Filed by:
Kri Pelletier, Property Specialist - SBA Communications
134 Flanders Rd., Suite 125, Westborough, MA 01581
508.251.0720 x 3804 - kpelletier@sbasite.com

February 27, 2019

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

Application for Tower Share
1662 Route 184 (aka 1662 Gold Star Highway), Groton CT
41 23 8.4 N
-72 0 47.9 W
T-Mobile #: CTNL011B_NSD

Dear Ms. Bachman:

Please accept this letter as notification pursuant to Connecticut General Statutes § 16-50aa and R.C.S.A § 16-50j-88 of T-Mobile's Application for Tower Sharing at the existing 150-foot Monopole Tower at 1662 Route 184 (aka 1662 Gold Star Highway) in Groton, CT.

Per the requirements under R.C.S.A §16-50j-89 please find the following statements in support of T-Mobile's Application:

1. Facility and Proposed Modifications

   A. Existing Facility and Appurtenances
   - Initial approval was given for this facility on February 27, 2007 by the Council under Docket 319 with the following conditions:
     - Approved monopole with top of antennas not to exceed 133' (later tower extension approved)
     - Certificate holder to permit public or private entities to share space on tower for fair consideration or to provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing
     - Certificate holder to provide space on tower for no compensation for any Town public safety services
     - Certificate holder to remove any nonfunctioning antennas and associated antenna mounting equipment within 60 days of date antenna ceased to function
     - On July 26,2007, Council further approved the extension of the tower to 150' under Verizon's Petition # 822
   - Latitude / Longitude: 41 23 8.4 N / -72 0 47.9 W
   - Height of Tower: 150'
   - Owned/operated by: SBA Infrastructure, LLC
   - Property Owner: Chester G. Crouch, Jr.
   - Size/Components of existing equipment compound:
     - 49'11" x 79'11" fenced compound with swing gate containing:

(3) Ericsson Radio 4449 B71+B12
(3) Ericsson Radio 2217 B2
(3) Ericsson Radio 4415 B25
(1) Low Profile Platform w/ Site Pro RMQP-4096-HK
(3) 1-5/8" fiber
(1) ½" line

Ground (within existing compound):
(1) 10'x15' concrete pad
(1) H-Frame
(1) PPC
(1) Ice Bridge
(1) GPS Antennas mounted to existing ice bridge post
(1) RBS6102 Equipment Cabinet
(1) RAC 24
(1) Delta 25kw DC Emergency Backup Diesel Generator

Existing Equipment to Remain: N/A

C. This Proposal is technically, legally, environmentally, and economically feasible and meets public safety concerns per Connecticut General Statute Section 16-50aa.

T-Mobile proposes to collocate at the above-referenced existing telecommunication facility rather than to require additional tower construction. The 1662 Route 184 site sits in a heavily trafficked area serving the southeast section of town, in and around the Center Groton area, in the general vicinity of State Routes 184 (Gold Star Memorial Highway) and 117 (North Road.) Since the site was built, wireless technology has flourished, resulting in greatly increased consumer usage and data transfer. Two carriers currently share space on the tower.

The proposed collocation meets with all legal and technical requirements. This Application contains all required information and statements per R.C.S.A §16-50j-89 and the proposed installation has been drafted per current code, and studied with regard to structural feasibility and RF emissions output. Drawings and Reports are attached. T-Mobile's proposed collocation presents no known material changes to environmental conditions from those as documented in the Council's original Findings of Fact and presents no known public safety concerns.

2. Engineering Drawings per the requirements under R.C.S.A. §16-50j-89 are enclosed herewith.

3. Engineering and Structural Analysis per the requirements under R.C.S.A. §16-50j-89 is enclosed herewith.

4. A Letter from SBA, as Owner of the Facility, agreeing to the proposed shared use of the facility, is enclosed herewith.

5. With regard to any potential environmental impact:

   A. T-Mobile's collocation will not have any significant adverse visual impact on the surrounding areas. The antennas should result in only marginal additional equipment visibility from areas that already have views of the existing tower. The proposed work would not require any Federal Aviation Administration obstruction marking or lighting.

B. The proposed collocation does not affect or alter the existing site with regard to wetlands, water resources or air quality. According to record Docket 319, site survey and field investigations showed no federally regulated wetlands or watercourses would be impacted by the site and FEMA Flood Rate Maps indicated that the site was not within the 100 year floor zone.

C. T-Mobile's collocation proposes the installation of a 25kW DC diesel emergency backup generator within the leased area of the compound. The genset and 220 gallon fuel tank adhere to all required safety zones and clearances along with additional safety measures, inclusive of an externally mounted emergency shutdown and fuel leakage switch, emergency vents, overfill protector and spill container. While small in footprint (77.2"H x 37.5"W x 82.7"D), the generator would provide backup time of 72 hours in case of emergency. A spec sheet is attached herewith.

The proposed work is not thought to have any substantial adverse environmental impact. Public Need for the additional coverage outweighs any minor environmental effects that would result from the construction, operation, and maintenance of the proposed collocation.

6. The operation of T-Mobile's new antennas will not increase the total radio frequency electromagnetic power density at the site to a level at or above the applicable standards. The anticipated Maximum Composite contributions from the T-Mobile facility are only 3.58% of the allowable FCC established general public limit. The anticipated composite MPE value for this site assuming all carriers present is 7.94% of the allowable FCC established general public limit sampled at the ground level. A Power Density / RF Report per the requirements under R.C.S.A. §16-50j-89 is enclosed herewith.

7. An original and fifteen copies of this Tower Share Application are being submitted along with a $625 filing fee per Conn. Gen. Stat. §4-189j; Regs., Conn. State Agencies §16-50v-1a.
   A. A copy of this Application and all attachments is being sent to:
      i. The Town of Groton's Town Manager, John Burt
      ii. The Town of Groton's Director of Planning, Jonathan J. Riener, AICP
      iii. The Property Owner, Chester G. Crouch, Jr
      iv. (Separate notice is not being sent to tower owner, as it belongs to SBA)

Please note, additionally: the planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. §16.50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modification will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modification will not cause a significant change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

T-Mobile respectfully submits for the Council's review and approval this Application for Tower Share.

Sincerely,

Kri Pelletier
Property Specialist
SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581
508.251.0720 x3804 + T
508.366.2610 + F
203.446.7700 + C
kpelletier@sbasite.com

Attachments

cc: John Burt, Town Manager / with attachments
Town of Groton, 134 Groton Long Point Road, Groton, CT 06340
Jonathan J. Riener, AICP, Director of Planning / with attachments
Town of Groton, 134 Groton Long Point Road, Groton, CT 06340
Chester G. Crouch, Jr. / with attachments
4120 Silvermoon Dr., Plant City FL 33566

POWER DENSITY

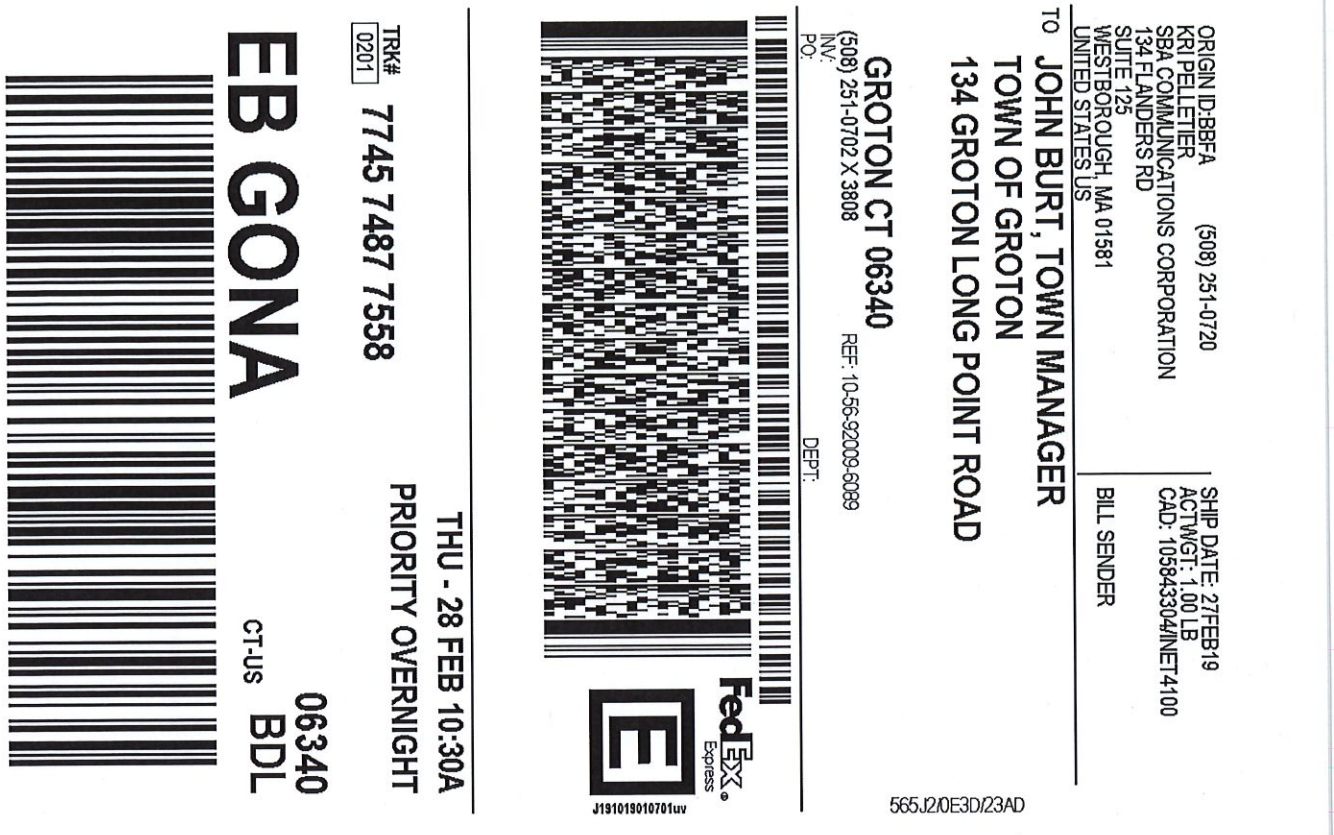
T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR3246 B66	Make / Model:	Ericsson AIR3246 B66	Make / Model:	Ericsson AIR3246 B66
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	160	Total TX Power(W):	160	Total TX Power(W):	160
ERP (W):	6,224.72	ERP (W):	6,224.72	ERP (W):	6,224.72
Antenna A1 MPE%	**1.30**	Antenna B1 MPE%	**1.30**	Antenna C1 MPE%	**1.30**
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	1900 MHz (PCS)	Frequency Bands	1900 MHz (PCS)	Frequency Bands	1900 MHz (PCS)
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	80	Total TX Power(W):	80	Total TX Power(W):	80
ERP (W):	3,412.64	ERP (W):	3,412.64	ERP (W):	3,412.64
Antenna A2 MPE%	**0.72**	Antenna B2 MPE%	**0.72**	Antenna C2 MPE%	**0.72**
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 / 15.65 dBd	Gain:	12.95 / 13.35 / 15.65 dBd	Gain:	12.95 / 13.35 / 15.65 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	600 MHz / 700 MHz / 1900 MHz (PCS)	Frequency Bands	600 MHz / 700 MHz / 1900 MHz (PCS)	Frequency Bands	600 MHz / 700 MHz / 1900 MHz (PCS)
Channel Count	5	Channel Count	5	Channel Count	5
Total TX Power(W):	160	Total TX Power(W):	160	Total TX Power(W):	160
ERP (W):	3,912.15	ERP (W):	3,912.15	ERP (W):	3,912.15
Antenna A3 MPE%	**1.52**	Antenna B3 MPE%	**1.52**	Antenna C3 MPE%	**1.52**

Microwave Backhaul Data								
Make / Model:	Gain	Height (AGL):	Frequency Bands	Channel Count	Total TX Power(W)	ERP (W)	MPE %	Sector
Commscope SC2-W100AB	32.35 dBd	137	11 GHz	1	1	1717.91	**0.04**	A

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Sector A)	**3.58 %**
AT&T	**2.19 %**
Clearwire	**0.35 %**
Verizon Wireless	**1.82 %**
Site Total MPE %:	**7.94 %**

T-Mobile Sector A Total:	3.58 %
T-Mobile Sector B Total:	3.54 %
T-Mobile Sector C Total:	3.54 %
Site Total:	7.94 %



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

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Print Card

Farm Property Card

Print Date: 1/18/2019

Card 1 Of 1

Account	Location	Grand List Code	Zoning	Acres
270013126797	1662 GOLD STAR HWY	FARM	RU-40	32.248

District	Neighborhood	Deed Book/Page	Use Code
CENTER GROTON	1010	1100/751	PA FOREST

Current Owner

CROUCH CHESTER G JR
4120 SILVERMOON DR
PLANT CITY FL 33566

Residential Building Information

Style:	RAISED RANCH
Exterior:	FRAME
Attic:	NONE
Stories:	1
Basement:	FULL
Year Built:	1957
Tot Living Area:	1614 SqFt.
Fuel:	OIL
Heating:	BASIC
System:	HOT WATER
Bedrooms:	4
Full Baths:	2
Half Baths:	

Valuation

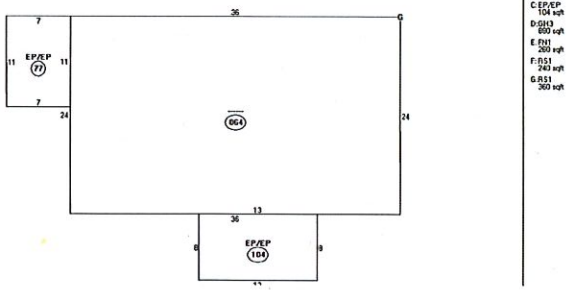
Land:	$148,400
Building:	$119,300
Total:	$267,700
Assessed Value:	$187,360

Recent Sales

Book/Page	Date	Price
1100/751	9/26/2012	$0
1013/844	7/10/2008	$0

Property Picture

Building Sketch



Sketch Legend

----	Main Living Area	1SMA	Masonry	GRHS	Attached Greenhouse
1FR	Frame	OMP	Open Masonry Porch	CAT	Cathedral Ceiling
OFP	Open Frame Porch	EMP	Enclosed Msry Porch	SOP	Screen Open Frame Prch
EFP	Enclosed Frame Porch	MUB	Masonry Utility	SMP	Screen Open Msnry Prch
FUB	Frame Utility Building	MB	Masonry Bay	CPAT	Concrete Patio
FB	Frame Bay	MOH	Masonry Overhang	B	Basement
FG	Frame Garage	.5MA	1/2 Story Masonry		
FOH	Frame Overhang	MP	Masonry Patio		
.5FR	1/2 Story Frame	WD	Wood Deck		
A(U)	Attic (Unfinished)	CPY	Canopy		
A(F)	Attic (Finished)				

February 18, 2019

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

RE: **Notice of Intent to Allow Shared Use of the Existing SBA Telecommunications Site**
Location: **1662 Route 184, Groton CT**
TMO Site No: CTNL011B_NSD
SBA Site No: CT13073-A

Dear Ms. Bachman:

Please let the following serve as Evidence of Intent to allow T-Mobile's shared use of the existing SBA telecommunications site at 1662 Route 184, Groton, CT.

SBA Infrastructure, LLC ("Owner") and T-Mobile Northeast LLC ("Tenant") are entering into a Site Lease Agreement. Tenant will be provided ground space within the existing site compound for its base station equipment and space at the height of 137' for antennas and associated equipment.

Thank you,

Rick Woods
Site Development Manager
SBA COMMUNICATIONS CORPORATION
134 Flanders Road, Suite 125
Westboro, MA 01581

508.251.0720 x3800 + T
508.366.2610 + F
508.614.0389 + C
rwoods@sbasite.com

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTNL011B

Groton North
1662 Gold Star Highway
Groton, CT 06340

February 1, 2019

EBI Project Number: 6219000310

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**7.94 %**

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

EBI Consulting
environmental | engineering | due diligence

February 1, 2019

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CTNL011B – Groton North**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1662 Gold Star Highway, Groton, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **1662 Gold Star Highway, Groton, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas 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 UMTS channel (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

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

3) 4 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

5) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

6) 1 microwave backhaul channel (11 GHz) was considered for the proposed facility. 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 **Ericsson AIR3246 B66** & **RFS APX16DWV-16DWVS-E-A20** for 1900 MHz (PCS) and 2100 MHz (AWS) channels, the **RFS APXVAARR24_43-U-NA20** for 1900 MHz (PCS), 600 MHz and 700 MHz channels as well as the **Commscope SC2-W100AB** for the proposed 11 GHz microwave backhaul. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site 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 centerline of the proposed antennas (both panel antennas and microwave dish) is **137 feet** above ground level (AGL).

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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR3246 B66	Make / Model:	Ericsson AIR3246 B66	Make / Model:	Ericsson AIR3246 B66
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	160	Total TX Power(W):	160	Total TX Power(W):	160
ERP (W):	6,224.72	ERP (W):	6,224.72	ERP (W):	6,224.72
Antenna A1 MPE%	**1.30**	Antenna B1 MPE%	**1.30**	Antenna C1 MPE%	**1.30**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	1900 MHz (PCS)	Frequency Bands	1900 MHz (PCS)	Frequency Bands	1900 MHz (PCS)
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	80	Total TX Power(W):	80	Total TX Power(W):	80
ERP (W):	3,412.64	ERP (W):	3,412.64	ERP (W):	3,412.64
Antenna A2 MPE%	**0.72**	Antenna B2 MPE%	**0.72**	Antenna C2 MPE%	**0.72**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 / 15.65 dBd	Gain:	12.95 / 13.35 / 15.65 dBd	Gain:	12.95 / 13.35 / 15.65 dBd
Height (AGL):	137 feet	Height (AGL):	137 feet	Height (AGL):	137 feet
Frequency Bands	600 MHz / 700 MHz / 1900 MHz (PCS)	Frequency Bands	600 MHz / 700 MHz / 1900 MHz (PCS)	Frequency Bands	600 MHz / 700 MHz / 1900 MHz (PCS)
Channel Count	5	Channel Count	5	Channel Count	5
Total TX Power(W):	160	Total TX Power(W):	160	Total TX Power(W):	160
ERP (W):	3,912.15	ERP (W):	3,912.15	ERP (W):	3,912.15
Antenna A3 MPE%	**1.52**	Antenna B3 MPE%	**1.52**	Antenna C3 MPE%	**1.52**

Microwave Backhaul Data

Make / Model:	Gain	Height (AGL):	Frequency Bands	Channel Count	Total TX Power(W)	ERP (W)	MPE %	Sector
Commscope SC2-W100AB	32.35 dBd	137	11 GHz	1	1	1717.91	**0.04**	A

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Sector A)	**3.58 %**
AT&T	**2.19** %
Clearwire	**0.35** %
Verizon Wireless	**1.82** %
Site Total MPE %:	**7.94 %**

T-Mobile Sector A Total:	3.58 %
T-Mobile Sector B Total:	3.54 %
T-Mobile Sector C Total:	3.54 %
Site Total:	7.94 %

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile _Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	4	1,556.18	137	13.04	AWS - 2100 MHz	1000.00	1.30%
T-Mobile PCS - 1900 MHz LTE	2	1,706.32	137	7.15	PCS - 1900 MHz	1000.00	0.72%
T-Mobile 600 MHz LTE	2	788.97	137	3.31	600 MHz	400.00	0.82%
T-Mobile 700 MHz LTE	2	432.54	137	1.81	700 MHz	467.00	0.39%
T-Mobile PCS - 1900 MHz UMTS	1	1,469.13	137	3.08	PCS - 1900 MHz	1000.00	0.31%
T-Mobile 11 GHz Microwave	1	1,717.91	137	0.36	11 GHz	1000.00	0.04%
						Total:	**3.58%**

Summary

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

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	3.58 %
Sector B:	3.54 %
Sector C:	3.54 %
T-Mobile Maximum MPE % (Sector A):	3.58 %
Site Total:	7.94 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **7.94%** 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.

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

Structural Analysis Report

Existing 150 ft Rohn Monopole

Customer Name: SBA Communications Corp

Customer Site Number: CT13073-A

Customer Site Name: Groton North

Carrier Name: T-Mobile (App#: 103146, V1)

Carrier Site ID / Name: CTNL011B / Groton North

Site Location: 1662 Route 184

Groton, Connecticut

New London County

Latitude: 41.385666

Longitude: -72.013306

1/21/19

Analysis Result:

Max Structural Usage: 60.1% [Pass]

Max Foundation Usage: 58.0% [Pass]

Additional Usage Caused by New Mount/Mount Modification: N/A

Report Prepared By : Tawfeeq Alajaj

Introduction

The purpose of this report is to summarize the analysis results on the 150 ft Rohn Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

Sources of Information

Tower Drawings	Radian, File Nos. 060-3663 & 57974EH, Drawing No. A070130, dated March 16, 2007
Foundation Drawing	Radian, File Nos. 060-3663 & 57974EH, Drawing No. A070131, dated March 16, 2007
Geotechnical Report	Gemini Geotechnical Associates, Inc., Project No. 07022CT, dated March 13, 2007
Modification Drawings	N/A

Analysis Criteria

The rigorous analysis was performed in accordance with the requirements and stipulations of the ANSI/TIA/EIA 222-G**.** In accordance with this standard, the structure was analyzed using **TESPoles,** a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

Wind Speed Used in the Analysis:	Ultimate Design Wind Speed V_{ult} = 135.0 mph (3-Sec. Gust)/ Nominal Design Wind Speed V_{asd} = 105.0 mph (3-Sec. Gust)
Wind Speed with Ice:	50 mph (3-Sec. Gust) with 3/4" radial ice concurrent
Operational Wind Speed:	60 mph + 0" Radial ice
Standard/Codes:	ANSI/TIA/EIA 222-G / 2015 IBC / 2018 Connecticut State Building Code
Exposure Category:	B
Structure Class:	II
Topographic Category:	1
Crest Height:	0 ft
Seismic Parameters:	S_S = 0.27, S_1 = 0.24

This structural analysis is based upon the tower being classified as a Structure Class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

Items	Elevation (ft)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
1	149.0	3	Amphenol Antel - BXA-70063-6CF - Panel	Low Profile Platform	(13) 1 5/8"	Verizon
2		3	Andrew - HBXX-6517DS-VTM - Panel			
3		3	Andrew - HBXX-6516DS-VTM - Panel			
4		3	Andrew - LNX-6512DS-A1M - Panel			
5		1	DB-T1-6Z-8AB-0Z			
6		3	ALU RRH 2x60 AWS			
7		6	RFS FD9R6004/2C-3L Diplexer			
15	128.0	6	Allgon - 7770 - Panel	Low Profile Platform	(12) 1 5/8"	AT&T
16		2	Andrew - SBNH-1D6565C - Panel			
17		1	KMW - AM-X-CD-14-65-00T-RET - Panel			
18		6	Powerwave LGP21401 RET			
19		1	Raycap DC6-48-60-18-8F			
20		6	RRU-11			
21		6	Powerwave LGP21903			

Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

Items	Elevation (ft)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
8	137.0	3	Ericsson - Air 3246 B66 - Panel	Site Pro RMQP-4096-HK	(3) 1 5/8" Fiber (1) 1/2"	T-Mobile
9		3	RFS - APXVAARR24_43-U-NA2 - Panel			
10		3	RFS - APX16DWV-16DWV-S-E-A20 - Panel			
11		1	RFS SC2-w100AB - Dish			
12		3	Ericsson Radio 4449 B71+B12			
13		3	Ericsson Radio 2217 B2			
14		3	Ericsson Radio 4415 B25			

All transmission lines are considered running inside of the pole shafts.

Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

	Pole shafts	Anchor Bolts	Base Plate
Max. Usage:	**38.7%**	**50.2%**	**60.1%**
Pass/Fail	**Pass**	**Pass**	**Pass**

Foundations

	Moment (Kip-Ft)	Shear (Kips)	Axial (Kips)
Original Design Reactions	6114.4	55.6	94.8
Analysis Reactions	3079.5	28.8	74.6
Factored Reactions*	8254.4	75.1	128.0
% of Design Reactions	37.3%	38.4%	58.3%

* Per section 15.5.1 of the TIA-222-G standard, factored reactions were obtained by multiplying a 1.35 factor to the original design reactions.

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

Operational Condition (Rigidity):

Operational characteristics of the tower are found to be within the limits prescribed by ANSI/TIA/EIA 222-G for the installed antennas. The maximum twist/sway at the elevation of the proposed equipment is 0.5276 degrees under the operational wind speed as specified in the Analysis Criteria.

Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the ANSI/TIA/EIA 222-G Standard under the design basic wind speed as specified in the Analysis Criteria.

Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The structural analysis was performance based upon the evidence available at the time of this report. All information provided by the client is considered to be accurate.

3. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

4. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

5. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

6. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

Usage Diagram - Max Ratio 38.67% at 0.0ft

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North	**Exposure:**	B	
Height:	150.00 (ft)	**Gh:**	1.1	
Base Elev:	0.000 (ft)			Page: 1

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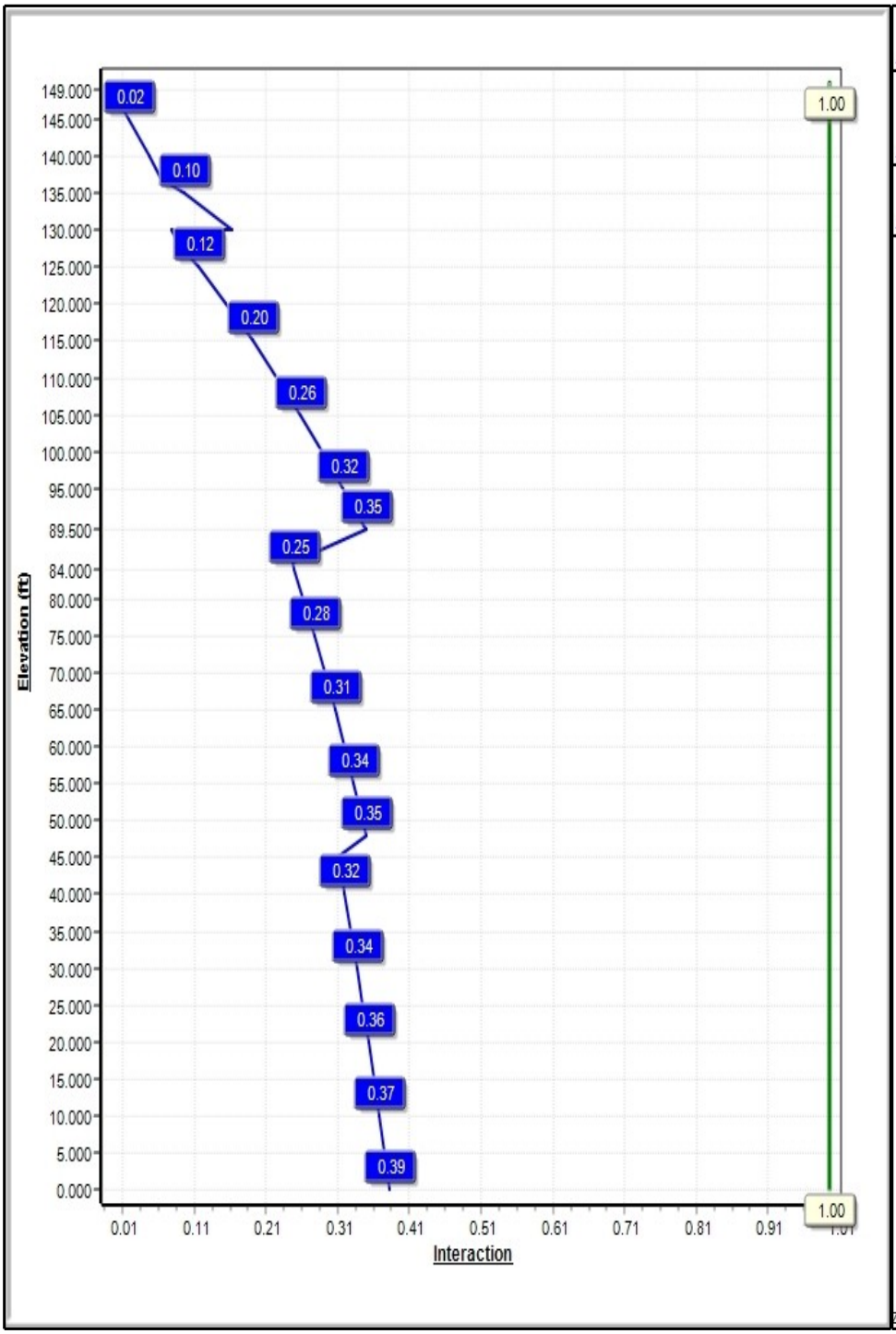
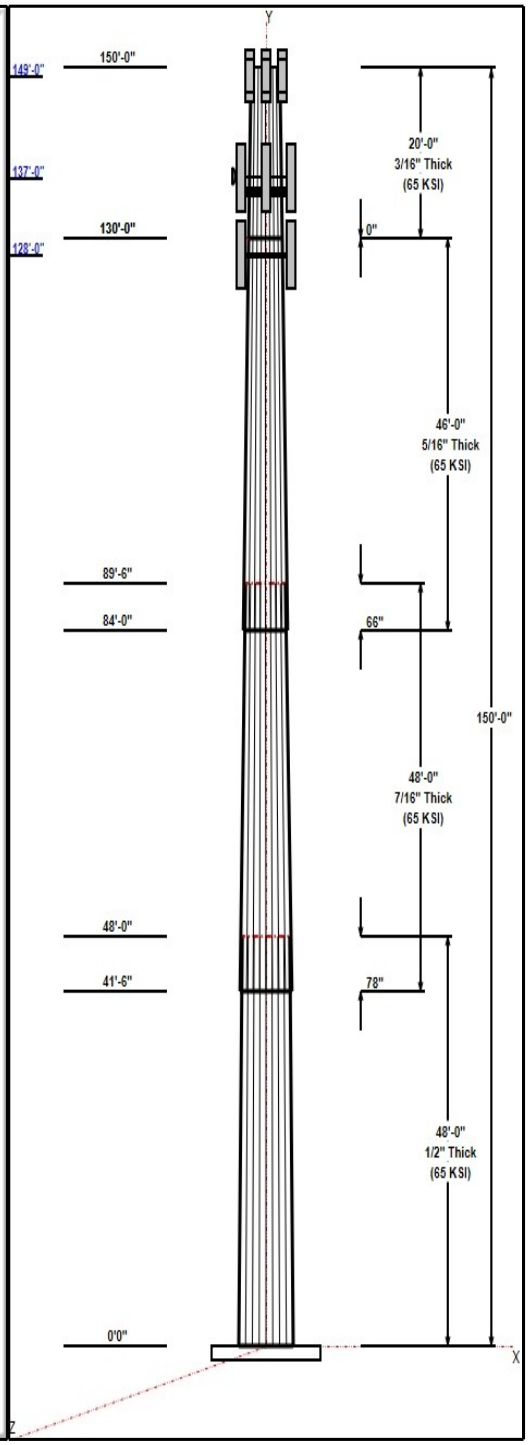
Dead Load Factor: 1.20
Wind Load Factor: 1.60

Load Case : 1.2D + 1.6W 105 mph Wind

Iterations: 21





Structure: CT13073-A-SBA

Type: Custom
Site Name: Groton North
Height: 150.00 (ft)
Base Elev: 0.00 (ft)

Base Shape: 18 Sided
Taper: 0.20967

1/21/2019

Tower Engineering Solutions

Shaft Properties

Seq	Length (ft)	Top (in)	Bottom (in)	Thick (in)	Joint Type	Taper	Grade (ksi)
1	48.00	49.94	60.00	0.500		0.20967	65
2	48.00	42.11	52.17	0.438	Slip	0.20967	65
3	46.00	34.24	43.89	0.313	Slip	0.20967	65
4	20.00	30.00	34.24	0.188	Butt	0.21215	65

Discrete Appurtenances

Attach Elev (ft)	Force Elev (ft)	Qty	Description	Carrier
149.00	149.00	3	BXA-70063-6CF	Verizon
149.00	149.00	3	HBXX-6517DS-VTM	Verizon
149.00	149.00	3	HBXX-6516DS-VTM	Verizon
149.00	149.00	3	LNX-6512DS-A1M	Verizon
149.00	149.00	1	DB-T1-6Z-8AB-0Z	Verizon
149.00	149.00	3	ALU RRH 2x60 AWS	Verizon
149.00	149.00	6	RFS FD9R6004/2C-3L	Verizon
137.00	137.00	3	Air 3246 B66	T-Mobile
137.00	137.00	3	APXVAARR24_43-U-NA2	T-Mobile
137.00	137.00	3	APX16DWV-16DWV-S-E-	T-Mobile
137.00	137.00	1	RMQP-4096-HK	T-Mobile
137.00	137.00	1	SC2-w100AB	T-Mobile
137.00	137.00	3	Ericsson Radio 4449	T-Mobile
137.00	137.00	3	Ericsson Radio 2217 B2	T-Mobile
137.00	137.00	3	Ericsson Radio 4415 B25	T-Mobile
128.00	128.00	6	7770	AT&T
128.00	128.00	2	SBNH-1D6565C	AT&T
128.00	128.00	1	AM-X-CD-14-65-00T-RET	AT&T
128.00	128.00	6	Powerwave LGP21401	AT&T
128.00	128.00	1	Raycap DC6-48-60-18-8F	AT&T
128.00	128.00	6	RRU-11	AT&T
128.00	128.00	6	Powerwave LGP21903	AT&T
128.00	128.00	1	Low Profile Platform	AT&T

Linear Appurtenances

Elev From (ft)	Elev To (ft)	Placement	Description	Carrier
0.00	149.00	Inside	1 5/8" Coax	Verizon
0.00	137.00	Inside	1 5/8" Fiber	T-Mobile
0.00	137.00	Inside	1/2" Coax	T-Mobile
0.00	128.00	Inside	1 5/8" Coax	AT&T

Anchor Bolts

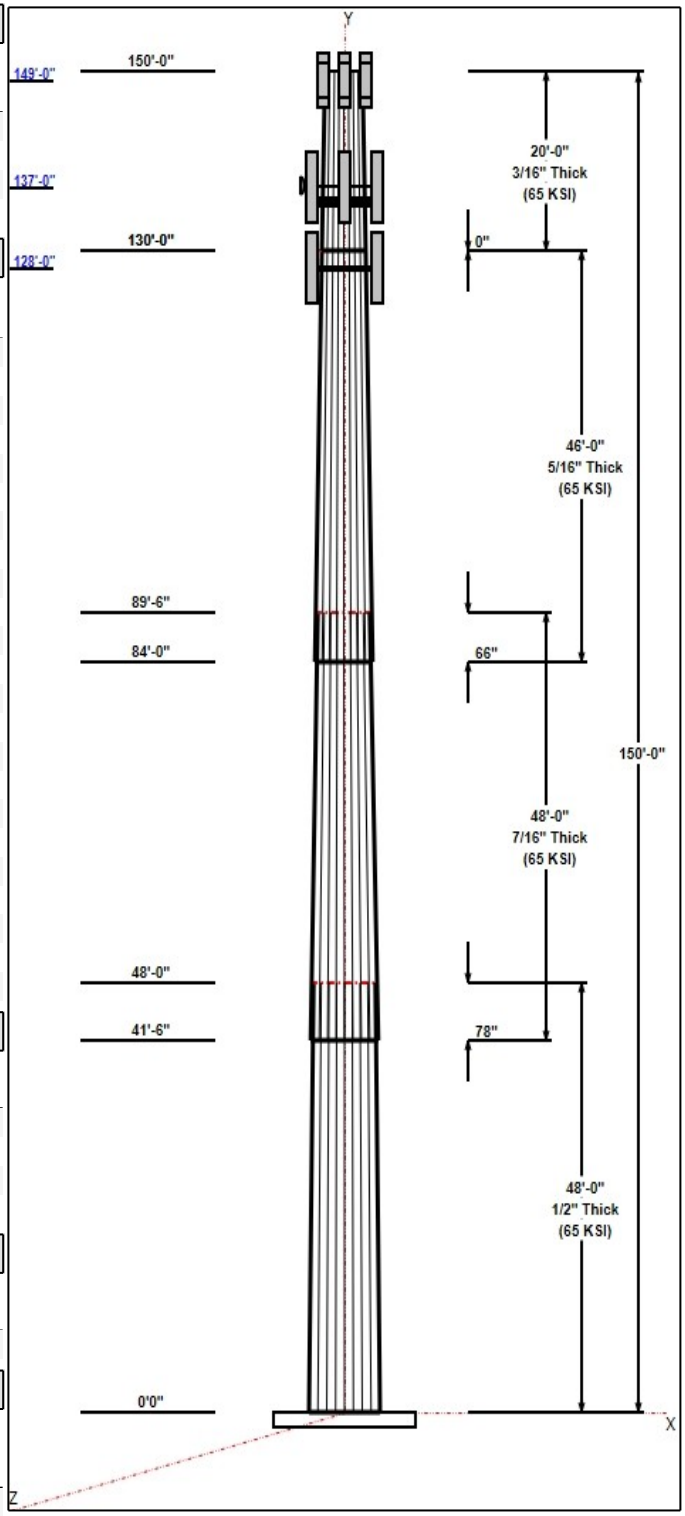
Qty	Specifications	Grade (ksi)	Arrangement
34	1.5" F1554 105	105.0	Radial

Base Plate

Thickness (in)	Specifications (in)	Grade (ksi)	Geometry
1.7500	69.5	50.0	Round

Reactions

Load Case	Moment (FT-Kips)	Shear (Kips)	Axial (Kips)
1.2D + 1.6W 105 mph Wind	3079.5	28.8	51.8



0.9D + 1.6W 105 mph Wind	3062.2	28.8	38.9
1.2D + 1.0Di + 1.0Wi 50 mph Wind	724.6	7.0	74.6
1.2D + 1.0E	345.0	3.1	51.9
0.9D + 1.0E	343.0	3.1	38.9
1.0D + 1.0W 60 mph Wind	626.2	5.9	43.2

Structure: CT13073-A-SBA - Coax Line Placement

Type: Monopole
Site Name: Groton North
Height: 150.00 (ft)

1/21/2019

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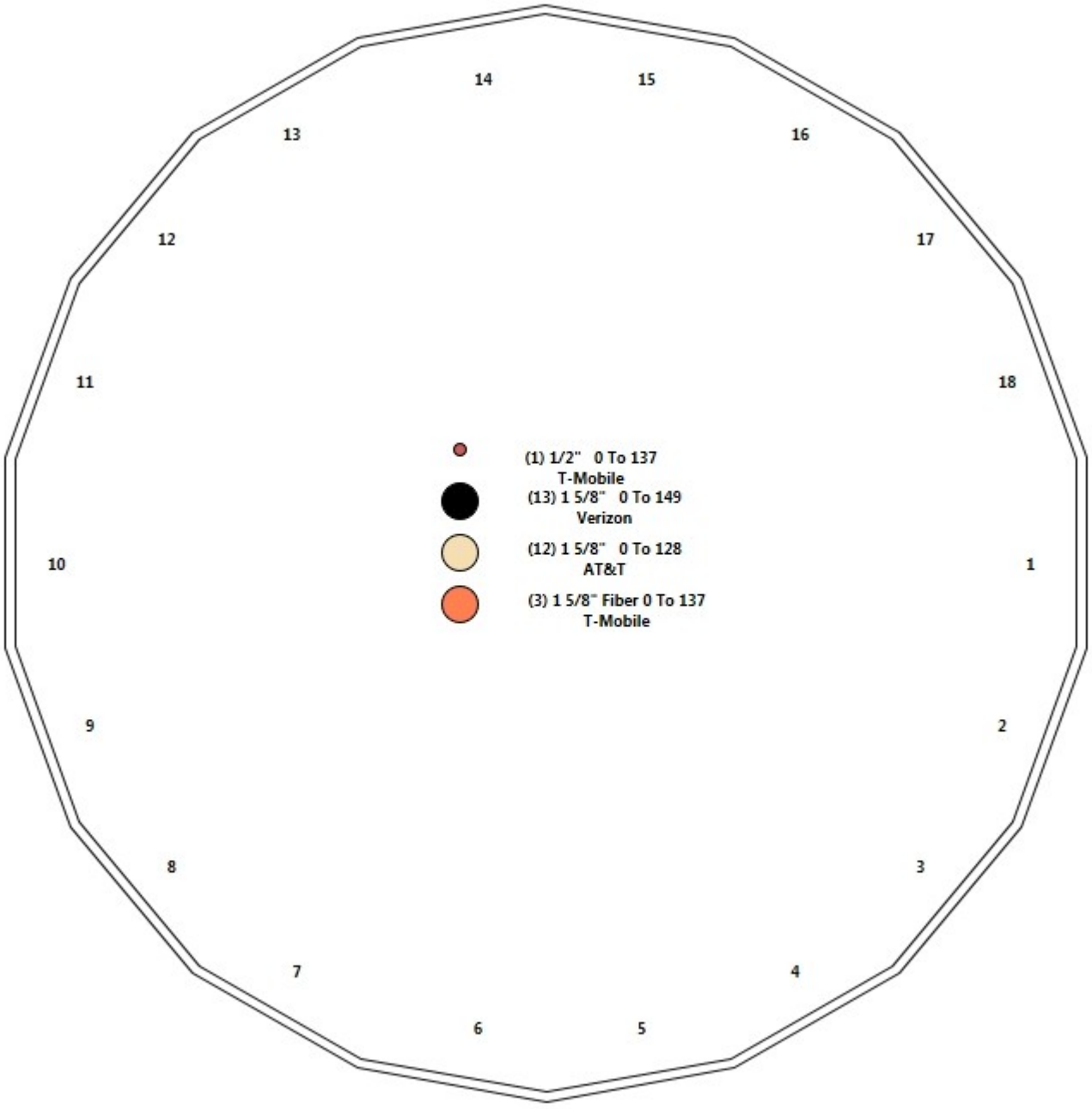

Shaft Properties

Structure:	CT13073-A-SBA		**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North		**Exposure:**	B	
Height:	150.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 5

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Sec. No.	Shape	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Overlap (in)	Weight (lb)
1	18	48.000	0.5000	65		0.00	14,118
2	18	48.000	0.4375	65	Slip	78.00	10,593
3	18	46.000	0.3125	65	Slip	66.00	6,016
4	18	20.000	0.1875	65	Flange	0.00	1,293
					Total Shaft Weight:		**32,020**

	Bottom						Top						
Sec. No.	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Taper
1	60.00	0.00	94.42	42234.30	19.75	120.00	49.94	48.00	78.45	24223.7	16.20	99.87	0.209669
2	52.17	41.50	71.84	24294.43	19.62	119.25	42.11	89.50	57.86	12695.7	15.56	96.25	0.209669
3	43.89	84.00	43.22	10368.48	23.35	140.44	34.24	130.00	33.65	4895.14	17.91	109.5	0.209669
4	34.24	130.0	20.27	2969.66	30.79	182.63	30.00	150.00	17.74	1992.24	26.80	160.0	0.212150

Load Summary

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 6	

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Discrete Appurtenances

				No Ice			Ice				
No.	Elev (ft)	Description	Qty	Weight (lb)	CaAa (sf)	CaAa Factor	Weight (lb)	CaAa (sf)	CaAa Factor	Hor. Ecc. (ft)	Vert Ecc (ft)
1	149.00	BXA-70063-6CF	3	17.00	7.57	0.73	165.20	10.332	0.73	0.00	0.00
2	149.00	HBXX-6517DS-VTM	3	40.70	8.55	0.77	216.82	11.467	0.77	0.00	0.00
3	149.00	HBXX-6516DS-VTM	3	30.60	5.43	0.77	153.82	7.411	0.77	0.00	0.00
4	149.00	LNX-6512DS-A1M	3	28.00	5.09	0.80	149.46	6.979	0.80	0.00	0.00
5	149.00	DB-T1-6Z-8AB-0Z	1	18.90	4.80	1.00	162.51	5.673	1.00	0.00	0.00
6	149.00	ALU RRH 2x60 AWS	3	55.00	3.50	0.67	134.96	4.289	0.67	0.00	0.00
7	149.00	RFS FD9R6004/2C-3L Diplexer	6	3.10	0.36	1.00	11.12	0.803	1.00	0.00	0.00
8	137.00	Air 3246 B66	3	180.00	7.94	0.83	379.73	9.110	0.83	0.00	0.00
9	137.00	APXVAARR24_43-U-NA2	3	128.00	20.24	0.70	541.69	22.122	0.70	0.00	0.00
10	137.00	APX16DWV-16DWV-S-E-A20	3	40.70	6.46	0.62	176.17	7.563	0.62	0.00	0.00
11	137.00	RMQP-4096-HK	1	2645.00	51.70	1.00	5389.66	89.611	1.00	0.00	0.00
12	137.00	SC2-w100AB	1	22.00	4.79	1.00	121.14	6.069	1.00	0.00	0.00
13	137.00	Ericsson Radio 4449 B71+B12	3	70.00	1.65	0.67	137.47	2.182	0.67	0.00	0.00
14	137.00	Ericsson Radio 2217 B2	3	27.00	1.35	0.67	61.01	1.821	0.67	0.00	0.00
15	137.00	Ericsson Radio 4415 B25	3	46.00	1.64	0.67	86.73	2.151	0.67	0.00	0.00
16	128.00	7770	6	35.00	5.50	0.73	167.57	6.547	0.73	0.00	0.00
17	128.00	SBNH-1D6565C	2	66.10	11.47	0.80	292.37	14.670	0.80	0.00	0.00
18	128.00	AM-X-CD-14-65-00T-RET	1	36.40	5.00	1.00	146.17	6.845	1.00	0.00	0.00
19	128.00	Powerwave LGP21401 RET	6	14.10	1.29	1.00	38.71	2.112	1.00	0.00	0.00
20	128.00	Raycap DC6-48-60-18-8F	1	31.80	0.92	1.00	92.65	1.351	1.00	0.00	0.00
21	128.00	RRU-11	6	51.00	2.52	0.67	122.14	3.143	0.67	0.00	0.00
22	128.00	Powerwave LGP21903	6	5.50	0.27	0.84	13.79	0.661	0.84	0.00	0.00
23	128.00	Low Profile Platform	1	1600.00	22.00	1.00	2974.20	39.384	1.00	0.00	0.00
		Totals:	**71**	**7,127.50**			**18,200.25**				

Linear Appurtenances

Bottom Elev. (ft)	Top Elev. (ft)	Description	Exposed Width	Exposed
0.00	149.00	(13) 1 5/8" Coax	0.00	Inside
0.00	137.00	(3) 1 5/8" Fiber	0.00	Inside
0.00	137.00	(1) 1/2" Coax	0.00	Inside
0.00	128.00	(12) 1 5/8" Coax	0.00	Inside

Shaft Section Properties

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 7	

Increment Length: **5 (ft)**

Elev (ft)	Description	Thick (in)	Dia (in)	Area (in^2)	Ix (in^4)	W/t Ratio	D/t Ratio	Fpy (ksi)	S (in^3)	Weight (lb)
0.00		0.5000	60.000	94.423	42234.3	19.75	120.00	78.2	1386.	0.0
5.00		0.5000	58.952	92.759	40041.0	19.38	117.90	78.6	1337.	1592.4
10.00		0.5000	57.903	91.096	37925.0	19.01	115.81	79.0	1290.	1564.0
15.00		0.5000	56.855	89.432	35884.8	18.64	113.71	79.5	1243.	1535.7
20.00		0.5000	55.807	87.768	33919.2	18.27	111.61	79.9	1197.	1507.4
25.00		0.5000	54.758	86.105	32026.7	17.90	109.52	80.3	1152.	1479.1
30.00		0.5000	53.710	84.441	30205.9	17.53	107.42	80.8	1107.	1450.8
35.00		0.5000	52.662	82.777	28455.5	17.16	105.32	81.2	1064.	1422.5
40.00		0.5000	51.613	81.114	26774.1	16.79	103.23	81.7	1021.	1394.2
41.50	Bot - Section 2	0.5000	51.299	80.615	26282.9	16.68	102.60	81.8	1009.	412.7
45.00		0.5000	50.565	79.450	25160.2	16.42	101.13	82.1	980.0	1802.7
48.00	Top - Section 1	0.4375	50.811	69.947	22424.6	19.07	116.14	0.0	0.0	1524.5
50.00		0.4375	50.392	69.365	21869.3	18.90	115.18	79.2	854.8	474.0
55.00		0.4375	49.343	67.909	20521.1	18.48	112.78	79.7	819.1	1167.8
60.00		0.4375	48.295	66.454	19229.5	18.05	110.39	80.2	784.2	1143.0
65.00		0.4375	47.247	64.998	17993.3	17.63	107.99	80.7	750.1	1118.2
70.00		0.4375	46.198	63.542	16811.2	17.21	105.60	81.2	716.7	1093.5
75.00		0.4375	45.150	62.086	15682.1	16.79	103.20	81.7	684.1	1068.7
80.00		0.4375	44.101	60.631	14604.7	16.36	100.80	82.2	652.3	1043.9
84.00	Bot - Section 3	0.4375	43.263	59.466	13779.2	16.03	98.89	82.5	627.3	817.3
85.00		0.4375	43.053	59.175	13577.8	15.94	98.41	82.5	621.2	348.6
89.50	Top - Section 2	0.3125	42.735	42.076	9566.9	22.70	136.75	0.0	0.0	1547.5
90.00		0.3125	42.630	41.972	9496.1	22.64	136.42	74.8	438.7	71.5
95.00		0.3125	41.581	40.932	8807.7	22.05	133.06	75.5	417.2	705.3
100.00		0.3125	40.533	39.892	8153.4	21.46	129.71	76.2	396.2	687.6
105.00		0.3125	39.485	38.853	7532.3	20.87	126.35	76.9	375.7	669.9
110.00		0.3125	38.436	37.813	6943.6	20.28	123.00	77.6	355.8	652.2
115.00		0.3125	37.388	36.773	6386.4	19.69	119.64	78.2	336.4	634.5
120.00		0.3125	36.340	35.733	5859.8	19.09	116.29	78.9	317.6	616.8
125.00		0.3125	35.291	34.693	5363.0	18.50	112.93	79.6	299.3	599.1
128.00		0.3125	34.662	34.070	5078.9	18.15	110.92	80.1	288.6	351.0
130.00	Top - Section 3	0.3125	34.243	33.654	4895.1	17.91	109.58	80.3	281.6	230.4
130.00	Bot - Section 4	0.1875	34.243	20.267	2969.7	29.85	182.63	65.2	170.8	
135.00		0.1875	33.182	19.635	2700.7	29.79	176.97	66.4	160.3	339.4
137.00		0.1875	32.758	19.383	2597.9	29.40	174.71	66.8	156.2	132.8
140.00		0.1875	32.122	19.004	2448.5	28.80	171.31	67.5	150.1	195.9
145.00		0.1875	31.061	18.373	2212.5	27.80	165.66	68.7	140.3	318.0
149.00		0.1875	30.212	17.868	2035.1	27.00	161.13	69.6	132.7	246.6
150.00		0.1875	30.000	17.742	1992.2	26.80	160.00	69.9	130.8	60.6
										32020.4

Wind Loading - Shaft

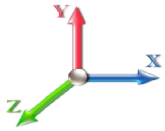
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 8	

Tower Engineering Solutions

Load Case: 1.2D + 1.6W 105 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.60



Iterations 21

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	18.769	20.65	446.02	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		1.00	0.70	18.769	20.65	438.23	0.650	0.000	5.00	25.164	16.36	540.3	0.0	1910.8
10.00		1.00	0.70	18.769	20.65	430.44	0.650	0.000	5.00	24.720	16.07	530.8	0.0	1876.9
15.00		1.00	0.70	18.769	20.65	422.64	0.650	0.000	5.00	24.277	15.78	521.3	0.0	1842.9
20.00		1.00	0.70	18.769	20.65	414.85	0.650	0.000	5.00	23.833	15.49	511.7	0.0	1808.9
25.00		1.00	0.70	18.769	20.65	407.06	0.650	0.000	5.00	23.390	15.20	502.2	0.0	1775.0
30.00		1.00	0.70	18.785	20.66	399.43	0.650	0.000	5.00	22.946	14.91	493.1	0.0	1741.0
35.00		1.00	0.73	19.631	21.59	400.36	0.650	0.000	5.00	22.503	14.63	505.4	0.0	1707.0
40.00		1.00	0.76	20.394	22.43	399.94	0.650	0.000	5.00	22.059	14.34	514.7	0.0	1673.1
41.50	Bot - Section 2	1.00	0.77	20.610	22.67	399.60	0.650	0.000	1.50	6.531	4.25	154.0	0.0	495.3
45.00		1.00	0.79	21.092	23.20	398.47	0.650	0.000	3.50	15.343	9.97	370.2	0.0	2163.2
48.00	Top - Section 1	1.00	0.80	21.485	23.63	397.16	0.650	0.000	3.00	12.979	8.44	319.0	0.0	1829.4
50.00		1.00	0.81	21.737	23.91	403.12	0.650	0.000	2.00	8.564	5.57	212.9	0.0	568.9
55.00		1.00	0.83	22.337	24.57	400.15	0.650	0.000	5.00	21.099	13.71	539.1	0.0	1401.3
60.00		1.00	0.85	22.899	25.19	396.55	0.650	0.000	5.00	20.655	13.43	541.1	0.0	1371.6
65.00		1.00	0.87	23.429	25.77	392.40	0.650	0.000	5.00	20.212	13.14	541.7	0.0	1341.9
70.00		1.00	0.89	23.930	26.32	387.78	0.650	0.000	5.00	19.768	12.85	541.2	0.0	1312.2
75.00		1.00	0.91	24.406	26.85	382.73	0.650	0.000	5.00	19.324	12.56	539.6	0.0	1282.5
80.00		1.00	0.93	24.861	27.35	377.31	0.650	0.000	5.00	18.881	12.27	537.0	0.0	1252.7
84.00	Bot - Section 3	1.00	0.94	25.210	27.73	372.72	0.650	0.000	4.00	14.785	9.61	426.4	0.0	980.8
85.00		1.00	0.94	25.295	27.82	371.54	0.650	0.000	1.00	3.705	2.41	107.2	0.0	418.3
89.50	Top - Section 2	1.00	0.96	25.671	28.24	366.09	0.650	0.000	4.50	16.452	10.69	483.2	0.0	1857.0
90.00		1.00	0.96	25.711	28.28	370.90	0.650	0.000	0.50	1.806	1.17	53.1	0.0	85.8
95.00		1.00	0.97	26.112	28.72	364.59	0.650	0.000	5.00	17.815	11.58	532.2	0.0	846.3
100.00		1.00	0.99	26.497	29.15	358.01	0.650	0.000	5.00	17.371	11.29	526.6	0.0	825.1
105.00		1.00	1.00	26.869	29.56	351.19	0.650	0.000	5.00	16.928	11.00	520.3	0.0	803.9
110.00		1.00	1.02	27.229	29.95	344.15	0.650	0.000	5.00	16.484	10.71	513.5	0.0	782.6
115.00		1.00	1.03	27.577	30.33	336.89	0.650	0.000	5.00	16.040	10.43	506.0	0.0	761.4
120.00		1.00	1.04	27.914	30.71	329.44	0.650	0.000	5.00	15.597	10.14	498.1	0.0	740.2
125.00		1.00	1.05	28.242	31.07	321.81	0.650	0.000	5.00	15.153	9.85	489.6	0.0	718.9
128.00	Appurtenance(s)	1.00	1.06	28.434	31.28	317.15	0.650	0.000	3.00	8.879	5.77	288.8	0.0	421.2
130.00	Top - Section 3	1.00	1.07	28.560	31.42	314.00	0.650	0.000	2.00	5.831	3.79	190.5	0.0	276.5
135.00		1.00	1.08	28.869	31.76	305.92	0.650	0.000	5.00	14.264	9.27	471.1	0.0	407.3
137.00	Appurtenance(s)	1.00	1.08	28.991	31.89	302.65	0.650	0.000	2.00	5.580	3.63	185.1	0.0	159.3
140.00		1.00	1.09	29.171	32.09	297.69	0.650	0.000	3.00	8.235	5.35	274.8	0.0	235.1
145.00		1.00	1.10	29.465	32.41	289.30	0.650	0.000	5.00	13.366	8.69	450.5	0.0	381.6
149.00	Appurtenance(s)	1.00	1.11	29.695	32.66	282.49	0.650	0.000	4.00	10.370	6.74	352.3	0.0	296.0
150.00		1.00	1.11	29.752	32.73	280.78	0.650	0.000	1.00	2.548	1.66	86.7	0.0	72.7
								Totals:	**150.00**			**15,371.1**		**38,424.5**

Discrete Appurtenance Forces

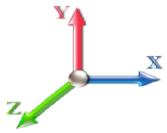
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 9	

Tower Engineering Solutions

Load Case: 1.2D + 1.6W 105 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.60



Iterations 21

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	149.00	HBXX-6516DS-VTM	3	29.695	32.664	0.69	0.90	11.29	110.16	0.000	0.000	590.00	0.00	0.00
2	149.00	BXA-70063-6CF	3	29.695	32.664	0.66	0.90	14.92	61.20	0.000	0.000	779.79	0.00	0.00
3	149.00	HBXX-6517DS-VTM	3	29.695	32.664	0.69	0.90	17.78	146.52	0.000	0.000	929.00	0.00	0.00
4	149.00	RFS FD9R6004/2C-3L	6	29.695	32.664	0.90	0.90	1.94	22.32	0.000	0.000	101.60	0.00	0.00
5	149.00	LNX-6512DS-A1M	3	29.695	32.664	0.72	0.90	10.99	100.80	0.000	0.000	574.60	0.00	0.00
6	149.00	DB-T1-6Z-8AB-0Z	1	29.695	32.664	0.90	0.90	4.32	22.68	0.000	0.000	225.78	0.00	0.00
7	149.00	ALU RRH 2x60 AWS	3	29.695	32.664	0.60	0.90	6.33	198.00	0.000	0.000	330.90	0.00	0.00
8	137.00	Ericsson Radio 4415 B25	3	28.991	31.890	0.50	0.75	2.47	165.60	0.000	0.000	126.15	0.00	0.00
9	137.00	Ericsson Radio 2217 B2	3	28.991	31.890	0.50	0.75	2.04	97.20	0.000	0.000	103.84	0.00	0.00
10	137.00	Ericsson Radio 4449	3	28.991	31.890	0.50	0.75	2.49	252.00	0.000	0.000	126.92	0.00	0.00
11	137.00	SC2-w100AB	1	28.991	31.890	1.00	1.00	4.79	26.40	0.000	0.000	244.41	0.00	0.00
12	137.00	RMQP-4096-HK	1	28.991	31.890	1.00	1.00	51.70	3174.00	0.000	0.000	2637.95	0.00	0.00
13	137.00	APXVAARR24_43-U-NA2	3	28.991	31.890	0.52	0.75	31.88	460.80	0.000	0.000	1626.55	0.00	0.00
14	137.00	Air 3246 B66	3	28.991	31.890	0.62	0.75	14.83	648.00	0.000	0.000	756.58	0.00	0.00
15	137.00	APX16DWV-16DWV-S-E-	3	28.991	31.890	0.46	0.75	9.01	146.52	0.000	0.000	459.82	0.00	0.00
16	128.00	Powerwave LGP21401	6	28.434	31.277	0.80	0.80	6.19	101.52	0.000	0.000	309.87	0.00	0.00
17	128.00	7770	6	28.434	31.277	0.58	0.80	19.27	252.00	0.000	0.000	964.43	0.00	0.00
18	128.00	SBNH-1D6565C	2	28.434	31.277	0.64	0.80	14.68	158.64	0.000	0.000	734.71	0.00	0.00
19	128.00	AM-X-CD-14-65-00T-RET	1	28.434	31.277	0.80	0.80	4.00	43.68	0.000	0.000	200.17	0.00	0.00
20	128.00	RRU-11	6	28.434	31.277	0.54	0.80	8.10	367.20	0.000	0.000	405.57	0.00	0.00
21	128.00	Raycap DC6-48-60-18-8F	1	28.434	31.277	0.80	0.80	0.74	38.16	0.000	0.000	36.83	0.00	0.00
22	128.00	Powerwave LGP21903	6	28.434	31.277	0.67	0.80	1.09	39.60	0.000	0.000	54.48	0.00	0.00
23	128.00	Low Profile Platform	1	28.434	31.277	1.00	1.00	22.00	1920.00	0.000	0.000	1100.95	0.00	0.00
							Totals:		**8,553.00**			**13,420.89**		

Total Applied Force Summary

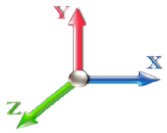
Structure:	CT13073-A-SBA		**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North		**Exposure:**	B	
Height:	150.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 10

Tower Engineering Solutions

Load Case: 1.2D + 1.6W 105 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.60



Iterations 21

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		540.31	2086.50	0.00	0.00
10.00		530.79	2052.54	0.00	0.00
15.00		521.26	2018.57	0.00	0.00
20.00		511.74	1984.60	0.00	0.00
25.00		502.22	1950.64	0.00	0.00
30.00		493.11	1916.67	0.00	0.00
35.00		505.35	1882.70	0.00	0.00
40.00		514.66	1848.74	0.00	0.00
41.50		153.99	548.00	0.00	0.00
45.00		370.23	2286.20	0.00	0.00
48.00		318.99	1934.76	0.00	0.00
50.00		212.95	639.13	0.00	0.00
55.00		539.14	1577.02	0.00	0.00
60.00		541.09	1547.30	0.00	0.00
65.00		541.72	1517.58	0.00	0.00
70.00		541.17	1487.86	0.00	0.00
75.00		539.56	1458.14	0.00	0.00
80.00		536.98	1428.42	0.00	0.00
84.00		426.41	1121.33	0.00	0.00
85.00		107.21	453.42	0.00	0.00
89.50		483.16	2015.16	0.00	0.00
90.00		53.12	103.37	0.00	0.00
95.00		532.16	1021.99	0.00	0.00
100.00		526.57	1000.76	0.00	0.00
105.00		520.33	979.53	0.00	0.00
110.00		513.47	958.31	0.00	0.00
115.00		506.04	937.08	0.00	0.00
120.00		498.07	915.85	0.00	0.00
125.00		489.58	894.62	0.00	0.00
128.00	(29) attachments	4095.83	3447.38	0.00	0.00
130.00		190.50	316.86	0.00	0.00
135.00		471.08	508.13	0.00	0.00
137.00	(20) attachments	6267.27	5170.16	0.00	0.00
140.00		274.82	283.79	0.00	0.00
145.00		450.54	462.68	0.00	0.00
149.00	(22) attachments	3883.94	1022.54	0.00	0.00
150.00		86.71	72.70	0.00	0.00
	Totals:	**28,792.02**	**51,851.00**	**0.00**	**0.00**

Calculated Forces

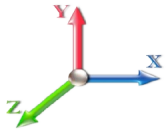
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 11	

Tower Engineering Solutions

Load Case: 1.2D + 1.6W 105 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.60



Iterations 21

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-51.82	-28.84	0.00	-3079.5	0.00	3079.55	6643.18	3321.59	16232.9	8128.53	0.00	0.000	0.000	0.387
5.00	-49.69	-28.38	0.00	-2935.3	0.00	2935.36	6562.43	3281.22	15750.7	7887.07	0.05	-0.101	0.000	0.380
10.00	-47.59	-27.93	0.00	-2793.4	0.00	2793.43	6480.38	3240.19	15272.4	7647.59	0.22	-0.203	0.000	0.373
15.00	-45.52	-27.48	0.00	-2653.7	0.00	2653.77	6397.03	3198.52	14798.3	7410.16	0.48	-0.305	0.000	0.365
20.00	-43.49	-27.04	0.00	-2516.3	0.00	2516.35	6312.38	3156.19	14328.4	7174.88	0.86	-0.408	0.000	0.358
25.00	-41.50	-26.59	0.00	-2381.1	0.00	2381.16	6226.42	3113.21	13863.0	6941.83	1.34	-0.510	0.000	0.350
30.00	-39.54	-26.15	0.00	-2248.1	0.00	2248.19	6139.16	3069.58	13402.2	6711.09	1.93	-0.613	0.000	0.342
35.00	-37.62	-25.69	0.00	-2117.4	0.00	2117.42	6050.60	3025.30	12946.2	6482.75	2.63	-0.716	0.000	0.333
40.00	-35.75	-25.20	0.00	-1988.9	0.00	1988.95	5960.74	2980.37	12495.2	6256.90	3.43	-0.819	0.000	0.324
41.50	-35.18	-25.07	0.00	-1951.1	0.00	1951.16	5933.53	2966.76	12360.9	6189.64	3.70	-0.850	0.000	0.321
45.00	-32.87	-24.70	0.00	-1863.4	0.00	1863.43	5869.58	2934.79	12049.3	6033.61	4.35	-0.922	0.000	0.315
48.00	-30.92	-24.38	0.00	-1789.3	0.00	1789.33	4971.57	2485.79	10282.0	5148.64	4.95	-0.984	0.000	0.354
50.00	-30.25	-24.19	0.00	-1740.5	0.00	1740.58	4942.60	2471.30	10136.2	5075.65	5.37	-1.026	0.000	0.349
55.00	-28.64	-23.68	0.00	-1619.6	0.00	1619.62	4869.24	2434.62	9774.42	4894.48	6.50	-1.135	0.000	0.337
60.00	-27.06	-23.16	0.00	-1501.2	0.00	1501.24	4794.58	2397.29	9416.42	4715.21	7.75	-1.243	0.000	0.324
65.00	-25.51	-22.63	0.00	-1385.4	0.00	1385.47	4718.63	2359.31	9062.39	4537.93	9.11	-1.350	0.000	0.311
70.00	-24.00	-22.09	0.00	-1272.3	0.00	1272.33	4641.37	2320.68	8712.52	4362.74	10.58	-1.455	0.000	0.297
75.00	-22.52	-21.55	0.00	-1161.8	0.00	1161.87	4562.80	2281.40	8366.97	4189.70	12.16	-1.558	0.000	0.282
80.00	-21.07	-21.01	0.00	-1054.1	0.00	1054.10	4482.94	2241.47	8025.91	4018.92	13.85	-1.658	0.000	0.267
84.00	-19.95	-20.57	0.00	-970.06	0.00	970.06	4418.04	2209.02	7756.28	3883.90	15.27	-1.737	0.000	0.254
85.00	-19.48	-20.47	0.00	-949.49	0.00	949.49	4396.40	2198.20	7680.13	3845.78	15.64	-1.757	0.000	0.251
89.50	-17.46	-19.93	0.00	-857.40	0.00	857.40	2828.72	1414.36	4933.25	2470.29	17.33	-1.842	0.000	0.353
90.00	-17.34	-19.90	0.00	-847.43	0.00	847.43	2824.36	1412.18	4913.38	2460.34	17.53	-1.852	0.000	0.351
95.00	-16.29	-19.36	0.00	-747.95	0.00	747.95	2780.02	1390.01	4715.55	2361.28	19.53	-1.971	0.000	0.323
100.00	-15.28	-18.83	0.00	-651.13	0.00	651.13	2734.38	1367.19	4519.43	2263.07	21.66	-2.084	0.000	0.293
105.00	-14.29	-18.30	0.00	-556.97	0.00	556.97	2687.43	1343.72	4325.17	2165.80	23.90	-2.190	0.000	0.263
110.00	-13.32	-17.77	0.00	-465.47	0.00	465.47	2639.19	1319.59	4132.95	2069.55	26.25	-2.286	0.000	0.230
115.00	-12.38	-17.24	0.00	-376.62	0.00	376.62	2589.64	1294.82	3942.93	1974.40	28.69	-2.373	0.000	0.196
120.00	-11.47	-16.72	0.00	-290.39	0.00	290.39	2538.79	1269.39	3755.30	1880.44	31.21	-2.447	0.000	0.159
125.00	-10.58	-16.20	0.00	-206.79	0.00	206.79	2486.64	1243.32	3570.20	1787.76	33.81	-2.507	0.000	0.120
128.00	-7.31	-11.96	0.00	-158.18	0.00	158.18	2454.72	1227.36	3460.44	1732.79	35.40	-2.536	0.000	0.094
130.00	-7.00	-11.76	0.00	-134.26	0.00	134.26	2433.18	1216.59	3387.83	1696.43	36.46	-2.553	0.000	0.082
130.00	-7.00	-11.76	0.00	-134.26	0.00	134.26	1188.95	594.48	1667.65	835.07	36.46	-2.553	0.000	0.167
135.00	-6.51	-11.27	0.00	-75.46	0.00	75.46	1172.65	586.33	1593.28	797.82	39.15	-2.583	0.000	0.100
137.00	-1.63	-4.77	0.00	-52.92	0.00	52.92	1165.76	582.88	1563.43	782.88	40.24	-2.597	0.000	0.069
140.00	-1.35	-4.49	0.00	-38.60	0.00	38.60	1155.02	577.51	1518.58	760.42	41.88	-2.612	0.000	0.052
145.00	-0.91	-4.02	0.00	-16.16	0.00	16.16	1136.06	568.03	1443.74	722.95	44.62	-2.628	0.000	0.023
149.00	-0.07	-0.09	0.00	-0.09	0.00	0.09	1119.92	559.96	1383.89	692.97	46.82	-2.632	0.000	0.000
150.00	0.00	-0.09	0.00	0.00	0.00	0.00	1115.76	557.88	1368.94	685.49	47.37	-2.632	0.000	0.000

Wind Loading - Shaft

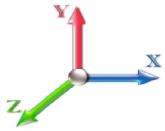
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 12	

Tower Engineering Solutions

Load Case: 0.9D + 1.6W 105 mph Wind

Dead Load Factor 0.90

Wind Load Factor 1.60



Iterations 21

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	18.769	20.65	446.02	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		1.00	0.70	18.769	20.65	438.23	0.650	0.000	5.00	25.164	16.36	540.3	0.0	1433.1
10.00		1.00	0.70	18.769	20.65	430.44	0.650	0.000	5.00	24.720	16.07	530.8	0.0	1407.6
15.00		1.00	0.70	18.769	20.65	422.64	0.650	0.000	5.00	24.277	15.78	521.3	0.0	1382.2
20.00		1.00	0.70	18.769	20.65	414.85	0.650	0.000	5.00	23.833	15.49	511.7	0.0	1356.7
25.00		1.00	0.70	18.769	20.65	407.06	0.650	0.000	5.00	23.390	15.20	502.2	0.0	1331.2
30.00		1.00	0.70	18.785	20.66	399.43	0.650	0.000	5.00	22.946	14.91	493.1	0.0	1305.7
35.00		1.00	0.73	19.631	21.59	400.36	0.650	0.000	5.00	22.503	14.63	505.4	0.0	1280.3
40.00		1.00	0.76	20.394	22.43	399.94	0.650	0.000	5.00	22.059	14.34	514.7	0.0	1254.8
41.50	Bot - Section 2	1.00	0.77	20.610	22.67	399.60	0.650	0.000	1.50	6.531	4.25	154.0	0.0	371.5
45.00		1.00	0.79	21.092	23.20	398.47	0.650	0.000	3.50	15.343	9.97	370.2	0.0	1622.4
48.00	Top - Section 1	1.00	0.80	21.485	23.63	397.16	0.650	0.000	3.00	12.979	8.44	319.0	0.0	1372.0
50.00		1.00	0.81	21.737	23.91	403.12	0.650	0.000	2.00	8.564	5.57	212.9	0.0	426.6
55.00		1.00	0.83	22.337	24.57	400.15	0.650	0.000	5.00	21.099	13.71	539.1	0.0	1051.0
60.00		1.00	0.85	22.899	25.19	396.55	0.650	0.000	5.00	20.655	13.43	541.1	0.0	1028.7
65.00		1.00	0.87	23.429	25.77	392.40	0.650	0.000	5.00	20.212	13.14	541.7	0.0	1006.4
70.00		1.00	0.89	23.930	26.32	387.78	0.650	0.000	5.00	19.768	12.85	541.2	0.0	984.1
75.00		1.00	0.91	24.406	26.85	382.73	0.650	0.000	5.00	19.324	12.56	539.6	0.0	961.8
80.00		1.00	0.93	24.861	27.35	377.31	0.650	0.000	5.00	18.881	12.27	537.0	0.0	939.6
84.00	Bot - Section 3	1.00	0.94	25.210	27.73	372.72	0.650	0.000	4.00	14.785	9.61	426.4	0.0	735.6
85.00		1.00	0.94	25.295	27.82	371.54	0.650	0.000	1.00	3.705	2.41	107.2	0.0	313.7
89.50	Top - Section 2	1.00	0.96	25.671	28.24	366.09	0.650	0.000	4.50	16.452	10.69	483.2	0.0	1392.8
90.00		1.00	0.96	25.711	28.28	370.90	0.650	0.000	0.50	1.806	1.17	53.1	0.0	64.3
95.00		1.00	0.97	26.112	28.72	364.59	0.650	0.000	5.00	17.815	11.58	532.2	0.0	634.7
100.00		1.00	0.99	26.497	29.15	358.01	0.650	0.000	5.00	17.371	11.29	526.6	0.0	618.8
105.00		1.00	1.00	26.869	29.56	351.19	0.650	0.000	5.00	16.928	11.00	520.3	0.0	602.9
110.00		1.00	1.02	27.229	29.95	344.15	0.650	0.000	5.00	16.484	10.71	513.5	0.0	587.0
115.00		1.00	1.03	27.577	30.33	336.89	0.650	0.000	5.00	16.040	10.43	506.0	0.0	571.0
120.00		1.00	1.04	27.914	30.71	329.44	0.650	0.000	5.00	15.597	10.14	498.1	0.0	555.1
125.00		1.00	1.05	28.242	31.07	321.81	0.650	0.000	5.00	15.153	9.85	489.6	0.0	539.2
128.00	Appurtenance(s)	1.00	1.06	28.434	31.28	317.15	0.650	0.000	3.00	8.879	5.77	288.8	0.0	315.9
130.00	Top - Section 3	1.00	1.07	28.560	31.42	314.00	0.650	0.000	2.00	5.831	3.79	190.5	0.0	207.4
135.00		1.00	1.08	28.869	31.76	305.92	0.650	0.000	5.00	14.264	9.27	471.1	0.0	305.5
137.00	Appurtenance(s)	1.00	1.08	28.991	31.89	302.65	0.650	0.000	2.00	5.580	3.63	185.1	0.0	119.5
140.00		1.00	1.09	29.171	32.09	297.69	0.650	0.000	3.00	8.235	5.35	274.8	0.0	176.3
145.00		1.00	1.10	29.465	32.41	289.30	0.650	0.000	5.00	13.366	8.69	450.5	0.0	286.2
149.00	Appurtenance(s)	1.00	1.11	29.695	32.66	282.49	0.650	0.000	4.00	10.370	6.74	352.3	0.0	222.0
150.00		1.00	1.11	29.752	32.73	280.78	0.650	0.000	1.00	2.548	1.66	86.7	0.0	54.5
								Totals:	**150.00**			**15,371.1**		**28,818.4**

Discrete Appurtenance Forces

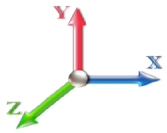
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 13	

Tower Engineering Solutions

Load Case: 0.9D + 1.6W 105 mph Wind

Dead Load Factor 0.90

Wind Load Factor 1.60



Iterations 21

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	149.00	HBXX-6516DS-VTM	3	29.695	32.664	0.69	0.90	11.29	82.62	0.000	0.000	590.00	0.00	0.00
2	149.00	BXA-70063-6CF	3	29.695	32.664	0.66	0.90	14.92	45.90	0.000	0.000	779.79	0.00	0.00
3	149.00	HBXX-6517DS-VTM	3	29.695	32.664	0.69	0.90	17.78	109.89	0.000	0.000	929.00	0.00	0.00
4	149.00	RFS FD9R6004/2C-3L	6	29.695	32.664	0.90	0.90	1.94	16.74	0.000	0.000	101.60	0.00	0.00
5	149.00	LNX-6512DS-A1M	3	29.695	32.664	0.72	0.90	10.99	75.60	0.000	0.000	574.60	0.00	0.00
6	149.00	DB-T1-6Z-8AB-0Z	1	29.695	32.664	0.90	0.90	4.32	17.01	0.000	0.000	225.78	0.00	0.00
7	149.00	ALU RRH 2x60 AWS	3	29.695	32.664	0.60	0.90	6.33	148.50	0.000	0.000	330.90	0.00	0.00
8	137.00	Ericsson Radio 4415 B25	3	28.991	31.890	0.50	0.75	2.47	124.20	0.000	0.000	126.15	0.00	0.00
9	137.00	Ericsson Radio 2217 B2	3	28.991	31.890	0.50	0.75	2.04	72.90	0.000	0.000	103.84	0.00	0.00
10	137.00	Ericsson Radio 4449	3	28.991	31.890	0.50	0.75	2.49	189.00	0.000	0.000	126.92	0.00	0.00
11	137.00	SC2-w100AB	1	28.991	31.890	1.00	1.00	4.79	19.80	0.000	0.000	244.41	0.00	0.00
12	137.00	RMQP-4096-HK	1	28.991	31.890	1.00	1.00	51.70	2380.50	0.000	0.000	2637.95	0.00	0.00
13	137.00	APXVAARR24_43-U-NA2	3	28.991	31.890	0.52	0.75	31.88	345.60	0.000	0.000	1626.55	0.00	0.00
14	137.00	Air 3246 B66	3	28.991	31.890	0.62	0.75	14.83	486.00	0.000	0.000	756.58	0.00	0.00
15	137.00	APX16DWV-16DWV-S-E-	3	28.991	31.890	0.46	0.75	9.01	109.89	0.000	0.000	459.82	0.00	0.00
16	128.00	Powerwave LGP21401	6	28.434	31.277	0.80	0.80	6.19	76.14	0.000	0.000	309.87	0.00	0.00
17	128.00	7770	6	28.434	31.277	0.58	0.80	19.27	189.00	0.000	0.000	964.43	0.00	0.00
18	128.00	SBNH-1D6565C	2	28.434	31.277	0.64	0.80	14.68	118.98	0.000	0.000	734.71	0.00	0.00
19	128.00	AM-X-CD-14-65-00T-RET	1	28.434	31.277	0.80	0.80	4.00	32.76	0.000	0.000	200.17	0.00	0.00
20	128.00	RRU-11	6	28.434	31.277	0.54	0.80	8.10	275.40	0.000	0.000	405.57	0.00	0.00
21	128.00	Raycap DC6-48-60-18-8F	1	28.434	31.277	0.80	0.80	0.74	28.62	0.000	0.000	36.83	0.00	0.00
22	128.00	Powerwave LGP21903	6	28.434	31.277	0.67	0.80	1.09	29.70	0.000	0.000	54.48	0.00	0.00
23	128.00	Low Profile Platform	1	28.434	31.277	1.00	1.00	22.00	1440.00	0.000	0.000	1100.95	0.00	0.00
							Totals:		**6,414.75**			**13,420.89**		

Total Applied Force Summary

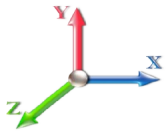
Structure:	CT13073-A-SBA		**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North		**Exposure:**	B	
Height:	150.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 14

Tower Engineering Solutions

Load Case: 0.9D + 1.6W 105 mph Wind

Dead Load Factor 0.90

Wind Load Factor 1.60



Iterations 21

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		540.31	1564.88	0.00	0.00
10.00		530.79	1539.40	0.00	0.00
15.00		521.26	1513.93	0.00	0.00
20.00		511.74	1488.45	0.00	0.00
25.00		502.22	1462.98	0.00	0.00
30.00		493.11	1437.50	0.00	0.00
35.00		505.35	1412.03	0.00	0.00
40.00		514.66	1386.55	0.00	0.00
41.50		153.99	411.00	0.00	0.00
45.00		370.23	1714.65	0.00	0.00
48.00		318.99	1451.07	0.00	0.00
50.00		212.95	479.35	0.00	0.00
55.00		539.14	1182.77	0.00	0.00
60.00		541.09	1160.47	0.00	0.00
65.00		541.72	1138.18	0.00	0.00
70.00		541.17	1115.89	0.00	0.00
75.00		539.56	1093.60	0.00	0.00
80.00		536.98	1071.31	0.00	0.00
84.00		426.41	841.00	0.00	0.00
85.00		107.21	340.06	0.00	0.00
89.50		483.16	1511.37	0.00	0.00
90.00		53.12	77.53	0.00	0.00
95.00		532.16	766.49	0.00	0.00
100.00		526.57	750.57	0.00	0.00
105.00		520.33	734.65	0.00	0.00
110.00		513.47	718.73	0.00	0.00
115.00		506.04	702.81	0.00	0.00
120.00		498.07	686.89	0.00	0.00
125.00		489.58	670.96	0.00	0.00
128.00	(29) attachments	4095.83	2585.54	0.00	0.00
130.00		190.50	237.64	0.00	0.00
135.00		471.08	381.10	0.00	0.00
137.00	(20) attachments	6267.27	3877.62	0.00	0.00
140.00		274.82	212.84	0.00	0.00
145.00		450.54	347.01	0.00	0.00
149.00	(22) attachments	3883.94	766.91	0.00	0.00
150.00		86.71	54.53	0.00	0.00
	Totals:	**28,792.02**	**38,888.25**	**0.00**	**0.00**

Calculated Forces

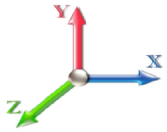
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 15	

Tower Engineering Solutions

Load Case: 0.9D + 1.6W 105 mph Wind

Dead Load Factor 0.90

Wind Load Factor 1.60



Iterations 21

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-38.86	-28.83	0.00	-3062.2	0.00	3062.20	6643.18	3321.59	16232.9	8128.53	0.00	0.000	0.000	0.383
5.00	-37.25	-28.35	0.00	-2918.0	0.00	2918.06	6562.43	3281.22	15750.7	7887.07	0.05	-0.101	0.000	0.376
10.00	-35.66	-27.88	0.00	-2776.3	0.00	2776.31	6480.38	3240.19	15272.4	7647.59	0.21	-0.202	0.000	0.369
15.00	-34.10	-27.41	0.00	-2636.9	0.00	2636.92	6397.03	3198.52	14798.3	7410.16	0.48	-0.303	0.000	0.361
20.00	-32.57	-26.95	0.00	-2499.8	0.00	2499.86	6312.38	3156.19	14328.4	7174.88	0.85	-0.405	0.000	0.354
25.00	-31.06	-26.49	0.00	-2365.1	0.00	2365.12	6226.42	3113.21	13863.0	6941.83	1.33	-0.507	0.000	0.346
30.00	-29.58	-26.04	0.00	-2232.6	0.00	2232.67	6139.16	3069.58	13402.2	6711.09	1.92	-0.609	0.000	0.338
35.00	-28.13	-25.56	0.00	-2102.4	0.00	2102.49	6050.60	3025.30	12946.2	6482.75	2.61	-0.711	0.000	0.329
40.00	-26.72	-25.06	0.00	-1974.6	0.00	1974.67	5960.74	2980.37	12495.2	6256.90	3.41	-0.813	0.000	0.320
41.50	-26.29	-24.93	0.00	-1937.0	0.00	1937.08	5933.53	2966.76	12360.9	6189.64	3.67	-0.844	0.000	0.317
45.00	-24.55	-24.56	0.00	-1849.8	0.00	1849.84	5869.58	2934.79	12049.3	6033.61	4.32	-0.916	0.000	0.311
48.00	-23.09	-24.24	0.00	-1776.1	0.00	1776.17	4971.57	2485.79	10282.0	5148.64	4.92	-0.978	0.000	0.350
50.00	-22.58	-24.04	0.00	-1727.7	0.00	1727.70	4942.60	2471.30	10136.2	5075.65	5.33	-1.019	0.000	0.345
55.00	-21.36	-23.52	0.00	-1607.4	0.00	1607.48	4869.24	2434.62	9774.42	4894.48	6.46	-1.127	0.000	0.333
60.00	-20.17	-23.00	0.00	-1489.8	0.00	1489.86	4794.58	2397.29	9416.42	4715.21	7.70	-1.235	0.000	0.320
65.00	-19.00	-22.46	0.00	-1374.8	0.00	1374.88	4718.63	2359.31	9062.39	4537.93	9.05	-1.341	0.000	0.307
70.00	-17.86	-21.93	0.00	-1262.5	0.00	1262.57	4641.37	2320.68	8712.52	4362.74	10.51	-1.445	0.000	0.293
75.00	-16.75	-21.39	0.00	-1152.9	0.00	1152.93	4562.80	2281.40	8366.97	4189.70	12.08	-1.547	0.000	0.279
80.00	-15.66	-20.85	0.00	-1045.9	0.00	1045.99	4482.94	2241.47	8025.91	4018.92	13.75	-1.647	0.000	0.264
84.00	-14.81	-20.41	0.00	-962.60	0.00	962.60	4418.04	2209.02	7756.28	3883.90	15.17	-1.725	0.000	0.251
85.00	-14.46	-20.30	0.00	-942.19	0.00	942.19	4396.40	2198.20	7680.13	3845.78	15.53	-1.745	0.000	0.248
89.50	-12.94	-19.78	0.00	-850.83	0.00	850.83	2828.72	1414.36	4933.25	2470.29	17.22	-1.829	0.000	0.349
90.00	-12.85	-19.74	0.00	-840.93	0.00	840.93	2824.36	1412.18	4913.38	2460.34	17.41	-1.839	0.000	0.347
95.00	-12.06	-19.21	0.00	-742.22	0.00	742.22	2780.02	1390.01	4715.55	2361.28	19.40	-1.957	0.000	0.319
100.00	-11.29	-18.68	0.00	-646.16	0.00	646.16	2734.38	1367.19	4519.43	2263.07	21.51	-2.069	0.000	0.290
105.00	-10.55	-18.15	0.00	-552.77	0.00	552.77	2687.43	1343.72	4325.17	2165.80	23.74	-2.174	0.000	0.259
110.00	-9.82	-17.63	0.00	-462.01	0.00	462.01	2639.19	1319.59	4132.95	2069.55	26.07	-2.270	0.000	0.227
115.00	-9.11	-17.10	0.00	-373.89	0.00	373.89	2589.64	1294.82	3942.93	1974.40	28.49	-2.356	0.000	0.193
120.00	-8.43	-16.59	0.00	-288.37	0.00	288.37	2538.79	1269.39	3755.30	1880.44	31.00	-2.429	0.000	0.157
125.00	-7.77	-16.08	0.00	-205.43	0.00	205.43	2486.64	1243.32	3570.20	1787.76	33.58	-2.489	0.000	0.118
128.00	-5.36	-11.87	0.00	-157.20	0.00	157.20	2454.72	1227.36	3460.44	1732.79	35.15	-2.518	0.000	0.093
130.00	-5.13	-11.67	0.00	-133.46	0.00	133.46	2433.18	1216.59	3387.83	1696.43	36.21	-2.534	0.000	0.081
130.00	-5.13	-11.67	0.00	-133.46	0.00	133.46	1188.95	594.48	1667.65	835.07	36.21	-2.534	0.000	0.165
135.00	-4.76	-11.19	0.00	-75.09	0.00	75.09	1172.65	586.33	1593.28	797.82	38.88	-2.565	0.000	0.099
137.00	-1.17	-4.75	0.00	-52.71	0.00	52.71	1165.76	582.88	1563.43	782.88	39.96	-2.578	0.000	0.068
140.00	-0.97	-4.47	0.00	-38.45	0.00	38.45	1155.02	577.51	1518.58	760.42	41.58	-2.593	0.000	0.051
145.00	-0.64	-4.00	0.00	-16.10	0.00	16.10	1136.06	568.03	1443.74	722.95	44.31	-2.609	0.000	0.023
149.00	-0.05	-0.09	0.00	-0.09	0.00	0.09	1119.92	559.96	1383.89	692.97	46.50	-2.613	0.000	0.000
150.00	0.00	-0.09	0.00	0.00	0.00	0.00	1115.76	557.88	1368.94	685.49	47.04	-2.613	0.000	0.000

Wind Loading - Shaft

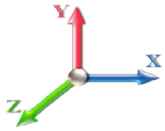
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 16	

Tower Engineering Solutions

Load Case: 1.2D + 1.0Di + 1.0Wi 50 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.00



Iterations 20

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	4.256	4.68	0.00	1.200	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		1.00	0.70	4.256	4.68	0.00	1.200	1.242	5.00	26.199	31.44	147.2	468.4	2379.2
10.00		1.00	0.70	4.256	4.68	0.00	1.200	1.331	5.00	25.830	31.00	145.1	494.0	2370.8
15.00		1.00	0.70	4.256	4.68	0.00	1.200	1.386	5.00	25.432	30.52	142.9	505.8	2348.7
20.00		1.00	0.70	4.256	4.68	0.00	1.200	1.427	5.00	25.022	30.03	140.6	511.5	2320.4
25.00		1.00	0.70	4.256	4.68	0.00	1.200	1.459	5.00	24.605	29.53	138.2	513.8	2288.7
30.00		1.00	0.70	4.260	4.69	0.00	1.200	1.486	5.00	24.184	29.02	136.0	513.7	2254.7
35.00		1.00	0.73	4.451	4.90	0.00	1.200	1.509	5.00	23.760	28.51	139.6	512.0	2219.0
40.00		1.00	0.76	4.625	5.09	0.00	1.200	1.529	5.00	23.333	28.00	142.4	509.0	2182.1
41.50	Bot - Section 2	1.00	0.77	4.673	5.14	0.00	1.200	1.535	1.50	6.915	8.30	42.7	152.4	647.7
45.00		1.00	0.79	4.783	5.26	0.00	1.200	1.547	3.50	16.246	19.50	102.6	359.5	2522.7
48.00	Top - Section 1	1.00	0.80	4.872	5.36	0.00	1.200	1.557	3.00	13.757	16.51	88.5	306.5	2135.8
50.00		1.00	0.81	4.929	5.42	0.00	1.200	1.564	2.00	9.085	10.90	59.1	203.5	772.4
55.00		1.00	0.83	5.065	5.57	0.00	1.200	1.579	5.00	22.414	26.90	149.9	503.5	1904.9
60.00		1.00	0.85	5.193	5.71	0.00	1.200	1.592	5.00	21.982	26.38	150.7	497.6	1869.2
65.00		1.00	0.87	5.313	5.84	0.00	1.200	1.605	5.00	21.549	25.86	151.1	491.2	1833.1
70.00		1.00	0.89	5.426	5.97	0.00	1.200	1.617	5.00	21.116	25.34	151.2	484.3	1796.5
75.00		1.00	0.91	5.534	6.09	0.00	1.200	1.628	5.00	20.681	24.82	151.1	477.1	1759.5
80.00		1.00	0.93	5.637	6.20	0.00	1.200	1.639	5.00	20.247	24.30	150.7	469.5	1722.2
84.00	Bot - Section 3	1.00	0.94	5.716	6.29	0.00	1.200	1.647	4.00	15.883	19.06	119.9	370.6	1351.4
85.00		1.00	0.94	5.736	6.31	0.00	1.200	1.649	1.00	3.980	4.78	30.1	93.6	511.9
89.50	Top - Section 2	1.00	0.96	5.821	6.40	0.00	1.200	1.657	4.50	17.695	21.23	136.0	414.7	2271.8
90.00		1.00	0.96	5.830	6.41	0.00	1.200	1.658	0.50	1.944	2.33	15.0	46.0	131.8
95.00		1.00	0.97	5.921	6.51	0.00	1.200	1.667	5.00	19.204	23.04	150.1	451.6	1297.9
100.00		1.00	0.99	6.008	6.61	0.00	1.200	1.676	5.00	18.768	22.52	148.8	443.0	1268.1
105.00		1.00	1.00	6.093	6.70	0.00	1.200	1.684	5.00	18.331	22.00	147.4	434.2	1238.1
110.00		1.00	1.02	6.174	6.79	0.00	1.200	1.692	5.00	17.894	21.47	145.8	425.2	1207.8
115.00		1.00	1.03	6.253	6.88	0.00	1.200	1.699	5.00	17.457	20.95	144.1	416.0	1177.4
120.00		1.00	1.04	6.330	6.96	0.00	1.200	1.707	5.00	17.019	20.42	142.2	406.6	1146.8
125.00		1.00	1.05	6.404	7.04	0.00	1.200	1.714	5.00	16.581	19.90	140.2	397.1	1116.1
128.00	Appurtenance(s)	1.00	1.06	6.448	7.09	0.00	1.200	1.718	3.00	9.738	11.69	82.9	234.8	656.0
130.00	Top - Section 3	1.00	1.07	6.476	7.12	0.00	1.200	1.720	2.00	6.404	7.68	54.7	155.0	431.5
135.00		1.00	1.08	6.546	7.20	0.00	1.200	1.727	5.00	15.703	18.84	135.7	377.5	784.8
137.00	Appurtenance(s)	1.00	1.08	6.574	7.23	0.00	1.200	1.729	2.00	6.156	7.39	53.4	149.4	308.7
140.00		1.00	1.09	6.615	7.28	0.00	1.200	1.733	3.00	9.102	10.92	79.5	220.5	455.6
145.00		1.00	1.10	6.681	7.35	0.00	1.200	1.739	5.00	14.815	17.78	130.7	357.2	738.8
149.00	Appurtenance(s)	1.00	1.11	6.734	7.41	0.00	1.200	1.744	4.00	11.532	13.84	102.5	279.2	575.1
150.00		1.00	1.11	6.746	7.42	0.00	1.200	1.745	1.00	2.838	3.41	25.3	69.4	142.1
								Totals:	**150.00**			**4,313.7**		**52,139.3**

Discrete Appurtenance Forces

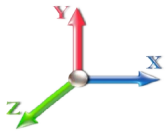
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 17	

Tower Engineering Solutions

Load Case: 1.2D + 1.0Di + 1.0Wi 50 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.00



Iterations 20

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	149.00	HBXX-6516DS-VTM	3	6.734	7.407	0.69	0.90	15.41	373.91	0.000	0.000	114.12	0.00	0.00
2	149.00	BXA-70063-6CF	3	6.734	7.407	0.66	0.90	20.36	378.29	0.000	0.000	150.84	0.00	0.00
3	149.00	HBXX-6517DS-VTM	3	6.734	7.407	0.69	0.90	23.84	521.29	0.000	0.000	176.58	0.00	0.00
4	149.00	RFS FD9R6004/2C-3L	6	6.734	7.407	0.90	0.90	4.34	56.65	0.000	0.000	32.12	0.00	0.00
5	149.00	LNX-6512DS-A1M	3	6.734	7.407	0.72	0.90	15.07	360.77	0.000	0.000	111.66	0.00	0.00
6	149.00	DB-T1-6Z-8AB-0Z	1	6.734	7.407	0.90	0.90	5.11	166.29	0.000	0.000	37.82	0.00	0.00
7	149.00	ALU RRH 2x60 AWS	3	6.734	7.407	0.60	0.90	7.76	377.58	0.000	0.000	57.46	0.00	0.00
8	137.00	Ericsson Radio 4415 B25	3	6.574	7.231	0.50	0.75	3.24	259.60	0.000	0.000	23.44	0.00	0.00
9	137.00	Ericsson Radio 2217 B2	3	6.574	7.231	0.50	0.75	2.74	175.54	0.000	0.000	19.85	0.00	0.00
10	137.00	Ericsson Radio 4449	3	6.574	7.231	0.50	0.75	3.29	454.42	0.000	0.000	23.79	0.00	0.00
11	137.00	SC2-w100AB	1	6.574	7.231	1.00	1.00	6.07	96.84	0.000	0.000	43.89	0.00	0.00
12	137.00	RMQP-4096-HK	1	6.574	7.231	1.00	1.00	89.61	5163.66	0.000	0.000	648.01	0.00	0.00
13	137.00	APXVAARR24_43-U-NA2	3	6.574	7.231	0.52	0.75	34.84	1701.86	0.000	0.000	251.96	0.00	0.00
14	137.00	Air 3246 B66	3	6.574	7.231	0.62	0.75	17.01	1101.10	0.000	0.000	123.03	0.00	0.00
15	137.00	APX16DWV-16DWV-S-E-	3	6.574	7.231	0.46	0.75	10.55	552.93	0.000	0.000	76.30	0.00	0.00
16	128.00	Powerwave LGP21401	6	6.448	7.092	0.80	0.80	10.14	206.57	0.000	0.000	71.92	0.00	0.00
17	128.00	7770	6	6.448	7.092	0.58	0.80	22.94	1047.42	0.000	0.000	162.71	0.00	0.00
18	128.00	SBNH-1D6565C	2	6.448	7.092	0.64	0.80	18.78	479.38	0.000	0.000	133.17	0.00	0.00
19	128.00	AM-X-CD-14-65-00T-RET	1	6.448	7.092	0.80	0.80	5.48	121.55	0.000	0.000	38.84	0.00	0.00
20	128.00	RRU-11	6	6.448	7.092	0.54	0.80	10.11	698.01	0.000	0.000	71.70	0.00	0.00
21	128.00	Raycap DC6-48-60-18-8F	1	6.448	7.092	0.80	0.80	1.08	81.31	0.000	0.000	7.67	0.00	0.00
22	128.00	Powerwave LGP21903	6	6.448	7.092	0.67	0.80	2.67	74.97	0.000	0.000	18.91	0.00	0.00
23	128.00	Low Profile Platform	1	6.448	7.092	1.00	1.00	39.38	3094.20	0.000	0.000	279.32	0.00	0.00
							Totals:		**17,544.15**			**2,675.09**		

Total Applied Force Summary

Structure:	CT13073-A-SBA		**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North		**Exposure:**	B	
Height:	150.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 18

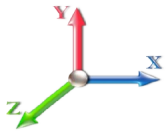
Tower Engineering Solutions

Load Case: 1.2D + 1.0Di + 1.0Wi 50 mph Wind

Iterations 20

Dead Load Factor 1.20

Wind Load Factor 1.00



Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		147.18	2554.87	0.00	0.00
10.00		145.11	2546.51	0.00	0.00
15.00		142.88	2524.34	0.00	0.00
20.00		140.57	2496.12	0.00	0.00
25.00		138.23	2464.40	0.00	0.00
30.00		135.98	2430.38	0.00	0.00
35.00		139.61	2394.69	0.00	0.00
40.00		142.43	2357.75	0.00	0.00
41.50		42.66	700.37	0.00	0.00
45.00		102.57	2645.68	0.00	0.00
48.00		88.47	2241.25	0.00	0.00
50.00		59.11	842.68	0.00	0.00
55.00		149.86	2080.53	0.00	0.00
60.00		150.67	2044.89	0.00	0.00
65.00		151.12	2008.75	0.00	0.00
70.00		151.25	1972.17	0.00	0.00
75.00		151.08	1935.22	0.00	0.00
80.00		150.66	1897.93	0.00	0.00
84.00		119.85	1491.92	0.00	0.00
85.00		30.13	547.04	0.00	0.00
89.50		135.97	2429.88	0.00	0.00
90.00		14.96	149.36	0.00	0.00
95.00		150.09	1473.61	0.00	0.00
100.00		148.85	1443.78	0.00	0.00
105.00		147.43	1413.74	0.00	0.00
110.00		145.84	1383.50	0.00	0.00
115.00		144.09	1353.08	0.00	0.00
120.00		142.20	1322.49	0.00	0.00
125.00		140.17	1291.74	0.00	0.00
128.00	(29) attachments	867.11	6564.80	0.00	0.00
130.00		54.75	471.84	0.00	0.00
135.00		135.69	885.64	0.00	0.00
137.00	(20) attachments	1263.68	9854.98	0.00	0.00
140.00		79.47	504.25	0.00	0.00
145.00		130.66	819.90	0.00	0.00
149.00	(22) attachments	783.10	2874.82	0.00	0.00
150.00		25.28	142.08	0.00	0.00
	Totals:	**6,988.74**	**74,556.96**	**0.00**	**0.00**

Calculated Forces

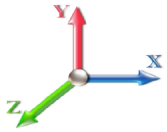
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G		1/21/2019
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 19

Tower Engineering Solutions

Load Case: 1.2D + 1.0Di + 1.0Wi 50 mph Wind

Dead Load Factor 1.20

Wind Load Factor 1.00



Iterations 20

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-74.56	-7.00	0.00	-724.60	0.00	724.60	6643.18	3321.59	16232.9	8128.53	0.00	0.000	0.000	0.100
5.00	-72.00	-6.89	0.00	-689.58	0.00	689.58	6562.43	3281.22	15750.7	7887.07	0.01	-0.024	0.000	0.098
10.00	-69.45	-6.77	0.00	-655.15	0.00	655.15	6480.38	3240.19	15272.4	7647.59	0.05	-0.048	0.000	0.096
15.00	-66.92	-6.65	0.00	-621.30	0.00	621.30	6397.03	3198.52	14798.3	7410.16	0.11	-0.072	0.000	0.094
20.00	-64.42	-6.53	0.00	-588.05	0.00	588.05	6312.38	3156.19	14328.4	7174.88	0.20	-0.096	0.000	0.092
25.00	-61.96	-6.42	0.00	-555.38	0.00	555.38	6226.42	3113.21	13863.0	6941.83	0.31	-0.120	0.000	0.090
30.00	-59.52	-6.30	0.00	-523.29	0.00	523.29	6139.16	3069.58	13402.2	6711.09	0.45	-0.144	0.000	0.088
35.00	-57.13	-6.18	0.00	-491.79	0.00	491.79	6050.60	3025.30	12946.2	6482.75	0.62	-0.167	0.000	0.085
40.00	-54.77	-6.04	0.00	-460.90	0.00	460.90	5960.74	2980.37	12495.2	6256.90	0.80	-0.191	0.000	0.083
41.50	-54.07	-6.01	0.00	-451.84	0.00	451.84	5933.53	2966.76	12360.9	6189.64	0.87	-0.199	0.000	0.082
45.00	-51.42	-5.91	0.00	-430.81	0.00	430.81	5869.58	2934.79	12049.3	6033.61	1.02	-0.215	0.000	0.080
48.00	-49.18	-5.82	0.00	-413.07	0.00	413.07	4971.57	2485.79	10282.0	5148.64	1.16	-0.230	0.000	0.090
50.00	-48.33	-5.78	0.00	-401.43	0.00	401.43	4942.60	2471.30	10136.2	5075.65	1.26	-0.239	0.000	0.089
55.00	-46.25	-5.64	0.00	-372.54	0.00	372.54	4869.24	2434.62	9774.42	4894.48	1.52	-0.264	0.000	0.086
60.00	-44.20	-5.50	0.00	-344.36	0.00	344.36	4794.58	2397.29	9416.42	4715.21	1.81	-0.289	0.000	0.082
65.00	-42.19	-5.35	0.00	-316.88	0.00	316.88	4718.63	2359.31	9062.39	4537.93	2.13	-0.314	0.000	0.079
70.00	-40.22	-5.21	0.00	-290.12	0.00	290.12	4641.37	2320.68	8712.52	4362.74	2.47	-0.338	0.000	0.075
75.00	-38.28	-5.06	0.00	-264.09	0.00	264.09	4562.80	2281.40	8366.97	4189.70	2.83	-0.361	0.000	0.071
80.00	-36.39	-4.91	0.00	-238.79	0.00	238.79	4482.94	2241.47	8025.91	4018.92	3.22	-0.384	0.000	0.068
84.00	-34.89	-4.79	0.00	-219.16	0.00	219.16	4418.04	2209.02	7756.28	3883.90	3.55	-0.402	0.000	0.064
85.00	-34.35	-4.76	0.00	-214.37	0.00	214.37	4396.40	2198.20	7680.13	3845.78	3.64	-0.406	0.000	0.064
89.50	-31.92	-4.61	0.00	-192.96	0.00	192.96	2828.72	1414.36	4933.25	2470.29	4.03	-0.425	0.000	0.089
90.00	-31.77	-4.60	0.00	-190.65	0.00	190.65	2824.36	1412.18	4913.38	2460.34	4.08	-0.428	0.000	0.089
95.00	-30.29	-4.46	0.00	-167.64	0.00	167.64	2780.02	1390.01	4715.55	2361.28	4.54	-0.454	0.000	0.082
100.00	-28.85	-4.31	0.00	-145.36	0.00	145.36	2734.38	1367.19	4519.43	2263.07	5.03	-0.480	0.000	0.075
105.00	-27.43	-4.16	0.00	-123.83	0.00	123.83	2687.43	1343.72	4325.17	2165.80	5.54	-0.503	0.000	0.067
110.00	-26.05	-4.01	0.00	-103.04	0.00	103.04	2639.19	1319.59	4132.95	2069.55	6.08	-0.525	0.000	0.060
115.00	-24.70	-3.86	0.00	-82.99	0.00	82.99	2589.64	1294.82	3942.93	1974.40	6.64	-0.544	0.000	0.052
120.00	-23.37	-3.71	0.00	-63.69	0.00	63.69	2538.79	1269.39	3755.30	1880.44	7.22	-0.560	0.000	0.043
125.00	-22.08	-3.56	0.00	-45.13	0.00	45.13	2486.64	1243.32	3570.20	1787.76	7.82	-0.573	0.000	0.034
128.00	-15.53	-2.63	0.00	-34.45	0.00	34.45	2454.72	1227.36	3460.44	1732.79	8.18	-0.579	0.000	0.026
130.00	-15.06	-2.57	0.00	-29.19	0.00	29.19	2433.18	1216.59	3387.83	1696.43	8.42	-0.583	0.000	0.023
130.00	-15.06	-2.57	0.00	-29.19	0.00	29.19	1188.95	594.48	1667.65	835.07	8.42	-0.583	0.000	0.048
135.00	-14.17	-2.43	0.00	-16.33	0.00	16.33	1172.65	586.33	1593.28	797.82	9.04	-0.590	0.000	0.033
137.00	-4.33	-1.06	0.00	-11.47	0.00	11.47	1165.76	582.88	1563.43	782.88	9.28	-0.593	0.000	0.018
140.00	-3.83	-0.98	0.00	-8.28	0.00	8.28	1155.02	577.51	1518.58	760.42	9.66	-0.596	0.000	0.014
145.00	-3.01	-0.84	0.00	-3.39	0.00	3.39	1136.06	568.03	1443.74	722.95	10.28	-0.599	0.000	0.007
149.00	-0.14	-0.03	0.00	-0.03	0.00	0.03	1119.92	559.96	1383.89	692.97	10.79	-0.600	0.000	0.000
150.00	0.00	-0.03	0.00	0.00	0.00	0.00	1115.76	557.88	1368.94	685.49	10.91	-0.600	0.000	0.000

Seismic Segment Forces (Factored)

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 20	

Tower Engineering Solutions

Load Case: 1.2D + 1.0E

Gust Response Factor	1.10			**Sds**	0.29	**Iterations**	19
Dead Load Factor	1.20	**Seismic Load Factor**	1.00	**Sd1**	0.31	**Ss**	0.27
Wind Load Factor	0.00	**Structure Frequency**	0.47	**SA**	0.14	**S1**	0.24
						Seismic Importance Factor	1.00

Top Elev (ft)	Description	Wz (lb)	a	b	c	Lateral Fs (lb)	R: 1.50
0.00		0.00	0.00	0.00	0.00	0.00	
5.00		1592.3	0.00	0.03	0.02	19.22	
10.00		1564.0	0.01	0.05	0.03	30.39	
15.00		1535.7	0.02	0.06	0.04	36.90	
20.00		1507.4	0.03	0.07	0.04	40.92	
25.00		1479.1	0.05	0.07	0.04	43.77	
30.00		1450.8	0.08	0.07	0.04	46.22	
35.00		1422.5	0.10	0.07	0.04	48.64	
40.00		1394.2	0.13	0.07	0.03	51.11	
41.50	Bot - Section 2	412.74	0.14	0.07	0.03	15.44	
45.00		1802.6	0.17	0.07	0.03	70.63	
48.00	Top - Section 1	1524.4	0.19	0.06	0.02	61.95	
50.00		474.05	0.21	0.06	0.02	19.70	
55.00		1167.7	0.25	0.05	0.02	50.82	
60.00		1143.0	0.30	0.04	0.01	51.19	
65.00		1118.2	0.35	0.03	0.01	50.44	
70.00		1093.4	0.41	0.01	0.01	48.44	
75.00		1068.7	0.47	-0.01	0.01	45.27	
80.00		1043.9	0.54	-0.03	0.01	41.20	
84.00	Bot - Section 3	817.33	0.59	-0.05	0.01	30.06	
85.00		348.57	0.61	-0.06	0.02	12.58	
89.50	Top - Section 2	1547.5	0.67	-0.08	0.02	51.49	
90.00		71.50	0.68	-0.08	0.03	2.36	
95.00		705.26	0.76	-0.10	0.04	22.02	
100.00		687.57	0.84	-0.12	0.07	21.97	
105.00		669.88	0.93	-0.12	0.10	24.47	
110.00		652.19	1.02	-0.11	0.14	30.12	
115.00		634.50	1.11	-0.06	0.19	39.35	
120.00		616.81	1.21	0.01	0.26	52.37	
125.00		599.11	1.31	0.14	0.35	69.21	
128.00	Appurtenance(s)	2784.9	1.38	0.24	0.41	383.74	
130.00	Top - Section 3	230.45	1.42	0.32	0.45	35.56	
135.00		339.44	1.53	0.58	0.58	68.42	
137.00	Appurtenance(s)	4274.8	1.58	0.71	0.64	952.85	
140.00		195.93	1.65	0.93	0.73	50.46	
145.00		317.96	1.77	1.39	0.92	102.48	
149.00	Appurtenance(s)	798.04	1.86	1.85	1.09	303.68	
150.00		60.59	1.89	1.98	1.14	23.99	
	Totals:	**39,147.9**				**3,049.4**	**Total Wind:** **28,792.0**

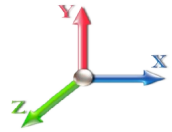
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

Calculated Forces

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 21	

Tower Engineering Solutions

Load Case: 1.2D + 1.0E



Gust Response Factor	1.10			**Sds**	0.29	**Iterations**	19		
Dead Load Factor	1.20	**Seismic Load Factor**	1.00	**Sd1**	0.31	**Ss**	0.27		
Wind Load Factor	0.00	**Structure Frequency**	0.47	**SA**	0.14	**S1**	0.24	**Seismic Importance Factor**	1.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-51.85	-3.05	0.00	-345.02	0.00	345.02	6643.18	3321.59	16232.9	8128.53		0.00	0.00	0.050
5.00	-49.76	-3.04	0.00	-329.76	0.00	329.76	6562.43	3281.22	15750.7	7887.07		0.01	-0.01	0.049
10.00	-47.71	-3.02	0.00	-314.53	0.00	314.53	6480.38	3240.19	15272.4	7647.59		0.02	-0.02	0.048
15.00	-45.69	-2.99	0.00	-299.42	0.00	299.42	6397.03	3198.52	14798.3	7410.16		0.05	-0.03	0.048
20.00	-43.71	-2.96	0.00	-284.45	0.00	284.45	6312.38	3156.19	14328.4	7174.88		0.10	-0.05	0.047
25.00	-41.75	-2.92	0.00	-269.64	0.00	269.64	6226.42	3113.21	13863.0	6941.83		0.15	-0.06	0.046
30.00	-39.84	-2.88	0.00	-255.03	0.00	255.03	6139.16	3069.58	13402.2	6711.09		0.22	-0.07	0.044
35.00	-37.95	-2.84	0.00	-240.61	0.00	240.61	6050.60	3025.30	12946.2	6482.75		0.30	-0.08	0.043
40.00	-36.11	-2.79	0.00	-226.41	0.00	226.41	5960.74	2980.37	12495.2	6256.90		0.39	-0.09	0.042
41.50	-35.56	-2.78	0.00	-222.22	0.00	222.22	5933.53	2966.76	12360.9	6189.64		0.42	-0.10	0.042
45.00	-33.27	-2.71	0.00	-212.50	0.00	212.50	5869.58	2934.79	12049.3	6033.61		0.49	-0.10	0.041
48.00	-31.34	-2.65	0.00	-204.37	0.00	204.37	4971.57	2485.79	10282.0	5148.64		0.56	-0.11	0.046
50.00	-30.70	-2.63	0.00	-199.08	0.00	199.08	4942.60	2471.30	10136.2	5075.65		0.61	-0.12	0.045
55.00	-29.12	-2.58	0.00	-185.93	0.00	185.93	4869.24	2434.62	9774.42	4894.48		0.73	-0.13	0.044
60.00	-27.57	-2.53	0.00	-173.03	0.00	173.03	4794.58	2397.29	9416.42	4715.21		0.88	-0.14	0.042
65.00	-26.05	-2.48	0.00	-160.36	0.00	160.36	4718.63	2359.31	9062.39	4537.93		1.03	-0.15	0.041
70.00	-24.57	-2.44	0.00	-147.94	0.00	147.94	4641.37	2320.68	8712.52	4362.74		1.20	-0.17	0.039
75.00	-23.11	-2.39	0.00	-135.76	0.00	135.76	4562.80	2281.40	8366.97	4189.70		1.38	-0.18	0.037
80.00	-21.68	-2.35	0.00	-123.80	0.00	123.80	4482.94	2241.47	8025.91	4018.92		1.57	-0.19	0.036
84.00	-20.56	-2.32	0.00	-114.40	0.00	114.40	4418.04	2209.02	7756.28	3883.90		1.73	-0.20	0.034
85.00	-20.10	-2.31	0.00	-112.08	0.00	112.08	4396.40	2198.20	7680.13	3845.78		1.77	-0.20	0.034
89.50	-18.09	-2.25	0.00	-101.70	0.00	101.70	2828.72	1414.36	4933.25	2470.29		1.97	-0.21	0.048
90.00	-17.98	-2.25	0.00	-100.58	0.00	100.58	2824.36	1412.18	4913.38	2460.34		1.99	-0.21	0.047
95.00	-16.96	-2.23	0.00	-89.33	0.00	89.33	2780.02	1390.01	4715.55	2361.28		2.22	-0.23	0.044
100.00	-15.96	-2.20	0.00	-78.20	0.00	78.20	2734.38	1367.19	4519.43	2263.07		2.47	-0.24	0.040
105.00	-14.98	-2.18	0.00	-67.17	0.00	67.17	2687.43	1343.72	4325.17	2165.80		2.72	-0.25	0.037
110.00	-14.02	-2.15	0.00	-56.28	0.00	56.28	2639.19	1319.59	4132.95	2069.55		3.00	-0.26	0.033
115.00	-13.08	-2.11	0.00	-45.54	0.00	45.54	2589.64	1294.82	3942.93	1974.40		3.28	-0.27	0.028
120.00	-12.17	-2.05	0.00	-35.01	0.00	35.01	2538.79	1269.39	3755.30	1880.44		3.57	-0.28	0.023
125.00	-11.27	-1.98	0.00	-24.75	0.00	24.75	2486.64	1243.32	3570.20	1787.76		3.87	-0.29	0.018
128.00	-7.83	-1.58	0.00	-18.82	0.00	18.82	2454.72	1227.36	3460.44	1732.79		4.06	-0.29	0.014
130.00	-7.51	-1.54	0.00	-15.66	0.00	15.66	2433.18	1216.59	3387.83	1696.43		4.18	-0.30	0.012
130.00	-7.51	-1.54	0.00	-15.66	0.00	15.66	1188.95	594.48	1667.65	835.07		4.18	-0.30	0.025
135.00	-7.00	-1.47	0.00	-7.96	0.00	7.96	1172.65	586.33	1593.28	797.82		4.49	-0.30	0.016
137.00	-1.84	-0.49	0.00	-5.02	0.00	5.02	1165.76	582.88	1563.43	782.88		4.62	-0.30	0.008
140.00	-1.56	-0.44	0.00	-3.55	0.00	3.55	1155.02	577.51	1518.58	760.42		4.81	-0.30	0.006
145.00	-1.09	-0.33	0.00	-1.36	0.00	1.36	1136.06	568.03	1443.74	722.95		5.13	-0.30	0.003
149.00	-0.07	-0.02	0.00	-0.02	0.00	0.02	1119.92	559.96	1383.89	692.97		5.38	-0.30	0.000
150.00	0.00	-0.02	0.00	0.00	0.00	0.00	1115.76	557.88	1368.94	685.49		5.44	-0.30	0.000

Seismic Segment Forces (Factored)

Structure:	CT13073-A-SBA		**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North		**Exposure:**	B	
Height:	150.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 22

Tower Engineering Solutions

Load Case:	0.9D + 1.0E							**Iterations**	19
Gust Response Factor	1.10				**Sds**	0.29		**Ss**	0.27
Dead Load Factor	0.90	**Seismic Load Factor**	1.00		**Sd1**	0.31		**S1**	0.24
Wind Load Factor	0.00	**Structure Frequency**	0.47		**SA**	0.14	**Seismic Importance Factor**		1.00

Top Elev (ft)	Description	Wz (lb)	a	b	c	Lateral Fs (lb)	R: 1.50
0.00		0.00	0.00	0.00	0.00	0.00	
5.00		1592.3	0.00	0.03	0.02	19.22	
10.00		1564.0	0.01	0.05	0.03	30.39	
15.00		1535.7	0.02	0.06	0.04	36.90	
20.00		1507.4	0.03	0.07	0.04	40.92	
25.00		1479.1	0.05	0.07	0.04	43.77	
30.00		1450.8	0.08	0.07	0.04	46.22	
35.00		1422.5	0.10	0.07	0.04	48.64	
40.00		1394.2	0.13	0.07	0.03	51.11	
41.50	Bot - Section 2	412.74	0.14	0.07	0.03	15.44	
45.00		1802.6	0.17	0.07	0.03	70.63	
48.00	Top - Section 1	1524.4	0.19	0.06	0.02	61.95	
50.00		474.05	0.21	0.06	0.02	19.70	
55.00		1167.7	0.25	0.05	0.02	50.82	
60.00		1143.0	0.30	0.04	0.01	51.19	
65.00		1118.2	0.35	0.03	0.01	50.44	
70.00		1093.4	0.41	0.01	0.01	48.44	
75.00		1068.7	0.47	-0.01	0.01	45.27	
80.00		1043.9	0.54	-0.03	0.01	41.20	
84.00	Bot - Section 3	817.33	0.59	-0.05	0.01	30.06	
85.00		348.57	0.61	-0.06	0.02	12.58	
89.50	Top - Section 2	1547.5	0.67	-0.08	0.02	51.49	
90.00		71.50	0.68	-0.08	0.03	2.36	
95.00		705.26	0.76	-0.10	0.04	22.02	
100.00		687.57	0.84	-0.12	0.07	21.97	
105.00		669.88	0.93	-0.12	0.10	24.47	
110.00		652.19	1.02	-0.11	0.14	30.12	
115.00		634.50	1.11	-0.06	0.19	39.35	
120.00		616.81	1.21	0.01	0.26	52.37	
125.00		599.11	1.31	0.14	0.35	69.21	
128.00	Appurtenance(s)	2784.9	1.38	0.24	0.41	383.74	
130.00	Top - Section 3	230.45	1.42	0.32	0.45	35.56	
135.00		339.44	1.53	0.58	0.58	68.42	
137.00	Appurtenance(s)	4274.8	1.58	0.71	0.64	952.85	
140.00		195.93	1.65	0.93	0.73	50.46	
145.00		317.96	1.77	1.39	0.92	102.48	
149.00	Appurtenance(s)	798.04	1.86	1.85	1.09	303.68	
150.00		60.59	1.89	1.98	1.14	23.99	
	Totals:	**39,147.9**				**3,049.4**	**Total Wind:** **28,792.0**

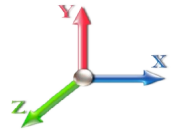
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

Calculated Forces

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 23	

Tower Engineering Solutions

Load Case: 0.9D + 1.0E



Gust Response Factor	1.10			**Sds**	0.29	**Iterations**	19		
Dead Load Factor	0.90	**Seismic Load Factor**	1.00	**Sd1**	0.31	**Ss**	0.27		
Wind Load Factor	0.00	**Structure Frequency**	0.47	**SA**	0.14	**S1**	0.24	**Seismic Importance Factor**	1.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-38.89	-3.05	0.00	-343.04	0.00	343.04	6643.18	3321.59	16232.9	8128.53		0.00	0.00	0.048
5.00	-37.32	-3.04	0.00	-327.78	0.00	327.78	6562.43	3281.22	15750.7	7887.07		0.01	-0.01	0.047
10.00	-35.78	-3.02	0.00	-312.58	0.00	312.58	6480.38	3240.19	15272.4	7647.59		0.02	-0.02	0.046
15.00	-34.27	-2.99	0.00	-297.49	0.00	297.49	6397.03	3198.52	14798.3	7410.16		0.05	-0.03	0.046
20.00	-32.78	-2.95	0.00	-282.56	0.00	282.56	6312.38	3156.19	14328.4	7174.88		0.10	-0.05	0.045
25.00	-31.32	-2.91	0.00	-267.81	0.00	267.81	6226.42	3113.21	13863.0	6941.83		0.15	-0.06	0.044
30.00	-29.88	-2.87	0.00	-253.25	0.00	253.25	6139.16	3069.58	13402.2	6711.09		0.22	-0.07	0.043
35.00	-28.46	-2.83	0.00	-238.90	0.00	238.90	6050.60	3025.30	12946.2	6482.75		0.29	-0.08	0.042
40.00	-27.08	-2.78	0.00	-224.77	0.00	224.77	5960.74	2980.37	12495.2	6256.90		0.38	-0.09	0.040
41.50	-26.67	-2.76	0.00	-220.61	0.00	220.61	5933.53	2966.76	12360.9	6189.64		0.41	-0.10	0.040
45.00	-24.95	-2.69	0.00	-210.94	0.00	210.94	5869.58	2934.79	12049.3	6033.61		0.49	-0.10	0.039
48.00	-23.50	-2.63	0.00	-202.86	0.00	202.86	4971.57	2485.79	10282.0	5148.64		0.55	-0.11	0.044
50.00	-23.02	-2.61	0.00	-197.60	0.00	197.60	4942.60	2471.30	10136.2	5075.65		0.60	-0.12	0.044
55.00	-21.84	-2.56	0.00	-184.54	0.00	184.54	4869.24	2434.62	9774.42	4894.48		0.73	-0.13	0.042
60.00	-20.68	-2.51	0.00	-171.72	0.00	171.72	4794.58	2397.29	9416.42	4715.21		0.87	-0.14	0.041
65.00	-19.54	-2.47	0.00	-159.15	0.00	159.15	4718.63	2359.31	9062.39	4537.93		1.02	-0.15	0.039
70.00	-18.42	-2.42	0.00	-146.82	0.00	146.82	4641.37	2320.68	8712.52	4362.74		1.19	-0.16	0.038
75.00	-17.33	-2.37	0.00	-134.73	0.00	134.73	4562.80	2281.40	8366.97	4189.70		1.37	-0.18	0.036
80.00	-16.26	-2.33	0.00	-122.86	0.00	122.86	4482.94	2241.47	8025.91	4018.92		1.56	-0.19	0.034
84.00	-15.42	-2.30	0.00	-113.54	0.00	113.54	4418.04	2209.02	7756.28	3883.90		1.72	-0.20	0.033
85.00	-15.08	-2.29	0.00	-111.24	0.00	111.24	4396.40	2198.20	7680.13	3845.78		1.76	-0.20	0.032
89.50	-13.56	-2.23	0.00	-100.94	0.00	100.94	2828.72	1414.36	4933.25	2470.29		1.96	-0.21	0.046
90.00	-13.49	-2.23	0.00	-99.83	0.00	99.83	2824.36	1412.18	4913.38	2460.34		1.98	-0.21	0.045
95.00	-12.72	-2.21	0.00	-88.67	0.00	88.67	2780.02	1390.01	4715.55	2361.28		2.21	-0.22	0.042
100.00	-11.97	-2.19	0.00	-77.62	0.00	77.62	2734.38	1367.19	4519.43	2263.07		2.45	-0.24	0.039
105.00	-11.23	-2.16	0.00	-66.69	0.00	66.69	2687.43	1343.72	4325.17	2165.80		2.71	-0.25	0.035
110.00	-10.51	-2.13	0.00	-55.88	0.00	55.88	2639.19	1319.59	4132.95	2069.55		2.97	-0.26	0.031
115.00	-9.81	-2.09	0.00	-45.22	0.00	45.22	2589.64	1294.82	3942.93	1974.40		3.26	-0.27	0.027
120.00	-9.12	-2.04	0.00	-34.77	0.00	34.77	2538.79	1269.39	3755.30	1880.44		3.55	-0.28	0.022
125.00	-8.45	-1.96	0.00	-24.60	0.00	24.60	2486.64	1243.32	3570.20	1787.76		3.85	-0.29	0.017
128.00	-5.87	-1.57	0.00	-18.70	0.00	18.70	2454.72	1227.36	3460.44	1732.79		4.03	-0.29	0.013
130.00	-5.63	-1.53	0.00	-15.57	0.00	15.57	2433.18	1216.59	3387.83	1696.43		4.15	-0.29	0.011
130.00	-5.63	-1.53	0.00	-15.57	0.00	15.57	1188.95	594.48	1667.65	835.07		4.15	-0.29	0.023
135.00	-5.25	-1.46	0.00	-7.92	0.00	7.92	1172.65	586.33	1593.28	797.82		4.46	-0.30	0.014
137.00	-1.38	-0.49	0.00	-5.00	0.00	5.00	1165.76	582.88	1563.43	782.88		4.59	-0.30	0.008
140.00	-1.17	-0.44	0.00	-3.53	0.00	3.53	1155.02	577.51	1518.58	760.42		4.77	-0.30	0.006
145.00	-0.82	-0.33	0.00	-1.35	0.00	1.35	1136.06	568.03	1443.74	722.95		5.09	-0.30	0.003
149.00	-0.05	-0.02	0.00	-0.02	0.00	0.02	1119.92	559.96	1383.89	692.97		5.34	-0.30	0.000
150.00	0.00	-0.02	0.00	0.00	0.00	0.00	1115.76	557.88	1368.94	685.49		5.41	-0.30	0.000

Wind Loading - Shaft

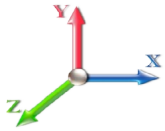
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 24	

Tower Engineering Solutions

Load Case: 1.0D + 1.0W 60 mph Wind

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations 19

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	6.129	6.74	254.87	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		1.00	0.70	6.129	6.74	250.42	0.650	0.000	5.00	25.164	16.36	110.3	0.0	1592.4
10.00		1.00	0.70	6.129	6.74	245.96	0.650	0.000	5.00	24.720	16.07	108.3	0.0	1564.0
15.00		1.00	0.70	6.129	6.74	241.51	0.650	0.000	5.00	24.277	15.78	106.4	0.0	1535.7
20.00		1.00	0.70	6.129	6.74	237.06	0.650	0.000	5.00	23.833	15.49	104.4	0.0	1507.4
25.00		1.00	0.70	6.129	6.74	232.60	0.650	0.000	5.00	23.390	15.20	102.5	0.0	1479.1
30.00		1.00	0.70	6.134	6.75	228.25	0.650	0.000	5.00	22.946	14.91	100.6	0.0	1450.8
35.00		1.00	0.73	6.410	7.05	228.77	0.650	0.000	5.00	22.503	14.63	103.1	0.0	1422.5
40.00		1.00	0.76	6.659	7.33	228.54	0.650	0.000	5.00	22.059	14.34	105.0	0.0	1394.2
41.50	Bot - Section 2	1.00	0.77	6.730	7.40	228.34	0.650	0.000	1.50	6.531	4.25	31.4	0.0	412.7
45.00		1.00	0.79	6.887	7.58	227.70	0.650	0.000	3.50	15.343	9.97	75.6	0.0	1802.7
48.00	Top - Section 1	1.00	0.80	7.015	7.72	226.95	0.650	0.000	3.00	12.979	8.44	65.1	0.0	1524.5
50.00		1.00	0.81	7.098	7.81	230.36	0.650	0.000	2.00	8.564	5.57	43.5	0.0	474.0
55.00		1.00	0.83	7.294	8.02	228.66	0.650	0.000	5.00	21.099	13.71	110.0	0.0	1167.8
60.00		1.00	0.85	7.477	8.22	226.60	0.650	0.000	5.00	20.655	13.43	110.4	0.0	1143.0
65.00		1.00	0.87	7.650	8.42	224.23	0.650	0.000	5.00	20.212	13.14	110.6	0.0	1118.2
70.00		1.00	0.89	7.814	8.60	221.59	0.650	0.000	5.00	19.768	12.85	110.4	0.0	1093.5
75.00		1.00	0.91	7.969	8.77	218.70	0.650	0.000	5.00	19.324	12.56	110.1	0.0	1068.7
80.00		1.00	0.93	8.118	8.93	215.60	0.650	0.000	5.00	18.881	12.27	109.6	0.0	1043.9
84.00	Bot - Section 3	1.00	0.94	8.232	9.05	212.98	0.650	0.000	4.00	14.785	9.61	87.0	0.0	817.3
85.00		1.00	0.94	8.260	9.09	212.31	0.650	0.000	1.00	3.705	2.41	21.9	0.0	348.6
89.50	Top - Section 2	1.00	0.96	8.382	9.22	209.19	0.650	0.000	4.50	16.452	10.69	98.6	0.0	1547.5
90.00		1.00	0.96	8.396	9.24	211.95	0.650	0.000	0.50	1.806	1.17	10.8	0.0	71.5
95.00		1.00	0.97	8.526	9.38	208.34	0.650	0.000	5.00	17.815	11.58	108.6	0.0	705.3
100.00		1.00	0.99	8.652	9.52	204.58	0.650	0.000	5.00	17.371	11.29	107.5	0.0	687.6
105.00		1.00	1.00	8.774	9.65	200.68	0.650	0.000	5.00	16.928	11.00	106.2	0.0	669.9
110.00		1.00	1.02	8.891	9.78	196.65	0.650	0.000	5.00	16.484	10.71	104.8	0.0	652.2
115.00		1.00	1.03	9.005	9.91	192.51	0.650	0.000	5.00	16.040	10.43	103.3	0.0	634.5
120.00		1.00	1.04	9.115	10.03	188.25	0.650	0.000	5.00	15.597	10.14	101.6	0.0	616.8
125.00		1.00	1.05	9.222	10.14	183.89	0.650	0.000	5.00	15.153	9.85	99.9	0.0	599.1
128.00	Appurtenance(s)	1.00	1.06	9.284	10.21	181.23	0.650	0.000	3.00	8.879	5.77	58.9	0.0	351.0
130.00	Top - Section 3	1.00	1.07	9.326	10.26	179.43	0.650	0.000	2.00	5.831	3.79	38.9	0.0	230.4
135.00		1.00	1.08	9.427	10.37	174.81	0.650	0.000	5.00	14.264	9.27	96.1	0.0	339.4
137.00	Appurtenance(s)	1.00	1.08	9.466	10.41	172.94	0.650	0.000	2.00	5.580	3.63	37.8	0.0	132.8
140.00		1.00	1.09	9.525	10.48	170.11	0.650	0.000	3.00	8.235	5.35	56.1	0.0	195.9
145.00		1.00	1.10	9.621	10.58	165.32	0.650	0.000	5.00	13.366	8.69	91.9	0.0	318.0
149.00	Appurtenance(s)	1.00	1.11	9.696	10.67	161.42	0.650	0.000	4.00	10.370	6.74	71.9	0.0	246.6
150.00		1.00	1.11	9.715	10.69	160.44	0.650	0.000	1.00	2.548	1.66	17.7	0.0	60.6
								Totals:	**150.00**			**3,137.0**		**32,020.4**

Discrete Appurtenance Forces

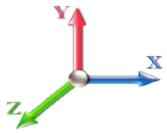
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 25	

Tower Engineering Solutions

Load Case: 1.0D + 1.0W 60 mph Wind

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations 19

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	149.00	HBXX-6516DS-VTM	3	9.696	10.666	0.69	0.90	11.29	91.80	0.000	0.000	120.41	0.00	0.00
2	149.00	BXA-70063-6CF	3	9.696	10.666	0.66	0.90	14.92	51.00	0.000	0.000	159.14	0.00	0.00
3	149.00	HBXX-6517DS-VTM	3	9.696	10.666	0.69	0.90	17.78	122.10	0.000	0.000	189.59	0.00	0.00
4	149.00	RFS FD9R6004/2C-3L	6	9.696	10.666	0.90	0.90	1.94	18.60	0.000	0.000	20.73	0.00	0.00
5	149.00	LNX-6512DS-A1M	3	9.696	10.666	0.72	0.90	10.99	84.00	0.000	0.000	117.27	0.00	0.00
6	149.00	DB-T1-6Z-8AB-0Z	1	9.696	10.666	0.90	0.90	4.32	18.90	0.000	0.000	46.08	0.00	0.00
7	149.00	ALU RRH 2x60 AWS	3	9.696	10.666	0.60	0.90	6.33	165.00	0.000	0.000	67.53	0.00	0.00
8	137.00	Ericsson Radio 4415 B25	3	9.466	10.413	0.50	0.75	2.47	138.00	0.000	0.000	25.74	0.00	0.00
9	137.00	Ericsson Radio 2217 B2	3	9.466	10.413	0.50	0.75	2.04	81.00	0.000	0.000	21.19	0.00	0.00
10	137.00	Ericsson Radio 4449	3	9.466	10.413	0.50	0.75	2.49	210.00	0.000	0.000	25.90	0.00	0.00
11	137.00	SC2-w100AB	1	9.466	10.413	1.00	1.00	4.79	22.00	0.000	0.000	49.88	0.00	0.00
12	137.00	RMQP-4096-HK	1	9.466	10.413	1.00	1.00	51.70	2645.00	0.000	0.000	538.36	0.00	0.00
13	137.00	APXVAARR24_43-U-NA2	3	9.466	10.413	0.52	0.75	31.88	384.00	0.000	0.000	331.95	0.00	0.00
14	137.00	Air 3246 B66	3	9.466	10.413	0.62	0.75	14.83	540.00	0.000	0.000	154.41	0.00	0.00
15	137.00	APX16DWV-16DWV-S-E-	3	9.466	10.413	0.46	0.75	9.01	122.10	0.000	0.000	93.84	0.00	0.00
16	128.00	Powerwave LGP21401	6	9.284	10.213	0.80	0.80	6.19	84.60	0.000	0.000	63.24	0.00	0.00
17	128.00	7770	6	9.284	10.213	0.58	0.80	19.27	210.00	0.000	0.000	196.82	0.00	0.00
18	128.00	SBNH-1D6565C	2	9.284	10.213	0.64	0.80	14.68	132.20	0.000	0.000	149.94	0.00	0.00
19	128.00	AM-X-CD-14-65-00T-RET	1	9.284	10.213	0.80	0.80	4.00	36.40	0.000	0.000	40.85	0.00	0.00
20	128.00	RRU-11	6	9.284	10.213	0.54	0.80	8.10	306.00	0.000	0.000	82.77	0.00	0.00
21	128.00	Raycap DC6-48-60-18-8F	1	9.284	10.213	0.80	0.80	0.74	31.80	0.000	0.000	7.52	0.00	0.00
22	128.00	Powerwave LGP21903	6	9.284	10.213	0.67	0.80	1.09	33.00	0.000	0.000	11.12	0.00	0.00
23	128.00	Low Profile Platform	1	9.284	10.213	1.00	1.00	22.00	1600.00	0.000	0.000	224.68	0.00	0.00
							Totals:		**7,127.50**			**2,738.96**		

Total Applied Force Summary

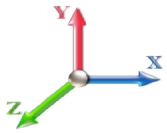
Structure:	CT13073-A-SBA		**Code:**	EIA/TIA-222-G	1/21/2019
Site Name:	Groton North		**Exposure:**	B	
Height:	150.00 (ft)		**Crest Height:**	0.00	
Base Elev:	0.000 (ft)		**Site Class:**	D - Stiff Soil	
Gh:	1.1	**Topography:** 1	**Struct Class:**	II	Page: 26

Tower Engineering Solutions

Load Case: 1.0D + 1.0W 60 mph Wind

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations 19

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		110.27	1738.75	0.00	0.00
10.00		108.32	1710.45	0.00	0.00
15.00		106.38	1682.14	0.00	0.00
20.00		104.44	1653.84	0.00	0.00
25.00		102.49	1625.53	0.00	0.00
30.00		100.63	1597.22	0.00	0.00
35.00		103.13	1568.92	0.00	0.00
40.00		105.03	1540.61	0.00	0.00
41.50		31.43	456.66	0.00	0.00
45.00		75.56	1905.17	0.00	0.00
48.00		65.10	1612.30	0.00	0.00
50.00		43.46	532.61	0.00	0.00
55.00		110.03	1314.18	0.00	0.00
60.00		110.43	1289.42	0.00	0.00
65.00		110.55	1264.65	0.00	0.00
70.00		110.44	1239.88	0.00	0.00
75.00		110.11	1215.11	0.00	0.00
80.00		109.59	1190.35	0.00	0.00
84.00		87.02	934.45	0.00	0.00
85.00		21.88	377.85	0.00	0.00
89.50		98.60	1679.30	0.00	0.00
90.00		10.84	86.14	0.00	0.00
95.00		108.60	851.66	0.00	0.00
100.00		107.46	833.97	0.00	0.00
105.00		106.19	816.28	0.00	0.00
110.00		104.79	798.59	0.00	0.00
115.00		103.27	780.90	0.00	0.00
120.00		101.65	763.21	0.00	0.00
125.00		99.91	745.51	0.00	0.00
128.00	(29) attachments	835.88	2872.82	0.00	0.00
130.00		38.88	264.05	0.00	0.00
135.00		96.14	423.44	0.00	0.00
137.00	(20) attachments	1279.03	4308.47	0.00	0.00
140.00		56.09	236.49	0.00	0.00
145.00		91.95	385.56	0.00	0.00
149.00	(22) attachments	792.64	852.12	0.00	0.00
150.00		17.70	60.59	0.00	0.00
	Totals:	**5,875.92**	**43,209.17**	**0.00**	**0.00**

Calculated Forces

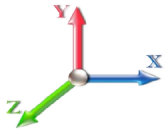
Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 27	

Tower Engineering Solutions

Load Case: 1.0D + 1.0W 60 mph Wind

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations 19

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-43.21	-5.88	0.00	-626.16	0.00	626.16	6643.18	3321.59	16232.9	8128.53	0.00	0.000	0.000	0.084
5.00	-41.47	-5.79	0.00	-596.75	0.00	596.75	6562.43	3281.22	15750.7	7887.07	0.01	-0.021	0.000	0.082
10.00	-39.75	-5.69	0.00	-567.82	0.00	567.82	6480.38	3240.19	15272.4	7647.59	0.04	-0.041	0.000	0.080
15.00	-38.07	-5.60	0.00	-539.36	0.00	539.36	6397.03	3198.52	14798.3	7410.16	0.10	-0.062	0.000	0.079
20.00	-36.42	-5.50	0.00	-511.37	0.00	511.37	6312.38	3156.19	14328.4	7174.88	0.17	-0.083	0.000	0.077
25.00	-34.79	-5.41	0.00	-483.84	0.00	483.84	6226.42	3113.21	13863.0	6941.83	0.27	-0.104	0.000	0.075
30.00	-33.19	-5.32	0.00	-456.78	0.00	456.78	6139.16	3069.58	13402.2	6711.09	0.39	-0.125	0.000	0.073
35.00	-31.62	-5.23	0.00	-430.18	0.00	430.18	6050.60	3025.30	12946.2	6482.75	0.53	-0.146	0.000	0.072
40.00	-30.08	-5.12	0.00	-404.06	0.00	404.06	5960.74	2980.37	12495.2	6256.90	0.70	-0.166	0.000	0.070
41.50	-29.62	-5.10	0.00	-396.37	0.00	396.37	5933.53	2966.76	12360.9	6189.64	0.75	-0.173	0.000	0.069
45.00	-27.71	-5.02	0.00	-378.54	0.00	378.54	5869.58	2934.79	12049.3	6033.61	0.88	-0.187	0.000	0.067
48.00	-26.10	-4.96	0.00	-363.47	0.00	363.47	4971.57	2485.79	10282.0	5148.64	1.01	-0.200	0.000	0.076
50.00	-25.57	-4.92	0.00	-353.56	0.00	353.56	4942.60	2471.30	10136.2	5075.65	1.09	-0.208	0.000	0.075
55.00	-24.25	-4.81	0.00	-328.98	0.00	328.98	4869.24	2434.62	9774.42	4894.48	1.32	-0.231	0.000	0.072
60.00	-22.96	-4.70	0.00	-304.93	0.00	304.93	4794.58	2397.29	9416.42	4715.21	1.57	-0.253	0.000	0.069
65.00	-21.69	-4.60	0.00	-281.41	0.00	281.41	4718.63	2359.31	9062.39	4537.93	1.85	-0.274	0.000	0.067
70.00	-20.45	-4.49	0.00	-258.43	0.00	258.43	4641.37	2320.68	8712.52	4362.74	2.15	-0.296	0.000	0.064
75.00	-19.24	-4.38	0.00	-236.00	0.00	236.00	4562.80	2281.40	8366.97	4189.70	2.47	-0.317	0.000	0.061
80.00	-18.05	-4.27	0.00	-214.12	0.00	214.12	4482.94	2241.47	8025.91	4018.92	2.81	-0.337	0.000	0.057
84.00	-17.11	-4.18	0.00	-197.05	0.00	197.05	4418.04	2209.02	7756.28	3883.90	3.10	-0.353	0.000	0.055
85.00	-16.73	-4.16	0.00	-192.88	0.00	192.88	4396.40	2198.20	7680.13	3845.78	3.18	-0.357	0.000	0.054
89.50	-15.05	-4.05	0.00	-174.18	0.00	174.18	2828.72	1414.36	4933.25	2470.29	3.52	-0.374	0.000	0.076
90.00	-14.97	-4.04	0.00	-172.15	0.00	172.15	2824.36	1412.18	4913.38	2460.34	3.56	-0.376	0.000	0.075
95.00	-14.11	-3.93	0.00	-151.95	0.00	151.95	2780.02	1390.01	4715.55	2361.28	3.97	-0.401	0.000	0.069
100.00	-13.28	-3.82	0.00	-132.29	0.00	132.29	2734.38	1367.19	4519.43	2263.07	4.40	-0.423	0.000	0.063
105.00	-12.46	-3.72	0.00	-113.17	0.00	113.17	2687.43	1343.72	4325.17	2165.80	4.86	-0.445	0.000	0.057
110.00	-11.66	-3.61	0.00	-94.59	0.00	94.59	2639.19	1319.59	4132.95	2069.55	5.33	-0.465	0.000	0.050
115.00	-10.88	-3.50	0.00	-76.54	0.00	76.54	2589.64	1294.82	3942.93	1974.40	5.83	-0.482	0.000	0.043
120.00	-10.12	-3.40	0.00	-59.03	0.00	59.03	2538.79	1269.39	3755.30	1880.44	6.34	-0.497	0.000	0.035
125.00	-9.37	-3.29	0.00	-42.05	0.00	42.05	2486.64	1243.32	3570.20	1787.76	6.87	-0.509	0.000	0.027
128.00	-6.51	-2.43	0.00	-32.17	0.00	32.17	2454.72	1227.36	3460.44	1732.79	7.19	-0.515	0.000	0.021
130.00	-6.25	-2.39	0.00	-27.31	0.00	27.31	2433.18	1216.59	3387.83	1696.43	7.41	-0.519	0.000	0.019
130.00	-6.25	-2.39	0.00	-27.31	0.00	27.31	1188.95	594.48	1667.65	835.07	7.41	-0.519	0.000	0.038
135.00	-5.82	-2.29	0.00	-15.36	0.00	15.36	1172.65	586.33	1593.28	797.82	7.96	-0.525	0.000	0.024
137.00	-1.53	-0.97	0.00	-10.78	0.00	10.78	1165.76	582.88	1563.43	782.88	8.18	-0.528	0.000	0.015
140.00	-1.29	-0.91	0.00	-7.86	0.00	7.86	1155.02	577.51	1518.58	760.42	8.51	-0.531	0.000	0.011
145.00	-0.91	-0.82	0.00	-3.29	0.00	3.29	1136.06	568.03	1443.74	722.95	9.07	-0.534	0.000	0.005
149.00	-0.06	-0.02	0.00	-0.02	0.00	0.02	1119.92	559.96	1383.89	692.97	9.52	-0.535	0.000	0.000
150.00	0.00	-0.02	0.00	0.00	0.00	0.00	1115.76	557.88	1368.94	685.49	9.63	-0.535	0.000	0.000

Final Analysis Summary

Structure:	CT13073-A-SBA	**Code:**	EIA/TIA-222-G	1/21/2019	
Site Name:	Groton North	**Exposure:**	B		
Height:	150.00 (ft)	**Crest Height:**	0.00		
Base Elev:	0.000 (ft)	**Site Class:**	D - Stiff Soil		
Gh:	1.1 **Topography:** 1	**Struct Class:**	II	Page: 28	

Tower Engineering Solutions

Reactions

Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	Moment MZ (ft-kips)
1.2D + 1.6W 105 mph Wind	28.8	0.00	51.82	0.00	0.00	3079.55
0.9D + 1.6W 105 mph Wind	28.8	0.00	38.86	0.00	0.00	3062.20
1.2D + 1.0Di + 1.0Wi 50 mph Wind	7.0	0.00	74.56	0.00	0.00	724.60
1.2D + 1.0E	3.1	0.00	51.85	0.00	0.00	345.02
0.9D + 1.0E	3.1	0.00	38.89	0.00	0.00	343.04
1.0D + 1.0W 60 mph Wind	5.9	0.00	43.21	0.00	0.00	626.16

Max Stresses

Load Case	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Elev (ft)	Stress Ratio
1.2D + 1.6W 105 mph Wind	-51.82	-28.84	0.00	-3079.5	0.00	-3079.5	6643.18	3321.5	16232.9	8128.53	0.00	0.387
0.9D + 1.6W 105 mph Wind	-38.86	-28.83	0.00	-3062.2	0.00	-3062.2	6643.18	3321.5	16232.9	8128.53	0.00	0.383
1.2D + 1.0Di + 1.0Wi 50 mph Wind	-74.56	-7.00	0.00	-724.60	0.00	-724.60	6643.18	3321.5	16232.9	8128.53	0.00	0.100
1.2D + 1.0E	-51.85	-3.05	0.00	-345.02	0.00	-345.02	6643.18	3321.5	16232.9	8128.53	0.00	0.050
0.9D + 1.0E	-38.89	-3.05	0.00	-343.04	0.00	-343.04	6643.18	3321.5	16232.9	8128.53	0.00	0.048
1.0D + 1.0W 60 mph Wind	-43.21	-5.88	0.00	-626.16	0.00	-626.16	6643.18	3321.5	16232.9	8128.53	0.00	0.084

Monopole Mat Foundation Design

			Date: 1/21/2019
Customer Name:	T-Mobile	**EIA/TIA Standard:**	EIA-222-G
Site Name:		**Structure Height (Ft.):**	150
Site Number:	CT13073-A-SBA	**Engineer Name:**	V. Patel
Engr. Number:	68165	**Engineer Login ID:**	

Foundation Info Obtained from: Drawings/Calculations

Structure Type: Monopole

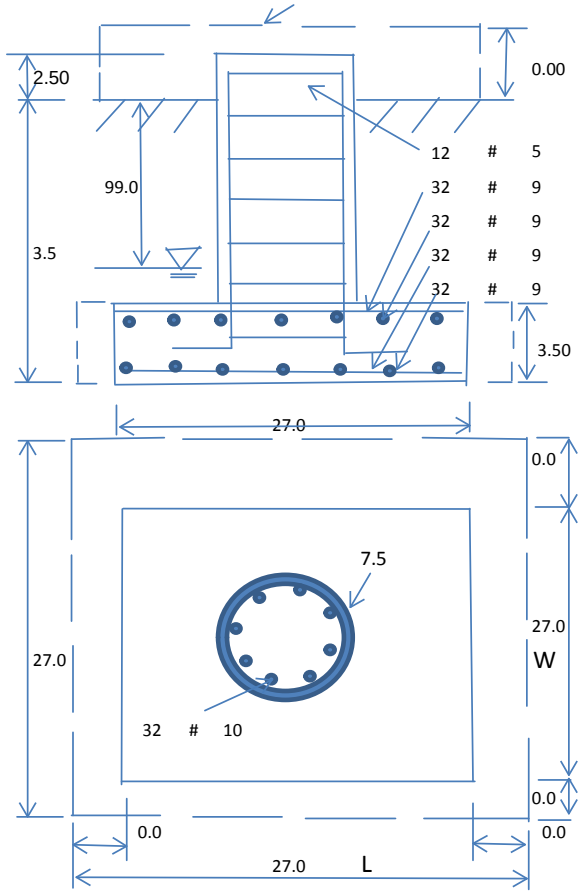
Analysis or Design? Analysis

Base Reactions (Factored):

Axial Load (Kips):	51.8	Shear Force (Kips):	28.8
Uplift Force (Kips):	0.0	Moment (Kips-ft):	3079.6
Allowable overstress %:	5.0%		

Foundation Geometries:

		Mods required -Yes/No ?:	No
Diameter of Pier (ft.):	7.5	Depth of Base BG (ft.):	3.5
Pier Height A. G. (ft.):	2.50	Thickness of Pad (ft):	3.50
Length of Pad (ft.):	27	Width of Pad (ft.):	27
Final Length of pad (ft)	27.0	Final width of pad (ft):	27.0
Control Value for Cell D18:	0	Control Value for Cell F18:	0



Material Properties and Reabr Info:

Concrete Strength (psi):	4000	Steel Elastic Modulus:	29000	ksi
Vertical bar yield (ksi)	60	Tie steel yield (ksi):	60	
Vertical Rebar Size #:	10	Tie / Stirrup Size #:	5	
Qty. of Vertical Rebars:	32	Tie Spacing (in):	6.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	9	
Concrete Cover (in.):	3	Unit Weight of Concrete:	150.0	pcf

Rebar at the bottom of the concrete pad:

Qty. of Rebar in Pad (L):	32	Qty. of Rebar in Pad (W):	32

Rebar at the top of the concrete pad:

Qty. of Rebar in Pad (L):	32	Qty. of Rebar in Pad (W):	32
Apply 1.35 factor for e/w Per G:	1.35		

Soil Design Parameters:

Soil Unit Weight (pcf):	100.0	Soil Buoyant Weight:	37.6	Pcf		
Water Table B.G.S. (ft):	99.0	Unit Weight of Water:	62.4	pcf	Angle from Top of Pad:	30
Ultimate Bearing Pressure (psf):	20000	Ultimate Skin Friction:	0	Psf	Angle from Bottm of Pad:	25
Consider Friction for O.T.M. (Y/N):	No	Consider Friction for bearing (Y/N):	No		Angle from Bottm of Pad:	25
Consider soil hor. resist. for OTM.:	Yes	Reduction factor on the maximum soil bearing pressure:	1.00			

Foundation Analysis and Design: Uplift Strength Reduction Factor: 0.75 — Compression Strength Reduction Factor: 0.75

Total Dry Soil Volume (cu. Ft.):	13.70	Total Dry Soil Weight (Kips):	1.37
Total Buoyant Soil Volume (cu. Ft.):	0.00	Total Buoyant Soil Weight (Kips):	0.00
Total Effective Soil Weight (Kips):	1.37	Weight from the Concrete Block at Top (K):	0.00
Total Dry Concrete Volume (cu. Ft.):	2662.83	Total Dry Concrete Weight (Kips):	399.42
Total Buoyant Concrete Volume (cu. Ft.):	0.00	Total Buoyant Concrete Weight (Kips):	0.00
Total Effective Concrete Weight (Kips):	399.42	Total Vertical Load on Base (Kips):	452.61

Check Soil Capacities:

					Load/ Capacity Ratio	
Calculated Maxium Net Soil Pressure under the base (psf):	1924	<	Allowable Factored Soil Bearing (psf):	15000	0.13	OK!
Allowable Foundation Overturning Resistance (kips-ft.):	5569.2	>	Design Factored Momont (kips-ft):	3217	0.58	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):	1.73	OK!				

Check the capacities of Reinforceing Concrete:

Strength reduction factor (Flexure and axial tension):	0.90	Strength reduction factor (Shear):	0.75		
Strength reduction factor (Axial compresion):	0.65	Wind Load Factor on Concrete Design:	1.00		

(1) Concrete Pier:

Vertical Steel Rebar Area (sq. in./each):	1.27		Tie / Stirrup Area (sq. in./each):	0.31		
Calculated Moment Capacity (Mn,Kips-Ft):	7267.6	>	Design Factored Moment (Mu, Kips-F	3152.1	0.43	OK!
Calculated Shear Capacity (Kips):	1049.9	>	Design Factored Shear (Kips):	28.8	0.03	OK!
Calculated Tension Capacity (Tn, Kips):	2194.6	>	Design Factored Tension (Tu Kips):	0.0	0.00	OK!
Calculated Compression Capacity (Pn, Kips):	11175.7	>	Design Factored Axial Load (Pu Kips):	51.8	0.00	OK!
Moment & Axial Strength Combination:	0.43	OK!	Check Tie Spacing (Design/Required):		0.5	OK!
Pier Reinforcement Ratio:	0.006	Reinforcement Ratio is satisfied per ACI				

(2).Concrete Pad:

One-Way Design Shear Capacity (L-Direction, Kips):	1181.5	>	One-Way Factored Shear (L-D. Kips):	200.6	0.17	OK!
One-Way Design Shear Capacity (W-Direction, Kips):	1181.5	>	One-Way Factored Shear (W-D., Kips)	200.6	0.17	OK!
One-Way Design Shear Capacity (Corner-Corner. Kips):	1062.3	>	One-Way Factored Shear (C-C, Kips):	192.5	0.18	OK!
Lower Steel Pad Reinforcement Ratio (L-Direct.):	0.0026	OK!	Lower Steel Pad Reinf. Ratio (W-Direc	0.0026		
Lower Steel Pad Moment Capacity (L-Direction. Kips-ft):	5409.5	>	Moment at Bottom (L-Dir. K-Ft):	1256.8	0.23	OK!
Lower Steel Pad Moment Capacity (W-Direction. Kips-ft):	5409.5	>	Moment at Bottom (W-Dir. K-Ft):	1256.8	0.23	OK!
Lower Steel Pad Moment Capacity (Corner-Corner,K-ft):	7606.8	>	Moment at Bottom (C-C Dir. K-Ft):	1777.4	0.23	OK!
Upper Steel Pad Reinforcement Ratio (L-Direct.):	0.0026	OK!	Upper Steel Reinf. Ratio (W-Dir.):	0.0026		
Upper Steel Pad Moment Capacity (L-Direc. Kips-ft):	5409.5	>	Moment at the top (L-Dir K-Ft):	468.7	0.09	OK!
Upper Steel Pad Moment Capacity (W-Direc. Kips-ft):	5409.5	>	Moment at the top (W-Dir K-Ft):	468.7	0.09	OK!
Upper Steel Pad Moment Capacity (Corner-Corner. K-ft):	7606.8	>	Moment at the top (C-C Dir. K-Ft):	439.6	0.06	OK!

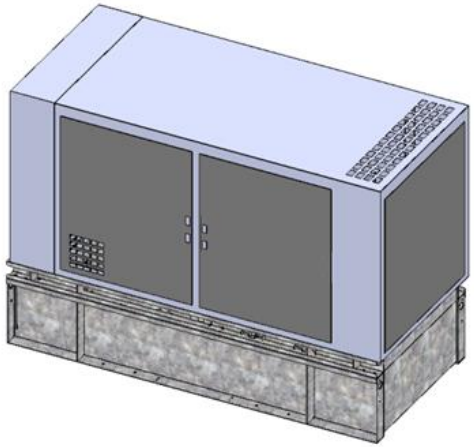
(3).Check Punching Shear Capacity due to Moment in the Pier:

Moment transferred by punching shear:	1231.8	k-ft.	Max. factored shear stress v_{u_CD}:	1.8	Psi
Max. factored shear stress v_{u_AB}:	7.0	Psi	Factored shear Strength ϕv_n:	189.7	Psi
Max. factored shear stress v_u:	7.0	Psi	Check Usage of Punching Shear Capacity:	0.04	OK!

T-Mobile DC Diesel Generators
15kW and 25kW

Contents

Features



- Intelligent and Friendly Monitoring by Remote Control (via SNMP)
- Longer Service Interval: >500hrs
- Low Acoustic Noise: <75dBA @ 7 meters
  - Optional Upgrades: <65dBA @ 7 meters
- Longer Backup Time:

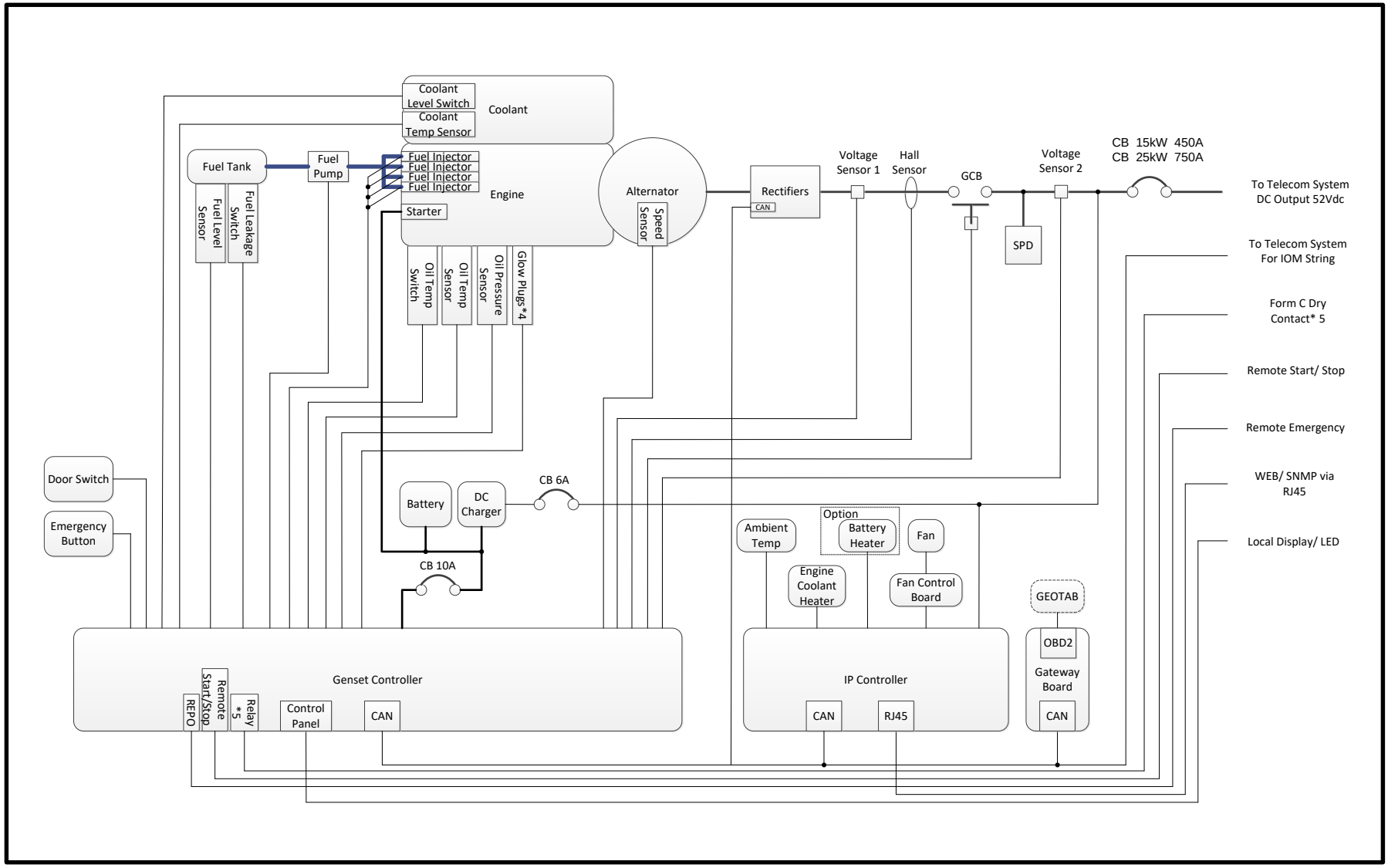
	Tank	15kW @ 75% Load	25kW @ 75% Load
Standard	130 gallon	94 hours	72 hours
Upgraded	220 gallon	155 hours	120 hours

- Output Ripple < 250mV
- Battery Management – Temperature compensation,
  Life management,
  Precise Battery Current Limitation
- Corrosion Resistant
- Rodent Resistant

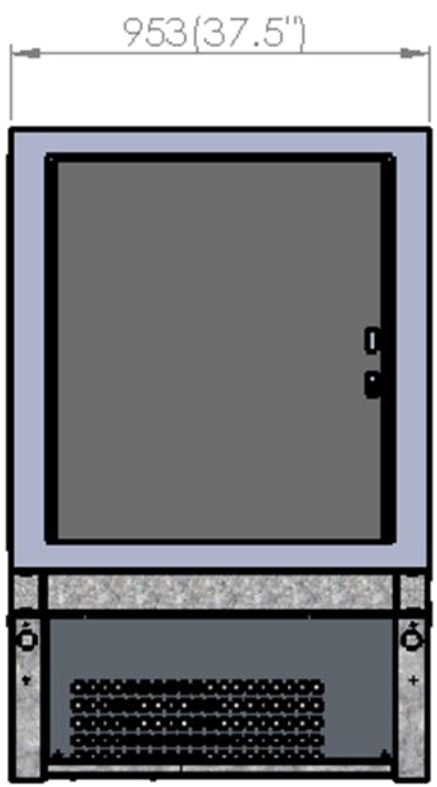
General Specification

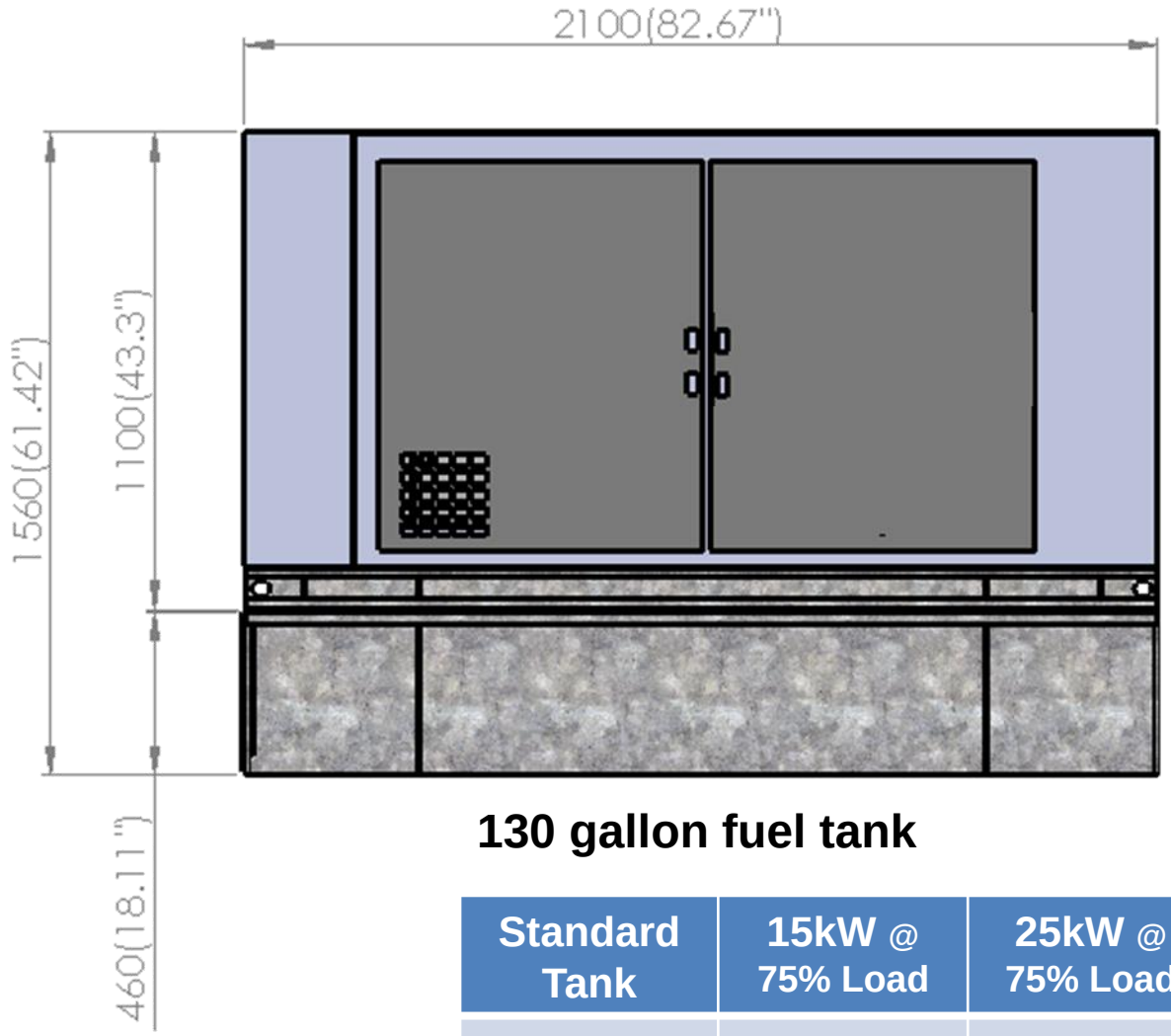
Model	15kW DC	25kW DC
DC Output	52Vdc at 100% load	
Engine Model	Perkins Tier 4 Interim	
Engine Speed	1800rpm	
Weight (estimated)	1120kg (2470lb)	1320kg (2910lb)
Operating Temperature	-25℃ to +45℃	
Safety	UL2200 / UL142	

Block Diagram



130 Gallon Tank Dimensions
15kW or 25kW DC Genset

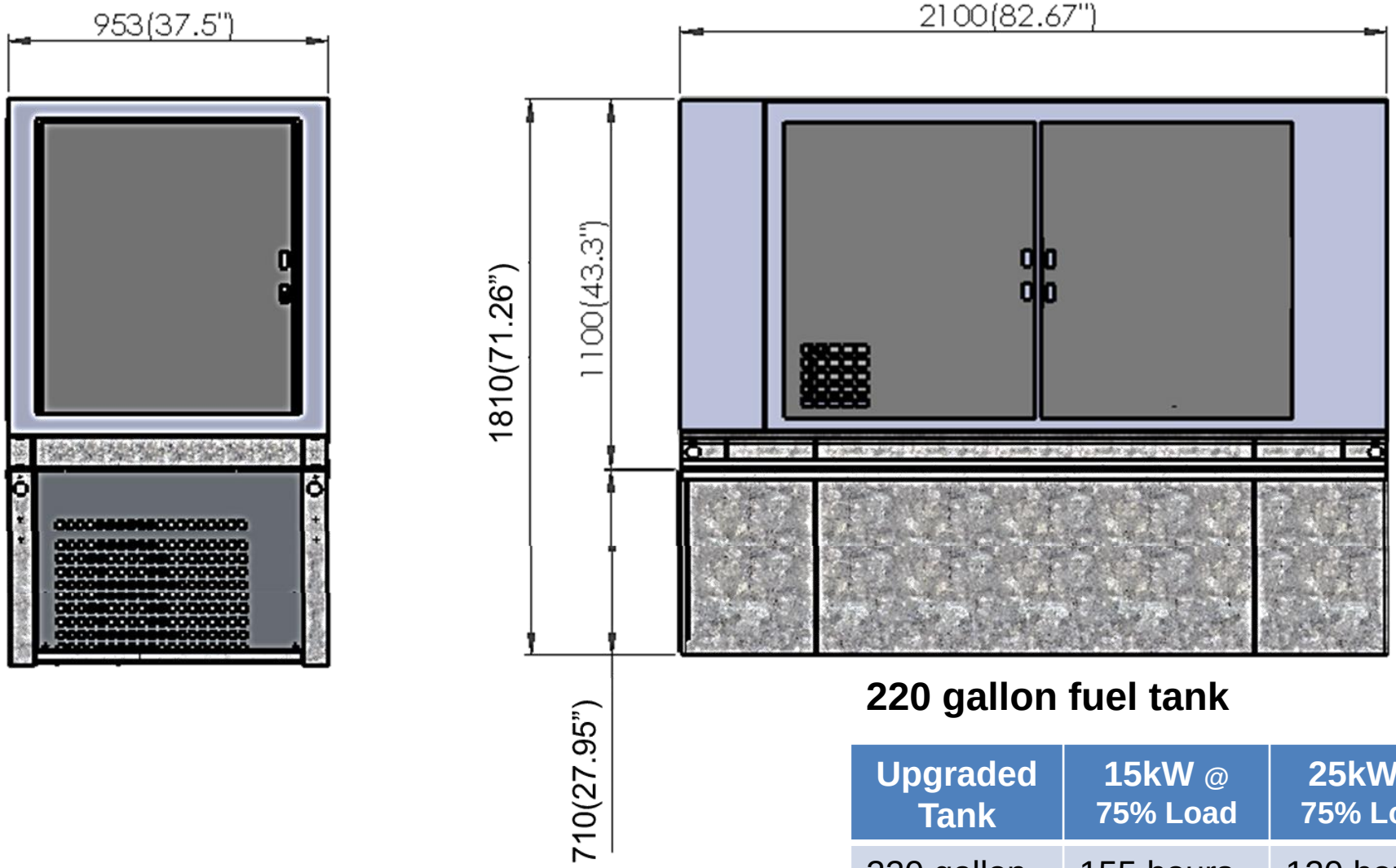




130 gallon fuel tank

Standard Tank	15kW @ 75% Load	25kW @ 75% Load
130 gallon	94 hours	72 hours

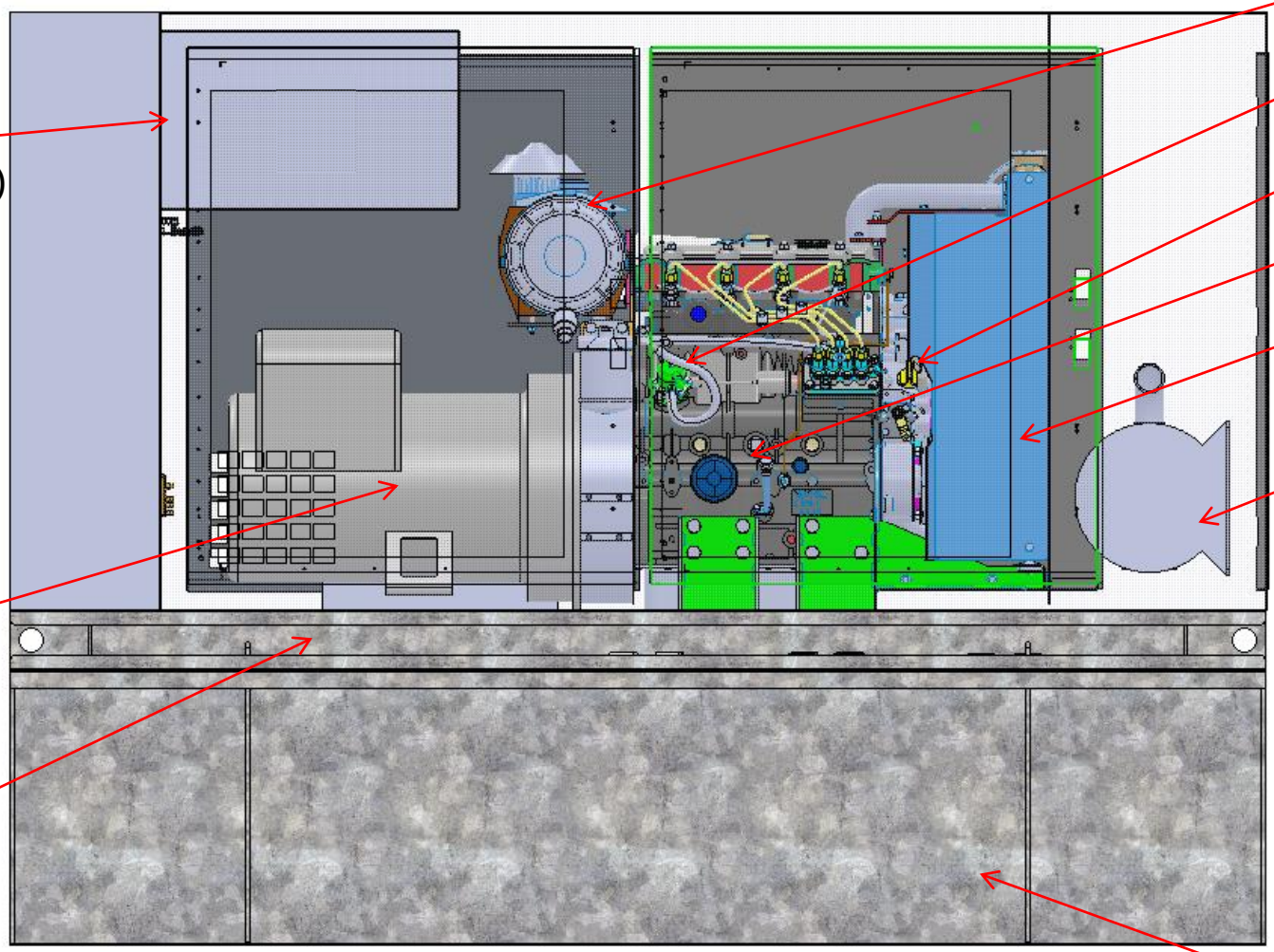
220 Gallon Tank Dimensions
15kW or 25kW DC Genset



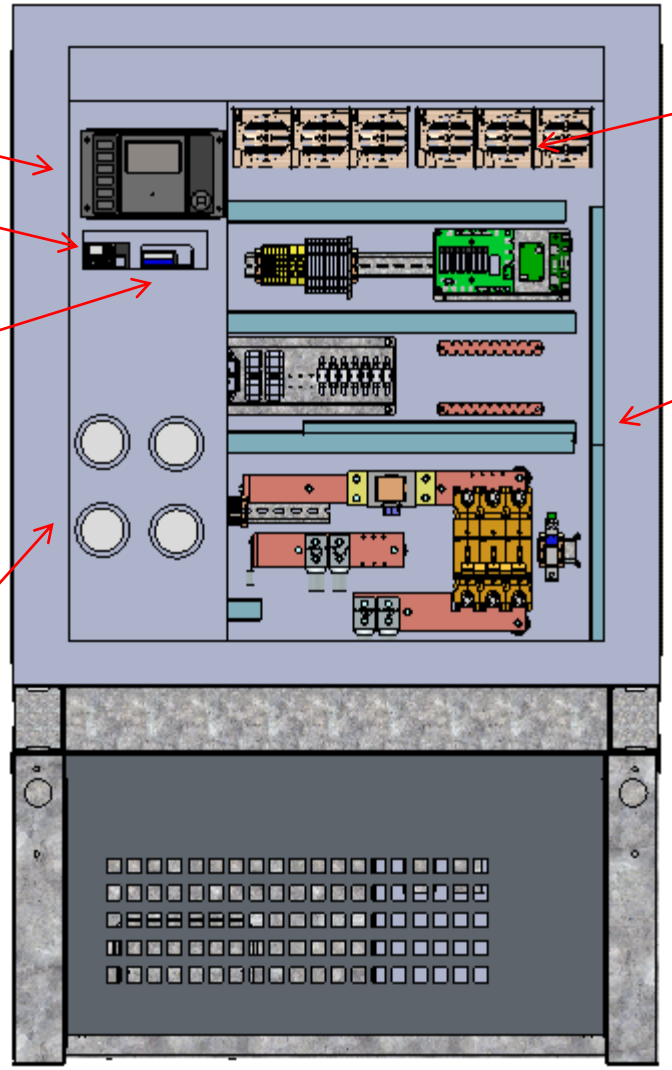
220 gallon fuel tank

Upgraded Tank	15kW @ 75% Load	25kW @ 75% Load
220 gallon	155 hours	120 hours

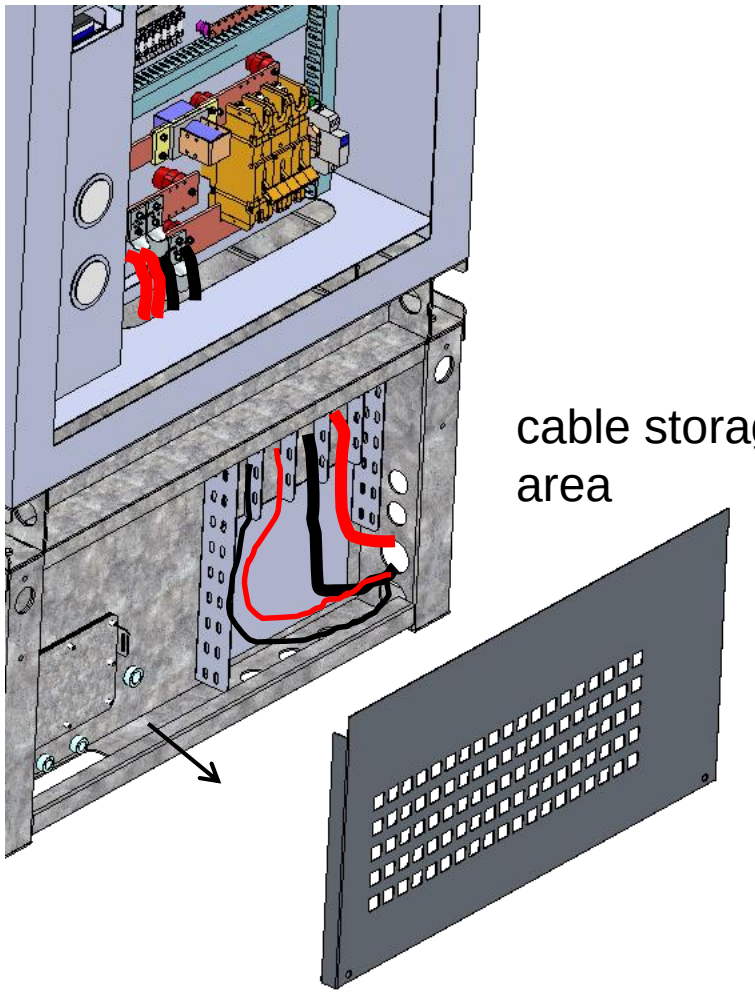
Generator Layout Front View



Left Side View

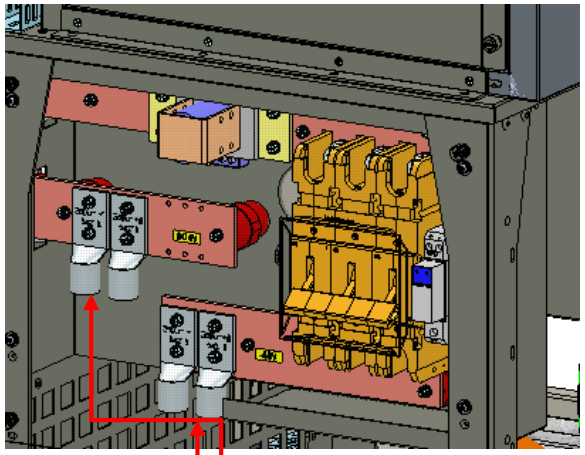


Cable Connections



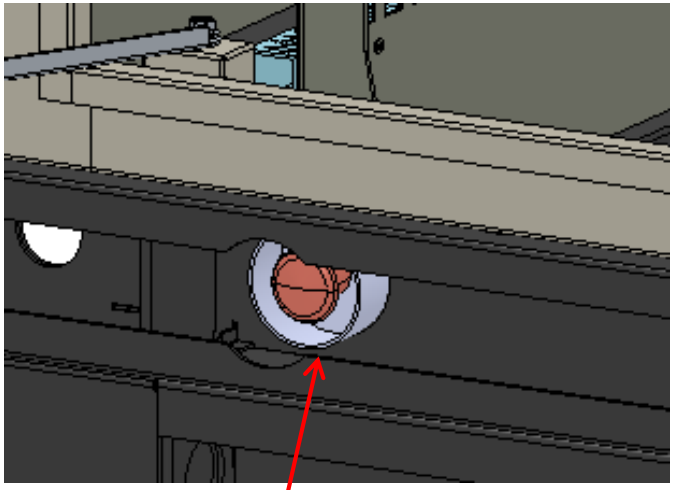
cable storage area

DC output busbar and breaker



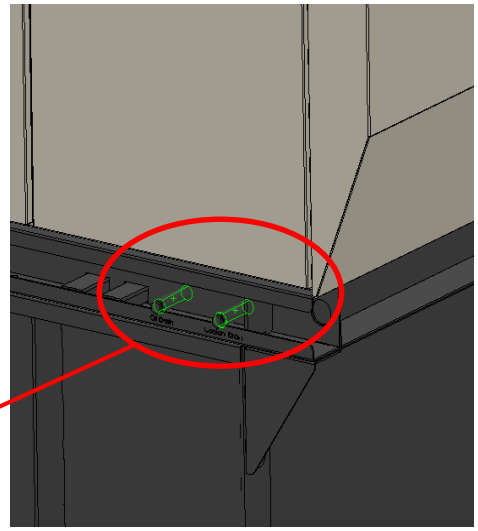
redundant landings for portable generator connection

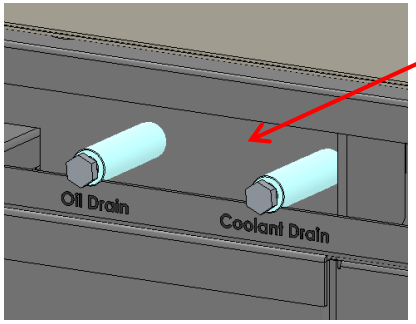
External Detail



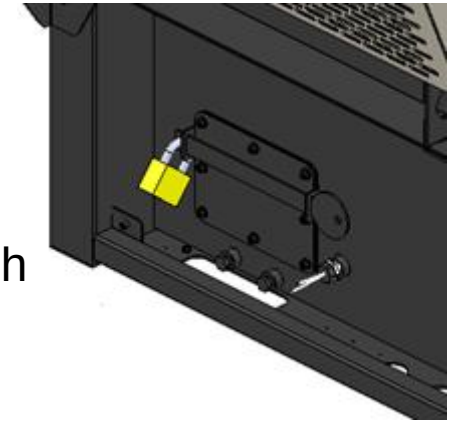
Front Bottom Left Side:
Emergency shutdown
switch externally mounted

Front Bottom Right Side:
External coolant, and
oil drains with plugs

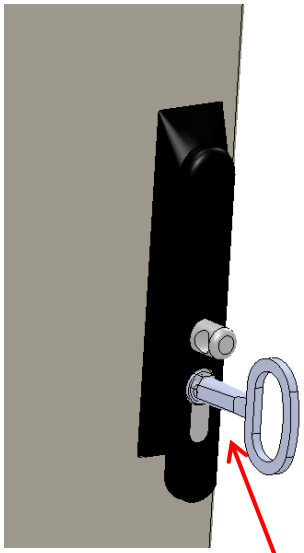




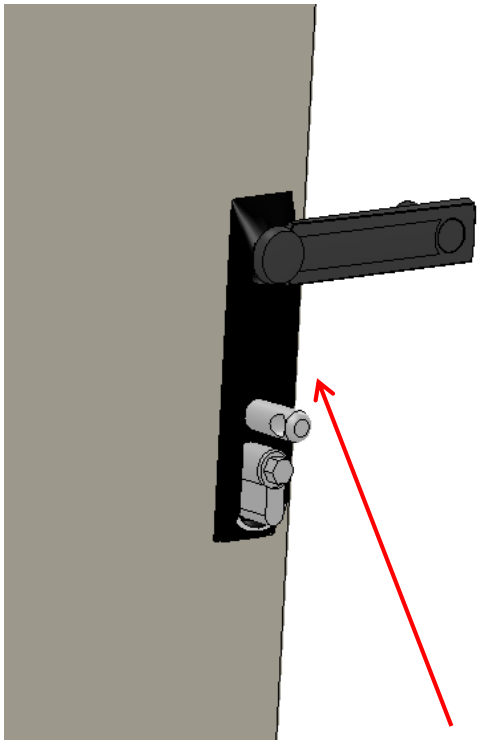
Right Side Panel:
Ball valve drain switch
inside with a padlock



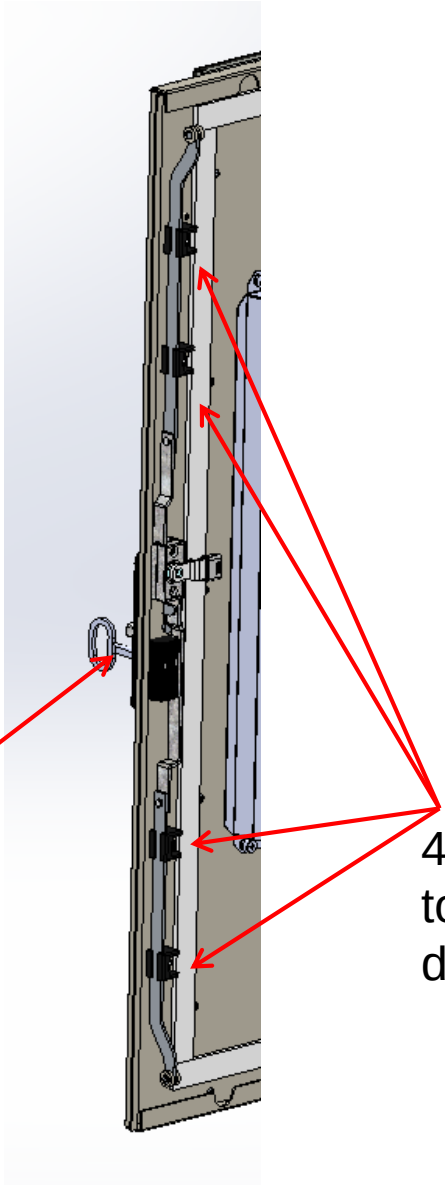
Higher Locking Method



twist key to release handle

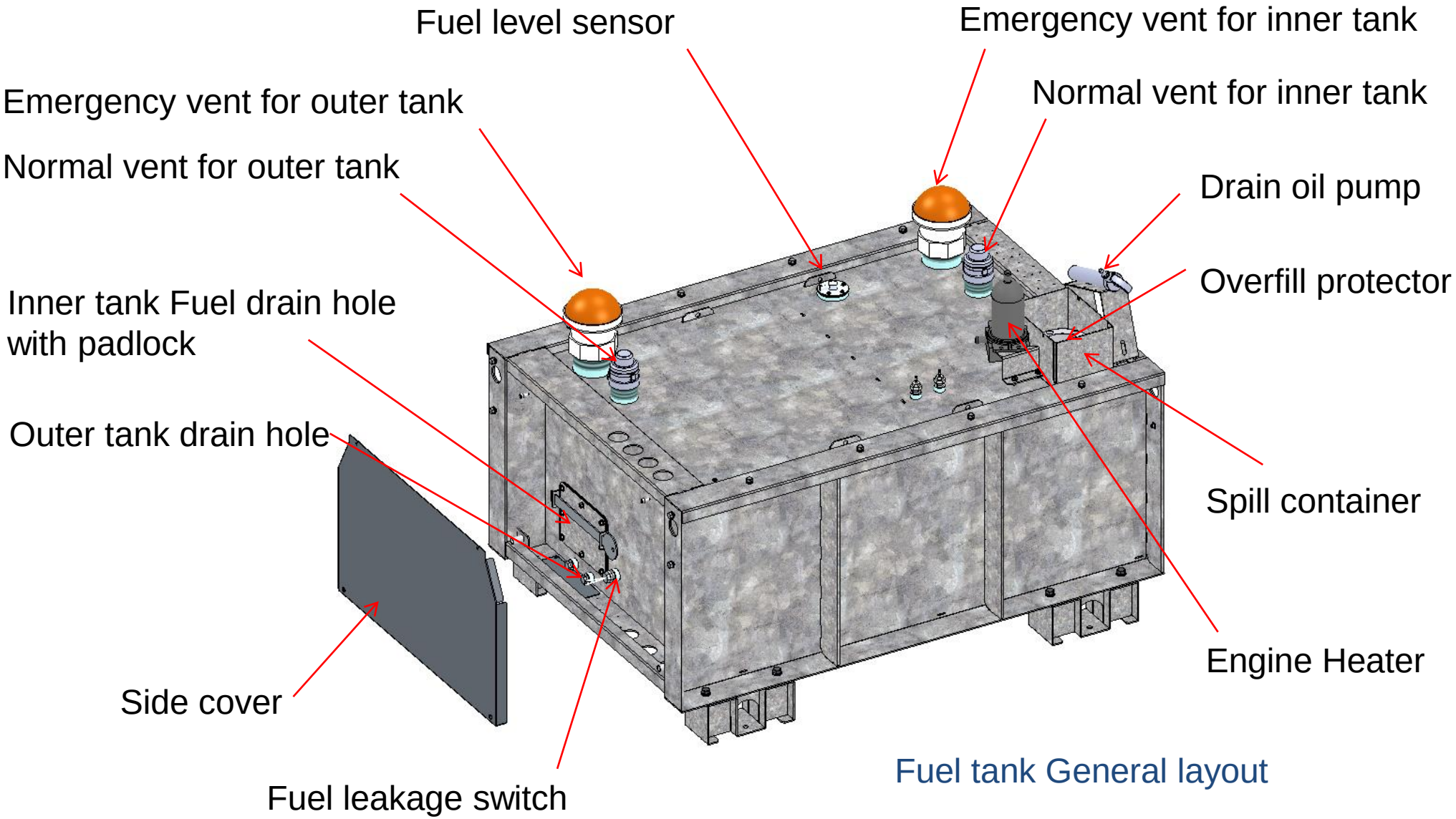


twist handle to release connecting bar



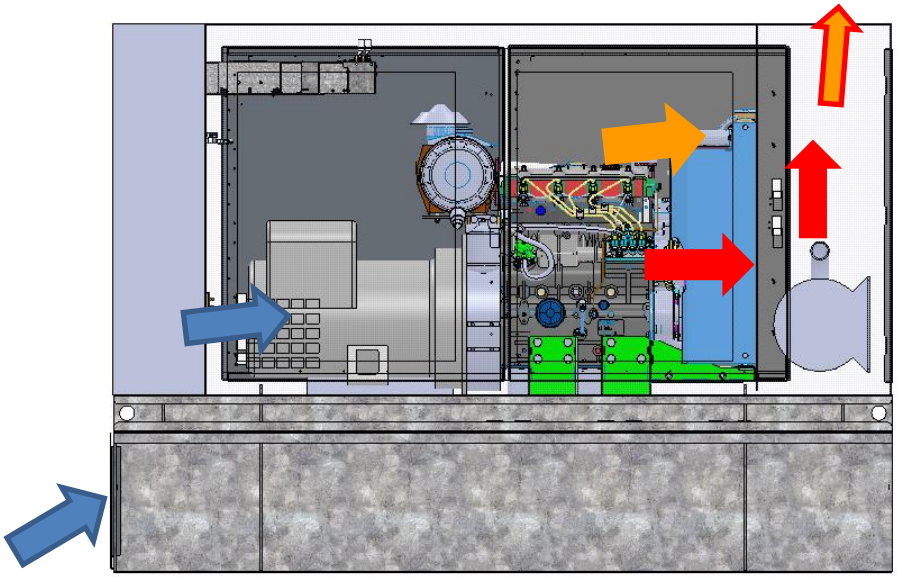
4 positions to lock the door

Fuel Tank Detail

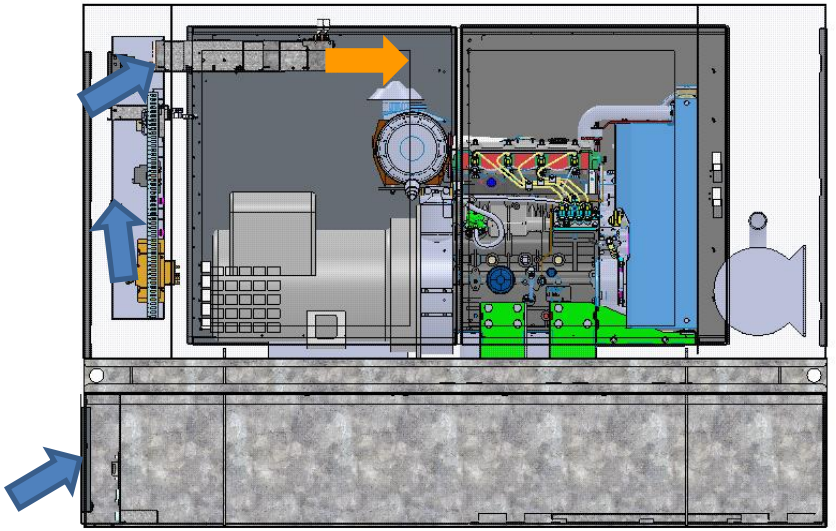


Fuel tank General layout

Air Flow



Front View
Air flow for engine



Front View
Air flow for Rectifier

- Cool air intake
- Warm air exhaust
- Hot air exhaust
- Mixed cooler exhaust air

Controllers

Generator controller provides local user interface

IP controller provides WEB and SNMP via RJ45

Local User Interface

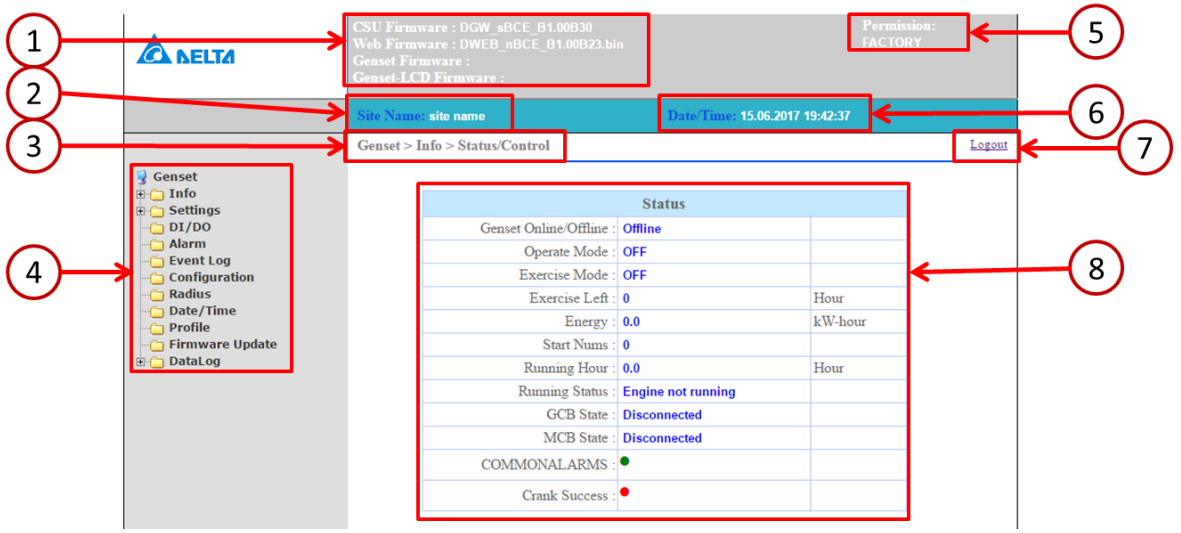
1. Controller LCD Display
2. Stop Button
3. Start Button
4. Manual Button ON/OFF DC Output Contactor

   LED Indication – Run and Output connected.
5. Alarm reset
6. Skip Buzzer Button
7. Menu Button
8. Up/Down and Left/Right Direct Button
9. Enter Button

Local User Interface Screen

1. Generator output power
2. Generator output voltage
3. Generator output current
4. Alternator output voltage
5. Operative mode
6. Running status
7. Counter
8. Speed

WEB Interface



1. Software version
2. Site name
3. Path
4. Function list
5. Permission
6. Date/ Time
7. Logout
8. Operation page

Smarter. Greener. Together.

To learn more about Delta, please visit www.deltaww.com

GROTON NORTH

1662 GOLD STAR HWY
GROTON, CT 06340
NEW LONDON COUNTY

SITE NO.: CTNL011B

SITE TYPE: 150'± MONOPOLE

RF DESIGN GUIDELINE: 3SEC-67D98M3

APPROVALS

PROJECT MANAGER:	DATE:	ZONING/SITE ACQ.:	DATE:
CONSTRUCTION:	DATE:	OPERATIONS:	DATE:
RF ENGINEERING:	DATE:	TOWER OWNER:	DATE:

T-MOBILE TECHNICIAN SITE SAFETY NOTES

LOCATION	SPECIAL RESTRICTIONS
SECTOR A:	ACCESS BY CERTIFIED CLIMBER
SECTOR B:	ACCESS BY CERTIFIED CLIMBER
SECTOR C:	ACCESS BY CERTIFIED CLIMBER
GPS/LMU:	UNRESTRICTED
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

SITE NOTES

1. THIS IS AN UNMANNED AND RESTRICTED ACCESS TELECOMMUNICATION FACILITY, AND IS NOT FOR HUMAN HABITATION. IT WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNAL FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
   - ADA COMPLIANCE NOT REQUIRED.
   - PORTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   - NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACE THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. NEW CONSTRUCTION WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - BUILDING CODE: 2018 CONNECTICUT STATE BUILDING CODE
   - ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE
   - STRUCTURAL CODE: TIA/EIA-222-H STRUCTURAL STANDARDS FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

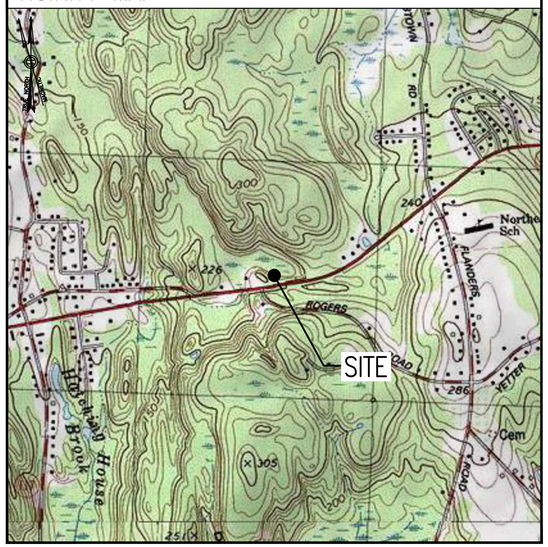
GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE OMNIPOINT REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS/CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
12. THE CONTRACTOR SHALL MAKE NECESSARY PROMISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.
15. THE CONTRACTOR SHALL NOTIFY THE PROJECT OWNER'S REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK.

AT LEAST 72 HOURS PRIOR TO DIGGING, THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT 811

VICINITY MAP

SCALE: 1" = 1000'-0"



DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SHEET INDEX

SHEET NO.	DESCRIPTION	REV. NO.
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GN-1	GENERAL NOTES	2
A-1	COMPOUND & EQUIPMENT PLAN	2
A-2	TOWER ELEVATIONS & ANTENNA PLAN	2
A-3	SITE DETAILS	2
A-4	GENERATOR DETAILS	2
A-5	GENERATOR INSTALLATION DETAILS	2
S-1	GROUND EQUIPMENT DETAILS	2
S-2	TOWER EQUIPMENT DETAILS	2
E-1	ELECTRICAL NOTES, DIAGRAMS & DETAILS	2
E-2	GROUNDING NOTES, PLAN, DIAGRAM & DETAILS	2

SPECIAL ZONING NOTE:
BASED ON INFORMATION PROVIDED BY T-MOBILE REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409(A), AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW, AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW, OR ADMINISTRATIVE REVIEW).

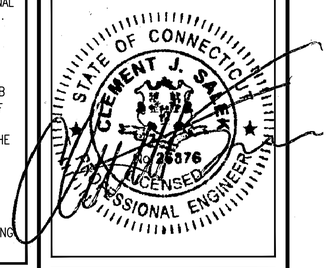
PROJECT SUMMARY

SITE NUMBER:	CTNL011B
SBA SITE NUMBER:	CT13073A
SBA SITE NAME:	GROTON NORTH
SITE ADDRESS:	1662 ROUTE 184 (GOLD STAR HWY) GROTON, CT 06340
TOWER OWNER:	SBA INFRASTRUCTURE, LLC 8501 CONGRESS AVENUE BOCA RATON, FL 33487 PHONE: 561-226-9523
COUNTY:	NEW LONDON
ZONING DISTRICT:	RURAL (RU-40)
STRUCTURE TYPE:	MONOPOLE
STRUCTURE HEIGHT:	150'
APPLICANT:	T-MOBILE NORTHEAST LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
SBA RSM:	STEPHEN ROTH PHONE: 860-539-4920 EMAIL: SRoth@sbasite.com
ARCHITECT:	CHAPPELL ENGINEERING ASSOCIATES, LLC. 201 BOSTON POST ROAD WEST, SUITE 101 MARLBOROUGH, MA 01752
STRUCTURAL ENGINEER:	CHAPPELL ENGINEERING ASSOCIATES, LLC. 201 BOSTON POST ROAD WEST, SUITE 101 MARLBOROUGH, MA 01752

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
(860) 648-1116

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil· Structural ·Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com



CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	02/05/19	CONSTRUCTION REVISED	CMC
1	01/25/19	ISSUED FOR CONSTRUCTION	CMC
0	11/15/18	ISSUED FOR REVIEW	JRV

SITE NUMBER:
CTNL011B

SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

1815.027

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – T–MOBILE
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL, STATE AND FEDERAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

5. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER, T1 CABLES AND GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR AND/OR LANDLORD PRIOR TO CONSTRUCTION.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION AND RETURN DISTURBED AREAS TO ORIGINAL CONDITIONS.

13. THE SUBCONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE SUBCONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

14. SUBCONTRACTOR SHALL NOTIFY CHAPPELL ENGINEERING ASSOCIATES, LLC 48 HOURS IN ADVANCE OF POURING CONCRETE OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS AND POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEERING REVIEW.

15. CONSTRUCTION SHALL COMPLY WITH ALL T–MOBILE STANDARDS AND SPECIFICATIONS.

16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

17. THE EXISTING CELL SITES ARE IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. IF THE EXISTING CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.

6. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

7. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

8. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF ENGINEERING, OWNER AND/OR LOCAL UTILITIES.

9. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION AS SPECIFIED IN THE PROJECT SPECIFICATIONS.

10. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

11. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000PSI) MAY BE USED. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 381 CODE REQUIREMENTS

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF .....1½ IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER
   OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....¾ IN.
   BEAMS AND COLUMNS .....1½ IN.

5. A CHAMFER ¾" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHORS SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO THE MANUFACTURERS RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY SIMPSON OR APPROVED EQUAL.

7. CONCRETE CYLINDER TIES ARE NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TEST PERFORMED AT THE SUPPLIERS PLANT.
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7. TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS AND T–MOBILE SPECIFICATIONS UNLESS OTHERWISE NOTED. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL USE BEARING TYPE ASTM A325 BOLTS (⅞"ø) AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. ALL BOLTS SHALL BE GALVANIZED OR STAINLESS STEEL.

4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE ⅝" DIA. ASTM A 307 BOLTS (GALV) UNLESS NOTED OTHERWISE.

5. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL

6. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL TO EXPOSE NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING #1 SIEVE.

5. AS AN ALTERNATE TO ITEMS 2 AND 3, THE SUBGRADE SOILS WITH 5 PASSES OR A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND–OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). AND SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL–GRADED GRANULAR FILL AND COMPACTED AS STATED ABOVE.

COMPACTION EQUIPMENT:

1. HAND OPERATED DOUBLE DRUN, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
SUBCONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND UTILITY TRENCHWORK.

2. COORDINATION OF WORK:
SUBCONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH CONTRACTOR.

3. CABLE LADDER RACK:
SUBCONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY AND/OR ICE BRIDGE, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.

ELECTRICAL INSTALLATION NOTES:

1. WIRING, RACEWAY, AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

2. SUBCONTRACTOR SHALL MODIFY OR INSTALL CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. SUBCONTRACTOR SHALL SUBMIT MODIFICATIONS TO CONTRACTOR FOR APPROVAL.

3. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

4. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.

5. EACH END OF EVERY POWER, GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA, AND MATCH INSTALLATION REQUIREMENTS.

6. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, ½ INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC AND OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (#6 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.

13. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

14. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY HARGER (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75'C (90'C IF AVAILABLE).

15. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

16. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

17. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

18. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

19. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

20. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

21. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

22. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

23. CABINETS, BOXES AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

24. CABINETS, BOXES AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

25. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

26. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

27. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

28. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

29. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

30. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

31. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

32. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.

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STATE OF CONNECTICUT
CLEMENT J. GAUTHIER
No. 26876
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	02/05/19	CONSTRUCTION REVISED	CMC
1	01/25/19	ISSUED FOR CONSTRUCTION	CMC
0	11/15/18	ISSUED FOR REVIEW	JRV

SITE NUMBER:
CTNL011B

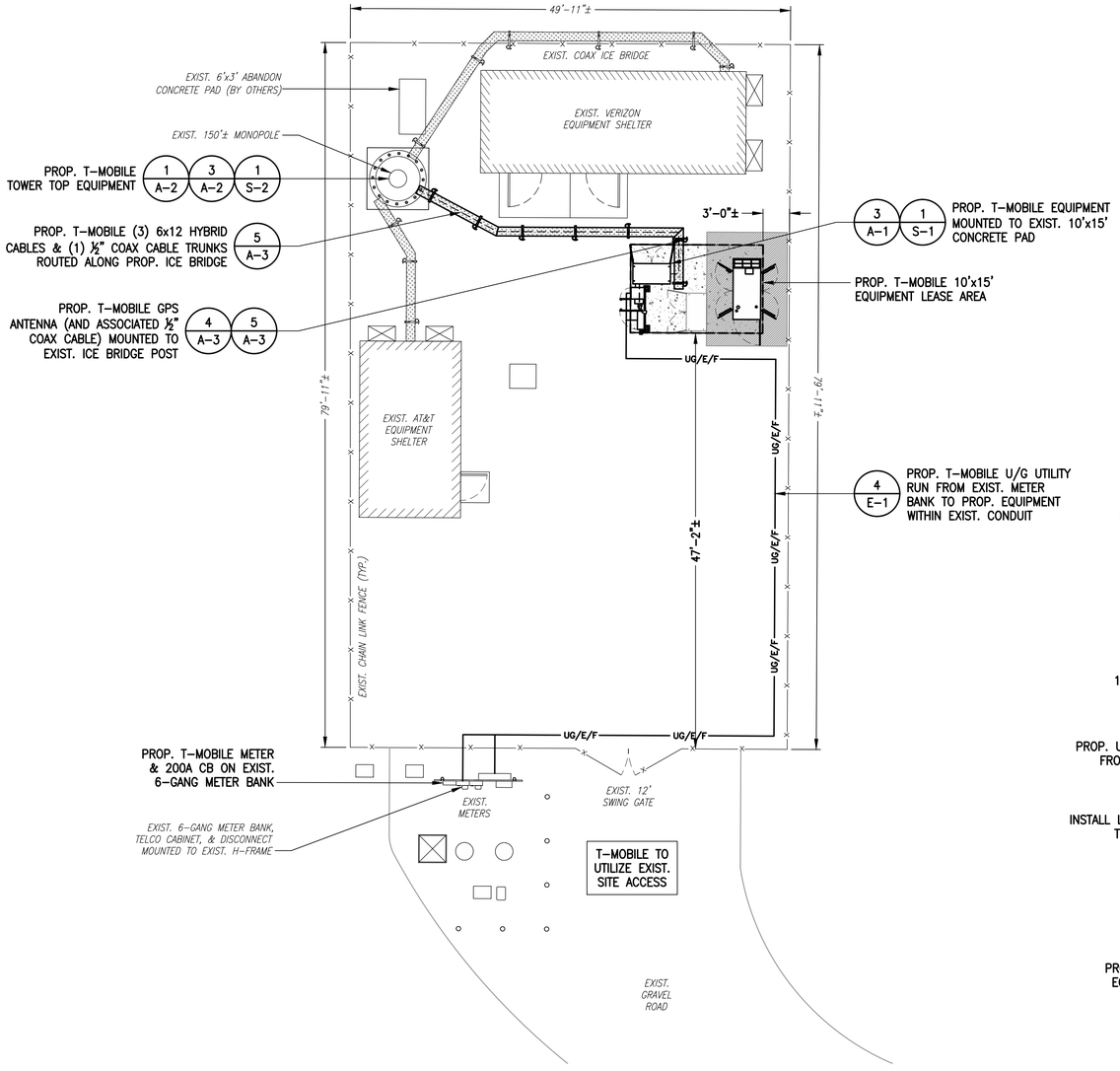
SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-1

1815.027

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.

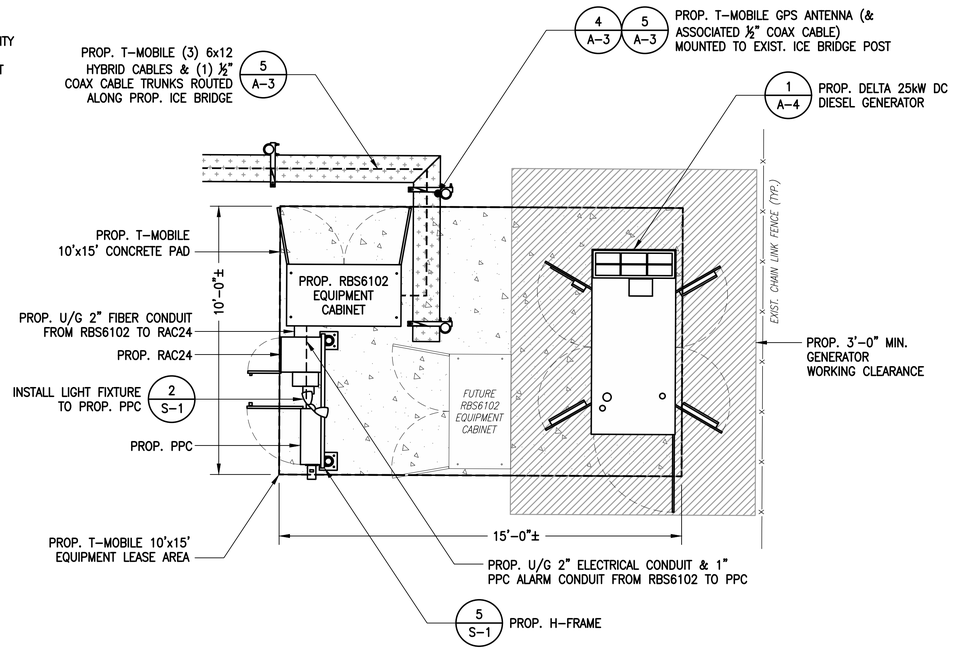


COMPOUND PLAN 1/A-1
SCALE: 1/8" = 1'-0"
0 4'-0" 8'-0" 16'-0" 24'-0"

SOURCE: CEA SITE VISIT 11.13.18

EQUIPMENT AREA PHOTO 2/A-1
SCALE: N.T.S.

3/A-1 APPROX. LOCATION OF PROP. 10'x26' EQUIPMENT LEASE AREA



PROPOSED EQUIPMENT PLAN 3/A-1
SCALE: 1/2" = 1'-0"
0 1' 2' 4' 6'

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COMPOUND & EQUIPMENT PLAN

SHEET NUMBER
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1815.027

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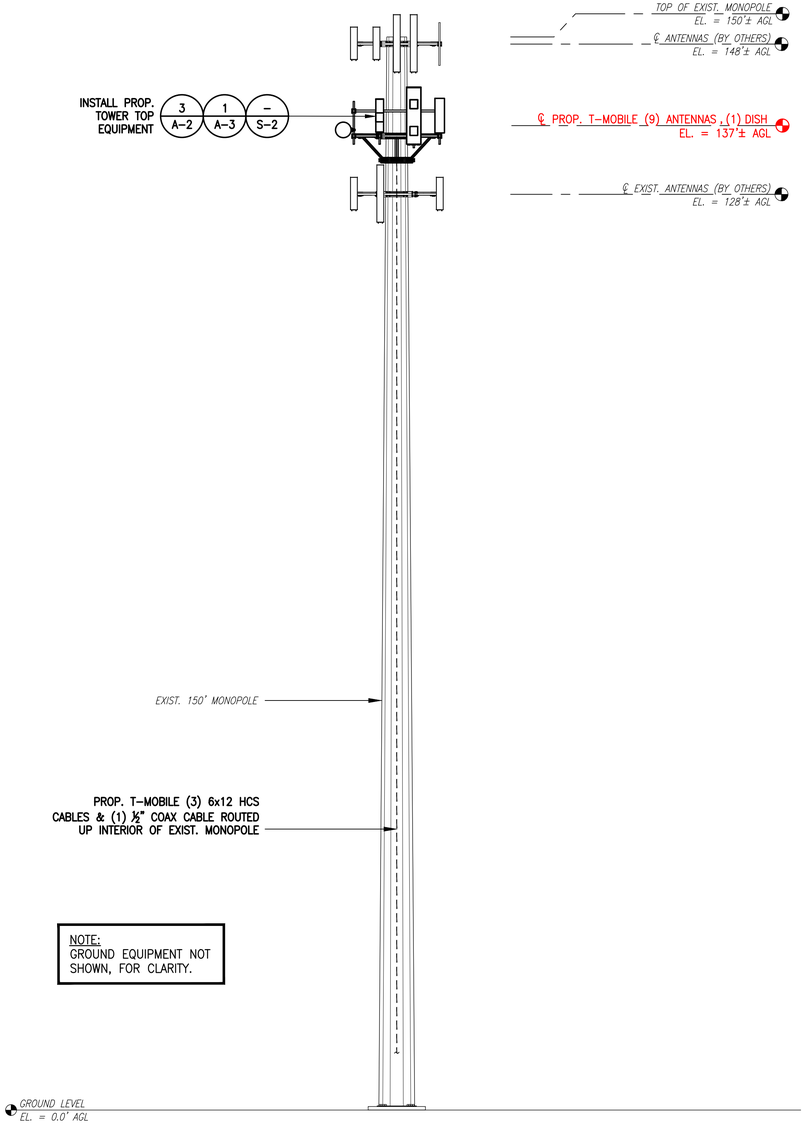
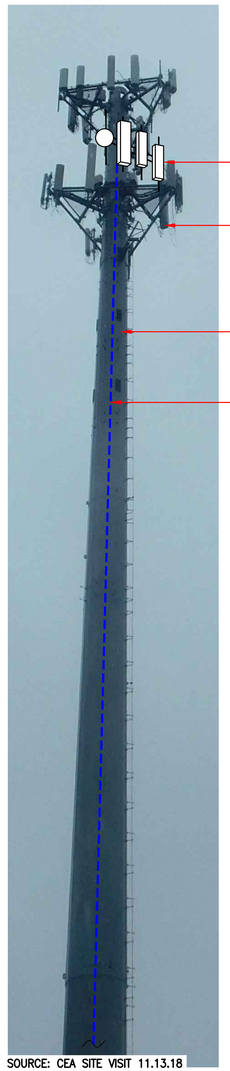
SPECIAL TOWER TOP EQUIPMENT INSTALLATION WORK NOTE (SAFETY-CLIMB ALIGNMENT REQUIREMENTS):
GENERAL CONTRACTOR SHALL ORIENT PROPOSED PLATFORM REINFORCEMENT KIT RING-MOUNTS SO THAT EXISTING SAFETY CLIMB CABLE IS NOT OBSTRUCTED/RE-ROUTED FROM VERTICAL ALIGNMENT AND IS NOT IN PHYSICAL CONTACT WITH EXISTING OR PROPOOSED RING-MOUNT HARDWARE. GENERAL CONTRACTOR SHALL INSTALL NEW OR ADDITIONAL SAFETY-CLIMB CABLE GUIDES IF ADDITIONAL CLEARANCE IS REQUIRED. ADDITIONAL CABLE GUIDES SHALL BE ATTACHED SECURELY TO THE POLE USING MECHANICAL FASTENERS OR FIELD WELDED BY A CERTIFIED WELDING TECHNICIAN.

RAD CENTER NOTE:
T-MOBILE RAD CENTER SHOWN IN RED TEXT BASED ON SBA-PROVIDED CO-LOCATION APPLICATION, EQUIPMENT DATABASE, AND STRUCTURAL ANALYSIS. THE SBA-PROVIDED ANTENNA RAD CENTER SHALL SUPERSEDE ANY CONFLICTING INFORMATION DERIVED FROM THE T-MOBILE RFDS.



NOTE:
GROUND EQUIPMENT NOT SHOWN, FOR CLARITY.

TOWER ELEVATION
SCALE: 1" = 10'
0 10' 20' 40' 60'
1 A-2

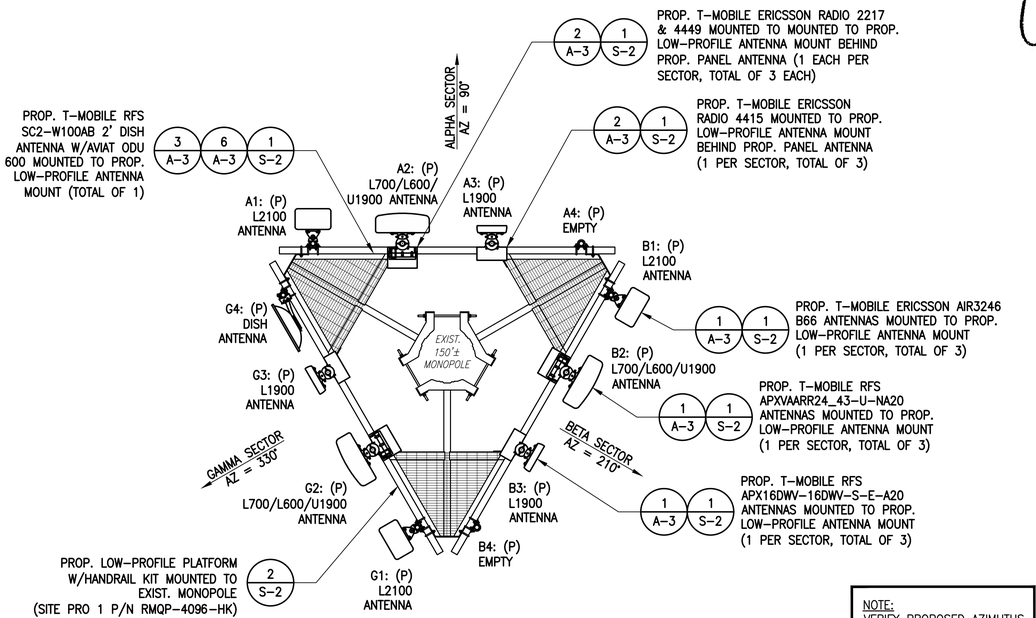


SOURCE: CEA SITE VISIT 11.13.18

NOTE:
PROPOSED T-MOBILE RRH'S NOT SHOWN, FOR CLARITY.

NOTE: ONE SECTOR SHOWN FOR CLARITY

TOWER PHOTO
SCALE: N.T.S.
2 A-2



PROPOSED ANTENNA PLAN
SCALE: N.T.S.
3 A-2

NOTE:
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION.

ANTENNA STATUS LEGEND:

EMPTY – EMPTY PIPE

(E) – EXISTING
(P) – INSTALL
(F) – FUTURE

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STATE OF CONNECTICUT CLEMENT J. SAMEK No. 26876 LICENSED PROFESSIONAL ENGINEER

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SITE NUMBER:
CTNL011B

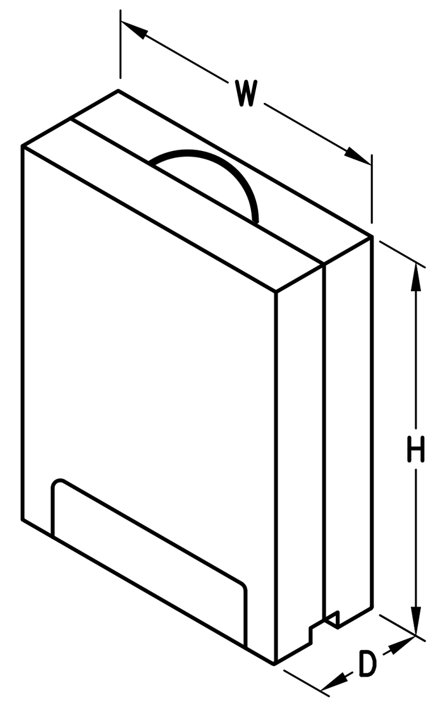
SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE
TOWER ELEVATIONS & ANTENNA PLAN

SHEET NUMBER
A-2

1815.027

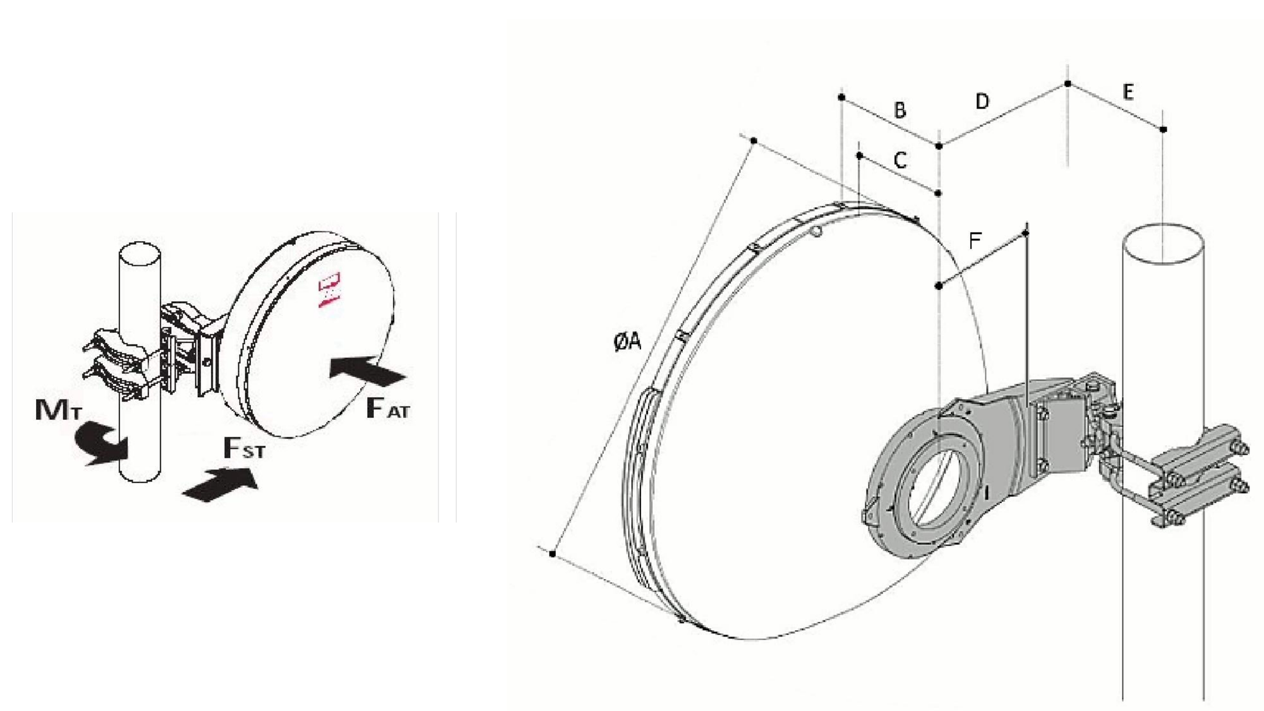
FINAL ANTENNA CONFIGURATION								
SECTOR	ANTENNA	RAD CENTER	AZIMUTH (TRUE NORTH)	MECHANICAL DOWNTILT	ELECTRICAL DOWNTILT	BAND	RADIOS	CABLES
ALPHA	ERICSSON AIR3246 B66A	137'± AGL	90°	0°	0°	L2100	–	(1) 6x12 HCS CABLE
	RFS APXVAARR24_43-U-NA20	137'± AGL	90°	0°	0°	U1900	ERICSSON RADIO 2217 B2	
						L600/L700	ERICSSON RADIO 4449 B71+B12	
	RFS APX16DWV-16DWVS-S-E-A20	137'± AGL	90°	0°	0°	L1900	ERICSSON RADIO 4415 B25	
BETA	ERICSSON AIR3246 B66A	137'± AGL	210°	0°	0°	L2100	–	(1) 6x12 HCS CABLE
	RFS APXVAARR24_43-U-NA20	137'± AGL	210°	0°	0°	U1900	ERICSSON RADIO 2217 B2	
						L600/L700	ERICSSON RADIO 4449 B71+B12	
	RFS APX16DWV-16DWVS-S-E-A20	137'± AGL	210°	0°	0°	L1900	ERICSSON RADIO 4415 B25	
GAMMA	ERICSSON AIR3246 B66A	137'± AGL	330°	0°	0°	L2100	–	(1) 6x12 HCS CABLE
	RFS APXVAARR24_43-U-NA20	137'± AGL	330°	0°	0°	U1900	ERICSSON RADIO 2217 B2	
						L600/L700	ERICSSON RADIO 4449 B71+B12	
	RFS APX16DWV-16DWVS-S-E-A20	137'± AGL	330°	0°	0°	L1900	ERICSSON RADIO 4415 B25	
DISH	RFS SC2-W100AB	137'± AGL	TBD	–	–	–	AVIAT OCU 600	(1) ½" COAX CABLE



ERICSSON 2217
DIMENSIONS: 20.0"H x 17"W x 7"D
WEIGHT: 50.7 LBS
1 PER SECTOR, TOTAL OF 3

ERICSSON 4449 B71&B12 RRU
DIMENSIONS: 15.0"H x 13.2"W x 7.4"D
WEIGHT: 60.0 LBS
1 PER SECTOR, TOTAL OF 3

RRU DETAILS (2 / A-3)
SCALE: N.T.S.

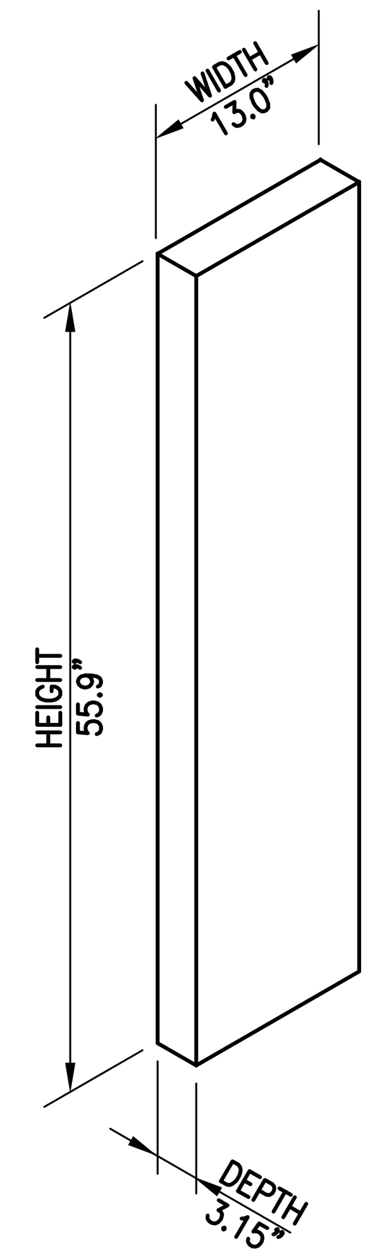


All dimensions in mm (in)

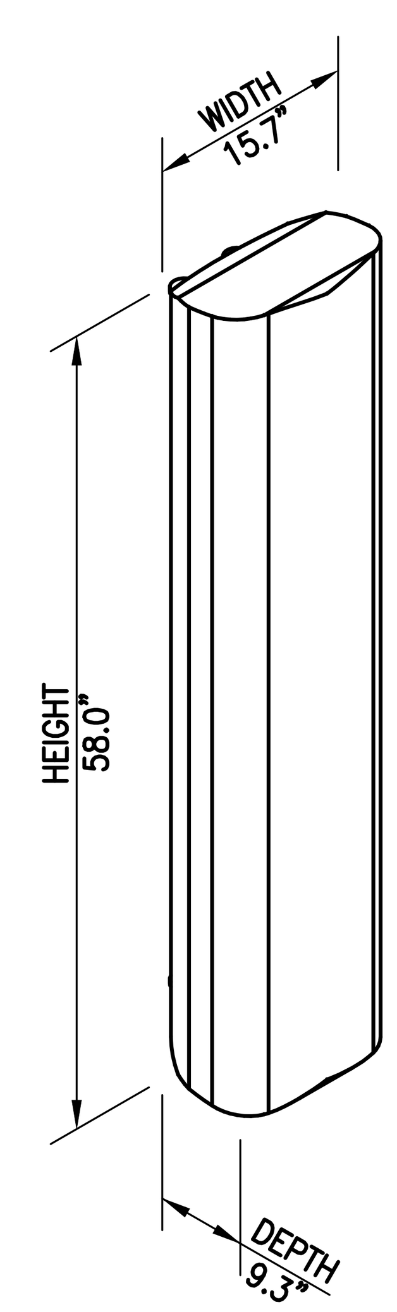
ØA	B	C	ØD for mounting pipe diam. 219 (8.5)	114 (4.5)	89 (3.5)	51 (2.0)	E	F
670 (26.4)	293 (11.5)	254 (10)		293 (11.4)	293 (11.4)	293 (11.4)	123 (4.8)	100 (3.9)

RFS SC2-W100BD 2' DISH ANTENNA
DIMENSIONS: 26.4"ø x 11.5"D
WEIGHT: 22 LBS
TOTAL OF 1

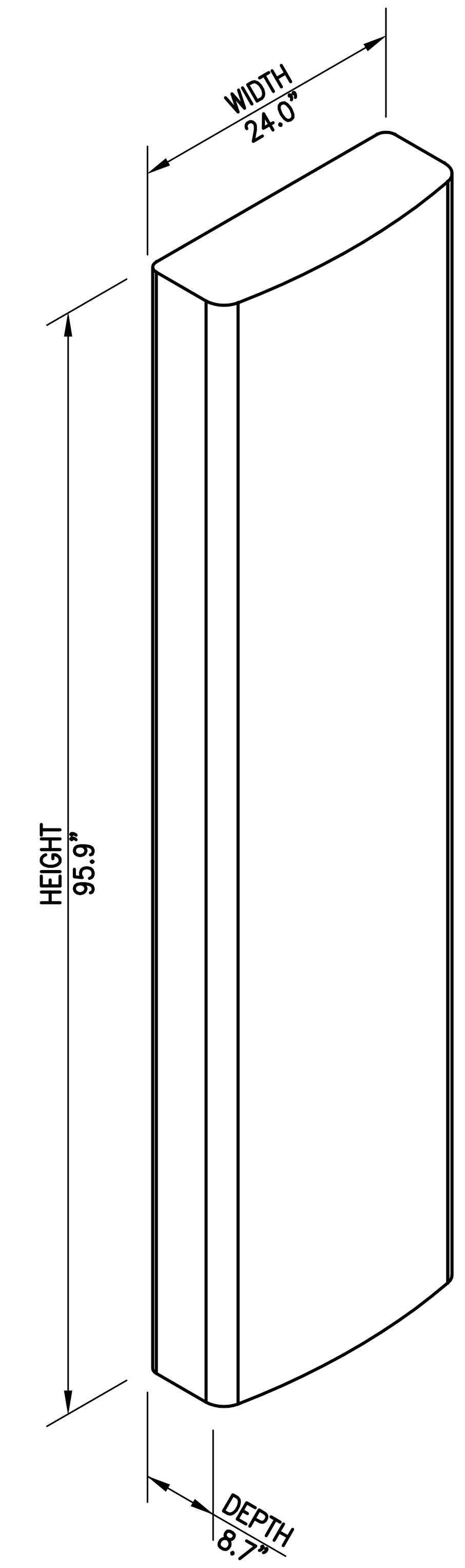
DISH ANTENNA DETAIL (3 / A-3)
SCALE: N.T.S.



RFS APX16DWV-16DWVS-S-E-A20 PANEL ANTENNA
DIMENSIONS: 55.9"H x 13.0"W x 3.15"D
WEIGHT: 40.7 LBS
1 PER SECTOR, TOTAL OF 3



ERICSSON AIR3246 B66A ANTENNA
DIMENSIONS: 58.0"H x 15.7"W x 9.3"D
WEIGHT: 178.5 LBS
1 PER SECTOR, TOTAL OF 3

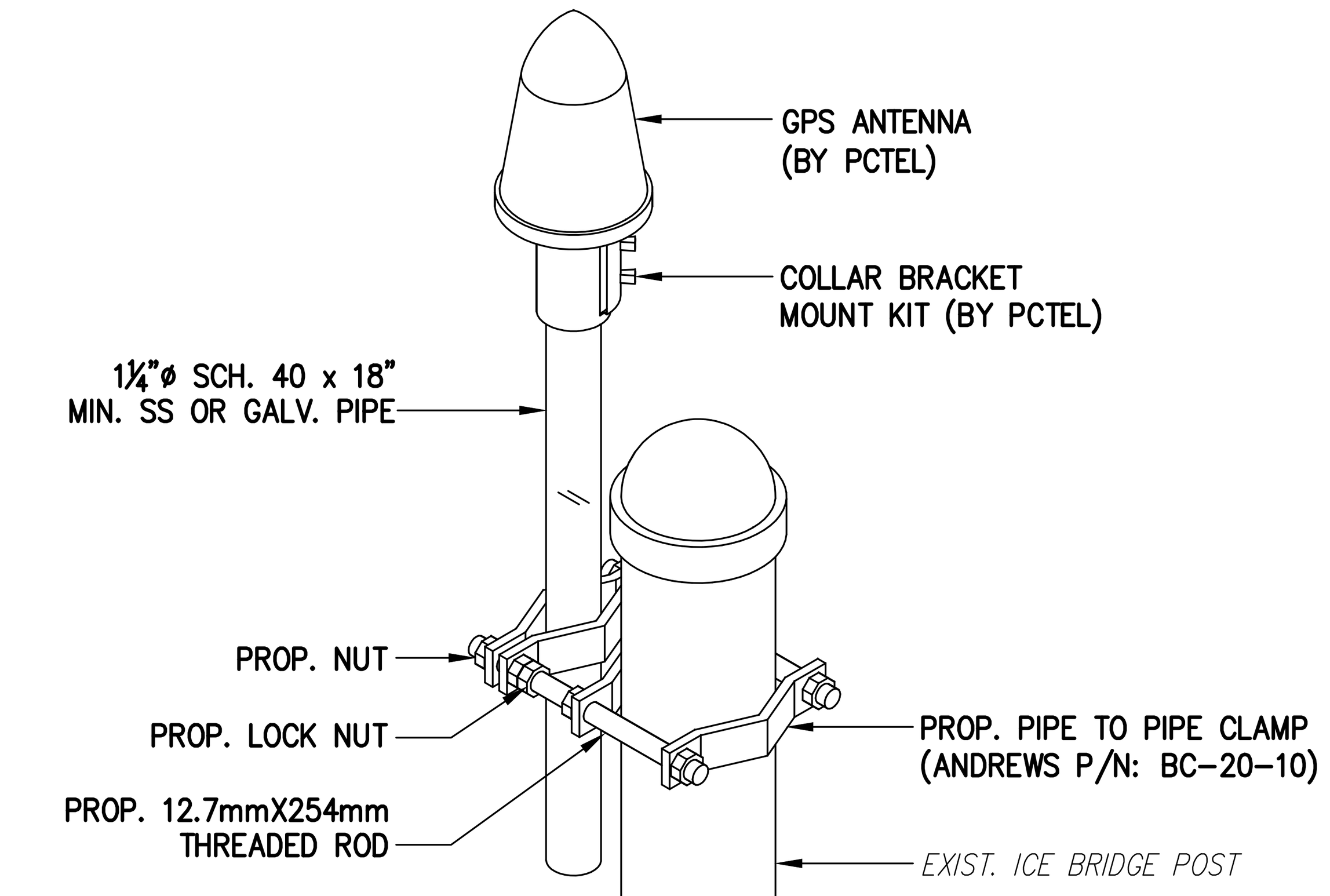


RFS APXVAARR24_43-U-NA20 PANEL ANTENNA
DIMENSIONS: 95.9"H x 24.0"W x 8.7"D
WEIGHT: 128.0 LBS
1 PER SECTOR, TOTAL OF 3

ANTENNA DETAILS (1 / A-3)
SCALE: N.T.S.

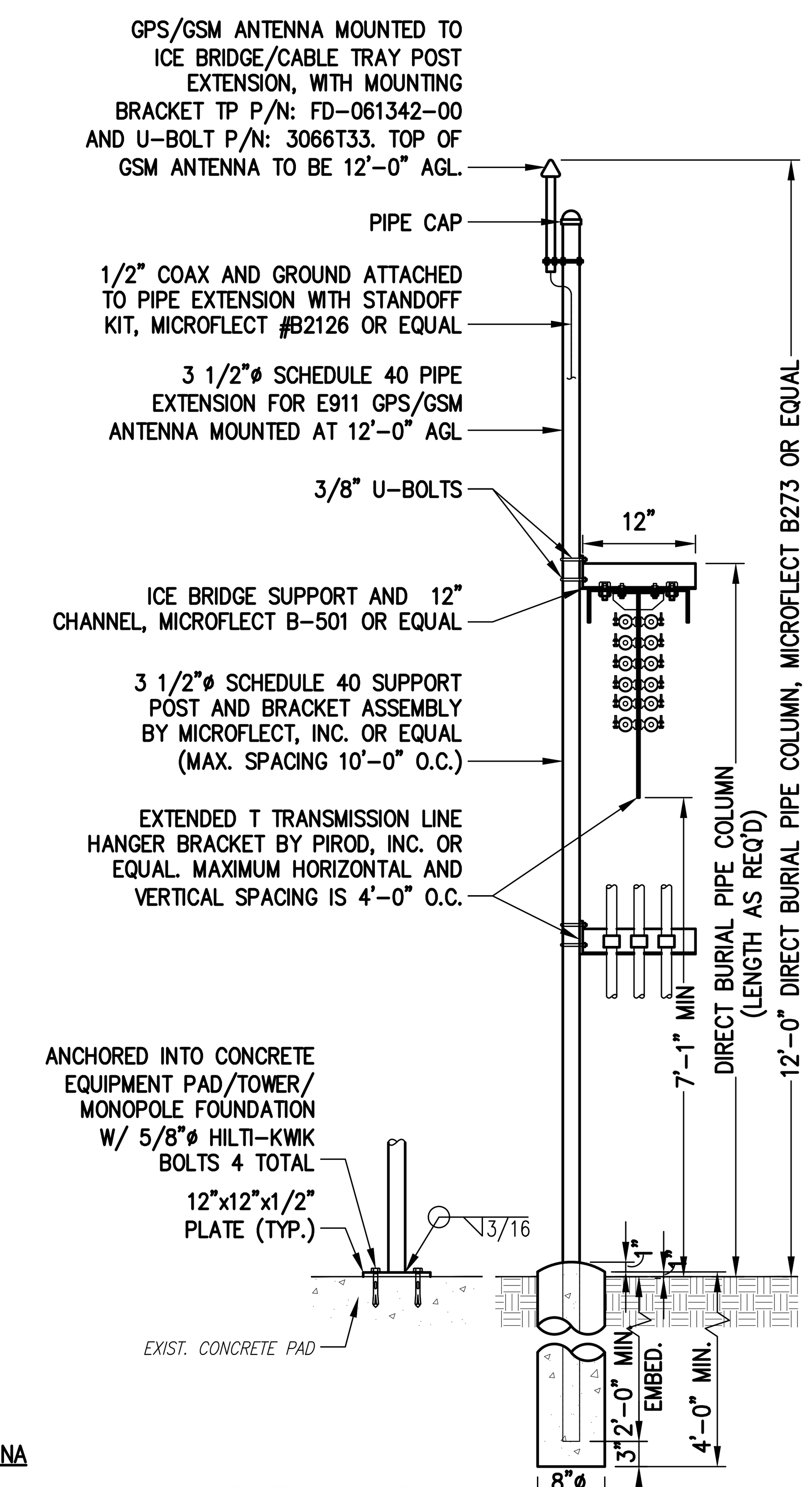
AVIAT ODU 600
DIMENSIONS: 10.4"H x 10.4"W x 4.9"D
WEIGHT: 11 LBS
TOTAL OF 1

ODU DETAIL (6 / A-3)
SCALE: N.T.S.



1. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 1"–1½" DIAMETER GALVANIZED STEEL OR STAINLESS STEEL PIPE. THE PIPE MUST NOT BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.
2. THE MOUNTING PLATE SHALL BE FASTENED AS SHOWN AND ATTACHED TO THE APPROPRIATE SUPPORT STRUCTURE USING U-BOLTS. THE SUPPORT PIPE SHALL THEN BE ATTACHED TO THE MOUNTING PLATE USING THE OVERSIZE U-BOLTS PROVIDED TO ALLOW ADJUSTMENT. IT IS CRITICAL THAT THE GPS ANTENNA IS MOUNTED WITHIN 2 DEGREES OF VERTICAL AND THE BASE OF THE ANTENNA IS WITHIN 2 DEGREES OF LEVEL.

GPS MOUNTING DETAIL (4 / A-3)
SCALE: NTS



SECTION AT ICE BRIDGE/CABLE TRAY (5 / A-3)
SCALE: 3/4"=1'-0"
0 8" 1'-4" 2'-8" 4'-0"

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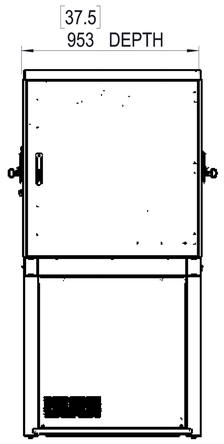
GROTON, CT 06340

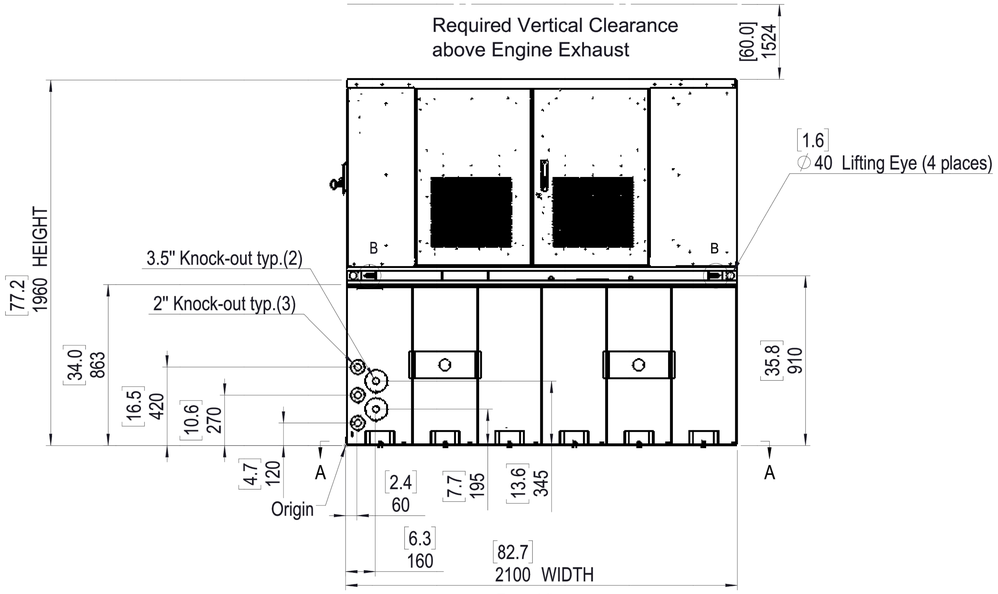
SHEET TITLE
SITE DETAILS

SHEET NUMBER
A-3

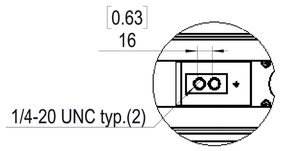
1815.027



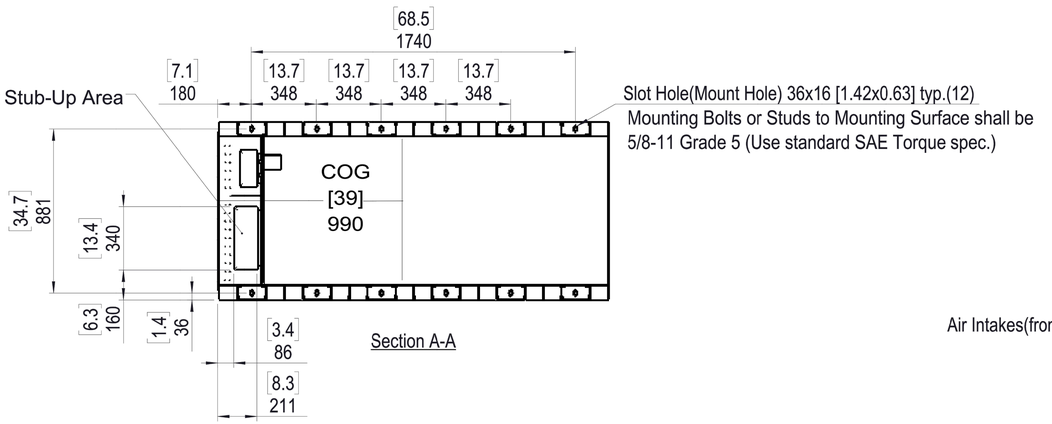
Left (PDU) Side View



Front View

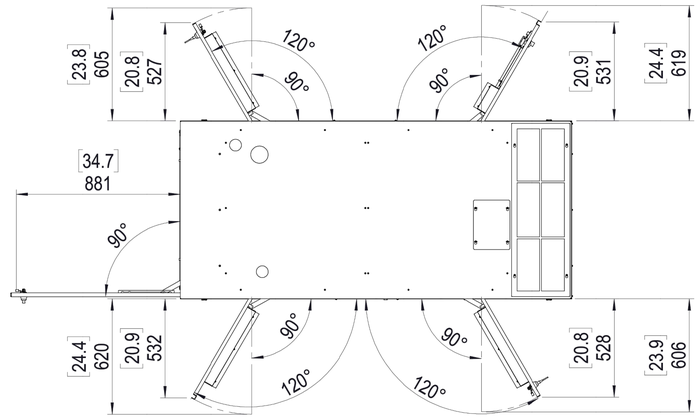


Chassis Ground Detail "B" (4 places)

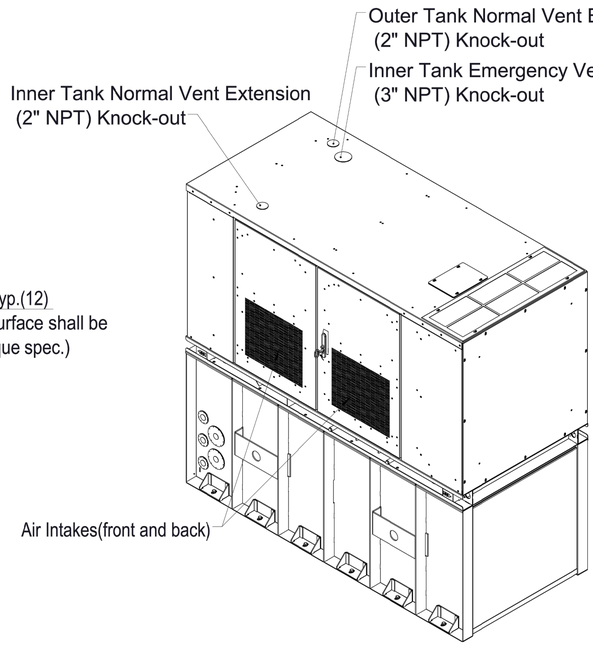


Section A-A

Recommended 914.4[36.0] Minimum Perimeter Clearance



Top View



DELTA ESOG480-CCA02 25kW DC DIESEL GENERATOR
DIMENSIONS: 77.2"H x 37.5"W x 82.7"L
WEIGHT: 3216 LBS

GENERATOR DETAILS (1 / A-4)
SCALE: N.T.S.

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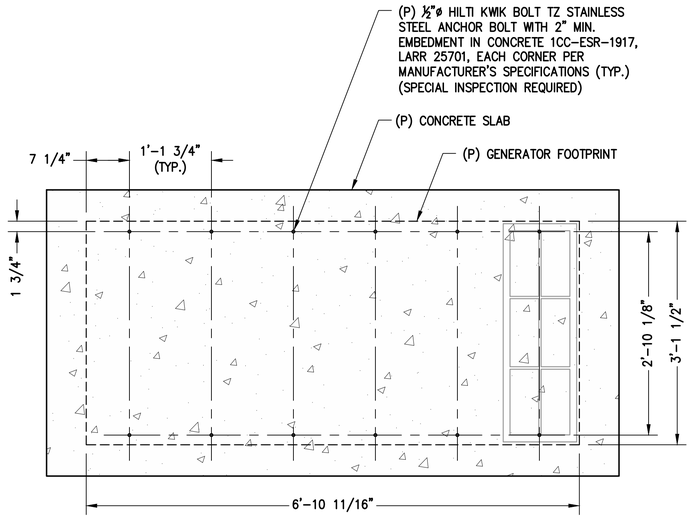
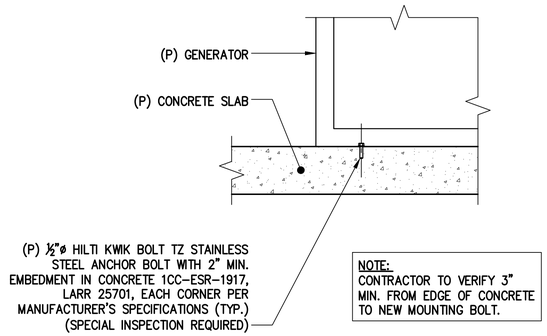
SHEET TITLE
GENERATOR DETAILS

SHEET NUMBER
A-4

1815.027



GENERATOR ANCHORING DETAIL 1/A-5
SCALE: N.T.S.



GENERATOR MOUNTING DETAIL 2/A-5
SCALE: N.T.S.

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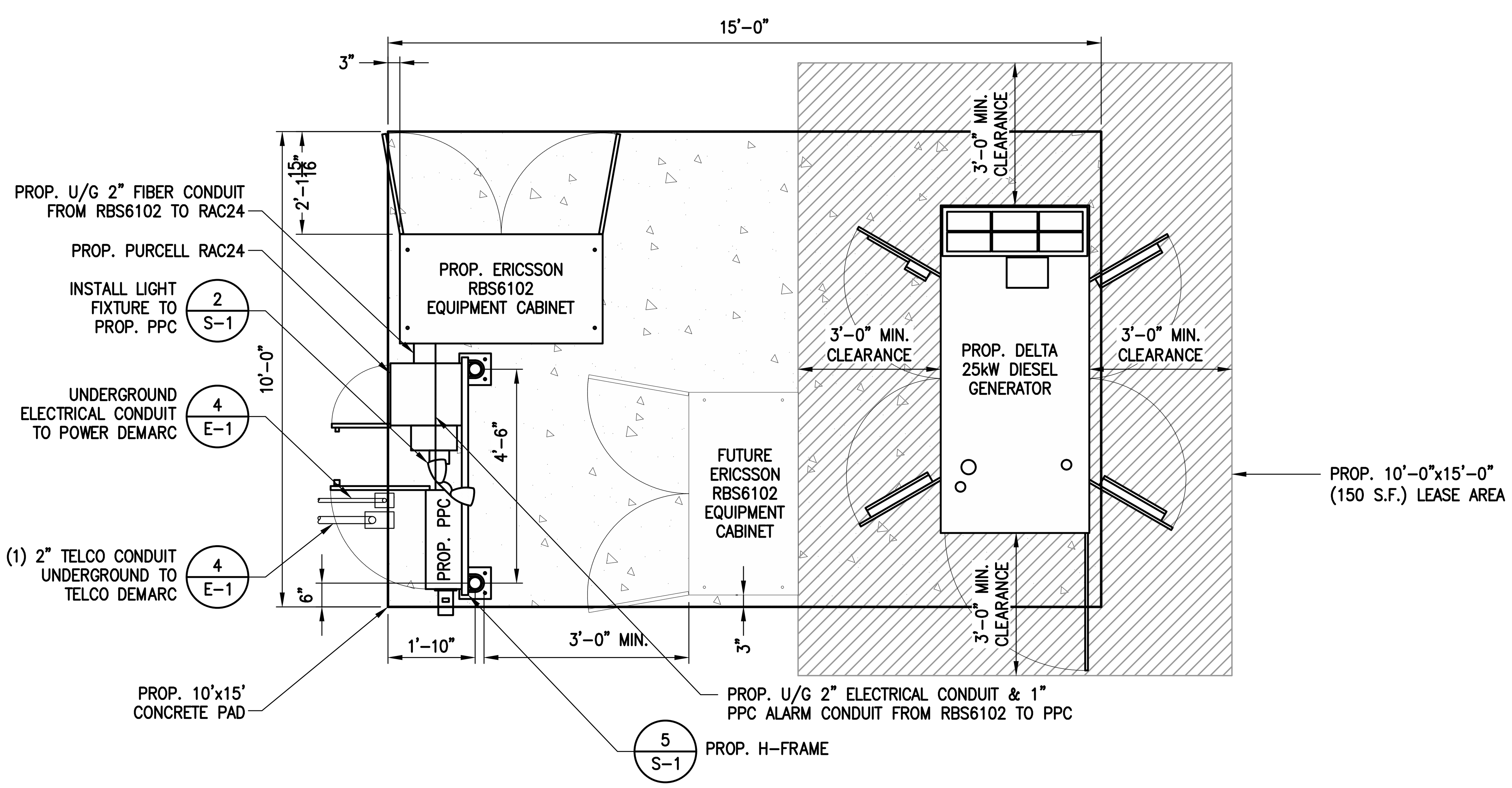
SHEET TITLE
GENERATOR
INSTALLATION DETAILS

SHEET NUMBER
A-5

1815.027

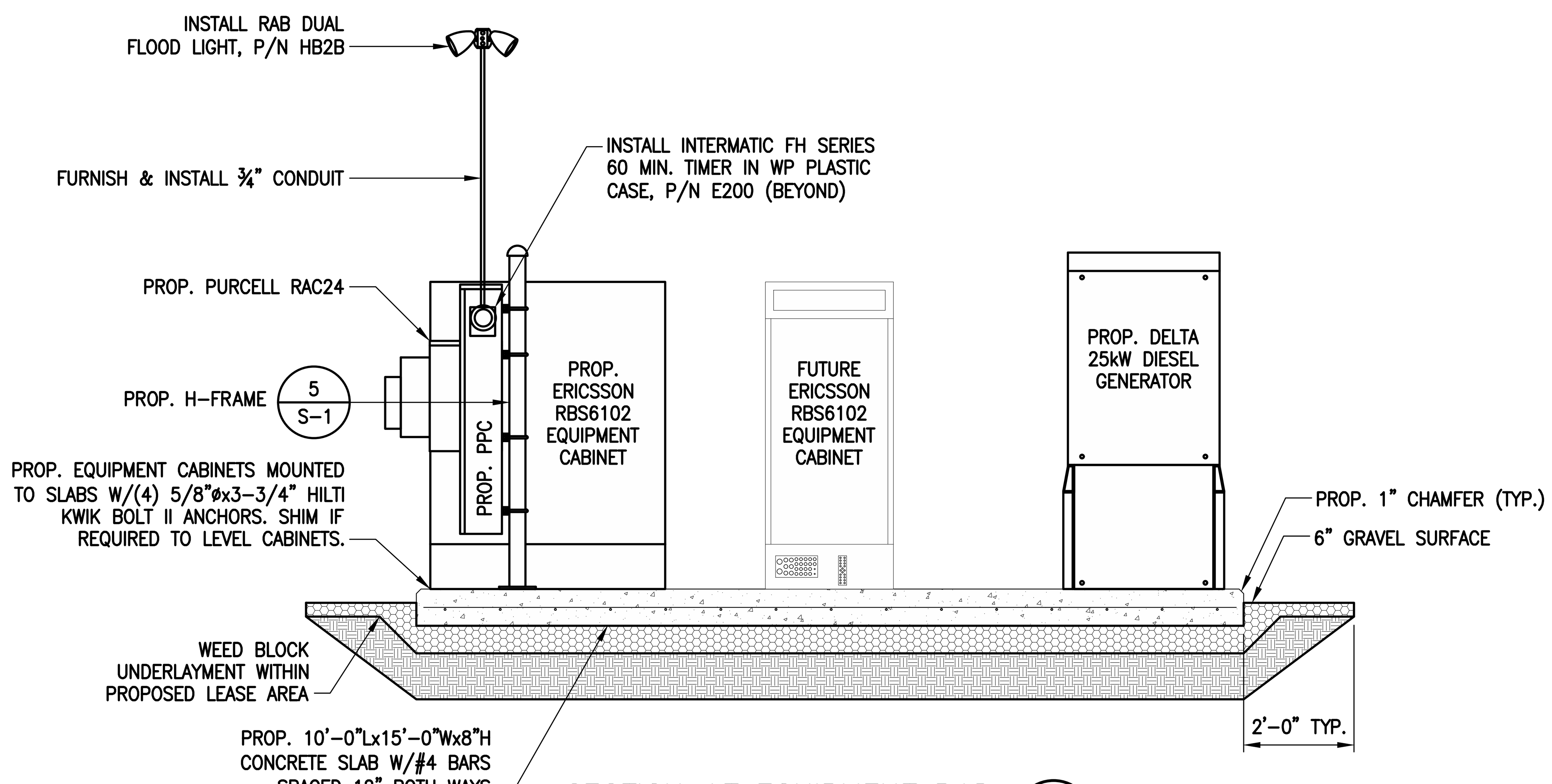
EQUIPMENT CABINET INSTALLATION NOTE:
GENERAL CONTRACTOR SHALL INSTALL EQUIPMENT CABINET FLOOR-MOUNT KIT AND SHALL FURNISH AND INSTALL ALL FASTENERS/ANCHORS PER MANUFACTURER'S INSTALLATION GUIDELINES.



PLAN AT EQUIPMENT PAD (1 / S-1)

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

0 1' 2' 4' 6'



SECTION AT EQUIPMENT PAD (2 / S-1)

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

0 1' 2' 4' 6'

CONCRETE GENERAL NOTES

1. ALL CONCRETE WORK SHALL CONFORM TO ACI 318, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" AND TO THE PROJECT SPECIFICATIONS.
2. ALL CONCRETE IS TO BE NORMAL DENSITY CONCRETE WITH A MAXIMUM SLUMP OF 4 INCHES. MAXIMUM AGGREGATE SIZE ¾ INCH. NO ADDITIONAL WATER SHALL BE ADDED TO THE CONCRETE AT THE JOB SITE.
3. PROVIDE AIR ENTRAINMENT OF 4 TO 6 PERCENT IN ALL EXPOSED CONCRETE WORK WITH AIR-ENTRAINING ADMIXTURE COMPLYING WITH ASTM C 260. AT TROWEL-FINISHED FLOORS, DO NOT EXCEED AIR-ENTRAINMENT CONTENT OF 3 PERCENT.
4. NO HOLES OR SLEEVES SHALL BE MADE THROUGH CONCRETE WORK OTHER THAN THOSE INDICATED ON THE STRUCTURAL DRAWINGS WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER.
5. ALL FORMWORK OFFSET TOLERANCES (PER ACI 117) TO BE CLASS A.
6. FLOOR SLAB TOLERANCES TO ASTM E1155; SPECIFIED OVERALL MINIMUM VALUE OF FLATNESS F F=25 WITH LOCAL MINIMUM F F=17, AND MINIMUM VALUE OF LEVELNESS F F=20 WITH LOCAL MINIMUM F I AND F F WITHIN 72 HOURS OF SLAB CONSTRUCTION.
7. CABINETS ON SLAB (IF APPLICABLE). ALLOWABLE CAPACITY OF CONCRETE USED IN DESIGN MIN. 4000 PSI.

FOUNDATION NOTES:

1. DESIGN INFORMATION AND GENERAL REQUIREMENTS

   1.1 CODES

   A. DESIGN CONFORMS TO INTERNATIONAL BUILDING CODE 2012.

   B. AMERICAN CONCRETE INSTITUTE "BUILDING COADE REQUIREMENTS FOR REINFORCED CONCRETE," ACI 318-08.

2. EARTHWORK

   2.1 FOUNDATIONS

   A. FOUNDATIONS HAVE BEEN DESIGNED TO BEAR ON (UNDISTURBED RESIDUAL SOILS/COMPACTED STRUCTURAL FILL), CAPABLE OF SAFELY SUPPORTING A NET ALLOWABLE BEARING PRESSURE OF 2000 PSF. IF FOUNDATION CONDITIONS PROVE UNACCEPTABLE AT ELEVATIONS SHOWN, EXCAVATION SHALL BE CARRIED DEEPER AND SHALL BE BACKFILLED WITH LEAN CONCRETE TO PLAN FOOTING BOTTOM, OR REDESIGN OF FOUNDATIONS WILL BE REQUIRED AT THE DIRECTION OF THE ENGINEER.

   B. DESIGN, FURNISH AND INSTALL ALL TEMPORARY SHEETING, SHORING AND DRAINAGE NECESSARY TO MAINTAIN THE EXCAVATION AND PROTECT SURROUNDING STRUCTURES AND UTILITIES.

   C. THOROUGHLY COMPACT ALL BOTTOM OF FOOTINGS PRIOR TO PLACING ANY CONCRETE.

3. CONCRETE

   3.1 FORMWORK

   A. CONCRETE CONSTRUCTION SHALL CONFORM TO "SPECIFICATIONS FOR STRUCTURAL, CONCRETE FOR BUILDINGS," (ACI 301-89).

   B. FORMWORK SHALL CONFORM TO ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS."

   3.2 REINFORCEMENT

   A. REINFORCING STEEL ASTM A615, GRADE 60. WELDED WIRE ASTM A185 (FLAT SHEET). LAPS 40 BAR DIAMETERS UNLESS NOTED. BARS SHALL BE SECURELY HELD IN ACCURATE POSITION BY SUITABLE ACCESSORIES, TIE BARS, SUPPORT BARS, ETC. HOOK LENGTHS SHALL BE 12 BAR DIAMETERS.

   B. CONCRETE COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:

   FOOTINGS & SLABS CAST AGAINST GROUND . . . . 3"
   CONCRETE TO BE IN CONTACT WITH GROUND
   OR WEATHER AT BARS GREATER THAN #5 . . . . 2"
   AT BARS #5 OR LESS . . . . 1-1/2"
   CONCRETE NOT TO BE EXPOSED TO GROUND
   OR WEATHER BEAMS, GIRDERS & COLUMNS . . . . 1-1/2"
   SLABS & WALLS . . . . 3/4"

   3.3 CAST-IN-PLACE-CONCRETE

   A. MINIMUM 28 DAY CYLINDER STRENGHT AND MAXIMUM SLUMP, PRIOR TO ADDITION OF SUPER PLASTICIZERS, AS FOLLOWS:

	F'C (PSI)	SLUMP
CLASS I FOOTINGS	4000	3"
CLASS II FOOTINGS	4000	3"
CLASS III INTERIOR ELEVATED SLABS & WALLS	4000	4"
CLASS V OTHER WORK	4000	4"
CLASS VI LEAN CONCRETE FOR OVER EXCAVATION OF FOUNDATIONS	2000	N/A

   B. MIX DESIGN TO BE IN ACCORDANCE WITH ACI 318, CHAPTER 5. NO CALCIUM CHLORIDE OR ADMIXTURE CONTAINING CHLORIDES SHALL BE USED IN ANY CONCRETE.

   C. COARSE AGGREGATE FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33 SIZE $57. COARSE AGGREGATE FOR LIGHT WEIGHT CONCRETE SHALL CONFORM TO ASTM C330 GRADED 3/4" TO 1/4".

   D. COLD WEATHER PLACEMENT SHALL COMPLY WITH ACI 306.1.

   E. HOT WEATHER PLACEMENT SHALL COMPLY WITH ACI 305 R.

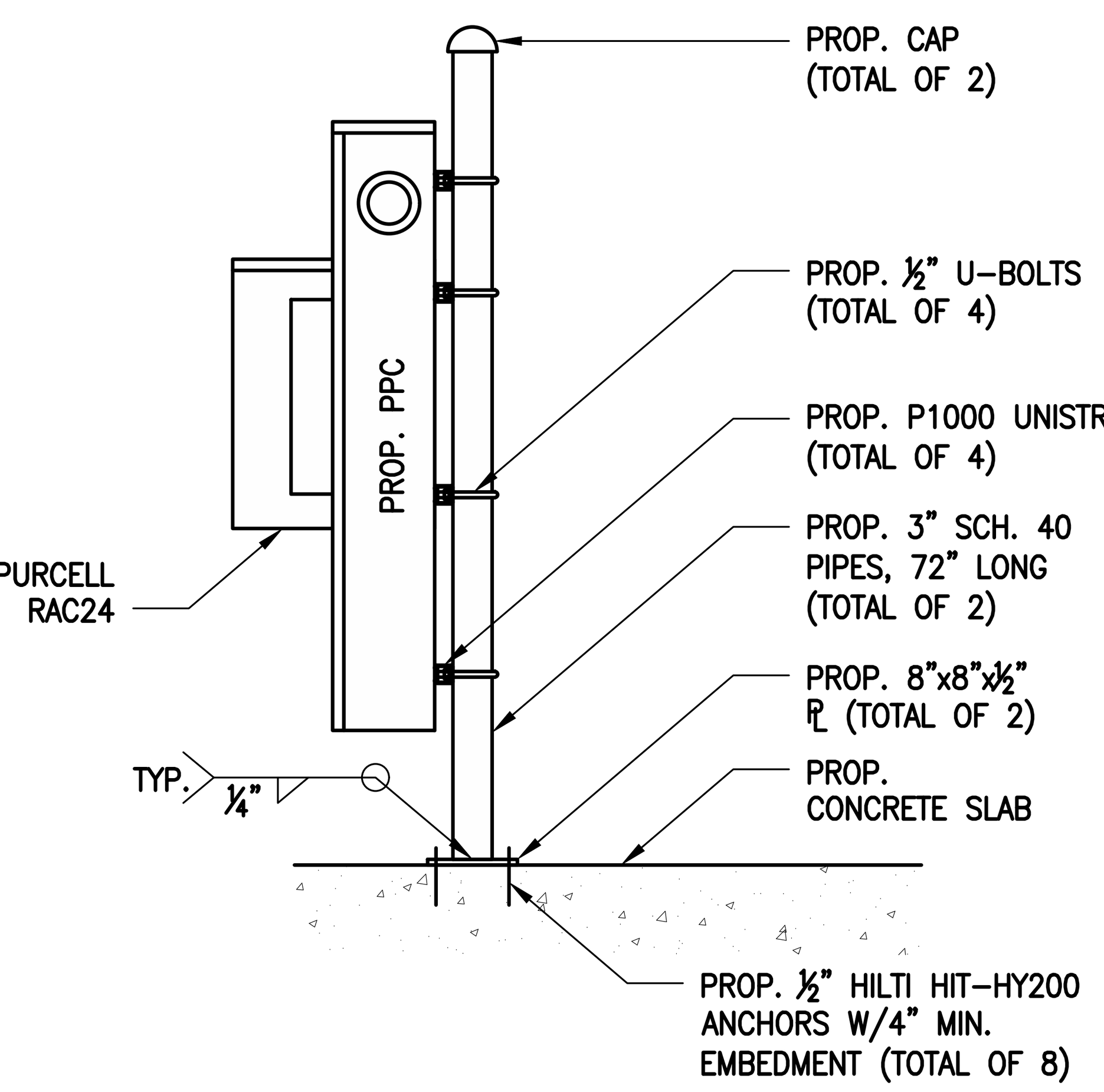
   F. CHAMFER ALL EXPOSED EDGES 3/4".

   G. THE MAXIMUM TEMPERATURE OF ALL CONCRETE AT DELIVERY TO THE SITE SHALL BE 85°F. TOTAL DELIVERY TIME SHALL BE LESS THAN 75 MINUTES.

PURCELL SITE SUPPORT CABINET RAC24
DIMENSIONS: 24.0"H x 15.7"W x 20.0"D
TOTAL OF 1

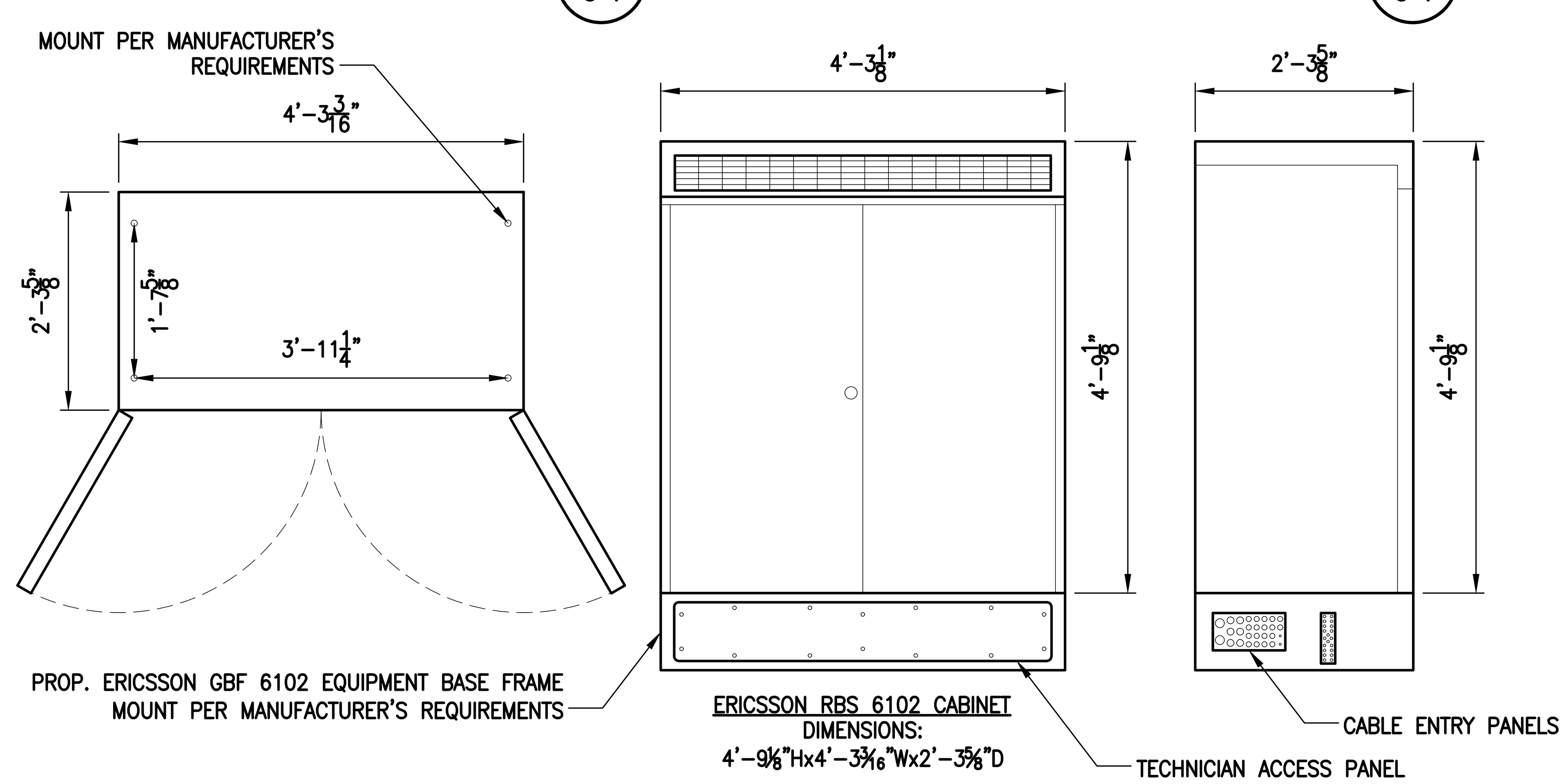
SSC DETAILS (4 / S-1)

SCALE: N.T.S.



H-FRAME DETAIL (5 / S-1)

SCALE: N.T.S.



ERICSSON RBS 6102 CABINET
DIMENSIONS:
4'-9 1/8"Hx4'-3 1/16"Wx2'-3 5/8"D

RBS6102 DETAILS (3 / S-1)

SCALE: N.T.S.

T-MOBILE NORTHEAST LLC

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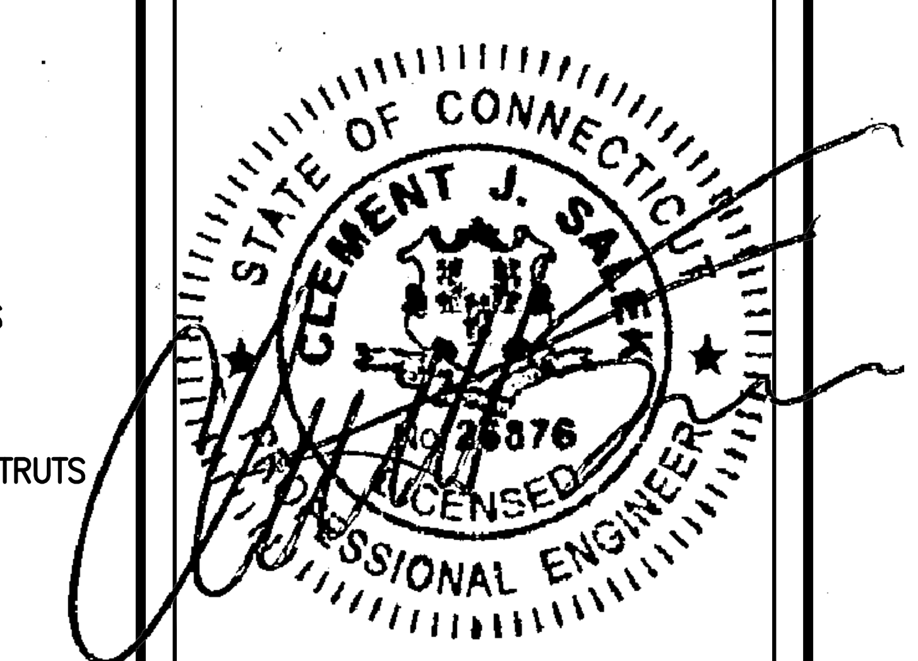

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1	01/25/19	ISSUED FOR CONSTRUCTION	CMC
0	11/15/18	ISSUED FOR REVIEW	JRV

SITE NUMBER:
CTNL011B

SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE

GROUND EQUIPMENT DETAILS

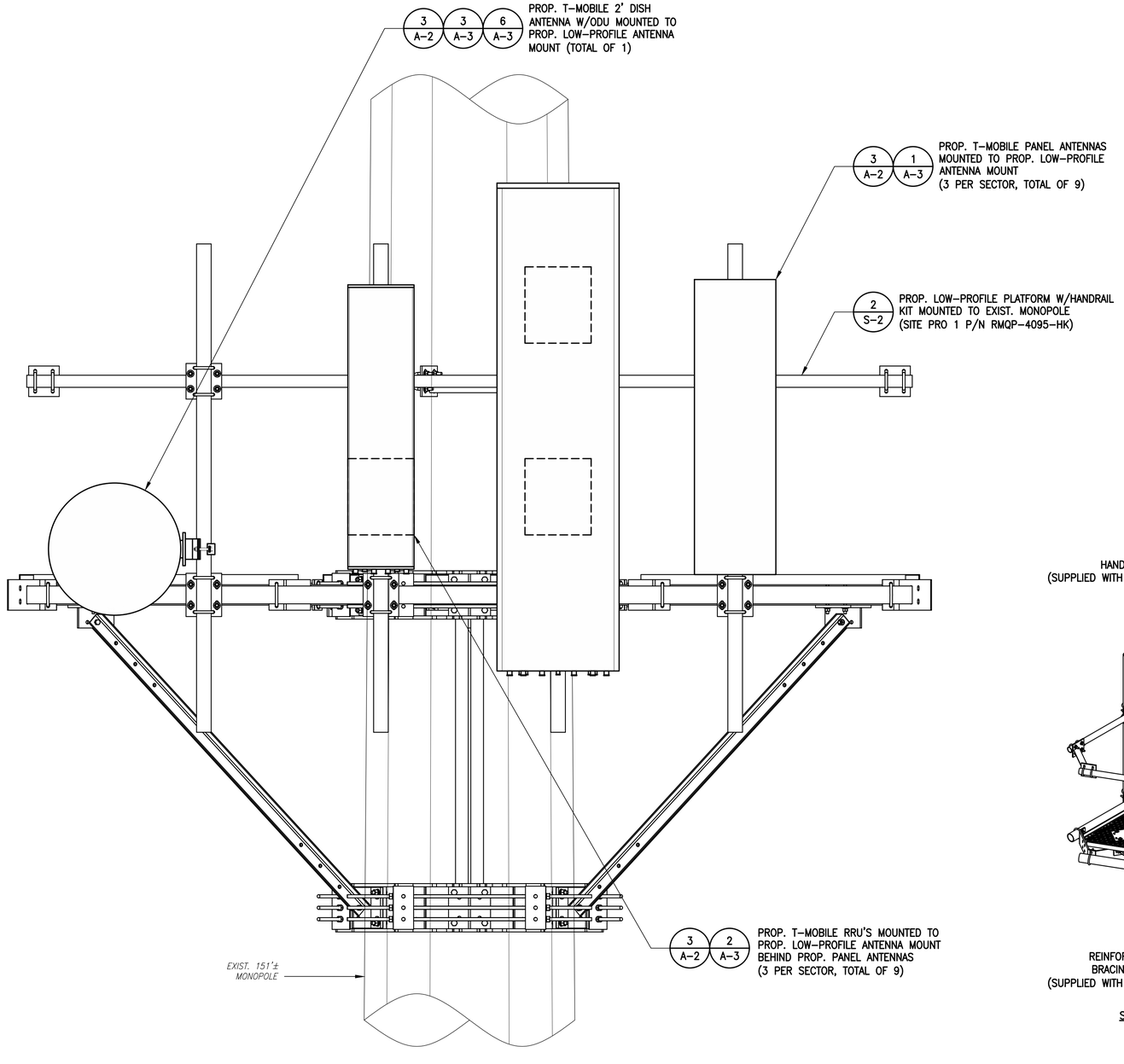
SHEET NUMBER

S-1

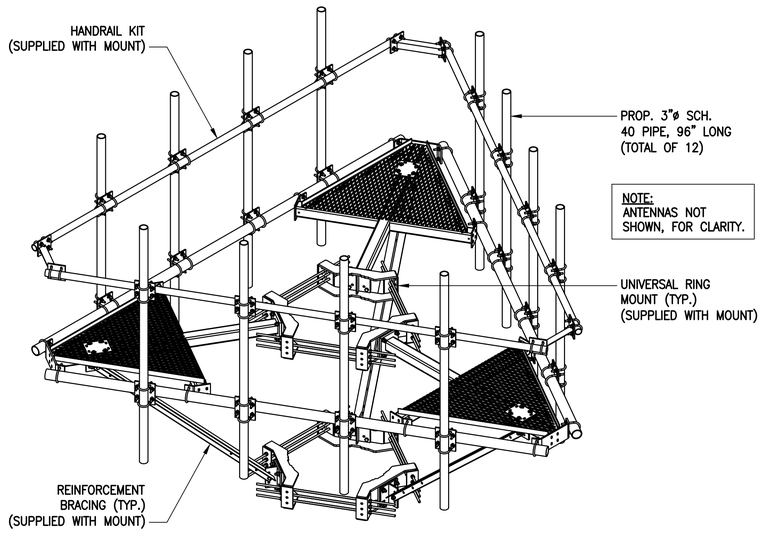
1815.027

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.

SPECIAL TOWER TOP EQUIPMENT INSTALLATION WORK NOTE (SAFETY-CLIMB ALIGNMENT REQUIREMENTS):
GENERAL CONTRACTOR SHALL ORIENT PROPOSED PLATFORM REINFORCEMENT KIT RING-MOUNTS SO THAT EXISTING SAFETY CLIMB CABLE IS NOT OBSTRUCTED/RE-ROUTED FROM VERTICAL ALIGNMENT AND IS NOT IN PHYSICAL CONTACT WITH EXISTING OR PROPOSED RING-MOUNT HARDWARE. GENERAL CONTRACTOR SHALL INSTALL NEW OR ADDITIONAL SAFETY-CLIMB CABLE GUIDES IF ADDITIONAL CLEARANCE IS REQUIRED. ADDITIONAL CABLE GUIDES SHALL BE ATTACHED SECURELY TO THE POLE USING MECHANICAL FASTENERS OR FIELD WELDED BY A CERTIFIED WELDING TECHNICIAN.



ANTENNA MOUNTING DETAIL 1/S-2
SCALE: N.T.S.



SITE-PRO 1 12'-6" LOW-PROFILE CO-LOCATION PLATFORM W/HANDRAIL KIT
PART NUMBERS: RMQP-4096-HK
(TOTAL OF 1 REQUIRED)

TYPICAL SITE PRO 1 12'-6" PLATFORM MOUNT 2/S-1
SCALE: N.T.S.

T-MOBILE NORTHEAST LLC
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R.K. EXECUTIVE CENTRE
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MARLBOROUGH, MA 01752
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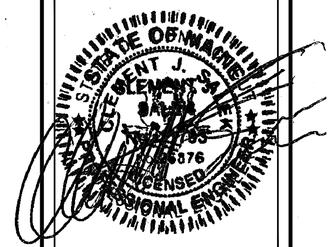

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

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SITE NUMBER:
CTNL011B

SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE
TOWER EQUIPMENT DETAILS

SHEET NUMBER
S-2

1815.027

NOTES TO CONTRACTOR:

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE ENGINEER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS REQUIRED WITH LOCAL AUTHORITY.
3. UTILITY SERVICES SHOWN ARE PROPOSED, THE ELECTRIC CONTRACTOR SHALL COORDINATE EXACT TELEPHONE AND ELECTRIC SERVICE CONNECTION POINTS, ROUTING AND ASSOCIATED REQUIREMENTS WITH LOCAL UTILITY COMPANIES & SPRINT CONSTRUCTION MANAGER.
4. THE CONTRACTOR SHALL PROVIDE TEMPORARY POWER AND LIGHTING AS REQUIRED FOR THE WORK.
5. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO ROUGH-IN.
6. THE CONDUIT RUNS AS SHOWN ON THE PLANS ARE APPROXIMATE. EXACT LOCATION AND ROUTING SHALL BE PER EXISTING FIELD CONDITIONS.
7. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.
8. ALL CONDUITS SHALL BE MET WITH BENDS MADE IN ACCORDANCE WITH NEC TABLE 346-10. NO RIGHT ANGLE DEVICE OTHER THAN STANDARD CONDUIT ELBOWS WITH 12" MINIMUM INSIDE SWEEPS FOR ALL CONDUITS 2" OR LARGER.
9. ALL CONDUIT TERMINATIONS SHALL BE PROVIDED WITH PLASTIC THROAT INSULATING GROUNDING BUSHINGS.
10. ALL WIRE SHALL BE TYPE THWN, SOLID, ANNEALED COPPER UP TO SIZE #10 AWG (#8 AND LARGER SHALL BE CONCENTRIC STRANDED) 75 DEGREE C, (167 DEGREES F), 98% CONDUCTIVITY, MINIMUM #12.
11. ALL WIRES SHALL BE TAGGED AT ALL PULL BOXES, J-BOXES, EQUIPMENT BOXES AND CABINETS WITH APPROVED PLASTIC TAGS, ACTION CRAFT, BRADY, OR APPROVED EQUAL.
12. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
13. CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH MECHANICAL CONTRACTOR AND COMPLY AS REQUIRED.
14. ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN NOT HAND WRITTEN.
15. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULLBOXES, AND ALL DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.
16. THE CONTRACTOR SHALL PREPARE AS-BUILT DRAWINGS, DOCUMENT ANY AND ALL WIRING AND EQUIPMENT CONDITIONS AND CHANGES WHILE COMPLETING THIS CONTRACT. SUBMIT AT SUBSTANTIAL COMPLETION.
17. ALL DISCONNECT SWITCHES AND OTHER CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL LOCATIONS FED FROM (NO EXCEPTIONS.)
18. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS OR RISERS THROUGH BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS WITHOUT CONSTRUCTION MANAGERS APPROVAL. SLEEVES AND/OR PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE PACKED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FILL FOR FLOOR PENETRATIONS SHALL PREVENT PASSAGE OF WATER, SMOKE, FIRE AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THIS PURPOSE.

   NOTE: ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT (NEW AND EXISTING) SHALL BE FIELD VERIFIED WITH THE OWNER'S REPRESENTATIVE AND EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN OF CONDUIT AND WIRE. ALL EQUIPMENT SHALL BE PROPERLY CONNECTED ACCORDING TO THE NAMEPLATE DATA FURNISHED ON THE EQUIPMENT (THE DESIGN OF THESE PLANS ARE BASED UPON BEST AVAILABLE INFORMATION AT THE TIME OF DESIGN AND SOME EQUIPMENT CHARACTERISTICS MAY NOT BE CORRECT AS SHOWN ON THESE DRAWINGS). LOCATION OF OUTLETS, BOXES, ETC. AND THE TYPE OF CONNECTION (PLUG OR DIRECT) SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
19. ALL UNDERGROUND CONDUIT ROUTING SHALL BE COORDINATED IN FIELD BETWEEN SPRINT WIE, CONTRACTOR, AND RESPECTIVE UTILITY COMPANIES.
20. ALL CONDUITS ROUTED BELOW GRADE SHALL TRANSITION TO RIGID GALVANIZED ELBOWS WITH RIGID GALVANIZED STEEL CONDUIT ABOVE GRADE.
21. CONTRACTOR SHALL PROVIDE ALL DIRECT BURIED CONDUITS WITH 6" WIDE. 6 MIL THICK ALUMINIZED PLASTIC WARNING TAPE IDENTIFYING CONTENTS. TAPE COLORS SHALL BE ORANGE FOR TELEPHONE AND RED FOR ELECTRIC.
22. ELECTRICAL CONTRACTOR SHALL PROVIDE A SECTION OF SEALTITE CONDUIT FOR TELCO CONNECTION TO THE PRIMARY RADIO CABINET. COORDINATE EXACT CONNECTION TYPE WITH LUCENT.
23. ELECTRICAL CONTRACTOR SHALL PROVIDE A SECTION OF SEALTITE CONDUIT FOR POWER CONNECTION TO THE PRIMARY RADIO CABINET. THE CONTRACTOR SHALL PROVIDE AN ADDITIONAL 6'-0" COIL OF WIRE AT THE END OF THE SEALTITE.
24. GROUND IN ACCORD W/LOCAL CODE & SHEET E-2.
25. PROVIDE (2) 4" GALVANIZED RIGID STEEL CONDUIT RISER WITH 1/4" NYLON DRAG LINE INCLUDING 90° GRC SWEEP AT POLE (UP TO 20'-0" AFG). SECURE TO POLE PER UTILITY COMPANY REQUIREMENTS. PRIMARY CABLES BY UTILITY COMPANY.

ELECTRICAL SPECIFICATIONS

SECTION 16010 – GENERAL PROVISIONS

A. REQUIREMENTS: FURNISH ALL LABOR, MATERIALS, SERVICE, EQUIPMENT, AND APPLIANCES REQUIRED TO COMPLETE THE INSTALLATION OF THE COMPLETE ELECTRICAL SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS AND CONTRACT DRAWINGS.

B. REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS: INSTALLATION, MATERIAL, EQUIPMENT AND WORKMANSHIP SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THE NATIONAL ELECTRICAL CODE (NEC) – APPLICABLE STATE ELECTRIC CODES, THE NATIONAL ELECTRICAL SAFETY CODE (NESC), AND THE TERMS AND THE CONDITIONS OF THE AUTHORITIES HAVING LAWFUL JURISDICTION PERTAINING TO THE WORK REQUIRED. ALL MODIFICATIONS REQUIRED BY THESE CODES, RULES, REGULATIONS, AND AUTHORITIES SHALL BE MADE BY THE CONTRACTOR WITHOUT ADDITIONAL CHARGE TO THE OWNER.

C. UNDERWRITER'S LABORATORIES (UL): ALL MATERIALS, APPLIANCES, EQUIPMENT, OR OR DEVICES SHALL CONFORM TO THE APPLICABLE STANDARDS OF UNDERWRITER'S LABORATORIES, INC. THE LABEL OF, OR LISTING BY. UL, IS REQUIRED.

SECTION 16110 – RACEWAYS, BOXES AND FITTINGS

A. CONDUIT FITTINGS, CONNECTORS AND COUPLINGS, EMT COUPLINGS AND CONNECTORS EITHER STEEL OR MALLEABLE IRON ONLY. "CONCRETE TIGHT" OR "RAIN TIGHT" AND EITHER THE GLAND AND RING COMPRESSION TYPE OR STAINLESS STEEL MULTIPLE POINT LOCKING TYPE. CONNECTORS TO HAVE INSULATED THROATS. EMT FITTINGS USING SET SCREWS OR INDENTATIONS AS A MEANS OF ATTACHMENT ARE NOT PERMITTED.

B. BUSHINGS: INSULATED TYPE, DESIGNED TO PREVENT ABRASION OF WIRES WITHOUT IMPAIRING THE CONTINUITY OF THE CONDUIT GROUNDING SYSTEM, FOR RIGID STEEL CONDUIT, IMC AND RIGID ALUMINUM CONDUIT.

C. CONDUIT INSTALLATIONS: CONDUIT SYSTEMS, EMT, OR RIGID NON-METALLIC CONDUIT UNLESS NOTED. INSTALL CONCEALED CONDUIT AND EMT IN AS DIRECT LINES AS POSSIBLE. INSTALL EXPOSED CONDUITS AND EMT PARALLEL TO OR AT RIGHT ANGLES TO THE LINES OF THE BUILDING. RIGHT ANGLE BENDS IN EXPOSED CONDUIT AND EMT RUNS SHALL BE MADE WITH STANDARD ELBOWS, SCREW JOINTED CONDUIT FITTINGS OR CONDUIT BENT TO RADIUS NO LESS THAN THOSE OF STANDARD ELBOWS.

D. CONDUIT SUPPORTS: PROVIDE SUPPORTS FOR HORIZONTAL CONDUITS AND EMT NOT MORE THAN 8 FEET APART WITH NOT LESS THAN TWO SUPPORTS FOR EACH 10 FOOT STRAIGHT LENGTH AND ONE SUPPORT NEAR EACH ELBOW OR BEND INCLUDING RUNS ABOVE SUSPENDED CEILINGS AND WITHIN 3 FEET OF ALL JUNCTION BOXES, SWITCHES, FITTINGS, ETC. INSTALL ONE HOLE PIPE STRAPS ON CONDUITS 1 INCH OR SMALLER INSTALL INDIVIDUAL PIPE HANGERS FOR CONDUITS LARGER THAN 1 INCH. SPRING STEEL FASTENERS WITH HANGER RODS MAY BE USED IN DRY LOCATIONS IN LIEU OF PIPE STRAPS.

SECTION 16120 – CONDUCTORS

A. WIRES AND CABLES (600 VOLTS): CONFORM TO THE APPLICABLE UL AND ICEA STANDARDS FOR THE USE INTENDED. USE COPPER CONDUCTORS WITH 600 VOLTS INSULATION UNLESS OTHERWISE SPECIFIED OR NOTED ON THE DRAWINGS. USE STRANDED CONDUCTORS FOR NO. 8 OR LARGER WHERE ELSEWHERE SPECIFIED OR NOTED OTHERWISE ON THE DRAWINGS. USE OF ALUMINUM CONDUCTORS WILL NOT BE PERMITTED. INSULATION SHALL BE TYPE THHN/THWN, 75°C, FOR ALL CONDUCTORS, USELESS OTHERWISE SPECIFIED OR NOTED ON THE DRAWINGS.

B. COLOR CODING. PHASE, NEUTRAL, AND GROUND CONDUCTORS COLOR-CODED IN ACCORDANCE WITH NEC. CONNECT ALL CONDUCTORS OF THE SAME COLOR TO THE SAME PHASE CONDUCTOR, COLOR CODING SHALL BE BLACK, RED, BLUE, WHITE (120/208) OR BROWN ORANGE, YELLOW, GRAY (277/480) WITH GREEN FOR ALL GROUND CONDUCTORS.

C. CONNECTORS AND LUGS: FOR COPPER CONDUCTORS NO. 6 AND SMALLER: 3M SCOTCH-LOK OR T & B STA-KON COMPRESSION OR INDENT TYPE CONNECTORS WITH INTEGRAL OR SEPARATE INSULATING CAPS. FOR COPPER CONDUCTORS LARGER THAN NO. 6 SOLDERLESS, INDENT, HEX SCREW OR BOLT TYPE PRESSURE CONNECTORS, PROPERLY TAPED OR INSULATED.

D. SPLICES: (480 VOLTS AND UNDER): CONDUCTOR LENGTHS SHALL BE CONTINUOUS FROM TERMINATION TO TERMINATION WITHOUT SPLICES UNLESS APPROVED BY THE BUILDING INSPECTOR.

SECTION 16220 – CIRCUIT BREAKERS

A. PROVIDE MOLDED CASE, BOLT-ON, THERMAL MAGNETIC TRIP, SINGLE, TWO OR THREE POLE BRANCH CIRCUIT BREAKERS AS SHOWN ON DRAWINGS. MULTIPLE POLE BREAKERS SHALL BE SINGLE HANDLE, COMMON TRIP. AIC RATING TO MATCH EXISTING OR AS REQUIRED FOR AVAILABLE FAULT CURRENTS.

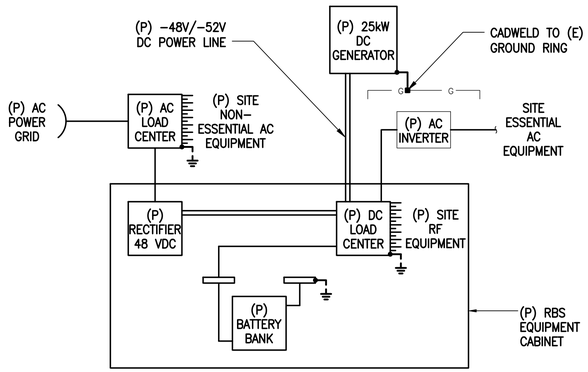
ELECTRICAL LEGEND

SYMBOLS

- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CONDUIT RUN UNDERGROUND
- CONDUIT RUN ABOVE GROUND
- (M) METER ON METER/BREAKER UNIT
- 5/8" x 10'-0" COPPER CLAD GROUND ROD
- EXOTHERMIC TYPE CONNECTION
- COMPRESSION TYPE CONNECTION
- G — G GROUND RING, #2 AWG SOLID TINNED BARE COPPER GROUND CONDUCTOR 6" BELOW FROST LINE AND 24" OFF CONCRETE PLATFORM
- XXX / XXX REPRESENTS DETAIL NUMBER; REF. DRAWING NUMBER
- XXX DETAIL NUMBER

ABBREVIATIONS

ACCA	ANTENNA CABLE COVER ASSEMBLY
AGB	COPPER ANTENNA GROUND BAR
AWG	AMERICAN WIRE GAUGE
BCW	BARE COPPER WIRE
BTS	BASE TRANSMISSION SYSTEM
CIBGE	COAX ISOLATED GROUND BAR EXTERNAL
DWG	DRAWING
EMT	ELECTRICAL METALLIC TUBING
GEN	GENERATOR
GPS	GLOBAL POSITIONING SYSTEM
GR	GROWTH
IGR	INTERIOR GROUND RING (HALO)
LAGB	LOWER ANTENNA COPPER GROUND BAR
MIGB	MASTER ISOLATED GROUND BAR
PCS	PERSONAL COMMUNICATION SYSTEM
PPC	POWER PROTECTION CABINET
PRC	PRIMARY RADIO CABINET
RGS	RIGID GALVANIZED STEEL
RWY	RACEWAY
TYP	TYPICAL
SSLP	SPRINT SPECTRUM LIMITED PARTNERSHIP
UAGB	UPPER ANTENNA COPPER GROUND BAR
EXIST.	EXISTING
PROP.	PROPOSED



WIRING DIAGRAM (5 / E-1)
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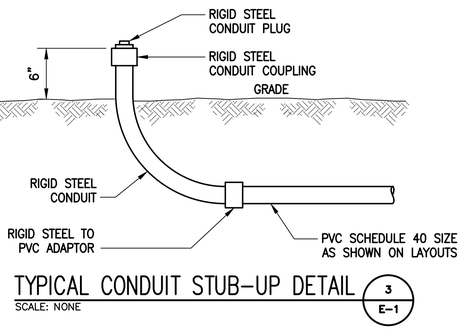
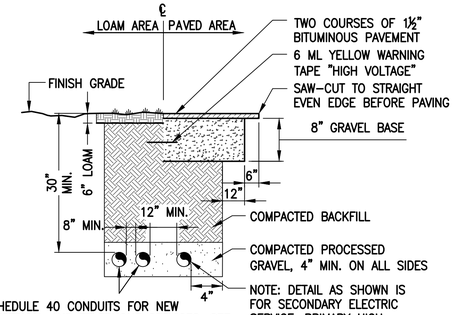


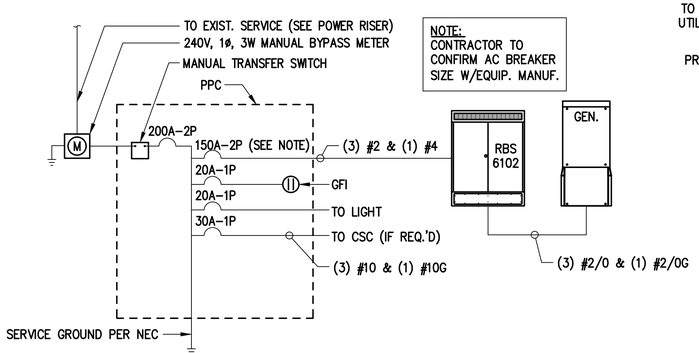
TYPICAL CONDUIT STUB-UP DETAIL (3 / E-1)
SCALE: NONE



SCHEDULE 40 CONDUITS FOR NEW ELECTRICAL AND TELEPHONE SERVICES. SEE UTILITY AND SITE PLANS. PROVIDE APPROVED PULL BOXES AS REQUIRED, AND COORDINATE INSTALLATION W/ALL UTILITY COMPANIES FOR INTERFACING AT TERMINATION POINTS. PROVIDE FULL LENGTH PULL ROPES (TYP.).

NOTE: DETAIL AS SHOWN IS FOR SECONDARY ELECTRIC SERVICE. PRIMARY HIGH VOLTAGE SERVICE REQUIRES 4" CONCRETE ENCASEMENT.

BURIED CONDUIT DETAIL (4 / E-1)
SCALE: NOT TO SCALE



ONE LINE DIAGRAM (1 / E-1)
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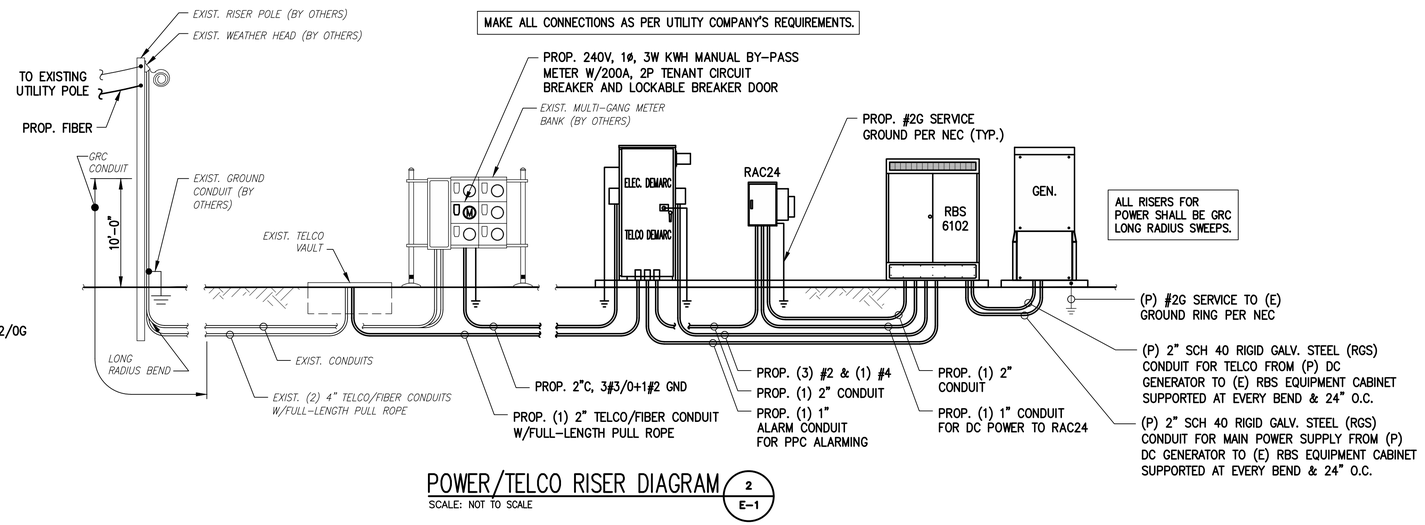

POWER/TELCO RISER DIAGRAM (2 / E-1)
SCALE: NOT TO SCALE

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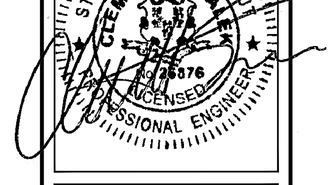

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SITE NUMBER:
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SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE
ELECTRICAL NOTES, DIAGRAMS & DETAILS

SHEET NUMBER
E-1

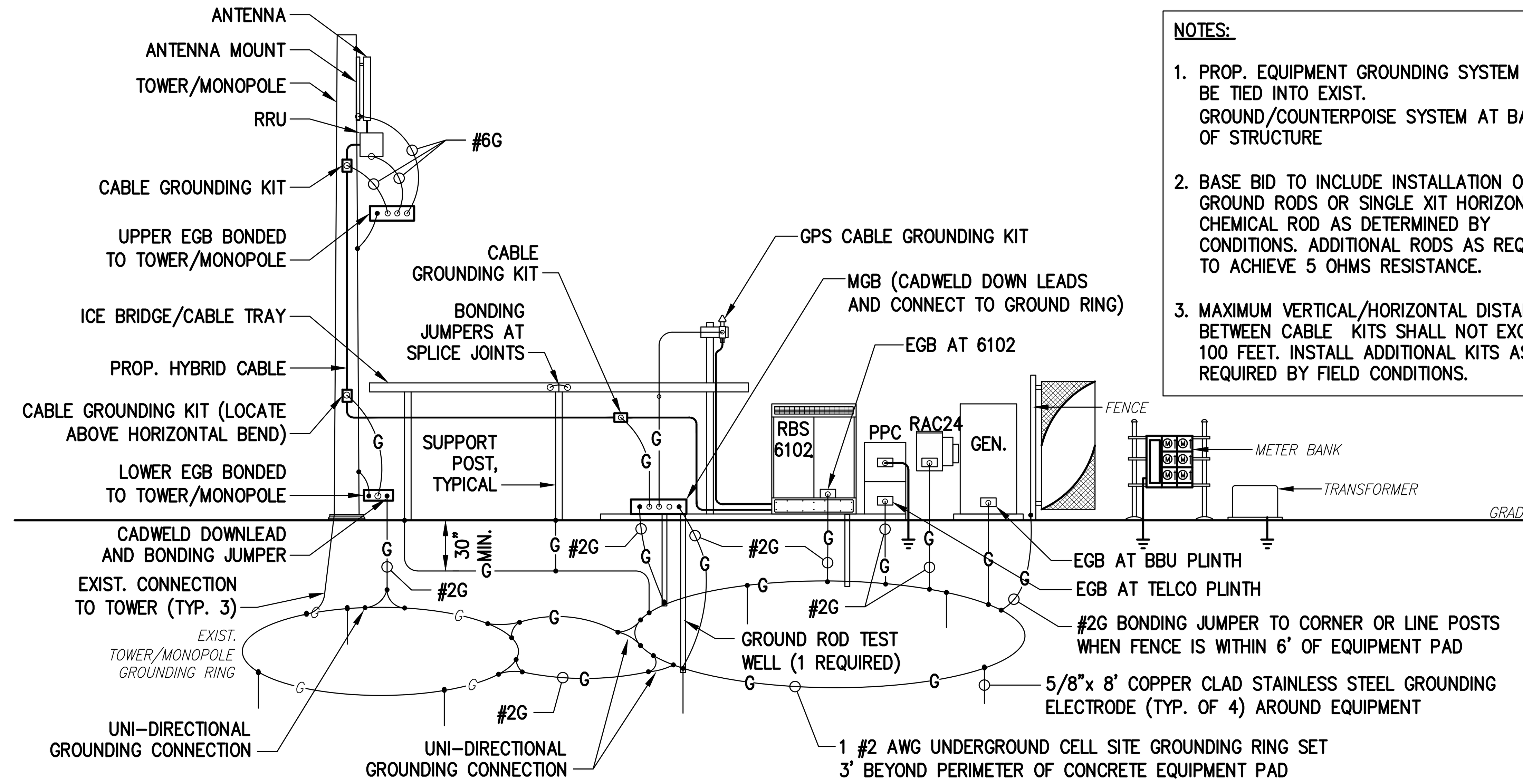
1815.027

PROTECTIVE GROUNDING SYSTEMS GENERAL NOTES

1. GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250–GROUNDING AND BONDING.
2. GROUNDING SHALL BE IN ACCORDANCE WITH SPRINT SSEO DOCUMENTS 3.018.02.004 "BONDING, GROUNDING AND TRANSIENT PROTECTION FOR CELL SITES" AND 3.018.10.002 "SITE RESISTANCE TO EARTH TESTING".
3. PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
4. GROUND CONNECTIONS: CLEAN SURFACES THOROUGHLY BEFORE APPLYING GROUND LUGS OR CLAMPS. IF SURFACE IS COATED, REMOVE THE COATING, APPLY A NON–CORROSIVE APPROVED COMPOUND TO CLEAN SURFACE AND INSTALL LUGS OR CLAMPS. WHERE GALVANIZING IS REMOVED FROM METAL, IT SHALL BE PAINTED OR TOUCHED UP WITH "GALVAMOX" OR EQUAL.
5. ALL GROUNDING WIRES SHALL PROVIDE A STRAIGHT, DOWNWARD PATH TO GROUND WITH GRADUAL BENDS AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
6. ALL CLAMPS AND SUPPORTS USED TO SUPPORT THE GROUNDING SYSTEM CONDUCTORS AND PVC CONDUITS SHALL BE PVC TYPE (NON CONDUCTIVE). DO NOT USE METAL BRACKETS OR SUPPORTS WHICH WOULD FORM A COMPLETE RING AROUND ANY GROUNDING CONDUCTOR.
7. ALL GROUND WIRES SHALL BE #2 SOLID TINNED BCW UNLESS NOTED OTHERWISE.
8. PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
9. GROUND ANTENNA BASES, FRAMES, CABLE RACKS, AND OTHER METALLIC COMPONENTS WITH #2 INSULATED TINNED STRANDED COPPER GROUNDING CONDUCTORS AND CONNECT TO INSULATED SURFACE MOUNTED GROUND BARS. CONNECTION DETAILS SHALL FOLLOW MANUFACTURER'S SPECIFICATIONS FOR GROUNDING.
10. EACH EQUIPMENT CABINET SHALL BE CONNECTED TO THE MASTER ISOLATION GROUND BAR (MGB) WITH #2 SOLID TINNED BCW EQUIPMENT CABINETS WALL HAVE (2) CONNECTIONS.
11. GROUND HYBRIFLEX SHIELD AT TOP, BOTTOM AND AT TRANSITION TO HYBRIFLEX JUMPER CABLES AT EQUIPMENT CABINET ENTRANCE USING MANUFACTURER'S GUIDELINES. WHEN HYBRIFLEX CABLE EXCEEDS 200', GROUND AT INTERVALS NOT EXCEEDING 100'.
12. THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
13. 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 "C" CLAMP. THE COPPER CABLES SHALL BE COATED WITH AN ANTI–OXIDANT (THOMAS BETTS KOPR–SHILD) BEFORE MAKING THE CRIMP CONNECTIONS THE CONTRACTOR SHALL FOLLOW MANUFACTURER'S RECOMMENDED TORQUES ON THE BOLT ASSEMBLY TO SECURE CONNECTIONS.
14. AT ALL TERMINATIONS AT EQUIPMENT ENCLOSURES, PANEL, AND FRAMES OF EQUIPMENT AND WHERE EXPOSED FOR GROUNDING. CONDUCTOR TERMINATION SHALL BE PERFORMED UTILIZING TWO HOLE BOLTED TONGUE COMPRESSION TYPE LUGS WITH STAINLESS STEEL SELF–TAPPING SCREWS.
15. THE MASTER GROUND BAR (MGB) SHALL BE MADE OF BARE 1/4"x2" COPPER (FOR OUTDOOR APPLICATIONS IT SHALL BE TINNED COPPER) AND LARGE ENOUGH TO ACCOMMODATE THE REQUIRED NUMBER OF GROUND CONNECTIONS. THE HARDWARE SECURING THE MGB SHALL ELECTRICAL INSULATE THE MGB FROM ANY STRUCTURE TO WHICH IT IS FASTENED.
16. ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
17. ALL GROUNDING CONNECTIONS SHALL BE COATED WITH A COPPER SHIELD ANTI–CORROSIVE AGENT SUCH AS T&B KOPR SHIELD. VERIFY PRODUCT WITH SPRINT CONSTRUCTION MANAGER.
18. FOR NEW OR REPAIRED GROUNDING EQUIPMENT. REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
   –ANTI–THEFT UPDATE TO SPRINT GROUNDING DATED 08–24–12
   –SPRINT ENGINEERING LETTER EL–0504 DATED 04–20–12

GROUNDING LEGEND

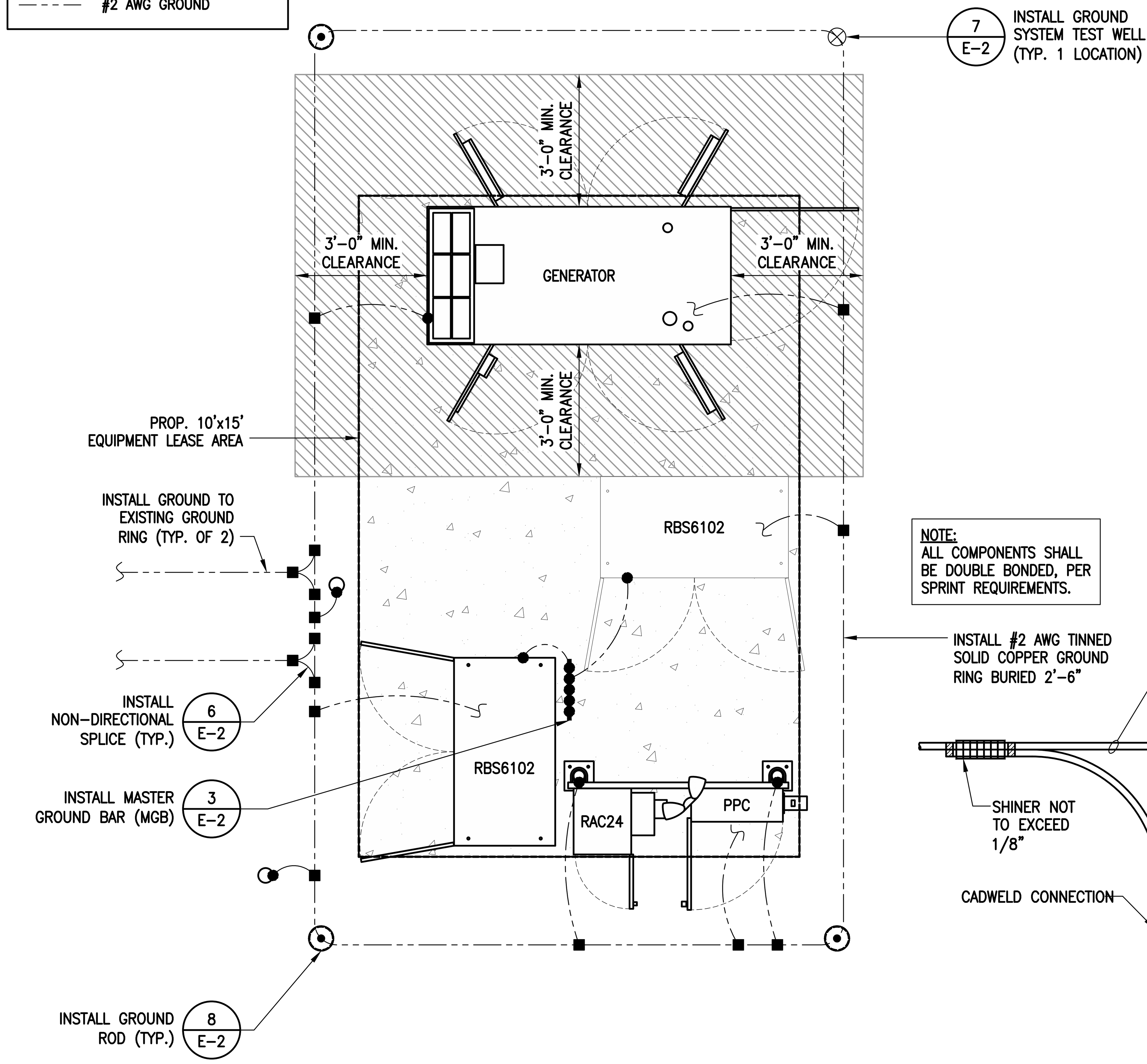
Symbol	Description
■	EXOTHERMIC GROUND
●	MECHANICAL GROUND
⊙	GROUND ROD
⊗	TEST WELL
– – –	#2 AWG GROUND



NOTES:

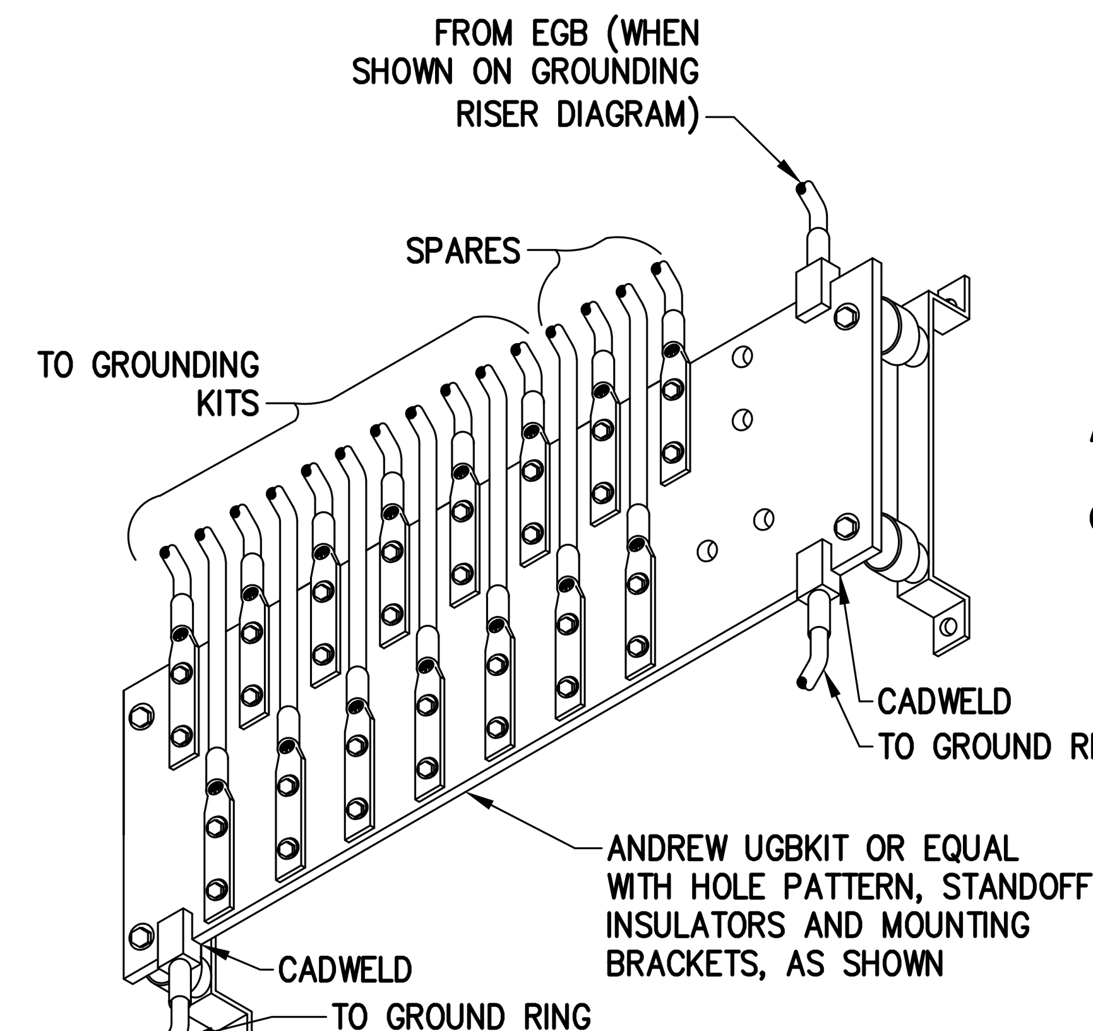
1. PROP. EQUIPMENT GROUNDING SYSTEM TO BE TIED INTO EXIST. GROUND/COUNTERPOISE SYSTEM AT BASE OF STRUCTURE
2. BASE BID TO INCLUDE INSTALLATION OF (4) GROUND RODS OR SINGLE XIT HORIZONTAL CHEMICAL ROD AS DETERMINED BY CONDITIONS. ADDITIONAL RODS AS REQUIRED TO ACHIEVE 5 OHMS RESISTANCE.
3. MAXIMUM VERTICAL/HORIZONTAL DISTANCE BETWEEN CABLE KITS SHALL NOT EXCEED 100 FEET. INSTALL ADDITIONAL KITS AS REQUIRED BY FIELD CONDITIONS.

GROUNDING RISER DIAGRAM (2 / E-2)
SCALE: NOT TO SCALE

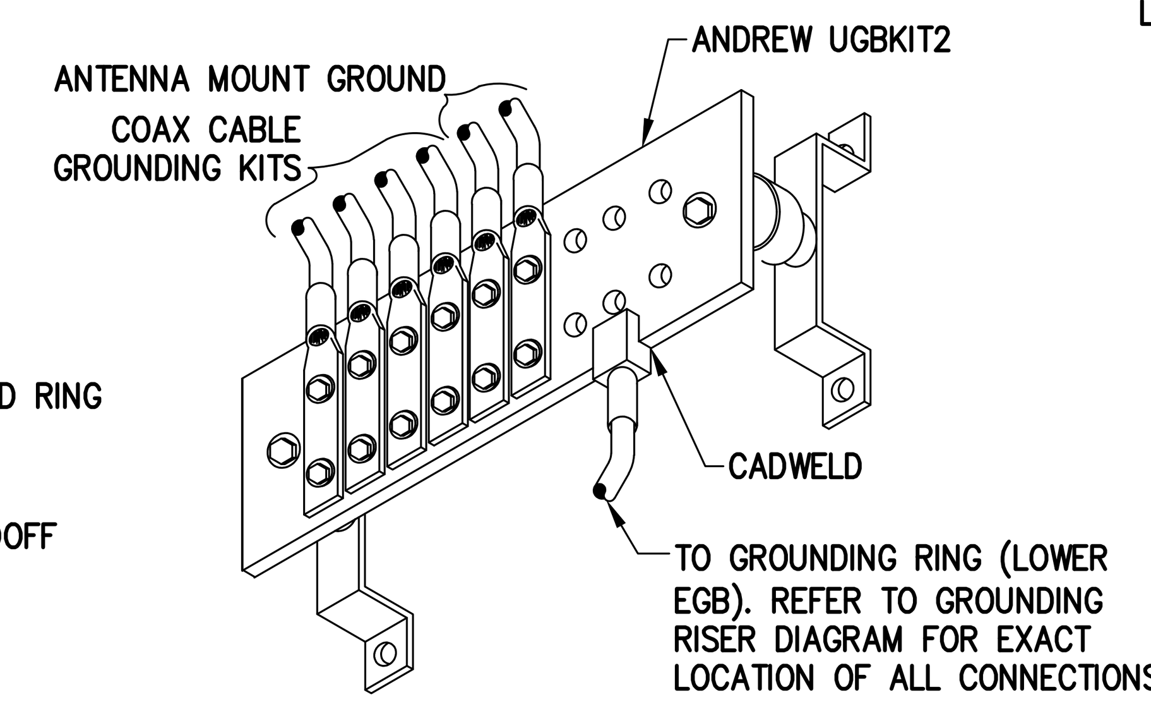


NOTE: ALL COMPONENTS SHALL BE DOUBLE BONDED, PER SPRINT REQUIREMENTS.

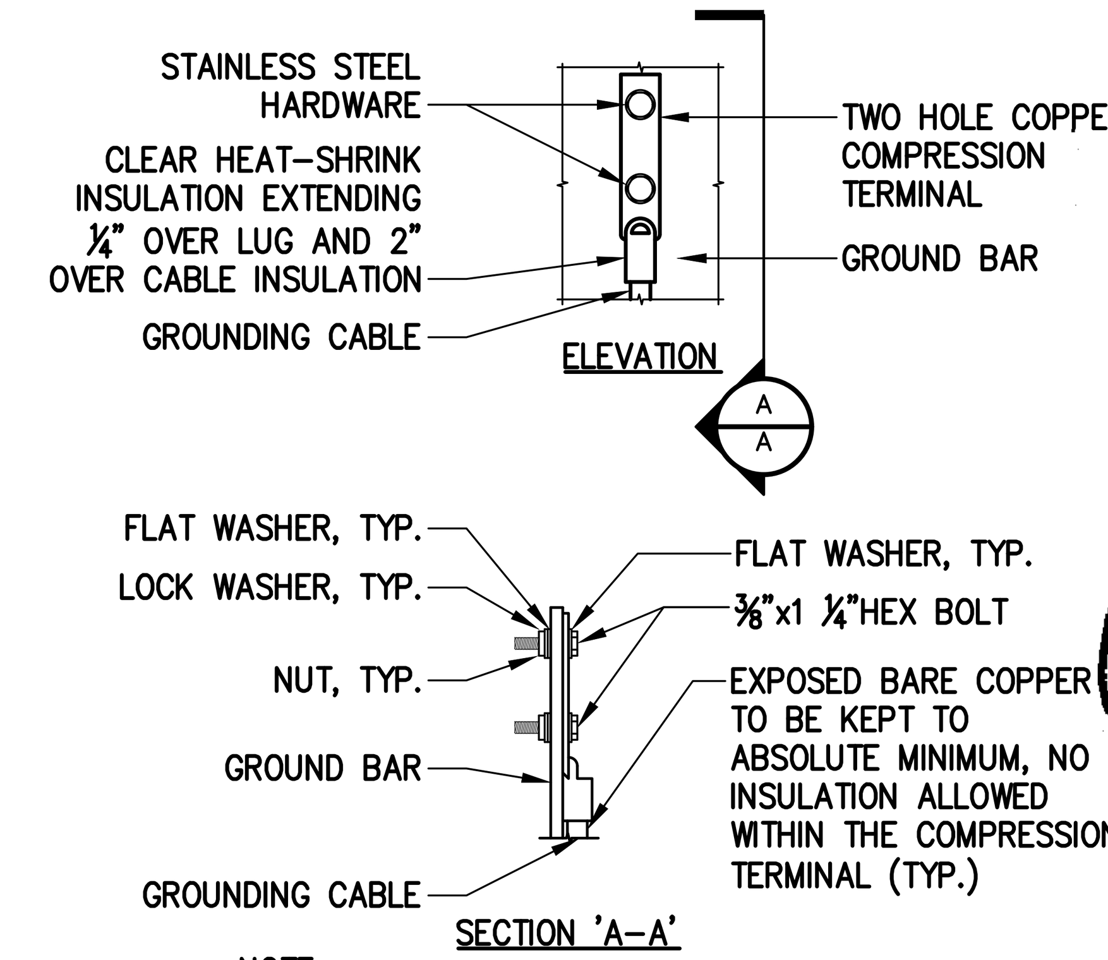
GROUNDING PLAN (1 / E-2)
SCALE: N.T.S.



MASTER GROUND BAR (MGB) (3 / E-2)
SCALE: NOT TO SCALE



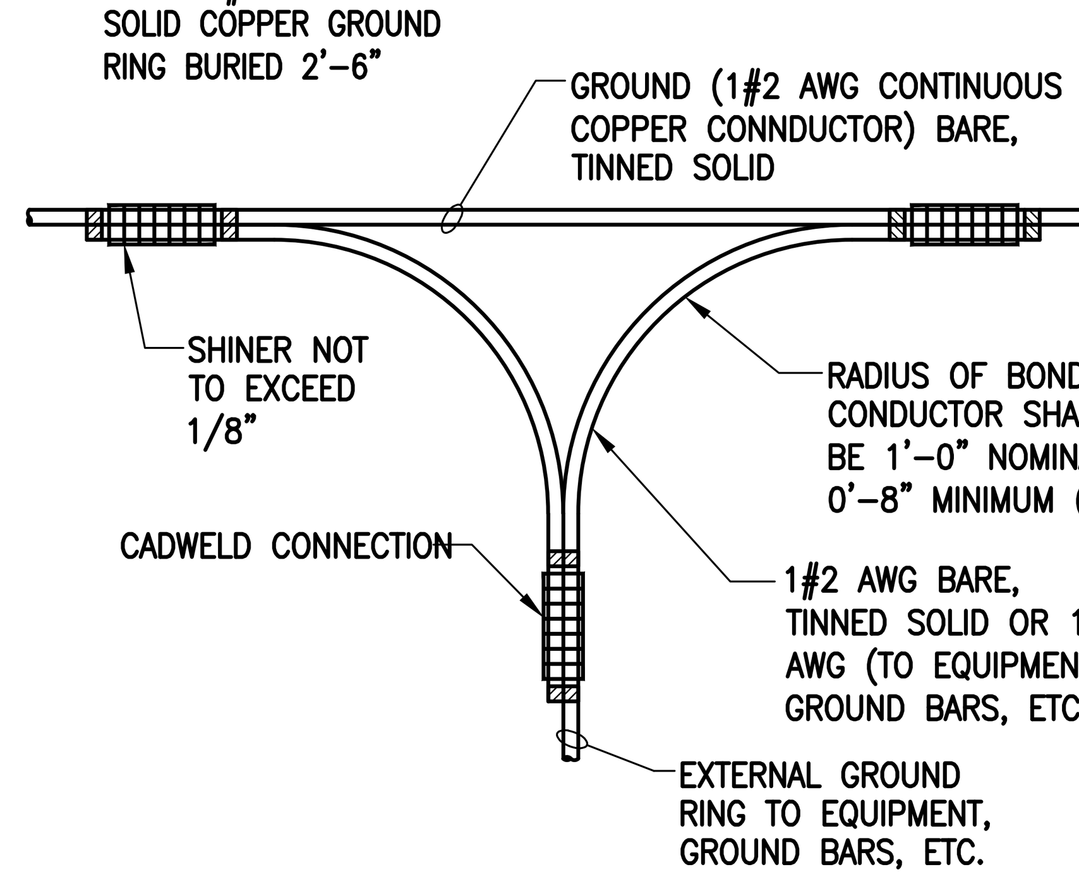
GROUND BAR (EGB) (4 / E-2)
SCALE: NOT TO SCALE



NOTE:

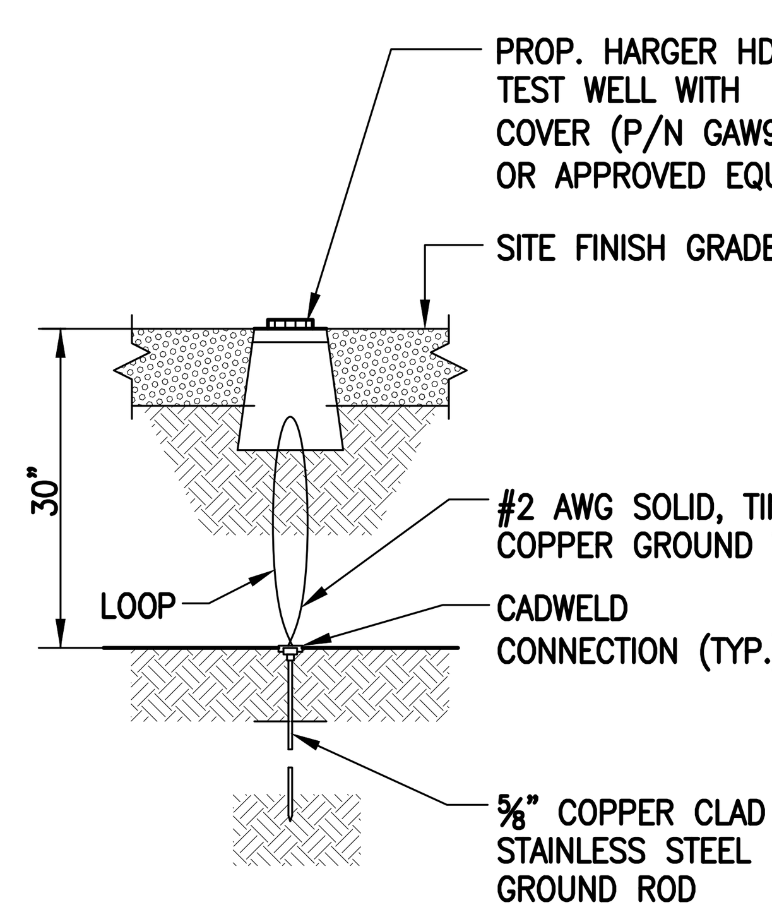
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELL DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.

TYPICAL GROUND BAR CONNECTIONS DETAIL (5 / E-2)
SCALE: NOT TO SCALE

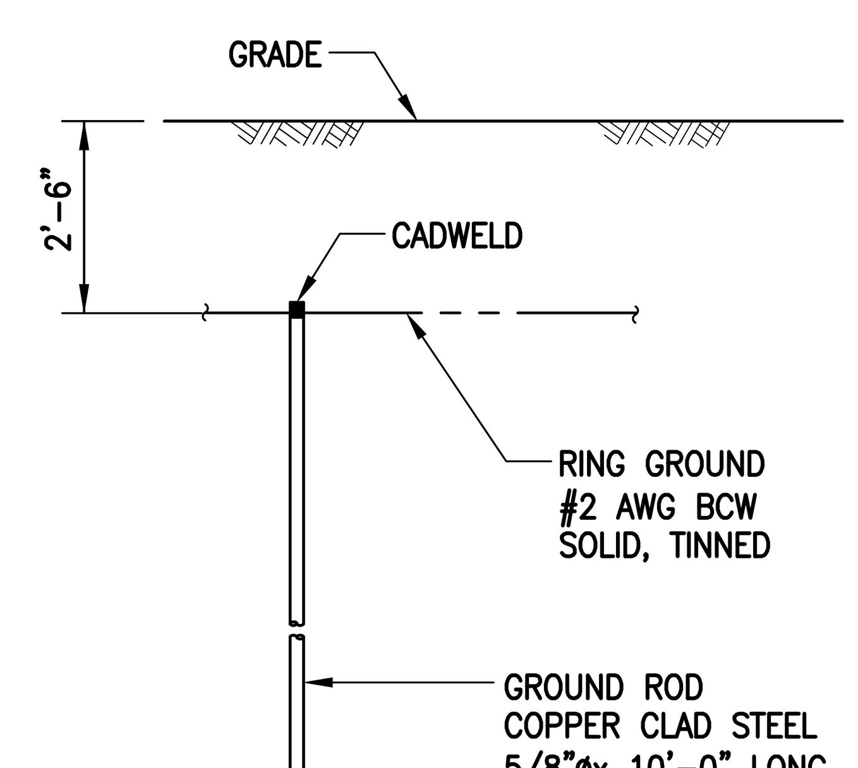


NOTE: ALL CONNECTION TO GROUND SHALL BE NON–DIRECTIONAL.

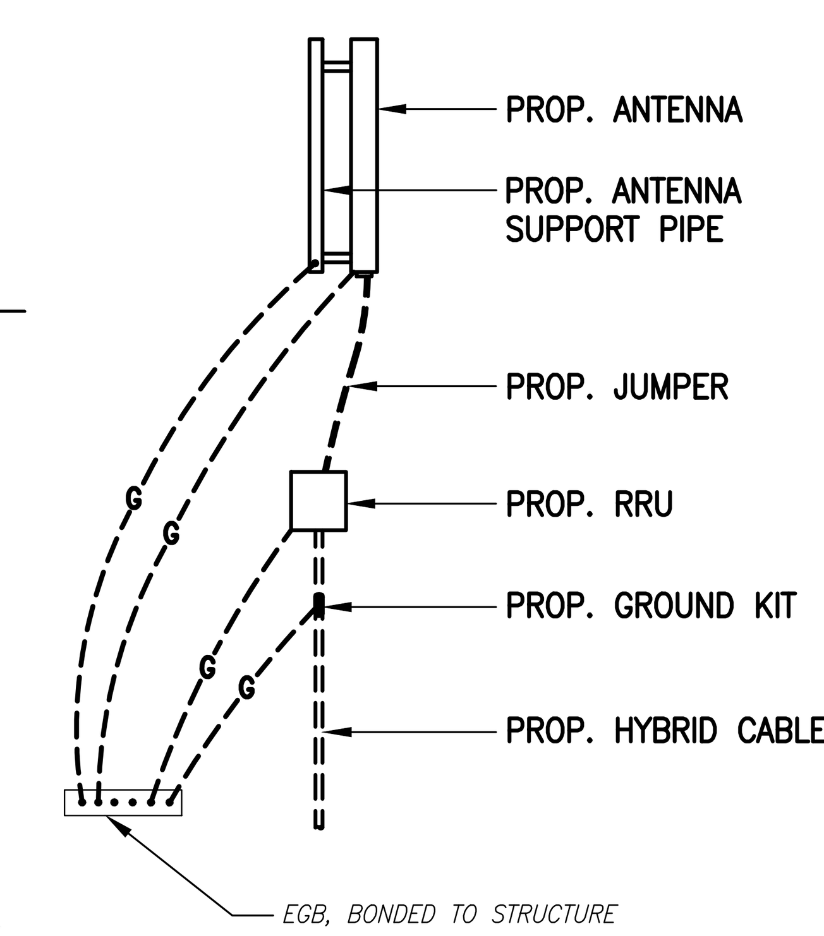
NON–DIRECTIONAL SPLICE (6 / E-2)
SCALE: NOT TO SCALE



GROUND ROD TEST WELL DETAIL (7 / E-2)
SCALE: NOT TO SCALE



GROUND ROD (8 / E-2)
SCALE: NOT TO SCALE



HYBRID CABLE CONNECTION AND GROUNDING DETAIL (9 / E-2)
SCALE: NOT TO SCALE

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CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	02/05/19	CONSTRUCTION REVISED	CMC
1	01/25/19	ISSUED FOR CONSTRUCTION	CMC
0	11/15/18	ISSUED FOR REVIEW	JRV

SITE NUMBER:
CTNL011B

SITE ADDRESS:
1662 ROUTE 184 (GOLD STAR HWY)
GROTON, CT 06340

SHEET TITLE
GROUNDING NOTES, PLAN, DIAGRAM & DETAILS

SHEET NUMBER
E-2

1815.027