CITY OF CAMBRIDGE

BOARD OF ZONING APPEAL

831 Massachusetts Avenue, Cambridge MA 02139

617-349-6100

2022 AUG -2 PM 12: 21

OFFICE OF THE CITY CLERK
CAMBRIDGE, MASSACHUSETTS

BZA Application Form

BZA Number: 184415

General Information

The undersigned hereby petitions the Board of Zoning Appeal for the following:

Special Permit: ___X___ Variance: _____ Appeal: _____

PETITIONER: Norshire, LLC C/O Cellco D/B/A Verizon Wireless - C/o Attorney Ellen Freyman

PETITIONER'S ADDRESS: 1441 Main Street, Springfield, MA 01103

LOCATION OF PROPERTY: 284-288 Norfolk Street , Cambridge, MA

TYPE OF OCCUPANCY: Retail-Office **ZONING DISTRICT:** Residence C-1 Zone

REASON FOR PETITION:

/Telecommunication Facility (antenna)/

DESCRIPTION OF PETITIONER'S PROPOSAL:

Granting of Special Permit to perform modification/update to wireless communications facility existing on the rooftop of the existing building located at the aforementioned address.

SECTIONS OF ZONING ORDINANCE CITED:

Article: 4.000 Section: 4.32.G.1 & 4.40 (Footnote 49) (Telecommunications Facility)
Article: 10.000 Section: 10.40 (Special Permit).
Article: 6409 Section: (Federal Middle Class Tax Relief Act (Spectrum Act)

Original Signature(s): Cellco Partnership d/b/a Verizon Wireless by Ellen W. Freyman authorized agent
(Petitioner (s) / Owner)

Ellen W. Freyman
(Print Name)

Address: 1441 main st., Springfield, MA 01103

BZA APPLICATION FORM - OWNERSHIP INFORMATION

To be completed by OWNER, signed before a notary and returned to The Secretary of the Board of Zoning Appeals.

I/We Neal Heffron, for Norshire LLC (OWNER)

Address: 238 Norfolk St. Cambridge MA 02139

State that I/We own the property located at 238 Norfolk St,

which is the subject of this zoning application.

The record title of this property is in the name of Norshire LLC

*Pursuant to a deed of duly recorded in the date 11/17/2008, Middlesex South County Registry of Deeds at Book 51897, Page 321; or

Middlesex Registry District of Land Court, Certificate No. _____

Book _____ Page _____.

SIGNATURE BY LAND OWNER OR AUTHORIZED TRUSTEE, OFFICER ORAGENT*

Written evidence of Agent's standing to represent petitioner may be requested.

Commonwealth of Massachusetts, County of Middlesex

The above-name Neal Heffron personally appeared before me, this 5th of May, 2022, and made oath that the above statement is true.

Notary

My commission expires _____ (Notary Seal).

REBECCA A. RAFFERTY
Notary Public
Commonwealth of Massachusetts
My Commission Expires
December 22, 2028

- If ownership is not shown in recorded deed, e.g. if by court order, recent deed, or inheritance, please include documentation.

BZA Application Form

SUPPORTING STATEMENT FOR A SPECIAL PERMIT

Please describe in complete detail how you meet each of the following criteria referring to the property and proposed changes or uses which are requested in your application. Attach sheets with additional information for special permits which have additional criteria, e.g.; fast food permits, comprehensive permits, etc., which must be met.

Granting the Special Permit requested for 288 Norfolk St , Cambridge, MA (location) would not be a detriment to the public interest because:

A) Requirements of the Ordinance can or will be met for the following reasons:

As required by Verizon Wireless's license from the Federal Communications Commission ("FCC"), the upgraded facility will conform with requirements of the FCC. The tower has been designed in a manner which will minimize any visual impacts to the surrounding properties and community, and the proposed modification to the existing facility is not inconsistent with the character that prevails in the surrounding neighborhood.

B) Traffic generated or patterns of access or egress would not cause congestion hazard, or substantial change in established neighborhood character for the following reasons:

The upgraded facility will have no effect on existing traffic or patterns of ingress or egress. The facility only generates about one or two vehicle trips per month by a standard passenger vehicle during normal business hours for routine maintenance, which will remain the case after the modification is complete.

C) The continued operation of or the development of adjacent uses as permitted in the Zoning Ordinance would not be adversely affected by the nature of the proposed use for the following reasons:

The upgraded facility will not adversely effect any operations of adjacent uses. There will be no emission of light, odor, dust or glare and it will not generate any unusual noise or other adverse impacts. Instead, the facility will benefit the adjacent uses by enhancing wireless coverage in the area around the tower.

D) Nuisance or hazard would not be created to the detriment of the health, safety, and/or welfare of the occupant of the proposed use or the citizens of the City for the following reasons:

The upgraded facility will create no nuisance, hazard, or any other negative impacts on the people or properties within the City of Cambridge. There will be no traffic, noise, light, odor or any other potentially negative impact generated from the upgraded facility. The upgraded facility will only provide the community with increased wireless service and enhance the health, safety, and welfare of the residents of Cambridge.

E) For other reasons, the proposed use would not impair the integrity of the district or adjoining district or otherwise derogate from the intent or purpose of this ordinance for the following reasons:

The upgraded facility is designed to minimize any potential visual impact to the surrounding properties and in no way impairs, but rather aligns with the purpose and intent of the Zoning Ordinance as well as the previously issued Special Permit for this use.

***If you have any questions as to whether you can establish all of the applicable legal requirements, you should consult with an attorney.**

BZA Application Form

DIMENSIONAL INFORMATION

Applicant: Norshire, LLC
Location: 288 Norfolk St , Cambridge, MA
Phone: 413-737-1131

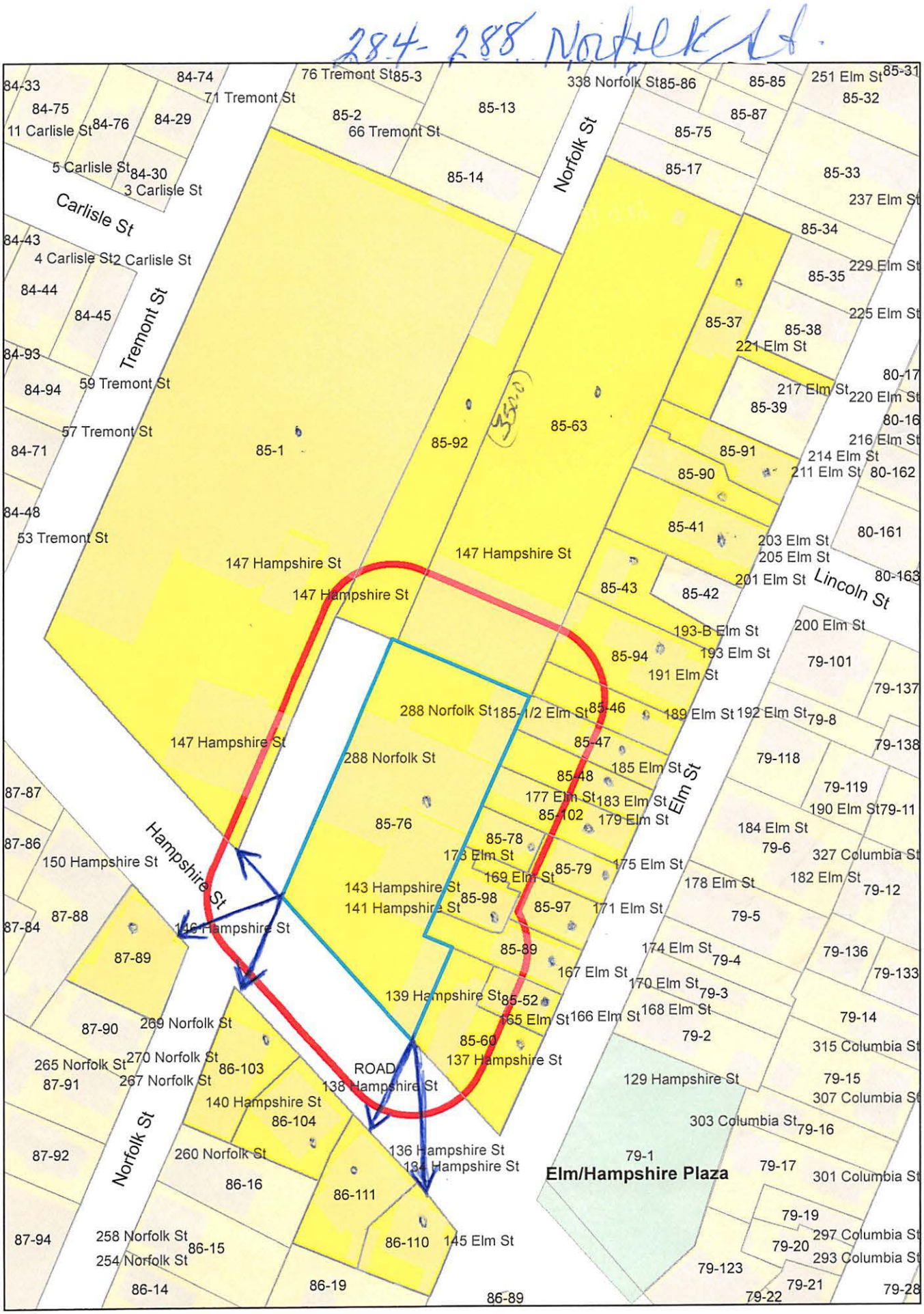
Present Use/Occupancy: Retail-Office
Zone: Residence C-1 Zone
Requested Use/Occupancy: Retail-Office

		Existing Conditions		Requested Conditions		Ordinance Requirements	
TOTAL GROSS FLOOR AREA:		N/A		N/A		N/A	(max.)
LOT AREA:		N/A		N/A		N/A	(min.)
RATIO OF GROSS FLOOR AREA TO LOT AREA: [2]		N/A		N/A		N/A	
LOT AREA OF EACH DWELLING UNIT		N/A		N/A		N/A	
SIZE OF LOT:	WIDTH	N/A		N/A		N/A	
	DEPTH	N/A		N/A		N/A	
SETBACKS IN FEET:	FRONT	N/A		N/A		N/A	
	REAR	N/A		N/A		N/A	
	LEFT SIDE	N/A		N/A		N/A	
	RIGHT SIDE	N/A		N/A		N/A	
SIZE OF BUILDING:	HEIGHT	51' - 4"		No Change		N/A	
	WIDTH	N/A		N/A		N/A	
RATIO OF USABLE OPEN SPACE TO LOT AREA:		N/A		N/A		N/A	
NO. OF DWELLING UNITS:		N/A		N/A		N/A	
NO. OF PARKING SPACES:		N/A		N/A		N/A	
NO. OF LOADING AREAS:		N/A		N/A		N/A	
DISTANCE TO NEAREST BLDG. ON SAME LOT		N/A		N/A		N/A	

Describe where applicable, other occupancies on the same lot, the size of adjacent buildings on same lot, and type of construction proposed, e.g; wood frame, concrete, brick, steel, etc.:

N/A

1. SEE CAMBRIDGE ZONING ORDINANCE ARTICLE 5.000, SECTION 5.30 (DISTRICT OF DIMENSIONAL REGULATIONS).
2. TOTAL GROSS FLOOR AREA (INCLUDING BASEMENT 7'-0" IN HEIGHT AND ATTIC AREAS GREATER THAN 5') DIVIDED BY LOT AREA.
3. OPEN SPACE SHALL NOT INCLUDE PARKING AREAS, WALKWAYS OR DRIVEWAYS AND SHALL HAVE A MINIMUM DIMENSION OF 15'.


284-288 Norfolk St.
Carlisle St
Tremont St
Norfolk St
Hampshire St
Elm St
Lincoln St
Elm/Hampshire Plaza
ROAD
147 Hampshire St
288 Norfolk St
85-1
85-92
85-63
85-76
85-14
85-13
85-2
85-3
85-85
85-86
85-87
85-75
85-17
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87-94
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79-101
79-137
79-118
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79-136
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79-21
79-22
79-123
79-28
80-17
80-16
80-162
80-161
80-163
76 Tremont St
71 Tremont St
66 Tremont St
11 Carlisle St
5 Carlisle St
3 Carlisle St
4 Carlisle St
2 Carlisle St
59 Tremont St
57 Tremont St
53 Tremont St
338 Norfolk St
251 Elm St
237 Elm St
229 Elm St
225 Elm St
221 Elm St
217 Elm St
220 Elm St
216 Elm St
214 Elm St
211 Elm St
203 Elm St
205 Elm St
201 Elm St
200 Elm St
193-B Elm St
193 Elm St
191 Elm St
189 Elm St
192 Elm St
185-1/2 Elm St
185 Elm St
183 Elm St
179 Elm St
177 Elm St
175 Elm St
173 Elm St
169 Elm St
171 Elm St
167 Elm St
165 Elm St
166 Elm St
168 Elm St
174 Elm St
170 Elm St
178 Elm St
184 Elm St
182 Elm St
190 Elm St
327 Columbia St
315 Columbia St
307 Columbia St
303 Columbia St
301 Columbia St
297 Columbia St
293 Columbia St
150 Hampshire St
146 Hampshire St
143 Hampshire St
141 Hampshire St
139 Hampshire St
138 Hampshire St
137 Hampshire St
136 Hampshire St
134 Hampshire St
140 Hampshire St
129 Hampshire St
269 Norfolk St
270 Norfolk St
267 Norfolk St
265 Norfolk St
260 Norfolk St
258 Norfolk St
254 Norfolk St
145 Elm St
350'

284-288 Norfolk St

Petitioner

85-1-63-92
CAMBRIDGE CITY OF PUBLIC WORKS DEPT
147 HAMPSHIRE ST
CAMBRIDGE, MA 02139

85-1-63-92
CITY OF CAMBRIDGE
C/O CITY MANAGER

ELLEN W. FREYMAN
1441 MAIN STREET
SPRINGFIELD, MA 01103

85-1-63-92
CITY OF CAMBRIDGE
C/O NANCY GLOWA
CITY SOLICITOR

86-111
JEFFRIES, BENJAMIN E.,
TR OF HAMPSHIRE STREET REALTY TRUST
S.B. JEFFRIES CONSULTANTS
121 MT. VERNON ST
BOSTON, MA 02108-1104

85-52
ELMSHIRE LLC
288 NORFOLK ST
CAMBRIDGE, MA 02139

86-104-103
ROWLEY, JAMES J. & JOANNE K. ROWLEY,
TRS THE ROWLEY FAMILY REALTY TRUST
29 RUSKIN ST.
WEST ROXBURY, MA 02132

85-76
NORSHIRE LLC,
288 NORFOLK ST
CAMBRIDGE, MA 02139

85-91
LACOURT FOUNDATION, LLC
30 COLLEGE AVE
SOMERVILLE, MA 02144

85-47
CAZEAU, ANDRE & MATANIE CAZEAU,
TRS. THE CAZEAU REALTY TRUST
P.O. BOX 400844
CAMBRIDGE, MA 02140

86-110
HENRY, SHAWN R. & LAETITIA M. HENRY
145 ELM ST
CAMBRIDGE, MA 02139

85-37
219-221 ELM STREET LLC
38-40 GRANVILLE ROAD
CAMBRIDGE, MA 02138

85-43
PEREZ, FELIX & CARMEN PEREZ
197 ELM ST.
CAMBRIDGE, MA 02139

85-46
CHERNEY, CHARLES & CANDACE BOTT
189 ELM ST
CAMBRIDGE, MA 02139

85-60
NORSHIRE LLC,
288 NORFOLK ST
CAMBRIDGE, MA 02139

85-78
SYTCHOV, MIKHAIL
173R ELM ST
CAMBRIDGE, MA 02139

87-89
MASS AVE BAPTIST CHURCH INC
146 HAMPSHIRE
CAMBRIDGE, MA 02139

85-90
MALAMUD, NORBERT S. & LINDA NGUYEN
209 ELM ST
CAMBRIDGE, MA 02139

85-94
PIRES, FRANCISCA
193 ELM ST
CAMBRIDGE, MA 02139

85-98
THAMES, JAMES NATHAN &
ELIZABETH WILLARD THAMES
169R ELM ST.
CAMBRIDGE, MA 02139

85-41
SELIGER, VERENA INGEBORG
203-205 ELM ST., #2
CAMBRIDGE, MA 02139

85-79
SEWELL, ELI A. & JILL W. SEWELL
175 ELM ST., #175/1
CAMBRIDGE, MA 02139

85-79
WONG, ON YI
394 NORFOLK ST.
CAMBRIDGE, MA 02139

85-89
YANG, YU-SANG
167 ELM ST., #2
CAMBRIDGE, MA 02139

85-89
SCOTT,LEONARD GREGORY &PAMELA KAY OTSTOT
TRUSTEES OF THE LG& PK SCOTT 2013 TRUST
2434 JACKSON ST.
SAN FRANCISCO, CA 94118

85-89
PETERSON, HILLARY FITZPATRICK &
BENJAMIN J. PETERSON
167 ELM ST., #1
CAMBRIDGE, MA 02139

85-79
YIP, ARTHUR HONG CHUN
175 ELM ST., #175/3
CAMBRIDGE, MA 02139

85-102
DASILVA, NAZIDIR RODRIGUES
179 ELM STREET
CAMBRIDGE, MA 02139

85-97
PEDRELLI, PAOLA
171 ELM ST., UNIT #1
CAMBRIDGE, MA 02139

85-97
KHANGURA, NAVTEJ
180 FRONT ST
BROOKLYN, NY 11201

284-288 Norfolk St.

85-97
MARTYN, RAJEEVE & MELISSA DUGGAN
171 ELM ST., #2
CAMBRIDGE, MA 02139

85-41
HOSS JENNIFER L & ANDREW GUZIOR
TRS THE HOSS FAMILY TRUST
203-205 ELM ST UNIT 3
CAMBRIDGE, MA 02139

85-48
SUZUKI, YUJI , KEIKO SUZUKI & SARA SUZUKI
183 ELM ST., #1
CAMBRIDGE, MA 02139

85-102
BERRY JESSICA AVILA JOSE MANUEL
177 ELM ST
CAMBRIDGE, MA 02141

85-48
LEE, BRITTANY L.
183 ELM ST., #2
CAMBRIDGE, MA 02140

85-41
DE ALOK M & MAYA DE
203 ELM ST -UNIT 1
CAMBRIDGE, MA 02139

Verizon Wireless 60-Day Eligible Facility
Request Modification of Existing Wireless Base Station

Request Date: *July 11, 2022*

Jurisdiction: *City of Cambridge, Massachusetts*

Department: *Planning Board*

Site Address: *284 Norfolk Street, Cambridge, Massachusetts 02139*

Verizon Wireless Contact: *Rebecca Rafferty, SAI, (603) 475-0347*

This document serves as Verizon Wireless's eligible facilities request to modify an existing wireless rooftop facility at the above-referenced site address. This eligible facilities request must be approved administratively under Section 6409 of the Federal Spectrum Act and Federal Communications Commission ("FCC") rules (the "Spectrum Act"). Review by the City of Cambridge is limited to determining whether the proposed modification qualifies as an eligible facilities request that does not substantially change the physical dimensions of the wireless facility. All permits necessary to commence construction must be approved within 60 days of the request date set forth above, subject to tolling for incompleteness.

For this request, Verizon Wireless attaches the following documents for the permit required by the City of Cambridge to commence construction of the modification:

1. *Special Permit Application;*
2. *Plans prepared by Dewberry Engineers Inc. dated May 4, 2022 (the "Plans");*
3. *Letter of Authorization from property owner;*
4. *Certified List of Abutters within 300 feet*
5. *GIS Block Map*
6. *FCC Licenses*
7. *Power Density Calculation*
8. *Antenna Specifications*
9. *Engineering Necessity Case*
10. *Photo Simulations of proposed modifications*

Project Description

To accommodate new wireless technologies, Verizon Wireless proposes to remove (6) Panel Antennas and (9) Remote Radio Heads from the existing False Chimney and existing structures on the rooftop and install (6) updated Panel Antennas and (9) updated Remote Radio Heads as well as supporting equipment to the proposed 32" x 32" RF Friendly False Chimney replacing the existing 32" x 32" RF Friendly False Chimney. No additional changes are proposed for the modification.

FCC Rules for Eligible Facilities Requests

The Spectrum Act states that "a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station." An "eligible facilities request"[1] is defined to include any collocation, removal, or replacement of existing equipment.[2]

The FCC adopted rules providing legally binding guidance on key terms of the Spectrum Act, notably defining "substantial change" with the six thresholds described below.[3] The FCC requires that qualifying eligible facilities requests be approved within 60 days, subject to tolling for incompleteness.[4] The 60-day period begins when an applicant takes the first procedural step required by a local government, and submits written documentation.[5] The only submittal documents a local government can require are those relevant to determining if a proposed modification qualifies as an eligible facilities request.[6] If a local government does not render a decision within the 60-day period, an eligible facilities request can be deemed granted by operation of law.[7]

The Proposed Modification Does Not Constitute a "Substantial Change"

Below are the FCC's six "substantial change" thresholds for a wireless base station,[8] each followed by an explanation why the proposed modification does not exceed that threshold.

1) It increases the height of the structure by more than 10% or more than ten feet, whichever is greater.

   As shown on the Plans, there are no proposed height increases beyond any of the existing structures on the rooftop.

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[1] 47 U.S.C. § 1455(a)(1).
[2] 47 U.S.C. § 1455(a)(2).
[3] *See* Report and Order FCC 14-153, 29 FCC Rcd. 12865 (FCC October 17, 2014); *see also* Report and Order FCC 20-153, 2020 WL 6501650 (FCC October 27, 2020).
[4] *See* 47 C.F.R. § 1.6100(c)(2),(3).
[5] Declaratory Ruling 20-75, 35 FCC Rcd 5977, ¶ 16 (FCC June 9, 2020).
[6] *See* 47 C.F.R. § 1.6100(c)(1).
[7] *See* 47 C.F.R. § 1.6100(c)(4).
[8] *See* 47 C.F.R. § 1.6100(b)(7).

2) It involves adding an appurtenance to the body of the structure that would protrude from the edge of the structure by more than six feet.

As shown on the Plans, none of the proposed equipment protrudes from the edge of the building by more than six feet.

3) For any eligible support structure, it involves the installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four; or, for base stations, it involves installation of any new equipment cabinets on the ground if there are no pre-existing ground cabinets associated with the structure, or else involves installation of ground cabinets that are more than 10% larger in height or overall volume than any other ground cabinets associated with the structure.

As shown on the Plans, no new cabinets are proposed.

4) Entails any excavation or deployment outside the current site (as defined at 47 C.F.R. § 1.6100(b)(6)).

As shown on the Plans, none of the modifications entail excavation or deployment outside the current site.

5) Would defeat any concealment elements of the existing facility.

As shown on the Plans, the existing concealment elements of the base station will not change. Therefore, the modification does not defeat any concealment elements of the existing facility.

6) Does not comply with conditions associated with the prior approval of the existing facility, unless the non-compliance is due only to a change in height, width, etc., that does not exceed the first four thresholds.

There are no prior conditions of approval that would render the modification to be non-compliant, aside from any conditions that would be preempted by the first four "substantial change" thresholds.

In sum, the modification clearly qualifies as an "eligible facilities request" under the Spectrum Act and FCC rules, because it does not exceed any of the thresholds such that it would "substantially change" the physical dimensions of the existing base station.

Failure to process this eligible facilities request and approve all necessary permits within 60 days may result in the request being deemed granted by operation of law.

verizon fuze | RFDS

EAST > North East > New England > New England East > CAMBRIDGE_DONNELLY_FIELD_MA

Summers, Melissa - melissa.summers@verizonwireless.com - 1/3/2022 13:5:54

Project Details

FUZE Project ID:	16070570
Project Name:	850 ADD
Project Alt Name:	CAMBRIDGE_DONNELLY_FIELD_MA - 850LTE, NR, PCS, L-Sub6 Add
Project Type:	Modification
Modification Type:	RF
Designed Sector Carrier 4G:	15
Designed Sector Carrier 5G:	3
Additional Sector Carrier 4G:	N/A
Additional Sector Carrier 5G:	N/A
FP Solution Type & Tech Type:	MODIFICATION;4G_850,4G_Radio Swap,5G_L-Sub6-Prep
Carrier Aggregation:	false
MPT Id:	789339
eCIP-0:	false
Suffix:	REV1

Location Information

Site ID:	674415
E-NodeB ID:	0569001,056012
PSLC:	161282
Switch Name:	W Roxbury 1
Tower Owner:	
Tower Type:	Building Side-Mounted
Site Type:	MACRO
Site Sub Type:	CRAN
Street Address:	284 Norfolk Street
City:	Cambridge
State:	MA
Zip Code:	02139
County:	Middlesex
Latitude:	42.371278 / 42° 22' 16.6008" N
Longitude:	-71.097106 / 71° 5' 49.5816" W

RFDS Project Scope:

RFDS SOW: 850 5GNR/ L-SUB6 8T8R carrier add, Samsung dual band RRH swap, antenna change

REV1 (1/3/22): Upgrades OVP/ Hybriflex and changes design to 8T8R on all sectors

1- Retain 700/ AWS/ PCS carriers and add 850 5GNR/ L-SUB6 8T8R carriers
2- Replace (6) existing antennas with (3) new Commscope NHHS4-65A-R3B and (3) new Commscope NHH-65A-R2B antennas
3- Replace (6) existing Nokia RRHs on rooftop and TRDU in shelter with (3) new B5/B13 RRH- RF4440d-13A, (3) new Samsung B2/B66A RRH-RF4439d-25A, and (3) new Samsung RT8808-77A RRHs on rooftop
4- Add (3) Commscope CHB626-43-2X combiners on Rooftop
5- Remove quadraplexers from shelter
6- Upgrade OVPs/ Hybriflex
7- Plumb 700/ 850/ PCS/ AWS/ L-SUB6 according to the plumbing diagram
8- Use RF ports on dual band RRHs to communicate with RETs via Smart bias-T built into the antenna plus RET cable for LS6
7- Cap and weatherproof unused ports/connectors

Antenna Summary

Added

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	CDMA LTE 5G	LTE			COMMSCOPE	NHH-65A-R2B	59.2	61.5	305(03)	true	true	PHYSICAL	1	NHH-65A-R2B
LTE	CDMA LTE 5G	LTE			COMMSCOPE	NHH-65A-R2B	56	58.3	50(01) 150(02)	true	true	PHYSICAL	2	NHH-65A-R2B
LTE	LTE 5G		LTE	5G	COMMSCOPE	NHHS4-65A-R3B	56	58.3	50(01) 150(02)	true	true	PHYSICAL	2	
LTE	LTE 5G		LTE	5G	COMMSCOPE	NHHS4-65A-R3B	59.2	61.5	305(03)	true	true	PHYSICAL	1	

Removed

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	CDMA	LTE	LTE		AMPHENOL	HEX654CW0000X	56	58.1	50(01) 150(02)	false	false	PHYSICAL	4	
LTE	CDMA	LTE	LTE		AMPHENOL	HEX654CW0000X	59.2	61.3	305(03)	false	false	PHYSICAL	2	

Retained

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available.

Added: 6 | **Removed:** 6 | **Retained:** 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Combiner	Tower	LTE	CDMA LTE 5G				COMMSCOPE	CHB626-43-2X			PHYSICAL	3	
Coaxial Cables	Tower						N/A	1/2" Coax (CAL)		1/2"	PHYSICAL	3	
Hybrid Cable	Tower	LTE	LTE 5G	LTE	LTE	5G	N/A	6x12 Hybriflex LI		1 1/4"	PHYSICAL	3	
OVP Box	Tower	LTE	LTE 5G	LTE	LTE	5G	Raycap	OVP-6			PHYSICAL	3	
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)			PHYSICAL	3	
RRU	Tower	LTE	LTE 5G				Samsung	B5/B13 RRH ORAN (RF4440d-13A)			PHYSICAL	3	
RRU	Tower					5G	Samsung	RT-8808-77A			PHYSICAL	3	

Removed

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Hybrid Cable	Tower						N/A	2x4 Hybriflex non-LI		1 1/4"	PHYSICAL	3	
Hybrid Cable	Tower						N/A	6x12 Hybriflex non-LI		1 1/4"	PHYSICAL	1	
RRU	Tower			LTE			Nokia	UHFA B25 RRH 4x30			PHYSICAL	3	
RRU	Tower				LTE		Nokia	UHIE B66A RRH 4x45			PHYSICAL	3	
OVP Box	Tower						Raycap	OVP-2			PHYSICAL	3	
OVP Box	Tower						Raycap	OVP-6			PHYSICAL	1	
RRU	Shelter	LTE					Nokia	UHBC B13 TRDU 2x40			PHYSICAL	3	
Quadplexer	Shelter	LTE	CDMA				Unknown	Quadplexer			PHYSICAL	6	

Retained

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Coaxial Cables	Tower						N/A	1-5/8" Coax		1 5/8"	SPARE	6	
Coaxial Cables	Tower		CDMA				N/A	1-5/8" Coax		1 5/8"	PHYSICAL	6	

Service Info

700 MHz LTE	0000			5GLS		
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID	056012	056012	056012	056012	056012	056012
Antenna Model	HEX654CW0000X-T13-7 50-(-45)-RED	HEX654CW0000X-T14-7 50-(-45)-RED	HEX654CW0000X-T12-7 50-(-45)-RED	NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	13	14	12	13	14	12
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	63.79	62.63	60.5	66	66	66
DLEARFCN	5230	5230	5230	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10	10	10	10
Total ERP (W)	574.12	563.64	544.5	594.02	594.02	594.02
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHBC B13 TRDU 2x40	UHBC B13 TRDU 2x40	UHBC B13 TRDU 2x40	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines	2,2	2,2	2,2	4,4	4,4	4,4
Position	1	1	1	1	1	1
Transmitter Id	1862323	1862414	1862499	11184456	11184459	11184462
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE				5GLS		
Sector				**01**	**02**	**03**
Azimuth				50	150	305
Cell / ENode B ID				056012	056012	056012
Antenna Model				NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make				COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)				56	56	59.2
Mechanical Down-Tilt(Deg.)				0	0	0
Electrical Down-Tilt				13	14	12
Tip Height				58.3	58.3	61.5
Regulatory Power				282.24	282.24	282.24
DLEARFCN				2560	2560	2560
Channel Bandwidth(MHz)				10	10	10
Total ERP (W)				635.04	635.04	635.04
TMA Make						
TMA Model						
RRU Make				Samsung	Samsung	Samsung
RRU Model				B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines				4,4	4,4	4,4
Position				1	1	1
Transmitter Id				11217219	11217217	11217218
Source				ATOLL_API	ATOLL_API	ATOLL_API

850 MHz CDMA

	0000			5GLS		
Sector	**D1**	**D2**	**D3**	**D1**	**D2**	**D3**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID						
Antenna Model	HEX654CW0000X-T13-8 50-(-45)-RED	HEX654CW0000X-T14-8 50-(-45)-RED	HEX654CW0000X-T12-8 50-(-45)-RED	NHH-65A-R2B	NHH-65A-R2B	NHH-65A-R2B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	13	14	12	13	14	12
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	250.03	243.78	233.88	235.07	229.19	219.89
DLEARFCN	31	31	31	31	31	31
Channel Bandwidth(MHz)	1.23	1.23	1.23	1.23	1.23	1.23
Total ERP (W)						
TMA Make						
TMA Model						
RRU Make						
RRU Model						
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position						
Transmitter Id						
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz 5GNR

				5GLS		
Sector				**0106**	**0107**	**0108**
Azimuth				50	150	305
Cell / ENode B ID				0569001	0569001	0569001
Antenna Model				NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make				COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)				56	56	59.2
Mechanical Down-Tilt(Deg.)				0	0	0
Electrical Down-Tilt				13	14	12
Tip Height				58.3	58.3	61.5
Regulatory Power				282.24	282.24	282.24
DLEARFCN				2560	2560	2560
Channel Bandwidth(MHz)				10	10	10
Total ERP (W)				635.04	635.04	635.04
TMA Make						
TMA Model						
RRU Make				Samsung	Samsung	Samsung
RRU Model				B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines				4,4	4,4	4,4
Position				1	1	1
Transmitter Id				11217219	11217217	11217218
Source				ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE		0000			5GLS	
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID	056012	056012	056012	056012	056012	056012
Antenna Model	HEX654CW0000X-T08-1 900-(-45)-BLUE	HEX654CW0000X-T08-1 900-(-45)-BLUE	HEX654CW0000X-T08-1 900-(-45)-BLUE	NHH-65A-R2B	NHH-65A-R2B	NHH-65A-R2B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	8	8	8	8	8	8
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	96.98	97.42	80.85	130.52	130.52	130.52
DLEARFCN	1025	1025	1025	1025	1025	1025
Channel Bandwidth(MHz)	15	15	15	15	15	15
Total ERP (W)	797.99	801.68	665.27	1073.99	1073.99	1073.99
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHFA B25 RRH 4x30	UHFA B25 RRH 4x30	UHFA B25 RRH 4x30	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	2,4	2,4	2,4	4,4	4,4	4,4
Position	1	1	1	1	1	1
Transmitter Id	1862330	1862489	1862505	11184457	11184460	11184463
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE		0000			5GLS	
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID	056012	056012	056012	056012	056012	056012
Antenna Model	HEX654CW0000X-T08-2 100-(-45)-BLUE	HEX654CW0000X-T08-2 100-(-45)-BLUE	HEX654CW0000X-T08-2 100-(-45)-BLUE	NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	8	8	8	8	8	8
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	113.43	114.74	102.03	120.37	120.37	120.37
DLEARFCN	2050	2050	2050	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20	20	20	20
Total ERP (W)	1244.51	1258.93	1119.44	1320.69	1320.69	1320.69
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	2,4	2,4	2,4	4,4	4,4	4,4
Position	1	1	1	1	1	1
Transmitter Id	1862406	1862491	1862507	11184458	11184461	11184464
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

	5GLS		
Sector	**0106**	**0107**	**0108**
Azimuth	50	150	305
Cell / ENode B ID	0569001	0569001	0569001
Antenna Model	NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	57.5	57.5	60.2
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	59.8	59.8	62.5
Regulatory Power	246.85	246.85	246.85
DLEARFCN	648672	648672	648672
Channel Bandwidth(MHz)	60	60	60
Total ERP (W)	4062.56	4062.56	4062.56
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RT-8808-77A	RT-8808-77A	RT-8808-77A
Number of Tx, Rx Lines	2,2	2,2	2,2
Position	1	1	1
Transmitter Id	11217253	11217254	11217255
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

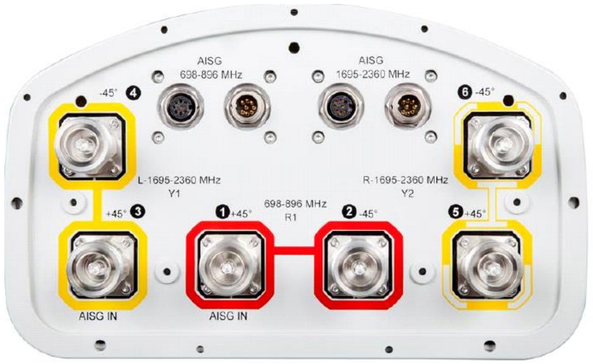
Callsigns Per Antenna

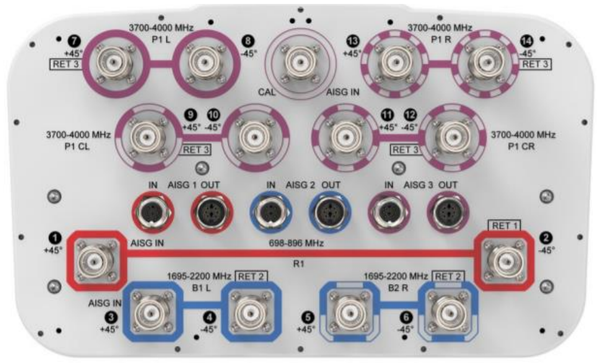
Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz
No data available.																	

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq Mi	Status	Action	Approved for Insvc
WQJQ689	*Northeast*	*WU*	*REA001*	*C*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*22.000*	*746.000-757.000*	*776.000-787.000*	*.000-.000*	*.000-.000*	*66*	*1000*	*1837.92*	*Active*	*added*	*Yes*
KNKA201	*Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH*	*CL*	*CMA006*	*B*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*25.000*	*835.000-845.000*	*880.000-890.000*	*846.500-849.000*	*891.500-894.000*	*282.24*	*400*	*1837.92*	*Active*	*added*	*Yes*
KNLF646	*Boston, MA*	*CW*	*BTA051*	*C*	*MA*	*Middlesex*	*AirTouch Cellular*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*130.52*	*1640*	*1837.92*	*Active*	*added*	*Yes*
KNLH310	*Boston, MA*	*CW*	*BTA051*	*E*	*MA*	*Middlesex*	*AirTouch Cellular*	*Yes*	*10.000*	*1885.000-1890.000*	*1965.000-1970.000*	*.000-.000*	*.000-.000*	*130.52*	*1640*	*1837.92*	*Active*	*added*	*Yes*
KNLH242	*Boston, MA*	*CW*	*BTA051*	*F*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*10.000*	*1890.000-1895.000*	*1970.000-1975.000*	*.000-.000*	*.000-.000*	*130.52*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WQGB266	*Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH*	*AW*	*CMA006*	*A*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*1710.000-1720.000*	*2110.000-2120.000*	*.000-.000*	*.000-.000*	*120.37*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRNE627	*Boston, MA*	*PM*	*PEA007*	*A1*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*3700.000-3720.000*	*.000-.000*	*.000-.000*	*.000-.000*	*246.85*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRNE628	*Boston, MA*	*PM*	*PEA007*	*A2*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*3720.000-3740.000*	*.000-.000*	*.000-.000*	*.000-.000*	*246.85*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRNE629	*Boston, MA*	*PM*	*PEA007*	*A3*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*3740.000-3760.000*	*.000-.000*	*.000-.000*	*.000-.000*	*246.85*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WQGA900	*Boston-Worcester-Lawrence-Lowell-Brockton, MA-NH-R*	*AW*	*BEA003*	*B*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*1720.000-1730.000*	*2120.000-2130.000*	*.000-.000*	*.000-.000*	*120.37*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRBA936	Boston, MA	UU	BTA051	L1	MA	Middlesex	Cellco Partnership	Yes	325.000	27600.000 27925.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRBA937	Boston, MA	UU	BTA051	L2	MA	Middlesex	Cellco Partnership	Yes	325.000	27925.000 27950.000	28050.000 28350.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD671	Boston, MA	UU	PEA007	M1	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37600.000 37700.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD672	Boston, MA	UU	PEA007	M10	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38500.000 38600.000	.000-.000	.000-.000	.000-.000			1837.92	Active	N/A	No
WRHD673	Boston, MA	UU	PEA007	M2	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37700.000 37800.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD674	Boston, MA	UU	PEA007	M3	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37800.000 37900.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD675	Boston, MA	UU	PEA007	M4	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37900.000 38000.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD676	Boston, MA	UU	PEA007	M5	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38000.000 38100.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD677	Boston, MA	UU	PEA007	M6	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38100.000 38200.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD678	Boston, MA	UU	PEA007	M7	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38200.000 38300.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD679	Boston, MA	UU	PEA007	M8	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38300.000 38400.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes

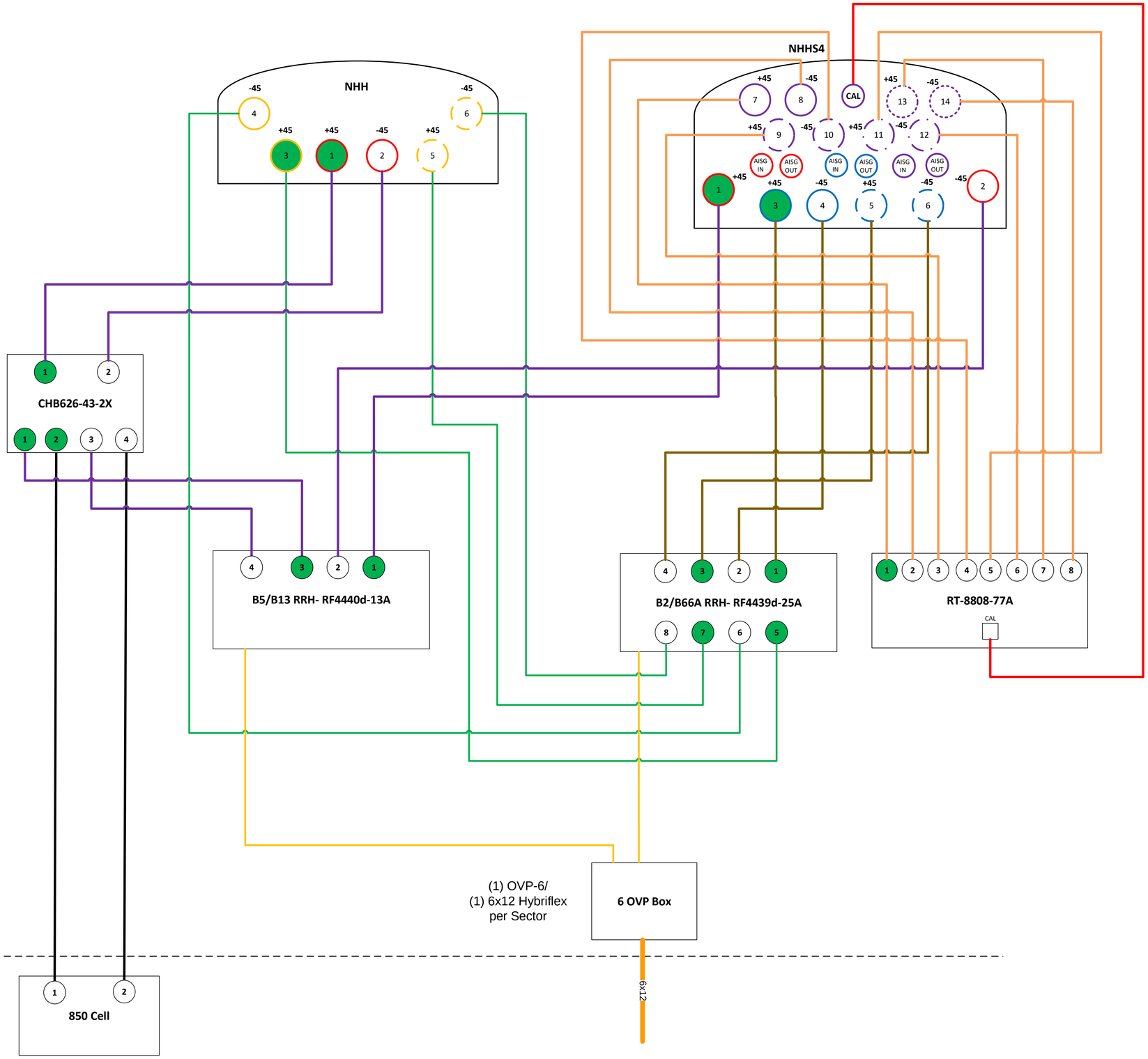
WRHD680	Boston, MA	UU	PEA007	M9	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD681	Boston, MA	UU	PEA007	N1	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000			1837.92	Active	N/A	No
WRLD616	D25017 - Middlesex, MA	PL	D25017	0	MA	Middlesex	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	.00	Active		Yes
WRLD615	D25017 - Middlesex, MA	PL	D25017	0	MA	Middlesex	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	.00	Active		Yes
WRLD617	D25017 - Middlesex, MA	PL	D25017	0	MA	Middlesex	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	.00	Active		Yes
WRNE630	Boston, MA	PM	PEA007	A4	MA	Middlesex	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE631	Boston, MA	PM	PEA007	A5	MA	Middlesex	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE632	Boston, MA	PM	PEA007	B1	MA	Middlesex	Cellco Partnership	Yes	20.000	3800.000-3820.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE633	Boston, MA	PM	PEA007	B2	MA	Middlesex	Cellco Partnership	Yes	20.000	3820.000-3840.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE634	Boston, MA	PM	PEA007	B3	MA	Middlesex	Cellco Partnership	Yes	20.000	3840.000-3860.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No





- Port 1 & 2 are for low band (698-896 MHz).
- Port 3,4,5, & 6 are for high band (1695-2360 MHz).
- Smart Bias Tee (SBT) is through antenna ports 1 & 3 (1 for low band & 3 for high band).
- AISG cable is only needed when drawn in the diagrams below, if it is not drawn then SBT is enough to control all RET motors.
- Not all SBT ports are needed to control RET, only green port connection to green port will control RET.

RET DC signal pass for RET
(Port that will control RET)



- The Calibration Port (CAL) on the antenna is required to be used on the MX14FIT antenna as C-Band cannot use the Beam Forming function without this. The cable to this port is shown in RED and should be connected to the antenna using 1/2" coax cable.

CAL — CAL

Calibration signal pass for
Calibration
(Port that will control
Calibration for C Band)

DC signal capable Port

AISG Cable

RET DC signal pass for RET
(Port that will control RET)

Hybriflex cables

Comments:

Diagram shows antenna port configuration as viewed from below antennas.

Antenna positions are indicated as viewed from IN FRONT of antennas.

Cap and weatherproof unused antenna ports.

All plumbing diagram colors are irrelevant except for AISG & Hybriflex cable. (For the coax colors follow Coax Colors guide above)

Band	Sector 1 (Alpha) Color Codes						
850 CDMA	R						
	R	R					
700	R	P					
	R	R	P				
	R	R	R	P			
	R	R	R	R	P		
850 LTE	R	P	P				
	R	R	P	P			
	R	R	R	P	P		
	R	R	R	R	P	P	
700 / 850	R	P	P	P			
	R	R	P	P	P		
	R	R	R	P	P	P	
	R	R	R	R	P	P	P
AWS	R	W					
	R	R	W				
	R	R	R	W			
	R	R	R	R	W		
PCS	R	W	W				
	R	R	W	W			
	R	R	R	W	W		
	R	R	R	R	W	W	
AWS / PCS	R	W	W	W			
	R	R	W	W	W		
	R	R	R	W	W	W	
	R	R	R	R	W	W	W
CBRS	R	Y					
	R	R	Y				
	R	R	R	Y			
	R	R	R	R	Y		
LAA	R	Y	Y				
	R	R	Y	Y			

Band	Sector 2 (Beta) Color Codes						
850 CDMA	B						
	B	B					
700	B	P					
	B	B	P				
	B	B	B	P			
	B	B	B	B	P		
850 LTE	B	P	P				
	B	B	P	P			
	B	B	B	P	P		
	B	B	B	B	P	P	
700 / 850	B	P	P	P			
	B	B	P	P	P		
	B	B	B	P	P	P	
	B	B	B	B	P	P	P
AWS	B	W					
	B	B	W				
	B	B	B	W			
	B	B	B	B	W		
PCS	B	W	W				
	B	B	W	W			
	B	B	B	W	W		
	B	B	B	B	W	W	
AWS / PCS	B	W	W	W			
	B	B	W	W	W		
	B	B	B	W	W	W	
	B	B	B	B	W	W	W
CBRS	B	Y					
	B	B	Y				
	B	B	B	Y			
	B	B	B	B	Y		
LAA	B	Y	Y				
	B	B	Y	Y			

Band	Sector 3 (Gamma) Color Codes						
850 CDMA	G						
	G	G					
700	G	P					
	G	G	P				
	G	G	G	P			
	G	G	G	G	P		
850 LTE	G	P	P				
	G	G	P	P			
	G	G	G	P	P		
	G	G	G	G	P	P	
700 / 850	G	P	P	P			
	G	G	P	P	P		
	G	G	G	P	P	P	
	G	G	G	G	P	P	P
AWS	G	W					
	G	G	W				
	G	G	G	W			
	G	G	G	G	W		
PCS	G	W	W				
	G	G	W	W			
	G	G	G	W	W		
	G	G	G	G	W	W	
AWS / PCS	G	W	W	W			
	G	G	W	W	W		
	G	G	G	W	W	W	
	G	G	G	G	W	W	W
CBRS	G	Y					
	G	G	Y				
	G	G	G	Y			
	G	G	G	G	Y		
LAA	G	Y	Y				
	G	G	Y	Y			

	Sector 4 (Delta) Color Codes							
850 CDMA	Gray	R						
	Gray	R	R					
700	Gray	R	P					
	Gray	R	R	P				
	Gray	R	R	R	P			
	Gray	R	R	R	R	P		
850 LTE	Gray	R	P	P				
	Gray	R	R	P	P			
	Gray	R	R	R	P	P		
	Gray	R	R	R	R	P	P	
700 / 850	Gray	R	P	P	P			
	Gray	R	R	P	P	P		
	Gray	R	R	R	P	P	P	
	Gray	R	R	R	R	P	P	P
AWS	Gray	R	W					
	Gray	R	R	W				
	Gray	R	R	R	W			
	Gray	R	R	R	R	W		
PCS	Gray	R	W	W				
	Gray	R	R	W	W			
	Gray	R	R	R	W	W		
	Gray	R	R	R	R	W	W	
AWS / PCS	Gray	R	W	W	W			
	Gray	R	R	W	W	W		
	Gray	R	R	R	W	W	W	
	Gray	R	R	R	R	W	W	W
CBRS	Gray	R	Y					
	Gray	R	R	Y				
	Gray	R	R	R	Y			
	Gray	R	R	R	R	Y		
LAA	Gray	R	Y	Y				
	Gray	R	R	Y	Y			

	Sector 5 (Epsilon) Color Codes							
850 CDMA	Gray	B						
	Gray	B	B					
700	Gray	B	P					
	Gray	B	B	P				
	Gray	B	B	B	P			
	Gray	B	B	B	B	P		
850 LTE	Gray	B	P	P				
	Gray	B	B	P	P			
	Gray	B	B	B	P	P		
	Gray	B	B	B	B	P	P	
700 / 850	Gray	B	P	P	P			
	Gray	B	B	P	P	P		
	Gray	B	B	B	P	P	P	
	Gray	B	B	B	B	P	P	P
AWS	Gray	B	W					
	Gray	B	B	W				
	Gray	B	B	B	W			
	Gray	B	B	B	B	W		
PCS	Gray	B	W	W				
	Gray	B	B	W	W			
	Gray	B	B	B	W	W		
	Gray	B	B	B	B	W	W	
AWS / PCS	Gray	B	W	W	W			
	Gray	B	B	W	W	W		
	Gray	B	B	B	W	W	W	
	Gray	B	B	B	B	W	W	W
CBRS	Gray	B	Y					
	Gray	B	B	Y				
	Gray	B	B	B	Y			
	Gray	B	B	B	B	Y		
LAA	Gray	B	Y	Y				
	Gray	B	B	Y	Y			

	Sector 6 (Zeta) Color Codes							
850 CDMA	Gray	G						
	Gray	G	G					
700	Gray	G	P					
	Gray	G	G	P				
	Gray	G	G	G	P			
	Gray	G	G	G	G	P		
850 LTE	Gray	G	P	P				
	Gray	G	G	P	P			
	Gray	G	G	G	P	P		
	Gray	G	G	G	G	P	P	
700 / 850	Gray	G	P	P	P			
	Gray	G	G	P	P	P		
	Gray	G	G	G	P	P	P	
	Gray	G	G	G	G	P	P	P
AWS	Gray	G	W					
	Gray	G	G	W				
	Gray	G	G	G	W			
	Gray	G	G	G	G	W		
PCS	Gray	G	W	W				
	Gray	G	G	W	W			
	Gray	G	G	G	W	W		
	Gray	G	G	G	G	W	W	
AWS / PCS	Gray	G	W	W	W			
	Gray	G	G	W	W	W		
	Gray	G	G	G	W	W	W	
	Gray	G	G	G	G	W	W	W
CBRS	Gray	G	Y					
	Gray	G	G	Y				
	Gray	G	G	G	Y			
	Gray	G	G	G	G	Y		
LAA	Gray	G	Y	Y				
	Gray	G	G	Y	Y			

Sector	Antenna Desc	Base Station ID	Sector ID
Alpha	700-850	056012_1_17	056012_1, 056012_1_7
Alpha	AWS	056012_1_2	056012_1_2
Alpha	PCS	056012_1_4	056012_1_4
Alpha	850 CDMA	056012_1_7	056012_1_7, EXCLUDE
Beta	700-850	056012_2_17	056012_2, 056012_2_7
Beta	AWS	056012_2_2	056012_2_2
Beta	PCS	056012_2_4	056012_2_4
Beta	850 CDMA	056012_2_7	056012_2_7, EXCLUDE
Gamma	700-850	056012_3_17	056012_3, 056012_3_7
Gamma	AWS	056012_3_2	056012_3_2
Gamma	PCS	056012_3_4	056012_3_4
Gamma	850 CDMA	056012_3_7	056012_3_7, EXCLUDE

City of Cambridge

MASSACHUSETTS

BOARD OF ZONING APPEAL

2 Bds

831 Mass Avenue, Cambridge, MA.
(617) 349-6100

BZA

POSTING NOTICE – PICK UP SHEET

The undersigned picked up the notice board for the Board of Zoning Appeals Hearing.

Name: Rebecca Rafferty (Print) **Date:** 8/24/2022

Address: 284-288 Norfolk St.

Case No. BZA-184415

Hearing Date: 9/8/22

Thank you,
Bza Members

verizon WIRELESS

CAMBRIDGE DONNELLY FIELD MA

284 NORFOLK STREET
CAMBRIDGE, MA 02139

FUZE PROJECT ID: 16070570

PSLC: 161282

VICINITY MAP N.T.S.

ENGINEER

DEWBERRY ENGINEERS INC.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110

PHONE # (617) 695-3400

CONTACT: BENJAMIN REVETTE, P.E.

CONSTRUCTION

VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

COORDINATES*:

LATITUDE: 42° 22' 16.60" N
LONGITUDE: 71° 5' 49.58" W
*PER RFDS

GROUND ELEVATION*:

15'±
*PER GOOGLE EARTH

PROJECT INFORMATION

PMI ACCESSED AT:	HTTPS://PMI.VZWSMART.COM
SMART TOOL VENDOR PROJECT NUMBER:	10126787 & 10126788
MASER CONSULTING PROJECT#	20777020A (REV3)
VZW LOCATION CODE (PSLC):	161282
FUZE NUMBER:	16070570
PMI AND REQUIREMENTS ALSO IMBEDDED IN MOUNT ANALYSIS REPORT	
MOUNT MODIFICATION REQUIRED?	YES
VZW APPROVED SMART KIT VENDORS	
REFER TO MOUNT MODIFICATION DRAWINGS PAGE FOR VZW SMART KIT APPROVED VENDORS	

CONTRACTOR PMI REQUIREMENTS

THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAIN. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

A.D.A. COMPLIANCE:
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

EQUIPMENT TO BE REMOVED:

- REMOVE (6) EXISTING RRHS FROM THE ROOF LEVEL & (3) RRHS FROM THE SHELTER.
- REMOVE (4) EXISTING OVP BOXES & (4) HYBRIDFLEX CABLES FROM THE ROOF. REMOVE (6) QUADPLEXERS FROM THE SHELTER.
- REMOVE (6) EXISTING PANEL ANTENNAS FROM THE ROOF LEVEL.

EQUIPMENT TO BE INSTALLED:

- INSTALL (3) NEW NHHS4-65A-R3B PANEL ANTENNAS INSIDE THE EXISTING RF FRIENDLY ENCLOSURES & FACADE.
- INSTALL (3) NEW NHH-65A-R2B PANEL ANTENNAS INSIDE THE EXISTING RF FRIENDLY ENCLOSURES & FACADE.
- INSTALL (9) NEW RRHS, (3) OVP-6, (3) HYBRIDFLEX LI & (3) COAX CABLES, & (3) COMBINERS ON THE ROOF LEVEL.
- INSTALL NEW RRH FRAMES ON EXISTING BALLAST MOUNTS FOR ALPHA & BETA SECTORS.
- CAP AND WEATHER PROOF UNUSED ANTENNA PORTS.
- INSTALL HYBRID CABLES & OTHER JUMPERS AS REQUIRED BETWEEN SECTOR OVPS, RRHS AND ANTENNAS.
- EXISTING PIPE MOUNTS SHALL BE GROUNDED PER VERIZON WIRELESS SPECIFICATIONS.

RFDS NOTE:

1. SCOPE OF WORK BASED ON RFDS FOR "CAMBRIDGE DONNELLY FIELD MA" DATED 01/03/22. VERIFY SCOPE OF WORK WITH FINAL RFDS PRIOR TO CONSTRUCTION.

SCOPE OF WORK

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
GN-1	GENERAL NOTES
C-1	EXISTING ROOF PLAN
C-2	PROPOSED ROOF PLAN
C-3	SOUTH ELEVATION
C-4	CONSTRUCTION DETAILS
C-5	SMART TOOL SECTOR PLANS & ELEVATIONS
C-6	FINAL EQUIPMENT CONFIGURATION & DETAILS
S-1	STRUCTURAL DETAILS

SHEET INDEX

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS

1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 49220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	OAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL CONSTRUCTION NOTES :

1. ALL WORK SHALL CONFORM TO ALL CURRENT APPLICABLE FEDERAL, STATE, AND LOCAL CODES, AND COMPLY WITH VERIZON WIRELESS SPECIFICATIONS.
2. CONTRACTOR SHALL CONTACT "DIG SAFE" (888-344-7233) FOR IDENTIFICATION OF UNDERGROUND UTILITIES PRIOR TO START OF CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL REQUIRED INSPECTIONS.
4. ALL DIMENSIONS TO, OF, AND ON EXISTING BUILDINGS, DRAINAGE STRUCTURES, AND SITE IMPROVEMENTS SHALL BE VERIFIED IN FIELD BY CONTRACTOR WITH ALL DISCREPANCIES REPORTED TO THE ENGINEER.
5. DO NOT CHANGE SIZE OR SPACING OF STRUCTURAL ELEMENTS.
6. DETAILS SHOWN ARE TYPICAL; SIMILAR DETAILS APPLY TO SIMILAR CONDITIONS UNLESS OTHERWISE NOTED.
7. THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY WHICH IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
8. CONTRACTOR SHALL BRACE STRUCTURES UNTIL ALL STRUCTURAL ELEMENTS NEEDED FOR STABILITY ARE INSTALLED. THESE ELEMENTS ARE AS FOLLOWS: LATERAL BRACING, ANCHOR BOLTS, ETC.
9. CONTRACTOR SHALL DETERMINE EXACT LOCATION OF EXISTING UTILITIES, DRAIN PIPES, VENTS, ETC. BEFORE COMMENCING WORK.
10. INCORRECTLY FABRICATED, DAMAGED, OR OTHERWISE MISFITTING OR NONCONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE OWNER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH REMEDIAL ACTION SHALL REQUIRE WRITTEN APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO PROCEEDING.
11. EACH CONTRACTOR SHALL COOPERATE WITH THE OWNER'S REPRESENTATIVE, AND COORDINATE HIS WORK WITH THE WORK OF OTHERS.
12. CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED BY CONSTRUCTION OF THIS PROJECT TO MATCH EXISTING PRE-CONSTRUCTION CONDITIONS TO THE SATISFACTION OF THE VERIZON WIRELESS CONSTRUCTION MANAGER.
13. ALL CABLE/CONDUIT ENTRY/EXIT PORTS SHALL BE WEATHERPROOFED DURING INSTALLATION USING A SILICONE SEALANT.
14. WHERE EXISTING CONDITIONS DO NOT MATCH THOSE SHOWN IN THIS PLAN SET, CONTRACTOR WILL NOTIFY ENGINEER, VERIZON WIRELESS PROJECT CONSTRUCTION MANAGER, AND LANDLORD IMMEDIATELY.
15. CONTRACTOR SHALL ENSURE ALL SUBCONTRACTORS ARE PROVIDED WITH A CURRENT SET OF DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT.
16. ALL ROOF WORK SHALL BE DONE BY A QUALIFIED AND EXPERIENCED ROOFING CONTRACTOR IN COORDINATION WITH ANY CONTRACTOR WARRANTING THE ROOF TO ENSURE THAT THE WARRANTY IS MAINTAINED.
17. CONTRACTOR SHALL REMOVE ALL RUBBISH AND DEBRIS FROM THE SITE AT THE END OF EACH DAY.
18. CONTRACTOR SHALL COORDINATE WORK SCHEDULE WITH LANDLORD AND TAKE PRECAUTIONS TO MINIMIZE IMPACT AND DISRUPTION OF OTHER OCCUPANTS OF THE FACILITY.
19. CONTRACTOR SHALL FURNISH VERIZON WIRELESS WITH THREE AS-BUILT SETS OF DRAWINGS UPON COMPLETION OF WORK.
20. ANTENNAS AND CABLES ARE TYPICALLY PROVIDED BY VERIZON WIRELESS. PRIOR TO SUBMISSION OF BID, CONTRACTOR SHALL COORDINATE WITH PROJECT MANAGER TO DETERMINE WHAT, IF ANY, ITEMS WILL BE PROVIDED BY VERIZON WIRELESS. ALL ITEMS NOT PROVIDED BY VERIZON WIRELESS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR. CONTRACTOR WILL INSTALL ALL ITEMS PROVIDED BY VERIZON WIRELESS.
21. PRIOR TO SUBMISSION OF BID, CONTRACTOR WILL COORDINATE WITH VERIZON WIRELESS PROJECT MANAGER TO DETERMINE IF ANY PERMITS WILL BE OBTAINED BY VERIZON WIRELESS. ALL REQUIRED PERMITS NOT OBTAINED BY VERIZON WIRELESS MUST BE OBTAINED, AND PAID FOR, BY THE CONTRACTOR.
22. GENERAL CONTRACTOR SHALL HAVE A LICENSED HVAC CONTRACTOR START THE HVAC UNITS, SYNCHRONIZE THE THERMOSTATS, ADJUST ALL SETTINGS ON EACH UNIT ACCORDING TO VERIZON WIRELESS CONSTRUCTION MANAGER'S SPECIFICATIONS, AND THOROUGHLY TEST AND BALANCE EACH UNIT TO ENSURE PROPER OPERATION PRIOR TO TURNING THE SITE OVER TO OWNER.
23. CONTRACTOR SHALL INSTALL ALL SITE SIGNAGE IN ACCORDANCE WITH VERIZON WIRELESS SPECIFICATIONS AND REQUIREMENTS.
24. CONTRACTOR SHALL SUBMIT ALL SHOP DRAWINGS TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.
25. UNLESS OTHERWISE NOTED VERIZON WIRELESS SHALL PROVIDE ALL REQUIRED RF MATERIAL FOR CONTRACTOR TO INSTALL, INCLUDING ANTENNAS, TMA'S, BIAS-T'S, COMBINERS, PDU, DC BLOCKS, SURGE ARRESTORS, GPS ANTENNA, GPS SURGE ARRESTOR, COAXIAL CABLE.
26. PRIOR TO SUBMISSION OF BID, CONTRACTOR SHALL VERIFY ALL EQUIPMENT TO BE PROVIDED BY VERIZON WIRELESS FOR INSTALLATION BY CONTRACTOR.
27. ALL EQUIPMENT SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS AND LOCATED ACCORDING TO VERIZON WIRELESS SPECIFICATIONS, AND AS SHOWN IN THESE PLANS.
28. DETAILS SHOWN ARE TYPICAL; SIMILAR DETAILS APPLY TO SIMILAR CONDITIONS UNLESS OTHERWISE NOTED.
29. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
30. CONTRACTOR SHALL NOTIFY THE ENGINEER A MINIMUM OF 48 HOURS IN ADVANCE PRIOR TO CONSTRUCTION START, MORE SPECIFICALLY BEFORE; SEALING ANY FLOOR, WALL OR ROOF PENETRATION, FINAL UTILITY CONNECTIONS, POURING CONCRETE, BACKFILLING UTILITY TRENCHES AND STRUCTURAL POST OR MOUNTING CONNECTIONS, FOR ENGINEERING REVIEW AND INSPECTION.
31. SEAL PENETRATIONS THROUGH FIRE RATED AREAS WITH UL LISTED O FIRE CODE APPROVED MATERIALS.
32. REPAIR ANY DAMAGE DURING CONSTRUCTION TO MATCH EXISTING PRE-CONSTRUCTION CONDITIONS TO THE SATISFACTION OF THE CONSTRUCTION MANAGER AND LANDLORD.
33. ALL DISRUPTIVE WORK AND WORK WITHIN TENANT SPACES TO BE COORDINATED WITH BUILDING REPRESENTATIVE.

CODE SPECIFICATIONS:

1. ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

   MASSACHUSETTS STATE BUILDING CODE, 9TH EDITION, CONSISTENT WITH THE FOLLOWING CODES:
   2015 INTERNATIONAL RESIDENTIAL CODE (IRC)
   2015 INTERNATIONAL BUILDING CODE (IBC)
   2015 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
   2020 NATIONAL ELECTRICAL CODE (NEC)

   IN THE EVENT OF CONFLICT, THE MOST RESTRICTIVE CODE SHALL PREVAIL.
2. ALL STRUCTURAL WORK TO BE DONE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL, 13TH EDITION (AISC 13TH ED.)
3. ALL CONCRETE WORK TO BE DONE IN ACCORDANCE WITH THE AMERICAN CONCRETE INSTITUTE (ACI 301) SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 318) AND BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.
4. ALL REINFORCING STEEL WORK TO BE DONE IN ACCORDANCE WITH THE (ACI 315) MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES.

GROUNDING NOTES:

1. GROUNDING SHALL COMPLY WITH NEC ART. 250.
2. GROUNDING CONDUCTORS SHALL BE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR INDOOR USE.
3. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
4. ROUTE GROUNDING CONNECTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NOT BE BENT AT RIGHT ANGLE. ALWAYS MAKE 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY.
5. CONNECTIONS TO GROUNDING BAR SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
6. TEST COMPLETED GROUNDING SYSTEM AND RECORD RESISTANCE VALUES FOR PROJECT CLOSE-OUT DOCUMENTATION. GROUND RESISTANCE SHALL NOT EXCEED 5 OHMS.
7. GROUNDING CONDUCTORS BETWEEN MGB AND WATERMAIN SHALL BE #2/0. BONDING JUMPERS FROM METALLIC SURFACES SHALL BE #2 MINIMUM. ALL GROUND CONDUCTORS AND BONDING JUMPERS SHALL BE SOFT DRAWN ANNEALED, TINNED, BARE STRANDED COPPER WIRE. COAXIAL CABLES SHALL BE GROUNDED AT A MINIMUM OF TWO LOCATIONS USING VERIZON PROVIDED GROUNDING KITS. EXACT LOCATIONS SHALL BE FINALIZED IN THE FIELD BY THE CONSTRUCTION MANAGER.

STRUCTURAL STEEL NOTES:

1. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".
2. STRUCTURAL STEEL ROLLED SHAPES, PLATES, AND BARS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

ASTM A-992, GRADE 50	ALL W SHAPES, UNLESS NOTED OR A992 OTHERWISE.
ASTM A-36	ALL OTHER ROLLED SHAPES, PLATES AND BARS UNLESS NOTED OTHERWISE.
ASTM A-500, GRADE B	HSS SECTION (SQUARE, RECTANGULAR, ROUND)
ASTM A-325, TYPE SC OR N	ALL BOLTS FOR CONNECTING STRUCTURAL MEMBERS.
F1554, GRADE 36	ALL ANCHORS BOLTS, UNLESS NOTED OTHERWISE.
ASTM A-53, GRADE B	STEEL PIPE

3. ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 14TH EDITION. WHERE WELD LENGTH IS NOT INDICATED, USE FULL LENGTH WELD. AT THE COMPLETION OF ALL WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.
4. BOLTED CONNECTIONS SHALL USE BEARING TYPE GALVANIZED ASTM A325 BOLTS (3/4" DIA.) SUPPLIED WITH A NUT AND WASHER UNDER TURNED END AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE.
5. DO NOT DRILL HOLES THROUGH STRUCTURAL STEEL MEMBERS EXCEPT AS SHOWN AND DETAILED ON STRUCTURAL DRAWINGS.
6. NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. GALVANIZED ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.
7. USE PRECAUTIONS & PROCEDURES PER AWS D1.1 WHEN WELDING GALVANIZED METALS.
8. ALL EXISTING BEAM AND COLUMN DIMENSIONS SHALL BE FIELD VERIFY BY CONTRACTOR PRIOR TO FABRICATION. ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THOSE SHOWN SHALL BE REPORTED TO DEWBERRY ENGINEER IMMEDIATELY.
9. CONNECTION DESIGN BY FABRICATOR WILL BE SUBJECT TO REVIEW AND APPROVAL BY ENGINEER.
10. ALL EXTERIOR STEEL WORK SHALL BE GALVANIZED IN ACCORDANCE WITH SPECIFICATION ASTM A123/A123M-00 HOT-DIP GALVANIZED FINISH UNLESS OTHERWISE NOTED. GALVANIZING SHALL BE PERFORMED AFTER SHOP FABRICATION TO THE GREATEST EXTENT POSSIBLE. ALL DINGS, SCRAPES, MARS, AND WELDS IN THE GALVANIZED AREAS SHALL BE REPAIRED. REPAIR DAMAGED GALVANIZED COATINGS ON GALVANIZED ITEMS WITH GALVANIZED REPAIR PAINT ACCORDING TO ASTM A780 AND MANUFACTURER'S WRITTEN INSTRUCTIONS, PRIOR TO COMPLETION OF WORK. TOUCHUP ALL DAMAGED GALVANIZED STEEL WITH APPROVED COLD ZINC, "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCHUP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.
11. ALL WELDED COMPONENTS TO BE SHOP WELDED PRIOR TO INSTALLATION. NO WELDING ACTIVITIES IS PERMITTED DURING INSTALLATION OF PROPOSED EQUIPMENTS AND/OR HARDWARE ON SITE.

verizon WIRELESS

VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01851

CAMBRIDGE
DONNELLY FIELD MA

ANTMO DRAWINGS

1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry

Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 40220
10/17/22
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	GAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

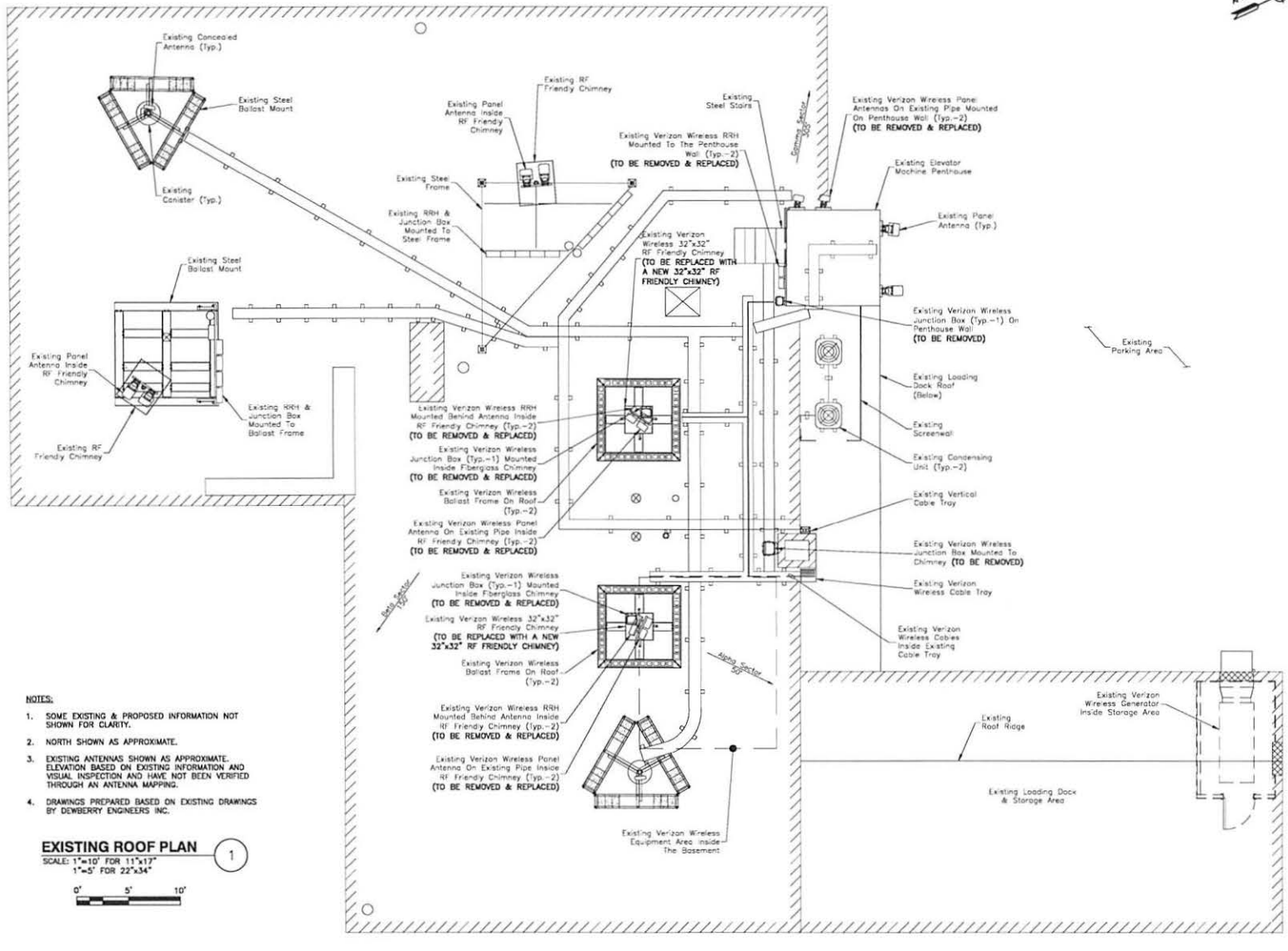
284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-1



NOTES:

1. SOME EXISTING & PROPOSED INFORMATION NOT SHOWN FOR CLARITY.
2. NORTH SHOWN AS APPROXIMATE.
3. EXISTING ANTENNAS SHOWN AS APPROXIMATE. ELEVATION BASED ON EXISTING INFORMATION AND VISUAL INSPECTION AND HAVE NOT BEEN VERIFIED THROUGH AN ANTENNA MAPPING.
4. DRAWINGS PREPARED BASED ON EXISTING DRAWINGS BY DEWBERRY ENGINEERS INC.

EXISTING ROOF PLAN (1)

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

0' 5' 10'

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS

1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 49220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	GAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

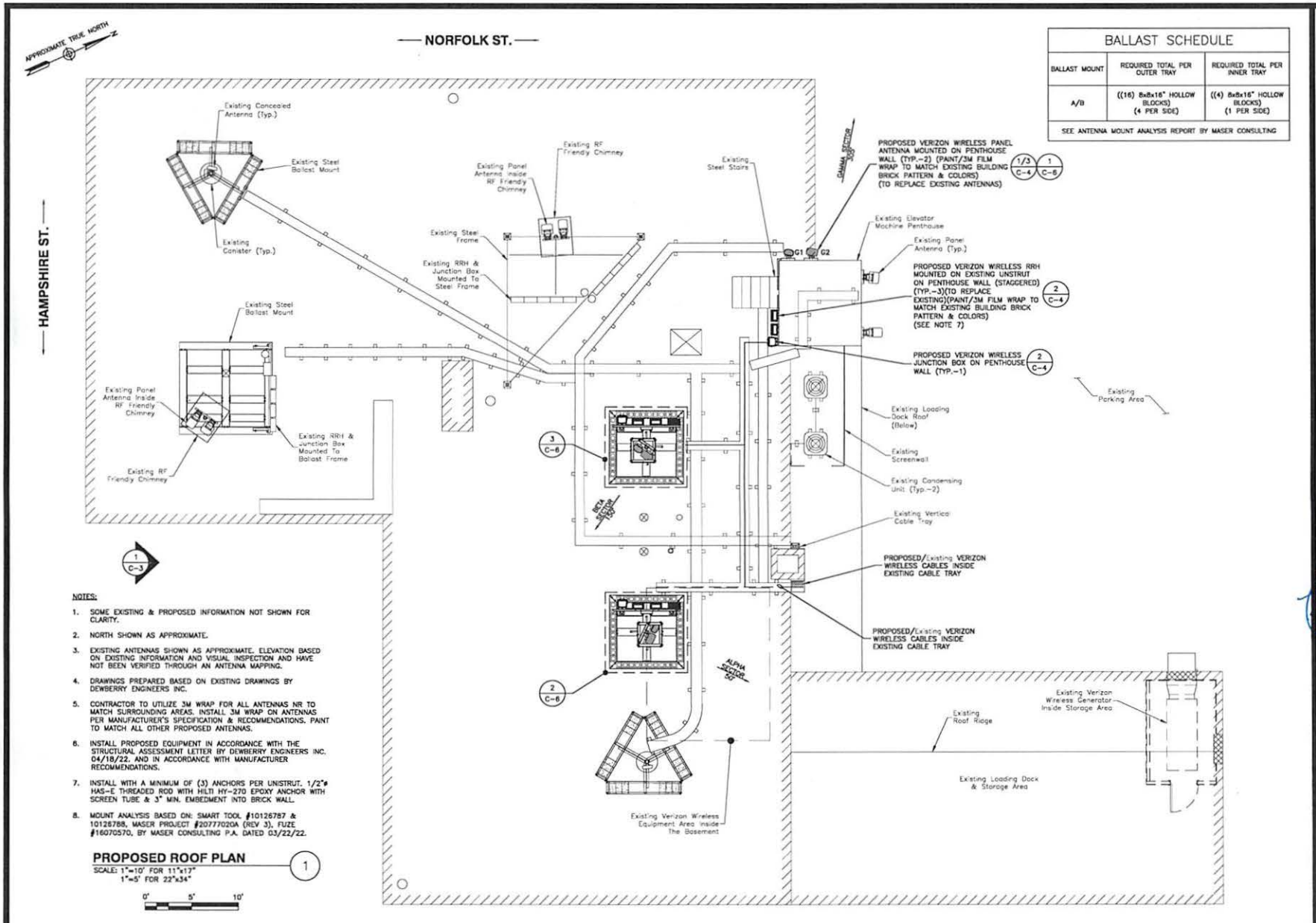
284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

EXISTING ROOF PLAN

SHEET NUMBER

C-1



BALLAST SCHEDULE		
BALLAST MOUNT	REQUIRED TOTAL PER OUTER TRAY	REQUIRED TOTAL PER INNER TRAY
A/B	((16) 8x8x16" HOLLOW BLOCKS) (4 PER SIDE)	((4) 8x8x16" HOLLOW BLOCKS) (1 PER SIDE)
SEE ANTENNA MOUNT ANALYSIS REPORT BY MASER CONSULTING		

NOTES:

1. SOME EXISTING & PROPOSED INFORMATION NOT SHOWN FOR CLARITY.
2. NORTH SHOWN AS APPROXIMATE.
3. EXISTING ANTENNAS SHOWN AS APPROXIMATE. ELEVATION BASED ON EXISTING INFORMATION AND VISUAL INSPECTION AND HAVE NOT BEEN VERIFIED THROUGH AN ANTENNA MAPPING.
4. DRAWINGS PREPARED BASED ON EXISTING DRAWINGS BY DEWBERRY ENGINEERS INC.
5. CONTRACTOR TO UTILIZE 3M WRAP FOR ALL ANTENNAS NR TO MATCH SURROUNDING AREAS. INSTALL 3M WRAP ON ANTENNAS PER MANUFACTURER'S SPECIFICATION & RECOMMENDATIONS. PAINT TO MATCH ALL OTHER PROPOSED ANTENNAS.
6. INSTALL PROPOSED EQUIPMENT IN ACCORDANCE WITH THE STRUCTURAL ASSESSMENT LETTER BY DEWBERRY ENGINEERS INC. 04/18/22. AND IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
7. INSTALL WITH A MINIMUM OF (3) ANCHORS PER UNISTRUT. 1/2"ø HAS-E THREADED ROD WITH HILTI HY-270 EPOXY ANCHOR WITH SCREEN TUBE & 3" MIN. EMBEDMENT INTO BRICK WALL.
8. MOUNT ANALYSIS BASED ON: SMART TOOL #10126787 & 10126788, MASER PROJECT #20777020A (REV 3), FUZE #16070570, BY MASER CONSULTING P.A. DATED 03/22/22.

PROPOSED ROOF PLAN 1

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

0' 5' 10'

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01851

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS		
1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 40220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	GAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

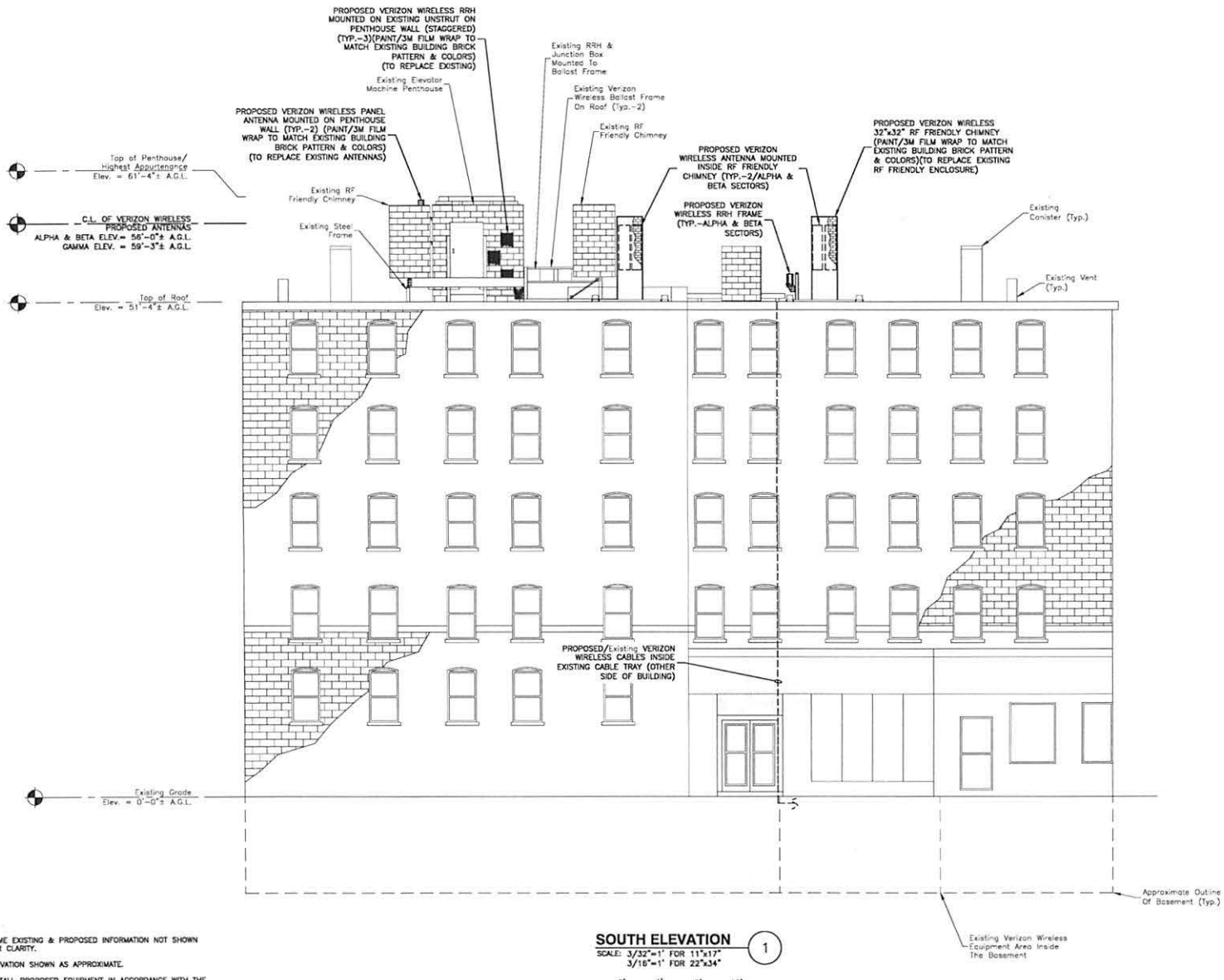
284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

PROPOSED ROOF PLAN

SHEET NUMBER

C-2



SOUTH ELEVATION (1)

SCALE: 3/32"=1' FOR 11"x17"
3/16"=1' FOR 22"x34"

0' 4' 8' 12'

NOTES:

1. SOME EXISTING & PROPOSED INFORMATION NOT SHOWN FOR CLARITY.
2. ELEVATION SHOWN AS APPROXIMATE.
3. INSTALL PROPOSED EQUIPMENT IN ACCORDANCE WITH THE STRUCTURAL ASSESSMENT LETTER BY DEWBERRY ENGINEERS INC. 04/18/22, AND IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
4. A.G.L. = ABOVE GRADE LEVEL
   C.L. = CENTER LINE

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01851

CAMBRIDGE
DONNELLY FIELD MA

ANTMO DRAWINGS		
1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 40220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	DAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

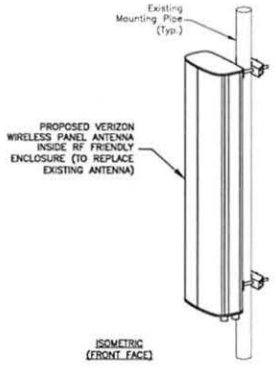
284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

SOUTH ELEVATION

SHEET NUMBER

C-3



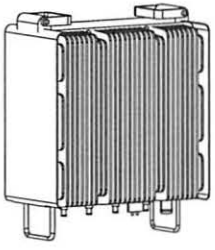
Existing Antennas:	
Model:	HEX65ACW0000x
Dimensions:	51.1"H X 12.0"W X 7.1"D
Weight:	39.7 LBS.
PROPOSED ANTENNAS:	
MODEL:	NHH-65A-R2B
DIMENSIONS:	55.6"H X 11.9"W X 7.1"D
WEIGHT:	35.1 LBS. (W/O MOUNTING KIT)
MODEL:	NHHS4-65A-R3B
DIMENSIONS:	55.6"H X 13.8"W X 8.2"D
WEIGHT:	51 LBS. (W/O MOUNTING KIT)

ANTENNA NOTES:

1. INSTALL ALL EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. USE APPROPRIATE MOUNTING HARDWARE FOR CONSTRUCTION TYPE.
2. RUSTED BOLTS ARE TO BE REMOVED AND REPLACED AS REQUIRED IN KIND.
3. ALL FEEDERS ARE TO BE NEATLY BUNDLED. PROVIDE MOUNTING HARDWARE AS REQUIRED.
4. ALL STEEL TO BE GALVANIZED.
5. CONTRACTOR TO GROUND EXISTING/PROPOSED PIPE MOUNTS WITH GROUNDING LEADS. CONNECT LEADS TO THE SECTOR GROUNDING BAR.
6. WEATHER SEAL AROUND EXTERIOR WALL ATTACHMENT ANGLES WITH SILICONE SEALANT.

PANEL ANTENNA DETAIL 1

SCALE: N.T.S.



RRH

COMBINER

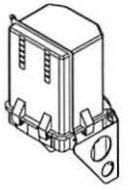
PROPOSED SUB6	
MANUFACTURER:	SAMSUNG
MODEL:	RT-8808-77A
DIMENSIONS:	15.0"H X 15.0"W X 6.8"D
WEIGHT:	60.0 LBS

PROPOSED LTE 700/850	
MANUFACTURER:	SAMSUNG
MODEL:	700/850MHZ MACRO RADIO RF4440d-13A
DIMENSIONS:	14.9"H X 14.9"W X 9.0"D
WEIGHT:	70.3 LBS

PROPOSED LTE AWS/PCS	
MANUFACTURER:	SAMSUNG
MODEL:	AWS/PCS MACRO RADIO RF4439d-25A
DIMENSIONS:	14.9"H X 14.9"W X 10.0"D
WEIGHT:	74.7 LBS

PROPOSED COMBINER	
MANUFACTURER:	COMMSCOPE
MODEL:	CHB626-43-2X
DIMENSIONS:	7.1"H X 14.6"W X 3.4"D
WEIGHT:	19.4 LBS

RRH MOUNTING CLEARANCE
TOP: ≥ 12"
SIDES: ≥ 6"
BOTTOM: ≥ 18"
FRONT: ≥ 36"
SEE MANUFACTURER SPECIFICATIONS & RECOMMENDATIONS.



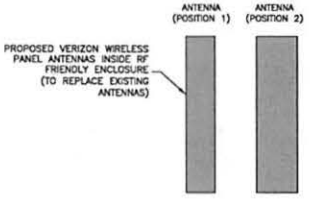
OVP BOX	
MANUFACTURER:	RAYCAP
MODEL:	OVP BOX
DIMENSIONS:	29.5"H X 16.5"W X 12.6"D
WEIGHT:	32.0 LBS

NOTE:

1. CONTRACTOR TO VERIFY WITH CONSTRUCTION MANAGER FOR FINAL MANUFACTURER SPECIFICATIONS PRIOR TO CONSTRUCTION.

REMOTE UNIT DETAILS 2

SCALE: N.T.S.

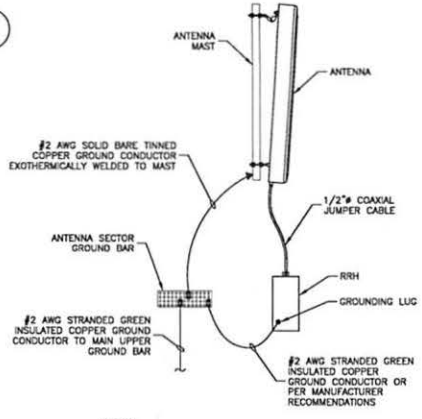


NOTE:

1. AS VIEWED BEHIND THE ANTENNAS.

ANTENNA CONFIGURATION 3

SCALE: N.T.S.

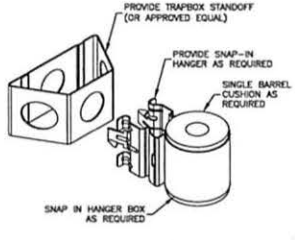


NOTES:

1. VERIFY EXISTING GROUNDING SYSTEM IS INSTALLED PER VERIZON WIRELESS STANDARDS.
2. BOND NEW EQUIPMENT INTO EXISTING GROUND SYSTEM IN ACCORDANCE WITH VERIZON WIRELESS STANDARDS & MANUFACTURER'S RECOMMENDATIONS.

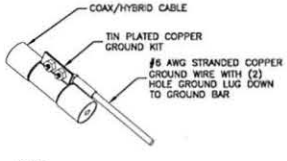
TYPICAL ANTENNA/RRH GROUNDING DETAIL 4

SCALE: N.T.S



JUMPER MOUNT 5

SCALE: N.T.S.



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND. ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TIN PLATED COPPER WITH TWO-HOLE LUG, SIZE PER COAX DIAMETER.
3. WEATHER SEAL GROUND KIT PER CARRIER REQUIREMENTS.
4. COAX CABLE GROUND KIT LOCATION & QUANTITY SHALL BE PER CARRIER SPECIFICATIONS & STANDARDS.

COAX/HYBRID GROUNDING DETAIL 6

SCALE: N.T.S.

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS		
1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 49220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	CAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

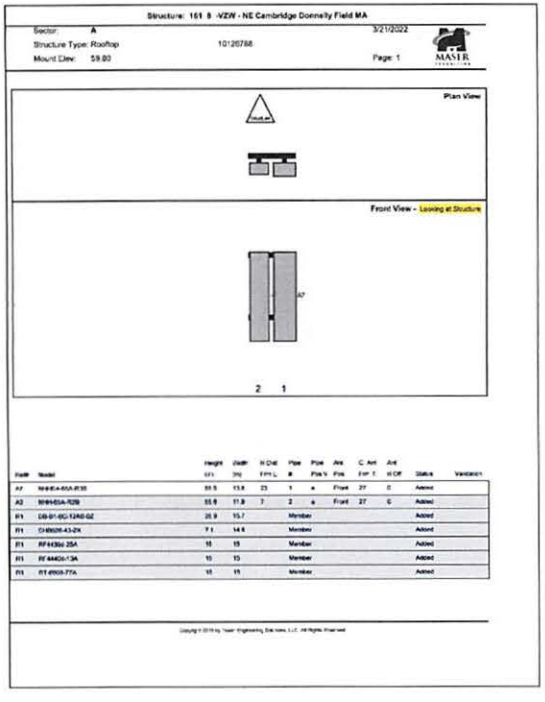
284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

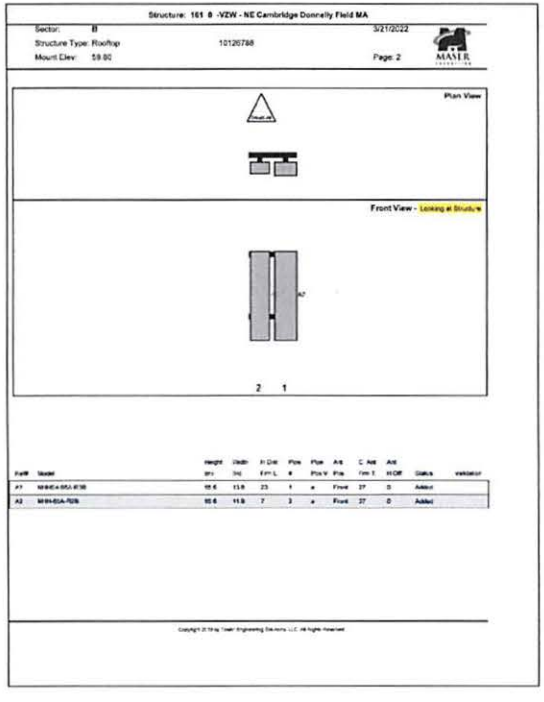
CONSTRUCTION DETAILS

SHEET NUMBER

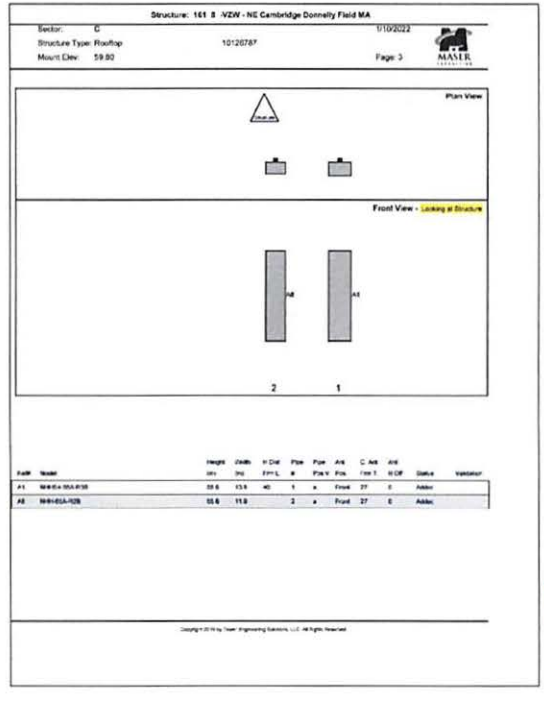
C-4



ALPHA SECTOR (1)
SCALE: N.T.S.



BETA SECTOR (2)
SCALE: N.T.S.



GAMMA SECTOR (3)
SCALE: N.T.S.

NOTE:

1. MOUNT ANALYSIS BASED ON: SMART TOOL #10126787 & 10126788, MASER PROJECT #20777020A (REV 3). FUZE #16070570, BY MASER CONSULTING P.A. DATED 03/22/22.

verizon WIRELESS

VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS

1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 49220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	GAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

SMART TOOL SECTOR PLANS & ELEVATIONS

SHEET NUMBER

C-5

FINAL EQUIPMENT CONFIGURATION

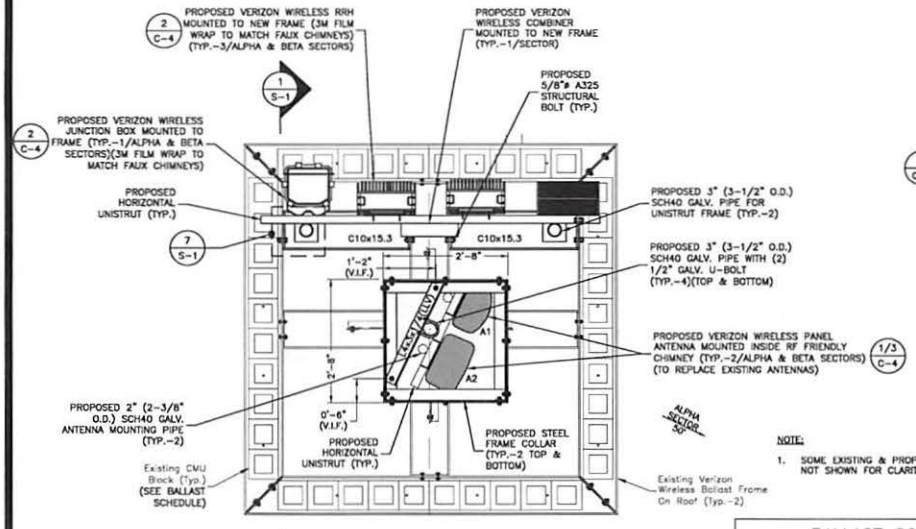
SECTOR	POSITION	TECHNOLOGY	ANTENNA MODEL	VENDOR	RRH & COMBINER (QTY./MODEL)	CENTERLINE (A.G.L.)	AZIMUTH (DEGREES)	OVP	FEED LINE LENGTH*
ALPHA	A1	LTE 700/CDMA 5G/1900	(P) NHH-65A-R2B	COMMSCOPE	(P) RF4439d-25A (P) 4460d-13A (P) B808-77A (P) CHB626-42-2X	56'-0"±	50°	(1) (P) OVP-6 Box	140'±
	A2	LTE 700/5G/AWS/SUB-6	(P) NHHS4-65A-R3B	COMMSCOPE		56'-0"±	50°		
BETA	B1	LTE 700/CDMA 5G/1900	(P) NHH-65A-R2B	COMMSCOPE	(P) RF4439d-25A (P) 4460d-13A (P) B808-77A (P) CHB626-42-2X	56'-0"±	150°	(1) (P) OVP-6 Box	150'±
	B2	LTE 700/5G/AWS/SUB-6	(P) NHHS4-65A-R3B	COMMSCOPE		56'-0"±	150°		
GAMMA	G1	LTE 700/CDMA 5G/1900	(P) NHH-65A-R2B	COMMSCOPE	(P) RF4439d-25A (P) 4460d-13A (P) B808-77A (P) CHB626-42-2X	59'-3"±	305°	(1) (P) OVP-6 Box	170'±
	G2	LTE 700/5G/AWS/SUB-6	(P) NHHS4-65A-R3B	COMMSCOPE		59'-3"±	305°		

*CONTRACTOR TO FIELD VERIFY HYBRID CABLE LENGTHS PRIOR TO CONSTRUCTION. LENGTH IS ESTIMATED FROM THE BASE EQUIPMENT OVP TO SECTOR OVP WITH 15% BUFFER.

(P) = PROPOSED

FINAL EQUIPMENT CONFIGURATION (1)

SCALE: N.T.S.



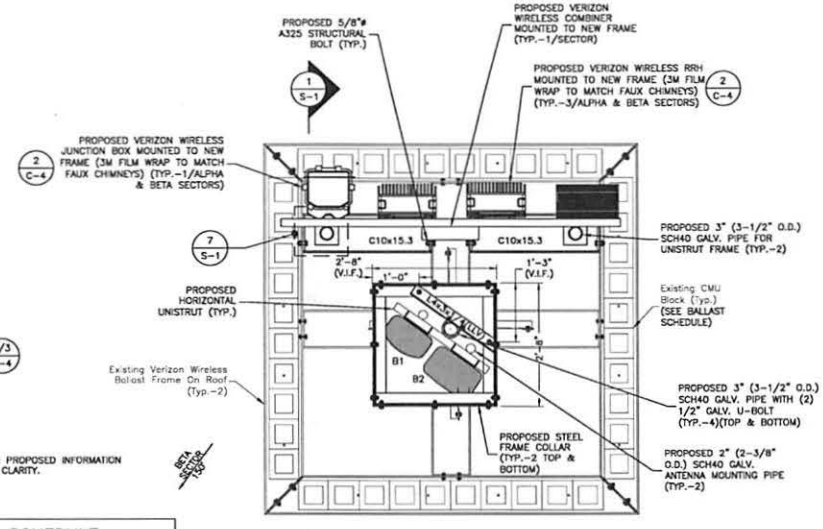
NOTE:

1. SOME EXISTING & PROPOSED INFORMATION NOT SHOWN FOR CLARITY.

ALPHA SECTOR FRAME PLAN (2)

SCALE: 3/8"=1' FOR 11"x17"
3/4"=1' FOR 22"x34"

0' 1' 2' 3'



BETA SECTOR FRAME PLAN (3)

SCALE: 3/8"=1' FOR 11"x17"
3/4"=1' FOR 22"x34"

0' 1' 2' 3'

BALLAST SCHEDULE		
BALLAST MOUNT	REQUIRED TOTAL PER OUTER TRAY	REQUIRED TOTAL PER INNER TRAY
A/B	((16) 8x8x16" HOLLOW BLOCKS) (4 PER SIDE)	((4) 8x8x16" HOLLOW BLOCKS) (1 PER SIDE)
SEE ANTENNA MOUNT ANALYSIS REPORT BY MASER CONSULTING		

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS		
1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

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COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 49220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	GAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

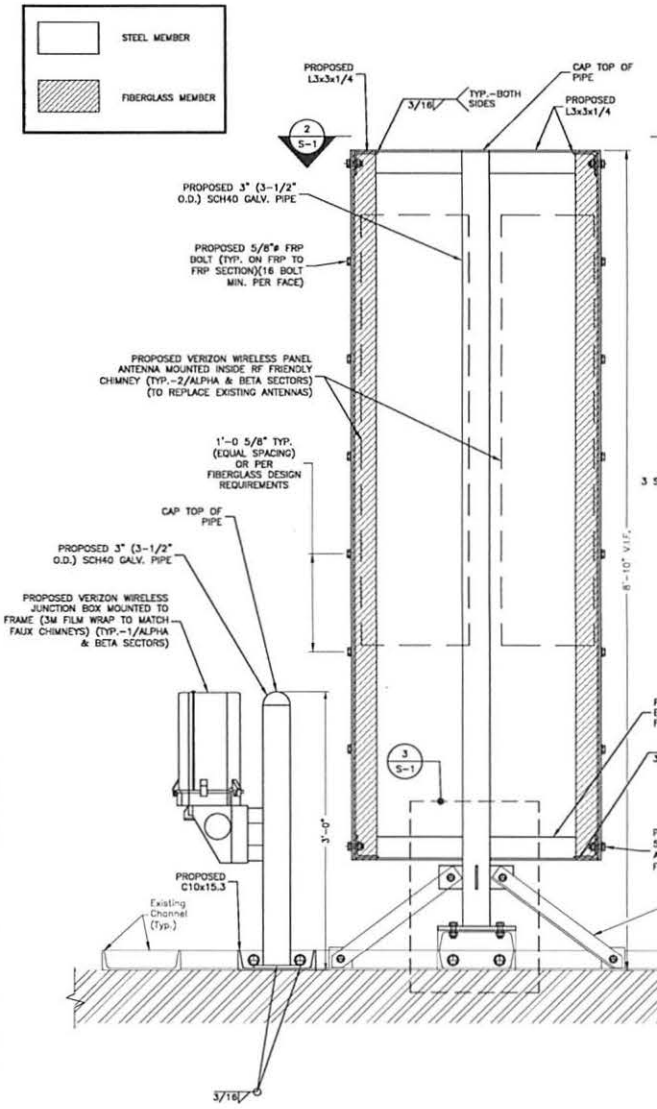
284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

FINAL EQUIPMENT CONFIGURATION & DETAILS

SHEET NUMBER

C-6



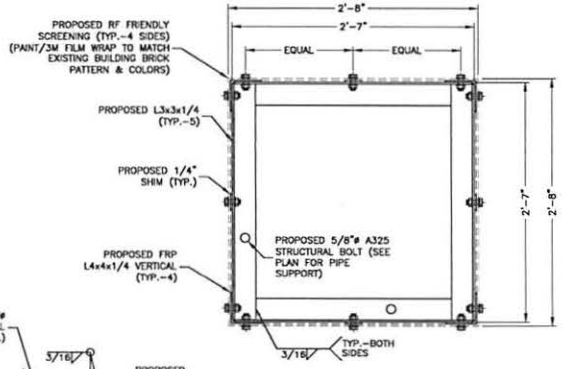
CHIMNEY SECTION (1)

SCALE: 3/4"=1' FOR 11"x17"
1 1/2"=1' FOR 22"x34"

0' 1/2' 1' 1 1/2'

NOTE:

1. SOME EXISTING & PROPOSED INFORMATION NOT SHOWN FOR CLARITY.



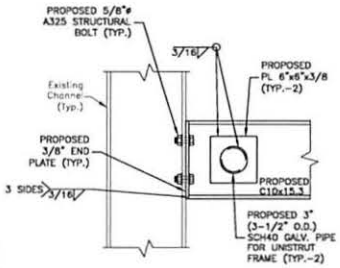
NOTES:

1. CONTRACTOR TO LOCATE MOUNTING PIPE ANGLES & U-BOLT AS REQUIRED TO ACHIEVE AZIMUTH.
2. CHIMNEY BRACKET IS TYPICAL FOR TOP AND BOTTOM.
3. PROPOSED ANTENNA NOT SHOWN FOR CLARITY.
4. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.

CHIMNEY BRACKET (2)

SCALE: 3/4"=1' FOR 11"x17"
1 1/2"=1' FOR 22"x34"

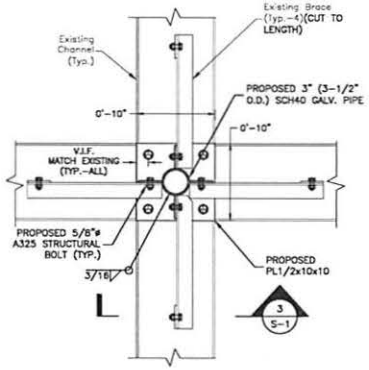
0' 1/2' 1' 1 1/2'



C & BASE PLATE DETAIL (7)

SCALE: 3/4"=1' FOR 11"x17"
1 1/2"=1' FOR 22"x34"

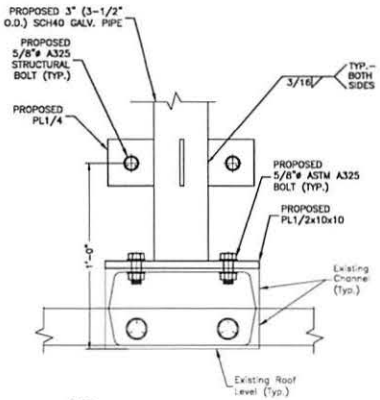
0' 1/2' 1' 1 1/2'



BASE PLATE DETAIL (4)

SCALE: 3/4"=1' FOR 11"x17"
1 1/2"=1' FOR 22"x34"

0' 1/2' 1' 1 1/2'



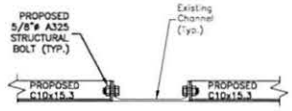
NOTE:

1. EXISTING BRACE ANGLES NOT SHOWN.

CONNECTION DETAIL (3)

SCALE: 1 1/2"=1' FOR 11"x17"
3"=1' FOR 22"x34"

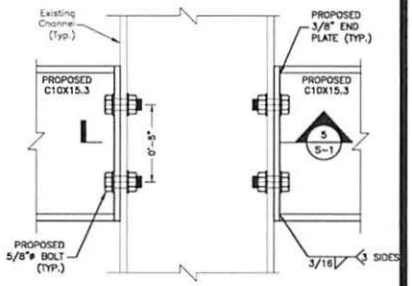
0' 3" 6" 9"



C TO C CONNECTION (5)

SCALE: 3/4"=1' FOR 11"x17"
1 1/2"=1' FOR 22"x34"

0' 1/2' 1' 1 1/2'



C TO C CONNECTION -PLAN (6)

SCALE: 1 1/2"=1' FOR 11"x17"
3"=1' FOR 22"x34"

0' 3" 6" 9"

verizon WIRELESS
VERIZON WIRELESS
900 CHELMSFORD STREET
TOWER 2 FLOOR 5
LOWELL, MA 01581

CAMBRIDGE DONNELLY FIELD MA

ANTMO DRAWINGS		
1	05/04/22	FOR SUBMITTAL
0	04/27/22	FOR SUBMITTAL
A	01/18/22	FOR REVIEW

Dewberry
Dewberry Engineers Inc.
99 SUMMER STREET
SUITE 700
BOSTON, MA 02110
PHONE: 617.695.3400
FAX: 617.695.3310

COMMONWEALTH OF MASSACHUSETTS
BENJAMIN B. REVETTE
CIVIL
No. 49220
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY:	MR
REVIEWED BY:	OAS
CHECKED BY:	BBR
PROJECT NUMBER:	50121487
JOB NUMBER:	50143906
SITE ADDRESS:	

284 NORFOLK ST.
CAMBRIDGE, MA 02139

SHEET TITLE

STRUCTURAL DETAILS

SHEET NUMBER

S-1

verizon WIRELESS

Cambridge Donnelly Field MA
284 Norfolk Street
Cambridge, MA 02139

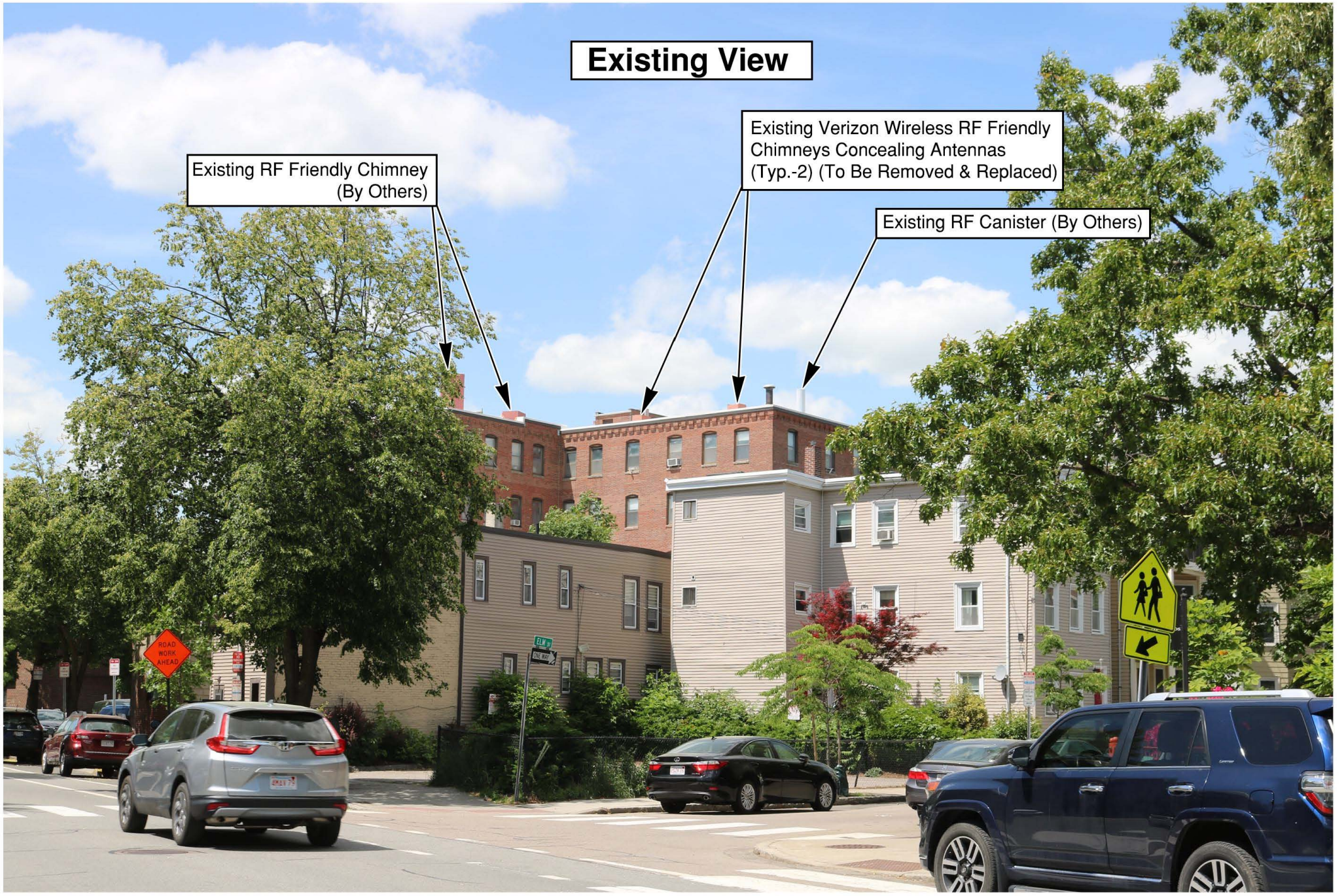
Dewberry

verizon WIRELESS

Cambridge Donnelly Field MA

284 Norfolk Street
Cambridge, MA 02139
(Page 2 of 9)

Dewberry



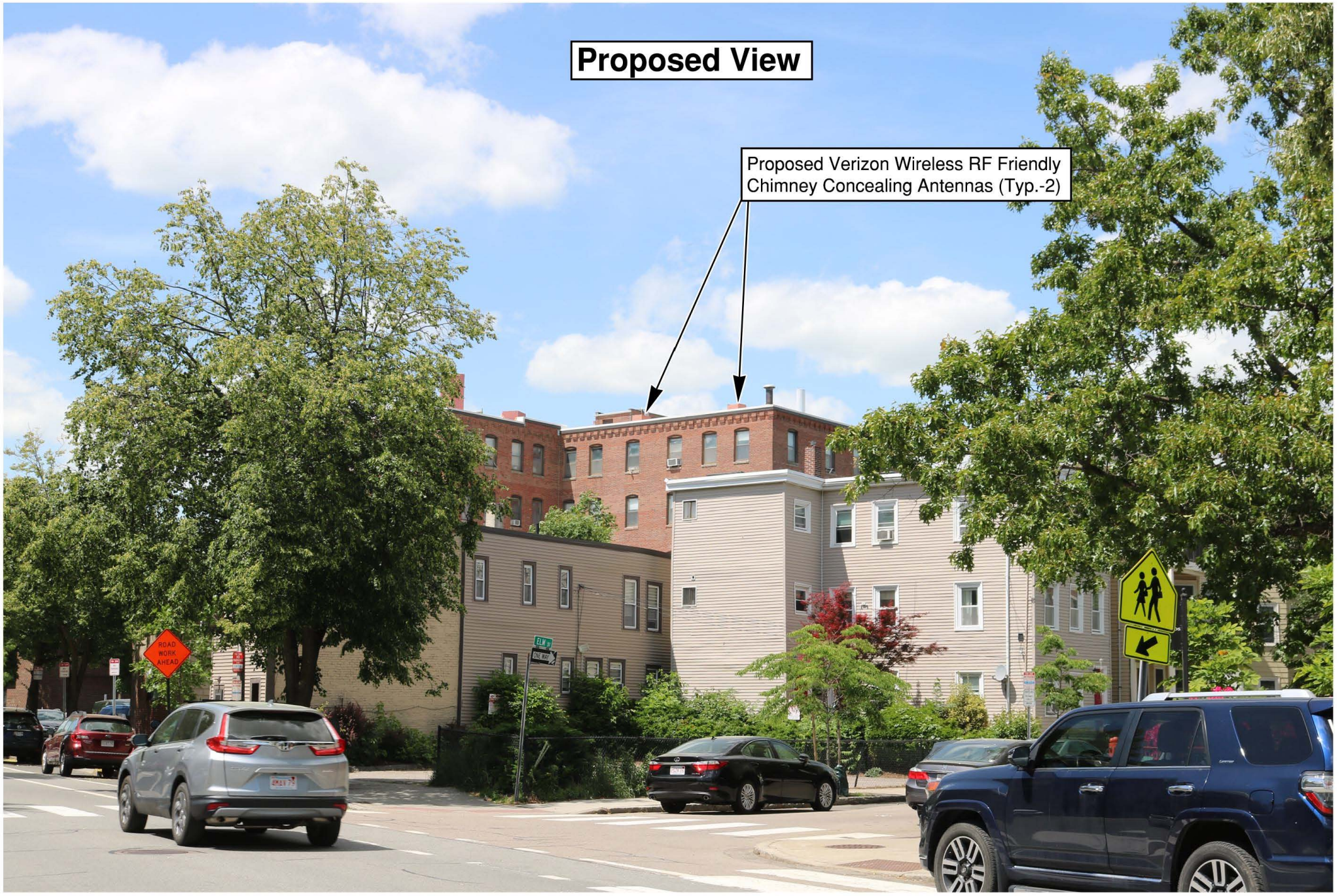
verizon WIRELESS

Cambridge Donnelly Field MA

Photo 1A

View Facing Northwest From Hampshire Street

Dewberry



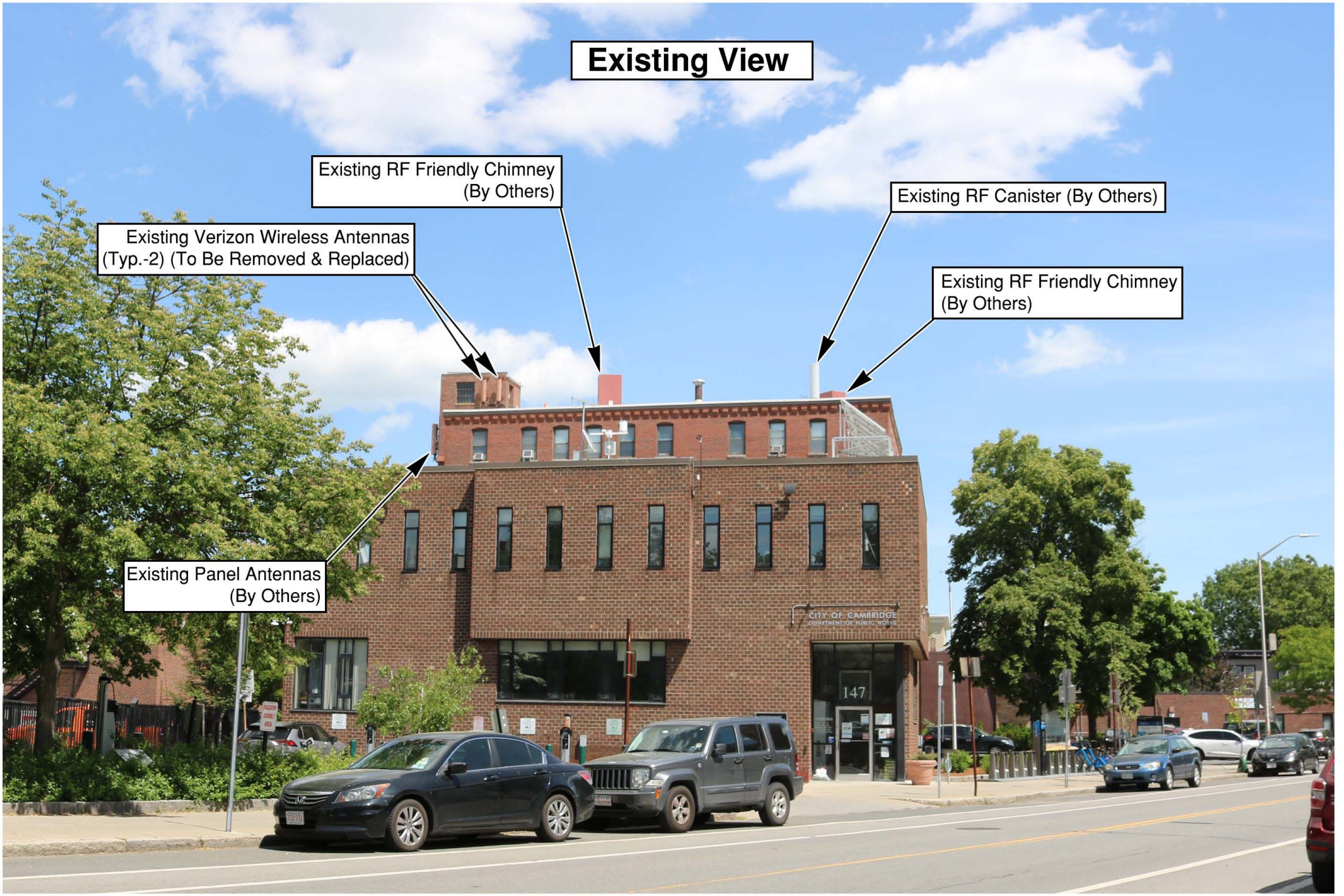
verizon WIRELESS

Cambridge Donnelly Field MA

Photo 1B

View Facing Northwest From Hampshire Street

Dewberry



verizon WIRELESS

Cambridge Donnelly Field MA

Photo 2A
View Facing East From Hampshire Street
(Page 5 of 9)

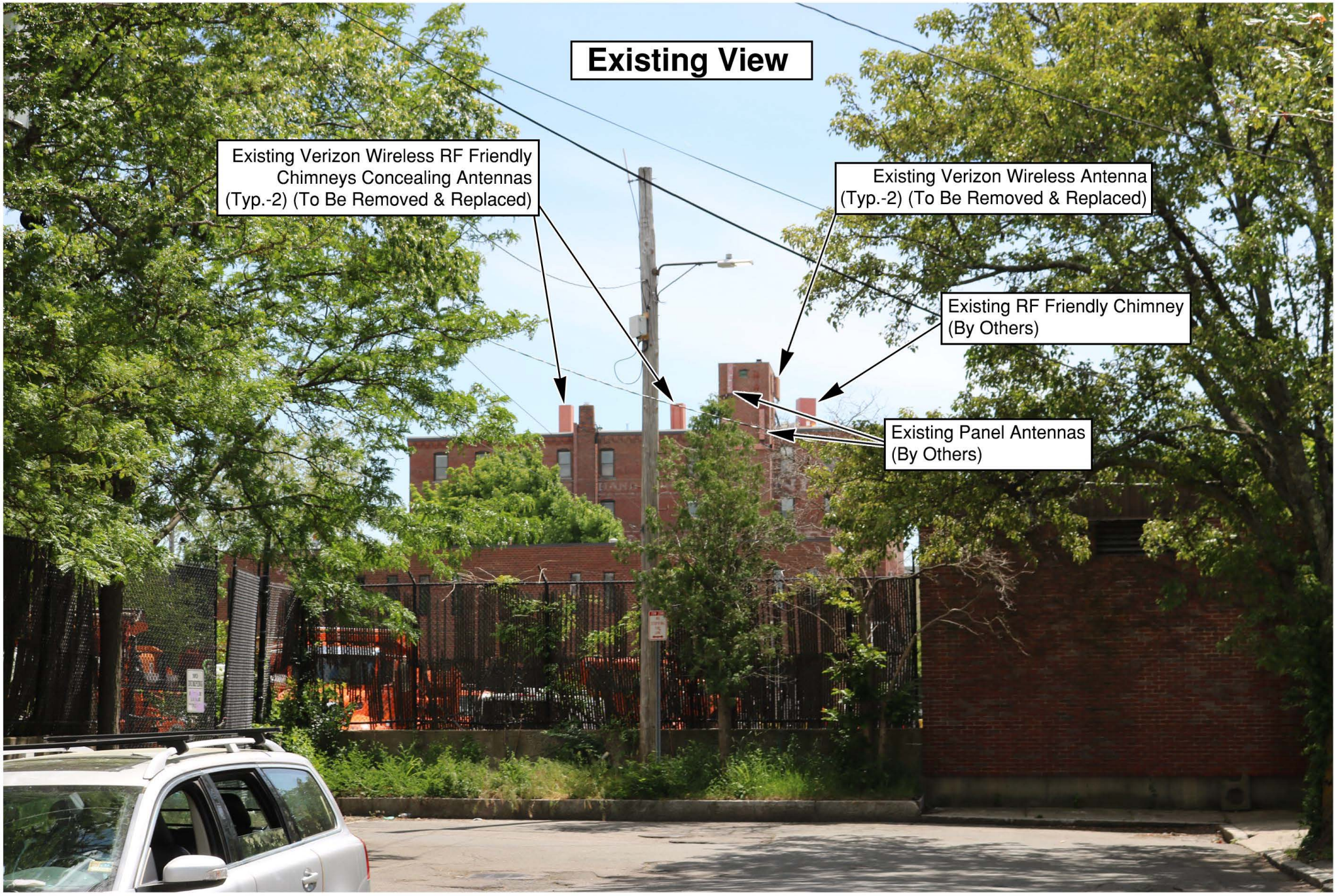
Dewberry

verizon WIRELESS

Cambridge Donnelly Field MA

Photo 2B
View Facing East From Hampshire Street
(Page 6 of 9)

Dewberry

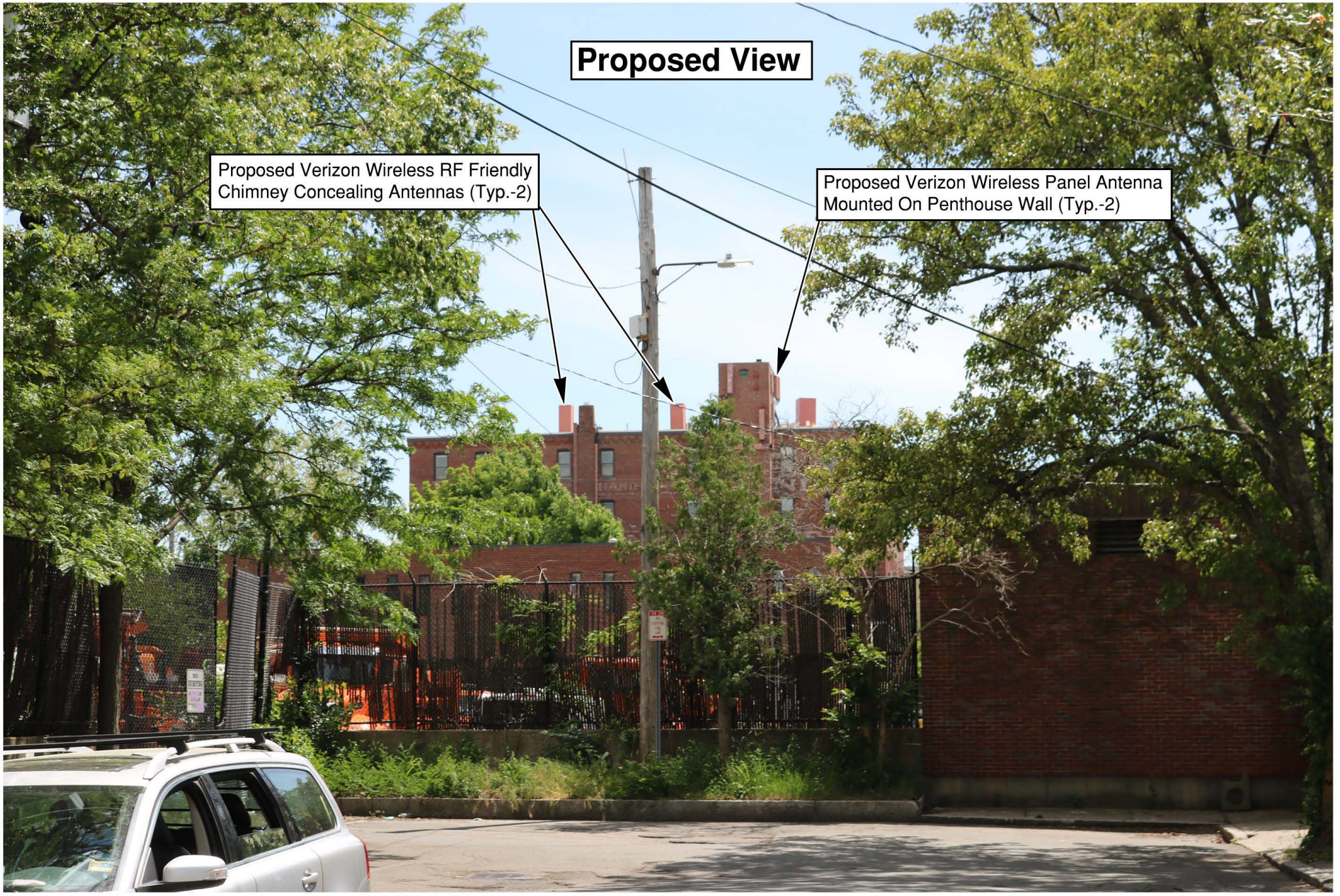


verizon WIRELESS

Cambridge Donnelly Field MA

Photo 3A
View Facing South From Norfolk Street
(Page 7 of 9)

Dewberry



verizon WIRELESS

Cambridge Donnelly Field MA

Photo 3B
View Facing South From Norfolk Street
(Page 8 of 9)

Dewberry

verizon WIRELESS

Cambridge Donnelly Field MA

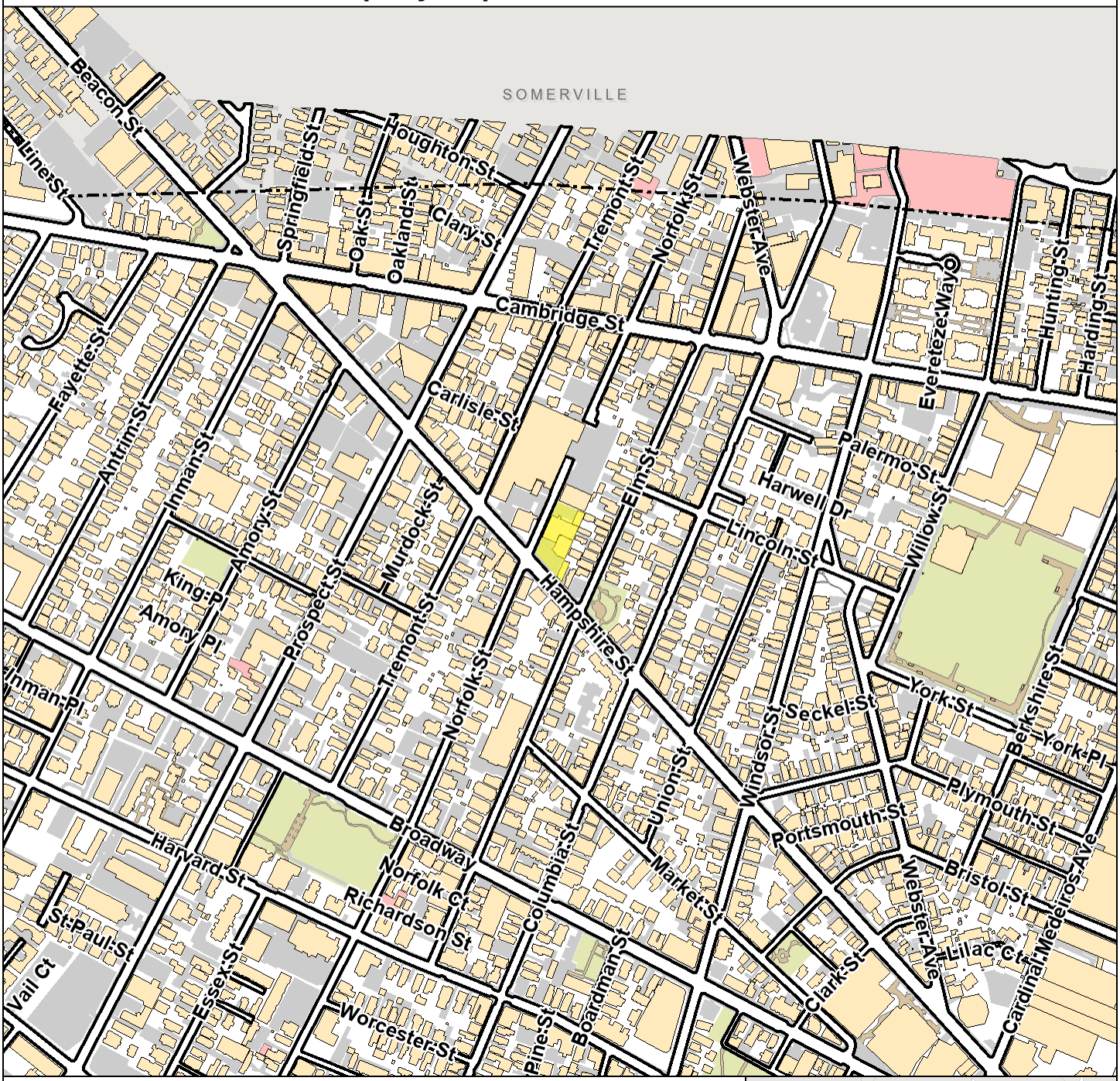
Photo 4
View Facing Northwest From Elm Street

Dewberry

City of Cambridge

Property Map for 284 NORFOLK ST.

June 24, 2022



City of Cambridge
Massachusetts

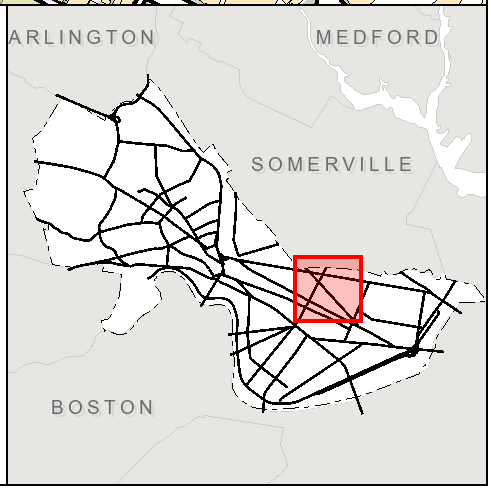
1" = 497 ft

www.cambridgema.gov/gis

- Rail
- Building Footprints

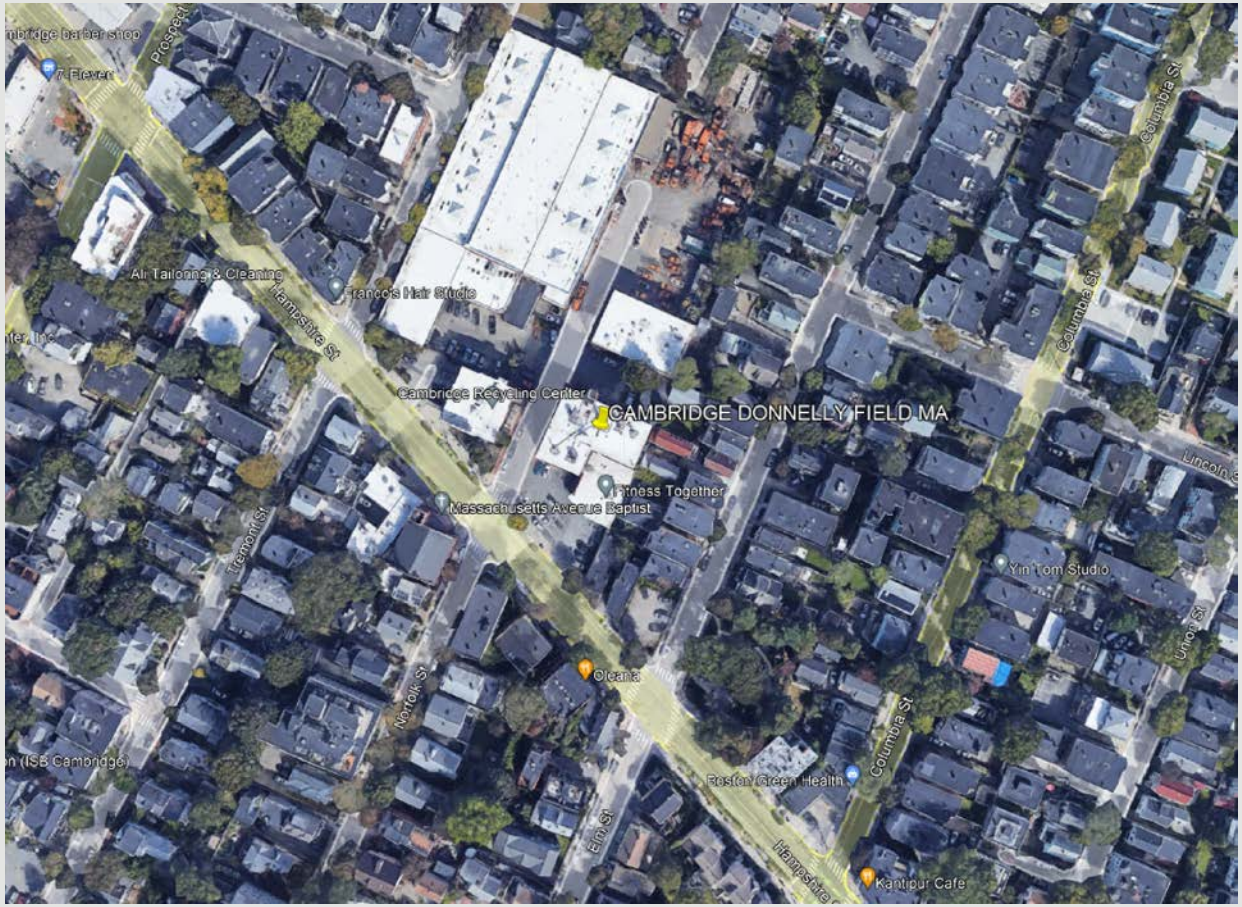
Paved Surfaces

- Paved Roads
- Bridges
- Unpaved Roads
- Unpaved Parking
- Sidewalks
- Driveways
- Alleys
- Other Paved Surface
- Public Footpath



Verizon Wireless Communications Facility

Engineering Necessity Case – Cambridge Donnelly Field, MA



Prepared by:
Melissa Summers
July, 2022

verizon

Project Need Overview:

This Radio Frequency (RF) report is being provided for Verizon's proposed modification to the existing Cambridge Donnelly Field, MA site. Cambridge Donnelly Field MA is an existing Verizon cell site on the rooftop of 284-288 Norfolk Street, Cambridge, MA, 02139. This existing site has (4) antennas behind (2) stealth "chimneys" at 56' and (2) antennas flush mounted on the NW facing wall of the penthouse at 59.2'. These antennas are film wrapped to match the existing brick pattern on the wall.

Verizon plans to swap out the existing (6) antennas with (6) similar size/ weight antennas in order to add additional frequencies/ capacity to the area. (4) of the antennas will remain behind the stealth chimneys and the (2) flush mounted antennas on the penthouse will be film wrapped to match the existing brick pattern on the wall. The changes will be visually unnoticeable. The testimony provided in this report for Cambridge Donnelly Field, MA is to make the case for more capacity on this existing site.

Included in the following pages is information on common terms, educational resources on common topics, best network design practices, and coverage maps.

The site(s) proposed in this application are necessary to achieve the technical objectives stated above. Note that there are several ways by which an applicant can establish site need. See Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment," FCC 18-133, 83 FR 51867, at ¶ 6 (October 15, 2018) (confirming that the test for establishing an effective prohibition is whether "a state or local legal requirement *materially inhibits* a provider's ability to engage in any of a *variety of activities related to its provision of a covered service*," and this test is met "not only when filling a coverage gap but *also when densifying a wireless network, introducing new services or otherwise improving service capabilities*").

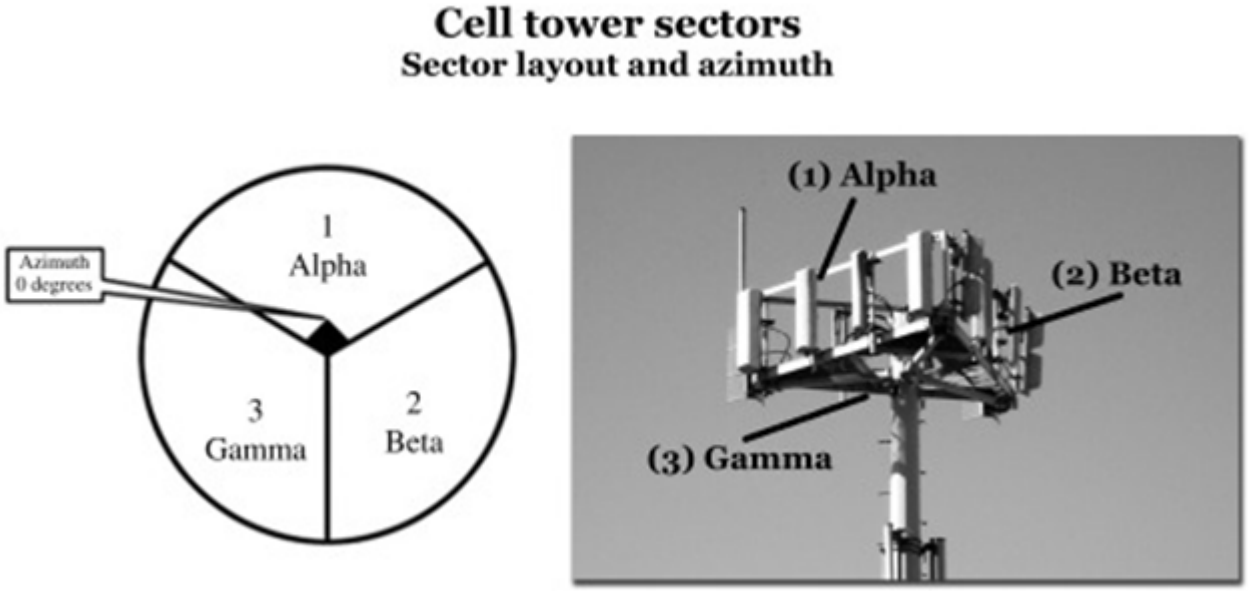
Introduction:

Expected capacity deficiencies and the use of new 5G technology are the main drivers that prompt the need for modification to the existing wireless communications facility (WCF). Most WCF provide a mixture of both capacity and coverage for the benefit of the end user.

Capacity is the metric used to determine if sufficient wireless resources exist and is now the primary means to measure how a community's wireless needs are being addressed. "Five bars" no longer means guaranteed coverage and capacity because each WCF has a limited amount of resources to handle voice calls, data connections and data volume. When these limits are reached and the WCF becomes overloaded (meaning there is more demand than signal to service it), the user experience quickly degrades preventing customers from making/receiving calls or getting applications to run. A WCF short on capacity could also make internet connections time out or delay information to emergency response personnel.

Introduction:

Sectors provide both Coverage and Capacity from a WCF towards a designed geographic area. Individual sectors are mounted near the top of a WCF and include radio equipment such as antennas, remote radio heads, and coaxial cables. Individual Sectors are typically labeled using the Greek alphabet, and each sector has an azimuth associated with it which defines the orientation of that sectors antennas. The existing three sector facility has azimuths of 50(Alpha), 150 (Beta) & 305 (Gamma) and will be mounted behind different stealth measures on an existing rooftop.



Explanation of Wireless Capacity

Capacity is the amount of resources that a WCF has to service customer demand. Verizon utilizes sophisticated programs and customer feedback to monitor current usage trends and to forecast future needs. Because it takes an average of 2-3 years to complete a WCF, we have to start the process of adding a new WCF several years in advance of when the WCF will be needed.

Location, Location, Location. A good capacity WCF needs to be in the center of a user population which insures that traffic is evenly distributed around the WCF. A typical WCF is configured into three sectors (like a pie cut into three pieces), with each slice (sector) having 33% of the WCF resources. If one sector is under-utilized, it's resources can not necessarily be diverted to another sector. Therefore, optimal performance is only obtained when all three sectors have an even traffic distribution.

Explanation of Wireless Coverage

Coverage will not change with the Capacity modifications proposed at Cambridge Donnelly Field MA since higher frequency carriers are being added. Diagram 1 shows the current/ future low band (max) coverage of the site.

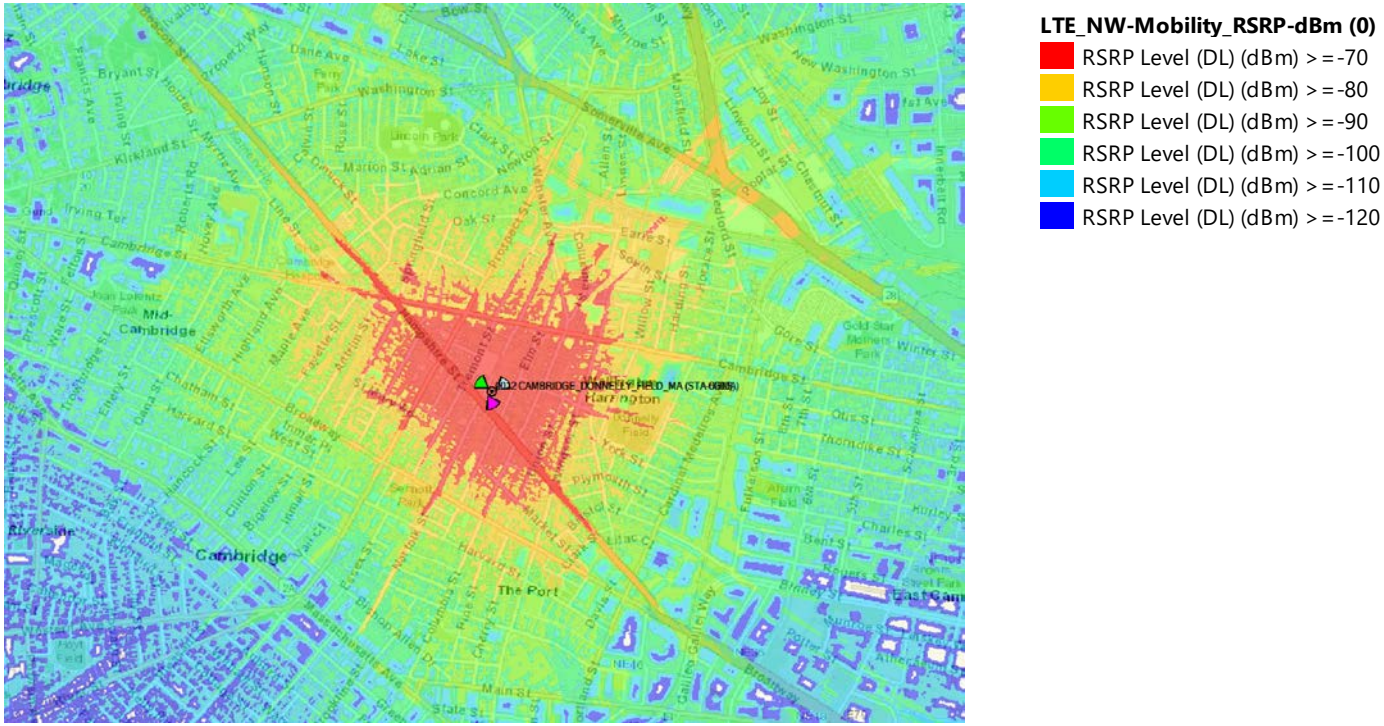


Diagram 1: Cambridge Donnelly Field MA 700 MHz Coverage (low frequency)

Coverage is best shown via coverage maps. RF engineers use tools that take into account terrain, vegetation, building types, and WCF specifics to model the existing coverage and prediction what we expect to see with the addition of a proposed WCF.

Coverage also changes depending on which frequencies are used. Most phones today use 3G at 800 MHZ or 4G at 700 MHz spectrum which are considered low frequencies. Low frequencies can travel further distances than then the higher 1900 MHz and 2100 MHz frequencies now being employed due to increased capacity demands. Operating at higher frequencies makes it necessary for carriers to install substantially more wireless facilities to achieve the same coverage as one tower operating on the lower frequencies.

Wireless Data Growth

Each year Verizon sees large increases in how much data its customers need. As the resolution of the pictures we send increases, the quality of the video we watch improves and the complexity of the applications grow, we commonly see tremendous growth year-over-year. 57% of American homes are wireless only. (CDC's 2018 Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, July-December, 2018)

Machine to Machine communications will also increase the data burden on wireless networks, as over the next five (5) years more and more services that improve our safety and make our lives easier will be available over the wireless infrastructure, such as:

- Cars that notify 911 when an airbag deploys.
- "Driverless" cars needing traffic data and maps to reach your destination as quickly as possible.
- Medical monitors that will alert us should a loved one neglect taking their prescription drugs.
- Home alarms that notify you when your child arrives home from school.
- Smart street lights that notify the city when they are not working.
- City garbage cans that let people know when they need to be emptied.
- Tracking watches will aid in finding lost Alzheimer patients.

Radio Emission Safety…

A common question received is “Are the radio emissions safe?”

Verizon goes to great effort to ensure that all of its projects meet the standards established by the FCC to ensure safety of the public and its employees. The links below are to three reputable organizations that have performed extensive reviews of the science available on this subject and have good educational articles on the results of the research.

World Health Organization
http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html

American Cancer Society
http://www.cancer.org/cancer/cancercauses/othercarcinogens/athome/wireless facilityular-phone-towers

FCC Radio Frequency Safety
https://www.fcc.gov/general/radio-frequency-safety-0

Verizon is part of your community.

Because we live and work there too.

We believe technology can help solve our biggest social problems.

We're working with innovators, community leaders, non-profits, universities and our peers to address some of the unmet challenges in education, healthcare and energy management.

Learn more about our corporate social responsibility at www.verizon.com.

verizon

Thank you.

verizon fuze | RFDS

EAST > North East > New England > New England East > CAMBRIDGE_DONNELLY_FIELD_MA

Summers, Melissa - melissa.summers@verizonwireless.com - 1/3/2022 13:5:54

Project Details

FUZE Project ID:	16070570
Project Name:	850 ADD
Project Alt Name:	CAMBRIDGE_DONNELLY_FIELD_MA - 850LTE, NR, PCS, L-Sub6 Add
Project Type:	Modification
Modification Type:	RF
Designed Sector Carrier 4G:	15
Designed Sector Carrier 5G:	3
Additional Sector Carrier 4G:	N/A
Additional Sector Carrier 5G:	N/A
FP Solution Type & Tech Type:	MODIFICATION;4G_850,4G_Radio Swap,5G_L-Sub6-Prep
Carrier Aggregation:	false
MPT Id:	789339
eCIP-0:	false
Suffix:	REV1

Location Information

Site ID:	674415
E-NodeB ID:	0569001,056012
PSLC:	161282
Switch Name:	W Roxbury 1
Tower Owner:	
Tower Type:	Building Side-Mounted
Site Type:	MACRO
Site Sub Type:	CRAN
Street Address:	284 Norfolk Street
City:	Cambridge
State:	MA
Zip Code:	02139
County:	Middlesex
Latitude:	42.371278 / 42° 22' 16.6008" N
Longitude:	-71.097106 / 71° 5' 49.5816" W

RFDS Project Scope:

RFDS SOW: 850 5GNR/ L-SUB6 8T8R carrier add, Samsung dual band RRH swap, antenna change

REV1 (1/3/22): Upgrades OVP/ Hybriflex and changes design to 8T8R on all sectors

1- Retain 700/ AWS/ PCS carriers and add 850 5GNR/ L-SUB6 8T8R carriers
2- Replace (6) existing antennas with (3) new Commscope NHHS4-65A-R3B and (3) new Commscope NHH-65A-R2B antennas
3- Replace (6) existing Nokia RRHs on rooftop and TRDU in shelter with (3) new B5/B13 RRH- RF4440d-13A, (3) new Samsung B2/B66A RRH-RF4439d-25A, and (3) new Samsung RT8808-77A RRHs on rooftop
4- Add (3) Commscope CHB626-43-2X combiners on Rooftop
5- Remove quadraplexers from shelter
6- Upgrade OVPs/ Hybriflex
7- Plumb 700/ 850/ PCS/ AWS/ L-SUB6 according to the plumbing diagram
8- Use RF ports on dual band RRHs to communicate with RETs via Smart bias-T built into the antenna plus RET cable for LS6
7- Cap and weatherproof unused ports/connectors

Antenna Summary

Added

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	CDMA LTE 5G	LTE			COMMSCOPE	NHH-65A-R2B	59.2	61.5	305(03)	true	true	PHYSICAL	1	NHH-65A-R2B
LTE	CDMA LTE 5G	LTE			COMMSCOPE	NHH-65A-R2B	56	58.3	50(01) 150(02)	true	true	PHYSICAL	2	NHH-65A-R2B
LTE	LTE 5G		LTE	5G	COMMSCOPE	NHHS4-65A-R3B	56	58.3	50(01) 150(02)	true	true	PHYSICAL	2	
LTE	LTE 5G		LTE	5G	COMMSCOPE	NHHS4-65A-R3B	59.2	61.5	305(03)	true	true	PHYSICAL	1	

Removed

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	CDMA	LTE	LTE		AMPHENOL	HEX654CW0000X	56	58.1	50(01) 150(02)	false	false	PHYSICAL	4	
LTE	CDMA	LTE	LTE		AMPHENOL	HEX654CW0000X	59.2	61.3	305(03)	false	false	PHYSICAL	2	

Retained

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available.

Added: 6 | **Removed:** 6 | **Retained:** 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Combiner	Tower	LTE	CDMA LTE 5G				COMMSCOPE	CHB626-43-2X			PHYSICAL	3	
Coaxial Cables	Tower						N/A	1/2" Coax (CAL)		1/2"	PHYSICAL	3	
Hybrid Cable	Tower	LTE	LTE 5G	LTE	LTE	5G	N/A	6x12 Hybriflex LI		1 1/4"	PHYSICAL	3	
OVP Box	Tower	LTE	LTE 5G	LTE	LTE	5G	Raycap	OVP-6			PHYSICAL	3	
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)			PHYSICAL	3	
RRU	Tower	LTE	LTE 5G				Samsung	B5/B13 RRH ORAN (RF4440d-13A)			PHYSICAL	3	
RRU	Tower					5G	Samsung	RT-8808-77A			PHYSICAL	3	

Removed

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Hybrid Cable	Tower						N/A	2x4 Hybriflex non-LI		1 1/4"	PHYSICAL	3	
Hybrid Cable	Tower						N/A	6x12 Hybriflex non-LI		1 1/4"	PHYSICAL	1	
RRU	Tower			LTE			Nokia	UHFA B25 RRH 4x30			PHYSICAL	3	
RRU	Tower				LTE		Nokia	UHIE B66A RRH 4x45			PHYSICAL	3	
OVP Box	Tower						Raycap	OVP-2			PHYSICAL	3	
OVP Box	Tower						Raycap	OVP-6			PHYSICAL	1	
RRU	Shelter	LTE					Nokia	UHBC B13 TRDU 2x40			PHYSICAL	3	
Quadplexer	Shelter	LTE	CDMA				Unknown	Quadplexer			PHYSICAL	6	

Retained

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
Coaxial Cables	Tower						N/A	1-5/8" Coax		1 5/8"	SPARE	6	
Coaxial Cables	Tower		CDMA				N/A	1-5/8" Coax		1 5/8"	PHYSICAL	6	

Service Info

700 MHz LTE	0000			5GLS		
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID	056012	056012	056012	056012	056012	056012
Antenna Model	HEX654CW0000X-T13-7 50-(-45)-RED	HEX654CW0000X-T14-7 50-(-45)-RED	HEX654CW0000X-T12-7 50-(-45)-RED	NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	13	14	12	13	14	12
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	63.79	62.63	60.5	66	66	66
DLEARFCN	5230	5230	5230	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10	10	10	10
Total ERP (W)	574.12	563.64	544.5	594.02	594.02	594.02
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHBC B13 TRDU 2x40	UHBC B13 TRDU 2x40	UHBC B13 TRDU 2x40	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines	2,2	2,2	2,2	4,4	4,4	4,4
Position	1	1	1	1	1	1
Transmitter Id	1862323	1862414	1862499	11184456	11184459	11184462
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE				5GLS		
Sector				**01**	**02**	**03**
Azimuth				50	150	305
Cell / ENode B ID				056012	056012	056012
Antenna Model				NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make				COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)				56	56	59.2
Mechanical Down-Tilt(Deg.)				0	0	0
Electrical Down-Tilt				13	14	12
Tip Height				58.3	58.3	61.5
Regulatory Power				282.24	282.24	282.24
DLEARFCN				2560	2560	2560
Channel Bandwidth(MHz)				10	10	10
Total ERP (W)				635.04	635.04	635.04
TMA Make						
TMA Model						
RRU Make				Samsung	Samsung	Samsung
RRU Model				B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines				4,4	4,4	4,4
Position				1	1	1
Transmitter Id				11217219	11217217	11217218
Source				ATOLL_API	ATOLL_API	ATOLL_API

850 MHz CDMA

	0000			5GLS		
Sector	**D1**	**D2**	**D3**	**D1**	**D2**	**D3**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID						
Antenna Model	HEX654CW0000X-T13-8 50-(-45)-RED	HEX654CW0000X-T14-8 50-(-45)-RED	HEX654CW0000X-T12-8 50-(-45)-RED	NHH-65A-R2B	NHH-65A-R2B	NHH-65A-R2B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	13	14	12	13	14	12
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	250.03	243.78	233.88	235.07	229.19	219.89
DLEARFCN	31	31	31	31	31	31
Channel Bandwidth(MHz)	1.23	1.23	1.23	1.23	1.23	1.23
Total ERP (W)						
TMA Make						
TMA Model						
RRU Make						
RRU Model						
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position						
Transmitter Id						
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz 5GNR

				5GLS		
Sector				**0106**	**0107**	**0108**
Azimuth				50	150	305
Cell / ENode B ID				0569001	0569001	0569001
Antenna Model				NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make				COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)				56	56	59.2
Mechanical Down-Tilt(Deg.)				0	0	0
Electrical Down-Tilt				13	14	12
Tip Height				58.3	58.3	61.5
Regulatory Power				282.24	282.24	282.24
DLEARFCN				2560	2560	2560
Channel Bandwidth(MHz)				10	10	10
Total ERP (W)				635.04	635.04	635.04
TMA Make						
TMA Model						
RRU Make				Samsung	Samsung	Samsung
RRU Model				B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines				4,4	4,4	4,4
Position				1	1	1
Transmitter Id				11217219	11217217	11217218
Source				ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE		0000			5GLS	
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID	056012	056012	056012	056012	056012	056012
Antenna Model	HEX654CW0000X-T08-1 900-(-45)-BLUE	HEX654CW0000X-T08-1 900-(-45)-BLUE	HEX654CW0000X-T08-1 900-(-45)-BLUE	NHH-65A-R2B	NHH-65A-R2B	NHH-65A-R2B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	8	8	8	8	8	8
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	96.98	97.42	80.85	130.52	130.52	130.52
DLEARFCN	1025	1025	1025	1025	1025	1025
Channel Bandwidth(MHz)	15	15	15	15	15	15
Total ERP (W)	797.99	801.68	665.27	1073.99	1073.99	1073.99
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHFA B25 RRH 4x30	UHFA B25 RRH 4x30	UHFA B25 RRH 4x30	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	2,4	2,4	2,4	4,4	4,4	4,4
Position	1	1	1	1	1	1
Transmitter Id	1862330	1862489	1862505	11184457	11184460	11184463
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE		0000			5GLS	
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	50	150	305	50	150	305
Cell / ENode B ID	056012	056012	056012	056012	056012	056012
Antenna Model	HEX654CW0000X-T08-2 100-(-45)-BLUE	HEX654CW0000X-T08-2 100-(-45)-BLUE	HEX654CW0000X-T08-2 100-(-45)-BLUE	NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	56	56	59.2	56	56	59.2
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	8	8	8	8	8	8
Tip Height	58.1	58.1	61.3	58.3	58.3	61.5
Regulatory Power	113.43	114.74	102.03	120.37	120.37	120.37
DLEARFCN	2050	2050	2050	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20	20	20	20
Total ERP (W)	1244.51	1258.93	1119.44	1320.69	1320.69	1320.69
TMA Make						
TMA Model						
RRU Make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU Model	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	2,4	2,4	2,4	4,4	4,4	4,4
Position	1	1	1	1	1	1
Transmitter Id	1862406	1862491	1862507	11184458	11184461	11184464
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

	5GLS		
Sector	**0106**	**0107**	**0108**
Azimuth	50	150	305
Cell / ENode B ID	0569001	0569001	0569001
Antenna Model	NHHS4-65A-R3B	NHHS4-65A-R3B	NHHS4-65A-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	57.5	57.5	60.2
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	59.8	59.8	62.5
Regulatory Power	246.85	246.85	246.85
DLEARFCN	648672	648672	648672
Channel Bandwidth(MHz)	60	60	60
Total ERP (W)	4062.56	4062.56	4062.56
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RT-8808-77A	RT-8808-77A	RT-8808-77A
Number of Tx, Rx Lines	2,2	2,2	2,2
Position	1	1	1
Transmitter Id	11217253	11217254	11217255
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

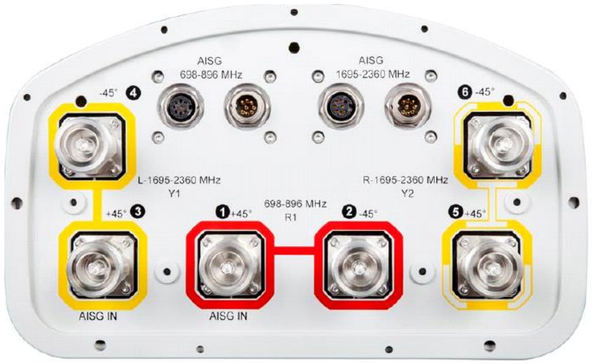
Callsigns Per Antenna

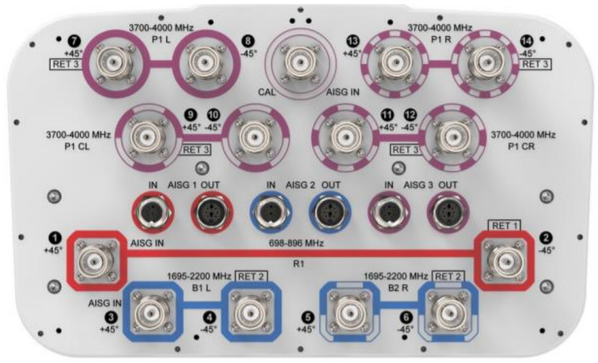
Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz
No data available.																	

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq Mi	Status	Action	Approved for Insvc
WQJQ689	*Northeast*	*WU*	*REA001*	*C*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*22.000*	*746.000-757.000*	*776.000-787.000*	*.000-.000*	*.000-.000*	*66*	*1000*	*1837.92*	*Active*	*added*	*Yes*
KNKA201	*Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH*	*CL*	*CMA006*	*B*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*25.000*	*835.000-845.000*	*880.000-890.000*	*846.500-849.000*	*891.500-894.000*	*282.24*	*400*	*1837.92*	*Active*	*added*	*Yes*
KNLF646	*Boston, MA*	*CW*	*BTA051*	*C*	*MA*	*Middlesex*	*AirTouch Cellular*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*130.52*	*1640*	*1837.92*	*Active*	*added*	*Yes*
KNLH310	*Boston, MA*	*CW*	*BTA051*	*E*	*MA*	*Middlesex*	*AirTouch Cellular*	*Yes*	*10.000*	*1885.000-1890.000*	*1965.000-1970.000*	*.000-.000*	*.000-.000*	*130.52*	*1640*	*1837.92*	*Active*	*added*	*Yes*
KNLH242	*Boston, MA*	*CW*	*BTA051*	*F*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*10.000*	*1890.000-1895.000*	*1970.000-1975.000*	*.000-.000*	*.000-.000*	*130.52*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WQGB266	*Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH*	*AW*	*CMA006*	*A*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*1710.000-1720.000*	*2110.000-2120.000*	*.000-.000*	*.000-.000*	*120.37*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRNE627	*Boston, MA*	*PM*	*PEA007*	*A1*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*3700.000-3720.000*	*.000-.000*	*.000-.000*	*.000-.000*	*246.85*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRNE628	*Boston, MA*	*PM*	*PEA007*	*A2*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*3720.000-3740.000*	*.000-.000*	*.000-.000*	*.000-.000*	*246.85*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRNE629	*Boston, MA*	*PM*	*PEA007*	*A3*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*3740.000-3760.000*	*.000-.000*	*.000-.000*	*.000-.000*	*246.85*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WQGA900	*Boston-Worcester-Lawrence-Lowell-Brockton, MA-NH-R*	*AW*	*BEA003*	*B*	*MA*	*Middlesex*	*Cellco Partnership*	*Yes*	*20.000*	*1720.000-1730.000*	*2120.000-2130.000*	*.000-.000*	*.000-.000*	*120.37*	*1640*	*1837.92*	*Active*	*added*	*Yes*
WRBA936	Boston, MA	UU	BTA051	L1	MA	Middlesex	Cellco Partnership	Yes	325.000	27600.000 27925.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRBA937	Boston, MA	UU	BTA051	L2	MA	Middlesex	Cellco Partnership	Yes	325.000	27925.000 27950.000	28050.000 28350.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD671	Boston, MA	UU	PEA007	M1	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37600.000 37700.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD672	Boston, MA	UU	PEA007	M10	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38500.000 38600.000	.000-.000	.000-.000	.000-.000			1837.92	Active	N/A	No
WRHD673	Boston, MA	UU	PEA007	M2	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37700.000 37800.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD674	Boston, MA	UU	PEA007	M3	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37800.000 37900.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD675	Boston, MA	UU	PEA007	M4	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	37900.000 38000.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD676	Boston, MA	UU	PEA007	M5	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38000.000 38100.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD677	Boston, MA	UU	PEA007	M6	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38100.000 38200.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD678	Boston, MA	UU	PEA007	M7	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38200.000 38300.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD679	Boston, MA	UU	PEA007	M8	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38300.000 38400.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes

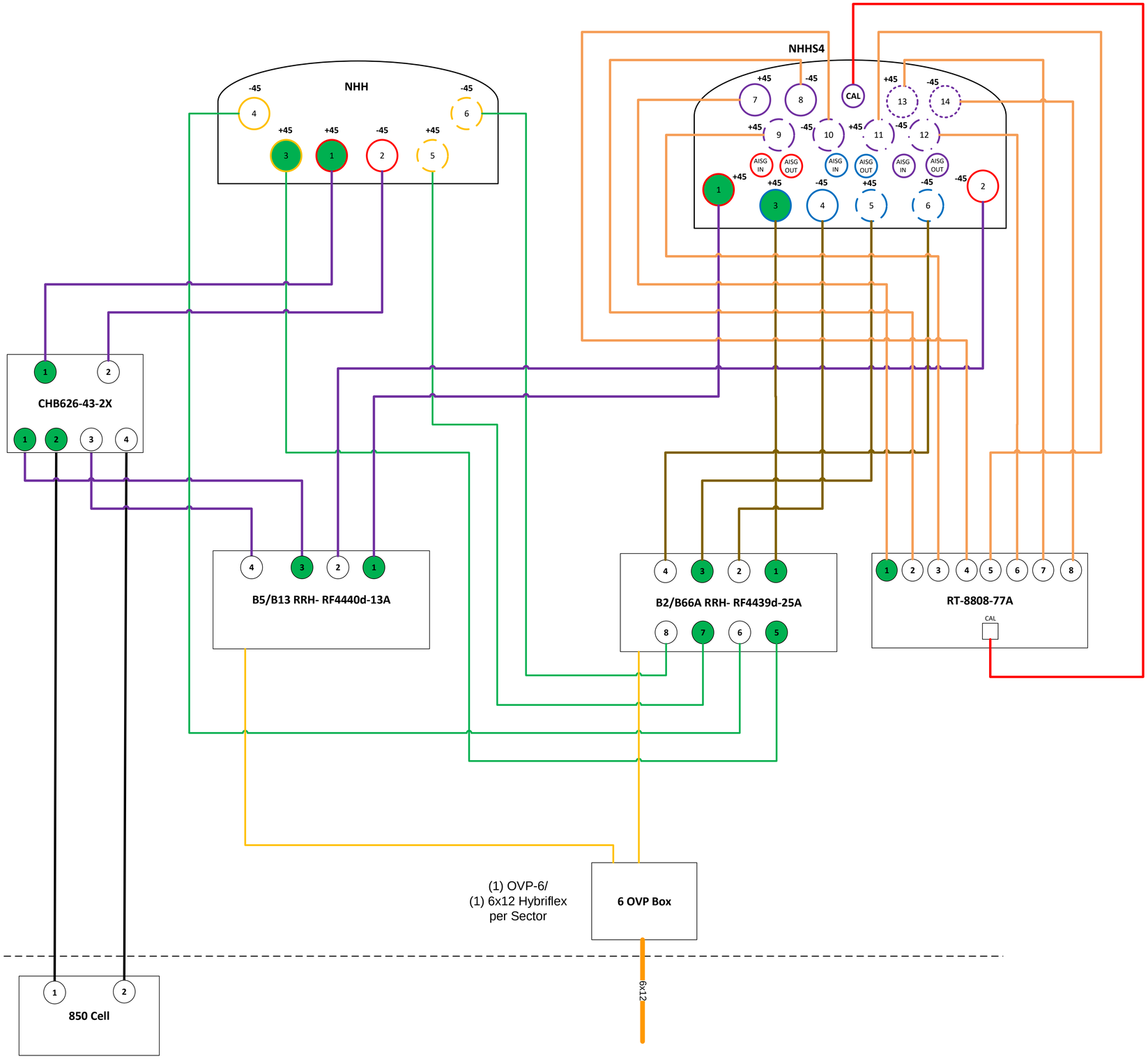
WRHD680	Boston, MA	UU	PEA007	M9	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000			1837.92	Active		Yes
WRHD681	Boston, MA	UU	PEA007	N1	MA	Middlesex	Straight Path Spectrum, LLC	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000			1837.92	Active	N/A	No
WRLD616	D25017 - Middlesex, MA	PL	D25017	0	MA	Middlesex	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	.00	Active		Yes
WRLD615	D25017 - Middlesex, MA	PL	D25017	0	MA	Middlesex	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	.00	Active		Yes
WRLD617	D25017 - Middlesex, MA	PL	D25017	0	MA	Middlesex	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	.00	Active		Yes
WRNE630	Boston, MA	PM	PEA007	A4	MA	Middlesex	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE631	Boston, MA	PM	PEA007	A5	MA	Middlesex	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE632	Boston, MA	PM	PEA007	B1	MA	Middlesex	Cellco Partnership	Yes	20.000	3800.000-3820.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE633	Boston, MA	PM	PEA007	B2	MA	Middlesex	Cellco Partnership	Yes	20.000	3820.000-3840.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No
WRNE634	Boston, MA	PM	PEA007	B3	MA	Middlesex	Cellco Partnership	Yes	20.000	3840.000-3860.000	.000-.000	.000-.000	.000-.000		1640	1837.92	Active		No





- Port 1 & 2 are for low band (698-896 MHz).
- Port 3,4,5, & 6 are for high band (1695-2360 MHz).
- Smart Bias Tee (SBT) is through antenna ports 1 & 3 (1 for low band & 3 for high band).
- AISG cable is only needed when drawn in the diagrams below, if it is not drawn then SBT is enough to control all RET motors.
- Not all SBT ports are needed to control RET, only green port connection to green port will control RET.

RET DC signal pass for RET
(Port that will control RET)



- The Calibration Port (CAL) on the antenna is required to be used on the MX14FIT antenna as C-Band cannot use the Beam Forming function without this. The cable to this port is shown in RED and should be connected to the antenna using 1/2" coax cable.

CAL — CAL

Calibration signal pass for
Calibration
(Port that will control
Calibration for C Band)

DC signal capable Port

AISG Cable

RET DC signal pass for RET
(Port that will control RET)

Hybriflex cables

Comments:

Diagram shows antenna port configuration as viewed from below antennas.

Antenna positions are indicated as viewed from IN FRONT of antennas.

Cap and weatherproof unused antenna ports.

All plumbing diagram colors are irrelevant except for AISG & Hybriflex cable. (For the coax colors follow Coax Colors guide above)

Band	Sector 1 (Alpha) Color Codes						
850 CDMA	R						
	R	R					
700	R	P					
	R	R	P				
	R	R	R	P			
	R	R	R	R	P		
850 LTE	R	P	P				
	R	R	P	P			
	R	R	R	P	P		
	R	R	R	R	P	P	
700 / 850	R	P	P	P			
	R	R	P	P	P		
	R	R	R	P	P	P	
	R	R	R	R	P	P	P
AWS	R	W					
	R	R	W				
	R	R	R	W			
	R	R	R	R	W		
PCS	R	W	W				
	R	R	W	W			
	R	R	R	W	W		
	R	R	R	R	W	W	
AWS / PCS	R	W	W	W			
	R	R	W	W	W		
	R	R	R	W	W	W	
	R	R	R	R	W	W	W
CBRS	R	Y					
	R	R	Y				
	R	R	R	Y			
	R	R	R	R	Y		
LAA	R	Y	Y				
	R	R	Y	Y			

Band	Sector 2 (Beta) Color Codes						
850 CDMA	B						
	B	B					
700	B	P					
	B	B	P				
	B	B	B	P			
	B	B	B	B	P		
850 LTE	B	P	P				
	B	B	P	P			
	B	B	B	P	P		
	B	B	B	B	P	P	
700 / 850	B	P	P	P			
	B	B	P	P	P		
	B	B	B	P	P	P	
	B	B	B	B	P	P	P
AWS	B	W					
	B	B	W				
	B	B	B	W			
	B	B	B	B	W		
PCS	B	W	W				
	B	B	W	W			
	B	B	B	W	W		
	B	B	B	B	W	W	
AWS / PCS	B	W	W	W			
	B	B	W	W	W		
	B	B	B	W	W	W	
	B	B	B	B	W	W	W
CBRS	B	Y					
	B	B	Y				
	B	B	B	Y			
	B	B	B	B	Y		
LAA	B	Y	Y				
	B	B	Y	Y			

Band	Sector 3 (Gamma) Color Codes						
850 CDMA	G						
	G	G					
700	G	P					
	G	G	P				
	G	G	G	P			
	G	G	G	G	P		
850 LTE	G	P	P				
	G	G	P	P			
	G	G	G	P	P		
	G	G	G	G	P	P	
700 / 850	G	P	P	P			
	G	G	P	P	P		
	G	G	G	P	P	P	
	G	G	G	G	P	P	P
AWS	G	W					
	G	G	W				
	G	G	G	W			
	G	G	G	G	W		
PCS	G	W	W				
	G	G	W	W			
	G	G	G	W	W		
	G	G	G	G	W	W	
AWS / PCS	G	W	W	W			
	G	G	W	W	W		
	G	G	G	W	W	W	
	G	G	G	G	W	W	W
CBRS	G	Y					
	G	G	Y				
	G	G	G	Y			
	G	G	G	G	Y		
LAA	G	Y	Y				
	G	G	Y	Y			

	Sector 4 (Delta) Color Codes							
850 CDMA	Gray	R						
	Gray	R	R					
700	Gray	R	P					
	Gray	R	R	P				
	Gray	R	R	R	P			
	Gray	R	R	R	R	P		
850 LTE	Gray	R	P	P				
	Gray	R	R	P	P			
	Gray	R	R	R	P	P		
	Gray	R	R	R	R	P	P	
700 / 850	Gray	R	P	P	P			
	Gray	R	R	P	P	P		
	Gray	R	R	R	P	P	P	
	Gray	R	R	R	R	P	P	P
AWS	Gray	R	W					
	Gray	R	R	W				
	Gray	R	R	R	W			
	Gray	R	R	R	R	W		
PCS	Gray	R	W	W				
	Gray	R	R	W	W			
	Gray	R	R	R	W	W		
	Gray	R	R	R	R	W	W	
AWS / PCS	Gray	R	W	W	W			
	Gray	R	R	W	W	W		
	Gray	R	R	R	W	W	W	
	Gray	R	R	R	R	W	W	W
CBRS	Gray	R	Y					
	Gray	R	R	Y				
	Gray	R	R	R	Y			
	Gray	R	R	R	R	Y		
LAA	Gray	R	Y	Y				
	Gray	R	R	Y	Y			

	Sector 5 (Epsilon) Color Codes							
850 CDMA	Gray	B						
	Gray	B	B					
700	Gray	B	P					
	Gray	B	B	P				
	Gray	B	B	B	P			
	Gray	B	B	B	B	P		
850 LTE	Gray	B	P	P				
	Gray	B	B	P	P			
	Gray	B	B	B	P	P		
	Gray	B	B	B	B	P	P	
700 / 850	Gray	B	P	P	P			
	Gray	B	B	P	P	P		
	Gray	B	B	B	P	P	P	
	Gray	B	B	B	B	P	P	P
AWS	Gray	B	W					
	Gray	B	B	W				
	Gray	B	B	B	W			
	Gray	B	B	B	B	W		
PCS	Gray	B	W	W				
	Gray	B	B	W	W			
	Gray	B	B	B	W	W		
	Gray	B	B	B	B	W	W	
AWS / PCS	Gray	B	W	W	W			
	Gray	B	B	W	W	W		
	Gray	B	B	B	W	W	W	
	Gray	B	B	B	B	W	W	W
CBRS	Gray	B	Y					
	Gray	B	B	Y				
	Gray	B	B	B	Y			
	Gray	B	B	B	B	Y		
LAA	Gray	B	Y	Y				
	Gray	B	B	Y	Y			

	Sector 6 (Zeta) Color Codes							
850 CDMA	Gray	G						
	Gray	G	G					
700	Gray	G	P					
	Gray	G	G	P				
	Gray	G	G	G	P			
	Gray	G	G	G	G	P		
850 LTE	Gray	G	P	P				
	Gray	G	G	P	P			
	Gray	G	G	G	P	P		
	Gray	G	G	G	G	P	P	
700 / 850	Gray	G	P	P	P			
	Gray	G	G	P	P	P		
	Gray	G	G	G	P	P	P	
	Gray	G	G	G	G	P	P	P
AWS	Gray	G	W					
	Gray	G	G	W				
	Gray	G	G	G	W			
	Gray	G	G	G	G	W		
PCS	Gray	G	W	W				
	Gray	G	G	W	W			
	Gray	G	G	G	W	W		
	Gray	G	G	G	G	W	W	
AWS / PCS	Gray	G	W	W	W			
	Gray	G	G	W	W	W		
	Gray	G	G	G	W	W	W	
	Gray	G	G	G	G	W	W	W
CBRS	Gray	G	Y					
	Gray	G	G	Y				
	Gray	G	G	G	Y			
	Gray	G	G	G	G	Y		
LAA	Gray	G	Y	Y				
	Gray	G	G	Y	Y			

Sector	Antenna Desc	Base Station ID	Sector ID
Alpha	700-850	056012_1_17	056012_1, 056012_1_7
Alpha	AWS	056012_1_2	056012_1_2
Alpha	PCS	056012_1_4	056012_1_4
Alpha	850 CDMA	056012_1_7	056012_1_7, EXCLUDE
Beta	700-850	056012_2_17	056012_2, 056012_2_7
Beta	AWS	056012_2_2	056012_2_2
Beta	PCS	056012_2_4	056012_2_4
Beta	850 CDMA	056012_2_7	056012_2_7, EXCLUDE
Gamma	700-850	056012_3_17	056012_3, 056012_3_7
Gamma	AWS	056012_3_2	056012_3_2
Gamma	PCS	056012_3_4	056012_3_4
Gamma	850 CDMA	056012_3_7	056012_3_7, EXCLUDE

(5)

(5)

Bk: 51897 Pg: 321 Doc: DEED
Page: 1 of 5 11/17/2008 09:50 AM

QUITCLAIM DEED

E.L.I., Inc., a Massachusetts corporation and a successor by merger to Eli Heffron & Sons, Inc., with a principal place of business at 139-145 Hampshire Street, Cambridge, Massachusetts 02139 (collectively, the "Grantor"), hereby grants, conveys and transfers to Norshire LLC, a Massachusetts limited liability company, with a principal place of business at 288 Norfolk Street, Cambridge, Massachusetts 02139 (the "Grantee"), in consideration of ONE MILLION THREE HUNDRED AND TWENTY FIVE THOUSAND DOLLARS ($1,325,000.00), the receipt and sufficiency of which is hereby acknowledged,

With QUITCLAIM COVENANTS

The land in Cambridge, Middlesex County, Massachusetts, together with the buildings and other improvements thereon bounded and described as follows:

PARCEL NO. 1 is shown as Lot 18 on "Mason's Plan of Building Lots in Cambridgeport", dated October 21, 1852 and recorded with Middlesex County South District Registry of Deeds (the "Registry"), Book of Plans 16, Plan 18 (the "Plan"), and is bounded and described as follows:

Beginning at a point in the southeasterly line of Norfolk Street, one hundred thirty-eight and 83/100 (138.83) feet northeasterly from the intersection of said line with the northeasterly line of Hampshire Street, thence

NORTHEASTERLY — along said line of Norfolk Street, fifty (50) feet; thence

SOUTHEASTERLY — by a line at right angles to said Norfolk Street, ninety-nine (99) feet to its intersection with the southeasterly boundary line of land of the City of Cambridge, thence

ess: 133-145 Hampshire Street and 284-288 Norfolk Street, Cambridge, MA

Madoff & Khoury
124 Washington Street
Foxboro, MA 02035

MASSACHUSETTS EXCISE TAX
Southern Middlesex District ROD # 001
Date: 11/17/2008 09:50 AM
Ctrl# 117808 29160 Doc# 00184084
Fee: $6,042.00 Cons: $1,325,000.00

SOUTHWESTERLY along said boundary line fifty (50) feet to its intersection with the division line between land of said City and land now or formerly of Richard H. and Sidney J. Monk, thence

NORTHWESTERLY along said division line, ninety-nine (99) feet to its intersection with the southeasterly line of Norfolk Street at the point of beginning.

PARCEL NO. 2 is shown as Lot 19 on the Plan and is bounded and described as follows:

NORTHEASTERLY by Norfolk Street, fifty (50) feet;

NORTHWESTERLY by Lot 18 as shown on the Plan, ninety-nine (99) feet;

SOUTHEASTERLY by land formerly of Snelling, fifty (50) feet; and

SOUTHWESTERLY by Lot 21 as shown on the Plan and by Lot 20 as shown on the Plan, ninety-nine (99) feet.

PARCEL NO. 3 is shown as Lot 20 on the Plan and is bounded and described as follows:

NORTHWESTERLY by said Norfolk Street, eighty-eight (88) feet, ten (10) inches;

SOUTHWESTERLY by Hampshire Street, fifty-three (53) feet, eleven (11) inches;

SOUTHEASTERLY by Lot 21 as shown on the Plan, one hundred ten (110) feet, eight (8) inches;

NORTHEASTERLY by Lot 19 as shown on the Plan, forty-nine (49) feet, six (6) inches.

Said lots together containing 14,840 square feet of land and be any or all of said measurements or contents more or less.

PARCEL NO. 4 is shown as Lot 21 on the Plan, and is bounded and described as follows:

NORTHEASTERLY by land now or formerly of Close, being shown as Lot No. 19 on the Plan, forty-nine (49) feet, six (6) inches;

SOUTHEASTERLY by land formerly of Snelling, now of owners unknown, one hundred thirty-two (132) feet, six (6) inches;

SOUTHWESTERLY by Hampshire Street, fifty-three (53) feet, eleven (11) inches; and

NORTHWESTERLY by land shown as Lot No. 20 on the Plan, one hundred ten (110) feet, eight (8) inches, be any or all of said measurements more or less, and containing 6,019 square feet, more or less.

PARCEL NO. 5 comprises a portion of Lot No. 6 as shown on a "Plan of House Lots in Cambridgeport, owned by E.H. Snelling". Jos. Whitney, Surveyor, dated June, 1851, recorded with the Registry at the end of Record Book 730, and is shown as Lot "B" on a plan entitled "Subdivision Lot #6 for Bessie Feinberg from office of Silverman, Engineering Co." recorded with the Registry at the end of Book 3460, and is bounded and described as follows:

SOUTHERLY by Hampshire Street, twenty-one and 84/100 (21.84) feet;

WESTERLY by Lot 21 as shown on plan above referred as recorded in Plan Book 16, Plan 18, sixty and 70/100 (60.70) feet;

NORTHERLY by land shown on Lot No. 5 on the Plan dated June 1851 recorded at the end of Book 730, twenty (20) feet;

EASTERLY by land of owners unknown, sixty-nine and 48/100 (69.48) feet, be any or all of said measurements more or less and containing 1302 square feet, more or less.

PARCEL NO. 6 comprises a certain parcel of land bounded and described as follows:

Beginning at the junction of Hampshire Street with the Northwesterly line of Elm Street and running

NORTHEASTERLY on said Elm Street, seventy-four and 16/100 (74.16) feet; thence running

NORTHWESTERLY by land nor or formerly of Dennis Shea, forty-nine (49) feet; thence running

SOUTHWESTERLY by land now or formerly of Hiram Someroy or of persons unknown fifty-two and 11/100 (52.11) feet to Hampshire Street; thence running

SOUTHEASTERLY by said Hampshire Street, fifty-three and 52/100 (53.52) feet to the point of beginning.

Containing 3,106.75 square feet of land more or less.

For title to Parcels 1, 2 and 3, see that deed from Rosberts Co., Inc. to the Grantor dated September 5, 1974 and recorded at the Registry at Book 12695, Page 172 and that deed from Harry Rosenfield et al, dated October 6, 1947 and recorded with the Registry in Book 7215, Page 99.

For title to Parcels 4, 5 and 6 above, see that deed from Rosberts Co., Inc. to the Grantor dated September 5, 1974 and recorded at the Registry at Book 12695, Page 172 and that deed from Colonial Beverage Company dated June 26, 1953 and recorded with the Registry in Book 8096, Page 80.

PARCEL 7: A certain parcel of land with the buildings thereon situated in said Cambridge, and being Lot A on a plan called "Subdivision Lot #6 for Bessie Feinberg from the office of Silverman Engineering Co." recorded with Middlesex South District Deeds at the end of record book 3460, and bounded and described as follows:

SOUTHERLY	by Hampshire Street thirty-two and 76/100 (32.76) feet;
WESTERLY	by Lot B on the Plan sixty-nine and 48/100 (69.48) feet;
NORTHERLY	by Lot 5 on a plan "Plan of House Lots in Cambridgeport owned by E.H. Snelling, Jos. Whitney, surveyors dated June, 1851 and recorded with the Registry at the end of record book 730, thirty (30) feet;
EASTERLY	by Lot 7 on said second mentioned plan eighty-two and 65/100 (82.65) feet;

Containing about 2,282 square feet more or less according to the Plan. For title of Grantor, from Paru Realty Corp. recorded at the Registry at Book 13517, Page 76.

[SIGNATURE PAGE FOLLOWS]

Witness our hand and seal this _____ day of November, 2008.

E.L.I, INC., Seller
as Successor by Merger to
Eli Heffron & Sons, Inc.

By: _____
Bennett Heffron, its duly-authorized President

E.L.I, INC., Seller
as Successor by Merger to
Eli Heffron & Sons, Inc.

By: _____
Jo-Edith Heffron, its duly-authorized Treasurer

COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss. November 4, 2008

Before me personally appeared the above-named Bennett Heffron and Jo-Edith Heffron, proved to me through satisfactory evidence of identification, which were MA DL _____, to be the persons who signed the preceding document in my presence, and who acknowledged to me that they signed it voluntarily for its stated purpose as the duly-authorized President and Treasurer of E.L.I., Inc.

_____
Notary Public: MY COMMISSION EXPIRES
My Commission Expires: DECEMBER 29, 2011

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
WQJQ689	

Radio Service
WU - 700 MHz Upper Band (Block C)

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
09-11-2019	07-15-2020	06-13-2029	

Market Number	Channel Block	Sub-Market Designator
REA001	C	0

Market Name
Northeast

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
06-13-2013	06-13-2019		

Waivers/Conditions:

If the facilities authorized herein are used to provide broadcast operations, whether exclusively or in combination with other services, the licensee must seek renewal of the license either within eight years from the commencement of the broadcast service or within the term of the license had the broadcast service not been provided, whichever period is shorter in length. See 47 CFR §27.13(b).

This authorization is conditioned upon compliance with section 27.16 of the Commission's rules

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

FCC 601-MB
August 2021

Licensee Name: CELLCO PARTNERSHIP

Call Sign: WQJQ689 **File Number:** **Print Date:**

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission
Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
KNKA201	
Radio Service CL - Cellular	
Market Numer CMA006	**Channel Block** B
Sub-Market Designator 0	

FCC Registration Number (FRN): 0003290673

Market Name
Boston-Lowell-Brockton-Lawrenc

Grant Date	Effective Date	Expiration Date	Five Yr Build-Out Date	Print Date
08-26-2014	11-01-2016	10-01-2024		

Site Information:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
1	42-38-26.3 N	070-36-25.2 W	36.3	35.7	

Address: (Rockport) Thatcher Road
City: Rockport **County:** ESSEX **State:** MA **Construction Deadline:**

Antenna: 5
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	70.400	34.100	34.100	34.100	70.400	67.800	55.200	61.300
Transmitting ERP (watts)	246.920	325.500	33.310	0.940	0.820	0.820	1.210	20.070

Antenna: 6
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	70.400	34.100	34.100	34.100	70.400	67.800	55.200	61.300
Transmitting ERP (watts)	0.820	3.330	54.020	373.730	191.670	10.780	0.820	0.820

Antenna: 7
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	70.400	34.100	34.100	34.100	70.400	67.800	55.200	61.300
Transmitting ERP (watts)	3.330	0.820	0.820	0.820	7.810	126.630	409.780	89.650

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

FCC 601-C
March 2018

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
4	42-08-56.4 N	071-24-55.2 W	75.6	44.2	

Address: 113 Main Street

City: Medway **County:** NORFOLK **State:** MA **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	59.500	66.700	61.200	46.900	23.900	39.300	13.900	12.300
Transmitting ERP (watts)	81.280	89.130	24.550	1.120	0.200	0.200	0.420	16.600

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	59.500	66.700	61.200	46.900	23.900	39.300	13.900	12.300
Transmitting ERP (watts)	0.200	2.000	33.800	95.500	67.610	10.700	0.200	0.200

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	59.500	66.700	61.200	46.900	23.900	39.300	13.900	12.300
Transmitting ERP (watts)	3.890	0.200	0.200	0.200	6.760	57.540	100.000	44.670

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
9	42-11-42.4 N	070-49-10.2 W	57.9	56.1	

Address: (Scituate) OFF CLAPP RD

City: SCITUATE **County:** PLYMOUTH **State:** MA **Construction Deadline:**

Antenna: 7

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	105.300	106.100	93.800	85.900	95.600	76.500	81.800	104.300
Transmitting ERP (watts)	172.400	167.230	26.990	1.190	0.960	0.960	1.720	28.870

Antenna: 8

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	105.300	106.100	93.800	85.900	95.600	76.500	81.800	104.300
Transmitting ERP (watts)	0.980	3.910	54.020	409.780	200.700	15.220	0.980	0.980

Antenna: 9

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	105.300	106.100	93.800	85.900	95.600	76.500	81.800	104.300
Transmitting ERP (watts)	4.490	0.980	0.980	1.300	10.060	123.750	449.320	96.060

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
10	42-52-57.3 N	071-16-28.2 W	163.0	58.2	

Address: (Derry) 46 FLOYD ROAD

City: DERRY **County:** ROCKINGHAM **State:** NH **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	82.200	129.400	144.500	155.100	136.800	127.900	126.200	118.100
Transmitting ERP (watts)	31.810	146.820	102.310	15.410	1.000	1.000	1.000	1.130

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	82.200	129.400	144.500	155.100	136.800	127.900	126.200	118.100
Transmitting ERP (watts)	1.000	1.000	4.660	82.110	250.350	80.300	3.790	1.000

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	80.200	129.400	144.500	155.100	136.800	127.900	126.200	118.100
Transmitting ERP (watts)	32.480	1.680	1.000	1.000	1.000	13.740	107.220	143.470

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
12	41-52-08.3 N	070-52-56.1 W	29.6	58.2	

Address: (Middleboro) E. GROVE ST.

City: MIDDLESBORO **County:** PLYMOUTH **State:** MA **Construction Deadline:**

Antenna: 7

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.600	32.400	40.200	47.600	44.900	41.300	50.300	52.600
Transmitting ERP (watts)	277.330	364.730	40.890	2.250	0.960	0.960	2.410	20.640

Antenna: 8

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.600	32.400	40.200	47.600	44.900	41.300	50.300	52.600
Transmitting ERP (watts)	0.960	3.730	61.620	418.280	215.780	13.090	1.700	0.960

Antenna: 9

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.600	32.400	40.200	47.600	44.900	41.300	50.300	52.600
Transmitting ERP (watts)	5.070	1.130	0.610	1.600	5.050	89.040	278.490	66.210

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
14	42-28-06.3 N	071-27-16.2 W	102.1	54.0	

Address: Main Street

City: South Acton **County:** MIDDLESEX **State:** MA C**onstruction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	69.000	79.000	105.500	96.200	72.600	76.300	47.400	58.700
Transmitting ERP (watts)	65.200	77.960	20.970	2.400	0.200	0.200	2.000	13.720

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	69.000	79.900	105.500	96.200	72.600	76.300	47.400	58.700
Transmitting ERP (watts)	0.200	3.880	23.800	59.780	43.360	10.290	0.830	0.200

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	76.400	65.500	105.500	96.200	72.600	76.300	47.400	58.700
Transmitting ERP (watts)	5.010	0.420	0.200	0.740	6.570	43.660	91.210	34.920

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
15	42-30-08.4 N	070-55-02.2 W	39.6	46.3	

Address: 12 First Street

City: Salem **County:** ESSEX **State:** MA C**onstruction Deadline:**

Antenna: 7

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	63.400	62.100	62.800	77.900	77.500	70.500	40.900	50.900
Transmitting ERP (watts)	49.150	56.730	19.190	2.360	0.200	0.200	1.930	12.920

Antenna: 8

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	63.400	62.100	62.800	77.900	77.500	70.500	40.900	50.900
Transmitting ERP (watts)	0.100	1.550	9.520	23.920	17.350	4.120	0.330	0.100

Antenna: 9

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	63.400	62.100	62.800	77.900	77.500	70.500	40.900	50.900
Transmitting ERP (watts)	5.010	0.380	0.200	0.680	6.510	35.500	64.630	29.380

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
16	42-16-51.4 N	071-02-04.2 W	5.2	53.0	

Address: 100 HANCOCK STREET
City: QUINCY **County:** NORFOLK **State:** MA **Construction Deadline:**

Antenna: 5
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	43.000	44.100	42.200	29.000	8.300	14.800	12.100	31.500
Transmitting ERP (watts)	7.170	6.480	6.790	0.320	0.100	0.100	0.160	5.630

Antenna: 6
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	40.900	41.900	40.000	26.800	6.200	12.600	9.900	29.300
Transmitting ERP (watts)	0.100	0.340	3.140	2.480	2.970	1.500	0.100	0.100

Antenna: 7
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	43.000	44.100	42.200	29.000	8.300	14.800	12.100	31.500
Transmitting ERP (watts)	0.100	0.100	0.100	0.120	2.640	2.770	2.720	2.360

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
21	42-30-36.4 N	070-51-21.2 W	23.2	47.2	

Address: Tioga Way
City: Marblehead **County:** ESSEX **State:** MA **Construction Deadline:**

Antenna: 2
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	46.700	37.200	60.400	60.400	54.600	28.000	43.700
Transmitting ERP (watts)	0.100	0.130	3.130	7.860	6.600	1.220	0.100	0.100

Antenna: 3
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	46.700	37.200	60.400	60.400	54.600	28.000	43.700
Transmitting ERP (watts)	0.410	0.100	0.100	0.100	0.530	5.070	8.210	4.870

Antenna: 4
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	46.700	37.200	60.400	60.400	54.600	28.000	43.700
Transmitting ERP (watts)	6.780	7.760	2.800	0.100	0.100	0.100	0.100	1.540

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
22	42-51-55.4 N	070-56-13.2 W	94.5	50.9	

Address: (Amesbury) 10 DENNET WAY

City: AMESBURY **County:** ESSEX **State:** MA **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	117.000	123.800	125.500	137.800	126.100	109.800	94.200	100.300
Transmitting ERP (watts)	178.880	225.190	34.880	0.860	0.860	0.860	0.860	10.780

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	117.000	123.800	125.500	137.800	126.100	109.800	94.200	100.300
Transmitting ERP (watts)	0.860	1.240	35.690	258.560	148.780	12.380	0.860	0.860

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	117.000	123.800	125.500	137.800	126.100	109.800	94.200	100.300
Transmitting ERP (watts)	3.110	0.830	0.860	0.860	3.110	89.650	270.740	81.760

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
24	42-03-31.4 N	071-17-29.2 W	105.5	59.1	

Address: (Wrentham) 415 Washington St. - Route 1

City: WRENTHAM **County:** NORFOLK **State:** MA **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	99.900	78.700	94.600	120.300	114.800	77.800	71.700	95.700
Transmitting ERP (watts)	2.580	85.500	401.990	363.280	54.920	1.060	0.850	0.850

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	99.900	78.700	94.600	120.300	114.800	77.800	71.700	95.700
Transmitting ERP (watts)	0.850	0.850	0.850	8.930	146.240	311.250	197.740	18.980

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	99.900	78.700	94.600	120.300	114.800	77.800	71.700	95.700
Transmitting ERP (watts)	352.500	136.390	5.560	0.980	0.980	0.980	39.210	263.760

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
25	43-10-34.3 N	071-12-24.2 W	335.3	31.4	

Address: (Northwood) SADDLEBACK MOUNTAIN
City: NORTHWOOD **County:** ROCKINGHAM **State:** NH C**onstruction Deadline:**

Antenna: 4
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	152.900	213.700	260.100	268.500	234.000	215.400	150.700	173.600
Transmitting ERP (watts)	45.240	219.790	199.540	31.860	1.550	1.000	1.000	2.360

Antenna: 5
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	152.900	213.700	260.100	268.500	234.000	215.400	150.700	173.600
Transmitting ERP (watts)	1.000	1.000	6.160	105.350	236.610	142.220	7.190	1.780

Antenna: 6
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	152.900	213.700	260.100	268.500	234.000	215.400	150.700	173.600
Transmitting ERP (watts)	55.630	1.980	1.000	1.000	2.260	8.170	110.540	141.320

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
27	41-41-13.4 N	070-48-25.1 W	22.9	59.4	

Address: (Mattapoisett) Industrial Drive
City: Mattapoisett **County:** PLYMOUTH **State:** MA C**onstruction Deadline:**

Antenna: 4
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	61.700	76.400	79.200	79.900	80.600	75.400	56.100	60.600
Transmitting ERP (watts)	217.540	281.390	29.930	2.050	0.980	0.980	2.340	21.270

Antenna: 5
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	61.700	76.400	79.300	79.900	80.600	75.400	56.100	60.600
Transmitting ERP (watts)	0.980	10.610	118.800	349.190	74.510	4.550	0.980	0.980

Antenna: 6
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	61.700	76.400	79.200	79.900	80.600	75.400	56.100	60.600
Transmitting ERP (watts)	2.220	0.980	0.980	2.540	27.640	252.570	253.110	22.510

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
29	41-55-21.0 N	070-39-05.0 W	39.6	77.4	1021869

Address: (Plymouth) CALEB ST

City: Plymouth **County:** PLYMOUTH **State:** MA **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	94.600	84.200	79.500	67.900	61.400	63.600	52.500	63.200
Transmitting ERP (watts)	252.450	246.240	37.800	1.470	0.940	0.940	2.080	39.370

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	94.600	84.200	79.500	67.900	61.400	63.600	52.500	63.200
Transmitting ERP (watts)	1.000	3.000	53.330	346.500	184.150	15.870	1.000	1.000

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	94.600	84.200	79.500	67.900	61.400	63.600	52.500	63.200
Transmitting ERP (watts)	4.660	1.000	1.000	1.000	5.610	128.480	425.450	99.740

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
31	42-14-40.0 N	071-30-38.0 W	142.6	102.0	1009024

Address: 1.25 MI NNE

City: HOPKINTON **County:** MIDDLESEX **State:** MA **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	107.800	138.000	130.800	126.800	101.200	85.900	73.000	97.500
Transmitting ERP (watts)	23.200	21.890	16.370	2.550	0.130	0.100	1.640	13.250

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	107.800	138.000	130.800	126.800	101.200	85.900	73.000	97.500
Transmitting ERP (watts)	0.940	9.100	53.990	96.320	78.580	26.320	3.730	0.460

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	107.800	138.000	130.800	126.800	101.200	85.900	73.000	97.500
Transmitting ERP (watts)	13.400	1.700	0.620	2.340	18.300	72.460	95.170	63.740

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
34	42-23-29.5 N	071-07-22.9 W	7.9	26.8	

Address: 2067 MASSACHUSETTS AVENUE
City: CAMBRIDGE **County:** SUFFOLK **State:** MA **Construction Deadline:**

Antenna: 4
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-3.400	5.800	21.700	28.600	13.000	-2.600	-14.400	-21.300
Transmitting ERP (watts)	6.780	7.760	2.800	0.100	0.100	0.100	0.100	1.540

Antenna: 5
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-3.400	5.800	21.700	28.600	13.000	-2.600	-14.400	-21.300
Transmitting ERP (watts)	0.100	0.130	3.130	7.860	6.600	1.220	0.100	0.100

Antenna: 6
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-3.400	5.800	21.700	28.300	13.000	-2.600	-14.400	-21.300
Transmitting ERP (watts)	0.410	0.100	0.100	0.100	0.530	5.070	8.210	4.870

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
35	42-39-16.7 N	071-44-12.3 W	192.6	51.2	

Address: 84 Bayberry Hill Road
City: Townsend **County:** MIDDLESEX **State:** MA **Construction Deadline:**

Antenna: 2
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.900	139.500	149.200	136.100	102.200	42.700	-79.000	-25.700
Transmitting ERP (watts)	0.580	7.080	42.660	95.500	77.620	22.390	2.820	0.460

Antenna: 4
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	51.300	146.600	148.900	136.600	101.300	25.000	-79.700	-22.300
Transmitting ERP (watts)	35.060	35.620	17.670	2.660	0.200	0.150	1.860	13.500

Antenna: 5
Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	51.300	146.600	148.900	136.600	101.300	25.000	-79.700	-22.300
Transmitting ERP (watts)	5.360	0.690	0.250	0.930	7.320	28.980	38.070	25.500

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
38	42-38-45.8 N	071-05-37.7 W	117.3	52.4	

Address: 5 Boston Hill Road

City: North Andover **County:** ESSEX **State:** MA **Construction Deadline:**

Antenna: 4

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	96.900	98.200	110.000	111.300	110.000	101.700	90.300	106.200
Transmitting ERP (watts)	83.180	87.100	23.990	2.290	0.200	0.200	1.820	20.420

Antenna: 5

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	96.900	98.100	110.000	111.300	110.000	101.700	90.200	106.200
Transmitting ERP (watts)	0.240	4.170	38.020	97.720	66.070	11.750	1.050	0.200

Antenna: 6

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	96.900	98.200	110.000	111.300	110.000	101.700	90.200	106.200
Transmitting ERP (watts)	5.250	0.340	0.200	0.830	9.770	60.262	100.000	42.660

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
39	42-18-13.0 N	071-13-05.0 W	44.8	96.0	1018331

Address: 140 CABOT ST

City: NEEDHAM **County:** NORFOLK **State:** MA **Construction Deadline:**

Antenna: 1

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	68.400	58.900	48.800	36.300	40.300	44.100	41.600
Transmitting ERP (watts)	30.340	35.650	9.380	0.920	0.100	0.100	0.610	6.050

Antenna: 2

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	68.400	58.900	48.800	36.300	40.300	44.100	41.600
Transmitting ERP (watts)	0.100	1.230	10.440	23.990	19.000	4.420	0.370	0.100

Antenna: 3

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	68.400	58.900	48.800	36.300	40.300	44.100	41.600
Transmitting ERP (watts)	2.200	0.190	0.100	0.300	2.700	19.270	35.660	16.260

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201 **File Number:** **Print Date:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
41	42-22-16.6 N	071-05-49.6 W	6.3	18.6	

Address: (Cambridge Donnelly Field site) 284 Norfolk Street

City: Cambridge **County:** MIDDLESEX **State:** MA C**onstruction Deadline:** 07-03-2014

Antenna: 1

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	-11.600	16.500	20.700	21.000	2.200	-20.400	2.300	-16.900
Transmitting ERP (watts)	48.150	197.980	63.920	1.080	0.680	0.680	0.680	0.850

Antenna: 2

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	-11.600	16.500	20.700	21.000	2.200	-20.400	2.300	-16.900
Transmitting ERP (watts)	0.670	0.670	18.990	128.120	74.750	3.300	0.670	0.670

Antenna: 3

Maximum Transmitting ERP in Watts: 140.820

Azimuth(from true north)	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**
Antenna Height AAT (meters)	-10.600	17.600	21.700	22.000	3.200	-19.400	3.400	-15.900
Transmitting ERP (watts)	28.690	0.650	0.650	0.650	0.650	5.700	114.450	208.740

Control Points:

Control Pt. No. 3

Address: 500 W. Dove Rd.

City: Southlake **County:** TARRANT **State:** TX **Telephone Number:** (800)264-6620

Waivers/Conditions:

THE FOLLOWING CELLULAR GEOGRAPHIC SERVICE AREAS HAVE BEEN COMBINED (LISTED BY CALL SIGN, MARKET NUMBER AND BLOCK, AND MARKET NAME): KNKA201 6B BOSTON, MASSACHUSETTS KNKA251 76B

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
WQGB266	0009783855
Radio Service AW - AWS (1710-1755 MHz and 2110-2155 MHz)	

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
02-10-2022	02-10-2022	11-29-2036	02-11-2022

Market Number	Channel Block	Sub-Market Designator
CMA006	A	0

Market Name
Boston-Lowell-Brockton-Lawrenc

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date

Waivers/Conditions:

This authorization is conditioned upon the licensee, prior to initiating operations from any base or fixed station, making reasonable efforts to coordinate frequency usage with known co-channel and adjacent channel incumbent federal users operating in the 1710-1755 MHz band whose facilities could be affected by the proposed operations. See, e.g., FCC and NTIA Coordination Procedures in the 1710-1755 MHz Band, Public Notice, FCC 06-50, WTB Docket No. 02-353, rel. April 20, 2006.

Conditions:

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

The license is subject to compliance with the provisions of the January 12, 2001 Agreement between Deutsche Telekom AG, VoiceStream Wireless Corporation, VoiceStream Wireless Holding Corporation and the Department of Justice (DOJ) and the Federal Bureau of Investigation (FBI), which addresses national security, law enforcement, and public safety issues of the FBI and the DOJ regarding the authority granted by this license. Nothing in the Agreement is intended to limit any obligation imposed by Federal lawor regulation including, but not limited to, 47 U.S.C. Section 222(a) and (c)(1) and the FCC's implementing regulations. The Agreement is published at VoiceStream-DT Order, IB Docket No. 00-187, FCC 01-142, 16 FCC Rcd 9779, 9853 (2001).

Licensee Name: CELLCO PARTNERSHIP

Call Sign: WQGB266 **File Number:** 0009783855 **Print Date:** 02-11-2022

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
WQGA900	0009773233
Radio Service AW - AWS (1710-1755 MHz and 2110-2155 MHz)	

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
01-11-2022	01-11-2022	11-29-2036	01-12-2022

Market Number	Channel Block	Sub-Market Designator
BEA003	B	1

Market Name
Boston-Worcester-Lawrence-Lowe

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date

Waivers/Conditions:

This authorization is conditioned upon the licensee, prior to initiating operations from any base or fixed station, making reasonable efforts to coordinate frequency usage with known co-channel and adjacent channel incumbent federal users operating in the 1710-1755 MHz band whose facilities could be affected by the proposed operations. See, e.g., FCC and NTIA Coordination Procedures in the 1710-1755 MHz Band, Public Notice, FCC 06-50, WTB Docket No. 02-353, rel. April 20, 2006.

AWS operations must not cause harmful interference across the Canadian or Mexican Border. The authority granted herein is subject to future international agreements with Canada or Mexico, as applicable.

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

FCC 601-MB
August 2021

Licensee Name: CELLCO PARTNERSHIP

Call Sign: WQGA900 **File Number:** 0009773233 **Print Date:** 01-12-2022

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
WRNE627	
Radio Service PM - 3.7 GHz Service	

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
07-23-2021	07-23-2021	07-23-2036	

Market Number	Channel Block	Sub-Market Designator
PEA007	A1	0

Market Name
Boston, MA

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
07-23-2029	07-23-2033		

Waivers/Conditions:

Operation for this combination license grants both interim and final rights for this PEA and is not impacted by the relocation process pursuant to 47 CFR ? 27.1412(g).

License is conditioned on compliance with all applicable FCC rules and regulations, including licensee making payments required by 47 C.F.R. §§ 27.1401- 27.1424 as described in FCC 20-22. See FCC 20-22, paras. 178-331.

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select “License Search”. Follow the instructions on how to search for license information.

FCC 601-MB
August 2021

Licensee Name: CELLCO PARTNERSHIP

Call Sign: WRNE627 **File Number:** **Print Date:**

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
WRNE628	

Radio Service
PM - 3.7 GHz Service

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
07-23-2021	07-23-2021	07-23-2036	

Market Number	Channel Block	Sub-Market Designator
PEA007	A2	0

Market Name
Boston, MA

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
07-23-2029	07-23-2033		

Waivers/Conditions:

Operation for this combination license grants both interim and final rights for this PEA and is not impacted by the relocation process pursuant to 47 CFR ? 27.1412(g).

License is conditioned on compliance with all applicable FCC rules and regulations, including licensee making payments required by 47 C.F.R. §§ 27.1401- 27.1424 as described in FCC 20-22. See FCC 20-22, paras. 178-331.

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select “License Search”. Follow the instructions on how to search for license information.

FCC 601-MB
August 2021

Licensee Name: CELLCO PARTNERSHIP

Call Sign: WRNE628 **File Number:** **Print Date:**

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
WRNE629	
Radio Service PM - 3.7 GHz Service	

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
07-23-2021	07-23-2021	07-23-2036	

Market Number	Channel Block	Sub-Market Designator
PEA007	A3	0

Market Name
Boston, MA

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
07-23-2029	07-23-2033		

Waivers/Conditions:

Operation for this combination license grants both interim and final rights for this PEA and is not impacted by the relocation process pursuant to 47 CFR ? 27.1412(g).

License is conditioned on compliance with all applicable FCC rules and regulations, including licensee making payments required by 47 C.F.R. §§ 27.1401- 27.1424 as described in FCC 20-22. See FCC 20-22, paras. 178-331.

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

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FCC 601-MB
August 2021

Licensee Name: CELLCO PARTNERSHIP

Call Sign: WRNE629 **File Number:** **Print Date:**

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: AIRTOUCH CELLULAR

ATTN: REGULATORY
AIRTOUCH CELLULAR
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
KNLF646	
Radio Service CW - PCS Broadband	

FCC Registration Number (FRN): 0006146468

Grant Date	Effective Date	Expiration Date	Print Date
12-02-2016	11-30-2017	01-03-2027	

Market Number	Channel Block	Sub-Market Designator
BTA051	C	3

Market Name
Boston, MA

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
12-07-2003	01-03-2007		

Waivers/Conditions:

This authorization is subject to the condition that, in the event that systems using the same frequencies as granted herein are authorized in an adjacent foreign territory (Canada/United States), future coordination of any base station transmitters within 72 km (45 miles) of the United States/Canada border shall be required to eliminate any harmful interference to operations in the adjacent foreign territory and to ensure continuance of equal access to the frequencies by both countries.

Special Condition for AU/name change (6/4/2016): Grant of the request to update licensee name is conditioned on it not reflecting an assignment or transfer of control (see Rule 1.948); if an assignment or transfer occurred without proper notification or FCC approval, the grant is void and the station is licensed under the prior name.

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

FCC 601-MB
August 2021

Licensee Name: AIRTOUCH CELLULAR

Call Sign: KNLF646 **File Number:** **Print Date:**

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: AIRTOUCH CELLULAR

ATTN: REGULATORY
AIRTOUCH CELLULAR
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
KNLH310	
Radio Service CW - PCS Broadband	

FCC Registration Number (FRN): 0006146468

Grant Date	Effective Date	Expiration Date	Print Date
06-08-2017	11-30-2017	06-27-2027	

Market Number	Channel Block	Sub-Market Designator
BTA051	E	0

Market Name
Boston, MA

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
06-27-2002			

Waivers/Conditions:

NONE

Conditions:

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

Licensee Name: AIRTOUCH CELLULAR

Call Sign: KNLH310 **File Number:** **Print Date:**

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Call Sign	File Number
KNLH242	0007716969
Radio Service CW - PCS Broadband	

FCC Registration Number (FRN): 0003290673

Grant Date	Effective Date	Expiration Date	Print Date
06-02-2017	06-02-2017	06-27-2027	06-06-2017

Market Number	Channel Block	Sub-Market Designator
BTA051	F	0

Market Name
Boston, MA

1st Build-out Date	2nd Build-out Date	3rd Build-out Date	4th Build-out Date
06-27-2002			

Waivers/Conditions:

This authorization is subject to the condition that, in the event that systems using the same frequencies as granted herein are authorized in an adjacent foreign territory (Canada/United States), future coordination of any base station transmitters within 72 km (45 miles) of the United States/Canada border shall be required to eliminate any harmful interference to operations in the adjacent foreign territory and to ensure continuance of equal access to the frequencies by both countries.

This authorization is conditioned upon the full and timely payment of all monies due pursuant to Sections 1.2110 and 24.716 of the Commission's Rules and the terms of the Commission's installment plan as set forth in the Note and Security Agreement executed by the licensee. Failure to comply with this condition will result in the automatic cancellation of this authorization.

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

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FCC 601-MB
August 2021

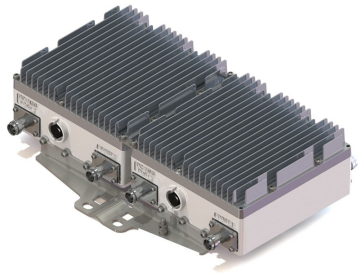
Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNLH242 **File Number:** 0007716969 **Print Date:** 06-06-2017

700 MHz Relicensed Area Information:

Market	Market Name	Buildout Deadline	Buildout Notification	Status

CHB626-43-2X | D15T01P38



Twin Hybrid Combiner

- Hybrid combiner providing the flexibility of combining any two carriers within 617-2700 MHz
- Ideal for combining carriers of any technology combination (LTE, UMTS, CDMA, GSM, etc.) independent of guard band restrictions
- Integrated low PIM load allows for simplified installation
- Self-contained housing ensures highest reliability in severe environments
- DC-AISG passing capability from Port 2 to Common Port
- New 4.3-10 connectors for improved PIM performance and size reduction

Product Classification

Product Type	Hybrid combiner
Product Brand	UltraBand™

General Specifications

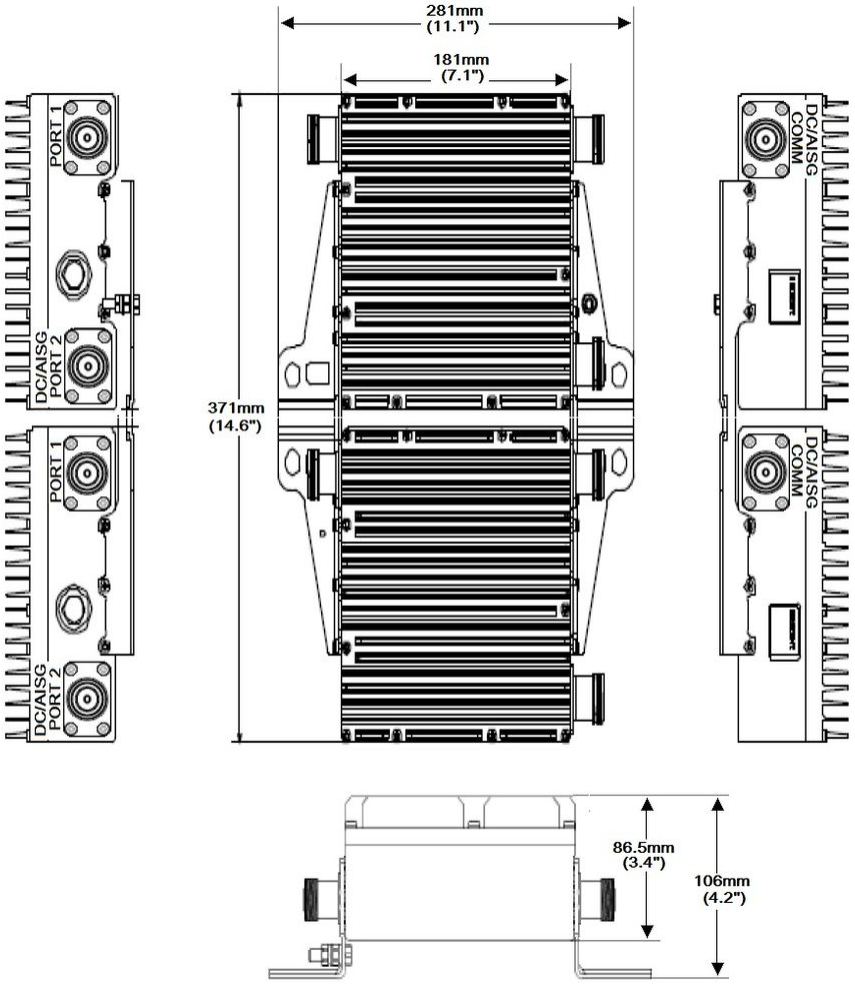
AISG Carrier	2176 KHz ± 100 ppm
Color	Gray
Connector Interface	4.3-10 Female
Modularity	Two-pack twin
Mounting	Pole | Wall
Mounting Pipe Hardware	Band clamps

Dimensions

Height	181 mm | 7.126 in
Width	371 mm | 14.606 in
Depth	86.5 mm | 3.406 in
Ground Screw Diameter	6 mm | 0.236 in

Outline Drawing

CHB626-43-2X | D15T01P38



Electrical Specifications

3rd Order IMD Test Method	Two +43 dBm carriers
3rd Order IMD, typical	-161 dBc
dc Pass-through	Branch 2
Lightning Surge Current	10 kA
Lightning Surge Current Waveform	8/20 waveform

Electrical Specifications, AISG

dc Current, maximum	2.5 A

Electrical Specifications, Branch 1

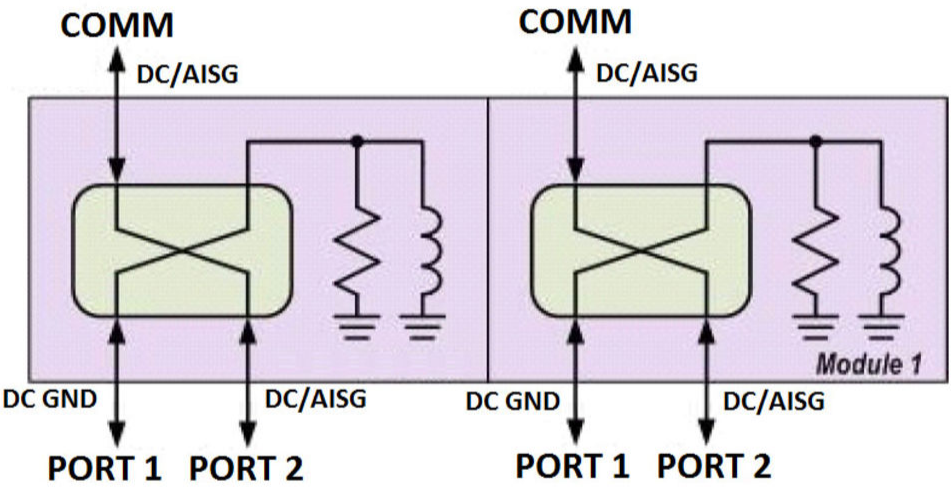
Coupling	3.1 dB

Coupling Tolerance	±0.8 dB
Input Power, PEP	3000 W
Input Power, RMS	150 W
Isolation, typical	30 dB
Operating Frequency Band	617 – 2700 MHz
Port Designation	Port 1
Return Loss, typical	22 dB

Electrical Specifications, Branch 2

Coupling	3.1 dB
Coupling Tolerance	±0.8 dB
Input Power, PEP	3000 W
Input Power, RMS	150 W
Isolation, typical	30 dB
Operating Frequency Band	617 – 2700 MHz
Port Designation	Port 2
Return Loss, typical	22 dB

Block Diagram



Environmental Specifications

Operating Temperature	-40 °C to +65 °C (-40 °F to +149 °F)
Ingress Protection Test Method	IEC 60529:2001, IP67

Packaging and Weights

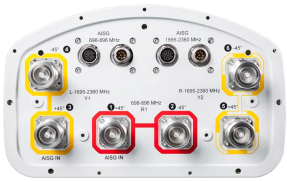
Included	Mounting hardware
Weight, net	8.8 kg | 19.401 lb

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system

COMMSCOPE®

NHH-65A-R2B



6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	13.4	13.5	16.4	16.5	17.1	17.5
Beamwidth, Horizontal, degrees	66	61	69	64	61	61
Beamwidth, Vertical, degrees	17.8	16.2	7.1	6.5	6.1	5.5
Beam Tilt, degrees	0–18	0–18	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	16	18	17	16	15
Front-to-Back Ratio at 180°, dB	29	26	33	32	30	32
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

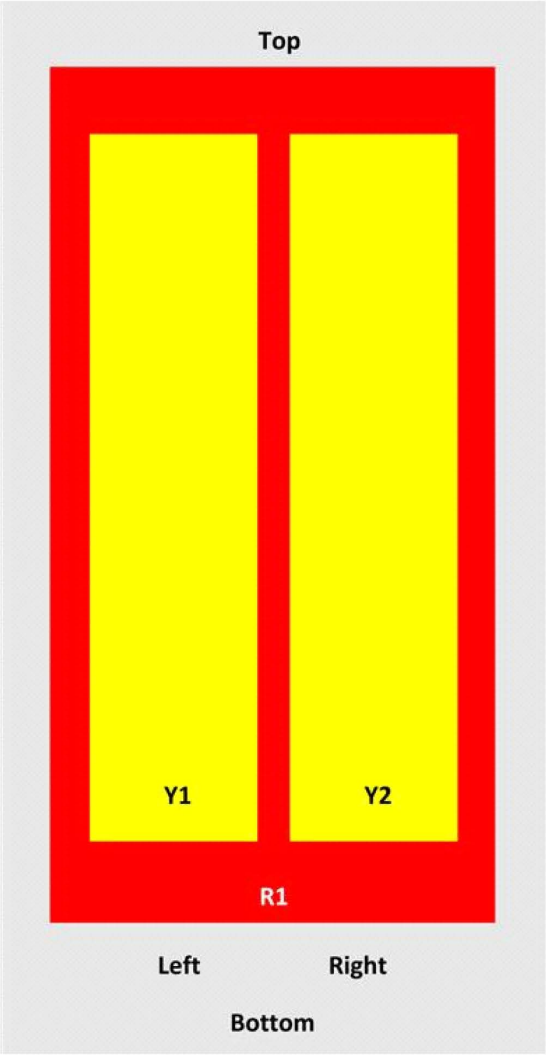
Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	13.1	13.2	16.1	16.3	16.6	17.1
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5	±0.4	±0.4	±0.6	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 13.3 9 ° | 13.2 18 ° | 13.8	0 ° | 13.4 9 ° | 13.4 18 ° | 12.7	0 ° | 16.0 5 ° | 16.1 10 ° | 16.0	0 ° | 16.1 5 ° | 16.3 10 ° | 16.3	0 ° | 16.4 5 ° | 16.7 10 ° | 16.4	0 ° | 17.0 5 ° | 17.2 10 ° | 16.7
Beamwidth, Horizontal Tolerance, degrees	±2.8	±3.6	±3.9	±3.5	±6.6	±4.6
Beamwidth, Vertical Tolerance, degrees	±1.5	±1.3	±0.3	±0.4	±0.5	±0.3
USLS, beampeak to 20° above beampeak, dB	15	16	12	13	13	14
Front-to-Back Total Power at 180° ± 30°, dB	24	23	27	26	23	26
CPR at Boresight, dB	18	19	20	22	21	22
CPR at Sector, dB	10	5	12	9	5	2

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

NHH



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANxxxxxxxxxxxxxxx1
Y1	1695-2360	3-4	2	ANxxxxxxxxxxxxxxx2
Y2	1695-2360	5-6		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Antenna Type	Sector

NHH-65A-R2B

Band	Multiband
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Total Input Power, maximum	900 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	206.0 N @ 150 km/h 46.3 lbf @ 150 km/h
Wind Loading, lateral	169.0 N @ 150 km/h 38.0 lbf @ 150 km/h
Wind Loading, maximum	396.0 N @ 150 km/h 89.0 lbf @ 150 km/h
Effective Projected Area (EPA), frontal	0.19 m^2 | 2.05 ft^2
Effective Projected Area (EPA), lateral	0.16 m^2 | 1.72 ft^2
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1413.0 mm | 55.6 in
Width	301.0 mm | 11.9 in
Depth	180.0 mm | 7.1 in
Net Weight, without mounting kit	15.9 kg | 35.1 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 3
Internal RET	High band (1) | Low band (1)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male

NHH-65A-R2B

RET Interface, quantity	2 female | 2 male

Packed Dimensions

Length	1532.0 mm | 60.3 in
Width	409.0 mm | 16.1 in
Depth	299.0 mm | 11.8 in
Shipping Weight	26.8 kg | 59.1 lb

Regulatory Compliance/Certifications

Agency	**Classification**
RoHS 2011/65/EU	Compliant by Exemption
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
China RoHS SJ/T 11364-2014	Above Maximum Concentration Value (MCV)

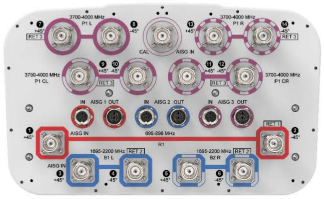
Included Products

BSAMNT-3 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

NHHS4-65A-R3B



General Specifications

Antenna Type	Sector- and beamforming
Band	Multiband
Calibration Connector Interface	4.3-10 Female
Calibration Connector Quantity	1
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, High band	8
RF Connector Quantity, Mid band	4
RF Connector Quantity, Low band	2
RF Connector Quantity, Total	14

Remote Electrical Tilt (RET) Information, General

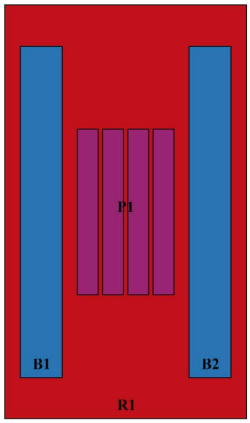
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	3 Male | 3 Female

Dimensions

Length	1413 mm | 55.6 in
Width	350 mm | 13.8 in
Depth	208 mm | 8.2 in

NHHS4-65A-R3B

Array Layout



Array ID	Frequency (MHz)	RF Connector	RET (SRET)	AISG RET UID
R1	698-896	1 - 2	1	CPxxxxxxxxxxxxxxR1
B1	1695-2200	3 - 4	2	CPxxxxxxxxxxxxxxB1
B2	1695-2200	5 - 6		
P1	3700-4000	7 - 14	3	CPxxxxxxxxxxxxxxP1

(Sizes of colored boxes are not true depictions of array sizes)

Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	698 – 896 MHz | 1695 – 2200 MHz | 3700 – 4000 MHz
Total Input Power, maximum	1000 W
Polarization	±45°

Remote Electrical Tilt (RET) Information, Electrical

Protocol	3GPP/AISG 2.0 (Single RET)
Internal RET, Low band	1
Internal RET, Mid band	1
Internal RET, High band	1
Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 3 | Cal Port

NHHS4-65A-R3B

Electrical Specifications

RF Ports	1,2	1,2	3~6	3~6	3~6	7~14
Array	R1	R1	B1,B2	B1,B2	B1,B2	P1
Frequency Band,MHz	698-806	806-896	1695-1880	1850-1990	1920-2200	3700-4000
Gain, dBi	14.2	14.2	16.8	17.1	17.1	16.2
Beamwidth, Horizontal, degrees	69	68	65	64	68	83
Beamwidth, Vertical, degrees	16.6	15	6.6	6.2	5.9	5.7
Beam Tilt, degrees	0-18	0-18	0-10	0-10	0-10	0-10
USLS (First Lobe), dB	19	20	16	18	18	13
Front-to-Back Ratio at 180°, dB	36	37	34	38	37	30
Coupling level, Amp, Antenna port to Cal port, dB						26
Coupling level, max Amp Δ, Antenna port to Cal port, dB						±2
Coupler, max Amp Δ, Antenna port to Cal port, dB						0.9
Coupler, max Phase Δ, Antenna port to Cal port, degrees						7
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	25
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-145
Input Power per port, Maximum (at elevated temp 50°C), Watt	300	300	250	250	250	75

Electrical Specifications, BASTA

RF Ports	1,2	1,2	3~6	3~6	3~6	7~14
Array	R1	R1	B1,B2	B1,B2	B1,B2	P1
Frequency Band,MHz	698-806	806-896	1695-1880	1850-1990	1920-2200	3700-4000
Gain by all Beam Tilts, average, dBi	13.8	13.9	16.4	16.7	16.7	15.2
Gain by all Beam Tilts Tolerance, dBi	±0.5	±0.5	±0.7	±0.5	±0.5	±0.9
Beamwidth, Horizontal Tolerance, degrees	±3.2	±2.1	±6.7	±6.7	±7	±23
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.9	±0.4	±0.2	±0.4	±0.5
Front-to-Back Total Power at 180° ± 30°, dB	27	25	27	28	28	23
CPR at Boresight, dB	26	25	22	22	22	15
CPR at Sector, dB	13	7	11	11	8	6

Electrical Specifications, Broadcast 5G NR

RF Ports	1,2	1,2	3~6	3~6	3~6	7~14
Array	R1	R1	B1,B2	B1,B2	B1,B2	P1
Frequency Band,MHz	698-806	806-896	1695-1880	1850-1990	1920-2200	3700-4000
Gain, dBi						20.1

NHHS4-65A-R3B

Electrical Specifications, Broadcast 65°

RF Ports	1,2	1,2	3~6	3~6	3~6	7~14
Array	R1	R1	B1,B2	B1,B2	B1,B2	P1
Frequency Band,MHz	698-806	806-896	1695-1880	1850-1990	1920-2200	3700-4000
Gain, dBi						16.5
Beamwidth, Horizontal, degrees						65
Beamwidth, Vertical, degrees						5.8
Beamwidth, Vertical Tolerance, degrees						±0.4
USLS (First Lobe), dB						15
Front-to to-Back Total Power at 180° ± 30°, dB						25

Electrical Specifications, Service Beam

RF Ports	1,2	1,2	3~6	3~6	3~6	7~14
Array	R1	R1	B1,B2	B1,B2	B1,B2	P1
Frequency Band,MHz	698-806	806-896	1695-1880	1850-1990	1920-2200	3700-4000
Steered 0° Gain, dBi						20.5
Steered 0° Gain Tolerance, dBi						±0.7
Steered 0° Beamwidth, Horizontal, degrees						22
Steered 0° Horizontal Sidelobe, dB						13
Steered 0° Front-to to-Back Total Power at 180° ± 30°, dB						29
Steered 30° Gain, dBi						19.1
Steered 30° Gain Tolerance, dBi						±0.9
Steered 30° Beamwidth, Horizontal, degrees						28
Steered 30° Front-to to-Back Total Power at 180° ± 30°, dB						27

Electrical Specifications, Soft Split

RF Ports	1,2	1,2	3~6	3~6	3~6	7~14
Array	R1	R1	B1,B2	B1,B2	B1,B2	P1
Frequency Band,MHz	698-806	806-896	1695-1880	1850-1990	1920-2200	3700-4000
Gain, dBi						18.6
Beamwidth, Horizontal, degrees						33
Horizontal Sidelobe, dB						15
Front-to-Back Total Power at 180° ± 30°, dB						27

Material Specifications

Radiator Material	Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum

NHHS4-65A-R3B

Mechanical Specifications

Wind Loading at Velocity, frontal	224 N @ 150 km/h | 50.4 lbf @ 150 km/h
Wind Loading at Velocity, lateral	187 N @ 150 km/h | 42.0 lbf @ 150 km/h
Wind Loading at Velocity, rear	237 N @ 150 km/h | 53.3 lbf @ 150 km/h
Wind Loading at Velocity, maximum	474 N @ 150 km/h | 106.6 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Packaging and Weights

Length, packed	1557 mm | 61.3 in
Width, packed	448 mm | 17.6 in
Depth, packed	355 mm | 14.0 in
Net Weight, without mounting kit	23 kg | 50.7 lb
Weight, gross	35.2 kg | 77.6 lb

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
ROHS	Compliant
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
CHINA-ROHS	Below maximum concentration value

Included Products

BSAMNT-3 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 8 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightening protection.

Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows **flexibility for indoor or outdoor installation** on a roof or tower top
- Weatherproof enclosure and ports – **improves system reliability**
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – **ideally suited for RRH technology** – won't shut down the RRH the way spark gap technology does (certain models only)

Technical Specifications

Mechanical Specifications

Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, upgradable to 6 OVPs	Standard without OVP
Dimensions-H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum	
Fiber Connection Method	LC-LC Single- or Multi-mode duplex	
Environmental Rating	NEMA 4x	
Operating Temperature, °C (°F)	-40 to +80 (-40 to +176)	
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs	

Electrical Specifications

Nominal Operating Voltage	48 VDC	
Nominal Discharge Current (I_n) per UL 1449 3rd Ed	20 kA 8/20 µs	N/A
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 µs	N/A
Maximum Impulse (Lightning) Current (I_{imp}) per IEC 61643-1	5 kA 10/350 µs	N/A
Maximum Continuous Operating Voltage (U_c)	75 VDC	N/A
Voltage Protection Rating per UL1449 3rd Ed	400 V	N/A
Protection Class as per IEC 61643-1	Class 1	N/A
Strikesorb OVP Compliance	ANSI/UL 1449-3rd Ed	N/A
	IEEE C62.41	N/A
	NEMA LS-1	N/A
	IEC 61643-1	N/A
	IEC 61643-12	N/A
	EN 61643-11	N/A

* This data is provisional and subject to change.

SAMSUNG

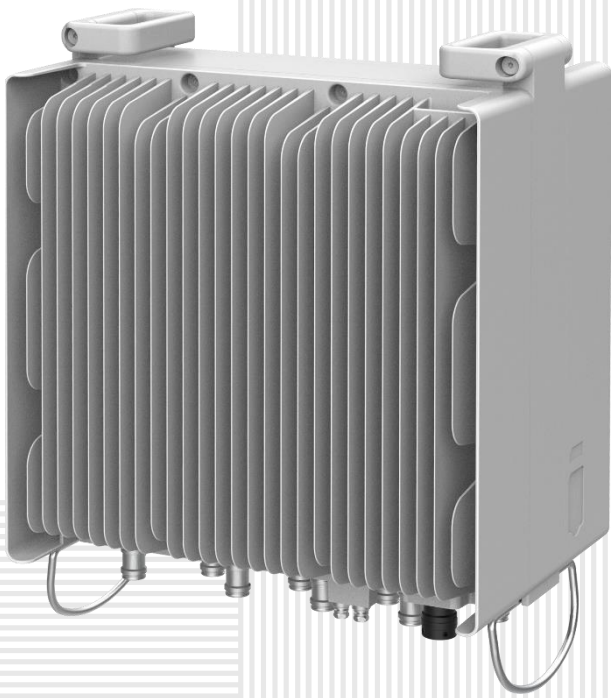
AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This AWS/PCS 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

57196

Model Code	RF4439d-25A



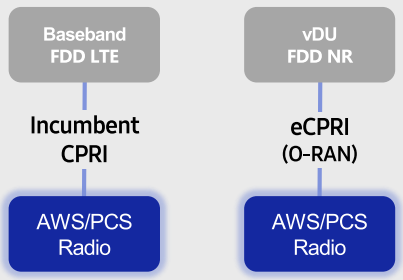
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

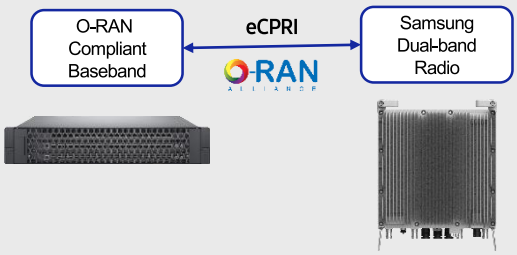
Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

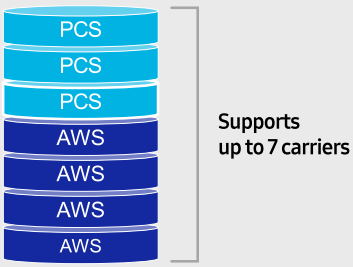
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

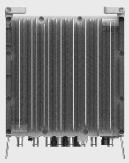
The number of required carriers varies according to site (region). Supporting many carriers is essential for using all frequencies that the operator has available.

The new AWS/PCS dual-band radio can support up to 3 carriers in the PCS (1.9GHz) band and 4 carriers in the AWS (2.1GHz) band, respectively.



Brand New Features in a Compact Size

Samsung's AWS/PCS macro radio offers several features, such as dual connectivity for baseband for both CDU and vDU, O-RAN capability, more carriers and an enlarged PCS spectrum, combined into an incumbent radio volume of 36.8L.



- 2 FH connectivity
- O-RAN capability
- More carriers and spectrum

Same as an incumbent radio volume

Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B25(PCS), B66(AWS)
Frequency Band	DL: 1930 – 1995MHz, UL: 1850 – 1915MHz DL: 2110 – 2200MHz, UL: 1710 – 1780MHz
RF Power	(B25) 4 × 40W or 2 × 60W (B66) 4 × 60W or 2 × 80W
IBW/OBW	(B25) 65MHz / 30MHz (B66) DL 90MHz, UL 70MHz / 60MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 10.04inch (36.8L) / 74.7lb

SAMSUNG

700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This 700/850MHz 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code	RF4440d-13A

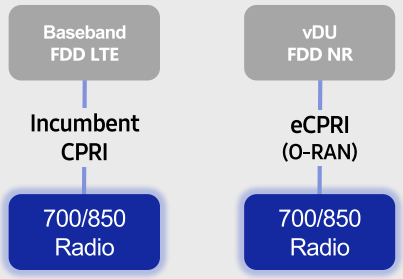
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

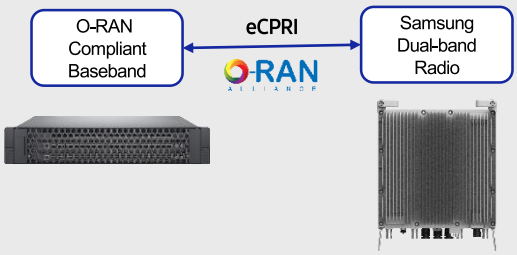
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help when implementing cost-effective networks because it is capable of sending more data without compromising additional investments.

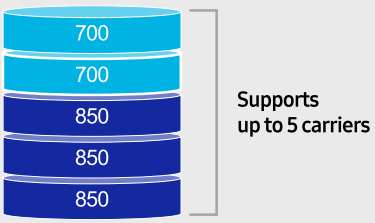
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

The number of required carriers varies according to site (region). The ability to support many carriers is essential for using all frequencies that the operator has available.

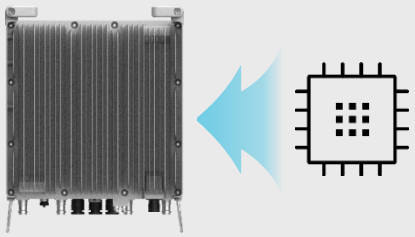
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



Secured Integrity

Access to sensitive data is allowed only to authorized software.

The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B13(700MHz), B5(850MHz)
Frequency Band	DL: 746 – 756MHz, UL: 777 – 787MHz DL: 869 – 894MHz, UL: 824 – 849MHz
RF Power	(B13) 4 × 40W or 2 × 60W (B5) 4 × 40W or 2 × 60W
IBW/OBW	(B13) 10MHz / 10MHz (B5) 25MHz / 25MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 9.05inch (33.2L) / 70.33 lb

SAMSUNG

Radio Access Network

102 RRU
Product Specification

for RT8808-77A

Specifies hardware configuration, functions, specifications, components, ports, and LED information for the radio units.

Document Version 1.0
June 2021

Document Number: 2600-00T7PZGA2

This manual should be read and used as a guideline for properly installing and/or operating the product.

This manual may be changed for system improvement, standardization and other technical reasons without prior notice.

Updated manuals are available at:

https://systems.samsungwireless.com/

For questions on the manuals or their content, contact

NetSys Tech Writer@sea.samsung.com

Contents

List of Figures

List of Tables

Preface

This document describes the C-Band NR RT8808 (8T8R 320W, Remote Radio Unit) in a 5G network.

The document provides information that is useful to the network operators during the installation, operation, and management cycles. It includes information such as the radio unit functions, hardware configuration, ports, and LED information.

Few hardware configurations are not supported by all the software releases or approved for all markets.

Relevance

This manual applies to the following products/software.

Name	Type
C-Band NR RT8808 (8T8R 320W RU)	Hardware

Conventions in this Document

Samsung Networks product documentation uses the following conventions.

Symbols

Symbol	Description
	Indicates a task.
	Indicates a shortcut or an alternative method.
	Provides additional information.
	Provides information or instructions that you should follow to avoid service failure or damage to equipment.
	Provides information or instructions that you should follow to avoid personal injury or fatality.
	Provides antistatic precautions that you should observe.

Menu Commands

menu | command

This indicates that you must select a command on a menu, where **menu** is the name of the menu, and **command** is the name of the command on that menu.

File Names and Paths

These are indicated by a bold typeface. For example:

Copy **filename.ext** into the **/home/folder1/folder2/bin/** folder.

User Input and Console Screen Output Text

- The input and output text is presented in the Courier New font. For example, `context <designated epc-context-name>`.
- The CLI command is presented in bold capital letters and Courier New font. For example, Type the **`RTRV-NE-STS`** command in the input field.
- The YANG object is presented in lowercase letters, bold style. For example, **eutran-cell-conf-idle**.

Revision History

The following table lists all versions of this document.

Document Version	Publication Date	Remarks
1.0	June 2021	First version

Organization of This Document

Section	Title	Description
Chapter 1	Introduction	This chapter provides the introduction.
Chapter 2	Overview	This chapter provides the hardware overview, functional description, and general specifications.
Chapter 3	Radio Units	This chapter describes the function of this product in detail.
Appendix	Acronyms	This appendix spells out the acronyms used in this manual.

Related Documentation

- 101 5G NR gNB System Description
- 201 5G NR gNB Dimensioning and Configuration Manual
- 310 RRU(RT8808-77A) Installation Manual

Personal and Product Safety

This product safety information includes European directives, which you must follow. If these do not apply in your country, please follow similar directives that do apply in your country.

Electrical

All structural parts are grounded and all input and outputs have built-in isolation from the network. All input and output ports that connect to external power sources are designed to meet relevant national safety requirements.

The product contains hazardous energy levels as defined by EN 60950. Care must be taken when maintaining this equipment as injury to personnel or damage to the equipment could result from mistakes. Maintenance should only be carried out by trained and competent engineers who are familiar with the relevant procedures and instructions.

Lasers

The product is fitted with optic modules rated as Class 1 radiation-emitting devices under EN 60825-1. During installation, operation, and maintenance, never look into the end of an optical fiber directly or by reflection either with the naked eye or through an optical instrument. Do not operate equipment with exposed fiber connectors-cover these with fiber cables or blanking caps. Do not remove equipment covers during operation unless requested to do so in the documentation. Carry out normal safety precautions when trimming fibers during installation.

Manual Handling

Care should be taken when handling equipment. Give due consideration to the weight of the equipment, the physical capability of the individual(s) handling the equipment, and movements such as twisting, bending and stooping, which could lead to skeletal and muscular injuries.

Installation

Installation must be carried out by trained and competent engineers only. All relevant safety measures should be taken to ensure equipment is not connected to live power and transmission sources during installation. Equipment must be correctly installed to meet the relevant safety standards and approval conditions.

Each power feed to the unit requires a separate fused feed from the provided power supply. The cable between the power distribution point and the installed equipment must have a minimum cross-sectional area of 2.5 mm^2.

Rack-mountable equipment must be placed in a standard 19-inch rack and secured with the appropriate fixings as detailed in the installation manual.

Maintenance

Maintenance must only be carried out by a suitably trained and competent technician. All safety instructions must be carefully observed at all times. Equipment covers should not be removed while live power and transmission is connected unless in a controlled environment by trained technicians.

Fire

To protect against potential fire due to current overload, the equipment is fused.

Environment

The product must be operated in an environment with the specified relative humidity and ambient temperature ranges.

Keep all liquids away from the equipment as accidental spillage can cause severe damage.

Cooling

The product is natural convection cooling type.

Anti-Static Precautions

The circuit boards and other modules in the product are sensitive to and easily damaged by static electricity. If any card or sub-assembly is removed from the unit, the following anti-static precautions must be observed at all times:

- Service personnel must wear anti-static wrist straps.
- Circuit boards and sub-assemblies must be placed on ground conductive mats or in conductive bags.
- All tools must be discharged to ground before use.
- The anti-static wrist strap and cord must be checked at regular intervals for their suitability for use.

Grounding

To comply with EN 60950, the equipment must be connected to a safety grounding point via a permanent link. Grounding points are located on the product for this purpose. Always connect the ground cable before fitting other cables. The product must remain grounded continuously unless all connections to the power supply and data network are all removed.

If equipment is grounded through a cabinet or rack, make sure it is done so properly according to the installation instructions.

Power Supply Connection

Power connections and installation of associated wiring must be carried out by a suitably qualified technician.

Only devices that comply with all relevant national safety requirements should be connected to the unit's power supply inlets. Other usage will invalidate any approval given to this equipment.

Connection of this equipment to devices that are not marked with all relevant national safety requirements may produce hazardous conditions on the network.

When the power supply is obtained by a rectifier/safety isolation transformer, the supply must meet the requirements of EN 60950 providing double/reinforced insulation between hazardous voltages and SELV/TNV circuits. Any battery must be separated from hazardous voltages by reinforced insulation.

Indirect Connection

Before indirectly connecting any equipment to another device through a shared power supply, ALWAYS seek advice from a competent engineer.

Devices that are not marked according to the relevant national safety standards may produce hazardous conditions on the network.

Product Disposal

To reduce the environmental impact of products, Samsung has joined WEEE compliance activities.

The WEEE symbol on the product indicates that the product is covered by the European Directive 2002/96/CE for the disposal of Waste Electrical and Electronic Equipment (WEEE). This means that the product should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities. This will help prevent potential negative consequences for the environment and human health. Please check the terms and conditions of the purchase contract for information about correct disposal.

Battery Disposal

The product contains a battery on the processor card. The battery should not be disposed of with other household waste. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66. The battery incorporated in this product is not user replaceable. For information on its replacement, please contact your service provider. Do not attempt to remove the battery or dispose it in a fire. Do not disassemble, crush, or puncture the battery.

End of life recycling materials information is available from Samsung.

California USA Only

This Perchlorate warning applies only to primary CR (Manganese Dioxide) Lithium coin cells in the product sold or distributed ONLY in California USA.

'Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate.'

Equipment Markings

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Correct disposal of batteries in this product
(Applicable in countries with separate collection systems.)

The marking on the battery, manual or packaging indicates that the battery in this product should not be disposed of with other household waste. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66.

The battery incorporated in this product is not user replaceable. For information on its replacement, please contact your service provider. Do not attempt to remove the battery or dispose it in a fire. Do not disassemble, crush, or puncture the battery. If you intend to discard the product, the waste collection site will take the appropriate measures for the recycling and treatment of the product, including the battery.

Hot surface warning

Allow to cool before servicing.

Do not touch before cooling.

Notice! Be careful not to touch due to high temperature.

The system must be installed in a restricted area, and make sure the work is done by personnel properly trained for the job.

Protective earth

RRU should be grounded.

Chapter 1 Introduction

The Samsung eNB consists of the Digital Unit (DU) and the Radio Unit (RU). The DU is a digital unit and can be mounted into indoor or outdoor 19-inch commercial rack. The RU is a RF integration module consisting of a transceiver, power amplifier, and filter. It transmits and receives traffic, clock information, and alarm and control messages to and from the DU.

This document describes the product components, serving as the reference for the installation and O & M. It specifies hardware configuration, functions, specifications, component's ports, and LED information of the RU hardware component.

The document is divided into three chapters. An overview of all the chapters is given in this section.

- Introduction

  This chapter provides an introduction of the document.

- Overview

  This chapter describes hardware overview, functional description, and general, mechanical and environmental specification for the RU products.

- Radio Units

  This chapter describes hardware components of radio unit in detail, such as appearance of external interface, and detail information of ports and LED.

- Acronyms

  This appendix spells out the acronyms used in this document.

Chapter 2 Overview

The RT8808-77A is a Remote Radio Unit (RRU) consisting of a digital block and the radio block. The digital block supports the interface with Digital Unit (DU) and the Low-PHY function (functional split option 7-2). The radio block transmits and receives the Radio Frequency (RF) signals with a separate 8T8R antenna.

The following table outlines the name and description of the RT8808-77A.

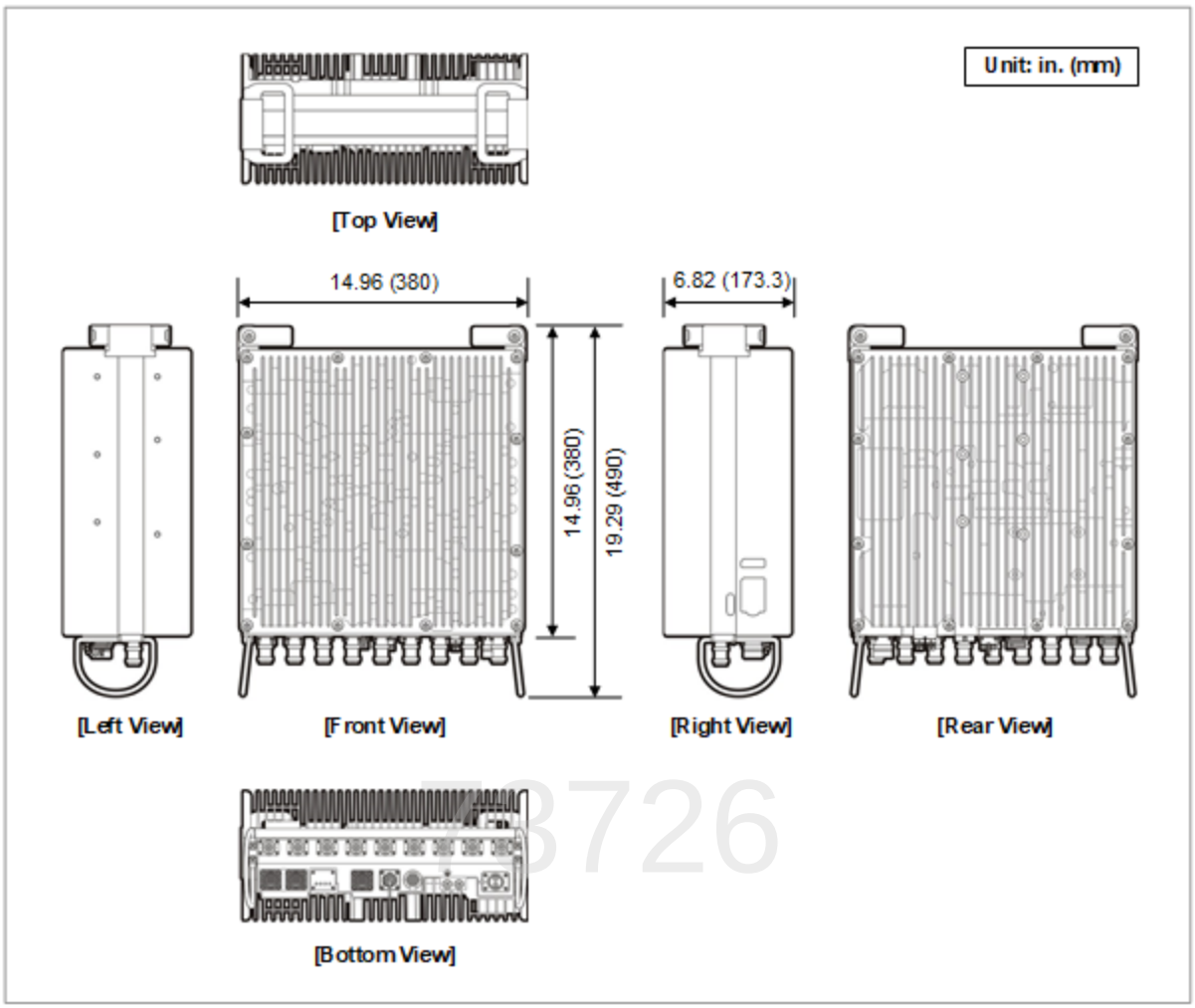
Table 1. Name and Description of Units

Model Name	Description
RT8808-77A	3.7 GHz NR 8T8R 320W RRU

Few hardware configurations are not supported by all the software releases or approved for all markets.

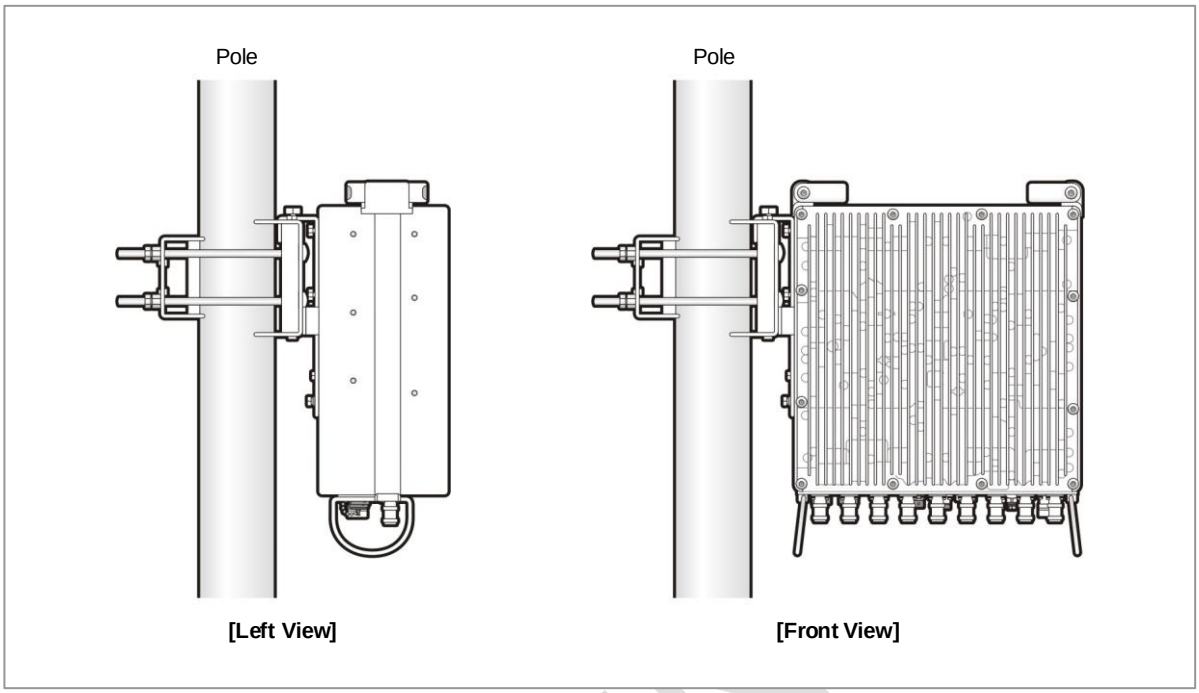
The following figure depicts the physical views of the RT8808-77A:

Figure 1. Appearance



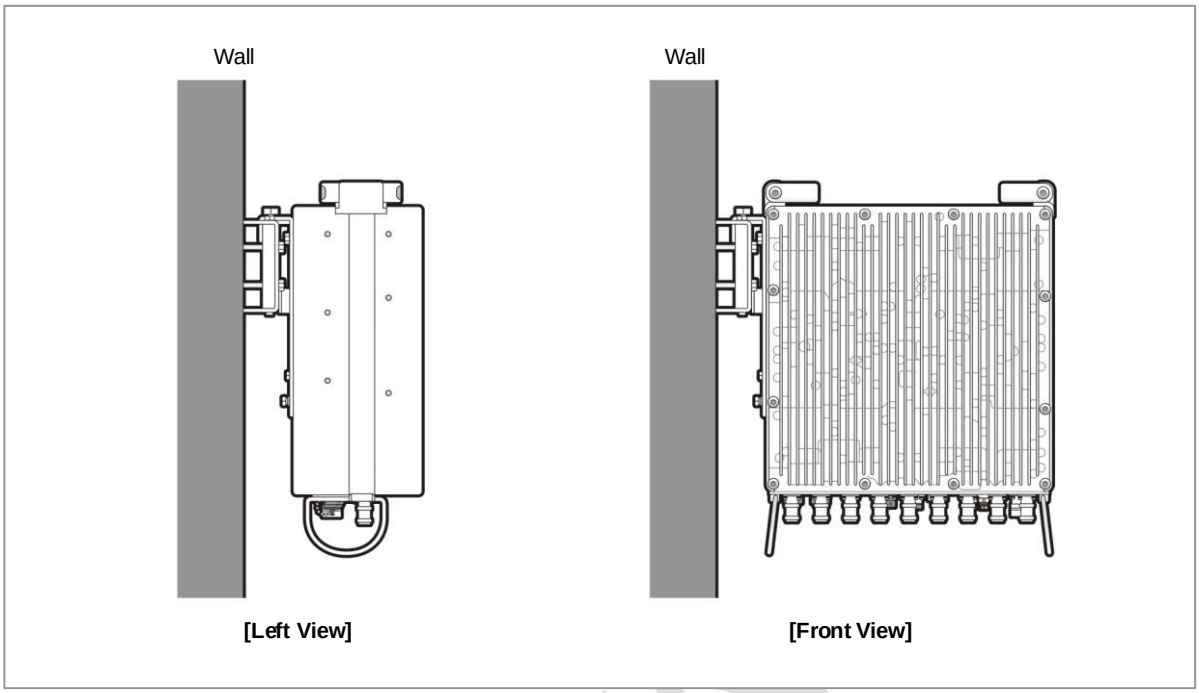
The RT8808-77A can be mounted on a wall or pole as displayed in the following installation scenario:

Figure 2. Pole Type Installation



The above installation scenario might be different depending on the system configuration. For more information, refer to the *RRU(RT8808-77A) Installation Manual*.

Figure 3. Wall Type Installation

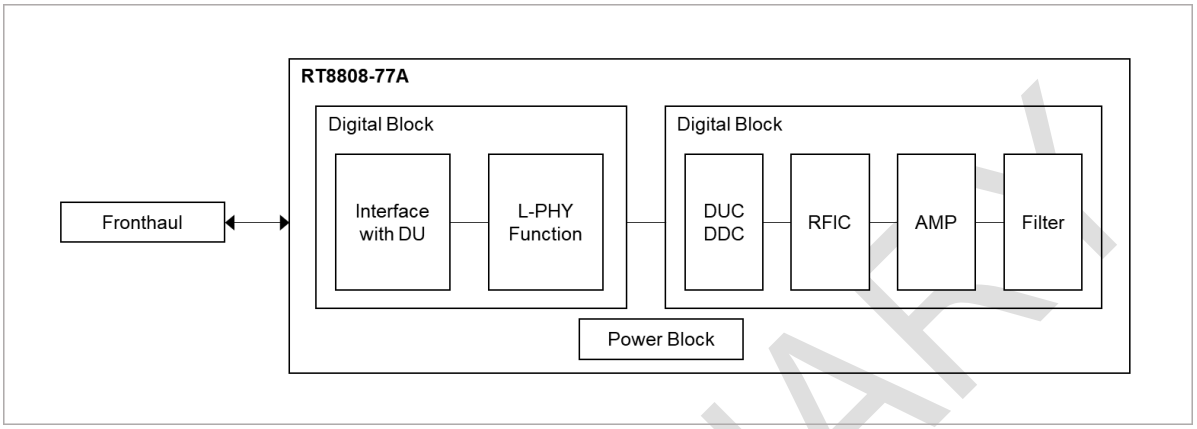


The above installation scenario might be different depending on the system configuration. For more information, refer to the *RRU(RT8808-77A) Installation Manual*.

Functional Description

The following figure displays the block diagram of the RT8808-77A.

Figure 4. Block Diagram



The RT8808-77A consists of the digital block, the radio block, and the power block. The digital block consists of the interface block and the L-PHY block. The digital block supports the interface with the DU, operation and management of the RT8808-77A, and processes the L-PHY function such as precoding, digital beamforming, iFFT/FFT, and so on.

The radio block consists of the digital up/down converter, RFIC (digital/analogue converter), amplifier, and filter.

Clock

The RT8808-77A receives the synchronization signal from the IEEE1588v2/SyncE. After receiving the synchronization signal, the RT8808-77A generates and distributes the clock for the internal devices.

Cooling

The RT8808-77A uses a natural convection cooling method without using a fan.

Specifications

The following table outlines the main specifications of RT8808-77A.

Table 2. Specifications (RT8808-77A)

Item	RT8808-77A
Radio Technology	5G NR
Operating Frequency	3700 to 3980 MHz
Channel Bandwidth	20/40/60/80/100 MHz
RF Chain	• 8T8R, 4T4R+4T4R Bi-sector • 2T2R+2T2R+2T2R Tri-sector • 4T8R+4T8R split mode
RF Output Power	Max. 320W (8 x 40W)
Capacity	Total Max 2C
CPRI interface	15km, 2 ports (25Gbps x 2), SFP28, single mode, Bi-di (Option: Duplex)
Input Voltage	-48 V DC (-38 V DC to -57 V DC)
Power Consumption (Max.)	1,192 W (100% load, 25°C) (w/o RET)
Operating Humidity	5% to 100%RH (Condensing, not to exceed 30g/m3 absolute humidity)
Operating Temperature	-40°C to 55°C (without solar load)
Dimension (in./mm)	14.96/380 (W) × 6.82/173.3(D) × 14.96/380 (H)
Weight (kg)	27 or less than
Cooling	Natural convection
Waterproof/Dustproof	IP65
Wind Resistance	Telcordia GR-487-CORE Issue5 • Wind Resistance (Section 3.36)
Earthquake Specification	Telcordia GR-63-CORE, Issue5, □ Earthquake (Section 4.4.1)
Vibration Specification	Telcordia GR-63-CORE, Issue5, • Office Vibration (Section 4.4.4) • Transportation Vibration (Section 4.4.5)
Altitude	Telcordia GR-63-CORE, Issue5, • Altitude (Section 4.1.3)
EMC	FCC Title 47 CFR Part 15
RF	FCC Title 47 CFR Part 27, 24
Safety	UL 62368-1, 2nd Edition
Installation	Pole, Wall, Tower

The power consumption is predicted with a simulation and the measured value is subject to change by ±10%

Chapter 3 Radio Units

This chapter describes the function of an RT8808-77A in detail.

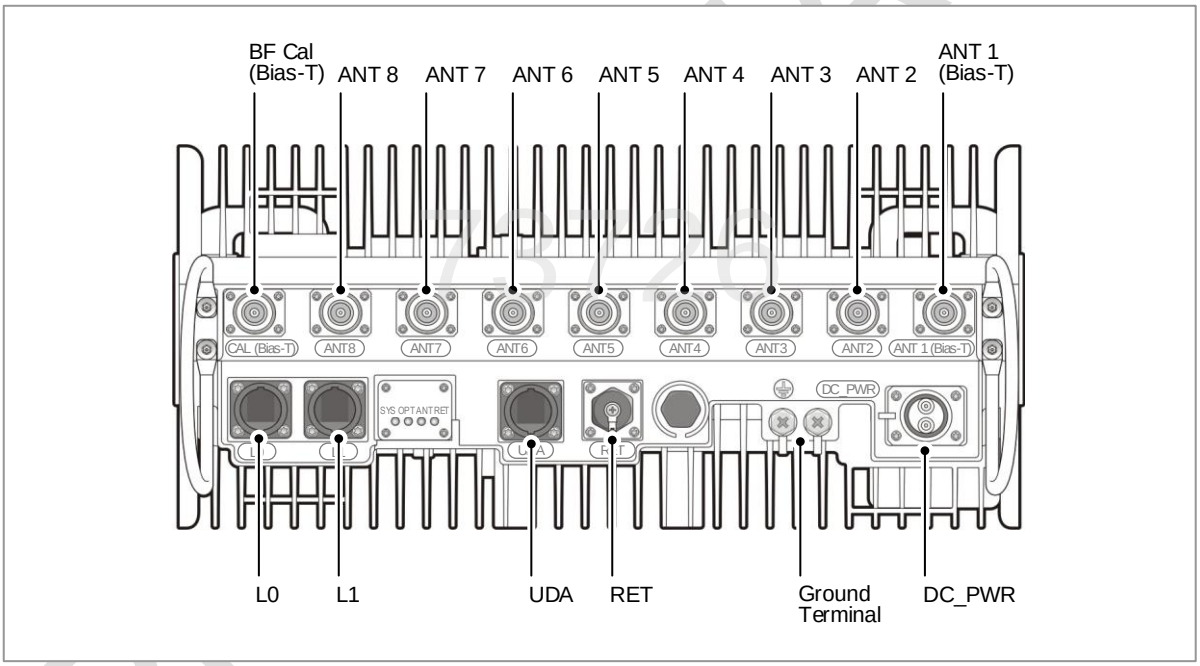
RT8808-77A

This section describes the external interface, LED information, and the port information of the RT8808-77A.

External Interface

The following figures depict the external interface of the RT8808-77A.

Figure 5. External Interface



LED Information

The LED displays the current status of the RT8808-77A. The following table outlines the status and description for the RT8808-77A.

Table 3. LED Information

LED	Status		Description
SYS	●	Solid Red	• Abnormal condition due to alarm ○ At least one path has shut down by major alarm or disabled alarm (Except for Voltage High/Low Major Alarm) • The eCPRI link is not set up • Initialization is in progress (all path is disabled)
	◐	Blinking Red	• Imperfect condition due to alarm ○ At least one path has shut down by major alarm or disabled alarm and at least one path works in normal operation
	●	Solid Green	• Standby condition ○ All the paths do not shut down by major alarm or disable alarm and all paths do not work in normal operation • Initialization is completed and ready to send the notification message to DU
	◐	Blinking Green	• Normal condition ○ All paths do not have shut down by major alarm or disable alarm and At least 1 path work in normal operation • In multi-carrier case, at least 1 carrier in path works in normal operation.
	○	Off	No DC input power
OPT	●	Solid Red	Optic RX LOS or Optic Tx fault at all ports
	◐	Blinking Red	Optic RX LOS or Optic Tx fault at one of the port
	●	Solid Green	No optical module insert
	◐	Blinking Green	No alarm, normal condition
	○	OFF	No DC input power
ANT	●	Solid Red	VSWR major alarm at all the paths
	◐	Blinking Red	VSWR alarm occurs at one of the path
	●	Solid Green	No RF output power (PA disable)
	◐	Blinking Green	No VSWR Alarm, Normal condition
	○	OFF	No DC input power
RET	●	Solid Red	RET power is failed
	◐	Blinking Red	Reserved
	●	Solid Green	• The RET power is OK • There is no RET data received for 180 s. If the RET is disconnected, blinking green status can last for 180 s.

LED	Status		Description
	◐	Blinking Green	When the RU receives data by RET
	◯	OFF	No DC input power

Port Information

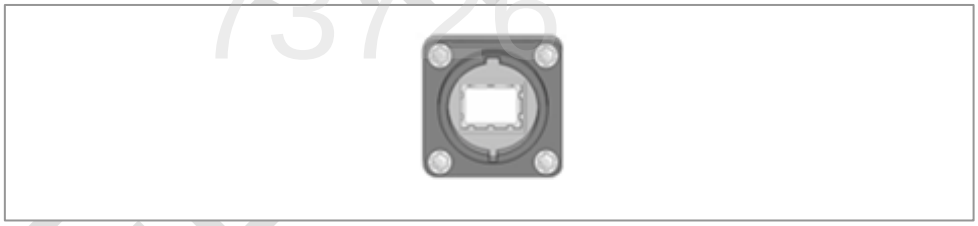
The following table outlines the port information of the RT8808-77A.

Table 4. Port Information

Port Name	Connector Type	Description
L0, L1	Push pull, SFP28 type	25GbE fronthaul optic interface
UDA	Push pull, RJ45 type	User defined alarm (4 Rx)
RET	Circular	Remote electric tilt
DC_PWR	Push pull	-48 VDC (-38 to -57 VDC)
SYS, OPT, ANT, RET	LED	Status LED for system, optic, antenna, RET
ANT1 - ANT8	4.3-10(Plus), Female	Antenna Port
CAL	4.3-10(Plus), Female	Calibration Port

Connector for L0, L1

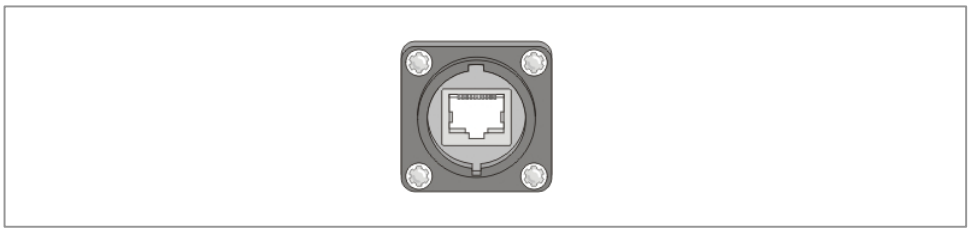
The following figure displays the connector for L0 and L1



L0 and L1 are optical interfaces. Do not look into the optical module to avoid damage to the eyes.

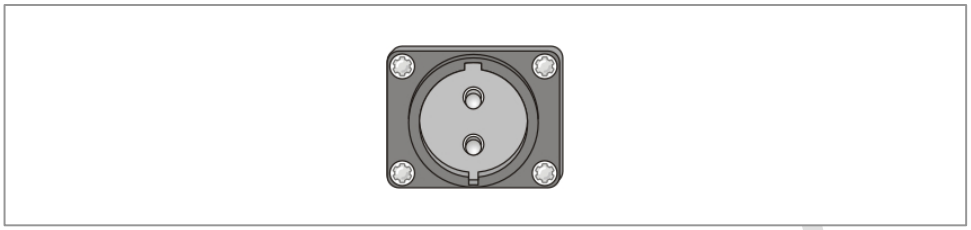
Connector for UDA

The following figure displays the connector for UDA port.



Connector for DC_PWR

The following figure display the connector for DC_PWR port:



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Appendix Acronyms

ADC	Analog to Digital Converter
AMP	Amplifier
ANT	Antenna
CPRI	Common Public Radio Interface
DDC	Digital Down Converter
DU	Digital Unit
DUC	Digital Up Converter
EMC	Electromagnetic Compatibility
FCC	Federal Communications Commission
gNB	next generation Node B
LED	Light Emitting Diode
L-PHY	Low Physical Layer
MMU	Massive MIMO Unit
NR	New Radio
RF	Radio Frequency
RFIC	Radio Frequency Integrated Circuit
RU	Radio Unit
SFP	Small Form Factor Pluggable
UDA	User Defined Alarm

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Product Specification for RT8808-77A

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