

STATE OF CONNECTICUT  
CONNECTICUT SITING COUNCIL

IN RE: :  
 :  
A PETITION OF SBA COMMUNICATIONS : PETITION NO. 1547  
CORPORATION FOR A DECLARATORY :  
RULING ON THE NEED TO OBTAIN A :  
SITING COUNCIL CERTIFICATE FOR THE :  
MODIFICATION OF AN EXISTING :  
TELECOMMUNICATIONS FACILITY AT :  
277 HUCKLEBERRY HILL ROAD, AVON, :  
CONNECTICUT : JANUARY 13, 2023

RESPONSES OF SBA COMMUNICATIONS CORPORATION  
TO CONNECTICUT SITING COUNCIL INTERROGATORIES

On December 8, 2022, the Connecticut Siting Council (“Council”) issued Interrogatories to SBA Communications Corporation (“SBA”), relating to Petition No. 1547. Below are SBA’s responses.

Project Development

Question No. 1

What is the estimated cost of the proposed project?

Response

SBA’s estimate project costs are \$550,000 and include the installation of the new replacement tower, the removal of the existing tower, the expansion of the facility compound and the installation of the Verizon Wireless concrete equipment pad.

Question No. 2

Is the project, or any portion of the project, proposed to be undertaken by state departments, institutions or agencies, or to be funded in whole or in part by the state through any contract or grant?

Response

No portion of the SBA funded improvements, including the installation of the proposed replacement tower and the expansion of the facility compound will be undertaken or funded by any state department, institution or agency. However, the Department of Emergency Services and Public Protection (DESPP) Division of Statewide Emergency Telecommunications (DSET) has received an appropriation from the State Bond Commission to fund the purchase and installation of State public safety equipment on the tower which will benefit the Town of Avon while also enhancing the coverage of the Connecticut Land Mobile Radio Network (CLMRN).

Question No. 3

Provide typical construction workdays and hours, and the anticipated duration of construction.

Response

Construction would occur between 7 a.m. and 7 p.m. Monday through Saturday.

Question No. 4

How long will it take to switch over AT&T's and T-Mobile's existing antennas/equipment to the replacement tower? When will the relocated equipment become operational? Will customers experience service outages?

Response

SBA does not anticipate an interruption in AT&T or T-Mobile service. SBA anticipates that both AT&T and T-Mobile will relocate their antennas and related equipment on the replacement tower prior to terminating service from the existing antennas.

Question No. 5

Would a temporary tower facility be required to maintain AT&T and T-Mobile service during the cutover of carrier equipment to the replacement facility?

Response

SBA does not anticipate the need for a temporary facility to maintain continuity of service. The existing tower will remain operational during construction of the replacement tower.

Question No. 6

What is the timeline for removal of the existing laminate wood tower?

Response

SBA expects that the existing wood tower would be removed within 90 days of the activation of AT&T, T-Mobile and Cellco Partnership d/b/a Verizon Wireless (“Cellco”) antennas and equipment to the new tower.

Existing Facility Site

Question No. 7

Referencing Petition p. 2, it states, “SBA acquired the existing facility from Sprint in 2012.” Council records for the existing facility indicate Sprint transferred the Certificate to TowerCo on January 23, 2009, but there is no record of any subsequent transfer of the Certificate to SBA. Explain how SBA acquired the Certificate.

Response

On October 1, 2012, SBA acquired TowerCo Assets LLC and its inventory of tower sites in Connecticut, including the existing Avon Landfill Tower site at 277 Huckleberry Hill Road in

Avon. Attachment 1 to these responses includes the Amended and Restated Certificate of Formation of TowerCo Assets LLC which identifies SBA 2012 TC Acquisition, LLC as the acquiring entity.

Question No. 8

Provide photographs of the existing facility and the proposed compound expansion area. Use stakes to show the limits of the expansion area.

Response

See Attachment 2. Photos 1, 2 and 3 show the approximately four-foot expansion of the fence line along the north side of the compound. Photos 4, 5 and 6 show the compound expansion area to the south to accommodate Cellco's equipment. The photos show the three existing trees that will be removed to accommodate the southerly expansion of the compound.

Question No. 9

Provide the number of residences within 1,000 feet of the site.

Response

There are eighteen (18) residences within 1000 feet of the proposed replacement tower.

Proposed Replacement Facility

Question No. 10

Referencing pp. 1-2 and 4 of the Petition, Sprint has antennas at the 100-foot level of the existing facility that will be removed. Would the 100-foot level of the replacement facility remain vacant?

Response

Yes, the 100-foot level on the replacement tower will remain vacant for the time being.

Question No. 11

What is the maximum number of wireless carriers that the replacement tower can support?

Response

SBA intends to design the replacement tower to support a minimum of four (4) wireless carriers and the Town of Avon public safety radio equipment.

Question No. 12

Have any other carriers expressed an interest in locating at the replacement facility?

Response

As of the date of this filing, AT&T, T-Mobile, Verizon Wireless and the Town of Avon are all committed to share the replacement tower.

Question No. 13

The site plan in Petition Attachment 5, Q&A 3, Question 6 shows a tower profile with antenna platforms and a standoff arm mount at the 120-foot level. This profile differs from the Petition Site Plans which show flush-mount antennas for AT&T and T-Mobile. Explain.

Response

The Lease Exhibit referenced in Attachment 5, Q&A 3, Question 6, was a preliminary exhibit available during the early stages of the municipal outreach process. The tower design and carrier's antenna mounts in the project plans reflect the current SBA proposal accurately. As discussed in the Petition, T-Mobile and AT&T do not have any current plans to modify their respective antenna mounts, so both are shown as flush-mounted installations, consistent with the existing conditions.

Question No. 14

Petition Attachment 5, Q&A 2 states that the structure height is limited to 150 feet per the lease amendment. Would the replacement tower and foundation be designed to be expandable to a height of 150 feet?

Response

No. The tower height will be restricted to 130 feet. The top of the Town's whip antennas will extend above the top of the tower to a height of approximately 142 feet above ground level. Proposed lightning protection may extend above the top of the Town antennas.

Public Safety

Question No. 15

Provide a rigorous cumulative far-field radio frequency analysis for the replacement facility that accounts for Cellco's and the Town's proposed equipment and all other entities equipment on the tower, accounting for a 6-foot tall person at ground level and the actual antenna patterns for the facility with a cumulative %MPE at or below 100%. Identify the distance from the tower with the highest cumulative %MPE.

Response

*See Attachment 3* - Calculated Radio Frequency Exposure Report for the proposed replacement tower at 277 Huckleberry Hill Road.

Question No. 16

The Connecticut State Building Code was updated effective October 1, 2022. Has the facility been designed to the updated code? If not, what changes are necessary to the design of the facility to comply with the updated code?

Response

Yes, the facility will be designed to meet the recently revised Connecticut State Building Code.

Question No. 17

Does AT&T offer FirstNet services from the existing facility? Could the replacement facility accommodate any additional equipment that might be required to provide FirstNet services?

Response

AT&T does not currently have First Net services deployed on the existing Avon Landfill tower site. A more robust tower, like the proposed SBA replacement, is preferable for any future network growth, including AT&T's FirstNet capabilities.

Question No. 18

Referencing p. 2 of the Petition, the Town is working with the state to use the SBA replacement tower to augment coverage in the Connecticut Land Mobile Radio Network (CLMRN). What is the CLMRN, what agency manages the network and is the Town eligible to use the CLMRN? Explain.

Response

The Connecticut Land Mobile Radio Network (CLMRN) is a trunked P25 Phase 1 (FDMA) and 2 (TDMA) 700 and 800 MHz system that provides a level of coverage statewide and is managed by the Department of Emergency Services and Public Protection (DESPP) and Division of Statewide Emergency Telecommunications (DSET). This provides public safety grade reliability with 24/7/365 monitoring by a dedicated team of experts at the Network Control Center. Recent updates to the CLMRN have increased capacity; making it possible for

municipalities, State and Federal agencies, and public safety providers to benefit from the advantages of the CLMRN. The Town of Avon will be incorporated into the CLMRN. Both the Town of Avon and DESPP believe that the shared use of the CLMRN will improve public safety communications and enhance the interests of public safety within the Town of Avon.

See; [https://portal.ct.gov/-/media/DESPP/DSET/CTS/CLMRN-Brochure\\_Final\\_5APR21.pdf](https://portal.ct.gov/-/media/DESPP/DSET/CTS/CLMRN-Brochure_Final_5APR21.pdf)

Website: <https://portal.ct.gov/DESPP/Division-of-Statewide-Emergency-Telecommunications/Connecticut-Telecommunications-System-Unit>

#### Question No. 19

Has the Town determined if they are locating on the proposed replacement facility? If yes, when will the Town locate on the replacement facility? Are all Town approvals in place to allow the installation of the municipal antennas? If no, what Town approvals are still necessary?

#### Response

Yes. In consultation with its third-party consultant, Federal Engineering, and its vendor, Motorola Solutions, the Town of Avon has determined that the Town's Transfer Station property, located at 277 Huckleberry Hill Road, is the optimal location for a radio site that will achieve the Town's public safety communications objectives. The Town would prefer to co-locate at the existing tower site rather than construct a new, standalone tower in a new location within the same property.

Following a public information process in late 2021 and early 2022, the Avon Town Council authorized the execution of a lease amendment with SBA to construct the proposed replacement tower (See Petition, Section III). The Town's plan to achieve its public safety communications objective includes building out an additional site for the CLMRN to increase coverage in the west side of Avon. After working with the Connecticut Department of



Emergency Services and Public Protection, Division of Statewide Emergency

Telecommunications (DESPP/DSET) on a system design, DESPP/DSET informed the Town that a CLMRN site at this location would not only benefit the Town but benefit all CLMRN agencies in the area and that they would fund the necessary equipment at this site. In December 2022, DESPP/DSET received a State bond authorization for funding of the public safety improvements at this site. The public safety system design, equipment, and coverage area remains the same, only the funding source has changed.

Provided that the Siting Council renders an approval for the tower replacement project and SBA constructs the new tower, the Town intends to finalize a memorandum of understanding with DESPP/DSET for use of the CLMRN. DESPP/DSET will engage Motorola to purchase and install the public safety communications equipment at the Property and coordinate with the Town on the implementation of the CLMRN on the new tower. The collaboration between the State of Connecticut and the Town of Avon will greatly assist in expanding CLMRN coverage in this area.

While the improvements to this location are in process, the Town is also working directly with Motorola for the additional improvements needed to fully utilize the CLMRN system for its public safety needs, including new portable and mobile radios, new equipment at the Police dispatch center, and upgrading another existing public safety radio site in Avon.

Question No. 20

If the Town has not set a firm date for locating on the replacement facility, would SBA construct a 110-foot tower capable of supporting a 20-foot extension?

Response

If the Petition is ultimately approved by the Council, SBA would design, fabricate and

install the 130-foot tower from the start and avoid additional costs associated with two or more construction mobilization periods. The installation and activation of the Town's new public safety communications system is a high priority and the Town of Avon looks to have the system installed as soon as possible. Considering this, every effort will be made to keep the construction timeline for the CLMRN facility installation on a parallel path with SBA's construction of the replacement tower. Also, SBA contemplates that certain CLMRN improvements, (e.g. shelter slab preparations and utility work etc.), would be completed when similar site improvements are undertaken by SBA for Cellco T-Mobile and AT&T.

Question No. 21

Provide emergency backup generator/fuel tank specifications and run times for the Town's installation. Identify fuel spill containment measures.

Response

A copy of the Town's back-up generator specifications is included as Attachment 4. The proposed generator maintains a 275 gallon fuel tank and can run for 74 hours before refueling would be required (rated at 3.7 gallons per hour at 100% load). The generator fuel tank is double-walled for spill containment.

Question No. 22

Would operation of proposed facility comply with Department of Energy and Environmental Protection noise control standards at the property boundaries?

Response

Yes.

Question No. 23

What measures are proposed for the site to ensure security and deter vandalism?

(Including alarms, gates, locks, anti-climb fence design, etc.)

Response

The expanded facility compound will be surrounded by a six-foot tall chain link security fence and gate with barbed-wire at the top. The compound gate will remain locked at all times and restrict access to the carriers, the Town of Avon, DESPP/DSET staff and SBA. Wireless service equipment will maintain silent intrusion alarms that are monitored remotely. Climbing pegs will be removed from the bottom portion of the tower to deter climbing of the tower.

Question No. 24

Identify the safety standards and/or codes by which equipment, machinery or technology that would be used or operated at the proposed facility.

Response

- 2021 International Building Code, as modified by the 2022 Connecticut Supplement.
- National Electric Code (NFPA70).
- 2022 Connecticut State Fire Safety Code.
- TIA-222 Rev. H - "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures".
- Occupational Safety and Health Administration (OSHA).

Environmental

Question No. 25

Petition p. 8 states the lower portion of the replacement tower may be visible through the trees from abutting residential properties during leaf-off conditions. Which properties might

have these views? Why wouldn't the upper portion of the tower also be visible?

Response

According to the Petitioner's engineering consultant, the lower portion of the replacement tower may be visible through the tree, even under leaf-off conditions, from the closest residential property to the south, due to the density of the vegetation in the area but can't rule it out completely. The upper portion of the tower would not be visible from many of these same locations due to the height of the trees, the tree density between the nearest residence and the tower site and the angle at which a person standing on the adjacent property would be attempting to view the top portion of the tower. As indicated in the photo-simulations included in the Petition, because of the mature vegetation around the tower site, views of the tower from the surrounding area are very limited. *See* Petition, Attachment 6 - TEP photo simulations.

Question No. 26

The Petition Visibility Analysis by Tower Engineering Professionals states vegetation may fully or partially obscure the replacement tower from residential areas. Would residential yards within a 0.5 mile of the site have year-round views of portions the tower above the tree canopy? If yes, which properties? What methodology was used to determine visibility from residential areas?

Response

The tower was not visible from residential areas to the north, south, or west; nor is it likely to be visible from Huckleberry Hill Road to the east, New Road to the west or the Farmington River Trail to the west. The TEP report shows simulated images of the replacement tower as viewed from fourteen different locations within a 0.5-mile radius of the proposed tower location.

Utilizing Google Earth, TEP superimposed a placemark at the proposed 130' tower height at the proposed location, in order to simulate the top of steel of the proposed structure. TEP subsequently utilized the program's Street View feature, which provides continuous photography along public rights-of-way, and digital elevation modelling ability to superimpose the elevated placemark on the existing Street View photography and determine the location of the top of the proposed tower from various viewpoints. This technique was utilized to create the photoshop simulations utilizing recently obtained photographs, to simulate the appearance of the proposed tower when viewed from fourteen locations within an approximately 0.5-mile radius of the proposed tower site.

Question No. 27

The Docket 297 visibility analysis for the 100-foot tower showed year-round visibility occurring from Route 179 west of the site and Huckleberry Hill Road east of the site. What analysis was conducted to determine if the proposed 130-foot replacement tower would be visible from these areas?

Response

The proposed replacement tower will be 30 feet taller than the existing tower, so if there is documentation of the existing tower being visible from specific locations along these roads, then the replacement tower may also be visible from those same locations. It is possible that tree growth in the area since the Docket No. 297 approval in 2005, may impact (favorably) visibility of the structure from these same locations along Route 179 and Huckleberry Hill Road. That said, TEP did determine that the existing tower is not visible from the two locations along Route 179 captured in the photo simulations by TEP dated October 24, 2022, during leaf-on conditions.

Question No. 28

What effect, if any, would the replacement tower have of the Farmington River, a designated Partnership Wild & Scenic River?

Response

The replacement tower is located approximately 1400' feet (horizontally) from the eastern banks of the Farmington River. The area between the tower site and the Farmington River is heavily vegetated with mature tree and remains undeveloped. No construction activity will impact the river or the immediate adjacent area. The ground elevation at the Farmington River immediately west of the tower site is approximately 310 feet AMSL, which is approximately 219 feet below the ground elevation at the tower site. Due to the overall distance and the change in ground elevation between the tower site and the Farmington River, SBA submits that the new 130-foot tower would likely be visible from the river during parts of the year.

Question No. 29

Does SBA or the Town intend on painting the whip antennas light blue? Why was this color chosen?

Response

The dbSpectra DS7C09P36U-D antennas specified by Motorola for the public safety system are manufactured in a "Horizon Blue" color. Because the Town's whip antennas will extend above the top of the tower the Horizon Blue color may help reduce the visibility of the whip antennas.

Question No. 30

Assuming the whip antennas extend above the tree canopy when viewed from an area, at

what approximate distance would the whip antennas not be discernable? (e.g. 0.1 mile).

Response

Whip antennas at the top of the towers like the Avon structure are generally indiscernible beyond distances of approximately 1300 feet.

Question No. 31

Would visibility of the proposed replacement tower be reduced if it was painted? If so, what colors are available that may reduce visibility? Would SBA be willing to paint the replacement tower and wireless carrier panel antennas/mounting equipment?

Response

Steel galvanized monopole tower tend to weather soon after installation and maintain a dull gray finish. This dull gray finish tends to blend in nicely with trees and related vegetation like that surrounding the Avon Landfill property and the existing tower site. It is possible that painting the tower a brown color may also soften seasonal and year-round views of the tower but not necessarily better than the dull gray finish described above. Painting the tower would also present future maintenance problems for SBA and the carriers.

Question No. 32

What, if any, stealth tower design options would be feasible to employ at this site? Please provide costs related to each stealth tower design.

Response

Given the heavy vegetation that will be maintained between the proposed tower site and any of the nearest neighboring properties, the only stealth tower design options considered feasible would be the installation of a tree tower at the site. Typically, the cost of a stealth tree tower is three-times that of a traditional monopole. That said, given the overall distance between

the tower site and the nearest residence, the tree tower would not significantly reduce the overall visual impact of the tower. As mentioned above, a standard steel monopole will “weather” over time and maintain a dull gray finish shortly after installation. The dull gray color tends to blend in nicely with surrounding vegetation, having the same effect as painting the tower, without the associated maintenance costs and maintenance obligations.

Question No. 33

Did SBA consider a wood laminate finish for the replacement facility similar to the finish of the existing tower? If so, please provide costs related to this design.

Response

No. In order to accommodate (structurally) four (4) wireless service providers and the needs of the Town, and potential future shared-use of the tower, a steel monopole tower is the appropriate choice under these circumstances.

Question No. 34

Identify the nearest “Important Bird Area” as designated by the National Audubon Society?

Response

The nearest Important Bird Area is Topsmead State Forest, 12.6-miles west-southwest of the site.

Question No. 35

Would the proposed replacement tower comply with the USFWS Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance and Decommissioning? (available at <https://www.fws.gov/sites/default/files/documents/usfws-communication-tower-guidance.pdf>).



Response

Yes.

Question No. 36

How many acres of additional visibility would result from construction of the proposed replacement tower? Characterize the additional visibility from the surrounding areas.

Response

The area of year-round visibility is approximately 11 acres for the existing tower and an additional 16 acres for the replacement tower. Seasonal visibility remains about the same for the existing and the proposed replacement tower.

# **ATTACHMENT 1**

# Delaware

PAGE 1

*The First State*

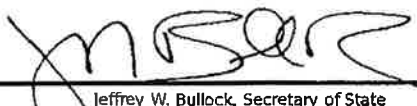
I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE RESTATED CERTIFICATE OF "TOWERCO ASSETS LLC", CHANGING ITS NAME FROM "TOWERCO ASSETS LLC" TO "SBA 2012 TC ASSETS, LLC", FILED IN THIS OFFICE ON THE FIRST DAY OF OCTOBER, A.D. 2012, AT 10:38 O'CLOCK A.M.

4595986 8100

121083716

You may verify this certificate online  
at [corp.delaware.gov/authver.shtml](http://corp.delaware.gov/authver.shtml)



  
Jeffrey W. Bullock, Secretary of State  
AUTHENTICATION: 9885270

DATE: 10-01-12

## AMENDED AND RESTATED CERTIFICATE OF FORMATION

OF

## TOWERCO ASSETS LLC

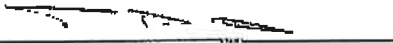
THIS Amended and Restated Certificate of Formation of TOWERCO ASSETS LLC, a Delaware limited liability company (the "*Company*"), dated October 1, 2012, has been duly executed and is being filed by the undersigned, as an authorized person, in accordance with the provisions of 6 Dcl. C. § 18-208, to amend and restate the original Certificate of Formation of the Company, which was filed on September 4, 2008 under the name TowerCo Assets LLC with the Secretary of State of Delaware, as hereafter amended (the "*Certificate*"), to form a limited liability company under the Delaware Limited Liability Company Act (6 Dcl. C. §§ 18-101, et seq.).

The Certificate is hereby amended and restated in its entirety to read as follows:

- "FIRST: The name of the Limited Liability Company is SBA 2012 TC Assets, LLC.
- SECOND: The address of the registered office of the Company in the State of Delaware is 3411 Silverside Road, Rodney Building, Suite 104, New Castle County, Wilmington, Delaware 19810. The name and address of the registered agent of the Company for service of process in the State of Delaware is Corporate Creations Network, Inc., 3411 Silverside Road, Rodney Building, Suite 104, New Castle County, Wilmington, Delaware 19810."

IN WITNESS WHEREOF, the undersigned has executed this Amended and Restated Certificate of Formation as of the date first-above written.

SBA 2012 TC Acquisition, LLC, a Delaware limited liability company, its sole member, as an authorized person

  
Thomas P. Hunt  
Senior Vice President, General Counsel and  
Secretary

State of Delaware  
Secretary of State  
Division of Corporations  
Delivered 10:38 AM 10/01/2012  
FILED 10:38 AM 10/01/2012  
SRV 121083716 - 4595986 FILE

TOTAL P.02

# **ATTACHMENT 2**

Photo No. 1

09/01/2023 15:55



Photo No. 2

09/01/2023 15:36



Photo No. 3

09/01/2023 15:31





Photo No. 4

09/01/2023 15:54



Photo No. 5

09/01/2023 15:54



Photo No. 6

09/01/2023 15:54



# **ATTACHMENT 3**



C Squared Systems, LLC  
65 Dartmouth Drive  
Auburn, NH 03032  
603-644-2800  
[support@csquaredsystems.com](mailto:support@csquaredsystems.com)

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## Calculated Radio Frequency Exposure



CT46143

277 Huckleberry Hill Road, Avon, CT

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January 10, 2023

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## 1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of AT&T, T-Mobile, Verizon and Town of Avon antenna arrays on the proposed tower located at Huckleberry Hill Rd in Avon, CT.

AT&T, T-Mobile and Verizon are proposed to locate the following equipment:

- AT&T – Three (3) multi-band antennas per sector to support its LTE networks;
- T-Mobile – Three (3) multi-band antennas per sector to support its LTE networks;
- Verizon – Up to five (5) multi-band antennas per sector to support its 5G NR, LTE, and CDMA networks;

This report considers the planned antenna configuration<sup>1</sup> for AT&T, T-Mobile, Verizon and the Town of Avon to derive the resulting % Maximum Permissible Exposure of its proposed installation.

## 2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm<sup>2</sup>). The general population exposure limits for the various frequency ranges are defined in the attached “FCC Limits for Maximum Permissible Exposure (MPE)” in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

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<sup>1</sup> As referenced in the RFDS provided by SBA Communications Corporation  
CT46143

### 3. RF Exposure Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left( \frac{1.6^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

ERP = Effective Radiated Power

R = Radial Distance =  $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

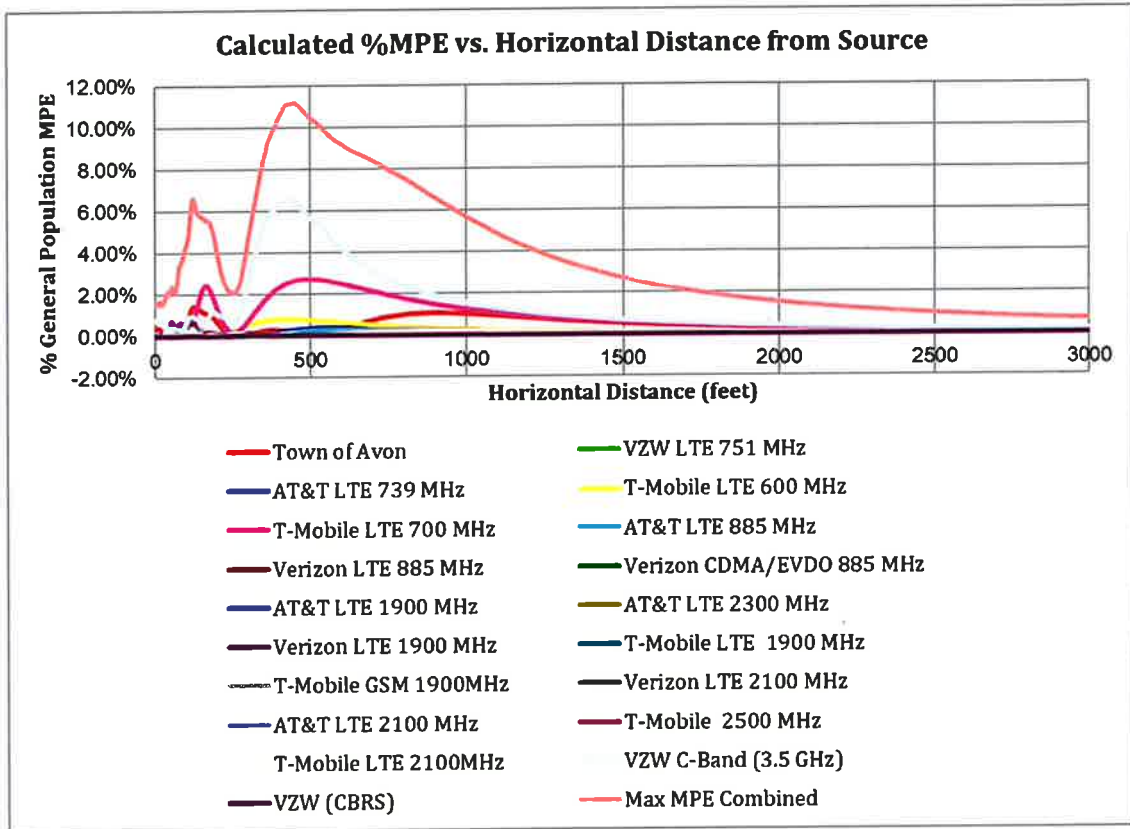
Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not consider actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final installations.



#### 4. Calculation Results

The calculated power density results are shown in Figure 1 below. For completeness, the calculations for this analysis range from 0 feet horizontal distance (directly below the antennas) to a value of 3,000 feet horizontal distance from the site. In addition to the other worst-case scenario considerations that were previously mentioned, the power density calculations to each horizontal distance point away from the antennas was completed using a local maximum off beam antenna gain (within  $\pm 5$  degrees of the true mathematical angle) to incorporate a realistic worst-case scenario.



**Figure 1: Graph of General Population % MPE vs. Distance**

The highest percent of MPE (11.14% of the General Population limit) is calculated to occur at a horizontal distance of 450 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 450 feet from the site (reference Figure 1).

As stated in Section 3, all calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. In addition, a six foot height offset was considered in this analysis to account for average human height. As a result, the predicted signal levels are significantly higher than the actual signal levels will be from the final configuration. The results presented in Figure 1 and Table 1 assume level ground elevation from the base of the tower out to the horizontal distances calculated.

Carrier	Number of Transmitters	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	% MPE
AT&T LTE 1900 MHz	1	160.0	90.0	450	0.000224	1.000	0.02%
AT&T LTE 2100 MHz	1	240.0	90.0	450	0.000337	1.000	0.03%
AT&T LTE 2300 MHz	1	160.0	90.0	450	0.000171	1.000	0.02%
AT&T LTE 739 MHz	1	160.0	90.0	450	0.001390	0.493	0.28%
AT&T LTE 885 MHz	1	160.0	90.0	450	0.001063	0.590	0.18%
T-Mobile 2500 MHz	1	160.0	80.0	450	0.000617	1.000	0.06%
T-Mobile GSM 1900MHz	1	15.0	100.0	450	0.000018	1.000	0.00%
T-Mobile LTE 1900 MHz	1	160.0	80.0	450	0.000124	1.000	0.01%
T-Mobile LTE 2100MHz	1	160.0	80.0	450	0.000593	1.000	0.06%
T-Mobile LTE 600 MHz	2	120.0	80.0	450	0.003405	0.421	0.81%
T-Mobile LTE 700 MHz	1	1200.0	80.0	450	0.012404	0.467	2.66%
Verizon CDMA/EVDO 885 MHz	1	20.0	110.0	450	0.000117	0.590	0.02%
Verizon LTE 1900 MHz	1	160.0	110.0	450	0.000167	1.000	0.02%
Verizon LTE 2100 MHz	1	160.0	110.0	450	0.000267	1.000	0.03%
Verizon LTE 885 MHz	1	160.0	110.0	450	0.000169	0.567	0.03%
VZW (CBRS)	1	20.0	110.0	450	0.000364	1.000	0.04%
VZW C-Band (3.5 GHz)	1	200.0	110.0	450	0.064903	1.000	6.49%
VZW LTE 751 MHz	1	160.0	110.0	450	0.000831	0.501	0.17%
Town of Avon 769.20625 MHz	1	100.0	134.0	450	0.000101	0.513	0.02%
Town of Avon 769.70625 MHz	1	100.0	134.0	450	0.000101	0.513	0.02%
Town of Avon 770.18125 MHz	1	100.0	134.0	450	0.000101	0.513	0.02%
Town of Avon 770.90625 MHz	1	100.0	134.0	450	0.000149	0.514	0.02%
Town of Avon 773.58125 MHz	1	100.0	134.0	450	0.000149	0.516	0.02%
Town of Avon 774.53125 MHz	1	100.0	134.0	450	0.000149	0.516	0.02%
Town of Avon 851.0375 MHz	1	100.0	134.0	450	0.000149	0.567	0.02%
Town of Avon 851.4 MHz	1	100.0	134.0	450	0.000149	0.567	0.02%
Town of Avon 851.9375 MHz	1	100.0	134.0	450	0.000149	0.568	0.02%
Town of Avon 852.4125 MHz	1	100.0	134.0	450	0.000149	0.568	0.02%
Town of Avon 852.7625 MHz	1	100.0	134.0	450	0.000149	0.568	0.02%
Town of Avon 853.2625 MHz	1	100.0	134.0	450	0.000149	0.568	0.02%
<b>Total</b>							<b>11.14%</b>

**Table 1: Maximum Percent of General Population Exposure Values**

## 5. Conclusion

The above analysis concludes that RF exposure at ground level from the proposed facility will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using conservative calculation methods, the highest expected percent of Maximum Permissible Exposure at ground level for AT&T's equipment is **11.14% of the FCC General Population/Uncontrolled limit**. This maximum cumulative percent of MPE value is calculated to occur 450 feet away from the site.

## 6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in FCC OET Bulletin 65 Edition 97-01, ANSI/IEEE Std. C95.1 and ANSI/IEEE Std. C95.3.



Report Prepared By:

\_\_\_\_\_  
Ram Acharya  
RF Engineer  
C Squared Systems, LLC

January 9, 2023  
Date



Reviewed/Approved By:

\_\_\_\_\_  
Martin J. Lavin  
Senior RF Engineer  
C Squared Systems, LLC

January 10, 2023  
Date

### **Attachment A: References**

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

**Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)**

**(A) Limits for Occupational/Controlled Exposure<sup>2</sup>**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

**(B) Limits for General Population/Uncontrolled Exposure<sup>3</sup>**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz \* Plane-wave equivalent power density

**Table 2: FCC Limits for Maximum Permissible Exposure (MPE)**

<sup>2</sup> Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

<sup>3</sup> General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

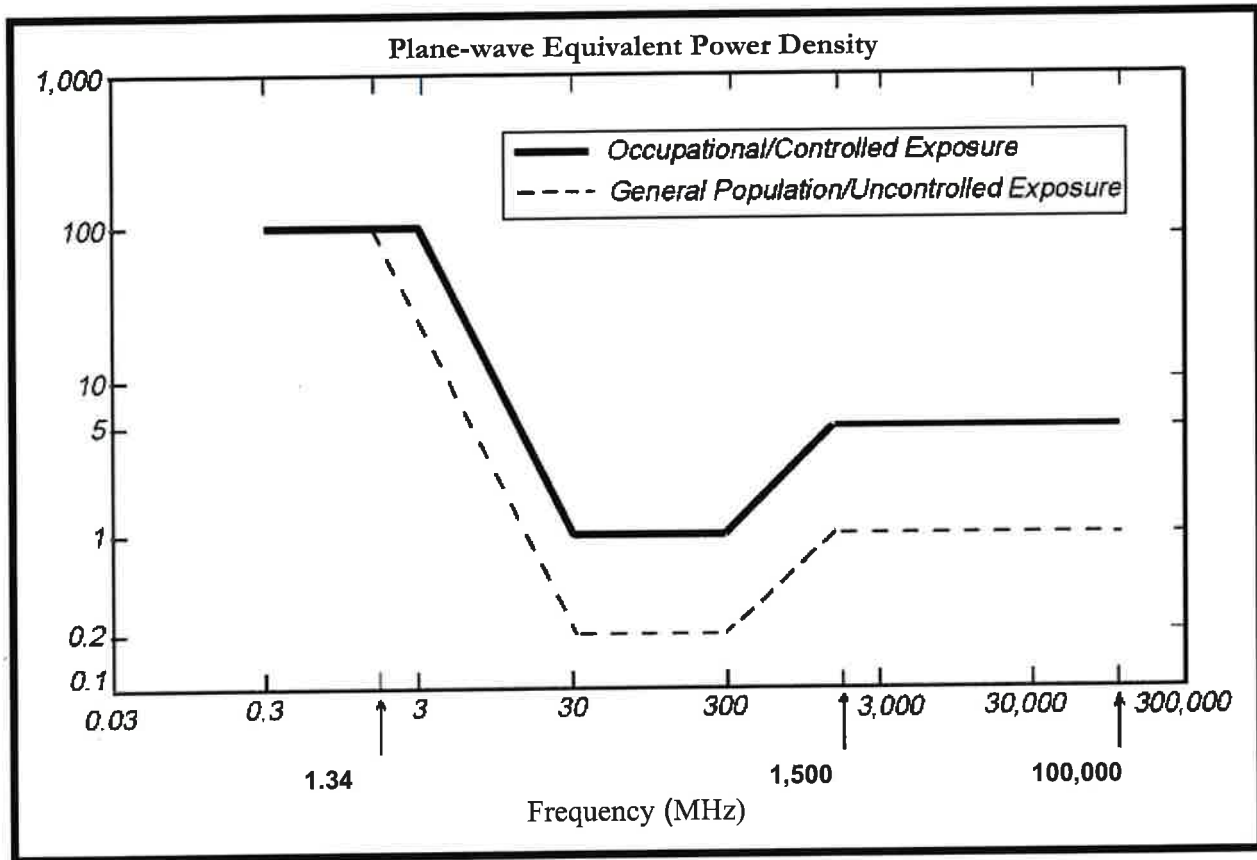
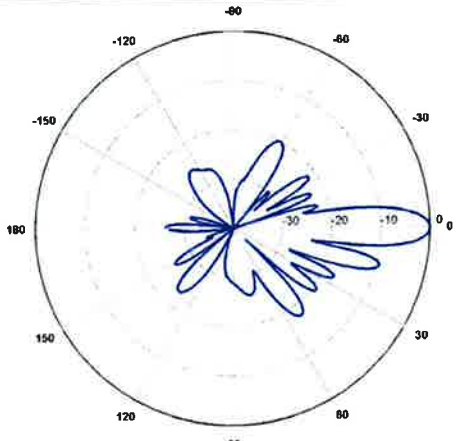
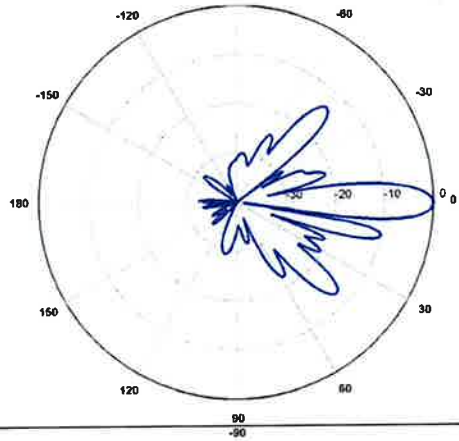
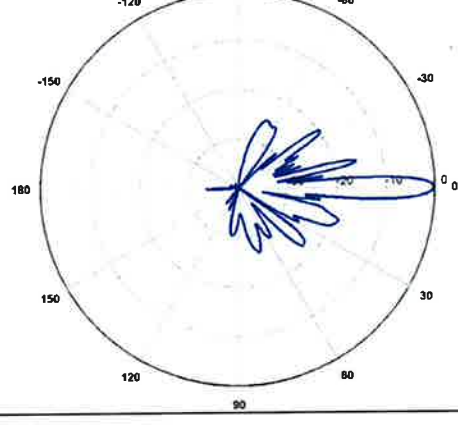


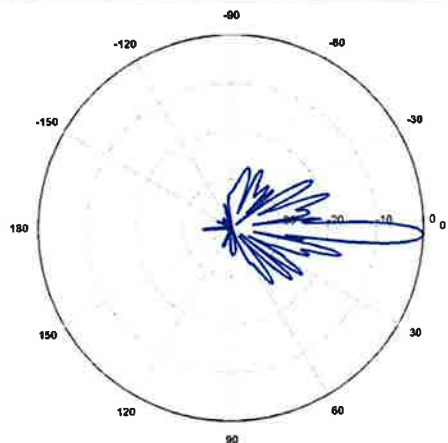
Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

**Attachment C: AT&T Antenna Data Sheets and Electrical Patterns**

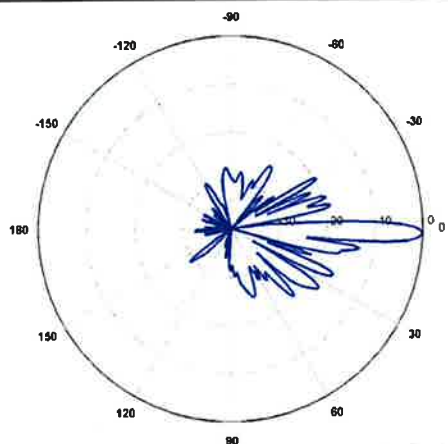
<p><b>700 MHz</b></p> <p>Manufacturer: CommScope            Model #: SBNH-1D65C            Frequency Band: 698 - 806 MHz            Gain: 16.2 dBi            Vertical Beamwidth: 8.9°            Horizontal Beamwidth: 66.2°            Polarization: ±45°            Size L x W x D: 96.58" x 11.85" x 7.1"</p>	
<p><b>885 MHz</b></p> <p>Manufacturer: CommScope            Model #: SBNH-1D65C            Frequency Band: 806 - 896 MHz            Gain: 16 dBi            Vertical Beamwidth: 7.8°            Horizontal Beamwidth: 63.8°            Polarization: ±45°            Size L x W x D: 96.58" x 11.85" x 7.1"</p>	
<p><b>1900 MHz</b></p> <p>Manufacturer: CommScope            Model #: SBNH-1D65C            Frequency Band: 1850 - 1990 MHz            Gain: 17.9 dBi            Vertical Beamwidth: 5.2°            Horizontal Beamwidth: 64.5°            Polarization: ±45°            Size L x W x D: 96.58" x 11.85" x 7.1"</p>	

**2100 MHz**

Manufacturer: CommScope  
 Model #: SBNH-1D65C  
 Frequency Band: 1920 - 2200 MHz  
 Gain: 18.5 dBi  
 Vertical Beamwidth: 5°  
 Horizontal Beamwidth: 63°  
 Polarization: ±45°  
 Size L x W x D: 96.58" x 11.85" x 7.1"

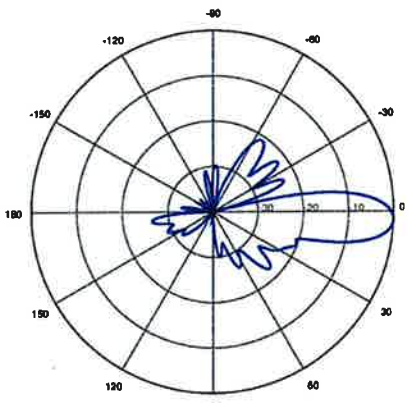
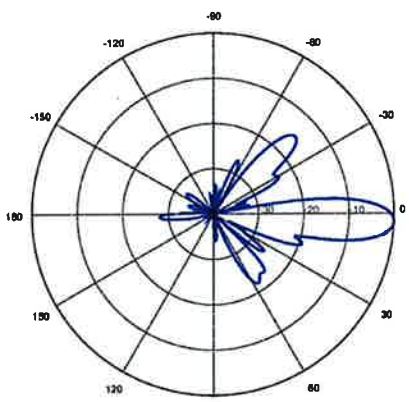
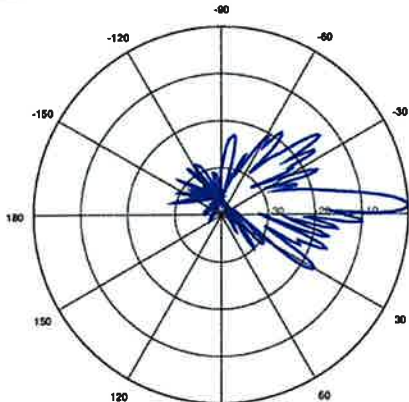

**2300 MHz**

Manufacturer: CommScope  
 Model #: SBNH-1D65C  
 Frequency Band: 2300 - 2360 MHz  
 Gain: 18.5 dBi  
 Vertical Beamwidth: 4.4°  
 Horizontal Beamwidth: 58°  
 Polarization: ±45°  
 Size L x W x D: 96.58" x 11.85" x 7.1"



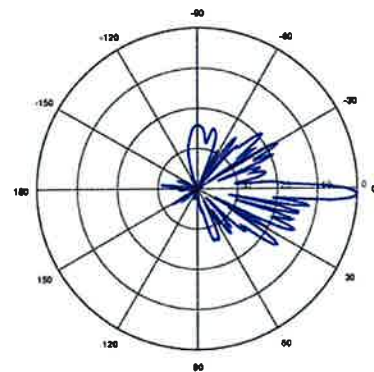


**Attachment D: T-Mobile Antenna Data Sheets and Electrical Patterns**

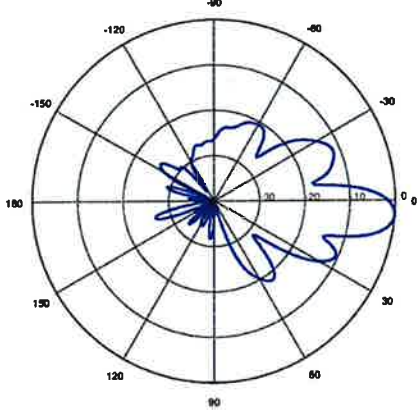
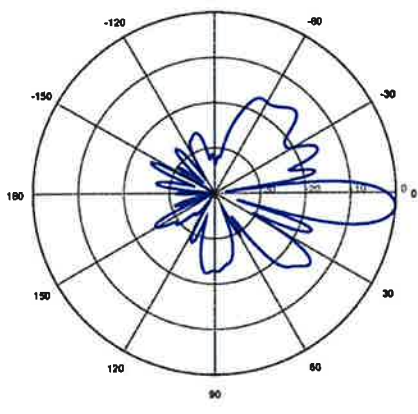
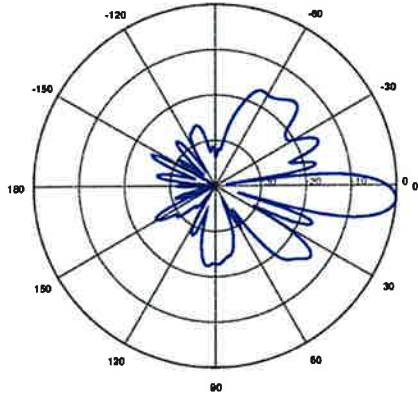
<p><b>600 MHz</b></p> <p>Manufacturer: RFS            Model #: APXVAR18_43-C-NA20            Frequency Band: 617 - 698 MHz            Gain: 14.7 dBi            Vertical Beamwidth: 15.5°            Horizontal Beamwidth: 66.1°            Polarization: ±45°            Size L x W x D: 68" x 16" x 9"</p>	
<p><b>700 MHz</b></p> <p>Manufacturer: RFS            Model #: APXVAR18_43-C-NA20            Frequency Band: 698 - 746 MHz            Gain: 15 dBi            Vertical Beamwidth: 14.1°            Horizontal Beamwidth: 63.8°            Polarization: ±45°            Size L x W x D: 68" x 16" x 9"</p>	
<p><b>1900 MHz</b></p> <p>Manufacturer: RFS            Model #: APXVAR18_43-C-NA20            Frequency Band: 1850 - 1990 MHz            Gain: 18.1 dBi            Vertical Beamwidth: 5.5°            Horizontal Beamwidth: 69.1°            Polarization: ±45°            Size L x W x D: 68" x 16" x 9"</p>	

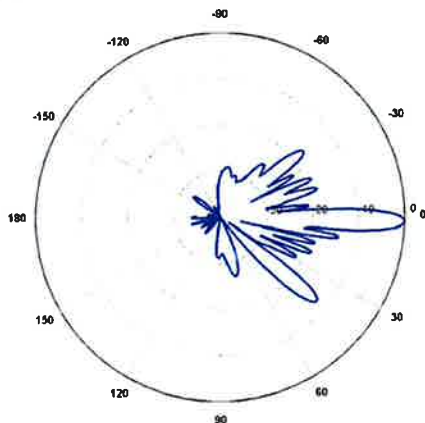
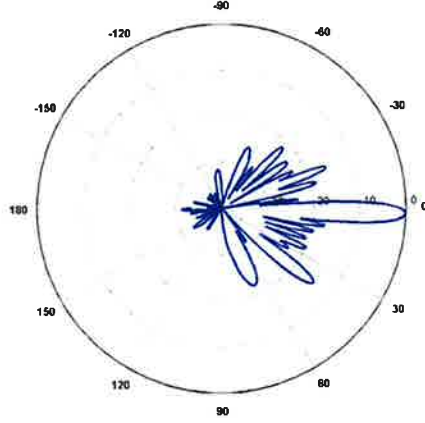
**2100 MHz**

Manufacturer: RFS  
Model #: APXVAR18\_43-C-NA20  
Frequency Band: 1920 - 2200 MHz  
Gain: 18.9 dBi  
Vertical Beamwidth: 5.1°  
Horizontal Beamwidth: 64.3°  
Polarization:  $\pm 45^\circ$   
Size L x W x D: 68" x 16" x 9"



**Attachment E: Verizon Antenna Data Sheets and Electrical Patterns**

<p><b>700 MHz</b></p> <p>Manufacturer: CommScope          Model #: NHH-65B-R2B          Frequency Band: 698 - 806 MHz          Gain: 14.9 dBi          Vertical Beamwidth: 12.4°          Horizontal Beamwidth: 65°          Polarization: ±45°          Size L x W x D: 71.97" x 11.85" x 7.1"</p>	 <p>A polar plot showing the radiation pattern for 700 MHz. The plot is circular with concentric grid lines representing gain levels. The main lobe is centered at 0 degrees and extends horizontally to approximately 110 degrees. There are several side lobes and nulls distributed around the main lobe. The plot is labeled with angles from -180 to 180 degrees in 30-degree increments.</p>
<p><b>875 MHz</b></p> <p>Manufacturer: CommScope          Model #: NHH-65B-R2B          Frequency Band: 806 - 896 MHz          Gain: 15 dBi          Vertical Beamwidth: 11.2°          Horizontal Beamwidth: 60°          Polarization: ±45°          Size L x W x D: 71.97" x 11.85" x 7.1"</p>	 <p>A polar plot showing the radiation pattern for 875 MHz. The plot is circular with concentric grid lines representing gain levels. The main lobe is centered at 0 degrees and extends horizontally to approximately 110 degrees. There are several side lobes and nulls distributed around the main lobe. The plot is labeled with angles from -180 to 180 degrees in 30-degree increments.</p>
<p><b>890 MHz</b></p> <p>Manufacturer: CommScope          Model #: NHH-65B-R2B          Frequency Band: 806 - 896 MHz          Gain: 15 dBi          Vertical Beamwidth: 11.2°          Horizontal Beamwidth: 60°          Polarization: ±45°          Size L x W x D: 71.97" x 11.85" x 7.1"</p>	 <p>A polar plot showing the radiation pattern for 890 MHz. The plot is circular with concentric grid lines representing gain levels. The main lobe is centered at 0 degrees and extends horizontally to approximately 110 degrees. There are several side lobes and nulls distributed around the main lobe. The plot is labeled with angles from -180 to 180 degrees in 30-degree increments.</p>

<p><b>1900 MHz</b></p> <p>Manufacturer: CommScope          Model #: NHH-65B-R2B          Frequency Band: 1920 - 2200 MHz          Gain: 18.4 dBi          Vertical Beamwidth: 4.9°          Horizontal Beamwidth: 64°          Polarization: <math>\pm 45^\circ</math>          Size L x W x D: 71.97" x 11.85" x 7.1"</p>	
<p><b>2100 MHz</b></p> <p>Manufacturer: CommScope          Model #: NHH-65B-R2B          Frequency Band: 1920 - 2200 MHz          Gain: 18.4 dBi          Vertical Beamwidth: 4.9°          Horizontal Beamwidth: 64°          Polarization: <math>\pm 45^\circ</math>          Size L x W x D: 71.97" x 11.85" x 7.1"</p>	

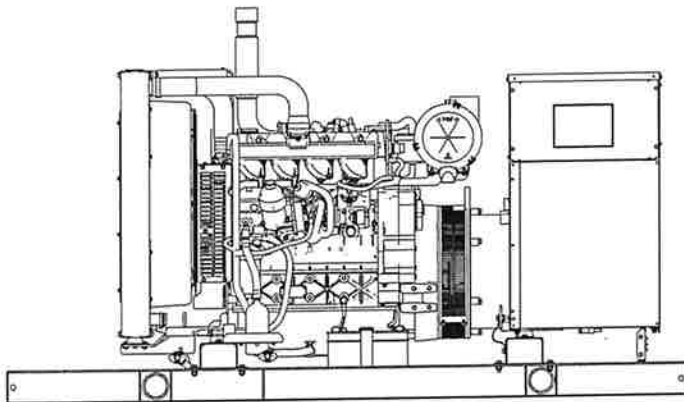
# **ATTACHMENT 4**



**Tier 3 EPA-Certified for Stationary  
Emergency Applications**

### Ratings Range

<b>Standby:</b>	<b>kW</b>	<b>60 Hz</b>	37- 42
	<b>kVA</b>		37- 52
<b>Prime:</b>	<b>kW</b>		34- 37
	<b>kVA</b>		34- 46



Model with TM Engine Shown

### Generator Set Ratings

Alternator	Voltage	Ph	Hz	130°C Rise Standby Rating		105°C Rise Prime Rating	
				kW/kVA	Amps	kW/kVA	Amps
4P5X	120/208	3	60	42/52	145	37/46	128
	127/220	3	60	42/52	137	37/46	121
	120/240	3	60	41/51	123	37/46	111
	120/240	1	60	37/37	154	34/34	141
	139/240	3	60	42/52	126	37/46	111
	220/380	3	60	41/51	77	37/46	70
	277/480	3	60	42/52	63	37/46	55
	347/600	3	60	42/52	50	37/46	44
4P7BX	120/208	3	60	42/52	145	37/46	128
	127/220	3	60	42/52	137	37/46	121
	120/240	3	60	41/51	123	37/46	111
	120/240	1	60	40/40	166	36/36	150
	139/240	3	60	42/52	126	37/46	111
	220/380	3	60	42/52	79	37/46	70
	277/480	3	60	42/52	63	37/46	55
347/600	3	60	42/52	50	37/46	44	
4Q5X	120/240	1	60	40/40	166	36/36	150
4Q7BX	120/240	1	60	40/40	166	36/36	150

**RATINGS:** All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. **Standby Ratings:** Standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. **Prime Power Ratings:** At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain the technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

### Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940 / ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- The generator set engine is certified to meet the Environmental Protection Agency (EPA) emergency stationary emissions requirements.
- A one-year limited warranty covers all generator set systems and components. Two- and five-year extended limited warranties are also available.
- Alternator features:
  - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controllers for one-source system integration and remote communication. See Controllers on page 3.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
  - The generator set for 49-state applications is equipped with the KDI 3404 TM engine. The generator set that is CARB compliant/California South Coast Air Quality Management District (SCAQMD) pre-certified is equipped with the KDI 3404 TCR engine.

# Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth Permanent Magnet
Leads: quantity, type	12, Reconnectable 4, 110- 120/220- 240 V
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Specifications	Alternator
Peak motor starting kVA:	(35% dip for voltages below)
480 V 4P5X (12 lead)	138
480 V 4P7BX (12 lead)	180
240 V 4Q5X (4 lead)	92
240 V 4Q7BX (4 lead)	113

## Application Data

### Engine

Engine Specifications	49-State Engine	California SCAQMD
Manufacturer	Kohler Diesel	
	KDI	KDI
Engine model	3404TM	3404TCR
Engine type	4-Cycle, Turbocharged	
Cylinder arrangement	4 Inline	
Displacement, L (cu. in.)	3.4 (207)	
Bore and stroke, mm (in.)	96 x 116 (3.28 x 4.57)	
Compression ratio	18.5:1	17.0:1
Piston speed, m/min. (ft./min.)	418 (1371)	510 (1673)
Main bearings: quantity, type	5, Replaceable Insert	
Rated rpm	1800	
Max. power at rated rpm, kWm (BHP)	50 (67)	70 (94)
Cylinder head material	Cast Iron	
Crankshaft material	Cast Iron	
Valve material:		
Intake	Chromium-Silicon Steel	
Exhaust	Chromium Steel	
Governor: type, make/model	Mech. (or Electronic *)	Electronic
	Droop, 5% (or Isochr. *)	Isochronous
Frequency regulation, no-load to full-load	±0.5%	±0.28%
Frequency regulation, steady state	Fixed	
Frequency	Dry	
Air cleaner type, all models		
* Requires available electronic governor option		

### Engine Electrical

Engine Electrical System	49-State Engine	California SCAQMD
Battery charging alternator:		
Ground (negative/positive)	Negative	
Volts (DC)	12	
Ampere rating	90	
Starter motor rated voltage (DC)	12	
Battery, recommended cold cranking amps (CCA):		
Quantity, CCA rating	One, 650	
Battery voltage (DC)	12	

### Fuel

Fuel System	49-State Engine	California SCAQMD
Fuel supply line, min. ID, mm (in.)	8.0 (0.31)	
Fuel return line, min. ID, mm (in.)	6.0 (0.25)	
Max. lift, engine-driven fuel pump, m (ft.)	6.0 (20.0)	3.7 (12.1)
Max. fuel flow, Lph (gph)	46 (12.2)	87.4 (23.1)
Max. return line restriction, kPa (in. Hg)	20 (5.9)	17.7 (5.2)
Fuel filter		
Prefilter	74 Microns	
Primary/Water Separator	5 Microns @ 98% Efficiency	5 Microns @ 95% Efficiency
Recommended fuel	#2 Ultra Low Sulfur Diesel / HVO / RD	

### Lubrication

Lubricating System	49-State Engine	California SCAQMD
Type	Full Pressure	
Oil pan capacity, L (qt.) §	15.3 (16.2)	
Oil pan capacity with filter, L (qt.) §	15.6 (16.5)	
Oil filter: quantity, type §	1, Cartridge	
Oil cooler	Water-Cooled	
§ Kohler recommends the use of Kohler Genuine oil and filters.		

### Exhaust

Exhaust System	49-State Engine	California SCAQMD
Exhaust manifold type	Dry	
Exhaust flow at rated kW, m <sup>3</sup> /min. (cfm)	8.1 (286)	
Exhaust temperature at rated kW, dry exhaust, °C (°F)	490 (914)	471 (880)
Minimum/maximum allowable back pressure, kPa (in. Hg)	6 (1.8)/ 9 (2.7)	8 (2.4)/ 13.5 (4.0)
Exhaust outlet size at engine hookup, mm (in.)	63.5 (2.5)	

## Application Data

### Cooling

Radiator System	49-State Engine	California SCAQMD
Ambient temperature, °C (°F) *	50 (122)	
Engine jacket water capacity, L (gal.)	4.5 (1.19)	
Radiator system capacity, including engine, L (gal.)	12.3 (3.2)	
Engine jacket water flow, Lpm (gpm)	125 (33)	120 (32)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	32 (1821)	35 (1991)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	11 (626)	7.7 (437)
Water pump type	Centrifugal	
Fan diameter, including blades, mm (in.)	597 (23.5)	
Fan, kWm (HP)	1.8 (2.3)	
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H <sub>2</sub> O)	0.125 (0.5)	

\* Enclosure reduces ambient temperature capability by 5°C (9°F).

### Operation Requirements

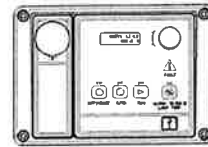
Air Requirements	49-State Engine	California SCAQMD
Radiator-cooled cooling air, m <sup>3</sup> /min. (scfm) †	96.3 (3400)	
Combustion air, m <sup>3</sup> /min. (cfm)	4.5 (159)	3.7 (132)
Heat rejected to ambient air:		
Engine, kW (Btu/min.)	10.5 (600)	
Alternator, kW (Btu/min.)	7.6 (435)	
Max. air intake restriction, kPa (in. Hg)	5.2 (1.54)	4.2 (1.24)

† Air density = 1.20 kg/m<sup>3</sup> (0.075 lbm/ft<sup>3</sup>)

Fuel Consumption**	49-State Engine	
Diesel, Lph (gph) at % load	Standby Rating	
100%	14.0	(3.7)
75%	11.7	(3.1)
50%	9.1	(2.4)
25%	4.9	(1.3)
Diesel, Lph (gph) at % load	Prime Rating	
100%	13.2	(3.5)
75%	10.6	(2.8)
50%	7.6	(2.0)
25%	4.9	(1.3)
Fuel Consumption**	Calif. SCAQMD Engine	
Diesel, Lph (gph) at % load	Standby Rating	
100%	12.3	(3.2)
75%	9.4	(2.6)
50%	6.7	(1.8)
25%	4.2	(1.1)
Diesel, Lph (gph) at % load	Prime Rating	
100%	11.1	(2.9)
75%	8.8	(2.3)
50%	6.2	(1.6)
25%	3.6	(1.0)

\*\* Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

## Controllers

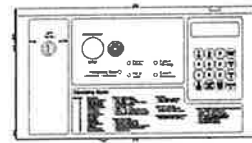


### APM402 Controller

Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-161 for additional controller features and accessories.



(Available with the 49-State generator set only.)

### Decision-Maker® 550 Controller

Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities.

- Digital display and keypad provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or modem configuration
- Controller supports Modbus® protocol
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-46 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.



## Additional Standard Features

- Air Cleaner, Heavy Duty
- Alternator Protection
- Battery Rack and Cables
- Open Crankcase Ventilation
- Oil Drain and Coolant Drain with Hose Barb
- Oil Drain Extension (with narrow skid and enclosure models only)
- Operation and Installation Literature
- Radiator Drain Extension (with enclosure models only)
- Stainless Steel Fasteners on Enclosure (with enclosure models only)

## Available Options

### Approvals and Listings

- CSA Certified
- IBC Seismic Certification
- UL2200 Listing

### Enclosed Unit

- Sound Enclosure (with enclosed critical silencer)
- Weather Enclosure (with enclosed critical silencer)
- Stainless Steel Latches and Hinges

### Open Unit

- Exhaust Silencer, Critical (kit: PA-324470)
- Flexible Exhaust Connector, Stainless Steel

### Fuel System

- Flexible Fuel Lines
- Fuel Pressure Gauge (Available with 49-state engine only)
- Subbase Fuel Tanks

### Controller

- 15-Relay Dry Contact (SCAQMD engine with APM402 controller only)
- Common Failure Relay (550 controller only)
- Communication Products and PC Software (550 controller only)
- Customer Connection (550 controller only)
- Dry Contact (isolated alarm) (550 controller only)
- Two Input/Five Output Module (49-state engine with APM402 controller only)
- Key Switch (SCAQMD engine with APM402 controller only)
- Manual Speed Adjust (requires Electronic Governor or SCAQMD engine)
- Remote Annunciator Panel
- Remote Emergency Stop
- Run Relay

### Cooling System

- Block Heater (1000 W, 110-120 V)  
Recommended for ambient temperatures below 20°C (68°F).
- Block Heater (1400 W, 110-120 V)  
Recommended for ambient temperatures below 0°C (32°F).
- Radiator Duct Flange

### Electrical System

- Alternator Strip Heater
- Battery
- Battery Charger, Equalize/Float Type
- Battery Heater
- Electronic Governor
- Line Circuit Breaker (NEMA type 1 enclosure)
- Line Circuit Breaker with Shunt Trip (NEMA type 1 enclosure)

### Miscellaneous

- Air Cleaner Restriction Indicator
- Engine Fluids Added
- Rated Power Factor Testing
- Rodent Guards

### Literature

- General Maintenance
- NFPA 110
- Overhaul
- Production

### Warranty

- 2-Year Basic Limited Warranty
- 5-Year Basic Limited Warranty
- 5-Year Comprehensive Limited Warranty

### Other Options

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

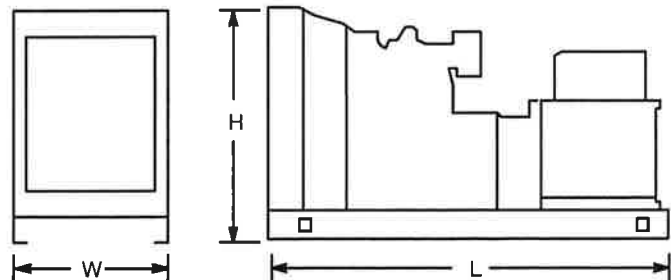
## Dimensions and Weights

Overall Size, L x W x H, mm (in.):

Wide Skid: 2300 x 1040 x 1131 (90.6 x 41.0 x 44.5)

Narrow Skid: 1871 x 780 x 1055 (73.6 x 30.7 x 41.5)

Weight (radiator model), wet, kg (lb.): 787 (1735)



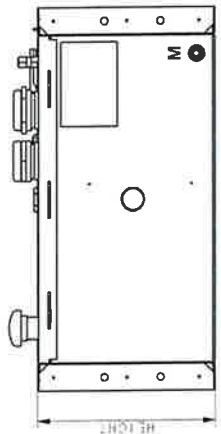
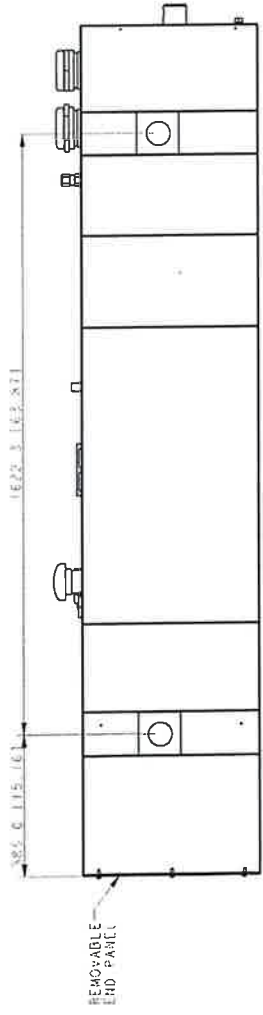
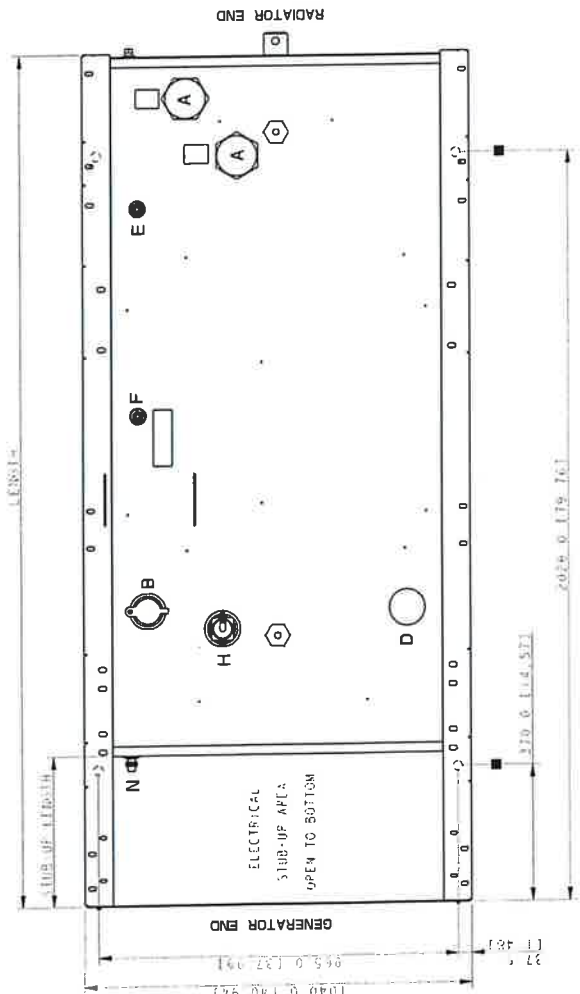
NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

## DISTRIBUTED BY:

6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

MODEL	CAPACITY		WEIGHT		LENGTH		HEIGHT		STAGE UP LENGTH		EMERGENCY VENT GAS INNEBR/OUTER	
	GAL	LITERS	KG	LBS	MM	IN	MM	IN	MM	IN	IN	IN
40750-60K-W	50.5	190	280	618	2300.0	90.6	482.5	19.0	456.0	18.1	37.3	37.3
40750-40	229	865	379	836	2400.0	94.5	787.4	31.0	483.0	19.1	37.3	37.3
40760-W	104.3	395	416	918	2360.0	93.5	929.0	35.0	404.0	16.1	37.3	37.3
50750-W	152.7	572	405	892	2835.0	111.6	914.4	36.0	364.3	14.0	37.3	37.3

**TANK FITTINGS:**  
 A. 1/2" NPT FEMALE CHECK VALVE FITTING PER NFPA 30 WITH VENT CAPS 10772  
 B. 2" NPT FUEL FILL FITTING WITH LOCKABLE CAP  
 C. 1/2" NPT NORMAL VENT FITTING WITH MUFFED END  
 D. 1/2" NPT FUEL FILL FITTING WITH MUFFED END  
 E. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE ENGINE SUPPLY  
 F. 1/2" NPT FEMALE CHECK VALVE FITTING WITH CHECK VALVE  
 G. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 H. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 I. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 J. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 K. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 L. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 M. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN  
 N. 1/2" NPT FUEL FILL FITTING FOR REMOVABLE FUEL RETURN



**NOTE:**  
 FOR FURTHER JAMB. DETAIL SEE INDIVIDUAL DRAWINGS  
 ■ 47 935.4 (11.03) STANDARD MOUNTING

REV	DATE	DESCRIPTION	BY	CHECKED	DATE	PROJECT	NO.	REV.
1	10-15-14	ISSUE FOR FABRICATION	MS	MS	10-15-14	ADV-8753	1	
2	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	2	
3	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	3	
4	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	4	
5	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	5	
6	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	6	
7	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	7	
8	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	8	
9	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	9	
10	10-15-14	REVISED FOR FABRICATION	MS	MS	10-15-14	ADV-8753	10	

**STANDARD TANK**  
 ADV-8753  
 DIMENSION PRINT  
 KOHLER CO. METRIC PRO-E

