text{if Ex} = \text{"B"} \\ 900 \text{ ft} & \text{if Ex} = \text{"C"} \\ 700 \text{ ft} & \text{if Ex} = \text{"D"} \end{cases}$$

$$z_g = 1.2 \times 10^3 \text{ ft}$$

$$K_{z\min} := \begin{cases} 0.70 & \text{if Ex} = \text{"B"} \\ 0.85 & \text{if Ex} = \text{"C"} \\ 1.03 & \text{if Ex} = \text{"D"} \end{cases}$$

$$K_{z\min} = 0.7$$

$$\alpha := \begin{cases} 7.0 & \text{if Ex} = \text{"B"} \\ 9.5 & \text{if Ex} = \text{"C"} \\ 11.5 & \text{if Ex} = \text{"D"} \end{cases}$$

$$\alpha = 7$$

$$K_e := \begin{cases} 0.90 & \text{if Ex} = \text{"B"} \\ 1.00 & \text{if Ex} = \text{"C"} \\ 1.10 & \text{if Ex} = \text{"D"} \end{cases}$$

$$K_e = 0.9$$

$$K_z := 2.01 \cdot \left(\frac{z}{z_g} \right)^{\frac{2}{\alpha}}$$

$$K_z = 0.988$$

$$K_{z\min} < K_z < 2.01, \text{ OK}$$

$$K_t := \begin{cases} .43 & \text{if TC} = 2 \\ .53 & \text{if TC} = 3 \\ .72 & \text{if TC} = 4 \\ 0 & \text{if TC} = 1 \end{cases}$$

$$K_t = 0$$

$$f := \begin{cases} 1.25 & \text{if TC} = 2 \\ 2.0 & \text{if TC} = 3 \\ 1.5 & \text{if TC} = 4 \\ 0 & \text{if TC} = 1 \end{cases}$$

$$f = 0$$

$$K_a := 1.0$$

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PH: 847.277.0070
AE@westchesterservices.com

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Antenna loads - per TIA-222-G

$$K_{h.ant} := \begin{cases} \text{for } n \in 1 \dots N_{\text{antenna}} \\ x_n \leftarrow e^{\left(\frac{f \cdot z}{z_{\text{ant}_n}} \right)} \\ x \end{cases}$$

$$K_{zt.ant} := \left(1 + \frac{K_c \cdot K_t}{K_{h.ant}} \right)^2 \quad \text{Ref. (2), 2.6.6.4}$$

$$K_{iz.ant} := \left(\frac{z}{33 \cdot \text{ft}} \right)^{0.1} \quad K_{iz.ant} = 1.117 < 1.4, \text{ OK}$$

$$K_{z.ant} := \begin{cases} \text{for } n \in 1 \dots N_{\text{antenna}} \\ p_n \leftarrow \max \left[K_{zmin}, \min \left[2.01 \cdot \left(\frac{z_{\text{ant}_n}}{z_g} \right)^{\frac{2}{\alpha}}, 2.01 \right] \right] \\ p \end{cases}$$

	1
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1

 $K_{zt.ant} =$ $K_{h.ant} =$

	1
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1

 $K_{z.ant} =$

	1
1	0.968
2	0.968
3	0.968
4	0.968
5	0.988
6	0.988
7	0.988
8	0.988
9	0.988
10	0.943
11	0.943
12	0.943

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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$$q_{z,ant} := \begin{cases} \text{for } n \in 1..N_{\text{antenna}} \\ p_n \leftarrow 0.00256 \cdot K_{z,ant_n} \cdot K_{zt,ant_n} \cdot K_d \cdot V^2 \cdot i_m \cdot \text{psf} \\ p \end{cases}$$

$$W_{\text{ant}} := \sum_{i=1}^{N_{\text{antenna}}} \left(n_{\text{ant}_i} \cdot \text{weight}_{\text{ant}_i} \right)$$

$$W_{\text{ant}} = 2.902 \times 10^3 \cdot \text{lbf}$$

$$q_{z,ant} = \text{psf}$$

	1
1	22.418
2	22.418
3	22.418
4	22.418
5	22.888
6	22.888
7	22.888
8	22.888
9	22.888
10	21.849
11	21.849
12	21.849

$$C_{\text{max}} := \begin{cases} \text{for } i \in 1..N_{\text{antenna}} \\ x_i \leftarrow \left(i_m \cdot K_{zt,ant_i} \cdot K_{z,ant_i} \right)^{0.5} \cdot V \cdot \text{width}_{\text{ant}_i} \cdot \frac{1}{\text{ft}} \\ x \end{cases}$$

$$C_{\text{max}} =$$

	1
1	157.617
2	156.817
3	103.211
4	85.609
5	97.011
6	97.011
7	56.59
8	145.516
9	80.842
10	93.994
11	95.574
12	134.278

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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 $C_{A,max} :=$ for $n \in 1 \dots N_{\text{antenna}}$
if SHAPE_n

$$\text{Aspect}_n \leftarrow \frac{\text{height}_{\text{ant}_n}}{\text{width}_{\text{ant}_n}}$$

$$p_n \leftarrow \begin{cases} 1.2 & \text{if } \text{Aspect}_n \leq 2.5 \\ 1.2 + .2 \cdot \frac{\text{Aspect}_n - 2.5}{7 - 2.5} & \text{if } 2.5 \leq \text{Aspect}_n \leq 7 \\ 1.4 & \text{if } \text{Aspect}_n = 7 \\ 1.4 + .6 \cdot \frac{\text{Aspect}_n - 7}{25 - 7} & \text{if } 7 \leq \text{Aspect}_n \leq 25 \\ 2.0 & \text{if } \text{Aspect}_n \geq 25 \end{cases}$$

otherwise

$$\text{Aspect}_n \leftarrow \frac{\text{height}_{\text{ant}_n}}{\text{width}_{\text{ant}_n}}$$

$$p_n \leftarrow \begin{cases} \text{if } C_{\max_n} < 32 \\ \begin{cases} .7 & \text{if } \text{Aspect}_n \leq 2.5 \\ .7 + .1 \cdot \frac{\text{Aspect}_n - 2.5}{7 - 2.5} & \text{if } 2.5 \leq \text{Aspect}_n \leq 7 \\ .8 & \text{if } \text{Aspect}_n = 7 \\ .8 + .4 \cdot \frac{\text{Aspect}_n - 7}{25 - 7} & \text{if } 7 \leq \text{Aspect}_n \leq 25 \\ 1.2 & \text{if } \text{Aspect}_n \geq 25 \end{cases} \end{cases}$$

 $C_{A,max} =$

	1
1	1.2
2	1.252
3	1.2
4	1.2
5	1.433
6	1.356
7	1.2
8	1.2
9	0.5
10	1.437
11	1.295
12	1.2

continued...

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*cont.*if $32 \leq C_{\max_n} \leq 64$

$$\frac{3.76}{(C_{\max_n})^{.485}} \quad \text{if } \text{Aspect}_n \leq 2.5$$

$$\frac{3.76}{(C_{\max_n})^{.485}} + \left[\frac{3.37}{(C_{\max_n})^{.415}} - \frac{3.76}{(C_{\max_n})^{.485}} \right] \cdot \frac{\text{Aspect}_n - 2.5}{7 - 2.5} \quad \text{if } 2.5 \leq \text{Aspect}_n \leq 7$$

$$\frac{3.37}{(C_{\max_n})^{.415}} \quad \text{if } \text{Aspect}_n = 7$$

$$\frac{3.37}{(C_{\max_n})^{.415}} + \left[\frac{38.4}{C_{\max_n}} - \frac{3.37}{(C_{\max_n})^{.415}} \right] \cdot \frac{\text{Aspect}_n - 7}{25 - 7} \quad \text{if } 7 \leq \text{Aspect}_n \leq 25$$

$$\frac{38.4}{C_{\max_n}} \quad \text{if } \text{Aspect}_n \geq 25$$

if $C_{\max_n} > 64$

$$.5 \quad \text{if } \text{Aspect}_n \leq 2.5$$

$$.5 + .1 \cdot \frac{\text{Aspect}_n - 2.5}{7 - 2.5} \quad \text{if } 2.5 \leq \text{Aspect}_n \leq 7$$

$$.6 \quad \text{if } \text{Aspect}_n \geq 7$$

p

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Barrington, IL 60010
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AE@westchesterservices.com

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$$A_{A,max} := \begin{cases} \text{for } n \in 1 \dots N_{\text{antenna}} \\ p_n \leftarrow \text{height}_{\text{ant}_n} \cdot \max(\text{depth}_{\text{ant}_n}, \text{width}_{\text{ant}_n}) \\ p \end{cases}$$

$$A_{A,max} = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 3.502 \\ \hline 2 & 9.8 \\ \hline 3 & 1.433 \\ \hline 4 & 1.927 \\ \hline 5 & 8 \\ \hline 6 & 6 \\ \hline 7 & 0.486 \\ \hline 8 & 2.25 \\ \hline 9 & 1.667 \\ \hline 10 & 7.983 \\ \hline 11 & 4.722 \\ \hline 12 & 2.361 \\ \hline \end{array} \cdot \text{ft}^2$$

$$F_{A,max} := \begin{cases} \text{for } n \in 1 \dots N_{\text{antenna}} \\ p_n \leftarrow n_{\text{ant}_n} \cdot \max(K_a G_H q_{z,\text{ant}_n} \cdot C_{A,max_n}, 25 \cdot \text{psf}) \cdot A_{A,max_n} \\ p \end{cases}$$

$$F_{A,max} = \begin{array}{|c|c|} \hline & 1 \\ \hline 1 & 282.647 \\ \hline 2 & 825.283 \\ \hline 3 & 231.354 \\ \hline 4 & 155.525 \\ \hline 5 & 787.338 \\ \hline 6 & 1116.921 \\ \hline 7 & 80.107 \\ \hline 8 & 185.391 \\ \hline 9 & 125 \\ \hline 10 & 752.062 \\ \hline 11 & 801.905 \\ \hline 12 & 371.437 \\ \hline \end{array} \cdot \text{lbf}$$



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AE@westchesterservices.com

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$$F_A := \begin{cases} \text{for } n \in 1 \dots N_{\text{antenna}} \\ \left| \begin{array}{l} f_n \leftarrow F_{\text{ant},\alpha_n} \cdot \text{ceil}\left(n_{\text{ant}_n} \cdot \frac{1}{3}\right) + F_{\text{ant},\beta_n} \cdot \left(\text{ceil}\left(\text{floor}\left(n_{\text{ant}_n} \cdot \frac{2}{3}\right) \cdot \frac{1}{2}\right)\right) \dots \text{ if } \text{SHIELD}_n = 0 \\ \quad + F_{\text{ant},\gamma_n} \cdot \text{floor}\left(\text{floor}\left(n_{\text{ant}_n} \cdot \frac{2}{3}\right) \cdot \frac{1}{2}\right) \\ f_n \leftarrow F_{\text{ant},\alpha_n} \cdot \text{ceil}\left(n_{\text{ant}_n} \cdot \frac{1}{3}\right) + F_{\text{ant},\beta_n} \cdot \left(\text{ceil}\left(\text{floor}\left(n_{\text{ant}_n} \cdot \frac{2}{3}\right) \cdot \frac{1}{2}\right)\right) \text{ if } \text{SHIELD}_n = 1 \\ f_n \leftarrow 0 \text{ lbf if } \text{SHIELD}_n = 2 \end{array} \right. \\ f \end{cases}$$

	1
1	181.33
2	524.276
3	171.073
4	119.857
5	528.454
6	744.781
7	86.44
8	116.481
9	45.127
10	522.049
11	532.009
12	230.454

$F_A =$ lbf

Total wind force from antennas,
including any shielding and
wind direction correction

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Barrington, IL 60010
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Ice

$$t_{iz.ant} := \begin{cases} \text{for } n \in 1..N_{\text{antenna}} \\ p_n \leftarrow 2.0 \cdot t_i \cdot i_m \cdot \max \left[1.4, \left(\frac{z_{ant_n}}{33 \cdot \text{ft}} \right)^{0.1} \right] \cdot (K_{zt.ant_n})^{0.35} \\ p \end{cases}$$

$$t_{iz.ant} = \text{in}$$

	1
1	2.415
2	2.415
3	2.415
4	2.415
5	2.415
6	2.415
7	2.415
8	2.415
9	2.415
10	2.415
11	2.415
12	2.415

$$A_{A.ice} := \begin{cases} \text{for } n \in 1..N_{\text{antenna}} \\ p_n \leftarrow (\text{height}_{ant_n} + 2 \cdot t_{iz.ant_n}) \cdot (\text{width}_{ant_n} + 2 \cdot t_{iz.ant_n}) \\ p \end{cases}$$

$$A_{A.ice} = \text{ft}^2$$

	1
1	5.184
2	13.034
3	2.565
4	3.217
5	11.785
6	8.98
7	1.218
8	3.62
9	2.969
10	11.784
11	7.175
12	3.764

$$C := \begin{cases} \text{for } i \in 1..N_{\text{antenna}} \\ x_i \leftarrow (i_m \cdot K_{zt.ant_i} \cdot K_{z.ant_i})^{0.5} \cdot V \cdot \max(\text{width}_{ant_i}, \text{depth}_{ant_i}) \cdot \frac{1}{\text{ft}} \\ x \end{cases}$$

$$C =$$

	1
1	157.617
2	156.817
3	103.211
4	88.809
5	97.011
6	97.011
7	56.59
8	145.516
9	80.842
10	93.994
11	95.574
12	134.278

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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 $C_{A.ice} :=$ for $n \in 1..N_{antenna}$

$$Aspect_n \leftarrow \frac{height_{ant_n} + 2 \cdot t_{iz.ant_n}}{width_{ant_n} + 2 \cdot t_{iz.ant_n}}$$

 $p_n \leftarrow$ if $C_n < 32$
 $.7$ if $Aspect_n \leq 2.5$

$$.7 + .1 \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7$$

 $.8$ if $Aspect_n = 7$

$$.8 + .4 \cdot \frac{Aspect_n - 7}{25 - 7} \text{ if } 7 \leq Aspect_n \leq 25$$

 1.2 if $Aspect_n \geq 25$

 if $32 \leq C_n \leq 64$

$$\frac{3.76}{(C_n)^{.485}} \text{ if } Aspect_n \leq 2.5$$

$$\frac{3.76}{(C_n)^{.485}} + \left[\frac{3.37}{(C_n)^{.415}} - \frac{3.76}{(C_n)^{.485}} \right] \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7$$

$$\frac{3.37}{(C_n)^{.415}} \text{ if } Aspect_n = 7$$

$$\frac{3.37}{(C_n)^{.415}} + \left[\frac{38.4}{C_n} - \frac{3.37}{(C_n)^{.415}} \right] \cdot \frac{Aspect_n - 7}{25 - 7} \text{ if } 7 \leq Aspect_n \leq 25$$

$$\frac{38.4}{C_n} \text{ if } Aspect_n \geq 25$$

 if $C_n > 64$
 $.5$ if $Aspect_n \leq 2.5$

$$.5 + .1 \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7$$

 $.6$ if $Aspect_n \geq 7$

p

 $C_{A.ice} =$

	1
1	0.5
2	0.514
3	0.5
4	0.5
5	0.578
6	0.546
7	0.531
8	0.5
9	0.5
10	0.579
11	0.525
12	0.5

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604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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$$q_{z,ant,ice} := \begin{cases} \text{for } n \in 1..N_{antenna} \\ p_n \leftarrow 0.00256 \cdot K_{z,ant_n} \cdot K_{zt,ant_n} \cdot K_d \cdot V_i^2 \cdot i_m \cdot \text{psf} \\ p \end{cases}$$

$$q_{z,ant,ice} =$$

	1
1	6.768
2	6.768
3	6.768
4	6.768
5	6.91
6	6.91
7	6.91
8	6.91
9	6.91
10	6.596
11	6.596
12	6.596

$$F_{A,ice} := \begin{cases} \text{for } n \in 1..N_{antenna} \\ p_n \leftarrow n_{ant_n} \cdot K_a \cdot G_H \cdot q_{z,ant,ice_n} \cdot (C_{A,ice})_n \cdot A_{A,ice_n} \\ p \end{cases}$$

$$F_{A,ice} =$$

	1
1	52.624
2	136.117
3	52.073
4	32.659
5	141.093
6	203.221
7	26.822
8	37.515
9	30.773
10	135.059
11	148.961
12	74.487

$$W_{ant,ice} := \begin{cases} \text{for } n \in 1..N_{antenna} \\ D_{c_n} \leftarrow \begin{cases} \sqrt{(\text{width}_{ant_n})^2 + (\text{depth}_{ant_n})^2} & \text{if } \text{SHAPE}_n \\ \text{width}_{ant_n} & \text{otherwise} \end{cases} \\ x_n \leftarrow n_{ant_n} \cdot 56\text{pcf} \cdot (\text{height}_{ant_n} + 2 \cdot t_{iz,ant_n}) \cdot \pi \cdot t_{iz,ant_n} \cdot (D_{c_n} + t_{iz,ant_n}) \\ x \end{cases}$$

$$W_{ant,ice} =$$

	1
1	546.097
2	1332.344
3	589.235
4	392.373
5	1177.448
6	1794.374
7	241.035
8	372.375
9	264.012
10	1217.428
11	1433.422
12	761.9

Pipes

$$K_{h,pipe} := \begin{cases} \text{for } n \in 1..N_{pipe} \\ x_n \leftarrow e^{\left(\frac{f \cdot z}{z_{pipe_n}}\right)} \\ x \end{cases}$$

$$K_{h,pipe} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

$$K_{zt,pipe} := \left(1 + \frac{K_e \cdot K_t}{K_{h,pipe}}\right)^2$$

$$K_{zt,pipe} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

Ref. (2), 2.6.6.4

$$K_{iz,pipe} := \left(\frac{z}{33 \cdot \text{ft}}\right)^{0.1}$$

$$K_{iz,pipe} = 1.117$$

< 1.4, OK

$$K_{z,pipe} := \begin{cases} \text{for } n \in 1..N_{pipe} \\ p_n \leftarrow \max \left[K_{zmin}, \min \left[2.01 \cdot \left(\frac{z_{pipe_n}}{z_g} \right)^{\frac{2}{\alpha}}, 2.01 \right] \right] \\ p \end{cases}$$

$$K_{z,pipe} = \begin{pmatrix} 0.988 \\ 0.968 \\ 0.943 \end{pmatrix}$$

$$A_{A,pipe} := \begin{cases} \text{for } n \in 1..N_{pipe} \\ p_n \leftarrow \text{length}_{pipe_n} \cdot D_{pipe_n} \\ p \end{cases}$$

$$A_{A,pipe} = \begin{pmatrix} 1.587 \\ 1.587 \\ 1.587 \end{pmatrix} \cdot \text{ft}^2$$

$$q_{z,pipe} := \begin{cases} \text{for } n \in 1..N_{pipe} \\ p_n \leftarrow 0.00256 \cdot K_{z,pipe_n} \cdot K_{zt,pipe_n} \cdot K_d \cdot V^2 \cdot i_m \cdot \text{psf} \\ p \end{cases}$$

$$q_{z,pipe} = \begin{pmatrix} 22.888 \\ 22.418 \\ 21.849 \end{pmatrix} \cdot \text{psf}$$

$C_{A.pipe} :=$ for $n \in 1 \dots N_{pipe}$

$$Aspect_n \leftarrow \frac{length_{pipe_n}}{D_{pipe_n}}$$

$p_n \leftarrow$ if $C_n < 32$

$$.7 \text{ if } Aspect_n \leq 2.5$$

$$.7 + .1 \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7$$

$$.8 \text{ if } Aspect_n = 7$$

$$.8 + .4 \cdot \frac{Aspect_n - 7}{25 - 7} \text{ if } 7 \leq Aspect_n \leq 25$$

$$1.2 \text{ if } Aspect_n \geq 25$$

if $32 \leq C_n \leq 64$

$$\frac{3.76}{(C_n)^{.485}} \text{ if } Aspect_n \leq 2.5$$

$$\frac{3.76}{(C_n)^{.485}} + \left[\frac{3.37}{(C_n)^{.415}} - \frac{3.76}{(C_n)^{.485}} \right] \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7$$

$$\frac{3.37}{(C_n)^{.415}} \text{ if } Aspect_n = 7$$

$$\frac{3.37}{(C_n)^{.415}} + \left[\frac{38.4}{C_n} - \frac{3.37}{(C_n)^{.415}} \right] \cdot \frac{Aspect_n - 7}{25 - 7} \text{ if } 7 \leq Aspect_n \leq 25$$

$$\frac{38.4}{C_n} \text{ if } Aspect_n \geq 25$$

if $C_n > 64$

$$.5 \text{ if } Aspect_n \leq 2.5$$

$$.5 + .1 \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7$$

$$.6 \text{ if } Aspect_n \geq 7$$

p

$$C_{A.pipe} = \begin{pmatrix} 0.6 \\ 0.6 \\ 0.6 \end{pmatrix}$$

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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$$q_{z,pipe} := \begin{cases} \text{for } n \in 1..N_{pipe} \\ p_n \leftarrow 0.00256 \cdot K_{z,pipe_n} \cdot K_{zt,pipe_n} \cdot K_d \cdot V_m^2 \cdot i_m \cdot psf \\ p \end{cases} \quad q_{z,pipe} = \begin{pmatrix} 22.888 \\ 22.418 \\ 21.849 \end{pmatrix} \cdot psf$$

$$F_{pipe} := \begin{cases} \text{for } n \in 1..N_{pipe} \\ p_n \leftarrow n_{pipe_n} \max(G_H \cdot K_a \cdot q_{z,pipe_n} \cdot C_{A,pipe_n}, 25 \cdot psf) \cdot A_{A,pipe_n} \\ p \end{cases} \quad F_{pipe} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \cdot lbf$$

$$W_{pipe} := \sum_{i=1}^{N_{pipe}} (n_{pipe_i} \cdot weight_{pipe_i} \cdot length_{pipe_i}) \quad W_{pipe} = 0 \cdot lbf$$

Ice

$$t_{iz,pipe} := \begin{array}{l} \text{for } n \in 1 \dots N_{pipe} \\ p_n \leftarrow 2.0 \cdot t_i \cdot i_m \cdot \max \left[1.4, \left(\frac{z_{pipe_n}}{33 \cdot ft} \right)^{0.1} \right] \cdot (K_{zt,ant_n})^{0.35} \end{array}$$

$$t_{iz,pipe} = \begin{pmatrix} 2.415 \\ 2.415 \\ 2.415 \end{pmatrix} \cdot in$$

$$q_{z,pipe,ice} := \begin{array}{l} \text{for } n \in 1 \dots N_{pipe} \\ p_n \leftarrow 0.00256 \cdot K_{z,pipe_n} \cdot K_{zt,ant_n} \cdot K_d \cdot V_i^2 \cdot i_m \cdot psf \end{array}$$

$$q_{z,pipe,ice} = \begin{pmatrix} 6.91 \\ 6.768 \\ 6.596 \end{pmatrix} \cdot psf$$

$$A_{A,pipe,ice} := \begin{array}{l} \text{for } n \in 1 \dots N_{pipe} \\ p_n \leftarrow (length_{pipe_n} + 2 \cdot t_{iz,pipe_n}) \cdot (D_{pipe_n} + 2 \cdot t_{iz,pipe_n}) \end{array}$$

$$A_{A,pipe,ice} = \begin{pmatrix} 15.146 \\ 15.146 \\ 15.146 \end{pmatrix} \cdot ft^2$$

$$C_{A,pipe,ice} := \begin{array}{l} \text{for } n \in 1 \dots N_{pipe} \\ \text{Aspect}_n \leftarrow \frac{length_{pipe_n} + 2 \cdot t_{iz,pipe_n}}{D_{pipe_n} + 2 \cdot t_{iz,pipe_n}} \\ p_n \leftarrow \begin{array}{l} \text{if } C_n < 32 \\ \begin{array}{l} .7 \text{ if } Aspect_n \leq 2.5 \\ .7 + .1 \cdot \frac{Aspect_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq Aspect_n \leq 7 \\ .8 \text{ if } Aspect_n = 7 \\ .8 + .4 \cdot \frac{Aspect_n - 7}{25 - 7} \text{ if } 7 \leq Aspect_n \leq 25 \\ 1.2 \text{ if } Aspect_n \geq 25 \end{array} \end{array} \end{array}$$

continued...

cont.

if $32 \leq C_n \leq 64$

$$\frac{3.76}{(C_n)^{.485}} \text{ if } \text{Aspect}_n \leq 2.5$$

$$\frac{3.76}{(C_n)^{.485}} + \left[\frac{3.37}{(C_n)^{.415}} - \frac{3.76}{(C_n)^{.485}} \right] \cdot \frac{\text{Aspect}_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq \text{Aspect}_n \leq 7$$

$$\frac{3.37}{(C_n)^{.415}} \text{ if } \text{Aspect}_n = 7$$

$$\frac{3.37}{(C_n)^{.415}} + \left[\frac{38.4}{C_n} - \frac{3.37}{(C_n)^{.415}} \right] \cdot \frac{\text{Aspect}_n - 7}{25 - 7} \text{ if } 7 \leq \text{Aspect}_n \leq 25$$

$$\frac{38.4}{C_n} \text{ if } \text{Aspect}_n \geq 25$$

if $C_n > 64$

$$.5 \text{ if } \text{Aspect}_n \leq 2.5$$

$$.5 + .1 \cdot \frac{\text{Aspect}_n - 2.5}{7 - 2.5} \text{ if } 2.5 \leq \text{Aspect}_n \leq 7$$

$$.6 \text{ if } \text{Aspect}_n \geq 7$$

$$C_{A.\text{pipe.ice}} = \begin{pmatrix} 0.6 \\ 0.6 \\ 0.6 \end{pmatrix}$$

$$F_{\text{pipe.ice}} := \begin{array}{l} \text{for } n \in 1 \dots N_{\text{pipe}} \\ p_n \leftarrow n_{\text{pipe}_n} G_H K_a q_{z.\text{pipe.ice}_n} C_{A.\text{pipe.ice}_n} A_{A.\text{pipe.ice}_n} \end{array}$$

$$F_{\text{pipe.ice}} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \cdot \text{lbf}$$

$$W_{\text{pipe.ice}} := \begin{array}{l} \text{for } n \in 1 \dots N_{\text{pipe}} \\ D_{c_n} \leftarrow D_{\text{pipe}_n} \\ x_n \leftarrow n_{\text{pipe}_n} \cdot 56 \text{pcf} \cdot (\text{length}_{\text{pipe}_n} + 2 \cdot t_{iz.\text{pipe}_n}) \cdot \pi \cdot t_{iz.\text{pipe}_n} \cdot (D_{c_n} + t_{iz.\text{pipe}_n}) \end{array}$$

$$W_{\text{pipe.ice}} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \cdot \text{lbf}$$

Dishes, Mounts, and Other Equipment

$$K_{h, \text{equip}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ x_n \leftarrow e^{\left(\frac{f \cdot z}{z_{\text{equip}_n}} \right)} \\ x \end{cases}$$

$$K_{h, \text{equip}} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

$$K_{zt, \text{equip}} := \left(1 + \frac{K_e \cdot K_t}{K_{h, \text{equip}}} \right)^2$$

$$K_{zt, \text{equip}} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

Ref. (2), 2.6.6.4

$$K_{iz, \text{equip}} := \left(\frac{z}{33 \cdot \text{ft}} \right)^{0.1}$$

$$K_{iz, \text{equip}} = 1.117$$

< 1.4, OK

$$K_{z, \text{equip}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ p_n \leftarrow \max \left[K_{zmin}, \min \left[2.01 \cdot \left(\frac{z_{\text{equip}_n}}{z_g} \right)^{\frac{2}{\alpha}}, 2.01 \right] \right] \\ p \end{cases}$$

$$K_{z, \text{equip}} = \begin{pmatrix} 0.943 \\ 0.968 \\ 0.968 \end{pmatrix}$$

$$q_{z, \text{equip}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ p_n \leftarrow 0.00256 \cdot K_{z, \text{equip}_n} \cdot K_{zt, \text{equip}_n} \cdot K_d \cdot V^2 \cdot i_m \cdot \text{psf} \\ p \end{cases}$$

$$q_{z, \text{equip}} = \begin{pmatrix} 21.849 \\ 22.418 \\ 22.418 \end{pmatrix} \cdot \text{psf}$$

$$F_{\text{equip}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ p_n \leftarrow n_{\text{equip}_n} \cdot G_H \cdot K_a \cdot q_{z, \text{equip}_n} \cdot CaAa_{\text{equip}_n} \\ n \end{cases}$$

$$F_{\text{equip}} = \begin{pmatrix} 819.347 \\ 840.677 \\ 70.393 \end{pmatrix} \cdot \text{lbf}$$

$$W_{\text{equip}} := \sum_{i=1}^{N_{\text{equip}}} (n_{\text{equip}_i} \cdot \text{weight}_{\text{equip}_i})$$

$$W_{\text{equip}} = 1.83 \times 10^3 \cdot \text{lbf}$$

Ice

$$t_{iz, \text{equip}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ p_n \leftarrow 2.0 \cdot t_i \cdot i_m \cdot \max \left[1.4, \left(\frac{z_{\text{equip}_n}}{33 \cdot \text{ft}} \right)^{0.1} \right] \cdot (K_{zt, \text{equip}_n})^{0.35} \\ p \end{cases}$$

$$t_{iz, \text{equip}} = \begin{pmatrix} 2.415 \\ 2.415 \\ 2.415 \end{pmatrix} \cdot \text{in}$$

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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$$q_{z, \text{equip.ice}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ p_n \leftarrow 0.00256 \cdot K_{z, \text{equip}_n} \cdot K_{zt, \text{equip}_n} \cdot K_d \cdot V_i^2 \cdot i_m \cdot \text{psf} \\ p \end{cases}$$

$$q_{z, \text{equip.ice}} = \begin{pmatrix} 6.596 \\ 6.768 \\ 6.768 \end{pmatrix} \cdot \text{psf}$$

$$F_{\text{equip.ice}} := \begin{cases} \text{for } n \in 1 \dots N_{\text{equip}} \\ p_n \leftarrow n_{\text{equip}_n} \cdot G_H \cdot K_a \cdot q_{z, \text{equip.ice}_n} \cdot \text{CaAa}_{\text{equip.ice}_n} \\ p \end{cases}$$

$$F_{\text{equip.ice}} = \begin{pmatrix} 435.349 \\ 446.683 \\ 23.079 \end{pmatrix} \cdot \text{lbf}$$

$$W_{\text{equip.ice}} := \sum_{j=1}^{N_{\text{equip}}} (n_{\text{equip}_j} \cdot \text{weight}_{\text{equip.ice}_j})$$

$$W_{\text{equip.ice}} = 2.745 \times 10^3 \cdot \text{lbf}$$

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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Feedlines

$$K_{z.feed} := \max \left[K_{zmin}, \min \left[2.01 \cdot \left(\frac{z}{z_g} \right)^{\frac{2}{\alpha}}, 2.01 \right] \right]$$

$$K_{z.feed} = 0.988$$

$$q_{z.feed} := 0.00256 \cdot K_{z.feed} \max(K_{zt.ant}) \cdot K_d \cdot V_i^2 \cdot i_m \cdot \text{psf}$$

$$q_{z.feed} = 22.888 \cdot \text{psf}$$

$$q_{feed} := n_{feed} \cdot \max(q_{z.feed} \cdot G_H, 20 \cdot \text{psf}) \cdot 0.198 \cdot \frac{\text{ft}^2}{\text{ft}}$$

$$q_{feed} = 13.595 \cdot \frac{\text{lbf}}{\text{ft}}$$

Linear wind load on feed cables

$$q_{z.ice} := 0.00256 \cdot K_{z.feed} \max(K_{zt.ant}) \cdot K_d \cdot V_i^2 \cdot i_m \cdot \text{psf}$$

$$q_{z.ice} = 6.91 \cdot \text{psf}$$

$$t_{iz.feed} := 2.0 \cdot t_i \cdot i_m \cdot \max \left[1.4, \left(\frac{z}{33 \cdot \text{ft}} \right)^{0.1} \right] \cdot \max(K_{zt.ant})^{0.35}$$

$$t_{iz.feed} = 2.415 \cdot \text{in}$$

$$q_{feed.ice} := n_{feed} \cdot q_{z.ice} \cdot G_H \cdot 0.598 \cdot \frac{\text{ft}^2}{\text{ft}}$$

$$q_{feed.ice} = 12.396 \cdot \frac{\text{lbf}}{\text{ft}}$$

*Linear wind load on feed cables
with 1/2" ice*

$$n_{feed.ice} := n_{feed}$$

$$z_{feed} := \max(L_{feed})$$

$$z_{feed} = 59 \text{ ft}$$

Wind Load for Water Tank - per AWWA D100-11

From Ref. (3)

$$C_{f_flat} := 1.0$$

Force coefficient (flat)

$$C_{f_cyl} := 0.6$$

Force coefficient (cylindrical or conical with apex angle <15 deg)

$$C_{f_sphere} := 0.5$$

Force coefficient (double curved or conical with apex angle >15 deg)

$$G := 1$$

Gust-effect factor

$$I := 1.15$$

Wind importance factor

Note: (Eq. 3-1) from Ref. (3) states: $P := q_z \cdot G \cdot C_f \geq 30 \text{ psf}$ C_f Each element will be checked against this condition.

Wind loading on each of the water tank components**Tank****Top dome**

$$h_{\text{lower}} := h_{\text{tank}} - (h_{\text{top}} + h_{\text{main}} + h_{\text{bottom}})$$

$$h_{\text{lower}} = 36 \text{ ft}$$

*Elevation of lowest point of tank
(point of connection of main riser)*

$$L_{\text{top}} := \frac{1}{2h_{\text{top}}} \cdot \left(\frac{d_{\text{tank}}}{2} \right)^2 - \frac{1}{2} h_{\text{top}}$$

$$L_{\text{top}} = 19.813 \text{ ft}$$

$$R_{\text{top}} := \frac{1}{2h_{\text{top}}} \cdot \left(\frac{d_{\text{tank}}}{2} \right)^2 + \frac{1}{2} h_{\text{top}}$$

$$R_{\text{top}} = 23.813 \text{ ft}$$

Radius of curvature of top dome

$$\Theta_{\text{top}} := 2 \arccos \left(\frac{L_{\text{top}}}{R_{\text{top}}} \right)$$

$$\Theta_{\text{top}} = 67.386 \cdot \text{deg}$$

Arc angle

$$A_{\text{top}} := \frac{\Theta_{\text{top}} \cdot R_{\text{top}}^2}{2} - \frac{1}{2} L_{\text{top}} \cdot d_{\text{tank}}$$

$$A_{\text{top}} = 71.728 \text{ ft}^2$$

Projected top dome area

$$Y_{\text{top}} := \frac{4R_{\text{top}} \cdot \sin \left(\frac{\Theta_{\text{top}}}{2} \right)^3}{3(\Theta_{\text{top}} - \sin(\Theta_{\text{top}}))} - L_{\text{top}}$$

$$Y_{\text{top}} = 1.612 \text{ ft}$$

Centroid of arc segment

$$y_{\text{top}} := h_{\text{lower}} + h_{\text{bottom}} + h_{\text{main}} + Y_{\text{top}}$$

$$y_{\text{top}} = 57.612 \text{ ft}$$

Centroid of top dome of tank

Main body of tank

$$A_{\text{main}} := d_{\text{tank}} \cdot h_{\text{main}}$$

$$A_{\text{main}} = 396.296 \text{ ft}^2$$

Projected area of main body

$$y_{\text{main}} := h_{\text{lower}} + h_{\text{bottom}} + \frac{1}{2} h_{\text{main}}$$

$$y_{\text{main}} = 48.5 \text{ ft}$$

Centroid of main body of tank

Westchester Services, LLC.

604 Fox Glen
 Barrington, IL 60010
 PH: 847.277.0070
 AE@westchesterservices.com

Stamford
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Bottom dome

$$L_{\text{bottom}} := \frac{1}{2h_{\text{bottom}}} \cdot \left(\frac{d_{\text{tank}}}{2} \right)^2 - \frac{1}{2}h_{\text{bottom}}$$

$$L_{\text{bottom}} = 14.95 \text{ ft}$$

$$R_{\text{bottom}} := \frac{1}{2h_{\text{bottom}}} \cdot \left(\frac{d_{\text{tank}}}{2} \right)^2 + \frac{1}{2}h_{\text{bottom}}$$

$$R_{\text{bottom}} = 19.95 \text{ ft}$$

*Radius of curvature of
bottom dome*

$$\Theta_{\text{bottom}} := 2 \arccos \left(\frac{L_{\text{bottom}}}{R_{\text{bottom}}} \right)$$

$$\Theta_{\text{bottom}} = 82.928 \cdot \text{deg}$$

Arc angle

$$A_{\text{bottom}} := \frac{\Theta_{\text{bottom}} \cdot R_{\text{bottom}}^2}{2} - \frac{1}{2}L_{\text{bottom}} \cdot d_{\text{tank}}$$

$$A_{\text{bottom}} = 90.54 \text{ ft}^2$$

Projected bottom dome area

$$Y_{\text{bot}} := R_{\text{bottom}} - \frac{4R_{\text{bottom}} \cdot \sin \left(\frac{\Theta_{\text{bottom}}}{2} \right)^3}{3(\Theta_{\text{bottom}} - \sin(\Theta_{\text{bottom}}))}$$

$$Y_{\text{bot}} = 2.977 \text{ ft}$$

*Centroid of arc segment
(measured from curved side)*

$$y_{\text{bot}} := h_{\text{lower}} + Y_{\text{bot}}$$

$$y_{\text{bot}} = 38.977 \text{ ft}$$

Centroid of bottom dome of tank

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070

AE@westchesterservices.com

Stamford
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Diagonal bracing and horizontal struts and rods

$$D := \text{Dist}_{\text{col}}$$

$$h_{\text{leg}} := h_{\text{balcony}}$$

$$\alpha := \frac{360 \text{deg}}{n_{\text{legs}}}$$

$$\alpha = 90 \cdot \text{deg}$$

$$\Theta := \frac{180 \text{deg} - \alpha}{2}$$

$$\Theta = 45 \cdot \text{deg}$$

$$r_{\text{bottom}} := D \cdot \frac{\sin(\Theta)}{\sin(\alpha)}$$

$$r_{\text{bottom}} = 13.789 \text{ ft}$$

$$r_{\text{tank}} := \frac{d_{\text{tank}}}{2}$$

$$r_{\text{tank}} = 13.21 \text{ ft}$$

$$d := r_{\text{tank}} \cdot \frac{\sin(\alpha)}{\sin(\Theta)}$$

$$d = 18.682 \text{ ft}$$

$$g := \sqrt{h_{\text{leg}}^2 + (r_{\text{bottom}} - r_{\text{tank}})^2}$$

$$g = 41.004 \text{ ft}$$

$$Z := \begin{cases} Z_1 \leftarrow d \\ \text{for } n \in 2 \dots n_{\text{bays}} \\ \quad Z_n \leftarrow d + \frac{n-1}{n_{\text{bays}}} \cdot (D - d) \\ Z_{n_{\text{bays}}+1} \leftarrow D \\ Z \end{cases}$$

$$Z = \begin{pmatrix} 18.682 \\ 19.5 \end{pmatrix} \text{ ft}$$

Length of horizontal members per elevation. Note: the first and last members of the matrix do not physically exist, they are there for computations sake.

$$b := \begin{cases} \text{for } n \in 1 \dots n_{\text{bays}} \\ \quad b_n \leftarrow \sqrt{\left(\frac{1}{n_{\text{bays}}} \cdot g\right)^2 + Z_n \cdot Z_{n+1}} \\ b \end{cases}$$

$$b = (45.229) \text{ ft}$$

Length of diagonal rods per each bay

Wind on members

Diagonal rods

$$y_b := \begin{cases} \text{for } n \in 1 \dots n_{bays} \\ y_n \leftarrow h_{leg} \cdot \left(\frac{n_{bays} - n}{n_{bays}} \right) + \frac{h_{leg}}{2n_{bays}} \end{cases} \quad y_b = (20.5) \text{ ft} \quad \text{Centroid of each rod level}$$

$$A_b := \begin{cases} \text{for } n \in 1 \dots n_{bays} \\ a_n \leftarrow 2 \cdot d_{rod} \cdot b_n \end{cases} \quad A_b = (9.423) \text{ ft}^2 \quad \text{Projected area of each diagonal rod per elevation}$$

Columns

$$A_{col} := d_{col} \cdot g \quad A_{col} = 61.506 \text{ ft}^2 \quad \text{Projected area of one column}$$

$$y_{col} := h_{leg} \cdot 0.5 \quad y_{col} = 20.5 \text{ ft} \quad \text{The elevation of the centroids of the columns}$$

Center Riser

$$H_{riser} := h_{lower}$$

$$A_{riser} := d_{riser} \cdot H_{riser} \quad A_{riser} = 297.938 \text{ ft}^2 \quad \text{Projected area of riser}$$

$$y_{riser} := H_{riser} \cdot 0.5 \quad y_{riser} = 18 \text{ ft} \quad \text{The elevation of the centroid of the riser}$$

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

Stamford
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Wind Load Determination

As per Ref. (3), the wind loading is to be determined by the height of the individual centroid of each element.

$$KZ := \begin{pmatrix} y_{\text{top}} + z_{\text{roof}} \\ y_{\text{main}} + z_{\text{roof}} \\ y_{\text{bot}} + z_{\text{roof}} \\ y_{\text{col}} + z_{\text{roof}} \\ y_{\text{riser}} + z_{\text{roof}} \end{pmatrix} \quad KZ = \begin{pmatrix} 98.195 \\ 89.083 \\ 79.56 \\ 61.083 \\ 58.583 \end{pmatrix} \text{ ft}$$

$$K_Z := \begin{cases} \text{for } n \in 1 \dots 5 \\ K_n \leftarrow \begin{cases} 1.09 & \text{if } 0 \text{ ft} < KZ_n \leq 50 \text{ ft} \\ 0.0036(KZ_n - 50 \text{ ft}) \cdot \frac{1}{\text{ft}} + 1.09 & \text{if } 50 \text{ ft} < KZ_n \leq 100 \text{ ft} \\ 0.0022(KZ_n - 100 \text{ ft}) \cdot \frac{1}{\text{ft}} + 1.27 & \text{if } 100 \text{ ft} < KZ_n \leq 150 \text{ ft} \\ 0.0016(KZ_n - 150 \text{ ft}) \cdot \frac{1}{\text{ft}} + 1.38 & \text{if } 150 \text{ ft} < KZ_n \leq 200 \text{ ft} \\ 0.0014(KZ_n - 200 \text{ ft}) \cdot \frac{1}{\text{ft}} + 1.46 & \text{if } 200 \text{ ft} < KZ_n \leq 250 \text{ ft} \\ 0.0014(KZ_n - 250 \text{ ft}) \cdot \frac{1}{\text{ft}} + 1.53 & \text{if } 250 \text{ ft} < KZ_n \leq 300 \text{ ft} \\ 0.0010(KZ_n - 300 \text{ ft}) \cdot \frac{1}{\text{ft}} + 1.60 & \text{if } 300 \text{ ft} < KZ_n \leq 350 \text{ ft} \end{cases} \end{cases}$$

$$K_Z = \begin{pmatrix} 1.264 \\ 1.231 \\ 1.196 \\ 1.13 \\ 1.121 \end{pmatrix}$$

$$q_Z := 0.00256 K_Z \cdot I \cdot V^2 \cdot \text{psf}$$

$$q_Z = \begin{pmatrix} 30.803 \\ 30.004 \\ 29.168 \\ 27.546 \\ 27.327 \end{pmatrix} \text{ psf}$$

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070

AE@westchesterservices.com

Stamford
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$$P_{top} := \max(q_{z1} \cdot G \cdot C_{f_sphere}, 30\text{psf} \cdot C_{f_sphere}) \cdot A_{top} \quad P_{top} = 1104.73 \text{ lbf}$$

Total wind loading on top dome of tank

$$P_{main} := \max(q_{z2} \cdot G \cdot C_{f_cyl}, 30\text{psf} \cdot C_{f_cyl}) \cdot A_{main} \quad P_{main} = 7.134 \cdot \text{kip}$$

Total wind loading on main body of tank

$$P_{bottom} := \max(q_{z3} \cdot G \cdot C_{f_sphere}, 30\text{psf} \cdot C_{f_sphere}) \cdot A_{bo} \quad P_{bottom} = 1358.1 \text{ lbf}$$

Total wind loading on bottom dome of tank

$$P_{col} := \begin{cases} \max(q_{z4} \cdot G \cdot C_{f_flat}, 30\text{psf} \cdot C_{f_cyl}) \cdot n_{legs} \cdot A_{col} & \text{if LEG} = 1 \\ \max(q_{z4} \cdot G \cdot C_{f_flat}, 30\text{psf} \cdot C_{f_flat}) \cdot n_{legs} \cdot A_{col} & \text{if LEG} = 2 \end{cases}$$

$$P_{col} = 7.381 \cdot \text{kip}$$

Total wind loads on the columns

$$P_{riser} := \max(q_{z5} \cdot G \cdot C_{f_cyl}, 30\text{psf} \cdot C_{f_cyl}) \cdot A_{riser} \quad P_{riser} = 5.363 \cdot \text{kip}$$

Wind load on the riser

Diagonals, Struts, and Horizontal Rods

Diagonal Rods

$$K_{Z,b} := \begin{cases} \text{for } n \in 1 \dots n_{\text{bays}} - 1 \\ K_n \leftarrow \begin{cases} 1.09 & \text{if } 0\text{ft} < y_{b_n} \leq 50\text{ft} \\ 0.0036(y_{b_n} - 50\text{ft}) \cdot \frac{1}{\text{ft}} + 1.09 & \text{if } 50\text{ft} < y_{b_n} \leq 100\text{ft} \\ 0.0022(y_{b_n} - 100\text{ft}) \cdot \frac{1}{\text{ft}} + 1.27 & \text{if } 100\text{ft} < y_{b_n} \leq 150\text{ft} \\ 0.0016(y_{b_n} - 150\text{ft}) \cdot \frac{1}{\text{ft}} + 1.38 & \text{if } 150\text{ft} < y_{b_n} \leq 200\text{ft} \\ 0.0014(y_{b_n} - 200\text{ft}) \cdot \frac{1}{\text{ft}} + 1.46 & \text{if } 200\text{ft} < y_{b_n} \leq 250\text{ft} \\ 0.0014(y_{b_n} - 250\text{ft}) \cdot \frac{1}{\text{ft}} + 1.53 & \text{if } 250\text{ft} < y_{b_n} \leq 300\text{ft} \\ 0.0010(y_{b_n} - 300\text{ft}) \cdot \frac{1}{\text{ft}} + 1.60 & \text{if } 300\text{ft} < y_{b_n} \leq 350\text{ft} \end{cases} \end{cases}$$

$$K_{Z,b} = (1.09)$$

$$q_{Z,b} := 0.00256 K_{Z,b} \cdot I \cdot V^2 \cdot \text{psf} \quad q_{Z,b} = (26.573) \cdot \text{psf}$$

$$P_b := \begin{cases} \text{for } n \in 1 \dots n_{\text{bays}} \\ p_n \leftarrow \max(q_{Z,b} \cdot G \cdot C_{f_cyl}, 30\text{psf} \cdot C_{f_cyl}) \cdot n_{\text{legs}} \cdot A_{b_n} \end{cases} \quad P_b = (678.429) \text{ lbf}$$

Wind loading on all the diagonal rods per elevation

$$M_B := \begin{cases} \text{for } n \in 1 \dots n_{\text{bays}} \\ m_n \leftarrow P_{b_n} \cdot y_{b_n} \end{cases} \quad M_B = (13.908) \cdot \text{kip} \cdot \text{ft}$$

Overturning moment for diagonal rods per elevation

$$M_{\text{brace}} := \sum_{n = n_{\text{bays}}}^1 M_{B_n} \quad M_{\text{brace}} = 13.908 \cdot \text{kip} \cdot \text{ft}$$

Total overturning moment due to diagonal rods

Westchester Services, LLC.

604 Fox Glen
Barrington, IL 60010
PH: 847.277.0070
AE@westchesterservices.com

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Water Tank Review**The overturning moment about the base from the water tank**

$$M_{ot} := P_{top} \cdot y_{top} + P_{main} \cdot y_{main} + P_{bottom} \cdot y_{bot} + P_{col} \cdot y_{col} + P_{riser} \cdot y_{riser} + M_{brace}$$

$$M_{ot} = 724.33 \cdot \text{kip} \cdot \text{ft}$$

The overturning moment about the base from the antennas

done to the current AWWA design specifications

$$M_{app} := \sum_{j=1}^{N_{antenna}} \left[F_{A_j} \cdot (z_{ant_j} - z_{roof}) \right] + \sum_{j=1}^{N_{pipe}} \left[F_{pipe_j} \cdot (z_{pipe_j} - z_{roof}) \right] + \sum_{j=1}^{N_{equip}} \left[F_{equip_j} \cdot (z_{equip_j} - z_{roof}) \right] \dots$$

$$+ 0.5 n_{feed} \cdot q_{feed} \cdot z_{feed}^2$$

$$M_{app} = 354.816 \cdot \text{kip} \cdot \text{ft}$$

Overturning moment from all
appurtenances

Check stress in tower legs

$$\text{Vol} := 10000 \text{ gal}$$

Estimated volume of tank

$$W_{t_{total}} := \left(\text{Vol} \cdot 62.5 \frac{\text{lb}}{\text{ft}^3} \right) \cdot 0.1 = 8.355 \cdot \text{kip}$$

It is conservative to assume the weight of the empty tank is 10%
the weight of the capacity of water.

$$\text{BC} := \text{Dist}_{col} \cdot \sqrt{2} = 27.577 \text{ ft}$$

Bolt Circle

$$P_{leg} := \frac{4(M_{ot} + M_{app})}{\text{BC} \cdot n_{legs}} + \frac{W_{t_{total}}}{n_{legs}} = 41.22 \cdot \text{kip}$$

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Allowable Stresses on Legs

$$E := 29000 \text{ ksi}$$

$$K := 2$$

$$F_L := 18 \text{ ksi}$$

$$L_{\text{leg}} := h_{\text{balcony}}$$

$$L_{\text{leg}} = 41 \text{ ft}$$

Overall length of legs

$$r_{\text{leg}} := 5.8995 \text{ in}$$

$$r_{\text{leg}} = 0.492 \text{ ft}$$

Radius of gyration of leg
(determined through AutoCAD
Massprop)

$$KL_T := \frac{K \cdot L_{\text{leg}}}{r_{\text{leg}}}$$

$$KL_T = 166.794$$

$$S_{\text{leg}} := 81.1 \text{ in}^3$$

Section modulus of leg (determined
through AutoCAD Massprop)

$$A_{g,\text{leg}} := 19.57 \text{ in}^2$$

Gross area of cross section of leg
(determined through AutoCAD
Massprop)

Allowable Local Buckling Stress
per AWWA-D100-11 Class II Material

$$K_{\psi} := C_c \leftarrow \sqrt{\frac{\pi^2 \cdot E}{F_L}}$$

Slenderness Reduction Factor

$$K \leftarrow 1 - \frac{1}{2} \cdot \left(\frac{KL_T}{C_c} \right)^2 \quad \text{if } 25 < KL_T \leq C_c$$

$$K \leftarrow \frac{1}{2} \cdot \left(\frac{KL_T}{C_c} \right)^2 \quad \text{if } KL_T > C_c$$

$$K \leftarrow 1 \quad \text{if } KL_T \leq 25$$

$$K_{\psi} = 0.875$$

Allowable Axial Stress

$$F_{a,\text{leg}} := F_L \cdot K_{\psi}$$

$$F_{a,\text{leg}} = 15.75 \cdot \text{ksi}$$

Allowable Shear Stress

$$F_{v,\text{leg}} := F_L$$

$$F_{v,\text{leg}} = 18 \cdot \text{ksi}$$

Allowable Bending Stress

$$F_{b,\text{leg}} := F_L$$

$$F_{b,\text{leg}} = 18 \cdot \text{ksi}$$

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Stress Analysis**Axial Stress**

$$W_{\text{water}} := \text{Vol} \cdot 62.5 \frac{\text{lb}}{\text{ft}^3}$$

$$W_{\text{water}} = 83.55 \cdot \text{kip}$$

Weight of water

$$W_{\text{steel}} := 0.10 \cdot W_{\text{water}}$$

$$W_{\text{steel}} = 8.36 \cdot \text{kip}$$

It is conservative to assume the weight of the steel of the tank is 10% of the water weight

$$f_{a,\text{leg}} := \frac{W_{\text{water}} + W_{\text{ant}} + W_{\text{pipe}} + W_{\text{equip}} + W_{\text{steel}}}{A_{g,\text{leg}}}$$

$$f_{a,\text{leg}} = 4.938 \cdot \text{ksi}$$

$$\frac{f_{a,\text{leg}}}{F_{a,\text{leg}}} = 31.36\%$$

< 100%

OK

Bending Stress

$$S_{\text{tot}} := 4350 \text{ in}^3$$

Section modulus determined through AutoCAD Massprop

$$f_{b,\text{leg}} := \frac{M_{\text{ot}} + M_{\text{app}}}{S_{\text{tot}}}$$

$$f_{b,\text{leg}} = 2.977 \cdot \text{ksi}$$

$$\frac{f_{b,\text{leg}}}{F_{b,\text{leg}}} = 16.539\%$$

< 100%

OK

Combined Stresses (Increased by 1.33 for wind)

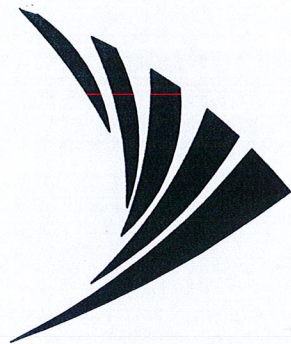
$$\text{Stress} := \frac{f_{a,\text{leg}}}{1.33 F_{a,\text{leg}}} + \frac{f_{b,\text{leg}}}{1.33 F_{b,\text{leg}}}$$

$$\text{Stress} = 36.014\%$$

< 100%

OK

Sprint



PROJECT: MIMO UPGRADE

SITE NAME: STAMFORD

SITE CASCADE: CT52XC012-A

**SITE ADDRESS: 650 GLENBROOK ROAD
STAMFORD, CT 06905**

Sprint
201 STATE ROUTE 17 NORTH
RUTHERFORD, NJ 07070
TEL: (201) 684-4000
FAX: (201) 684-4223

**Cherundolo
Consulting**

1280 ROUTE 46 WEST
PARSIPPANY, NJ 07054
TELEPHONE: 646-544-5324

**WESTCHESTER
SERVICES LLC**
604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080
AE@westchesterservices.com

**JOHN M. BANKS
ARCHITECT**
604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080

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0 07.10.18 FINAL CD
NO. DATE DESCRIPTION
DRAWN BY: JS
CHECKED BY: JMB
JOB NUMBER: CT52XC012-A
ARCHITECT: JOHN BANKS

SEAL

DATE: 07.13.18
EXPIRATION: 07.31.18

SITE NAME

STAMFORD

SITE NUMBER

CT52XC012-A

SITE LOCATION

650 GLENBROOK ROAD
STAMFORD, CT 06905
FAIRFIELD COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

SITE INFORMATION

SITE ADDRESS:
650 GLENBROOK ROAD
STAMFORD, CT 06905

PROPERTY OWNER:
GLENBROOK INDUSTRIAL PARK ASSOCIATES
30 COMMERCE ROAD
STAMFORD, CT 06902

ZONING JURISDICTION:
FAIRFIELD

ZONING DISTRICT:

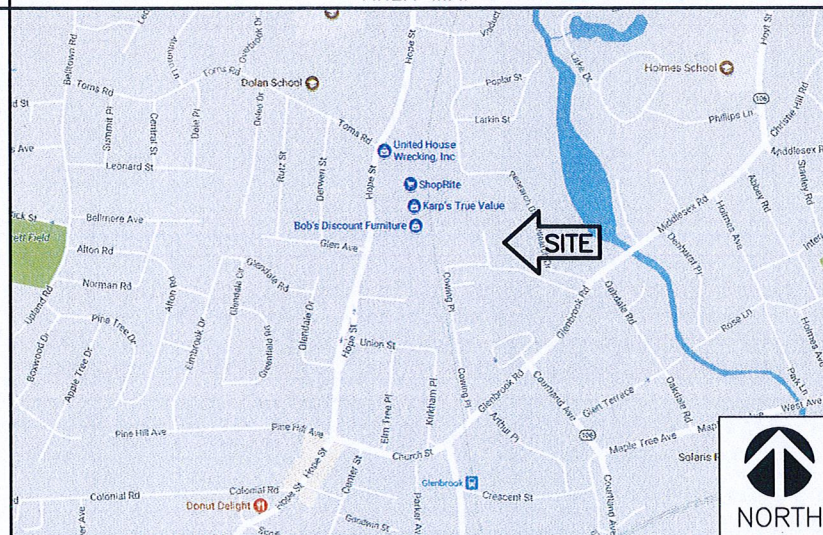
POWER COMPANY:
NORTHEAST UTILITIES
(800) 286-2000

COUNTY:
FAIRFIELD

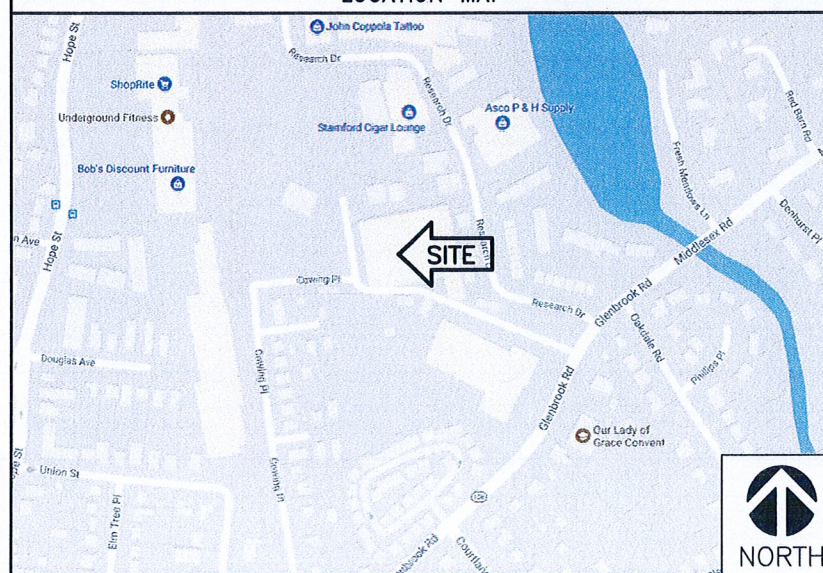
GEOGRAPHIC COORDINATES (NAD83):
LAT: 41° 04' 31.52"N
41.07542222°
LONG: 73° 31' 09.60"W
(-73.51938889°)

SPRINT CONSTRUCTION MANAGER:
NAME:
PHONE:
EMAIL:

AREA MAP



LOCATION MAP



PROJECT DESCRIPTION

- (1) EXISTING INDOOR CW RACK TO REMAIN
- INSTALL (1) NEW ELTEK E-CAB CABINET
- INSTALL (1) NEW ELETEK I-CAB CABINET
- REMOVE (3) EXISTING CW ANTENNAS
- REMOVE (3) EXISTING CW RRHS
- REMOVE (6) EXISTING IDEN ANTENNAS
- (1) EXISTING 2'-0" SPRINT DISH ANTENNA TO REMAIN
- INSTALL (3) NEW 800/1900 MHz ANTENNAS
- INSTALL (3) NEW MIMO ANTENNAS
- INSTALL (6) NEW 800 MHz RRHS
- INSTALL (3) NEW 1900 MHz RRHS
- INSTALL (3) NEW 1-1/2" HYBRIFLEX CABLES
- INSTALL (3) NEW MIMO UPGRADE FIBER CABLES
- INSTALL (1) NEW SPRINT SPRINT GPS UNIT
- INSTALL (9) NEW 6'-0" LONG, 3" SCHED. 40 GALV. MOUNTING PIPES

APPLICABLE CODES

SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION FOR THE LOCATION. THE EDITION OF THE ADOPTED CODES AND STANDARDS IN EFFECT OF THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

- 2015 INTERNATIONAL BUILDING CODE AS ADOPTED BY THE STATE OF CONNECTICUT
- NEC 2014, AS ADOPTED BY THE STATE OF CONNECTICUT
- NFPA 780 - LIGHTNING PROTECTION CODE
- ANSI/TIA-222G TELECOM STRUCTURAL STANDARD

DIG SAFE



Know what's below.
Call before you dig.

TO OBTAIN LOCATION OF PARTICIPANTS
UNDERGROUND FACILITIES BEFORE
YOU DIG IN CONNECTICUT, CONTACT
CALL BEFORE YOU DIG
TOLL FREE: 1-800-922-4455 OR
www.cbyd.com

CONNECTICUT STATUTE
REQUIRES MIN OF 2
WORKING DAYS NOTICE
BEFORE YOU EXCAVATE

DRAWING INDEX

SHEET NO:	SHEET TITLE	REV
T-1	TITLE SHEET	0
SP-1	SPRINT SPECIFICATIONS	0
SP-2	SPRINT SPECIFICATIONS	0
SP-3	SPRINT SPECIFICATIONS	0
A-1	OVERALL SITE PLAN	0
A-2	EQUIPMENT LAYOUT	0
A-3	WATER TANK & BUILDING ELEVATION	0
A-4	ANTENNA LAYOUT	0
A-5	MIMO PLUMBING DIAGRAM	0
A-6	CABLE DETAILS	0
A-7	EQUIPMENT DETAILS	0
A-8	ANTENNA MOUNT DETAILS	0
A-9	ANTENNA MOUNT DETAILS	0
E-1	ELECTRIC PLAN & NOTES	0
E-2	ELECTRICAL DETAILS	0

PROFESSIONAL LICENSE

I HEREBY CERTIFY THAT THESE PLANS WERE
PREPARED BY ME OR UNDER MY DIRECT SUPERVISION
AND THAT I AM A DULY REGISTERED ARCHITECT
UNDER THE LAWS OF THE STATE OF CONNECTICUT

EXPIRES: 07-31-18 NO. 10137 SIGNED: 9/13/18

SECTION 01 100 – SCOPE OF WORK

THE WORK:

THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE CONSTRUCTION DRAWINGS AND ASSOCIATED OUTLINE SPECIFICATIONS AND SITE SPECIFIC WORK ORDER, DESCRIBE THE WORK TO BE PERFORMED BY THIS CONSTRUCTION CONTRACTOR SUPPLIER

RELATED DOCUMENTS

- A. THE REQUIREMENTS OF EACH SECTION OF THIS SPECIFICATION APPLY TO ALL, INDIVIDUALLY AND COLLECTIVELY.
- B. RELATED DOCUMENTS: THE CONTRACTOR SHALL COMPLY WITH THE MOST CURRENT VERSION OF THE FOLLOWING SUPPLEMENTAL REQUIREMENTS FOR INSTALLATION AND TESTING
1. EN-2012-001: (FIBER OPTIC, DC CABLE, AND DC CIRCUIT BREAKER TAGGING STANDARDS)
 2. TS-200-(TRANSMISSION ANTENNA LINE ACCEPTANCE STANDARDS)
 3. EL-0568: (FIBER TESTING POLICY)
 4. NP-312-201: (EXTERIOR GROUNDING SYSTEM TESTING)
 5. NP-760-500: ETHERNET, MICROWAVE, TESTING AND ACCEPTANCE

NATIONALLY RECOGNIZED CODES AND STANDARDS:

THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS, INCLUDED

- A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
- B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT
- C. GR-1089-CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY-GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT
- D. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE-"NEW") AND NFPA 101 (LIFE SAFETY CODE).
- E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
- F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
- G. AMERICAN CONCRETE INSTITUTE (ACI)
- H. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
- I. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
- J. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
- K. PORTLAND CEMENT ASSOCIATION (PCA)
- L. NATIONAL CONCRETE MASONRY ASSOCIATION (PCA)
- M. BRICK INDUSTRY ASSOCIATION (BIA)
- N. AMERICAN WELDING SOCIETY (AWS)
- P. SGEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOICATION (SMACNA)
- Q. DOOR AND HARDWARE INSTITUTE (DHI)
- R. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
- S. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND INTERNATIONAL BUILDING CODE.

DEFINITIONS:

- A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN CONTRACT DOCUMENTS
- B. COMPANY: "SPRINT": SPRINT CORPORATION AND IT'S OPERATING ENTITIES
- C. ARCHITECT: SYNONYMOUS WITH ARCHITECT&ENGINEER AND "A&E", THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT
- D. CONTRACTOR: CONSTRUCTION CONTRACTOR, SUPPLIER, VENDOR; INDIVIDUAL OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
- E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE CO, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO B UT NOT INCLUDED IN THE WORK
- F. CONSTRUCTION MANAGER – ALL PROJECTS RELATED COMMUNICATION TO FOLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT.

SITE FAMILIARITY:

CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION.

POINT OF CONTACT:

COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT

ON-SITE SUPERVISION:

THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE:

THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.

- A. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. PROVIDE ALL MATERIALS AND LABOR AS REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONING SYSTEM. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
- B. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.

USE OF JOB SITE:

CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

UTILITY SERVICES:

WHERE NECESSARY TO CUT EXISTING PIPES, ELECTRICAL WIRES, CONDUITS, CABLES, ETC., OF UTILITY SERVICES, OR OF FIRE PROTECTION OR COMMUNICATIONS SYSTEMS, THEY SHALL BE CUT AND CAPPED AT SUITABLE PLACES OF WHERE SHOWN. ALL SUCH ACTIONS SHALL BE COORDINATED WITH THE UTILITY COMPANY INVOLVED:

PERMITS/FEES:

WHEN REQUIRED THAT A PERMIT OR CONNECTION FEE BE PAID TO A PUBLIC UTILITY PROVIDER FOR NEW SERVICE TO THE CONSTRUCTION PROJECT, PAYMENT OF SUCH FEE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR

CONTRACTOR:

CONTRACTOR SHALL TAKE ALL MEASURES AND PROVIDE ALL MATERIAL NECESSARY FOR PROTECTING EXISTING EQUIPMENT AND PROPERTY

USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

CONTRACTOR WILL UTILIZE ITS BEST EFFORTS TO WORK WITH SPRINT ELECTRONIC PM SYSTEMS. CONTRACTOR UNDERSTANDS THAT SUFFICIENT INTERNET ACCESS, EQUIVALENT TO "BROADBAND" OR BETTER, IS REQUIRED TO TIMELY AND EFFECTIVELY UTILIZE SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS AND AGREES TO MAINTAIN APPROPRIATE CONNECTIONS FOR CONTRACTORS STAFF AND OFFICE THAT ARE COMPATIBLE WITH SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS.

TEMPORARY UTILITIES AND FACILITIES:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMP UTILITIES AND FACILITIES NECESSARY EXCEPT OTHERWISE INDICATED IN CONSTRUCTION DOCUMENTS. TEMP UTILITIES AND FACILITIES INCLUDE POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSABLE FALSITIES, TELECOM SERVICES, PROVIDE TEMP UTILITIES AND FACILITIES ACCORDANCE WITH OSHA AND AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE CO. ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSOR'S OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN CONTRACT DOCUMENTS.

ACCESS TO WORK:

THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE A&E DURING ALL PHASED OF WORK.

DIMENSIONS:

VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

EXISTING CONDITIONS:

NOTIFY SPRINT CM OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

SECTION 01 200 – COMPANY FURNISHED MATERIAL AND EQUIPMENT:

FURNISHED MATERIALS:

COMPANY FURNISHED MATERIALS AND EQUIPMENT TO BE INSTALLED BY THE CONTRACTOR (OFIC) IS IDENTIFIED ON THE RFDS IN THE CONSTRUCTION DOCUMENTS.

RECEIPT OF MATERIAL AND EQUIPMENT:

- A. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON PRECEPT SHALL:
1. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT
 2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES
 3. TAKE RESPONSIBILITIES FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT
- B. RECORD ANY DEFECTS OR DAMAGES AND WITHIN 24 HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
- C. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
- D. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

DELIVERABLES:

- A. COMPLETE SHIPPING RECEIPT DOCUMENTATION IN ACCORDANCE W/COMPANY PRACTICE
- B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE W/COMPANY PRACTICE, AND AS DIRECTED BY COMPANY

SECTION 01 300-CELL SITE CONSTRUCTION

NOTICE TO PROCEED:

- A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S ISSUANCE OF THE WORK ORDER.
- B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.
- C. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITIONS
1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITIONS WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
 2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR EXPOSE TO INDIVIDUALS.
- D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS: SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION.

FUNCTIONAL REQUIREMENTS:

- A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. CONTRACTOR SHALL TAKE ALL ACTIONS AS NECESSARY TO COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.
- B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.
- C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES
- D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
 2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
 3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND BACKHAUL (FIBER, COPPER, OR MICROWAVE).
 4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
 5. INSTALL ABOVE GROUND GROUNDING SYSTEMS, CONDUIT AND BOXES.
 6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
 7. INSTALL H-FRAMES, CABINETS, PADS & PLATFORMS AS INDICATED.
 8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
 9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.

10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
11. PROVIDE SLABS AND EQUIPMENT PLATFORMS
12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS
13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER
14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS
16. INSTALLED FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS
17. INSTALL ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EX. TOWER AS REQUIRED
17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT
18. CONDUCT ALL REQUIRED TESTS AND INSPECTIONS
19. PERFORM, DOCUMENT, AND CLOSE OUT ALL JURISDICTIONAL PERMITTING REQUIREMENTS AND CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
20. PERFORM ALL ADDITIONAL WORK AS IDENTIFIED IN SCOPE OF SERVICES ATTACHED TO THE SUPPLIER AGREEMENT FOR THIS PROJECT. THIS WORK MAY INCLUDE COMMISSIONING, INTEGRATION, SPECIAL WAREHOUSING, REVERSE LOGISTICS ACTIVITIES, ETC. PERFORM COMMISSIONING AND INTEGRATION ACTIVATIONS PER APPLICABLE MOPS

DELIVERABLES:

- A. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED TEST REPORTS AND DOCUMENTATION INCLUDED BU NOT LIMITED TO THE FOLLOWING
1. PRODUCT SPECIFICATIONS FOR MATERIALS OR SPECIAL CONSTRUCTION REQUESTED BY SPRINT
 2. ACTUALIZE ALL CONSTRUCTION RELATED MILESTONES IN SITERRA AND COMPLETE ALL ON-LINES AND COMPLETE DOCUMENT UP-LOADS. UPLOAD ALL REQUIRED CLOSEOUT DOCUMENTS AND FINAL SITE PHOTOS.
 3. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT LEFT ON SITE INSIDE BASE OF MAIN RF CABINET IN A PROTECTIVE POUCH.
 4. ALL REQUIRED TEST REPORTS.
 5. REQUIRED CLOSEOUT DOCUMENTATION INCLUDING BUT NOT LIMITED TO:
 - a. ALL JURISDICTIONAL PERMITTING AND OCCUPANCY INFORMATION
 - b. PDF SCAN OF REDLINES PRODUCED IN THE FIELD
 - c. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS
 - d. LIEN WAIVERS
 - e. FINAL PAYMENT APPLICATION
 - f. REQUIRED FINAL CONSTRUCTION PHOTOS
 - g. CONSTRUCTION & COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
 - h. LISTS OF SUBCONTRACTORS
- B. PROVIDE ADDITIONAL DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT &/OR UPLOADED INTO SMS
1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
 2. PROJECT PROGRESS REPORTS.
 3. PRE-CONSTRUCTION MEETING NOTES.

SECTION -1 400-TESTS, INSPECTIONS, SUBMITTALS, AND PROJECT CLOSEOUT TESTS AND INSPECTIONS:

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. COAX SWEEPS AND FIBER TESTS PER TS-0200 (CURRENT VERSION) ANTENNA LINE ACCEPTANCE STANDARDS
 2. POST CONSTRUCTION HEIGHT VERIFICATION, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
 3. CONCRETE BREAK TESTS
 4. SITE RESISTANCE TO EARTH TEST
 5. STRUCTURAL BACKFILL COMPACTION TESTS
 6. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.
 7. ADDITIONAL TESTING AS REQUIRED ELSEWHERE IN THIS SPECIFICATION.

SUBMITTALS:

- A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
- B. UPLOAD FOLLOWING TO SITERRA AS APPLICABLE BUT NOT LIMITED TO THE FOLLOWING:
1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
 2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
 3. CHEMICAL GROUNDING SYSTEM
 4. REINFORCEMENT CERTIFICATIONS
 5. STRUCTURAL BACKFILL TEST RESULTS
 6. SWEEP AND FIBER TESTS
 7. ANTENNA AZIMUTH AND DOWN-TILT VERIFICATION
 8. POST CONSTRUCTION HEIGHT VERIFICATION
 9. ADDITIONAL SUBMITTALS MAY BE REQUIRED FOR SPECIAL CONSTRUCTION OR MINOR MATERIALS
- C. ALTERNATES: AT COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS FOR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

TESTING:

- A. EMPLOY AN AGENCY OF ENGINEERS AND SCIENTISTS WHO IS REGULARLY ENGAGED IN FIELD AND LABORATORY TESTING AND ANALYSIS. AGENCY SHALL HAVE BEEN IN BUSINESS A MINIMUM OF FIVE YEARS, AND BE LICENSED AS PROFESSIONAL ENGINEERS IN THE STATE WHERE THE PROJECT IS LOCATED. AGENCY IS SUBJECT TO APPROVAL BY COMPANY.
1. AGENCY MUST HAVE THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
 2. AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
 3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE AND ASPHALT TESTING USIING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
- B.REQUIRED THIRD PARTY TESTS
1. SITE RESISTANCE TO EARTH TEST PER NP-3 2-201
 2. CONCRETE CYLINDER BREAK TESTS FOR TOWER PIER AND ANCHORS PER NATIONALLY RECOGNIZED STANDARDS
 3. STRUCTURAL SOILS COMPACTION TESTS PER NATIONALLY RECOGNIZED STANDARDS
 4. REBAR PLACEMENT VERIFICATION WITH REPORT
 5. SITE RESISTANCE TO EARTH TEST
 6. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES &/OR AS A RESULT OF TESTING



201 STATE ROUTE 17 NORTH
RUTHERFORD, NY 07070
TEL: (201) 684-4000
FAX: (201) 684-4223



1280 ROUTE 46 WEST
PARSIPPANY, NJ 07054
TELEPHONE: 646-544-5324



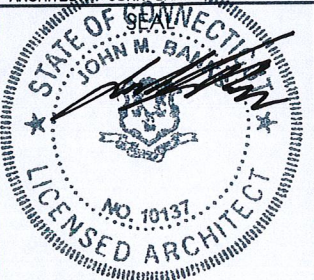
604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080
AE@westchesterservices.com

JOHN M. BANKS
ARCHITECT

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080

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0	07.10.18	FINAL CD
NO.	DATE	DESCRIPTION
DRAWN BY: JS		
CHECKED BY: JMB		
JOB NUMBER: CT52XC012-A		
ARCHITECT: JOHN M. BANKS		



DATE: 07.13.18
EXPIRATION: 07.31.18

SITE NAME
STAMFORD
SITE NUMBER
CT52XC012-A
SITE LOCATION
650 GLENBROOK ROAD STAMFORD, CT 06905 FAIRFIELD COUNTY
SHEET TITLE
SPRINT SPECIFICATIONS
SHEET NUMBER
SP-1

- C. REQUIRED BY CONTRACTOR
1. COAX SWEEP TESTS PER SPRINT STANDARD TS--0200
 2. FIBER TESTS PER SPRINT STANDARD EL--0568
 3. MICROWAVE LINK TESTS PER NP--760--500
 4. ANTENNA AZIMUTHS AND DOWN TILT USING ELECTRONIC ALIGNMENT TOOL PER ANTENNA INSTALLATION SPECIFICATION HEREIN
 5. POST CONSTRUCTION HEIGHT VERIFICATION AS REQUIRED HERewith IN IN THE TOWER INSTALLATION SPECIFICATIONS.
 6. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED HERewith IN THE ASPHALT PAVING SPECIFICATIONS.
 7. FIELD QUALITY CONTROL TESTING AS SPECIFIED HERewith IN THE CONCRETE PAVING SPECIFICATIONS.
 8. TESTING REQUIRED HERewith UNDER SPECIFICATIONS FOR AGGREGATE BASE FOR ROADWAYS.
 9. ALL OTHER TESTS REQUIRED BY LOCAL JURISDICTION.
- D. INSPECTIONS BY COMPANY: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN INSPECTION ACTIVITIES, FINAL ACCEPTANCE/PUNCH WALK REVIEW, AND/OR AS A RESULT OF TESTING.
- E. SPRINT RESERVES THE RIGHT TO INSPECT THE CONSTRUCTION SITE AT ANY TIME VIA SITE WALKS AND/OR PHOTO REVIEWS. CONTRACTOR SHALL GIVE SPRINT 24 HOURS NOTICE PRIOR TO COMMENCEMENT.
1. GROUNDING SYSTEM AND BURIED UTILITIES INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
 2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
 3. COMPACTION OF BACKFILL MATERIALS, AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS, ASPHALT PAVING, AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
 4. PRE AND POST CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES. PRIOR TO CONSTRUCTION ACTIVITIES AND AFTER CONSTRUCTION IS COMPLETE, PROVIDE PHOTOGRAPHIC DOCUMENTATION OF ROOF, FLASHINGS, AND PARAPETS, BOTH BEFORE AND AFTER CONSTRUCTION IS COMPLETE.
 5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
 6. TOWER TOP AND INACCESSIBLE EQUIPMENT (RRUS, ANTENNAS, AND CABLING): PROVIDE PHOTOS OF THE BACKS OF ALL ANTENNAS, RRUS, COMBINERS, FILTERS, FIBER AND DC CABLING, CABLE COLOR CODING, EQUIPMENT GROUNDING AND CONNECTOR WATER PROOFING INCLUDING NAME PLATE AND SERIAL NUMBER FOR ALL SERIALIZED EQUIPMENT.

PROJECT CLOSEOUT:

- A. FINAL ACCEPTANCE PUNCH WALK AND INSPECTION: AS IDENTIFIED IN THE SCOPE OF SERVICES, SPRINT WILL CONDUCT A FINAL PUNCH WALK OR FINAL DESK TOP PHOTO REVIEW (SITE MODIFICATIONS). PUNCH WALKS MUST BE SCHEDULED IN ADVANCE AS REQUIRED. AT THE PUNCH WALK / REVIEW, SPRINT MAY IDENTIFY CRITICAL DEFICIENCIES WHICH MUST BE CORRECTED PRIOR TO PUTTING SITE ON AIR. MINOR DEFICIENCIES MUST BE CORRECTED WITHIN 30 DAYS EXCEPT AS OTHERWISE REQUIRED. VERIFICATIONS OF CORRECTIONS MAY BE MADE BY COMPANY DURING A REPEAT SITE WALK OR DESK TOP PHOTO REVIEW AT COMPANY'S SOLE DISCRETION.
- B. CLOSEOUT DOCUMENTATION: ALL CLOSEOUT DOCUMENTATION AND PHOTOGRAPHS SHALL BE UPLOADED PRIOR TO FINAL ACCEPTANCE. SPRINT WILL REVIEW CLOSEOUT DOCUMENTATION FOR PRESENCE AND CONTENT. CLOSEOUT DOCUMENTATION SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING AS APPLICABLE:
1. COAX SWEEP TESTS:
 2. FIBER TESTS:
 3. JURISDICTION FINAL INSPECTION DOCUMENTATION
 4. REINFORCEMENT CERTIFICATION (MILL CERTIFICATION)
 5. CONCRETE MIX DESIGN AND PRODUCT DATA (TOWER FOUNDATION)
 6. LIEN WAIVERS AND RELEASES.
 7. POST --CONSTRUCTION HEIGHT VERIFICATION
 8. JURISDICTION CERTIFICATE OF OCCUPANCY
 9. ELECTRONIC ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
 10. STRUCTURAL BACKFILL TEST RESULTS (IF APPLICABLE)
 11. CELL SITE UTILITY SETUP
 12. AS--BUILT REDLINE CONSTRUCTION DRAWINGS (PDF SCAN OF FIELD MARKS)
 13. AS--BUILT CONSTRUCTION DRAWINGS IN DWG AND PDF FORMATS
 14. LIST OF SUB CONTRACTORS
 15. APPROVED PERMITTING DOCUMENTS
 16. FINAL SITE PHOTOS UP--LOADED TO SITERRA. INCLUDE THE FOLLOWING AS APPLICABLE:
 - a. TOWER, ANTENNAS, RRUS, AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX/CABLE LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING -- TOP AND BOTTOM; PHOTOS OF COAX GROUNDING--TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
 - b. ROOF TOPS: PRE--CONSTRUCTION AND POST--CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
 - c. SITE LAYOUT -- PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
 - d. FINISHED UTILITIES: CLOSE--UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE--UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE--UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.

PROJECT PHOTOGRAPHS

- A. PROVIDE PROJECT CLOSEOUT GENERAL ARRANGEMENT PHOTOS OF ALL NEW YORK. THE FOLLOWING LIST REPRESENTS MIN. REQUIREMENTS AND MIN QUANTITY. ADDITIONAL PHOTOS MAY BE REQUIRED TO ADEQUATELY DOCUMENT THE WORK
1. ASR AND RF MPE SIGNAGE (IF NOT IN PLACE, SUPPLIER NOTIFIES EMS FIELD REPRESENTATIVE)
 2. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR)
 3. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR) CLOSE UP SHOWING WEATHERPROOFING AND GROUNDING (AS REQUIRED). CLOSE--UP OF BACK SIDE OF EACH PERMANENT RRU SHOWING SERIAL NUMBER/BAR CODE.
 4. VIEW (1 EACH SECTOR) ALONG THE AZIMUTH AND TILT OF THE ANTENNAS
 5. TOP OF TOWER FROM GROUND, 1 EACH SECTOR
 6. MAINLINE HYBRID CABLE ROUTE DOWN TOWER SHOWING FASTENERS AND SUPPORT
 7. MAINLINE/HYBRID CABLE ROUTE ALONG ICE BRIDGE OR IN CABLE TRAY SHOWING FASTENERS AND SUPPORT
 8. GROUND MOUNTED RRU RACKS (FRONT AND BACK)
 9. FRONT, SIDE AND BACK ELEVATIONS OF ALL GROUND CABINETS
 10. VIEW OF COMPOUND FROM A DISTANCE
 11. VIEW OF EACH GROUND CABINET (POWER, RF, FIBER SPOOL, PPC POWER, PPC TELCO WITH DOOR OPEN)
 12. BACKHAUL FIBER MEET--ME--POINT AND CONDUIT ROUTE (MICROWAVE INSTALLATION IF NOT FIBER)
 13. AAV NETWORK INTERFACE DEVICE OR MICROWAVE RADIO INSTALLATION

DEFICIENCY CORRECTIONS:

CONTRACTOR IS RESPONSIBLE FOR ALL CORRECTIONS TO DEFICIENCIES IDENTIFIED THROUGH TESTING, REVIEW OF SUBMITTALS, INSPECTIONS AND CLOSEOUT REVIEWS.

SECTION 01 500--PROJECT REPORTING WEEKLY REPORTS:

- A. CONTRACTOR SHALL REPORT TO SPRINT AT MINIMUM ON A WEEKLY BASIS VIA SITERRA BY UPDATING ALL APPLICABLE POST END KEEPING MILESTONES WITH ACTUAL AND FORECASTED COMPLETION DATES.
- B. ADDITIONAL REQUIREMENTS FOR REPORTING MAY BE IDENTIFIED ELSEWHERE OR REQUIRED BY THE SCOPE OF SERVICES OR SPRINTS LOCAL MARKET CONSTRUCTION MANAGER. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

PROJECT CONFERENCE CALLS:

SPRINT MAY HOLD PERIODIC PROJECT CONFERENCE CALLS. CONTRACTOR WILL BHE REQUIRED TO COMMUNICATE SITE STATUS, MILESTONE COMPLETIONS AND UPCOMING MILESTONE PROJECTIONS, AND ANSWER ANY OTHER SITE STATUS QUESTIONS AS NECESSARY.

FINAL PROJECT ACCEPTANCE: PRIOR TO SPRINTS FINAL PROJECT ACCEPTANCE. ALL REQUIRED MILESTONE ACTUALS MUST BE UPDATED IN SITERRA AND ALL REQUIRED REPORTING TASKS MUST BE COMPLETE.

SECTION II 700--ANTENNA ASSEMBLY, REMOTE RADIO UNITS AND CABLE INSTALLATION SUMMARY:

THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRUS, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

ANTENNAS AND RRUS:

THE NUMBER AND TYPE OF ANTENNAS AND RRUS TO BE INSTALLED IS DETAILED ON THE CONSTRUCTION DRAWINGS.

HYBRID CABLE:

HYBRID CABLE WILL DC/FIBER AND FURNISHED FOR INSTALLATION AT EACH SITE. CABLE SHALL BE INSTALLED PER CONSTRUCTION DRAWINGS AND APPLICABLE MANUFACTURER'S REQUIREMENT.

JUMPERS AND CONNECTORS:

FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRUS AND ANTENNAS. JUMPERS SHALL BE LDF 4, FLC 12--50, CR 540, OR FXL 540. SUPER--FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRUS AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL, MIN. LENGTH FOR JUMPER SHALL BE 10'-0"

REMOTE ELECTRICAL TILT (RET) CABLES:

MISCELLANEOUS:

INSTALL SPLITTERS, COMBINERS, FILTERS PER RF DATA SHOW, FURNISHED BY SPRINT.

ANTENNA INSTALLATION:

THE CONTRACTOR SHALL ASSEMBLE ALL ANTENNAS ONSITE IN ACCORDANCE WITH THE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER. ANTENNA HEIGHT, AZIMUTH, AND FEED ORIENTATION INFORMATION SHALL BE A DESIGNATED ON THE CONSTRUCTION DRAWINGS.

A. THE CONTRACTOR SHALL POSITION THE ANTENNA ON TOWER PIPE MOUNTS SO THAT THE BOTTOM STRUT IS LEVEL. THE PIPE MOUNTS SHALL BE PLUMB TO WITHIN 1 DEGREE

B. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS

HYBRID CABLE INSTALLATION:

- A. THE CONTRACTOR SHALL ROUTE, TEST, AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS
- B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAN THE MANUFACTURER'S SPECS FOR BENDING RADIi
- C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.
1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER
 2. FASTENING INDIVIDUAL FIBER & DC CABLES ABOVE BREAKOUT ENCLOSURE, WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES

1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER
2. FASTENING INDIVIDUAL FIBER & DC CABLES ABOVE BREAKOUT ENCLOSURE, WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES
 - a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
 - b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LIENS WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS.
 - c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM BEND RADIUS
3. FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
4. CABLE INSTALLATION:
 - a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
 - b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS
 - c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM BEND RADIUS.
5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED IN TS 0200 (CURRENT VERSION)
7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA--NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE--EN2012--001, REV 1

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

- A. ALL FIBER & COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.
- B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.
1. COLD SHRINK: ENCOMPASS CONNECTOR IN COLD SHRINK TUBING AND PROVIDE A DOUBLE WRAP OR 2" ELEC TAPE EXTENDING 2" BEYOND TUBING. PROVIDE 3M COLD SHRINK CXS SERIES OR EQUAL.
 2. SELF AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF--AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELEC TAPE EXTENDING 2" BEYOND SELF--AMALGAMATING TAPE.
 3. 3M SLIM LOCK CLOSURE 7 16: SUBSTITUTIONS WILL NOT BE ALLOWED.
 4. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

SECTION 11 800--INSTALLATION OF MULTIMODAL BASE STATIONS AND RELATED EQUIPMENT:

SUMMARY:

- A. THIS SECTION SPECIFIES MMBS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BUT NOT LIMITED TO RECTIFIERS, POWER DIST UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI)
- B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISC MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND REQUIRED BY THE APPLICABLE INSTALLATION MOPS.
- C. COMPLY WITH MANUFACTURER'S INSTALLATION AND START--UP REQUIREMENTS.

DC CIRCUIT BREAKER LABELING:

A. NEW DC CIRCUIT IS REQUIRED IN MMBS CABINET SHALL BE CLEARLY IDENTIFIED AS TO RRU BEING SERVICED.

SECTION 26--100--BASIC ELECTRICAL REQUIREMENTS

SUMMARY:

THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS QUALITY ASSURANCE:

A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTINGS ARE AVAILABLE IN THE INDUSTRY

B. MANUFACTURERS OR EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE PROPOSED USE FOR THIS PROJECT.

C.MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN AND FREE FROM DEFECTS.

SUPPORTING DEVICES:

- A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS PROVIDE PRODUCTS BY THE FOLLOWING
1. ALLIED TUBE AND CONDUIT
 2. B--LINE SYSTEM
 3. UNISTRUT DIVERSIFIED PRODUCTS.
 4. THOMAS & BETTS
- B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
 2. POWER--DRIVEN THREADED STUDS: HEAT--TREATED STEEL DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE
 3. FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
 4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
 5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE SOLID MASONRY.
 6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRINT--TENSION CLAMPS ON STEEL.
 7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
 8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES
 9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

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CT52XC012-A		
SITE LOCATION		
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SHEET TITLE		
SPRINT SPECIFICATIONS		
SHEET NUMBER		
SP-2		

SUPPORTING DEVICES:

- A. INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC.
- B. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER TRADES
- C. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:
1. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.
 2. USE VIBRATION AND SHOCK-RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

ELECTRICAL IDENTIFICATION:

- A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.
- B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AT THE BRANCH CIRCUIT PANELBOARD.

SECTION 26 200-ELECTRICAL MATERIALS AND EQUIPMENT

- A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOATIONS AND FOR UNDERGROUND RUNS. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW-C-581 AND SHALL BE LISTED WITH THE UNDERWRITER'S LABORATORIES. FITTINGS SHALL BE THREADED - SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.
- B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.
- C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.
- D. EMT OR RIGID GALVANIZED STEEL MAYBE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO-GALVANIZED OR HOT DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATION C80.3, FEDERAL SPECIFICATION WW-C-563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC, OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.
- E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF THE CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6 FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRED BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.
- F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21 MM)

HUBS AND BOXES:

- A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.
- B. CABLE TERMINATION FITTINGS FOR CONDUIT
1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL BY ROXTEC.
 2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO - CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.
- C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOFED, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE-HINDS FORM 8 OR EQUAL
- D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKET COVERS, OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION. PROVIDE CROUSE-HINDS FORM 8 OR EQUAL.
- E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE"D", CROUSE-HINDS, COOPER, ADALET, APPLETON, O-Z GEDNEY, OR APPROVED EQUAL.

SUPPLEMENTAL GROUNDING SYSTEM:

- A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM TO THE EXTENT INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE.
- B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO HOLE SPADES WITH NO-OX
- C. STOLEN GROUND BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CM FOR REPLACEMENT INSTRUCTION USING THREADED RODS.

EXISTING STRUCTURE:

- A. EXISTING EXPOSED WIRING AND ALL EXPOSED OUTLETS, RECEPTACLES, SWITCHES, DEVICES, BOXES AND OTHER EQUIPMENT THAT ARE NOT TO BE UTILIZED IN THE COMPLETED PROJECT SHALL BE REMOVED OR DE-ENERGIZED AND CAPPED IN THE WALL, CEILING, OR FLOOR SO THAT THEY ARE CONCEALED AND SAFE. WALL, CEILING, OR FLOOR SHALL BE PATCHED TO MATCH THE ADJACENT CONSTRUCTION.

CONDUIT AND CONDUCTOR INSTALLATION:

- A. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL, AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIE.
- B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.

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201 STATE ROUTE 17 NORTH
RUTHERFORD, NY 07070
TEL: (201) 684-4000
FAX: (201) 684-4223

Cherundolo

Consulting

1280 ROUTE 46 WEST
PARSIPPANY, NJ 07054
TELEPHONE: 646-544-5324

WESTCHESTER

SERVICES LLC

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080
AE@westchesterservices.com

JOHN M. BANKS

ARCHITECT

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
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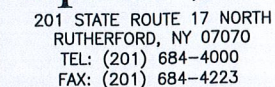
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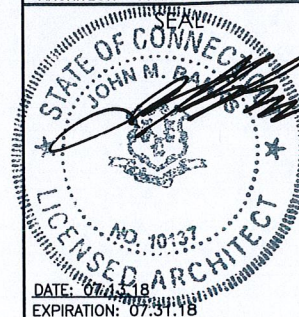
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BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080
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JOHN M. BANKS
ARCHITECT

604 FOX GLEN
BARRINGTON, IL 60010
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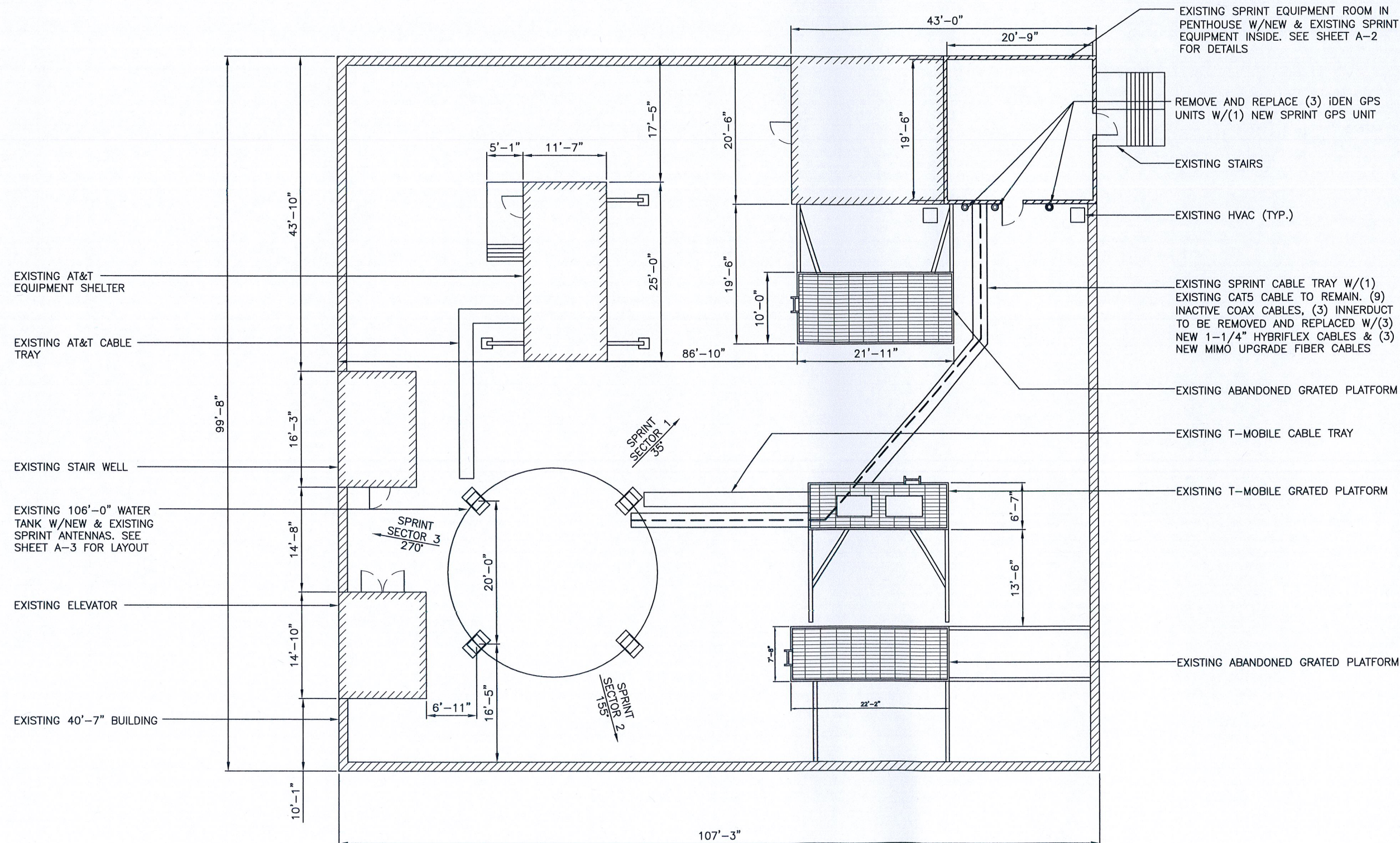
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A-1



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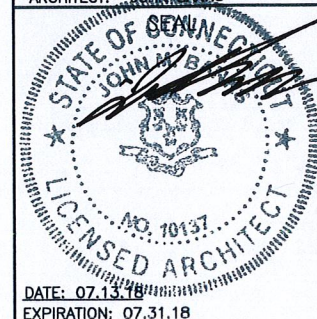
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604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080
AE@westchesterservices.com

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604 FOX GLEN
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TELEPHONE: 847-277-0070
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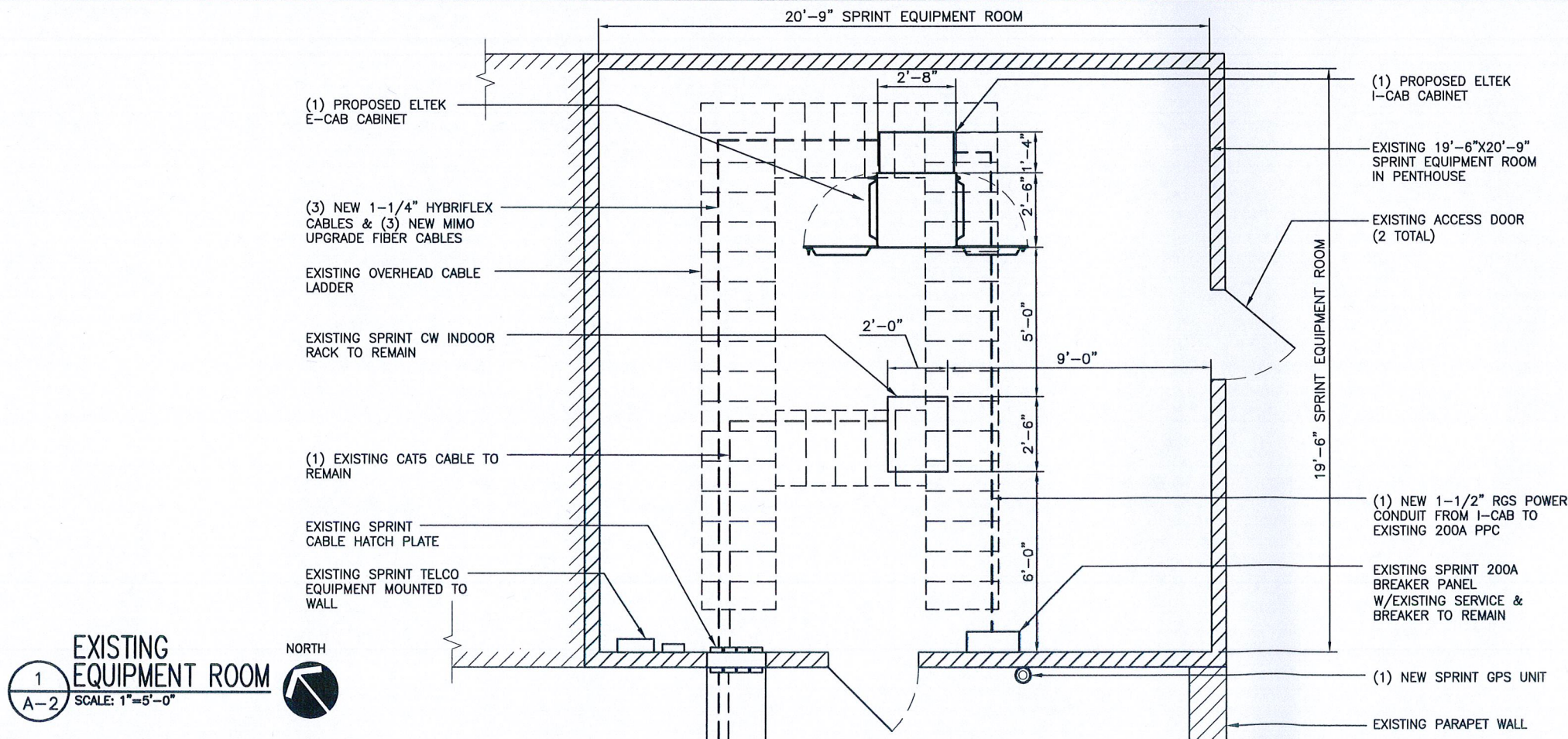
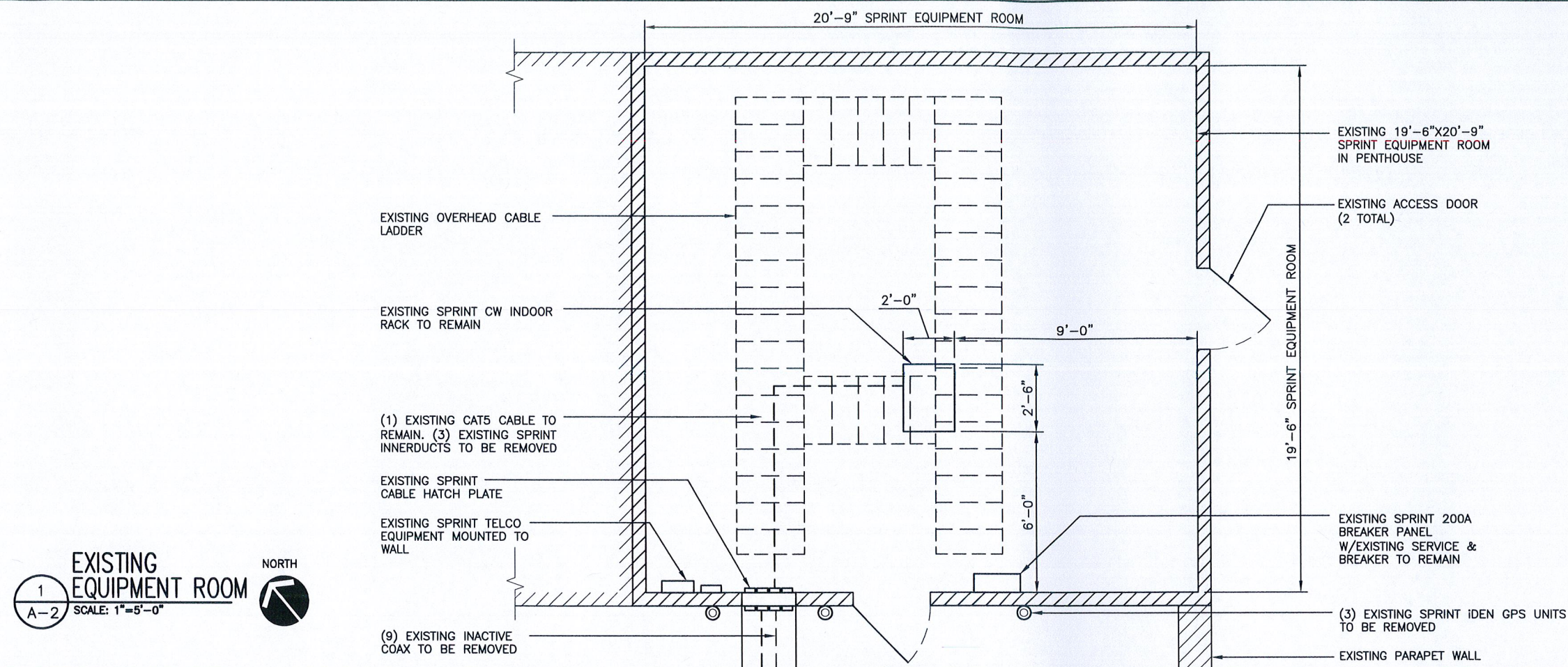
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EQUIPMENT
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TEL: (201) 684-4000
FAX: (201) 684-4223

Cherundolo Consulting

1280 ROUTE 46 WEST
PARSIPPANY, NJ 07054
TELEPHONE: 646-544-5324

WESTCHESTER SERVICES LLC

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX : 847-277-0080
AE@westchesterservices.com

JOHN M. BANKS ARCHITECT

604 FOX GLEN
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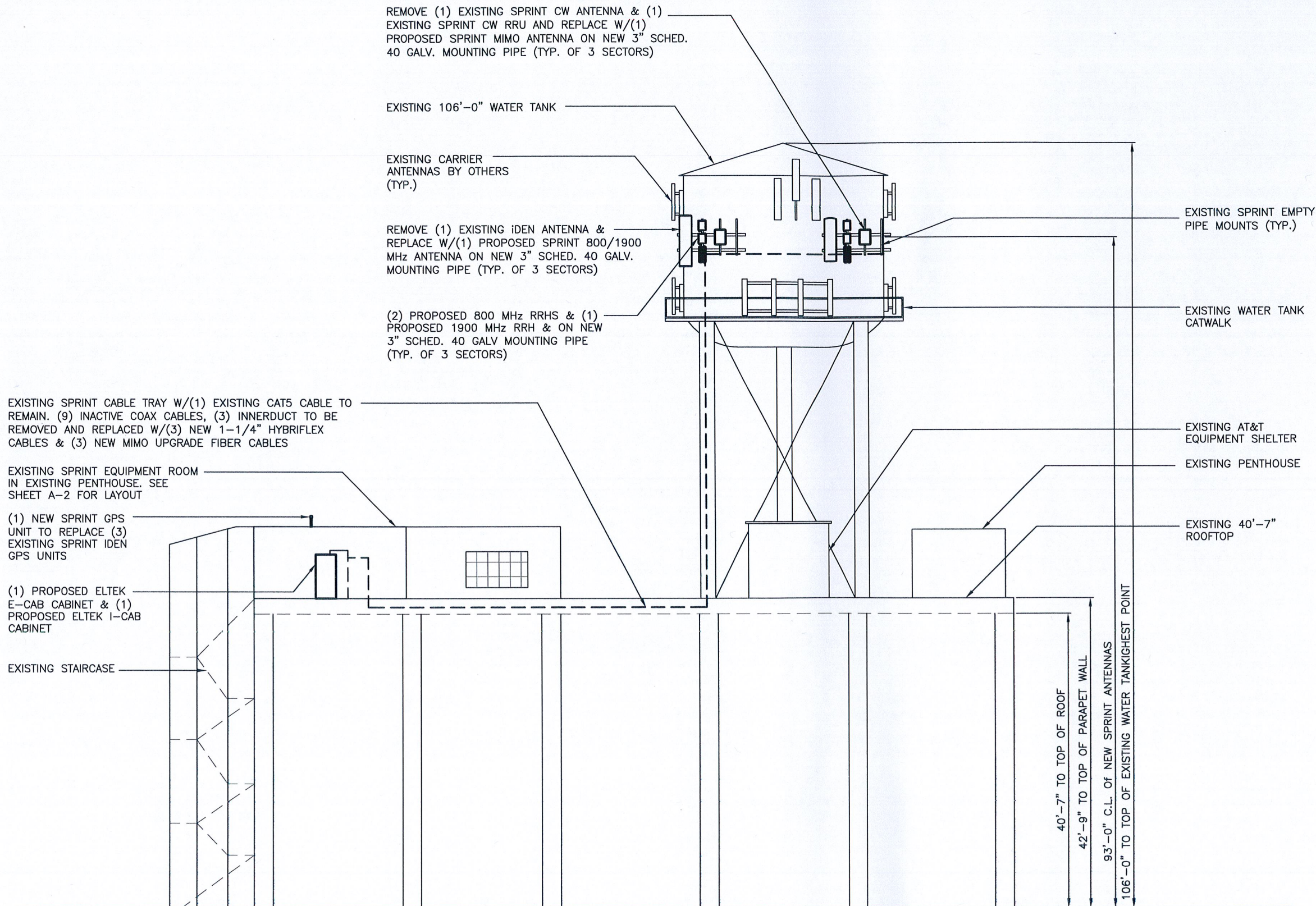
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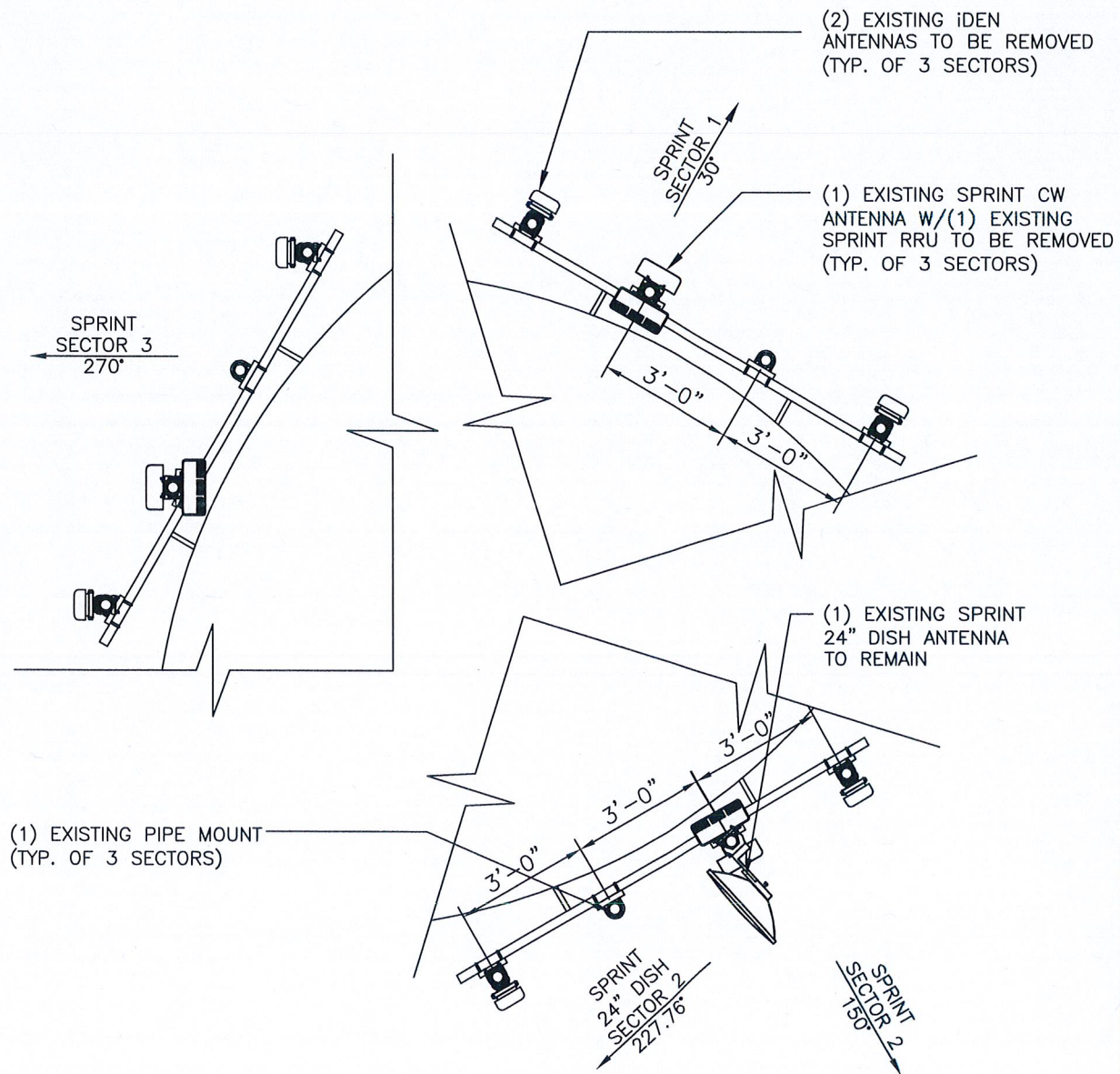
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BUIDLING ELEVATION

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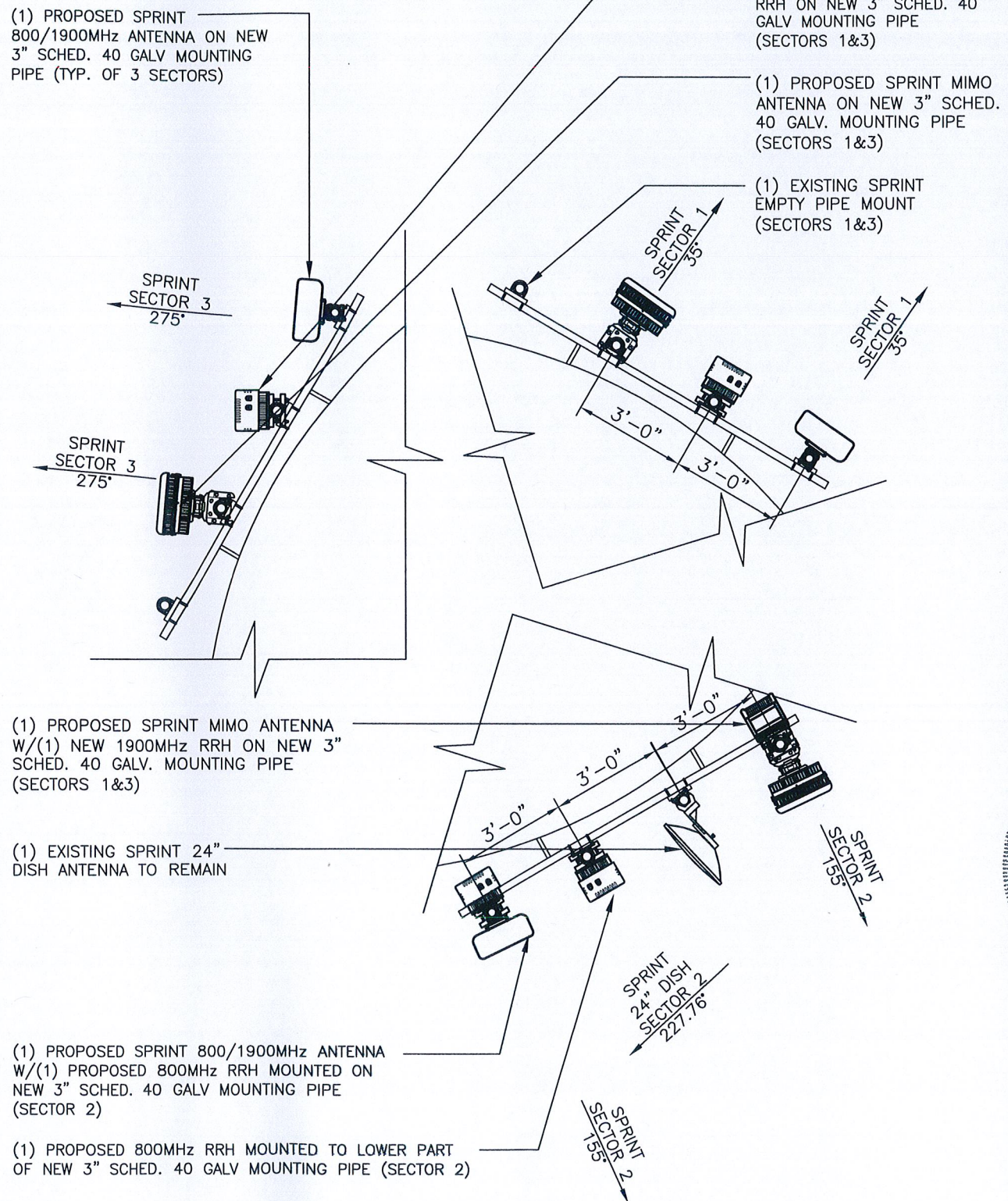
A-3



1 WATER TANK & BUILDING ELEVATION
A-3 SCALE: 1"=15'-0"



1
A-4
EXISTING ANTENNA PLAN
SCALE: 1/4"=1'-0"



2
A-4
PROPOSED ANTENNA PLAN
SCALE: 1/4"=1'-0"



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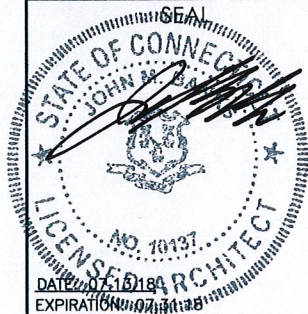
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BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX: 847-277-0080
AE@westchesterservices.com

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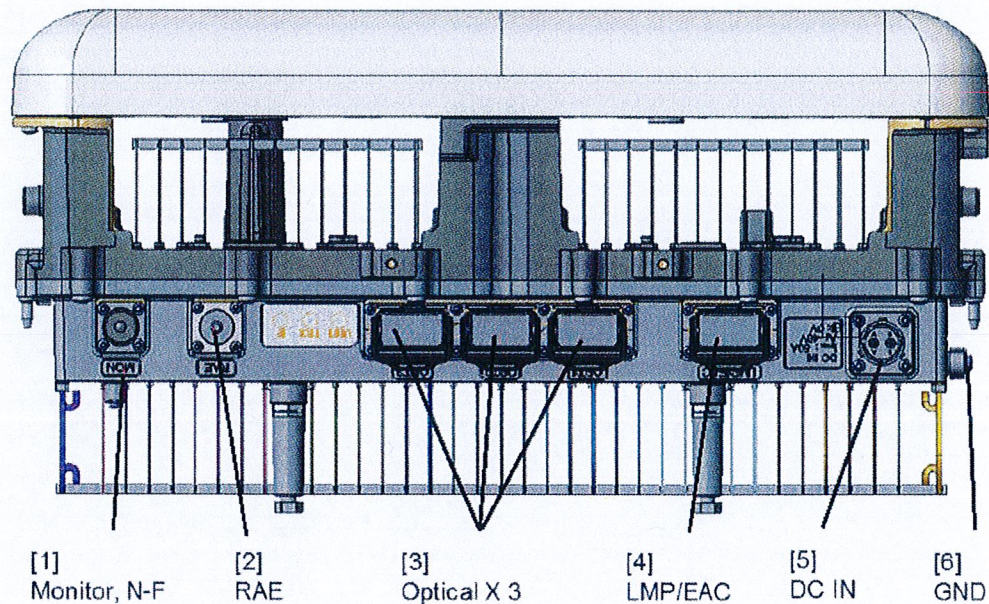
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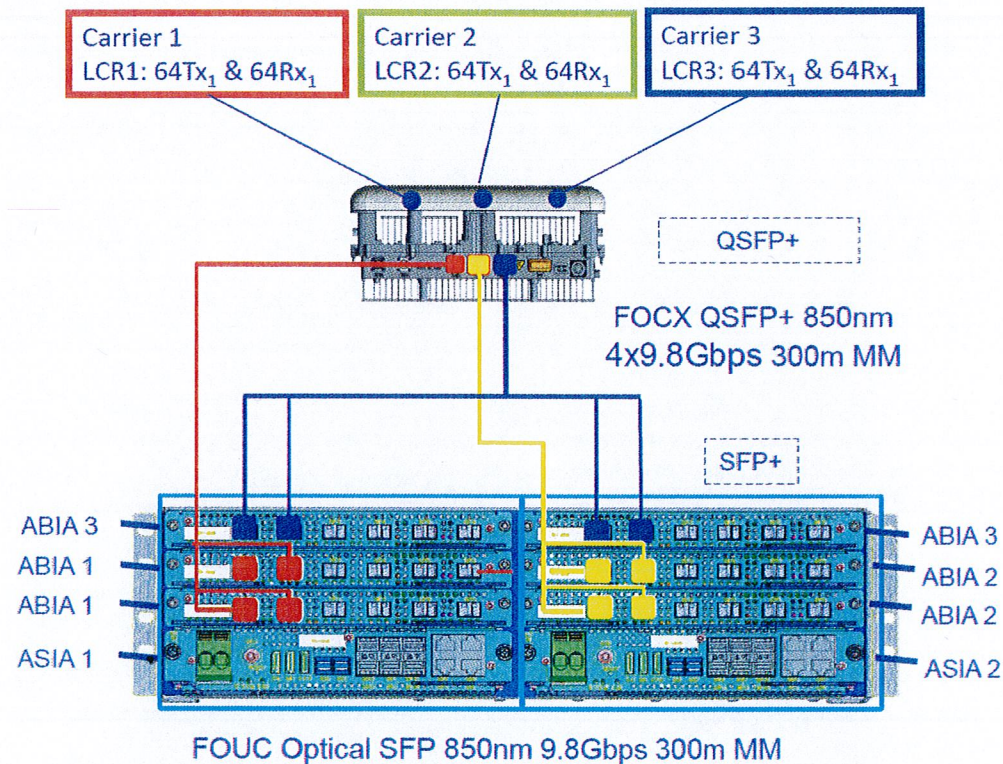
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SHEET TITLE
ANTENNA LAYOUT

SHEET NUMBER
A-4

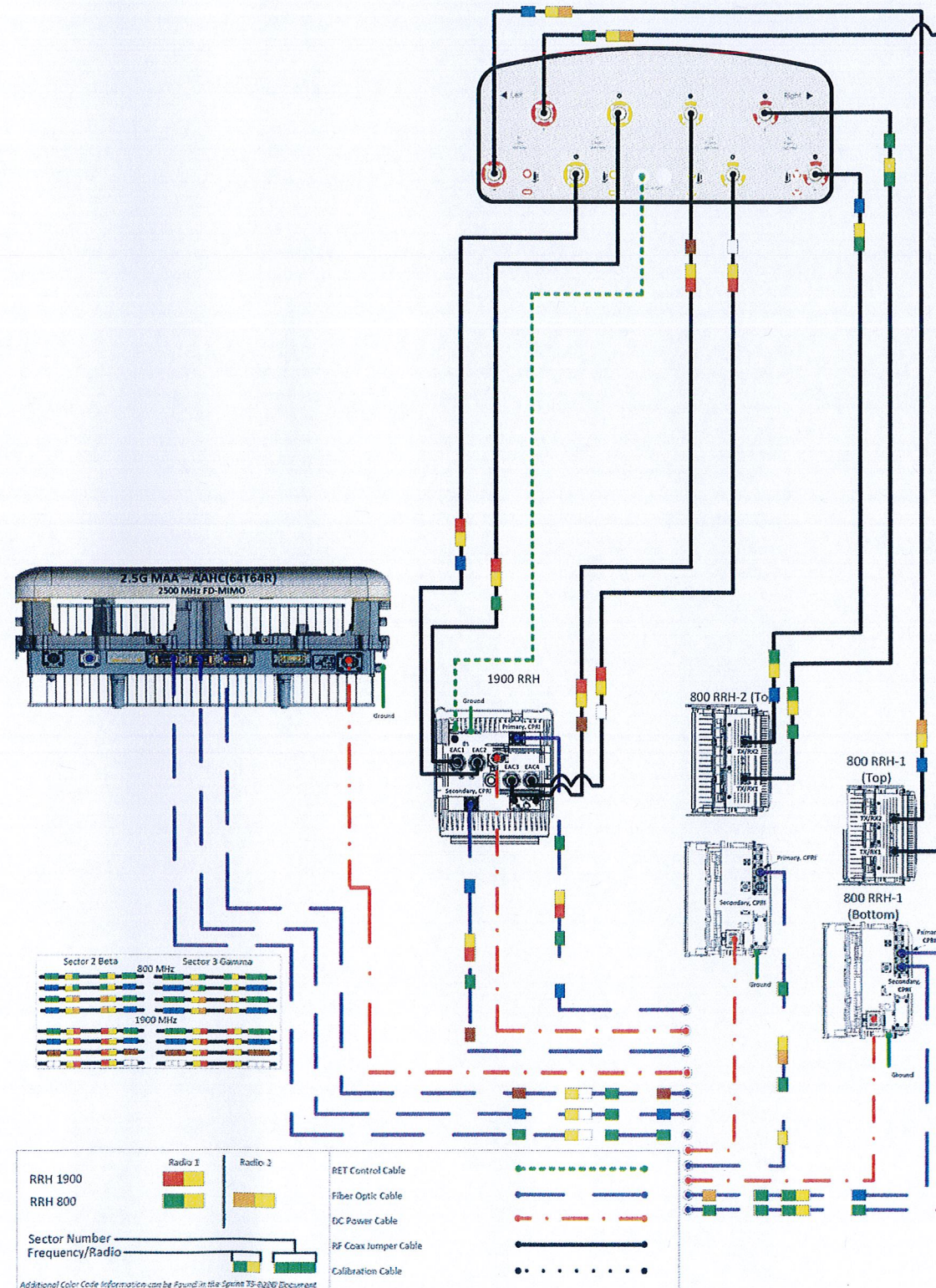


1 MIMO CONNECTORS DETAIL
A-5 SCALE: N.T.S.



2 64T64R DIAGRAM
A-5 SCALE: N.T.S.

MIMO + NNVV-65B-R4 w/o FILTERS



3 MIMO + 800/1900 MHz PLUMBING DIAGRAM
A-5 SCALE: N.T.S.

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TEL: (201) 684-4000
FAX: (201) 684-4223

Cherundolo Consulting

1280 ROUTE 46 WEST
PARSIPPANY, NJ 07054
TELEPHONE: 646-544-5324

WESTCHESTER SERVICES LLC

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX: 847-277-0080
AE@westchesterservices.com

JOHN M. BANKS ARCHITECT

604 FOX GLEN
BARRINGTON, IL 60010
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EXPIRATION: 07.31.18

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FAIRFIELD COUNTY

SHEET TITLE

MIMO PLUMBING
DIAGRAM

SHEET NUMBER

A-5

Nokia-A
New Build Hybrid Selection Table

Nokia-A Scenarios	Cable Description	Cable Length (ft)	Diameter (in)	Weight (lbs/ft)
1 Cable per Sector (1)1900 (2)800 (1)mMIMO or 8T8R	4 pairs of 6AWG DC Conductors with 24 Multi-Mode Fiber Pairs	0-120	1.376	1.354
1 Cable per Sector (1)1900 (2)800 (1)mMIMO or 8T8R	4 pairs of 4AWG DC Conductors with 24 Multi-Mode Fiber Pairs	121-200	1.545	1.875
1 Cable per Sector (1)1900 (2)800 (1)mMIMO(WITH BI-WIRE) or 8T8R	5 pairs of 4AWG DC Conductors with 24 Multi-Mode Fiber Pairs	201-375	1.619	2.161

* All Fiber Pairs Terminate in SENKO IP-LC at Tower Top

mMIMO Addition Non-Standard Structure Hybrid Selection Table

Nokia-A Scenarios	Cable Description	Cable Length (ft)	Diameter (in)	Weight (lbs/ft)
1 Cable per mMIMO Radio WITH SPARES	6 pairs of 4AWG DC Conductors with 48 Multi-Mode Fiber Pairs (12' in cabinet)	30	1.689	2.307

* All Fiber Pairs Terminate in SENKO IP-LC at Tower Top.

mMIMO Addition Non-Standard Structure Trunk Selection Table

Nokia-A Scenarios	Cable Description	Cable Length (ft)	Diameter (in)	Weight (lbs/ft)
1 Cable per mMIMO Radio WITH SPARES	16 Multi-Mode Fiber Pairs	0-375	0.41	0.091

* All Fiber Pairs Terminate in SENKO IP-LC at Tower Top

MIMO CABLE LENGTHS				
SECTOR	DESCRIPTION	QTY	DIMENSIONS	PART/MODEL#
SECTOR 1	MIMO 16 MULTI-MODE FIBER PAIRS	1	210'-0"	MIMO UPGRADE FIBER 0.41"φ
SECTOR 2	MIMO 16 MULTI-MODE FIBER PAIRS	1	195'-0"	MIMO UPGRADE FIBER 0.41"φ
SECTOR 3	MIMO 16 MULTI-MODE FIBER PAIRS	1	230'-0"	MIMO UPGRADE FIBER 0.41"φ

1 MIMO CABLE LENGTHS & DETAIL
A-6 SCALE: N.T.S.

Structure			
Outer Conductor Armor:	Corrugated Aluminum	(mm (in))	36.0 (1.42)
Jacket:	Polyethylene, PE	(mm (in))	39.6 (1.54)
UV-Protection:	Individual and External Jacket		Yes

Mechanical Properties			
Weight, Approximate	(kg/m (lbs/ft))		1.78 (1.20)
Minimum Bending Radius, Single Bending	(mm (in))		200 (8)
Minimum Bending Radius, Repeated Bending	(mm (in))		500 (20)
Recommended Maximum Clamp Spacing	(m (ft))		1.0 / 1.2 (3.25 / 4.0)

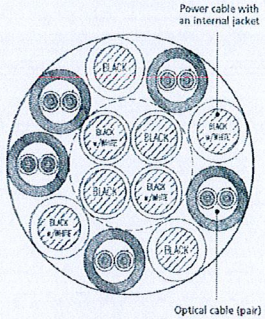
Electrical Properties			
DC-Resistance Outer Conductor Armor	(Ω/km (Ω/1000ft))		0.9 (0.27)
DC-Resistance Power Cable, 8.4mm ² (8AWG)	(Ω/km (Ω/1000ft))		2.1 (0.64)

Fiber Optic Properties			
Version			Multi-mode
Quantity, Fiber Count			5 pairs
Core/Clad	(μm)		50/125
Primary Coating (Acrylate)	(μm)		245
Buffer Diameter, Nominal	(μm)		500
Secondary Protection, Jacket, Nominal	(mm (in))		2.0 (0.08)
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant

DC Power Cable Properties			
Size	(mm ² (AWG))		8.4 (8)
Quantity, Wire Count			4 (2 pairs)
Size	(mm ² (AWG))		13.3 (6)
Quantity, Wire Count			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal	(mm (in))		6.1 (0.24)
Standards (Meets or exceeds)			ICEA S-95-658, E-29-520 UL Type XHHW-2, VHW-1 IEEE-383 (1974) RoHS Compliant

Environment			
Installation Temperature	(°C (°F))		-40 to +65 (-40 to 149)
Operation Temperature	(°C (°F))		-40 to +65 (-40 to 149)

- DC conductor and fiber needs one full sector (includes CPRI's for CDMA):
 - Massive MIMO: 12 fiber pairs and 1 pair DC conductor (Nokia/ALU)
 - 1500 RRH: 2 fiber pairs and 1 pair DC conductor
 - 800 RRH no.1: 2 fiber pairs and 1 pair DC conductor
 - 800 RRH no.2: 1 fiber pair and 1 pair DC conductor
- Total need is 17 Pairs of Multimode fiber and 4 pair DC conductors plus spares.



Construction Detail

HB114-1-0813U4-M5J

MIMO CABLE LENGTHS				
SECTOR	DESCRIPTION	QTY	DIMENSIONS	PART/MODEL#
SECTOR 1	1-1/4" HYBRIFLEX CABLE	1	210'-0"	HB114-1-0813U4-M5J
SECTOR 2	1-1/4" HYBRIFLEX CABLE	1	195'-0"	HB114-1-0813U4-M5J
SECTOR 3	1-1/4" HYBRIFLEX CABLE	1	230'-0"	HB114-1-0813U4-M5J

2 800/1900 CABLE LENGTHS & DETAIL
A-6 SCALE: N.T.S.

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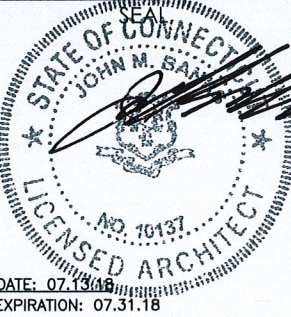
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FAX : 847-277-0080
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CABLE DETAILS

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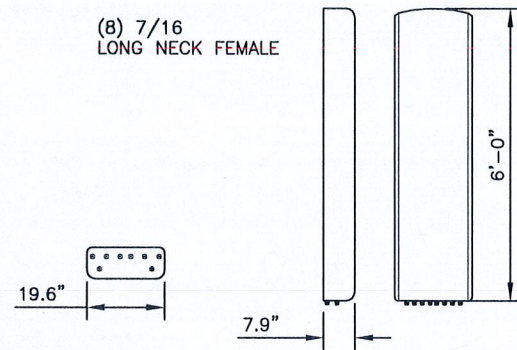
A-6

COMMSCOPE ANTENNA NNVV-65B-R4

DIMENSIONS, HxWxD: (72"x19.6"x7.8")

WEIGHT, WITH OUT PRE-MOUNTED BRACKETS: 77.4 lbs

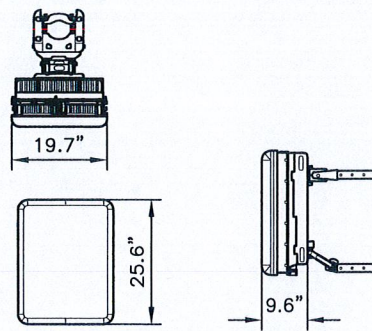
CONNECTOR: (8) 7/16 LONG NECK FEMALE



1 800/1900 MHz ANTENNA SPECIFICATIONS
SCALE: 1/4"=1'-0"

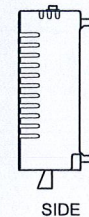
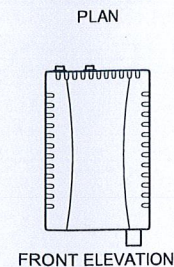
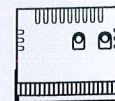
NOKIA MIMO AAHC ANTENNA

DIMENSIONS, HxWxD: 25.6"x19.7"x9.64"
WEIGHT: 103.7 lbs

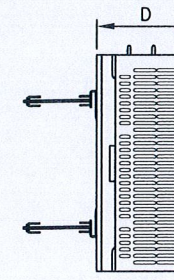
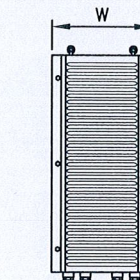
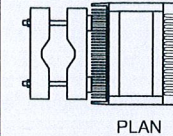


2 MIMO ANTENNA SPECIFICATIONS
SCALE:

TYPE: 800 MHz 2x50W
MODEL: RRH-2x50-800
HEIGHT: 16.0"
WIDTH: 12.9"
DEPTH: 10.7"
WEIGHT: ±60 LBS



3 800 MHz RRH DETAIL
SCALE:



4 1900 MHz RRH DETAIL
SCALE:

TYPE: 1900 MHz 4x45W
MODEL #: RRH 1900 4X45 65MHz
HEIGHT: 25.0"
WIDTH: 10.7"
DEPTH: 11.1"
WEIGHT: ±68 LBS.

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TELEPHONE: 646-544-5324

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TELEPHONE: 847-277-0070
FAX: 847-277-0080
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EXPIRATION: 07.31.18

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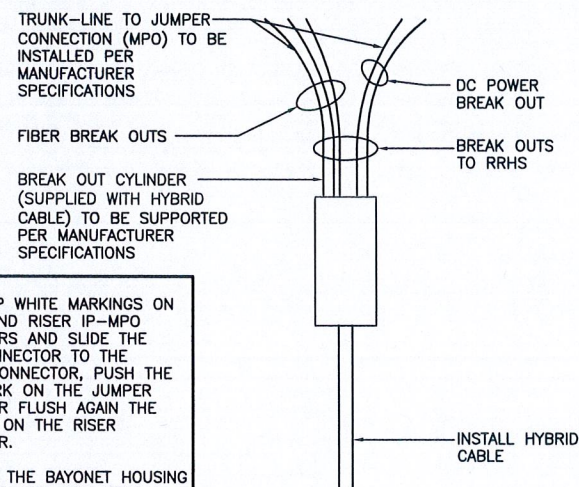
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SHEET TITLE

EQUIPMENT DETAILS

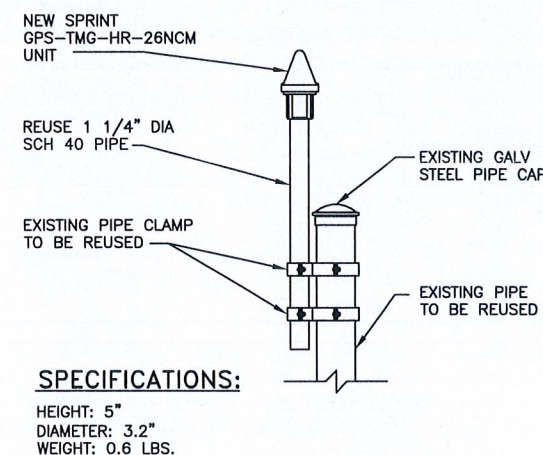
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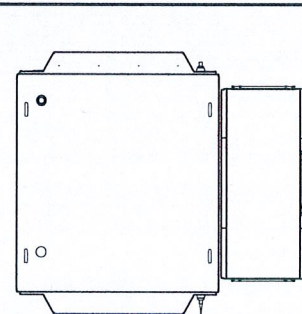
NOTE:
1. LINE UP WHITE MARKINGS ON JUMPER AND RISER IP-MPO CONNECTORS AND SLIDE THE RISER CONNECTOR TO THE JUMPER CONNECTOR, PUSH THE WHITE MARK ON THE JUMPER CONNECTOR FLUSH AGAIN THE RED SEAL ON THE RISER CONNECTOR.
2. ROTATE THE BAYONET HOUSING CLOCKWISE UNTIL YOU HEAR A CLICK SOUND

5 HYBRID BREAKOUT
SCALE: N.T.S.



SPECIFICATIONS:
HEIGHT: 5"
DIAMETER: 3.2"
WEIGHT: 0.6 LBS.

6 GPS UNIT DETAIL
SCALE: N.T.S.



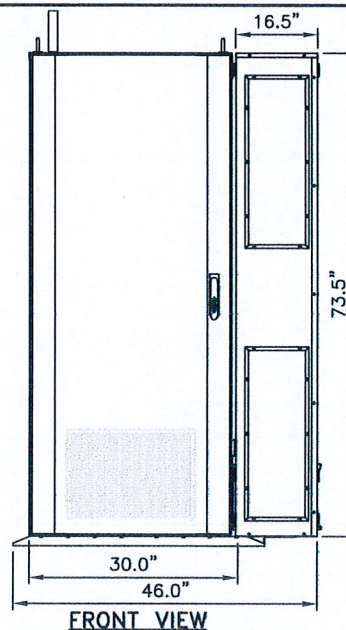
TOP VIEW

E-CAB & I-CAB

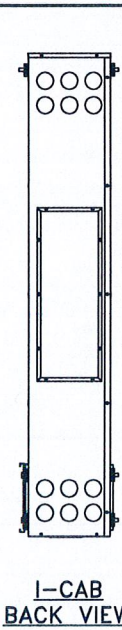
DIMENSIONS HxWxD: 73.5"x30.0"x38.0"

EMPTY WEIGHT: 505lbs

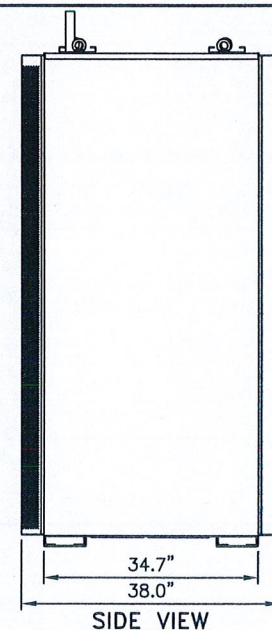
FULLY LOADED WEIGHT: 1,381lbs



FRONT VIEW

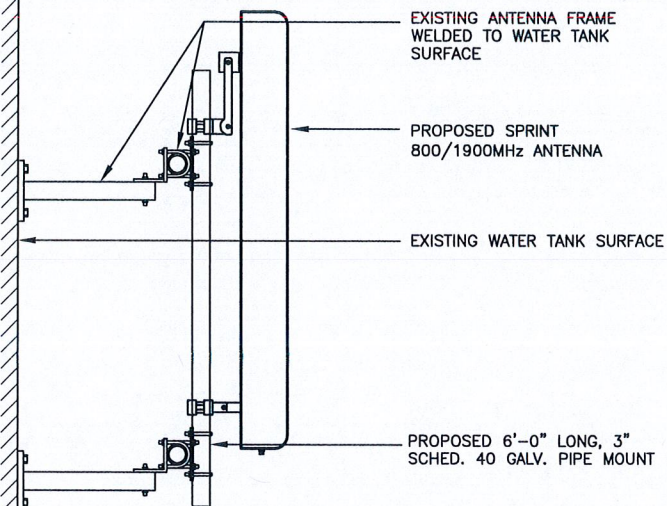


I-CAB
BACK VIEW

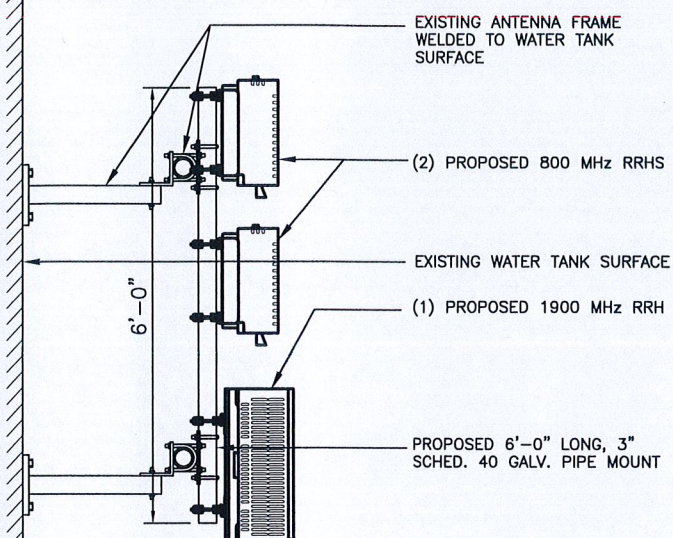


SIDE VIEW

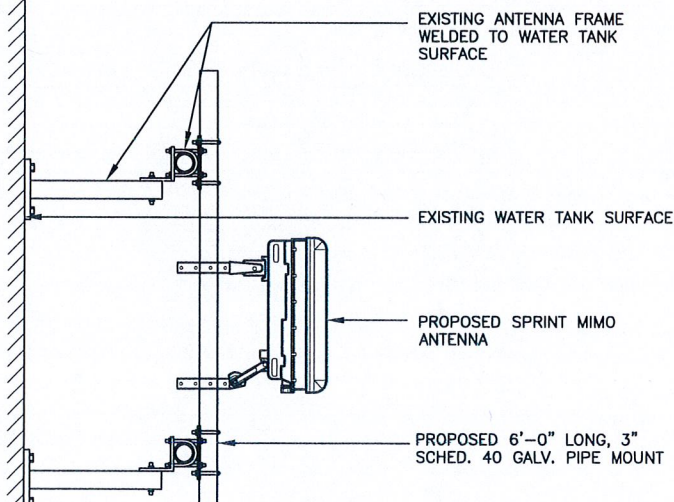
7 ELTEK E-CAB & I-CAB DETAIL
SCALE: N.T.S.



(SECTORS 1&3)
 1 800/1900 MHz ANTENNA MOUNTING DETAIL
 A-8 SCALE: N.T.S.



(SECTORS 1&3)
 2 RRH MOUNTING DETAIL
 A-8 SCALE: N.T.S.



(SECTORS 1&3)
 3 MIMO ANTENNA MOUNTING DETAIL
 A-8 SCALE: N.T.S.

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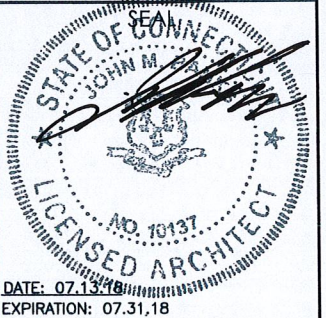
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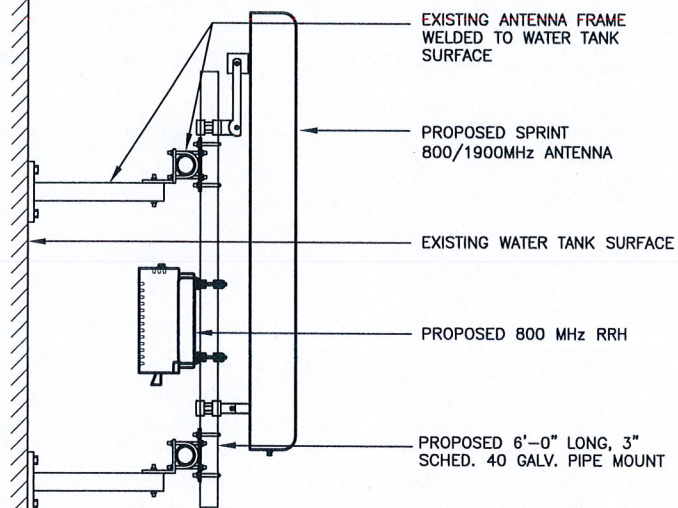
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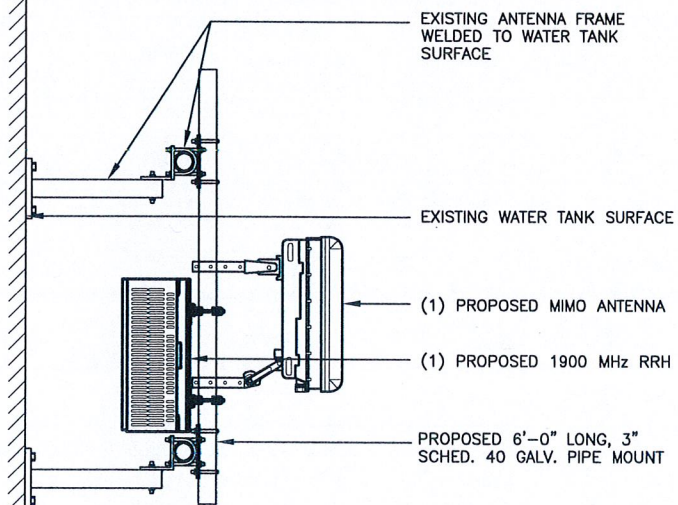
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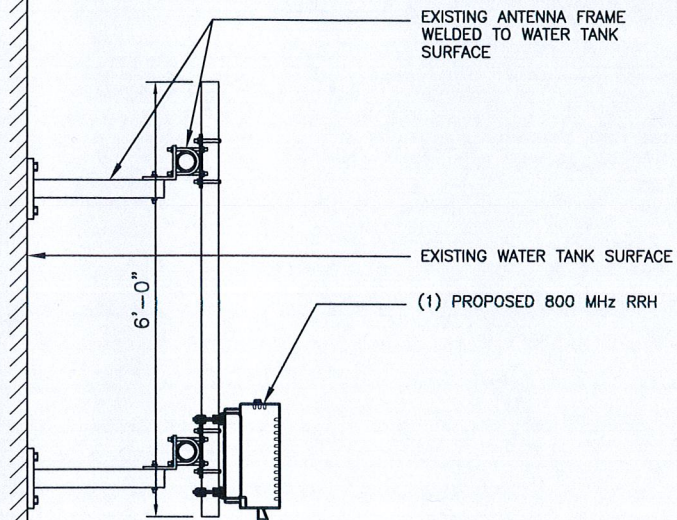
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SHEET TITLE
ANTENNA MOUNT DETAILS
SHEET NUMBER
A-8



(SECTOR 2)
1 800/1900 MHz ANTENNA/RRH MOUNTING DETAIL
A-9 SCALE: N.T.S.



(SECTOR 2)
3 MIMO ANTENNA MOUNTING DETAIL
A-9 SCALE: N.T.S.



(SECTOR 2)
2 RRH MOUNTING DETAIL
A-9 SCALE: N.T.S.

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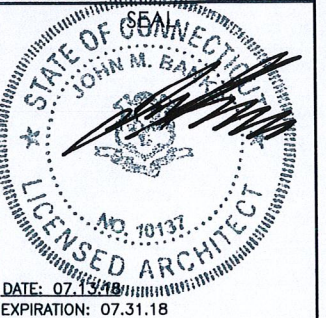
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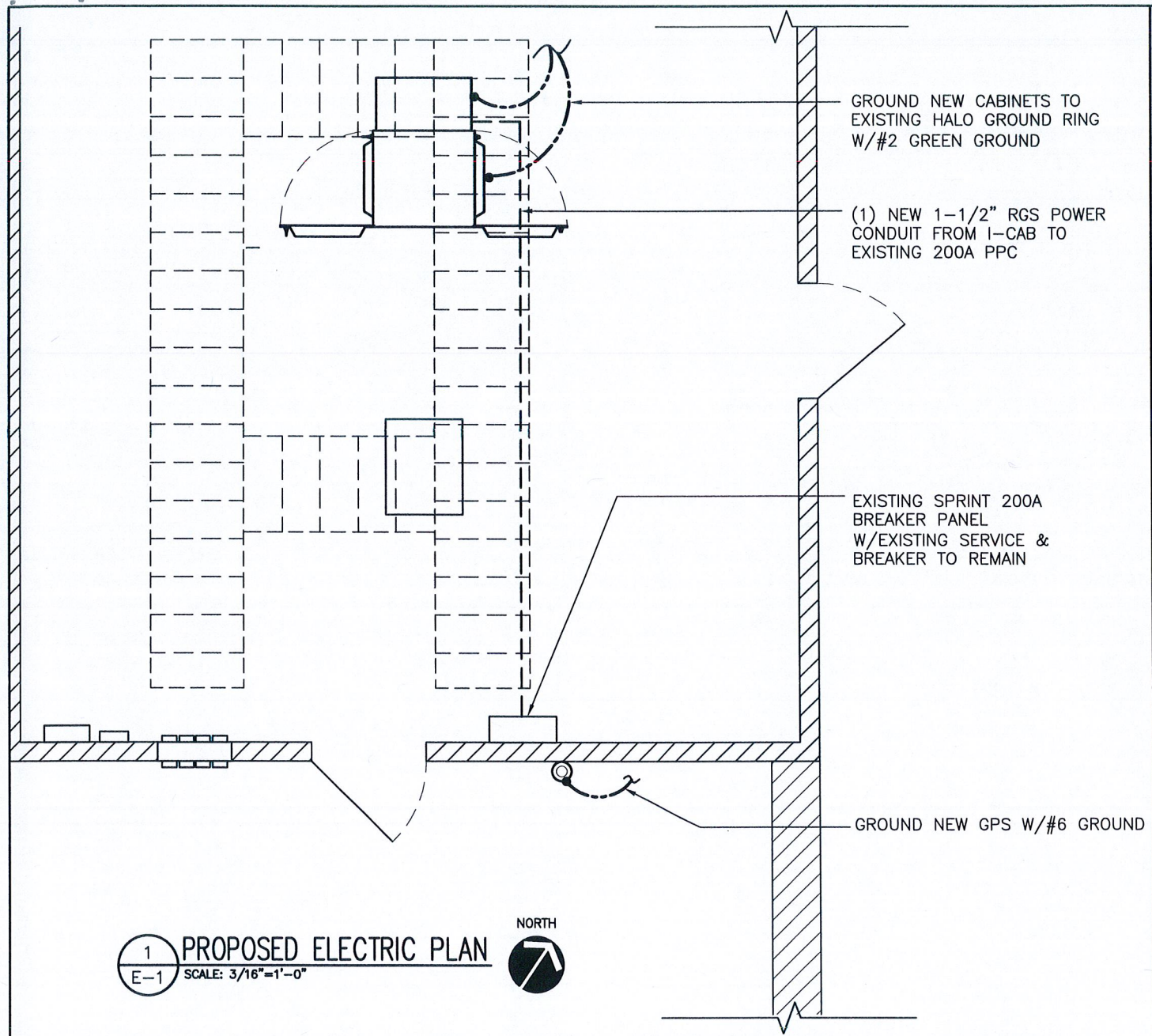
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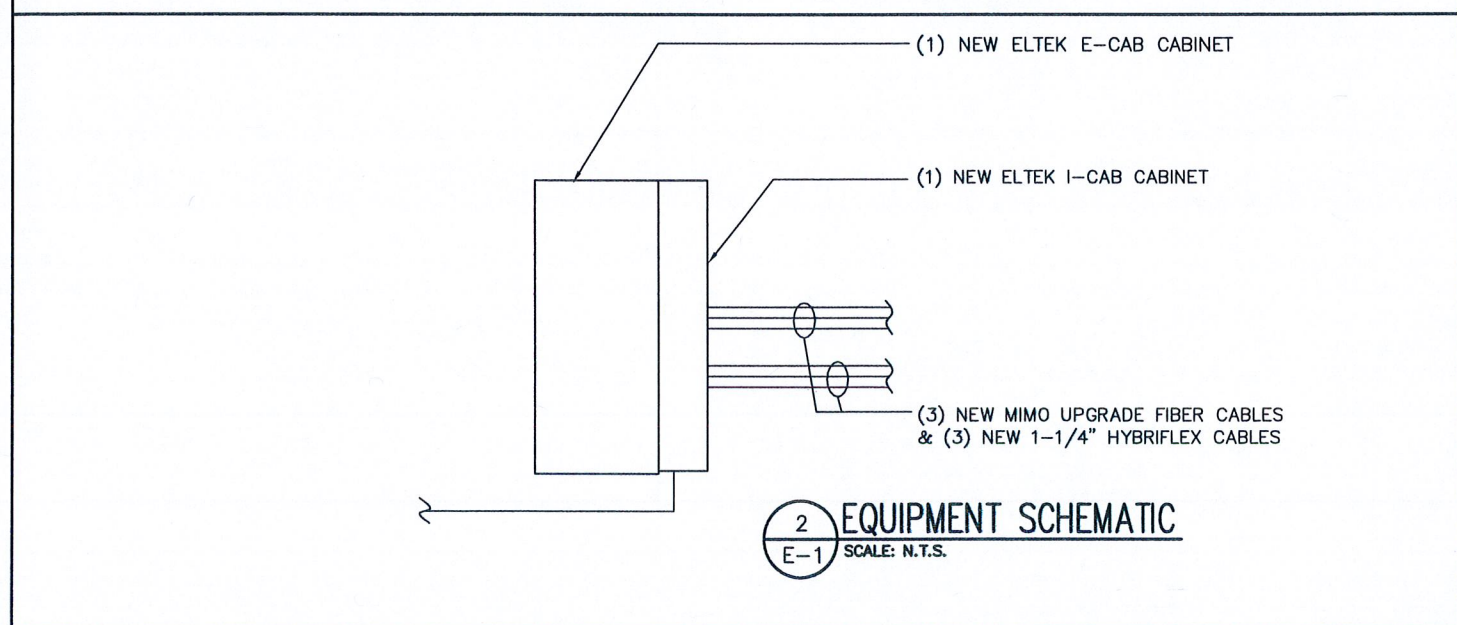
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SHEET TITLE
ANTENNA MOUNT DETAILS
SHEET NUMBER
A-9



1 PROPOSED ELECTRIC PLAN
E-1 SCALE: 3/16"=1'-0"
NORTH



2 EQUIPMENT SCHEMATIC
E-1 SCALE: N.T.S.

GROUNDING NOTES:

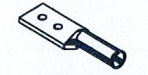
- 1 ALL ELECTRICAL AND GROUNDING AT THE CELL SITE SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 780 (LATEST EDITION), AND MANUFACTURER.
- 2 IF THE AC PANEL IN THE POWER CABINET IS WIRED AS SERVICE ENTRANCE, THE AC SERVICE GROUND CONDUCTOR SHALL BE CONNECTED TO GROUND ELECTRODE SYSTEM. WHEN THE AC PANEL IN THE POWER CABINET IS CONSIDERED A SUB-PANEL, THE GROUND WIRE SHALL BE INSTALLED IN THE AC POWER CONDUIT. THE INSTALLATION SHALL BE PER LOCAL AND NATIONAL ELECTRIC CODE (NFPA-70).
- 3 EXOTHERMIC WELDING IS RECOMMENDED FOR GROUNDING CONNECTION WHERE PRACTICAL. OTHERWISE, THE CONNECTION SHALL BE MADE USING COMPRESSION TYPE-2 HOLES. LONG BARREL LUGS OR DOUBLE CRIMP CLAMP "C" CLAMP. THE COPPER CABLES SHALL BE COATED WITH ANTIOXIDANT (COPPER SHIELD) BEFORE MAKING THE CONNECTIONS. THE MANUFACTURER'S TORQUE RECOMMENDATIONS ON THE BOLT ASSEMBLY TO SECURE CONNECTIONS SHALL BE FOLLOWED.
- 4 THE ANTENNA CABLES SHALL BE GROUNDED AT THE TOP AND BOTTOM OF THE VERTICAL RUN FOR LIGHTING PROTECTION. THE ANTENNA CABLE SHIELD SHALL BE BONDED TO A COPPER GROUND BUSS AT THE LOWER MOST POINT OF A VERTICAL RUN JUST BEFORE IT BEGINS TO BEND TOWARD THE HORIZONTAL PLANE. WIRE RUNS TO GROUND SHALL BE KEPT AS STRAIGHT AND SHORT AS POSSIBLE. ANTENNA CABLE SHIELD SHALL BE GROUNDED JUST BEFORE ENTERING THE CELL CABINET. ANY ANTENNA CABLES OVER 200 FEET IN LENGTH SHALL ALSO BE EQUIPPED WITH ADDITIONAL GROUNDING AT MID-POINT.
- 5 ALL GROUNDING CONDUCTORS INSIDE THE BUILDING SHALL BE RUN IN CONDUIT RACEWAY SYSTEM, AND SHALL BE INSTALLED AS STRAIGHT AS PRACTICAL WITH MINOR BENDS TO AVOID OBSTRUCTIONS. THE BENDING RADIUS OF ANY #2 GROUNDING CONDUCTOR IS 8". PVC RACEWAY MAY BE FLEXIBLE OR RIGID PER THE FIELD CONDITIONS. GROUNDING CONDUCTORS SHALL NOT MAKE CONTACT WITH ANY METALLIC CONDUITS, SURFACES OR EQUIPMENT.
- 6 PROVIDE PVC SLEEVES WHERE GROUNDING CONDUCTORS PASS THROUGH THE BUILDING WALLS AND /OR CEILINGS.
- 7 INSTALL GROUND BUSHINGS ON ALL METALLIC CONDUITS AND BOND TO THE EQUIPMENT GROUND BUSS IN THE PANEL BOARD.
- 8 GROUND ANTENNA BASES, FRAMES, CABLE RACKS AND OTHER METALLIC COMPONENTS WITH #2 GROUNDING CONDUCTORS AND CONNECT TO INSULATED SURFACE MOUNTED GROUND BARS. CONNECTION DETAILS SHALL FOLLOW MANUFACTURER'S SPECIFICATIONS FOR GROUNDING.
- 9 GROUND COAXIAL SHIELD AT BOTH ENDS USING MANUFACTURER'S GUIDELINES.GROUND FIELD TEST PROCEDURE:
A. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE A "FALL OF POTENTIAL" TEST ON THE NEW SUPPLEMENTAL GROUND FIELD PRIOR TO FINAL CONNECTION OF THE GROUNDING SYSTEM TO EQUIPMENT. THE TEST SHALL BE PERFORMED BY A QUALIFIED AND CERTIFIED TESTING AGENT. PROVIDE INDEPENDENT TEST RESULTS TO THE PROJECT MANAGER FOR REVIEW. THE GROUND SYSTEM RESISTANCE TO EARTH GROUND SHALL NOT EXCEED FIVE (5) OHMS. IF THE GROUND TEST EXCEEDS THE MAXIMUM OF 5 OHMS

GROUNDING LEGEND (ITEMS IN THIS LEGEND ONLY APPLY AS DETAILED IN GROUNDING PLAN):

- (A) GROUNDING RING. #2 AWG SOLID BARE TINNED COPPER WIRE
- (B) GROUND ROD
- (C) INSPECTION WELL
- (D) STEEL EQUIPMENT PLATFORM GROUNDING
- (E) STEEL EQUIPMENT GROUNDING
- (F) ICE BRIDGE GROUNDING AT EACH POST,
- (G) NEW GROUND RING BONDED TO EXISTING GROUND RING,
- (H) EXISTING GROUND RING. FIELD DETERMINE EXACT LOCATION.
- (J) SPRINT EQUIPMENT CABINET GROUNDING, TYP OF 3

GROUNDING LEGEND

- GROUND RING
- ⊗ GROUND ROD
- ⊗ INSPECTION WELL
- CADWELD CONNECTION (EXOTHERMIC WELD)
- ▲ MECHANICAL CONNECTION

CADWELD CONNECTIONS OR APPROVED EQUAL		BURNDY CONNECTIONS OR APPROVED EQUAL
 PARALLEL HORIZONTAL CONDUCTORS PARALLEL THROUGH CONNECTION OF HORIZONTAL CABLES TYPE PT	 HORIZONTAL STEEL SURFACE TO FLAT STEEL SURFACE OR HORIZONTAL PIPE TYPE HS	 BOND JUMPER FIELD FABRICATED GREEN STRANDED INSULATED TYPE 2-YA-2
 THROUGH CABLE TO GROUND ROD THROUGH CABLE TO TOP OF GROUND ROD TYPE GT	 VERTICAL STEEL SURFACE CABLE DOWN AT 45° TO VERTICAL STEEL SURFACE INCLUDING PIPE TYPE VS	 COPPER LUGS TWO HOLE - LONG BARREL LENGTH TYPE YA-2
 VERTICAL PIPE CABLE DOWN AT 45° TO RANGE OF VERTICAL PIPES TYPE VS	TYPICAL CADWELD TYPE CONNECTIONS NO SCALE	

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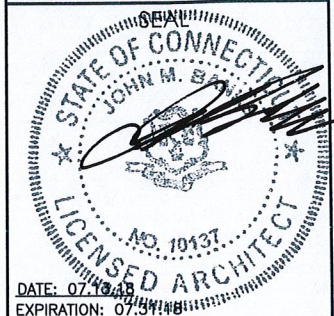
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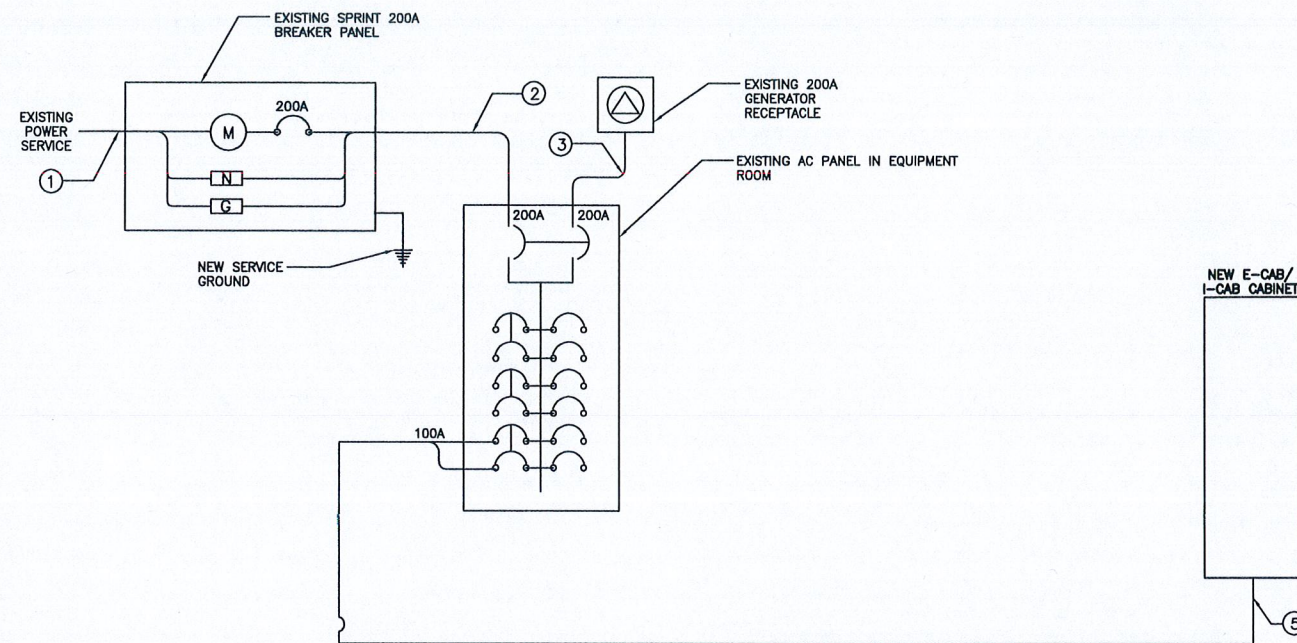
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SHEET TITLE

ELECTRIC PLAN & NOTES

SHEET NUMBER

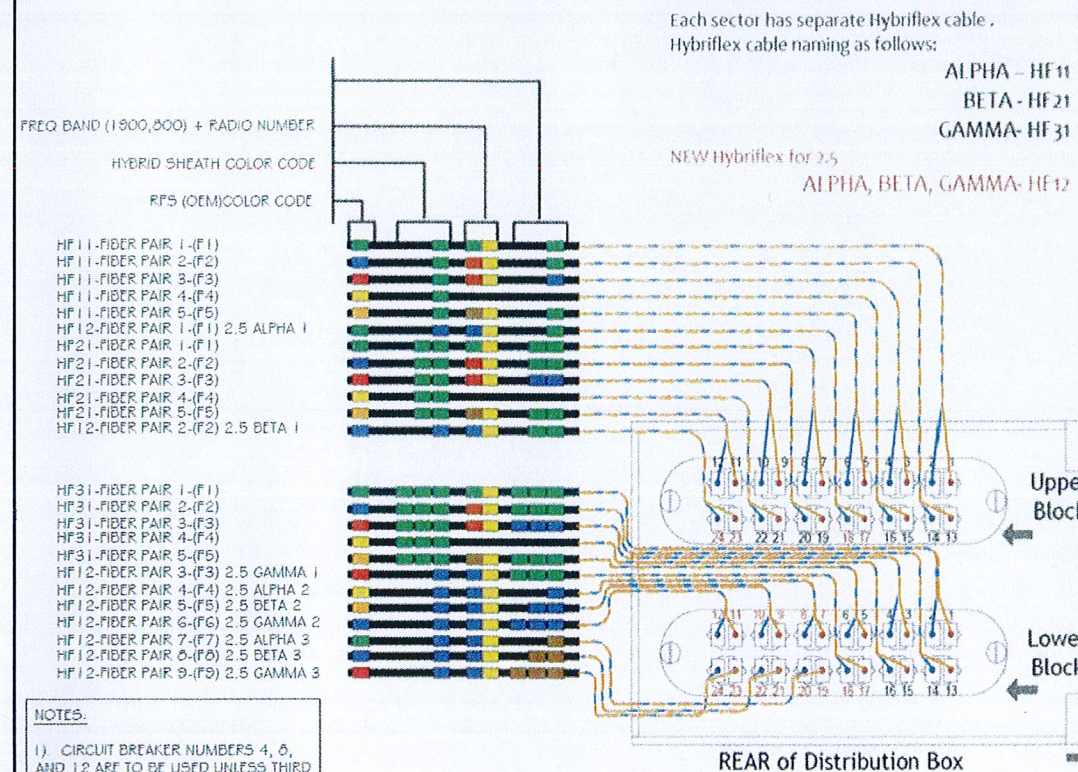
E-1



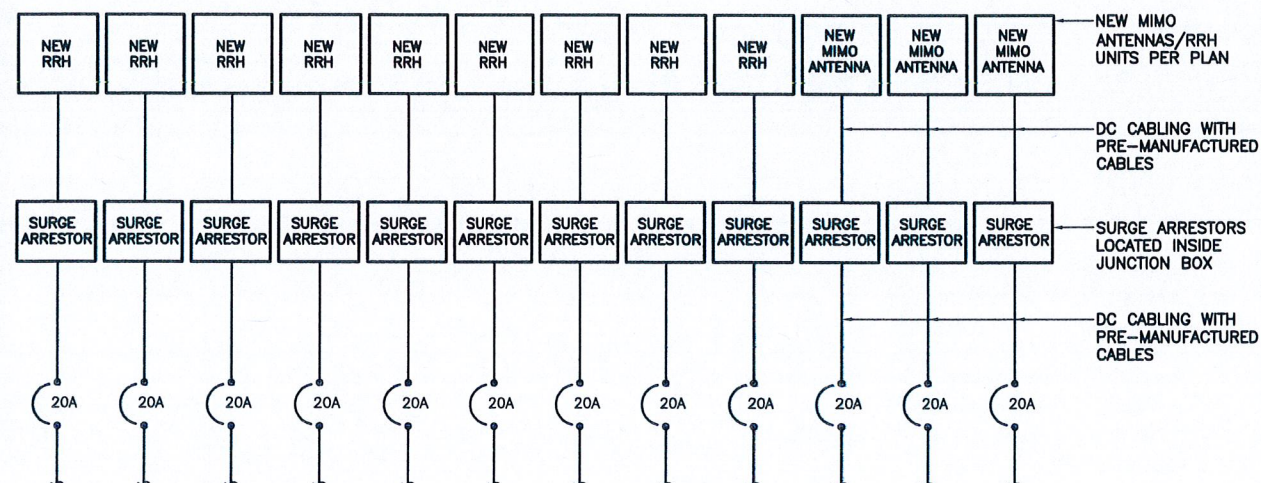
CIRCUIT SCHEDULE			
NO	FROM	TO	CONFIGURATION
①	UTILITY SOURCE	METER/DISCONNECT	EXISTING
②	METER/DISCONNECT	TRANSFER & LOAD CENTER	(2) #4 + (1) #2 IN 2" C
③	TRANSFER & LOAD CTR.	GENERATOR RECEPTACLE	(2) #4 + (1) #2 IN 2" C
④	TRANSFER & LOAD CTR.	NEW SPRINT BCAB CABINET	N/A
⑤	TRANSFER & LOAD CTR.	NEW SPRINT ECAB CABINET	(2) #2 AWG, (1) #8 GND IN 1-1/2" CONDUIT
⑥	TRANSFER & LOAD CTR.	NEW SPRINT 2.5 GROWTH CABINET	N/A

NOTE: CG SHALL REFERENCE ALL SPECS FOR "CONNECTING THE POWER SUPPLY" OF THE NEW INSTALLATION DOCUMENTS, FOR ALL CONNECTION SPECIFICATIONS.

1 ELECTRICAL ONE-LINE DIAGRAM
E-2 SCALE: N.T.S.



2 TYPICAL DC POWER DISTRIBUTION
E-2 SCALE: N.T.S.



3 DC ONE-LINE DIAGRAM
E-2 SCALE: N.T.S.

Sprint

201 STATE ROUTE 17 NORTH
RUTHERFORD, NY 07070
TEL: (201) 684-4000
FAX: (201) 684-4223

Cherundolo Consulting

1280 ROUTE 46 WEST
PARSIPPANY, NJ 07054
TELEPHONE: 646-544-5324

WESTCHESTER SERVICES LLC

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX: 847-277-0080
AE@westchesterservices.com

JOHN M. BANKS ARCHITECT

604 FOX GLEN
BARRINGTON, IL 60010
TELEPHONE: 847-277-0070
FAX: 847-277-0080

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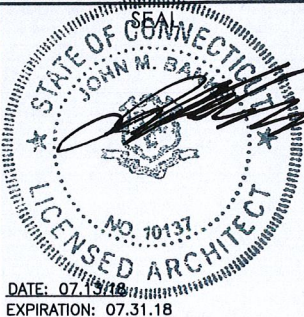
0 07.10.18 FINAL CD
NO. DATE DESCRIPTION

DRAWN BY: JS

CHECKED BY: JMB

JOB NUMBER: CT52XC012-A

ARCHITECT: JOHN M. BANKS



SITE NAME

STAMFORD

SITE NUMBER

CT52XC012-A

SITE LOCATION

650 GLENBROOK ROAD
STAMFORD, CT 06905
FAIRFIELD COUNTY

SHEET TITLE

ELECTRICAL DETAILS

SHEET NUMBER

E-2