BZA APPLICATION FORM

GENERAL INFORMATION

BZA -216904

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

Special Permit: √ **Variance:** _____ **Appeal:** _____

PETITIONER: New Cingular Wireless PCs, LLC d/b/a AT&T Mobility c/o Carolyn Seeley

PETITIONER'S ADDRESS: 85 Rangeway Rd Building 3 Suite 102, North Billerica, MA 01862

LOCATION OF PROPERTY: 840 Memorial Drive AKA 18 Blackstone Street

TYPE OF OCCUPANCY: RES-&-DEV-FC **ZONING DISTRICT:** O-2

2023 MAR 13 PM 1:51
OFFICE OF THE CITY CLERK
CAMBRIDGE, MASSACHUSETTS

REASON FOR PETITION:

_____ Additions _____ New Structure

_____ Change in Use/Occupancy _____ Parking

_____ Conversion to Addi'l Dwelling Unit's _____ Sign

_____ Dormer _____ Subdivision

√ Other: Wireless Communications Facility upgrade

DESCRIPTION OF PETITIONER'S PROPOSAL:

AT&T proposes to make minor modification to its existing cell site at this location as part of nationwide upgrades. The proposed scope of work is to replace (12) panel antennas with (12) new panel antennas and to replace (6) remote radio units with (6) new remote radio units and its associated cabling.

SECTIONS OF ZONING ORDINANCE CITED:

Article 4.000 Section 4.32.G.1 (Telecommunications Facility)

Article 4.000 Section 4.40 (Footnote 49) (Telecommunications Facility)

Article 10.000 Section 10.40 (Special Permit)

6409 Middle Class Tax Relief and Job Creation Act

Applicants for a **Variance** must complete Pages 1-5
Applicants for a **Special Permit** must complete Pages 1-4 and 6
Applicants for an **Appeal** to the BZA of a Zoning determination by the Inspectional Services Department must attach a statement concerning the reasons for the appeal

Original Signature(s): _____
(Petitioner(s)/Owner)

Carolyn Seeley / Smartlink / AT&T
(Print Name)

Address: 85 Rangeway Rd, Bldg 3 Suite 102

North Billerica, MA 01862

Tel. No.: 978-760-5577

E-Mail Address: Carolyn.Seeley@smartlinkgroup.com

Date: 3/29/2023

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 Rivertech Associates II, LLC
(OWNER)

Address: 840 Memorial Drive Cambridge, MA 02139

State that I/We own the property located at 840 Memorial Drive Cambridge, MA 02139, which is the subject of this zoning application.

The record title of this property is in the name of Rivertech Associates II, LLC

*Pursuant to a deed of duly recorded in the date 12/29/89, Middlesex South County Registry of Deeds at Book 01065, Page 74; or Middlesex Registry District of Land Court, Certificate No. ~~[illegible]~~ 187024 Book 01065 Page 74.

*SIGNATURE BY LAND OWNER OR AUTHORIZED TRUSTEE, OFFICER OR AGENT**

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

Commonwealth of Massachusetts, County of ~~Middlesex~~ Suffolk

The above-name David Epstein personally appeared before me, this 8th of March, 2023, and made oath that the above statement is true.

Notary
AOIFE AUSTIN

My commission expires NOV 6, 2026 (Notary Seal).

AOIFE AUSTIN
NOTARY PUBLIC
COMMONWEALTH OF MASSACHUSETTS
MY COMMISSION EXPIRES NOVEMBER 06, 2026

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

March 31, 2023

Donna P. Lopez, City Clerk City of Cambridge City Hall 795 Massachusetts Avenue Cambridge, MA 02139	Constantine Alexander, Chair Board of Zoning Appeal City Hall 795 Massachusetts Avenue Cambridge, MA 02139

Applicant: New Cingular Wireless PCS, LLC ("AT&T")
Property Address: 840 Memorial Drive AKA 18 Blackstone Street
Assessor's Map 129, Lot 58 (the "Property")
Re: Application for:
(i) Eligible Facilities Request pursuant to Section 6409 of the Middle Class Tax Relief and Job Creation Act of 2012, 47 U.S.C. § 1455; or, in the alternative,
(ii) Special Permit under Cambridge Zoning Ordinance Section 4.32(g)(1) and M.G.L. c. 40A, Section 9; and
(iii) Any other zoning relief required.
(All relief if and to the extent necessary, all rights reserved)

Dear Ms. Lopez, Mr. Alexander and Members of the Board of Zoning Appeal:

Pursuant to Section 6409 of the Middle Class Tax Relief and Job Creation Act of 2012 (a/k/a the "Spectrum Act" or "Section 6409"), 47 U.S.C. § 1455, as further implemented by the Federal Communications Commission's Report and Order *In re Acceleration of Broadband Deployment by Improving Wireless Facilities Siting Policies*, FCC Docket No. 13-238, Report and Order No. 14-153 (October 17, 2014) (the "FCC Order"), New Cingular Wireless PCS, LLC ("AT&T") hereby submits this Eligible Facilities Request ("Request"); and, in the alternative, applies for a special permit from the City of Cambridge Board of Zoning Appeal (the "Board") under Section 432(g)(1) of the Cambridge Zoning Ordinance (the "Ordinance") to modify its existing "Telephone Exchange including Transmission Facilities to serve a Mobile Communication System" (the "Facility") on and within the existing building located at 840 Memorial Drive AKA 18 Blackstone Street (the "Special Permit Application").[2]

Under Section 6409, AT&T's proposed modification of its existing transmission equipment on and within the existing building, previously approved by the Board for use as a wireless communication

[2] AT&T submits this Request, Special Permit application and supporting materials subject to a full and complete reservation of AT&T's rights under the Spectrum Act and the FCC Order including without limitation its rights with respect to (i) any submittal requirements or approval criteria that are inconsistent with the prohibitions established by the FCC Order, (ii) any delay beyond the deadlines established in the FCC Order, (iii) the imposition of conditions on any approval that are inconsistent with the FCC Order, and (iv) referral or requirement to a discretionary review process such as a special permit.

base station, does "not substantially change the physical dimensions" of the existing building. Therefore, AT&T's Request must be approved administratively, including the issuance of a building permit, to enable AT&T to make the proposed modifications to its transmission equipment.

In the alternative, as demonstrated in this application letter, the AT&T's proposed modifications to its existing Facility on the Property located in the PUD-2 & Residence C-3A zoning district satisfy the requirements for the grant of a special permit pursuant to Section 10.43 of the Ordinance.

I. APPLICATION PACKAGE

Enclosed with this application is a check payable to the City of Cambridge in the amount of $500.00. In addition to the signed original of this letter are copies of the letter and the following materials:

1. The following completed and signed application forms:

   a. BZA Application Form – General Information;
   b. BZA Application Form – Ownership Information;
   c. BZA Application Form – Dimensional Requirements;
   d. BZA Application Form – Supporting Statement for a Special Permit; and
   e. BZA Application Form – Check List;

2. AT&T's relevant FCC License information.

3. Drawings by Ramaker consisting of 11 pages dated 04/6/2022.

SHEET	TITLE	REV DATE
T1	Title Sheet	04/06/2022
GN-1	Notes and Specifications	04/06/2022
C1	Compound Plan	04/06/2022
C2	Elevation View	04/06/2022
C3	Antenna Layouts	04/06/2022
C4	Antenna Schedule	04/06/2022
A1-A2	Construction Details	04/06/2022
A3	Plumbing Diagram	04/06/2022
G1-G2	Grounding Details	04/06/2022

4. Manufacturer's specification sheets for AT&T's proposed antennas and other featured equipment;

5. Photographs of the existing building and photo simulations of the proposed modifications Facility by Ramaker dated 07/22/2022.

6. Radio Frequency Coverage Report, demonstrating the public need for the proposed modifications to the Facility, radio frequency coverage maps showing (a) existing or predicted coverage from neighboring facilities; and (b) coverage with the proposed Facility.

7. Structural Analysis by Ramaker dated 04/06/2022.

8. Maximum Permissible Exposure Study, Theoretical Report, by MobileComm, dated 07/28/2020.

9. Letter of Authorization from Owner of Subject Property.

10. Deed to subject property; and

11. Attorney General's letters to the Towns of Mount Washington, Lynnfield, and Montague.

II. PROPOSED FACILITY DESIGN

AT&T seeks to modify the existing Facility on and within the building located at the Property. The existing Facility consists of twelve (12) panel antennas (Alpha Sector: 4 antennas, Beta Sector: 4 antennas, and Gamma Sector: 4 antennas) that are mounted in three (3) locations. The proposed modifications include the replacement of twelve (12) antenna, (4) per sector, which will be mounted to the building façade, and will have no visible change to the current Facility's design. Six (6) remote radio-head units (RRU) will be added in close proximity to the antenna. Consistent with the concealment elements of the existing Facility's design, the new antenna and RRU will be located along with the existing equipment.

The Facility's design is shown in detail in the Zoning Drawings attached as Exhibit 3 to this application letter and featured equipment is described in the manufacturers' specification sheets attached as Exhibit 4. The photographs and photo simulations (Exhibit 5) show the existing Facility from various locations in the neighborhood around the Property and as simulated with proposed modifications. A structural analysis for the Facility demonstrates that the building is capable of supporting AT&T's proposed equipment at or near the locations shown on the Zoning Drawings (*see* Exhibit 7).

The Facility will continue to bring advanced wireless voice, text, and data communications services to the surrounding areas. It will allow residents, professionals, government, businesses, and students to communicate locally, nationally, and internationally from virtually any location within the coverage area. In the event of an emergency, the improved Facility will allow immediate contact with fire, rescue, and other emergency personnel. The improved Facility will thus enhance public health, safety, and welfare both in ordinary daily living and in the event of fire, accident, medical emergency, natural disaster or other dangers.

III. BACKGROUND

AT&T is licensed by the Federal Communications Commission to construct and operate a wireless telecommunications network in various markets throughout the country, including the Commonwealth of Massachusetts and the City of Cambridge. A copy of the AT&T's FCC license that covers the area of the proposed Facility is included with this application (*see* Exhibit 2). AT&T is in the process of designing and constructing additional wireless facilities to its existing telecommunications system to serve Massachusetts. One of the key design objectives of its systems is to provide adequate and reliable coverage. Such a system requires a grid of radio transmitting and receiving links located approximately .5 to 2 miles apart, depending on the location of existing and proposed installations in the surrounding area, the extent of use of AT&T's wireless services within the network, and the existing topography and obstructions. The radio transmitting and receiving facilities operate on a line-of-sight basis, requiring a clear path from the facility to the user on the ground. In urban settings, this dynamic requires the antennas to be located on buildings at heights and in locations where the signal is not obstructed or degraded by other buildings or by topographical features such as hills.

IV. RF COVERAGE DETERMINATION

AT&T has performed a study of radio frequency coverage for the City of Cambridge and from the Property, the results of which are described in the Radio Frequency Report submitted with this application (*see* Exhibit 6). Without the proposed modifications to its existing Facility, AT&T has a substantial coverage gap in this area of Cambridge. AT&T has determined that the proposed modifications to the existing Facility located on the building at the Property will provide needed coverage to the targeted sections of the City and the immediately surrounding area if AT&T's antennas are located on the building's roof at the height and in the configuration requested. The importance of a facility at this location is underscored by AT&T's interest in enhancing its ability to provide its most up-to-date wireless technology, known as long-term evolution technology ("LTE"), in this area to satisfy its customers' ever-increasing needs for high-speed data services. Radio frequency coverage maps included in the report are provided to pictorially and vividly show the differences in existing and proposed wireless coverage at the various bands authorized for AT&T's service. The maps show dramatic improvements to wireless coverage at all three (3) bands with the inclusion of the proposed Facility, namely, at 700, 1900, and 2100 MHz.

V. THE FEDERAL SPECTRUM ACT AND THE FCC ORDER

As set forth below, the proposed modifications constitute an Eligible Facilities Request pursuant to the federal Spectrum Act,[3] as further implemented by the FCC Order.[4]

Under the Spectrum Act, as further clarified by the FCC Order, the streamlined process for this Eligible Facilities Request is limited to non-discretionary review. Specifically, the FCC Order "adopt[s] an objective standard for determining when a proposed modification will 'substantially change the physical dimensions' of an existing tower or base station." *FCC Order*, ¶ 87. As stated in the FCC Order, Section 6409 "states without equivocation that the reviewing authority 'may not deny, and shall approve' any qualifying application. This directive leaves no room for a lengthy and discretionary approach to reviewing an application that meets the statutory criteria." *FCC Order*, ¶ 116.

In issuing the FCC Order and eliminating discretionary review for eligible facilities requests, the FCC's goal was to "adopt a test that is defined by specific, objective factors rather than the contextual and entirely subjective standard advocated by the IAC and municipalities." The FCC intentionally sought to reduce "flexibility" and "open ended context-specific approach" engendered by the discretionary review process:

> While we acknowledge that the IAC approach would provide municipalities with maximum flexibility to consider potential effects, we are concerned that it would invite lengthy review processes that conflict with Congress's intent. Indeed, some municipal commenters anticipate their review of covered requests under a subjective, case-by-case approach could take even longer than their review of collocations absent Section 6409(a). We also anticipate that disputes arising from a subjective approach would tend to require longer and more costly litigation to resolve given the more fact-intensive nature of the IAC's open-ended and context-specific approach. We find that an objective definition, by contrast, will provide an appropriate balance between municipal flexibility and the rapid deployment of covered facilities. We find further support for this approach in State statutes that have implemented Section 6409(a), all of which establish objective standards.

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[3] Pursuant to Section 6409(a)(2) an "eligible facilities request" means any request for modification of an existing wireless tower or base station that involves—

> (A) collocation of new transmission equipment;
> (B) removal of transmission equipment; or
> (C) replacement of transmission equipment.

47 U.S.C. § 1455(a)(2).

[4] The Order was effective on February 9, 2015, except for § 1.40001, which became effective on April 8, 2015, except for §§ 1.40001(c)(3)(i), 1.40001(c)(3)(iii), 1.140001(c)(4), and 17.4(c)(1)(vii), which became effective on May 18, 2015, after approval by the Office of Management and Budget. The FCC Order makes clear that under the Spectrum Act discretionary review is not required or permitted for an Eligible Facilities Request.

FCC Order, ¶ 88.

As a result, the FCC Order implementing Section 6409 establishes clear and objective criteria for determining eligibility, limits the types of information that a municipality may require when processing an application for an eligible facilities request, and imposes a "deemed granted" remedy for failure to timely process and eligible facilities request.[5] The FCC Order also establishes significant limits on the information that can be required to be provided with an eligible facilities request and limits it to only that information "reasonably related to determining whether the request meets the requirements of this section. A State or local government may not require an applicant to submit any other documentation". 47 CFR 1.40001(c)(1).

Both before and after the FCC Order was issued, the Massachusetts Attorney General's Office provided clear guidance that an eligible request cannot be subjected to a discretionary special permit process. *See* Attorney General's letters to (i) Town of Mount Washington, dated June 12, 2014, p. 3 (ii) Town of Lynnfield, dated February 10, 2015, p. 3 (the "AG Lynnfield Letter") and (iii) Town of Montague, dated February 23, 2015, p. 2 (all attached hereto). As set forth in each letter [t]he Act's requirement that a local government 'may not deny, and shall approve, any eligible facilities request' means that a request for modification to an existing facility that does not substantially change the physical dimensions of the tower or base station must be approved. ***Such qualifying requests also cannot be subject to a discretionary special permit.***")(Emphasis added). In providing these opinions, the Attorney General's Office specifically opined that provisions in zoning ordinances that specifically required a special permit for modifications to existing facilities could not be applied to eligible facilities requests. While approving the Town of Lynnfield's Zoning Bylaw, the Attorney General stated that "Section 8.7.5.1 requires that PWSF may only be erected upon the grant of a special permit. The Town cannot apply this requirement to eligible facilities requests for modification to existing facilities that qualify for required approval under Section 6409 of the Act." *AG Lynnfield Letter*, p. 3.

Therefore, as set forth in the FCC Order and Attorney General's opinion letters, the City cannot impose a requirement that AT&T obtain a special permit, or an amendment to an existing special permit utilizing the same discretionary review process, in connection with its eligible facilities request. To the extent that the City of Cambridge's Zoning Ordinance and any prior decisions by the Board include provisions seeking to further regulate the modification of wireless communication facilities, federal law overrules those requirements. *See* Sprint Spectrum L.P. v. Town of Swansea, 574 F.Supp.2d 227, 236 (2008) (Board is obligated to consider whether its actions would violate federal law even if a different outcome would be permitted under state law). The standard of review for an application to modify an existing wireless communication facility on an existing tower or base station is governed by the Spectrum Act and the FCC Order which require eligible facilities requests to be permitted "by right."

In addition, the FCC Order establishes a 60-day period for approval from the time of AT&T's submission. 47 CFR §1.40001(c)(2). Within the context of the Spectrum Act and FCC Order, approval means all necessary approvals to permit the proposed modifications, including the issuance of a building permit, if required. The FCC found that this 60-day period is appropriate

[5] *See* 47 CFR §§1.40001(c)(1) - (c)(4).

due to "the more restricted scope of review applicable to applications under section 6409(a)." *FCC Order*, ¶ 108. If the Request is not acted upon within the 60-day period, it is deemed granted. 47 CFR §1.40001(c)(4).

As set forth below, the proposed modifications constitute an eligible facilities request. Therefore, AT&T respectfully requests the Board to find that Section 4.32(g)(1) of the Ordinance does not apply to its Request.

VI. THE PROPOSED MODIFICATIONS ARE AN ELIGIBLE FACILITIES REQUEST

Under Section 6409 and the FCC Order, a "base station" means "[a] structure or equipment at a fixed location that enables Commission-licensed or authorized wireless communications between user equipment and a communications network." 47 C.F.R §1.40001(b)(1). A Base Station includes "any structure other than a tower" that supports or houses "authorized wireless communications between user equipment and a communications network." 47 C.F.R §1.40001(b)(1). Therefore, the existing building that is currently used for FCC-licensed transmissions for personal wireless services is a "base station" for purposes of Section 6409.

AT&T proposes to modify its existing Facility as described above and depicted on the Plans submitted herewith.

The proposed modifications will not require the installation of any part of the facility on the ground outside of the building.

As a result, AT&T's proposed modifications involving the removal and replacement of the existing transmission equipment constitute an "eligible facilities request" under Section 6409. The proposed eligible facilities request is not a "substantial modification" under Section 6409 and the FCC Order because it does not:

(i) Result in an increase in "the height of the structure by more than 10% or more than ten feet, whichever is greater" because the proposed replacement antennas will either be mounted and located below the screen wall or utilize the existing equipment mounting frame that and therefore will not exceed 10 feet above the existing building;

(ii) Protrude from the edge of the edge of the building by more than six feet because AT&T's proposed antennas will not protrude more than six feet from building façade;

(iii) Involve the installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets no new radio communications equipment cabinets will be installed;

(iv) Require any excavation or deployment outside the current site of the tower or base station because all antennas, equipment cabinets and related equipment will be installed entirely on and within the existing building; or

(v) Otherwise defeat the existing concealment elements of the tower or base station because the proposed replacement antennas will be located behind the existing screen wall or utilize the existing mounting frame and will continue to integrate the Facility into the existing architecture of the building. . Therefore, AT&T's proposed Facility will remain aesthetically consistent with the exterior finish of the building as well as maintain the concealment elements of the original design.

See FCC Order, §1.40001(b)(7)(i)-(v).

VII. COMPLIANCE WITH THE CAMBRIDGE ZONING ORDINANCE

In the alternative, AT&T respectfully requests the Board to grant a special permit for the proposed modifications to the existing Facility.[6]

A. AT&T complies with the Wireless Communications provisions set forth in Section 4.32(g)(1), and Section 4.40, Footnote 49 of the Ordinance.

AT&T's proposed modifications comply with Section 4.32(g)(1), and Section 4.40, Footnote 49 of the Ordinance as follows:[7]

Section 4.32(g)(1): Section 4.32(g)(1) of the Ordinance allows for the use of a "*[t]elephone exchange (including switching, relay, and transmission facilities serving mobile communications systems) and any towers or antennas accessory thereto.*" Under the Table of Use Regulations beginning at Section 4.30, AT&T's proposed use of the Facility as a transmission facility serving a mobile communications system is permitted by special permit in the PUD-2 & Residence C-3A zoning district *(see* the table at Section 4.32(g)(1)).

Section 4.40, Footnote 49: Section 4.32(g)(1) includes a reference to Section 4.40, Footnote 49 which sets out the standards for granting the special permit. AT&T's proposed Facility complies with Footnote 49's standards as noted below:

1. **The Board of Zoning Appeal shall consider "[t]he scope of or limitations imposed by any license secured from any state or federal agency having jurisdiction over such matters."**

[6] AT&T's request is made, if and to the extent necessary, all rights reserved. As discussed above, the FCC Order establishes a 60-day period for receipt of all necessary approvals from the time of AT&T's submission, including a building permit, if required. 47 CFR §1.40001(c)(2). If the Request is not acted upon within the 60-day period, it is deemed granted. 47 CFR §1.40001(c)(4). Therefore, AT&T expressly reserves its rights under 47 CFR §1.40001(c)(2) and (4).

[7] To the extent that Section 4.32(g)(1), and Section 4.40, Footnote 49 of the Ordinance purport to require the submission of information that is beyond the scope permitted by the FCC Order or Spectrum Act, AT&T expressly reserves, and does not waive, its right to assert that such information is not required under the Spectrum Act and the submission of such information shall not constitute a waiver of AT&T's rights pursuant thereto.

AT&T's Response: AT&T's FCC license is included with this application and the license information included shows that AT&T is authorized to provide wireless service in the area served by the Facility (*see* Exhibit 2).

2. **The Board of Zoning Appeal shall consider "[t]he extent to which the visual impact of the various elements of the proposed facility is minimized: (1) through the use of existing mechanical elements on the building's roof or other features of the building as support and background, (2) through the use in materials that in texture and color blend with the materials to which the facilities are attached, or (3) other effective means to reduce the visual impact of the facility on the site."**

AT&T's Response: The design of the overall Facility, including the choice and placement of replacement antennas and associated equipment, behind the existing screen wall or utilizing the existing mounting frame, minimizes the visual impact of the proposed Facility. This is because the any visible antennas and equipment will be minimally visible and consistent with the elements of the existing Facility. The minimal visual impact of the Facility is shown in the photographs of the existing Facility and the photosimulations that superimpose the proposed modifications to the existing Facility (*see,* Exhibit 5).

3. **The Board of Zoning Appeal shall consider "[w]here it is proposed to erect such a facility in any residential zoning district, the extent to which there is a demonstrated public need for the facility at the proposed locations, the existence of alternative, functionally suitable sites in nonresidential locations, the character of the prevailing uses in the area, and the prevalence of other existing mechanical systems and equipment carried on or above the roof of nearby structures. The Board of Zoning Appeal shall grant a special permit to erect such a facility in a residential zoning district only upon finding that nonresidential uses predominate in the vicinity of the proposed facility's location and that the telecommunications facility is not inconsistent with the character that does prevail in the surrounding neighborhood.**

In granting a special permit the Board of Zoning Appeal shall set forth in its decision under which circumstances or procedures, if any, the permittee shall be allowed to replace and upgrade its equipment without the necessity of seeking a new special permit."

AT&T's Response: As demonstrated by the Radio Frequency Report and the associated coverage maps, AT&T has demonstrated an immediate and compelling need for the proposed modifications to its existing Facility located at the Property in order to provide substantially improved indoor coverage to residents, businesses, students and faculty, and the general public in that area.[8] AT&T also seeks to substantially improve its ability to satisfy the ever-increasing need of its customers for data accessibility, navigation and use. This is especially critical in and around the area of Brookline Ave. which also serves as home for numerous businesses. AT&T proposes to satisfy its RF coverage needs in the area by adding to the existing Facility the antennas and equipment necessary to provide the

[8] AT&T must generate a signal strength of at least -74 dBm to provide serviceable voice and data coverage on its mobile wireless devices in indoor environments. AT&T also seeks to substantially improve its data navigation service coverage in the area by including antennas and equipment that will provide LTE service.

latest LTE wireless communications service technology. Further, by modifying its existing Facility, and obviating the need to construct an entirely new facility within this area of Cambridge in order to meet its wireless network coverage needs, of the residents, businesses, and general public.

As provided in Footnote 49, AT&T requests that once permission is received from the City to site the Facility at the Property, the Board permit AT&T to replace and upgrade the equipment at this Facility in the future without further zoning proceedings or a new special permit, provided that such equipment shall meet the eligible facilities request criteria set forth in 47 CFR § 1.40001.

B. AT&T complies with the Special Permit Criteria set forth in Section 10.43 of the Ordinance.

Section 10.43 of the Ordinance specifies the following criteria for issuance of a special permit: "Special permits will normally be granted where specific provisions of this Ordinance are met, except when particulars of the location or use, not generally true of the district or of the uses permitted in it, would cause granting of such permit to be to the detriment of the public interest because:

(a) The requirements of this Ordinance cannot or will not be met, or

AT&T's Response: As provided above, AT&T's proposed modifications comply with the requirements set forth in Section 4.32(g), Footnote 49 of the Ordinance, the Spectrum Act and the eligible facilities request criteria set forth in 47 CFR § 1.40001. Granting the special permit would not be a detriment to the public interest and is consistent with the Board's obligations pursuant to the Spectrum Act and FCC Order.

(b) Traffic generated or patterns of access or egress would cause congestion, hazard, or substantial change in established neighborhood character for the following reasons, or

AT&T's Response: The proposed modifications to AT&T's existing Facility will not result in any change to the existing traffic on or near the Property. The Facility will continue to be unmanned and only require infrequent visits by a technician (typically two times per month for routine diagnostics and/or maintenance, except in cases of emergency), there will be no material increase in traffic or disruption to patterns of access or egress that will cause congestion, hazards or a substantial change in the established neighborhood character. AT&T's maintenance personnel will make use of the existing access roads and parking at the building. Granting the special permit would not be a detriment to the public interest and is consistent with the Board's obligations pursuant to the Spectrum Act and FCC Order.

(c) The continued operation of or the development of adjacent uses as permitted in the Zoning Ordinance would be adversely affected by the nature of the proposed use, or

AT&T's Response: As described above and illustrated on the attached photographs and photosimulations (*see* Exhibit 5) the proposed modifications to the existing Facility will result in a *de minimis* change in the appearance of the building. As a result, the Facility as a whole either will be hidden from view or will visually blend with existing characteristics of the building and the surrounding neighborhood. Because the proposed installation will not generate any traffic, smoke, dust, heat or glare, discharge noxious substances, nor pollute waterways or groundwater, it will not adversely affect residential uses on neighboring streets. Conversely, the surrounding properties and general public will benefit from the potential to enjoy improved wireless communications services. Granting the special permit would not be a detriment to the public interest and is consistent with the Board's obligations pursuant to the Spectrum Act and FCC Order.

(d) Nuisance or hazard would 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, or

AT&T's Response: Because the proposed modifications to the existing Facility will not cause the Facility to generate any traffic, smoke, dust, heat or glare, discharge noxious substances, nor pollute waterways or groundwater, no nuisance or hazard will be created to the detriment of the health, safety, or welfare of the occupants of the building or the residents of the City of Cambridge. To the contrary, the proposed Facility will benefit the City and promote the safety and welfare of its residents, businesses and drivers by providing reliable state-of-the-art digital wireless voice and data services that will improve the reliability of emergency communications with the police and fire departments by eliminating dropped or blocked calls due to inadequate signal strength or insufficient network capacity to handle call volume, particularly important during emergency situations. The Facility, as modified, will continue to comply with all federal, state and local safety requirements including the standards established by the FCC and Federal Aviation Administration (FAA). (*See* Exhibit 8 Maximum Permissible Exposure Study, Theoretical Report). Granting the special permit would not be a detriment to the public interest and is consistent with the Board's obligations pursuant to the Spectrum Act and FCC Order.

(e) For other reasons, the proposed installation would impair the integrity of the district or adjoining district or otherwise derogate from the intent or purpose of this Ordinance, or

AT&T's Response: The purpose of the Ordinance is multifaceted, the relevant aspects of which relating to wireless telecommunications facilities include the lessening of congestion in the streets, conserving health, securing safety from fire, flood, panic and other danger, conserving the value of land and buildings and natural resources, preventing blight and pollution, encouraging the most rational use of land throughout the city, including encouraging appropriate economic development, and protecting residential neighborhoods from incompatible activities.

As noted above, the proposed modifications to the existing Facility directly accord with the purposes of the Ordinance because the modifications will not result in any traffic, smoke, dust, heat or glare, discharge noxious substances, nor pollute waterways or groundwater. As the Facility will improve the ability of residents, businesses, travelers and drivers in the area to access state-of-the-

art wireless technology, the City's ability to provide emergency services will be improved, as will the economic development of the City as more people will be able to conduct commerce by virtue of a mobile platform. Because the proposed modifications to the existing Facility will be installed on an existing building that includes the Facility, and the proposed modifications are consistent with the existing concealment elements, the proposed modifications to the existing Facility are in consistent with the building's character and will not affect the value of the building or the natural resources of the City. Because the proposed modifications to the existing Facility are designed to be consistent with the existing concealment elements of the Facility and characteristics of the Property, the visual impact on the underlying and adjacent zoning districts will be *de minimis*. As a result, the proposed modifications to the existing Facility are consistent with the Ordinance's purpose to allow for less intrusive wireless telecommunications facilities in all districts (other than Open Space) including the applicable overlay districts, and the underlying PUD-2 & Residence C-3A district. Granting the special permit would not be a detriment to the public interest and is consistent with the Board's obligations pursuant to the Spectrum Act and FCC Order.

(f) The new use or building construction is inconsistent with the Urban Design Objectives set forth in Section 19.30

AT&T's Response: As stated in the Section 19.30, the Citywide Urban Design Objectives ("Objectives") "are intended to provide guidance to property owners and the general public as to the city's policies with regard to the form and character desirable for new development in the city. It is understood that application of these principles can vary with the context of specific building proposals in ways that, nevertheless, fully respect the policies' intent. It is intended that proponents of projects, and city staff, the Planning Board and the general public, where public review or approval is required, should be open to creative variations from the detailed provisions presented in this Section as long as the core values expressed are being served. ***A project need not meet all the objectives of this Section 19.30 where this Section serves as the basis for issuance of a special permit. Rather the permit granting authority shall find that on balance the objectives of the city are being served.*** Nor shall a project subject to special permit review be required to conform to the Required Building and Site Plan Requirements set forth in Section 11.50." [emphasis added]. For the reasons stated in AT&T's response to this Section 10.43(f) of the Zoning Ordinance and in its application generally, "on balance, the objectives of the city are being served" by the installation of the Facility at the Property so that granting the special permit would not be a detriment to the public interest and is consistent with the Board's obligations pursuant to the Spectrum Act and FCC Order.

The following are the Objectives' headings as appearing in the Ordinance:

19.31: New projects should be responsive to the existing or anticipated pattern of development.

AT&T's Response: The existing Facility is located on and within the existing building, some of the equipment of which is hidden from view behind the screen wall and within the building, or otherwise obstructed from view, and the remaining equipment utilizes the existing antenna mounting frame and blends with the structures and colors of the building to the extent feasible. The proposed modifications to the existing Facility are consistent with the previously approved design and concealment elements of the existing Facility. Therefore, the proposed modifications are

responsive to the existing pattern of development in the Property's applicable zoning and overlay districts.

19.32: Development should be pedestrian and bicycle-friendly, with a positive relationship to its surroundings.

AT&T's Response: The existing Facility is located on and within the existing building. The Facility is only accessed by authorized AT&T personnel for routine maintenance one to two times per month and is not accessed by the general public. The proposed modifications to the existing Facility will not result in any increase in routine visits nor otherwise result in a change in traffic patterns in the vicinity of the Property that would affect pedestrian flow or cyclists' access to the building or surrounding areas within the Property's applicable zoning districts.

19.33 The building and site design should mitigate adverse environmental impacts of a development upon its neighbors. Indicators include[9]

(1) Mechanical equipment that is carefully designed, well organized or visually screened from its surroundings and is acoustically buffered from neighbors. Consideration is given to the size, complexity and appearance of the equipment, its proximity to residential areas, and its impact on the existing streetscape and skyline. The extent to which screening can bring order, lessen negative visual impacts, and enhance the overall appearance of the equipment should be taken into account. More specifically:

(a) Reasonable attempts have been made to avoid exposing rooftop mechanical equipment to public view from city streets. Among the techniques that might be considered are the inclusion of screens or a parapet around the roof of the building to shield low ducts and other equipment on the roof from view.

(b) Treatment of the mechanical equipment (including design and massing of screening devices as well as exposed mechanical elements) that relates well to the overall design, massing, scale and character of the building.

(c) Placement of mechanical equipment at locations on the site other than on the rooftop (such as in the basement), which reduces the bulk of elements located on the roof; however, at-grade locations external to the building should not be viewed as desirable alternatives.

(d) Tall elements, such as chimneys and air exhaust stacks, which are typically carried above screening devices for functioning reasons, are carefully designed as features of the building, thus creating interest on the skyline.

[9] Inasmuch as Section 19.33 is most relevant to the Facility, it is stated here in full.

(e) All aspects of the mechanical equipment have been designed with attention to their visual impact on adjacent areas, particularly with regard to residential neighborhoods and views and vistas.

AT&T's Response: As shown in the photosimulations (*see* Exhibit 5), the existing Facility, as proposed to be modified herein, will continue to be visually consistent with the color and texture of the building, the concealment elements of the design of the Facility, and with other existing wireless communications facilities from competing carriers located on the building. As a result, AT&T's Facility is in keeping with the building's existing features without adversely affecting the building's overall design, massing, scale or character.

(2) Trash that is handled to avoid impacts (noise, odor, and visual quality) on neighbors, e.g. the use of trash compactors or containment of all trash storage and handling within a building is encouraged.

AT&T's Response: The Facility does not generate trash, therefore this design objective is inapplicable.

(3) Loading docks that are located and designed to minimize impacts (visual and operational) on neighbors.

AT&T's Response: The Facility does not utilize any loading dock, therefore this design objective is inapplicable.

(4) Stormwater Best Management Practices and other measures to minimize runoff and improve water quality are implemented.

AT&T's Response: The existing Facility, and the proposed modifications, are located entirely on and within the existing Building on the Property and have no effect on stormwater runoff, therefore this design objective is inapplicable.

(5) Landscaped areas and required Green Area Open Space, in addition to serving as visual amenities, are employed to reduce the rate and volume of stormwater runoff compared to pre-development conditions.

AT&T's Response: The existing Facility and proposed modifications have no effect any landscaped or Green Area Open Space, therefore this design objective is inapplicable.

(6) The structure is designed and sited to minimize shadow impacts on neighboring lots, especially shadows that would have a significant impact on the use and enjoyment of adjacent open space and shadows that might impact the operation of a Registered Solar Energy System as defined in Section 22.60 of this Zoning Ordinance.

AT&T's Response: The existing Facility and proposed modifications are designed so as not to cause shadows on neighboring lots.

(7) Changes in grade across the lot are designed in ways that minimize the need for structural retaining walls close to property lines.

AT&T's Response: The existing Facility and proposed modifications are located entirely on and within the existing building and have no impact on the grade of the Property, therefore this design objective is inapplicable.

(8) Building scale and wall treatment, including the provision of windows, are sensitive to existing residential uses on adjacent lots.

AT&T's Response: The proposed modifications to the existing Facility will not change the building's scale because antennas and equipment will be mounted behind the existing screen wall or on an existing antenna mounting frame already located on the building (*see* Exhibit 3). The existing Facility and proposed modifications are consistent with characteristics of the existing building design, maintain the existing concealment elements of the Facility and therefore minimize any visual impact from the Facility.

(9) Outdoor lighting is designed to provide minimum lighting and necessary to ensure adequate safety, night vision, and comfort, while minimizing light pollution.

AT&T's Response: The existing Facility does not use any outdoor lighting. The proposed modifications to the Facility do not include any additional lighting of the Facility or building. As a result, this design objective is inapplicable.

(10) The creation of a Tree Protection Plan that identifies important trees on the site, encourages their protection, or provides for adequate replacement of trees lost to development on the site.

AT&T's Response: The existing Facility and proposed modifications are located entirely on and within the existing building and have no effect on any trees on the Property, therefore this design objective is inapplicable.

19.34: Projects should not overburden the City infrastructure services, including neighborhood roads, city water supply system, and sewer system.

AT&T's Response: The existing Facility, including the proposed modifications, is a passive use and will not generate trash, odor, excess noise, or utilize water or wastewater services. As such, it will not burden the City's infrastructure services.

19.35: New construction should reinforce and enhance the complex urban aspects of Cambridge as it has developed historically.

AT&T's Response: The proposed modification of the existing Facility located on and within the existing building, will obviate the need for AT&T to construct an additional Facility to address its wireless network coverage need in this area of Cambridge. The existing Facility and the proposed modifications blend the equipment with the building texture and color, and are consistent with the concealment elements of the Facility's design. As a result, the Facility will reinforce the existing Cambridge landscape as it currently is manifested at the Property.

19.36: Expansion of the inventory of housing in the city is encouraged.

AT&T's Response: The Facility and proposed modifications provide wireless services and will not adversely impact the City's housing inventory.

19.37. Enhancement and expansion of open space amenities in the city should be incorporated into new development in the city.

AT&T's Response: The Facility and proposed modifications are located on and within the existing building. The Facility and proposed modifications will not adversely impact or otherwise reduce open space amenities within the City.

VIII. SUMMARY

For the foregoing reasons AT&T respectfully requests that the Board to determine that pursuant to the Spectrum Act and the FCC Order, the Request constitutes and eligible facilities request and therefore AT&T's Request must be approved administratively, including the issuance of a building permit, without the need for further relief from the Board. In the alternative, without waiving its rights, AT&T requests the Board grant the foregoing zoning relief in the form of a Special Permit and such other relief as the Board deems necessary to allow the modification and operation of AT&T's proposed Facility.

Best Regards,

Carolyn Seeley
Authorized Agent to New Cingular Wireless PCS, LLC ("AT&T")

cc: Jonathan T. Elder, Esq.

BZA APPLICATION FORM

DIMENSIONAL INFORMATION

APPLICANT: New Cingular Wireless PCS, LLC d/b/a AT&T Mobility c/o Carolyn Seeley, Smartlink **PRESENT USE/OCCUPANCY:** RES-&-DEV-FC

LOCATION: 840 Memorial Drive AKA 18 Blackstone Street **ZONE:** O-2

PHONE: 978-760-5577 **REQUESTED USE/OCCUPANCY:** N/A

		EXISTING CONDITIONS	*REQUESTED CONDITIONS*	*ORDINANCE REQUIREMENTS*[1]	
TOTAL GROSS FLOOR AREA:		0	0	0	(max.)
LOT AREA:		0		0	(min.)
RATIO OF GROSS FLOOR AREA TO LOT AREA:[2]		0	0	0	(max.)
LOT AREA FOR EACH DWELLING UNIT:		0	0	0	(min.)
SIZE OF LOT:	WIDTH	0		0	(min.)
	DEPTH				
Setbacks in Feet:	FRONT	0	0	0	(min.)
	REAR	0	0	0	(min.)
	LEFT SIDE	0	0	0	(min.)
	RIGHT SIDE	0	0	0	(min.)
SIZE OF BLDG.:	HEIGHT	0	0	0	(max.)
	LENGTH				
	WIDTH				
RATIO OF USABLE OPEN SPACE TO LOT AREA:[3])		0	0	0	(min.)
NO. OF DWELLING UNITS:		0	0	0	(max.)
NO. OF PARKING SPACES:		0	0	0	(min./max)
NO. OF LOADING AREAS:		0	0	0	(min.)
DISTANCE TO NEAREST BLDG. ON SAME LOT:		0	0	0	(min.)

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

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'.*

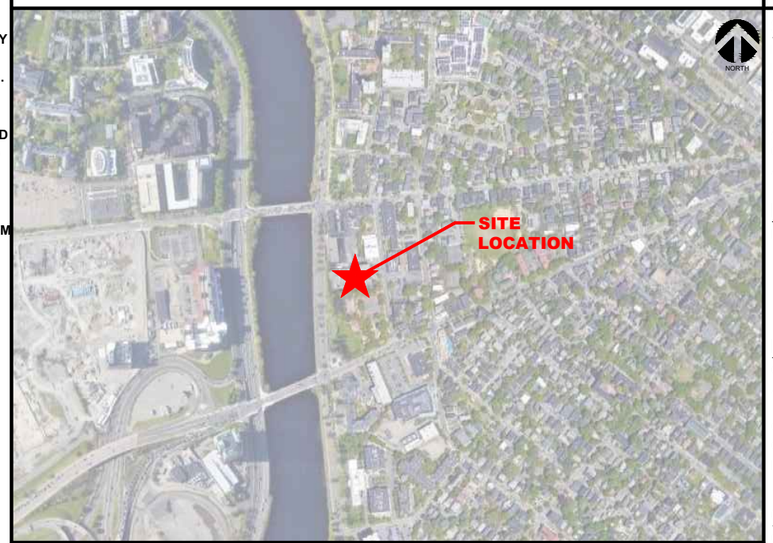
PROJECT NOTES:

1. SITE INFORMATION OBTAINED FROM THE FOLLOWING:
   A. PLAN ENTITLED "CAMBRIDGE PUTNAM AVENUE" PREPARED BY DEWBERRY ENGINEERS INC. OF BOSTON, MA LAST REVISED 01/25/2021.
   B. LIMITED FIELD OBSERVATION BY RAMAKER ON 12/29/2021.
2. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITY COMPANIES OR OTHER PUBLIC/GOVERNING AUTHORITIES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
4. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS OR PERFORMANCE OF WORK.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE AS A RESULT OF CONSTRUCTION OF THIS FACILITY AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
6. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
7. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING THE BID TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND CONSTRUCTION DRAWINGS.
8. THE CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THESE DRAWINGS MUST BE VERIFIED. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
9. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY POTENTIALLY DANGEROUS EXPOSURE LEVELS.
10. THE PROPOSED FACILITY WILL CAUSE NO INCREASE IN STORM WATER RUNOFF, THEREFORE, NO DRAINAGE STRUCTURES ARE PROPOSED.
11. NO NOISE, SMOKE, DUST OR ODOR WILL RESULT FROM THIS FACILITY AS TO CAUSE A NUISANCE.
12. THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION (NO HANDICAP ACCESS IS REQUIRED).
13. THE FACILITY DOES NOT REQUIRE POTABLE WATER OR SANITARY SERVICE.
14. CONTRACTOR SHALL VERIFY ANTENNA ELEVATION AND AZIMUTHS WITH RF ENGINEERING PRIOR TO INSTALLATION.
15. THE TOWER, MOUNTS AND ANTENNAS SHALL BE DESIGNED TO MEET EIA/TIA-222-G AS PER IBC REQUIREMENTS.
16. ALL STRUCTURAL ELEMENTS SHALL BE HOT DIPPED GALVANIZED STEEL.
17. CONTRACTOR MUST FIELD LOCATE ALL EXISTING UNDERGROUND UTILITIES PRIOR TO ANY EXCAVATION.
18. CONSTRUCTION SHALL NOT COMMENCE UNTIL COMPLETION OF A PASSING STRUCTURAL ANALYSIS CERTIFIED BY A LICENSED PROFESSIONAL ENGINEER.
19. CONTRACTOR SHALL CONTACT STATE SPECIFIC ONE CALL SYSTEM THREE WORKING DAYS PRIOR TO ANY EARTH MOVING ACTIVITIES.

at&t

SITE NAME:	**CAMBRIDGE MEMORIAL DRIVE**
FA NUMBER:	**10546807**
SITE NUMBER:	**MAL02881**
ADDRESS:	**840 MEMORIAL DRIVE** **CAMBRIDGE, MA 02139**
SCOPE:	**4TX4RX SOFTWARE RETROFIT - MRCTB062466 (2101A149QE),** **5G NR ACTIVATION - MRCTB058143, (-)** **5G NR ACTIVATION - MRCTB058149, (-)** **5G NR 1SR CBAND - MRCTB052281 (2101A102CF),** **BBU RECONFIGURATION - MRCTB050850 (2101A0Z85X),** **5G NR 1SR CBAND - MRCTB051464 (2101A0Z7FR),** **LTE 5C - MRCTB051052 (2101A0Z76F),** **4TXRX ANTENNA RETROFIT - MRCTB051059 (2101A0Z716),**

AERIAL MAP:



CODE COMPLIANCE:

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

1. 9TH EDITION OF THE MA STATE BUILDING CODE
2. 2015 INTERNATIONAL BUILDING CODE
3. 2015 INTERNATIONAL MECHANICAL CODE
4. ANSI/TIA-222-G STRUCTURAL STANDARD

811 Know what's below. Call before you dig. www.call811.com

PROJECT INFORMATION:

SITE INFORMATION:

LATITUDE:	42.3630861° N
LONGITUDE:	71.1154083° W
JURISDICTION:	MIDDLESEX COUNTY

APPLICANT/LESSEE:

COMPANY:	AT&T
ADDRESS:	NEW ENGLAND MARKET

PROPERTY OWNER:

PROPERTY OWNER: RIVERTECH ASSOCIATES, LLC.
C/O ABBEY GROUP
177 HUNTINGTON AVE.
FLOOR 24
BOSTON, MA 02115

REAL ESTATE:

COMPANY:	SMARTLINK, LLC
ADDRESS:	85 RANGEWAY ROAD BUILDING 3, SUITE 102
CITY, STATE, ZIP:	NORTH BILLERICA, MA 01862
CONTACT:	EVAN GIANNAKAS
E-MAIL:	EVAN.GIANNAKAS@ SMARTLINKGROUP.COM

CONSTRUCTION MANAGER:

COMPANY:	SMARTLINK, LLC
ADDRESS:	85 RANGEWAY ROAD BUILDING 3, SUITE 102
CITY, STATE, ZIP:	NORTH BILLERICA, MA 01862
CONTACT:	EVAN GIANNAKAS
E-MAIL:	EVAN.GIANNAKAS @SMARTLINKGROUP.COM

ENGINEER:

COMPANY:	RAMAKER
ADDRESS:	855 COMMUNITY DRIVE
CITY, STATE, ZIP:	SAUK CITY, WI 53583
CONTACT:	ANGELA KVALHEIM
E-MAIL:	AKVALHEIM@RAMAKER.COM

PROJECT DESCRIPTION/ SCOPE OF WORK

- REMOVE (6) EXISTING COAX, (3) EXISTING 18 PAIR FIBER TRUNKS, (6) DC TRUNKS
- REMOVE (3) EXISTING RRU-11 B12 RRUs, (1) PER SECTOR
- REMOVE (3) EXISTING 4478 B5 RRUs, (1) PER SECTOR
- INSTALL (3) NEW 4478 B14 RRUs, (1) PER SECTOR
- INSTALL (3) NEW 4449 B5/12 RRUs, (1) PER SECTOR
- REMOVE (3) EXISTING KMW EPBQ-654L8H8-L2 ANTENNAS, (1) PER SECTOR
- REMOVE (3) EXISTING CCI OPA65R-BU8B ANTENNAS, (1) PER SECTOR
- REMOVE (6) EXISTING CCI HPA65R-BU8A ANTENNAS, (2) PER SECTOR
- INSTALL (3) NEW ERICSSON AIR6449 B77D ANTENNAS, (1) PER SECTOR
- INSTALL (3) NEW CCI TPA65R-BU4DA ANTENNAS, (1) PER SECTOR
- INSTALL (3) NEW ERICSSON AIR6419 B77G ANTENNAS, (1) PER SECTOR
- INSTALL (3) NEW CCI DMP65R-BU4DA ANTENNAS, (1) PER SECTOR
- REMOVE (2) EXISTING DC6-48-60-0-8C SQUIDS
- REMOVE (1) EXISTING DC6-48-60-18-8F SQUID
- INSTALL (3) NEW DC-9-48-60-24-PC16-EV POWER/FIBER NEMA BOX
- INSTALL (9) NEW 4 AWG DC POWER CABLES
- INSTALL (3) NEW 24 PAIR FIBER TRUNK
- ADD (3) Y-CABLES
- ADD 6648
- ADD IDLe Xcede
- ADD 6630 WITH IDLe
- DECOM UMTS AND REMOVE UNUSED LINES

PROPOSED PROJECT SCOPE BASED ON RFDS
ID# 4654903, VERSION 4.0, LAST UPDATED 03/23/2022.

SHEET INDEX

SHEET NUMBER	SHEET DESCRIPTION
T-1	TITLE SHEET
GN-1	GENERAL NOTES
C-1	COMPOUND PLAN
C-2	EQUIPMENT LAYOUT PLAN & ELEVATION
C-3	ANTENNA LAYOUTS
C-4	ANTENNA SCHEDULE
A-1	CONSTRUCTION DETAILS
A-2	CONSTRUCTION DETAILS
A-3	RF PLUMBING DIAGRAM
G-1	GROUNDING DETAILS
G-2	GROUNDING DETAILS

at&t

smartlink
85 RANGEWAY ROAD - BLDG 3, SUITE 102
NORTH BILLERICA, MA 01862
SMARTLINKLLC.COM

RAMAKER
employee-owned
(608) 643-4100 www.ramaker.com

Certification & Seal:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Massachusetts.

COMMONWEALTH OF MASSACHUSETTS
JEFFREY ZANDER
STRUCTURAL
No. 55191
REGISTERED
PROFESSIONAL ENGINEER

Registered Structural Engineer Signature: 4/06/2022 Date:

MARK	DATE	DESCRIPTION
1	04/06/22	STAMPED FOR CONSTRUCTION
0	03/25/22	CDs ISSUED FOR REVIEW

ISSUE PHASE: FINAL
DATE ISSUED: 03/25/2022

PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
TITLE SHEET

SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: T-1

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.

DRAWN BY: AEM CHECKED BY: AJK

C:\Users\lkluender\AppData\Local\Temp\AcPublish_20700\51676_10546807_AE201_211207_MAL02881_Rev0_CBand.dwg Printed by: lkluender on Apr 06, 2022 - 2:07pm

GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND FOR GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5O HMS OR LESS.
4. THE SUBCONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
5. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
6. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
7. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE EQUIPMENT GROUND RING WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK TO BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE #2 AWG SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
10. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
11. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. ALL BENDS SHALL BE MADE WITH 12" RADIUS OR LARGER.
12. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
13. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS EXCEPT FOR GROUND BAR CONNECTION FROM MGB TO OUTSIDE EXTERIOR GROUND SHALL ALL BE CADWELD CONNECTIONS.
14. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
15. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED TO THE TOWER GROUND BAR.
16. APPROVED ANTIOXIDANT COATINGS (I.E. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
17. ALL EXTERIOR AND INTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
18. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
19. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF MAIN GROUND WIRES WITH 1-#2 AWG TIN-PLATED COPPER GROUND CONDUCTOR.
20. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G. NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
21. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/4" IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50.
22. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
    CONTRACTOR - SMARTLINK
    SUBCONTRACTOR - GENERAL CONTRACTOR (CONSTRUCTION)
    OWNER - AT&T (NEW CINGULAR WIRELESS PCS, LLC)
23. ALL SITE WORK SHALL BE COMPLETED AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
24. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
25. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
26. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
27. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
28. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
29. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
30. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
31. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
32. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE RESPONSIBLE ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING & EXCAVATION.
33. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, AS DIRECTED BY THE RESPONSIBLE ENGINEER, AND SUBJECT TO THE APPROVAL OF THE OWNER AND/OR LOCAL UTILITIES.
34. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION.
35. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
36. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
37. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
38. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.
39. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
40. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE.
41. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
42. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTOR.
43. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
44. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
45. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS.
46. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (FY = 36 KSI) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (FY = 35 KSI). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
47. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."
48. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
49. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION, ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
50. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN ALERT OF DANGEROUS EXPOSURE LEVELS.

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Certification & Seal:
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COMMONWEALTH OF MASSACHUSETTS
JEFFREY ZANDER
STRUCTURAL
No. 55191
REGISTERED
PROFESSIONAL ENGINEER

Registered Structural Engineer Signature: 4/06/2022 Date:

MARK	DATE	DESCRIPTION
1	04/06/22	STAMPED FOR CONSTRUCTION
0	03/25/22	CDs ISSUED FOR REVIEW

ISSUE PHASE: FINAL DATE ISSUED: 03/25/2022

PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
NOTES

SCALE: NONE

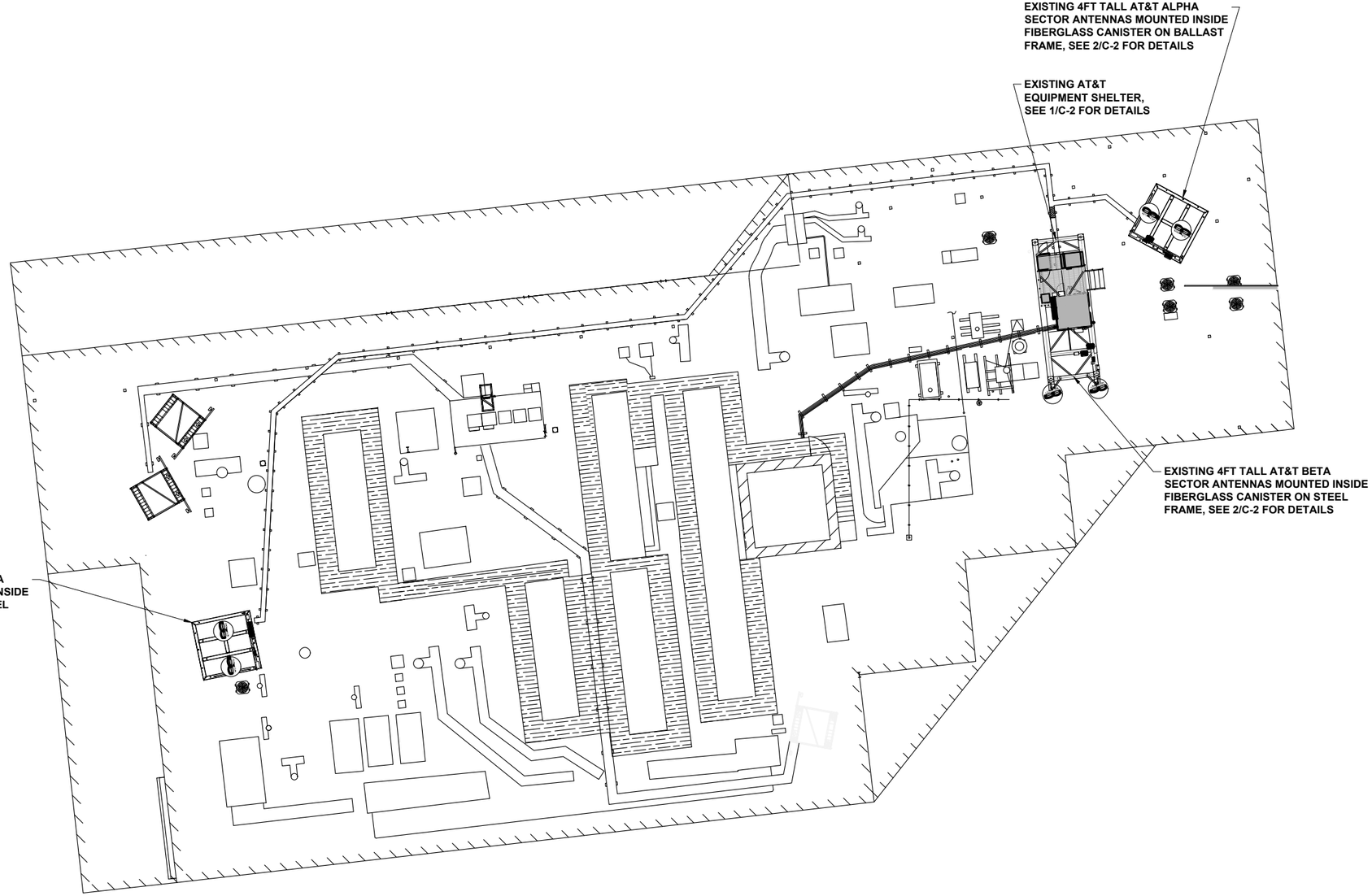
PROJECT NUMBER: 51676
SHEET NUMBER: GN-1

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.

DRAWN BY: AEM CHECKED BY: AJK

C:\Users\lkluender\AppData\Local\Temp\AcPublish_20700\51676_10546807_AE201_211207_MAL02881_Rev0_CBand.dwg Printed by: lkluender on Apr 06, 2022 - 2:07pm

NORTH



COMPOUND PLAN
SCALE: 1" = 25' (1)

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PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
COMPOUND PLAN

0 12.5' 25' 50'
11" x 17" - 1" = 25'
22" x 34" - 1" = 12.5'

PROJECT NUMBER: 51676
SHEET NUMBER: C-1

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.

NORTH

EXISTING NATURAL GAS BOOSTER MOUNTED ON STEEL PLATFORM

EXISTING 15KW DC GENERATOR MOUNTED ON STEEL PLATFORM

EXISTING STAIRS

EXISTING TRANSFORMER ON STEEL PLATFORM

DECOM UMTS AND REMOVE UNUSED LINE ELEMENTS

EXISTING 6'-8" x 6'-8" AT&T WALK IN CABINET (WIC) ON STEEL FRAME BOLTED TO STEEL PLATFORM FRAME MEMBERS

ADD 6648, IDLe Xcede & 6630 WITH IDLe TO EXISTING CABINET

FINAL BBU CONFGURATION:
(1) 6648 + Xcede LINK
(1) 6630 + (1) XMU + IDLe LINK
(1) 6630

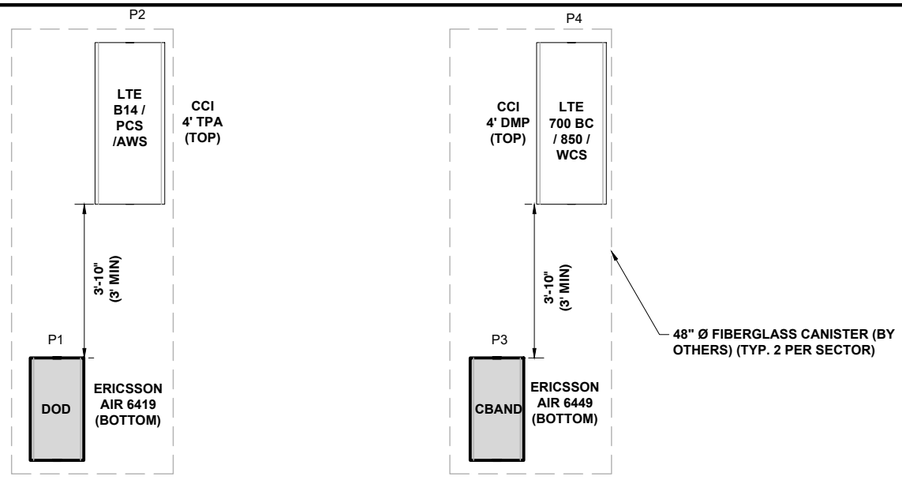
EXISTING STEEL PLATFORM

EXISTING GPS ANTENNA MOUNTED TO WIC

EXISTING BETA RADIOS AND SQUID MOUNTED ON STRUT FRAME ON PLATFORM.

EQUIPMENT LAYOUT (1)

SCALE: 1" = 3.75'



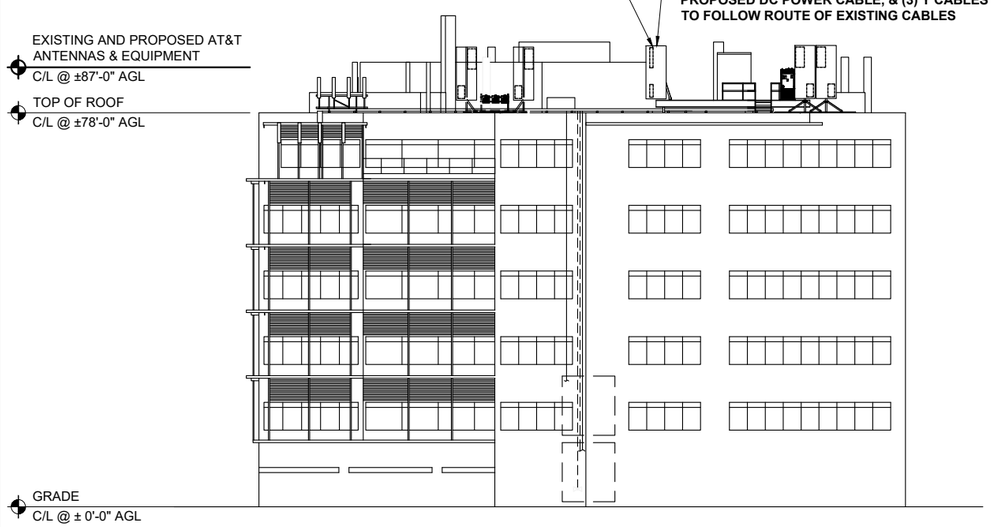
ENLARGED ELEVATION OF BACK OF ANTENNAS (2)

SCALE: 1" = 3.75'

NOTE:
A STRUCTURAL & MOUNT ASSESSMENT OF THE ANTENNA AND EQUIPMENT MOUNTING STRUCTURE HAS BEEN COMPLETED BY RAMAKER, DATED APRIL 6, 2022.

EXISTING & PROPOSED AT&T ANTENNAS & EQUIPMENT, SEE C-3 FOR DETAILS

(6) EXISTING COAX, (2) EXISTING 18 PAIR FIBER TRUNK, & (6) EXISTING DC POWER CABLES TO BE REMOVED.
(3) PROPOSED 24 PAIR FIBER TRUNK, (9) PROPOSED DC POWER CABLE, & (3) Y CABLES TO FOLLOW ROUTE OF EXISTING CABLES



ELEVATION VIEW (3)

SCALE: 1" = 30'

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COMMONWEALTH OF MASSACHUSETTS
JEFFREY ZANDER STRUCTURAL No. 55191 REGISTERED PROFESSIONAL ENGINEER

Registered Structural Engineer Signature: 4/06/2022 Date:

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PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

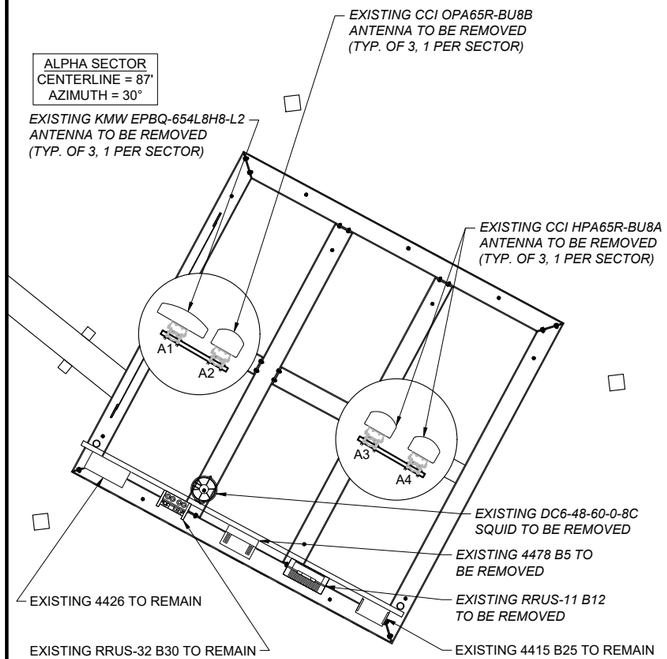
PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
EQUIPMENT LAYOUT AND ELEVATION VIEW

SCALE:
AS NOTED

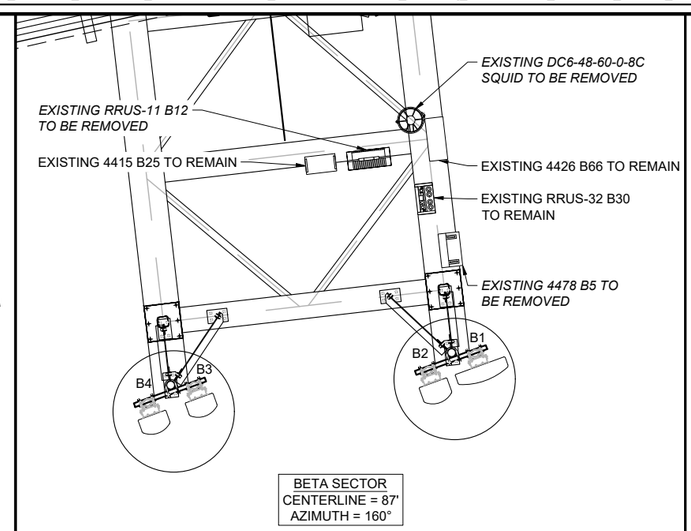
PROJECT NUMBER: 51676
SHEET NUMBER: C-2

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.



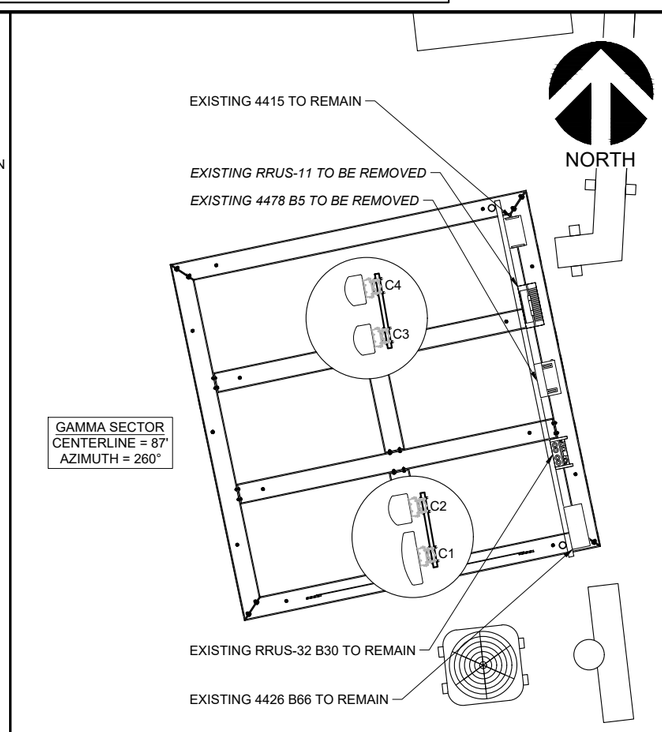
EXISTING ALPHA SECTOR ANTENNA LAYOUT 1

SCALE: NTS



EXISTING BETA SECTOR ANTENNA LAYOUT 2

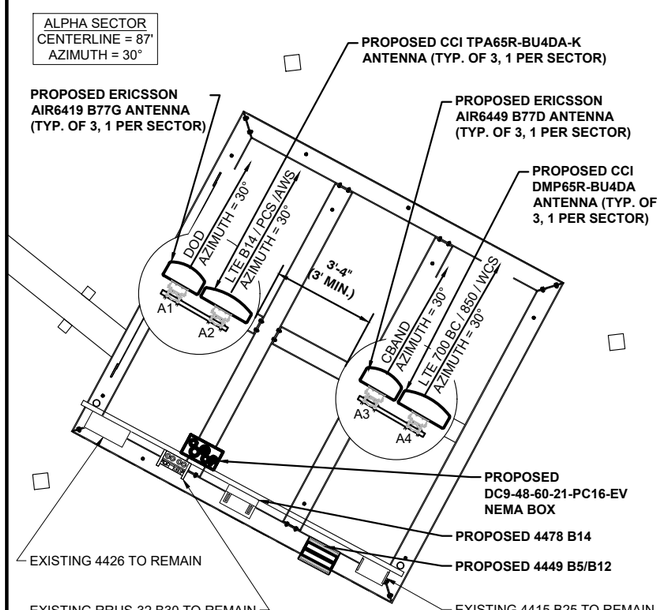
SCALE: NTS



EXISTING GAMMA SECTOR ANTENNA LAYOUT 3

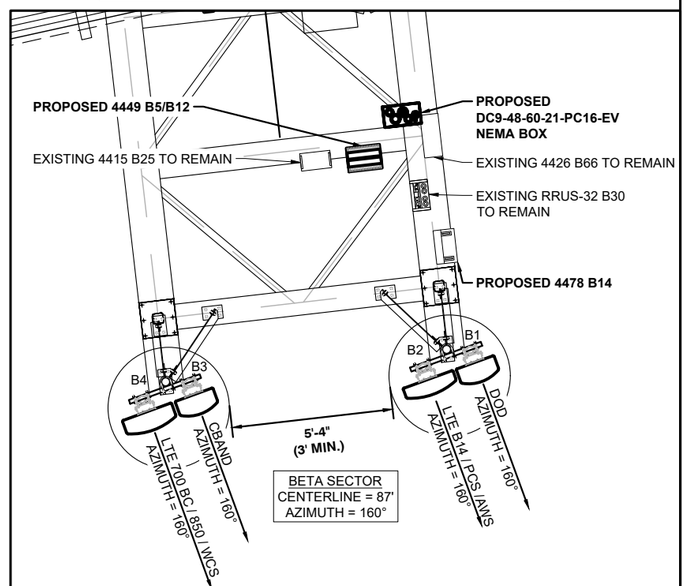
SCALE: NTS

NOTES:
-3 FEET MINIMUM SEPARATION BETWEEN LTE ANTENNAS
-6 FEET MINIMUM SEPARATION BETWEEN 700 BC & 700 DE ANTENNAS
-8 INCH MINIMUM SEPARATION BETWEEN BACK OF PANEL ANTENNA AND EXISTING/PROPOSED EQUIPMENT



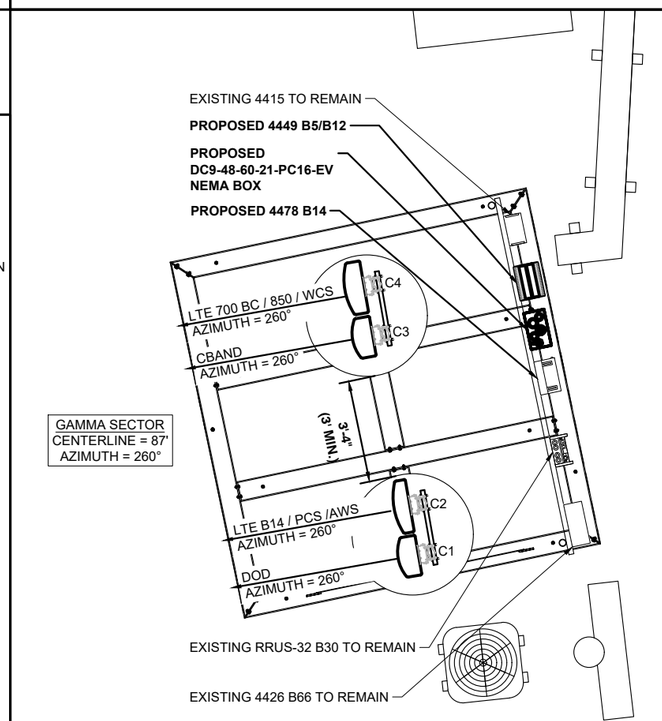
PROPOSED ALPHA SECTOR ANTENNA LAYOUT 4

SCALE: NTS



PROPOSED BETA SECTOR ANTENNA LAYOUT 5

SCALE: NTS



PROPOSED GAMMA SECTOR ANTENNA LAYOUT 6

SCALE: NTS

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COMMONWEALTH OF MASSACHUSETTS
JEFFREY ZANDER STRUCTURAL No. 55191
REGISTERED PROFESSIONAL ENGINEER

4/06/2022
Professional Structural Engineer Signature: Date:

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0	03/25/22	CDs ISSUED FOR REVIEW

ISSUE PHASE: FINAL — DATE ISSUED: 03/25/2022

PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
ANTENNA LAYOUTS

SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: C-3

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.

SECTOR		EXISTING ANTENNA	PROPOSED ANTENNA	TECHNOLOGY	ANTENNA STATUS	HEIGHT (IN.)	WIDTH (IN.)	DEPTH (IN.)	WEIGHT (LBS.)	ANTENNA AZIMUTH (DEG.)	ANT. C/L ELEV. (FT.)	REMOTE RADIO/TMA CONFIGURATION	TRANSMISSION CABLE			-
													QUANTITY	TYPE	STATUS	
SECTOR 1	1	*KWM EPBQ-654L8H8-L2*	ERICSSON AIR6419 B77G	DOD	PROPOSED	28.3	16.1	7.9	77	30	87	-	-	-	-	*(2) EXISTING DC6-48-60-0-8C SQUIDS (REMOVE)* *(1) EXISTING DC6-48-60-18-8F SQUID (REMOVE)* **(3) PROPOSED DC9-48-60-24-PC16-EV NEMA BOX**
	2	*CCI OPA65R-BU8B*	CCI TPA-65R-BU4DA-K	LTE B14 / PCS /AWS	PROPOSED	48.0	20.7	7.7	52.6	30	87	(1) 4478 B14 (1) 4415 B25 (1) 4426 B66	1 3	24 PAIR FIBER 4AWG DC POWER	PROPOSED	
	3	*CCI HPA65R-BU8A*	ERICSSON AIR6449 B77D	CBAND	PROPOSED	30.4	15.9	10.6	83.8	30	87	-	-	-	-	
	4	*CCI HPA65R-BU8A*	CCI DMP65R-BU4DA	LTE 700 BC / 850 / WCS	PROPOSED	48.0	20.7	7.7	67.9	30	87	**(1) 4449 B5/B12** (1) RRUS-32 B30	1	Y-CABLE	PROPOSED	
SECTOR 2	1	*KWM EPBQ-654L8H8-L2*	ERICSSON AIR6419 B77G	DOD	PROPOSED	28.3	16.1	7.9	77	160	87	-	-	-	-	
	2	*CCI OPA65R-BU8B*	CCI TPA-65R-BU4DA-K	LTE B14 / PCS /AWS	PROPOSED	48.0	20.7	7.7	52.6	160	87	(1) 4478 B14 (1) 4415 B25 (1) 4426 B66	1 3	24 PAIR FIBER 4AWG DC POWER	PROPOSED	
	3	*CCI HPA65R-BU8A*	ERICSSON AIR6449 B77D	CBAND	PROPOSED	30.4	15.9	10.6	83.8	160	87	-	-	-	-	
	4	*CCI HPA65R-BU8A*	CCI DMP65R-BU4DA	LTE 700 BC / 850 / WCS	PROPOSED	48.0	20.7	7.7	67.9	30	87	**(1) 4449 B5/B12** (1) RRUS-32 B30	1	Y-CABLE	PROPOSED	
SECTOR 3	1	*KWM EPBQ-654L8H8-L2*	ERICSSON AIR6419 B77G	DOD	PROPOSED	28.3	16.1	7.9	77	260	87	-	-	-	-	
	2	*CCI OPA65R-BU8B*	CCI TPA-65R-BU4DA-K	LTE B14 / PCS /AWS	PROPOSED	48.0	20.7	7.7	52.6	260	87	(1) 4478 B14 (1) 4415 B25 (1) 4426 B66	1 3	24 PAIR FIBER 4AWG DC POWER	PROPOSED	
	3	*CCI HPA65R-BU8A*	ERICSSON AIR6449 B77D	CBAND	PROPOSED	30.4	15.9	10.6	83.8	260	87	-	-	-	-	
	4	*CCI HPA65R-BU8A*	CCI DMP65R-BU4DA	LTE 700 BC / 850 / WCS	PROPOSED	48.0	20.7	7.7	67.9	30	87	**(1) 4449 B5/B12** (1) RRUS-32 B30	1	Y-CABLE	PROPOSED	

Typos on the Azimuths for P4 on Beta & Gamma

ANTENNA SCHEDULE (1)
SCALE: NTS

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CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
ANTENNA SCHEDULE

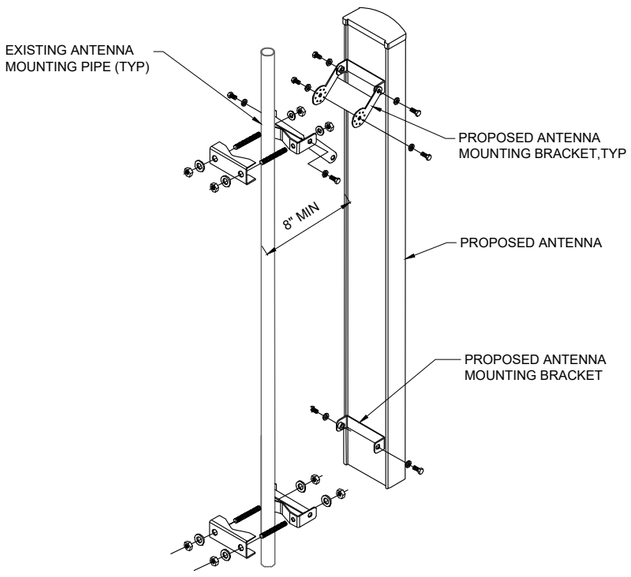
SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: C-4

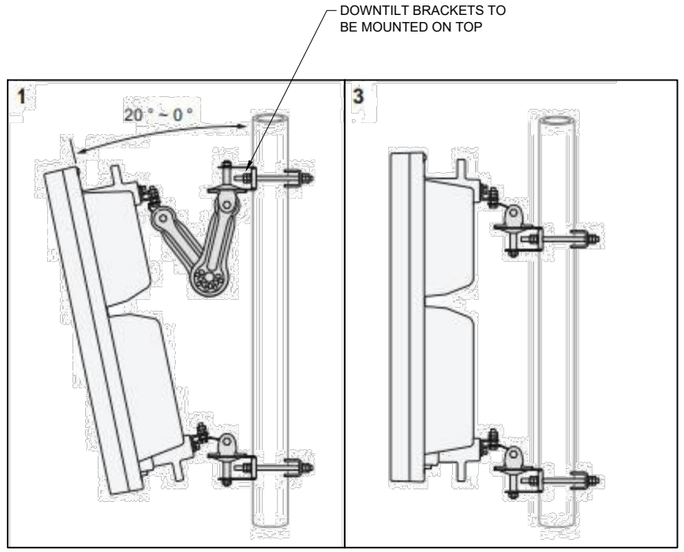
BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.

NOTES:
-3 FEET MINIMUM SEPARATION BETWEEN LTE ANTENNAS

-8 INCH MINIMUM SEPARATION BETWEEN BACK OF PANEL ANTENNA AND EXISTING/PROPOSED EQUIPMENT



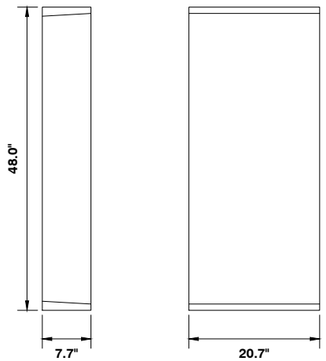
ANTENNA MOUNTING DETAIL (1)
SCALE: NTS



ANTENNA MOUNT DETAIL (2)
SCALE: NTS

CCI DMP65R-BU4DA

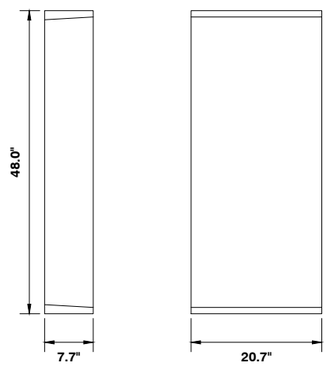
DIMENSIONS (HxWxD):
48"x20.7"x7.7"
WEIGHT (LBS): 67.9



DETAIL LABEL (3)
SCALE: NTS

CCI TPA65R-BU4DA

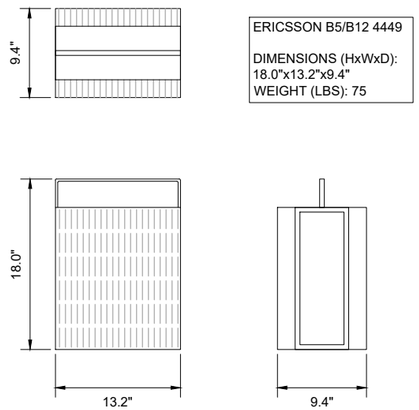
DIMENSIONS (HxWxD):
48"x20.7"x7.7"
WEIGHT (LBS): 67.9



DETAIL LABEL (4)
SCALE: NTS

ERICSSON B5/B12 4449

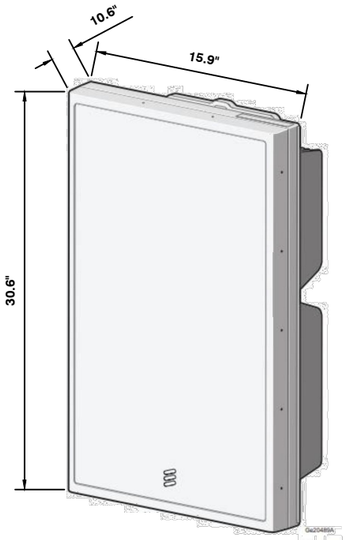
DIMENSIONS (HxWxD):
18.0"x13.2"x9.4"
WEIGHT (LBS): 75



RRUS B5/B12 4449 DETAIL (5)
SCALE: NTS

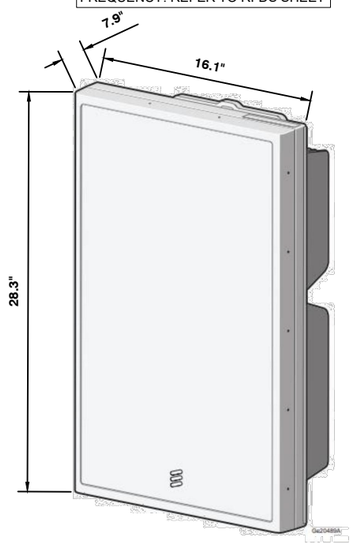
MANUFACTURER: ERICSSON
MODEL: AIR 6449
DIMENSIONS: 30.6"x15.9"x10.6"
WEIGHT: 83.8 LBS
FREQUENCY: REFER TO RFDS SHEET

NOTE:
1FT TIP TO TIP SEPARATION BETWEEN AIR ANTENNAS REQUIRED.



ANTENNA DETAIL (6)
SCALE: NTS

MANUFACTURER: ERICSSON
MODEL: AIR 6419
DIMENSIONS: 28.3"x16.1"x7.9"
WEIGHT: 77 LBS
FREQUENCY: REFER TO RFDS SHEET



ANTENNA DETAIL (6)
SCALE: NTS

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COMMONWEALTH OF MASSACHUSETTS
JEFFREY ZANDER STRUCTURAL No. 55191 REGISTERED
PROFESSIONAL ENGINEER

Registered Structural Engineer Signature: 4/06/2022 Date:

MARK	DATE	DESCRIPTION
1	04/06/22	STAMPED FOR CONSTRUCTION
0	03/25/22	CDs ISSUED FOR REVIEW

ISSUE PHASE: FINAL
DATE ISSUED: 03/25/2022

PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

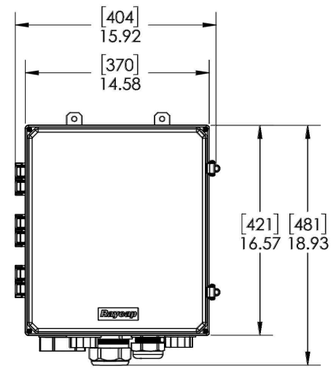
PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

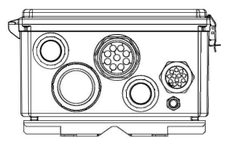
SHEET TITLE:
CONSTRUCTION DETAILS

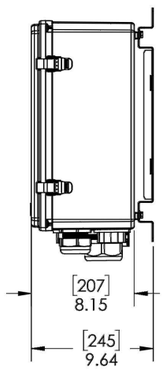
SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: A-1

MANUFACTURER: RAYCAP
MODEL: DC9-48-60-24-PC16-EV
DIMENSIONS: 16.34" × 16.57" × 8.19"
WEIGHT: 34.9 LBS
FREQUENCY: REFER TO RFDS SHEET







DC9-48-60-24-PC16-EV DETAIL (1)
SCALE: NTS

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smartlink

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FA# 10546807
SITE# MAL02881

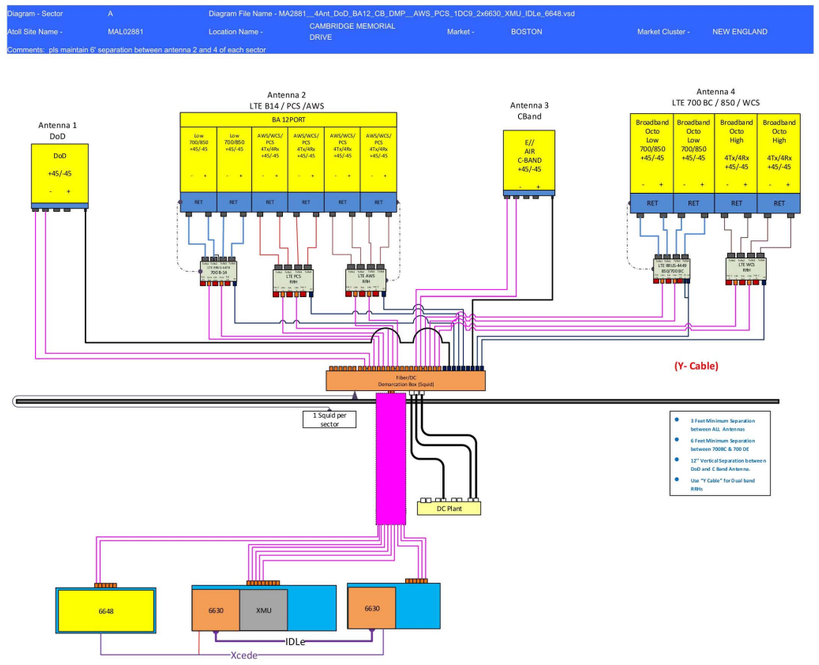
PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

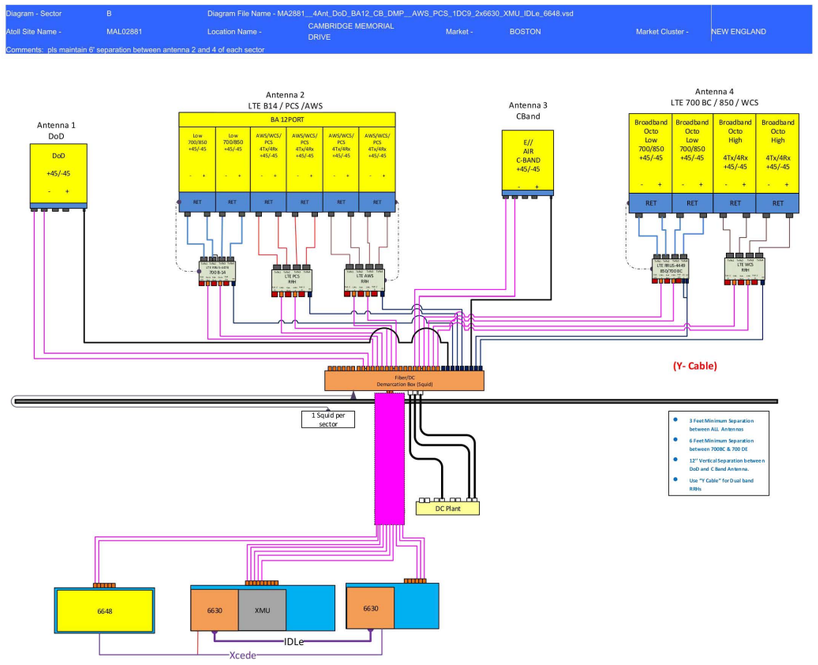
SHEET TITLE:
CONSTRUCTION DETAILS

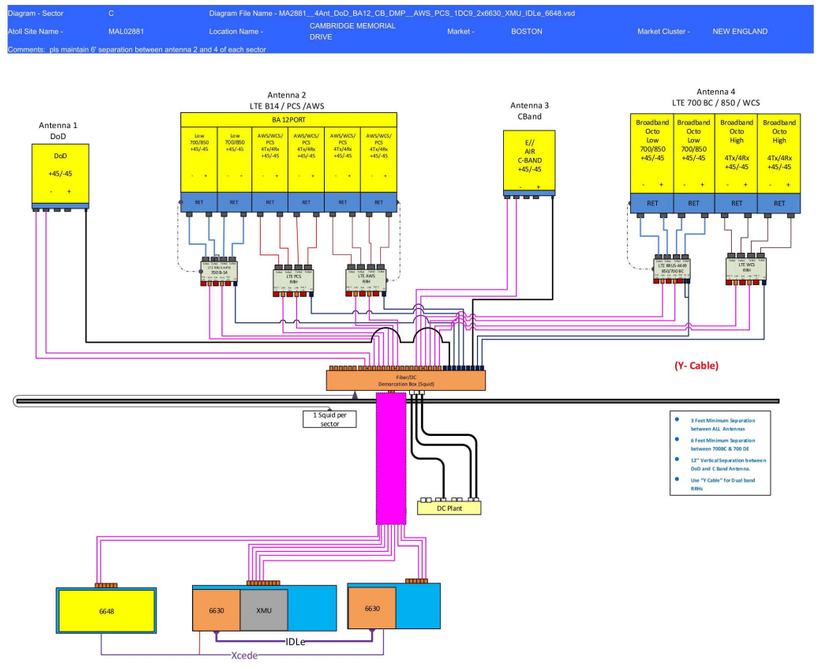
SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: A-2

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.







RF PLUMBING DIAGRAMS
SCALE: NTS
1

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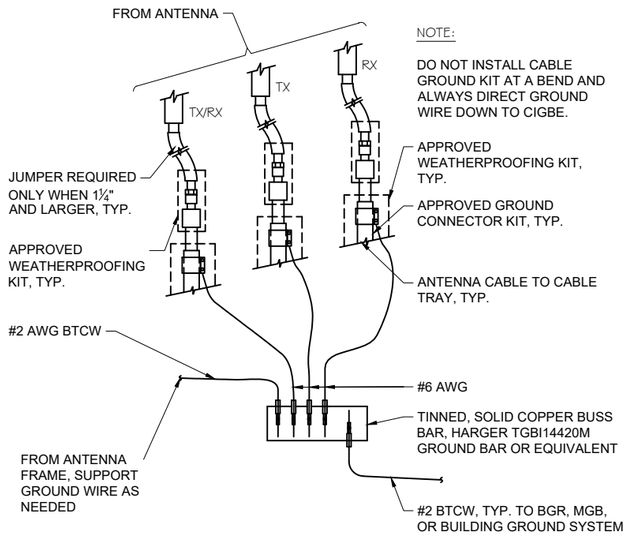
FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
RF PLUMBING DIAGRAMS

SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: A-3

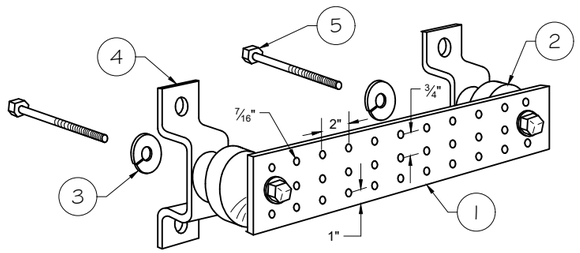


GROUND WIRE TO GROUND BAR DETAIL (1)

SCALE: NTS

NOTES:

1. ALL MOUNTING HARDWARE CAN BE USED ON 6", 12", 18", ETC. GROUND BARS.
2. ENTIRE ASSEMBLY AVAILABLE FROM NEWTON INSTRUMENT CO. CAT. NO. 2106060010 OR AS HARGER TGBI14420M.

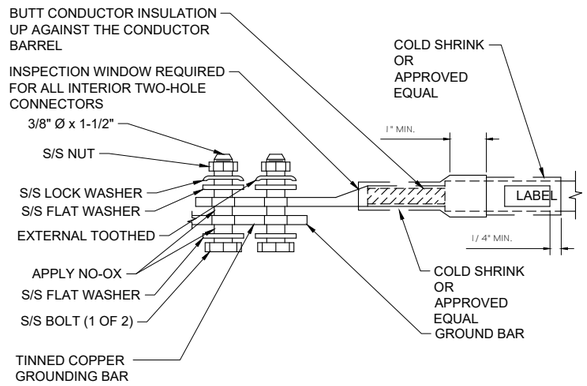


LEGEND

1. TINNED COPPER GROUND BAR, ¼" x 4" x 20", NEWTON CO., HARGER TGBI14420M, OR EQUIVALENT. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. INSULATORS. INSTRUMENT CO. CAT. NO. 3061-4 OR HARGER EQUIVALENT.
3. ⅝" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8 OR EQUIVALENT.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT. NO. A-6056 OR HARGER EQUIVALENT.
5. ⅝" x 1" H.H.C.S. BOLTS, NEWTON INSTRUMENT CO. CAT. NO. 3012-1 OR HARGER EQUIVALENT.

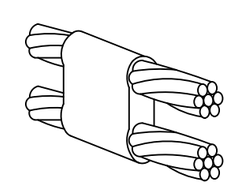
TYPICAL GROUND BAR DETAIL (2)

SCALE: NTS

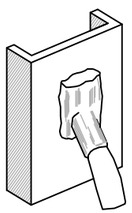


TYPICAL GROUND BAR CONNECTION DETAIL (3)

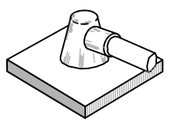
SCALE: NTS



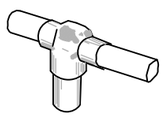
TYPE PT (PARALLEL HORIZ. COND.)
PARALLEL THROUGH CONNECTION OF HORIZONTAL CABLES



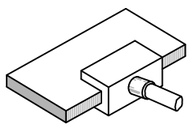
TYPE VS (VERT. STEEL SURFACE)
CABLE TAP DOWN AT 45° TO VERTICAL STEEL SURFACE INCLUDING PIPE



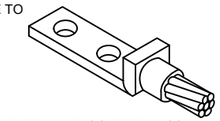
TYPE HS (HORIZ. STEEL SURFACE)
TO FLAT STEEL SURFACE OR HORIZONTAL PIPE



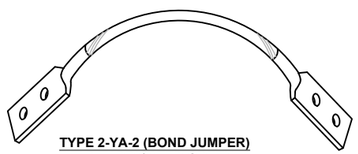
TYPE GT (THROUGH CABLE TO GROUND ROD)
THROUGH CABLE TO TOP OF GROUND ROD



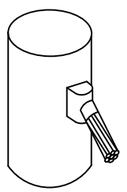
TYPE LJ (FLAT BUSBAR)
TAP OF HORIZONTAL CABLE TO EDGE OF HORIZONTAL



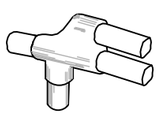
TYPE YA-2 (COPPER LUGS)
TWO HOLE- LONG BARREL LENGTH



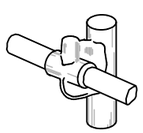
TYPE 2-YA-2 (BOND JUMPER)
FIELD FABRICATED GREEN STRANDED INSULATED



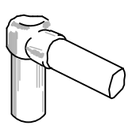
TYPE VS (VERTICAL PIPE)
CABLE TAP DOWN AT 45° TO RANGE OF VERTICAL PIPES



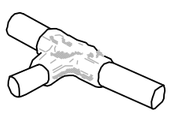
TYPE NC
THROUGH AND TAP CABLES TO GROUND ROD



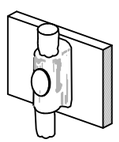
TYPE GY
THROUGH CABLE TO SIDE OF GROUND ROD



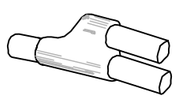
TYPE GR
CABLE TAP TO TOP OF GROUND ROD



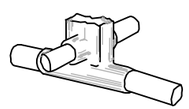
TYPE TA
TEE OF HORIZONTAL RUN AND TAP CABLES



TYPE W
THROUGH VERTICAL CABLE TO VERTICAL STEEL SURFACE OR TO THE SIDE OF EITHER HORIZONTAL OR VERTICAL PIPE



TYPE PC
PARALLEL TAP CABLES



TYPE XB
CROSS OF HORIZONTAL CABLES. LAPPED AND NOT CUT.

TYPICAL CADWELD TYPES DETAIL (4)

SCALE: NTS

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PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE
FA# 10546807
SITE# MAL02881

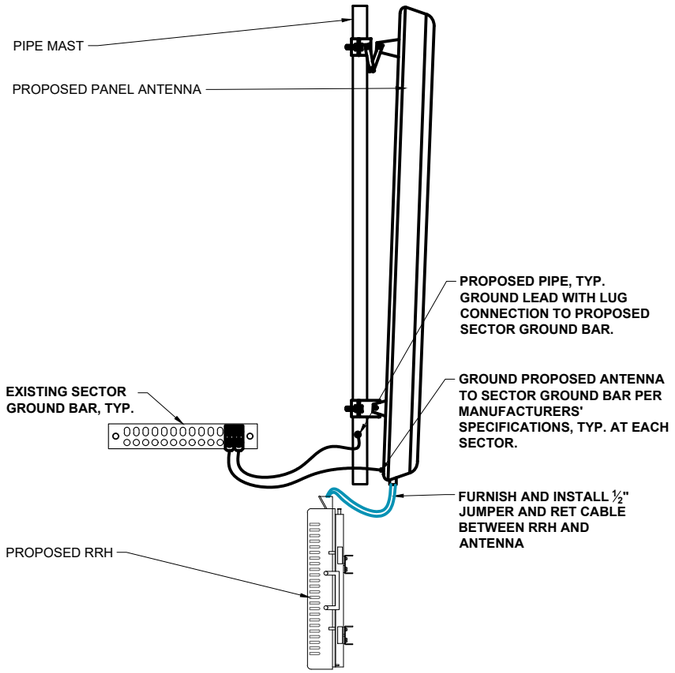
PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
GROUNDING DETAILS

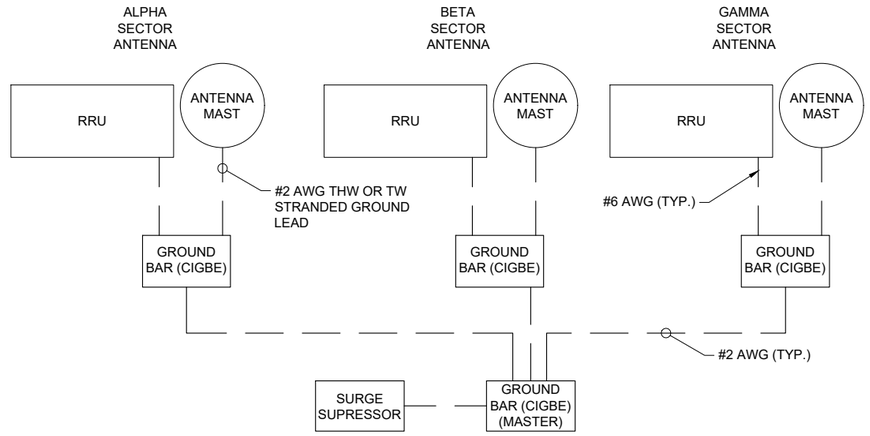
SCALE: NONE

PROJECT NUMBER: 51676
SHEET NUMBER: G-1

BASED ON: RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00" LAST REVISED 03/23/2022.



ANTENNA & RRU GROUNDING DETAIL 1
SCALE: NTS



SCHEMATIC DIAGRAM GROUNDING SYSTEM 2
SCALE: NTS

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FA# 10546807
SITE# MAL02881

PROJECT INFORMATION:
840 MEMORIAL DRIVE
CAMBRIDGE, MA 02139
MIDDLESEX COUNTY

SHEET TITLE:
GROUNDING DETAILS

SCALE: NONE

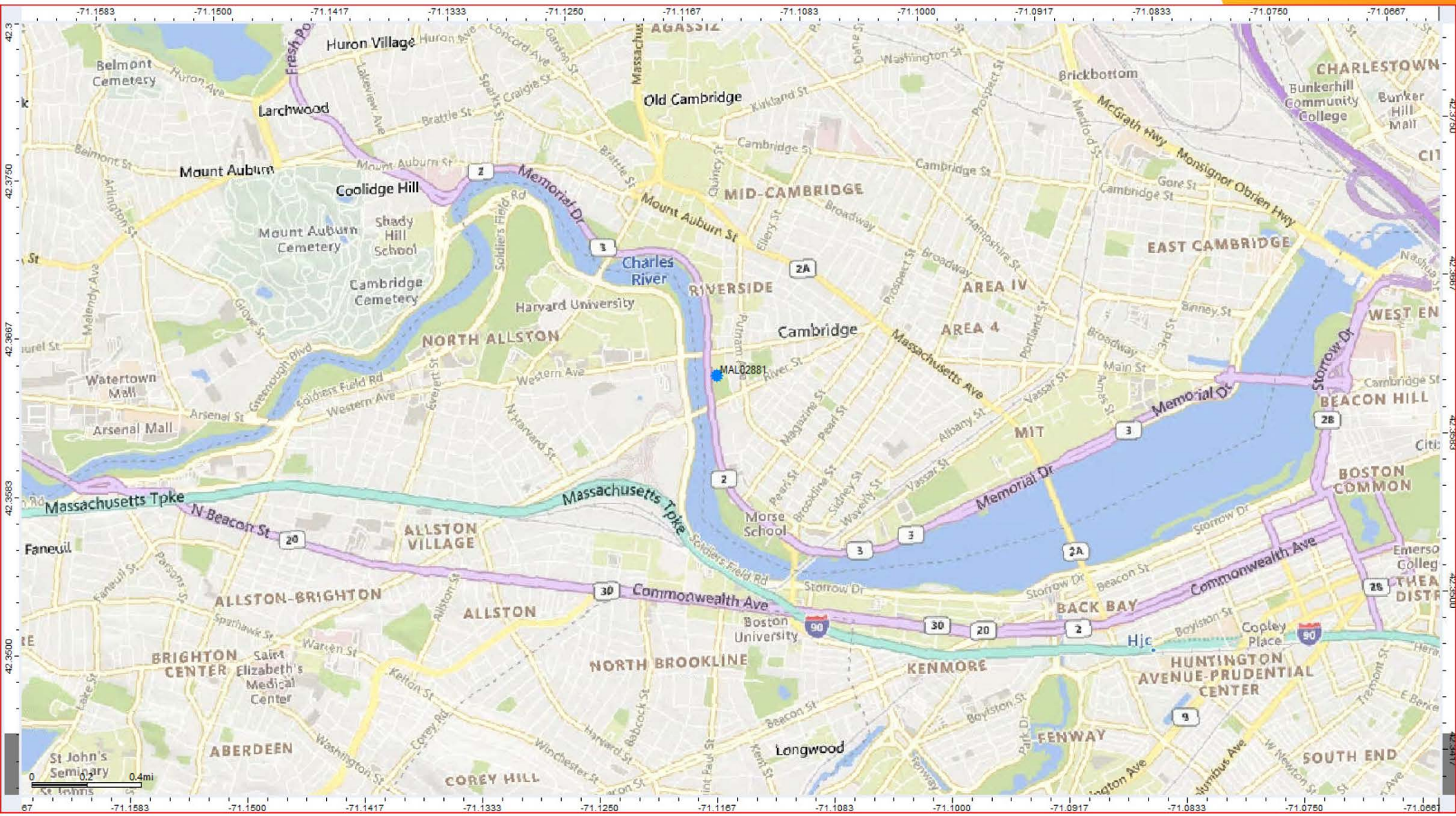
PROJECT NUMBER: 51676
SHEET NUMBER: G-2

Rethink Possible

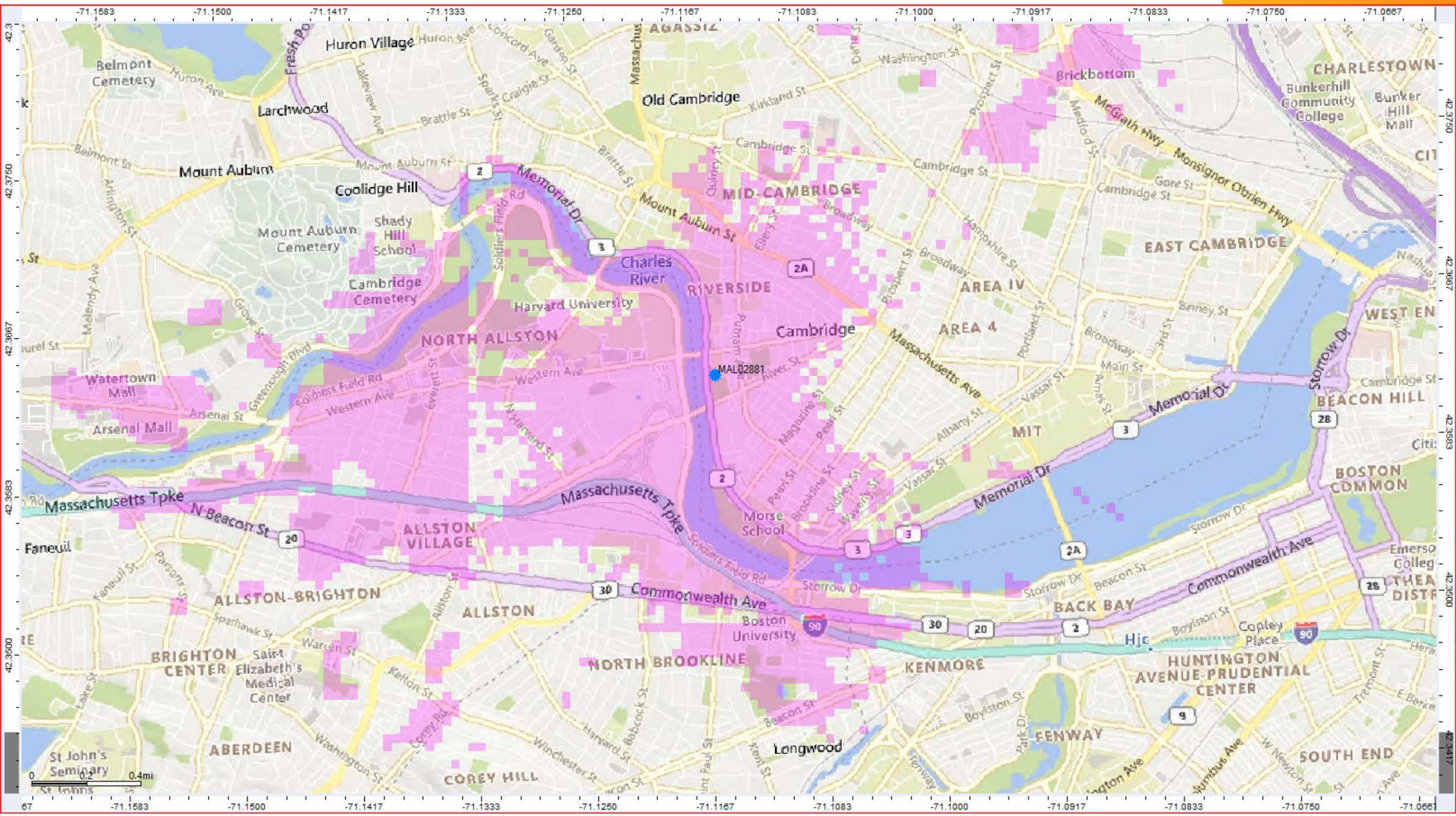
MAMN002881 New 5G C-Band NR & LTE 5C 700 B14 Coverage Plots

- Zoning Proposed C Band 5G Band & 5C LTE carrier add Plots

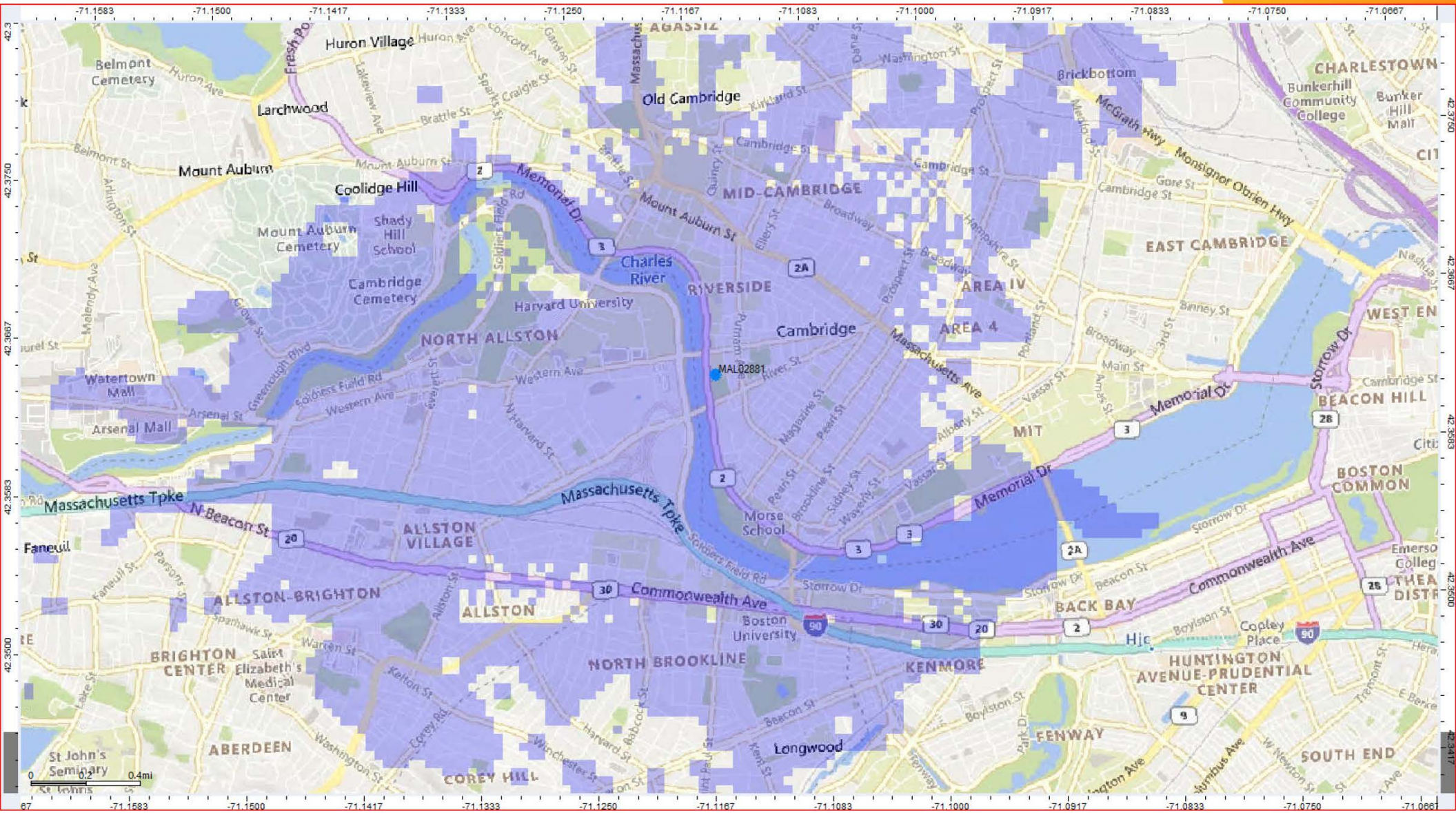
MAMN002881 Map Location



With Proposed MAMN002881 C Band Coverage



With Proposed MAL02881 proposed LTE 5C 700 B14 Band Coverage



SHEET TITLE:
PHOTO RENDERING/SIMULATION LOCATION MAP

PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:
51676

PROJECT LOCATION:
840 MEMORIAL DRIVE CAMBRIDGE, MA 02139

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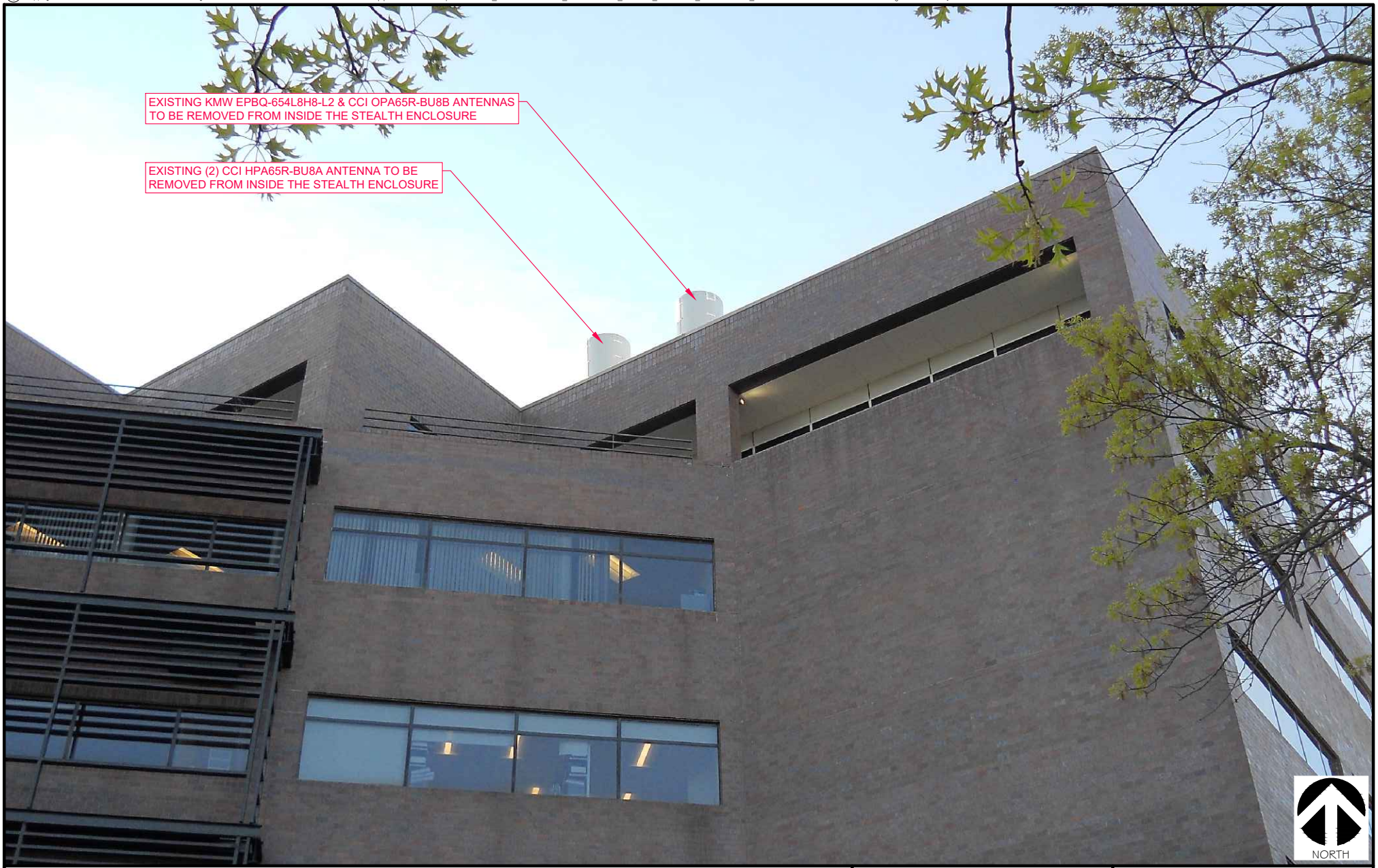

SHEET TITLE:

BEFORE PHOTO RENDERING/SIMULATION - LOOKING NORTH

PROJECT TITLE:

CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:

51676

PROJECT LOCATION:

840 MEMORIAL DRIVE CAMBRIDGE, MA 02139

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SHEET TITLE:

AFTER PHOTO RENDERING/SIMULATION - LOOKING NORTH

PROJECT TITLE:

CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:

51676

PROJECT LOCATION:

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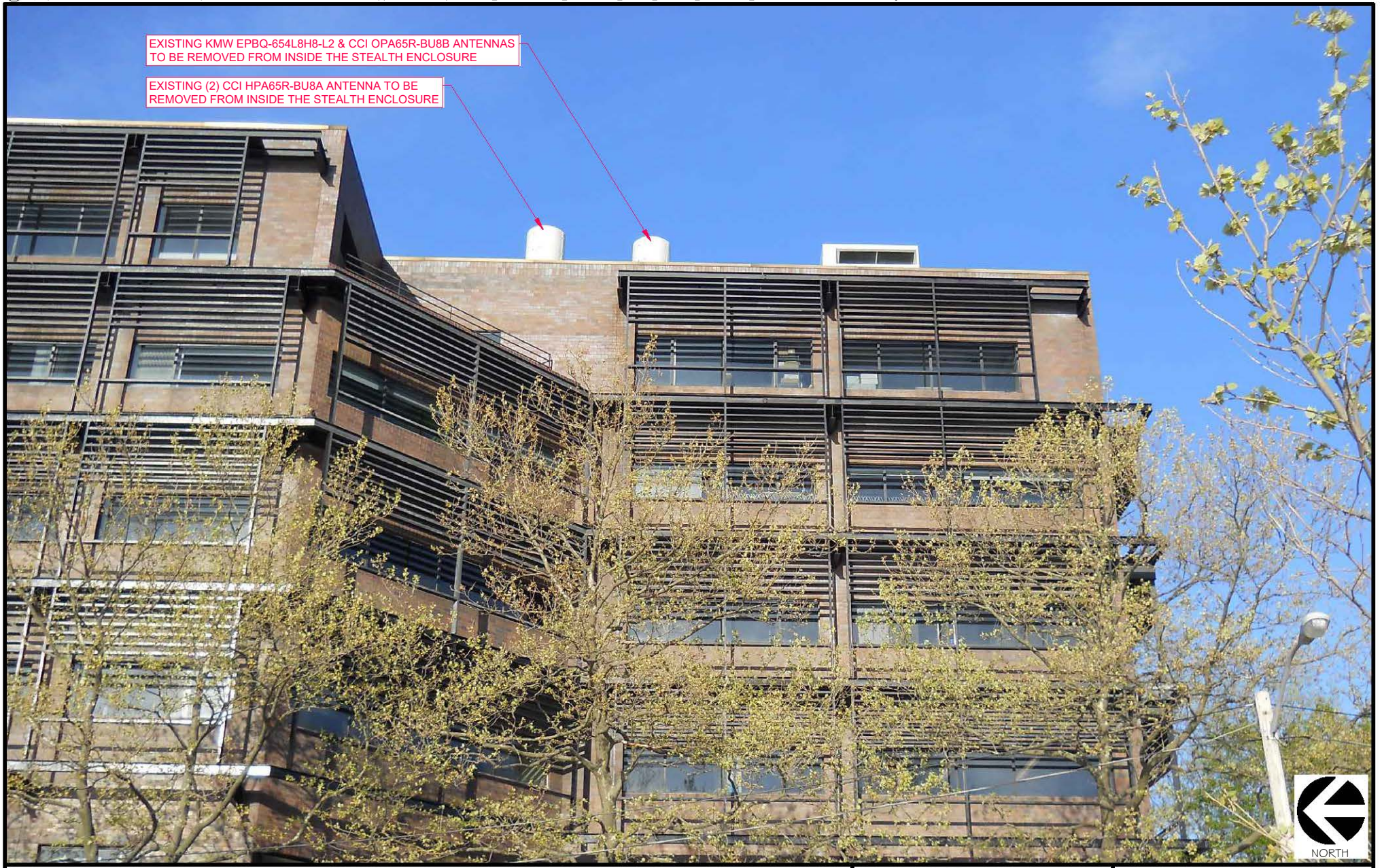

SHEET TITLE:

BEFORE PHOTO RENDERING/SIMULATION - LOOKING EAST

PROJECT TITLE:

CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:

51676

PROJECT LOCATION:

840 MEMORIAL DRIVE CAMBRIDGE, MA 02139

at&t

smartlink

85 RANGEWAY ROAD - BLDG 3, SUITE 102
NORTH BILLERICA, MA 01862
SMARTLINKLLC.COM

RAMAKER
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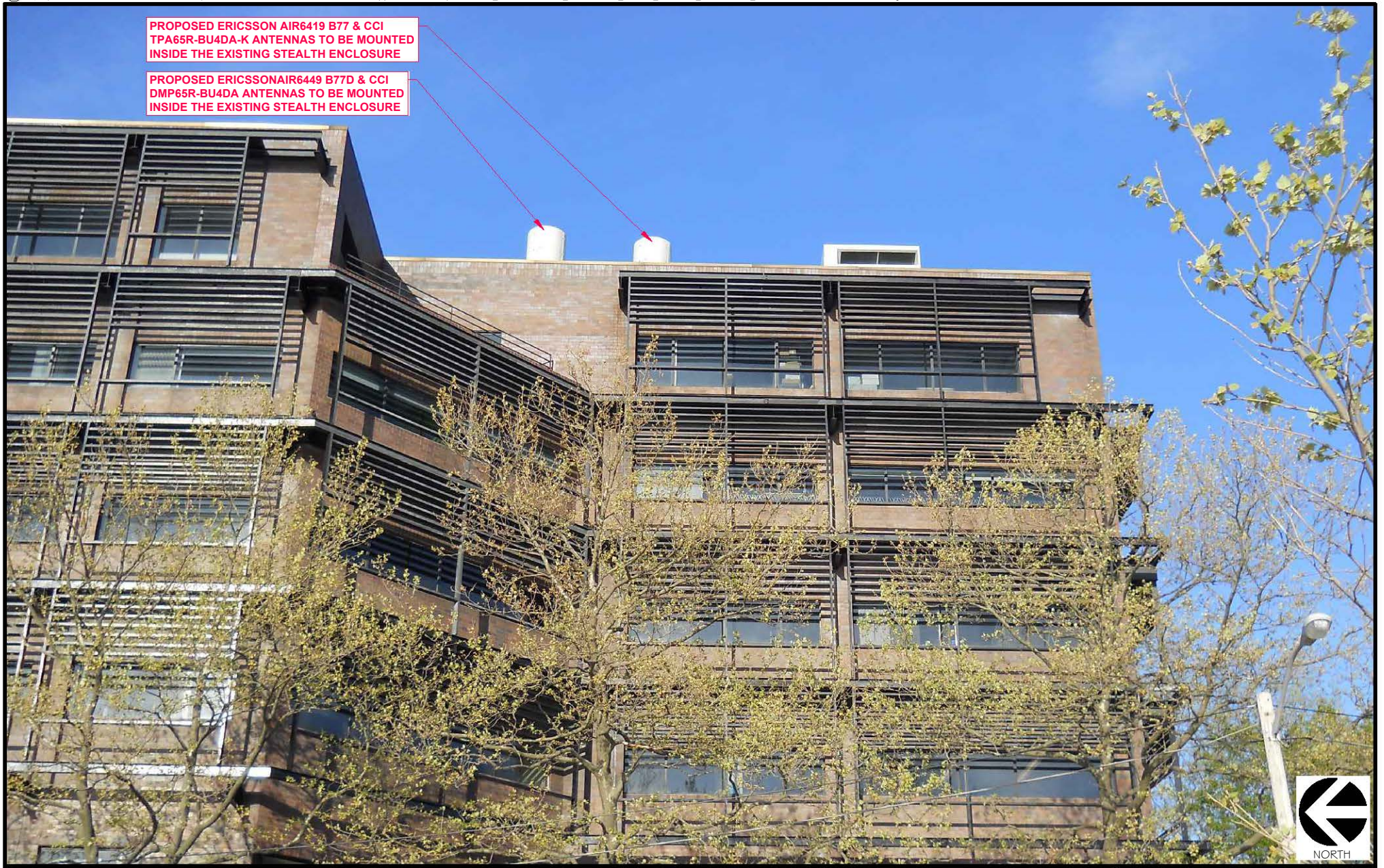
(608) 643-4100 www.ramaker.com



SHEET TITLE:

AFTER PHOTO RENDERING/SIMULATION - LOOKING EAST

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SHEET TITLE:

BEFORE PHOTO RENDERING/SIMULATION - LOOKING SOUTHEAST

PROJECT TITLE:

CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:

51676

PROJECT LOCATION:

840 MEMORIAL DRIVE CAMBRIDGE, MA 02139

at&t

smartlink

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SHEET TITLE:
AFTER PHOTO RENDERING/SIMULATION - LOOKING SOUTHEAST

PROJECT TITLE:
CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:
51676

PROJECT LOCATION:
840 MEMORIAL DRIVE CAMBRIDGE, MA 02139

at&t

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SHEET TITLE:

BEFORE PHOTO RENDERING/SIMULATION - LOOKING WEST

PROJECT TITLE:

CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:

51676

PROJECT LOCATION:

840 MEMORIAL DRIVE CAMBRIDGE, MA 02139

at&t

smartlink

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SHEET TITLE:

AFTER PHOTO RENDERING/SIMULATION - LOOKING WEST

PROJECT TITLE:

CAMBRIDGE MEMORIAL DRIVE

PROJECT NUMBER:

51676

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June 12, 2013

Gail Garrett, Town Clerk
Town of Mount Washington
118 East Street
Mount Washington, MA 01258

RE: Mount Washington Special Town Meeting of April 1, 2013 - Case # 6642
Warrant Articles # 1, 2, and 3 (Zoning)

Dear Ms. Garrett:

Articles 1, 2, and 3 - We approve the amendments to the Town by-laws adopted under Articles 1, 2, and 3 on the warrant for the Mount Washington Special Town Meeting that convened on April 1, 2013, and the map pertaining to Article 3. Our comments on Articles 1 and 2 are provided below.

Article 1 - The amendments adopted under Article 1 add a new Section 215-27 to the zoning by-laws entitled "Wireless Telecommunication Facility Zoning Bylaw." We approve the new Section 215-27, but offer the following comments.

I. Applicable Law

The federal Telecommunications Act of 1996, 47 U.S.C. § 332 (7) preserves state and municipal zoning authority to regulate personal wireless service facilities, subject to the following limitations:

1. Zoning regulations "shall not unreasonably discriminate among providers of functionally equivalent services." 47 U.S.C. §332(7) (B) (i) (I)

2. Zoning regulations "shall not prohibit or have the effect of prohibiting the provisions of personal wireless services." 47 U.S.C. § 332 (7) (B) (i) (II).

3. The Zoning Authority "shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time." 47 U.S.C.

§ 332 (7) (B) (ii).

4. Any decision "to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record." 47 U.S.C. § 332 (7) (B) (iii).

5. "No state or local government or instrumentality thereof may regulate the placement, construction and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the [Federal Communications] Commission's regulations concerning emissions." 47 U.S.C. § 332(7) (B) (iv).

Federal courts have construed the limitations listed under 47 U.S.C. § 332(7) as follows. First, even a facially neutral by-law may have the effect of prohibiting the provision of wireless coverage if its application suggests that no service provider is likely to obtain approval. "If the criteria or their administration effectively preclude towers no matter what the carrier does, they may amount to a ban 'in effect'...." Town of Amherst, N.H. v. Omnipoint Communications Enters, Inc., 173 F.3d 9, 14 (1st Cir. 1999).

Second, local zoning decisions and by-laws that prevent the closing of significant gaps in wireless coverage have been found to effectively prohibit the provision of personal wireless services in violation of 47 U.S.C. § 332(7). See, e.g., Nat'l Tower, LLC v. Plainville Zoning Bd. of Appeals, 297 F.3d 14, 20 (1st Cir. 2002) ("local zoning decisions and ordinances that prevent the closing of significant gaps in the availability of wireless services violate the statute"); Omnipoint Communications MB Operations, LLC v. Town of Lincoln, 107 F. Supp. 2d 108, 117 (D. Mass. 2000) (by-law resulting in significant gaps in coverage within town had effect of prohibiting wireless services).

Third, whether the denial of a permit has the effect of prohibiting the provision of personal wireless services depends in part upon the availability of reasonable alternatives. See 360 Degrees Communications Co. v. Bd. of Supervisors, 211 F.3d 79, 85 (4th Cir. 2000). Zoning regulations must allow cellular towers to exist somewhere. Towns may not effectively ban towers throughout the municipality, even under the application of objective criteria. See Virginia Metronet, Inc. v. Bd. of Supervisors, 984 F. Supp. 966, 971 (E.D. Va. 1998).

State law also establishes certain limitations on a municipality's authority to regulate wireless communications facilities and service providers. Under General Laws Chapter 40A, Section 3, wireless service providers may apply to the Department of Telecommunications and Cable for an exemption from local zoning requirements. If a telecommunication provider does not apply for or is not granted an exemption under c. 40A, § 3, it remains subject to local zoning requirements pertaining to cellular towers. See Building Comm'r of Franklin v. Dispatch Communications of New England, Inc., 48 Mass. App. Ct. 709, 722 (2000). Also, G.L. c. 40J, § 6B, charges the Massachusetts Broadband Institute with the task of promoting broadband access throughout the state. Municipal regulation of broadband service providers must not frustrate the achievement of this statewide policy.

In addition, Section 6409 of the Middle Class Tax Relief and Job Creation Act of 2012

requires 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." (emphasis added). The Act defines "eligible facilities request" as any request for modification of an existing wireless tower or base station that involves: 1) collocation of new transmission equipment; 2) removal of transmission equipment; or 3) replacement of transmission equipment. The Act applies "[n]otwithstanding section 704 of the Telecommunications Act of 1996." The Act's requirement that a local government "may not deny, and shall approve, any eligible facilities request" means that a request for modification to an existing facility that does not substantially change the physical dimensions of the tower or base station must be approved. Such qualifying requests also cannot be subject to a discretionary special permit.

We approve the new Section 215-27. However, the Town must apply the by-law in a manner consistent with the applicable law outlined above. In particular, Section IV of the new by-law requires that Wireless Telecommunication Facilities are only allowed by special permit in the Wireless Telecommunication Overlay District. This requirement cannot be applied to eligible facilities requests for modification to existing facilities which qualify for required approval under Section 6409 of the Act, as described above. We urge the Town to consult closely with Town Counsel regarding the appropriate response to applications for collocation in light of these recent amendments.

II. Analysis of Mount Washington's Wireless Telecommunication Facility By-Law

A. Section VIII "Criteria For Approval and Conditions".

This section provides as follows:

> 5. The applicant will remove the Facility, should the Facility be abandoned or cease to operate. The Planning Board may require the applicant to provide a bond, or other form of financial guarantee acceptable to the Planning Board to cover the cost of removal of the Facility, should the Facility be abandoned or cease to operate, and ensure other compliance hereunder.

The Town must apply any bond or other financial guarantee proceeds in a manner consistent with state law. Bond proceeds do not become Town funds unless and until the applicant defaults on the obligation under the proposed by-law. Moreover, if the Town must use the bond to pay for removal of a wireless communication facility or the repair and/or restoration of the premises, an appropriation is required before expenditure is made to do the work. General Laws Chapter 44, Section 53, provides that "[a]ll moneys received by a city, town or district officer or department, except as otherwise provided by special acts and except fees provided for by statute, shall be paid by such officers or department upon their receipt into the city, town or district treasury." Under Section 53 all moneys received by the Town become a part of the general fund, unless the Legislature has expressly made other provisions that are applicable to such receipt. In the absence of any general or special law to the contrary, performance security funds of the sort contemplated here must be deposited with the Town Treasurer and made part of the Town's general fund, pursuant to G.L. c. 44, § 53. The Town must then appropriate the money for the specific purpose of completing the work required for removal and/or restoration.

B. Section X "Permit Revocation For Non-Performance".

Section X authorizes the Planning Board to revoke a special permit for failure to comply with certain conditions. We approve Section X. However, before the Planning Board revokes a permit for failure to comply with certain conditions provided in Section X, the Planning Board should discuss with Town Counsel what due process, including notice and hearing requirements, are required. We suggest that the Town discuss this issue in more detail with Town Counsel.

Finally, the word "ordinance" is used in the by-law. Towns enact "by-laws" and cities enact "ordinances." The Town may wish delete the word "ordinance" from the new Section 215-27 and insert the word "by-law" at a future Town Meeting.

Article 2 - The amendments adopted under Article 2 add a new Section 215-28, "Solar Photovoltaic Installation Moratorium Bylaw," to the Town's zoning by-laws. The temporary moratorium (through one year from the date of enactment of Section 215-28) on solar photovoltaic installation other than those mounted on an existing structure provides as follows:

> Whereas, the Town of Mount Washington is undertaking a comprehensive study with respect to regulating the use of land for Solar Photovoltaic Installations, and
>
> Whereas, there have been significant changes in law regarding Solar Photovoltaic Installations; and,
>
> Whereas, the Town wishes to act carefully in a field with evolving law and technology, to investigate ways to preserve the character of the community while serving the needs of its people, and to devise an orderly process for granting permits by drafting an amendment to the Bylaw which is comprehensive, practical, equitable, and addresses the concerns of the Town on number, size, appearance, site standards, and location of Solar Photovoltaic Installations; and,
>
> Whereas, it is desired to protect the Town from ill-advised and inappropriate development of Solar Photovoltaic Installations pending a thorough review and the formulation of such a zoning amendment; and,
>
> Whereas, the Planning Board has determined that one year is necessary for such a comprehensive review and development of a Bylaw Subsection on Solar Photovoltaic Installations.
>
> Now, therefore, no Solar Photovoltaic Installations other than those mounted on an existing structure, in the usual manner, shall be permitted for one year from the date of enactment of this Bylaw.

We approve the temporary moratorium adopted under Article 2 because the Town has the authority to "impose reasonable time limitations on development, at least where those restrictions are temporary and adopted to provide controlled development while the municipality engages in comprehensive planning studies." Sturges v. Chilmark, 380 Mass. 246, 252-253 (1980). Such a temporary moratorium is within the Town's zoning power where there is a stated need for "study, reflection and decision on a subject matter of [some] complexity..." W.R.

Grace v. Cambridge City Council, 56 Mass. App. Ct. 559, 569 (2002) (City's temporary moratorium on building permits in two districts was within city's authority to zone for public purposes.) The time limit Mount Washington has selected for its temporary moratorium (one year from the date of enactment of the by-law) appears to be reasonable in the circumstances. The moratorium is limited in time period and scope (to the use of land and structures for solar photovoltaic installations), and thus does not present the problem of a rate-of-development bylaw of unlimited duration which the Zuckerman court determined was unconstitutional. Zuckerman v. Hadley, 442 Mass. 511, 512 (2004) ("[A]bsent exceptional circumstances not present here, restrictions of unlimited duration on a municipality's rate of development are in derogation of the general welfare and thus are unconstitutional.")

While we approve the temporary one year moratorium on solar photovoltaic installations, we note that G.L. c. 40A, § 3, protects solar energy systems and the building of structures that facilitate the collection of solar energy from certain local zoning requirements. General Laws Chapter 40A, Section 3, provides in pertinent part as follows:

> No zoning ordinance or by-law shall prohibit or unreasonably regulate the installation of solar energy systems or the building of structures that facilitate the collection of solar energy, except where necessary to protect the public health, safety or welfare.

General Laws Chapter 40A, Section 3, prohibits towns from adopting zoning by-laws that prohibit or *unreasonably regulate* the installation of solar energy systems or the building of structures that facilitate the collection of solar energy, except where necessary to protect the public health, safety or welfare. A temporary moratorium longer than one year may be vulnerable to a challenge in court that it is an unreasonable regulation of solar energy systems under G.L. c. 40A, § 3. We suggest the Town consult closely with Town Counsel on this issue.

Note: Pursuant to G.L. c. 40, § 32, neither general nor zoning by-laws take effect unless the Town has first satisfied the posting/publishing requirements of that statute. Once this statutory duty is fulfilled, (1) general by-laws and amendments take effect on the date these posting and publishing requirements are satisfied unless a later effective date is prescribed in the by-law, and (2) zoning by-laws and amendments are deemed to have taken effect from the date they were approved by the Town Meeting, unless a later effective date is prescribed in the by-law.

Very truly yours,
MARTHA COAKLEY
ATTORNEY GENERAL
Kelli E. Gunagan
By: Kelli E. Gunagan
Assistant Attorney General
Municipal Law Unit
10 Mechanic Street, Suite 301
Worcester, MA 01608
(508) 792-7600

cc: Town Counsel Joel Bard (via electronic mail)

MAURA HEALEY
ATTORNEY GENERAL

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February 23, 2015

Debra A. Bourbeau, Town Clerk
Town of Montague
1 Avenue A
Montague, MA 01376

RE: Montague Special Town Meeting of October 29, 2014 - Case # 7451
Warrant Article # 17 (Zoning)

Dear Ms. Bourbeau:

Article 17 - We approve Article 17 from the October 29, 2014 Montague Special Town Meeting. Article 17 amends several portions of the Town's zoning by-laws pertaining to site plan review.

1. Section 5.2 (d), Permitted Uses and Special Permits - Procedures

Section 5.2 (d) was deleted in its entirety and replaced with new text that provides as follows (with emphasis added):

> All applications for Special Permits and Site Plan Review from the Board of Appeals or the Planning Board shall be subject to the procedural requirements established by the respective Board. The Board of Appeals or Planning Board may determine that the assistance of outside professional expertise is required due to the size, scale, or complexity of a given project or its potential impact on the health, safety, and welfare of the Town. When outside review is determined to be necessary, the Board may require the applicant pay all reasonable expenses for this purpose, in accordance with the Board's regulations and M.G.L. Chapter 44 Section 53G.

General Laws Chapter 44, Section 53G, authorizes zoning boards, planning boards, boards of health, and conservation commissions, acting under authority conferred by G.L. c. 40A, § 9 and 12, c. 41, § 81Q, c. 40B, § 21, c. 111; and c. 40, § 8C, to impose consultant review fees, to disburse the funds collected, and to return unused portions to the applicant. However, the Legislature did not include Boards acting under the authority conferred solely by a local law within the small class of local boards that enjoy the benefits of G.L. c. 44, § 53G. When the Board is reviewing a site plan application based solely on the authority granted under local law, it cannot avail itself of the provisions of G.L. c. 44, § 53G. We suggest that the Town discuss this issue in more detail with Town Counsel.

2. Section 7.5.2, Telecommunication Facilities - General Provisions

Section 7.5.2, was deleted in its entirety and replaced with new text that provides as follows:

> Telecommunication Facilities may be allowed by Special Permit from the Board of Appeals pursuant to Sections 5.2 and Section 7.5. Conditions shall maximize the shared use of any new or existing structures to minimize the required number of such facilities; and shall minimize[e] adverse visual impacts through careful design, siting, and screening. No facility shall be located in a (RS) Residential District. (see: Section 2, Definitions).

Section 7.5.2 must be applied in a manner consistent with Section 6409 of the Middle Class Tax Relief and Job Creation Act of 2012, which requires 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." (emphasis added). The Act defines "eligible facilities request" as any request for modification of an existing wireless tower or base station that involves: 1) collocation of new transmission equipment; 2) removal of transmission equipment; or 3) replacement of transmission equipment. The Act applies "[n]otwithstanding section 704 of the Telecommunications Act of 1996." The Act's requirement that a local government "may not deny, and shall approve, any eligible facilities request" means that a request for modification to an existing facility that does not substantially change the physical dimensions of the tower or base station must be approved. Such qualifying requests also cannot be subject to a discretionary special permit.

The Town must apply Section 7.5.2 in a manner consistent with the applicable law outlined above. We also urge the Town to consult closely with Town Counsel regarding the appropriate response to applications for collocation in light of these recent amendments.

Note: Pursuant to G.L. c. 40, § 32, neither general nor zoning by-laws take effect unless the Town has first satisfied the posting/publishing requirements of that statute. Once this statutory duty is fulfilled, (1) general by-laws and amendments take effect on the date these posting and publishing requirements are satisfied unless a later effective date is prescribed in the by-law, and (2) zoning by-laws and amendments are deemed to have taken effect from the

date they were approved by the Town Meeting, unless a later effective date is prescribed in the by-law.

Very truly yours,

MAURA HEALEY
ATTORNEY GENERAL
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By: Nicole B. Caprioli
Assistant Attorney General
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cc: Town Counsel Gregg J. Corbo

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February 10, 2015

Trudy L. Reid, Town Clerk
Town of Lynnfield
55 Summer Street
Lynnfield, MA 01940

RE: Lynnfield Fall Annual Town Meeting of October 20, 2014 - Case # 7408
Warrant Articles # 12, 13 and 14 (Zoning)
Warrant Articles # 16 and 17 (General)

Dear Ms. Reid:

Articles 12, 13, 14, 16 and 17 - We approve Articles 12, 13, 14, 16 and 17 from the October 20, 2014 Lynnfield Fall Annual Town Meeting. Our comments regarding Article 14 are provided below.

Article 14 - Article 14 makes a number of changes to the Town's zoning by-laws pertaining to Radio Telecommunication Facilities (RTF) and Personal Wireless Service Facilities (PWSF) including adding new definitions to Section 2, amending Section 7.4, "Site Plan" to add a new sub-section 7.4A "Additional Requirements for Personal Wireless Service Facilities"; and amending Section 8, "Special Permits" to add a new sub-section 8.7, "Siting of Radio Telecommunications Facilities."

I. Applicable Law

The federal Telecommunications Act of 1996, 47 U.S.C. § 332 (7) preserves state and municipal zoning authority to regulate personal wireless service facilities, subject to the following limitations:

1. Zoning regulations "shall not unreasonably discriminate among providers of functionally equivalent services." 47 U.S.C. §332(7) (B) (i) (I)

2. Zoning regulations "shall not prohibit or have the effect of prohibiting the provisions of personal wireless services." 47 U.S.C. § 332 (7) (B) (i) (II).

3. The Zoning Authority "shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time." 47 U.S.C. § 332 (7) (B) (ii).

4. Any decision "to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record." 47 U.S.C. § 332 (7) (B) (iii).

5. "No state or local government or instrumentality thereof may regulate the placement, construction and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the [Federal Communications] Commission's regulations concerning emissions." 47 U.S.C. § 332(7) (B) (iv).

Federal courts have construed the limitations listed under 47 U.S.C. § 332(7) as follows. First, even a facially neutral by-law may have the effect of prohibiting the provision of wireless coverage if its application suggests that no service provider is likely to obtain approval. "If the criteria or their administration effectively preclude towers no matter what the carrier does, they may amount to a ban 'in effect'...." Town of Amherst, N.H. v. Omnipoint Communications Enters, Inc., 173 F.3d 9, 14 (1st Cir. 1999).

Second, local zoning decisions and by-laws that prevent the closing of significant gaps in wireless coverage have been found to effectively prohibit the provision of personal wireless services in violation of 47 U.S.C. § 332(7). See, e.g., Nat'l Tower, LLC v. Plainville Zoning Bd. of Appeals, 297 F.3d 14, 20 (1st Cir. 2002) ("local zoning decisions and ordinances that prevent the closing of significant gaps in the availability of wireless services violate the statute"); Omnipoint Communications MB Operations, LLC v. Town of Lincoln, 107 F. Supp. 2d 108, 117 (D. Mass. 2000) (by-law resulting in significant gaps in coverage within town had effect of prohibiting wireless services).

Third, whether the denial of a permit has the effect of prohibiting the provision of personal wireless services depends in part upon the availability of reasonable alternatives. See 360 Degrees Communications Co. v. Bd. of Supervisors, 211 F.3d 79, 85 (4th Cir. 2000). Zoning regulations must allow cellular towers to exist somewhere. Towns may not effectively ban towers throughout the municipality, even under the application of objective criteria. See Virginia Metronet, Inc. v. Bd. of Supervisors, 984 F. Supp. 966, 971 (E.D. Va. 1998).

State law also establishes certain limitations on a municipality's authority to regulate wireless communications facilities and service providers. Under General Laws Chapter 40A, Section 3, wireless service providers may apply to the Department of Telecommunications and Cable for an exemption from local zoning requirements. If a telecommunication provider does not apply for or is not granted an exemption under c. 40A, § 3, it remains subject to local zoning requirements pertaining to cellular towers. See Building Comm'r of Franklin v. Dispatch Communications of New England, Inc., 48 Mass. App. Ct. 709, 722 (2000). Also, G.L. c. 40J, § 6B, charges the Massachusetts Broadband Institute with the task of promoting broadband access throughout the state. Municipal regulation of broadband service providers must not frustrate the achievement of this statewide policy.

In addition, Section 6409 of the Middle Class Tax Relief and Job Creation Act of 2012 requires 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." (emphasis added). The Act defines "eligible facilities request" as any request for modification of an existing wireless tower or base station that involves: 1) collocation of new transmission equipment; 2) removal of transmission equipment; or 3) replacement of transmission equipment. The Act applies "[n]otwithstanding section 704 of the Telecommunications Act of 1996." The Act's requirement that a local government "may not deny, and shall approve, any eligible facilities request" means that a request for modification to an existing facility that does not substantially change the physical dimensions of the tower or base station must be approved. Such qualifying requests also cannot be subject to a discretionary special permit.

The Town must apply Article 14 in a manner consistent with the applicable law outlined above. In particular, Section 8.7.5.1 requires that PWSF may only be erected upon the grant of a special permit. The Town cannot apply this requirement to eligible facilities requests for modification to existing facilities that qualify for required approval under Section 6409 of the Act. We also urge the Town to consult closely with Town Counsel regarding the appropriate response to applications for collocation in light of these recent amendments.

II. Section 8.7, Siting of Radio Telecommunications Facilities

A. Section 8.7.2, Purpose

Section 8.7.2 provides that the purpose of the by-law is to establish general guidelines for the siting of RTFs. Section 8.7.2 (4) establishes one of the by-law's goals as "[t]o make all RTF locations available for municipal agencies use where feasible."

It is unclear whether Section 8.7.2 (4) would require the Town's use of the RTF, and whether such use would be compensated or uncompensated. When applying the by-law, the Town cannot require an applicant to transfer property to the public without fair compensation. "The Fifth Amendment to the United States Constitution, made applicable to the States through the Fourteenth Amendment, provides that private property shall not 'be taken for public use, without just compensation.'" This protection is "designed to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole." Giovanella v. Conservation Commission of Ashland, 447 Mass. 720, 724 (2006) (*quoting* Armstrong v. United States, 364 U.S. 40, 49 (1960). More recently, the court in Collins v. Stow, 79 Mass. App. Ct. 447 (2011) ruled that a town cannot condition subdivision approval on the dedication of open space for public use and actual conveyance of the land to the Town in exchange for waivers. "Although a planning board's authority under the subdivision control law certainly encompasses, in appropriate circumstances, requiring open space, it does not extend to requiring the transfer of that open space to the public for reasons unrelated to adequate access and safety of the subdivision without providing just compensation." Id. at 453. We suggest that the Town consult with Town Counsel regarding the proper application of Section 8.7.2 (4).

B. Section 8.7.5.4, General

Section 8.7.5.4.1 provides in relevant part that:

> An undertaking shall be required, secured by a BOND appropriate in form and amount for removal of the PWSF within 6 months of cessation of operation of said facility or such other activity which may be appropriate to prevent the structures from becoming a nuisance or aesthetic blights.

The Town must apply any bond proceeds in a manner consistent with state law. Bond proceeds do not become Town funds unless and until the applicant defaults on the obligation under the by-law. Moreover, if the Town must use the bond to pay for removal of a PWSF or for other activity to prevent nuisance or blight, an appropriation is required before expenditure is made to do the work. General Laws Chapter 44, Section 53, provides that "[a]ll moneys received by a city, town or district officer or department, except as otherwise provided by special acts and except fees provided for by statute, shall be paid by such officers or department upon their receipt into the city, town or district treasury." Under Section 53 all moneys received by the Town become a part of the general fund, unless the Legislature has expressly made other provisions that are applicable to such receipt. In the absence of any general or special law to the contrary, performance security funds of the sort contemplated here must be deposited with the Town Treasurer and made part of the Town's general fund, pursuant to G.L. c. 44, § 53. The Town must then appropriate the money for the specific purpose of completing the work required for removal and/or other activities. The Town should consult with Town Counsel regarding the proper application of Section 8.7.5.4.

C. Section 8.7.5.5, Application Procedures

Section 8.7.5.5 pertaining to the Special Permit application provides in relevant part, that:

> The Application Phase of the process begins with the receipt by the SPGA of a complete application including all materials required by the Zoning Bylaw and any applicable regulations.
>
> *****
>
> Within 30 days of receipt, the SPGA or its designee shall review the application for consistency and completeness with respect to the Application Requirements in the bylaw and any applicable regulations and shall notify the Applicant in writing of any deficiency in the completeness of the application.
>
> *****
>
> The SPGA shall take regulatory notice of the Federal Communications Commission (FCC) presumption that the final action of the SPGA on a new Antenna Tower should take no more than 150 days from the date of receipt of the completed application, and that final action on a Collocation or Site Sharing application should take no more than 90 days from the date of receipt of the completed application except upon written

extension of these timelines by mutual agreement between the SPGA and the Applicant.

Section 8.7.5.5 must be applied in a manner consistent with the time limits established in G.L. c. 40A, § 9. General Laws Chapter 40A, Section 9, requires that the special permit granting authority "shall hold a public hearing for which notice has been given as provided in section eleven, on any application for a special permit within sixty-five days from the date of filing of such application. . . . The decision of the special permit granting authority shall be made within ninety days following the date of such public hearing. . . Failure by the special permit granting authority to take final action within . . . ninety days . . . shall be deemed to be a grant of the special permit." (emphasis added).

Pursuant to G.L. c. 40A, § 9, the filing of a special permit application "starts the clock" on the time period within which the special permitting authority must act. Section 8.7.5.5 cannot be applied in a manner that "starts the clock" only when a *completed* application is filed. The Town must apply Section 8.7.5.5 consistent with G.L. c. 40A, § 9. *See* Massachusetts Broken Stone Co. v. Town of Weston, 430 Mass. 637, 642 (2000). The Town should consult with Town Counsel regarding the proper application of Section 8.7.5.5.

Note: Pursuant to G.L. c. 40, § 32, neither general nor zoning by-laws take effect unless the Town has first satisfied the posting/publishing requirements of that statute. Once this statutory duty is fulfilled, (1) general by-laws and amendments take effect on the date these posting and publishing requirements are satisfied unless a later effective date is prescribed in the by-law, and (2) zoning by-laws and amendments are deemed to have taken effect from the date they were approved by the Town Meeting, unless a later effective date is prescribed in the by-law.

Very truly yours,

MAURA HEALEY
ATTORNEY GENERAL
Nicole B. Caprioli

By: Nicole B. Caprioli
Assistant Attorney General
Municipal Law Unit
10 Mechanic Street, Suite 301
Worcester, MA 01608
(508) 792-7600 ext. 4418
nicole.caprioli@state.ma.us

cc: Town Counsel Thomas Mullen

CITY OF CAMBRIDGE, MASSACHUSETTS

PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE

January 27, 2016

To: The Board of Zoning Appeal

From: The Planning Board

RE: BZA #9059- 2016, 1815 Massachusetts Avenue

The Planning Board reviewed the Special Permit application for the communication antenna at Lesley University and finds that this proposal is no worse than the current installations. The Planning Board does suggest that the antennas be located in such a way as to not break the roof line when viewed from the street, and that they be painted to match the facades. For example to match either the red brick or the gray stone band around the top of the tower.

City of Cambridge

2850

MASSACHUSETTS

BOARD OF ZONING APPEAL

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

2013 00231979
Bk: 62872 Pg: 5 Doc: DECIS
Page: 1 of 6 11/01/2013 09:24 AM

NOTICE OF DECISION

DECISION FILED WITH THE OFFICE OF THE CITY CLERK ON OCT 11 2013

Any person aggrieved by a decision of the Board of Zoning Appeal may appeal to the Superior Court or Land Court. Appeals, if any, shall be made pursuant to Section 17, Chapter 40A, Massachusetts General Laws and shall be filed within twenty calendar days from the above date, and a copy thereof shall be filed with the Cambridge City Clerk's office by that same date.

PREMISES: 330 (a/k/a 300) Mount Auburn Street
Cambridge, MA
Owner: Mount Auburn Hospital

PETITIONER: New Cingular Wireless PCS, LLC ("AT&T")
C/o David Ford, Centerline Communications

PETITION: Special Permit: To install twelve (12) antennas which will be façade mounted to the existing hospital building painted to match the building color. Fifteen (15) remote radio-heads units (RRU's) will be mounted inside of the existing penthouse on the rooftop. An equipment shelter will be installed on the rooftop of house ancillary equipment associated with the antenna facility. Cabling and associated trays and conduits also will be placed on the rooftop, along with GPS antennas which will be mounted on the shelter.

DECISION: GRANTED

48678.259

CASE NO: 10480

***For full details, please refer to the decision available at Inspectional Services Dept.**

City of Cambridge

MASSACHUSETTS

BOARD OF ZONING APPEAL

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

OCT 11 2013

Centerline Communications, LLC
C/o David Ford
95 Ryan Drive, Suite 1
Raynham, MA 02767

Case No. 10480

Dear: Mr. Ford,

We enclose the decision of the Board of Zoning Appeal as it pertains to the premises located at 330 (a/k/a 300) Mt. Auburn Street, Cambridge, Mass.

A copy of this decision has been filed with office of the City Clerk, this date. When twenty days have passed you **MUST:**

1. HAVE THIS DECISION COMPLETED AND SIGNED BY THE CITY CLERK, CITY HALL – 795 Mass Avenue, Cambridge, Ma. (In the space provided on the decision)

2. FILE THE DECISION WITH THE REGISTRY OF DEEDS
Middlesex County Courthouse, 208 Cambridge Street, Cambridge, MA. (There is usually a fee, payable to the Registry of Deeds and the book and page number is required by the Registry).

3. SUPPLY THE BOARD OF ZONING APPEAL WITH DOCUMENTATION OF SUCH FILING – (with the Registry of Deeds).

- THE DIVISION OF INSPECTIONAL SERVICES WILL NOT ISSUE BUILDING PERMITS
- UNLESS THE ABOVE ITEMS HAVE BEEN COMPLETED.

Any person aggrieved by a decision of the Board of Zoning Appeal may appeal to the Superior Court or Land Court. Appeals, if any, shall be made pursuant to Section 17, Chapter 40A, Massachusetts General Laws and shall be filed within twenty days of the above date, and a copy thereof shall be filed with the Cambridge City Clerk's office by that same date.

If you have any questions, please phone me at 349-6100.

Sincerely yours,

Maria Pacheco

Maria L. Pacheco
Secretary

Section 10.35 of the Zoning Ordinances:
If the rights authorized by a variance are not exercised within one year of the date of granting of such variance (two years for a special permit), they shall lapse and may be reestablished only after notice and new hearing pursuant to this Section 10.30.

City of Cambridge

MASSACHUSETTS

BOARD OF ZONING APPEAL

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

2013 OCT 11 AM 10 50

OFFICE OF THE CITY CLERK
CAMBRIDGE, MASSACHUSETTS

CASE NO: 10480

LOCATION: 330 (a/k/a 300) Mt. Auburn St. Cambridge, MA — Residence C-1/C-3 Zone

PETITIONER: NEW CINGULAR WIRELESS PCS, LLC ("AT&T")
C/o DAVID FORD, CENTERLINE COMMUNICATIONS

PETITION: Special Permit: To install twelve (12) antennas which will be façade mounted to the existing hospital building painted to match the building color. Fifteen (15) remote radio-head unit (RRU's) will be mounted inside of the existing penthouse on the rooftop. An equipment shelter will be installed on the rooftop of house ancillary equipment associated with the antenna facility. Cabling and associated trays and conduits also will be placed on the rooftop, along GPS antennas which will be mounted on the shelter.

VIOLATION: Art. 4.000, Sec. 4.32.G.1 (Footnote 49) (Telecommunication Facility).
Art. 10.000, Sec. 10.40 (Special Permit).

DATE OF PUBLIC NOTICE: August 1 & 8, 2013

DATE OF PUBLIC HEARING: August 15, 2013

MEMBERS OF THE BOARD:

CONSTANTINE ALEXANDER – CHAIR	✓
TIMOTHY HUGHES – VICE-CHAIR	✓
BRENDAN SULLIVAN	✓
THOMAS SCOTT	✓
JANET O. GREEN	✓

ASSOCIATE MEMBERS:

DOUGLAS MYERS	
SLATER W. ANDERSON	
LINDSEY T. THORNE-BINGHAM	
ANDREA A. HICKEY	

Members of the Board of Zoning Appeal heard testimony and viewed materials submitted regarding the above request for relief from the requirements of the Cambridge Zoning Ordinance. The Board is familiar with the location of the petitioner's property, the layout and other characteristics as well as the surrounding district.

Case No. 10480
Location: 330 (300) Mt. Auburn Street
Petitioner: New Singular Wireless PCS (AT&T) c/o David Ford

On September 12, 2013, Petitioner David Ford appeared before the Board of Zoning Appeal with his attorney Susan Roberts requesting a special permit in order to install twelve antennas façade mounted to the existing hospital building and painted to match, to install fifteen remote radio-head units mounted inside the existing penthouse, to install an equipment shelter on the roof, to install cabling, associated trays and conduits on the rooftop, and to install GPS antennas on the shelter. The Petitioner requested relief from Article 4, Section 4.32.G.1 of the Cambridge Zoning Ordinance ("Ordinance"). The Petitioner submitted application materials including information about the project, plans, and photographs.

Ms. Roberts stated that the design had been modified in order to reduce visual impacts. She stated that the equipment shelter had been moved out of view and that the antennas had been mounted parallel to each other on low profile mounts and painted to match the building. She stated that the property was in a residential zone, but that residential uses did not predominate in the area, which was largely hospital grounds and the highway. She stated that the Petitioner was FCC licensed and that the installation was needed to fill gaps in coverage.

The Chair asked if anyone wished to be heard on the matter, no one indicated such.

After discussion, the Chair moved that the Board grant the special permit for relief in order to install twelve antennas façade mounted to the existing hospital building and painted to match, to install fifteen remote radio-head units mounted inside the existing penthouse, to install an equipment shelter on the roof, to install cabling, associated trays and conduits on the rooftop, and to install GPS antennas on the shelter based on the finding that the Petitioner was a duly licensed federal telecommunications carrier in good standing. The Chair moved that the Board find that the Petitioner had taken steps to minimize the visual impact of the various elements of the proposed facility. The Chair moved that the Board find that the plans had been revised and went a long way toward minimizing visual impacts. The Chair moved that the Board find that there was a public need for the facility at the proposed location due to lapses in coverage, which would be corrected with the proposed antennas. The Chair moved that the Board find that were no alternative functionally suitable sites in nonresidential locations. The Chair moved that the Board find that the property was not in an area where there were many large buildings that could support the installation of the equipment. The Chair moved that the Board find that nonresidential uses predominated in the vicinity of the proposed location and that the telecommunication facility was not inconsistent with the character that did prevail in the surrounding neighborhood. The Chair moved that the Board find that the proposed use would not cause congestion, hazard, or substantial change in established neighborhood

The Board of Zoning Appeal is empowered to waive local zoning regulations only. This decision therefore does not relieve the petitioner in any way from the duty to comply with local ordinances and regulations of the other local agencies, including, but not limited to the Historical Commission, License Commission and/or compliance with requirements pursuant to the Building Code and other applicable codes.

Constantine Alexander, Chair

Attest: A true and correct copy of decision filed with the offices of the City Clerk and Planning Board on 10/11/13 by Maria Pacheco, Clerk.

Twenty days have elapsed since the filing of this decision.

No appeal has been filed ✓.

Appeal has been filed and dismissed or denied.

Date: Nov. 1, 2013 Donna P. Lopez City Clerk.

Radio Frequency Safety Survey Report Predictive (RFSSRP) Prepared For AT&T

Site Name:	CAMBRIDGE MEMORIAL DRIVE
FA#	10546807
USID:	134433
Site ID:	MAL02881
Address:	840 MEMORIAL DRIVE CAMBRIDGE, MA 02139
County:	MIDDLESEX
Latitude:	42.36288464
Longitude:	-71.11524003
Structure Type:	ROOFTOP
Property Owner:	RIVERTECH ASSOCIATES, LLC.
Pace Job:	MRCTB062466
RFDS Technology	5G NR 1SR CBAND

Report Information

Report Writer: Parul

Report Generated Date: 07-28-2022

Compliance Statement

AT&T Mobility Compliance Statement: Based on the information collected, AT&T Mobility will be Compliant when the remediation recommended in section 5 or appropriate remediation determined by AT&T is implemented

Table of Contents

1. Executive Summary

1.1 Site Summary

Max Predictive Spatial Average MPE% & Location on Site (General Public)	380804.00% on Antennas Centerline Level & at AT&T Sec-B antenna no. #B1
Max Predictive Spatial Average MPE% on Ground (General Public)	5.56%
AT&T Mobility Site Compliance	AT&T Mobility will be Compliant by implementing remediation recommended as per section 5 in this report.

TABLE 1: Site Summary

1.2 Signage Summary (Proposed)

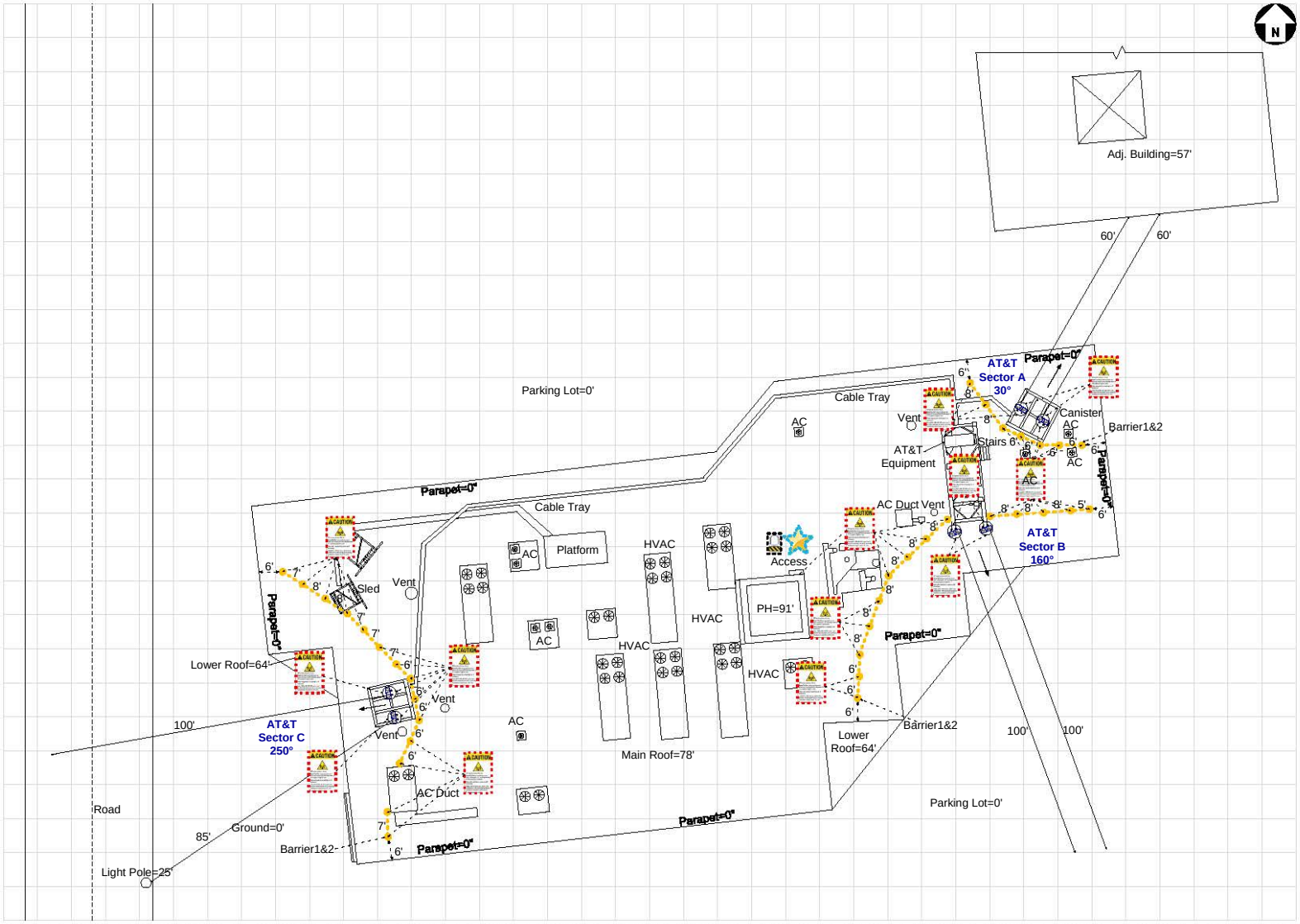
AT&T Signage Locations	Sign Type									
	Safety Instructions	Notice Sign 2	Caution Sign 2	Caution Sign 2B	Caution Sign 2C	Caution 7"x7"	Warning Sign 1B	RF Exposure Map	Lock	Barriers
Access Point(s)			**1**					**1**	**1**	
Alpha			**11**							**X**
Beta			**18**							**X**
Gamma			**18**							**X**

TABLE 2: Signage Summary (Proposed)

1.3 List of Documents used to prepare this Report

- 10546807_AE201_220513_MAL02881_Rev2_5C-5GNR-CBand-BBU-4TXRX
- NEW-ENGLAND_BOSTON_MAL02881_2022-5G-NR-Radio_5G-NR-1SR-CBAND_mm093q_2101A149QE_10546807_134433_07-23-2021_Final-Approved_v4.00

2. Site Scale Map



AT&T Antenna		Proposed		Proposed Signage									
	Panel	Barrier		Safety Instructions	Notice 2	Caution 2	Caution 2B	Caution 2C	Caution 7"x7"	Warning 1B	RF Exposure Map	Lock	***Map Scale = 10 ft***
	OMNI	Posts											

3. Antenna Inventory

Ant ID	Operator	Antenna Mfg	Antenna Model	Antenna Type	FREQ. (MHz)	TECH.	AZ. (0)	HBW (0)	Antenna Gain (dBd)	Antenna Aperture (ft)	Transmitter Power (Watts)	Total Loss (dB)	Total ERP (Watts)	Total EIRP (Watts)
A1	AT&T	Ericsson	AIR 6419 B77G^	Panel	3450	5G	30	11	23.5	2.55	108.44*	0	24277.05*	39828.68*
A2	AT&T	CCI	TPA65R-BU4D	Panel	2100	LTE/5G	30	66	15.05	4	180.00	0.5	5131.83	8419.23
A2	AT&T	CCI	TPA65R-BU4D	Panel	1900	LTE/5G	30	66	14.95	4	120.00	0.5	3343.35	5485.06
A2	AT&T	CCI	TPA65R-BU4D	Panel	700	LTE(FN)	30	74	11.15	4	120.00	0.5	1393.74	2286.55
A3	AT&T	Ericsson	AIR 6449 B77D^	Panel	3840	5G	30	11	23.5	2.55	108.44*	0	24277.05*	39828.68*
A4	AT&T	CCI	DMP65R-BU4D	Panel	850	5G	30	67	10.85	4	120.00	0.5	1300.71	2133.94
A4	AT&T	CCI	DMP65R-BU4D	Panel	700	LTE(B12)	30	75	10.55	4	120.00	0.5	1213.90	1991.50
A4	AT&T	CCI	DMP65R-BU4D	Panel	2300	LTE	30	57	15.05	4	75.00	0.5	2138.26	3508.01
B1	AT&T	Ericsson	AIR 6419 B77G^	Panel	3450	5G	160	11	23.5	2.55	108.44*	0	24277.05*	39828.68*
B2	AT&T	CCI	TPA65R-BU4D	Panel	2100	LTE/5G	160	66	15.05	4	180.00	0.5	5131.83	8419.23
B2	AT&T	CCI	TPA65R-BU4D	Panel	1900	LTE/5G	160	66	14.95	4	120.00	0.5	3343.35	5485.06
B2	AT&T	CCI	TPA65R-BU4D	Panel	700	LTE(FN)	160	74	11.15	4	120.00	0.5	1393.74	2286.55
B3	AT&T	Ericsson	AIR 6449 B77D^	Panel	3840	5G	160	11	23.5	2.55	108.44*	0	24277.05*	39828.68*
B4	AT&T	CCI	DMP65R-BU4D	Panel	850	5G	160	67	10.85	4	120.00	0.5	1300.71	2133.94
B4	AT&T	CCI	DMP65R-BU4D	Panel	700	LTE(B12)	160	75	10.55	4	120.00	0.5	1213.90	1991.50
B4	AT&T	CCI	DMP65R-BU4D	Panel	2300	LTE	160	57	15.05	4	75.00	0.5	2138.26	3508.01
C1	AT&T	Ericsson	AIR 6419 B77G^	Panel	3450	5G	260	11	23.5	2.55	108.44*	0	24277.05*	39828.68*
C2	AT&T	CCI	TPA65R-BU4D	Panel	2100	LTE/5G	260	66	15.05	4	180.00	0.5	5131.83	8419.23
C2	AT&T	CCI	TPA65R-BU4D	Panel	1900	LTE/5G	260	66	14.95	4	120.00	0.5	3343.35	5485.06
C2	AT&T	CCI	TPA65R-BU4D	Panel	700	LTE(FN)	260	74	11.15	4	120.00	0.5	1393.74	2286.55
C3	AT&T	Ericsson	AIR 6449 B77D^	Panel	3840	5G	260	11	23.5	2.55	108.44*	0	24277.05*	39828.68*
C4	AT&T	CCI	DMP65R-BU4D	Panel	850	5G	260	67	10.85	4	120.00	0.5	1300.71	2133.94
C4	AT&T	CCI	DMP65R-BU4D	Panel	700	LTE(B12)	260	75	10.55	4	120.00	0.5	1213.90	1991.50
C4	AT&T	CCI	DMP65R-BU4D	Panel	2300	LTE	260	57	15.05	4	75.00	0.5	2138.26	3508.01

Table 3.1: Antenna Inventory Table

Note: ^ **Mechanical Tilt value of "0°" MUST be retained for C-BAND and/or DoD AAS antenna(s) at all times to ensure that "EME (Predictive) Study" shall remain valid.**
* 75% TDD duty Cycle, 1.5dB Power Tolerance & 0.32 Power Reduction factor[1] are used to calculate Transmitter Power & ERP/EiRP

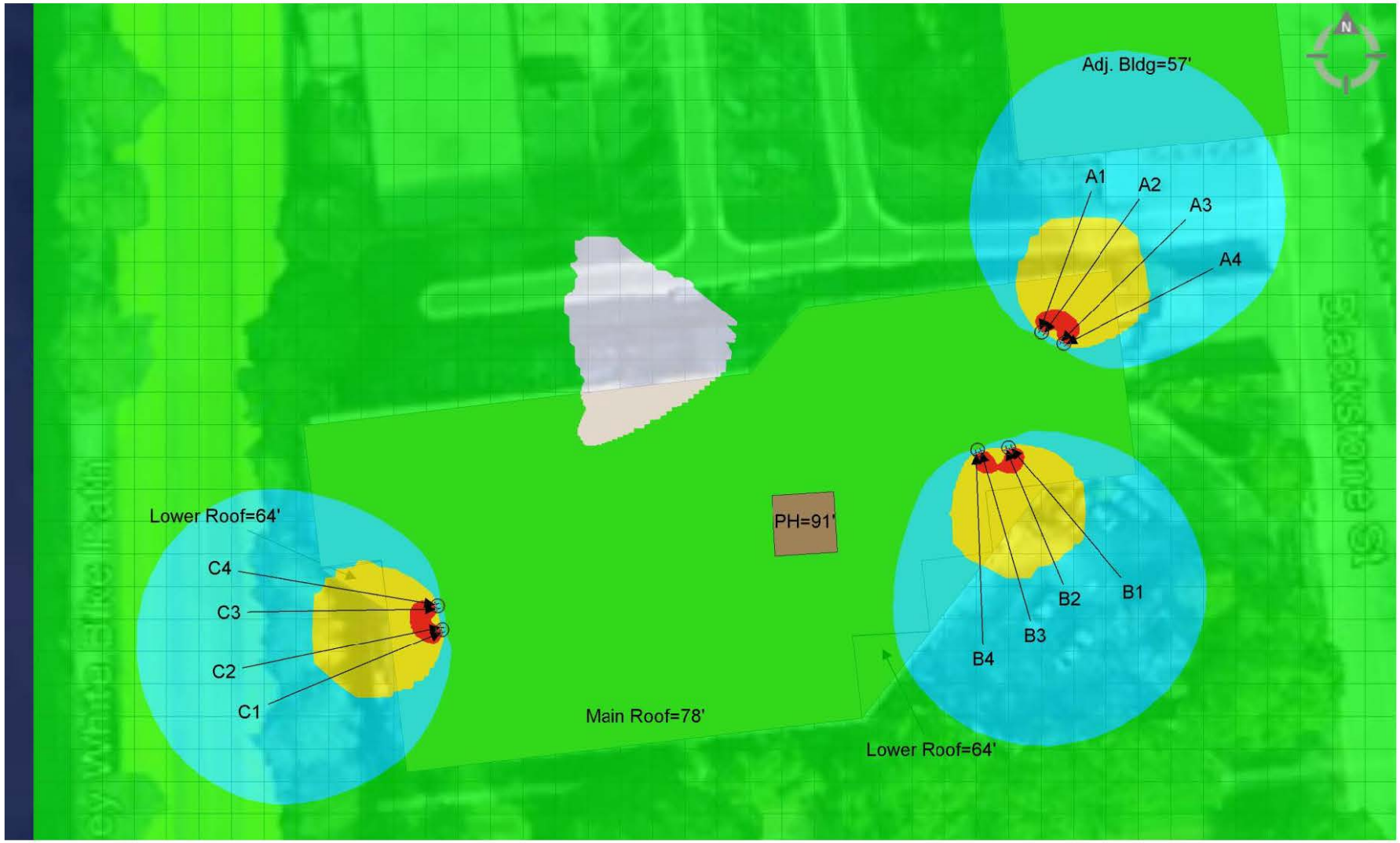
Antenna Heights (Z)

Ant ID	Operator	Antenna Radiation Centerline	Z-Height from Main Roof	Z-Height from Lower Roof	Z-Height from Adjacent Building	Z-Height from Ground
A1	AT&T	87.00	7.72	21.73	28.73	85.73
A2	AT&T	87.00	7.00	21.00	28.00	85.00
A3	AT&T	87.00	7.72	21.73	28.73	85.73
A4	AT&T	87.00	7.00	21.00	28.00	85.00
B1	AT&T	87.00	7.72	21.73	28.73	85.73
B2	AT&T	87.00	7.00	21.00	28.00	85.00
B3	AT&T	87.00	7.72	21.73	28.73	85.73
B4	AT&T	87.00	7.00	21.00	28.00	85.00
C1	AT&T	87.00	7.72	21.73	28.73	85.73
C2	AT&T	87.00	7.00	21.00	28.00	85.00
C3	AT&T	87.00	7.72	21.73	28.73	85.73
C4	AT&T	87.00	7.00	21.00	28.00	85.00

Table 3.2: Antenna Height(s) Summary Table

4. Predicted Emission

4.1 Predictive Cumulative MPE Contribution from All Sources at Antennas Centerline Level (87 ft.)



Max. Predictive Spatial Average MPE% = **380804.00%**

Proposed Barrier

Proposed Posts

% of FCC General Public Exposure Limit (Predictive Spatial Average)

Non-Simulated	0-1	1-100	100-500	500-5000	>5000

Map Scale = 10 ft

4.2 Predictive Cumulative MPE Contribution from All Sources at Main Roof Level (78 ft.)

Max. Predictive Spatial Average MPE% = **2144.85%**

Proposed Barrier

Proposed Posts

% of FCC General Public Exposure Limit (Predictive Spatial Average)

Non-Simulated	0-1	1-100	100-500	500-5000	>5000

Map Scale = 10 ft

4.3 Predictive Cumulative MPE Contribution from All Sources at Lower Roof Level (64 ft.)

Max. Predictive Spatial Average MPE% = **81.76%**

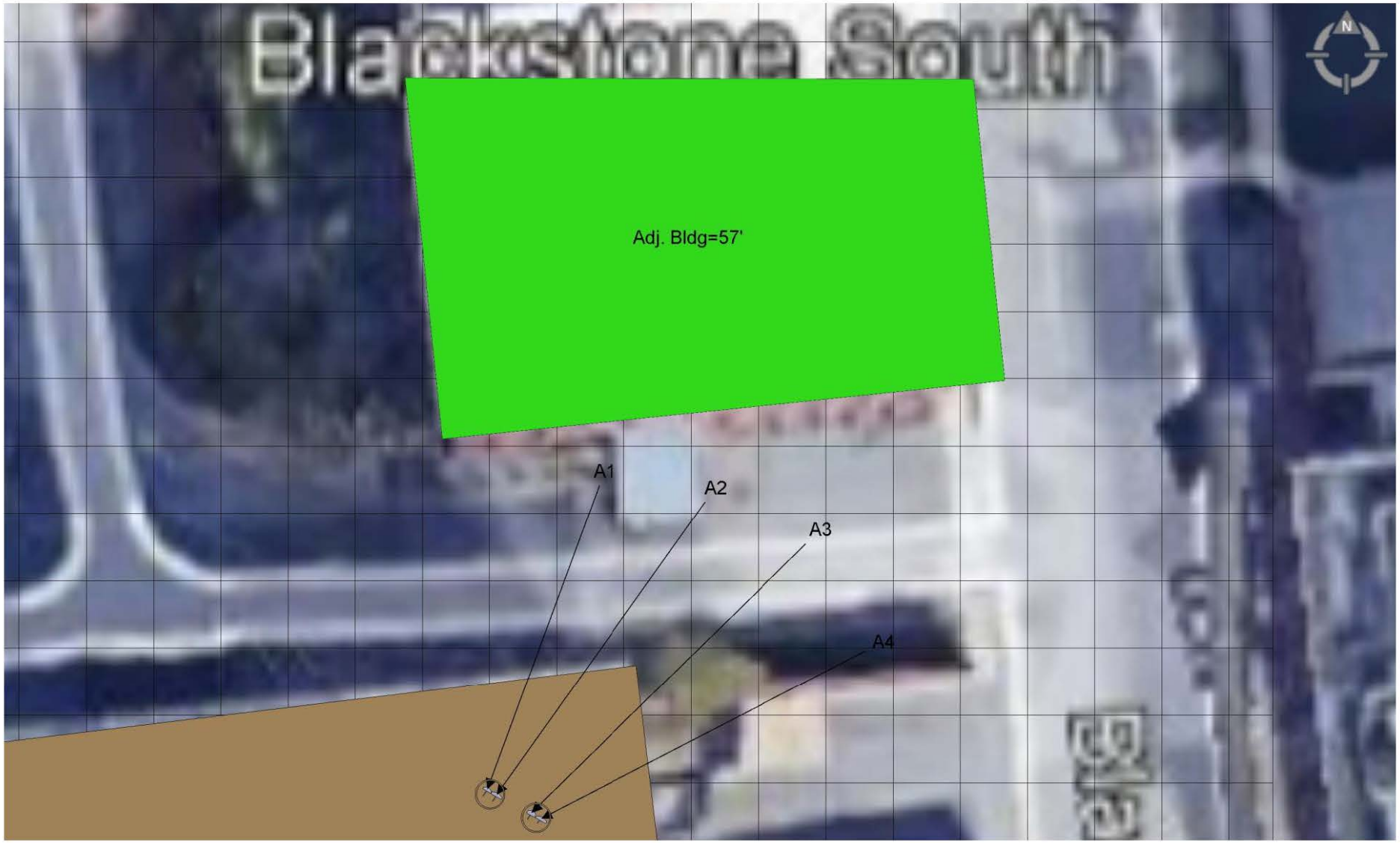
Proposed Barrier
Proposed Posts

% of FCC General Public Exposure Limit (Predictive Spatial Average)

Non-Simulated	0-1	1-100	100-500	500-5000	>5000

Map Scale = 10 ft

4.4 Predictive Cumulative MPE Contribution from All Sources at Adjacent Building Level (57 ft.)



Max. Predictive Spatial Average MPE% = **65.28%**

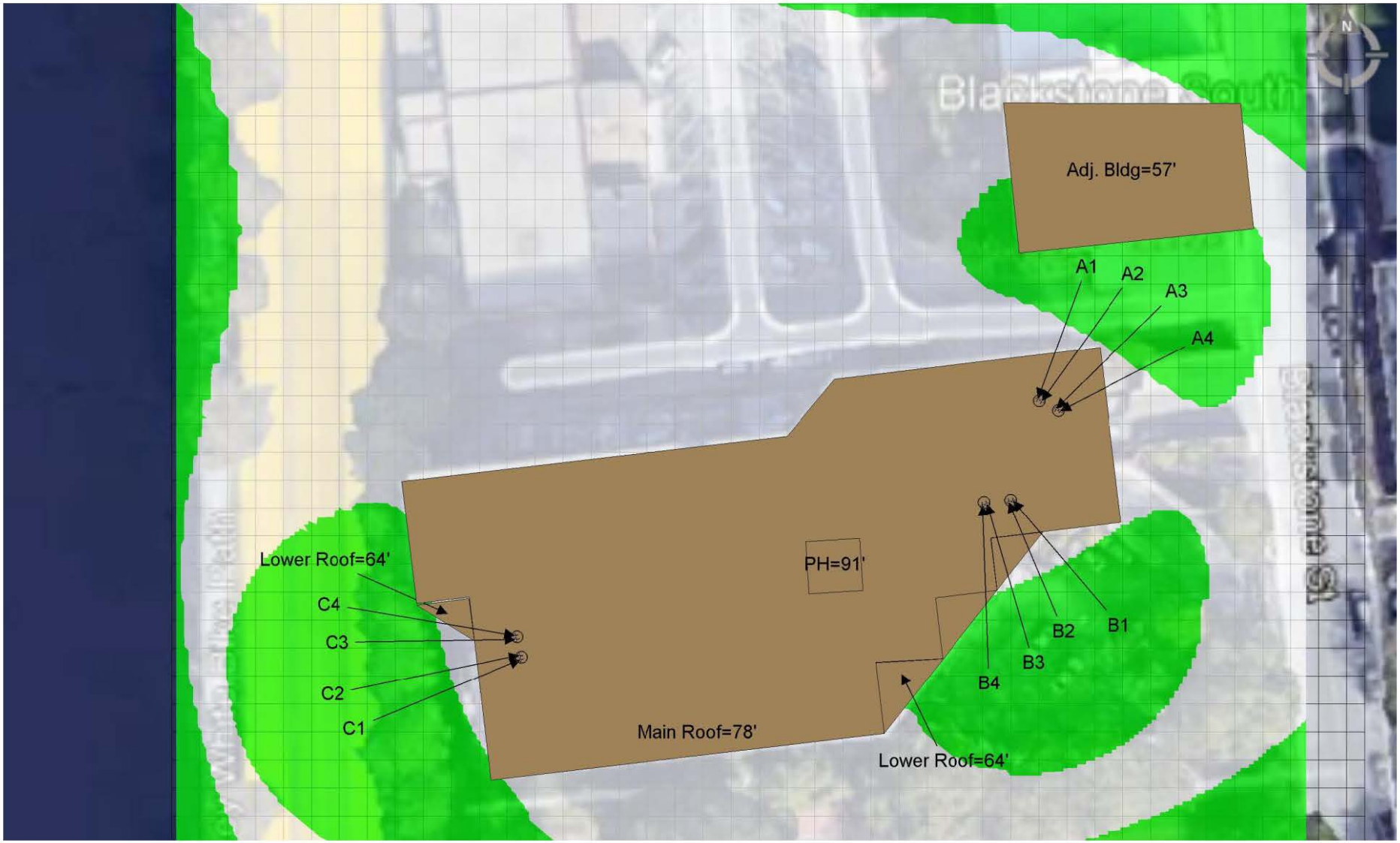
Proposed Barrier
Proposed Posts

% of FCC General Public Exposure Limit (Predictive Spatial Average)

Non-Simulated	0-1	1-100	100-500	500-5000	>5000

Map Scale = 10 ft

4.5 Predictive Cumulative MPE Contribution from All Sources at Ground Level (0 ft.)



Max. Predictive Spatial Average MPE% = **5.56%**

Proposed Barrier
Proposed Posts

% of FCC General Public Exposure Limit (Predictive Spatial Average)

Non-Simulated	0-1	1-100	100-500	500-5000	>5000

Map Scale = 10 ft

5. Statement of Compliance

5.1 Statement of AT&T Mobility Compliance

At the time of our Analysis, AT&T Mobility is required to take action to fulfill their Obligations to comply with the FCC's mandate as defined in OET-65

Recommendations

AT&T Alpha Sector:

- Two Caution 2 Signs to be posted back-to-back, 2 feet above the Main Roof level on the canister covering (Ant. #A1 & Ant. #A2) facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. (2 Total Signs)

- Two Caution 2 Signs to be posted back-to-back, 2 feet above the Main Roof level on the canister covering (Ant. #A3 & Ant. #A4) facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. (2 Total Signs)

- **Barrier1&2 12ft** "6ft x 6ft" **x 12ft** "6ft x 6ft" **x 16ft** "8ft x 8ft" required with **Seven Posts** with Caution-2 Sign posted on the top of each Post facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. This barrier is not connected towards the parapet because existing parapet is less than 39" and as per "AT&T's Unprotected Roof Edge Policy", barriers must stop 6' away from unprotected roof edge. (7 Total Signs)

AT&T Beta Sector:

- Two Caution 2 Signs to be posted back-to-back, 2 feet above the Main Roof level on the canister covering (Ant. #B1 & Ant. #B2) facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. (2 Total Signs)

- Two Caution 2 Signs to be posted back-to-back, 2 feet above the Main Roof level on the canister covering (Ant. #B3 & Ant. #B4) facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. (2 Total Signs)

- **Barrier1&2 29ft** "8ft x 8ft x 8ft x 5ft" **& 12ft** "6ft x 6ft" **x 24ft** "8ft x 8ft x 8ft" **x 24ft** "8ft x 8ft x 8ft" required with **Fourteen Posts** with Caution-2 Sign posted on the top of each Post facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. This barrier is not connected towards the parapet because existing parapet is less than 39" and as per "AT&T's Unprotected Roof Edge Policy", barriers must stop 6' away from unprotected roof edge. (14 Total Signs)

AT&T Gamma Sector:

- Two Caution 2 Signs to be posted back-to-back, 2 feet above the Main Roof level on the canister covering (Ant. #C1 & Ant. #C2) facing outwards so approaching people can see as shown in “Recommendations Map – Detailed View” on page 15. (2 Total Signs)

- Two Caution 2 Signs to be posted back-to-back, 2 feet above the Main Roof level on the canister covering (Ant. #C3 & Ant. #C4) facing outwards so approaching people can see as shown in “Recommendations Map – Detailed View” on page 15. (2 Total Signs)

- **Barrier1&2 12ft** “6ft x 6ft” **& 7ft & 23ft** “7ft x 8ft x 8ft” **x 12ft** “6ft x 6ft” **x 27ft** “7ft x 7ft x 7ft x 6ft” required with **Fourteen Posts** with Caution-2 Sign posted on the top of each Post facing outwards so approaching people can see as shown in "Recommendations Map – Detailed View" on page 15. This barrier is not connected towards the parapet because existing parapet is less than 39” and as per “AT&T’s Unprotected Roof Edge Policy”, barriers must stop 6’ away from unprotected roof edge. (14 Total Signs)

- Rooftop access door must be restricted with Lock and One Caution 2 Sign & RF Exposure Map to be posted as per RF Exposure diagram shown on page 14 on access door as shown in the "Recommendations Map – Detailed View" on page 15. (1 Total Sign)

Rooftop Access:

- Rooftop access door must be restricted with Lock and One Caution 2 Sign & RF Exposure Map to be posted as per RF Exposure diagram shown on page 14 on access door as shown in the "Recommendations Map – Detailed View" on page 15. (1 Total Sign)

Proposed RF Exposure diagram (Cumulative) for RF Exposure Map:

Proposed Barrier

Proposed Posts

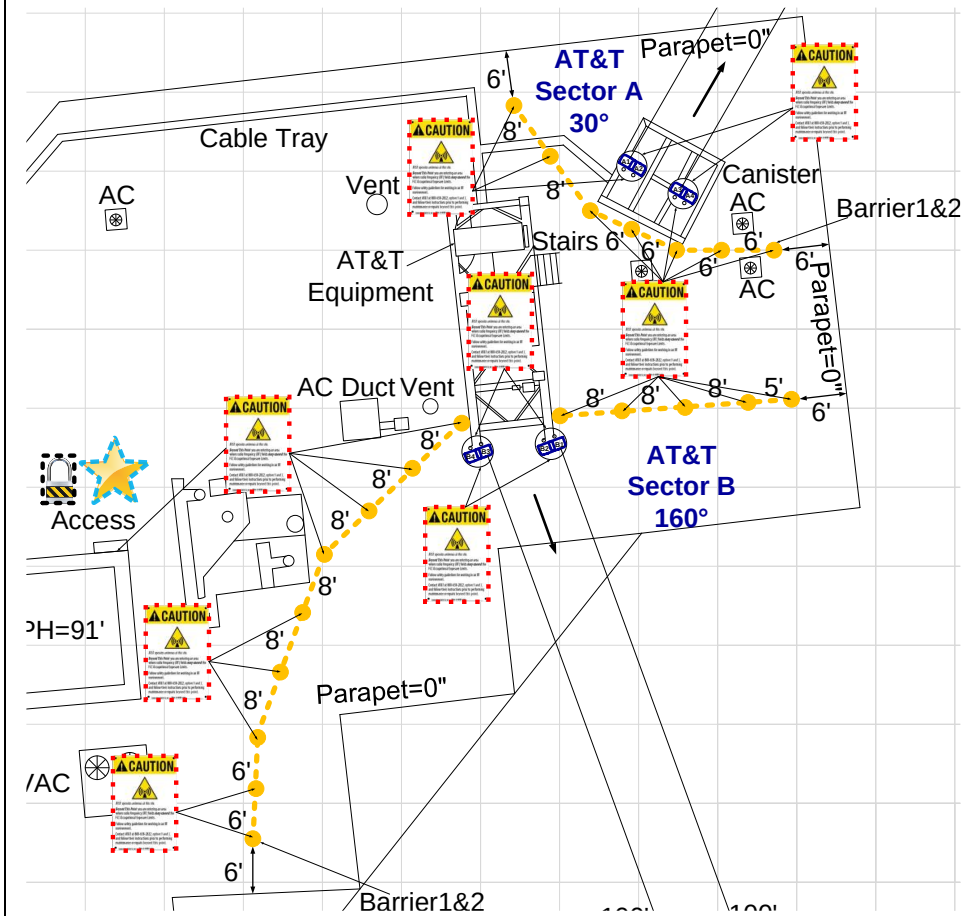
% of FCC General Public Exposure Limit (Predictive Spatial Average)

Non-Simulated	0-1	1-100	100-500	500-5000	>5000

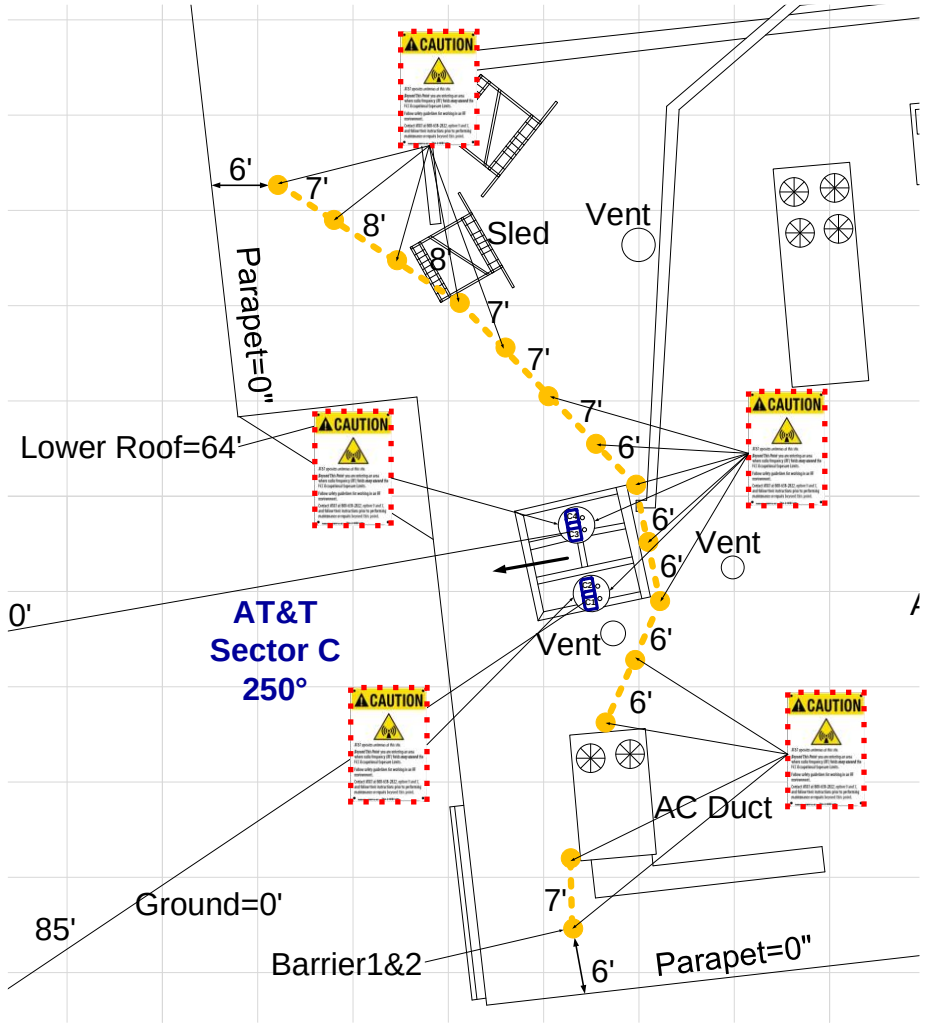
Map Scale = 10 ft

Recommendations Map – Detailed View

AT&T Alpha, Beta Sectors & Access



AT&T Gamma Sector



AT&T Antenna	Proposed	Proposed Signage								
Panel	Barrier	Safety Instructions	Notice 2	Caution 2	Caution 2B	Caution 2C	Caution 7"x7"	Warning 1B	RF Exposure Map	Lock
OMNI	Posts									

Map Scale = 10 ft

Appendix A – Statement of Limiting Conditions

General Model Assumptions

In this site compliance report, it is assumed that all antennas are operating at full power at all times. AT&T has further recommended to assume a 75% duty cycle of maximum radiated power for all LTE & 5G carriers (& consider 100% duty cycle for all UMTS carriers).

In this site compliance report, it is assumed that Mechanical Tilt value of "0°" MUST be retained for C-BAND and/or DoD AAS^ antenna(s) at all times to ensure that "EME (Predictive) Study" shall remain valid.

AT&T recommended to consider - For C-BAND and/or DoD AAS^ antenna(s) 75% TDD duty Cycle, 1.5dB Power Tolerance & 0.32 Power Reduction factor[1] are used to calculate Transmitter Power & ERP/EiRP.

AT&T recommended to use worst-case tilts for the simulations.

***Power Reduction Factor**: IEC Standard 62232: 2017 allows for a statistically conservative power density model to more realistically define the RF exposure area. AT&T recommends a "0.32" factor to calculate the "Actual Maximum" (time averaged) power value, which accounts for "Beam Scanning," "Scheduling," and "RBS Utilization" This recommended value is a conservative figure modelled and supported by other vendors and through measurements published in scientific articles and white papers by IEEE and others. Those publication are listed below:*

1. IEEE Access, Time-Averaged Realistic Maximum Power Levels for the Assessment of RF Exposure for 5G Radio Base Stations Using Massive MIMO (Published Sept. 18, 2017 / BJÖRN THORS, ANDERS FURUSKÄR, DAVIDE COLOMBI, AND CHRISTER TÖRNEVIK)
2. IEEE Explore, A Statistical Approach for RF Exposure Compliance Boundary Assessment in Massive MIMO Systems (Published Jan. 25, 2018 / Paolo Baracca, Andreas Weber, Thorsten Wild, Christophe Grangeat)
3. IEEE Access, In-situ Measurement Methodology for the Assessment of 5G NR Massive MIMO Base Station Exposure at Sub-6 GHz Frequencies (Published Dec. 20, 2019 / SAM AERTS, LEEN VERLOOCK, MATTHIAS VAN DEN BOSSCHE, DAVIDE COLOMBI, LUC MARTENS, CHRISTER TÖRNEVIK AND WOUT JOSEPH)
4. Applied Sciences, Analysis of the Actual Power and EMF Exposure from Base Stations in a Commercial 5G Network (Published July 30, 2020 / Davide Colombi, Paramananda Joshi, Bo Xu, Fatemeh Ghasemifard, Vignesh Narasaraju and Christer Törnevik)
5. Ofcom Technical Report, Electromagnetic Field (EMF) measurements near 5G mobile phone base stations (Published Feb. 21, 2020 / Davide Colombi, Paramananda Joshi, Bo Xu, Fatemeh Ghasemifard, Vignesh Narasaraju and Christer Törnevik)

MobileComm believes these areas to be safe for entry by occupationally trained personnel utilizing appropriate personal protective equipment (in most cases, a personal monitor). Thus, at any time, if power density measurements were made, we believe the real time measurements would indicate levels below those depicted in the RF emission diagram(s) in this report. By modelling in this way, MobileComm has conservatively shown exclusion areas – areas that should not be entered without the use of a personal monitor, carriers reducing power, or performing real-time measurements to indicate real-time exposure levels.

Use of Generic Antennas

For the purposes of this report, the use of "Generic" as an antenna model, or "Other Carrier" for an operator means the information about a carrier, their FCC license and/or antenna information was not provided and could not be obtained while on site. In the event of unknown information, MobileComm will use our industry specific knowledge of equipment, antenna models, and transmit power to model the site. Information about similar facilities is used when the service is identified and associated with a particular antenna. If no information is available regarding the transmitting service associated with an unidentified antenna, using the antenna manufacturer's published data regarding the antenna's physical characteristics makes more conservative assumptions.

Where the frequency is unknown, MobileComm uses the closest frequency in the antenna's range that corresponds to the highest Maximum Exposure Limit (MPE), resulting in a conservative analysis.

Appendix B – FCC Guidelines and Emissions Threshold Limits

All power density values used in this report were analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (µW/cm2).The number of µW/cm2 calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General Population/Uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (µW/cm2). The general population exposure limit for the 700 and 800 MHz Bands is approximately 467 µW/cm2 and 567 µW/cm2 respectively, and the general population exposure limit for the 1900 MHz PCS and 2100 MHz AWS bands is 1000 µW/cm2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure, have been properly trained in RF safety and can exercise control over their exposure. Occupational/Controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure, have been trained in RF safety and can exercise control over his or her exposure by leaving the area or by some other appropriate means. The Occupational/Controlled exposure limits all utilized frequency bands is five (5) times the FCC's General Public / Uncontrolled exposure limit.

Additional details can be found in FCC OET 65.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-I,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-I,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

Appendix C – Rules & Regulations

Explanation of Applicable Rules and Regulations

FCC has set forth guidelines in OET Bulletin 65 for human exposure to radio frequency electromagnetic fields. Currently, there are two different levels of MPE - General Public MPE and Occupational MPE. An individual classified as Occupational can be defined as an individual who has received appropriate RF training and meets the conditions outlined below. General Public is defined as anyone who does not meet the conditions of being Occupational. FCC Rules and Regulations define compliance in terms of total exposure to total RF energy, regardless of location of or proximity to the sources of energy.

It is the responsibility of all licensees to ensure these guidelines are maintained at all times. It is the ongoing responsibility of all licensees composing the site to maintain ongoing compliance with FCC rules and regulations.

A building owner or site manager can use this report as part of an overall RF Health and Safety Policy. It is important for building owners/site managers to identify areas in excess of the General Population MPE and ensure that only persons qualified as Occupational are granted access to those areas.

Occupational Environment Explained

The FCC definition of Occupational exposure limits apply to persons who:

- *are exposed to RF energy as a consequence of their employment;*
- *have been made aware of the possibility of exposure; and*
- *can exercise control over their exposure.*

FCC guidelines go further to state that persons must complete RF Safety Awareness training and must be trained in the use of appropriate personal protective equipment.

In order to consider this site an Occupational Environment, the site must be controlled to prevent access by any individuals classified as the General Public. Compliance is also maintained when any non-occupational individuals (the General Public) are prevented from accessing areas indicated as Red or Yellow in the attached RF Emissions diagram. In addition, a person must be aware of the RF environment into which they are entering. This can be accomplished by an RF Safety Awareness class, and by appropriate written documentation such as this Site Compliance Report.

Appendix D – General Safety Recommendations

The following are general recommendations appropriate for any site with accessible areas in excess of 100% General Public MPE. These recommendations are not specific to this site. These are safety recommendations appropriate for typical site management, building management, and other tenant operations.

1. All individuals needing access to the main site should be instructed to read and obey all posted placards and signs.

2. The site should be routinely inspected and this or similar report updated with the addition of any antennas or upon any changes to the RF environment including:

- *adding new antennas that may have been located on the site*
- *removing of any existing antennas*
- *changes in the radiating power or number of RF emitters*

3. Post the appropriate SAFETY INSTRUCTIONS, NOTICE, CAUTION & WARNING sign at the main site access point(s) and other locations as required. Note: Please refer to RF Exposure Diagrams in the report section above, to inform everyone who has access to this site that beyond posted signs there may be levels in excess of the limits prescribed by the FCC. The signs below are examples of signs meeting FCC guidelines.

4. Ensure that the site door remains locked (or appropriately controlled) to deny access to the general public if deemed as policy by the building/site owner.

5. For a General Public environment the five color levels identified in measured RF emission diagram can be interpreted in the following manner:

- *White represents areas predicted to be greater than or equal to 0% and less than 1% of the MPE general public limits*
- *Green represents areas predicted to be greater than or equal to 1% and less than 100% of the MPE general public limits*
- *Blue represents areas predicted to be greater than or equal to 100% and lesser than 500% of the MPE general public limits.*
- *Yellow represents areas predicted to be greater than or equal to 500% and lesser than 5000% of the MPE general public limits.*
- *Red areas indicates predicted levels greater than or equal to 5000% of the MPE general public limits.*

Appendix E – References

1 - FCC Definition

FCC defines an Occupational or Controlled environment as one where persons are exposed to RF fields as a consequence of their employment and where those persons exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Typical criteria for an Occupational or Controlled environment is restricted access (i.e. locked doors, gates, etc.) to areas where antennas are located coupled with proper RF warning signage.

FCC defines a site as a General Public or Uncontrolled environment when human exposure to RF fields occurs to the general public or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over the exposure. Typical criteria for a General Public or Uncontrolled environment are unrestricted access (i.e. unlocked or no restrictions) to areas where antennas are located without proper RF warning signage being posted.

2 - Physical Testing measurement procedure and Tools

The Narda Broadband Field Meter NBM-550 can make rapid conformance measurements with evaluation in the time domain when used in conjunction EA5091 probe. This probe is a so-called Shaped Probe, i.e. it is frequency weighted so that it automatically takes account of the FCC Occupational limit values. To collect data, the probe is pointed towards the potential source(s) of EME radiation and moved slowly from ground level up to slightly above head height (approx. 6 ft).

Spatial Average Measurement A technique used to average a minimum of ten (10) measurements taken in a ten (10) second interval from zero (0) to six (6) feet. This measurement is intended to model the average energy an average sized human body will absorb while present in an electromagnetic field of energy.

3 - Site Safety Procedures

The following items are general safety recommendations that should be administered on a site by site basis as needed by the carrier.

General Maintenance Work: *Any maintenance personnel required to work immediately in front of antennas and / or in areas indicated as above 100% of the Occupational MPE limits should coordinate with the wireless operators to disable transmitters during their work activities.*

Training and Qualification Verification: *All personnel accessing areas indicated as exceeding the General Population MPE limits should have a basic understanding of EME awareness and RF Safety procedures when working around transmitting antennas. Awareness training increases a workers understanding to potential RF exposure scenarios. Awareness can be achieved in a number of ways (e.g. videos, formal classroom lecture or internet based courses).*

Physical Access Control: *Access restrictions to transmitting antennas locations is the primary element in a site safety plan. Examples of access restrictions are as follows:*

- *Locked door or gate*
- *Alarmed door*
- *Locked ladder access*
- *Restrictive Barrier at antenna locations (e.g. Chain link with posted RF Sign)*

RF Signage: *Everyone should obey all posted signs at all times. RF signs play an important role in properly warning a worker prior to entering into a potential RF Exposure area.*

Assume all antennas are active: *Due to the nature of telecommunications transmissions, an antenna transmits intermittently. Always assume an antenna is transmitting. Never stop in front of an antenna. If you have to pass by an antenna, move through as quickly and safely as possible thereby reducing any exposure to a minimum.*

Maintain a 3 foot clearance from all antennas: *There is a direct correlation between the strength of an EME field and the distance from the transmitting antenna. The further away from an antenna, the lower the corresponding EME field is.*

Rooftop RF Emissions Diagram: *Section 4 of this report contains an RF Emissions Diagram that outlines various theoretical Maximum Permissible Exposure (MPE) areas on the rooftop. This analysis is all theoretical and assumes a duty cycle of 75% for each transmitting antenna at full power. This analysis is a worst case scenario. This analysis is based on one of two access control criteria: General Public criteria means the access to the site is uncontrolled and anyone can gain access. Occupational criteria means the access is restricted and only properly trained individuals can gain access to the antenna locations.*

4 - Definitions

Compliance- *The determination of whether a site is safe or not with regards to Human Exposure to Radio Frequency Radiation from transmitting antennas.*

Decibel (dB) – *A unit for measuring power or strength of a signal.*

Duty Cycle – *The percent of pulse duration to the pulse period of a periodic pulse train. Also, may be a measure of the temporal transmission characteristic of an intermittently transmitting RF source such as a paging antenna by dividing average transmission duration by the average period for transmission. A duty cycle of 75% corresponds to continuous operation.*

Effective (or Equivalent) Isotropic Radiated Power (EIRP) – *The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna, this product is divided by the cable losses*

Effective Radiated Power (ERP) – *In a given direction, the relative gain of a transmitting antenna with respect to the maximum directivity of a half wave dipole multiplied by the net power accepted by the antenna from the connecting transmitter.*

Gain (of an antenna in dbd) – *The ratio of the maximum intensity in a given direction to the maximum radiation in the same direction from a reference dipole. Gain is a measure of the relative efficiency of a directional antennas as compared to a reference dipole.*

General Population/Uncontrolled Environment – *Defined by the FCC, as an area where RFR exposure may occur to persons who are unaware of the potential for exposure and who have no control of their exposure. General Population is also referenced as General Public.*

Generic Antenna – *For the purposes of this report, the use of "Generic" as an antenna model means the antenna information was not provided and could not be obtained while on site. In the event of unknown information, MobileComm will use our industry specific knowledge of antenna models to select a worst case scenario antenna to model the site.*

Isotropic Antenna – *An antenna that is completely non-directional. In other words, an antenna that radiates energy equally in all directions.*

Maximum Measurement – *This measurement represents the single largest measurement recorded when performing a spatial average measurement.*

Maximum Exposure Limit (MPE) – *The RMS and peak electric and magnetic field strength, their squares, or the plane-wave equivalent power densities associated with these fields to which a person may be exposed without harmful effect and with acceptable safety factor.*

Occupational/Controlled Environment – *Defined by the FCC, as an area where Radio Frequency Radiation (RFR) exposure may occur to persons who are aware of the potential for exposure as a condition of employment or specific activity and can exercise control over their exposure.*

Radio Frequency Radiation – *Electromagnetic waves that are propagated from antennas through space.*

Spatial Average Measurement – *A technique used to average a minimum of ten (10) measurements taken in a ten (10) second interval from zero (0) to six (6) feet. This measurement is intended to model the average energy an average sized human body will absorb while present in an electromagnetic field of energy.*

Transmitter Power Output (TPO) – *The radio frequency output power of a transmitter's final radio frequency stage as measured at the output terminal while connected to a load.*

Appendix F – Proprietary Statement

This report was prepared for the use of AT&T Mobility, LLC to meet requirements specified in AT&T's corporate RF safety guidelines. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by MobileComm are based solely on the information provided by AT&T Mobility and all observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to MobileComm so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

April 6, 2022

Mark Donnelly
Smartlink
85 Rangeway Road, Bldg. # 3, Suite 102
North Billerica, MA 01862

Ramaker & Associates, Inc.
855 Community Drive
Sauk City, WI 53583

SUBJECT:	**STRUCTURAL ASSESSMENT**
CARRIER:	**AT&T**
SITE:	**CAMBRIDGE PUTNAM AVENUE (MAL02881)**
ADDRESS:	**840 MEMORIAL DRIVE** **CAMBRIDGE, MIDDLESEX COUNTY, MASSACHUSETTS 02139**
LATITUDE:	**42.3630861°**
LONGITUDE:	**-71.1154083°**
FA LOCATION CODE:	**10546807**
SCOPE:	**4TX4RX/ 5G NR/ 5G NR/ 5G NR 1SR/ BBU/ 5G NR 1SR/ 5C/ 4TXRX**
PACE NUMBER:	**MRCTB062466/ MRCTB058143/ MRCTB058149/ MRCTB052281/ MRCTB050850/ MRCTB051464/ MRCTB051052/ MRCTB051059**
PTN NUMBER:	**2101A149QE/ N/A/ N/A/ 2101A102CF/ 2101A0Z85X/ 2101A0Z7FR/ 2101A0Z76F/ 2101A0Z716**

RAMAKER & ASSOCIATES PROJECT NUMBER: 51676

RESULTS:	**MOUNT:**	**PASS**	**77.3%**
	EQUIPMENT PLATFORM:	**PASS**	**82.9%**
	SUPPORTING STRUCTURE:	**PASS**	

Dear Mark Donnelly:

Ramaker & Associates, Inc. (RAMAKER) respectfully submits this structural assessment for the above-mentioned site. The purpose of this report is to determine the structural integrity of the structure(s) with the proposed loading configurations. Engineering recommendations regarding the analysis results are provided in the following pages.

RAMAKER analyzed the structure(s) using accepted engineering practices. All information contained herein is valid only for the described structure configuration and loading conditions. RAMAKER reserves the right to modify our recommendations should alterations to the structure(s) loading occur.

If you have any questions or comments, please do not hesitate to contact our office.

Sincerely,

RAMAKER & ASSOCIATES, INC.

Gerardo Nunez Jr.
Structural Designer

COMMONWEALTH OF MASSACHUSETTS
JEFFREY ZANDER
STRUCTURAL
No. 55191
REGISTERED
PROFESSIONAL ENGINEER

Jeffrey H. Zander, P.E
Supervising Engineer

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ANALYSIS CRITERIA

State Building Code	Massachusetts 9th Ed. Amendments
Adopted Building Code	2015 IBC
Referenced Standard	TIA-222-G
Structure Class	II
Ultimate Design Wind Speed, V_{ult}	128 mph (3 sec. gust)
Nominal Design Wind Speed, V_{asd}	99 mph (3 sec. gust)
Design Wind Speed w/ Ice	50 mph (3 sec. gust)
Ice Thickness	3/4 inch
Exposure Category	C
Topographic Feature	None

SUPPORTING DOCUMENTATION

- Previous structural analysis by Dewberry, job number 50093723/50096257, dated 01/16/2018
- Final RFDS version 4.00 by AT&T, RFDS ID: 4654903, dated 03/23/2022
- Site visit(s) conducted by RAMAKER
- Other pertinent data procured or assumed by RAMAKER during site due diligence activities

MOUNT LOADING

RAMAKER understands that the loading to be used for this analysis will consist of the antennas and equipment configurations as shown in the following chart(s):

Equipment Loading Summary			
Elevation	**Appurtenance**	**Mount Type**	**Status**
87	**(6) CCI HPA65R-BU8A**	(2) Ballast Frames (2) Mount Pipe	**Remove**
	(3) KMW EPBQ-654L8H8-L2		
	(3) CCI OPA65R-BU8B		
	(3) Ericsson RRUS-11 B12		
	(3) Ericsson 4478 B5		
	(2) Raycap DC6-48-60-0-8C		
	(1) Raycap DC6-48-60-18-8F		
	(3) Ericsson RRUS-32 B30		Existing
	(3) Ericsson 4415 B25		
	(3) Ericsson 4426 B66		
	(3) CCI DMP65R-BU4DA		**Proposed**
	(3) CCI TPA65R-BU4DA-K		
	(3) Ericsson AIR6449 B77D		
	(3) Ericsson AIR6419 B77G		
	(3) Ericsson 4449 B5/B12		
	(3) Ericsson 4478 B14		
	(3) Raycap DC9-48-60-24-PC16-EV		

RESULTS

The maximum mount member stress capacities under the loading conditions previously described are as follows:

Component Type	Percent Capacity	Pass/Fail
Mount Pipe	5.5	Pass
Column	77.3	Pass
Kicker	23.1	Pass
Platform Main Beam	42.4	Pass
Platform Support Beam	28.9	Pass
Platform Brace	61.2	Pass
Platform Column	82.9	Pass
RATING	**82.9**	**PASS**

By engineering calculation and inspection, the antenna and equipment mounting structure(s) are capable of supporting the proposed loading configurations without causing an overstress condition in the antenna and equipment mounting structure(s).

The following table summarizes the final required ballast loads:

Ballast Placement	Required Weight (lb)	Approximate CMU Quantity*
Front Ballast Tray**	105	3
Back Ballast Tray	105	3
Total	**210**	**6**

* Assuming 8x8x16 hollow CMU @ 35lb each (contractor to verify actual weights and remove any excess ballast)
** The front tray is defined as the tray on the side of the frame upon which the antennas are installed

By engineering judgment, it is RAMAKER's assessment that the supporting roof structure will provide adequate support under proposed loading conditions.

ASSUMPTIONS

This analysis is based on the theoretical design capacity of the members and is not a condition assessment of the structure. This analysis is based on the information supplied and the results are only as accurate as the data obtained from this information. The Scope of Work for RAMAKER did not require verification of the provided information. The following assumptions were made for this structural analysis.

1) The mounts were built and maintained in accordance with the manufacturer's drawings and specifications and including the TIA Standards.
2) All structural members are in good condition and can achieve their full design capacity. All welds and connections can develop the full member capacity unless determined otherwise and explicitly stated in this report.
3) No physical deterioration has occurred in any of the structural components. No allowance was made for any damaged, missing, or rusted members, nor loose bolts or cracked welds.
4) All prior structural modifications, if any, are assumed to be properly installed and fully effective.
5) Information provided by the client regarding the structure, appurtenances, transmission cables, and other relevant information is assumed to be current and correct. Appurtenance sizes and weights as specified in the loading tables are best estimates and based on available information, if explicit documentation is not provided to RAMAKER. If the loading configuration is different than stated, then this analysis is invalid.
6) Mount steel grades meet the values as stated, unless noted otherwise:
    - Channel, Solid Round, Angle, Plate — ASTM A36 (GR 36)
    - Wide Flange — ASTM A992 (GR 50)
    - HSS (Rectangular) — ASTM A36 (GR 36)
    - Pipe — ASTM A53 (GR 35)
    - Unistrut — ASTM A653 SS (GR 33)
    - Threaded Rod — ASTM F1554 (GR 36)
    - Connection Bolt — ASTM A325

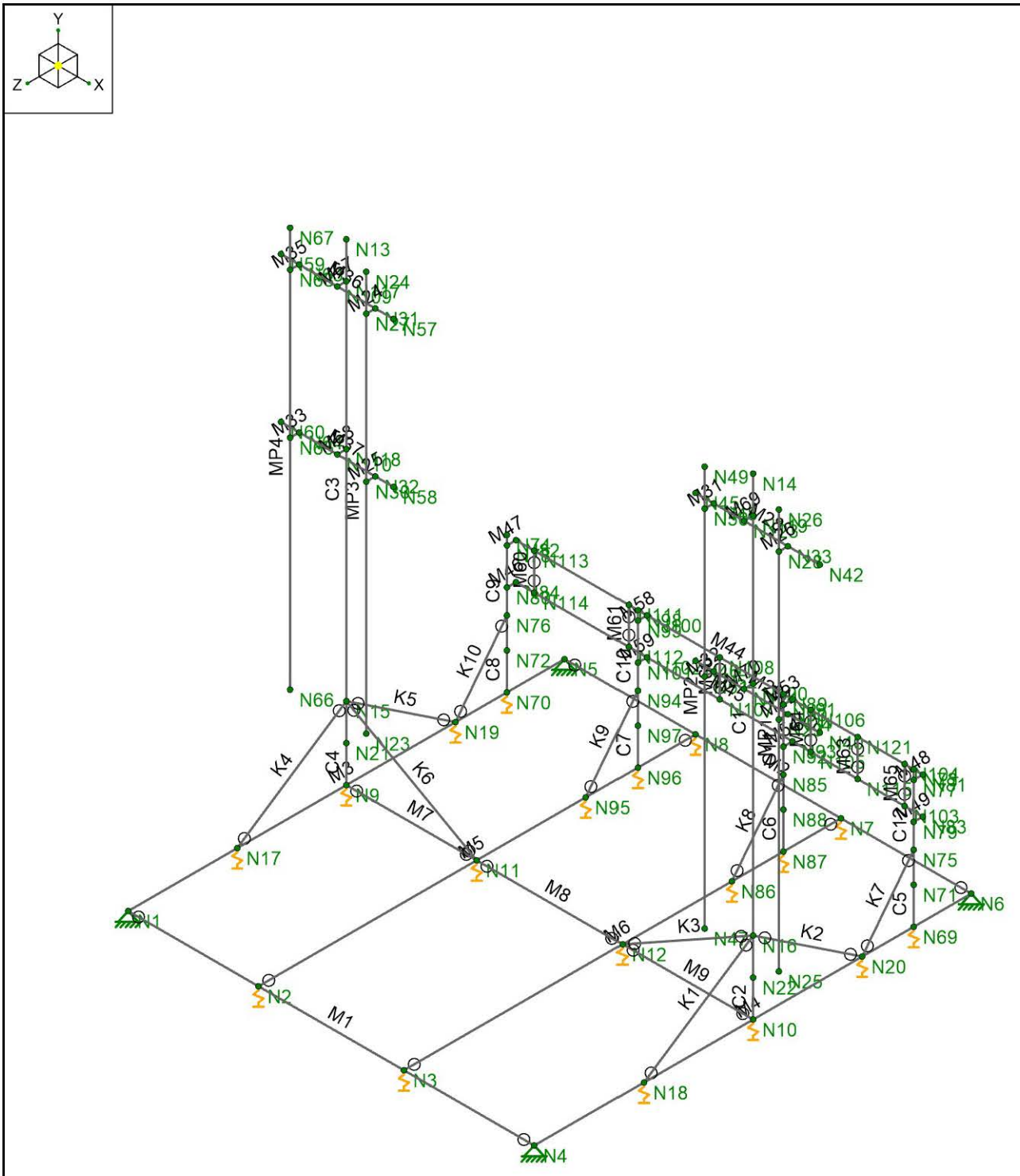
This analysis may be affected if any assumptions are not valid or have been made in error. RAMAKER should be notified to determine the effect on the structural integrity of the mount.

SCOPE AND LIMITATIONS

The engineering services performed by RAMAKER regarding this report are limited to an analysis of the mount and the capacity of its members. RAMAKER will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, or lack of maintenance. RAMAKER makes no warranties, expressed or implied in connection with this report and disclaims any liability arising from original design, material, fabrication and erection deficiencies or the "as-built" condition of this structure.

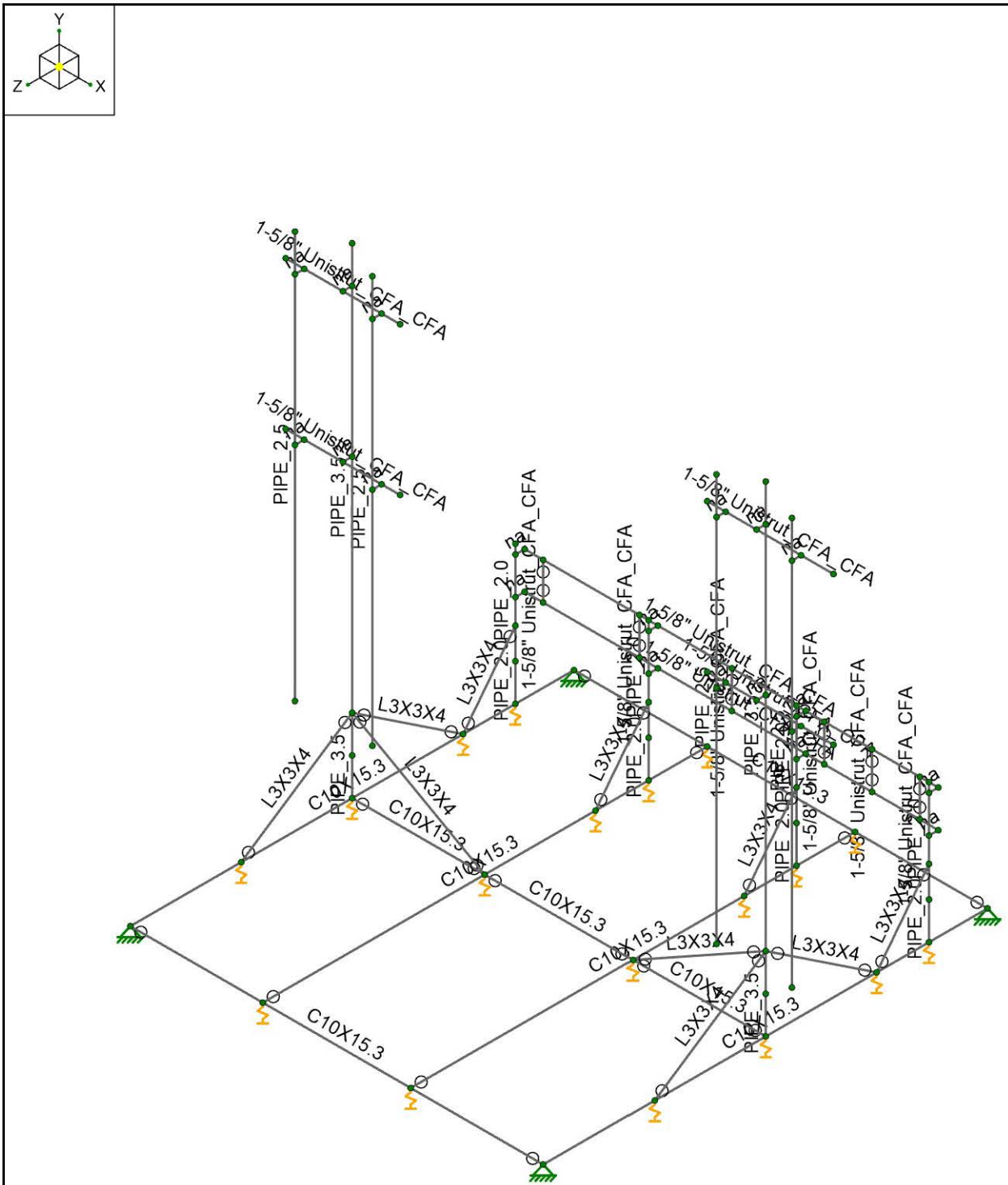
ATTACHMENTS

- Analysis Figures
- Analysis Calculations



Envelope Only Solution

RAMAKER	MAL02881	SK-1
GN		Mar 25, 2022
51676		51676 Alpha & Gamma Mount_…



Envelope Only Solution

RAMAKER	MAL02881	SK-2
GN		Mar 25, 2022
51676		51676 Alpha & Gamma Mount_…

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1
9	A106	29000	11154	0.3	0.65	0.49	35	1.1	60	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	C10x15.3	C10X15.3	Beam	Channel	A36 Gr.36	Typical	4.48	2.27	67.3	0.209
2	Pipe 2.0	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	0.627	0.627	1.25
3	Pipe 2.5	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
4	Pipe 3.5	PIPE_3.5	Beam	Pipe	A53 Gr.B	Typical	2.5	4.52	4.52	9.04
5	L3x3x1/4	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	0.031

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N4	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
2	M2	N5	N6	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
3	M3	N1	N5	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
4	M4	N4	N6	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
5	M5	N2	N8	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
6	M6	N3	N7	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
7	M7	N9	N11	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
8	M8	N11	N12	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
9	M9	N12	N10	270	C10x15.3	Beam	Channel	A36 Gr.36	Typical
10	K4	N17	N15	180	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
11	K5	N19	N15	90	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
12	K1	N18	N16	90	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
13	K2	N20	N16	90	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
14	K6	N15	N11	90	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
15	K3	N12	N16	90	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
16	C4	N9	N21		Pipe 3.5	Beam	Pipe	A53 Gr.B	Typical
17	C3	N21	N13		Pipe 3.5	Beam	Pipe	A53 Gr.B	Typical
18	C2	N10	N22		Pipe 3.5	Beam	Pipe	A53 Gr.B	Typical
19	C1	N22	N14		Pipe 3.5	Beam	Pipe	A53 Gr.B	Typical
20	MP3	N23	N24		Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
21	MP1	N25	N26		Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
22	M24	N27	N31		RIGID	None	None	RIGID	Typical
23	M25	N30	N32		RIGID	None	None	RIGID	Typical
24	M26	N28	N33		RIGID	None	None	RIGID	Typical
25	M27	N29	N34		RIGID	None	None	RIGID	Typical
26	M28	N45	N42		CF1	Beam	CS	A653 SS Gr33	Typical
27	M29	N46	N40		CF1	Beam	CS	A653 SS Gr33	Typical
28	MP2	N47	N49		Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
29	M31	N50	N48		RIGID	None	None	RIGID	Typical
30	M32	N51	N52		RIGID	None	None	RIGID	Typical
31	M33	N65	N64		RIGID	None	None	RIGID	Typical
32	MP4	N66	N67		Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
33	M35	N68	N63		RIGID	None	None	RIGID	Typical
34	M36	N59	N57		CF1	Beam	CS	A653 SS Gr33	Typical
35	M37	N60	N58		CF1	Beam	CS	A653 SS Gr33	Typical
36	C8	N70	N72		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
37	C9	N72	N74		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
38	C5	N69	N71		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
39	C12	N71	N73		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
40	K10	N76	N19	180	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
41	K7	N75	N20	180	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
42	M44	N82	N81		CF1	Beam	CS	A653 SS Gr33	Typical
43	M45	N84	N83		CF1	Beam	CS	A653 SS Gr33	Typical
44	M46	N80	N84		RIGID	None	None	RIGID	Typical
45	M47	N78	N82		RIGID	None	None	RIGID	Typical
46	M48	N77	N81		RIGID	None	None	RIGID	Typical
47	M49	N79	N83		RIGID	None	None	RIGID	Typical
48	K8	N85	N86	180	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
49	C6	N87	N88		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
50	C11	N88	N89		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
51	M53	N90	N91		RIGID	None	None	RIGID	Typical
52	M54	N92	N93		RIGID	None	None	RIGID	Typical
53	K9	N94	N95	180	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
54	C7	N96	N97		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
55	C10	N97	N98		Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
56	M58	N99	N100		RIGID	None	None	RIGID	Typical
57	M59	N101	N102		RIGID	None	None	RIGID	Typical
58	M60	N114	N113		CF1	Beam	CS	A653 SS Gr33	Typical
59	M61	N112	N111		CF1	Beam	CS	A653 SS Gr33	Typical
60	M64	N105	N106		CF1	Beam	CS	A653 SS Gr33	Typical
61	M65	N103	N104		CF1	Beam	CS	A653 SS Gr33	Typical
62	M66	N107	N108		CF1	Beam	CS	A653 SS Gr33	Typical
63	M63	N115	N121		CF1	Beam	CS	A653 SS Gr33	Typical
64	M69	N119	N123		RIGID	None	None	RIGID	Typical
65	M70	N120	N124		RIGID	None	None	RIGID	Typical
66	M67	N117	N109		RIGID	None	None	RIGID	Typical
67	M68	N118	N110		RIGID	None	None	RIGID	Typical

Basic Load Cases

	BLC Description	Category	Y Gravity	Point	Distributed
1	Antenna Dead	None		18	
2	Antenna Wind 0	None		36	
3	Antenna Wind 30	None		36	
4	Antenna Wind 45	None		36	
5	Antenna Wind 60	None		36	
6	Antenna Wind 90	None		36	
7	Antenna Wind 120	None		36	
8	Antenna Wind 135	None		36	
9	Antenna Wind 150	None		36	
10	Antenna Wind 180	None		36	
11	Antenna Wind 210	None		36	
12	Antenna Wind 225	None		36	
13	Antenna Wind 240	None		36	
14	Antenna Wind 270	None		36	
15	Antenna Wind 300	None		36	
16	Antenna Wind 315	None		36	
17	Antenna Wind 330	None		36	

Basic Load Cases (Continued)

	BLC Description	Category	Y Gravity	Point	Distributed
18	Antenna Ice Dead	None		18	
19	Antenna Wind w/Ice 0	None		36	
20	Antenna Wind w/Ice 30	None		36	
21	Antenna Wind w/Ice 45	None		36	
22	Antenna Wind w/Ice 60	None		36	
23	Antenna Wind w/Ice 90	None		36	
24	Antenna Wind w/Ice 120	None		36	
25	Antenna Wind w/Ice 135	None		36	
26	Antenna Wind w/Ice 150	None		36	
27	Antenna Wind w/Ice 180	None		36	
28	Antenna Wind w/Ice 210	None		36	
29	Antenna Wind w/Ice 225	None		36	
30	Antenna Wind w/Ice 240	None		36	
31	Antenna Wind w/Ice 270	None		36	
32	Antenna Wind w/Ice 300	None		36	
33	Antenna Wind w/Ice 315	None		36	
34	Antenna Wind w/Ice 330	None		36	
35	Member Dead	None	-1		
36	Member Wind 0	None			52
37	Member Wind 30	None			52
38	Member Wind 45	None			52
39	Member Wind 60	None			52
40	Member Wind 90	None			52
41	Member Wind 120	None			52
42	Member Wind 135	None			52
43	Member Wind 150	None			52
44	Member Wind 180	None			52
45	Member Wind 210	None			52
46	Member Wind 225	None			52
47	Member Wind 240	None			52
48	Member Wind 270	None			52
49	Member Wind 300	None			52
50	Member Wind 315	None			52
51	Member Wind 330	None			52
52	Member Ice Dead	None			26
53	Member Wind w/Ice 0	None			52
54	Member Wind w/Ice 30	None			52
55	Member Wind w/Ice 45	None			52
56	Member Wind w/Ice 60	None			52
57	Member Wind w/Ice 90	None			52
58	Member Wind w/Ice 120	None			52
59	Member Wind w/Ice 135	None			52
60	Member Wind w/Ice 150	None			52
61	Member Wind w/Ice 180	None			52
62	Member Wind w/Ice 210	None			52
63	Member Wind w/Ice 225	None			52
64	Member Wind w/Ice 240	None			52
65	Member Wind w/Ice 270	None			52
66	Member Wind w/Ice 300	None			52
67	Member Wind w/Ice 315	None			52
68	Member Wind w/Ice 330	None			52
69	LV-1	None			
70	LV-2	None			
71	LV-3	None			
72	LV-4	None			

Basic Load Cases (Continued)

	BLC Description	Category	Y Gravity	Point	Distributed
73	LV-5	None			
74	LV-6	None			
75	LV-7	None			
76	LV-8	None			
77	LV-9	None			
78	LV-10	None			
79	LV-11	None			
80	LV-12	None			
81	LV-13	None			
82	LV-14	None			
83	LV-15	None			
84	LM-1	None			
85	LM-2	None			
86	LM-3	None			
87	LM-4	None			
88	LM-5	None			
89	LM-6	None			
90	LM-7	None			
91	LM-8	None			
92	LM-9	None			
93	LM-10	None			
94	LM-11	None			
95	LM-12	None			
96	LM-13	None			
97	LM-14	None			
98	LM-15	None			
99	Frame Dead Load	None	-1		
100	Miscl. Dead Load	None	-0.3		
101	Stability Wind 180	None		36	52
102	Stability Wind 90	None		36	52

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4D	Yes	Y	1	1.4	35	1.4								
2	0.9D + 1.6 (0-Wind)	Yes	Y	1	0.9	35	0.9	2	1.6	36	1.6				
3	0.9D + 1.6 (30-Wind)	Yes	Y	1	0.9	35	0.9	3	1.6	37	1.6				
4	0.9D + 1.6 (45-Wind)	Yes	Y	1	0.9	35	0.9	4	1.6	38	1.6				
5	0.9D + 1.6 (60-Wind)	Yes	Y	1	0.9	35	0.9	5	1.6	39	1.6				
6	0.9D + 1.6 (90-Wind)	Yes	Y	1	0.9	35	0.9	6	1.6	40	1.6				
7	0.9D + 1.6 (120-Wind)	Yes	Y	1	0.9	35	0.9	7	1.6	41	1.6				
8	0.9D + 1.6 (135-Wind)	Yes	Y	1	0.9	35	0.9	8	1.6	42	1.6				
9	0.9D + 1.6 (150-Wind)	Yes	Y	1	0.9	35	0.9	9	1.6	43	1.6				
10	0.9D + 1.6 (180-Wind)	Yes	Y	1	0.9	35	0.9	10	1.6	44	1.6				
11	0.9D + 1.6 (210-Wind)	Yes	Y	1	0.9	35	0.9	11	1.6	45	1.6				
12	0.9D + 1.6 (225-Wind)	Yes	Y	1	0.9	35	0.9	12	1.6	46	1.6				
13	0.9D + 1.6 (240-Wind)	Yes	Y	1	0.9	35	0.9	13	1.6	47	1.6				
14	0.9D + 1.6 (270-Wind)	Yes	Y	1	0.9	35	0.9	14	1.6	48	1.6				
15	0.9D + 1.6 (300-Wind)	Yes	Y	1	0.9	35	0.9	15	1.6	49	1.6				
16	0.9D + 1.6 (315-Wind)	Yes	Y	1	0.9	35	0.9	16	1.6	50	1.6				
17	0.9D + 1.6 (330-Wind)	Yes	Y	1	0.9	35	0.9	17	1.6	51	1.6				
18	1.2D + 1.6 (0-Wind)	Yes	Y	1	1.2	35	1.2	2	1.6	36	1.6				
19	1.2D + 1.6 (30-Wind)	Yes	Y	1	1.2	35	1.2	3	1.6	37	1.6				
20	1.2D + 1.6 (45-Wind)	Yes	Y	1	1.2	35	1.2	4	1.6	38	1.6				
21	1.2D + 1.6 (60-Wind)	Yes	Y	1	1.2	35	1.2	5	1.6	39	1.6				
22	1.2D + 1.6 (90-Wind)	Yes	Y	1	1.2	35	1.2	6	1.6	40	1.6				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
23	1.2D + 1.6 (120-Wind)	Yes	Y	1	1.2	35	1.2	7	1.6	41	1.6				
24	1.2D + 1.6 (135-Wind)	Yes	Y	1	1.2	35	1.2	8	1.6	42	1.6				
25	1.2D + 1.6 (150-Wind)	Yes	Y	1	1.2	35	1.2	9	1.6	43	1.6				
26	1.2D + 1.6 (180-Wind)	Yes	Y	1	1.2	35	1.2	10	1.6	44	1.6				
27	1.2D + 1.6 (210-Wind)	Yes	Y	1	1.2	35	1.2	11	1.6	45	1.6				
28	1.2D + 1.6 (225-Wind)	Yes	Y	1	1.2	35	1.2	12	1.6	46	1.6				
29	1.2D + 1.6 (240-Wind)	Yes	Y	1	1.2	35	1.2	13	1.6	47	1.6				
30	1.2D + 1.6 (270-Wind)	Yes	Y	1	1.2	35	1.2	14	1.6	48	1.6				
31	1.2D + 1.6 (300-Wind)	Yes	Y	1	1.2	35	1.2	15	1.6	49	1.6				
32	1.2D + 1.6 (315-Wind)	Yes	Y	1	1.2	35	1.2	16	1.6	50	1.6				
33	1.2D + 1.6 (330-Wind)	Yes	Y	1	1.2	35	1.2	17	1.6	51	1.6				
34	1.2D + 1.0Di + 1.0 (0-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	19	1	53	1
35	1.2D + 1.0Di + 1.0 (30-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	20	1	54	1
36	1.2D + 1.0Di + 1.0 (45-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	21	1	55	1
37	1.2D + 1.0Di + 1.0 (60-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	22	1	56	1
38	1.2D + 1.0Di + 1.0 (90-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	23	1	57	1
39	1.2D + 1.0Di + 1.0 (120-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	24	1	58	1
40	1.2D + 1.0Di + 1.0 (135-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	25	1	59	1
41	1.2D + 1.0Di + 1.0 (150-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	26	1	60	1
42	1.2D + 1.0Di + 1.0 (180-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	27	1	61	1
43	1.2D + 1.0Di + 1.0 (210-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	28	1	62	1
44	1.2D + 1.0Di + 1.0 (225-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	29	1	63	1
45	1.2D + 1.0Di + 1.0 (240-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	30	1	64	1
46	1.2D + 1.0Di + 1.0 (270-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	31	1	65	1
47	1.2D + 1.0Di + 1.0 (300-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	32	1	66	1
48	1.2D + 1.0Di + 1.0 (315-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	33	1	67	1
49	1.2D + 1.0Di + 1.0 (330-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	34	1	68	1
50	1.2D + 1.5LV-1	Yes	Y	1	1.2	35	1.2	69	1.5						
51	1.2D + 1.5LV-2	Yes	Y	1	1.2	35	1.2	70	1.5						
52	1.2D + 1.5LV-3	Yes	Y	1	1.2	35	1.2	71	1.5						
53	1.2D + 1.5LV-4	Yes	Y	1	1.2	35	1.2	72	1.5						
54	1.2D + 1.5LV-5	Yes	Y	1	1.2	35	1.2	73	1.5						
55	1.2D + 1.5LV-6	Yes	Y	1	1.2	35	1.2	74	1.5						
56	1.2D + 1.5LV-7	Yes	Y	1	1.2	35	1.2	75	1.5						
57	1.2D + 1.5LV-8	Yes	Y	1	1.2	35	1.2	76	1.5						
58	1.2D + 1.5LV-9	Yes	Y	1	1.2	35	1.2	77	1.5						
59	1.2D + 1.5LV-10	Yes	Y	1	1.2	35	1.2	78	1.5						
60	1.2D + 1.5LV-11	Yes	Y	1	1.2	35	1.2	79	1.5						
61	1.2D + 1.5LV-12	Yes	Y	1	1.2	35	1.2	80	1.5						
62	1.2D + 1.5LV-13	Yes	Y	1	1.2	35	1.2	81	1.5						
63	1.2D + 1.5LV-14	Yes	Y	1	1.2	35	1.2	82	1.5						
64	1.2D + 1.5LV-15	Yes	Y	1	1.2	35	1.2	83	1.5						
65	1.2D + 1.5LM-1 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	2	0.092	36	0.092		
66	1.2D + 1.5LM-1 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	3	0.092	37	0.092		
67	1.2D + 1.5LM-1 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	4	0.092	38	0.092		
68	1.2D + 1.5LM-1 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	5	0.092	39	0.092		
69	1.2D + 1.5LM-1 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	6	0.092	40	0.092		
70	1.2D + 1.5LM-1 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	7	0.092	41	0.092		
71	1.2D + 1.5LM-1 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	8	0.092	42	0.092		
72	1.2D + 1.5LM-1 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	9	0.092	43	0.092		
73	1.2D + 1.5LM-1 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	10	0.092	44	0.092		
74	1.2D + 1.5LM-1 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	11	0.092	45	0.092		
75	1.2D + 1.5LM-1 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	12	0.092	46	0.092		
76	1.2D + 1.5LM-1 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	13	0.092	47	0.092		
77	1.2D + 1.5LM-1 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	14	0.092	48	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
78	1.2D + 1.5LM-1 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	15	0.092	49	0.092		
79	1.2D + 1.5LM-1 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	16	0.092	50	0.092		
80	1.2D + 1.5LM-1 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	17	0.092	51	0.092		
81	1.2D + 1.5LM-2 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	2	0.092	36	0.092		
82	1.2D + 1.5LM-2 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	3	0.092	37	0.092		
83	1.2D + 1.5LM-2 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	4	0.092	38	0.092		
84	1.2D + 1.5LM-2 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	5	0.092	39	0.092		
85	1.2D + 1.5LM-2 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	6	0.092	40	0.092		
86	1.2D + 1.5LM-2 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	7	0.092	41	0.092		
87	1.2D + 1.5LM-2 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	8	0.092	42	0.092		
88	1.2D + 1.5LM-2 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	9	0.092	43	0.092		
89	1.2D + 1.5LM-2 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	10	0.092	44	0.092		
90	1.2D + 1.5LM-2 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	11	0.092	45	0.092		
91	1.2D + 1.5LM-2 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	12	0.092	46	0.092		
92	1.2D + 1.5LM-2 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	13	0.092	47	0.092		
93	1.2D + 1.5LM-2 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	14	0.092	48	0.092		
94	1.2D + 1.5LM-2 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	15	0.092	49	0.092		
95	1.2D + 1.5LM-2 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	16	0.092	50	0.092		
96	1.2D + 1.5LM-2 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	17	0.092	51	0.092		
97	1.2D + 1.5LM-3 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	2	0.092	36	0.092		
98	1.2D + 1.5LM-3 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	3	0.092	37	0.092		
99	1.2D + 1.5LM-3 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	4	0.092	38	0.092		
100	1.2D + 1.5LM-3 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	5	0.092	39	0.092		
101	1.2D + 1.5LM-3 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	6	0.092	40	0.092		
102	1.2D + 1.5LM-3 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	7	0.092	41	0.092		
103	1.2D + 1.5LM-3 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	8	0.092	42	0.092		
104	1.2D + 1.5LM-3 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	9	0.092	43	0.092		
105	1.2D + 1.5LM-3 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	10	0.092	44	0.092		
106	1.2D + 1.5LM-3 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	11	0.092	45	0.092		
107	1.2D + 1.5LM-3 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	12	0.092	46	0.092		
108	1.2D + 1.5LM-3 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	13	0.092	47	0.092		
109	1.2D + 1.5LM-3 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	14	0.092	48	0.092		
110	1.2D + 1.5LM-3 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	15	0.092	49	0.092		
111	1.2D + 1.5LM-3 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	16	0.092	50	0.092		
112	1.2D + 1.5LM-3 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	17	0.092	51	0.092		
113	1.2D + 1.5LM-4 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	2	0.092	36	0.092		
114	1.2D + 1.5LM-4 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	3	0.092	37	0.092		
115	1.2D + 1.5LM-4 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	4	0.092	38	0.092		
116	1.2D + 1.5LM-4 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	5	0.092	39	0.092		
117	1.2D + 1.5LM-4 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	6	0.092	40	0.092		
118	1.2D + 1.5LM-4 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	7	0.092	41	0.092		
119	1.2D + 1.5LM-4 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	8	0.092	42	0.092		
120	1.2D + 1.5LM-4 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	9	0.092	43	0.092		
121	1.2D + 1.5LM-4 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	10	0.092	44	0.092		
122	1.2D + 1.5LM-4 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	11	0.092	45	0.092		
123	1.2D + 1.5LM-4 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	12	0.092	46	0.092		
124	1.2D + 1.5LM-4 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	13	0.092	47	0.092		
125	1.2D + 1.5LM-4 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	14	0.092	48	0.092		
126	1.2D + 1.5LM-4 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	15	0.092	49	0.092		
127	1.2D + 1.5LM-4 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	16	0.092	50	0.092		
128	1.2D + 1.5LM-4 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	17	0.092	51	0.092		
129	1.2D + 1.5LM-5 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	2	0.092	36	0.092		
130	1.2D + 1.5LM-5 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	3	0.092	37	0.092		
131	1.2D + 1.5LM-5 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	4	0.092	38	0.092		
132	1.2D + 1.5LM-5 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	5	0.092	39	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
133	1.2D + 1.5LM-5 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	6	0.092	40	0.092		
134	1.2D + 1.5LM-5 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	7	0.092	41	0.092		
135	1.2D + 1.5LM-5 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	8	0.092	42	0.092		
136	1.2D + 1.5LM-5 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	9	0.092	43	0.092		
137	1.2D + 1.5LM-5 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	10	0.092	44	0.092		
138	1.2D + 1.5LM-5 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	11	0.092	45	0.092		
139	1.2D + 1.5LM-5 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	12	0.092	46	0.092		
140	1.2D + 1.5LM-5 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	13	0.092	47	0.092		
141	1.2D + 1.5LM-5 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	14	0.092	48	0.092		
142	1.2D + 1.5LM-5 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	15	0.092	49	0.092		
143	1.2D + 1.5LM-5 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	16	0.092	50	0.092		
144	1.2D + 1.5LM-5 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	17	0.092	51	0.092		
145	1.2D + 1.5LM-6 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	2	0.092	36	0.092		
146	1.2D + 1.5LM-6 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	3	0.092	37	0.092		
147	1.2D + 1.5LM-6 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	4	0.092	38	0.092		
148	1.2D + 1.5LM-6 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	5	0.092	39	0.092		
149	1.2D + 1.5LM-6 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	6	0.092	40	0.092		
150	1.2D + 1.5LM-6 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	7	0.092	41	0.092		
151	1.2D + 1.5LM-6 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	8	0.092	42	0.092		
152	1.2D + 1.5LM-6 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	9	0.092	43	0.092		
153	1.2D + 1.5LM-6 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	10	0.092	44	0.092		
154	1.2D + 1.5LM-6 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	11	0.092	45	0.092		
155	1.2D + 1.5LM-6 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	12	0.092	46	0.092		
156	1.2D + 1.5LM-6 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	13	0.092	47	0.092		
157	1.2D + 1.5LM-6 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	14	0.092	48	0.092		
158	1.2D + 1.5LM-6 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	15	0.092	49	0.092		
159	1.2D + 1.5LM-6 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	16	0.092	50	0.092		
160	1.2D + 1.5LM-6 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	17	0.092	51	0.092		
161	1.2D + 1.5LM-7 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	2	0.092	36	0.092		
162	1.2D + 1.5LM-7 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	3	0.092	37	0.092		
163	1.2D + 1.5LM-7 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	4	0.092	38	0.092		
164	1.2D + 1.5LM-7 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	5	0.092	39	0.092		
165	1.2D + 1.5LM-7 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	6	0.092	40	0.092		
166	1.2D + 1.5LM-7 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	7	0.092	41	0.092		
167	1.2D + 1.5LM-7 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	8	0.092	42	0.092		
168	1.2D + 1.5LM-7 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	9	0.092	43	0.092		
169	1.2D + 1.5LM-7 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	10	0.092	44	0.092		
170	1.2D + 1.5LM-7 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	11	0.092	45	0.092		
171	1.2D + 1.5LM-7 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	12	0.092	46	0.092		
172	1.2D + 1.5LM-7 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	13	0.092	47	0.092		
173	1.2D + 1.5LM-7 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	14	0.092	48	0.092		
174	1.2D + 1.5LM-7 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	15	0.092	49	0.092		
175	1.2D + 1.5LM-7 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	16	0.092	50	0.092		
176	1.2D + 1.5LM-7 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	17	0.092	51	0.092		
177	1.2D + 1.5LM-8 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	2	0.092	36	0.092		
178	1.2D + 1.5LM-8 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	3	0.092	37	0.092		
179	1.2D + 1.5LM-8 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	4	0.092	38	0.092		
180	1.2D + 1.5LM-8 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	5	0.092	39	0.092		
181	1.2D + 1.5LM-8 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	6	0.092	40	0.092		
182	1.2D + 1.5LM-8 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	7	0.092	41	0.092		
183	1.2D + 1.5LM-8 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	8	0.092	42	0.092		
184	1.2D + 1.5LM-8 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	9	0.092	43	0.092		
185	1.2D + 1.5LM-8 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	10	0.092	44	0.092		
186	1.2D + 1.5LM-8 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	11	0.092	45	0.092		
187	1.2D + 1.5LM-8 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	12	0.092	46	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
188	1.2D + 1.5LM-8 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	13	0.092	47	0.092		
189	1.2D + 1.5LM-8 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	14	0.092	48	0.092		
190	1.2D + 1.5LM-8 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	15	0.092	49	0.092		
191	1.2D + 1.5LM-8 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	16	0.092	50	0.092		
192	1.2D + 1.5LM-8 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	17	0.092	51	0.092		
193	1.2D + 1.5LM-9 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	2	0.092	36	0.092		
194	1.2D + 1.5LM-9 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	3	0.092	37	0.092		
195	1.2D + 1.5LM-9 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	4	0.092	38	0.092		
196	1.2D + 1.5LM-9 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	5	0.092	39	0.092		
197	1.2D + 1.5LM-9 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	6	0.092	40	0.092		
198	1.2D + 1.5LM-9 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	7	0.092	41	0.092		
199	1.2D + 1.5LM-9 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	8	0.092	42	0.092		
200	1.2D + 1.5LM-9 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	9	0.092	43	0.092		
201	1.2D + 1.5LM-9 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	10	0.092	44	0.092		
202	1.2D + 1.5LM-9 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	11	0.092	45	0.092		
203	1.2D + 1.5LM-9 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	12	0.092	46	0.092		
204	1.2D + 1.5LM-9 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	13	0.092	47	0.092		
205	1.2D + 1.5LM-9 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	14	0.092	48	0.092		
206	1.2D + 1.5LM-9 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	15	0.092	49	0.092		
207	1.2D + 1.5LM-9 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	16	0.092	50	0.092		
208	1.2D + 1.5LM-9 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	17	0.092	51	0.092		
209	1.2D + 1.5LM-10 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	2	0.092	36	0.092		
210	1.2D + 1.5LM-10 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	3	0.092	37	0.092		
211	1.2D + 1.5LM-10 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	4	0.092	38	0.092		
212	1.2D + 1.5LM-10 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	5	0.092	39	0.092		
213	1.2D + 1.5LM-10 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	6	0.092	40	0.092		
214	1.2D + 1.5LM-10 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	7	0.092	41	0.092		
215	1.2D + 1.5LM-10 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	8	0.092	42	0.092		
216	1.2D + 1.5LM-10 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	9	0.092	43	0.092		
217	1.2D + 1.5LM-10 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	10	0.092	44	0.092		
218	1.2D + 1.5LM-10 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	11	0.092	45	0.092		
219	1.2D + 1.5LM-10 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	12	0.092	46	0.092		
220	1.2D + 1.5LM-10 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	13	0.092	47	0.092		
221	1.2D + 1.5LM-10 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	14	0.092	48	0.092		
222	1.2D + 1.5LM-10 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	15	0.092	49	0.092		
223	1.2D + 1.5LM-10 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	16	0.092	50	0.092		
224	1.2D + 1.5LM-10 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	17	0.092	51	0.092		
225	1.2D + 1.5LM-11 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	2	0.092	36	0.092		
226	1.2D + 1.5LM-11 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	3	0.092	37	0.092		
227	1.2D + 1.5LM-11 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	4	0.092	38	0.092		
228	1.2D + 1.5LM-11 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	5	0.092	39	0.092		
229	1.2D + 1.5LM-11 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	6	0.092	40	0.092		
230	1.2D + 1.5LM-11 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	7	0.092	41	0.092		
231	1.2D + 1.5LM-11 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	8	0.092	42	0.092		
232	1.2D + 1.5LM-11 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	9	0.092	43	0.092		
233	1.2D + 1.5LM-11 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	10	0.092	44	0.092		
234	1.2D + 1.5LM-11 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	11	0.092	45	0.092		
235	1.2D + 1.5LM-11 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	12	0.092	46	0.092		
236	1.2D + 1.5LM-11 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	13	0.092	47	0.092		
237	1.2D + 1.5LM-11 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	14	0.092	48	0.092		
238	1.2D + 1.5LM-11 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	15	0.092	49	0.092		
239	1.2D + 1.5LM-11 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	16	0.092	50	0.092		
240	1.2D + 1.5LM-11 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	17	0.092	51	0.092		
241	1.2D + 1.5LM-12 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	2	0.092	36	0.092		
242	1.2D + 1.5LM-12 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	3	0.092	37	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
243	1.2D + 1.5LM-12 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	4	0.092	38	0.092		
244	1.2D + 1.5LM-12 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	5	0.092	39	0.092		
245	1.2D + 1.5LM-12 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	6	0.092	40	0.092		
246	1.2D + 1.5LM-12 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	7	0.092	41	0.092		
247	1.2D + 1.5LM-12 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	8	0.092	42	0.092		
248	1.2D + 1.5LM-12 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	9	0.092	43	0.092		
249	1.2D + 1.5LM-12 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	10	0.092	44	0.092		
250	1.2D + 1.5LM-12 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	11	0.092	45	0.092		
251	1.2D + 1.5LM-12 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	12	0.092	46	0.092		
252	1.2D + 1.5LM-12 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	13	0.092	47	0.092		
253	1.2D + 1.5LM-12 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	14	0.092	48	0.092		
254	1.2D + 1.5LM-12 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	15	0.092	49	0.092		
255	1.2D + 1.5LM-12 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	16	0.092	50	0.092		
256	1.2D + 1.5LM-12 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	17	0.092	51	0.092		
257	1.2D + 1.5LM-13 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	2	0.092	36	0.092		
258	1.2D + 1.5LM-13 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	3	0.092	37	0.092		
259	1.2D + 1.5LM-13 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	4	0.092	38	0.092		
260	1.2D + 1.5LM-13 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	5	0.092	39	0.092		
261	1.2D + 1.5LM-13 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	6	0.092	40	0.092		
262	1.2D + 1.5LM-13 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	7	0.092	41	0.092		
263	1.2D + 1.5LM-13 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	8	0.092	42	0.092		
264	1.2D + 1.5LM-13 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	9	0.092	43	0.092		
265	1.2D + 1.5LM-13 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	10	0.092	44	0.092		
266	1.2D + 1.5LM-13 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	11	0.092	45	0.092		
267	1.2D + 1.5LM-13 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	12	0.092	46	0.092		
268	1.2D + 1.5LM-13 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	13	0.092	47	0.092		
269	1.2D + 1.5LM-13 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	14	0.092	48	0.092		
270	1.2D + 1.5LM-13 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	15	0.092	49	0.092		
271	1.2D + 1.5LM-13 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	16	0.092	50	0.092		
272	1.2D + 1.5LM-13 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	17	0.092	51	0.092		
273	1.2D + 1.5LM-14 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	2	0.092	36	0.092		
274	1.2D + 1.5LM-14 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	3	0.092	37	0.092		
275	1.2D + 1.5LM-14 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	4	0.092	38	0.092		
276	1.2D + 1.5LM-14 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	5	0.092	39	0.092		
277	1.2D + 1.5LM-14 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	6	0.092	40	0.092		
278	1.2D + 1.5LM-14 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	7	0.092	41	0.092		
279	1.2D + 1.5LM-14 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	8	0.092	42	0.092		
280	1.2D + 1.5LM-14 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	9	0.092	43	0.092		
281	1.2D + 1.5LM-14 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	10	0.092	44	0.092		
282	1.2D + 1.5LM-14 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	11	0.092	45	0.092		
283	1.2D + 1.5LM-14 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	12	0.092	46	0.092		
284	1.2D + 1.5LM-14 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	13	0.092	47	0.092		
285	1.2D + 1.5LM-14 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	14	0.092	48	0.092		
286	1.2D + 1.5LM-14 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	15	0.092	49	0.092		
287	1.2D + 1.5LM-14 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	16	0.092	50	0.092		
288	1.2D + 1.5LM-14 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	17	0.092	51	0.092		
289	1.2D + 1.5LM-15 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	2	0.092	36	0.092		
290	1.2D + 1.5LM-15 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	3	0.092	37	0.092		
291	1.2D + 1.5LM-15 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	4	0.092	38	0.092		
292	1.2D + 1.5LM-15 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	5	0.092	39	0.092		
293	1.2D + 1.5LM-15 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	6	0.092	40	0.092		
294	1.2D + 1.5LM-15 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	7	0.092	41	0.092		
295	1.2D + 1.5LM-15 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	8	0.092	42	0.092		
296	1.2D + 1.5LM-15 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	9	0.092	43	0.092		
297	1.2D + 1.5LM-15 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	10	0.092	44	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
298	1.2D + 1.5LM-15 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	11	0.092	45	0.092		
299	1.2D + 1.5LM-15 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	12	0.092	46	0.092		
300	1.2D + 1.5LM-15 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	13	0.092	47	0.092		
301	1.2D + 1.5LM-15 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	14	0.092	48	0.092		
302	1.2D + 1.5LM-15 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	15	0.092	49	0.092		
303	1.2D + 1.5LM-15 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	16	0.092	50	0.092		
304	1.2D + 1.5LM-15 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	17	0.092	51	0.092		
305	Frame Weight			99	1	100	1								
306	Stability (180-Wind)			101	1.141										
307	Stability (90-Wind)			102	1.141										

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	656.261	30	568.885	26	1623.497	5	0	304	0	304	0	304
2		min	-663.577	22	-905.885	5	-1388.807	28	0	1	0	1	0	1
3	N96	max	0	304	227.615	37	0	304	0	304	0	304	0	304
4		min	0	1	0	7	0	1	0	1	0	1	0	1
5	N6	max	1032.581	14	560.079	19	1501.923	20	0	304	0	304	0	304
6		min	-981.186	22	-1012.484	13	-1592.167	13	0	1	0	1	0	1
7	N4	max	663.717	30	567.282	26	1615.065	15	0	304	0	304	0	304
8		min	-655.626	22	-895.961	15	-1407.295	24	0	1	0	1	0	1
9	N87	max	0	304	238.632	47	0	304	0	304	0	304	0	304
10		min	0	1	0	3	0	1	0	1	0	1	0	1
11	N5	max	981.457	30	527.513	33	1482.473	32	0	304	0	304	0	304
12		min	-1033.171	6	-1034.758	7	-1606.921	7	0	1	0	1	0	1
13	N95	max	0	304	316.894	22	0	304	0	304	0	304	0	304
14		min	0	1	0	11	0	1	0	1	0	1	0	1
15	N86	max	0	304	316.811	30	0	304	0	304	0	304	0	304
16		min	0	1	0	3	0	1	0	1	0	1	0	1
17	N12	max	0	304	1305.715	30	0	304	0	304	0	304	0	304
18		min	0	1	0	3	0	1	0	1	0	1	0	1
19	N11	max	0	304	1323.116	22	0	304	0	304	0	304	0	304
20		min	0	1	0	11	0	1	0	1	0	1	0	1
21	N19	max	0	304	759.482	48	0	304	0	304	0	304	0	304
22		min	0	1	0	3	0	1	0	1	0	1	0	1
23	N17	max	0	304	992.465	28	0	304	0	304	0	304	0	304
24		min	0	1	0	2	0	1	0	1	0	1	0	1
25	N18	max	0	304	998.531	24	0	304	0	304	0	304	0	304
26		min	0	1	0	2	0	1	0	1	0	1	0	1
27	N20	max	0	304	768.539	36	0	304	0	304	0	304	0	304
28		min	0	1	0	10	0	1	0	1	0	1	0	1
29	N69	max	0	304	480.903	36	0	304	0	304	0	304	0	304
30		min	0	1	0	9	0	1	0	1	0	1	0	1
31	N70	max	0	304	471.877	48	0	304	0	304	0	304	0	304
32		min	0	1	0	4	0	1	0	1	0	1	0	1
33	N10	max	0	304	848.268	38	0	304	0	304	0	304	0	304
34		min	0	1	0	2	0	1	0	1	0	1	0	1
35	N7	max	0	304	211.697	18	0	304	0	304	0	304	0	304
36		min	0	1	0	6	0	1	0	1	0	1	0	1
37	N9	max	0	304	841.639	46	0	304	0	304	0	304	0	304
38		min	0	1	0	2	0	1	0	1	0	1	0	1
39	N2	max	0	304	130.814	1	0	304	0	304	0	304	0	304
40		min	0	1	0	3	0	1	0	1	0	1	0	1
41	N3	max	0	304	129.645	1	0	304	0	304	0	304	0	304
42		min	0	1	0	3	0	1	0	1	0	1	0	1

Envelope Node Reactions (Continued)

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
43	N8	max	0	304	201.443	47	0	304	0	304	0	304	0	304
44		min	0	1	0	6	0	1	0	1	0	1	0	1
45	Totals:	max	3328.652	14	7614.684	38	3306.171	18						
46		min	-3328.428	6	2406.416	14	-3306.158	10						

Envelope AISC 14TH (360-10): LRFD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
1	M1	C10X15.3	0.22	7.557	6	0.042	7.557	z	6	98424.402	145152	4987.996	41580.938	1	H1-1b
2	M2	C10X15.3	0.063	7.557	7	0.036	7.557	y	6	98424.402	145152	4987.996	41580.938	1	H1-1b
3	M3	C10X15.3	0.607	3.03	5	0.151	6.06	y	14	91053.003	145152	4987.996	37228.1	1	H1-1b
4	M4	C10X15.3	0.609	3.03	15	0.153	6.06	y	6	91053.003	145152	4987.996	29067.602	1.272	H1-1b
5	M5	C10X15.3	0.87	6.06	14	0.168	11.999	y	6	91053.003	145152	4987.996	29087.67	1.273	H1-1b
6	M6	C10X15.3	0.862	6.06	6	0.168	11.999	y	14	91053.003	145152	4987.996	37228.1	1	H1-1b
7	M7	C10X15.3	0.03	3.583	30	0.038	3.583	z	14	119786.494	145152	4987.996	41580.938	1	H1-1b*
8	M8	C10X15.3	0.009	2.02	1	0.046	4	z	22	114251.469	145152	4987.996	40673.372	1	H1-1b
9	M9	C10X15.3	0.031	3.583	22	0.038	3.583	z	6	119786.494	145152	4987.996	41580.938	1	H1-1b*
10	K4	L3X3X4	0.132	1.785	28	0.021	3.606	z	30	34981.942	46656	1688.138	3603.327	1.14	H2-1
11	K5	L3X3X4	0.126	1.785	32	0.057	3.606	y	14	34981.942	46656	1688.138	3603.327	1.14	H2-1
12	K1	L3X3X4	0.132	1.785	24	0.021	3.606	y	22	34981.942	46656	1688.138	3603.327	1.14	H2-1
13	K2	L3X3X4	0.126	1.785	20	0.057	3.606	y	6	34981.942	46656	1688.138	3603.327	1.14	H2-1
14	K6	L3X3X4	0.147	2.57	6	0.023	4.103	y	3	32130.861	46656	1688.138	3522.889	1.14	H2-1
15	K3	L3X3X4	0.145	1.534	14	0.024	4.103	y	17	32130.861	46656	1688.138	3522.889	1.14	H2-1
16	C4	PIPE_3.5	0.38	1	22	0.165	1		26	78429.633	78750	7953.75	7953.75	1.677	H1-1b
17	C3	PIPE_3.5	0.765	1.091	26	0.187	0.97		26	43784.048	78750	7953.75	7953.75	1.263	H1-1b
18	C2	PIPE_3.5	0.385	1	22	0.164	1		26	78429.633	78750	7953.75	7953.75	1.637	H1-1b
19	C1	PIPE_3.5	0.773	1.091	23	0.187	0.97		26	43784.048	78750	7953.75	7953.75	1.612	H1-1b
20	MP3	PIPE_2.5	0.054	10	31	0.007	10		30	18800.092	50715	3596.25	3596.25	2.544	H1-1b
21	MP1	PIPE_2.5	0.053	10	31	0.006	10		29	18800.092	50715	3596.25	3596.25	2.667	H1-1b
22	MP2	PIPE_2.5	0.055	10	20	0.006	10		22	18800.092	50715	3596.25	3596.25	2.773	H1-1b
23	MP4	PIPE_2.5	0.052	10	21	0.005	10		22	18800.092	50715	3596.25	3596.25	2.874	H1-1b
24	C8	PIPE_2.0	0.271	1	15	0.349	0		14	31747.067	32130	1871.625	1871.625	1.01	H3-6
25	C9	PIPE_2.0	0.395	0.833	15	0.404	1.5		14	29344.85	32130	1871.625	1871.625	2.573	H3-6
26	C5	PIPE_2.0	0.286	1	5	0.351	0		6	31747.067	32130	1871.625	1871.625	1.004	H3-6
27	C12	PIPE_2.0	0.416	0.833	5	0.406	1.5		6	29344.85	32130	1871.625	1871.625	2.565	H3-6
28	K10	L3X3X4	0.033	1.146	14	0.061	2.316	z	14	41428.122	46656	1688.138	3755.745	1.14	H2-1
29	K7	L3X3X4	0.035	1.146	5	0.061	2.316	z	6	41428.122	46656	1688.138	3755.745	1.14	H2-1
30	K8	L3X3X4	0.068	1.17	6	0.011	2.316	z	30	41428.122	46656	1688.138	3755.745	1.14	H2-1
31	C6	PIPE_2.0	0.23	0	14	0.181	0		30	31747.067	32130	1871.625	1871.625	2.221	H1-1b
32	C11	PIPE_2.0	0.501	0.833	6	0.216	1.5		30	29344.85	32130	1871.625	1871.625	1.398	H1-1b
33	K9	L3X3X4	0.066	1.17	14	0.011	2.316	z	5	41428.122	46656	1688.138	3755.745	1.14	H2-1
34	C7	PIPE_2.0	0.233	0	22	0.183	1		21	31747.067	32130	1871.625	1871.625	2.215	H1-1b
35	C10	PIPE_2.0	0.498	0.833	14	0.216	1.5		22	29344.85	32130	1871.625	1871.625	1.397	H1-1b

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	4/6/22

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V :	99	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	29.4	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	48.0	20.7	2.3	Flat	1.200	6.90	243.1	
Air 6449 B77D	30.6	15.9	1.9	Flat	1.200	3.37	118.9	
Air 6419 B77G	28.3	16.1	1.8	Flat	1.200	3.16	111.5	
DMP65R-BU4D	48.0	20.7	2.3	Flat	1.200	6.90	243.1	
RRUS 4478 B14	16.5	13.4	1.2	Flat	1.200	1.54	54.1	
RRUS 4415 B25	16.5	13.4	1.2	Flat	1.200	1.54	54.1	
4426 B66	27.2	12.1	2.2	Flat	1.200	2.29	80.5	
RRUS 4449 B5/B12	17.9	13.2	1.4	Flat	1.200	1.64	57.8	
RRUS-32 B30	27.2	12.1	2.2	Flat	1.200	2.29	80.5	
DC9-48-60-24-PC16-EV	16.6	14.6	1.1	Flat	1.200	1.68	59.1	
Pipe2-1/2STD x 11 ft	132.0	2.9	45.9	Round	1.200	2.64	92.8	8.4
Pipe3STD x 12 ft	144.0	3.5	41.1	Round	1.198	3.50	123.1	10.3
Pipe3STD x 1 ft	12.0	3.5	3.4	Round	0.720	0.29	6.2	6.2
Pipe2STD x 1 ft	12.0	2.4	5.1	Round	0.757	0.20	4.4	4.4
Pipe2STD x 2.75 ft	33.0	2.4	13.9	Round	0.953	0.54	15.2	5.5
L3X3X1/4 x 3.606 ft	43.3	3.0	14.4	Flat	1.647	0.90	43.6	12.1
L3X3X1/4 x 4.103 ft	49.2	3.0	16.4	Flat	1.714	1.03	51.6	12.6
L3X3X1/4 x 2.316 ft	27.8	3.0	9.3	Flat	1.475	0.58	25.1	10.8
48" Diam Fiberglass	134.0	48.0	2.8	Round	0.506	44.67	664.1	

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Job	MAL02881
Project	51676
By	GN
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Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V :	99	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	29.4	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	48.0	7.7	6.2	Flat	1.366	2.57	102.9	
Air 6449 B77D	30.6	10.6	2.9	Flat	1.218	2.24	80.2	
Air 6419 B77G	28.3	7.9	3.6	Flat	1.248	1.55	56.9	
DMP65R-BU4D	48.0	7.7	6.2	Flat	1.366	2.57	102.9	
RRUS 4478 B14	16.5	7.7	2.1	Flat	1.200	0.88	31.1	
RRUS 4415 B25	16.5	5.9	2.8	Flat	1.213	0.68	24.1	
4426 B66	27.2	7.0	3.9	Flat	1.262	1.32	49.0	
RRUS 4449 B5/B12	17.9	9.4	1.9	Flat	1.200	1.17	41.3	
RRUS-32 B30	27.2	7.0	3.9	Flat	1.262	1.32	49.0	
DC9-48-60-24-PC16-EV	16.6	8.2	2.0	Flat	1.200	0.94	33.0	
Pipe2-1/2STD x 11 ft	132.0	2.9	45.9	Round	1.200	2.64	92.8	8.4
Pipe3STD x 12 ft	144.0	3.5	41.1	Round	1.198	3.50	123.1	10.3
Pipe3STD x 1 ft	12.0	3.5	3.4	Round	0.720	0.29	6.2	6.2
Pipe2STD x 1 ft	12.0	2.4	5.1	Round	0.757	0.20	4.4	4.4
Pipe2STD x 2.75 ft	33.0	2.4	13.9	Round	0.953	0.54	15.2	5.5
L3X3X1/4 x 3.606 ft	43.3	3.0	14.4	Flat	1.647	0.90	43.6	12.1
L3X3X1/4 x 4.103 ft	49.2	3.0	16.4	Flat	1.714	1.03	51.6	12.6
L3X3X1/4 x 2.316 ft	27.8	3.0	9.3	Flat	1.475	0.58	25.1	10.8
48" Diam Fiberglass	134.0	48.0	2.8	Round	0.506	44.67	664.1	

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	4/6/22

Ice Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	7.47	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections
t_{iz} :	1.65	in	Design Thickness of Radial Ice at Height z (2.6.8)

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	51.3	24.0	2.1	Flat	1.200	8.55	76.7	
Air 6449 B77D	33.9	19.2	1.8	Flat	1.200	4.52	40.5	
Air 6419 B77G	31.6	19.4	1.6	Flat	1.200	4.26	38.2	
DMP65R-BU4D	51.3	24.0	2.1	Flat	1.200	8.55	76.7	
RRUS 4478 B14	19.8	16.7	1.2	Flat	1.200	2.30	20.6	
RRUS 4415 B25	19.8	16.7	1.2	Flat	1.200	2.30	20.6	
4426 B66	30.5	15.4	2.0	Flat	1.200	3.26	29.3	
RRUS 4449 B5/B12	21.2	16.5	1.3	Flat	1.200	2.43	21.8	
RRUS-32 B30	30.5	15.4	2.0	Flat	1.200	3.26	29.3	
DC9-48-60-24-PC16-EV	19.9	17.9	1.1	Flat	1.200	2.47	22.1	
Pipe2-1/2STD x 11 ft	135.3	6.2	21.9	Round	1.131	5.81	49.1	4.4
Pipe3STD x 12 ft	147.3	6.8	21.6	Round	1.125	6.96	58.5	4.8
Pipe3STD x 1 ft	15.3	6.8	2.2	Round	0.700	0.72	3.8	3.0
Pipe2STD x 1 ft	15.3	5.7	2.7	Round	0.704	0.60	3.2	2.5
Pipe2STD x 2.75 ft	36.3	5.7	6.4	Round	0.786	1.43	8.4	2.8
L3X3X1/4 x 3.606 ft	46.6	6.3	7.4	Flat	1.413	2.04	21.5	5.5
L3X3X1/4 x 4.103 ft	52.5	6.3	8.3	Flat	1.444	2.30	24.8	5.7
L3X3X1/4 x 2.316 ft	31.1	6.3	4.9	Flat	1.308	1.36	13.3	5.1
48" Diam Fiberglass	137.3	51.3	2.7	Round	0.704	48.92	257.3	

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Job	MAL02881
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By	GN
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Ice Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	7.47	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections
t_{iz} :	1.65	in	Design Thickness of Radial Ice at Height z (2.6.8)

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	51.3	11.0	4.7	Flat	1.296	3.92	38.0	
Air 6449 B77D	33.9	13.9	2.4	Flat	1.200	3.27	29.3	
Air 6419 B77G	31.6	11.2	2.8	Flat	1.214	2.46	22.3	
DMP65R-BU4D	51.3	11.0	4.7	Flat	1.296	3.92	38.0	
RRUS 4478 B14	19.8	11.0	1.8	Flat	1.200	1.51	13.6	
RRUS 4415 B25	19.8	9.2	2.2	Flat	1.200	1.27	11.4	
4426 B66	30.5	10.3	3.0	Flat	1.220	2.18	19.9	
RRUS 4449 B5/B12	21.2	12.7	1.7	Flat	1.200	1.88	16.8	
RRUS-32 B30	30.5	10.3	3.0	Flat	1.220	2.18	19.9	
DC9-48-60-24-PC16-EV	19.9	11.5	1.7	Flat	1.200	1.58	14.2	
Pipe2-1/2STD x 11 ft	135.3	6.2	21.9	Round	1.131	5.81	49.1	4.4
Pipe3STD x 12 ft	147.3	6.8	21.6	Round	1.125	6.96	58.5	4.8
Pipe3STD x 1 ft	15.3	6.8	2.2	Round	0.700	0.72	3.8	3.0
Pipe2STD x 1 ft	15.3	5.7	2.7	Round	0.704	0.60	3.2	2.5
Pipe2STD x 2.75 ft	36.3	5.7	6.4	Round	0.786	1.43	8.4	2.8
L3X3X1/4 x 3.606 ft	46.6	6.3	7.4	Flat	1.413	2.04	21.5	5.5
L3X3X1/4 x 4.103 ft	52.5	6.3	8.3	Flat	1.444	2.30	24.8	5.7
L3X3X1/4 x 2.316 ft	31.1	6.3	4.9	Flat	1.308	1.36	13.3	5.1
48" Diam Fiberglass	137.3	51.3	2.7	Round	0.704	48.92	257.3	

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By	GN
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Ice Load on Antennas TIA-222-G

Ice Weight :	56	pcf	Ice Density
t_i :	0.75		Design Ice Thickness
Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_{iz} :	1.10		Height Escalation Factor for Ice Thickness
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
t_{iz} :	1.65	in	Design Thickness of Radial Ice at Height z (2.6.8)

Platform Grating :	None	
Ice Load :		psf

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Width	Depth	Diam.	Area	Perim.	Ice Weight	
	in	*in*	*in*	*in*	*sq in*	*in*	*lb*	*plf*
TPA-65R-BU4D	51.3	24.0	11.0	22.09	123.25	63.41	191.7	
Air 6449 B77D	33.9	19.2	13.9	19.05	107.51	59.45	106.7	
Air 6419 B77G	31.6	19.4	11.2	17.93	101.69	54.61	93.3	
DMP65R-BU4D	51.3	24.0	11.0	22.09	123.25	63.41	191.7	
RRUS 4478 B14	19.8	16.7	11.0	15.45	88.82	48.81	47.5	
RRUS 4415 B25	19.8	16.7	9.2	14.64	84.60	45.21	45.2	
4426 B66	30.5	15.4	10.3	13.98	81.16	44.81	71.5	
RRUS 4449 B5/B12	21.2	16.5	12.7	16.22	92.80	51.87	53.8	
RRUS-32 B30	30.5	15.4	10.3	13.98	81.16	44.81	71.5	
DC9-48-60-24-PC16-EV	19.9	17.9	11.5	16.70	95.31	52.07	51.2	
Pipe2-1/2STD x 11 ft	135.3	6.2	6.2	2.88	23.51	14.22	100.6	9.1
Pipe3STD x 12 ft	147.3	6.8	6.8	3.50	26.75	16.19	124.8	10.4
Pipe3STD x 1 ft	15.3	6.8	6.8	3.50	26.75	16.19	10.4	10.4
Pipe2STD x 1 ft	15.3	5.7	5.7	2.38	20.91	12.65	8.1	8.1
Pipe2STD x 2.75 ft	36.3	5.7	5.7	2.38	20.91	12.65	22.4	8.1
L3X3X1/4 x 3.606 ft	46.6	6.3	6.3	4.24	30.61	18.61	42.9	11.9
L3X3X1/4 x 4.103 ft	52.5	6.3	6.3	4.24	30.61	18.61	48.8	11.9
L3X3X1/4 x 2.316 ft	31.1	6.3	6.3	4.24	30.61	18.61	27.6	11.9
48" Diam Fiberglass	137.3	51.3	51.3	48.00	257.80	155.99	1119.5	

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	4/6/22

Ballast Frame Analysis - Rectangular

Sector Location

Max Capacity 105%

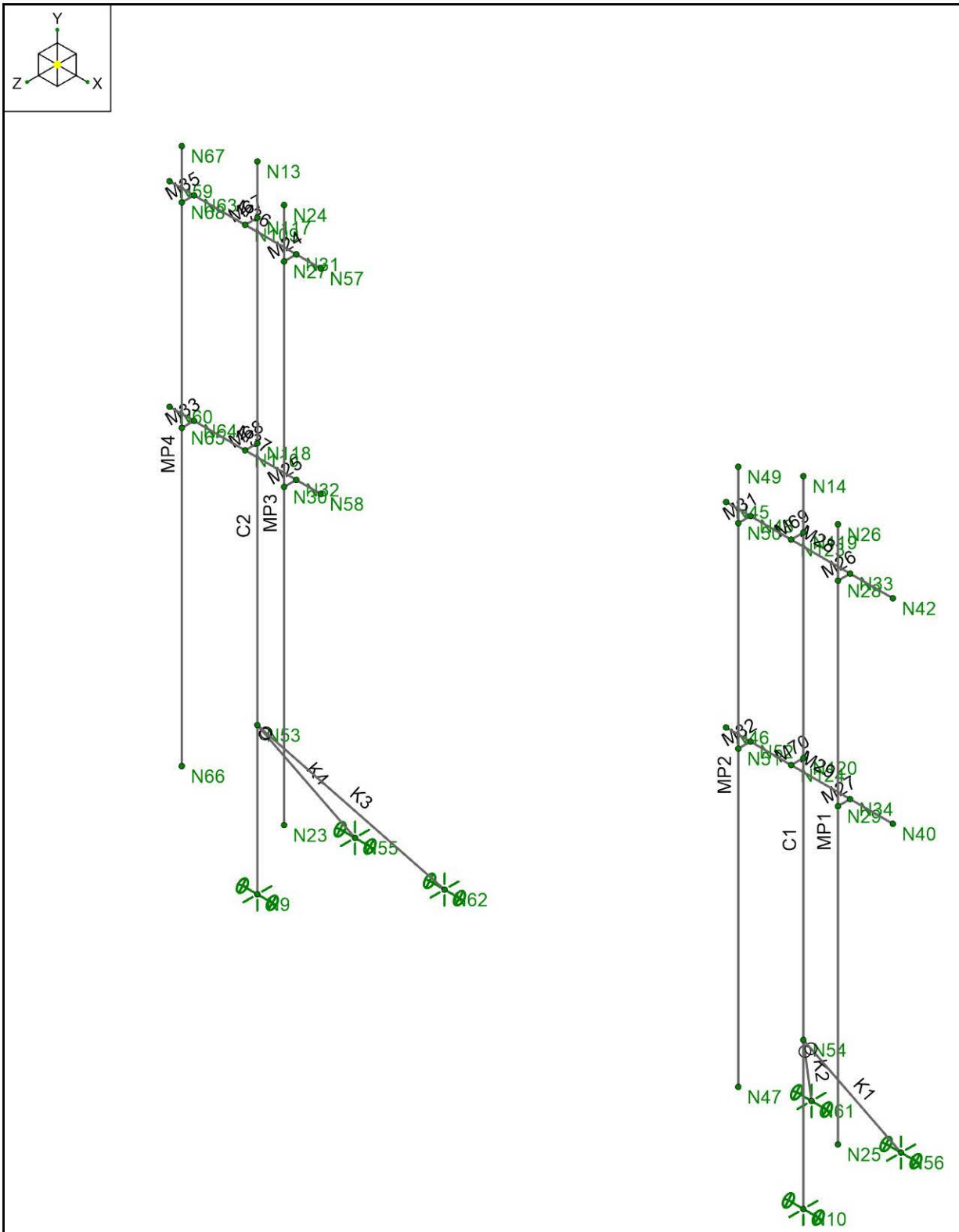
Weight Type	Weight		Front Arm		Back Arm		Side Arm	
Ballast Frame	2579.0	lb	6.25	ft	5.75	ft	6.00	ft
Front Ballast	105.0	lb	0.42	ft	11.58	ft	6.00	ft
Back Ballast	105.0	lb	11.58	ft	0.42	ft	6.00	ft
Equipment	663.8	lb	#VALUE!	ft	#VALUE!	ft	#VALUE!	ft
Overturning Resistance			#VALUE!	lb-ft	#VALUE!	lb-ft	#VALUE!	lb-ft
RISA-3D Factored OTM			13082.4	lb-ft	13082.4	lb-ft	13898.4	lb-ft
Capacity			**#VALUE!**		**#VALUE!**		**#VALUE!**	

Sliding Check

Sliding Coefficient	0.7	
Total Weight	3452.8	lb
Sliding Resistance	2416.94	lb
RISA-3D Factored Sliding	2373.6	lb
Capacity	**98%**	

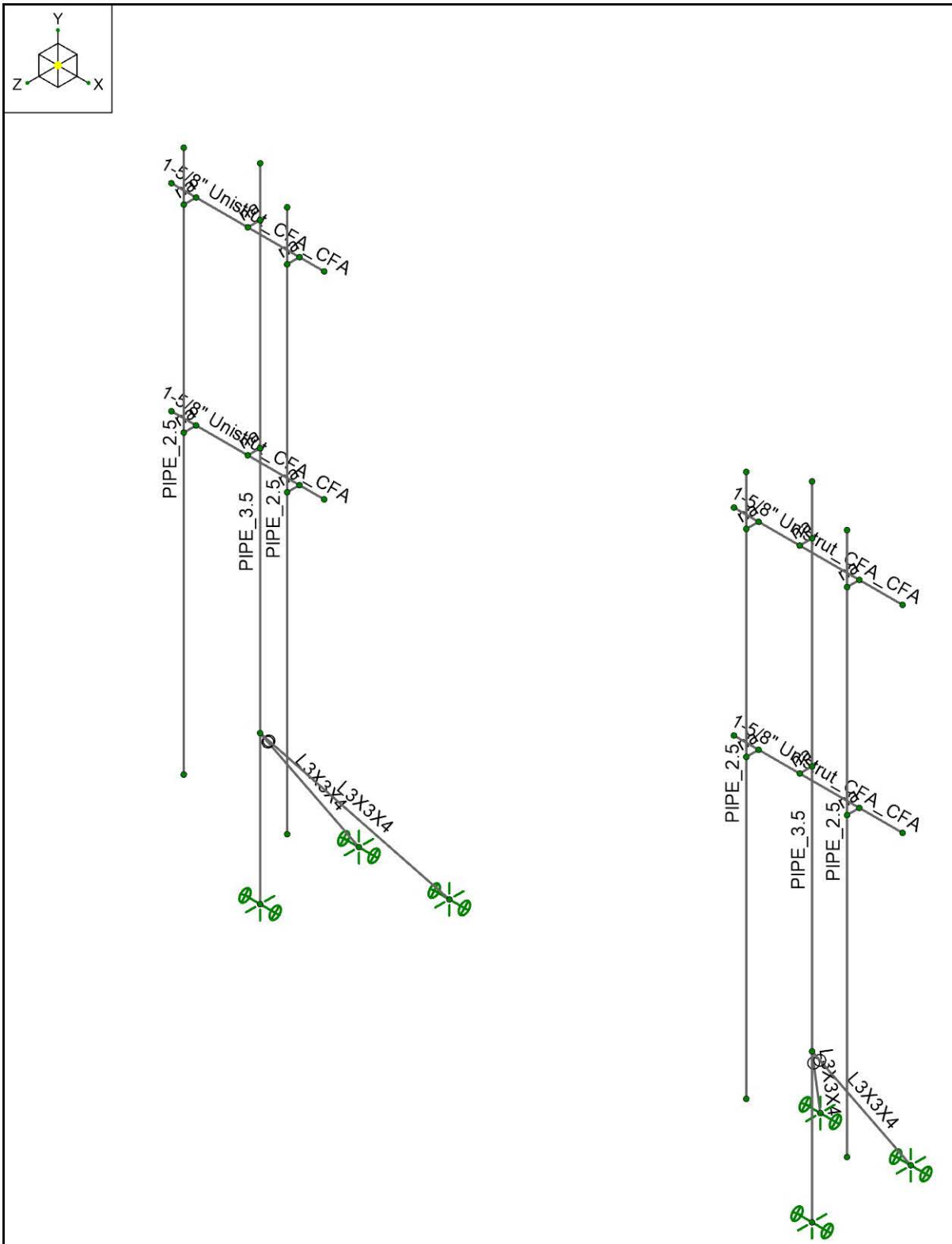
Max. Capacity #VALUE! #VALUE!

Block Information	Front Tray		Back Tray	
Size	8x8x16 - Hollow		8x8x16 - Hollow	
Weight	35	lbs per block	35	lbs per block
Unit Quantity	3	Units per tray	3	Units per tray
Weight	105	lbs per tray	105	lbs per tray
Tray Quantity	1	Tray(s)	1	Tray(s)
Total Weight	105	lbs	105	lbs



Envelope Only Solution

RAMAKER	MAL02881	SK-1
GN		Mar 25, 2022
51676		51676 Beta Mount_Rev1.r3d



Envelope Only Solution

RAMAKER	MAL02881	SK-2
GN		Mar 25, 2022
51676		51676 Beta Mount_Rev1.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1
9	A106	29000	11154	0.3	0.65	0.49	35	1.1	60	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Pipe 2.5	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
2	Pipe 3.5	PIPE_3.5	Beam	Pipe	A53 Gr.B	Typical	2.5	4.52	4.52	9.04
3	L3x3x1/4	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	0.031

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	MP3	N23	N24	Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
2	MP1	N25	N26	Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
3	M24	N27	N31	RIGID	None	None	RIGID	Typical
4	M25	N30	N32	RIGID	None	None	RIGID	Typical
5	M26	N28	N33	RIGID	None	None	RIGID	Typical
6	M27	N29	N34	RIGID	None	None	RIGID	Typical
7	M28	N45	N42	CF1	Beam	CS	A653 SS Gr33	Typical
8	M29	N46	N40	CF1	Beam	CS	A653 SS Gr33	Typical
9	MP2	N47	N49	Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
10	M31	N50	N48	RIGID	None	None	RIGID	Typical
11	M32	N51	N52	RIGID	None	None	RIGID	Typical
12	M33	N65	N64	RIGID	None	None	RIGID	Typical
13	MP4	N66	N67	Pipe 2.5	Beam	Pipe	A53 Gr.B	Typical
14	M35	N68	N63	RIGID	None	None	RIGID	Typical
15	M36	N59	N57	CF1	Beam	CS	A653 SS Gr33	Typical
16	M37	N60	N58	CF1	Beam	CS	A653 SS Gr33	Typical
17	M69	N119	N123	RIGID	None	None	RIGID	Typical
18	M70	N120	N124	RIGID	None	None	RIGID	Typical
19	M67	N117	N109	RIGID	None	None	RIGID	Typical
20	M68	N118	N110	RIGID	None	None	RIGID	Typical
21	C2	N9	N13	Pipe 3.5	Beam	Pipe	A53 Gr.B	Typical
22	C1	N10	N14	Pipe 3.5	Beam	Pipe	A53 Gr.B	Typical
23	K4	N53	N55	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
24	K3	N53	N62	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
25	K1	N54	N56	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
26	K2	N54	N61	L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical

Basic Load Cases

	BLC Description	Category	Y Gravity	Point	Distributed
1	Antenna Dead	None		12	
2	Antenna Wind 0	None		24	
3	Antenna Wind 30	None		24	
4	Antenna Wind 45	None		24	

Basic Load Cases (Continued)

	BLC Description	Category	Y Gravity	Point	Distributed
5	Antenna Wind 60	None		24	
6	Antenna Wind 90	None		24	
7	Antenna Wind 120	None		24	
8	Antenna Wind 135	None		24	
9	Antenna Wind 150	None		24	
10	Antenna Wind 180	None		24	
11	Antenna Wind 210	None		24	
12	Antenna Wind 225	None		24	
13	Antenna Wind 240	None		24	
14	Antenna Wind 270	None		24	
15	Antenna Wind 300	None		24	
16	Antenna Wind 315	None		24	
17	Antenna Wind 330	None		24	
18	Antenna Ice Dead	None		12	
19	Antenna Wind w/Ice 0	None		24	
20	Antenna Wind w/Ice 30	None		24	
21	Antenna Wind w/Ice 45	None		24	
22	Antenna Wind w/Ice 60	None		24	
23	Antenna Wind w/Ice 90	None		24	
24	Antenna Wind w/Ice 120	None		24	
25	Antenna Wind w/Ice 135	None		24	
26	Antenna Wind w/Ice 150	None		24	
27	Antenna Wind w/Ice 180	None		24	
28	Antenna Wind w/Ice 210	None		24	
29	Antenna Wind w/Ice 225	None		24	
30	Antenna Wind w/Ice 240	None		24	
31	Antenna Wind w/Ice 270	None		24	
32	Antenna Wind w/Ice 300	None		24	
33	Antenna Wind w/Ice 315	None		24	
34	Antenna Wind w/Ice 330	None		24	
35	Member Dead	None	-1		
36	Member Wind 0	None			20
37	Member Wind 30	None			20
38	Member Wind 45	None			20
39	Member Wind 60	None			20
40	Member Wind 90	None			20
41	Member Wind 120	None			20
42	Member Wind 135	None			20
43	Member Wind 150	None			20
44	Member Wind 180	None			20
45	Member Wind 210	None			20
46	Member Wind 225	None			20
47	Member Wind 240	None			20
48	Member Wind 270	None			20
49	Member Wind 300	None			20
50	Member Wind 315	None			20
51	Member Wind 330	None			20
52	Member Ice Dead	None			10
53	Member Wind w/Ice 0	None			20
54	Member Wind w/Ice 30	None			20
55	Member Wind w/Ice 45	None			20
56	Member Wind w/Ice 60	None			20
57	Member Wind w/Ice 90	None			20
58	Member Wind w/Ice 120	None			20
59	Member Wind w/Ice 135	None			20

Basic Load Cases (Continued)

	BLC Description	Category	Y Gravity	Point	Distributed
60	Member Wind w/Ice 150	None			20
61	Member Wind w/Ice 180	None			20
62	Member Wind w/Ice 210	None			20
63	Member Wind w/Ice 225	None			20
64	Member Wind w/Ice 240	None			20
65	Member Wind w/Ice 270	None			20
66	Member Wind w/Ice 300	None			20
67	Member Wind w/Ice 315	None			20
68	Member Wind w/Ice 330	None			20
69	LV-1	None			
70	LV-2	None			
71	LV-3	None			
72	LV-4	None			
73	LV-5	None			
74	LV-6	None			
75	LV-7	None			
76	LV-8	None			
77	LV-9	None			
78	LV-10	None			
79	LV-11	None			
80	LV-12	None			
81	LV-13	None			
82	LV-14	None			
83	LV-15	None			
84	LM-1	None			
85	LM-2	None			
86	LM-3	None			
87	LM-4	None			
88	LM-5	None			
89	LM-6	None			
90	LM-7	None			
91	LM-8	None			
92	LM-9	None			
93	LM-10	None			
94	LM-11	None			
95	LM-12	None			
96	LM-13	None			
97	LM-14	None			
98	LM-15	None			
99	Frame Dead Load	None	-1		
100	Miscl. Dead Load	None	-0.3		
101	Stability Wind 180	None		24	20
102	Stability Wind 90	None		24	20

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4D	Yes	Y	1	1.4	35	1.4								
2	1.0D		Y	1	1	35	1								
3	0.9D + 1.6 (0-Wind)	Yes	Y	1	0.9	35	0.9	2	1.6	36	1.6				
4	0.9D + 1.6 (30-Wind)	Yes	Y	1	0.9	35	0.9	3	1.6	37	1.6				
5	0.9D + 1.6 (45-Wind)	Yes	Y	1	0.9	35	0.9	4	1.6	38	1.6				
6	0.9D + 1.6 (60-Wind)	Yes	Y	1	0.9	35	0.9	5	1.6	39	1.6				
7	0.9D + 1.6 (90-Wind)	Yes	Y	1	0.9	35	0.9	6	1.6	40	1.6				
8	1.0W (90-Wind)		Y					6	1	40	1				
9	0.9D + 1.6 (120-Wind)	Yes	Y	1	0.9	35	0.9	7	1.6	41	1.6				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
10	0.9D + 1.6 (135-Wind)	Yes	Y	1	0.9	35	0.9	8	1.6	42	1.6				
11	0.9D + 1.6 (150-Wind)	Yes	Y	1	0.9	35	0.9	9	1.6	43	1.6				
12	0.9D + 1.6 (180-Wind)	Yes	Y	1	0.9	35	0.9	10	1.6	44	1.6				
13	1.0W (180-Wind)		Y					10	1	44	1				
14	0.9D + 1.6 (210-Wind)	Yes	Y	1	0.9	35	0.9	11	1.6	45	1.6				
15	0.9D + 1.6 (225-Wind)	Yes	Y	1	0.9	35	0.9	12	1.6	46	1.6				
16	0.9D + 1.6 (240-Wind)	Yes	Y	1	0.9	35	0.9	13	1.6	47	1.6				
17	0.9D + 1.6 (270-Wind)	Yes	Y	1	0.9	35	0.9	14	1.6	48	1.6				
18	0.9D + 1.6 (300-Wind)	Yes	Y	1	0.9	35	0.9	15	1.6	49	1.6				
19	0.9D + 1.6 (315-Wind)	Yes	Y	1	0.9	35	0.9	16	1.6	50	1.6				
20	0.9D + 1.6 (330-Wind)	Yes	Y	1	0.9	35	0.9	17	1.6	51	1.6				
21	1.2D + 1.6 (0-Wind)	Yes	Y	1	1.2	35	1.2	2	1.6	36	1.6				
22	1.2D + 1.6 (30-Wind)	Yes	Y	1	1.2	35	1.2	3	1.6	37	1.6				
23	1.2D + 1.6 (45-Wind)	Yes	Y	1	1.2	35	1.2	4	1.6	38	1.6				
24	1.2D + 1.6 (60-Wind)	Yes	Y	1	1.2	35	1.2	5	1.6	39	1.6				
25	1.2D + 1.6 (90-Wind)	Yes	Y	1	1.2	35	1.2	6	1.6	40	1.6				
26	1.2D + 1.6 (120-Wind)	Yes	Y	1	1.2	35	1.2	7	1.6	41	1.6				
27	1.2D + 1.6 (135-Wind)	Yes	Y	1	1.2	35	1.2	8	1.6	42	1.6				
28	1.2D + 1.6 (150-Wind)	Yes	Y	1	1.2	35	1.2	9	1.6	43	1.6				
29	1.2D + 1.6 (180-Wind)	Yes	Y	1	1.2	35	1.2	10	1.6	44	1.6				
30	1.2D + 1.6 (210-Wind)	Yes	Y	1	1.2	35	1.2	11	1.6	45	1.6				
31	1.2D + 1.6 (225-Wind)	Yes	Y	1	1.2	35	1.2	12	1.6	46	1.6				
32	1.2D + 1.6 (240-Wind)	Yes	Y	1	1.2	35	1.2	13	1.6	47	1.6				
33	1.2D + 1.6 (270-Wind)	Yes	Y	1	1.2	35	1.2	14	1.6	48	1.6				
34	1.2D + 1.6 (300-Wind)	Yes	Y	1	1.2	35	1.2	15	1.6	49	1.6				
35	1.2D + 1.6 (315-Wind)	Yes	Y	1	1.2	35	1.2	16	1.6	50	1.6				
36	1.2D + 1.6 (330-Wind)	Yes	Y	1	1.2	35	1.2	17	1.6	51	1.6				
37	1.2D + 1.0Di + 1.0 (0-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	19	1	53	1
38	1.2D + 1.0Di + 1.0 (30-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	20	1	54	1
39	1.2D + 1.0Di + 1.0 (45-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	21	1	55	1
40	1.2D + 1.0Di + 1.0 (60-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	22	1	56	1
41	1.2D + 1.0Di + 1.0 (90-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	23	1	57	1
42	1.2D + 1.0Di + 1.0 (120-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	24	1	58	1
43	1.2D + 1.0Di + 1.0 (135-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	25	1	59	1
44	1.2D + 1.0Di + 1.0 (150-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	26	1	60	1
45	1.2D + 1.0Di + 1.0 (180-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	27	1	61	1
46	1.2D + 1.0Di + 1.0 (210-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	28	1	62	1
47	1.2D + 1.0Di + 1.0 (225-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	29	1	63	1
48	1.2D + 1.0Di + 1.0 (240-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	30	1	64	1
49	1.2D + 1.0Di + 1.0 (270-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	31	1	65	1
50	1.2D + 1.0Di + 1.0 (300-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	32	1	66	1
51	1.2D + 1.0Di + 1.0 (315-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	33	1	67	1
52	1.2D + 1.0Di + 1.0 (330-Wind Ice)	Yes	Y	1	1.2	35	1.2	18	1	52	1	34	1	68	1
53	1.2D + 1.5LV-1	Yes	Y	1	1.2	35	1.2	69	1.5						
54	1.2D + 1.5LV-2	Yes	Y	1	1.2	35	1.2	70	1.5						
55	1.2D + 1.5LV-3	Yes	Y	1	1.2	35	1.2	71	1.5						
56	1.2D + 1.5LV-4	Yes	Y	1	1.2	35	1.2	72	1.5						
57	1.2D + 1.5LV-5	Yes	Y	1	1.2	35	1.2	73	1.5						
58	1.2D + 1.5LV-6	Yes	Y	1	1.2	35	1.2	74	1.5						
59	1.2D + 1.5LV-7	Yes	Y	1	1.2	35	1.2	75	1.5						
60	1.2D + 1.5LV-8	Yes	Y	1	1.2	35	1.2	76	1.5						
61	1.2D + 1.5LV-9	Yes	Y	1	1.2	35	1.2	77	1.5						
62	1.2D + 1.5LV-10	Yes	Y	1	1.2	35	1.2	78	1.5						
63	1.2D + 1.5LV-11	Yes	Y	1	1.2	35	1.2	79	1.5						
64	1.2D + 1.5LV-12	Yes	Y	1	1.2	35	1.2	80	1.5						

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
65	1.2D + 1.5LV-13	Yes	Y	1	1.2	35	1.2	81	1.5						
66	1.2D + 1.5LV-14	Yes	Y	1	1.2	35	1.2	82	1.5						
67	1.2D + 1.5LV-15	Yes	Y	1	1.2	35	1.2	83	1.5						
68	1.2D + 1.5LM-1 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	2	0.092	36	0.092		
69	1.2D + 1.5LM-1 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	3	0.092	37	0.092		
70	1.2D + 1.5LM-1 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	4	0.092	38	0.092		
71	1.2D + 1.5LM-1 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	5	0.092	39	0.092		
72	1.2D + 1.5LM-1 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	6	0.092	40	0.092		
73	1.2D + 1.5LM-1 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	7	0.092	41	0.092		
74	1.2D + 1.5LM-1 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	8	0.092	42	0.092		
75	1.2D + 1.5LM-1 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	9	0.092	43	0.092		
76	1.2D + 1.5LM-1 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	10	0.092	44	0.092		
77	1.2D + 1.5LM-1 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	11	0.092	45	0.092		
78	1.2D + 1.5LM-1 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	12	0.092	46	0.092		
79	1.2D + 1.5LM-1 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	13	0.092	47	0.092		
80	1.2D + 1.5LM-1 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	14	0.092	48	0.092		
81	1.2D + 1.5LM-1 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	15	0.092	49	0.092		
82	1.2D + 1.5LM-1 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	16	0.092	50	0.092		
83	1.2D + 1.5LM-1 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	84	1.5	17	0.092	51	0.092		
84	1.2D + 1.5LM-2 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	2	0.092	36	0.092		
85	1.2D + 1.5LM-2 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	3	0.092	37	0.092		
86	1.2D + 1.5LM-2 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	4	0.092	38	0.092		
87	1.2D + 1.5LM-2 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	5	0.092	39	0.092		
88	1.2D + 1.5LM-2 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	6	0.092	40	0.092		
89	1.2D + 1.5LM-2 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	7	0.092	41	0.092		
90	1.2D + 1.5LM-2 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	8	0.092	42	0.092		
91	1.2D + 1.5LM-2 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	9	0.092	43	0.092		
92	1.2D + 1.5LM-2 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	10	0.092	44	0.092		
93	1.2D + 1.5LM-2 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	11	0.092	45	0.092		
94	1.2D + 1.5LM-2 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	12	0.092	46	0.092		
95	1.2D + 1.5LM-2 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	13	0.092	47	0.092		
96	1.2D + 1.5LM-2 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	14	0.092	48	0.092		
97	1.2D + 1.5LM-2 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	15	0.092	49	0.092		
98	1.2D + 1.5LM-2 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	16	0.092	50	0.092		
99	1.2D + 1.5LM-2 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	85	1.5	17	0.092	51	0.092		
100	1.2D + 1.5LM-3 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	2	0.092	36	0.092		
101	1.2D + 1.5LM-3 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	3	0.092	37	0.092		
102	1.2D + 1.5LM-3 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	4	0.092	38	0.092		
103	1.2D + 1.5LM-3 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	5	0.092	39	0.092		
104	1.2D + 1.5LM-3 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	6	0.092	40	0.092		
105	1.2D + 1.5LM-3 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	7	0.092	41	0.092		
106	1.2D + 1.5LM-3 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	8	0.092	42	0.092		
107	1.2D + 1.5LM-3 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	9	0.092	43	0.092		
108	1.2D + 1.5LM-3 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	10	0.092	44	0.092		
109	1.2D + 1.5LM-3 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	11	0.092	45	0.092		
110	1.2D + 1.5LM-3 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	12	0.092	46	0.092		
111	1.2D + 1.5LM-3 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	13	0.092	47	0.092		
112	1.2D + 1.5LM-3 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	14	0.092	48	0.092		
113	1.2D + 1.5LM-3 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	15	0.092	49	0.092		
114	1.2D + 1.5LM-3 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	16	0.092	50	0.092		
115	1.2D + 1.5LM-3 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	86	1.5	17	0.092	51	0.092		
116	1.2D + 1.5LM-4 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	2	0.092	36	0.092		
117	1.2D + 1.5LM-4 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	3	0.092	37	0.092		
118	1.2D + 1.5LM-4 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	4	0.092	38	0.092		
119	1.2D + 1.5LM-4 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	5	0.092	39	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
120	1.2D + 1.5LM-4 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	6	0.092	40	0.092		
121	1.2D + 1.5LM-4 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	7	0.092	41	0.092		
122	1.2D + 1.5LM-4 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	8	0.092	42	0.092		
123	1.2D + 1.5LM-4 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	9	0.092	43	0.092		
124	1.2D + 1.5LM-4 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	10	0.092	44	0.092		
125	1.2D + 1.5LM-4 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	11	0.092	45	0.092		
126	1.2D + 1.5LM-4 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	12	0.092	46	0.092		
127	1.2D + 1.5LM-4 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	13	0.092	47	0.092		
128	1.2D + 1.5LM-4 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	14	0.092	48	0.092		
129	1.2D + 1.5LM-4 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	15	0.092	49	0.092		
130	1.2D + 1.5LM-4 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	16	0.092	50	0.092		
131	1.2D + 1.5LM-4 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	87	1.5	17	0.092	51	0.092		
132	1.2D + 1.5LM-5 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	2	0.092	36	0.092		
133	1.2D + 1.5LM-5 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	3	0.092	37	0.092		
134	1.2D + 1.5LM-5 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	4	0.092	38	0.092		
135	1.2D + 1.5LM-5 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	5	0.092	39	0.092		
136	1.2D + 1.5LM-5 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	6	0.092	40	0.092		
137	1.2D + 1.5LM-5 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	7	0.092	41	0.092		
138	1.2D + 1.5LM-5 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	8	0.092	42	0.092		
139	1.2D + 1.5LM-5 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	9	0.092	43	0.092		
140	1.2D + 1.5LM-5 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	10	0.092	44	0.092		
141	1.2D + 1.5LM-5 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	11	0.092	45	0.092		
142	1.2D + 1.5LM-5 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	12	0.092	46	0.092		
143	1.2D + 1.5LM-5 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	13	0.092	47	0.092		
144	1.2D + 1.5LM-5 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	14	0.092	48	0.092		
145	1.2D + 1.5LM-5 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	15	0.092	49	0.092		
146	1.2D + 1.5LM-5 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	16	0.092	50	0.092		
147	1.2D + 1.5LM-5 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	88	1.5	17	0.092	51	0.092		
148	1.2D + 1.5LM-6 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	2	0.092	36	0.092		
149	1.2D + 1.5LM-6 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	3	0.092	37	0.092		
150	1.2D + 1.5LM-6 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	4	0.092	38	0.092		
151	1.2D + 1.5LM-6 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	5	0.092	39	0.092		
152	1.2D + 1.5LM-6 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	6	0.092	40	0.092		
153	1.2D + 1.5LM-6 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	7	0.092	41	0.092		
154	1.2D + 1.5LM-6 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	8	0.092	42	0.092		
155	1.2D + 1.5LM-6 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	9	0.092	43	0.092		
156	1.2D + 1.5LM-6 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	10	0.092	44	0.092		
157	1.2D + 1.5LM-6 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	11	0.092	45	0.092		
158	1.2D + 1.5LM-6 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	12	0.092	46	0.092		
159	1.2D + 1.5LM-6 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	13	0.092	47	0.092		
160	1.2D + 1.5LM-6 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	14	0.092	48	0.092		
161	1.2D + 1.5LM-6 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	15	0.092	49	0.092		
162	1.2D + 1.5LM-6 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	16	0.092	50	0.092		
163	1.2D + 1.5LM-6 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	89	1.5	17	0.092	51	0.092		
164	1.2D + 1.5LM-7 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	2	0.092	36	0.092		
165	1.2D + 1.5LM-7 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	3	0.092	37	0.092		
166	1.2D + 1.5LM-7 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	4	0.092	38	0.092		
167	1.2D + 1.5LM-7 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	5	0.092	39	0.092		
168	1.2D + 1.5LM-7 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	6	0.092	40	0.092		
169	1.2D + 1.5LM-7 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	7	0.092	41	0.092		
170	1.2D + 1.5LM-7 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	8	0.092	42	0.092		
171	1.2D + 1.5LM-7 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	9	0.092	43	0.092		
172	1.2D + 1.5LM-7 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	10	0.092	44	0.092		
173	1.2D + 1.5LM-7 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	11	0.092	45	0.092		
174	1.2D + 1.5LM-7 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	12	0.092	46	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
175	1.2D + 1.5LM-7 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	13	0.092	47	0.092		
176	1.2D + 1.5LM-7 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	14	0.092	48	0.092		
177	1.2D + 1.5LM-7 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	15	0.092	49	0.092		
178	1.2D + 1.5LM-7 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	16	0.092	50	0.092		
179	1.2D + 1.5LM-7 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	90	1.5	17	0.092	51	0.092		
180	1.2D + 1.5LM-8 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	2	0.092	36	0.092		
181	1.2D + 1.5LM-8 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	3	0.092	37	0.092		
182	1.2D + 1.5LM-8 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	4	0.092	38	0.092		
183	1.2D + 1.5LM-8 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	5	0.092	39	0.092		
184	1.2D + 1.5LM-8 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	6	0.092	40	0.092		
185	1.2D + 1.5LM-8 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	7	0.092	41	0.092		
186	1.2D + 1.5LM-8 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	8	0.092	42	0.092		
187	1.2D + 1.5LM-8 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	9	0.092	43	0.092		
188	1.2D + 1.5LM-8 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	10	0.092	44	0.092		
189	1.2D + 1.5LM-8 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	11	0.092	45	0.092		
190	1.2D + 1.5LM-8 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	12	0.092	46	0.092		
191	1.2D + 1.5LM-8 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	13	0.092	47	0.092		
192	1.2D + 1.5LM-8 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	14	0.092	48	0.092		
193	1.2D + 1.5LM-8 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	15	0.092	49	0.092		
194	1.2D + 1.5LM-8 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	16	0.092	50	0.092		
195	1.2D + 1.5LM-8 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	91	1.5	17	0.092	51	0.092		
196	1.2D + 1.5LM-9 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	2	0.092	36	0.092		
197	1.2D + 1.5LM-9 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	3	0.092	37	0.092		
198	1.2D + 1.5LM-9 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	4	0.092	38	0.092		
199	1.2D + 1.5LM-9 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	5	0.092	39	0.092		
200	1.2D + 1.5LM-9 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	6	0.092	40	0.092		
201	1.2D + 1.5LM-9 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	7	0.092	41	0.092		
202	1.2D + 1.5LM-9 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	8	0.092	42	0.092		
203	1.2D + 1.5LM-9 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	9	0.092	43	0.092		
204	1.2D + 1.5LM-9 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	10	0.092	44	0.092		
205	1.2D + 1.5LM-9 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	11	0.092	45	0.092		
206	1.2D + 1.5LM-9 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	12	0.092	46	0.092		
207	1.2D + 1.5LM-9 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	13	0.092	47	0.092		
208	1.2D + 1.5LM-9 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	14	0.092	48	0.092		
209	1.2D + 1.5LM-9 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	15	0.092	49	0.092		
210	1.2D + 1.5LM-9 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	16	0.092	50	0.092		
211	1.2D + 1.5LM-9 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	92	1.5	17	0.092	51	0.092		
212	1.2D + 1.5LM-10 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	2	0.092	36	0.092		
213	1.2D + 1.5LM-10 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	3	0.092	37	0.092		
214	1.2D + 1.5LM-10 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	4	0.092	38	0.092		
215	1.2D + 1.5LM-10 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	5	0.092	39	0.092		
216	1.2D + 1.5LM-10 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	6	0.092	40	0.092		
217	1.2D + 1.5LM-10 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	7	0.092	41	0.092		
218	1.2D + 1.5LM-10 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	8	0.092	42	0.092		
219	1.2D + 1.5LM-10 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	9	0.092	43	0.092		
220	1.2D + 1.5LM-10 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	10	0.092	44	0.092		
221	1.2D + 1.5LM-10 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	11	0.092	45	0.092		
222	1.2D + 1.5LM-10 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	12	0.092	46	0.092		
223	1.2D + 1.5LM-10 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	13	0.092	47	0.092		
224	1.2D + 1.5LM-10 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	14	0.092	48	0.092		
225	1.2D + 1.5LM-10 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	15	0.092	49	0.092		
226	1.2D + 1.5LM-10 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	16	0.092	50	0.092		
227	1.2D + 1.5LM-10 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	93	1.5	17	0.092	51	0.092		
228	1.2D + 1.5LM-11 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	2	0.092	36	0.092		
229	1.2D + 1.5LM-11 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	3	0.092	37	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
230	1.2D + 1.5LM-11 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	4	0.092	38	0.092		
231	1.2D + 1.5LM-11 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	5	0.092	39	0.092		
232	1.2D + 1.5LM-11 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	6	0.092	40	0.092		
233	1.2D + 1.5LM-11 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	7	0.092	41	0.092		
234	1.2D + 1.5LM-11 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	8	0.092	42	0.092		
235	1.2D + 1.5LM-11 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	9	0.092	43	0.092		
236	1.2D + 1.5LM-11 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	10	0.092	44	0.092		
237	1.2D + 1.5LM-11 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	11	0.092	45	0.092		
238	1.2D + 1.5LM-11 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	12	0.092	46	0.092		
239	1.2D + 1.5LM-11 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	13	0.092	47	0.092		
240	1.2D + 1.5LM-11 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	14	0.092	48	0.092		
241	1.2D + 1.5LM-11 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	15	0.092	49	0.092		
242	1.2D + 1.5LM-11 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	16	0.092	50	0.092		
243	1.2D + 1.5LM-11 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	94	1.5	17	0.092	51	0.092		
244	1.2D + 1.5LM-12 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	2	0.092	36	0.092		
245	1.2D + 1.5LM-12 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	3	0.092	37	0.092		
246	1.2D + 1.5LM-12 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	4	0.092	38	0.092		
247	1.2D + 1.5LM-12 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	5	0.092	39	0.092		
248	1.2D + 1.5LM-12 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	6	0.092	40	0.092		
249	1.2D + 1.5LM-12 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	7	0.092	41	0.092		
250	1.2D + 1.5LM-12 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	8	0.092	42	0.092		
251	1.2D + 1.5LM-12 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	9	0.092	43	0.092		
252	1.2D + 1.5LM-12 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	10	0.092	44	0.092		
253	1.2D + 1.5LM-12 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	11	0.092	45	0.092		
254	1.2D + 1.5LM-12 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	12	0.092	46	0.092		
255	1.2D + 1.5LM-12 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	13	0.092	47	0.092		
256	1.2D + 1.5LM-12 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	14	0.092	48	0.092		
257	1.2D + 1.5LM-12 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	15	0.092	49	0.092		
258	1.2D + 1.5LM-12 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	16	0.092	50	0.092		
259	1.2D + 1.5LM-12 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	95	1.5	17	0.092	51	0.092		
260	1.2D + 1.5LM-13 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	2	0.092	36	0.092		
261	1.2D + 1.5LM-13 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	3	0.092	37	0.092		
262	1.2D + 1.5LM-13 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	4	0.092	38	0.092		
263	1.2D + 1.5LM-13 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	5	0.092	39	0.092		
264	1.2D + 1.5LM-13 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	6	0.092	40	0.092		
265	1.2D + 1.5LM-13 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	7	0.092	41	0.092		
266	1.2D + 1.5LM-13 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	8	0.092	42	0.092		
267	1.2D + 1.5LM-13 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	9	0.092	43	0.092		
268	1.2D + 1.5LM-13 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	10	0.092	44	0.092		
269	1.2D + 1.5LM-13 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	11	0.092	45	0.092		
270	1.2D + 1.5LM-13 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	12	0.092	46	0.092		
271	1.2D + 1.5LM-13 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	13	0.092	47	0.092		
272	1.2D + 1.5LM-13 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	14	0.092	48	0.092		
273	1.2D + 1.5LM-13 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	15	0.092	49	0.092		
274	1.2D + 1.5LM-13 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	16	0.092	50	0.092		
275	1.2D + 1.5LM-13 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	96	1.5	17	0.092	51	0.092		
276	1.2D + 1.5LM-14 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	2	0.092	36	0.092		
277	1.2D + 1.5LM-14 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	3	0.092	37	0.092		
278	1.2D + 1.5LM-14 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	4	0.092	38	0.092		
279	1.2D + 1.5LM-14 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	5	0.092	39	0.092		
280	1.2D + 1.5LM-14 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	6	0.092	40	0.092		
281	1.2D + 1.5LM-14 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	7	0.092	41	0.092		
282	1.2D + 1.5LM-14 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	8	0.092	42	0.092		
283	1.2D + 1.5LM-14 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	9	0.092	43	0.092		
284	1.2D + 1.5LM-14 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	10	0.092	44	0.092		

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
285	1.2D + 1.5LM-14 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	11	0.092	45	0.092		
286	1.2D + 1.5LM-14 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	12	0.092	46	0.092		
287	1.2D + 1.5LM-14 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	13	0.092	47	0.092		
288	1.2D + 1.5LM-14 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	14	0.092	48	0.092		
289	1.2D + 1.5LM-14 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	15	0.092	49	0.092		
290	1.2D + 1.5LM-14 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	16	0.092	50	0.092		
291	1.2D + 1.5LM-14 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	97	1.5	17	0.092	51	0.092		
292	1.2D + 1.5LM-15 + Maintenance (0-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	2	0.092	36	0.092		
293	1.2D + 1.5LM-15 + Maintenance (30-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	3	0.092	37	0.092		
294	1.2D + 1.5LM-15 + Maintenance (45-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	4	0.092	38	0.092		
295	1.2D + 1.5LM-15 + Maintenance (60-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	5	0.092	39	0.092		
296	1.2D + 1.5LM-15 + Maintenance (90-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	6	0.092	40	0.092		
297	1.2D + 1.5LM-15 + Maintenance (120-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	7	0.092	41	0.092		
298	1.2D + 1.5LM-15 + Maintenance (135-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	8	0.092	42	0.092		
299	1.2D + 1.5LM-15 + Maintenance (150-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	9	0.092	43	0.092		
300	1.2D + 1.5LM-15 + Maintenance (180-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	10	0.092	44	0.092		
301	1.2D + 1.5LM-15 + Maintenance (210-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	11	0.092	45	0.092		
302	1.2D + 1.5LM-15 + Maintenance (225-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	12	0.092	46	0.092		
303	1.2D + 1.5LM-15 + Maintenance (240-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	13	0.092	47	0.092		
304	1.2D + 1.5LM-15 + Maintenance (270-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	14	0.092	48	0.092		
305	1.2D + 1.5LM-15 + Maintenance (300-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	15	0.092	49	0.092		
306	1.2D + 1.5LM-15 + Maintenance (315-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	16	0.092	50	0.092		
307	1.2D + 1.5LM-15 + Maintenance (330-Wind)	Yes	Y	1	1.2	35	1.2	98	1.5	17	0.092	51	0.092		
308	Frame Weight			99	1	100	1								
309	Stability (180-Wind)			101	1										
310	Stability (90-Wind)			102	1										

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N10	max	1260.432	25	4969.893	29	1867.133	29	1761.405	29	0	307	0	307
2		min	-1196.249	17	-3836.152	3	-1729.256	3	-1649.113	3	0	1	0	1
3	N9	max	1232.11	25	4981.682	29	1869.341	29	1760.907	29	0	307	0	307
4		min	-1224.534	33	-3827.891	3	-1728.769	3	-1650.54	3	0	1	0	1
5	N55	max	32.05	33	5647.469	19	3779.301	19	43.757	3	0	307	0	307
6		min	-37.959	25	-5840.179	27	-3931.109	27	-57.204	29	0	1	0	1
7	N56	max	37.839	33	5680.538	23	3809.877	5	57.649	5	0	307	0	307
8		min	-31.975	7	-5759.984	31	-3886.239	31	-70.415	31	0	1	0	1
9	N61	max	2353.08	17	3813.785	17	2527.62	17	0.326	28	0	307	0	307
10		min	-2423.103	25	-3897.687	25	-2595.23	25	-0.327	36	0	1	0	1
11	N62	max	2387.464	33	3875.901	25	2567.175	25	0.638	3	0	307	0	307
12		min	-2389.132	25	-3839.472	33	-2556.519	33	-0.687	29	0	1	0	1
13	Totals:	max	2389.633	33	4805.898	40	2312.303	21						
14		min	-2389.626	7	846.356	16	-2312.262	12						

Envelope AISC 14TH (360-10): LRFD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
1	MP3	PIPE_2.5	0.042	10	34	0.005	10		32	18800.092	50715	3596.25	3596.25	2.928	H1-1b
2	MP1	PIPE_2.5	0.041	10	34	0.005	10		32	18800.092	50715	3596.25	3596.25	2.957	H1-1b
3	MP2	PIPE_2.5	0.041	10	23	0.004	10		25	18800.092	50715	3596.25	3596.25	3	H1-1b
4	MP4	PIPE_2.5	0.047	6	46	0.004	10		47	18800.092	50715	3596.25	3596.25	3	H1-1b
5	C2	PIPE_3.5	0.656	2.889	29	0.102	2.889		29	39541.798	78750	7953.75	7953.75	1.251	H1-1b
6	C1	PIPE_3.5	0.655	2.889	29	0.101	2.889		29	39541.798	78750	7953.75	7953.75	1.114	H1-1b
7	K4	L3X3X4	0.215	3.606	20	0.002	3.606	y	29	34981.942	46656	1688.138	3755.745	1.5	H2-1

Envelope AISC 14TH (360-10): LRFD Member Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
8	K3	L3X3X4	0.18	2.043	7	0.004	4.045	z	28	32472.883	46656	1688.138	3532.009	1.139	H2-1
9	K1	L3X3X4	0.231	3.606	5	0.003	3.606	y	30	34981.942	46656	1688.138	3664.012	1.264	H2-1
10	K2	L3X3X4	0.176	2.043	33	0.003	0	z	30	32472.883	46656	1688.138	3532.061	1.139	H2-1

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V :	99	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	29.4	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	48.0	20.7	2.3	Flat	1.200	6.90	243.1	
Air 6449 B77D	30.6	15.9	1.9	Flat	1.200	3.37	118.9	
Air 6419 B77G	28.3	16.1	1.8	Flat	1.200	3.16	111.5	
DMP65R-BU4D	48.0	20.7	2.3	Flat	1.200	6.90	243.1	
Pipe2-1/2STD x 11 ft	132.0	2.9	45.9	Round	1.200	2.64	92.8	8.4
Pipe3STD x 13 ft	156.0	3.5	44.6	Round	1.198	3.79	133.4	10.3
L3X3X1/4 x 3.606 ft	43.3	3.0	14.4	Flat	1.647	0.90	43.6	12.1
L3X3X1/4 x 4.045 ft	48.5	3.0	16.2	Flat	1.706	1.01	50.6	12.5
48" Diam Fiberglass	134.0	48.0	2.8	Round	0.506	44.67	664.1	

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V :	99	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	29.4	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	48.0	7.7	6.2	Flat	1.366	2.57	102.9	
Air 6449 B77D	30.6	10.6	2.9	Flat	1.218	2.24	80.2	
Air 6419 B77G	28.3	7.9	3.6	Flat	1.248	1.55	56.9	
DMP65R-BU4D	48.0	7.7	6.2	Flat	1.366	2.57	102.9	
Pipe2-1/2STD x 11 ft	132.0	2.9	45.9	Round	1.200	2.64	92.8	8.4
Pipe3STD x 13 ft	156.0	3.5	44.6	Round	1.198	3.79	133.4	10.3
L3X3X1/4 x 3.606 ft	43.3	3.0	14.4	Flat	1.647	0.90	43.6	12.1
L3X3X1/4 x 4.045 ft	48.5	3.0	16.2	Flat	1.706	1.01	50.6	12.5
48" Diam Fiberglass	134.0	48.0	2.8	Round	0.506	44.67	664.1	

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

Ice Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	7.47	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections
t_{iz} :	1.65	in	Design Thickness of Radial Ice at Height z (2.6.8)

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	51.3	24.0	2.1	Flat	1.200	8.55	76.7	
Air 6449 B77D	33.9	19.2	1.8	Flat	1.200	4.52	40.5	
Air 6419 B77G	31.6	19.4	1.6	Flat	1.200	4.26	38.2	
DMP65R-BU4D	51.3	24.0	2.1	Flat	1.200	8.55	76.7	
Pipe2-1/2STD x 11 ft	135.3	6.2	21.9	Round	1.131	5.81	49.1	4.4
Pipe3STD x 13 ft	159.3	6.8	23.4	Round	1.165	7.53	65.5	4.9
L3X3X1/4 x 3.606 ft	46.6	6.3	7.4	Flat	1.413	2.04	21.5	5.5
L3X3X1/4 x 4.045 ft	51.8	6.3	8.2	Flat	1.441	2.27	24.4	5.7
48" Diam Fiberglass	137.3	51.3	2.7	Round	0.704	48.92	257.3	

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

Ice Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	7.47	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections
t_{iz} :	1.65	in	Design Thickness of Radial Ice at Height z (2.6.8)

Mount & Antenna Ice Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
TPA-65R-BU4D	51.3	11.0	4.7	Flat	1.296	3.92	38.0	
Air 6449 B77D	33.9	13.9	2.4	Flat	1.200	3.27	29.3	
Air 6419 B77G	31.6	11.2	2.8	Flat	1.214	2.46	22.3	
DMP65R-BU4D	51.3	11.0	4.7	Flat	1.296	3.92	38.0	
Pipe2-1/2STD x 11 ft	135.3	6.2	21.9	Round	1.131	5.81	49.1	4.4
Pipe3STD x 13 ft	159.3	6.8	23.4	Round	1.165	7.53	65.5	4.9
L3X3X1/4 x 3.606 ft	46.6	6.3	7.4	Flat	1.413	2.04	21.5	5.5
L3X3X1/4 x 4.045 ft	51.8	6.3	8.2	Flat	1.441	2.27	24.4	5.7
48" Diam Fiberglass	137.3	51.3	2.7	Round	0.704	48.92	257.3	

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

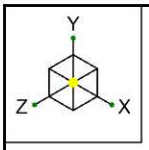
Ice Load on Antennas TIA-222-G

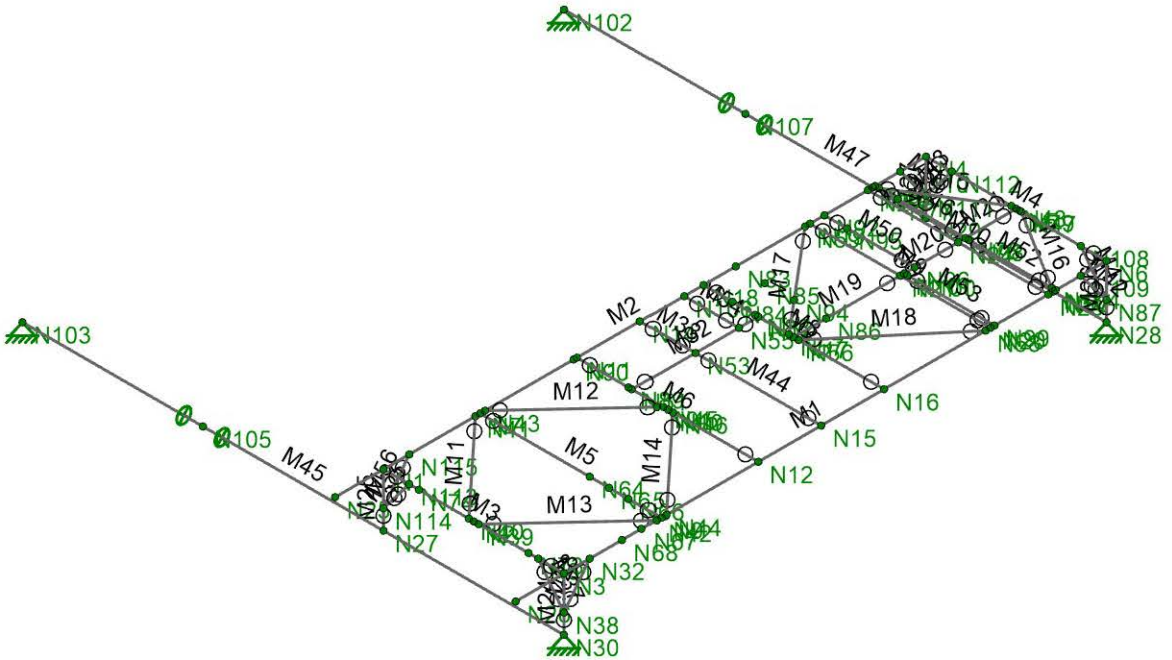
Ice Weight :	56	pcf	Ice Density
t_i :	0.75		Design Ice Thickness
Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V_i :	50	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_{iz} :	1.10		Height Escalation Factor for Ice Thickness
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
t_{iz} :	1.65	in	Design Thickness of Radial Ice at Height z (2.6.8)

Platform Grating :	None	
Ice Load :		psf

Mount & Antenna Ice Wind Loads

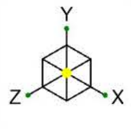
Appurtenance	Height	Width	Depth	Diam.	Area	Perim.	Ice Weight	
	in	*in*	*in*	*in*	*sq in*	*in*	*lb*	*plf*
TPA-65R-BU4D	51.3	24.0	11.0	22.09	123.25	63.41	191.7	
Air 6449 B77D	33.9	19.2	13.9	19.05	107.51	59.45	106.7	
Air 6419 B77G	31.6	19.4	11.2	17.93	101.69	54.61	93.3	
DMP65R-BU4D	51.3	24.0	11.0	22.09	123.25	63.41	191.7	
Pipe2-1/2STD x 11 ft	135.3	6.2	6.2	2.88	23.51	14.22	100.6	9.1
Pipe3STD x 13 ft	159.3	6.8	6.8	3.50	26.75	16.19	135.3	10.4
L3X3X1/4 x 3.606 ft	46.6	6.3	6.3	4.24	30.61	18.61	42.9	11.9
L3X3X1/4 x 4.045 ft	51.8	6.3	6.3	4.24	30.61	18.61	48.1	11.9
48" Diam Fiberglass	137.3	51.3	51.3	48.00	257.80	155.99	1119.5	

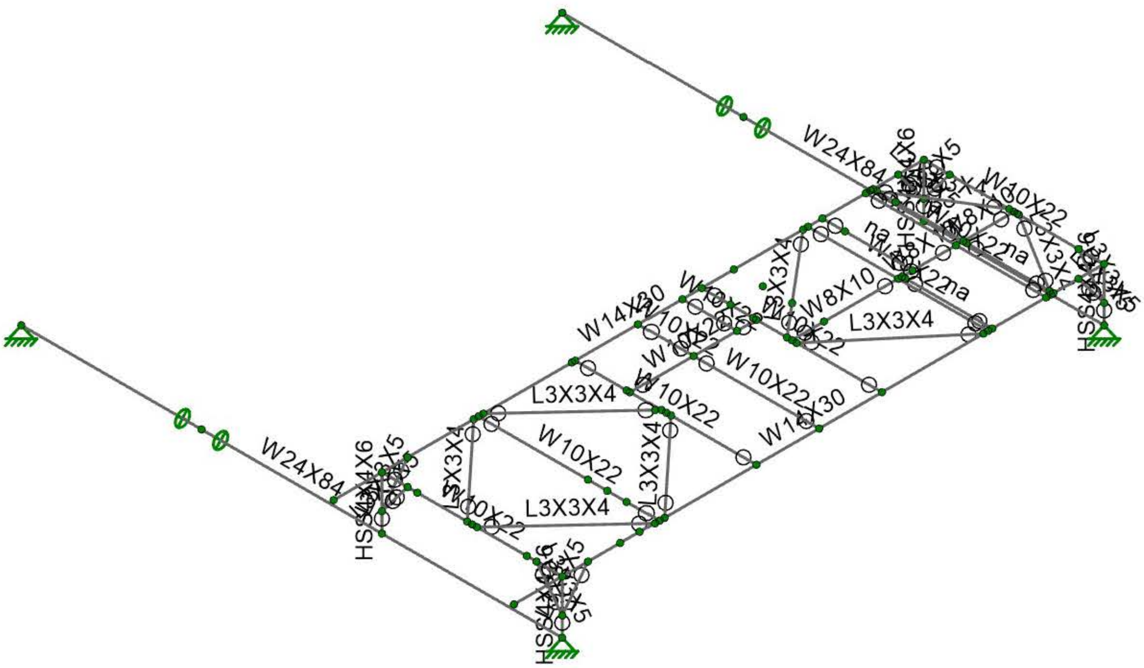




Envelope Only Solution

RAMAKER	MAL02881	SK-1
GN		Mar 25, 2022
51676		51676 Beta Mount_Rev1.r3d





Envelope Only Solution

RAMAKER	MAL02881	SK-2
GN		Mar 25, 2022
51676		51676 Beta Mount_Rev1.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.25	65	1.15
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	W14x30	W14X30	Beam	Wide Flange	A992	Typical	8.85	19.6	291	0.38
2	W8x10	W8X10	Beam	Wide Flange	A992	Typical	2.96	2.09	30.8	0.043
3	W10x22	W10X22	Beam	Wide Flange	A992	Typical	6.49	11.4	118	0.239
4	L3x3x1/4	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	0.031
5	L3x3x5/16	L3X3X5	Beam	Single Angle	A36 Gr.36	Typical	1.78	1.5	1.5	0.06
6	HSS4x4x3/8	HSS4X4X6	Beam	Tube	A36 Gr.36	Typical	4.78	10.3	10.3	17.5
7	W24x84	W24X84	Beam	Wide Flange	A572 Gr.50	Typical	24.7	94.4	2370	3.7
8	W18x40	W18X40	Beam	Wide Flange	A572 Gr.50	Typical	11.8	19.1	612	0.81

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N26	N6		W14x30	Beam	Wide Flange	A992	Typical
2	M2	N25	N4		W14x30	Beam	Wide Flange	A992	Typical
3	M3	N1	N3		W10x22	Beam	Wide Flange	A992	Typical
4	M4	N4	N6		W10x22	Beam	Wide Flange	A992	Typical
5	M5	N7	N9		W10x22	Beam	Wide Flange	A992	Typical
6	M6	N11	N12		W10x22	Beam	Wide Flange	A992	Typical
7	M8	N18	N16		W10x22	Beam	Wide Flange	A992	Typical
8	M9	N19	N20		W10x22	Beam	Wide Flange	A992	Typical
9	M10	N22	N23		W10x22	Beam	Wide Flange	A992	Typical
10	M11	N40	N41		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
11	M12	N43	N45		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
12	M13	N39	N42		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
13	M14	N44	N46		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
14	M15	N49	N48		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
15	M16	N50	N47		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
16	M17	N59	N57		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
17	M18	N58	N56		L3x3x1/4	Beam	Single Angle	A36 Gr.36	Typical
18	M19	N17	N21		W8x10	Beam	Wide Flange	A992	Typical
19	M20	N21	N24		W8x10	Beam	Wide Flange	A992	Typical
20	M21	N24	N5		W8x10	Beam	Wide Flange	A992	Typical
21	M24	N30	N3		HSS4x4x3/8	Beam	Tube	A36 Gr.36	Typical
22	M25	N27	N1		HSS4x4x3/8	Beam	Tube	A36 Gr.36	Typical
23	M26	N28	N6		HSS4x4x3/8	Beam	Tube	A36 Gr.36	Typical
24	M27	N29	N4		HSS4x4x3/8	Beam	Tube	A36 Gr.36	Typical
25	M28	N38	N32	90	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
26	M32	N51	N52		W10x22	Beam	Wide Flange	A992	Typical
27	M33	N14	N53		W10x22	Beam	Wide Flange	A992	Typical
28	M37	N38	N61	180	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
29	M46	N93	N78		RIGID	None	None	RIGID	Typical
30	M48	N83	N94		RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
31	M49	N90	N91		RIGID	None	None	RIGID	Typical
32	M50	N92	N96		RIGID	None	None	RIGID	Typical
33	M53	N101	N99		RIGID	None	None	RIGID	Typical
34	M52	N78	N104		RIGID	None	None	RIGID	Typical
35	M54	N55	N106		W10x22	Beam	Wide Flange	A992	Typical
36	M44	N53	N15		W10x22	Beam	Wide Flange	A992	Typical
37	M45	N103	N30		W24x84	Beam	Wide Flange	A572 Gr.50	Typical
38	M47	N102	N28		W24x84	Beam	Wide Flange	A572 Gr.50	Typical
39	M41	N87	N108	90	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
40	M42	N87	N109	180	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
41	M43	N111	N112	180	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
42	M51	N111	N110	90	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
43	M55	N114	N113	90	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical
44	M56	N114	N115	180	L3x3x5/16	Beam	Single Angle	A36 Gr.36	Typical

Basic Load Cases

	BLC Description	Category	Y Gravity	Nodal	Distributed	Area(Member)
1	Dl selfweight	DL	-1	4	2	
2	DL equipment	DL		14		4
3	DL grating	DL				3
4	DL railing	DL			3	
5	WLz	WLZ		35	14	
6	WLx	WLX		39	14	
7	LL	LL			2	3
8	S	SL			2	
9	BLC 2 Transient Area Loads	None			155	
10	BLC 3 Transient Area Loads	None			222	
11	BLC 7 Transient Area Loads	None			221	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	DL		Y	DL	1						
2	LL Service		Y	LL	1						
3	DL + LL Service		Y	DL	1	LL	1				
4	1.4DL	Yes	Y	DL	1.4						
5	1.2DL + 0.5LL	Yes	Y	DL	1.2	LL	0.5				
6	1.2DL	Yes	Y	DL	1.2						
7	1.2DL + 1.6LL	Yes	Y	DL	1.2	LL	1.6				
8	1.2DL + 1.6LL + 0.8WLX	Yes	Y	DL	1.2	LL	1.6	WLX	0.8		
9	1.2DL + 1.6LL + 0.8WLZ	Yes	Y	DL	1.2	LL	1.6			WLZ	0.8
10	1.2DL + 1.6LL - 0.8WLX	Yes	Y	DL	1.2	LL	1.6	WLX	-0.8		
11	1.2DL + 1.6LL - 0.8WLZ	Yes	Y	DL	1.2	LL	1.6			WLZ	-0.8
12	1.2DL + 1.6LL + 0.6WLX + 0.6WLZ	Yes	Y	DL	1.2	LL	1.6	WLX	0.6	WLZ	0.6
13	1.2DL + 1.6LL + 0.6WLX - 0.6WLZ	Yes	Y	DL	1.2	LL	1.6	WLX	0.6	WLZ	-0.6
14	1.2DL + 1.6LL - 0.6WLX + 0.6WLZ	Yes	Y	DL	1.2	LL	1.6	WLX	-0.6	WLZ	0.6
15	1.2DL + 1.6LL - 0.6WLX - 0.6WLZ	Yes	Y	DL	1.2	LL	1.6	WLX	-0.6	WLZ	-0.6
16	1.2DL + 0.8WLX	Yes	Y	DL	1.2			WLX	0.8		
17	1.2DL + 0.8WLZ	Yes	Y	DL	1.2					WLZ	0.8
18	1.2DL - 0.8WLX	Yes	Y	DL	1.2			WLX	-0.8		
19	1.2DL - 0.8WLZ	Yes	Y	DL	1.2					WLZ	-0.8
20	1.2DL + 0.6WLX + 0.6WLZ	Yes	Y	DL	1.2			WLX	0.6	WLZ	0.6
21	1.2DL + 0.6WLX - 0.6WLZ	Yes	Y	DL	1.2			WLX	0.6	WLZ	-0.6
22	1.2DL - 0.6WLX + 0.6WLZ	Yes	Y	DL	1.2			WLX	-0.6	WLZ	0.6

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
23	1.2DL - 0.6WLX - 0.6WLZ	Yes	Y	DL	1.2			WLX	-0.6	WLZ	-0.6
24	1.2DL + 0.5LL + 1.6WLX	Yes	Y	DL	1.2	LL	0.5	WLX	1.6		
25	1.2DL + 0.5LL + 1.6WLZ	Yes	Y	DL	1.2	LL	0.5			WLZ	1.6
26	1.2DL + 0.5LL - 1.6WLX	Yes	Y	DL	1.2	LL	0.5	WLX	-1.6		
27	1.2DL + 0.5LL - 1.6WLZ	Yes	Y	DL	1.2	LL	0.5			WLZ	-1.6
28	1.2DL + 0.5LL + 1.2WLX + 1.2WLZ	Yes	Y	DL	1.2	LL	0.5	WLX	1.2	WLZ	1.2
29	1.2DL + 0.5LL + 1.2WLX - 1.2WLZ	Yes	Y	DL	1.2	LL	0.5	WLX	1.2	WLZ	-1.2
30	1.2DL + 0.5LL - 1.2WLX + 1.2WLZ	Yes	Y	DL	1.2	LL	0.5	WLX	-1.2	WLZ	1.2
31	1.2DL + 0.5LL - 1.2WLX - 1.2WLZ	Yes	Y	DL	1.2	LL	0.5	WLX	-1.2	WLZ	-1.2
32	1.2DL + 1.6WLX	Yes	Y	DL	1.2			WLX	1.6		
33	1.2DL + 1.6WLZ	Yes	Y	DL	1.2					WLZ	1.6
34	1.2DL - 1.6WLX	Yes	Y	DL	1.2			WLX	-1.6		
35	1.2DL - 1.6WLZ	Yes	Y	DL	1.2					WLZ	-1.6
36	1.2DL + 1.2WLX + 1.2WLZ	Yes	Y	DL	1.2			WLX	1.2	WLZ	1.2
37	1.2DL + 1.2WLX - 1.2WLZ	Yes	Y	DL	1.2			WLX	1.2	WLZ	-1.2
38	1.2DL - 1.2WLX + 1.2WLZ	Yes	Y	DL	1.2			WLX	-1.2	WLZ	1.2
39	1.2DL - 1.2WLX - 1.2WLZ	Yes	Y	DL	1.2			WLX	-1.2	WLZ	-1.2
40	0.9DL + 1.6WLX	Yes	Y	DL	0.9			WLX	1.6		
41	0.9DL + 1.6WLZ	Yes	Y	DL	0.9					WLZ	1.6
42	0.9DL - 1.6WLX	Yes	Y	DL	0.9			WLX	-1.6		
43	0.9DL - 1.6WLZ	Yes	Y	DL	0.9					WLZ	-1.6
44	0.9DL + 1.2WLX + 1.2WLZ	Yes	Y	DL	0.9			WLX	1.2	WLZ	1.2
45	0.9DL + 1.2WLX - 1.2WLZ	Yes	Y	DL	0.9			WLX	1.2	WLZ	-1.2
46	0.9DL - 1.2WLX + 1.2WLZ	Yes	Y	DL	0.9			WLX	-1.2	WLZ	1.2
47	0.9DL - 1.2WLX - 1.2WLZ	Yes	Y	DL	0.9			WLX	-1.2	WLZ	-1.2
48	1.2D+1.6L+.5S	Yes	Y	DL	1.2	LL	1.6	SL	0.5		
49	1.2D+1.6S+L	Yes	Y	DL	1.2	SL	1.6	LL	1		
50	1.2D+1WLX+1WLZ+.5S	Yes	Y	DL	1.2	SL	0.5	WLX	1.6	WLZ	1.6
51	1.2D+.2S	Yes	Y	DL	1.2	SL	0.2				

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N105	max	0	51	0	51	0	51	0	51	0	51	0	51
2		min	0	4	0	4	0	4	0	4	0	4	0	4
3	N107	max	0	51	0	51	0	51	0	51	0	51	0	51
4		min	0	4	0	4	0	4	0	4	0	4	0	4
5	N30	max	3811.505	50	59457.314	49	-65.657	41	0	51	0	51	0	51
6		min	-3012.223	42	22833.471	42	-13582.638	27	0	4	0	4	0	4
7	N28	max	5095.234	40	65523.664	49	11060.213	25	0	51	0	51	0	51
8		min	-5136.334	26	25946.308	45	2611.719	43	0	4	0	4	0	4
9	N102	max	1029.002	32	57972.249	49	325.024	30	0	51	0	51	0	51
10		min	-1013.682	42	21261.925	46	26.868	45	0	4	0	4	0	4
11	N103	max	803.075	50	52186.74	49	38.779	41	0	51	0	51	0	51
12		min	-602.624	42	18860.309	42	-414.238	27	0	4	0	4	0	4
13	Totals:	max	9754.642	24	235139.967	49	9017.51	41						
14		min	-9754.636	42	90499.421	42	-9017.511	27						

Envelope AISC 14TH (360-10): LRFD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
1	M1	W14X30	0.424	28.96	30	0.178	3.697	y	27	138240.835	398250	33712.5	57379.253	1.508	H1-1b
2	M2	W14X30	0.396	2.465	50	0.067	2.465	y	50	138240.835	398250	33712.5	58991.128	1.55	H1-1b
3	M3	W10X22	0.15	1.886	24	0.052	1.414	y	50	213181.158	292050	22875	97500	1	H1-1b
4	M4	W10X22	0.08	1.414	24	0.065	0	y	26	213181.158	292050	22875	97500	1.813	H1-1b

Envelope AISC 14TH (360-10): LRFD Member Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
5	M5	W10X22	0.025	5.657	50	0.006	9.334	y	31	173243.779	292050	22875	93791.817	1.19	H1-1b
6	M6	W10X22	0.096	2.734	27	0.031	9.334	y	4	214048.675	292050	22875	97500	1	H1-1b
7	M8	W10X22	0.103	2.734	25	0.033	9.334	y	15	214048.675	292050	22875	97500	1	H1-1b
8	M9	W10X22	0.031	4.714	15	0.01	9.334	y	10	214300.328	292050	22875	97500	1	H1-1b
9	M10	W10X22	0.037	4.62	24	0.018	9.334	y	11	214300.328	292050	22875	97500	1	H1-1b
10	M11	L3X3X4	0.159	3.276	34	0.002	6.486	y	4	18372.13	46656	1688.138	3192.439	1.14	H2-1
11	M12	L3X3X4	0.25	3.276	50	0.003	6.486	y	50	18372.13	46656	1688.138	3192.107	1.139	H2-1
12	M13	L3X3X4	0.224	3.276	50	0.002	6.486	y	31	18372.13	46656	1688.138	3192.439	1.14	H2-1
13	M14	L3X3X4	0.214	3.276	31	0.005	6.486	y	31	18372.13	46656	1688.138	3192.439	1.14	H2-1
14	M15	L3X3X4	0.274	0.263	42	0.101	0.21	z	26	25613.189	46656	1688.138	3532.648	1.467	H2-1
15	M16	L3X3X4	0.274	0.263	24	0.1	0.21	z	24	25613.189	46656	1688.138	3546.688	1.5	H2-1
16	M17	L3X3X4	0.546	3.534	8	0.029	6.861	y	8	16424.242	46656	1688.138	3146.27	1.139	H2-1
17	M18	L3X3X4	0.547	3.396	14	0.031	6.861	y	15	16424.242	46656	1688.138	3146.454	1.14	H2-1
18	M19	W8X10	0.022	3.111	13	0.015	5.5	y	15	84840.42	133200	6119.448	31797.759	1.157	H1-1b
19	M20	W8X10	0.289	0.212	31	0.015	0	y	30	112120.38	133200	6119.448	32870.734	2.252	H1-1b
20	M21	W8X10	0.115	0	26	0.049	0.364	z	26	112120.38	133200	6119.448	32870.734	1.237	H1-1b
21	M24	HSS4X4X6	0.829	1	31	0.399	0	z	27	154023.004	154872	17253	17253	1	H1-1b
22	M25	HSS4X4X6	0.183	1	31	0.094	0	y	50	150805.887	154872	17253	17253	1.407	H1-1b
23	M26	HSS4X4X6	0.774	1	30	0.323	0	z	25	154023.004	154872	17253	17253	1	H1-1b
24	M27	HSS4X4X6	0.248	1	26	0.105	0	y	24	150805.887	154872	17253	17253	1.406	H1-1b
25	M28	L3X3X5	0.612	1.021	27	0.014	2.198	y	31	51780.491	57672	2014.646	4572.498	1.14	H2-1
26	M32	W10X22	0.05	3.217	50	0.021	6.5	y	4	241930.619	292050	22875	97500	1	H1-1b
27	M33	W10X22	0.002	2.834	50	0.003	2.834	y	50	273164.583	292050	22875	97500	1.125	H1-1b*
28	M37	L3X3X5	0.102	1.089	50	0.02	2.2	z	29	51768.186	57672	2014.646	4572.498	1.14	H2-1
29	M54	W10X22	0.003	2.834	50	0.007	0	y	15	273164.583	292050	22875	97500	1.131	H1-1b*
30	M44	W10X22	0.042	3.283	4	0.034	6.5	y	4	226710.818	292050	22875	97500	1.14	H1-1b
31	M45	W24X84	0.479	14.99	49	0.158	28	y	49	538399.697	1.1115e+6	122250	840000	1	H1-1b
32	M47	W24X84	0.527	14.707	49	0.176	28	y	49	538399.697	1.1115e+6	122250	840000	1	H1-1b
33	M41	L3X3X5	0.154	1.044	42	0.015	2.198	y	50	51780.491	57672	2014.646	4572.498	1.14	H2-1
34	M42	L3X3X5	0.504	1.022	25	0.015	2.2	z	26	51768.186	57672	2014.646	4572.498	1.14	H2-1
35	M43	L3X3X5	0.156	1.023	24	0.004	2.202	z	30	51762.597	57672	2014.646	4572.498	1.14	H2-1
36	M51	L3X3X5	0.063	1.066	30	0.011	2.199	y	26	51776.955	57672	2014.646	4572.498	1.14	H2-1
37	M55	L3X3X5	0.126	1.066	50	0.011	2.198	z	26	51780.491	57672	2014.646	4572.498	1.14	H2-1
38	M56	L3X3X5	0.068	1.022	27	0.009	2.2	z	26	51768.186	57672	2014.646	4572.498	1.14	H2-1

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V :	99	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	29.4	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Width	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
15 KW Generator	38.0	38.0	1.0	Flat	1.200	10.03	353.2	
E101-P-HTD	44.0	31.5	1.4	Flat	1.200	9.63	339.0	
Transformer	31.0	20.0	1.6	Flat	1.200	4.31	151.7	
RRUS 4415 B25	16.5	13.4	1.2	Flat	1.200	1.54	54.1	
RRUS 4478 B14	16.5	13.4	1.2	Flat	1.200	1.54	54.1	
RRUS 4449 B5/B12	17.9	13.2	1.4	Flat	1.200	1.64	57.8	
RRUS 4426 B66	15.0	13.2	1.1	Flat	1.200	1.37	48.3	
RRUS-32 B30	27.2	12.1	2.2	Flat	1.200	2.29	80.5	
DC6-48-60-18-8C-EV	18.3	10.2	1.8	Flat	1.200	1.30	45.8	
FC12-PC6-10E	14.0	16.1	1.2	Flat	1.200	1.57	55.1	
FC12-PC6-10E	14.0	16.1	1.2	Flat	1.200	1.57	55.1	
6.5'x6.5' cabinet	114.0	78.0	1.5	Flat	1.200	61.75	2175.2	
W14X30 x 2.5 ft	30.0	13.8	2.2	Flat	1.200	2.88	101.3	40.5
W14X30 x 28 ft	336.0	13.8	24.3	Flat	1.978	32.20	1869.9	66.8
W10X22 x 9.334 ft	112.0	10.2	11.0	Flat	1.533	7.93	357.0	38.2
L3X3X5/16 x 2.198 ft	26.4	3.0	8.8	Flat	1.460	0.55	23.5	10.7
HSS4X4X5/16 x 2.75 ft	33.0	4.0	8.3	Flat	1.442	0.92	38.8	14.1

RAMAKER employee-owned

Job	MAL02881
Project	51676
By	GN
Date	3/25/22

Wind Load on Antennas TIA-222-G

$q_z = 0.00256\ K_z\ K_{zt}\ K_d\ V^2\ I$

$F = q_z\ G_h\ C_a\ A_a$

Occupancy :	II		Classification of Structures (Table 2-1)
Exposure :	C		Exposure Category
V :	99	mph	Basic Wind Speed (Annex B)
z :	87	ft	Height above ground level to the center of the antenna
I :	1.00		Importance Factor (Table 2-3)
K_z :	1.23		Velocity Pressure Coefficient (2.6.5.2)
K_{zt} :	1.00		Topographic Factor (2.6.6.4)
K_d :	0.95		Wind Direction Probability Factor (Table 2-2)
q_z :	29.4	psf	Velocity Pressure at Height z
G_h :	1.00		Strength Design of Appurtenances and their Connections

Mount & Antenna Wind Loads

Appurtenance	Height	Depth	h/D	Shape	C_a	A_a	Force	Force
	in	*in*				*sq ft*	*lb*	*plf*
15 KW Generator	38.0	54.0	1.4	Flat	1.200	14.25	502.0	
E101-P-HTD	44.0	14.0	3.1	Flat	1.229	4.28	154.3	
Transformer	31.0	18.0	1.7	Flat	1.200	3.88	136.5	
RRUS 4415 B25	16.5	5.9	2.8	Flat	1.213	0.68	24.1	
RRUS 4478 B14	16.5	7.7	2.1	Flat	1.200	0.88	31.1	
RRUS 4449 B5/B12	17.9	9.4	1.9	Flat	1.200	1.17	41.3	
RRUS 4426 B66	15.0	5.8	2.6	Flat	1.204	0.60	21.3	
RRUS-32 B30	27.2	7.0	3.9	Flat	1.262	1.32	49.0	
DC6-48-60-18-8C-EV	18.3	31.4	1.7	Flat	1.200	3.99	140.4	
FC12-PC6-10E	14.0	6.7	2.1	Flat	1.200	0.65	22.8	
FC12-PC6-10E	14.0	6.7	2.1	Flat	1.200	0.65	22.8	
6.5'x6.5' cabinet	114.0	78.0	1.5	Flat	1.200	61.75	2175.2	
W14X30 x 2.5 ft	30.0	6.7	4.5	Flat	1.287	1.40	53.0	21.2
W14X30 x 28 ft	336.0	6.7	49.9	Flat	2.000	15.70	921.9	32.9
W10X22 x 9.334 ft	112.0	5.8	19.5	Flat	1.816	4.47	238.4	25.5
L3X3X5/16 x 2.198 ft	26.4	3.0	8.8	Flat	1.460	0.55	23.5	10.7
HSS4X4X5/16 x 2.75 ft	33.0	4.0	8.3	Flat	1.442	0.92	38.8	14.1


840 Memorial Drive
880 Memorial Dr
New Riverside Neighborhood Park
Charles River Basin
130-168
387 Western Ave
389 Western Ave
30 Hingham St
130-18
130-17
130-16
130-15
130-14
130-19
130-6
130-13
179 Putnam Ave
122-176
122-10
122-11
130-5
130-7
130-125
130-12
122-194
122-196
130-4
130-8
130-127
122-195
122-197
1 Riverside Pl
130-124
130-11
185 Putnam Ave
122-13
130-3
130-9
130-126
343 Western Ave
321 Western Ave
375 Western Ave
351 Western Ave
Western Ave
336 Western Ave
330 Western Ave
Western Avenue Bridge
46 Blackstone St
356 Western Ave
205 Putnam Ave
126-1
126-2
126-3
129-20
129-21
126-9
215 Putnam Ave
218 Putnam Ave
126-8
217 Putnam Ave
220 Putnam Ave
219 Putnam Ave
222 Putnam Ave
126-7
126-6
129-54
221 Putnam Ave
Ballord Pl
Memorial Dr
223 Putnam Ave
231 Putnam Ave
129-47
225 Putnam Ave
232 Putnam Ave
126-10
227 Putnam Ave
126-11
126-36
46 Blackstone St
229 Putnam Ave
238 Putnam Ave
24 Blackstone St
126-35
126-34
19 Blackstone St
244 Putnam Ave
126-33
237 Putnam Ave
Blackstone St
Putnam Ave
126-32
129-11
ROAD
840 Memorial Dr
126-31
129-58
126-120
129-28
263 Putnam Ave
260 Putnam Ave
Charles River Basin
129-29
126-29
129-30
264 Putnam Ave
129-31
126-26
126-28
11 Blackstone St
129-32
274 Putnam Ave
129-9
126-27
2 Blackstone St
129-33
277 Putnam Ave
305 River St
129-34
129-42
129-59
3 Blackstone St
321 River St
319 River St
127-132
Riverside Press Park
1 Blackstone St
129-48
323 River St
300 River St
327 River St
304 Putnam Ave
306 Putnam Ave
127-126
River St
312 Putnam Ave
330 River St
129-55
128-63
127-119
340 Putnam Ave
127-1
816 Memorial Dr
128-30
127-150
810 Memorial Dr
128-72
River Street Bridge
339 Putnam Ave
127-151
Charles River Basin
812 Memorial Dr
340 River St
127-152

840 Memorial Drive

Petitioner

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BILLERICA, MA 01862

129-9
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129-9
ADELMANN, PATRICIA &
JAMES JOSEPH MCCLURE
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129-9
HARWITZ, ALEXANDER L. & LAURA JOHNSON
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129-9
PERKINS EVELYN M.
TRUSTEE OF E.M. PERKINS REALTY TRUST.
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129-55
PECTEN PROPERTIES, LLC
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129-58
RIVERTECH ASSOCIATES LLC
C/O ABBEY GROUP
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129-9
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129-9
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129-47
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ZAPPE JEFFREY A & KIMBERLY J SAUDINO
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129-59
CAMBRIDGE CITY OF
C/O YI-AN HUANG
CITY MANAGER

129-59
CITY OF CAMBRIDGE
C/O NANCY GLOWA
CITY SOLICITOR

129-54
RABINOWITZ, REBECCA
217 PUTNAM AVE #2
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129-54
CARTER, SUSAN A.
217 PUTNAM AVE. UNIT#217/20
CAMBRIDGE, MA 02139

129-54
SUAZO, MELBA
217-219 PUTNAM AVE #217-18
CAMBRIDGE, MA 02139

129-54
GLISOVIC, BRANKO
217 PUTNAM AVE. UNIT#217/14
CAMBRIDGE, MA 02139

129-54
NOLAN, JOHN S. & NINA C. NOLAN
217 PUTNAM AVE., UNIT #13
CAMBRIDGE, MA 02139

129-54
LEMMA, ALEMAYEHU G. & SENAYET Y. GIGAR
217 PUTNAM AVE., #217/11
CAMBRIDGE, MA 02139

129-54
COLLINS, CHADWICK W.
217-229 PUTNAM AVE #225
CAMBRIDGE, MA 02139

129-54
EDOUAZIN, MARYSE
217 PUTNAM AVE., #223/6
CAMBRIDGE, MA 02139

129-54
CRASTA, FREDRICK & APOLINE RODRIGUES
223 PUTNAM AVE #223-2
CAMBRIDGE, MA 02139

129-54
KARMACHARYA, SUDDYAM &
BABA KARMACHARYA
219 PUTNAM AVE
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129-54
POOR, MICHAEL J. & SHANNON M. POOR
217 PUTNAM AVE. UNIT#9
CAMBRIDGE, MA 02139

129-54
HAILE, HAREGU
217 PUTNAM AVE., #217/8
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129-54
VILDORT, JEAN R. & CLAUDETTE B. VILDORT
217 PUTNAM AVE., #15
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129-54
SCANTLEBURY, KIM I.
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129-54
WEEMAN, MATTHEW & ELIN B. WEEMAN
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840 Memorial Drive

129-54
SUWAL, MAHESH R. & RADHIKA SUWAL
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129-54
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129-54
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129-54
THORPE, ROBERT W. & SOPHIA A. THORPE
217 PUTNAM AVE., 217/21
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129-54
CHAN, SOPHEA
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129-54
PERDOMO, AZLILN
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129-54
GACHETTE, MAX A. & MARIE L. GACHETTE
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129-54
GRAHAM, RHONDA
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129-54
WALKER, JEFFREY M.
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129-54
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129-54
GENESHSINGH, THAKUR A. &
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129-54
FIFIELD, SHANE & FELICIA N. FIFIELD
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129-54
SELK, CHARLES A. & SABRINA C. SELK
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129-9
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129-54
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129-54
DULAL, AMBIKA & BIGYAN GHIMIRE
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129-9
KANG, JEONG SEUK
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129-54
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