STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

VIA ELECTRONIC MAIL

September 5, 2018

Kyle Richers
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, NJ 07430

RE: **EM-T-MOBILE-135-180808** – T-Mobile notice of intent to modify an existing telecommunications facility located at 652 Glenbrook Road, Stamford, Connecticut.

Dear Mr. Richers:

The Connecticut Siting Council (Council) is in receipt of your correspondence of August 30, 2018 submitted in response to the Council's August 15, 2018 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/FC/emr

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August 15, 2018

Kyle Richers
Transcend Wireless
10 Industrial Avenue, Suite 3
Mahwah, New Jersey 07430

RE: **EM-T-MOBILE -135-180808** – T-Mobile notice of intent to modify an existing telecommunications facility located at 652 Glenbrook Road, Stamford, Connecticut.

Dear Mr. Richers:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on August 8, 2018.

According to Section 16-50j-71 of the Regulations of Connecticut State Agencies, "…any modification, as defined in Section 16-50j-2a of the Regulations of Connecticut State Agencies, to an existing tower site, except as specified in Sections 16-50j-72 and 16-50j-88 of the Regulations of Connecticut State Agencies, may have a substantial adverse environmental effect."

Staff has reviewed this exempt modification request for completeness and has identified the following deficiencies in the Structural Analysis Report dated July 2, 2018 that was submitted with the above referenced notice; as follows:

- The structural analysis does not account for equipment proposed by Sprint in a Structural Analysis Report dated July 10, 2018, as specified in an Exempt Modification notice received by the Council on August 6, 2018 and available on the Council's website using the following link: https://www.ct.gov/csc/lib/csc/ems/stamford/glenbrookrd/sprint/em-sprint-135-180806_filing_glenbrookrd.pdf
- The structural analysis does not indicate the percentage maximum water tower stress capacity.

Therefore, the exempt modification request is incomplete at this time. The Council recommends that Transcend Wireless provide a Structural Analysis Report that accounts for the above items on or before September 14, 2018. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to September 14, 2018.

This notice of incompletion shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

Melanie Bachman
Executive Director

MAB/RDM/IN

C: The Honorable David Martin, Mayor, City of Stamford
Ralph Blessing, Land Use Bureau Chief, City of Stamford

Robidoux, Evan

From: Kyle Richers <krichers@transcendwireless.com>
Sent: Thursday, August 30, 2018 8:16 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council; 'Dan Reid'; 'Jenn Dupont'
Subject: RE: Council Incomplete Letter for EM-T-MOBILE-135-180808
Attachments: 18058.59 - CT11334A Structural Analysis Rev0 18.08.30.pdf

Please see the attached revised structural analysis per the comments from CSC. Let me know if you will need new hard copies provided to the CSC office.

Thank you,

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

From: Robidoux, Evan
Sent: Thursday, August 16, 2018 4:25 PM
To: 'krichers@transcendwireless.com'
Cc: CSC-DL Siting Council
Subject: Council Incomplete Letter for EM-T-MOBILE-135-180808

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

60-ft Tall Existing Roof Mounted Water Tank

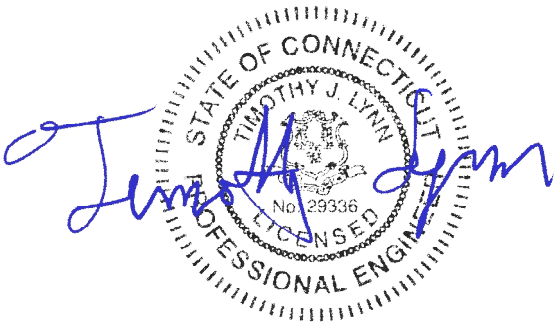
Proposed T-Mobile Antenna Upgrade

Site Ref: CT11334A

652 Glenbrook Road
Stamford, CT

CENTEK Project No. 18058.59

Date: August 30, 2018



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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- WATER TANK ANALYSIS

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- RF DATA SHEET
- EQUIPMENT CUT SHEETS

Introduction

The purpose of this report is to summarize the results of the structural analysis of the equipment upgrade proposed by T-Mobile on the existing host roof mounted water tank located in Stamford, CT.

The host structure is a 60-ft tall roof mounted water tank. The antennas are mounted to the water tank catwalk.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- AT&T (Existing):
  Antennas: Three (3) Powerwave 7770 panel antennas, three (3) Kathrein 800-10965 and three (3) CCI HPA-65R-BUU-H6 pipe mounted to the water tank façade with a RAD center elevation of 100-ft above grade.
  Appurtenances: Six (6) Powerwave LGP21401 TMAs, three (3) Ericsson RRUS-11 remote radio heads, three (3) Ericsson RRUS-32 B2 remote radio units, three (3) Ericsson RRUS-32 remote radio units, three (3) Ericsson B14 4478 remote radio units and three (3) Raycap DC-6 surge arrestors pipe mounted to the water tank façade.
- Sprint (Existing/Reserved):
  Antennas: Three (3) Commscope NNVV-65B-R4 panel antennas, three (3) Nokia AAHC panel antennas, three (3) 1900MHz 4X45W RRHs, six (6) 800MHz 2X50W RRHs and one (1) 2' dish mounted on steel frames attached to the façade of the water tank with a rad center antenna elevation of +/- 93-ft AGL.
- T-Mobile (Existing to Remain):
  Antennas: Three (3) Ericsson AIR21 panel antennas and three (3) TMAs mounted on steel frames attached to the handrail/façade of the water tank with a rad center antenna elevation of +/- 85-ft AGL.
- **T-Mobile (Existing to Remove):**
  Antennas: Three (3) Ericsson AIR21 panel antennas, three (3) Andrew LNX6515DS panel antennas and three (3) Ericsson RRUS-11 remote radio units mounted on steel frames attached to the handrail/façade of the water tank with a rad center antenna elevation of +/- 85-ft AGL.
- **T-Mobile (Proposed):**
  Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24-43-AN20 panel antennas and three (3) Ericsson 4449 B71_B12 remote radio units mounted on steel frames attached to the handrail/façade of the water tank with a rad center antenna elevation of +/- 85-ft AGL.

Design Loading

Loading was determined per the requirements of the 2015 International Building Code and ASCE 7-10 “Minimum Design Loads for Buildings and Other Structures”.

Wind Speed:	Vult = 120 mph (Risk Cat 3)	*[Appendix N of the 2016 CT Building Code]*

Results

A proposed antenna mount frame for Alpha and Gamma sectors was designed. Existing mount connections were reviewed for the proposed antenna configuration.

Component	Stress Ratio (percentage of capacity)	Result
Water Tank Leg	67.6%	**PASS**

Conclusion

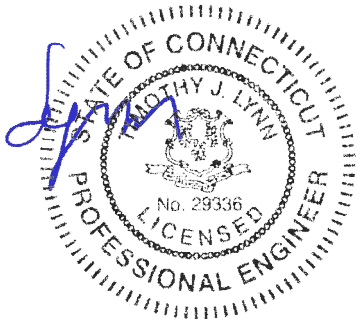
This analysis shows that the **existing water tank is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer



Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

Prepared by: T.J.L; Checked by: C.F.C.
Job No. 18058.59

Design Wind Load on Water Tanks:

Wind Speed =	$V := 120$ mph	(User Input)	
Exposure Category =	$Exp := C$	(User Input)	
Importance Factor =	$I := 1.15$	(User Input)	(AWWA D100-05 Sec. 3.1.4)
Commponent =	Tank Roof	(User Input)	
Type of Surface =	$TOS := DC$	(User Input)	(AWWA D100-05 Table 2)
Height Above Grade =	$Z := 100$ ft	(User Input)	
Area =	$A := 72$ sf	(User Input)	
Distance from Bot Tank to Centroid =	$D_1 := 60$ ft	(User Input)	

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if } Exp = B \\ 900 & \text{if } Exp = C \\ 700 & \text{if } Exp = D \end{cases} = 900$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if } Exp = B \\ 9.5 & \text{if } Exp = C \\ 11.5 & \text{if } Exp = D \end{cases} = 9.5$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases} = 1.27$$

Velocity Pressure =	$q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 53.65$		(AWWA D100-05 Eq. 3-2)
Force Coefficient =	$C_f = 0.5$		(AWWA D100-05 Table 2)
Gust Effect Factor =	$G := 1.0$		(AWWA D100-05 Sec. 3.1.4)
Wind Pressure =	$P_W := q_z \cdot G \cdot C_f = 27$	psf	(AWWA D100-05 Eq. 3.1)
Wind Force =	$F_1 := P_W \cdot A = 1932$	lbs	
Overturning Moment @ Base =	$M_1 := F_1 \cdot D_1 = 115893$	ft·lbs	

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Subject:	Water Tank Analysis
Location:	Stamford, CT
Rev. 0: 08/30/18	Prepared by: T.J.L; Checked by: C.F.C. Job No. 18058.59

Commponent =	Tank Wall	(User Input)	
Type of Surface =	TOS := Cyl	(User Input)	(AWWA D100-05 Table 2)
Height Above Grade =	Z := 92 ft	(User Input)	
Area =	A := 398 sf	(User Input)	
Distance from Bot Tank to Centroid =	D_2 := 53 ft		
Nominal Height of the Atmospheric Boundary Layer =	zg := 1200 if Exp = B = 900 900 if Exp = C 700 if Exp = D		
3-Sec Gust Speed Power Law Exponent =	α := 7 if Exp = B = 9.5 9.5 if Exp = C 11.5 if Exp = D		
Exposure Coefficient =	$K_z := 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)}$ if $15 \le Z \le zg$ = 1.24 $2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)}$ if $Z < 15$		
Velocity Pressure =	$q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I$ = 52.72		(AWWA D100-05 Eq. 3-2)
Force Coefficient =	C_f = 0.6		(AWWA D100-05 Table 2)
Gust Effect Factor =	G := 1.0		(AWWA D100-05 Sec. 3.1.4)
Wind Pressure =	$P_w := q_z \cdot G \cdot C_f$ = 32	psf	(AWWA D100-05 Eq. 3.1)
Wind Force =	$F_2 := P_w \cdot A$ = 12590	lbs	
Overturning Moment @ Base =	$M_2 := F_2 \cdot D_2$ = 667252	ft·lbs	

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Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

Prepared by: T.J.L; Checked by: C.F.C.
Job No. 18058.59

Commponent = Tank Bottom (User Input)

Type of Surface = $TOS := DC$ (User Input) (AWWA D100-05 Table 2)

Height Above Grade = $Z := 90$ ft (User Input)

Area = $A := 92$ sf (User Input)

Distance from Bot Tank to Centroid = $D_3 := 43$ ft

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases} = 900$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases} = 9.5$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg = 1.24 \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases}$$

Velocity Pressure = $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 52.48$ (AWWA D100-05 Eq. 3-2)

Force Coefficient = $C_f = 0.5$ (AWWA D100-05 Table 2)

Gust Effect Factor = $G := 1.0$ (AWWA D100-05 Sec. 3.1.4)

Wind Pressure = $P_w := q_z \cdot G \cdot C_f = 26$ psf (AWWA D100-05 Eq. 3.1)

Wind Force = $F_3 := P_w \cdot A = 2414$ lbs

Overturning Moment @ Base = $M_3 := F_3 \cdot D_3 = 103800$ ft·lbs

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Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

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Job No. 18058.59

Commponent = Tank Leg (User Input)

Type of Surface = TOS := Flat (User Input) (AWWA D100-05 Table 2)

Height Above Grade = $Z := 65$ ft (User Input)

Area = $A := 1.5$ $\frac{sf}{ft}$ (User Input)

Distance from Bot Tank to Centroid = $D_4 := 20$ ft

Leg Height = $H_{Leg} := 40$ ft

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases} = 900$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases} = 9.5$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases} = 1.16$$

Velocity Pressure = $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 49$ (AWWA D100-05 Eq. 3-2)

Force Coefficient = $C_f = 1$ (AWWA D100-05 Table 2)

Gust Effect Factor = $G := 1.0$ (AWWA D100-05 Sec. 3.1.4)

Wind Pressure = $P_w := q_z \cdot G \cdot C_f = 49$ psf (AWWA D100-05 Eq. 3.1)

Wind Force Top = $F_4 := P_w \cdot A = 74$ lb/ft

Overturning Moment @ Base = $M_4 := F_4 \cdot H_{Leg} \cdot D_4 = 58803$ ft·lbs

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Location:	Stamford, CT
Rev. 0: 08/30/18	Prepared by: T.J.L; Checked by: C.F.C. Job No. 18058.59

Commponent =	Tank Steel Riser	(User Input)	
Type of Surface =	TOS := Cyl	(User Input)	(AWWA D100-05 Table 2)
Height Above Grade =	Z := 100 ft	(User Input)	
Area =	A := 3 $\frac{sf}{ft}$	(User Input)	
Distance from Bot Tank to Centroid =	D_5 := 20 ft		

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases} = 900$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases} = 9.5$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases} = 1.27$$

Velocity Pressure =	$q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 53.65$		(AWWA D100-05 Eq. 3-2)
Force Coefficient =	$C_f = 0.6$		(AWWA D100-05 Table 2)
Gust Effect Factor =	G := 1.0		(AWWA D100-05 Sec. 3.1.4)
Wind Pressure =	$P_w := q_z \cdot G \cdot C_f = 32$	psf	(AWWA D100-05 Eq. 3.1)
Wind Force Top =	$F_5 := P_w \cdot A = 97$	lb/ft	
Overturning Moment @ Base =	$M_5 := F_5 \cdot H_{Leg} \cdot D_5 = 77262$	ft·lbs	

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Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

Prepared by: T.J.L; Checked by: C.F.C.
Job No. 18058.59

Commponent = AT&T Equipment (User Input)

Type of Surface = TOS := Flat (User Input) (AWWA D100-05 Table 2)

Height Above Grade = Z := 100 ft (User Input)

Area = A := 34 sf (User Input)

(Assumes one sector of equipment consisting of (3) antennas and (4) RRHS)

Distance from Bot Tank to Centroid = $D_6 := 60$ ft

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} = 900 \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases}$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} = 9.5 \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases}$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg = 1.27 \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases}$$

Velocity Pressure = $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 53.65$ (AWWA D100-05 Eq. 3-2)

Force Coefficient = $C_f = 1$ (AWWA D100-05 Table 2)

Gust Effect Factor = $G := 1.0$ (AWWA D100-05 Sec. 3.1.4)

Wind Pressure = $P_w := q_z \cdot G \cdot C_f = 54$ psf (AWWA D100-05 Eq. 3.1)

Wind Force = $F_6 := P_w \cdot A = 1824$ lb

Overturning Moment @ Base = $M_6 := F_6 \cdot D_6 = 109454$ ft·lbs

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Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

Prepared by: T.J.L; Checked by: C.F.C.
Job No. 18058.59

Commponent = Sprint Equipment (User Input)

Type of Surface = TOS := Flat (User Input) (AWWA D100-05 Table 2)

Height Above Grade = Z := 93 ft (User Input)

Area = A := 25 sf (User Input)

(Assumes one sector of equipment consisting of (2) antennas and (3) RRHS)

Distance from Bot Tank to Centroid = $D_7 := 53$ ft

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases} = 900$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases} = 9.5$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases} = 1.25$$

Velocity Pressure = $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 52.84$ (AWWA D100-05 Eq. 3-2)

Force Coefficient = $C_f = 1$ (AWWA D100-05 Table 2)

Gust Effect Factor = $G := 1.0$ (AWWA D100-05 Sec. 3.1.4)

Wind Pressure = $P_w := q_z \cdot G \cdot C_f = 53$ psf (AWWA D100-05 Eq. 3.1)

Wind Force = $F_7 := P_w \cdot A = 1321$ lb

Overturning Moment @ Base = $M_7 := F_7 \cdot D_7 = 70014$ ft·lbs

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Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

Prepared by: T.J.L; Checked by: C.F.C.
Job No. 18058.59

Commponent = T-Mobile Equipment (User Input)

Type of Surface = TOS := Flat (User Input) (AWWA D100-05 Table 2)

Height Above Grade = Z := 85 ft (User Input)

Area = A := 30 sf (User Input)

(Assumes one sector of equipment consisting of (3) antennas and (1) RRHS)

Distance from Bot Tank to Centroid = $D_8 := 45$ ft

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases} = 900$$

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases} = 9.5$$

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases} = 1.22$$

Velocity Pressure = $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 51.85$ (AWWA D100-05 Eq. 3-2)

Force Coefficient = $C_f = 1$ (AWWA D100-05 Table 2)

Gust Effect Factor = $G := 1.0$ (AWWA D100-05 Sec. 3.1.4)

Wind Pressure = $P_w := q_z \cdot G \cdot C_f = 52$ psf (AWWA D100-05 Eq. 3.1)

Wind Force = $F_8 := P_w \cdot A = 1555$ lb

Overturning Moment @ Base = $M_8 := F_8 \cdot D_8 = 69997$ ft·lbs

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Water Tank Analysis

Location: Stamford, CT

Rev. 0: 08/30/18

Prepared by: T.J.L; Checked by: C.F.C.
Job No. 18058.59

Commponent = Cables (User Input)

Type of Surface = TOS := Cyl (User Input) (AWWA D100-05 Table 2)

Height Above Grade = Z := 50 ft (User Input)

Area = A := 0.51 $\frac{sf}{ft}$ (User Input)

(Three 1-5/8" dia cable exposed Typ. of 2 legs)

Distance from Bot Tank to Centroid = $D_g := 20$ ft

Nominal Height of the Atmospheric Boundary Layer =

$$zg := \begin{cases} 1200 & \text{if Exp = B} \\ 900 & \text{if Exp = C} \\ 700 & \text{if Exp = D} \end{cases} = 900$$

(ACSE 7-02 Table 6-2)

3-Sec Gust Speed Power Law Exponent =

$$\alpha := \begin{cases} 7 & \text{if Exp = B} \\ 9.5 & \text{if Exp = C} \\ 11.5 & \text{if Exp = D} \end{cases} = 9.5$$

(ACSE 7-02 Table 6-2)

Exposure Coefficient =

$$K_z := \begin{cases} 2.01\left(\frac{Z}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } 15 \le Z \le zg \\ 2.01\left(\frac{15}{zg}\right)^{\left(\frac{2}{\alpha}\right)} & \text{if } Z < 15 \end{cases} = 1.09$$

(ACSE 7-02 Table 6-3)

Velocity Pressure = $q_z := 0.00256 \cdot K_z \cdot V^2 \cdot I = 46.37$ (AWWA D100-05 Eq. 3-2)

Force Coefficient = $C_f = 0.6$ (AWWA D100-05 Table 2)

Gust Effect Factor = $G := 1.0$ (AWWA D100-05 Sec. 3.1.4)

Wind Pressure = $P_w := q_z \cdot G \cdot C_f = 28$ psf (AWWA D100-05 Eq. 3.1)

Wind Force = $F_g := P_w \cdot A = 14$ lb/ft

Overturning Moment @ Base = $M_g := F_g \cdot H_{Leg} \cdot D_g \cdot 2 = 22702$ ft·lbs

Total Overtunring Moment = $M_{ot} := M_1 + M_2 + M_3 + M_4 + M_5 + M_6 + M_7 + M_8 + M_9 = 1295177$ ft·lbs

Weights:

Weight of Water =	$W_{water} := 60000 \cdot gal \cdot 62.4 \cdot pcf = 500500\,lb$	Assumed 60,0000 Tank
Weight of Tank Shell =	$W_{shell} := 25000 \cdot lb$	Assumed 1/4" Thick Plate
Weight of Tank Leg =	$W_{Leg} := 19.57 \cdot in^2 \cdot 490 \cdot pcf \cdot H_{Leg} \cdot ft \cdot 4 = 10655\,lb$	
Weight of Bracing =	$W_{bracing} := 3000 \cdot lb$	
Weight of Catwalk =	$W_{catwalk} := 1250 \cdot lb$	
Weight of Misc. =	$W_{misc} := 10000 \cdot lb$	
Weight of AT&T =	$W_{ATT} := 2200 \cdot lb$	
Weight of Sprt =	$W_{Sprt} := 1500 \cdot lb$	
Weight of TMo =	$W_{TMo} := 2000 \cdot lb$	

Total Weight =

$$W_{tot} := W_{water} + W_{shell} + W_{Leg} + W_{bracing} + W_{catwalk} + W_{misc} + W_{ATT} + W_{Sprt} + W_{TMo} = 556105\,lb$$

Member Stress Check: (Based on AWWA D100-05)

Commponent =	Tank Leg	(User Input)	
Number of Legs =	$N_{Leg} := 4$	(User Input)	
Leg Spread =	$D_{Leg} := 19.5 \cdot ft$	(User Input)	
Area =	$Area := 19.57 \cdot in^2$	(User Input)	
Section Modulus =	$S := 81.1 \cdot in^3$	(User Input)	
Unbraced Length =	$L := 41 \cdot ft$	(User Input)	
Radius of Gyration =	$r := 5.9 \cdot in$	(User Input)	
Effective Length Factor =	$K := 1$	(User Input)	
Modulus of Elasticity =	$E := 29000 \cdot ksi$	(User Input)	
Material Class =	$MC := 2$	(User Input)	(AWWA D100-05 Table 9)
Allowable Local Buckling Stress =	$F_L = 18\,ksi$		(AWWA D100-05 Sec. 3.4.2)
Column Slendeness Ratio =	$C_c := \sqrt{\frac{\pi^2 \cdot E}{F_L}} = 126.099$		(AWWA D100-05 Eq. 3-10)
Slenderness Reduction Factor =	$K_\varphi := \begin{cases} 1 - 0.5 \cdot \left[\frac{\left(\frac{K \cdot L}{r}\right)}{C_c}\right]^2 & \text{if } 25 < \frac{K \cdot L}{r} < C_c = 0.7813 \\ 0.5 \cdot \left(\frac{C_c}{\frac{K \cdot L}{r}}\right)^2 & \text{if } \frac{K \cdot L}{r} \geq C_c \\ 1.0 & \text{if } \frac{K \cdot L}{r} \leq 25 \end{cases}$		(AWWA D100-05 Eq. 3-7) (AWWA D100-05 Eq. 3-8) (AWWA D100-05 Eq. 3-9)
Allowable Compressive Stress Due to Axial Load =	$F_a := F_L \cdot K_\varphi = 14.064 \cdot ksi$		(AWWA D100-05 Eq. 3-4)
Allowable Compressive Stress Due to Bending Moment =	$F_b := F_L = 18 \cdot ksi$		(AWWA D100-05 Eq. 3-5)
Axial Stress =	$f_a := \frac{W_{tot}}{Area \cdot N_{Leg}} + \frac{M_{ot} \cdot ft \cdot lb}{\left(D_{Leg}^2 \cdot 2\right)^{0.5} \cdot Area} = 9.504\,ksi$		
Combined Stress Check =	$Tank\_Leg := if\left(\frac{f_a}{F_a} \leq 1.0, "OK", "Overstressed"\right)$		(AWWA D100-05 Eq. 3-6)
	Tank_Leg = "OK"		
	$\frac{f_a}{F_a} = 67.6 \cdot \%$		

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Section 1 - Site Information

Site ID: CT11334A
Status: Draft
Version: 1.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 5/11/2018 11:0:34 AM
Last Modified By: GSM1900\AMurill9

Site Name: Stamford-3/Hope St
Site Class: Watertank
Site Type: Structure Non Building
Solution Type:
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: <undefined>

Latitude: 41.0754840000
Longitude: -73.5191410000
Address: 652 Glenbrook Road
City, State: Stamford, CT
Region: NORTHEAST

RAN Template: 67D92DB Outdoor			AL Template: 67D92DB_2xAIR+1OP	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 6	**TMA Count:** 3	**RRU Count:** 3

Section 2 - Existing Template Images

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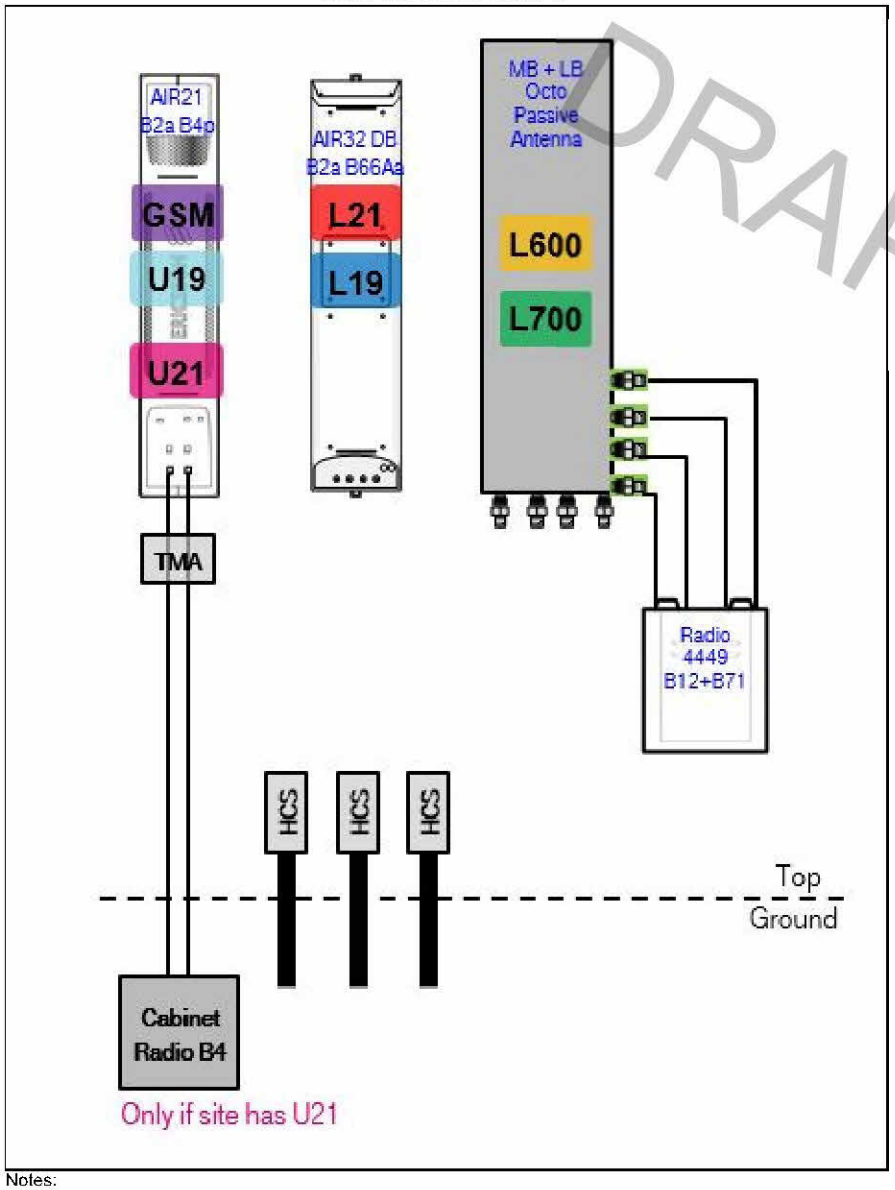
Section 3 - Proposed Template Images

67D92DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 702Cu

Enclosure	1	2
Enclosure Type	RBS 6131	S12000 Outdoor
Baseband	DUW30 (x2) DUG20 DUS41 RBS6601 (x2)	
Multiplexer	XMU	
Radio	RU22 (x6)	

Proposed RAN Equipment

Template: 67D92DB Outdoor

Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment
Baseband	DUW30 U1900 (DECOMMISSIONED); DUW30 U2100; DUG20 G1900; BB 5216 L2100 L1900 L700 L600	
Hybrid Cable System		Ericsson 6x12 HCS 6AWG 40m (x2); Ericsson 6x12 HCS 4AWG 60m
Multiplexer	XMU	
Radio	RU22 (x6) U2100	

RAN Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Section 6 - A&L Equipment

Existing Template: 702Cu
Proposed Template: 67D92DB_2xAIR+1OP

Sector 1 (Existing) view from behind

Address	**Address:** **City, State:** ,		**Latitude:** 41.0754840000 **Longitude:** -73.5191410000		
Coverage Type	A - Outdoor Macro				
Antenna	1		2		3
Antenna Model	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)
Azimuth	60		60		60
M. Tilt	0		0		0
Height	85		85		85
Ports	P1	P2	P3	P4	P5
Active Tech.	L2100		G1900	U2100	L700
Dark Tech.			U1900		
Restricted Tech.					
Decomm. Tech.					
E. Tilt	3		3	3	2
Cables	Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft. **(x2)** 1-5/8" Coax - 110 ft. **(x4)**	1-5/8" Coax - 110 ft. **(x4)**	Fiber Jumper - 15 ft. **(x2)**
TMAs				Generic Twin Style 1B - AWS (AtAntenna)	
Diplexers / Combiners					
Radio					RRUS11 B12 (At Antenna)
Sector Equipment					

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Sector 1 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1	2				3		4			
Antenna Model	Occupied Mount (Placeholder)	RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth		60				60		60			
M. Tilt		0				0		0			
Height		85				85		85			
Ports		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.				L700 L600	L700 L600	G1900	U2100	L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.						U1900					
E. Tilt											
Cables				Coax Jumper (x2)	Coax Jumper (x2)		Generic Feeder Coax (x2) Coax Jumper (x2)				
TMAs							Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners											
Radio				Radio 4449 B71+B12 (At Antenna)							
Sector Equipment											

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Sector 2 (Existing) view from behind

Address	**Address:** **City, State:** ,		**Latitude:** 41.0754840000 **Longitude:** -73.5191410000		
Coverage Type	A - Outdoor Macro				
Antenna	1		2		3
Antenna Model	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)
Azimuth	170		170		170
M. Tilt	0		0		0
Height	85		85		85
Ports	P1	P2	P3	P4	P5
Active Tech.	L2100		G1900	U2100	L700
Dark Tech.			U1900		
Restricted Tech.					
Decomm. Tech.					
E. Tilt	6		6	6	2
Cables	Fiber Jumper - 15 ft.		Fiber Jumper - 15 ft. **(x2)** 1-5/8" Coax - 170 ft. **(x4)**	1-5/8" Coax - 170 ft. **(x4)**	Fiber Jumper - 15 ft. **(x2)**
TMAs				Generic Twin Style 1B - AWS (AtAntenna)	
Diplexers / Combiners					
Radio					RRUS11 B12 (At Antenna)
Sector Equipment					

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Sector 2 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1	2				3		4			
Antenna Model	Occupied Mount (Placeholder)	RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth		170				170		170			
M. Tilt		0				0		0			
Height		85				85		85			
Ports		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.				L700 L600	L700 L600	G1900	U2100	L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.						U1900					
E. Tilt											
Cables				Coax Jumper (x2)	Coax Jumper (x2)		Generic Feeder Coax (x2) Coax Jumper (x2)				
TMAs							Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners											
Radio				Radio 4449 B71+B12 (At Antenna)							
Sector Equipment											

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Sector 3 (Existing) view from behind

Address	**Address:** **City, State:** ,		**Latitude:** 41.0754840000 **Longitude:** -73.5191410000		
Coverage Type	A - Outdoor Macro				
Antenna	1		2		3
Antenna Model	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Andrew - LNX-6515DS-A1M (Dual)
Azimuth	300		300		300
M. Tilt	0		0		0
Height	85		85		85
Ports	P1	P2	P3	P4	P5
Active Tech.	L2100		G1900	U2100	L700
Dark Tech.			U1900		
Restricted Tech.					
Decomm. Tech.					
E. Tilt	4		4	4	2
Cables	Fiber Jumper - 15 ft.		1-5/8" Coax - 170 ft. **(x4)** Fiber Jumper - 15 ft. **(x2)**	1-5/8" Coax - 170 ft. **(x4)**	Fiber Jumper - 15 ft. **(x2)**
TMAs				Generic Twin Style 1B - AWS (AtAntenna)	
Diplexers / Combiners					
Radio					RRUS11 B12 (At Antenna)
Sector Equipment					

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Sector 3 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1	2				3		4			
Antenna Model	Occupied Mount (Placeholder)	RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth		300				300		300			
M. Tilt		0				0		0			
Height		85				85		85			
Ports		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.				L700 L600	L700 L600	G1900	U2100	L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.						U1900					
E. Tilt											
Cables				Coax Jumper (x2)	Coax Jumper (x2)		Generic Feeder Coax (x2) Coax Jumper (x2)				
TMAs							Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners											
Radio				Radio 4449 B71+B12 (At Antenna)							
Sector Equipment											

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D92DB Outdoor	67D92DB_2xAIR+1OP	Custom

CT11334A_L600_1.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

----- This section is intentionally blank. -----

Proposed Power Systems Equipment

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.

- **24 Inch Width For Easier Zoning**
- **Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality**
- **Superior elevation pattern performance across the entire electrical down tilt range**
- **Includes three AISG RET motors - Includes 0.5m AISG jumper for optional diasy chain of two high band RET motors for one single AISG point of high band tilt control.**
- **Low band arrays driven by a single RET motor**

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain	dBi	14.8	15.1
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.3
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

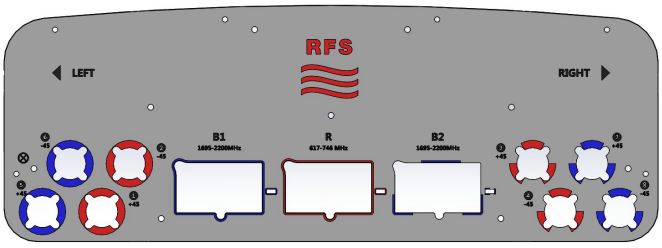
Impedance	Ohm	50.0
Polarization	Deg	±45°

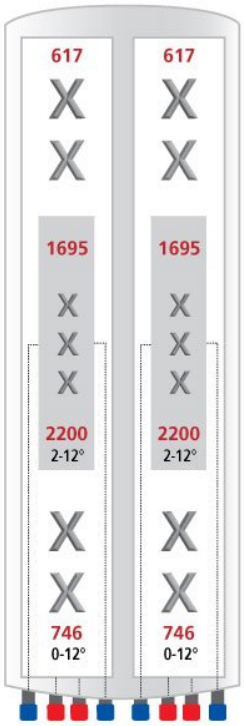
MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E





ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg