COHEN and WOLF P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

PLEASE REPLY TO: Bridgeport
WRITER'S DIRECT DIAL: (203) 337-4157
E-Mail Address: jkohler@cohenandwolf.com

March 13, 2015

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

Re: Notice of Exempt Modification
Amtrak/T-Mobile equipment upgrade
Site ID CT11175D
297 East Barber Street, Windsor Connecticut

Dear Attorney Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, Amtrak owns the existing monopole tower and related facility located at 297 East Barber Street, Windsor, Connecticut (Latitude: 41.810322; Longitude: -72.650052). T-Mobile intends to replace three (3) antennas and add three (3) antennas and related equipment at this existing telecommunications facility in Windsor ("Windsor Facility"). Please accept this letter as notification, pursuant to R.C.S.A. § 16-50j-73, of construction which 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 the Town Manager Peter Souza. The Town of Windsor is also the property owner.

The existing Windsor Facility consists of a 120 foot tall monopole tower.[1] T-Mobile plans to replace three (3) antennas, add three (3) antennas, add three (3) TMAs (tower mounted amplifiers, and add three (3) RRU's (remote radio units) on proposed antenna pipes at a centerline of 120 feet. T-Mobile will replace an equipment cabinet and add fiber and coax cable routed up the catenary tower as well as adding fiber and coax cable routed along the existing cable bridge. (See the plans revised to February 19, 2015 attached hereto as Exhibit A). The existing Windsor Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated January 26, 2015 and attached hereto as Exhibit B.

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

[1] The CSC online database does not contain a Docket or Petition relevant to the approval of this facility, however there is a notice of intent captioned EM-T-MOBILE-164-090429B.

1 . The proposed modification will not increase the height of the tower. T-Mobile's proposed modifications will be installed at a centerline of 120 feet, merely modifying existing antennas located at the same 120 foot elevation. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2 . The proposed modifications will not require an extension of the site boundaries. T-Mobile's modifications are all within the existing compound area as shown on Sheets A-1 and A-2.

3 . The proposed modification to the Windsor Facility will not increase the noise levels at the existing facility by six decibels or more.

4 . The operation of the replacement antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated February 18, 2015, T-Mobile's operations would add 9.29% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 16.78% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as Exhibit C.

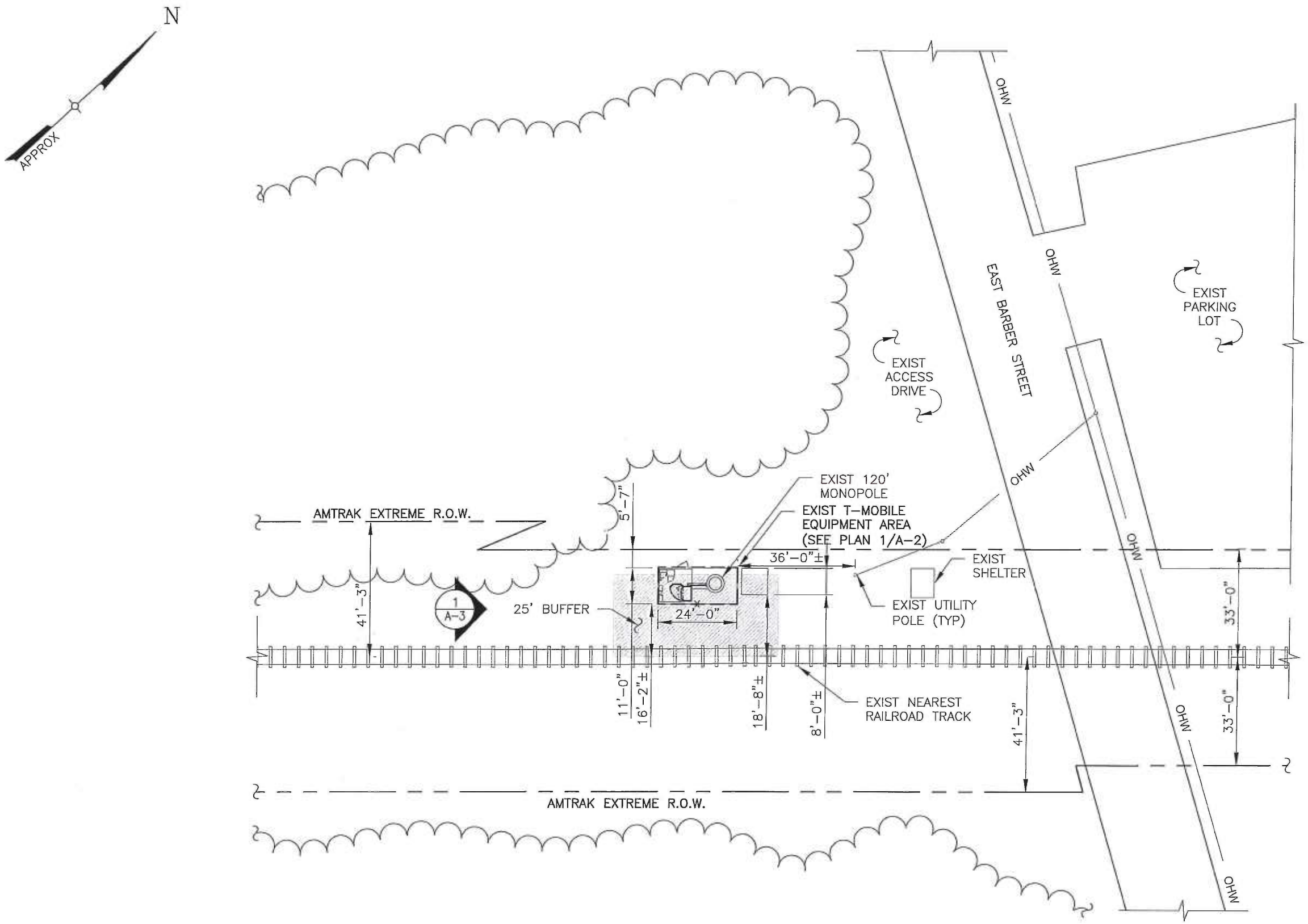
For the foregoing reasons, T-Mobile respectfully submits that the proposed replacement/additional antennas and equipment at the Windsor Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement by the Council of this proposed exempt modification, T-Mobile shall commence construction approximately sixty days from the date of the Council's notice of acknowledgement.

Sincerely,

Julie D. Kohler, Esq.

cc: Town of Windsor, Town Manager Peter Souza
Amtrak
Sheldon Freincle, NSS

EXHIBIT A



1 A-1 SITE PLAN

SCALE: 1/32" = 1'-0"

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

- PLANNING
- ENGINEERING
- SURVEYING
- CONSTRUCTION MANAGEMENT

TECTONIC Engineering & Surveying Consultants P.C.

1279 ROUTE 300
NEWBURGH, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile

12050 BALTIMORE AVENUE
BELTSVILLE, MD 20705

PROJECT NUMBER	DESIGNED BY
6421.CT11175D	MP

REV	DATE	REVISION	DRAWN BY
0	2/12/15	FOR COMMENTS	KA
1	2/19/15	PER COMMENTS	KA

ISSUED BY	DATE
BW	2/23/15

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

SITE INFORMATION

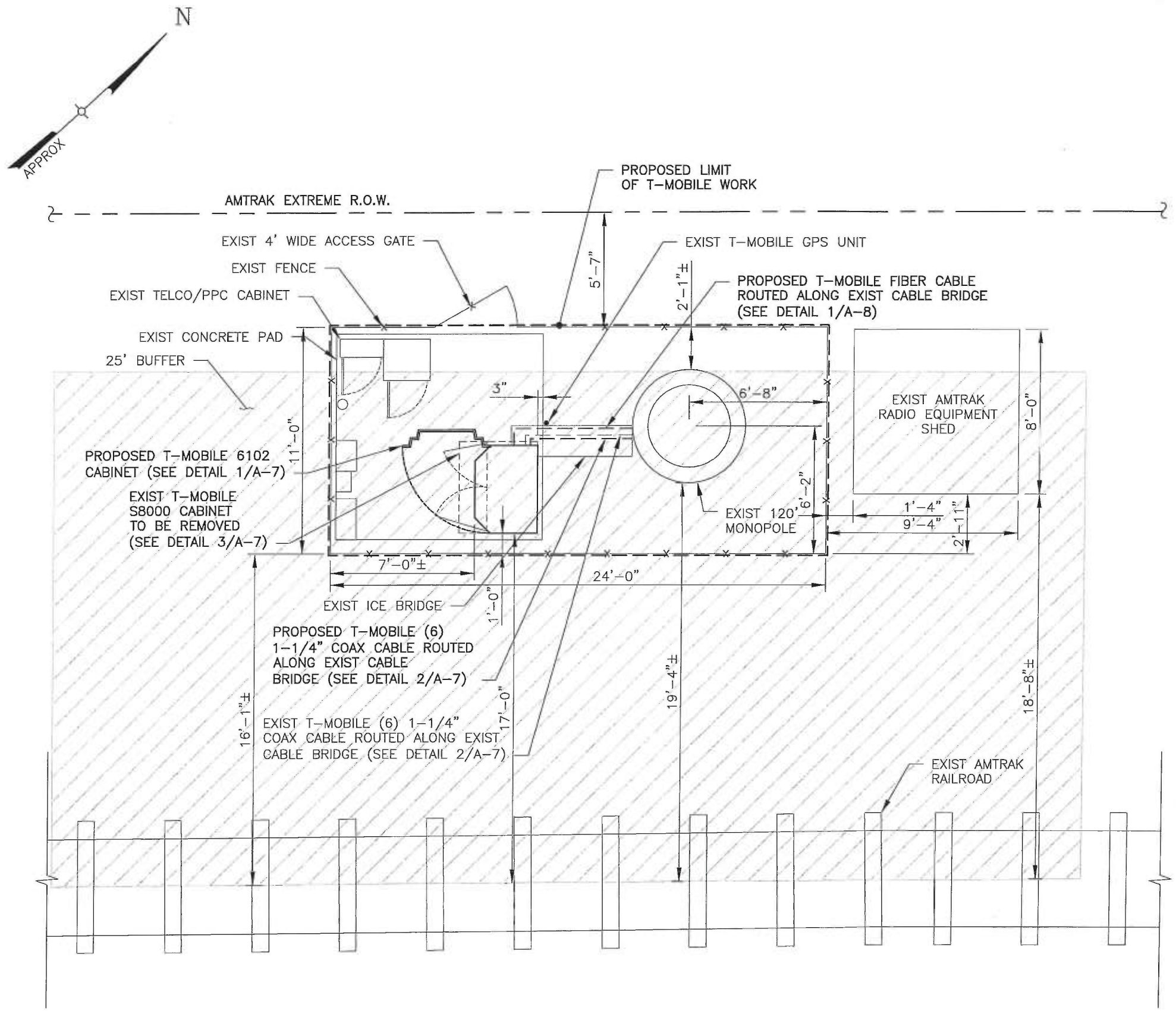
CT11175D
AMTRAK-WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE

SITE PLAN

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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0	2/12/15	FOR COMMENTS	KA
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ISSUED BY	DATE
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LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

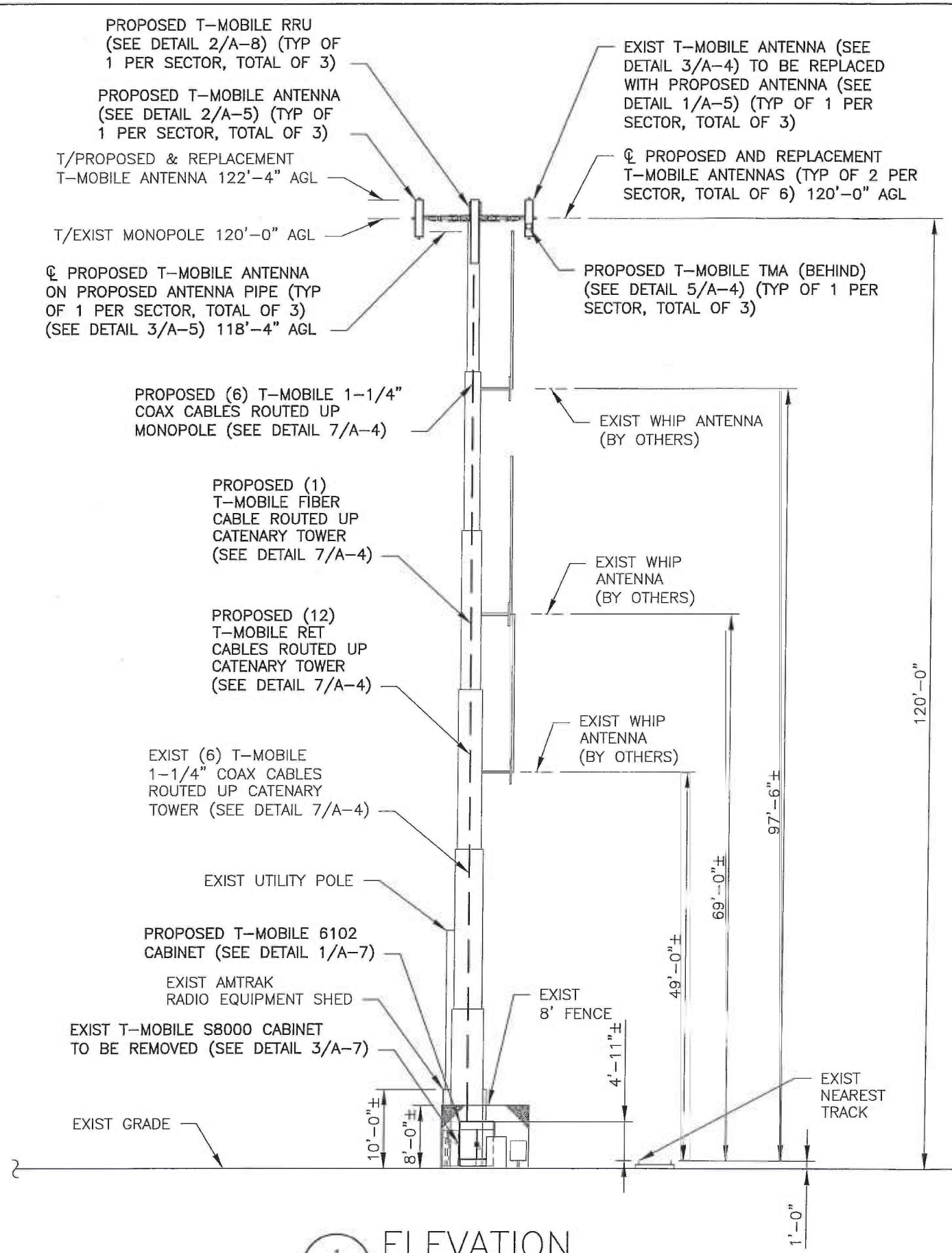
CT11175D
AMTRAK–WINDSOR
297 E BARBER STREET
WINDSOR, CT

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.

0 1 2 3

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T-Mobile
12050 BALTIMORE AVENUE
BELTSVILLE, MD 20705

PROJECT NUMBER: 6421.CT11175D
DESIGNED BY: MP

REV	DATE	REVISION	DRAWN BY
0	2/12/15	FOR COMMENTS	KA
1	2/19/15	PER COMMENTS	KA

ISSUED BY: BW
DATE: 2/23/15

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

SITE INFORMATION

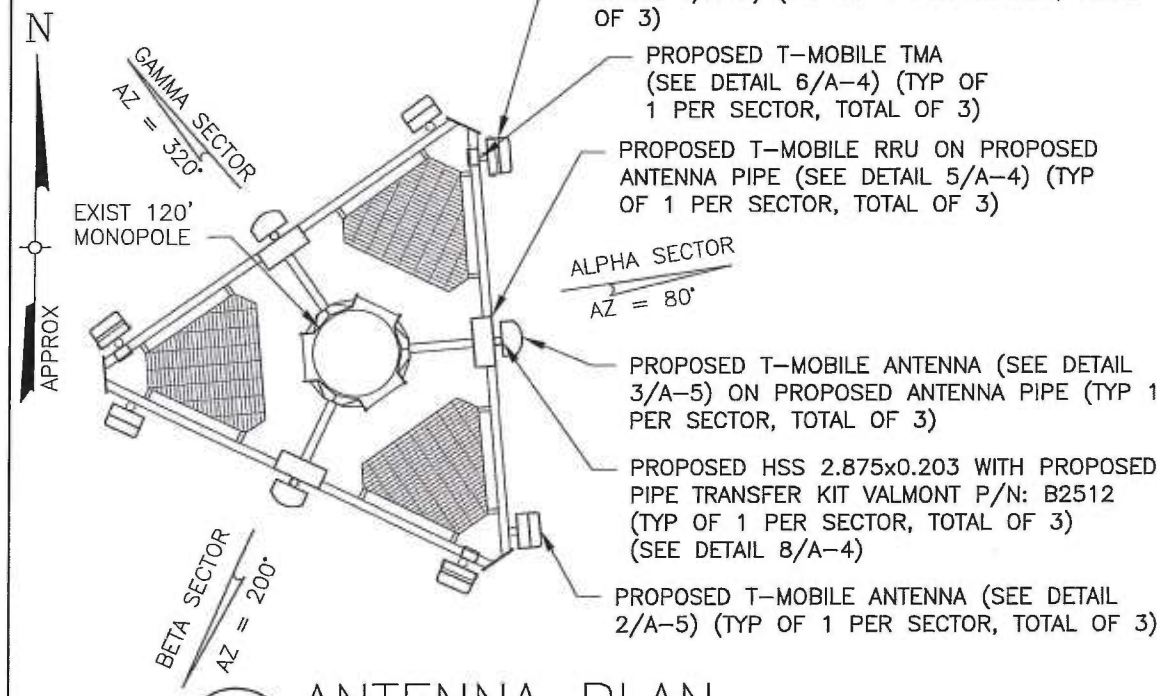
CT11175D
AMTRAK–WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE

ELEVATION & PHOTO

SHEET NUMBER

A–3

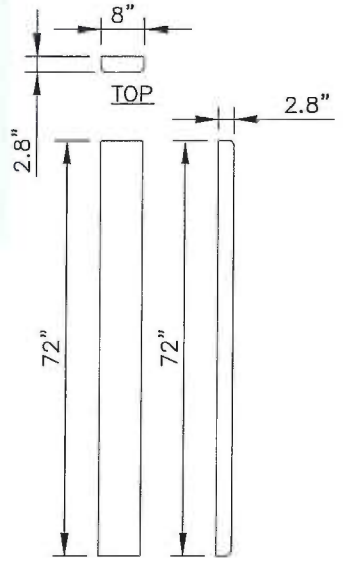


1/A-4 ANTENNA PLAN

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

2/A-4 PHOTO

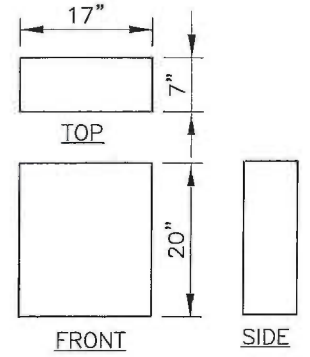
SCALE: N.T.S.



RR651902_P

3/A-4 ANTENNA (EXIST)

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

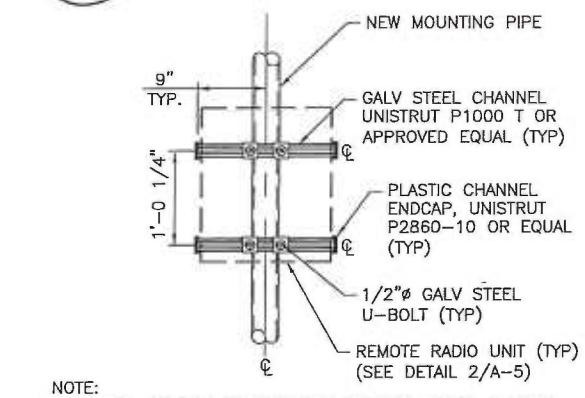


FRONT (PHOTO)

WEIGHT 50.7 lbs

4/A-4 RRU (NEW)

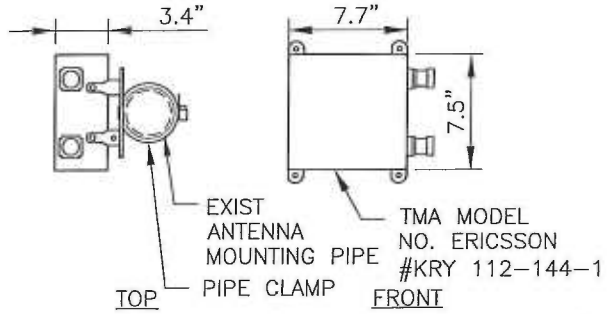
SCALE: 1/2"=1'-0"



NOTE:
MOUNTING OF RRU TO UNISTRUT CHANNEL SHALL BE PER MANUFACTURER DIRECTION. SEPARATION OF CHANNELS SHALL BE PER MANUFACTURER'S MOST CURRENT SPECIFICATION/INSTRUCTIONS. RRU WILL BE MOUNTED BEHIND NEW ANTENNA.

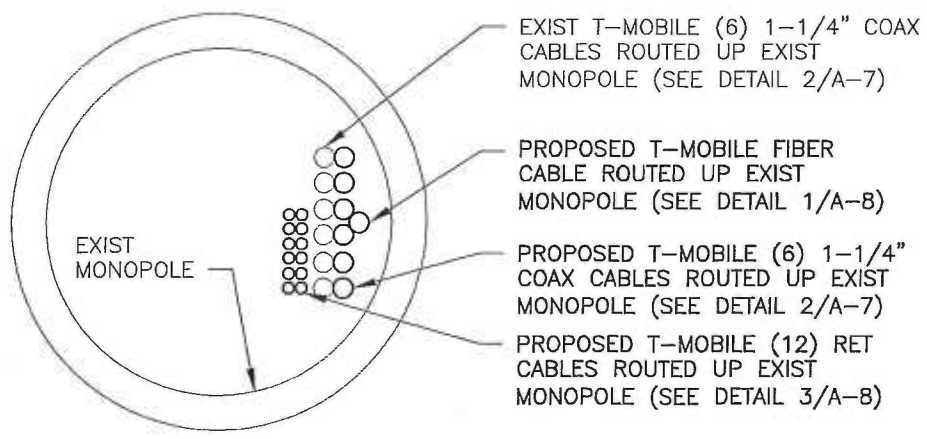
5/A-4 RRU DETAIL

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



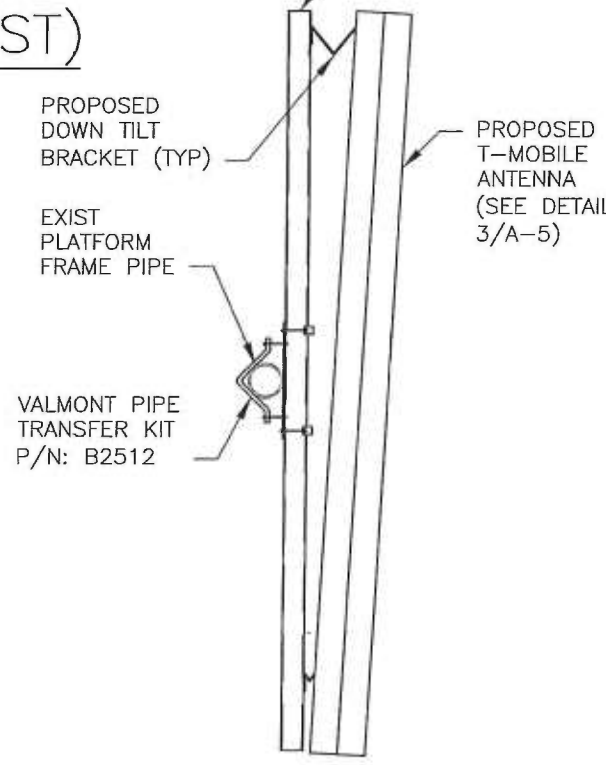
6/A-4 TMA (PROPOSED)

SCALE: 1" = 1'-0"



7/A-4 CABLE MOUNTING DETAIL

SCALE: 1" = 1'-0"



8/A-4 MOUNT DETAIL

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

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
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• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 ROUTE 300
NEWBURGH, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile
12050 BALTIMORE AVENUE
BELTSVILLE, MD 20705

PROJECT NUMBER	DESIGNED BY
5421.CT11175D	MP

REV	DATE	REVISION	DRAWN BY
0	2/12/15	FOR COMMENTS	KA
1	2/19/15	PER COMMENTS	KA

ISSUED BY	DATE
BW	2/23/15

STATE OF CONNECTICUT ANTONIO GUALTIERI No. 25406 LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

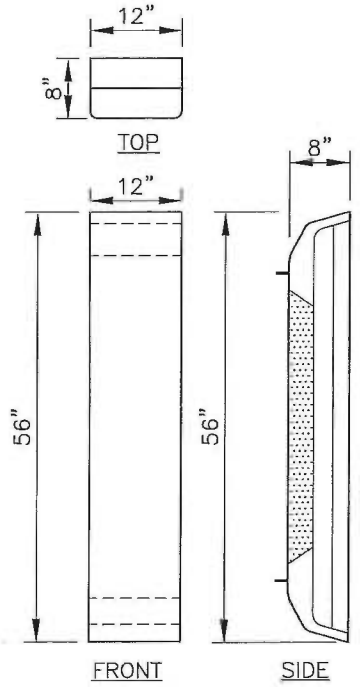
CT11175D
AMTRAK-WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE

ANTENNA PLAN, DETAILS & PHOTO

SHEET NUMBER

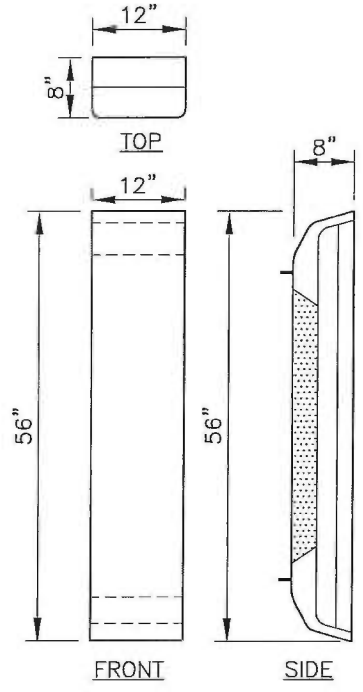
A-4



AIR21B2A/B4P

1 A-5 ANTENNA (PROPOSED)

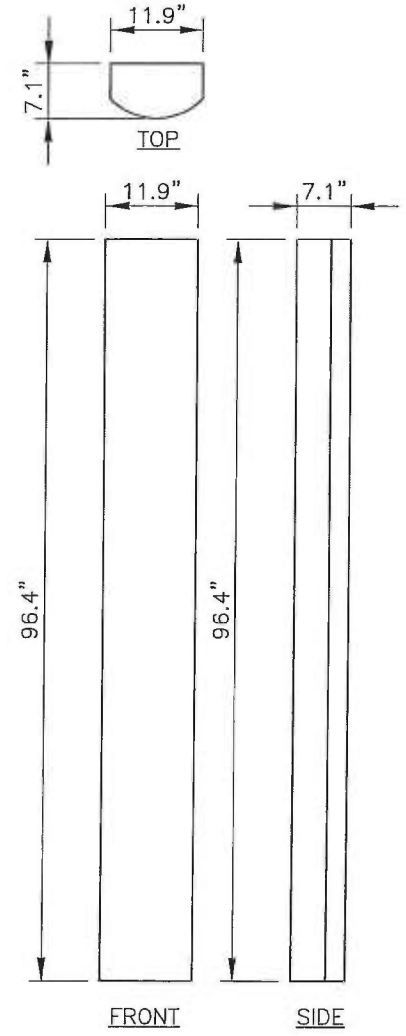
SCALE: 1/2" = 1'-0"



AIR21B4A/B2P

2 A-5 ANTENNA (PROPOSED)

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



LNX-6515DS-VTM

3 A-5 ANTENNA (PROPOSED)

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

0 1 2 3

ORIGINAL SIZE IN INCHES

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

SITE INFORMATION

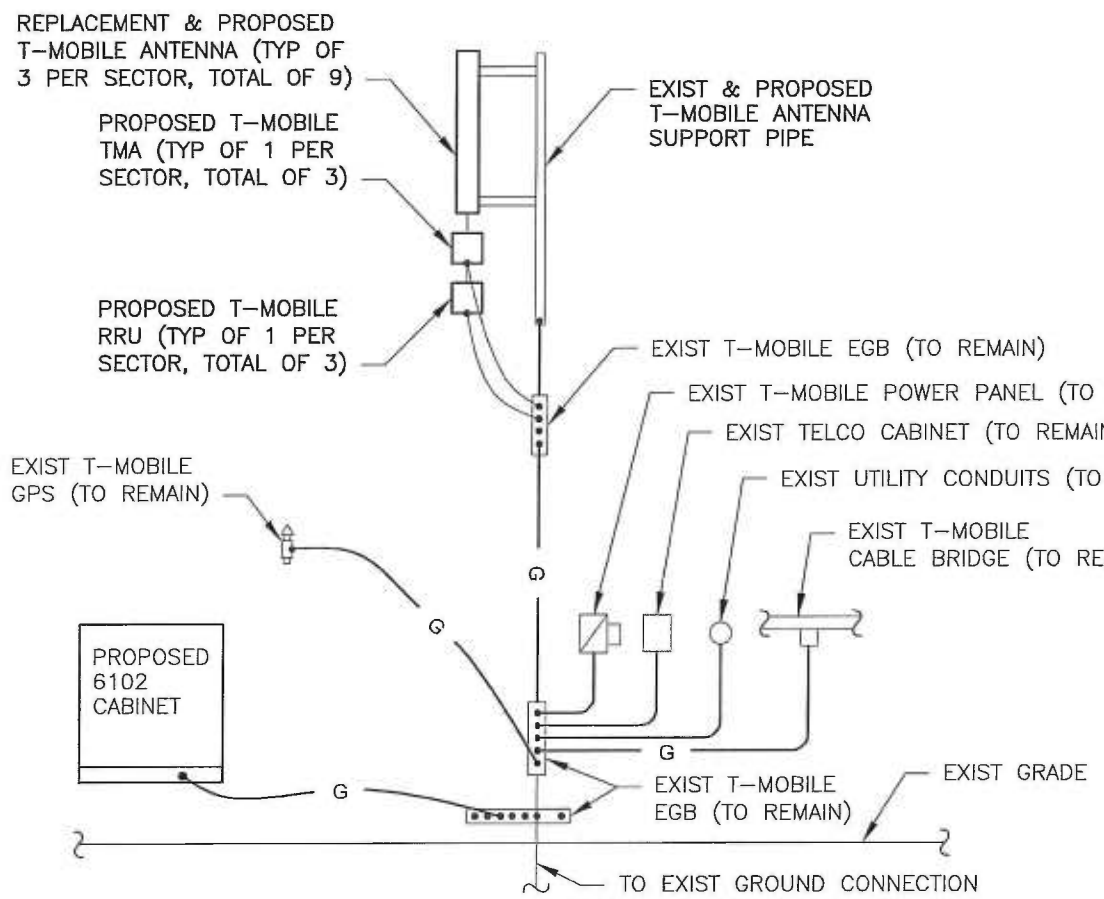
CT11175D
AMTRAK-WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE

DETAILS

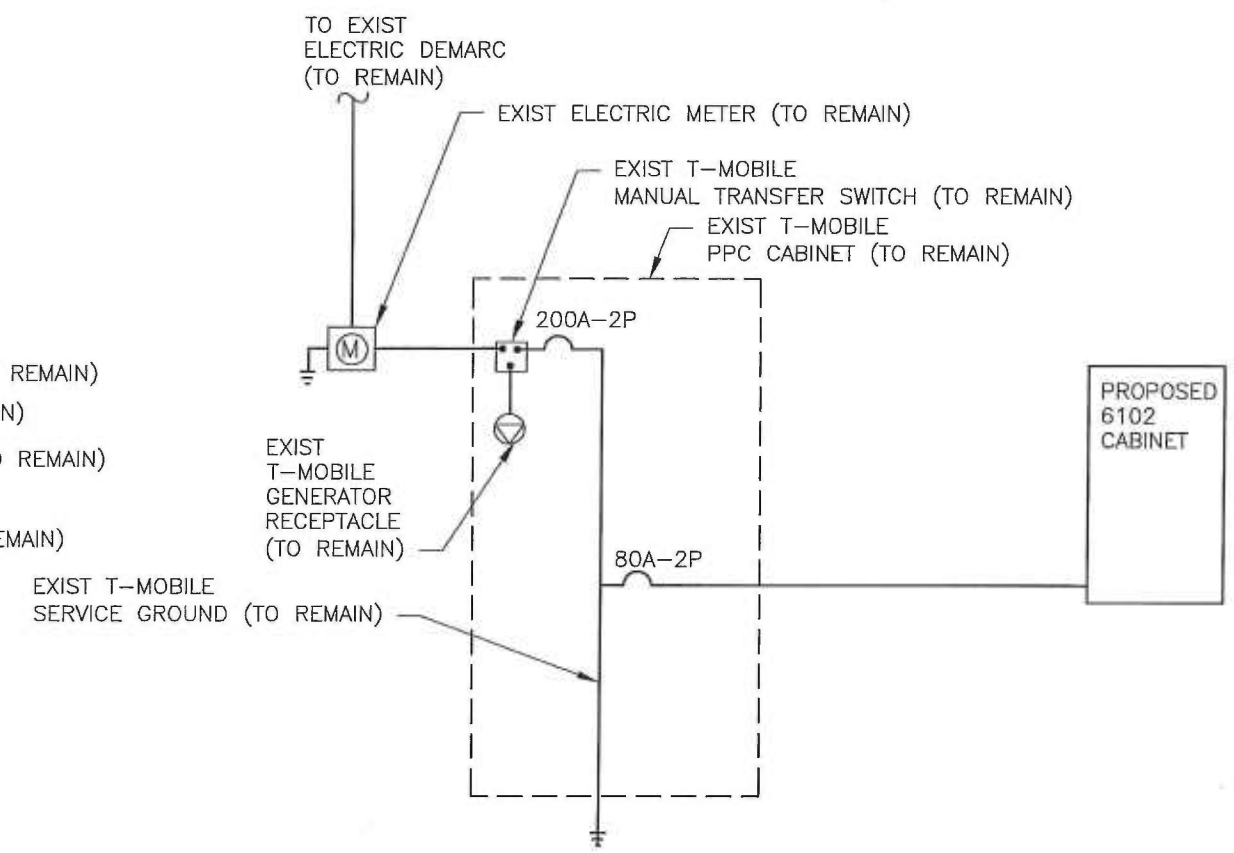
SHEET NUMBER

A-5



1 A–6 GROUNDING RISER DIAGRAM

SCALE: NTS



2 A–6 ONE–LINE POWER DIAGRAM

SCALE: NTS

0 1 2 3

ORIGINAL SIZE IN INCHES

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• ENGINEERING • CONSTRUCTION MANAGEMENT
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T-Mobile
12050 BALTIMORE AVENUE
BELTSVILLE, MD 20705

PROJECT NUMBER	DESIGNED BY
6421.CT11175D	MP

REV	DATE	REVISION	DRAWN BY
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1	2/19/15	PER COMMENTS	KA

ISSUED BY	DATE
BW	2/23/15

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

SITE INFORMATION

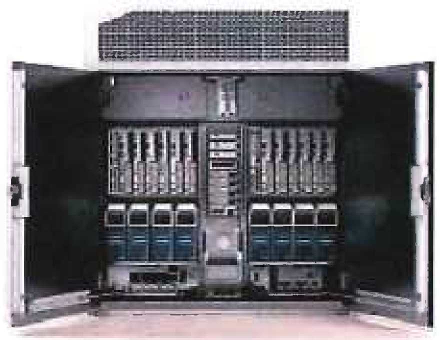
CT11175D
AMTRAK–WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE

WIRING DIAGRAMS

SHEET NUMBER

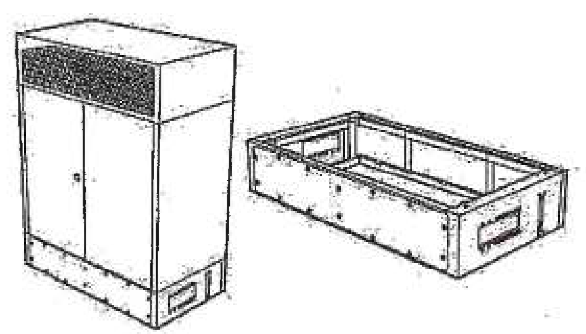
A–6



TECHNICAL SPECIFICATIONS RBS 6102

GBF 6102 BASE FRAME

The base frame is used when installing an RBS 6102 on a concrete slab.



Product Number:
BYB 911 33/1

Dimensions L x W x H
1300 x 680 x 250 mm (51 x 26 x 10 in)

Weight
35 kg (77 lbs)

1 / A-7 — 6102 CABINET (PROPOSED)
SCALE: NTS

Technical Specifications

Frequency range
Indoor: 850/1900 MHz GSM / 900 MHz EGSM / 900/1800 MHz GSM / 900 MHz GSM-R
Outdoor: GSM 850/ 1900/ E 900/ 900/ 1800

Receive sensitivity
without diversity: -110 dBm guaranteed (w/o TMA)
with diversity: -115 dBm guaranteed (w/o TMA)

Dimensions
Height: 1700 mm (Indoor) 1600 mm (Outdoor)
Width: 750 mm (Indoor) 1350 mm (Outdoor)
Depth: 450 mm (Indoor) 650 mm (Outdoor)

Weight
Fully Equipped: 250 kg (Indoor) 440 kg (Outdoor)

Capacity
Standard: 8 TRX per radio cabinet, up to 3 radio cabinets

Configuration
Trisectorial: Up to S888
Omnidirectional: up to O16

Amplifier Output Power
Standard: 30W (+/- 0.5 dB)
Optional: 60W (+/- 0.5 dB), frequency dependent

Power Control
Static: 6 steps of 2 dB
Dynamic: 15 steps of 2 dB

Supported Vocoders
Full Rate (FR), Enhanced Full Rate (EFR), Half Rate (AMR HR)

Power Supply
Indoor: Nominal -48V Rate Voltage Range -57V to -40.5V
Outdoor: 230V AC 50/60 Hz

1-1/4" Foam Dielectric,
LDF Series – *50-ohm*

LDF6-50

Description	Type No.
Cable Ordering Information	
Standard Cable	
1-1/4" Standard Cable, Standard Jacket	LDF6-50
Fire Retardant Cable	
1-1/4" Fire Retardant Jacket (CATVR)	LDF6RN-50
Low VSWR and Specialized Cables	
1-1/4" Low VSWR, specify operating band	LDF6P-50-(**)

** Insert suffix number from "Low VSWR Specifications" table, page 515

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	3.3
Velocity, percent	88
Peak Power Rating, kW	205
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.22 (0.72)
Outer	0.19 (0.62)
dc Breakdown, volts	9000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.9 (75.1)
Inductance, µH/ft (m)	0.056 (0.184)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	1.55 (39.4)
Diameter over Copper Outer Conductor, in (mm)	1.41 (35.8)
Diameter Inner Conductor, in (mm)	0.516 (13.1)
Nominal Inside Transverse Dimensions, cm	3.11
Minimum Bending Radius, in (mm)	15 (380)
Number of Bends, minimum (typical)	15 (40)
Bending Moment, lb-ft (N-m)	36 (49)
Cable Weight, lb/ft (kg/m)	0.63 (0.94)
Tensile Strength, lb (kg)	1300 (590)
Flat Plate Crush Strength, lb/in (kg/mm)	125 (2.2)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.017	0.056	175.0
1	0.024	0.079	123.0
1.5	0.030	0.097	101.0
2	0.034	0.112	87.1
10	0.077	0.253	38.6
20	0.110	0.361	27.1
30	0.135	0.444	22.0
50	0.176	0.579	16.9
88	0.237	0.778	12.6
100	0.254	0.832	11.7
108	0.264	0.867	11.3
150	0.314	1.03	9.47
174	0.340	1.12	8.75
200	0.367	1.20	8.12
300	0.457	1.50	6.52
400	0.535	1.76	5.57
450	0.571	1.87	5.22
500	0.606	1.99	4.92
512	0.614	2.01	4.86
600	0.671	2.20	4.44
700	0.732	2.40	4.07
800	0.789	2.59	3.78
824	0.803	2.63	3.71
894	0.841	2.76	3.54
960	0.876	2.87	3.40
1000	0.897	2.94	3.32
1250	1.02	3.35	2.92
1500	1.14	3.73	2.62
1700	1.22	4.02	2.43
1800	1.27	4.16	2.35
2000	1.35	4.43	2.21
2100	1.39	4.56	2.14
2200	1.43	4.69	2.08
2300	1.47	4.82	2.03
3000	1.73	5.68	1.72
3300	1.84	6.02	1.62

Standard Conditions:
For Attenuation, VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.

2 / A-7 — COAX CABLE (PROPOSED)
SCALE: NTS

3 / A-7 — S8000 CABINET (EXIST)
SCALE: NTS

0 1 2 3
ORIGINAL SIZE IN INCHES

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STATE OF CONNECTICUT ★ ANTONIO A. GUALTIERI ★ No. 26406 LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION
CT11175D
AMTRAK-WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE
SPECIFICATIONS

SHEET NUMBER
A-7

Product Data Sheet HB158-1-13U6-S6F18

RFS

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable.

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics - minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- UL listed, flame retardant jacket, UV protected assembly - Allows both indoor and outdoor applications

Figure 1: HYBRIFLEX Series

Technical Specifications

Mechanical			
Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Flame Retardant, Olefin-Based Thermoplastic, Zero-Halogen	[mm (in)]	50.3 (1.98)
UV Protection	Individual and External Jackets		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	2.3 (1.5)
Minimum Bending Radius, Single Bending		[mm (in)]	250 (10)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.5 / 2 (5 / 6.6)
Electrical Properties			
DC Resistance Outer Conductor Armor		[Ω/km (Ω/1000 ft)]	0.58 (0.176)
DC Resistance Power Cable 2 x 4 mm² (AWG11)		[Ω/km (Ω/1000 ft)]	5.17 (0.42)
Fiber Optic Properties			
Version			Single-mode OM3
Qualified Fiber Count			12 (6 pairs)
Core Size		[µm]	9/125
Minimum Operating Wavelength		[µm]	1310
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	120 (4.7)
Insertion Loss @ Wavelength 1310nm		dB/km	0.5
Insertion Loss @ Wavelength 1550nm		dB/km	0.5
Standards (Meets or exceeds)			TIA 568 C.3 / ISO 11801 RoHS Compliant
DC Power Cable Properties			
Size (Nominal)		[mm² (AWG)]	13.3 (6)
Quantity, Wire Count (Nominal)			12 (6 pairs)
Size (Nominal)		[mm² (AWG)]	0.5 (20)
Quantity, Wire Count (Nominal)			6 (3 pairs)
Type			UV protected
Stranding			19
Primary Jacket Thickness, Nominal		[mm (in)]	0.8 (0.031)
Standards (Meets or exceeds)	Alarm Cable		Optical Cable
	UL Standard 1685, 1581 VW-1 MTW Oil and Gasoline Resistant THWN-2 (Cable meets UL requirements) RoHS/REACH Compliant		UL Standard 83, 1581 National Electrical Code, NFPA 70 VW-1, Style 7, THWN-2 Sunlight Resistance RoHS/REACH Compliant Oil and Gasoline Resistance I
Environmental			
Installation Temperature		[°C (°F)]	-20 to +55 (-4 to +131)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to +149)
Storage Temperature		[°C (°F)]	-40 to +70 (-40 to +158)

* These are preliminary values in design

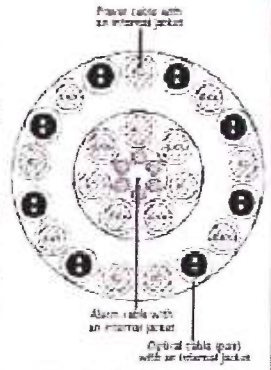
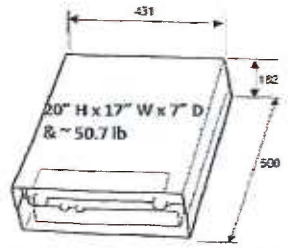


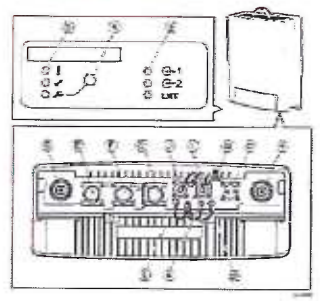
Figure 2: Construction Detail

1 / A-8 FIBER CABLE (PROPOSED)

SCALE: NTS

Remote Radio Unit – RRUS11 B12





Position	Description	Marking
A	Maintenance button	
B	Optical indicators	LNT ⊖1, ⊖2
C	-48 V DC power supply	LNT
D	-	LNT
E	Optical cable 1	⊖1
F	Optical cable 2	⊖2
G	Antenna 1	A
H	Antenna 2	B
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	⏚

* 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 S2502-R

Unit	Output Power
RRUS 11 B1, B4	2x30W
	2x40W
RRUS 11 B2	2x30W
	2x40W
RRUS 11 B12	2x30W

2 / A-8 RRU (PROPOSED)

SCALE: NTS

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

ATCB-B01-040

Teletilt® AISG RET Control Cable, 40 m

- Feeds data and power to RET system components
- AISG and RoHS compliant

General Specifications

Product Type	AISG standard cable
Brand	Teletilt®

Electrical Specifications

EU Certification	CB | CE
Protocol	AISG 1.1 | AISG 2.0
Voltage, maximum	300 V

Mechanical Specifications

AISG Connector A	8-pin DIN Female
AISG Connector A Body Style	Straight
AISG Connector A Standard	IEC 60130-9
AISG Connector B	8-pin DIN Male
AISG Connector B Body Style	Straight
AISG Connector B Standard	IEC 60130-9
Data Conductor Type	0.20 mm² (24 AWG) twisted pair
Power Conductor Type	0.82 mm² (18 AWG) stranded
Total Conductors, quantity	6
Color	Black

Environmental Specifications

Climatic Sequence Test Method	IEC 60068-2-14
Cold Exposure Test Method	IEC 60068-2-1
Damp Heat Exposure Test Method	IEC 60068-2-30, Test Condition Db
Heat Exposure Test Method	IEC 60068-2-2
Operating Temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Rain Simulation Test Method	IEC 60068-2-18, Test Condition Ra, Method 1
Relative Humidity	Up to 100%
UV Resistance Test Method	IEC 60068-2-5, Test Condition B
Ingress Protection Test Method	IEC 60529:2001, IP67

Dimensions

Length	40.0 m | 131.2 ft
Diameter Over Jacket	8.000 mm | 0.315 in
Net Weight	3.5 kg | 7.7 lb

3 / A-8 RET CABLE (PROPOSED)

SCALE: NTS

0 1 2 3

ORIGINAL SIZE IN INCHES

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NEWBURGH, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile
12050 BALTIMORE AVENUE
BELTSVILLE, MD 20705

PROJECT NUMBER	DESIGNED BY
6421.CT11175D	MP

REV	DATE	REVISION	DRAWN BY
0	2/12/15	FOR COMMENTS	KA
1	2/19/15	PER COMMENTS	KA

ISSUED BY	DATE
BW	2/23/15

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 24106
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CT11175D
AMTRAK–WINDSOR
297 E BARBER STREET
WINDSOR, CT

SHEET TITLE

SPECIFICATIONS

SHEET NUMBER

A–8

EXHIBIT B

STRUCTURAL ANALYSIS REPORT – REV 1

T-MOBILE UPGRADE

EXISTING 120' MONOPOLE

SITE NAME: HARTFORD/ I-84 X40_1

297 E BARBER STREET,

WINDSOR, CT

FEBRUARY 26, 2015

TEC W.O. 6421.CT11175D

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STRUCTURAL ANALYSIS REPORT

Project Information

W.O. Number:	6421.CT11175D	Report Date:	2/26/2015
Client:	T-Mobile	Revision:	1
Site Name:	Hartford/ I-84 X40_1		
Owner:	AMTRAK		
Site Address:	297 E Barber Street	FCC Regulation Number:	--
City, State:	Windsor, CT 06095	County:	Hartford

Structure Information

Structure Type: Monopole — Manufacturer: PiRod
Structure Height: 120 ft. — Year Built: -

Original Drawings: Structure: No Foundation: No

Documents provided:

Item	By	No.	Date
Structural Analysis Report (15 pages)	Armor Tower	CT11175D	4/23/10
Network Modernization RFDS (via email) (3 pages)	T-Mobile	-	9/12/14
Mapping Report (12 pages)	Vertical Solutions	141342	1/21/15

Inspection

Type: Climb — Date: 1/28/2015

General Condition:
Pole: Good
Foundation: Good

Observations: None

Finish: Painted — Condition: Intact

Proposed Installation

T-Mobile is proposing to replace its existing three (3) antennas with newer model antennas. In addition, six (6) panel antennas and associated appurtenances to be added 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
120	T-Mobile	3	Ericsson	AIR21 B2A/B4P	Existing 10' Low Profile Platform
		3	Ericsson	AIR21 B4A/B2P	
		3	Ericsson	KRY 112-144-1 TMA's	
		3	Ericsson	RRUS 11 B12	
118.33		3	Commscope	LNX-6515DS-VTM	

Cables:

Height (ft.)	Qty	Nom. Size	Location / Support
120	6	1-1/4" dia	Routed along the interior of the pole
120	1	Hybriflex Fiber Cables	To be routed along the interior of the pole
120	12	RET Cables	To be routed along the interior of the pole
120	6	1-1/4" dia	To be routed along the interior of the pole

Analysis Criteria

Design Standard: ANSI/TIA/EIA-222-F-1996
Building Code: 2005 Connecticut State Building Code Supplement (IBC 2003)

	Capacity (no ice)	Capacity w/ ice
Wind Speed:	80 mph	69 mph
Basic Ice Thickness:	0 inch	0.5 inch

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. The pole shaft, anchor bolts, and base plate conforms to ASTM-A53-B-42, ASTM-A687 and ASTM-A-36 grade, steel respectively.
4. The base plate and flange plates are sufficient without the stiffeners. As such, they have not been considered in this analysis

STRUCTURAL ANALYSIS REPORT (CONT.)

W.O. Number:	6421.CT11175D	Report Date:	2/26/2015
Client:	T-Mobile	Revision:	1
Site Name:	Hartford/ I-84 X40_1		

Analysis Results

Element	% Usage
Shaft	59%
Anchor Bolts	54%
Flange Connections	49%

Foundation Reactions (Envelope):

	Original Design Reactions[1]		Current Analysis		Percentage
Axial	-	kips	34	kips	-
Shear	15	kips	12	kips	80%
Moment	1489	kip-ft.	926	kip-ft.	62%

1. Based on Original Design Reactions listed in the Structural Analysis referenced above.

Conclusions

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

No information on the existing foundation was made available at the time of this report. A such, the foundation has not been evaluated in detail. However, based on the comparison of the current reactions with the Original Design reactions listed above and the magnitude of stresses in the pole shaft and anchor bolts, we believe that the existing foundation has adequate capacity for the proposed T-Mobile installations.

If the existing conditions are not as represented in this report, the design engineer should be immediately notified prior to construction. Any further changes to the antenna configuration or other appurtenances should be reviewed with respect to their effect on structural loads prior to implementation.

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Prepared by: Garrett Miller, EIT
Structural Engineer

Reviewed by: Vinod Ramesh, EIT
Structural Engineer

Approved by: STATE OF CONNECTICUT ANTONIO A. GUALTIERI No. 25406 PROFESSIONAL ENGINEER
Antonio A. Gualtieri, P.E.
Sr. Vice President

Date: 2/26/15

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Newburgh, NY 12550

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

TNX TOWER SUMMARY REPORT

STRUCTURAL ANALYSIS REPORT – REV 1

T-MOBILE UPGRADE

EXISTING 120' MONOPOLE

SITE NAME: HARTFORD/ I-84 X40_1

297 E BARBER STREET,

WINDSOR, CT

FEBRUARY 26, 2015

TEC W.O. 6421.CT11175D

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STRUCTURAL ANALYSIS REPORT

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		3	Ericsson	RRUS 11 B12	
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STRUCTURAL ANALYSIS REPORT (CONT.)

W.O. Number:	6421.CT11175D	Report Date:	2/26/2015
Client:	T-Mobile	Revision:	1
Site Name:	Hartford/ I-84 X40_1		

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Structural Engineer

Reviewed by: Vinod Ramesh, EIT
Structural Engineer

Approved by: STATE OF CONNECTICUT ANTONIO A. GUALTIERI No. 25408 LICENSED PROFESSIONAL ENGINEER
Antonio A. Gualtieri, P.E.
Sr. Vice President

Date: 2/26/15.

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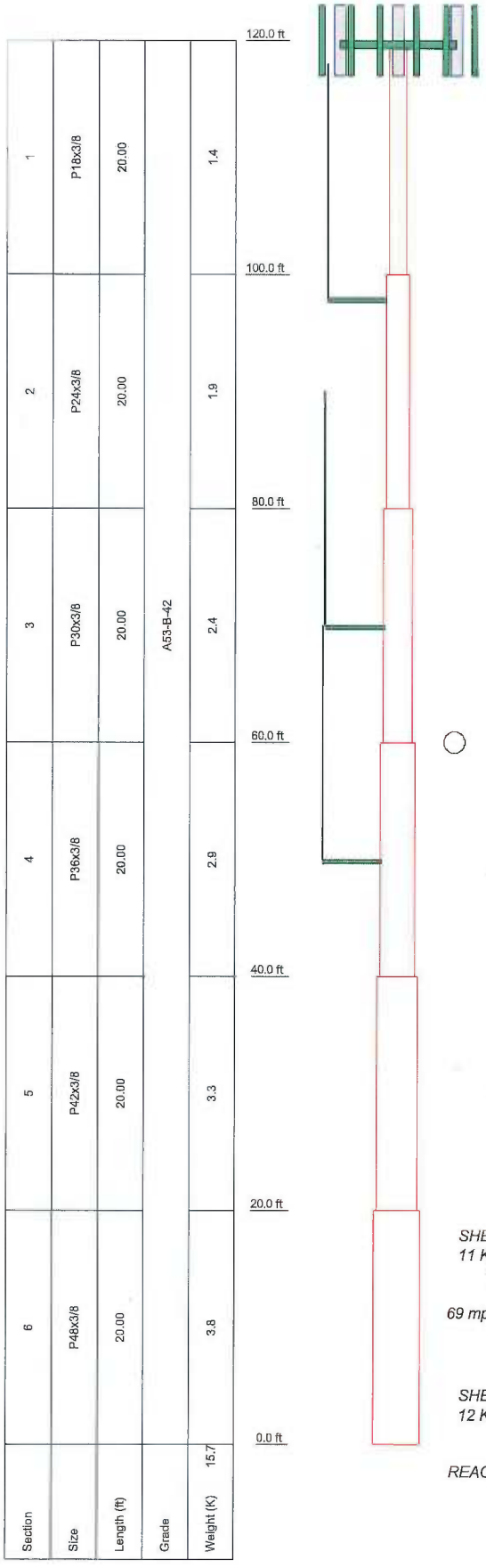
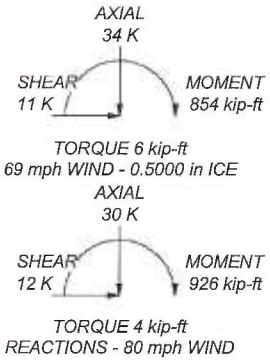
TNX TOWER SUMMARY REPORT





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ERICSSON AIR 21 B2A B4P w/ Mount Pipe (T-Mobile)	120	EXISTING LOW-PROFILE PLATFORM (T-Mobile)	120
ERICSSON AIR 21 B2A B4P w/ Mount Pipe (T-Mobile)	120	LNX-6515DS-VTM w/ Mount Pipe (T-Mobile)	118.33
ERICSSON AIR 21 B2A B4P w/ Mount Pipe (T-Mobile)	120	LNX-6515DS-VTM w/ Mount Pipe (T-Mobile)	118.33
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (T-Mobile)	120	LNX-6515DS-VTM w/ Mount Pipe (T-Mobile)	118.33
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (T-Mobile)	120	PD220 (Amtrak)	98
		4' x 2" STD Pipe	98
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (T-Mobile)	120	6' STANDOFF MOUNT (Amtrak)	98
		PD220 (Amtrak)	70
KRY 112 71/2 (T-Mobile)	120	4' x 2" STD Pipe	70
KRY 112 71/2 (T-Mobile)	120	6' STANDOFF MOUNT (Amtrak)	70
KRY 112 71/2 (T-Mobile)	120	PD220 (Amtrak)	50
RRUS 11 B12 (T-Mobile)	120	4' x 2" STD Pipe	50
RRUS 11 B12 (T-Mobile)	120	6' STANDOFF MOUNT (Amtrak)	50
RRUS 11 B12 (T-Mobile)	120		

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 a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 59.2%

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FAX: (845)-567-8703

Job: 6421.CT11175D			
Project: CT11175D - Hartford/ I-84 X40_1			
Client: T-Mobile	Drawn by: Vinod Ramesh		App'd:
Code: TIA/EIA-222-F	Date: 02/25/15		Scale: NTS
Path:			Dwg No. E-1

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Job	Page
6421.CT11175D	1 of 12
Project	**Date**
CT11175D - Hartford/ I-84 X40_1	13:57:55 02/25/15
Client	**Designed by**
T-Mobile	Vinod Ramesh

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	120.00-100.00	20.00	P18x3/8	A53-B-42 (42 ksi)	
L2	100.00-80.00	20.00	P24x3/8	A53-B-42 (42 ksi)	
L3	80.00-60.00	20.00	P30x3/8	A53-B-42 (42 ksi)	
L4	60.00-40.00	20.00	P36x3/8	A53-B-42 (42 ksi)	
L5	40.00-20.00	20.00	P42x3/8	A53-B-42 (42 ksi)	
L6	20.00-0.00	20.00	P48x3/8	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
L1 120.00-100.00				1	1	1		
L2 100.00-80.00				1	1	1		
L3 80.00-60.00				1	1	1		
L4 60.00-40.00				1	1	1		
L5 40.00-20.00				1	1	1		
L6 20.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
**										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF6-50A(1-1/4") (6E+6P)	A	No	Inside Pole	120.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
HB158-1-13U6-S6F18(1 -5/8)	A	No	Inside Pole	120.00 - 0.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
ATCB-B01-040 (5/16") (5/16)	C	No	Inside Pole	120.00 - 0.00	12	No Ice	0.00	7.00
						1/2" Ice	0.00	7.00
**								
LDF4P-50A(1/2")	C	No	Inside Pole	98.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF4P-50A(1/2")	C	No	Inside Pole	70.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF4P-50A(1/2")	C	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
**								
**								
Climbing Ladder	C	No	CaAa (Out Of Face)	120.00 - 10.00	1	No Ice	0.29	7.90
						1/2" Ice	0.55	10.60
Safety Line 3/8	C	No	CaAa (Out Of Face)	120.00 - 10.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.550	1.84
L2	100.00-80.00	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.550	1.85
L3	80.00-60.00	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00

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
		C	0.000	0.000	0.000	6.550	1.85
L4	60.00-40.00	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.550	1.85
L5	40.00-20.00	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.550	1.85
L6	20.00-0.00	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.275	1.77

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.750	1.91
L2	100.00-80.00	A	0.500	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.750	1.91
L3	80.00-60.00	A	0.500	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.750	1.91
L4	60.00-40.00	A	0.500	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.750	1.91
L5	40.00-20.00	A	0.500	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.750	1.92
L6	20.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.875	1.80

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120.00-100.00	-0.3492	0.2016	-0.5899	0.3406
L2	100.00-80.00	-0.3656	0.2111	-0.6446	0.3722
L3	80.00-60.00	-0.3762	0.2172	-0.6826	0.3941
L4	60.00-40.00	-0.3836	0.2215	-0.7105	0.4102
L5	40.00-20.00	-0.3890	0.2246	-0.7319	0.4226
L6	20.00-0.00	-0.2044	0.1180	-0.4035	0.2329

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
**									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe (T-Mobile)	A	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	6.83 7.35	5.64 6.48	0.11 0.17
ERICSSON AIR 21 B2A B4P w/ Mount Pipe (T-Mobile)	B	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	6.83 7.35	5.64 6.48	0.11 0.17
ERICSSON AIR 21 B2A B4P w/ Mount Pipe (T-Mobile)	C	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	6.83 7.35	5.64 6.48	0.11 0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (T-Mobile)	A	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	6.83 7.35	5.64 6.48	0.11 0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (T-Mobile)	B	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	6.83 7.35	5.64 6.48	0.11 0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (T-Mobile)	C	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	6.83 7.35	5.64 6.48	0.11 0.17
KRY 112 71/2 (T-Mobile)	A	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	0.68 0.80	0.51 0.62	0.01 0.02
KRY 112 71/2 (T-Mobile)	B	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	0.68 0.80	0.51 0.62	0.01 0.02
KRY 112 71/2 (T-Mobile)	C	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	0.68 0.80	0.51 0.62	0.01 0.02
LNX-6515DS-VTM w/ Mount Pipe (T-Mobile)	A	From Leg	4.00 0.00 0.00	0.0000	118.33	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	0.08 0.17
LNX-6515DS-VTM w/ Mount Pipe (T-Mobile)	B	From Leg	4.00 0.00 0.00	0.0000	118.33	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	0.08 0.17
LNX-6515DS-VTM w/ Mount Pipe (T-Mobile)	C	From Leg	4.00 0.00 0.00	0.0000	118.33	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	0.08 0.17
RRUS 11 B12 (T-Mobile)	A	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	3.31 3.55	1.36 1.54	0.05 0.07
RRUS 11 B12 (T-Mobile)	B	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	3.31 3.55	1.36 1.54	0.05 0.07
RRUS 11 B12 (T-Mobile)	C	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	3.31 3.55	1.36 1.54	0.05 0.07
EXISTING LOW-PROFILE PLATFORM (T-Mobile)	C	None		0.0000	120.00	No Ice 1/2" Ice	14.66 18.87	14.66 18.87	1.25 1.48
**									
PD220 (Amtrak)	C	From Leg	6.00 0.00 10.00	0.0000	98.00	No Ice 1/2" Ice	3.56 7.13	3.56 7.13	0.02 0.05
4' x 2" STD Pipe	C	From Leg	6.00	0.0000	98.00	No Ice	0.87	0.87	0.01

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral ft* / *Vert ft* / *ft*	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* K
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00						
6' STANDOFF MOUNT	C	From Leg	3.00	0.0000	98.00	No Ice	1.00	1.43	0.03
(Amtrak)			0.00			1/2" Ice	1.25	2.05	0.04
			0.00						
**									
PD220	C	From Leg	6.00	0.0000	70.00	No Ice	3.56	3.56	0.02
(Amtrak)			0.00			1/2" Ice	7.13	7.13	0.05
			10.00						
4' x 2" STD Pipe	C	From Leg	6.00	0.0000	70.00	No Ice	0.87	0.87	0.01
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00						
6' STANDOFF MOUNT	C	From Leg	3.00	0.0000	70.00	No Ice	1.00	1.43	0.03
(Amtrak)			0.00			1/2" Ice	1.25	2.05	0.04
			0.00						
**									
PD220	C	From Leg	6.00	0.0000	50.00	No Ice	3.56	3.56	0.02
(Amtrak)			0.00			1/2" Ice	7.13	7.13	0.05
			10.00						
4' x 2" STD Pipe	C	From Leg	6.00	0.0000	50.00	No Ice	0.87	0.87	0.01
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00						
6' STANDOFF MOUNT	C	From Leg	3.00	0.0000	50.00	No Ice	1.00	1.43	0.03
(Amtrak)			0.00			1/2" Ice	1.25	2.05	0.04
			0.00						
**									

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp

Comb. No.	Description
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 100	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-7.03	0.16	-0.09
			Max. Mx	11	-5.63	84.61	-0.08
			Max. My	8	-5.63	0.13	-84.57
			Max. Vy	11	-4.85	84.61	-0.08
			Max. Vx	8	4.85	0.13	-84.57
			Max. Torque	26			0.05
L2	100 - 80	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-11.43	0.93	-0.54
			Max. Mx	11	-9.63	199.09	-0.19
			Max. My	8	-9.63	0.43	-199.01
			Max. Vy	11	-6.23	199.09	-0.19
			Max. Vx	8	6.24	0.43	-199.01
			Max. Torque	26			2.04
L3	80 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.39	1.76	-1.02
			Max. Mx	11	-14.13	340.00	-0.26
			Max. My	8	-14.13	0.71	-339.95
			Max. Vy	11	-7.67	340.00	-0.26
			Max. Vx	8	7.69	0.71	-339.95
			Max. Torque	26			3.94
L4	60 - 40	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.91	2.65	-1.53
			Max. Mx	11	-19.12	509.78	-0.24
			Max. My	8	-19.12	0.92	-509.89
			Max. Vy	11	-9.12	509.78	-0.24
			Max. Vx	8	9.15	0.92	-509.89
			Max. Torque	26			5.76
L5	40 - 20	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.88	2.99	-1.73
			Max. Mx	11	-24.55	705.04	-0.00
			Max. My	8	-24.55	0.78	-705.49
			Max. Vy	11	-10.37	705.04	-0.00
			Max. Vx	8	10.39	0.78	-705.49
			Max. Torque	26			5.84
L6	20 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.29	3.19	-1.84
			Max. Mx	11	-30.39	925.35	0.30
			Max. My	8	-30.39	0.54	-926.19
			Max. Vy	11	-11.64	925.35	0.30

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	8	11.66	0.54	-926.19
			Max. Torque	26			5.88

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	34.29	-0.03	-10.60
	Max. H_x	11	30.39	11.64	0.02
	Max. H_z	2	30.39	0.02	11.66
	Max. M_x	2	923.88	0.02	11.66
	Max. M_z	5	921.36	-11.64	-0.02
	Max. Torsion	26	5.88	5.31	9.20
	Min. Vert	36	30.39	4.55	0.01
	Min. H_x	5	30.39	-11.64	-0.02
	Min. H_z	8	30.39	-0.02	-11.66
	Min. M_x	8	-926.19	-0.02	-11.66
	Min. M_z	11	-925.35	11.64	0.02
	Min. Torsion	20	-5.88	-5.31	-9.20

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	30.39	0.00	0.00	1.13	1.95	0.00
Dead+Wind 0 deg - No Ice	30.39	-0.02	-11.66	-923.88	3.45	-3.72
Dead+Wind 30 deg - No Ice	30.39	5.80	-10.09	-799.22	-458.42	-2.15
Dead+Wind 60 deg - No Ice	30.39	10.07	-5.81	-460.10	-796.92	-0.00
Dead+Wind 90 deg - No Ice	30.39	11.64	0.02	2.61	-921.36	2.15
Dead+Wind 120 deg - No Ice	30.39	10.09	5.85	464.93	-798.38	3.72
Dead+Wind 150 deg - No Ice	30.39	5.84	10.11	802.98	-460.94	4.30
Dead+Wind 180 deg - No Ice	30.39	0.02	11.66	926.19	0.54	3.72
Dead+Wind 210 deg - No Ice	30.39	-5.80	10.09	801.53	462.41	2.15
Dead+Wind 240 deg - No Ice	30.39	-10.07	5.81	462.41	800.92	-0.00
Dead+Wind 270 deg - No Ice	30.39	-11.64	-0.02	-0.30	925.35	-2.15
Dead+Wind 300 deg - No Ice	30.39	-10.09	-5.85	-462.63	802.37	-3.72
Dead+Wind 330 deg - No Ice	30.39	-5.84	-10.11	-800.68	464.93	-4.30
Dead+Ice+Temp	34.29	-0.00	0.00	1.84	3.19	0.00
Dead+Wind 0 deg+Ice+Temp	34.29	-0.03	-10.60	-849.93	5.27	-5.10
Dead+Wind 30 deg+Ice+Temp	34.29	5.26	-9.17	-734.79	-419.72	-2.94
Dead+Wind 60 deg+Ice+Temp	34.29	9.14	-5.28	-422.26	-731.38	-0.00
Dead+Wind 90 deg+Ice+Temp	34.29	10.57	0.03	3.90	-846.21	2.94
Dead+Wind 120 deg+Ice+Temp	34.29	9.17	5.33	429.53	-733.42	5.10
Dead+Wind 150 deg+Ice+Temp	34.29	5.31	9.20	740.56	-423.25	5.88
Dead+Wind 180 deg+Ice+Temp	34.29	0.03	10.60	853.67	1.20	5.10
Dead+Wind 210 deg+Ice+Temp	34.29	-5.26	9.17	738.53	426.19	2.94
Dead+Wind 240 deg+Ice+Temp	34.29	-9.14	5.28	426.00	737.86	-0.00
Dead+Wind 270 deg+Ice+Temp	34.29	-10.57	-0.03	-0.17	852.68	-2.94
Dead+Wind 300 deg+Ice+Temp	34.29	-9.17	-5.33	-425.80	739.90	-5.10
Dead+Wind 330 deg+Ice+Temp	34.29	-5.31	-9.20	-736.83	429.72	-5.88
Dead+Wind 0 deg - Service	30.39	-0.01	-4.55	-360.24	2.57	-1.46
Dead+Wind 30 deg - Service	30.39	2.27	-3.94	-311.53	-177.88	-0.84
Dead+Wind 60 deg - Service	30.39	3.93	-2.27	-179.05	-310.12	-0.00

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Load Combination	*Vertical*	*Shear$_x$*	*Shear$_z$*	*Overturning Moment, M_x*	*Overturning Moment, M_z*	*Torque*
	K	*K*	*K*	*kip-ft*	*kip-ft*	*kip-ft*
Dead+Wind 90 deg - Service	30.39	4.55	0.01	1.72	-358.74	0.84
Dead+Wind 120 deg - Service	30.39	3.94	2.28	182.34	-310.69	1.46
Dead+Wind 150 deg - Service	30.39	2.28	3.95	314.41	-178.86	1.68
Dead+Wind 180 deg - Service	30.39	0.01	4.55	362.54	1.43	1.46
Dead+Wind 210 deg - Service	30.39	-2.27	3.94	313.84	181.87	0.84
Dead+Wind 240 deg - Service	30.39	-3.93	2.27	181.36	314.12	-0.00
Dead+Wind 270 deg - Service	30.39	-4.55	-0.01	0.59	362.73	-0.84
Dead+Wind 300 deg - Service	30.39	-3.94	-2.28	-180.03	314.69	-1.46
Dead+Wind 330 deg - Service	30.39	-2.28	-3.95	-312.10	182.86	-1.68

Solution Summary

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX*	*PY*	*PZ*	*PX*	*PY*	*PZ*	*% Error*
	K	*K*	*K*	*K*	*K*	*K*	
1	0.00	-30.39	0.00	0.00	30.39	0.00	0.000%
2	-0.02	-30.39	-11.66	0.02	30.39	11.66	0.000%
3	5.80	-30.39	-10.09	-5.80	30.39	10.09	0.000%
4	10.07	-30.39	-5.81	-10.07	30.39	5.81	0.000%
5	11.64	-30.39	0.02	-11.64	30.39	-0.02	0.000%
6	10.09	-30.39	5.85	-10.09	30.39	-5.85	0.000%
7	5.84	-30.39	10.11	-5.84	30.39	-10.11	0.000%
8	0.02	-30.39	11.66	-0.02	30.39	-11.66	0.000%
9	-5.80	-30.39	10.09	5.80	30.39	-10.09	0.000%
10	-10.07	-30.39	5.81	10.07	30.39	-5.81	0.000%
11	-11.64	-30.39	-0.02	11.64	30.39	0.02	0.000%
12	-10.09	-30.39	-5.85	10.09	30.39	5.85	0.000%
13	-5.84	-30.39	-10.11	5.84	30.39	10.11	0.000%
14	0.00	-34.29	0.00	0.00	34.29	-0.00	0.000%
15	-0.03	-34.29	-10.60	0.03	34.29	10.60	0.000%
16	5.26	-34.29	-9.17	-5.26	34.29	9.17	0.000%
17	9.14	-34.29	-5.28	-9.14	34.29	5.28	0.000%
18	10.57	-34.29	0.03	-10.57	34.29	-0.03	0.000%
19	9.17	-34.29	5.33	-9.17	34.29	-5.33	0.000%
20	5.31	-34.29	9.20	-5.31	34.29	-9.20	0.000%
21	0.03	-34.29	10.60	-0.03	34.29	-10.60	0.000%
22	-5.26	-34.29	9.17	5.26	34.29	-9.17	0.000%
23	-9.14	-34.29	5.28	9.14	34.29	-5.28	0.000%
24	-10.57	-34.29	-0.03	10.57	34.29	0.03	0.000%
25	-9.17	-34.29	-5.33	9.17	34.29	5.33	0.000%
26	-5.31	-34.29	-9.20	5.31	34.29	9.20	0.000%
27	-0.01	-30.39	-4.55	0.01	30.39	4.55	0.000%
28	2.27	-30.39	-3.94	-2.27	30.39	3.94	0.000%
29	3.93	-30.39	-2.27	-3.93	30.39	2.27	0.000%
30	4.55	-30.39	0.01	-4.55	30.39	-0.01	0.000%
31	3.94	-30.39	2.28	-3.94	30.39	-2.28	0.000%
32	2.28	-30.39	3.95	-2.28	30.39	-3.95	0.000%
33	0.01	-30.39	4.55	-0.01	30.39	-4.55	0.000%
34	-2.27	-30.39	3.94	2.27	30.39	-3.94	0.000%
35	-3.93	-30.39	2.27	3.93	30.39	-2.27	0.000%
36	-4.55	-30.39	-0.01	4.55	30.39	0.01	0.000%
37	-3.94	-30.39	-2.28	3.94	30.39	2.28	0.000%
38	-2.28	-30.39	-3.95	2.28	30.39	3.95	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	0.00003561
3	Yes	5	0.00000001	0.00003999
4	Yes	5	0.00000001	0.00004533
5	Yes	4	0.00000001	0.00067120
6	Yes	5	0.00000001	0.00007012
7	Yes	5	0.00000001	0.00004507
8	Yes	5	0.00000001	0.00003545
9	Yes	5	0.00000001	0.00005884
10	Yes	5	0.00000001	0.00004619
11	Yes	4	0.00000001	0.00066617
12	Yes	5	0.00000001	0.00004318
13	Yes	5	0.00000001	0.00007502
14	Yes	4	0.00000001	0.00001685
15	Yes	5	0.00000001	0.00012551
16	Yes	5	0.00000001	0.00014191
17	Yes	5	0.00000001	0.00014304
18	Yes	5	0.00000001	0.00011282
19	Yes	5	0.00000001	0.00016877
20	Yes	5	0.00000001	0.00015226
21	Yes	5	0.00000001	0.00012598
22	Yes	5	0.00000001	0.00015682
23	Yes	5	0.00000001	0.00014569
24	Yes	5	0.00000001	0.00011379
25	Yes	5	0.00000001	0.00014965
26	Yes	5	0.00000001	0.00017541
27	Yes	4	0.00000001	0.00019684
28	Yes	4	0.00000001	0.00012609
29	Yes	4	0.00000001	0.00011796
30	Yes	4	0.00000001	0.00011749
31	Yes	4	0.00000001	0.00026204
32	Yes	4	0.00000001	0.00020680
33	Yes	4	0.00000001	0.00019793
34	Yes	4	0.00000001	0.00019555
35	Yes	4	0.00000001	0.00012312
36	Yes	4	0.00000001	0.00011866
37	Yes	4	0.00000001	0.00018345
38	Yes	4	0.00000001	0.00029123

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	10.185	35	0.8101	0.0071
L2	100 - 80	6.938	35	0.7007	0.0071
L3	80 - 60	4.296	35	0.5390	0.0051
L4	60 - 40	2.336	35	0.3831	0.0035
L5	40 - 20	1.008	35	0.2413	0.0019
L6	20 - 0	0.250	35	0.1140	0.0008

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	35	10.185	0.8101	0.0071	26004
118.33	LNX-6515DS-VTM w/ Mount Pipe	35	9.904	0.8021	0.0072	26004
98.00	PD220	35	6.642	0.6865	0.0070	6621
70.00	PD220	35	3.233	0.4587	0.0042	7261
50.00	PD220	35	1.598	0.3106	0.0027	8132

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	25.945	8	2.0631	0.0250
L2	100 - 80	17.678	8	1.7839	0.0247
L3	80 - 60	10.950	8	1.3729	0.0178
L4	60 - 40	5.957	8	0.9764	0.0121
L5	40 - 20	2.572	8	0.6155	0.0067
L6	20 - 0	0.637	8	0.2910	0.0027

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	8	25.945	2.0631	0.0250	10225
118.33	LNX-6515DS-VTM w/ Mount Pipe	8	25.229	2.0428	0.0251	10225
98.00	PD220	8	16.923	1.7478	0.0243	2603
70.00	PD220	8	8.244	1.1687	0.0147	2856
50.00	PD220	8	4.077	0.7919	0.0094	3196

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	120 - 100 (1)	P18x3/8	20.00	0.00	0.0	25.200	20.7640	-5.63	523.25	0.011
L2	100 - 80 (2)	P24x3/8	20.00	0.00	0.0	25.200	27.8325	-9.63	701.38	0.014
L3	80 - 60 (3)	P30x3/8	20.00	0.00	0.0	25.075	34.9011	-14.13	875.15	0.016
L4	60 - 40 (4)	P36x3/8	20.00	0.00	0.0	23.696	41.9697	-19.12	994.51	0.019
L5	40 - 20 (5)	P42x3/8	20.00	0.00	0.0	22.711	49.0383	-24.55	1113.69	0.022
L6	20 - 0 (6)	P48x3/8	20.00	0.00	0.0	21.972	56.1069	-30.39	1232.77	0.025

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T-Mobile	Vinod Ramesh

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	120 - 100 (1)	P18x3/8	84.63	11.331	27.720	0.409	0.00	0.000	27.720	0.000
L2	100 - 80 (2)	P24x3/8	199.09	14.760	27.720	0.532	0.00	0.000	27.720	0.000
L3	80 - 60 (3)	P30x3/8	339.95	15.979	25.075	0.637	0.00	0.000	25.075	0.000
L4	60 - 40 (4)	P36x3/8	509.89	16.540	23.696	0.698	0.00	0.000	23.696	0.000
L5	40 - 20 (5)	P42x3/8	705.49	16.738	22.711	0.737	0.00	0.000	22.711	0.000
L6	20 - 0 (6)	P48x3/8	926.19	16.767	21.972	0.763	0.00	0.000	21.972	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	120 - 100 (1)	P18x3/8	4.85	0.467	16.800	0.028	0.00	0.000	16.800	0.000
L2	100 - 80 (2)	P24x3/8	6.23	0.448	16.800	0.027	0.75	0.028	16.800	0.002
L3	80 - 60 (3)	P30x3/8	7.69	0.441	16.800	0.026	2.50	0.059	15.644	0.004
L4	60 - 40 (4)	P36x3/8	9.15	0.436	16.800	0.026	3.66	0.059	12.523	0.005
L5	40 - 20 (5)	P42x3/8	10.39	0.424	16.800	0.025	3.70	0.044	11.156	0.004
L6	20 - 0 (6)	P48x3/8	11.66	0.416	16.800	0.025	3.72	0.034	10.093	0.003

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 100 (1)	0.011	0.409	0.000	0.028	0.000	0.420 ✔	1.333	H1-3+VT ✔
L2	100 - 80 (2)	0.014	0.532	0.000	0.027	0.002	0.547 ✔	1.333	H1-3+VT ✔
L3	80 - 60 (3)	0.016	0.637	0.000	0.026	0.004	0.654 ✔	1.333	H1-3+VT ✔
L4	60 - 40 (4)	0.019	0.698	0.000	0.026	0.005	0.718 ✔	1.333	H1-3+VT ✔
L5	40 - 20 (5)	0.022	0.737	0.000	0.025	0.004	0.760 ✔	1.333	H1-3+VT ✔
L6	20 - 0 (6)	0.025	0.763	0.000	0.025	0.003	0.789 ✔	1.333	H1-3+VT ✔

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T-Mobile	Vinod Ramesh

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P K*	*SF*P$_{allow}$ K*	*% Capacity*	*Pass Fail*
L1	120 - 100	Pole	P18x3/8	1	-5.63	697.49	31.5	Pass
L2	100 - 80	Pole	P24x3/8	2	-9.63	934.94	41.0	Pass
L3	80 - 60	Pole	P30x3/8	3	-14.13	1166.57	49.1	Pass
L4	60 - 40	Pole	P36x3/8	4	-19.12	1325.68	53.9	Pass
L5	40 - 20	Pole	P42x3/8	5	-24.55	1484.55	57.0	Pass
L6	20 - 0	Pole	P48x3/8	6	-30.39	1643.28	59.2	Pass
							Summary	
						Pole (L6)	59.2	Pass
						RATING =	**59.2**	**Pass**

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

SITE # *CT11175D*
Site Name: *Hartford/ I-84 X40_1*

Pole Manufacturer:	*Pirod*

Reactions		
Moment:	926	ft-kips
Axial:	30	kips
Shear:	12	kips

Anchor Rod Data		
Qty:	36	
Diam:	1	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	105	ksi
Bolt Circle:	51	in

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

Anchor Rod Results

Maximum Rod Tension:	23.4	Kips
Allowable Tension:	43.2	Kips
Anchor Rod Stress Ratio:	54.1%	Pass

Rigid
Service, ASD
Fty*ASIF

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:	36.0	ksi
Base Plate Stress Ratio:	Rohn/Pirod, OK	

Rigid
Service ASD
0.75*Fy*ASIF
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

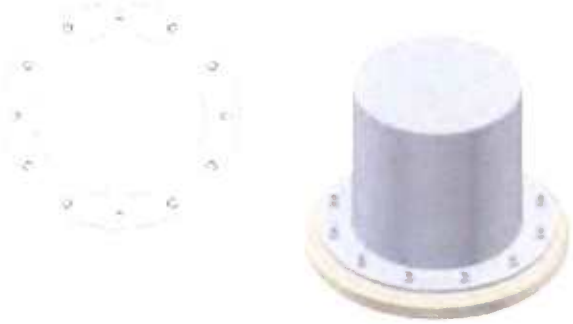
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

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

Stress Increase Factor		
ASIF:	1.333	



* 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

Analysis Date: 2/25/2015

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

Site Data

SITE # *CT11175D*
Site Name: *Hartford/ I-84 X40_1*
App #: *0*

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	32		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
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

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	705.49	ft-kips
Axial:	24.55	kips
Shear:	10.39	kips
Elevation:	20	feet

If No stiffeners, Criteria: AISC ASD <-Only Applicable to Unstiffened Cases

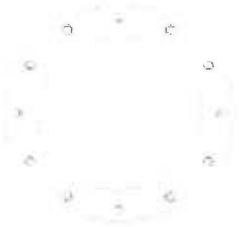
Flange Bolt Results

			Rigid
Bolt Tension Capacity, B:	46.07	kips	Service, ASD
Max Bolt directly applied T:	22.75	Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.365	in	
Min PL "treq" for actual T w/ Pry:	0.727	in	
Min PL "t1" for actual T w/o Pry:	0.959	in	
T allowable with Prying:	43.59	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	22.75	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	49.4%	**Pass**	

Exterior Flange Plate Results	Flexural Check	Rigid
Compression Side Plate Stress:	Rohn/Pirod OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod OK	Comp. Y.L. Length: 16.16
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 F

Site Data

SITE # *CT11175D*
Site Name: *Hartford/ I-84 X40_1*
App #: *0*

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	28		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
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

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	509.89	ft-kips
Axial:	19.12	kips
Shear:	9.15	kips
Elevation:	40	feet

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

Flange Bolt Results

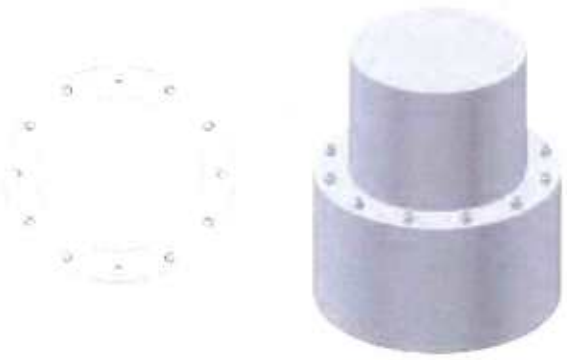
		Rigid
Bolt Tension Capacity, B:	46.07 kips	Service, ASD
Max Bolt directly applied T:	21.73 Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.379 in	
Min PL "treq" for actual T w/ Pry:	0.719 in	
Min PL "t1" for actual T w/o Pry:	0.947 in	
T allowable with Prying:	43.33 kips	0≤α'≤1 case
Prying Force, Q:	0.00 kips	
Total Bolt Tension=T+Q:	21.73 kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	47.2% Pass	

Exterior Flange Plate Results Flexural Check

		Rigid
Compression Side Plate Stress:	Rohn/Pirod OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod OK	Comp. Y.L. Length:
No Prying		15.00
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 F

Site Data

SITE # *CT11175D*
Site Name: *Hartford/ I-84 X40_1*
App #: *0*

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
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

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	340.00	ft-kips
Axial:	14.13	kips
Shear:	7.67	kips
Elevation:	60	feet

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

Flange Bolt Results

			Rigid
Bolt Tension Capacity, B:	46.07	kips	Service, ASD
Max Bolt directly applied T:	20.02	Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.398	in	
Min PL "treq" for actual T w/ Pry:	0.701	in	
Min PL "t1" for actual T w/o Pry:	0.922	in	
T allowable with Prying:	42.98	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	20.02	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	43.5%	**Pass**	

Exterior Flange Plate Results — Flexural Check

		Rigid
Compression Side Plate Stress:	Rohn/Pirod OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod OK	Comp. Y.L. Length: 13.75

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 F

Site Data

SITE # *CT11175D*
Site Name: *Hartford/ I-84 X40_1*
App #: *0*

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
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

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	199.10	ft-kips
Axial:	9.63	kips
Shear:	6.23	kips
Elevation:	80	feet

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

Flange Bolt Results

			Rigid
Bolt Tension Capacity, **B**:	46.07	kips	Service, ASD
Max Bolt directly applied T:	17.22	Kips	Fty*ASIF
Min. PL "tc" for **B** cap. **w/o** Pry:	1.427	in	
Min PL "treq" for actual **T w/ Pry**:	0.666	in	
Min PL "t1" for actual **T w/o Pry**:	0.873	in	
T allowable with Prying:	42.49	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	17.22	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	37.4%	**Pass**	

Exterior Flange Plate Results — Flexural Check

		Rigid
Compression Side Plate Stress:	Rohn/Pirod OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod OK	Comp. Y.L. Length: 12.37

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 F

Site Data

SITE # *CT11175D*
Site Name: *Hartford/ I-84 X40_1*
App #: *0*

Pole Manufacturer:	Pirod

Reactions		
Moment:	84.63	ft-kips
Axial:	5.63	kips
Shear:	4.85	kips
Elevation:	100	feet

If No stiffeners, Criteria:	AISC ASD	<-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	Bolt Fty:
N/A:	75	<-- Disregard	44.00
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

Stress Increase Factor		
ASIF:	1.333	

Flange Bolt Results

			Rigid
Bolt Tension Capacity, **B**:	46.07	kips	Service, ASD
Max Bolt directly applied T:	11.74	Kips	Fty*ASIF
Min. PL "tc" for **B** cap. **w/o** Pry:	1.474	in	
Min PL "treq" for actual **T w/ Pry**:	0.571	in	
Min PL "t1" for actual **T w/o Pry**:	0.744	in	
T allowable with Prying:	41.75	kips	0≤α'≤1 case
Prying Force, Q:	0.00	kips	
Total Bolt Tension=T+Q:	11.74	kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	25.5%	**Pass**	

Exterior Flange Plate Results — Flexural Check

		Rigid
Compression Side Plate Stress:	Rohn/Pirod OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod OK	Comp. Y.L. Length:
No Prying		10.82
Tension Side Stress Ratio, (treq/t)^2:	Rohn/Pirod OK	

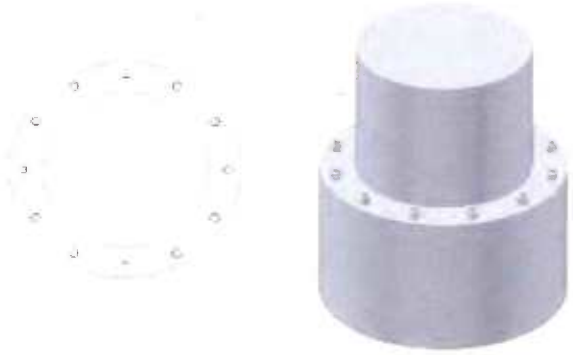
n/a

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

EXHIBIT C

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

T-Mobile Existing Facility

Site ID: CT11175D

Hartford / I-84/ X40_1
297 East Barber Street
Windsor, CT 06095

February 18, 2015

EBI Project Number: 62151209

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	16.78 %

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

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February 18, 2015

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

Emissions Analysis for Site: **CT11175D – Hartford / I-84/ X40_1**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **297 East Barber Street, Windsor, 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 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and 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 **297 East Barber Street, Windsor, 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 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 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.

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) 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.

6) For the following calculations the sample point was the top of a six 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.

7) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz 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. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. 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.

8) The antenna mounting height centerline of the proposed antennas is **120 feet** above ground level (AGL).

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

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

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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):	120	Height (AGL):	120	Height (AGL):	120
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	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	1.29	Antenna B1 MPE%	1.29	Antenna C1 MPE%	1.29
Antenna #:	2	Antenna #:	2	Antenna #:	2
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):	120	Height (AGL):	120	Height (AGL):	120
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:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE%	1.29	Antenna B2 MPE%	1.29	Antenna C2 MPE%	1.29
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	120	Height (AGL):	120	Height (AGL):	120
Frequency Bands	700 Mhz	Frequency Bands	700 Mhz	Frequency Bands	700 Mhz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	0.51	Antenna B3 MPE%	0.51	Antenna C3 MPE%	0.51

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**9.29**
Other Antennas	7.49 %
Site Total MPE %:	**16.78 %**

T-Mobile Sector 1 Total:	3.10 %
T-Mobile Sector 2 Total:	3.10 %
T-Mobile Sector 3 Total:	3.10 %
Site Total:	16.78 %

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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 1:	3.10 %
Sector 2:	3.10 %
Sector 3 :	3.10 %
T-Mobile Total:	9.29 %
Site Total:	16.78 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **16.78%** 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.

Scott Heffernan
RF Engineering Director

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