



**VIA CERTIFIED U.S. MAIL,
RETURN RECEIPT REQUESTED**

October 18, 2016

Fort Bend County
301 Jackson, Suite 719
Richmond, Texas 77469

Attn: Honorable Robert E. Hebert,
County Judge, Fort Bend County, Texas

And to:

Fort Bend County Purchasing Agent
4520 Reading Road, Suite A
Rosenberg, TX 77471

Re: T-Mobile Site #: A3F0194A / William Travis Building
Site Address: 309 South 4th Street, Richmond, TX 77469
Acknowledgment and Consent Letter for Upgrade and Modification of Antenna Facilities

Your Honor and Purchasing Agent,

T-Mobile West LLC, a Delaware limited liability company, successor by conversion or merger to T-Mobile West Corporation., a Delaware corporation and VoiceStream Houston, Inc. a Delaware Corporation ("Licensee"), and Fort Bend County, a body corporate and politic under the laws of the State of Texas ("Licensor") entered into a Lease Agreement ("the Lease") dated April 6, 2004, for site located at 309 South 4th Street, Richmond, TX, upon which T-Mobile operates wireless antenna facilities.

Pursuant to the Lease, specifically **Section 1 USE**, The Leased Premises are hereby leased to Lessee as a site for a communications facility consisting of antennae and associated cabling and equipment as more particularly described below. (the "Antenna Facility") and for any other lawful purpose consistent with related communications applications, for which Lessee may use the Leased Premises. Lessee shall have the right to erect, construct, operate, maintain, repair and replace on the leased Premises a single 10'x20' footprint for its radio equipment on the Leased Premises three all-weather outdoor cabinets and one (1) all-weather battery backup cabinet holding its radios and emergency batteries in the event of a power failure. Lessee agrees and shall be required to light the Antenna Facility in any manner required by the Federal Aviation Agency. Within the confines of each antenna footprint, Lessee shall have the right to erect, construct, operate, maintain, repair and replace a sled mount weighted down with ballast. Two (2) antennae will be mounted on the front of each sled approximately 10' – 12' apart.

By First Amendment to Lease Agreement dated July 24, 2012 the terms of the Lease Agreement were amended to allow additional equipment as reflected by the construction drawings attached thereto and made a part thereof. Specifically, the antenna count was increased to nine (9) antennas and additional hardware added.

T-Mobile needs to upgrade and modify the antenna facilities by removing three (3) antenna and installing the new equipment described in attached Construction Drawings, all pursuant to the terms and conditions contained in the Lease Agreement and First Amendment to the Lease Agreement, during the fourth quarter of 2016. All of the new equipment will be installed within the existing leased premises. Enclosed is a copy of the passing Structural Analysis for your records.

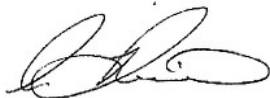
To confirm your approval of the proposed upgrade and modifications to the antenna facilities, please sign and date both counterparts of this letter and the first page of the construction drawings, keeping one for your records and return the other in the enclosed envelope.

If you have any questions, please contact me at (713) 407-3494 or via email at Anthony.Randio@T-Mobile.com.

Thank you for your cooperation and attention to this matter.

Sincerely,

T-Mobile West LLC



Anthony (Tony) Randio
Development Manager

Acknowledged, Accepted and Agreed:

Landlord: _____

By: _____

Name: _____

Title: _____

Date: _____



L1900 CAPACITY ADDITION

SITE NAME: WILLIAM TRAVIS BUILDING
SITE NUMBER: A3F0194A
STRUCTURE TYPE: ROOFTOP
MARKET: HOUSTON

CONSTRUCTION DRAWINGS
APPROVED BY: _____
DATE: _____

SIGN HERE

DRAWING INDEX

T1	TITLE SHEET
T2	GENERAL NOTES
T3	SITE PLAN & EQUIPMENT LAYOUT
C1	BUILDING ELEVATION
C2.1	ANTENNA LAYOUT
C2.2	EQUIPMENT SCHEDULE & DETAILS
C2.3	EQUIPMENT DETAILS

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

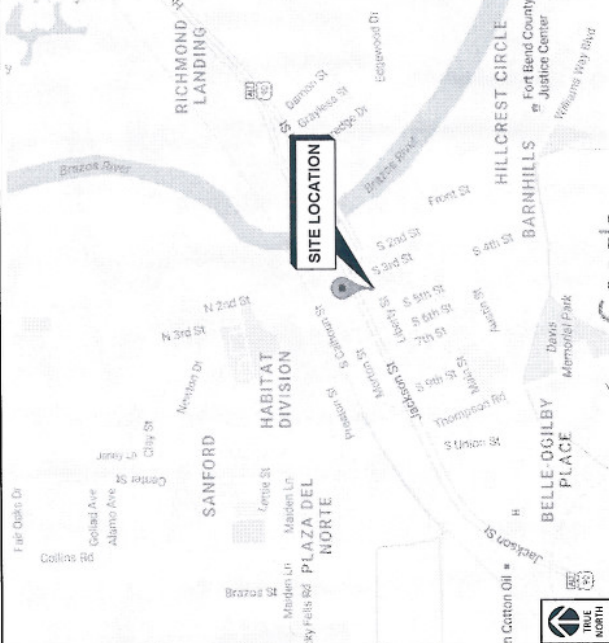
TITLE	SIGNATURE	DATE
T-MOBILE RF ENGINEER		
T-MOBILE REPRESENTATIVE		
CONSTRUCTION MANAGER		
SITE ACQUISITION		
SITE OWNER		
PROJECT MANAGER		

ONE CALL



MAP AND DIRECTIONS

FROM T-MOBILE SWITCH 4660 N SAM HOUSTON E. HEAD EAST ON TEXAS 8 BELTWAY FRONTAGE RD TOWARDS VICKERY DR. SLIGHT RIGHT ONTO TEXAS 8 BELTWAY FRONTAGE RD. TURN RIGHT ONTO S170/STASTEX FREEWAY SERVICE ROAD. TURN LEFT ONTO INTERSTATE 69 S 59 SUP. ROAD. MERGE ONTO I-69. TAKE THE WILLIAMS WAY BVD. EXIT. TURN RIGHT ONTO WILLIAMS WAY. TURN LEFT ONTO FRONT ST. TURN LEFT ONTO FRONT ST/MAIN ST. CONTINUE TO FOLLW MAIN ST. TURN RIGHT AT THE 2ND CROSS STREET ONTO S 3RD ST. TURN LEFT ONTO LIBERTY ST.



PROJECT INFORMATION

- SCOPE OF WORK:**
- THE WIRELESS COMMUNICATIONS FACILITY IS NOT INTENDED FOR HUMAN OCCUPANCY
 - THIS FACILITY DOES NOT REQUIRE POTABLE WATER AND WILL NOT PRODUCE ANY SERVICE OR WASTE
 - THE PROJECT DOES NOT INVOLVE ANY MODIFYING THE EXISTING WIRELESS INSTALLATION.
 - INSTALL (3) NEW FRBG & (3) NEW FHFB
 - INSTALL (3) NEW FRU
 - RELOCATED (1) FHFB TO FCCA CABINET
 - INSTALL (3) NEW ANTENNAS
 - INSTALL (3) TMA'S
 - EXISTING (3) ANTENNAS TO BE REMOVED
 - EXISTING (3) TMA'S TO BE REMOVED
 - EXISTING (3) FHFB TO BE REMOVED
 - EXISTING (3) FRBG TO BE REMOVED
 - INSTALL SYSTEM/RADIO MODULES IN EXISTING CABINET
 - INSTALL SYSTEM/RADIO MODULES IN EXISTING CABINET
 - THE PROPOSED ELECTRICAL WORK FOR THE SCOPE OF THIS PROJECT IS LOW VOLTAGE DC POWER ONLY

RFDS VERSION: 1.1
LATITUDE (NAD 83): 28.58166666° (29° 34' 54.00" N)
LONGITUDE (NAD 83): -95.7609444° (-95° 45' 39.39" W)
JURISDICTION: CITY OF RICHMOND

CONSULTING TEAM

ENGINEER: AERLINC, INC.
10006 LYMBROOK DR.
HOUSTON, TX 77042
CONTACT: IRAN TISHABADI
PHONE: 281-797-4397

PROPERTY OWNER: T-MOBILE USA
2 GREENWAY PLAZA, SUITE 1100
HOUSTON, TX 77046
CONTACT: J.C. WHITTEN
281-344-3950

BUILDING CODES

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE FOLLOWING APPLICABLE CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES:

- IBC 2012 BUILDING/INWELLING CODE
- IBC 2012 STRUCTURAL CODE
- 2012 UPC PLUMBING CODE
- 2012 UMC MECHANICAL CODE
- 2014 NEC ELECTRICAL CODE
- 2012 IFEC ELECTRICAL CODE
- 2009 ECC (ENERGY CONSERVATION CODE)

THIS TOWER WAS BUILT PRIOR TO JANUARY 1, 2016. THE SCOPE OF THIS PROJECT DOES NOT INVOLVE EMERGENCY RESPONSE EQUIPMENT.

THE TELECOMMUNICATIONS FACILITY WILL NOT PROVIDE SERVICE TO STRUCTURES OR FACILITIES DESIGNATED IN A RISK CATEGORY HIGHER THAN 2 AND IS NOT CONSIDERED ESSENTIAL TO EMERGENCY RESPONDERS TO COMPLETE THEIR TASK DURING AN EMERGENCY EVENT.

DESIGN WIND SPEED 110mph 3-SECOND GUST (EQUIVALENT TO 142mph ULTIMATE WIND SPEED) FOR THIS SITE LOCATION.

EXPOSURE CATEGORY C, STRUCTURAL CLASS II, TOPOGRAPHIC CATEGORY I.

PLANS PREPARED FOR:



T-MOBILE USA
2 GREENWAY PLAZA, SUITE 1100
HOUSTON, TX 77046

PLANS PREPARED BY:



ARIA
SERVICES, INC.
(281) 797-4387
www.aria-corp.com
TX FRM REG# F-15104

SITE NAME:

**WILLIAM TRAVIS
BUILDING**

SITE NUMBER:

A3F0194A

SITE ADDRESS:

**309 S. 4TH
RICHMOND, TX 77469
FORT BEND COUNTY**

REVISION HISTORY

REV	DATE	DESCRIPTION	BY
A	09/05/16	CONSTRUCTION REVIEW	RS

STAMP:



TEXAS BOARD OF PROFESSIONAL ENGINEERS #91987

SHEET TITLE:

TITLE SHEET

SHEET NUMBER:

T1

SCALE IS BASED ON 2" = 1' - 0" SIZE

[illegible]

PLANS PREPARED FOR:

T-Mobile

T-MOBILE USA
2 GREENWAY PLAZA, SUITE 1100
HOUSTON, TX 77046

PLANS PREPARED BY:



ARIA SERVICES, INC.
(281) 797-4387
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TEXAS BOARD OF PROFESSIONAL ENGINEERS # 91987

10/11/16

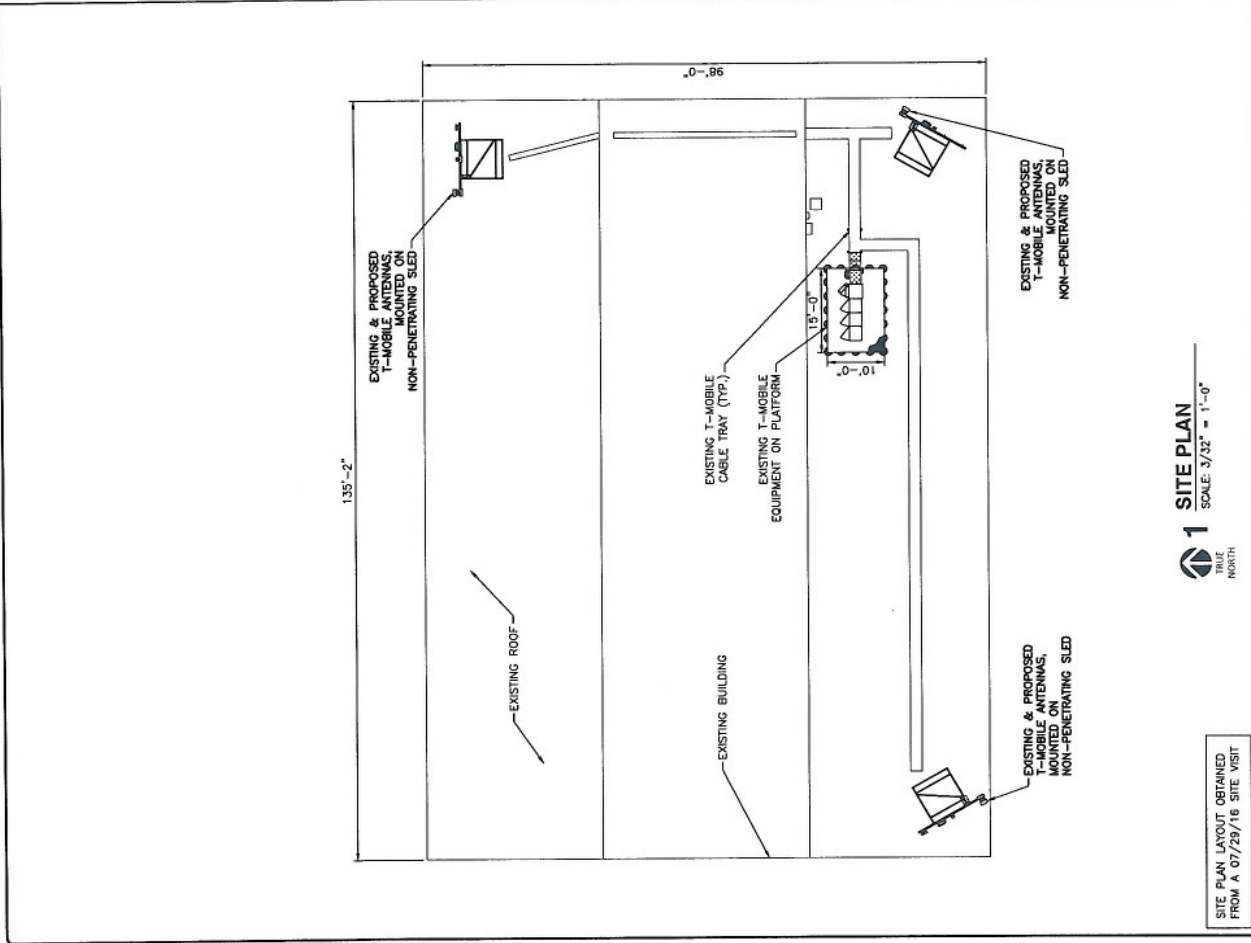
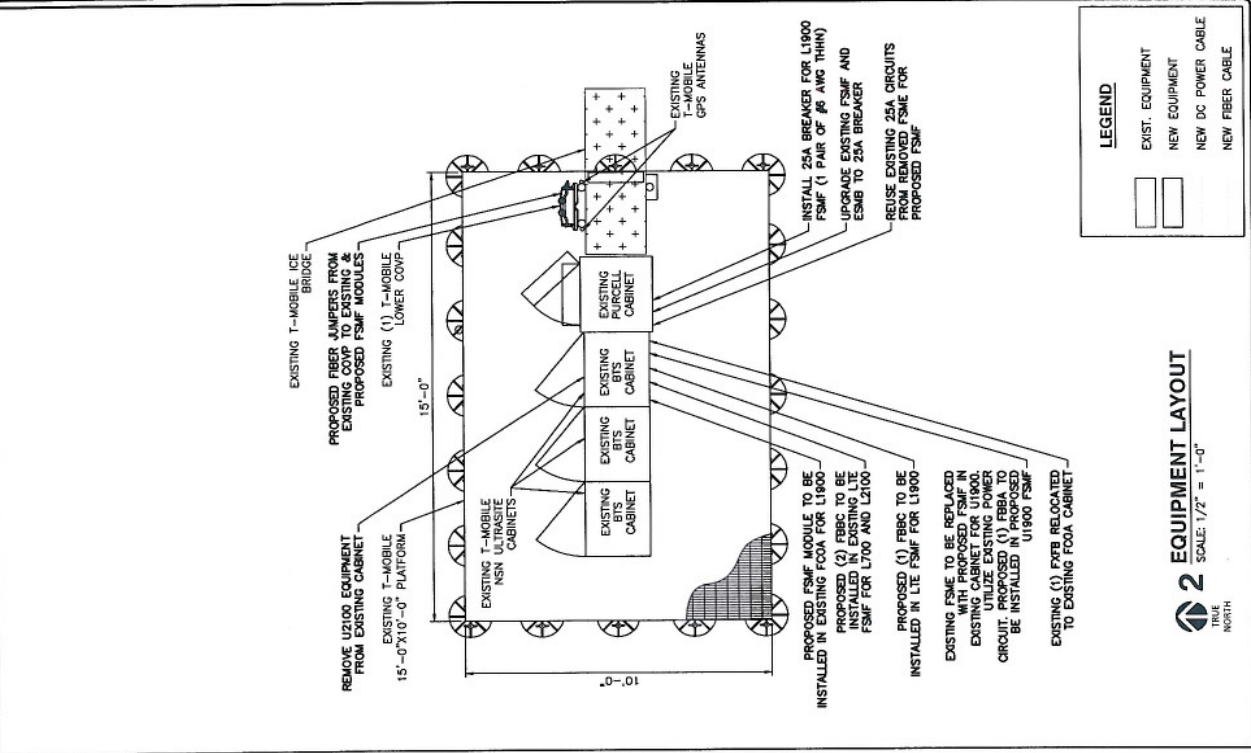
SHEET TITLE:

**SITE PLAN &
EQUIPMENT LAYOUT**

SHEET NUMBER:

C1

SCALE IS BASED ON 28" x 34" 10" SIZE



SITE PLAN LAYOUT OBTAINED FROM A 07/28/16 SITE VISIT

PLANS PREPARED FOR:

T-Mobile

T-MOBILE USA
2 GREENWAY PLAZA, SUITE 1100
HOUSTON, TX 77046

PLANS PREPARED BY:



**ARIA
SERVICES, INC.**
(281) 797-4387
www.aria-corp.com
TX FIRM REG# F-13104

SITE NAME:

**WILLIAM TRAVIS
BUILDING**

SITE NUMBER:

A3F0194A

SITE ADDRESS:

**309 S. 4TH
RICHMOND, TX 77469
FORT BEND COUNTY**

REVISION HISTORY			
REV	DATE	DESCRIPTION	BY
A	08/25/16	CONSTRUCTION REVIEW	RS

STAMP:



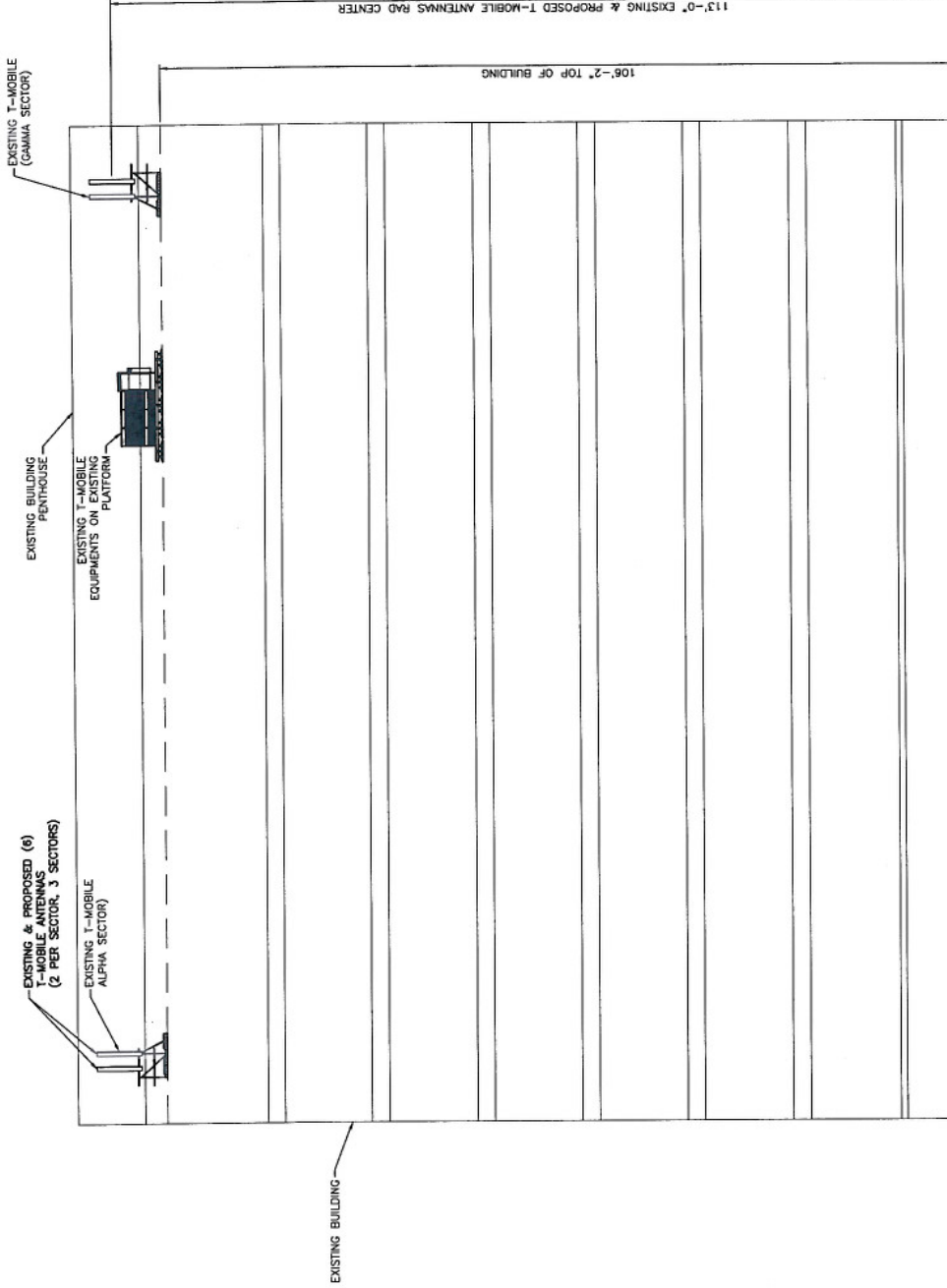
TEXAS BOARD OF PROFESSIONAL ENGINEERS # 91997
SHEET TITLE:
10/11/16

BUILDING ELEVATION

SHEET NUMBER:

C2

SCALE IS BASED ON 27" x 34" 10" SIZE



1 TOWER ELEVATION
SCALE: NOT TO SCALE

FOR STRUCTURAL INTEGRITY OF THE
TOWER, REFER TO STRUCTURAL
ANALYSIS REPORT, DONE BY ARIA
SERVICES, INC. DATED 08/25/16.

CONTRACTOR TO REFER
TO LATEST RFDS PRIOR
TO CONSTRUCTION.

SCALE IS BASED ON 22" x 34" "D" SIZE





PLANS PREPARED FOR:



T-MOBILE USA
2 GREENWAY PLAZA, SUITE 1100
HOUSTON, TX 77046

PLANS PREPARED BY:



ARIA SERVICES, INC.
(281) 797-4387
www.aria-corp.com
TX FIRM REG# F-13104

SITE NAME:

**WILLIAM TRAVIS
BUILDING**

SITE NUMBER:

A3F0194A

SITE ADDRESS:

**309 S. 4TH
RICHMOND, TX 77469
FORT BEND COUNTY**

REVISION HISTORY

REV	DATE	DESCRIPTION	BY
A	09/09/16	CONSTRUCTION REVIEW	RL

STAMP:



10/11/16

TEXAS BOARD OF PROFESSIONAL ENGINEERS 70397

SHEET TITLE:

**EQUIPMENT SCHEDULE
& DETAILS**

SHEET NUMBER:

C2.3

SCALE IS BASED ON 22" x 34" D SIZE

TOWER TOP EQUIPMENT SCHEDULE

SECTOR	ANTENNA NUMBER	TECHNOLOGY	ANTENNA MODEL	ANTENNA AZIMUTH	RAD CENTER	TRANSMISSION CABLE		RRU MODEL	TMA/DIPLER MODEL	TOWER TOP COWP MODEL
						LENGTH	TYPE			
ALPHA	A1	(LTE, PCS/UMTS/700 UNITS, PCS)	(P) NOKIA FASB RAS (PENTA)	0°	113°-0°	130'	(E) (1) 7/8" LOW CAP HYBRID CABLE	(P) (1) FRU	-	(1) (E) NSN LARGE COWP RAYCAP RNSDC-7771-PF-48
	A2	GSM PCS	(E) RFS (DUAL) APXY18-206517S-A20	0°	113°-0°	-	-	-	(P) (1) TMA RFS STYLE 1A-ATM19000-1A20	
BETA	B1	(LTE, PCS/UMTS/700 UNITS, PCS)	(P) NOKIA FASB RAS (PENTA)	120°	113°-0°	75'	(E) (1) 7/8" LOW CAP HYBRID CABLE	(P) (1) FRU	-	
	B2	GSM PCS	(E) RFS (DUAL) APXY18-206517S-A20	120°	113°-0°	-	-	-	(P) (1) TMA RFS STYLE 1A-ATM19000-1A20	
GAMMA	C1	(LTE, PCS/UMTS/700 UNITS, PCS)	(P) NOKIA FASB RAS (PENTA)	240°	113°-0°	155'	(E) (1) 7/8" LOW CAP HYBRID CABLE	(P) (1) FRU	-	
	C2	GSM PCS	(E) RFS (DUAL) APXY18-206517S-A20	240°	113°-0°	-	-	-	(P) (1) TMA RFS STYLE 1A-ATM19000-1A20	

NOTE: (P) DENOTES PROPOSED EQUIPMENT, (E) DENOTES EXISTING EQUIPMENT

1 EQUIPMENT SCHEDULE
SCALE: NOT TO SCALE

2 NOT USED
SCALE: NOT TO SCALE

3 NOT USED
SCALE: NOT TO SCALE

NOKIA

Preliminary Datasheet

Nokia FASB Antenna Specifications

Three Cross Polarized Column Antenna (2 x High Band, 1 x Low Band)

- 10-port antenna using 4.3-10 connectors for all antenna ports
- Independent electrical tilt for high and low bands.

Nokia Networks

NOKIA

Nokia Networks

Dimensions

Depth	13.4 in (340 mm)
Height	96 in (2440 mm)
Width	14.9 in (380 mm)
Weight, antenna assembly	108 lb (49 kg)

Remote Electrical Tilt (RET) Information

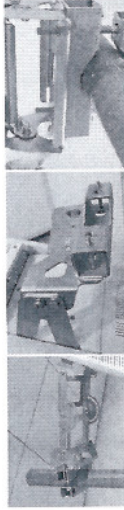
Protocol and RET interfaces	according to 3GPP/ANSI 2.0 standards
RET Interface connectors	8-pin DIN Female / 8-pin DIN Male
RET Interface, quantity	Four DIN connectors, (1 pair for HB and one pair for LB)

Environmental Specifications

Environmental conditions for operation	ETSI EN 300 019-1-4 Class 4.1E
Environmental conditions for transportation	ETSI EN 300 019-1-2 Class 2.3
Environmental conditions for storage	ETSI EN 300 019-1-1 Class 1.2
Operational air temperature range	-40°C ... +50°C (with solar load 1120W/m²)
Earthquake	3R-63-CORE, Zone 4
Wind Loading, maximum at 200km/h wind	Front: 1170N, Back: 950N, Side: 1230N
Wind Speed, maximum	200km/h steady wind, 67m/s wind gusts

Product Items Included

Full antenna, tilt brackets (upper and lower), jumper cables and related accessories



Confidential
Preliminary Datasheet

© Nokia Networks 2015

General Specifications

Antenna type	XXXpol, Multiband
Operating Frequency bands	898 - 894 MHz (Xpol) 1695 - 2690 MHz (XXpol)

Electrical Specifications

Frequency Band, MHz	Low Band	High Band 1	High Band 2
Gain, average [dBi]	69.4-79.1	1695-1780 79.1-89.4	1890-1920 1930-2000
Gain, Over All Tilts [dBi]	16.0 ± 0.4	17.3 ± 0.4	18.0 ± 0.4
Azimuth Beamwidth [°]	60 ± 4	63 ± 3	60 ± 4
Elevation Beamwidth [°]	10 ± 1	6.0 ± 0.7	5.5 ± 0.6
Electrical Downtilt [°]	2...12	2...12	2...12
USLS [dB]	> 17	> 16	> 17
Front-to-Back Ratio, at 180°±30° [dB]	> 25	> 25	> 25
Cross Polar Isolation [dB]	> 30	> 30	> 30
Isolation, Intersystem [dB]	> 30	> 30	> 30
VSWR / Return Loss [dB]	< 1.5 > 14	< 1.5 > 14	< 1.5 > 14
Passive Intermodulation (2x2x3dBm) [dBc]	< -150	< -150	< -150
Input Power per Port, max [W] (CF= 8dB)	300	200	200
Polarization [°]		± 45	
Impedance [Ohm]		50	

Mechanical Specifications

Radome Material	Fiberglass, UV resistant
Colour	RAL 7047
RF Connector Interface	4.3-10 Female, 10 pcs
RF Connector Location	Bottom
Lightning Protection	DC Ground

Confidential
Preliminary Datasheet

© Nokia Networks 2015

1 ANTENNA SPECIFICATIONS

SCALE: NOT TO SCALE

PLANS PREPARED FOR:

T-Mobile

T-MOBILE USA
2 GREENWAY PLAZA, SUITE 1100
HOUSTON, TX 77046

PLANS PREPARED BY:



ARIA
SERVICES, INC.
(281) 797-4387
www.aria-corp.com
TX FIRM REG# F-13104

SITE NAME:

WILLIAM TRAVIS
BUILDING

SITE NUMBER:

A3F0194A

SITE ADDRESS:

309 S. 4TH
RICHMOND, TX 77469
FORT BEND COUNTY

REV	DATE	DESCRIPTION	BY
A	07/05/16	CONSTRUCTION REVIEW	RS

STAMP:



TEXAS BOARD OF PROFESSIONAL ENGINEERS # 91997

SHEET TITLE:

EQUIPMENT DETAILS

SHEET NUMBER:

C3

SCALE IS BASED ON 22" x 34" "D" SIZE

ARIA SERVICES, INC.

6602 Harbor Town, Unit #101

Houston, TX 77036-4033

(281) 797-4387 – info@aria-corp.comwww.aria-corp.com TX Firm Reg# F-13104

May 05, 2012

Mr. Anthony J. Randio**T-Mobile****2 Greenway Plaza, Suite 1100****Houston, TX 77046**

Subject: **Structural Analysis Report**
Site Information: **A3F0194A, William Travis Building, T-Mobile**
309 S. 4th, Richmond, TX 77469
Jurisdiction: City of Richmond, TX
Latitude: 29.5816666 / Longitude: -95.7609444

Structure Type: **Rooftop, Antenna @ 113'-0" Rad Center**

Mr. Randio,

Aria Services, Inc. is pleased to submit this report to determine the structural integrity of the existing standard non-penetrating antenna mount sled on rooftop to support the following load (per sector):

- Two (2) RFS model # APX17DWV_DWVS panel antenna (75.2" L x 13" W x 3.15" D, 55 lbs.)
- One (1) RFS model # APXV18-206517S_C panel antenna (72" L x 6.65" W x 3.15" D, 32.5 lbs.)
- One (1) FXFB radio module (19.4" W x 5.2" H x 16.6" D, 55.1 lbs.)
- One (1) FRIA radio module (17.6" W x 5.2" H x 15.6" D, 55.1 lbs.)
- One (1) FRIG behind APX17 antenna, (18.9" L x 15.24" W x 5.98" D, 57.3 lbs.)

The enclosed calculation for the above condition has been executed in accordance with:

- 1996 TIA/EIA-222-F standard, 2006 International Building Code, and local code.
- Design wind speed 95 mph fastest mile wind/90 mph basic wind speed (equivalent to 110 mph, 3-second gust wind) for Richmond, Fort Bend County, TX.

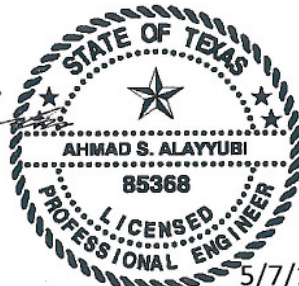
Per the enclosed calculation, the existing antenna mount sleds on roof deck at rad center 113'-0" have been determined to be **structurally adequate** to support the loading listed above at the location shown on construction drawings.

Please refer to Appendices for analysis results, for loading, and mounting method to the structure. Should you need any further assistance, please do not hesitate to contact us.

Sincerely,



Ahmad Al-Ayyubi, P.E.
Engineering Supervisor



5/7/12

APPENDIX – A

Structural Calculations

Wind Force Calculations:

Code: TIA/EIA-222-F

Antenna rad. center: 145'-0" AGL

$$q_{wind} = 0.00256 K_z \bar{V}^2 \times G_H \times C_F$$

$$K_z = \left(\frac{h}{33}\right)^{2/7} = \left(\frac{113}{33}\right)^{2/7} = 1.421$$

 $V = 95 \text{ mph (Fastest Mile)} = 110 \text{ mph (3 - Second Gust)}$

$$G_H = \frac{0.65}{\left(\frac{113}{33}\right)^{1/7}} + 0.60 = 1.145$$

$$q_{wind} = 0.00256 \times 1.421 \times 95^2 \times 1.145 \times 1 = 37.6 \text{ psf}$$

New Antennas, with one (1) FRIG, negligible behind one APX17 antenna:

$$A_F = \frac{2 \times 75.8" \times 13"}{144} + \frac{72" \times 6.65"}{144} = 17.01 \text{ ft}^2 \text{ per sector}$$

$$\text{Total Antennas Area} = 17.01 \text{ ft}^2 \text{ per sector}$$

Radio Modules, (1) FXFB and (1) FRIA, mounted 2'-0" above sled base:

$$A_F = \frac{19.4" \times 5.2"}{144} + \frac{17.6" \times 5.2"}{144} = 1.34 \text{ ft}^2 \text{ per sector}$$

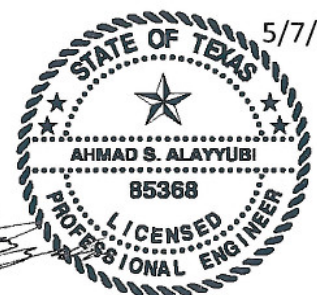
$$F_{WIND1} = 37.6 \text{ psf} \times 17.01 \text{ ft}^2 = 639.74\# \text{ per sector}$$

$$F_{WIND2} = 37.6 \text{ psf} \times 1.34 \text{ ft}^2 = 50.4\# \text{ per sector}$$

Average Height of Antennas above Roof = 7'-0" +/-

$$\text{Overturning moment} = (639.74\# \times 7' + 50.4\# \times 2') = 4579\# \cdot \text{ft}$$

$$\text{Factor of safety} = 1.50$$



5/7/12

Let W = Weight of total ballast per side

Sled weight & (3) 7', 2-3/8" mount pipes = 475#

Appurtenances weight (3 RFS antennas & 3 Radio Modules)

= $2 \times 55\# + 1 \times 32.5\# + 2 \times 55.1\# + 1 \times 57.3\# +$ = 310#

Total sled & appurtenances weight = 785#

Stability Equation:

$$(1.5)(4579) = W \left(8.5 - \frac{1.0}{2} \right) + 785 \times \left(\frac{8.5}{2} \right)$$

$$W_{REQ'D} = 442\# / side$$

For 4" x 8" x 16" Concrete Block

$$\text{Weight / Block} = \frac{4" \times 8" \times 16"}{12^3} \times 120\# / \text{ft}^3 = 36\# \text{ per block}$$

$$\text{Number of Blocks required} = \frac{442}{36} = 12.5 \text{ blocks per side}$$

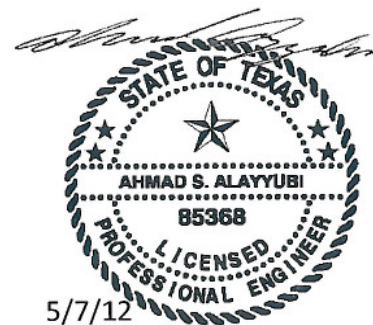
$$\text{Total Blocks Required per Sector } 12.5 \times 2 = 25 \text{ Blocks}$$

$$\text{Total Existing Blocks Weight } 36 \times 36\# + 1 \times 72\# \text{ per sled} = 1368\#$$

$$\text{Total Required Blocks Weight per sled} = 882\# < 1368\#, \text{ O.K}$$

Conclusion:

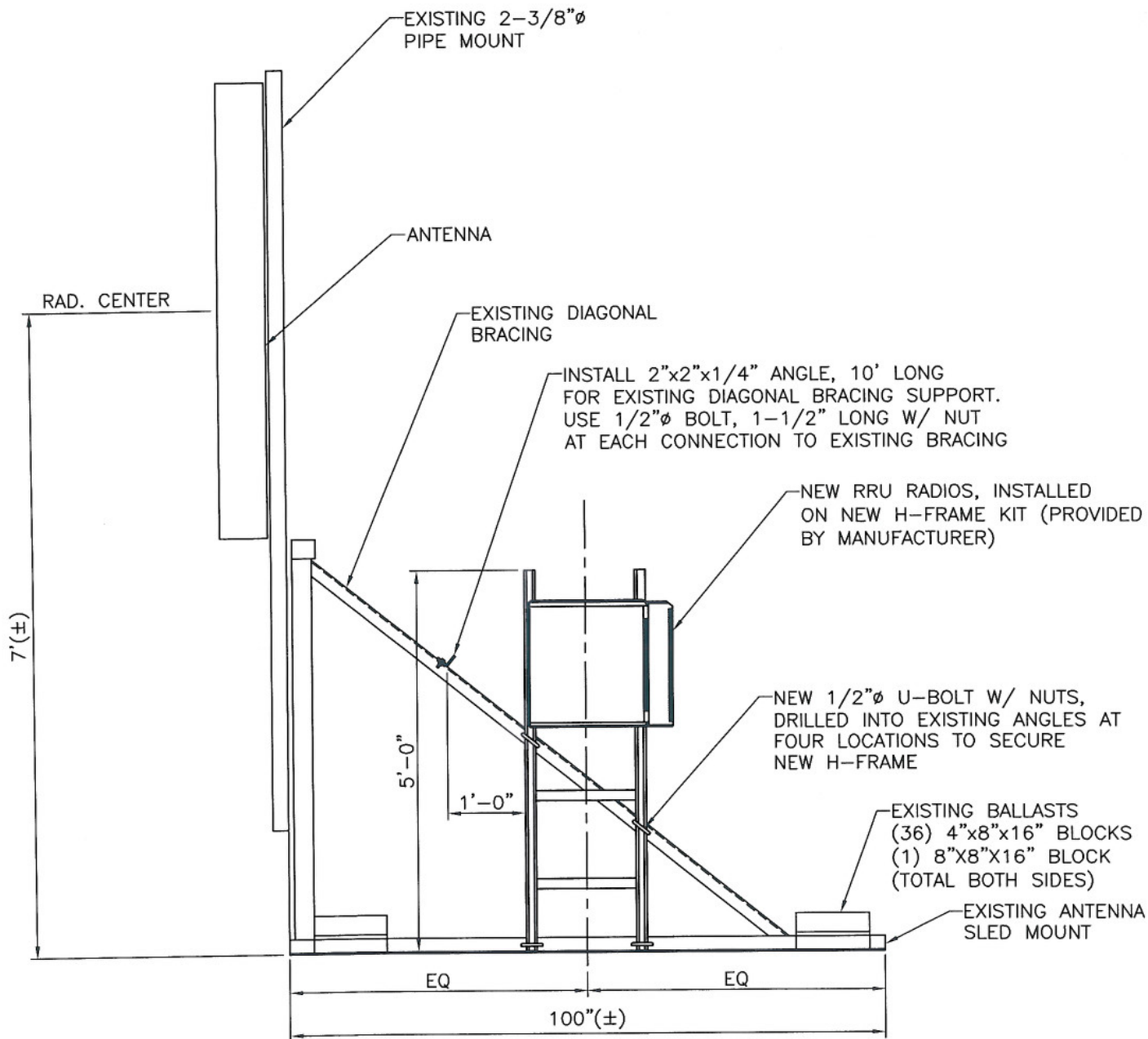
Existing sleds and roof are sufficient to support the new load.



APPENDIX – B

Reference Drawings

File Info: F:\Bran-Structural-Analysis\T-Mobile\3-Sled\3F01944_Site Survey_041612\3F01944_Sled Mount.dwg May 05, 2012 - 10:31am victor



SLED DETAIL
NOT TO SCALE

T-Mobile®
Get More From Life
2 GREENWAY PLAZA
11TH FLOOR
HOUSTON, TX 77046

**ARIA
SERVICES, INC.**
(281) 797-4387
WWW.ARIA-CORP.COM
TX FIRM REG# F-13104



SITE NAME: WILLIAM TRAVIS BLDG
SITE ADDRESS:
309 S. 4th (E911)
RICHMOND, TX 77469
DATE: 05-05-12
APPROVED _____
APPROVED _____

APPENDIX – C

Equipment Cut Sheets



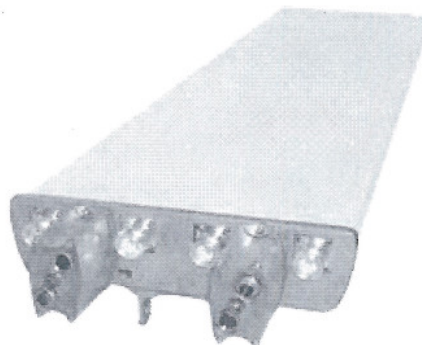
Optimizer® Side-by-Side Dual Polarized Antenna, 1710-2200, 65deg, 18.8dBi, 1.9m, VET, 0-10deg RET

Product Description

A combination of two X-Polarized antennas in a single radome, this pair of variable tilt antennas provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features null fill and a wide downtilt range with optional remote tilt. This antenna is optimized for performance across the entire frequency band (1710-2200 MHz). The antenna comes pre-connected two antenna control units (ACU).

Features/Benefits

- Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.
- High Suppression of all Upper Sidelobes (Typically <-20dB).
- Gain difference between UL and DL <1dB.
- Two X-Polarised panels in a single radome.
- Azimuth horizontal beamwidth difference <5deg between UL and DL (1710-1755 & 2110-2155).
- Low profile for low visual impact.
- Dual polarization; Broadband design.
- Includes (2) AISG 2.0 Compatible ACU-A20-N antenna control units



Technical Specifications

Electrical Specifications

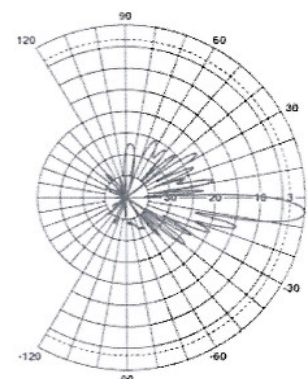
Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65 ±5 (64.8 average across band)
Vertical Beamwidth, deg	4.3 to 5.6
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.8 (16.7) Avg. across band
Upper Sidelobe Suppression, dB	Typically > 20
Front-To-Back Ratio, dB	> 25 (Typically 28)
Polarization	Dual pol +/-45°
VSWR	< 1.5:1
Isolation between Ports, dB	> 30
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)
7th Order IMP @ 2 x 38 dBm, dBc	> 170
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	(4) 7-16 Long Neck Female

Mechanical Specifications

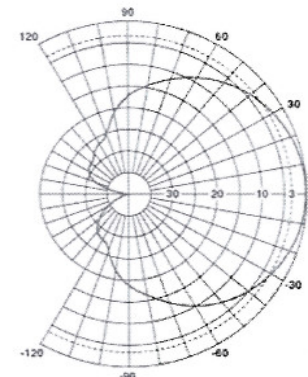
Dimensions - HxWxD, mm (in)	1925 x 331 x 80 (75.8 x 13 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	25.0 (55)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	160 (100)
Max Wind Loading Area, m² (ft²)	0.64 (6.85)
Front Thrust @ Rated Wind, N (lbf)	1026 (230)
Maximum Thrust @ Rated Wind, N (lbf)	1026 (230)
Wind Load - Side @ Rated Wind, N (lbf)	314 (70)
Wind Load - Rear @ Rated Wind, N (lbf)	554 (124)
Radome Material	Fiberglass
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Shipping Weight, kg (lb)	31 (68.2)
Packing Dimensions, HxWxD, mm (in)	2015 x 380 x 197 (79.3 x 15 x 7.8)

Ordering Information

Mounting Hardware	APM40-2 + APM40-E2
Mounting Pipe Diameter, mm (in)	60-120 (2.36-4.72)



Vertical Pattern



Horizontal Pattern

Other Documentation

- APM40 Series Datasheet
- APM40 Series Installation Instructions

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Features/Benefits

- Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.
- High Suppression of all Upper Sidelobes (Typically <-20dB).
- Gain difference between UL and DL <1dB.
- Azimuth horizontal beamwidth difference <7deg between UL and DL (1710-1755 & 2110-2155).
- Low profile for low visual impact.
- Dual polarization; Broadband design.
- Includes AISG 2.0 Compatible ACU-A20-N antenna control unit


Technical Specifications
Electrical Specifications

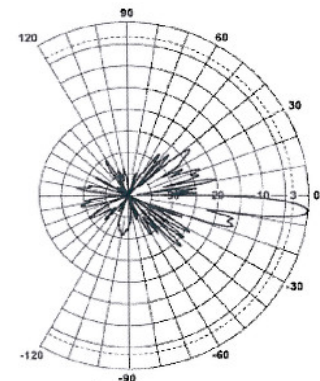
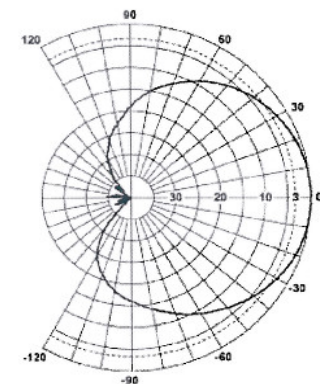
Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65 ±5 (65.1 average across band)
Vertical Beamwidth, deg	4.5 to 5.5
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.8 (16.7) Avg. across band
Upper Sidelobe Suppression, dB	Typically >20
Front-To-Back Ratio, dB	> 26 (Typically 29)
Polarization	Dual pol +/-45°
VSWR	< 1.5:1
Isolation between Ports, dB	> 30
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)
7th Order IMP @ 2 x 38 dBm, dBc	> 170
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	(2) 7-16 Long Neck Female

Mechanical Specifications

Dimensions - HxWxD, mm (in)	1850 x 169 x 80 (72.0 x 6.65 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	11.5 (25.3)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	160 (100)
Max Wind Loading Area, m² (ft²)	0.31 (3.3)
Front Thrust @ Rated Wind, N (lbf)	557 (125)
Maximum Thrust @ Rated Wind, N (lbf)	557 (125)
Wind Load - Side @ Rated Wind, N (lbf)	325 (73)
Wind Load - Rear @ Rated Wind, N (lbf)	269 (60)
Radome Material	Fiberglass
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Shipping Weight, kg (lb)	20 (44)
Packing Dimensions, HxWxD, mm (in)	1950 x 230 x 189 (76.77 x 9.06 x 7.44)

Ordering Information

Mounting Hardware	APM40-2
Mounting Hardware Weight, kg (lb)	3.4 (7.5)


Vertical Pattern

Horizontal Pattern

4 RF Module and Remote Radio Head dimensions and weights

RF Module dimensions and weights

The tables below list the dimensions and weights of the RF Module and the Remote Radio Head.

Property	3-sector RF Module	Dual RF Module	Single RF Module
Height	133 mm/3U (5.2 in)	133 mm/3U (5.2 in)	133 mm/3U (5.2 in)
Width	447 mm (17.6 in)	447 mm (17.6 in)	447 mm (17.6 in)
Width (with covers)	490 mm (19.3 in)	490 mm (19.3 in)	490 mm (19.3 in)
Depth (for rack assemblies)	395 mm (15.6 in)	395 mm (15.6 in)	395 mm (15.6 in)
Depth (with covers)	560 mm (22 in)	560 mm (22 in)	560 mm (22 in)
Weight (including the core, fans and casing)	Max. 25 kg (55.1 lb)	21.8 kg (48.1 lb)	18.7 kg (41.2 lb)

Table 11 Dimensions and weight of the RF Module



The module is heavy. Take care when lifting the module.

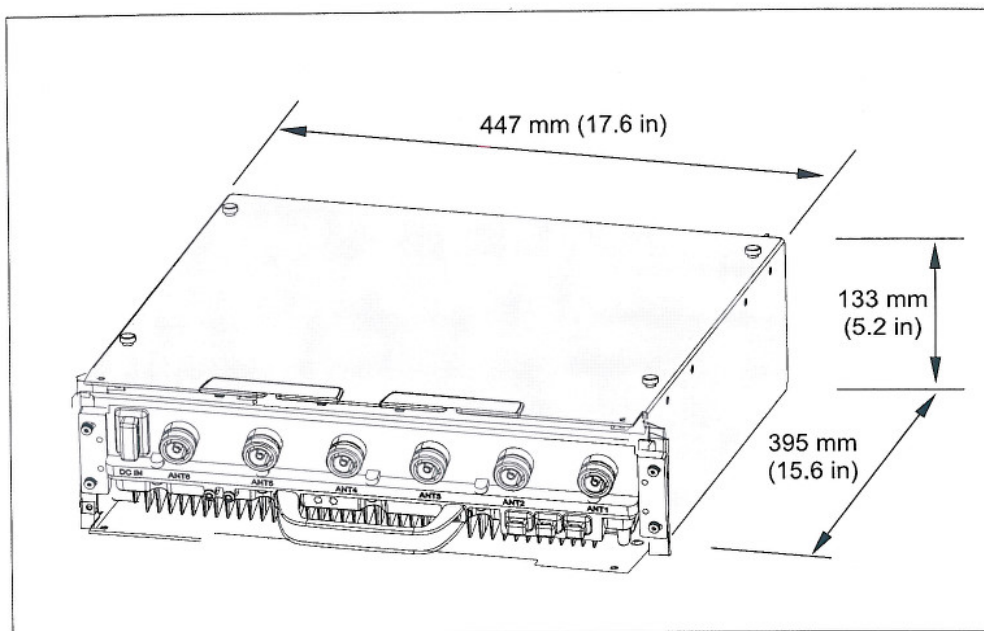
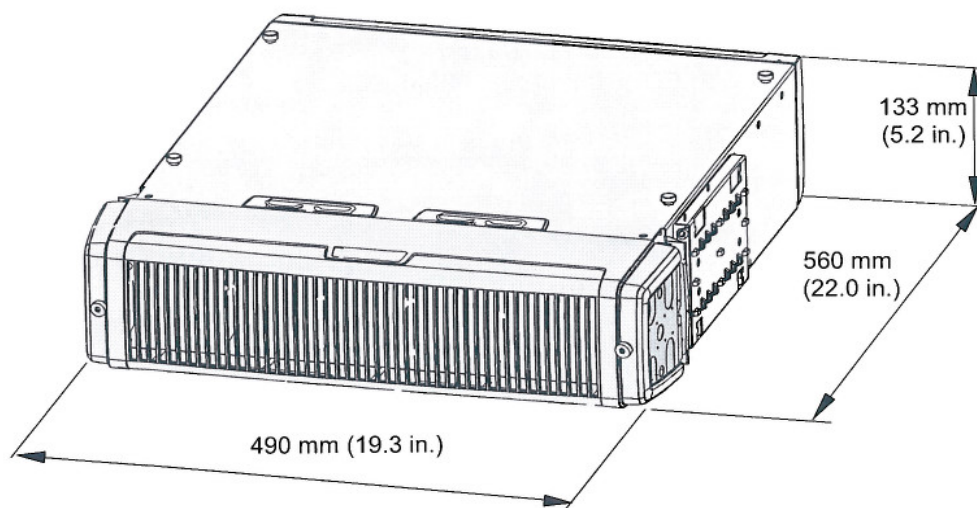


Figure 11 3U module dimensions for rack assembly



DN7039353

Figure 12 3U module dimensions with covers

6 Radio Frequency Module (FXxx) and Remote Radio Head Module (FHxx) dimensions and weight

Radio Frequency Module (FXxx) Dimensions and weight

The dimensions of the Radio Frequency Module are presented in the table below.

Property	Value
Width ¹⁾	447/492 mm (17.6/19.4 in.)
Height	133 mm/ 3U (5.2 in.)
Depth ²⁾	422/560 mm (16.6/22.1 in.)
Weight	25 kg (55.1 lbs)

Table 11 FXxx dimensions and weight

¹⁾ Width of the casing without front covers/with front covers

²⁾ Depth of the casing without front covers/with front covers

Remote Radio Head Module (FHxx) dimensions and weight

The dimensions of the Remote Radio Head Module are presented in the table below.

Property	Value
Width	358 mm (14.1 in.)
Height	579 mm (22.7 in.) - (as delivered, cable tie point recessed) 733 mm (28.8 in.) - (as installed, cable tie point released due to brackets and solar shields)
Depth	215 mm (8.4 in.)
Weight	FHxA - 20 kg (44 lbs)

Table 12 FHxx dimensions and weight

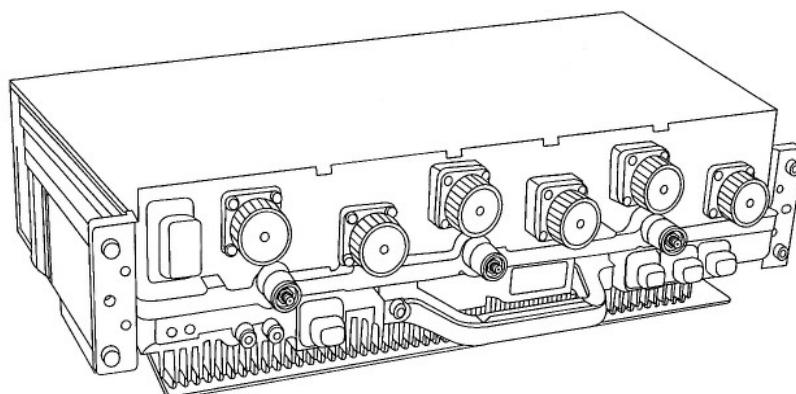


Figure 1 Isometric view of RF Module (FXDA, FXDJ, and FXEA)

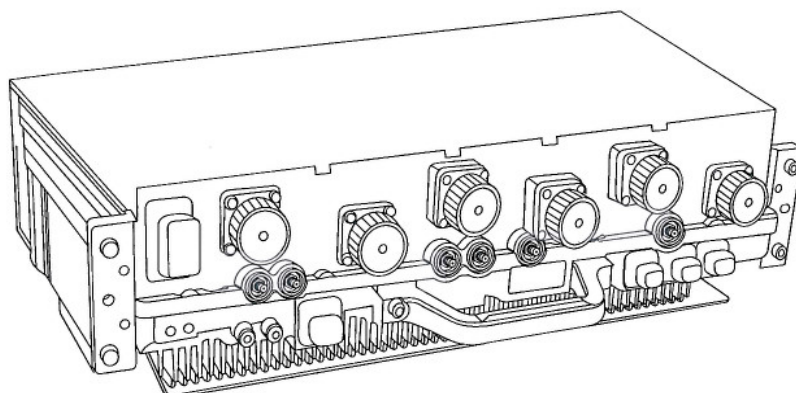


Figure 2 Isometric view of RF Module (FXFA and FXCA)

2.1.1 Software tunable filters (STuF)

STuF is a mechanical filter which is tuned with a small step motor, controlled automatically by the BTS software. There is one STuF on each branch of the RF Module. STuF has specific bandwidth on both RX and TX bands. The STuF tuning range covers the whole band, therefore a tuning window can be allocated anywhere within the band. When STuF is tuned, both RX and TX are tuned at the same time as RX and TX sides are mechanically coupled together. STuF is tuned only when the carrier allocation requires this. STuF center frequency is determined from TX & RX main frequency requests and also from diversity frequency requests when diversity sharing is used between the branches.

2.1.2 Digital predistortion (DAPD)

The reference signal for digital predistortion and RF power control is provided by predistortion RX path (PDRX). The power amplifier delivers the coupled and attenuated TX signal to the PDRX. For digital pre-distortion and RF power control, this signal is atten-

FRIG Dimensions (estimated)

Sub-section	Width (mm)	Height (mm)			Depth (mm)		Qty	Volume (L)
		Filter	PA	Total	Filter	PA		
Overall w/o bosses (3-way)	387	324.5	155	479.5	132.9	151.85	1	26

Note: Dimensions do not include flange, screw boss and connectors. Stepping fin height was used separately for volume calculation.

Installation options:

- RRH can be installed in vertical position (some tilt form vertical can be done , e.g. +/-10 deg depending on how final design will work)
- No horizontal installation
- Wall mounting possible

Please note that final dimensions may vary depending upon the final optimization after actual hardware is available and matched to the simulations.

Final dimensions:

Final dimensions are expected to be available by June 2012.

DRAFT:

Status of Mechanical Parameters

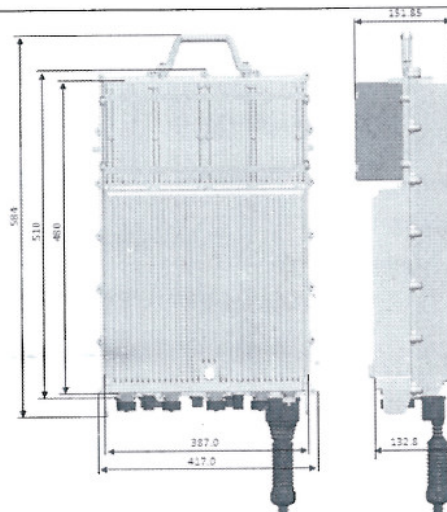
Overall Dimensions

Sub-section	Width (mm)	Height (mm)			Depth (mm)		Qty	Volume (L)
		Filter	PA	Total	Filter	PA		
Overall w/o bosses (3-way)	387	324.5	155	479.5	132.9	151.85	1	26

Note:
1. All the dimensions do not include Flange, Screw Boss & Connectors. Stepping fin height was used separately for Volume calculate

- 26 liters
- 26 Kg
- IP65
- -35 to +55 °C*
- 4*30W or 2*60W

Draft



Note:

These dimensions are based on thermal simulation and final dimensions are expected to be available by June 2012. Final dimensions may vary depending upon the final optimization after actual hardware is available.

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

1 of 1

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY CERTIFICATION OF FILING

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

T-Mobile West LLC
Houston, TX United States

Certificate Number:
2016-141700

Date Filed:
12/01/2016

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

Fort Bend County, Texas

Date Acknowledged:

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.

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Upgrade telecommunications equipment at existing cell site

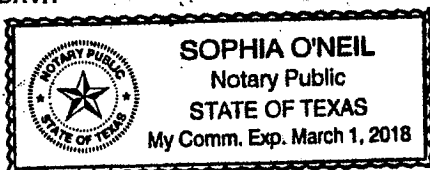
4	Name of Interested Party	City, State, Country (place of business)	Nature of interest (check applicable)	
			Controlling	Intermediary
	Deutsche Telekom Holding B.V.	Düsseldorf Berlin Germany	X	
	T-Mobile US, Inc	Bellevue, WA United States		X
	T-Mobile USA Inc.	Bellevue, WA United States		X

5 Check only if there is NO Interested Party.



6 AFFIDAVIT

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.



[Signature]
Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said Keith Haydon-Director, this the 2nd day of December 20 16, to certify which, witness my hand and seal of office.

Sophia O'Neil
Signature of officer administering oath

Sophia O'Neil
Printed name of officer administering oath

Project Manager
Title of officer administering oath