Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

June 16, 2017

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

Notice of Exempt Modification
225 S. Main Street (Amtrak Station), Windsor Locks, CT 06096
Latitude- 41.91330000
Longitude- -72.62621900

Dear Ms. Bachman,

T-Mobile currently maintains (6) existing antennas at the existing 148' and 150' level of the existing 150' monopole at 225 S. Main Street in Windsor Locks, CT. The tower and property is owned by Amtrak. T-Mobile now intends to replace (3) existing antennas with (3) new 700/2100 MHz antennas. These antennas would be installed at the same 148' level of the tower as existing. T-Mobile also intends to install (3) Tower-Mounted Amplifiers.

This facility was approved by the Town of Windsor Locks, and was exempt from all local Zoning Ordinances. Enclosed is documentation from the Town of Windsor Locks to verify this. The approval did not have conditions that could be feasibly violated by this proposed modification.

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

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

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

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

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

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

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

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

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitute an exempt modification under R.C.S.A. 16-50j-72(b)(2).

Sincerely,

Kyle Richers

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

cc: Amtrak- as tower and property owner
J. Christopher Kervick- as elected official
Jennifer Rodriguez- as zoning official

Town of Windsor Locks

Catherine Dorau
Assistant Zoning & Wetland Officer
Planning Coordinator

Building / Zoning &
Planning Department
Phone 860-627-1447
Fax 860-292-1121

September 28, 2000

Attorney Christopher R, Stone
Chadwick, Libbey, & Stone
555 Franklin Avenue
Hartford, CT 06114

Re: Amtrak Telecommunication Tower – Antenna

Dear Chris:

The original installation of the Amtrak tower was determined to be exempt from compliance with the Windsor Locks Zoning Ordinances (see attached copy of your letter dated November 17, 1998).

I'm enclosing a copy of a letter from LCC International, Inc. indicated interest in adding an antenna to the existing tower. Please advise if any additional antennas to this tower would also be exempt from the site plan review process.

Thank you for your anticipated response to this matter.

Very truly yours,

Catherine Dorau
Assistant Zoning & Wetlands Officer

Enclosures

File:p/townatty/2000/amtraktower092800

original attached

PER PHONE CALL W/ C. STONE – 10-11-2000,
Lcc international, Inc., should file for a site plan review before the PZC.
Advised Christine Belvin on October 12, 2000.

C.D.

Town of Windsor Locks

Catherine Dorau
Assistant Zoning/Wetlands Officer
Planning Coordinator

Building / Zoning &
Planning Department
Phone 860-627-1447
Fax 860-292-1121

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Catherine Dorau
Assistant Zoning & Wetlands Officer

Enclosures

File p:\formatty\2000\amtaktower092800

CHADWICK, LIBBEY, SZILAGYI & STONE
ATTORNEYS AT LAW
555 FRANKLIN AVENUE
HARTFORD, CONNECTICUT 06114
(860) 296-4500
FAX (860) 296-3535

CHRISTOPHER R. STONE

BRISTOL OFFICE
124 MAIN STREET
SUITE 103
BRISTOL, CT 06010
(203) 582-9200

EAST HARTFORD OFFICE
111 FOUNDERS PLAZA
SUITE 1401
EAST HARTFORD, CT 06108
(860) 610-4500
FAX (860) 610-4504
REPLY TO EAST HARTFORD OFFICE

November 17, 1998

VIA FACSIMILE 292-1121

Douglas Glazier, First Selectman
Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

RE: Application of Omnipoint Communications Enterprises, Inc. For Installation of Certain Wireless Communication Facilities Within Amtrak Property in the Town of Windsor Locks

Dear First Selectman Glazier:

Please be advised that I have reviewed several letters from Attorney John Harrington representing Omnipoint and the relevant federal statutes regarding the above-referenced application. As you recall, Omnipoint is seeking permission for the installation of a monopole within Amtrak property and has requested a determination that such activity is exempt from our zoning process.

Pursuant to 49 U.S.C.A. Section 24902(j), no local building, zoning, subdivision, or similar related law shall apply in connection with the construction or operation of any improvement undertaken by or for the benefit of Amtrak within the Northeast Corridor Improvement Project. The proposed improvements are within this Project, and have been undertaken by Amtrak for its benefit. As such, it is the opinion of this office that this particular proposal is exempt from compliance with the Windsor Locks Zoning Ordinances.

If you have any comments or questions, please feel free to contact me.

Very truly yours,

Christopher R. Stone

CRS/mjg

LCC, International

1792 Main Street
East Hartford, CT 06108

September 14, 2000

Catherine C. Dorau
Planning Coordinator
Town of Windsor Locks
Town Hall
50 Church Street
Windsor Locks, CT 06096-2343

Dear Sir or Madam:

Thank you for taking the time to speak with my colleague Stephen Schadler and myself, Tuesday morning September 12, 2000. We are a telecommunications consulting company developing a network for XM Radio. We are interested in adding a 70" whip antenna to the top of the Amtrak tower located at the Amtrak Station on Rte. 159 and a 4' X 4' X 5' repeater box between the Amtrak shelter and the tower with a 26" diameter dish off the repeater (see attachment 1).

Attached, please find a brief description of LCC and XM Radio. I have also enclosed pictures of the existing tower and a photo simulation of the tower with our 70" antenna on top.

I am interested in properly zoning and building these proposed changes. We are currently working with Amtrak on a lease. We will have an Architecture and Engineering firm out to prepare official drawings for submission at a later date. I appreciate any and all procedural help you can provide.

If you have any questions or need more information please contact me at (860) 833-9039.

Sincerely,

Christine Belvin
Zoning Specialist

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: CT11064F

Windsor/ I-91/ X40_1
8 South Main Street Amtrak Station
Windsor Locks, CT 06096

June 6, 2017

EBI Project Number: 6217002334

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	6.19 %

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

EBI Consulting
environmental | engineering | due diligence

June 6, 2017

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

Emissions Analysis for Site: **CT11064F – Windsor/ I-91/ X40_1**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **8 South Main Street Amtrak Station, Windsor Locks, 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 public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) 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 **8 South Main Street Amtrak Station, Windsor Locks, 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, 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) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 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 60 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) Since the 2100 MHz UMTS radios are ground mounted there are additional cabling losses accounted for. For each ground mounted 2100 MHz UMTS RF an additional 2.19 dB of loss was factored into the calculations used for this analysis. This is based on manufacturers Specifications for 170 feet of 1-1/4” coax cable on each path.

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

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

8) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** & **Commscope SBNH-1D65C** for 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope SBNH-1D65C** has a maximum gain of **15.1 dBd** at its main lobe at 2100 MHz and a maximum gain of **13.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerline of the proposed antennas is **150 feet** above ground level (AGL).

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

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

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	150	Height (AGL):	150	Height (AGL):	150
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A1 MPE%	1.62	Antenna B1 MPE%	1.62	Antenna C1 MPE%	1.62
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope SBNH-1D65C	Make / Model:	Commscope SBNH-1D65C	Make / Model:	Commscope SBNH-1D65C
Gain:	15.1 dBd / 13.6 dBd	Gain:	15.1 dBd / 13.6 dBd	Gain:	15.1 dBd / 13.6 dBd
Height (AGL):	150	Height (AGL):	150	Height (AGL):	150
Frequency Bands	2100 MHz (AWS) / 700 MHz	Frequency Bands	2100 MHz (AWS) / 700 MHz	Frequency Bands	2100 MHz (AWS) / 700 MHz
Channel Count	3	Channel Count	3	Channel Count	3
Total TX Power(W):	90	Total TX Power(W):	90	Total TX Power(W):	90
ERP (W):	1,859.86	ERP (W):	1,859.86	ERP (W):	1,859.86
Antenna A2 MPE%	0.46	Antenna B2 MPE%	0.46	Antenna C2 MPE%	0.46

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**2.08 %**
Amtrak	4.11 %
Site Total MPE %:	**6.19 %**

T-Mobile Sector A Total:	2.08 %
T-Mobile Sector B Total:	2.08 %
T-Mobile Sector C Total:	2.08 %
Site Total:	6.19 %

T-Mobile _Max Values per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	150	8.09	AWS - 2100 MHz	1000	0.81%
T-Mobile PCS - 1900 MHz LTE	2	2,334.27	150	8.09	PCS - 1900 MHz	1000	0.81%
T-Mobile AWS - 2100 MHz UMTS	2	586.30	150	2.03	AWS - 2100 MHz	1000	0.20%
T-Mobile 700 MHz LTE	1	687.26	150	1.19	700 MHz	467	0.26%
						Total:	**2.08%**

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	2.08 %
Sector B:	2.08 %
Sector C:	2.08 %
T-Mobile Per Sector Maximum:	2.08 %
Site Total:	6.19 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **6.19%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

STRUCTURAL ANALYSIS REPORT – REV 3

T-MOBILE UPGRADE

EXISTING 150' MONOPOLE

SITE NAME: WINDSOR / I-91/ X40_1

225 S MAIN STREET/AMTRAK STATION,

WINDSOR LOCKS, CT 06096

MAY 8, 2017

TEC W.O. 7421.CT11064F

TECTONIC

Practical Solutions, Exceptional Service

TABLE OF CONTENTS

TECTONIC

STRUCTURAL ANALYSIS REPORT

Project Information

W.O. Number:	7421.CT11064F	Report Date:	5/8/2017
Client:	T-Mobile	Revision:	3
Site Name:	Windsor/ I-91/ X40_1		
Owner:	AMTRAK		
Site Address:	225 S Main Street/Amtrak Station	FCC Regulation Number:	--
City, State:	Windsor Locks, CT 06096	County:	Hartford

Structure Information

Structure Type: Monopole — Manufacturer: PiRod
Structure Height: 150 ft. — Year Built: 1999

Original Drawings: Structure: Yes Foundation: Yes

Documents provided:

Item	By	No.	Date
Geotechnical Evaluation (11 pages)	French & Parrello Associates	98A005ER2	6/22/98
Tower and Foundation Drawings (9 pages)	PiRod Inc.	203977-B	1/7/99
Tower Mapping Report (14 pages)	Vertical Solutions	141329	1/14/15
MDRN Lite via L700 RFDS (via e-mail)	T-Mobile	-	1/27/16

Inspection

Type: Tower Mapping — Date: 1/14/2015
Visual Inspection from ground — Date: 4/26/2017

General Condition:
Pole: Good — Finish: Painted
Foundation: Good — Condition: Intact

Observations: Bird's nest at top of the pole

Existing Appurtenances

Antennas:

Height (ft.)	Carrier	Qty	Manuf.	Model	Mount	Comment
150	**T-Mobile**	3	Ericsson	AIR 21 B4A B2P	(1) 10' Low Profile Platform	To Remain
		3	**Commscope**	**LNX-6515DS-VTM**		**To be Removed**
			Ericsson	RRUS 11 B2		To Remain
			Ericsson	RRUS 11 B12		To Remain
150	Amtrak	1	Celwave	PD220 (Inverted)		To Remain
98.5	Amtrak	1	Celwave	PD220	(1) 6' Side Arm	To Remain
70.5	Amtrak	1	Celwave	PD220	(1) 6' Side Arm	To Remain
51	--	1	--	--	(1) Spare 6' Side Arm	To Remain

Cables:

Height (ft.)	Carrier	Qty	Nom. Size	Location / Support	Comment
150	T-Mobile	6	1-1/4" dia	Routed along the interior of the pole	To Remain
150	T-Mobile	1	Hybriflex	Routed along the interior of the pole	To Remain
150	Amtrak	1	1/2" dia	Routed along the interior of the pole	To Remain
98.5	Amtrak	1	1/2" dia	Routed along the interior of the pole	To Remain
70.5	Amtrak	1	1/2" dia	Routed along the interior of the pole	To Remain

Proposed Installation

T-Mobile is proposing to replace three (3) existing panel antennas with newer model antennas. In addition, three (3) TMA's are to be installed as part of this upgrade. The final T-Mobile configuration upon this installation will be as follows:

Antennas:

Height (ft.)	Carrier	Qty	Manuf.	Model	Mount
150	T-Mobile	3	Ericsson	AIR 21 B4A B2P	Existing 10' Low Profile Platform
		3	**Commscope**	**SBNH-1D65C**	
		3	Ericsson	RRUS 11 B2	
		3	Ericsson	RRUS 11 B12	
		3	**RFS**	**ATMA4P4DBP-1A20 TMA's**	

Cables:

Height (ft.)	Qty	Nom. Size	Location / Support
150	6	1-1/4"	Existing routed along the interior of the pole to remain
150	1	Hybriflex Fiber Cable	Existing routed along the interior of the pole to remain

TECTONIC

STRUCTURAL ANALYSIS REPORT (CONT.)

W.O. Number:	7421.CT11064F	Report Date:	5/8/2017
Client:	T-Mobile	Revision:	3
Site Name:	Windsor/ I-91/ X40_1		

Analysis Criteria

Design Standard: ANSI/TIA-222-G-2005
Building Code: 2016 Connecticut State Building Code

	Capacity (no ice)	Capacity w/ ice	Service
Wind Speed:	97 mph*	50 mph	60 mph
Basic Ice Thickness:	0 inch	1.0 inch	0 inch

*Nominal 3-second gust wind speed per Appendix N of 2016 Connecticut Building Code

Structure Class: 2 Seismic: No
Exposure Category: C
Topo Category: 1

Assumptions:

1. The monopole was designed and constructed in accordance with the applicable codes and standards.
2. The foundation was designed and constructed based on site-specific geotechnical information.
3. Wind area and weight of the existing antenna platform has been estimated based on the site specific pictures.
4. The existing base plate and flange plate have been adequately designed to carry the full capacity of the unreinforced pole shaft. Therefore, the base plate and flange plate capacity is governed by the pole shaft and/or anchor capacity.
5. The existing appurtenance mounts have not been analyzed in conjunction with this analysis of the overall tower.

Analysis Results

Element	% Usage
Shaft	91%
Anchor Bolts	51%
Flange Connections	94%
Foundation	32%

Service Load Deflections (Max)

Type	At Top	Allowable	Percentage
Horizontal (inch):	19.22	54.00	36%
Twist & Sway (deg):	1.59	4.00	40%

For detailed information, see the attached tnxTower output and additional calculations.

Foundation Reactions (Envelope):

	Original Design Reactions[1]	Adjusted per Rev G[2]	Current Analysis	Percentage[3]
Vertical	28.7 kips	38.7 kips	46 kips	**119%**
Shear	15.3 kips	20.7 kips	15 kips	73%
Moment	1489.9 kip-ft.	2011.4 kip-ft.	1370 kip-ft.	68%

1. Based on Original Tower Drawings referenced above.
2. Adjusted Original Design Reactions per section 15.5.1 of ANSI/TIA-222-G
3. Percentage shown for comparison only. Existing foundation has been analyzed to verify its actual reserve capacity.

W.O. Number:	7421.CT11064F	Report Date:	5/8/2017
Client:	T-Mobile	Revision:	3
Site Name:	Windsor/ I-91/ X40_1		

Conclusions

Based on our analysis, the existing monopole and its foundation have adequate capacity to support the proposed T-Mobile upgrade as described herein in accordance with current code requirements.

No structural problems for the monopole or its foundation are anticipated, and no modifications are necessary.

This analysis is solely based on the information provided by the client and may be affected if any assumptions are not valid or have been made in error. TECTONIC should be notified in this event to determine the effect on the structural integrity of the tower.

Any further changes to the antenna configuration or other appurtenances should be reviewed with respect to their effect on structural loads prior to implementation.

Prepared by: Vinod Ramesh, EIT
Structural Engineer

Reviewed by: Kavish M. Zawar, P.E., PMP
Sr. Project Manager

Approved by: Antonio A. Gualtieri, P.E.
Sr. Vice President

Date: 5/8/17

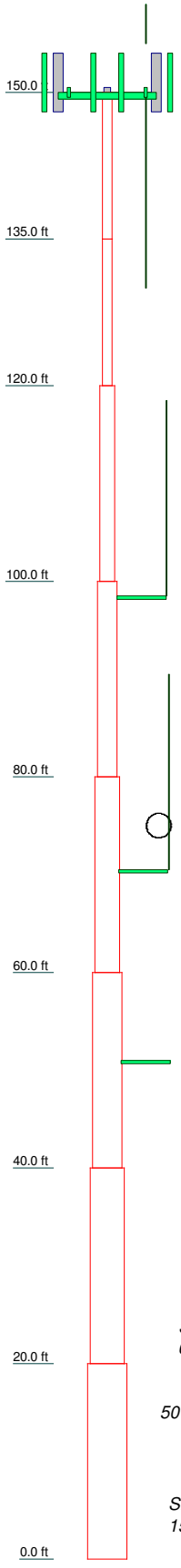
TECTONIC

Tectonic Engineering & Surveying Consultants, P.C.
1279 Route 300
Newburgh, NY 12550

Phone: (845) 567-6656
Fax: (845) 567-8703
Web: www.tectonicengineering.com

TNX TOWER SUMMARY REPORT

Section	Size	Length (ft)	Grade	Weight (K)
1	P12.75x0.375	15.000	A53-B-42	0.7
2	P12.75x0.375	15.000		0.7
3	P18x0.375	20.000		1.4
4	P24x0.375	20.000		1.9
5	P30x0.375	20.000		2.4
6	P36x0.375	20.000		2.9
7	P42x0.375	20.000		3.3
8	P48x0.375	20.000		3.8
				17.2



ALL REACTIONS ARE FACTORED

AXIAL 46 K

SHEAR 6 K *MOMENT 565 kip-ft*

TORQUE 4 kip-ft
50 mph WIND - 1.000 in ICE

AXIAL 26 K

SHEAR 15 K *MOMENT 1370 kip-ft*

TORQUE 5 kip-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
4' Lightning Rod	150	RRUS 11 B2	150
10' Low Profile Platform	150	2" STD Pipe (2.375 OD)x6'-0"	150
SBNH-1D65C w/ Mount Pipe	150	2" STD Pipe (2.375 OD)x6'-0"	150
SBNH-1D65C w/ Mount Pipe	150	PD220	150
SBNH-1D65C w/ Mount Pipe	150	2" STD Pipe (2.375 OD)x6'-0"	150
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	150	ATMA4P4DBP-1A20	150
		ATMA4P4DBP-1A20	150
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	150	ATMA4P4DBP-1A20	150
		6' Side Arm	98.5
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	150	PD220	98.5
		2" STD Pipe (2.375 OD)x4'-0"	98.5
RRUS 11 B12	150	6' Side Arm	70.5
RRUS 11 B12	150	PD220	70.5
RRUS 11 B12	150	2" STD Pipe (2.375 OD)x4'-0"	70.5
RRUS 11 B2	150	2" STD Pipe (2.375 OD)x4'-0"	51
RRUS 11 B2	150	6' Side Arm	51

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 90.5%

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Job: ***7421.CT11064F, Revision 3***			
Project: ***Windsor/I-91/X40_1***			
Client: T-Mobile	Drawn by: Vinod Ramesh		App'd:
Code: TIA-222-G	Date: 05/08/17		Scale: NTS
Path:			Dwg No. E-1

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Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.000 ft.
Nominal ice thickness of 1.000 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz		Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	150.000-135.000	15.000	P12.75x0.375	A53-B-42 (42 ksi)	
L2	135.000-120.000	15.000	P12.75x0.375	A53-B-42 (42 ksi)	
L3	120.000-100.000	20.000	P18x0.375	A53-B-42 (42 ksi)	
L4	100.000-80.000	20.000	P24x0.375	A53-B-42 (42 ksi)	
L5	80.000-60.000	20.000	P30x0.375	A53-B-42 (42 ksi)	
L6	60.000-40.000	20.000	P36x0.375	A53-B-42	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L7	40.000-20.000	20.000	P42x0.375	(42 ksi) A53-B-42 (42 ksi)	
L8	20.000-0.000	20.000	P48x0.375	A53-B-42 (42 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.000-135.000				1	1	1			
L2 135.000-120.000				1	1	1			
L3 120.000-100.000				1	1	1			
L4 100.000-80.000				1	1	1			
L5 80.000-60.000				1	1	1			
L6 60.000-40.000				1	1	1			
L7 40.000-20.000				1	1	1			
L8 20.000-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
Climbing Ladder	C	Surface Ar (CaAa)	150.000 - 0.000	1	1	0.000 0.000	1.000		0.008
Safety Line 3/8	C	Surface Ar (CaAa)	150.000 - 0.000	1	1	0.000 0.000	0.375		0.000

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF4-50A(1/2")	C	No	Inside Pole	150.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF4-50A(1/2")	C	No	Inside Pole	98.500 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF4-50A(1/2")	C	No	Inside Pole	70.500 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF6-50(1-1/4")	C	No	Inside Pole	150.000 - 0.000	6	No Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
HB158-1-13U6-S6F18(1-5/8)	C	No	Inside Pole	150.000 - 0.000	1	No Ice	0.000	0.002
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.002

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.000-135.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.063	0.000	0.212
L2	135.000-120.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.063	0.000	0.212
L3	120.000-100.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.750	0.000	0.283
L4	100.000-80.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.750	0.000	0.285
L5	80.000-60.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.750	0.000	0.287
L6	60.000-40.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.750	0.000	0.289
L7	40.000-20.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.750	0.000	0.289
L8	20.000-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	2.750	0.000	0.289

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	150.000-135.000	A	2.315	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	15.953	0.000	0.467
L2	135.000-120.000	A	2.289	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	15.799	0.000	0.462
L3	120.000-100.000	A	2.256	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	20.797	0.000	0.607
L4	100.000-80.000	A	2.211	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	20.439	0.000	0.599
L5	80.000-60.000	A	2.156	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	20.000	0.000	0.587
L6	60.000-40.000	A	2.085	0.000	0.000	0.000	0.000	0.000

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	19.429	0.000	0.571
L7	40.000-20.000	A	1.981	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	18.598	0.000	0.547
L8	20.000-0.000	A	1.775	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	16.949	0.000	0.502

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.000-135.000	0.000	0.194	0.000	0.712
L2	135.000-120.000	0.000	0.194	0.000	0.709
L3	120.000-100.000	0.000	0.198	0.000	0.834
L4	100.000-80.000	0.000	0.200	0.000	0.931
L5	80.000-60.000	0.000	0.201	0.000	0.995
L6	60.000-40.000	0.000	0.202	0.000	1.032
L7	40.000-20.000	0.000	0.202	0.000	1.043
L8	20.000-0.000	0.000	0.203	0.000	1.003

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	6	Climbing Ladder	135.00 - 150.00	1.0000	1.0000
L1	7	Safety Line 3/8	135.00 - 150.00	1.0000	1.0000
L2	6	Climbing Ladder	120.00 - 135.00	1.0000	1.0000
L2	7	Safety Line 3/8	120.00 - 135.00	1.0000	1.0000
L3	6	Climbing Ladder	100.00 - 120.00	1.0000	1.0000
L3	7	Safety Line 3/8	100.00 - 120.00	1.0000	1.0000
L4	6	Climbing Ladder	80.00 - 100.00	1.0000	1.0000
L4	7	Safety Line 3/8	80.00 - 100.00	1.0000	1.0000
L5	6	Climbing Ladder	60.00 - 80.00	1.0000	1.0000
L5	7	Safety Line 3/8	60.00 - 80.00	1.0000	1.0000
L6	6	Climbing Ladder	40.00 - 60.00	1.0000	1.0000
L6	7	Safety Line 3/8	40.00 - 60.00	1.0000	1.0000
L7	6	Climbing Ladder	20.00 - 40.00	1.0000	1.0000
L7	7	Safety Line 3/8	20.00 - 40.00	1.0000	1.0000
L8	6	Climbing Ladder	0.00 - 20.00	1.0000	1.0000
L8	7	Safety Line 3/8	0.00 - 20.00	1.0000	1.0000

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Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
4' Lightning Rod	B	From Leg	4.000 0.000 7.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.250 0.664 0.973	0.250 0.664 0.973	0.008 0.010 0.016
10' Low Profile Platform	C	None		0.000	150.000	No Ice 1/2" Ice 1" Ice	14.660 18.870 23.080	14.660 18.870 23.080	1.250 1.481 1.713
SBNH-1D65C w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	11.626 12.346 13.074	9.793 11.311 12.854	0.082 0.172 0.271
SBNH-1D65C w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	11.626 12.346 13.074	9.793 11.311 12.854	0.082 0.172 0.271
SBNH-1D65C w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	11.626 12.346 13.074	9.793 11.311 12.854	0.082 0.172 0.271
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	6.329 6.775 7.214	5.642 6.426 7.131	0.112 0.169 0.233
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	6.329 6.775 7.214	5.642 6.426 7.131	0.112 0.169 0.233
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	6.329 6.775 7.214	5.642 6.426 7.131	0.112 0.169 0.233
RRUS 11 B12	A	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B12	B	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B12	C	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B2	A	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B2	B	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B2	C	From Leg	4.000 0.000 1.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
2" STD Pipe (2.375 OD)x6'-0"	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
2" STD Pipe (2.375 OD)x6'-0"	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
PD220	B	From Leg	4.000 0.000 -10.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	3.560 7.130 10.700	3.560 7.130 10.700	0.023 0.046 0.069
2" STD Pipe (2.375 OD)x6'-0"	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
6' Side Arm	B	From Leg	3.000	0.000	98.500	No Ice	1.000	1.430	0.027
			0.000			1/2" Ice	1.250	2.050	0.038
			0.000			1" Ice	1.500	2.670	0.049
PD220	B	From Leg	6.000	0.000	98.500	No Ice	3.560	3.560	0.023
			0.000			1/2" Ice	7.130	7.130	0.046
			10.000			1" Ice	10.700	10.700	0.069
2" STD Pipe (2.375 OD)x4'-0"	B	From Leg	6.000	0.000	98.500	No Ice	0.866	0.866	0.015
			0.000			1/2" Ice	1.111	1.111	0.022
			0.000			1" Ice	1.365	1.365	0.032
***									
6' Side Arm	B	From Leg	3.000	0.000	70.500	No Ice	1.000	1.430	0.027
			0.000			1/2" Ice	1.250	2.050	0.038
			0.000			1" Ice	1.500	2.670	0.049
PD220	B	From Leg	6.000	0.000	70.500	No Ice	3.560	3.560	0.023
			0.000			1/2" Ice	7.130	7.130	0.046
			10.000			1" Ice	10.700	10.700	0.069
2" STD Pipe (2.375 OD)x4'-0"	B	From Leg	6.000	0.000	70.500	No Ice	0.866	0.866	0.015
			0.000			1/2" Ice	1.111	1.111	0.022
			0.000			1" Ice	1.365	1.365	0.032
***									
6' Side Arm	B	From Leg	3.000	0.000	51.000	No Ice	1.000	1.430	0.027
			0.000			1/2" Ice	1.250	2.050	0.038
			0.000			1" Ice	1.500	2.670	0.049
2" STD Pipe (2.375 OD)x4'-0"	B	From Leg	6.000	0.000	51.000	No Ice	0.866	0.866	0.015
			0.000			1/2" Ice	1.111	1.111	0.022
			0.000			1" Ice	1.365	1.365	0.032
***									
ATMA4P4DBP-1A20	A	From Leg	4.000	0.000	150.000	No Ice	0.747	0.457	0.016
			0.000			1/2" Ice	0.857	0.550	0.023
			0.000			1" Ice	0.975	0.651	0.031
ATMA4P4DBP-1A20	B	From Leg	4.000	0.000	150.000	No Ice	0.747	0.457	0.016
			0.000			1/2" Ice	0.857	0.550	0.023
			0.000			1" Ice	0.975	0.651	0.031
ATMA4P4DBP-1A20	C	From Leg	4.000	0.000	150.000	No Ice	0.747	0.457	0.016
			0.000			1/2" Ice	0.857	0.550	0.023
			0.000			1" Ice	0.975	0.651	0.031
***									

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice

Comb. No.	Description
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 135	Pole	Max Tension	26	0.000	0.000	0.000
			Max. Compression	26	-9.803	-0.833	-0.768
			Max. Mx	8	-3.267	-77.460	-0.157
			Max. My	14	-3.266	-0.117	-77.487
			Max. Vy	8	5.371	-77.460	-0.157
			Max. Vx	14	5.371	-0.117	-77.487
			Max. Torque	16			0.872
L2	135 - 120	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-11.831	-0.931	-1.111
			Max. Mx	8	-4.529	-161.983	-0.275
			Max. My	14	-4.528	-0.165	-162.101
			Max. Vy	8	5.880	-161.983	-0.275
			Max. Vx	14	5.881	-0.165	-162.101
			Max. Torque	16			0.871
L3	120 - 100	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-15.307	-1.048	-1.660

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	8	-6.666	-289.087	-0.470
			Max. My	14	-6.665	-0.220	-289.371
			Max. Vy	8	6.809	-289.087	-0.470
			Max. Vx	14	6.810	-0.220	-289.371
			Max. Torque	4			-0.864
L4	100 - 80	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-19.939	-2.690	-3.200
			Max. Mx	8	-9.423	-444.764	-0.700
			Max. My	14	-9.422	-0.380	-445.302
			Max. Vy	8	8.274	-444.764	-0.700
			Max. Vx	14	8.286	-0.380	-445.302
			Max. Torque	4			-2.732
L5	80 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-25.407	-4.326	-4.838
			Max. Mx	8	-12.763	-629.090	-0.894
			Max. My	14	-12.761	-0.476	-630.049
			Max. Vy	8	9.918	-629.090	-0.894
			Max. Vx	14	9.940	-0.476	-630.049
			Max. Torque	5			-4.559
L6	60 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-31.551	-5.145	-6.089
			Max. Mx	8	-16.667	-843.855	-0.885
			Max. My	14	-16.666	-0.265	-845.553
			Max. Vy	8	11.514	-843.855	-0.885
			Max. Vx	14	11.545	-0.265	-845.553
			Max. Torque	4			-5.132
L7	40 - 20	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-38.289	-5.166	-6.926
			Max. Mx	8	-21.108	-1089.676	-0.709
			Max. My	14	-21.108	0.264	-1092.347
			Max. Vy	8	13.058	-1089.676	-0.709
			Max. Vx	14	13.089	0.264	-1092.347
			Max. Torque	4			-5.131
L8	20 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-45.590	-5.165	-7.756
			Max. Mx	8	-26.136	-1365.740	-0.574
			Max. My	14	-26.136	0.801	-1369.426
			Max. Vy	8	14.540	-1365.740	-0.574
			Max. Vx	14	14.570	0.801	-1369.426
			Max. Torque	4			-5.130

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	45.590	-0.000	-0.000
	Max. H_x	20	26.139	14.534	-0.027
	Max. H_z	2	26.139	-0.027	14.565
	Max. M_x	2	1364.222	-0.027	14.565
	Max. M_z	8	1365.740	-14.534	0.027
	Max. Torsion	16	5.129	7.290	-12.627
	Min. Vert	11	19.604	-12.574	-7.259
	Min. H_x	8	26.139	-14.534	0.027
	Min. H_z	14	26.139	0.027	-14.565
	Min. M_x	14	-1369.426	0.027	-14.565
	Min. M_z	20	-1363.254	14.534	-0.027

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. Torsion	4	-5.129	-7.290	12.627

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	21.783	0.000	0.000	2.127	-1.011	-0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	26.139	0.027	-14.565	-1364.222	-3.234	4.442
0.9 Dead+1.6 Wind 0 deg - No Ice	19.604	0.027	-14.565	-1351.406	-2.906	4.442
1.2 Dead+1.6 Wind 30 deg - No Ice	26.139	7.290	-12.627	-1182.125	-685.213	5.129
0.9 Dead+1.6 Wind 30 deg - No Ice	19.604	7.290	-12.627	-1171.106	-678.149	5.129
1.2 Dead+1.6 Wind 60 deg - No Ice	26.139	12.600	-7.305	-682.577	-1183.928	4.442
0.9 Dead+1.6 Wind 60 deg - No Ice	19.604	12.600	-7.305	-676.489	-1171.933	4.442
1.2 Dead+1.6 Wind 90 deg - No Ice	26.139	14.534	-0.027	0.574	-1365.740	2.565
0.9 Dead+1.6 Wind 90 deg - No Ice	19.604	14.534	-0.027	-0.083	-1351.943	2.564
1.2 Dead+1.6 Wind 120 deg - No Ice	26.139	12.574	7.259	684.272	-1181.923	-0.000
0.9 Dead+1.6 Wind 120 deg - No Ice	19.604	12.574	7.259	676.867	-1169.937	-0.000
1.2 Dead+1.6 Wind 150 deg - No Ice	26.139	7.244	12.600	1185.309	-681.729	-2.565
0.9 Dead+1.6 Wind 150 deg - No Ice	19.604	7.244	12.600	1172.961	-674.683	-2.565
1.2 Dead+1.6 Wind 180 deg - No Ice	26.139	-0.027	14.565	1369.426	0.801	-4.442
0.9 Dead+1.6 Wind 180 deg - No Ice	19.604	-0.027	14.565	1355.268	1.106	-4.442
1.2 Dead+1.6 Wind 210 deg - No Ice	26.139	-7.290	12.627	1187.300	682.776	-5.129
0.9 Dead+1.6 Wind 210 deg - No Ice	19.604	-7.290	12.627	1174.947	676.345	-5.129
1.2 Dead+1.6 Wind 240 deg - No Ice	26.139	-12.600	7.305	687.741	1181.464	-4.442
0.9 Dead+1.6 Wind 240 deg - No Ice	19.604	-12.600	7.305	680.322	1170.110	-4.442
1.2 Dead+1.6 Wind 270 deg - No Ice	26.139	-14.534	0.027	4.608	1363.254	-2.564
0.9 Dead+1.6 Wind 270 deg - No Ice	19.604	-14.534	0.027	3.929	1350.104	-2.564
1.2 Dead+1.6 Wind 300 deg - No Ice	26.139	-12.574	-7.259	-679.062	1179.441	0.000
0.9 Dead+1.6 Wind 300 deg - No Ice	19.604	-12.574	-7.259	-673.000	1168.100	0.000
1.2 Dead+1.6 Wind 330 deg - No Ice	26.139	-7.244	-12.600	-1180.088	679.274	2.565
0.9 Dead+1.6 Wind 330 deg - No Ice	19.604	-7.244	-12.600	-1169.086	672.866	2.565
1.2 Dead+1.0 Ice+1.0 Temp	45.590	0.000	0.000	7.756	-5.165	-0.000
1.2 Dead+1.0 Wind 0 deg+1.0	45.590	0.021	-5.455	-517.630	-6.806	3.353

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	45.590	2.734	-4.735	-448.066	-268.359	3.871
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	45.590	4.714	-2.746	-256.349	-459.402	3.353
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	45.590	5.695	-0.021	6.152	-564.914	1.936
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	45.590	4.693	2.710	269.100	-457.779	0.000
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	45.590	2.698	4.714	462.024	-265.539	-1.935
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	45.590	-0.021	5.455	533.227	-3.538	-3.352
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	45.590	-2.734	4.735	463.637	258.013	-3.871
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	45.590	-4.714	2.746	271.909	449.034	-3.353
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	45.590	-5.695	0.021	9.419	554.526	-1.936
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	45.590	-4.693	-2.710	-253.500	447.391	-0.001
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	45.590	-2.698	-4.714	-446.412	255.174	1.935
Dead+Wind 0 deg - Service	21.783	0.006	-3.116	-288.724	-1.460	0.957
Dead+Wind 30 deg - Service	21.783	1.560	-2.702	-249.969	-146.597	1.105
Dead+Wind 60 deg - Service	21.783	2.696	-1.563	-143.654	-252.729	0.957
Dead+Wind 90 deg - Service	21.783	3.110	-0.006	1.731	-291.419	0.553
Dead+Wind 120 deg - Service	21.783	2.690	1.553	147.231	-252.300	-0.000
Dead+Wind 150 deg - Service	21.783	1.550	2.696	253.860	-145.852	-0.553
Dead+Wind 180 deg - Service	21.783	-0.006	3.116	293.046	-0.600	-0.957
Dead+Wind 210 deg - Service	21.783	-1.560	2.702	254.289	144.536	-1.105
Dead+Wind 240 deg - Service	21.783	-2.696	1.563	147.976	250.669	-0.957
Dead+Wind 270 deg - Service	21.783	-3.110	0.006	2.591	289.357	-0.553
Dead+Wind 300 deg - Service	21.783	-2.690	-1.553	-142.909	250.237	0.000
Dead+Wind 330 deg - Service	21.783	-1.550	-2.696	-249.537	143.791	0.553

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-21.783	0.000	0.000	21.783	0.000	0.000%
2	0.027	-26.139	-14.565	-0.027	26.139	14.565	0.000%
3	0.027	-19.604	-14.565	-0.027	19.604	14.565	0.000%
4	7.290	-26.139	-12.627	-7.290	26.139	12.627	0.000%
5	7.290	-19.604	-12.627	-7.290	19.604	12.627	0.000%
6	12.600	-26.139	-7.305	-12.600	26.139	7.305	0.000%
7	12.600	-19.604	-7.305	-12.600	19.604	7.305	0.000%
8	14.534	-26.139	-0.027	-14.534	26.139	0.027	0.000%
9	14.534	-19.604	-0.027	-14.534	19.604	0.027	0.000%
10	12.574	-26.139	7.259	-12.574	26.139	-7.259	0.000%
11	12.574	-19.604	7.259	-12.574	19.604	-7.259	0.000%
12	7.244	-26.139	12.600	-7.244	26.139	-12.600	0.000%
13	7.244	-19.604	12.600	-7.244	19.604	-12.600	0.000%
14	-0.027	-26.139	14.565	0.027	26.139	-14.565	0.000%
15	-0.027	-19.604	14.565	0.027	19.604	-14.565	0.000%
16	-7.290	-26.139	12.627	7.290	26.139	-12.627	0.000%
17	-7.290	-19.604	12.627	7.290	19.604	-12.627	0.000%
18	-12.600	-26.139	7.305	12.600	26.139	-7.305	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
19	-12.600	-19.604	7.305	12.600	19.604	-7.305	0.000%
20	-14.534	-26.139	0.027	14.534	26.139	-0.027	0.000%
21	-14.534	-19.604	0.027	14.534	19.604	-0.027	0.000%
22	-12.574	-26.139	-7.259	12.574	26.139	7.259	0.000%
23	-12.574	-19.604	-7.259	12.574	19.604	7.259	0.000%
24	-7.244	-26.139	-12.600	7.244	26.139	12.600	0.000%
25	-7.244	-19.604	-12.600	7.244	19.604	12.600	0.000%
26	0.000	-45.590	0.000	-0.000	45.590	-0.000	0.000%
27	0.021	-45.590	-5.455	-0.021	45.590	5.455	0.000%
28	2.734	-45.590	-4.735	-2.734	45.590	4.735	0.000%
29	4.714	-45.590	-2.746	-4.714	45.590	2.746	0.000%
30	5.695	-45.590	-0.021	-5.695	45.590	0.021	0.000%
31	4.693	-45.590	2.710	-4.693	45.590	-2.710	0.000%
32	2.698	-45.590	4.714	-2.698	45.590	-4.714	0.000%
33	-0.021	-45.590	5.455	0.021	45.590	-5.455	0.000%
34	-2.734	-45.590	4.735	2.734	45.590	-4.735	0.000%
35	-4.714	-45.590	2.746	4.714	45.590	-2.746	0.000%
36	-5.695	-45.590	0.021	5.695	45.590	-0.021	0.000%
37	-4.693	-45.590	-2.710	4.693	45.590	2.710	0.000%
38	-2.698	-45.590	-4.714	2.698	45.590	4.714	0.000%
39	0.006	-21.783	-3.116	-0.006	21.783	3.116	0.000%
40	1.560	-21.783	-2.702	-1.560	21.783	2.702	0.000%
41	2.696	-21.783	-1.563	-2.696	21.783	1.563	0.000%
42	3.110	-21.783	-0.006	-3.110	21.783	0.006	0.000%
43	2.690	-21.783	1.553	-2.690	21.783	-1.553	0.000%
44	1.550	-21.783	2.696	-1.550	21.783	-2.696	0.000%
45	-0.006	-21.783	3.116	0.006	21.783	-3.116	0.000%
46	-1.560	-21.783	2.702	1.560	21.783	-2.702	0.000%
47	-2.696	-21.783	1.563	2.696	21.783	-1.563	0.000%
48	-3.110	-21.783	0.006	3.110	21.783	-0.006	0.000%
49	-2.690	-21.783	-1.553	2.690	21.783	1.553	0.000%
50	-1.550	-21.783	-2.696	1.550	21.783	2.696	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00067534
3	Yes	5	0.00000001	0.00031804
4	Yes	6	0.00000001	0.00019695
5	Yes	6	0.00000001	0.00006264
6	Yes	6	0.00000001	0.00015005
7	Yes	6	0.00000001	0.00004545
8	Yes	5	0.00000001	0.00039115
9	Yes	5	0.00000001	0.00021526
10	Yes	6	0.00000001	0.00016802
11	Yes	6	0.00000001	0.00005189
12	Yes	6	0.00000001	0.00018176
13	Yes	6	0.00000001	0.00005696
14	Yes	5	0.00000001	0.00066482
15	Yes	5	0.00000001	0.00031292
16	Yes	6	0.00000001	0.00014853
17	Yes	6	0.00000001	0.00004486
18	Yes	6	0.00000001	0.00019285
19	Yes	6	0.00000001	0.00006109
20	Yes	5	0.00000001	0.00040249
21	Yes	5	0.00000001	0.00018821
22	Yes	6	0.00000001	0.00016631

23	Yes	6	0.00000001	0.00005156
24	Yes	6	0.00000001	0.00015524
25	Yes	6	0.00000001	0.00004746
26	Yes	4	0.00000001	0.00036517
27	Yes	6	0.00000001	0.00044784
28	Yes	6	0.00000001	0.00068125
29	Yes	6	0.00000001	0.00053272
30	Yes	6	0.00000001	0.00042205
31	Yes	6	0.00000001	0.00055194
32	Yes	6	0.00000001	0.00061446
33	Yes	6	0.00000001	0.00046349
34	Yes	6	0.00000001	0.00055137
35	Yes	6	0.00000001	0.00065724
36	Yes	6	0.00000001	0.00041089
37	Yes	6	0.00000001	0.00050212
38	Yes	6	0.00000001	0.00049181
39	Yes	4	0.00000001	0.00060658
40	Yes	5	0.00000001	0.00006278
41	Yes	4	0.00000001	0.00067089
42	Yes	4	0.00000001	0.00036717
43	Yes	4	0.00000001	0.00070020
44	Yes	4	0.00000001	0.00090873
45	Yes	4	0.00000001	0.00061398
46	Yes	4	0.00000001	0.00072281
47	Yes	5	0.00000001	0.00005905
48	Yes	4	0.00000001	0.00036561
49	Yes	4	0.00000001	0.00066104
50	Yes	4	0.00000001	0.00059673

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 135	19.220	44	1.592	0.015
L2	135 - 120	14.355	44	1.464	0.012
L3	120 - 100	10.295	44	1.075	0.008
L4	100 - 80	6.432	44	0.738	0.006
L5	80 - 60	3.787	45	0.509	0.004
L6	60 - 40	1.992	45	0.339	0.002
L7	40 - 20	0.840	45	0.205	0.001
L8	20 - 0	0.204	45	0.094	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.000	4' Lightning Rod	44	19.220	1.592	0.015	8740
98.500	6' Side Arm	44	6.198	0.719	0.006	4324
70.500	6' Side Arm	45	2.843	0.421	0.003	6492
51.000	6' Side Arm	45	1.404	0.275	0.002	8447

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 135	89.827	14	7.446	0.070
L2	135 - 120	67.122	14	6.854	0.053
L3	120 - 100	48.147	14	5.033	0.036
L4	100 - 80	30.079	14	3.452	0.028
L5	80 - 60	17.712	14	2.380	0.018
L6	60 - 40	9.314	14	1.585	0.011
L7	40 - 20	3.926	14	0.957	0.006
L8	20 - 0	0.955	16	0.439	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.000	4' Lightning Rod	14	89.827	7.446	0.070	1934
98.500	6' Side Arm	14	28.986	3.365	0.028	928
70.500	6' Side Arm	14	13.294	1.972	0.015	1391
51.000	6' Side Arm	14	6.563	1.287	0.009	1808

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 135 (1)	P12.75x0.375	15.000	0.000	0.0	14.579	-3.266	551.084	0.006
L2	135 - 120 (2)	P12.75x0.375	15.000	0.000	0.0	14.579	-4.528	551.084	0.008
L3	120 - 100 (3)	P18x0.375	20.000	0.000	0.0	20.764	-6.666	784.878	0.008
L4	100 - 80 (4)	P24x0.375	20.000	0.000	0.0	27.833	-9.422	1052.070	0.009
L5	80 - 60 (5)	P30x0.375	20.000	0.000	0.0	34.901	-12.761	1311.060	0.010
L6	60 - 40 (6)	P36x0.375	20.000	0.000	0.0	41.970	-16.666	1490.100	0.011
L7	40 - 20 (7)	P42x0.375	20.000	0.000	0.0	49.038	-21.108	1668.870	0.013
L8	20 - 0 (8)	P48x0.375	20.000	0.000	0.0	56.107	-26.136	1847.490	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	150 - 135 (1)	P12.75x0.375	77.538	180.952	0.428	0.000	180.952	0.000
L2	135 - 120 (2)	P12.75x0.375	162.139	180.952	0.896	0.000	180.952	0.000
L3	120 - 100 (3)	P18x0.375	289.386	367.000	0.789	0.000	367.000	0.000
L4	100 - 80 (4)	P24x0.375	445.303	623.717	0.714	0.000	623.717	0.000
L5	80 - 60 (5)	P30x0.375	630.049	947.858	0.665	0.000	947.858	0.000
L6	60 - 40 (6)	P36x0.375	845.550	1338.808	0.632	0.000	1338.808	0.000
L7	40 - 20 (7)	P42x0.375	1092.350	1796.558	0.608	0.000	1796.558	0.000
L8	20 - 0 (8)	P48x0.375	1369.625	2321.108	0.590	0.000	2321.108	0.000

TECTONIC
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567 6656
FAX: (845) 567 8703

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	150 - 135 (1)	P12.75x0.375	5.372	275.542	0.019	0.436	276.048	0.002
L2	135 - 120 (2)	P12.75x0.375	5.881	275.542	0.021	0.433	276.048	0.002
L3	120 - 100 (3)	P18x0.375	6.810	392.439	0.017	0.430	564.642	0.001
L4	100 - 80 (4)	P24x0.375	8.286	526.035	0.016	2.362	1019.708	0.002
L5	80 - 60 (5)	P30x0.375	9.940	655.528	0.015	3.945	1598.367	0.002
L6	60 - 40 (6)	P36x0.375	11.545	745.048	0.015	4.444	2189.067	0.002
L7	40 - 20 (7)	P42x0.375	13.089	834.437	0.016	4.442	2868.842	0.002
L8	20 - 0 (8)	P48x0.375	14.586	923.745	0.016	5.129	3637.700	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 135 (1)	0.006	0.428	0.000	0.019	0.002	0.435 ✔	1.000	4.8.2 ✔
L2	135 - 120 (2)	0.008	0.896	0.000	0.021	0.002	0.905 ✔	1.000	4.8.2 ✔
L3	120 - 100 (3)	0.008	0.789	0.000	0.017	0.001	0.797 ✔	1.000	4.8.2 ✔
L4	100 - 80 (4)	0.009	0.714	0.000	0.016	0.002	0.723 ✔	1.000	4.8.2 ✔
L5	80 - 60 (5)	0.010	0.665	0.000	0.015	0.002	0.675 ✔	1.000	4.8.2 ✔
L6	60 - 40 (6)	0.011	0.632	0.000	0.015	0.002	0.643 ✔	1.000	4.8.2 ✔
L7	40 - 20 (7)	0.013	0.608	0.000	0.016	0.002	0.621 ✔	1.000	4.8.2 ✔
L8	20 - 0 (8)	0.014	0.590	0.000	0.016	0.001	0.605 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 135	Pole	P12.75x0.375	1	-3.266	551.084	43.5	Pass
L2	135 - 120	Pole	P12.75x0.375	2	-4.528	551.084	90.5	Pass
L3	120 - 100	Pole	P18x0.375	3	-6.666	784.878	79.7	Pass
L4	100 - 80	Pole	P24x0.375	4	-9.422	1052.070	72.3	Pass
L5	80 - 60	Pole	P30x0.375	5	-12.761	1311.060	67.5	Pass
L6	60 - 40	Pole	P36x0.375	6	-16.666	1490.100	64.3	Pass
L7	40 - 20	Pole	P42x0.375	7	-21.108	1668.870	62.1	Pass
L8	20 - 0	Pole	P48x0.375	8	-26.136	1847.490	60.5	Pass
							Summary	
						Pole (L2)	90.5	Pass
						RATING =	**90.5**	**Pass**

FOUNDATION CALCULATIONS

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

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

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Pole Manufacturer:	*Pirod*

Reactions		
Mu:	1370	ft-kips
Axial, Pu:	26	kips
Shear, Vu:	15	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	36	
Diam:	1	in
Rod Material:	A687	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	51	in

Anchor Rod Results

Max Rod (Cu+ Vu/ń):	37.3	Kips
Allowable Axial, Φ*Fu*Anet:	72.7	Kips
Anchor Rod Stress Ratio:	51.4%	**Pass**

Rigid
AISC LRFD
φ*Tn

Plate Data		
Diam:	54	in
Thick:	1.25	in
Grade:	36	ksi
Single-Rod B-eff:	4.19	in

Base Plate Results Flexural Check

Base Plate Stress:	Rohn/Pirod,	OK
Allowable Plate Stress:	32.4	ksi
Base Plate Stress Ratio:	Rohn/Pirod,	OK

Rigid
AISC LRFD
φ*Fy
Y.L. Length: 17.23

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

n/a

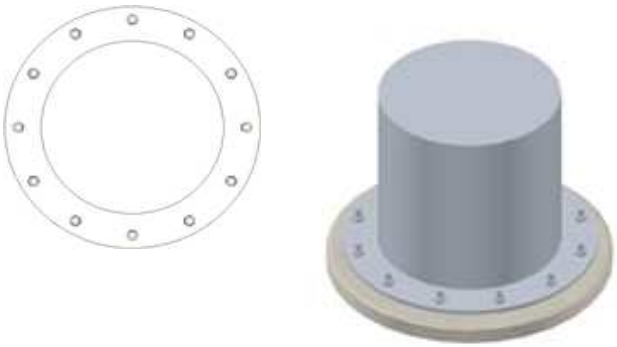
Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Diam:	48	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

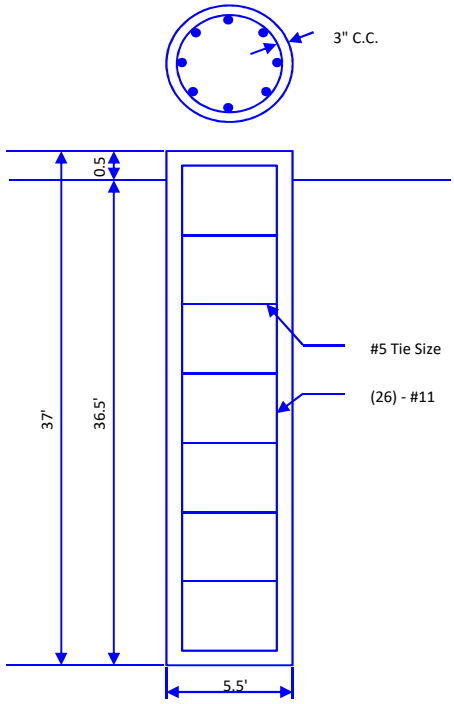
Date: 5/8/2017

Work Order:	7421.CT11064F
Site Name:	Windsor/ I-91/ X40_1

Monopole Drilled Pier

Input

Criteria		
TIA Revision:	G	
ACI 318 Revision:	2008	
Seismic Category:	B	
Forces		
Compression	26	kips
Shear	15	kips
Moment	1370	k-ft
Swelling Force	0	kips
Foundation Dimensions		
Pier Diameter:	5.5	ft
Ext. above grade:	0.5	ft
Depth below grade:	36.5	ft
Material Properties		
Number of Rebar:	26	
Rebar Size:	11	
Tie Size	5	
Rebar tensile strength:	60	ksi
Concrete Strength:	3000	psi
Ultimate Concrete Strain	0.003	in/in
Clear Cover to Ties:	3	in



Soil Profile: CT11064F Soil

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.33	0	3.33	90	0	0	0	0	0	
2	4.67	3.33	8	90	0	26	0	0	0	
3	23	8	31	30	0	26	0	0	0	
4	5.5	31	36.5	65	1000	0	0	0	12	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	7.61	ft
Max Moment, Mu:	1462.40	k-ft
Soil Safety Factor:	5.94	
Safety Factor Req'd:	1.33	
RATING:	22.4%	

Soil Axial Capacity

Skin Friction (k):	0.00	kips
End Bearing (k):	213.82	kips
Comp. Capacity (k), ϕCn:	213.82	kips
Comp. (k), Cu:	26.00	kips
RATING:	12.2%	

Concrete/Steel Check

Mu (from soil analysis)	1462.40	k-ft
ϕMn	4581.47	k-ft
RATING:	31.9%	

rho provided	1.19	
rho required	0.33	OK
Rebar Spacing	5.52	
Spacing required	22.56	OK
Dev. Length required	28.64	
Dev. Length provided	61.78	OK

Overall Foundation Rating: 31.9%

ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Reactions		
Mu	1092.35	ft-kips
Axial, Pu:	21.11	kips
Shear, Vu:	13.09	kips
Elevation:	20	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Pirod

If No stiffeners, Criteria: TIA G <-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	32		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	45		

Plate Data		
Diam:	48	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.12	in

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

Pole Data		
Diam:	42	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	
Max Bolt directly applied Tu:	35.75	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.006	in	
Min PL "treq" for actual **T w/ Pry**:	0.617	in	
Min PL "t1" for actual **T w/o Pry**:	0.815	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	35.75	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	65.6%	**Pass**	

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	Rohn/Piroc	OK
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	Rohn/Piroc	OK

No Prying

Tension Side Stress Ratio, (treq/t)^2: Rohn/Pirod OK

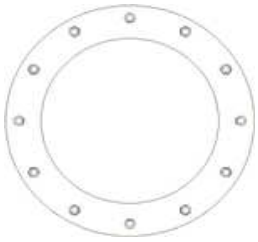
Rigid
TIA G
φ*Fy
Comp. Y.L. Length: 16.16

n/a

Stiffener Results	N/A for Rohn / Pirod
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check: N/A



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Reactions		
Mu	845.55	ft-kips
Axial, Pu:	16.67	kips
Shear, Vu:	11.55	kips
Elevation:	40	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Pirod

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	28		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	39		

Plate Data		
Diam:	42	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.04	in

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

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	
Max Bolt directly applied Tu:	36.57	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.017	in	
Min PL "treq" for actual **T w/ Pry**:	0.632	in	
Min PL "t1" for actual **T w/o Pry**:	0.833	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	36.57	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	67.1%	**Pass**	

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	Rohn/Piroc	OK
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	Rohn/Piroc	OK

No Prying

Tension Side Stress Ratio, (treq/t)^2: Rohn/Pirod OK

Rigid
TIA G
φ*Fy
Comp. Y.L. Length: 15.00

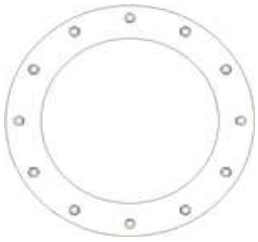
n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Reactions		
Mu	630.05	ft-kips
Axial, Pu:	12.76	kips
Shear, Vu:	9.94	kips
Elevation:	60	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Pirod

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	33		

Plate Data		
Diam:	36	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.93	in

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

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	
Max Bolt directly applied Tu:	37.65	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.031	in	
Min PL "treq" for actual **T w/ Pry**:	0.651	in	
Min PL "t1" for actual **T w/o Pry**:	0.857	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	37.65	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	69.0%	**Pass**	

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

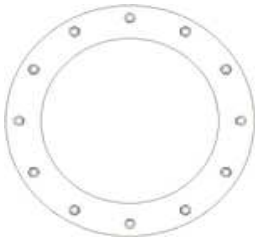
Exterior Flange Plate Results

	Flexural Check	
Compression Side Plate Stress:	Rohn/Piroc	OK
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	Rohn/Piroc	OK
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	Rohn/Pirod	OK

Rigid
TIA G
φ*Fy
Comp. Y.L. Length: 13.75

n/a

Stiffener Results	N/A for Rohn / Pirod
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A
Pole Results	
Pole Punching Shear Check:	N/A



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Reactions		
Mu	445.30	ft-kips
Axial, Pu:	9.42	kips
Shear, Vu:	8.29	kips
Elevation:	80	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Pirod

If No stiffeners, Criteria: TIA G <-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	27		

Plate Data		
Diam:	30	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

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

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	
Max Bolt directly applied Tu:	39.11	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.052	in	
Min PL "treq" for actual **T w/ Pry**:	0.680	in	
Min PL "t1" for actual **T w/o Pry**:	0.891	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	39.11	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	71.7%	**Pass**	

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	Rohn/Piroc	OK
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	Rohn/Piroc	OK

No Prying

Tension Side Stress Ratio, (treq/t)^2: Rohn/Pirod OK

Rigid
TIA G
φ*Fy
Comp. Y.L. Length: 12.37

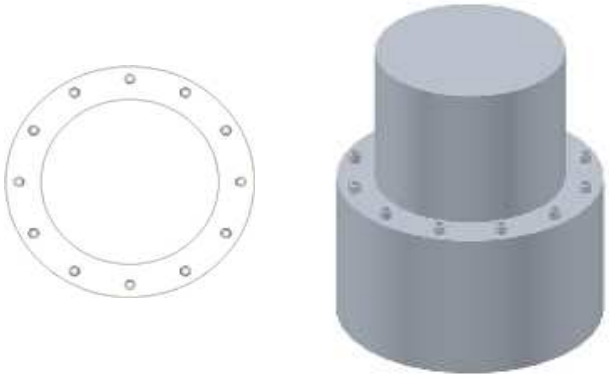
n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Reactions		
Mu	289.39	ft-kips
Axial, Pu:	6.67	kips
Shear, Vu:	6.81	kips
Elevation:	100	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Pirod

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	16		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	21		

Plate Data		
Diam:	24	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.53	in

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

Pole Data		
Diam:	18	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	
Max Bolt directly applied Tu:	40.92	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.087	in	
Min PL "treq" for actual **T w/ Pry**:	0.722	in	
Min PL "t1" for actual **T w/o Pry**:	0.941	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	40.92	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	75.0%	**Pass**	

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	Rohn/Piroc	OK
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	Rohn/Piroc	OK

Rigid
TIA G
φ*Fy
Comp. Y.L. Length: 10.82

No Prying

Tension Side Stress Ratio, (treq/t)^2: Rohn/Pirod OK

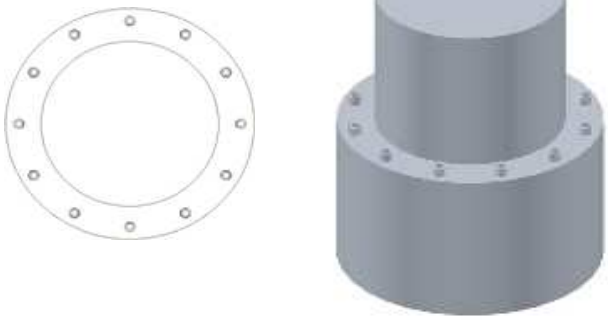
n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

WO: *7421.CT11064F*
Site Name: *Windsor/ I-91/ X40_1*
Revision: *3*

Reactions		
Mu	162.14	ft-kips
Axial, Pu:	4.53	kips
Shear, Vu:	5.88	kips
Elevation:	120	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Pirod

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data				
Qty:	10			
Diameter (in.):	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	100	<-- Disregard		
N/A:	75	<-- Disregard		
Circle (in.):	15			

Plate Data		
Diam:	18	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.01	in

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

Pole Data		
Diam:	12.75	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.53	kips	
Max Bolt directly applied Tu:	51.43	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	0.807	in	
Min PL "treq" for actual **T w/ Pry**:	0.708	in	
Min PL "t1" for actual **T w/o Pry**:	0.784	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	51.43	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	94.3%	**Pass**	

Rigid
φ*Tn
φTn[(1-(Vu/φVn)^2]^0.5

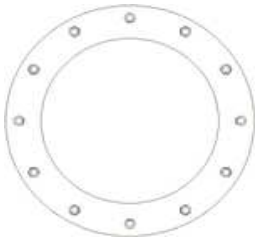
Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	Rohn/Piroc	OK
Allowable Plate Stress:	32.4	ksi
Compression Plate Stress Ratio:	Rohn/Piroc	OK
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	Rohn/Pirod	OK

Rigid
TIA G
φ*Fy
Comp. Y.L. Length: 7.90

n/a

Stiffener Results	N/A for Rohn / Pirod
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A
Pole Results	
Pole Punching Shear Check:	N/A



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

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

APPENDIX A

FRENCH & PARRELLO
ASSOCIATES, P. A.
CONSULTING ENGINEERS
Since 1974

670 NORTH BEERS STREET BLDG. #3
HOLMDEL, NEW JERSEY 07733
(732) 888-7700
http://www.fpawww.com
email: fpa@fpawww.com

LAURENCE E. FRENCH, P.E.
ARGO T. PARRELLO, P.E.
JAMES B. HELLER, P.E.
JOSEPH M. EDWARDS, P.E.
SCOTT D. WATKINS, P.E.

June 22, 1998

Mr. Dave Weinpahl
ARCNET
670 N. Beers Street - Bldg. 2
Holmdel, New Jersey 07733

Re: Report of Subsurface Exploration
and Geotechnical Evaluation
Amtrak – Windsor Locks
Arcnet No. A96.506-618A
South Main Street; Milepost 47.2
Windsor Locks, CT
FPA No. 98A005ER2 – Revised for 150 ft. monopole

Dear Mr. Weinpahl:

INTRODUCTION

Pursuant to your authorization, we have performed a subsurface exploration and geotechnical engineering evaluation in connection with the proposed 150 foot monopole at the above referenced site. The project site is located in the Amtrak right of way at milepost 47.2 off of South Main Street, Windsor Locks, Connecticut. A Regional Location Plan is presented on Drawing No. 1.

The purpose of our participation on the project at this time was to explore the subsurface conditions in the vicinity of the proposed monopole and to develop geotechnical engineering recommendations toward the design and construction of the pole foundation. Our scope of work has been performed in accordance with the scope of services dated May 6, 1998, and included the advancement of two test borings, engineering evaluation, and the generation of our recommendations.

DESIGN CONSIDERATIONS

It is our understanding that the proposed steel monopole will be approximately 150 feet high. Based on preliminary planning, it is anticipated that the proposed monopole will be founded on a drilled shaft. Design loads for the pole foundation were unavailable at the time this report was prepared.

FPA

SUBSURFACE EXPLORATION

French & Parrello Associates (FPA) performed two test borings on June 1, 1998 to characterize subsurface conditions in the vicinity of the proposed site, as shown on Drawing No. 2 "Site Layout". One boring was advanced to 12 feet in the vicinity of the proposed equipment cabinets and the second was advanced to a depth of 42 feet at the proposed monopole location. The field work was accomplished by a test boring subcontractor while under the full-time technical observation by a representative of FPA. The as-drilled boring locations are presented on Drawing No. 3, "Test Boring Location Plan."

Test boring B-1 was advanced to a depth of 42 feet below grade utilizing hollow stem auger drilling procedures. Test boring B-2 was advanced to 12 feet utilizing hollow stem auger procedures. Soil samples were obtained by advancing a standard 2-inch diameter split-spoon sampler in accordance with ASTM Test Method D-1586, The Standard Penetration Test. All soil samples were classified in the field using the Burmister Soil Classification System and were returned to our laboratory for further review. The samples will be stored for a period of 30 days from the date of this report. Details of the drilling procedures, as well as sample classifications, groundwater depths, and Standard Penetration Test results are presented on the attached boring logs.

SUBSURFACE CONDITIONS

In general, the soils encountered consisted of medium to fine sand of very loose density with varying fractions of silt and gravel to a depth of 31 feet. Organic fibers and organic odors were encountered form depth of 15 ft to 25 ft below existing grade. From 31 feet to the terminating depth of the boring, the soils encountered consisted of silt and clay of very stiff consistency.

Groundwater was encountered at depths of 8 and 10 feet during our subsurface exploration. For a more detailed description of the subsurface soil and groundwater conditions encountered, please refer to the attached boring logs.

FOUNDATION RECOMMENDATIONS

Based upon the results of our subsurface exploration and geotechnical engineering evaluation, it is our opinion that the proposed monopole may be supported on a drilled shaft foundation. Design of the foundation should be performed by an engineer licensed to practice in the State of Connecticut and should conform to all governing regulations. The foundation designer should take into account the existing topography when designing the monopole foundation. We recommend that the project specifications be written on a performance basis and that means and methods for installing the foundation be left to the discretion of the contractor. Responsibility for protecting any adjacent structures during installation should be stipulated to be with the contractor. Due to the close proximity to the railroad track and the encountered loose soils we

recommend utilizing permanent steel casing with drilled shaft. The installation should be made such that the steel casing is in firm contact with surrounding soil. Any voids between the steel casing and surrounding soil should be fill with pressure injected cement grout.

To facilitate the design of the monopole foundation, we offer the following soil parameters:

	0 – 31 Feet	31 – 42 Feet
• Total Unit Weight of Soil (γ)	90 pcf	125 pcf
• Buoyant Unit Weight of Soil (γ')	30 pcf	65 pcf
• Angle of Internal Friction (ϕ)	26°	0°
• Coefficient of At Rest Earth Pressure (K_o)	0.56	1
• Coefficient of Active Earth Pressure (K_a)	0.39	--
• Coefficient of Passive Earth Pressure (K_p)	2.56	--
• Cohesion (c)	--	1,000 psf
• Allowable Bearing Pressure	500 psf	6,000 psf

Care should be taken during construction to preclude disturbance to the adjacent railroad tracks. In addition vibration caused by frequently passing trains should be considered in the design.

CLOSING

The recommendations contained herein are contingent upon subsurface conditions remaining consistent with those encountered during our subsurface exploration. It is understood that actual subsurface conditions may vary from those which are encountered at the locations of the test borings. French & Parrello will base interpretations and recommendations upon conditions inferred from the conditions encountered. It should be recognized that any future determination of conditions different than those which were encountered at the sampling locations may significantly impact the interpretation and recommendations provided by French & Parrello. Any such variation of conditions should be brought to the prompt attention of French & Parrello to assess the impact of the variations on the previously provided interpretations and recommendations. French & Parrello will take no responsibility for any interpretation or recommendation others may make based upon subsurface data provided by French & Parrello.

LIMITATIONS

The scope of our work did not include an environmental assessment or investigation for the presence or absence of wetlands. Services performed by FPA for the project have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other

representation, expressed or implied, and no warranty or guarantee is included or intended in the services provided.

Should you have any questions or comments, please do not hesitate to contact us.

Very truly yours,

FRENCH & PARRELLO ASSOCIATES, P.A.

John Colagrande
Project Manager

R. Raymond Mankbadi, P.E.
Project Manager

RRM/clt

R. Raymond Mankbadi, P.E.
CT Professional License No. 16547

FRENCH & PARRELLO ASSOCIATES, P.A.
670 North Beers Street, Building No. 3
Holmdel, New Jersey 07733

TEST BORING LOG

AMTRAK – WINDSOR LOCKS
(FPA No. 98A005CB1)

BORING NO: B-1
SHEET 1 OF 2

DATE STARTED: 6-01-98
DATE FINISHED: 6-01-98

DEPTH OF WATER: 10.0'
LOCATION: SEE PLAN

GROUND ELEVATION: N/A
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: HOLLOW STEM AUGER

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
	S-1 0-2'	1 - 2 - 3 - 9		S-1 Brown mf SAND, trace+ Silt. (concrete in tip)
	S-2 2-4'	2 - 2 - 2 - 3		S-2 Brown mf SAND, little Silt.
--- 5'---	S-3 4-6'	3 - 1 - 2 - 2		S-3 Brown mf SAND, trace Silt.
	S-4 6-8'	2 - 2 - 1 - 2		S-4 Same as S-3 (2" recovery).
	S-5 8-10"	2 - 2 - 3 - 2		S-5 Same as S-3.
---10'---	S-6 10-12'	1 - 1 - 1 - 1		S-6 Brown f SAND, and Silt.
---15'---	S-7 15-17'	1 - 0 - 0 - 0		S-7 Same as S-6.
---20'---	S-8 20-22'	1 - 0 - 1 - 0		S-8 TOP12": Same as S-6. BOT12": Grey f SAND and Silt. (slight organic odor)
---25'---	S-9 25-27'	1 - 1 - 2 - 3		S-9 Grey f SAND, some Silt. (trace of organic fibers)
---30'---	S-10 30-32'	10 - 3 - 2 - 2		S-10 TOP 12": Brown mf SAND, some mf Gravel, trace+ Silt. BOT 12": Reddish Borwn SILT & CLAY.
---35'---	S-11 35-37'	15 - 12 - 22 - 16		S-11 Reddish Brown mf SAND, some Silt & Clay, some mf Gravel. (glacial till)
---40'---				

SOILS ENGINEER: R. RAYMOND MANKBADI, P.E..
DRILLING INSPECTOR: C. HILL

CONTRACTOR: CRAIG TEST BORING COMPANY
DRILLER: B. KIMLEY

The information shown hereon indicates the subsurface conditions encountered at the specified boring location on the date(s) of drilling. Subsurface Conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.

FRENCH & PARRELLO ASSOCIATES, P.A.
670 North Beers Street, Building No. 3
Holmdel, New Jersey 07733

FPA

TEST BORING LOG

AMTRAK – WINDSOR LOCKS
(FPA No. 98A005CB1)

BORING NO: B-1
SHEET 2 OF 2

DATE STARTED: 6-01-98
DATE FINISHED: 6-01-98

DEPTH OF WATER: 10.0'
LOCATION: SEE PLAN

GROUND ELEVATION: N/A
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: HOLLOW STEM AUGER

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
	S-12 40–41'6"	23 - 30 - 50/6" X		S-12 Reddish Brown SILT & CLAY, little mf Gravel, little mf Sand.
				END OF BORING AT 41'6"
--- 45'---				
---50'---				
---55'---				
---60'---				
---65'---				
---70'---				
---75'---				
---80'---				

SOILS ENGINEER: R. RAYMOND MANKBADI P.E.
DRILLING INSPECTOR: C. HILL

CONTRACTOR: CRAIG TEST BORING COMPANY
DRILLER: B. KIMLEY

FRENCH & PARRELLO ASSOCIATES, P.A.
670 North Beers Street, Building No. 3
Holmdel, New Jersey 07733

TEST BORING LOG

AMTRAK – WINDSOR LOCKS
(FPA No. 98A005CB2)

BORING NO: B-2
SHEET 1 OF 1

DATE STARTED: 6-01-98
DATE FINISHED: 6-01-98
DEPTH OF WATER: 8.0'
LOCATION: SEE PLAN
GROUND ELEVATION: N/A
GROUND WATER ELEV.: N/A

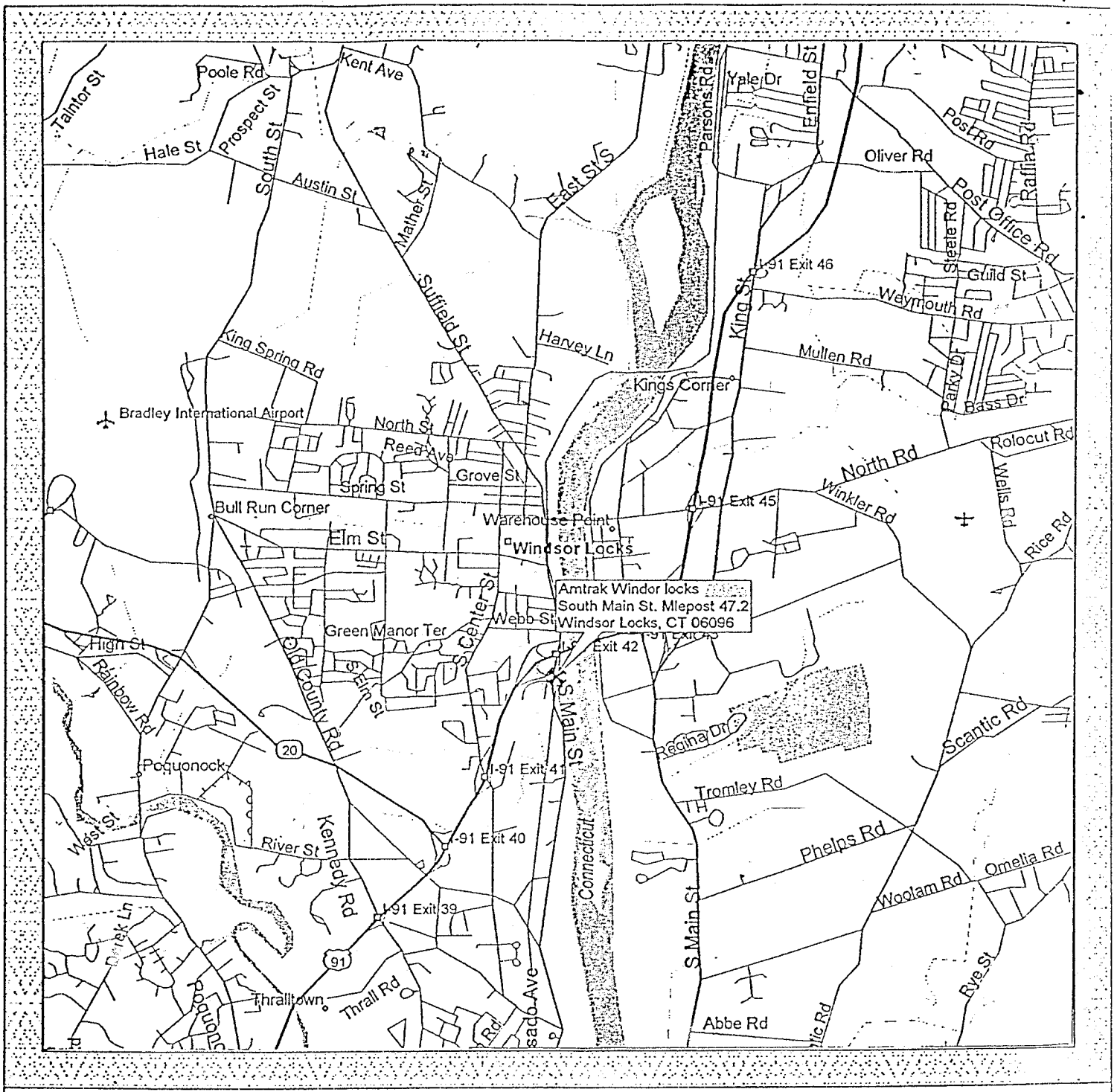
DRILLING TECHNIQUE: HOLLOW STEM AUGER

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
	S-1 0-2'	3 - 2 - 2 - 4		S-1 Brown mf SAND, little⁻ Silt.
	S-2 2-4'	4 - 4 - 5 - 3		S-2 Brown mf SAND, trace⁺ Silt.
--- 5'---	S-3 4-6'	2 - 2 - 2 - 2		S-3 Same as S-2 with railroad tie fragments.
	S-4 6-8'	2 - 3 - 2 - 2		S-4 Brown mf SAND, trace⁺ Silt.
	S-5 8-10"	2 - 1 - 2 - 3		S-5 Brown SILT & CLAY, little⁺ mf Sand, little f Gravel.
---10'---	S-6 10-12'	2 - 2 - 2 - 2		S-6 Brown f SAND, and Silt.
				END OF BORING AT 12'
---15'---				
---20'---				
---25'---				
---30'---				
---35'---				
---40'---				

SOILS ENGINEER: R. RAYMOND MANKBADI, P.E.
DRILLING INSPECTOR: C. HILL

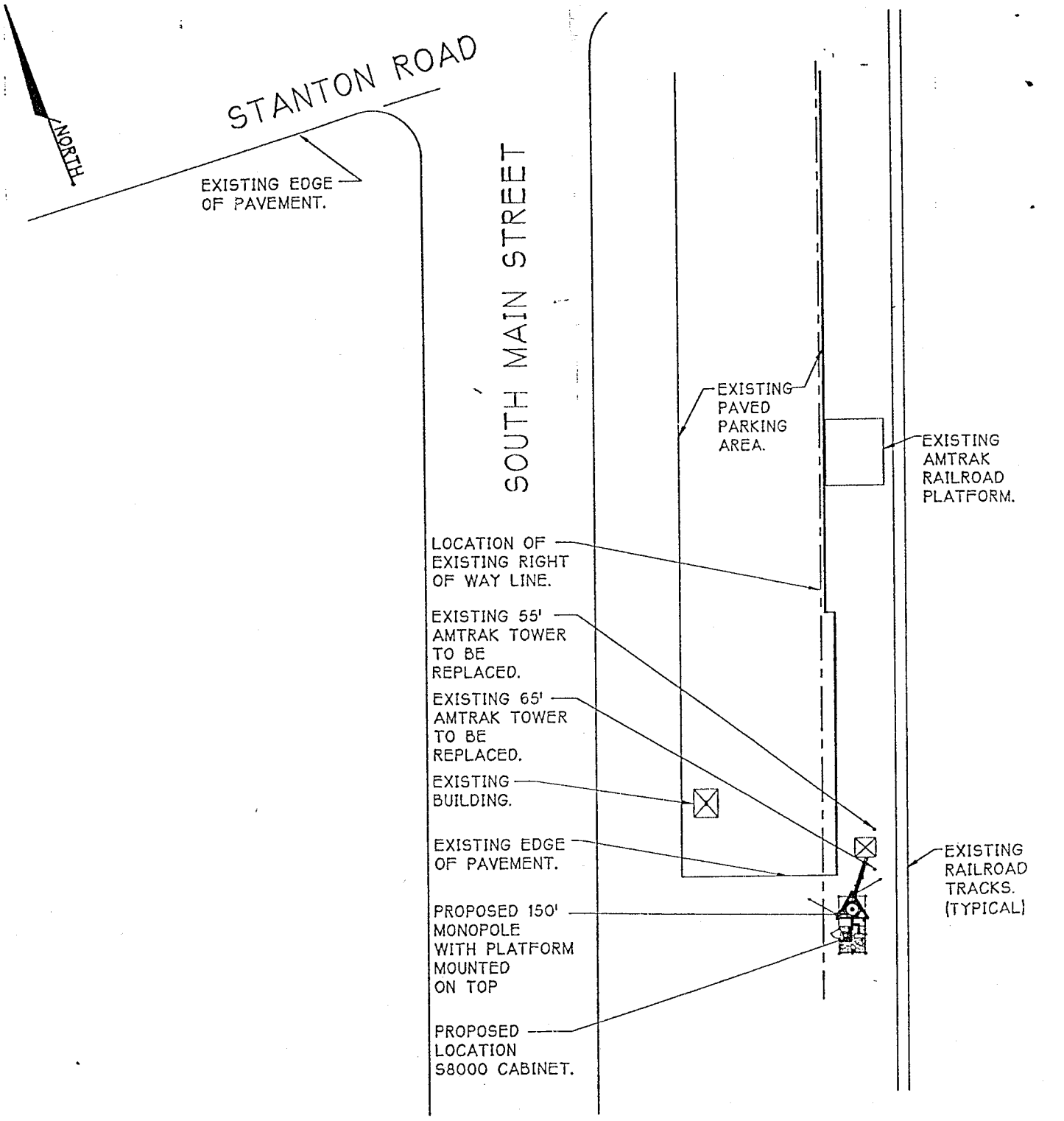
CONTRACTOR: CRAIG TEST BORING COMPANY
DRILLER: B. KIMLEY

The information shown hereon indicates the subsurface conditions encountered at the specified boring location on the date(s) of drilling. Subsurface Conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



REGIONAL LOCATION PLAN

FRENCH & PARRELLO ASSOCIATES, P.A. CONSULTING ENGINEERS 670 NORTH BEERS STREET BLDG. #3 HOLMDEL, NEW JERSEY 07733 TEL: (732) 888-7700 FAX: (732) 888-7622	PROJECT: AMTRAK - WINDSOR LOCKS SOUTH MAIN STREET; MILE POST 47.2 WINDSOR LOCKS, CT				
DRAWN BY: K.G.	CHECKED BY: J.C.	SCALE: N.T.S.	DATE: 6/3/98	JOB NO.: 98A005E	DRAWING NO.: 1

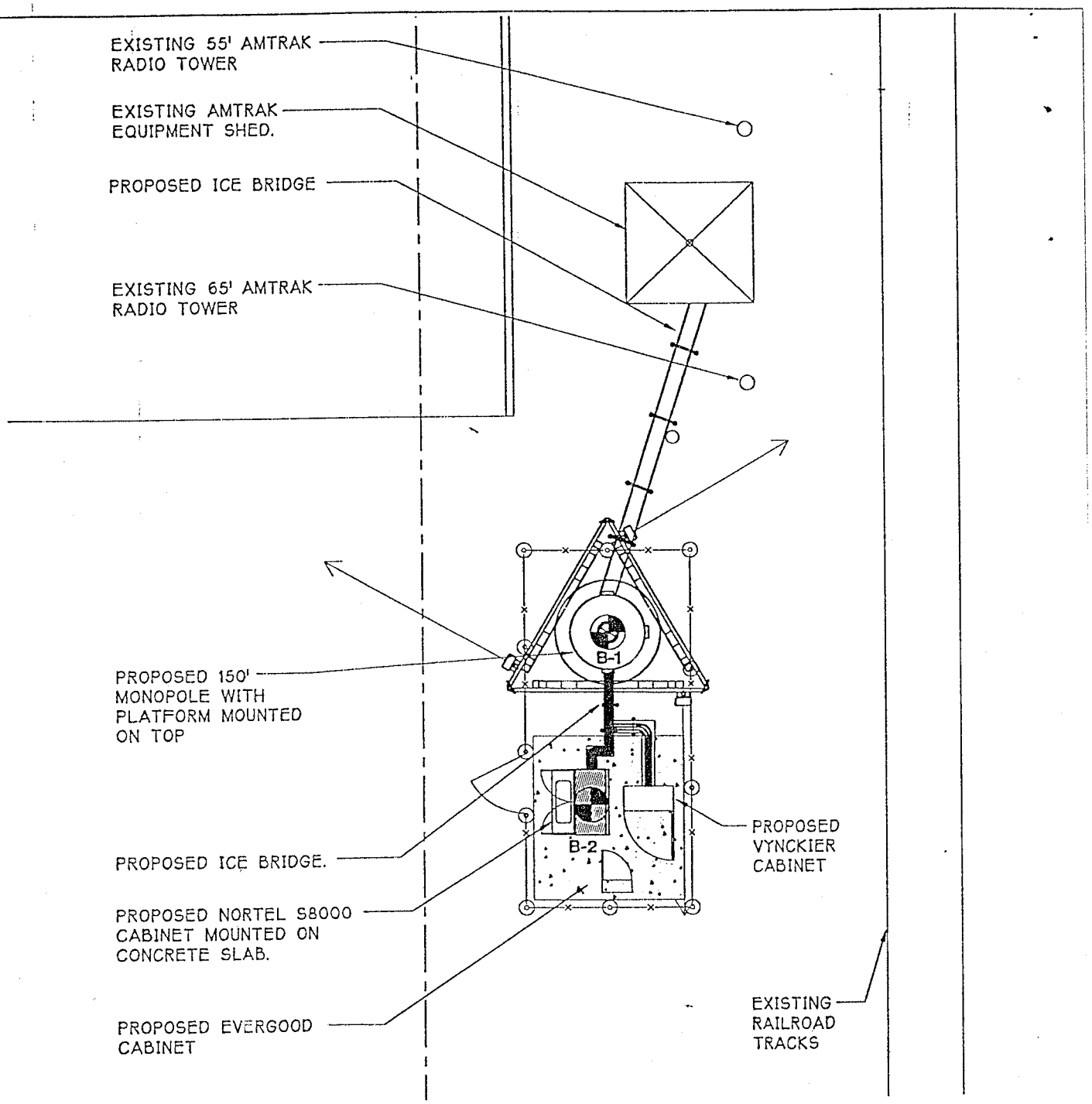


SITE LAYOUT

FRENCH & PARRELLO ASSOCIATES, P.A.
FPA
CONSULTING ENGINEERS
670 NORTH BEERS STREET BLDG. #3 HOLMDEL, NEW JERSEY 07733
TEL: (732) 888-7700 FAX: (732) 888-7622

PROJECT: AMTRAK - WINDSOR LOCKS
SOUTH MAIN STREET; MILEPOST 47.2
WINDSOR LOCKS, CT

DRAWN BY:	CHECKED BY:	SCALE:	DATE:	JOB NO.:	DRAWING NO.:
K.G.	J.C.	1"=60'-0"	6/3/98	98A005E	2



KEY

APPROXIMATE BORING LOCATION

TEST BORING LOCATION PLAN

FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS
670 NORTH BEERS STREET BLDG. #3 HOLMDEL, NEW JERSEY 07733
TEL: (732) 888-7700 FAX: (732) 888-7622

PROJECT: AMTRAK - WINDSOR LOCKS
SOUTH MAIN STREET; MILE POST. 47.2
WINDSOR LOCKS, CT

DRAWN BY:	CHECKED BY:	SCALE:	DATE:	JOB NO.:	DRAWING NO.:
K.G.	J.C.	3/16" = 1'-0"	6/2/98	98A131E	3

BURMISTER SOIL CLASSIFICATION SYSTEM

A. Cohesionless Soils: Particle Size Definitions

Soil	Fraction	U.S. Standard Sieve	Actual Size
Gravel	course	3 in. to 1 in.	76 mm to 25 mm
	medium	1 in. to 3/8 in.	25 mm to 9.5 mm
	fine	3/8 in. to No. 10	9.5 mm to 2.0 mm
Sand	course	No. 10 to No. 30	2.0 mm to 0.6 mm
	medium	No. 30 to No. 60	0.6 mm to 0.25 mm
	fine	No. 60 to No. 200	0.25 mm to .075 mm
Silt		< No. 200	< 0.075 mm

B. Terms Describing Gradation of Cohesionless Soils

Written Designation	Symbol/ Designation	Defining Proportions
coarse, medium to fine	cmf	all fractions > 10%
coarse to medium	cm	< 10% fine
medium to fine	mf	< 10% coarse
coarse	c	< 10% medium and fine
medium	m	< 10% coarse and fine
fine	f	< 10% coarse and medium

Note: Use (+) for upper limit and (-) for lower limit.

C. Cohesive Soils: Terms Describing Plasticity

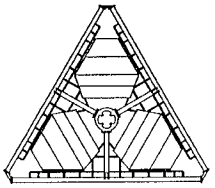
Soil	Plasticity Index	Workability	Plasticity Description
SILT	0	--	Non-Plastic
Clayey SILT	1 to 5	1/4 in. thread	Slightly Plastic
SILT & CLAY	5 to 10	1/8 in. thread	Low Plasticity
CLAY & SILT	10 to 20	1/16 in. thread	Medium Plasticity
Silty CLAY	20 to 40	1/32 in. thread	High Plasticity
CLAY	>40	1/64 in. thread	Very High Plasticity

D. Terms Describing Overall Composition of Soil

Written Proportion	Proportion Symbol	Proportion Percent by Weight
and	a	35 to 50
some	s	20 to 35
little	l	10 to 20
trace	t	1 to 10

Note: Use (+) for upper limit and (-) for lower limit.

APPENDIX B



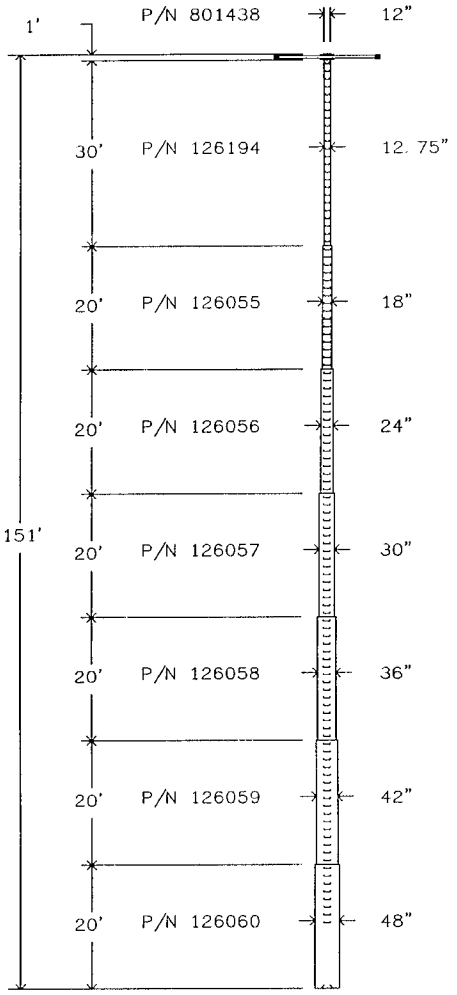
ROTATABLE TOP - TOP VIEW

MONOPOLE SECTION DATA

(ALL BOLTS ARE FOR BOTTOM OF SECTION)

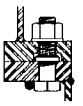
SECTION					CONNECT BOLT			PILOT BOLT		
LENGTH	PART#	SIZE	WALL	WT. *	DIAM	LENGTH	#	DIAM	LENGTH	#
1'	801438	12"	N/A	1020#	1"	4-1/2"	5			
30'	126194	12.75"	0.375"	1739#	1"	4-1/2"	7	1"	5"	3
20'	126055	18"	0.375"	1662#	1"	4-1/2"	13	1"	5"	3
20'	126056	24"	0.375"	2204#	1"	4-1/2"	17	1"	5"	3
20'	126057	30"	0.375"	2747#	1"	4-1/2"	21	1"	5"	3
20'	126058	36"	0.375"	3290#	1"	4-1/2"	25	1"	5"	3
20'	126059	42"	0.375"	3833#	1"	4-1/2"	29	1"	5"	3
20'	126060	48"	0.375"	4376#						

*THE WEIGHTS LISTED ARE THEORETICAL. THE ACTUAL WEIGHTS WILL VARY. ALL WEIGHTS SHOULD BE CONFIRMED IN THE FIELD PRIOR TO ERECTION.



TOP 1' CONSISTS OF ROTATABLE TOP ASSEMBLY. SEE DWG # 127799-B FOR INSTALLATION DETAILS. JAM NUTS NOT REQUIRED.

ALL CONNECTIONS ARE A-325 BOLTS SEE TABLE ABOVE FOR SIZE & QTY.



TYPICAL FLUSH FLANGE CONNECTION

VIEW A

SEE PAGE 2 OF THIS DRAWING FOR OPENING INFORMATION.

SEE PAGE 4 OF THIS DRAWING FOR CONNECTION BOLT TIGHTENING SPECIFICATIONS.

SEE PAGE 7 OF THIS DRAWING FOR BASE SECTION INSTALL.

REMOVABLE CLIMBING RUNGS.

REV	DESCRIPTION OF REVISIONS	INI	DATE
K	BECAME A DASH ONE - PGS 1, 4 & 5 (AUTOCAD)	KWD	01/07/1999
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
I	REVISED NOTES.	WBR	12/01/1998
H	REVISED FOUNDATION PER SITE CHANGE.	WBR	12/01/1998
G	REVISED SITE NAME - AUTOCAD	KWD	10/29/1998
F	REVISED SITE NAME	KWD	10/29/1998

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AMTRAK

AMTRAK-WINDSOR LOCKS #CT11064, CT

MP48 X 150' ASSEMBLY DRAWING

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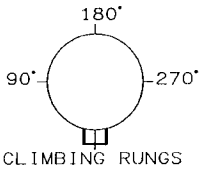
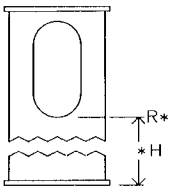
PAGE 1 OF 9

OPENINGS & BRACKETS WELDED TO POLE

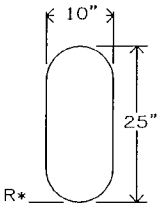
HEIGHT *H	TYP	DESCRIPTION	ANGL	ASSEMBLY DRAWING#
148' -11"	13	SAFETY CLIMB BRACKET	0°	
148' -6"	9	4" X 6" PORTHOLE EXITING UP	80°	
148' -6"	9	4" X 6" PORTHOLE EXITING UP	200°	
148' -6"	9	4" X 6" PORTHOLE EXITING UP	320°	
147' -6"	9	4" X 6" PORTHOLE EXITING UP	80°	
147' -6"	9	4" X 6" PORTHOLE EXITING UP	200°	
147' -6"	9	4" X 6" PORTHOLE EXITING UP	320°	
127' -9"	9	4" X 6" PORTHOLE EXITING UP	80°	
127' -9"	9	4" X 6" PORTHOLE EXITING UP	200°	
127' -9"	9	4" X 6" PORTHOLE EXITING UP	320°	
126' -9"	9	4" X 6" PORTHOLE EXITING UP	80°	
126' -9"	9	4" X 6" PORTHOLE EXITING UP	200°	
126' -9"	9	4" X 6" PORTHOLE EXITING UP	320°	
125' -9"	19	PAD EYES FOR FUTURE PLATFORM	SEE>	121975-B
107' -9"	9	4" X 6" PORTHOLE EXITING UP	80°	
107' -9"	9	4" X 6" PORTHOLE EXITING UP	200°	
107' -9"	9	4" X 6" PORTHOLE EXITING UP	320°	
106' -9"	9	4" X 6" PORTHOLE EXITING UP	80°	
106' -9"	9	4" X 6" PORTHOLE EXITING UP	200°	
106' -9"	9	4" X 6" PORTHOLE EXITING UP	320°	
105' -9"	19	PAD EYES FOR FUTURE PLATFORM	SEE>	121975-B
97' -6"	9	4" X 6" PORTHOLE EXITING UP	170°	
69'	9	4" X 6" PORTHOLE EXITING UP	170°	
49'	9	4" X 6" PORTHOLE EXITING UP	170°	
10'	8	TRANS. LINE BRIDGE ATTACH BRACKET	30°	
9' -6"	13	SAFETY CLIMB BRACKET	0°	
7' -6"	2	10" X 25" OVAL PORTHOLE	30°	
6' -11"	7	GROUNDING PLATE	30°	
4'	8	TRANS. LINE BRIDGE ATTACH BRACKET	120°	
4'	8	TRANS. LINE BRIDGE ATTACH BRACKET	210°	
1' -6"	2	10" X 25" OVAL PORTHOLE	120°	
1' -6"	2	10" X 25" OVAL PORTHOLE	210°	
1'	7	GROUNDING PLATE	120°	
1'	7	GROUNDING PLATE	210°	
1'	18	GROUNDING ANGLES (3)	SEE>	131093-B



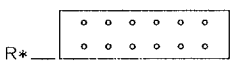
THE ANGLE TO THE OPENING IS MEASURED CLOCKWISE FROM THE CENTER-LINE OF THE CLIMBING RUNGS WHEN LOOKING DOWN.



* THE HEIGHT IN THE TABLE IS THE DISTANCE FROM THE BASE OF THE BOTTOM SECTION OF THE POLE TO THE OPENING REFERENCE (R*) AS SHOWN ON PAGES 2 - 3 OF THIS DRAWING.



TYPE 2 OPENING



GROUNDING PLATE

LINE BRIDGE BRACKET

REV	DESCRIPTION OF REVISIONS	INI	DATE
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
F	REVISED SITE NAME	KWD	10/29/1998
C	HEIGHTH CHANGE TO MP48 X 150', NEW REACTIONS	TSD	06/23/1998

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AMTRAK
AMTRAK-WINDSOR LOCKS #CT11064, CT
MP48 X 150' OPENINGS

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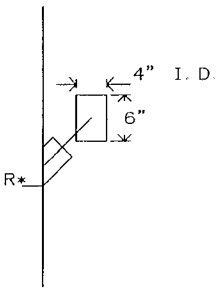
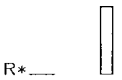
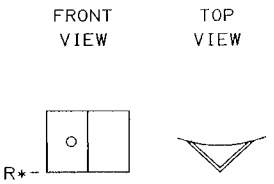
PAGE 2 OF 9



TYPE 9
OPENING



SAFETY CLIMB
BRACKET



GROUNDING ANGLE

AMTRAK

AMTRAK--WINDSOR LOCKS #CT11064, CT

MP48 X 150' OPENINGS

REV	DESCRIPTION OF REVISIONS	INI	DATE
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
F	REVISED SITE NAME	KWD	10/29/1998
C	HEIGHTH CHANGE TO MP48 X 150', NEW REACTIONS	TSD	06/23/1998

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PAGE 3 OF 9

GENERAL NOTES

1. TOWER DESIGN CONFORMS TO STANDARD EIA/TIA-222-F FOR 85 MPH BASIC WIND SPEED WITH NO ICE.
   TOWER DESIGN CONFORMS TO STANDARD EIA/TIA-222-F FOR 85 MPH BASIC WIND SPEED WITH 0.50" RADIAL ICE WITH LOAD DUE TO WIND REDUCED BY 25% WHEN CONSIDERED SIMULTANEOUSLY WITH ICE.
2. MATERIAL: (A) SOLID RODS CONFORM TO ASTM A-572 GRADE 50 REQUIREMENTS.
   (B) ANGLES CONFORM TO ASTM A-36 REQUIREMENTS.
   (C) PIPE CONFORMS TO ASTM A-53 TYPE E, GRADE B REQUIREMENTS (MIN YIELD STRENGTH=42 KSI)
   (D) ALL STEEL PLATES CONFORM TO ASTM A-36 REQUIREMENTS.
   (E) ALL ANCHOR BOLTS TO CONFORM TO ASTM - A687 SPECIFICATIONS.
3. BASE REACTIONS PER EIA/TIA-222-F FOR 85 MPH BASIC WIND SPEED WITH NO ICE.
   TOTAL WEIGHT= 25.9 KIPS.
   MOMENT= 1489.9 KIP-FT.
   MAXIMUM SHEAR= 15.3 KIPS TOTAL.
4. BASE REACTIONS PER EIA/TIA-222-F FOR 85 MPH BASIC WIND SPEED WITH 0.50" RADIAL ICE:
   TOTAL WEIGHT= 28.7 KIPS.
   MOMENT= 1173.5 KIP-FT.
   MAXIMUM SHEAR= 12.0 KIPS TOTAL.
5. FINISH: HOT DIPPED GALVANIZED AFTER FABRICATION.
6. ANTENNAS: TOP (6) EMSFR65-17-XXDP ANTENNAS MOUNTED ON A LOW PROFILE TOP USING 1-5/8" LINES.
   130' (6) EMSFR65-17-XXDP ANTENNAS MOUNTED ON A LOW PROFILE CLAMP-ON ROTATABLE PLATFORM USING 1-5/8" LINES.
   110' (6) EMSFR65-17-XXDP ANTENNAS MOUNTED ON A LOW PROFILE CLAMP-ON ROTATABLE PLATFORM USING 1-5/8" LINES.
   100' (1) PD220 ANTENNA MOUNTED ON A 4' - 6" SIDE ARM USING 1-5/8" LINE.
   70' (1) PD220 ANTENNA MOUNTED ON A 4' - 6" SIDE ARM USING 1-5/8" LINE.
   50' (1) PD220 ANTENNA MOUNTED ON A 4' - 6" SIDE ARM USING 1-5/8" LINE.
7. INSTALL BASE SECTION WITH MINIMUM OF 2" CLEARANCE ABOVE CONCRETE.
8. MIN. WELDS 5/16" UNLESS OTHERWISE SPECIFIED. ALL WELDING TO CONFORM TO AWS SPECIFICATIONS.
9. ALL BOLTS MUST BE IN PLACE WITH JAM NUTS PRIOR TO ERECTION OF THE STRUCTURE. ALL BOLTS AND NUTS MUST BE IN PLACE AND TIGHTENED BEFORE THE ADJOINING SECTION(S) ARE PLACED.
10. ALL A-325 BOLTS SHALL BE PRE-TENSIONED PER AISC SPECIFICATIONS. REFER TO DRAWING # 123107-A ("BOLT PRE-TENSIONING REQUIREMENTS")
11. EIA GROUNDING FOR TOWER.
12. OUTSIDE CLIMB RUNGS WITH SAFETY CLIMB.
13. MONOPOLE TO BE PAINTED SLATE GRAY.
14. MONOPOLE REACTIONS WERE NOT RUN WITH A LIGHTNING ROD EXTENDER.

REV	DESCRIPTION OF REVISIONS	INI	DATE
K	BECAME A DASH ONE - PGS 1, 4 & 5 (AUTOCAD)	KWD	01/07/1999
I	REVISED NOTES.	WBR	12/01/1998
G	REVISED SITE NAME - AUTOCAD	KWD	10/29/1998
E	REVISED SECTION SIZE, ADDED ANCHOR BOLT NOTE	KWD	07/23/1998
C	HEIGHTH CHANGE TO MP48 X 150', NEW REACTIONS	TSD	06/23/1998

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AMTRAK
AMTRAK-WINDSOR LOCKS #CT11064, CT
MP48 X 150' NOTES

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PAGE 4 OF 9

FOUNDATION NOTES

1. SOIL AS PER REPORT BY FRENCH & PARRELLO ASSOCIATES, P. A. DATED 6/9/98 (FILE #98A005ERI).
2. CONCRETE TO BE 3000 PSI @ 28 DAYS. REINFORCING BAR TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS. CONCRETE INSTALLATION TO CONFORM TO ACI-318 BUILDING REQUIREMENTS FOR REINFORCED CONCRETE. ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH FREE OF WATER AND ALL FOREIGN OBJECTS AND MATERIALS. A MINIMUM OF THREE' INCHES OF CONCRETE SHALL COVER ALL REINFORCEMENT. WELDING OF REBAR NOT PERMITTED.
3. A COLD JOINT IS PERMISSIBLE UPON CONSULTATION WITH PIROD. ALL COLD JOINTS SHALL BE COATED WITH BONDING AGENTS PRIOR TO SECOND POUR.
4. ALL REINFORCING STEEL TO BE FORMED INTO A CAGE PRIOR TO SETTING INTO POSITION IN THE EXCAVATED PIER.
5. GROUTING OF MONOPOLE BASE IS OPTIONAL. IF GROUT IS 'USED, DRAINAGE MUST BE PROVIDED FROM THE INTERIOR OF THE POLE. REFER TO DRAWING # 118492-B FOR BASE SECTION INSTALLATION.
6. BENDING, STRAIGHTENING OR REALIGNING (HOT OR COLD) OF THE ANCHOR BOLTS BY ANY METHOD IS PROHIBITED.
7. CROWN TOP OF FOUNDATION FOR PROPER DRAINAGE.
8. A PERMANENT STEEL CASING IS REQUIRED DUE TO THE PROXIMITY OF THE FOUNDATION TO THE RAILROAD TRACKS. THE CASING SHOULD BE INSTALLED SUCH THAT VOIDS AROUND THE CASING ARE MINIMAL. ANY VOIDS BETWEEN THE STEEL CASING AND THE SOIL MUST BE FILLED BY PRESSURE INJECTED GROUTING TECHNIQUES.
9. A SUMP OR OTHER DEWATERING SYSTEM MAY BE REQUIRED TO CONTROL GROUNDWATER INFILTRATION DURING CONSTRUCTION.

REV	DESCRIPTION OF REVISIONS	INI	DATE
K	BECAME A DASH ONE - PGS 1, 4 & 5 (AUTOCAD)	KWD	01/07/1999
I	REVISED NOTES.	WBR	12/01/1998
H	REVISED FOUNDATION PER SITE CHANGE.	WBR	12/01/1998
F	REVISED SITE NAME	KWD	10/29/1998
D	REVISED FOUNDATION PER TOWER HEIGHT CHANGE	WRH	06/23/1998
C	HEIGHTH CHANGE TO MP48 X 150', NEW REACTIONS	TSD	06/23/1998

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AMTRAK-WINDSOR LOCKS #CT11064, CT

MP48 X 150' NOTES

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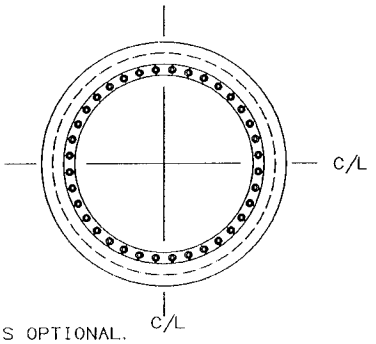
PAGE 5 OF 9

TOP VIEW

TOP AND SIDE VIEWS ARE
DRAWN TO DIFFERENT SCALE

BASE FLANGE MUST BE CENTERED IN PIER
WITHIN +/- 10% OF PIER DIAMETER

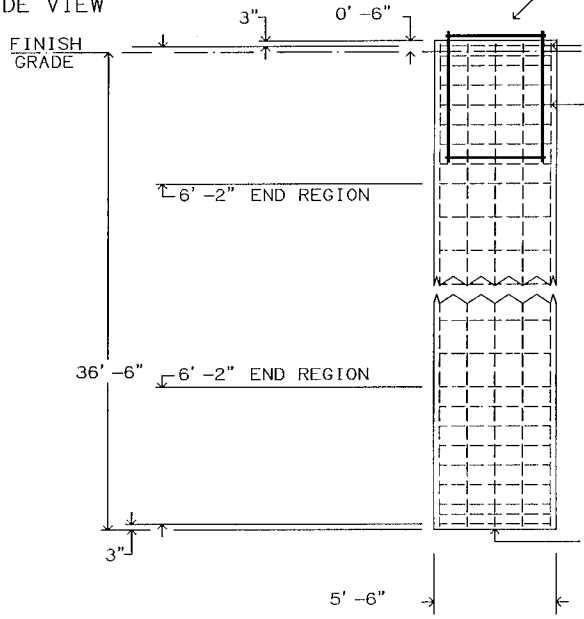


GROUTING OF MONOPOLE BASE IS OPTIONAL.
IF GROUT IS USED, DRAINAGE MUST BE
PROVIDED FROM THE INTERIOR OF POLE.

CROWN TOP OF FOUNDATION TO
FACILITATE DRAINAGE.

FOR ANCHOR STEEL IDENTIFICATION AND
PLACEMENT INFORMATION, SEE PAGE 8.
FOR BASE SECTION INSTALLATION, SEE PAGE 9

SIDE VIEW



FOR DETAIL VIEW OF REBAR CAGE
END AREA, SEE PAGE 7. (E)

5 HORIZONTAL TIES - SEE (B) ON PAGE 7.
34 PIECES REQUIRED.
PLACE RINGS AT 0'-11" NOMINAL
SPACING WITHIN END REGIONS,
AND 1'-6" NOMINAL SPACING IN
REMAINDER OF PIER.

#11 VERTICAL REBAR - SEE (A) ON PAGE 7.
26 PIECES REQUIRED , EQUALLY SPACED,
TO BE PLACED INSIDE TIES.

TOWER FOUNDATION

32.6 CUBIC YARDS CONCRETE REQUIRED

FOR INSTALLATION SPECIFICATIONS AND
ADDITIONAL INFORMATION, SEE PAGE 5
OF THIS DRAWING.

REV	DESCRIPTION OF REVISIONS	INI	DATE
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
H	REVISED FOUNDATION PER SITE CHANGE.	WBR	12/01/1998
G	REVISED SITE NAME - AUTOCAD	KWD	10/29/1998
D	REVISED FOUNDATION PER TOWER HEIGHT CHANGE	WRH	06/23/1998
C	HEIGHTH CHANGE TO MP48 X 150', NEW REACTIONS	TSD	06/23/1998
B	ADDED FOUNDATION PER SOIL REPORT.	WBR	06/19/1998

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AMTRAK
AMTRAK--WINDSOR LOCKS #CT11064, CT
MP48 X 150' FOUNDATION

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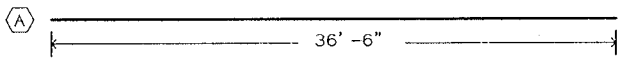
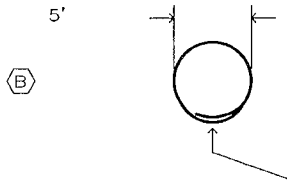
PAGE 6 OF 9



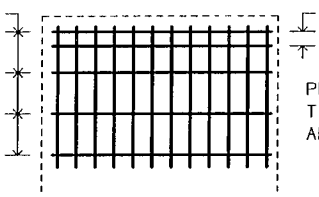
#11 REBAR - 26 PIECES REQ. TOTAL
APPROX WT = 193.9# EACH, 5041# TOTAL



5 REBAR - 34 PIECES REQUIRED TOTAL
APPROX UNBENT LENGTH = 17' -11- 1/4"
APPROX WT = 18.7# EACH, 636# TOTAL

LAP DIMENSION: 2' - 2- 3/4"
PLACE REBAR RINGS SO THAT LAPS ON ADJACENT RINGS ARE 180 DEGREES APART.
SEE PAGE 6 FOR RING PLACEMENT.

PLACE 8 CIRCULAR TIES WITHIN EACH END REGION (TOP AND BOTTOM). PLACE FIRST TIE AT END OF VERTICAL BARS AND CONTINUE SPACING AS SHOWN.
SEE PAGE 6 FOR REGION DEFINITION.



DETAIL OF REBAR CAGE END
E

PLACE AN ADDITIONAL CIRCULAR TIE 4" FROM THE END TIE (TOP AND BOTTOM) AS SHOWN.

REBAR DETAIL

TOTAL APPROX REBAR WEIGHT = 5677#
REINFORCING BAR TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS.

REV	DESCRIPTION OF REVISIONS	INI	DATE
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
H	REVISED FOUNDATION PER SITE CHANGE.	WBR	12/01/1998
G	REVISED SITE NAME - AUTOCAD	KWD	10/29/1998
D	REVISED FOUNDATION PER TOWER HEIGHT CHANGE	WRH	06/23/1998
C	HEIGHTH CHANGE TO MP48 X 150', NEW REACTIONS	TSD	06/23/1998
B	ADDED FOUNDATION PER SOIL REPORT.	WBR	06/19/1998

From: 76039.DFT - 01/07/99 09:37
Printed from: 2039777J.DWG - 01/07/1999 10:01 @ 09/10/2003 16:33

AMTRAK
AMTRAK-WINDSOR LOCKS #CT11064, CT
MP48 X 150' REBAR DETAIL

CONNECTICUT C. O. A.	PEC. 797	
APPROVED/ENG.	KWD	1/7/1999
APPROVED/FOUND.	WRH	1/7/1999
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ENG. FILE NO.	A-114828-1	
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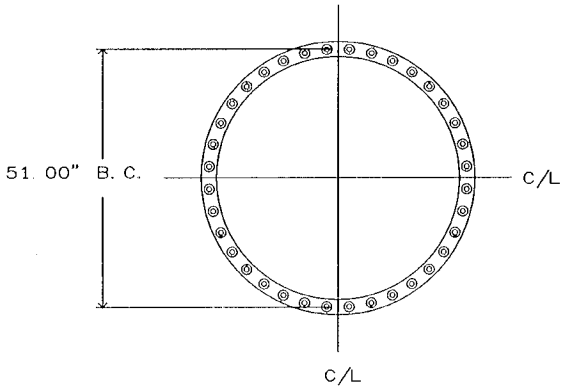
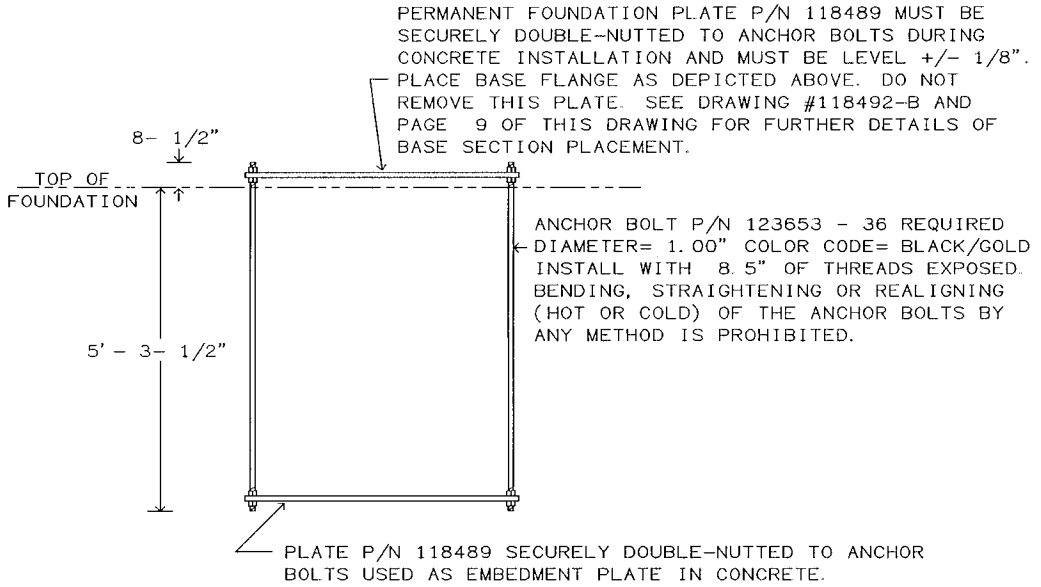
DRAWING NO. 203977-B
PAGE 7 OF 9

BASE FLANGE MUST BE CENTERED IN PIER
WITHIN +/- 10% OF PIER DIAMETER.



GROUTING OF MONOPOLE BASE IS OPTIONAL.
IF GROUT IS USED, DRAINAGE MUST BE
PROVIDED FROM THE INTERIOR OF POLE.



TOWER ANCHOR STEEL PLACEMENT

REV	DESCRIPTION OF REVISIONS	INI	DATE
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
G	REVISED SITE NAME - AUTOCAD	KWD	10/29/1998
D	REVISED FOUNDATION PER TOWER HEIGHT CHANGE	WRH	06/23/1998
B	ADDED FOUNDATION PER SOIL REPORT.	WBR	06/19/1998

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AMTRAK
AMTRAK-WINDSOR LOCKS #CT11064, CT
MP48 X 150' ANCHOR STEEL

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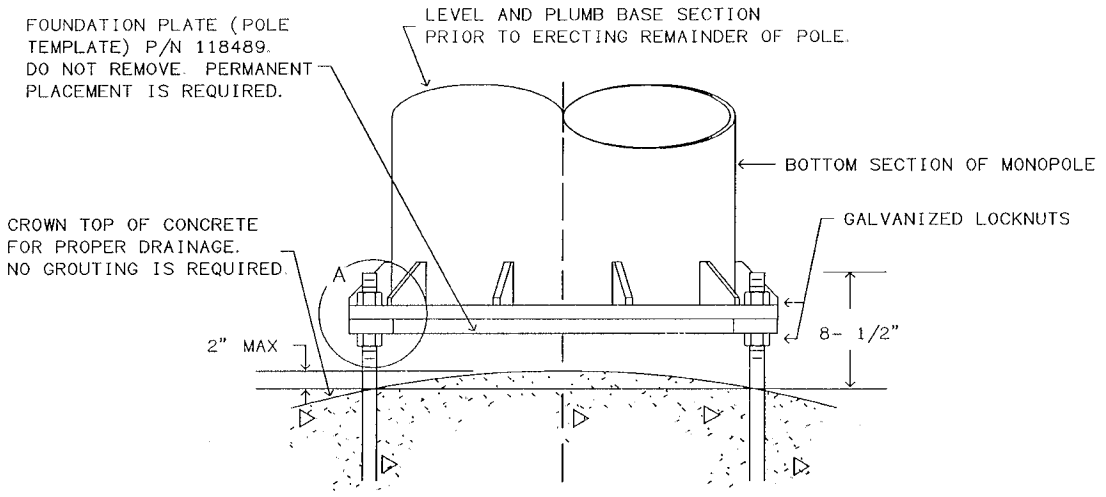
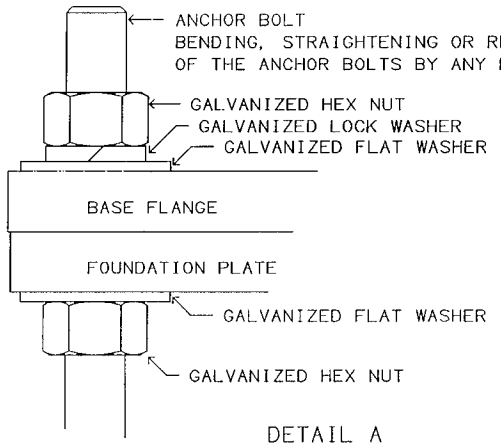
DRAWING NO. 203977-B
PAGE 8 OF 9





DETAIL A

TOWER BASE SECTION PLACEMENT

		AMTRAK	
		AMTRAK-WINDSOR LOCKS #CT11064, CT	
		MP48 X 150' BASE SECTION PLACEMENT	
J	BECAME A DASH ONE - PGS. 2, 3, 6, 7, 8 & 9	KWD	01/07/1999
G	REVISED SITE NAME - AUTOCAD	KWD	10/29/1998
D	REVISED FOUNDATION PER TOWER HEIGHT CHANGE	WRH	06/23/1998
B	ADDED FOUNDATION PER SOIL REPORT.	WBR	06/19/1998
REV	DESCRIPTION OF REVISIONS	INI	DATE

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APPROVED/FOUND.	WRH	1/7/1999	
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ENG. FILE NO.	A-114828-1	DRAWING NO.	203977-B
ARCHIVE	Q-76039	PAGE	9 OF 9

APPENDIX C

TOWER ELEVATION PHOTO

PROJECT INFORMATION:

150' SELF-SUPPORTING POLE STRUCTURE

TOWER MAPPING

PROJECT NAME:

AMTRAK-WINDSOR

SITE NUMBER:

CT11064F

**8 South Main Street,
Windsor, CT 06096
(Hartford County)**

MAPPING DATE:

1/14/2015

LATITUDE:	N 41° 54' 47.73"	N 41.913259°
LONGITUDE:	W 72° 37' 34.12"	W 72.626145°
GROUND ELEVATION (AMSL):	36'	
TOWER MANUFACTURER:	PiRod / Valmont	
TOWER MODEL OR SERIAL #:	-	
STRUCTURE HEIGHT:	154'±	
FCC REGISTRATION:	-	

TABLE OF CONTENTS

FIELD AGENTS:

Robert J. Danze

Will C. Hinkle

PLANS PREPARED FOR:

TECTONIC
Practical Solutions, Exceptional Service

36 British American Blvd
Suite 101
Latham, NY 12110
Phone: (518) 783-1630
Fax: (518) 783-1544

PLANS PREPARED BY:

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Cary, NC 27511
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Fax: (919) 321-1768
www.verticalsolutions-inc.com

REV	DATE:	Issued For:
0	1/20/2015	Tower Mapping Final Report

SIGNATURE OF CREW LEADER:

Robert Danze

VSI #: 141329

DRAWN BY: PAA

CHECKED BY: MRM

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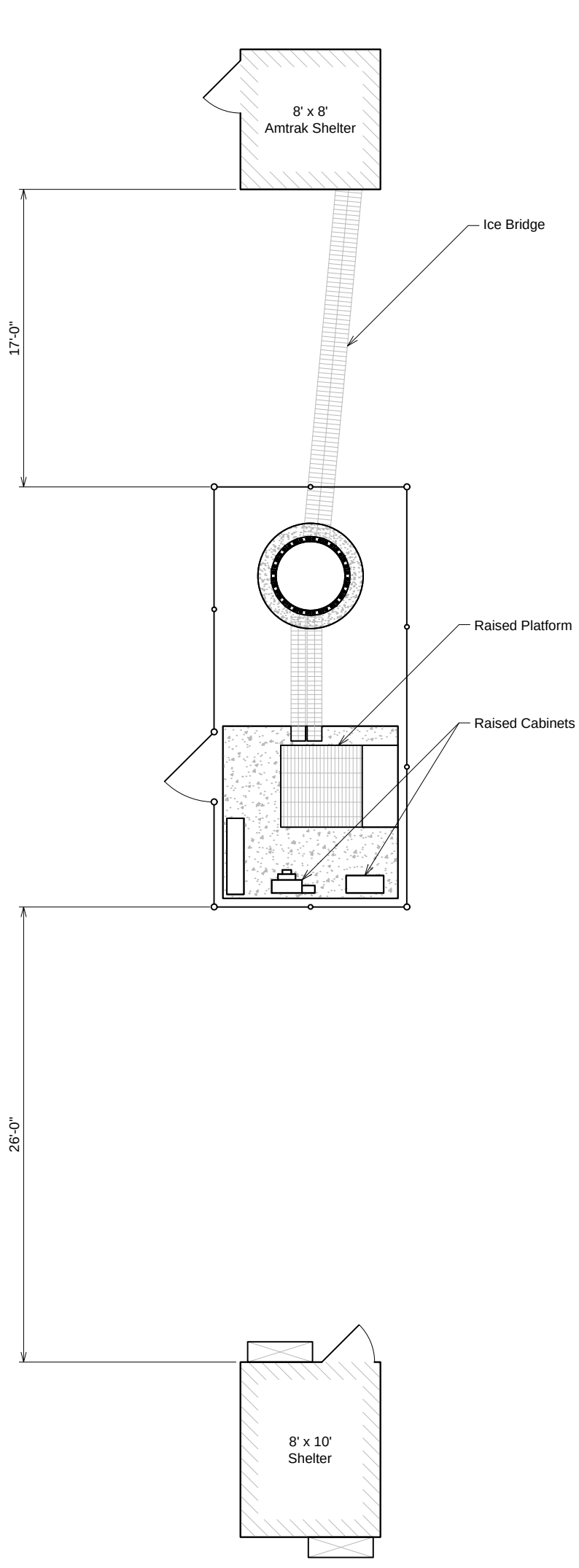
TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT
VSI # 141329
Client# CT11064F
Date 1/20/2015

COMPOUND PLAN SKETCH



Gate Combo	6678
Pedestal # & Location	-
Telephone Company	-
Power Company	-

Carrier	Site ID	Meter #
T-Mobile	CT11064F	-

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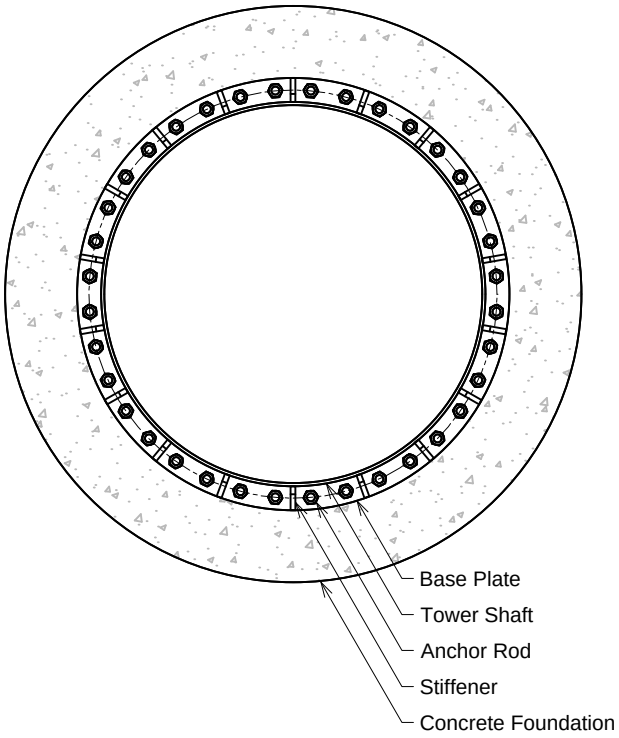
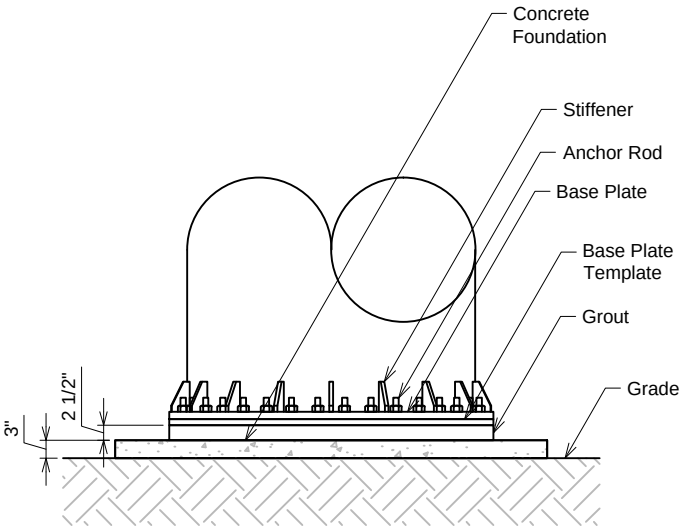
TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT
VSI # 141329
Client# CT11064F
Date 1/20/2015

BASE PLATE / TOP OF FOUNDATION DETAILS



PLAN VIEW



ELEVATION

Anchor Rod Information		
Qty.	**Size**	**Bolt Circle**
36	1" Ø	51"

Base Plate Information		Base Plate Template Information		Stiffener
Dimensions	**Thickness**	**Dimensions**	**Thickness**	**Dimensions**
4'-6"Ø ±	1 1/4"	4'-6"Ø ±	1"	See Page 4

Foundation Information	
Dimensions	**Projection Above Ground**
6'Ø ±	3"

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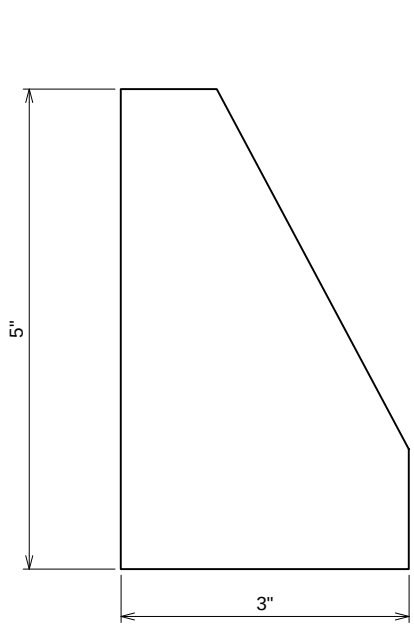
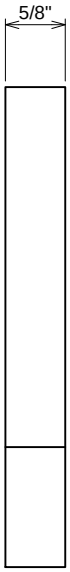
STIFFENER DETAIL



PLAN VIEW



ELEVATION

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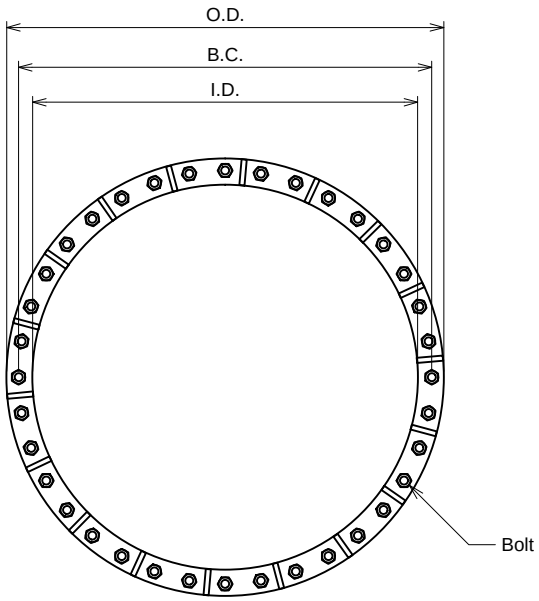
TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT
VSI # 141329
Client# CT11064F
Date 1/20/2015

FLANGE DETAILS

- Note any as-built conditions not depicted in drawings.



PLAN VIEW

					Bolts		
Section #	O.D.	I.D.	B.C.	Thickness	Qty	Size	Stiffener Qty
Bottom #1	54"	48"	51"	1 1/4"	36	1"Ø	18
Top #1	48"	-	45"	1 1/4"	32	1"Ø	-
Bottom #2	48"	42"	45"	1 1/4"	32	1"Ø	16
Top #2	42"	-	39"	1 1/4"	28	1"Ø	-
Bottom #3	42"	36"	39"	1 1/4"	28	1"Ø	14
Top #3	36"	-	33"	1 1/4"	24	1"Ø	-
Bottom #4	36"	-	33"	1 1/4"	24	1"Ø	12
Top #4	-	-	27"	1 1/4"	20	1"Ø	-
Bottom #5	-	24"	27"	1 1/4"	20	1"Ø	10
Top #5	24"	-	-	1 1/4"	16	1"Ø	-
Bottom #6	24"	-	-	1 1/4"	16	1"Ø	16
Top #6	-	-	-	1 1/4"	10	1"Ø	-
Bottom #7	-	-	-	1 1/4"	10	1"Ø	5
Top #7	-	-	-	1 1/4"	D.N.R	D.N.R	5

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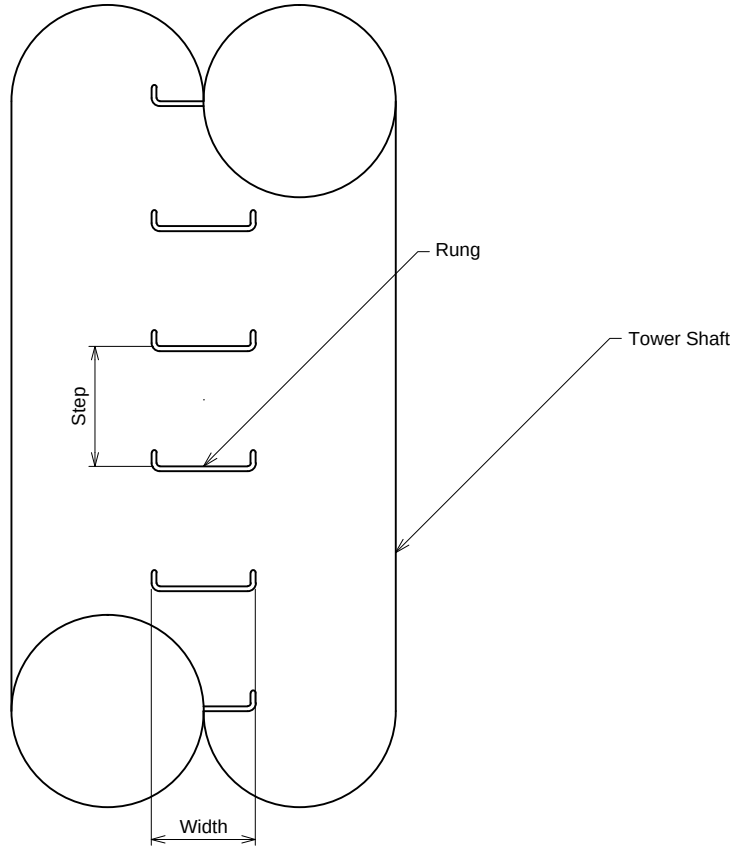
LADDER

Climbing Ladder Sketch



Ladder #	Flats #	Height	Width	Step	Rung	Safety Wire
1	N/A Round	10'- 6"	13"	15"	SR 5/8"Ø	3/8"Ø Stranded

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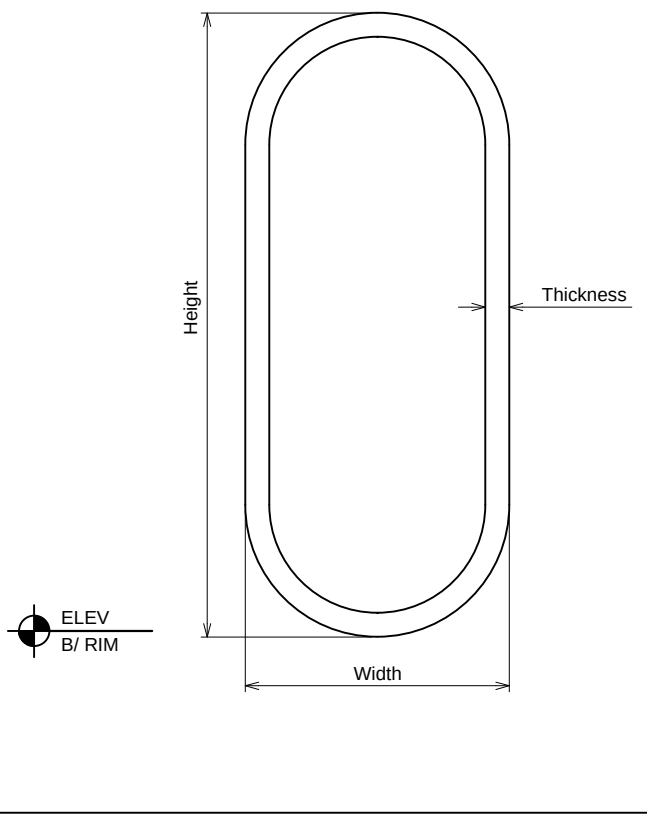
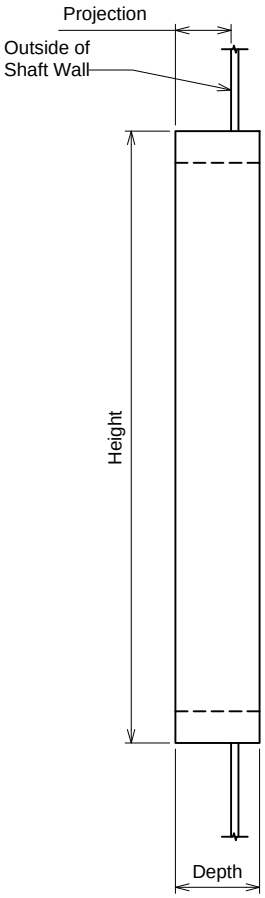
HAND HOLE RIMS

Front Elevation



Side Elevation



#	Elevation	Width	Height	Thickness	Depth	Projection	Cardinal Direction	Description
1	16"	13"	26"	-	-	4"	E	Covered
2	16"	13"	26"	1"	6"	4"	S	-
3	7'	13"	26"	1"	6"	4"	N	-

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HAND HOLE RIMS

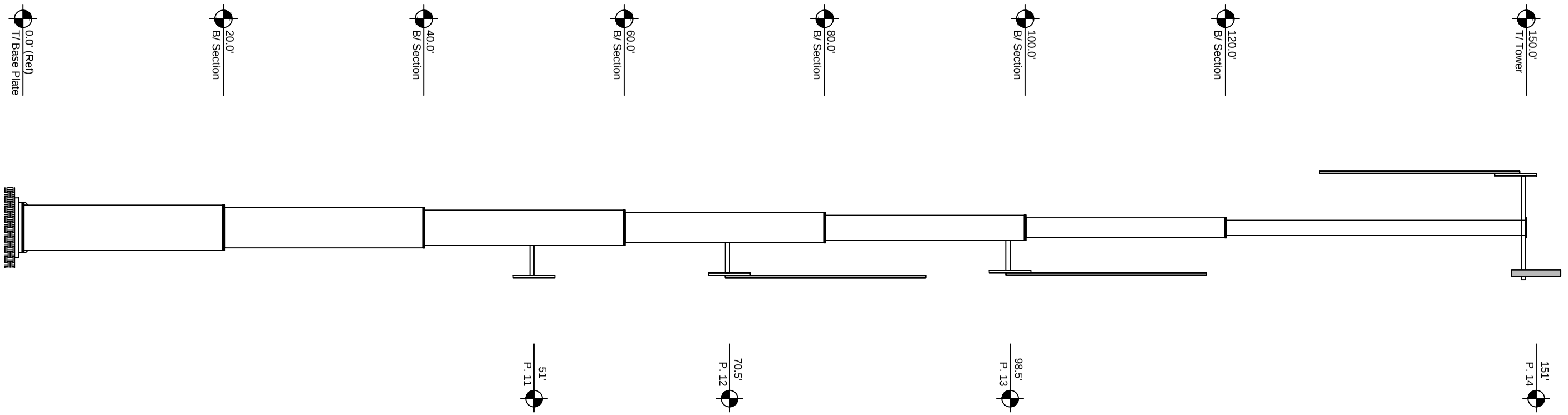
Front Elevation

Side Elevation

#	Elevation	Width	Height	Thickness	Depth	Projection	Cardinal Direction	Description
4	59.5'	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
5	69.5'	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
6	97.5'	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
7-9	106'- 9"	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
10-12	107'- 9"	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
13-15	126'- 9"	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
16-18	127'- 9"	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
19-21	147'- 4"	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-
22-24	148'- 4"	4"	6" / 9"	1/4"	3" / 8"	1" / 5"	NE, SE, SW	-

STRUCTURE

SECTION	01	02	03	04	05	06	07
LENGTH	20'	20'	20'	20'	20'	20'	30'
PiROD PN	126060	126059	126058	126057	126056	126055	1266194
NUMBER OF SIDES	ROUND	ROUND	ROUND	ROUND	ROUND	ROUND	ROUND
DIAMETER	48"	42"	36"	30"	24"	18"	12"
THICKNESS	0.375"	0.375"	0.375"	0.375"	0.375"	0.375"	0.375"
FLANGE BOLTS	-	(32) 1"Ø	(28) 1"Ø	(24) 1"Ø	(20) 1"Ø	(16) 1"Ø	(10) 1"Ø
ANCHOR RODS	(36) 1"Ø	-	-	-	-	-	-

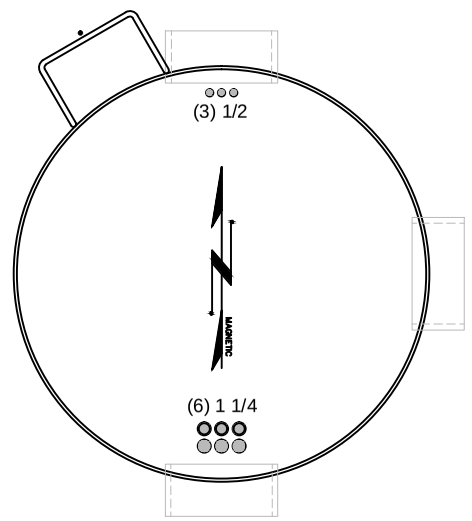


APPURTENANCES

ELEV.	CARRIER	MOUNT	EQUIPMENT				FEEDLINES	
			QTY.	ANTENNA TYPE	DIMENSIONS	AZIMUTH (±)	QTY.	SIZE
151'	T-Mobile	10'- 6" Low Profile Platform	3	EMS RR901702DP	59" x 8" x 2.8"	85°, 205°, 325°	6	1 1/4
			3	RFS / TMA	14" x 14" x 2"		1	1/2
			1	Inverted Omni	20'			
98.5'	Amtrack	6' Side Arm	1	Omni	20'	N/A	1	1/2
70.5'	Amtrack	6' Side Arm	1	Omni	20'	N/A	1	1/2
51'	Amtrack	6' Side Arm	1	Empty Mount	N/A	N/A	-	-

X
P. Y

NOTES:
1. X DENOTES APPURTENANCE HEIGHT IN FT. (REF. BASE PLATE)
   Y DENOTES PAGE NUMBER OF MAPPING REPORT TO REFER TO FOR MORE DETAIL.



PLAN VIEW
SCALE: N.T.S

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TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT

VSI # 141329

Client# CT11064F

Date 1/20/2015

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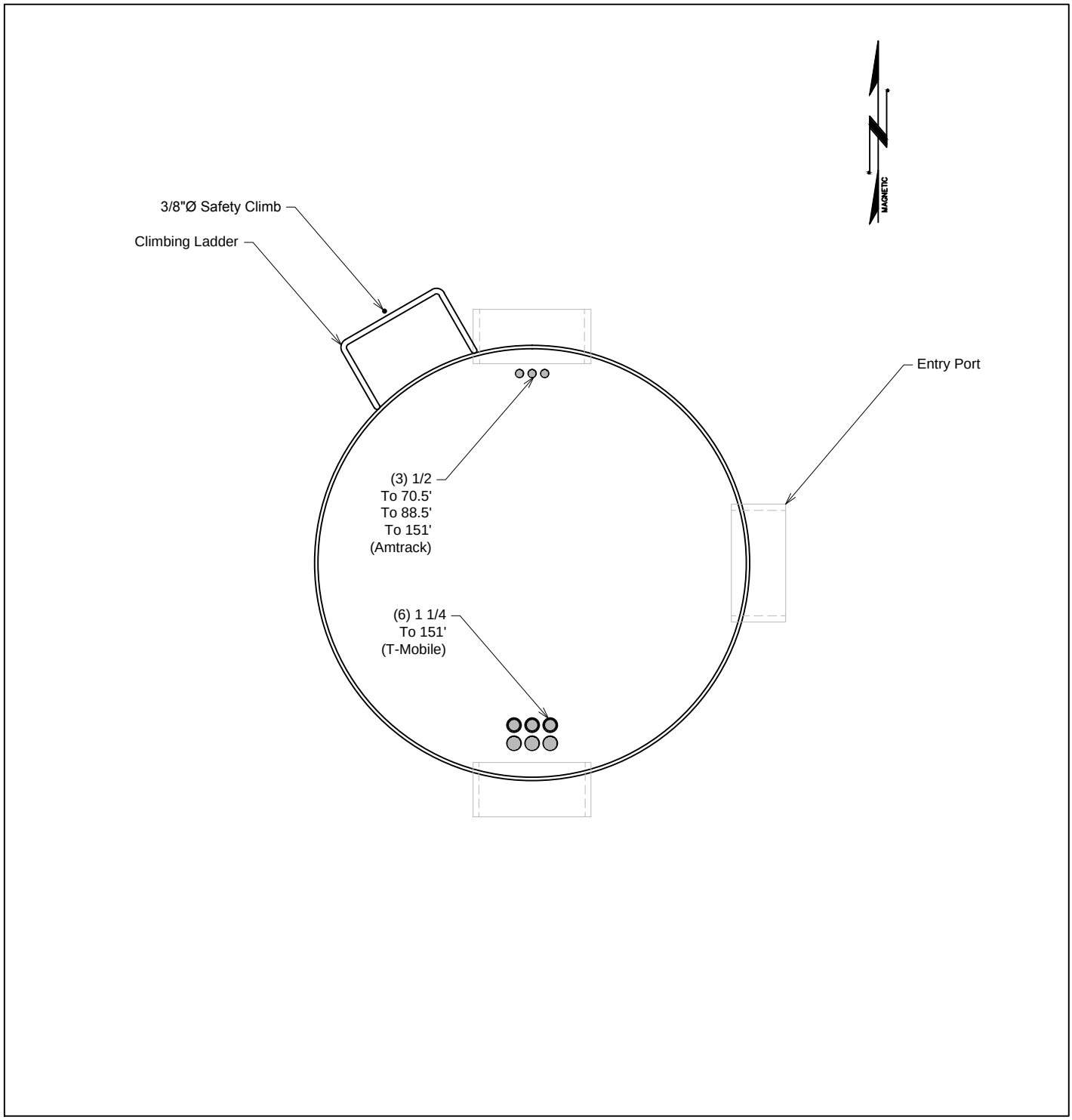
FEEDLINES



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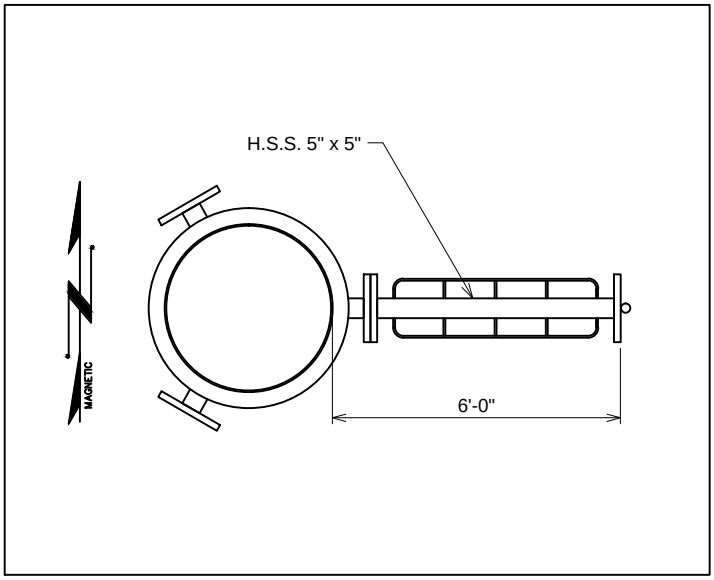
TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT
VSI # 141329
Client# CT11064F
Date 1/20/2015

ANTENNA AND MOUNT

Photo From Ground

Photo From Tower



Plan View

Elevation	Carrier	Mount Type	Leg
51'	N/A	6' Side Arm	N/A

Appurtenances			Feedlines	
Type	Dimensions	Azimuth ±	Quantity	Size
Empty Mount	-	90°	-	-

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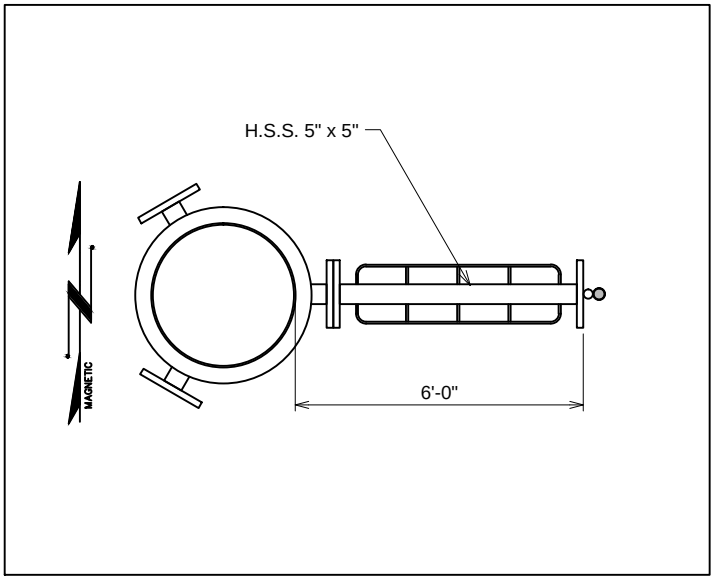
TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT
VSI # 141329
Client# CT11064F
Date 1/20/2015

ANTENNA AND MOUNT

Photo From Ground

Photo From Tower



Plan View

Elevation	Carrier	Mount Type	Leg
70.5'	Amtrack	6' Side Arm	N/A

Appurtenances			Feedlines	
Type	Dimensions	Azimuth ±	Quantity	Size
Omni	20'	N/A	1	1/2

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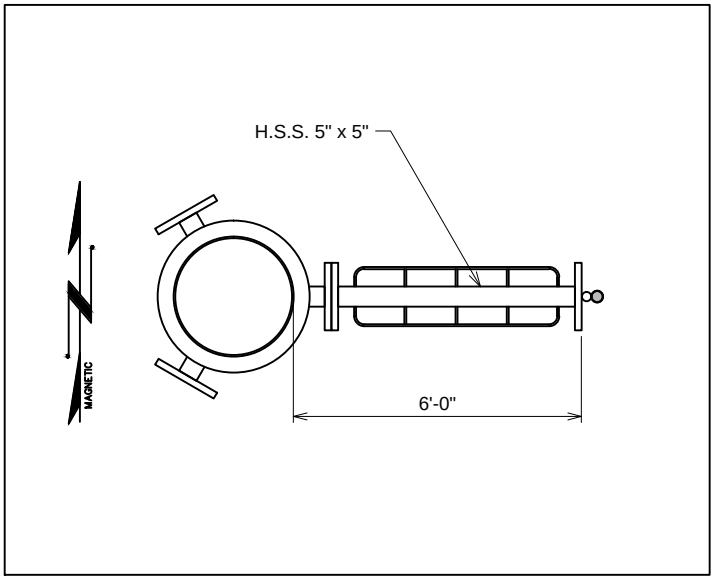
TOWER MAPPING REPORT

Site Name Amtrak-Windsor_CT
VSI # 141329
Client# CT11064F
Date 1/20/2015

ANTENNA AND MOUNT

Photo From Ground

Photo From Tower



Plan View

Elevation	Carrier	Mount Type	Leg
98.5'	Amtrack	6' Side Arm	N/A

Appurtenances			Feedlines	
Type	Dimensions	Azimuth ±	Quantity	Size
Omni	20'	N/A	1	1/2

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TOWER MAPPING REPORT

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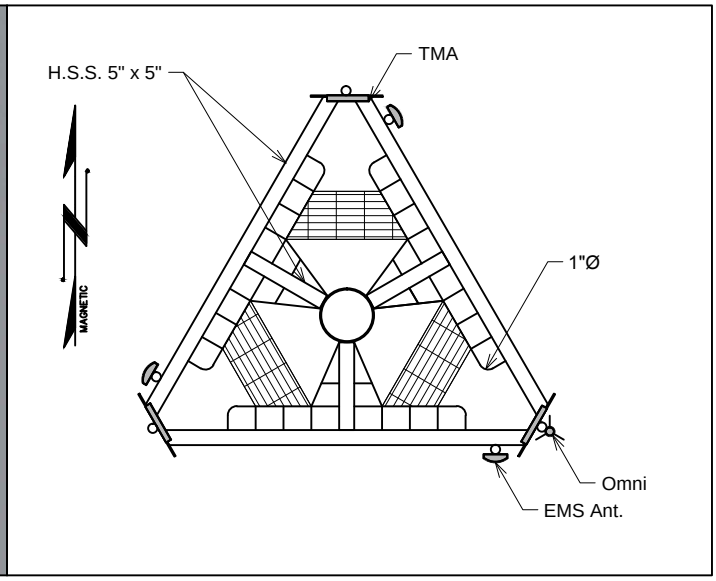
Client# CT11064F
Date 1/20/2015

ANTENNA AND MOUNT

Photo From Ground

Photo From Tower

Antenna Label



Plan View

Elevation	Carrier	Mount Type	Leg
151'	T-Mobile	10'- 6" Low Profile Platform	N/A

Appurtenances			Feedlines	
Type	Dimensions	Azimuth ±	Quantity	Size
(3) EMS RR901702DP	59" x 8" x 2.8"	85°, 205°, 325°	1	1/2
(3) RFS TMA	14" x 14" x 2"		6	1 1/4
(1) Inverted Omni	20'			

APPENDIX D

2016 CONNECTICUT BUILDING CODE – CHAPTER 16

(Amd) **1609.3 Basic wind speed.** The ultimate design wind speed, V_{ult}, in mph, for the determination of the wind loads shall be determined by Appendix N.

(APPENDIX N) MUNICIPALITY - SPECIFIC STRUCTURAL DESIGN PARAMETERS

Municipality	Ground Snow Load	MCE Spectral Accelerations (%g)		Wind Design Parameters: Ultimate Design Wind Speeds, V_{ult} (mph)			Nominal Design Wind Speeds, V_{asd} (mph)			Wind-Borne Debris Regions[1]		Hurricane-Prone Regions
		S_s	S_1	Risk Cat.I	Risk Cat.II	Risk Cat III-IV	Risk Cat. I	Risk Cat. II	Risk Cat. III-IV	Risk Cat. II & III except Occup I-2	Risk Cat III Occup I-2 & Risk Cat. IV	
Hamden	30	0.185	0.063	115	125	135	89	97	105			Yes
Hampton	35	0.172	0.062	120	130	140	93	101	108			Yes
Hartford	30	0.181	0.064	115	125	135	89	97	105			Yes
Hartland	40	0.175	0.065	110	120	125	85	93	97			Yes
Harwinton	35	0.183	0.065	110	120	130	85	93	101			Yes
Hebron	30	0.177	0.063	120	130	140	93	101	108			Yes

T-Mobile

NORTHEAST LLC.

SITE NAME: AMTRAK - WINDSOR LOCKS

SITE ID NUMBER: CT11064F

SITE ADDRESS: 225 S MAIN STREET/AMTRAK STATION, WINDSOR LOCKS, CT 06096

AMTRAK FILE NO.: 626.32

WORK CATEGORY: ANTENNA REPLACEMENT AND TMA ADDITION

PROJECT SUMMARY

SITE NUMBER:	CT11064F
AMTRAK FILE #:	626.32
MILEPOST:	47
SITE NAME:	AMTRAK-WINDSOR LOCKS
SITE ADDRESS:	225 S MAIN STREET/AMTRAK STATION, WINDSOR LOCKS, CT 06096
COUNTY:	HARTFORD
PROPERTY OWNER:	AMTRAK (NATIONAL RAILROAD PASSENGER CORPORATION)
APPLICANT:	T-MOBILE NORTHEAST, LLC. 4 SYLVAN WAY PARSIPPANY, NJ 07054 (914) 696-5243
CONTACT: PHONE:	ANDREW STROCK (215) 917-9950
ENGINEER/ SURVEYOR/ STRUCTURAL ENG:	TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C. 1279 ROUTE 300 NEWBURGH, NY 12550
CONTACT: PHONE:	MIKE PATEL (845) 567-6656 EXT. 2808
LATITUDE: (NAD 83)	41.9133
LONGITUDE: (NAD 83)	-72.626219

SITE DIRECTIONS

HEAD NORTHWEST ON SYLVAN WAY. TURN RIGHT ONTO US-202 N. CONTINUE ONTO LITTLETON ROAD AND TAKE THE RAMP ONTO I-287 N. TAKE THE I-87 S/I-287/NEW YORK THRUWAY EXIT TOWARD TAPPAN ZEE BR/NYC. MERGE ONTO I-287 E/I-87 S. KEEP LEFT AT THE FORK TO CONTINUE ON I-287 E AND FOLLOW SIGNS FOR WHITE PLAINS/RYE. TAKE EXIT 9N-9S FOR HUTCHINSON PKWY TOWARD WHITESTONE BRIDGE/ MERRITT PKWY. MERGE ONTO WESTCHESTER AVE. TAKE THE HUTCHINSON PKWY N RAMP TO MERRITT PKWY. KEEP RIGHT AT THE FORK TO STAY ON HUTCHINSON RIVER PKWY N. CONTINUE ONTO CT-15 N AND KEEP LEFT. TAKE EXIT 68 N-E TO MERGE ONTO I-91 N TOWARD CT-66 E/HARTFORD/MIDDLETOWN. TAKE EXIT 42 FOR CT-159 TOWARD WINDSOR LOCKS. TURN LEFT ONTO LAWNACRE ROAD THEN CONTINUE ONTO S MAIN ST. THE DESTINATION WILL BE ON THE RIGHT.

SHEET INDEX

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T-2	NOTES	1
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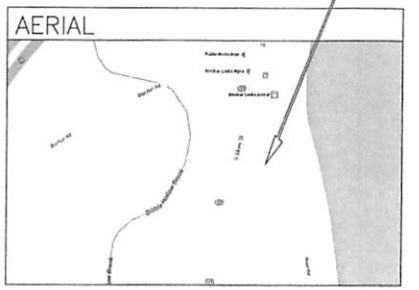
A-5	WIRING DIAGRAMS	1
A-6	SPECIFICATIONS	1

LOCATION MAP

SCALE: NTS

AERIAL



APPROXIMATE LOCATION OF EXIST T-MOBILE SITE

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

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TECTONIC Engineering & Surveying Consultants P.C.

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PROJECT NUMBER	DESIGNED BY
7421.CT11064F	MP

REV	DATE	REVISION	DRAWN BY
2	5/12/17	FOR COMMENT	BW
1	6/8/17	PER COMMENTS	JT

ISSUED BY	DATE
DSF	6/8/2017

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

SITE INFORMATION

CT11064F
AMTRAK-WINDSOR LOCKS
225 S MAIN STREET/
AMTRAK STATION,
WINDSOR LOCKS, CT
06096

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES

1. ALL APPLICABLE PERMITS MUST BE OBTAINED AND INSURANCE REQUIREMENTS MUST BE MET PRIOR TO CONSTRUCTION.
2. THESE PROJECT DRAWINGS ARE IN ACCORDANCE WITH AMTRAK STANDARDS AND ENGINEERING PRACTICES. PRIOR TO ENTERING AMTRAK'S PROPERTY, THE CONTRACTOR MUST NOTIFY PAUL DUBUQUE (401) 413-9881.
3. T-MOBILE IS RESPONSIBLE FOR ALL COSTS AND EXPENSES INCURRED BY ANY PARTY IN ASSOCIATION WITH THIS PROJECT. ALL WORK ASSOCIATED WITH THIS PROJECT WILL BE PERFORMED AT T-MOBILE'S SOLE EXPENSE. THIS INCLUDES 1) AMTRAK'S SAFETY ORIENTATION CLASS, 2) WIRE AND TRACK OUTAGES DURING CONSTRUCTION, 3) MODIFICATIONS TO THE CATENARY AND TRANSMISSION SYSTEMS IF REQUIRED, 4) MODIFICATIONS TO CATENARY POLE GUY WIRE ANCHORS IF REQUIRED.
4. UPGRADE OF EXISTING T-MOBILE TELECOMMUNICATIONS FACILITY. THE PROPOSED T-MOBILE PLANNED WORK INVOLVES THE ADDITION OF THREE (3) TMAs AND THE REPLACEMENT OF THREE (3) ANTENNAS ON THE EXISTING ANTENNA MOUNTING PIPES. NO DIGGING OR SOIL DISTURBANCE WILL OCCUR DURING THE PROJECT. NO MODIFICATIONS TO THE CATENARY AND TRANSMISSION SYSTEMS ARE REQUIRED TO ACCOMMODATE THIS PROJECT.
5. IF MODIFICATIONS TO THE CATENARY AND TRANSMISSION SYSTEMS ARE REQUIRED TO ACCOMMODATE THIS PROJECT A QUALIFIED ELECTRICAL CONSULTANT MUST BE RETAINED TO PERFORM THIS DESIGN.
6. THESE PROJECT DRAWINGS ARE IN COMPLIANCE WITH AED-1; AED-2; CE-4; EP3005-020B1A & EP3014-01141A.
7. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE AMTRAK-APPROVED PROJECT DRAWINGS, STATEMENTS OF WORK, PLANS AND SCHEDULES AND ALL OTHER AMTRAK REQUIREMENTS.
8. NO WORK MAY BE PERFORMED UNTIL AMTRAK ENGINEERING HAS APPROVED T-MOBILE'S SITE/JOB SPECIFIC SAFETY WORK PLAN (SSSWP) AND HAZARD ASSESSMENT FOR THE PROJECT.
9. ONCE AMTRAK APPROVES AN APPLICATION AND THE LICENSE AGREEMENT ISSUED, NO VARIANCE FROM THE PLANS, SPECIFICATIONS, METHODS OF CONSTRUCTION, ETC WILL BE CONSIDERED OR PERMITTED WITHOUT RESUBMISSION OF PLANS TO AND RECEIPT OF APPROVAL FROM AMTRAK

CONTRACTOR OPERATIONS AND SAFETY COORDINATION NOTES

1. BEFORE ENTRY OF PERMITTEE AND/OR CONTRACTORS ONTO RAILROAD'S PROPERTY, A PRE-ENTRY MEETING SHALL BE HELD WITH THE AMTRAK RAILROAD PROTECTION PERSONNEL.
2. CONTRACTORS SHALL CONDUCT THEIR OPERATIONS IN COMPLIANCE WITH ALL RULES, REGULATIONS, AND REQUIREMENTS OF RAILROAD WITH RESPECT TO ANY WORK PERFORMED ON, OVER, UNDER, WITHIN OR ADJACENT TO RAILROAD'S PROPERTY. CONTRACTORS SHALL BE RESPONSIBLE FOR ACQUAINTING THEMSELVES WITH SUCH RULES, REGULATIONS AND REQUIREMENTS. ANY VIOLATION OF RAILROAD'S SAFETY RULES, REGULATIONS, OR REQUIREMENTS SHALL BE GROUNDS FOR THE IMMEDIATE SUSPENSION OF THE CONTRACTOR WORK, AND THE RE-TRAINING OF ALL PERSONNEL, AT THE CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL KEEP RAILROAD'S PROPERTY CLEAR OF ALL REFUSE AND DEBRIS FROM ITS OPERATIONS. UPON COMPLETION OF THE WORK, THE CONTRACTOR MUST REMOVE ALL MACHINERY, EQUIPMENT, SURPLUS MATERIALS, FALSE WORK, RUBBISH, TEMPORARY STRUCTURES, AND OTHER ITEMS BELONGING TO THE CONTRACTOR FROM RAILROAD'S PROPERTY.
4. IF TRACKS OR OTHER PROPERTY OF RAILROAD ARE ENDANGERED DURING THE WORK, THE CONTRACTOR SHALL IMMEDIATELY TAKE SUCH STEPS AS MAY BE DIRECTED BY RAILROAD TO RESTORE SAFE CONDITIONS, AND UPON FAILURE OF THE CONTRACTOR TO IMMEDIATELY CARRY OUT SUCH DIRECTION, RAILROAD MAY TAKE WHATEVER STEPS ARE REASONABLY NECESSARY TO RESTORE SAFE CONDITIONS. ALL COSTS AND EXPENSES OF RESTORING SAFE CONDITIONS, AND OF REPAIRING ANY DAMAGE TO RAILROAD'S TRAINS, TRACKS, RIGHT-OF-WAY OR OTHER PROPERTY CAUSED BY THE OPERATIONS OF CONTRACTORS, SHALL BE PAID BY CONTRACTOR.
5. WHENEVER WORK IS PERFORMED IN THE VICINITY OF ELECTRIFIED TRACKS AND/OR HIGH VOLTAGE WIRES, PARTICULAR CARE MUST BE EXERCISED, AND RAILROAD'S REQUIREMENTS REGARDING CLEARANCE TO BE MAINTAINED BETWEEN EQUIPMENT AND TRACKS AND/OR ENERGIZED WIRES, AND OTHERWISE REGARDING WORK IN THE VICINITY OF ELECTRIFIED TRACKS, MUST BE STRICTLY OBSERVED. NO EMPLOYEES OR EQUIPMENT WILL BE PERMITTED TO WORK NEAR OVERHEAD WIRES, EXCEPT WHEN PROTECTED BY A CLASS "A" EMPLOYEE OF THE RAILROAD. THE CONTRACTORS MUST SUPPLY AN ADEQUATE LENGTH OF GROUNDING CABLE (4/0 COPPER WITH APPROVED CLAMPS) FOR EACH PIECE OF EQUIPMENT WORKING NEAR OR ADJACENT TO ANY OVERHEAD WIRE.
6. NO WORK WILL BE PERMITTED WITHIN TWENTY-FIVE (25) FEET OF THE CENTERLINE OF TRACK OR THE ENERGIZED WIRE OR HAVE POTENTIAL OF GETTING WITHIN TWENTY-FIVE (25) FEET OF TRACK WIRE WITHOUT THE APPROVAL OF THE CHIEF ENGINEER'S REPRESENTATIVE. CONTRACTORS SHALL CONDUCT THEIR WORK SO THAT NO PART OF ANY EQUIPMENT OR MATERIAL SHALL FOUL AN ACTIVE TRACK OR OVERHEAD WIRE WITHOUT THE WRITTEN PERMISSION OF THE CHIEF ENGINEER'S REPRESENTATIVE. ANY EQUIPMENT SHALL BE CONSIDERED TO BE FOULING A TRACK OR OVERHEAD WIRE WHEN LOCATED (A) WITHIN FIFTEEN (15) FEET FROM THE CENTERLINE OF THE TRACK OR WITHIN FIFTEEN (15) FEET FROM THE WIRE, OR (B) IN SUCH A POSITION THAT FAILURE OF SAME, WITH OR WITHOUT A LOAD, WOULD BRING IT WITHIN FIFTEEN (15) FEET FROM THE CENTERLINE OF THE TRACK OR WITHIN FIFTEEN (15) FEET FROM THE WIRE AND REQUIRES THE PRESENCE OF THE PROPER RAILROAD PROTECTION PERSONNEL.
7. DURING CONSTRUCTION, JACKING, BORING OR TUNNELING, TRENCHES SHALL BE FENCED, LIGHTED AND OTHERWISE PROTECTED AS DIRECTED BY AMTRAK DESIGNATED FIELD REPRESENTATIVE.
8. CONTRACTORS SHALL SCHEDULE ALL WORK TO BE PERFORMED IN SUCH A MANNER AS NOT TO INTERFERE WITH RAILROAD OPERATIONS. CONTRACTORS SHALL USE ALL NECESSARY CARE AND PRECAUTION TO AVOID ACCIDENTS, DELAY OR INTERFERENCE WITH RAILROAD'S PROPERTY.
9. THROUGHOUT ALL PHASES OF THE PROJECT (INCLUDING DURING PREPARATION FOR CONSTRUCTION OR INSTALLATION ACTIVITIES, DURING CONSTRUCTION OR INSTALLATION ACTIVITIES, AND, DURING CLEAN UP) ACCESS ROADS, ROUTES OR PATHS TO OR ALONG AMTRAK'S RIGHTS-OF-WAY SHALL REMAIN UNOBSTRUCTED AND IF ANY OBSTRUCTION EXISTS IT SHALL NOT BE EXACERBATED.
10. ALL EQUIPMENT TO BE USED IN THE VICINITY OF OPERATING TRACKS SHALL BE IN "CERTIFIED" FIRST-CLASS CONDITION SO AS TO PREVENT FAILURES THAT MIGHT CAUSE DAMAGE TO RAILROAD'S PROPERTY. NO EQUIPMENT SHALL BE PLACED OR PUT INTO OPERATION NEAR OR ADJACENT TO OPERATING TRACKS AND UNDER NO CIRCUMSTANCES SHALL ANY EQUIPMENT OR MATERIALS BE PLACED OR STORED WITHIN TWENTY-FIVE (25) FEET FROM THE CENTERLINE OF AN OUTSIDE TRACK, EXCEPT AS APPROVED BY THE SITE SPECIFIC SAFETY WORK PLAN. TO INSURE COMPLIANCE WITH THIS REQUIREMENT, CONTRACTORS MUST ESTABLISH A TWENTY-FIVE (25) FOOT FOUL LINE PRIOR TO THE START OF WORK BY TAPING OFF THE AREA.
11. NO MATERIAL OR EQUIPMENT SHALL BE STORED ON RAILROAD'S PROPERTY UNLESS APPROVED BY THE SITE SPECIFIC SAFETY WORK PLAN. ANY SUCH STORAGE WILL BE ON THE CONDITION THAT RAILROAD WILL NOT BE LIABLE FOR LOSS OF OR DAMAGE TO SUCH MATERIALS OR EQUIPMENT FROM ANY CAUSE.
12. PRIOR TO ENTERING ONTO AMTRAK'S PROPERTY, EACH EMPLOYEE OF T-MOBILE AND/OR ITS CONTRACTORS THAT IS TO ENTER ONTO AMTRAK'S PROPERTY WITHIN THE 12 MONTH PERIOD PRIOR TO ENTERING ONTO AMTRAK'S PROPERTY, EACH SHALL HAVE COMPLETED AMTRAK'S SAFETY ORIENTATION CLASS. WHILE ON AMTRAK'S PROPERTY, EACH SHALL BE IN POSSESSION OF A VALID, CURRENT AMTRAK SAFETY TRAINING BADGE AND WHILE ON AMTRAK'S PROPERTY, EACH SHALL FOLLOW ALL SAFETY RULES AND PROCEDURES AS DIRECTED BY AMTRAK (INCLUDING AMTRAK'S ON-SITE REPRESENTATIVE).
13. PRIOR TO COMMENCING WORK, T-MOBILE AND/OR ITS CONTRACTORS WILL LOCATE UNDERGROUND UTILITIES AND ANY OTHER FACILITIES (BELONGING TO AMTRAK AND/OR ANY OTHER PARTY. THROUGHOUT THE ENTIRE PROJECT, INCLUDING ALL PHASES OF CONSTRUCTION, EXCAVATION, TRENCHING, AND/OR BORING ACTIVITIES; T-MOBILE AND/OR ITS CONTRACTOR WILL PROTECT ALL SUCH UNDERGROUND UTILITIES AND OTHER FACILITIES. AMTRAK IS NOT A PART OF THE ONE-CALL SYSTEM AND, THEREFORE, T-MOBILE AND/OR ITS CONTRACTORS MUST WORK DIRECTLY WITH AMTRAK TO IDENTIFY AMTRAK'S BURIED UTILITIES AND FACILITIES.
14. T-MOBILE AND/OR ITS CONTRACTOR IS RESPONSIBLE FOR MAKING THE ONE-CALL. AMTRAK IS NOT PART OF THE ONE-CALL SYSTEM AND THEREFORE AMTRAK UTILITIES AND FACILITIES WILL NOT BE LOCATED OR PROTECTED THROUGH THE ONE-CALL SYSTEM. INSTEAD, T-MOBILE AND/OR ITS CONTRACTOR MUST WORK WITH AMTRAK TO IDENTIFY AND PROTECT ALL BURIED UTILITIES AND FACILITIES. T-MOBILE AND/OR ITS CONTRACTOR MUST IDENTIFY AND PROTECT ALL BURIED UTILITIES AND FACILITIES THROUGHOUT THE ENTIRE PROJECT, INCLUDING ALL PHASES OF CONSTRUCTION, EXCAVATION, TRENCHING AND/OR BORING ACTIVITIES.
15. NO CONSTRUCTION, EXCAVATION, TRENCHING AND/OR BORING ACTIVITIES MAY BE PERFORMED IN CLOSE PROXIMITY TO THE AMTRAK DUCT LINE UNLESS MONITORED BY ON-SITE AMTRAK COMMUNICATIONS AND SIGNAL DEPARTMENT PERSONNEL. HAND DIGGING MAY BE REQUIRED, AS DIRECTED BY AMTRAK THROUGH THE ON-SITE AMTRAK COMMUNICATIONS AND SIGNAL SUPPORT PERSONNEL OR OTHERWISE.
16. EQUIPMENT OR PERSONNEL WORKING CLOSER THAN 15 FEET TO THE CENTERLINE OF AN ADJACENT TRACK SHALL BE CONSIDERED AS FOULING THAT TRACK. INSOFAR AS POSSIBLE, ALL OPERATIONS SHALL BE CONDUCTED NO LESS THAN THIS DISTANCE. OPERATIONS CLOSER THAN 15' TO THE CENTERLINE OF A TRACK SHALL BE CONDUCTED ONLY WITH THE PERMISSION OF, AND AS DIRECTED BY A DULY QUALIFIED AMTRAK EMPLOYEE PRESENT AT THE WORKSITE. SPECIAL ARRANGEMENTS MUST BE MADE AT LEAST 21 WORKING DAYS IN ADVANCE OF THE WORK, WHERE FOULING OF TRACK OR STRUCTURES IS REQUIRED FOR ACCESS. THESE OPERATIONS REQUIRE THE PRIOR APPROVAL OF AMTRAK. CROSSING OF TRACKS AT GRADE BY EQUIPMENT AND PERSONNEL IS PROHIBITED, EXCEPT BY PRIOR ARRANGEMENT WITH, AND AS DIRECTED BY AMTRAK.

LIFT NOTES:

1. THE LIFT PLANS AND THE SOW OUTLINE A COMPLETE PROCEDURE, TIME SCHEDULE, THE ORDER OF LIFTS AND A MANEUVERING ENVELOPE REFLECTING THE AREA ALLOWED FOR THE EQUIPMENT TO REPOSITION IF DESIRED IS INCLUDED.
2. THIS LIFT PLAN IS IN COMPLIANCE WITH SECTION 01142A OF EP-3014 AND THE DOCUMENT CAPTIONED "AMTRAK ELECTRIFIED TERRITORY EQUIPMENT BONDING AND GROUNDING", ATTACHED TO THE SOW. THE CONTRACTOR AND THE OPERATOR ARE RESPONSIBLE FOR ADHERENCE TO ALL BONDING AND GROUNDING REQUIREMENTS. SUBSTITUTIONS TO THE MATERIALS LISTED ARE PROHIBITED
3. UNLESS OTHERWISE APPROVED BY AMTRAK IN WRITING, THE EQUIPMENT SHALL BE POSITIONED SO THAT THE BOOM IS NOT PERPENDICULAR TO THE TRACK, WHILE ALSO MAINTAINING ALL OTHER SAFETY REQUIREMENTS (INCLUDING CLEARANCES, ETC.), AND THE BOOM SHALL BE MECHANICALLY RESTRICTED TO PREVENT IT FROM ENCROACHING UPON AMTRAK'S INFRASTRUCTURE (WHICH INCLUDES, WITHOUT LIMITATION, ANY TRACK AND/OR CATENARY STRUCTURES) ANY MORE THAN WHAT IS ABSOLUTELY NECESSARY FOR THE IMPLEMENTATION OF THE WORK OUTLINED IN THESE PLANS. IDEALLY THE BOOM WILL BE RESTRICTED TO THE 180-DEGREE SEMI-CIRCLE AWAY FROM ALL TRACKS.
4. FINAL EQUIPMENT LOCATION WILL BE WITHIN THE RESTRICTED MANEUVERING ENVELOPE AS OUTLINED IN THIS APPROVED LIFT PLAN.
5. CONTRACTOR TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO COMMENCING WORK.
6. THE NOTES HEREIN ARE OFFERED FOR INFORMATION AND GUIDANCE AND ARE NOT TO BE TAKEN TO INFER THE ENGINEER IS IN ANY WAY INVOLVED IN OR IS RESPONSIBLE FOR THE ACTUAL LIFT IN THE FIELD.
7. DO NOT OPERATE IN WINDS OVER 20 MPH.
8. OPERATIONS TO BE CONDUCTED IN ACCORDANCE WITH OSHA AND AMTRAK REGULATIONS AND ALL OTHER APPLICABLE RULES AND CODES.
9. SWING PATH OF BOOM SHALL NOT BE OVER ADJACENT BUILDINGS, WORKERS OR OCCUPIED VEHICLES WHILE LIFTING LOADS.
10. BARRICADES SHALL BE INSTALLED AROUND THE LIFT ZONE AND ANY SWING AREAS AS NECESSARY TO ENSURE OTHERS NOT INVOLVED IN THE LIFT PROCESS DO NOT ENTER INTO THOSE AREAS.
11. THE TOTAL ESTIMATED DURATION OF LIFT ACTIVITIES ON SITE IS ONE EVENT LASTING (8) EIGHT HOURS.
12. CHECK ALL OF THE PARTS OF THE EQUIPMENT EACH NEW WORK SHIFT, INCLUDING ALL OF THE CABLES, EQUIPMENT PARTS AND ENGINE PARTS.
13. THE EQUIPMENT OPERATOR MUST CONFIRM THE HAND SIGNALS THAT WILL BE USED DURING THE LIFT WITH THE SUPPORT GROUND CREW PRIOR TO THE START OF ANY LIFT.
14. ALWAYS INSPECT THE AREA PRIOR TO LIFTING A LOAD TO MAKE SURE THERE ARE NO PEOPLE BELOW.
15. NO SIDE PULLS ALLOWED WHEN PERFORMING A LIFT.
16. EQUIPMENT OPERATOR TO KEEP THE GUY CABLES IN VIEW TO MAKE SURE THEY'RE NOT HIT IN ANY WAY. HIGH VISIBILITY RIBBON SHOULD BE INSTALLED TEMPORARILY TO ASSIST IN KEEPING TRACK OF THE GUY WIRE LOCATIONS.
17. ALL EQUIPMENT TO BE USED IN THE VICINITY OF OPERATING TRACKS SHALL BE IN "CERTIFIED" FIRST-CLASS CONDITION SO AS TO PREVENT FAILURES THAT MIGHT CAUSE DELAY TO TRAINS OR DAMAGE TO RAILROAD'S PROPERTY. NO EQUIPMENT SHALL BE PLACED NEAR OR PUT INTO OPERATION NEAR OR ADJACENT TO OPERATING TRACKS WITHOUT FIRST OBTAINING PERMISSION FROM THE CHIEF ENGINEER'S REPRESENTATIVE. UNDER NO CIRCUMSTANCES SHALL ANY EQUIPMENT OR MATERIALS BE PLACED OR STORED WITHIN TWENTY-FIVE (25) – FEET FROM THE CENTERLINE OF AN OUTSIDE TRACK, EXCEPT AS APPROVED BY THE SITE SPECIFIC SAFETY WORK PLAN.
18. NO MATERIAL OR EQUIPMENT SHALL BE STORED ON RAILROAD'S PROPERTY WITHOUT FIRST HAVING OBTAINED PERMISSION FROM THE CHIEF ENGINEER. ANY SUCH STORAGE WILL BE ON THE CONDITION THAT RAILROAD WILL NOT BE LIABLE FOR LOSS OF OR DAMAGE TO SUCH MATERIALS OR EQUIPMENT FROM ANY CAUSE.
19. PERMITTEE AND/OR CONTRACTORS SHALL KEEP RAILROAD'S PROPERTY CLEAR OF ALL REFUSE AND DEBRIS FROM ITS OPERATIONS, UPON COMPLETION OF THE WORK, PERMITTEE AND/OR CONTRACTORS SHALL REMOVE FROM RAILROAD'S PROPERTY ALL MACHINERY, EQUIPMENT, SURPLUS MATERIALS, FALSEWORK, RUBBISH, TEMPORARY STRUCTURES, AND OTHER PROPERTY OF THE PERMITTEE AND/OR CONTRACTORS AND SHALL LEAVE RAILROAD'S PROPERTY IN A CONDITION SATISFACTORY TO THE CHIEF ENGINEER.
20. THIS LIFT PLAN INCLUDES THE DESIRED LOCATION OF THE EQUIPMENT, THE OPERATING RADII, AND STAGING/DISPOSAL AREAS. ALL ITEMS HAVE BEEN DIMENSIONED FOR LOCATING THE ELEMENTS IN THE FIELD.
21. THE EQUIPMENT IS CAPABLE OF PICKING 150% OF THE LOAD, WHILE MAINTAINING NORMAL, RECOMMENDED FACTORS OF SAFETY. THE ADEQUACY OF THE EQUIPMENT FOR THE PROPOSED PICK SHALL BE DETERMINED BY USING THE MANUFACTURER'S PUBLISHED LOAD RATING CHARTS AND NOT THE MAXIMUM CAPACITY IF THE BOOM.
22. THE LIFT PLAN OUTLINES THE EXISTING OBSTRUCTIONS AND THE PROPOSED SWING BEING USED FOR THE LIFT. "WALKING" OF LOAD USING TWO PIECES OF EQUIPMENT WILL NOT BE PERMITTED, RATHER, MULTIPLE PICKS AND REPOSITIONING OF THE EQUIPMENT MAY BE PERMITTED TO GET THE LOAD TO THE NEEDED LOCATION FOR THE FINAL PICK, IF NECESSARY.
23. IF THERE ARE OVERHEAD POWER LINES PRESENT. ALL AERIAL WORK WILL BE PERFORMED WITH THE POWER LINES DE-ENERGIZED. NO WORK WILL BE PERFORMED AROUND OR NEAR THE POWER LINES WITHOUT AN AMTRAK E.T. LINEMAN'S AUTHORIZATION.

0 1 2 3

ORIGINAL SIZE IN INCHES

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

SITE INFORMATION

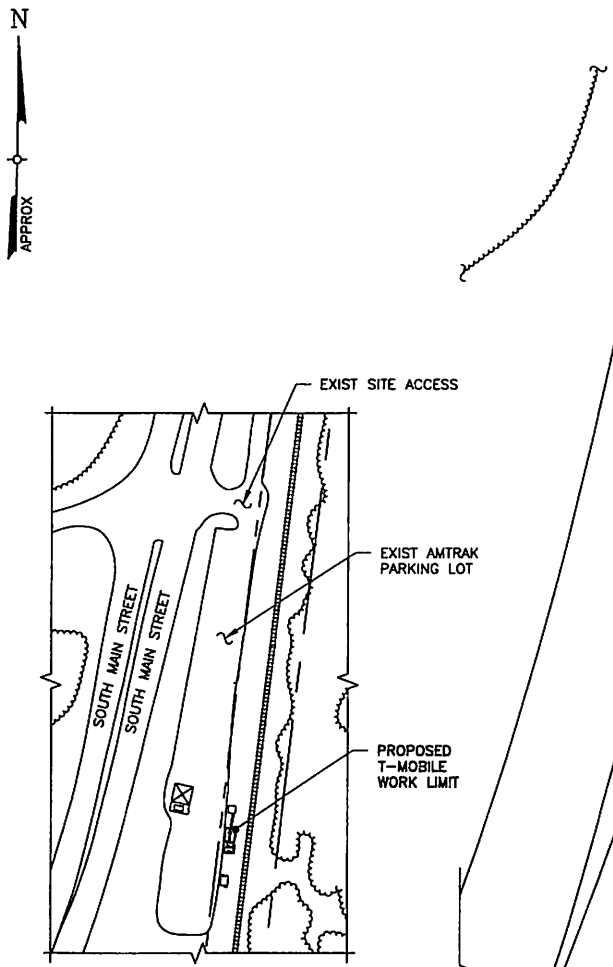
CT11064F
AMTRAK-WINDSOR LOCKS
225 S MAIN STREET/
AMTRAK STATION,
WINDSOR LOCKS, CT
06096

SHEET TITLE

NOTES

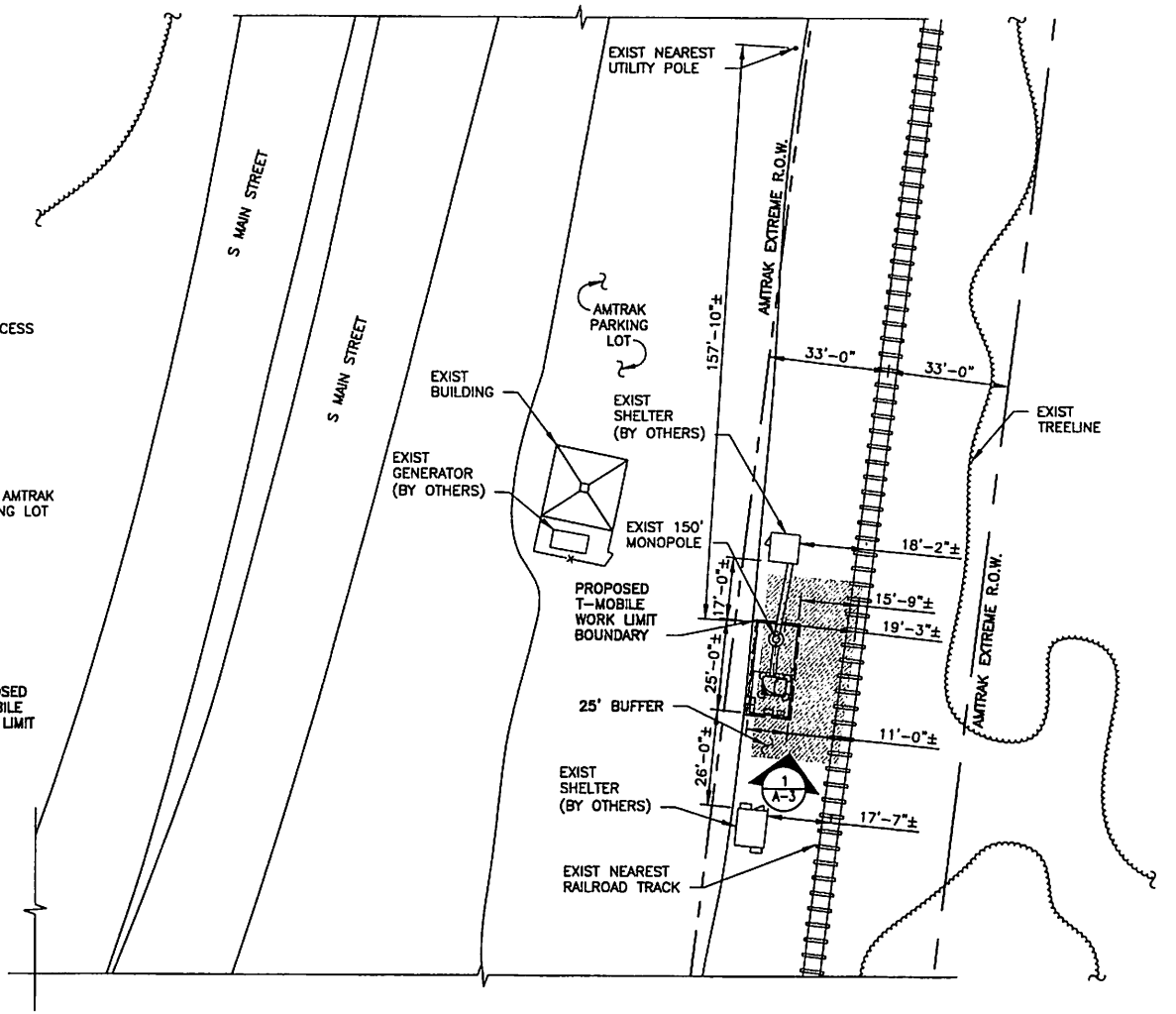
SHEET NUMBER

T-2



1 / A-1 KEY PLAN

SCALE: 1/128" = 1'-0"



2 / A-1 SITE PLAN

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

0 1 2 3

ORIGINAL SIZE IN INCHES

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No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CT11064F
AMTRAK–WINDSOR LOCKS
225 S MAIN STREET/
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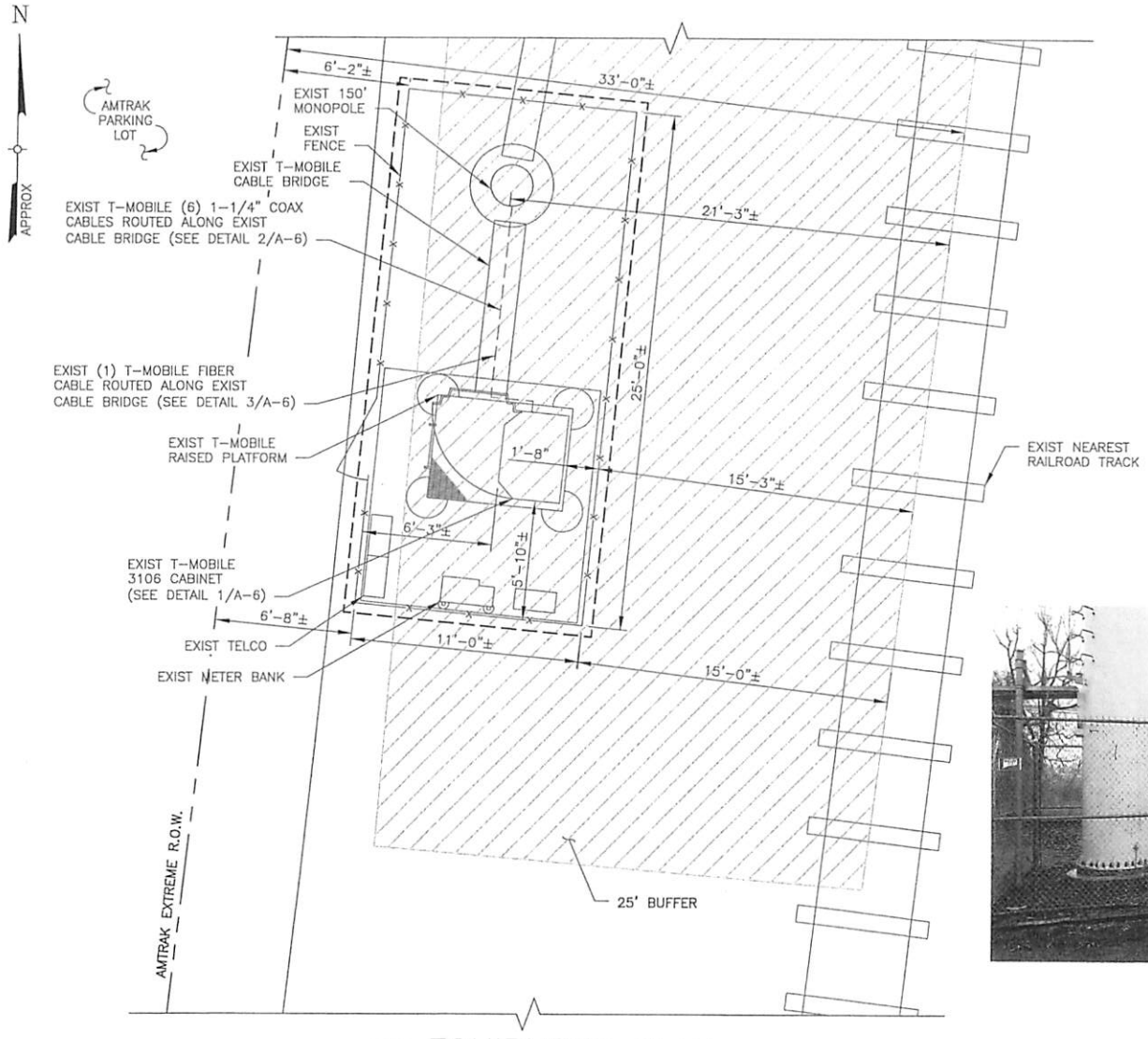
WINDSOR LOCKS, CT
06096

SHEET TITLE

KEY & SITE PLANS

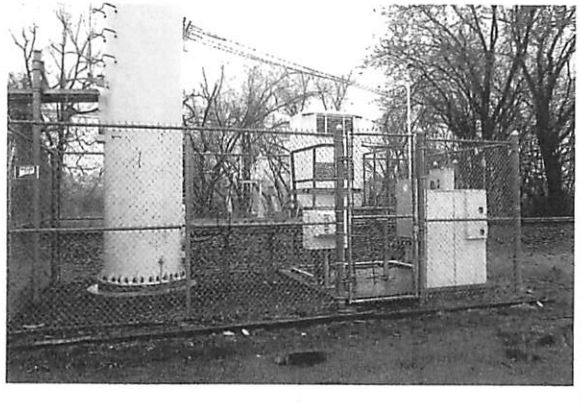
SHEET NUMBER

A–1



1 / A-2 EQUIPMENT PLAN

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



2 / A-2 PHOTO

SCALE: N.T.S.

0 1 2 3

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STATE OF CONNECTICUT
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LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

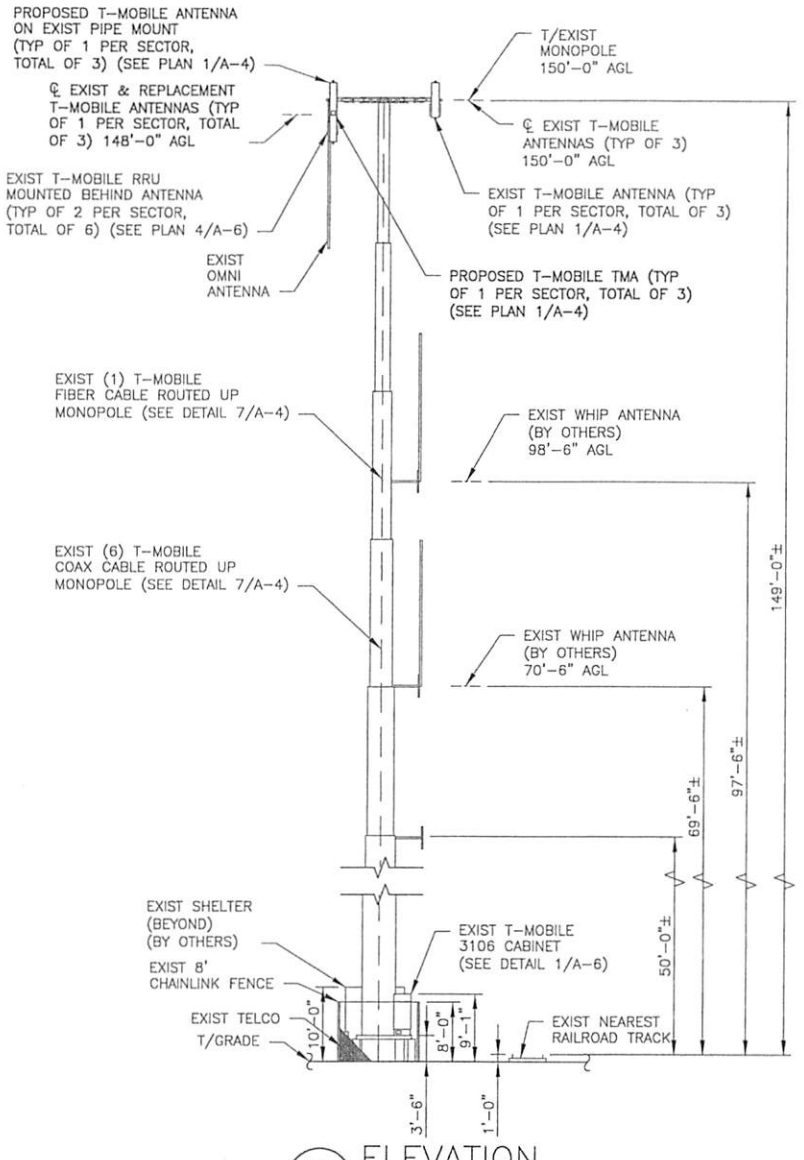
CT11064F
AMTRAK-WINDSOR LOCKS
225 S MAIN STREET/
AMTRAK STATION,
WINDSOR LOCKS, CT
06096

SHEET TITLE

EQUIPMENT PLAN
& PHOTO

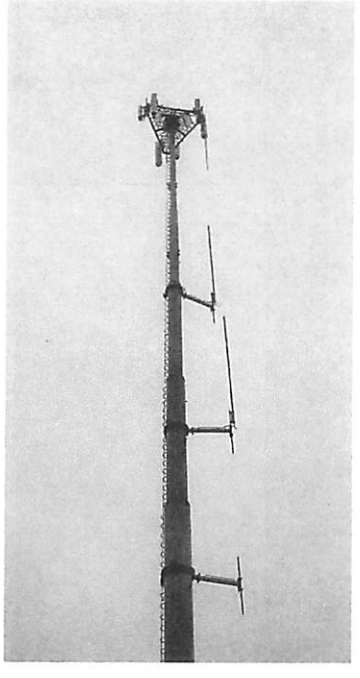
SHEET NUMBER

A-2



1 / A-3 ELEVATION

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



2 / A-3 PHOTO

SCALE: N.T.S.

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ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
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NEWBURGH, NY 12550
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Fax: (845) 567-8703

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12050 BALTIMORE AVENUE
BELTSVILLE, MD 20705

PROJECT NUMBER	DESIGNED BY
7421.CT11064F	MP

REV	DATE	REVISION	DRAWN BY
2	5/12/17	FOR COMMENT	BW
1	6/8/17	PER COMMENTS	JT

ISSUED BY	DATE
DSF	6/8/2017

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

SITE INFORMATION

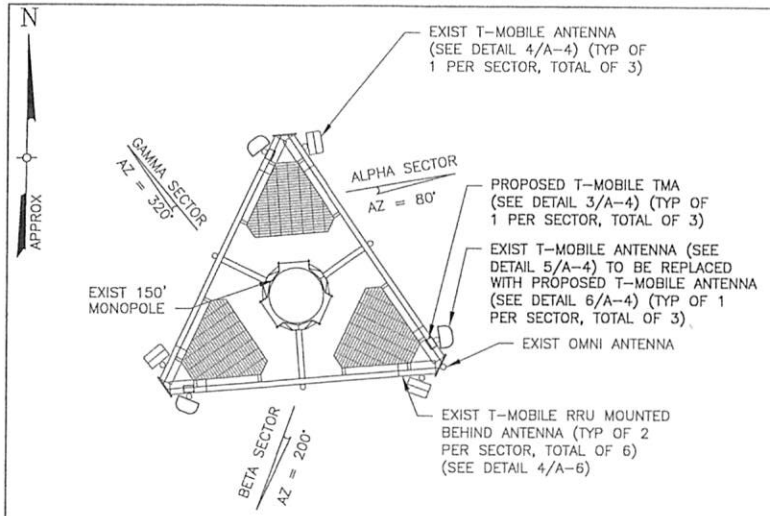
CT11064F
AMTRAK-WINDSOR LOCKS
225 S MAIN STREET/
AMTRAK STATION,
WINDSOR LOCKS, CT
06096

SHEET TITLE

ELEVATION & PHOTO

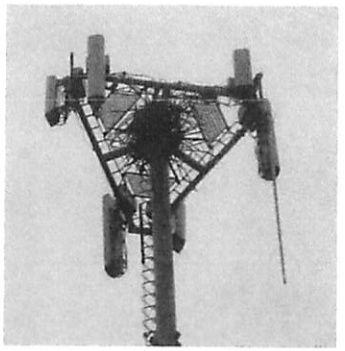
SHEET NUMBER

A-3



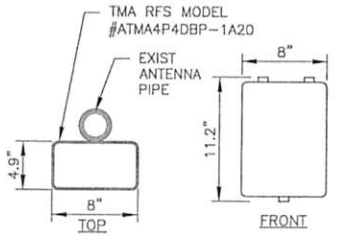
1 / A-4 ANTENNA PLAN

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



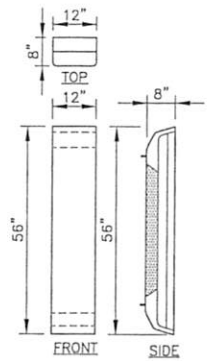
2 / A-4 PHOTO

SCALE: N.T.S.



3 / A-4 TMA (PROPOSED)

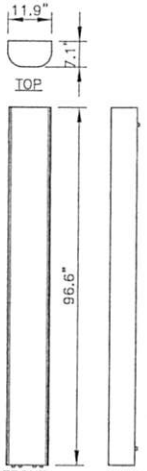
SCALE: 1" = 1'-0"



AIR21B4A/B2P

4 / A-4 ANTENNA (EXIST)

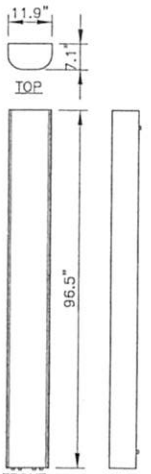
SCALE: 1/2" = 1'-0"



ANDREW LNX-6515DS-VTM
(WEIGHT: 43.7 LBS)

5 / A-4 ANTENNA (EXIST)

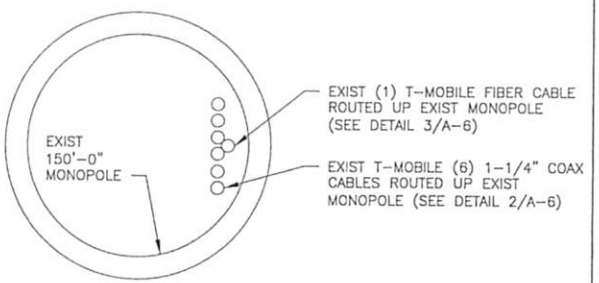
SCALE: 1/2" = 1'-0"



ANDREW SBNH-1D65C
(WEIGHT: 49.6 LBS)

6 / A-4 ANTENNA (PROPOSED)

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



7 / A-4 CABLE MOUNTING DETAIL

SCALE: 1" = 1'-0"

0 1 2 3

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

SITE INFORMATION

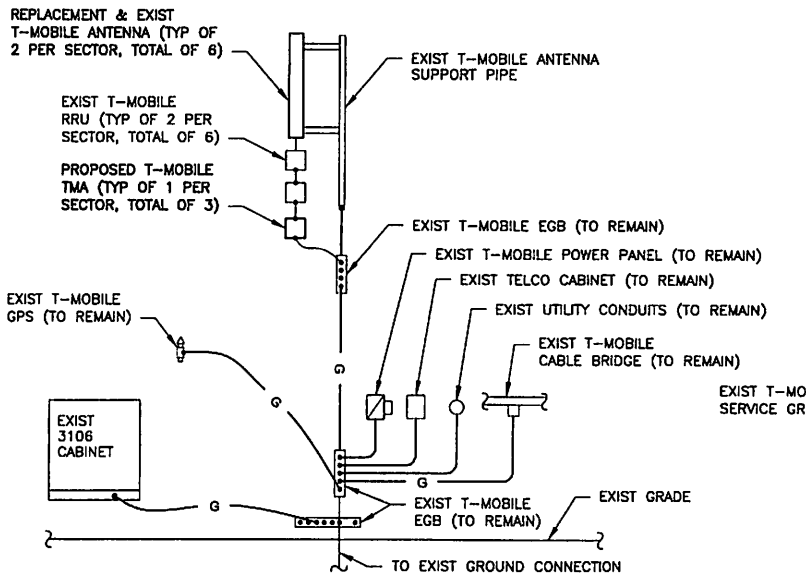
CT11064F
AMTRAK-WINDSOR LOCKS
225 S MAIN STREET/
AMTRAK STATION,
WINDSOR LOCKS, CT
06096

SHEET TITLE

ANTENNA PLANS, DETAILS, & PHOTO

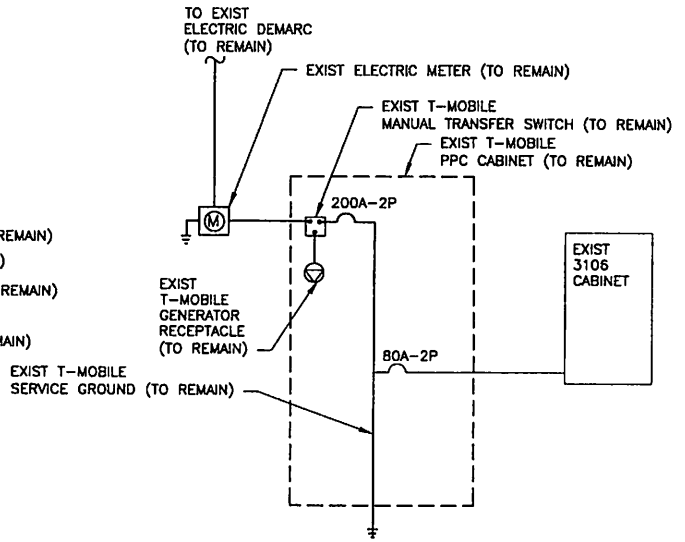
SHEET NUMBER

A-4



1 / A-5 GROUNDING RISER DIAGRAM

SCALE: NTS



2 / A-5 ONE-LINE POWER DIAGRAM

SCALE: NTS

0 1 2 3

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DJF	6/8/2017

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 20409
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CT11064F
AMTRAK-WINDSOR LOCKS
225 S MAIN STREET/
AMTRAK STATION,
WINDSOR LOCKS, CT
06096

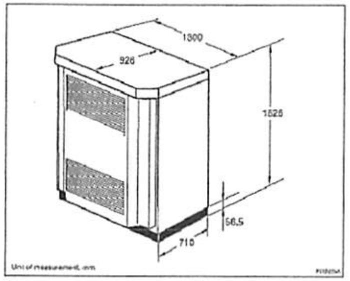
SHEET TITLE

WIRING DIAGRAMS

SHEET NUMBER

A-5

Unit	Dimensions (mm)
Height (including installation frame)	1626
Width	1300
Depth	710
Depth including door	926



1 / A-6 3106 CABINET (EXIST)

SCALE: NTS

PRODUCT DATASHEET

HB114-03U3S18-30M

RADIO FREQUENCY SYSTEMS

The Clear Choice

HYBRIFLEX® RRH Hybrid Feeder Cabling Solution 9x18, 10 AWG, 1-1/4", Single-Mode Fiber, 30m

Technical Features

STRUCTURE

Cable Type — HYBRIFLEX

Size

Length

MECHANICAL SPECIFICATIONS

Outer Diameter Nominal

Cable Weight

Minimum Bending Radius, Single Bend

Minimum Bending Radius, Multi Bends

Recommended / Maximum Clamp Spacing

DC POWER CABLE SPECIFICATIONS

Number of DC Pairs

Maximum DC-Resistance Power Cable

Cross Section of Power Cable

DC Wire Jacket Material

DC Cable Diameter

DC Cable Jacket

DC Standards (Meets or Exceeds)

DC Cable sealing method

CABLE JACKET

UV-Protection Individual and External Jacket

ARMOR SPECIFICATIONS

Armor Type

Maximum DC-Resistance of Armor

Diameter Corrugated Armor

F/O CABLE SPECIFICATIONS

F/O Cable Type — Single-mode

Number of F/O Pairs

Core/Clad

Single Bending Radius

F/O Standards (Meets or Exceeds)

Optical Loss

Fiber Termination End 1

Fiber Termination End 2

Cable sealing method

TESTING AND ENVIRONMENTAL

Storage Temperature

Operation Temperature

Installation Temperature

ASSEMBLY LOSS

Optical Insertion Loss, Assembly or Jumper

SYSTEM LOSS

Optical Insertion Loss, Total Path

FEATURES / BENEFITS

3 / A-6 FIBER CABLE (EXIST)

SCALE: NTS

Product Specifications

COMMSCOPE®

POWERED BY ANDREW

AVA6-50

AVA6-50, HELIAX® Andrew Virtual Air™ Coaxial Cable, corrugated copper, 1-1/4 in, black PE jacket

Construction Materials

Jacket Material	PE
Outer Conductor Material	Corrugated copper
Dielectric Material	Foam PE
Flexibility	Standard
Inner Conductor Material	Corrugated copper tube
Jacket Color	Black

Dimensions

Nominal Size	1-1/4 in
Cable Weight	0.46 lb/ft | 0.68 kg/m
Diameter Over Dielectric	34.036 mm | 1.340 in
Diameter Over Jacket	39.624 mm | 1.560 in
Inner Conductor OD	14.0208 mm | 0.5520 in
Outer Conductor OD	36.068 mm | 1.420 in

Electrical Specifications

Cable Impedance	50 ohm ±1 ohm
Capacitance	22.0 pF/ft | 72.0 pF/m
dc Resistance, Inner Conductor	0.530 ohms/kft | 1.740 ohms/km
dc Resistance, Outer Conductor	0.230 ohms/kft | 0.750 ohms/km
dc Test Voltage	8500 V
Inductance	0.057 µH/ft | 0.187 µH/m
Insulation Resistance	100000 Mohms•km
Jacket Spark Test Voltage (rms)	10000 V
Operating Frequency Band	1 – 3700 MHz
Peak Power	180.0 kW
Velocity	92%

Environmental Specifications

Installation Temperature	-40 °C to +60 °C (-40 °F to +140 °F)
Operating Temperature	-55 °C to +85 °C (-67 °F to +185 °F)
Storage Temperature	-70 °C to +85 °C (-94 °F to +185 °F)

General Specifications

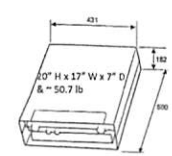
Brand	HELIAX®

page 1 of 3
February 12, 2015

2 / A-6 COAX CABLE (EXIST)

SCALE: NTS

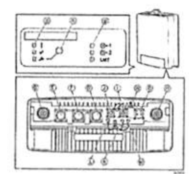
Remote Radio Unit – RRUS11 B12



* RRUS 11 B12 is exactly the same size as RRUS 11 B2 or B4 that T-Mobile is currently using.

Dimensions with Solar Shield and Handle	
Height	500 mm
Width	431 mm
Depth	182 mm
Weight	
RRUS 11	23 kg
Color	
Gray	NCS S2002-B

Unit	Output Power
RRUS 11 B1, B4	2x30 W
	2x40 W
RRUS 11 B2	2x30 W
	2x40 W
RRUS 11 B12	2x30 W



Position	Description	Marking
A	Maintenance button	
B	Optical indicators	
		Φ1, Φ2
		LMT
C	-48 V DC power supply	
D	–	LMT
E	Optical cable 1	Φ1
F	Optical cable 2	Φ2
G	Antenna 1	A12
H	Antenna 2	B12
I	ALD (used for a RET unit for example)	ALD
J	External alarm	
K(1)	Cross connect RXA	RXA I/O
L(1)	RXA co-site	RXA Out
M(1)	Cross connect RXB	RXB I/O
N	Grounding	

4 / A-6 RRU (EXIST)

SCALE: NTS

0 1 2 3

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06096

SHEET TITLE

SPECIFICATIONS

SHEET NUMBER

A-6