#2022-199 Vertical Bridge Monopine Tower
Special Use Permit & Zoning Variation
Project Review for Planning and Zoning Commission

Meeting Date:	December 21, 2022
Request:	A Special Use Permit (SUP) for a wireless communication tower and variations from the SUP criteria in Article 2-400 to allow the Monopine style tower and for the tower to be setback less than 110% of the height of the tower from the west and south property lines.
Location:	269 Liberty Drive
Acreage:	Approximately 1.2 acres
Existing Zoning:	M (Manufacturing)
Surrounding Properties:	North: B-2 (General Commercial) South: M (Manufacturing) Three Oaks Recreation Area East: B-2 PUD (General Commercial) future Water's Edge West: M PUD (Manufacturing)
Staff Contact:	Elizabeth Maxwell (815.356.3738)

Background:

- Existing Use: The property is currently improved with a commercial recreation building that teaches scuba diving.
- The request was originally presented at the November 2nd meeting and was referred to the City Council with a denial recommendation. The Council suggested moving the tower to the west away from the future residential and extending the "branches" down the trunk.
- The petitioner has moved the tower to the west and extended the branches down. Public notifications were completed for the revised request.
- The petitioner explored locating the wireless communication facilities on existing private towers and public utilities. According to the petitioner, there are currently no existing structures that could accommodate the communications facility within the petitioner's targeted area.
- The proposed tower is designed as a Monopine to look like a large pine tree. There is a tree line behind the property so the Monopine tower tree will blend with other nearby vegetation.
- UDO Requirements: A special use permit is required for wireless communication towers.
- SUP Criteria: The petitioner is deviating from two of the criteria:

  - The requirements to paint the tower a grey or sky color requires a variation since they have selected a Monopine design.
  - The requirement for wireless communication facilities to be setback 110% of the height of the tower, or 115.5 feet from all property lines. The tower would be setback:
    - 37 feet 10 inches from the west property line
    - 64 feet 9 inches from the south property line
  - It should be noted that the tower meets the setback to the north and east.
- Land Use: The land use map shows the area as Industry. This land use designation is appropriate for this use.
- Zoning: The site is zoned M (Manufacturing).

Proposed Development Description

- The proposed improvement is for a 105-foot Monopine tower in a 50-foot by 50-foot fenced area.
- The fenced area is setback about 260 feet from the roadway. The fence will be an eight-foot solid screening fence and inside will house the equipment.
- There is additional room within the fenced area to accommodate multiple carriers.
- The "pine" branches are manufactured of steel and the "needles" are an artificial material, which has been wind tunnel tested to over 100 mph winds.



Wind tunnel testing.


Revised illustration with lower "branches".

2030 Comprehensive Land Use Plan Review:

The Comprehensive Plan designates the subject property as Industry, which allows for existing and future manufacturing uses. The proposed wireless communication tower falls under Community Facilities. This project meets the following goal:

Community Facilities – Public Facilities

Goal: Support the specific needs and goals of public facilities to ensure cooperation between public and city facilities for the health, safety, and needs of the community.

This can be accomplished with the following supporting action:

Supporting Action: Carefully plan for utility service extensions to ensure compatibility with existing infrastructure and land uses.

Findings of Fact:

SPECIAL USE PERMIT

Special Uses require a separate review because of their potential to impact surrounding properties and the orderly development of the City. Section 2-400 of the Unified Development Ordinance establishes standard for all Special Uses in Crystal Lake. The criteria are as follows:

1. That the proposed use is necessary or desirable, at the location involved, to provide a service or facility which will further the public convenience and contribute to the general welfare of the neighborhood or community.

   ☐ *Meets* ☐ *Does not meet*

2. That the proposed use will not be detrimental to the value of other properties or improvements in the vicinity.

   ☐ *Meets* ☐ *Does not meet*

3. That the proposed use will comply with the regulations of the zoning district in which it is located and this Ordinance generally, including, but not limited to, all applicable yard and bulk regulations, parking and loading regulations, sign control regulations, watershed, wetlands, and flood plain regulations, Building and Fire Codes and all other applicable City Ordinances.

   ☐ *Meets* ☐ *Does not meet*

4. That the proposed use will not negatively impact the existing off-site traffic circulation; will adequately address on-site traffic circulation; will provide adequate on-site parking facilities; and, if required, will contribute financially, in proportion to its impact, to upgrading roadway and parking systems.

   ☐ *Meets* ☐ *Does not meet*

5. That the proposed use will not negatively impact existing public utilities and municipal service delivery systems and, if required, will contribute financially, in proportion to its impact, to the upgrading of public utility systems and municipal service delivery systems.

   ☐ *Meets* ☐ *Does not meet*

6. That the proposed use will not impact negatively on the environment by creating air, noise, or water pollution; ground contamination; or unsightly views.

   ☐ *Meets* ☐ *Does not meet*

7. That the proposed use will maintain, where possible, existing mature vegetation; provide adequate screening to residential properties; provide landscaping in forms of ground covers, trees and shrubs; and provide architecture, which is aesthetically appealing, compatible or complementary to surrounding properties and acceptable by community standards, as further detailed in Article 4, Development and Design Standards.

   ☐ *Meets* ☐ *Does not meet*

8. That the proposed use will meet standards and requirements established by jurisdictions other than the City such as Federal, State or County statutes requiring licensing procedures or health/safety inspections, and submit written evidence thereof.

   ☐ *Meets* ☐ *Does not meet*

9. That the proposed use shall conform to any stipulations or conditions approved as part of a Special Use Permit issued for such use.

   ☐ *Meets* ☐ *Does not meet*

10. That the proposed use shall conform to the standards established for specific special uses as provided in this section.

    ☐ *Meets* ☐ *Does not meet*

Radio transmission towers, wireless communication facilities. All radio transmission towers and wireless communication facilities must comply with the following standards:

1. Towers shall be designed to meet the wind loading requirements specified in the American National Standards Institute TIA-222-F Report, as amended.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

2. The owner/applicant shall provide documentation to the City demonstrating that the structural integrity of the towers and antenna will continue to comply with state and federal standards, local building codes, and the applicable standards for towers published by the American National Standards Institute (ANSI), as amended. If, upon inspection, it is determined a tower fails to comply with such standards and constitutes a danger to persons or property, the owner shall be notified that he/she has 30 days to bring the tower into compliance. Failure to bring the tower into compliance within 30 days shall constitute grounds for the removal of the tower at the owner's expense.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

3. Freestanding wireless communication or radio transmission towers shall not exceed 200 feet in height as measured from the tower base to the highest point of the tower and any attached receiving or transmitting device.

   ☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

4. Franchises and licenses: The operator shall provide documentation to the City to demonstrate that all franchises and licenses required by law for the construction and/or operation of a tower or antenna have been obtained.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

5. Towers shall either maintain a galvanized steel finish or, subject to any applicable standards of the FAA, be painted a neutral color (i.e., light grey) to reduce visual obtrusiveness or painted in a sky-tone above the top of surrounding trees and in an earth-tone below the treetop level.

   ☐ *Meets* ☐ *Does not meet*

   The proposed tower is a Monopine style to look like a pine tree.

6. At a tower site, the design of buildings and related structures shall, to the maximum extent practicable, use materials, colors and architectural styles that blend into the natural setting and surrounding buildings.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

7. Storage: No outside storage shall be allowed on any facility site.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

8. Lighting: Towers shall not be artificially lighted, unless required by the FAA or other applicable authority.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

9. A single sign measuring no more than two square feet in size shall be located on or near the tower, and shall identify the tower owner, the street address of the tower, the owner's identification code for the tower, and a twenty-four-hour emergency contact telephone number.

   ☐ *Meets* ☐ *Does not meet*

   They have submitted documents which show they are complying with this criterion.

10. No commercial advertising shall be allowed on the tower or its related facilities.

    ☐ *Meets* ☐ *Does not meet*

    They have submitted documents which show they are complying with this criterion.

11. Single lot: Towers, guy anchors, equipment buildings, and any other appurtenances related to the tower shall be considered as being located on one zoning lot.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

12. Setbacks: Wireless communications facilities shall comply with the following setback standards. Self supporting and monopole towers shall be setback from all property lines by a distance of 110% of the height of the tower.

☐ *Meets* ☐ *Does not meet*

They have requested a deviation from this setback requirement from the west and south property lines.

13. Equipment buildings associated with a wireless communication facility shall meet the minimum setback requirements for the zoning district where located.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

14. Separation: If an applicant proposes a new wireless communications tower or radio transmission tower within 1,200 feet of an existing tower, the applicant shall submit a statement indicating the reasons why the existing tower(s) was inadequate or unavailable. The Zoning Administrator shall allow the owner of such existing tower an opportunity to comment prior to making a decision.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

15. Collocation: New wireless communication or radio transmission towers shall provide evidence that the tower is structurally designed to support at least three additional users, and provide a written statement that the owner of the tower is willing to permit other user(s) to attach communication facilities, on a commercially reasonable basis, which do not interfere with the primary purpose of the tower. The site plan shall indicate a location for at least one equipment building in addition to that proposed for use by the applicant. A tower which is modified or reconstructed to accommodate the collocation of an additional antenna shall be of the same tower type as the existing tower, unless a monopole is determined more appropriate at the specific location. If an existing tower is increased in height or reconstructed to accommodate the collocation of additional antenna it shall meet the height restrictions outlined within this section of the Ordinance.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

16. Landscaping: Unless existing vegetation provides a buffer strip, all property lines along roadways or visible to existing abutting or nearby buildings (within 1/4 mile radius), for all facilities shall be landscaped as follows:

a. With six-foot to eight-foot evergreen shrubs planted in an alternate pattern, five feet on center and within 15 feet of the site boundary; or
b. With at least one row of deciduous trees, not less than 2 1/2 inch to three inches caliper measured three feet above grade, and spaced not more than 30 feet apart and within 25 feet of the site boundary; or
c. With at least one row of evergreen trees at least four to five feet in height when planted, and spaced not more than 15 feet apart within 40 feet of the site boundary.
d. In lieu of the foregoing, the Planning and Zoning Commission may determine that the existing vegetation must be supplemented to meet an equivalent means of achieving the desired goal of minimizing the visual impact.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

17. Security fencing: Towers, guy anchor supports, and ground-based equipment buildings shall be enclosed by security fencing not less than eight feet in height and equipped with an appropriate anti-climbing device.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

18. Radiation reporting: It shall be demonstrated that the proposed tower, antenna, and supporting equipment complies with FCC nonionizing radiation requirements for individual and combined facilities.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

19. Interference: No wireless communications tower, antenna, or supporting equipment shall interfere with equipment operated by the City of Crystal Lake.

☐ *Meets* ☐ *Does not meet*

They have submitted documents which show they are complying with this criterion.

Recommended Conditions:

If a motion to recommend approval of the petitioner's request is made, it should be with the following conditions:

1. Approved plans, reflecting staff and advisory board recommendations, as approved by the City Council:
   A. Application (Koch, received 07/28/22)
   B. Narrative Letter (Insite, dated 12/14/22 and 08/18/22, received 12/14/22 and 08/26/22 respectively)
   C. Fall Zone Letter (Valmont, dated 08/24/22, received 08/26/22)
   D. Site Design (Edge, dated 12/08/22, received 12/09/22)
   E. Site Photos (Edge, dated 12/07/22, received 12/09/22)
   F. Radio Frequency Letters (Bernardo, undated, received 08/26/22 and 10/25/22)

G. Coverage Map (undated, received 08/26/22)
H. Emission Report (Waterford, dated 07/18/22, received 08/26/22)

2. No outside storage shall be allowed on any facility site.

3. Towers shall not be artificially lighted, unless required by the FAA or other applicable authority.

4. A single sign measuring no more than two square feet in size can be located on or near the tower, and shall identify the tower owner, the street address of the tower, the owner's identification code for the tower, and a twenty-four-hour emergency contact telephone number.

5. No commercial advertising shall be allowed on the tower or its related facilities.

6. The petitioner shall work with staff to enhance the landscaping buffer along the property lines, especially to the east.

7. The driveway leading to the new cell tower will need to be paved per City standards.

8. If any portion of the equipment structure is visible above the fence the entire structure shall be constructed of brick. Any metal structure shall be painted a light grey or sky color to blend in.

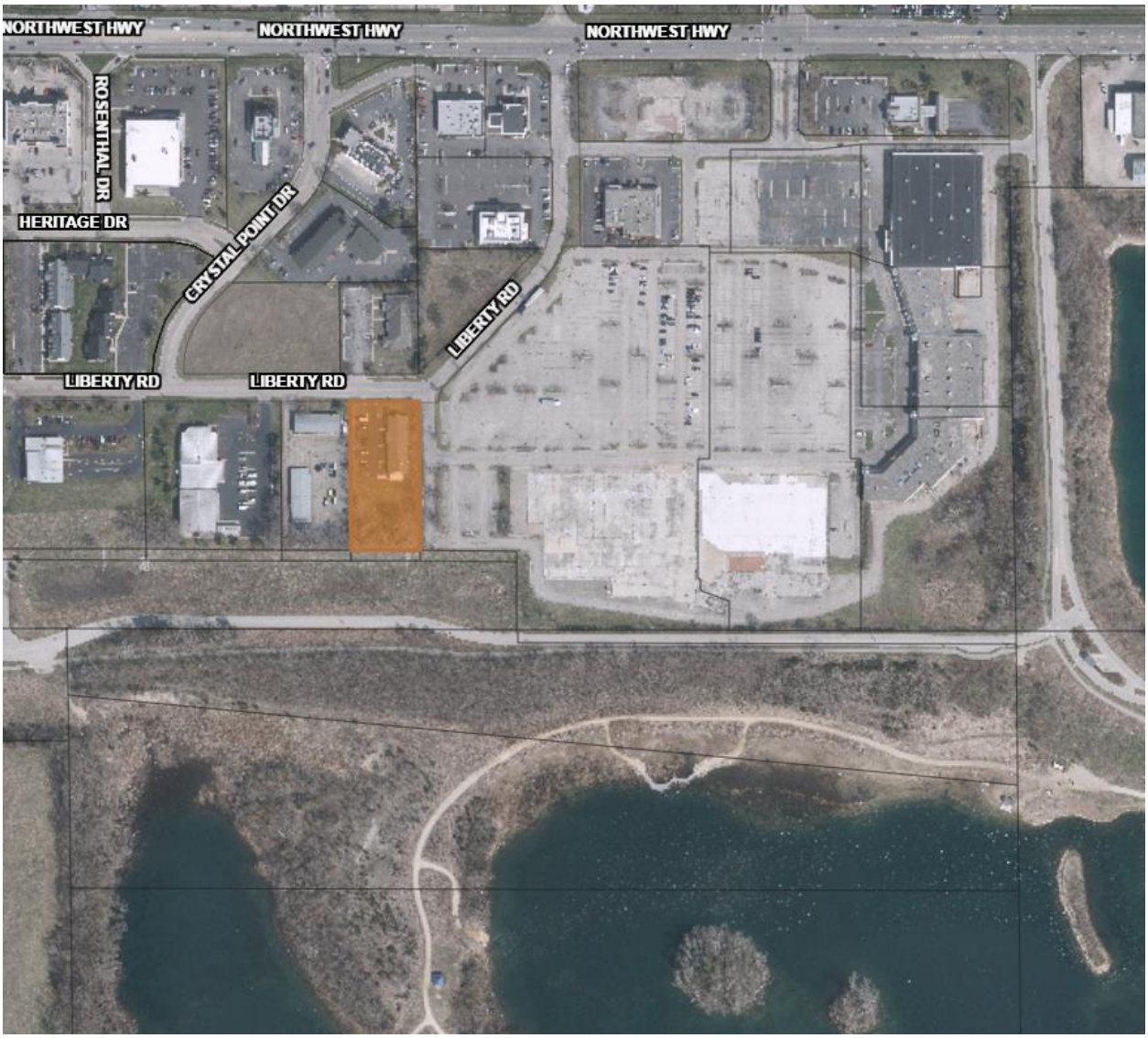
9. The structural integrity of the tower and antenna will continue to comply with state and federal standards, local building codes, and the applicable standards for towers published by the American National Standards Institute (ANSI), as amended. If, upon inspection, it is determined a tower fails to comply with such standards and constitutes a danger to persons or property, the owner shall be notified that he/she has 30 days to bring the tower into compliance. Failure to bring the tower into compliance within 30 days shall constitute grounds for the removal of the tower at the owner's expense.

10. The tower and antennas shall meet or exceed current standards and regulations of the FAA, the FCC, and any other agency of the state or federal government that regulates towers and antennas. If such standards and regulations change, owners shall be responsible for bringing the towers and antennas into compliance with the changed standards and regulations within six months of their effective date, unless a different compliance schedule is mandated by the controlling regulations (Failure to bring towers and antennas into compliance shall constitute grounds for removal of the tower or antenna, at the owner's expense.).

11. The monopine pole camouflaging elements must be maintained and the upkeep of the appearance/finish of the materials is the responsibility of the pole owner or property owner. Any missing camouflaging elements must be replaced if found missing, any debris that is blown into the camouflaging must be removed and any debris that sheds from the pole must be cleaned by the pole owner or property owner.

12. The petitioner shall address all of the review comments and requirements of the Community Development, Public Works and Engineering, Fire and Police Departments.

PIQ Map
269 Liberty Road



City of Crystal Lake
Development Application
Ownership Sign-off Acknowledgement Form

The following information is related to a development application. As the owner of the property in question, I (we) acknowledge that the information provided in the submittal was reviewed and approved.

Owner Information

Name: Arthur Koch

Address: 269 Liberty Road

Crystal Lake, IL 60014

Phone: 815-479-0996

E-mail: sealevel@sealeveldiving.com

Project Name & Description: Proposed Monopine Design Cell Tower at 269 Liberty Road

Project Address/Location: 269 Liberty Road (Sea Level Diving)

Signature

Arthur Koch July 28/2022

Owner: Print and Sign name Date

NOTE: If the property is held in a trust, the trust officer must sign this petition as owner. In addition, the trust officer must provide a letter that names all beneficiaries of the trust.

To whom it may concern,

Calypso Ventures, LLC an Illinois limited partnership, is owned by Arthur and Gina Koch of 828 Oak Hollow Dr, Crystal Lake, IL. Arthur Koch, as owner, has the authority to sign on behalf of Calypso Ventures, LLC.

Arthur Koch
Sea Level Diving
269 Liberty rd
Crystal Lake, IL 60014
815-479-0996

PUBLIC NOTICE BEFORE THE PLANNING AND ZONING COMMISSION OF THE CITY OF CRYSTAL LAKE, MCHENRY COUNTY, ILLINOIS

IN THE MATTER OF THE APPLICATION OF Insite Inc.

LEGAL NOTICE

Notice is hereby given in compliance with the Unified Development Ordinance (UDO) of the City of Crystal Lake, Illinois, that a public hearing will be held before the Planning and Zoning Commission upon the application by Mike Howley with Insite Inc. representing T-Mobile, on behalf of Arthur Koch for approval of a Special Use Permit and Variations to allow a Wireless Communication Tower at the following real estate known as 269 Liberty Road, Crystal Lake, Illinois 60014, PIN: 19-09-104-015.

This application is filed for the purpose of seeking a Special Use Permit with Variations from the required setback, the color/design, and any other variations as noted at the public hearing to allow a new MonoPine Wireless Communication Tower pursuant to Unified Development Ordinance Article 2, Article 4, and Article 9. Plans for this project can be viewed at the City of Crystal Lake Planning and Economic Development Department at City Hall.

A public hearing before the Planning and Zoning Commission on the request will be held at 7:00 p.m. on Wednesday, December 21, 2022, at the Crystal Lake City Hall, 100 West Woodstock Street, at which time and place any person determining to be heard may be present.

Jeff Greenman, Chairperson
Planning and Zoning Commission
City of Crystal Lake

(Published in Northwest Herald December 1, 2022) 2038007

STATE OF ILLINOIS

COUNTY OF MCHENRY

IN THE MATTER OF THE APPLICATION OF SPECIAL USE AND VARIANCE REQUESTS FOR 269 LIBERTY ROAD (SEA LEVEL DIVING);

AFFIDAVIT

Mike Howley, being first duly sworn on oath deposes and states as follows:

A. That a copy of the legal notice, concerning the hearing date for the above mentioned Petitioner, was sent to each of the persons named on the attached list by regular mail notifying them of the hearing before the Planning and Zoning Commission on December 21, 2022, at 7:00 p.m., at the City of Crystal Lake City Hall, 100 West Woodstock Street in Crystal Lake, Illinois. Said notice was mailed to each of the below mentioned persons by regular mail on December 2, 2022.

B. That the posting requirements of the Zoning Ordnance have been complied with by placing the customary public notice sign on the subject property on November 29, 2022.

Mike Howley

Subscribed and Sworn to me before
This 9th day of December, 2022

Notary Public

RAYMOND SHINKLE
Official Seal
Notary Public - State of Illinois
My Commission Expires Sep 23, 2024

Elizabeth Maxwell AICP

From: Michael Howley <howley@insite-inc.com>
Sent: Wednesday, December 14, 2022 8:48 PM
To: Elizabeth Maxwell AICP
Subject: 269 Liberty Road Proposal

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

PROPOSED WIRELESS TELECOMMUNICATIONS FACILITY 269 LIBERTY ROAD, CRYSTAL LAKE, IL 60014

Below please find an aerial photo that should provide better context to a previous e-mail exhibit submitted on November 7, 2022. The aerial displays a blue rectangular overlay representing the T-Mobile search area as determined by Rosemarie Bernardo, T-Mobile's Senior Radio Frequency Engineer. This search area depicts the location that a new antenna facility would need to be located in order to resolve T-Mobile's voice and data coverage deficiencies in the area. I have expanded the view to display the SBA tower located at 6521 Commercial Road and an existing monopole tower located at 6905 Cog Circle.

As Rosemarie Bernardo addressed in her affidavits, the tower located at 6521 Commercial Road was considered and determined to be too far from the T-Mobile coverage objective of serving the Three Oak Recreation Area and the large commercial shopping area located on the north side of Route 14, east of Main Street. As an aside, even if the SBA tower was a viable alternative to resolving T-Mobile's coverage problems, the SUP granted to approve the tower would need to be amended in order to accommodate T-Mobile's larger equipment.

In the aerial, I also have identified T-Mobile's existing site CH76364E that is located at 6502 S. State Route 31, on the First Baptist Church property. This site is a SBA owned tower that is designed to serve the surrounding residential areas near Route 31. T-Mobile already is located on the 6905 Cog Circle tower. The Cog Circle site provides coverage to the surrounding area and, importantly, provides added service capacity to the adjacent commercial areas.

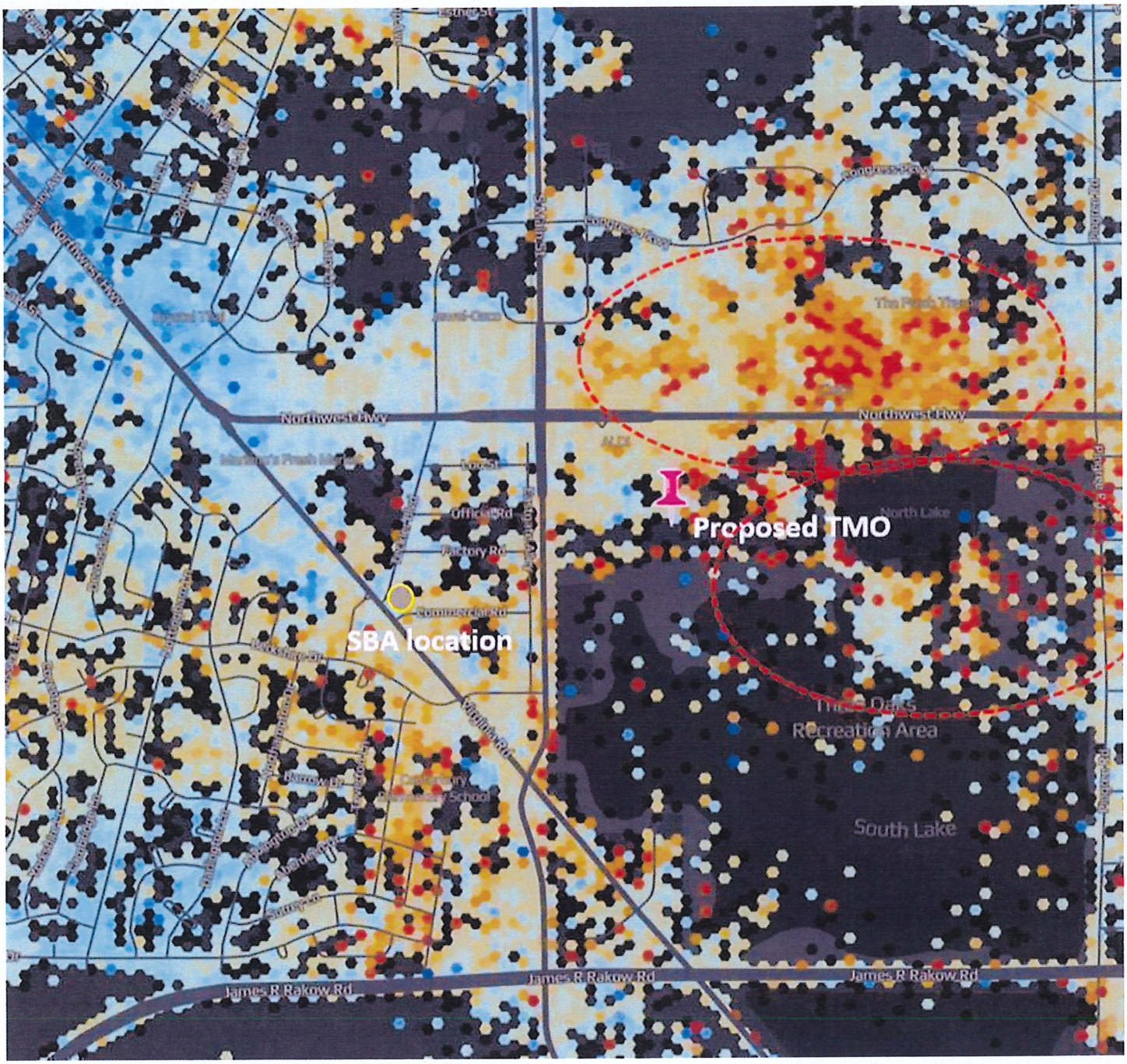


T-Mobile Senior Radio Frequency Engineer, Rosemarie Bernardo, provided the below Signal to Interference & Noise Ratio (SINR) exhibit that depicts the current T-Mobile signal quality in the area surrounding 269 Liberty Road. The red circled areas identify the geographic areas of Crystal Lake, including the large commercial area north of Route 14 and the Three Oaks Recreation Area, that have poor to at best fair signal quality. The coverage objective of the proposed antenna facility at 269 Liberty Road is to resolve the deficient wireless service in these geographic areas. Importantly, the aerial image below the SINR signal map, identified as AERIAL DEPICTION OF WIRELESS COVERAGE, demonstrates how the proposed antenna facility at 269 Liberty Road will resolve the coverage problems within these red circled areas of the SINR map, specifically the commercial area north of Route 14 and the Three Oaks Recreation Center.

SINR (**Signal to Interference & Noise Ratio**) measures signal quality: the strength of the wanted signal compared to the unwanted interference and noise.



SINR	Signal strength
>= 20 dB	Excellent
13 dB to 20 dB	Good
0 dB to 13 dB	Fair to poor
<= 0 dB	No signal

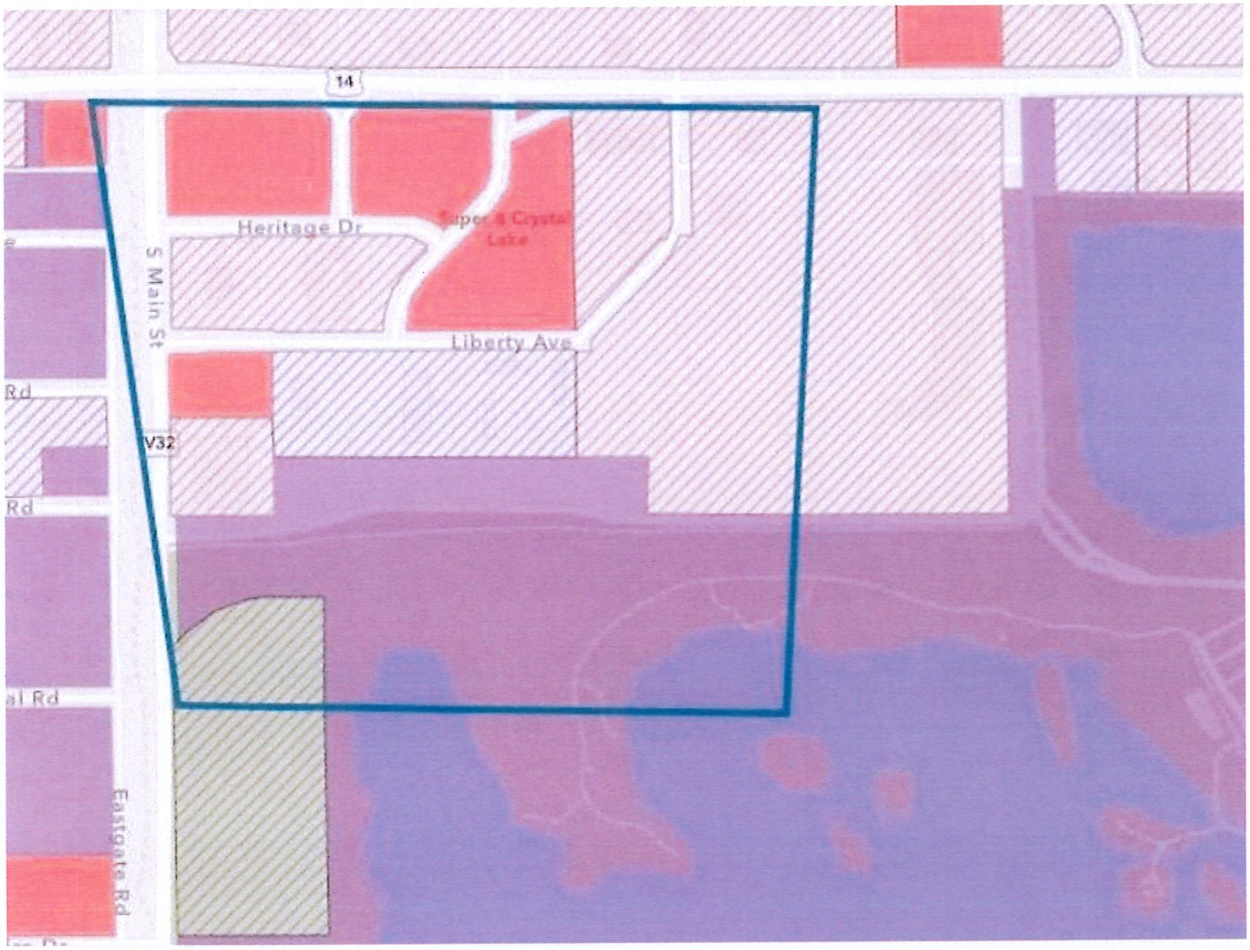


AERIAL DEPICTION OF WIRELESS COVERAGE
The blue circles represent the areas of coverage provided by:

- if T-Mobile was to locate proposed antenna facility at 269 Liberty Road;
- if T-Mobile was to locate antenna facility on the existing 6521 Commercial Road existing SBA tower;
- existing sites located at 6502 S. Illinois Route 31 and 6905 Cog Circle.



With the above system needs identified, T-Mobile sought to identify and lease a suitable property within the blue boxed search area. Based on the City of Crystal Lake Zoning Code, only M Zoned properties were viable considerations since towers are prohibited in the commercially zoned areas.

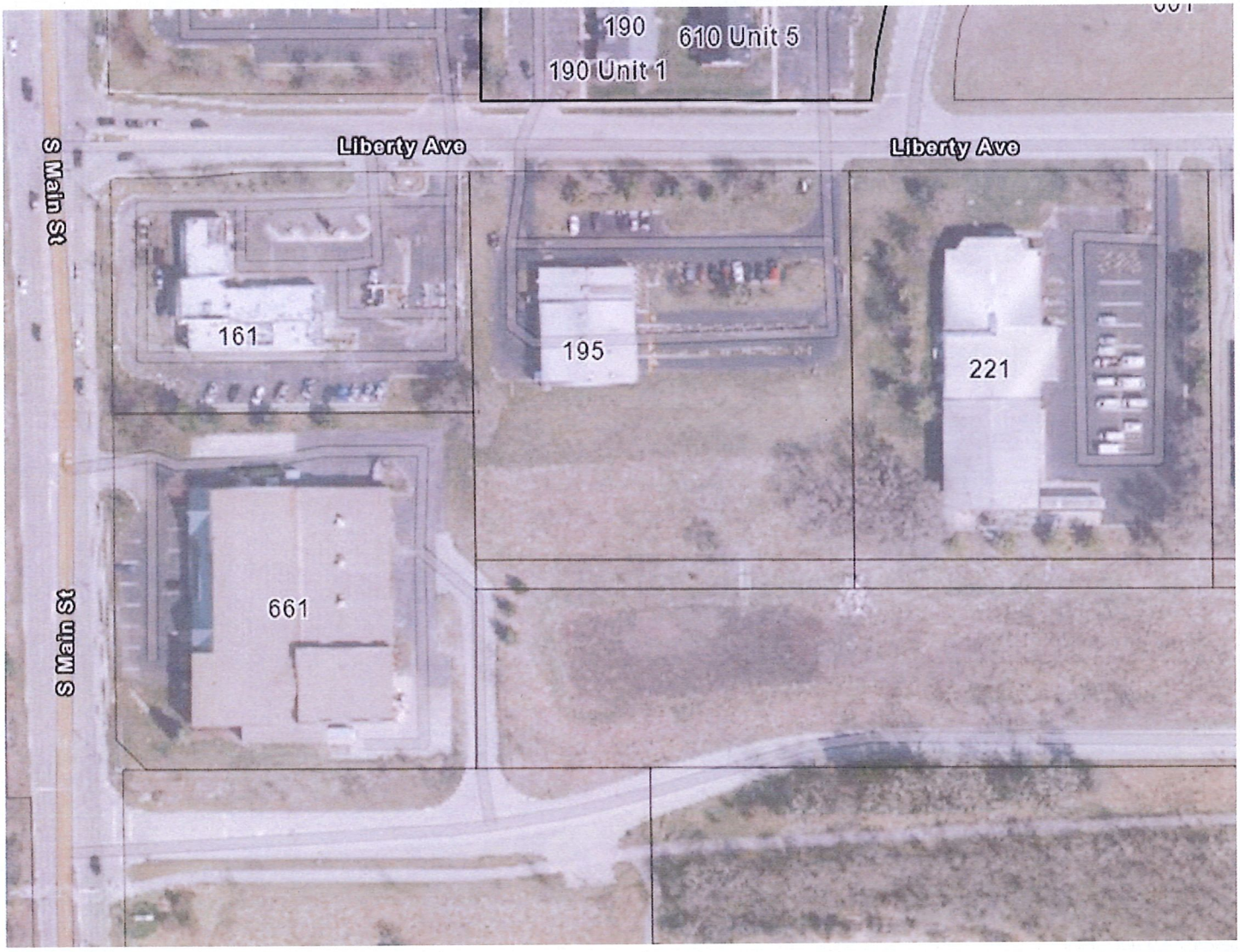


According to the Crystal Lake Zoning Map, the only M zoned properties within the blue boxed area are the city owned Three Oaks Recreation Area to the south and the following parcels:

269 Liberty	Proposed Tower Site at Sea Level Diving
261 Liberty	Auto Service Center (parcel immediately west of 269 Liberty)
221 Liberty	School District Administration Building
195 Liberty	State of Illinois Vehicle Emissions Testing

Importantly, the 269 and 261 Liberty parcels would require setback variances since the lots are only 152' wide. The 221 Liberty parcel is approximately 302' wide, but due to the existing building layout, placing the tower in the middle of the parking lot and so near to the existing building was deemed not feasible.

The 195 Liberty Avenue location is 325' wide. A tower site could be designed at this location without the need for setback relief. However, the only location for the tower was in a treeless area south of the building and would be much more visible from the Three Oaks Recreation Area Drive, Main Street and the surrounding area generally. Parcel map of these properties is shown below.



Mike Howley

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Wireless Consulting Services
1S660 Midwest Road, Suite 140
Oakbrook Terrace, IL 60181
630/240-3253
howley@insite-inc.com
www.insite-inc.com

August 25, 2022

Elizabeth Maxwell AICP/City Planner
City of Crystal Lake, Community Development
100 W. Woodstock Street
Crystal Lake, Illinois 60014

RE: 269 Liberty Road Special Use Zoning Petition; Letter to Address City SUP and Variance to Tower Setback Standards

Ms. Maxwell:

Please allow the following responses to address the applicable City of Crystal Lake Special Use Standards for wireless communication facilities.

2-400 Par. 48 Radio transmission towers, wireless communication facilities. …wireless communication facilities must comply with the following standards:

(a) Purpose and Intent: The purpose of this section is to establish general standards for the siting of …, wireless communication towers and antennas. The intent is that facilities must comply with the following standards:

(i) The proposed wireless communication facility is located in a manufacturing zoning district that is a significant from the nearest residential area. Moreover, to further limit any potential adverse impact, the applicant has designed a monopine style tower that visually blends in with the surrounding mature tree line. Photo simulations of the proposed tower are provided with this application;

(ii) The proposed wireless communication facility is consistent with the Crystal Lake standards for siting wireless communication towers because the subject site is located in a M District and is a significant distance from the nearest existing residential area;

(iii, iv) A new wireless communication tower is proposed only because there is no existing suitable existing structure within the required area of coverage need. A signed statement from the radio frequency engineer has been provided as further support. However, the subject tower will be designed to accommodate multiple wireless carriers and thereby, help minimize the future need for new towers in the City;

(v) The proposed wireless communication tower will be a monopine style tower so as to better blend in with the existing tree canopy. This innovative camouflage technique will minimize any adverse visual impacts on the area. Moreover, the proposed site will include an opaque fence that will visually screen all ground equipment at street level;

(vi) The construction of the proposed wireless communication tower will enable T-Mobile and any future wireless carriers to provide cutting edge wireless and data services to the community quickly, effectively and efficiently;

(vii) The subject wireless communication tower will be engineered in a way that in the event of a catastrophic event that causes tower failure, the structure will collapse on itself so as not to impact or damage adjacent properties. An engineer stamped fall zone letter is provided as part of this application for zoning relief;

d. Standards for ….wireless communication towers: Freestanding wireless communication….towers, …, shall comply with the following standards:

(i) Safety:

I. The proposed wireless communication facility will be designed to meet the wind loading requirements specified in American National Standards Institute TIA-222-F Report, as amended.

II. The applicant will provide documentation to the City that demonstrates that the structural integrity of the towers and antennas will continue to comply with state and federals standards, local building codes, and the applicable standards for towers published by the ANSI, as amended;

(ii) Height:
The proposed height of the wireless antenna facility is well below the city's maximum tower height of 200 feet;

(iii) Franchises and licenses:
The operator will provide City with documentation to demonstrate that all franchises and licenses required by law for the construction and/or operation of a tower or antenna have been obtained;

(iv) Color:

I. The proposed monopine design tower is designed to reduce visual obtrusiveness;

II. The applicant has selected opaque fencing that will screen all carrier ground equipment and the fencing will be a color that blends with the natural surroundings of the tree lined subject parcel;

(v) Storage:
There will be no outside storage of materials on site;

(vi) Lighting:
The proposed wireless communication tower will not be artificially lit;

(vii) Signage:

I and II A single sign no more than two square feet in size will identify the tower and there will be no commercial advertising on site;

(viii) Single lot:

The proposed wireless communication tower and related equipment will be placed on one zoning lot;

(ix) Setbacks:

I. The proposed wireless communication tower does not satisfy the 110% of tower height setback from all property lines so a setback variance is requested as part of this application for zoning relief.

II. Not applicable to the proposed tower as this is not a guyed tower design;

III. There are no proposed equipment buildings related to the current proposal. T-Mobile uses outdoor cabinets to house its radios and related equipment. The outdoor cabinets satisfy the minimum setback in the M zoning district from the nearest property line;

x. Separation:

The proposed wireless communication tower is located greater than 1,200 feet from the nearest existing cell tower;

xi. Collocation:

The applicant will provide evidence that the tower is structurally designed to support at least three additional users and will provide a written statement that the tower owner is willing to permit other users on the tower on a commercially reasonable basis. The submitted site plan depicts the potential location for a second wireless provider;

xii. Landscaping:

No landscaping is included in design given the tree lined nature of the subject parcel and the opaque fence will shield all ground-based equipment from view;

xiii. Security fencing:

The proposed wireless communication tower will be surrounded with an 8' opaque fence and the tower will include anti-climbing safeguards;

xiv. Radiation reporting:

The applicant has included an independent EME study that confirms that the proposed wireless antenna facility will comply with all FCC emission standards;

xv. Interference:

The proposed wireless antenna facility will not interfere with equipment operated by the City of Crystal Lake;

e. Compliance with state or federal laws and regulations:

The proposed wireless antenna facility will meet all FAA, FCC and any other state or local standards or regulations governing such facilities. The tower owner and any wireless carriers utilizing the tower will maintain compliance with said applicable laws and regulations and shall achieve compliance within 6 months of the effective date of any change in standards, laws or regulations, unless a different compliance schedule is mandated by the controlling regulations. It is understood that failure to bring towers and antennas into compliance shall constitute grounds for removal of the tower or antennas, at the owner's expense.

The subject proposal also will require zoning relief from the applicable City of Crystal Lake setback requirement that tower be setback from property line by 110% of tower height. Since a variance from the tower setback will be required, the following addresses the City of Crystal Lake Variance Standards:

B.

Standards.

(1)

The enforcement officer may grant variances to the provisions of this chapter if the petitioner provides evidence demonstrating that:

(a)

Failure to grant the variance would result in an unreasonable hardship;

The proposed facility is designed to fill a coverage gap in T-Mobile's network. Coverage gaps result in a substandard wireless signal, which, to the end user, means a dropped call or weak data connection. At this location, the antennas and hence, the tower, must be located at the proposed height to meet the coverage objectives. Carrying out the strict letter of the code would result in a unreasonable hardship since meeting the setback would result in a tower that is too low to adequately fill the coverage gap and would not provide adequate wireless service to your community;

and

(b)

The variance is necessary due to unique and exceptional physical circumstances or a condition of a particular property;

The property owner's situation is a result of the unique circumstance of the operation of wireless technology. Indeed, the need to locate wireless antennas at a height necessary to receive and transmit

signals has resulted in the owner's plight. Such hardship is a result of wireless technology and topography of the physical surroundings of the subject property, not anyone having an ownership interest in the property.

and

(c)

The variance is the minimum necessary to afford relief;

The applicant is proposing a tower that is the minimum height necessary for T-Mobile to adequately improve its wireless voice and data needs in the area of coverage need;

and

(d)

The variance will not cause detriment to the public good, safety or welfare;

The establishment, maintenance and operation of this wireless antenna facility will not be injurious to the public health, safety, morals, or general welfare of the community. To the contrary, improved wireless service in your community provides vital communications and residents and emergency personnel commonly will use the service for a wide variety of business, personal, "911" and other uses; thereby actively promoting the general public's health, safety and welfare.

The wireless telecommunications facility will not create any material noise, glare, smoke, debris, traffic flow or any other nuisance.

The proposed wireless communication facility will be licensed and regulated by the Federal Communications Commission ("FCC"), which imposes strict health, safety and interference standards. These standards are set by independent safety and standard groups such as the American National Standards Institute ("ANSI") and the Institute of Electrical Electronics ("IEEE").

and

(e)

The variance will not cause an increase in the water surface profile within a floodway;

The proposed wireless antenna facility has no impact on this standard.

and

(f)

The variance will not cause an increase in the water surface profile upstream of the development site,

The proposed wireless antenna facility has no impact on this standard.

and

(g)

The variance will not be contrary to the spirit, purpose and intent of this chapter;

The variance, if granted, would be in harmony with the City of Crystal Lake Ordinance since it would be constructed at a suitable height to accommodate multiple wireless providers and thereby would limit the number of future towers needed to serve this area of the community. The proposed facility meets all other provisions of this ordinance and, therefore will be in harmony with the provisions thereof and with the general purpose and intent of this chapter;

and

(h)

The regulated development meets the minimum federal, state, and other local regulations, including those of IDNR/OWR and FEMA for participation in the NFIP.

The proposed development will meet all applicable federal, state and other local regulations noted above.

verticalbridge

August 18, 2022

Elizabeth Maxwell AICP/City Planner
City of Crystal Lake, Community Development
100 W. Woodstock Street
Crystal Lake, Illinois 60014

RE: 269 Liberty Road Special Use Zoning Petition; Letter to Address City SUP Standards

Ms. Maxwell:

Please allow this letter to address a number of the City of Crystal Lake SUP Standards applicable to the applicant's proposal to construct a wireless communication facility at 269 Liberty Road.

1) The proposed tower will be designed to meet the wind loading requirements specified in the American National Standards Institute TIA-222-F Report, as amended.

2) The proposed tower will be designed to support at least three additional users and Vertical Bridge is willing to permit other users to attach communication facilities, on a commercially reasonable basis, which do not interfere with the primary purpose of the tower.

3) Vertical Bridge shall provide the City of Crystal Lake with documentation that demonstrates that the structural integrity of the tower and antenna will continue to comply with state and federal standards, local building codes, and the applicable standards for towers published by the American National Standards Institute (ANSI), as amended.

vertical bridge

4) Vertical Bridge shall provide documentation to the City of Crystal Lake to demonstrate that all franchises and licenses required by law for the construction and/or operation of a tower or antenna have been obtained.

5) The proposed tower and antennas shall meet or exceed current standards and regulations of the FAA, the FCC, and any other agency of the state or federal government that regulates towers and antennas. If such standards and regulations change, Vertical Bridge shall be responsible for bringing the tower and antennas into compliance with the changed standards and regulations within six months of their effective date, unless a different compliance schedule is mandated by the controlling regulations

Sincerely,

Ariel Rubin

Vice President of Tower Development

VB BTS II, LLC

750 Park of Commerce Drive, Suite 200

Boca Raton, FL 33487

September 27, 2022

Elizabeth Maxwell AICP/City Planner
City of Crystal Lake, Community Development
100 W. Woodstock Street
Crystal Lake, Illinois 60014

RE: 269 Liberty Road Special Use Zoning Petition; Letter to Address City Variance Standards for Tower Color

Ms. Maxwell:

The subject proposal also will require zoning relief from the applicable City of Crystal Lake tower color requirement in Section 2-400 (48)(d)(iv) that provides:

(iv) Color: I. Towers shall either maintain a galvanized steel finish or, subject to any applicable standards of the FAA, be painted a neutral color (i.e., light grey) to reduce visual obtrusiveness or painted in a sky-tone above the top of surrounding trees and in an earth-tone below the treetop level. II. At a tower site, the design of buildings and related structures shall, to the maximum extent practicable, use materials, colors and architectural styles, that blend into the natural setting and surrounding buildings.

Since a variance from the tower color will be required, the following addresses the City of Crystal Lake Variance Standards:

B.

Standards.

(1)

The enforcement officer may grant variances to the provisions of this chapter if the petitioner provides evidence demonstrating that:

(a)

Failure to grant the variance would result in an unreasonable hardship;

The proposed facility is designed to fill a coverage gap in T-Mobile's network. Coverage gaps result in a substandard wireless signal, which, to the end user, means a dropped call or weak data connection. At this location, the antennas and hence, the tower, must be located at the proposed height to meet the coverage objectives. The applicant designed this monopine style tower based on the particular treelined characteristics of this property with the belief that the monopine style would offer the most appealing appearance. As such, the applicant contends that the monopine should be allowed as an alternative to the UDO's design and color requirements since it best blends with the immediate surroundings and is therefore consistent with the spirit and intent of the UDO. It is applicant's position that not allowing this variance would result in a tower that is more visually obtrusive to your community;

and

(b)

The variance is necessary due to unique and exceptional physical circumstances or a condition of a particular property;

The property owner's situation is a result of the unique circumstance of the operation of wireless technology. Indeed, the need to locate wireless antennas at a height necessary to receive and transmit signals has resulted in the owner's plight. Such hardship is a result of wireless technology and topography of the physical surroundings of the subject property, not anyone having an ownership interest in the property. As depicted in the photo simulations provided, given the treelined nature of this property, it is applicant's contention that the proposed monopine design provides the least visual intrusiveness and better reflects the spirit and intent of the zoning code to camouflage the tower;

and

(c)

The variance is the minimum necessary to afford relief;

The applicant is proposing a tower that is the minimum height necessary for T-Mobile to adequately improve its wireless voice and data needs in the area of coverage need. Furthermore, it is applicant's belief that as set adjacent to the mature treeline to the south and west, the proposed monopine style tower presents the least visually intrusive design;

and

(d)

The variance will not cause detriment to the public good, safety or welfare;

The establishment, maintenance and operation of this wireless antenna facility will not be injurious to the public health, safety, morals, or general welfare of the community. To the contrary, improved wireless service in your community provides vital communications and residents and emergency personnel commonly will use the service for a wide variety of business, personal, "911" and other uses; thereby actively promoting the general public's health, safety and welfare.

The wireless telecommunications facility will not create any material noise, glare, smoke, debris, traffic flow or any other nuisance.

The proposed wireless communication facility will be licensed and regulated by the Federal Communications Commission ("FCC"), which imposes strict health, safety and interference standards. These standards are set by independent safety and standard groups such as the American National Standards Institute ("ANSI") and the Institute of Electrical Electronics ("IEEE").

and

(e)

The variance will not cause an increase in the water surface profile within a floodway;

The proposed wireless antenna facility has no impact on this standard.

and

(f)

The variance will not cause an increase in the water surface profile upstream of the development site,

The proposed wireless antenna facility has no impact on this standard.

and

(g)

The variance will not be contrary to the spirit, purpose and intent of this chapter;

The variance, if granted, would be in harmony with the City of Crystal Lake Ordinance since the monopine design is intended to reduce visual obtrusiveness through utilization of tower materials and color that help it blend with the surrounding tree line far better than simply painting the tower a neutral grey or sky color above the tree line. The portion of the monopine tower up to the existing tree line utilizes earth tones that mimic the surrounding treescape. Therefore, it is applicant's position that given the surrounding environment at this location, the proposed monopine facility will be in harmony with the provisions thereof and with the general purpose and intent of this chapter;

and

(h)

The regulated development meets the minimum federal, state, and other local regulations, including those of IDNR/OWR and FEMA for participation in the NFIP.

The proposed development will meet all applicable federal, state and other local regulations noted above.

Date: 24th August, 2022

VB BTS II, LLC

Attn: Christopher Molloy

SUBJECT: Project Number: 561031-P1
Site Name: Northwest Hwy - US-IL-5744
Structure to be Designed with a Theoretical Fall Radius of less than 50-ft

Communications structures designed by Valmont are sized in accordance with the latest governing revision of the ANSI/TIA 222 standard unless otherwise requested by our customer. This standard has been approved by ANSI/ASCE, which has dealt with the design of antenna support structures for over 50 years. The TIA standard, based on provisions of this nationally known specification, has a long history of reliability. Its core philosophy is first and foremost to safeguard and maintain the health and welfare of the public.

Valmont's communication structures have proven to be very reliable products. To our knowledge Valmont has never experienced an in-service failure of a communication structure due to weather induced overloading. We use the latest standards, wind speed information, and sophisticated analytical tools to ensure that we maintain our unblemished record for quality.

This structure will be designed to the following criteria:

- ANSI/TIA-222-H & ANSI/TIA-222-G
- Exposure Category C
- Topographical Category 1
- Risk Category II
- Site Elevation 887 feet
- 107 MPH Ultimate Wind Speed (no ice) per ASCE 7-16
- 40 MPH with 1.50 inch ice

The theoretical failure point will be designed at 50-ft or less from top of tower, by purposely over designing the structural components below this point. The predicted mode of wind induced failure would be local buckling of the shaft at or above this failure point with the upper section(s) folding over onto the intact lower section(s). The result, if it were to fail, would be a maximum theoretical fall zone equal to the height above the failure point at ground level.

I hope these comments address any issues that you might encounter relative to the anticipated performance of this structure.

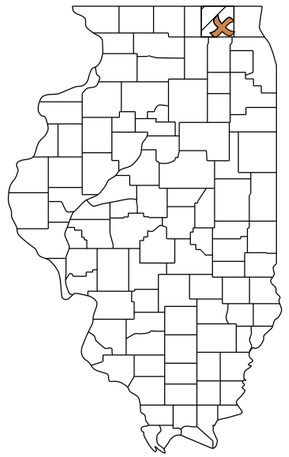
Sincerely,

Chandra Sekhar Rugada,
Assistant Manager - Design
Email: Chandra.Rao@Valmont.Com

LICENSED STRUCTURAL ENGINEER
RONALD E. GLOVER, JR.
081007768
EXP. 11/30/22
STATE OF ILLINOIS

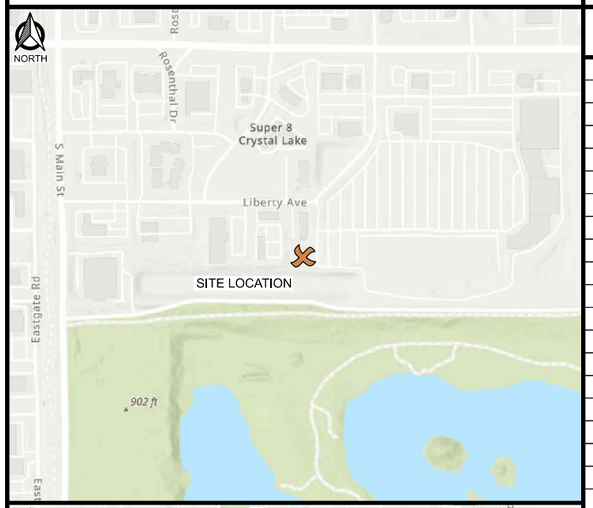
08/24/2022

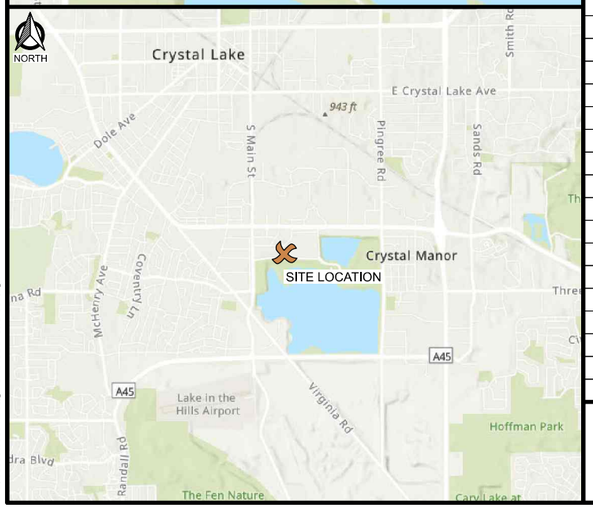
Valmont Microflect
3575 25th Street SE
Salem, OR 97302 USA



US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, ILLINOIS
CONSTRUCTION DRAWINGS
105' MONOPOLE

SITE LOCATION MAPS





SHEET INDEX

NO.:	SHEET TITLE
G-001	TITLE SHEET
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
-	SURVEY *
C-101	SITE PLAN
C-102	ENLARGED SITE PLAN
C-501	CONSTRUCTION DETAILS
C-502	FENCE DETAILS
A-001	EQUIPMENT CABINET SPECIFICATIONS
A-002	GROUND EQUIPMENT SPECIFICATIONS
A-101	EQUIPMENT PAD PLAN
A-201	EQUIPMENT PAD ELEVATIONS
A-501	EQUIPMENT PAD DETAILS
T-001	ANTENNA SPECIFICATIONS
T-002	EQUIPMENT SPECIFICATIONS
T-201	SITE ELEVATION
T-301	ANTENNA AND EQUIPMENT CONFIGURATION
T-501	INSTALLATION DETAILS
T-502	CABLE ROUTING DETAILS
T-503	PLUMBING DIAGRAM
T-504	CABLING DETAILS
E-001	UTILITY EQUIPMENT SPECIFICATIONS
E-101	GROUNDING PLAN
E-102	UTILITY PLAN
E-103	T-MOBILE UTILITY PLAN
E-501	GROUNDING DETAILS
E-502	GROUNDING DETAILS
E-503	UTILITY DETAILS
E-504	UTILITY DETAILS
R-901	SITE PHOTOS
	* COMPLETED BY OTHERS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS/CONDITIONS ON SITE. IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO PERFORMING ANY WORK OR BE RESPONSIBLE FOR THE SAME.

DIRECTORY

CLIENT:
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE, SUITE 200
BOCA RATON, FL 33487
CONTACT: STEVE HEDGES
PHONE: 773.988.1715

ENGINEERING COMPANY:
EDGE CONSULTING ENGINEERS, INC.
624 WATER STREET
PRAIRIE DU SAC, WI 53578
CONTACT: KEN BAUMGARDT
PHONE: 608.644.1449

SITE ACQUISITION:
INSITE INC.
1S660 MIDWEST ROAD
SUITE 140
OAKBROOK TERRACE, IL 60161
CONTACT: MIKE HOWLEY
PHONE: 630.240.3253

SURVEYOR:
MERIDIAN SURVEYING, LLC.
N9637 FRIENDSHIP DRIVE
KAUKAUNA, WI 54130
CONTACT: CRAIG KEACH
PHONE: 920.993.0881

PROJECT INFO

SITE LOCATION:
269 LIBERTY ROAD
CRYSTAL LAKE, IL 60014

PROPERTY OWNER:
CALYPSO VENTURES, LLC.
KOCH ARTHUR M.
269 LIBERTY ROAD
CRYSTAL LAKE, IL 60014-8032

SITE COORDINATES (PER 1-A CERTIFICATE):
LAT (NAD 1983/2011): 42°-13'-23.72"
LONG (NAD 1983/2011): 88°-18'-40.81"
GROUND ELEVATION (NAVD 88): 884.47'

PLSS INFORMATION:
A PORT OF THE N 1/2 OF THE NW 1/4,
SECTION 9, T.43N., R.8E., OF THE 3RD P.M.,
ALGONQUIN TOWNSHIP,
MCHENRY COUNTY, ILLINOIS

TAX KEY NUMBER:
19-09-104-015

ZONED:
M PUD

APPROVAL BLOCK

		APPROVED	APPROVED AS NOTED	REVISE
VERTICAL BRIDGE	DATE	☐	☐	☐
SITE ACQUISITION	DATE	☐	☐	☐
CONSTRUCTION MANAGER	DATE	☐	☐	☐
ZONING	DATE	☐	☐	☐
RF ENGINEERING	DATE	☐	☐	☐

UTILITY INFORMATION

ELECTRIC SERVICE PROVIDER:
COMMONWEALTH EDISON COMPANY (COMED)
PHONE: 1.855.433.2700

TO OBTAIN LOCATION OF PARTICIPANTS' UNDERGROUND FACILITIES BEFORE YOU DIG IN ILLINOIS, CALL CHICAGO DIGGERS HOTLINE

TOLL FREE: 1-312-744-7000

OR JULIE, INC. TOLL FREE: 1800-892-0123

IL STATUTE REQUIRES MIN. OF 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE.

ENGINEER SEAL:

PRELIMINARY - NOT FOR CONSTRUCTION

I HEREBY CERTIFY THAT THIS PLAN SET WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION OTHER THAN THE EXCEPTIONS NOTED IN THE SHEET INDEX, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.

SIGNATURE: _____

DATE: _____

CONSULTANT:
Edge
Consulting Engineers, Inc.
624 WATER STREET
PRAIRIE DU SAC, WI 53578
608.644.1449 VOICE
608.644.1549 FAX
www.edgeconsult.com

CLIENT:
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

SHEET TITLE:
TITLE SHEET
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	G-001

L:\33800\033894\Design\CAD\CD\Plot\G-001.dgn

© EDGE CONSULTING ENGINEERS, INC

SECTION 1: GENERAL REQUIREMENTS

1.1 PURPOSE AND INTENT

A. THE DRAWINGS ARE SUPPLEMENTAL TO ANY WRITTEN SPECIFICATIONS OR REQUIREMENTS. SHOULD ANYTHING BE SHOWN, INDICATED, OR SPECIFIED IN ONE AND NOT THE OTHER, OR IF ANY DISCREPANCIES OR DISAGREEMENTS ARE IDENTIFIED, THIS SHOULD BE BROUGHT TO THE ATTENTION OF THE OWNER AND/OR ENGINEER.

B. THE CONTRACTOR SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK.

1.2 CONFLICTS

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL MEASUREMENTS AT THE SITE BEFORE ORDERING MATERIALS OR DOING ANY WORK. NO EXTRA COMPENSATION WILL BE ALLOWED DUE TO DIFFERENCES BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS SHOWN ON THE PLANS. CONTRACTOR MUST SUBMIT NOTICE OF ANY DISCREPANCY IN DIMENSIONS TO OWNER FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK IN THE AFFECTED AREAS.

B. THE CONTRACTOR IS REQUIRED TO VISIT THE SITE TO ASSESS CONDITIONS PRIOR TO BIDDING. IN ADDITION, CONTRACTOR SHALL PERFORM TESTING AND ADDITIONAL INVESTIGATION AS DEEMED NECESSARY TO SUBMIT A FIXED BID. IGNORANCE OF THE SITE OR PROJECT CONDITIONS WILL NOT BE GROUNDS FOR CHANGE ORDERS OR ALTERING THE SCHEDULE.

1.3 CLEANUP

A. THE CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATION OF WASTE CAUSED BY EMPLOYEES. AT THE COMPLETION OF THE WORK, REMOVE ALL WASTE AND NON-CONSTRUCTION MATERIAL, INCLUDING ALL CONTRACTOR TOOLS. LEAVE THE SITE CLEAN AND READY FOR USE.

B. IF CLEARING IS REQUIRED, ALL BRUSH, STUMPS, AND OTHER WASTE MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY. THE OWNER SHALL BE CONSULTED FOR SPECIFICATIONS ON TREE PLACEMENT AND DISPOSAL. IF REQUIREMENTS ARE NOT SPECIFIED, A CONSERVATIVE ASSUMPTION SHALL BE UTILIZED FOR BIDDING PURPOSES.

C. THE SITE SHALL BE LEFT IN A CONDITION EQUIVALENT TO THE PRE-CONSTRUCTION CONDITION AND SATISFACTORY TO THE OWNER.

1.4 CODES

A. CONTRACTOR SHALL BE RESPONSIBLE FOR FOLLOWING ALL FEDERAL, STATE, AND LOCAL LAWS, REGULATIONS, AND RULES. THIS RESPONSIBILITY IS IN EFFECT REGARDLESS OF WHETHER THE LAW, ORDINANCE, REGULATION OR RULE IS MENTIONED IN THE DRAWINGS OR WRITTEN SPECIFICATIONS.

B. IN ADDITION TO ALL CODES, CONTRACTOR SHALL FOLLOW ALL MANUFACTURER RECOMMENDATIONS AND APPLICABLE STANDARDS (ACI, IBC, NEC, ETC).

1.5 QUALITY ASSURANCE

A. THE CONTRACTOR SHALL PROVIDE A PROJECT SCHEDULE PRIOR TO COMMENCING ANY WORK. IN ADDITION, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CHANGES TO THE SCHEDULE AS SOON AS THEY ARE KNOWN. THE CONTRACTOR SHALL PROVIDE 48-HOUR ADVANCE NOTICE OF SPECIFIC INSPECTION MILESTONES (SUCH AS FOUNDATION POURING). ADVANCE NOTICE WILL ALLOW FOR COORDINATION WITH INSPECTION COMPANIES.

PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL REQUEST A LIST OF INSPECTIONS FROM THE OWNER OR ENGINEER. AT A MINIMUM THIS WILL TYPICALLY INCLUDE THE FOUNDATION, GROUNDING, SUBSTANITAL COMPLETION, AND FINAL.

B. THE CONTRACTOR SHALL TAKE PHOTOGRAPHS OF ALL COMPLETED WORK AND PROVIDE THESE TO THE OWNER ON A WEEKLY BASIS. PHOTOGRAPHS SHALL INCLUDE DOCUMENTATION OF ALL SUBGRADE WORK THAT CANNOT BE VISIBLY INSPECTED UPON COMPLETION (GROUNDING, FOUNDATION, UTILITIES, ETC.).

C. THE CONTRACTOR IS THE GUARANTOR OF ALL WORK. FAILURE TO IDENTIFY A DISCREPANCY/DEFECT OR IMMEDIATELY NOTIFY THE CONTRACTOR OF SAID DEFECT DOES NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITIES IN THIS REGARD.

D. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT INSPECTIONS OCCUR PRIOR TO COMPLETION OF WORK. IF AN ITEM IS COMPLETED WITHOUT THE REQUESTED INSPECTION, THE OWNER WILL HAVE THE RIGHT TO ASSUME THAT THE WORK WAS NOT COMPLETED PROPERLY AND MUST BE REPLACED.

1.6 BUILDING PERMITS

THE CONTRACTOR IS RESPONSIBLE TO OBTAIN THE BUILDING PERMIT. CONTRACTOR SHALL COORDINATE AND SCHEDULE REQUIRED INSPECTIONS AT THE JOB SITE, COMPLY WITH SPECIFIC PROJECT RELATED REQUESTS AND SUGGESTIONS MADE BY BUILDING INSPECTOR, AND INFORM THE OWNER OF ANY REQUIREMENTS THAT MAY DEVIATE FROM THE CONSTRUCTION DOCUMENTS.

1.7 FAA PERMIT AND TOWER LIGHTING

REFER TO CONSTRUCTION DOCUMENTS AND CONSTRUCTION MANAGER FOR FAA AND STATE LIGHTING REQUIREMENTS. CONTRACTOR SHALL PROVIDE TEMPORARY FAA APPROVED LIGHTING UNTIL PERMANENT LIGHTING IS OPERATIONAL. THE CONTRACTOR SHALL ENSURE THAT ANY FAA ELEVATION LIMITATIONS ARE NOT EXCEEDED.

1.8 TOWER SECURITY

THE CONTRACTOR IS RESPONSIBLE FOR SITE SECURITY THROUGHOUT THE CONSTRUCTION PHASE. THE SITE MUST BE SECURELY FENCED (PERMANENTLY OR TEMPORARILY) WITHIN 24 HOURS OF TOWER ERECTION.

1.9 SITE CONTROL

A. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR CONTAINMENT OF SEDIMENT AND CONTROL OF EROSION AT THE SITE. ANY DAMAGE TO ADJACENT OR DOWNSTREAM PROPERTIES WILL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO OWNER.

B. IF WETLANDS ARE PRESENT IN THE PROJECT VICINITY THE CONTRACTOR IS RESPONSIBLE TO TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT THEY ARE NOT DISTURBED IN ANY MANNER. IF DISTURBANCE OCCURS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS AND CONSEQUENCES, INCLUDING FINES (EVEN IF ASSESSED TO THE OWNER).

C. THE CONTRACTOR IS TO MAINTAIN ADEQUATE DRAINAGE AT ALL TIMES. DO NOT ALLOW WATER TO STAND OR POND. ANY DAMAGE TO STRUCTURES OR THE SITE CAUSED BY INADEQUATE MAINTENANCE OF DRAINAGE PROVISIONS WILL BE THE RESPOINSIBILITY OF CONTRACTOR.

D. THE CONTRACTOR SHALL CONTAIN ALL CONSTRUCTION ACTIVITIES, MATERIALS, EQUIPMENT, ETC. TO THE LEASED AREA AND LEGAL EASEMENTS UNLESS PERMISSION TO DO OTHERWISE IS GRANTED BY THE PROPERTY OWNER.

1.10 CHANGE ORDER PROCEDURE

THE CONTRACTOR MUST PROVIDE NOTICE IN WRITING ON PROPER FORMS OF ANY POTENTIAL CLAIM FOR CONCEALED OR UNKNOWN CONDITIONS, OR ANY OTHER ITEM (EVEN IF A REQUEST BY OWNER) THAT MAY RESULT IN A TIME DELAY OR COST CHANGE WITHIN 1 DAY OF FIRST KNOWLEDGE. ANY CLAIM (CHANGE ORDER) MUST BE APPROVED BY THE OWNER PRIOR TO PROCEEDING OR INCURRING ANY COSTS. ANY CHANGES IN SCOPE OF WORK OR MATERIALS WHICH ARE PERFORMED BY THE CONTRACTOR WITHOUT WRITTEN APPROVAL BY THE OWNER SHALL PLACE FULL RESPONSIBILITY OF THESE ACTIONS ON THE CONTRACTOR AND ANY ASSOCIATED COST INCURRED WILL NOT BE PAID.

SECTION 2: EARTHWORK

2.1 SCOPE OF WORK

REFER TO THE SURVEY AND SITE PLAN FOR EXISTING GRADES AND FINAL ELEVATIONS.

2.2 SITE PREPARATION

A. CLEAR TREES, BRUSH AND DEBRIS FROM COMPOUND, ACCESS DRIVE, AND UTILITY PATH AS REQUIRED. SEE SITE PLAN FOR APPROPRIATE AREA TO BE CLEARED. REMOVE STUMPS, ORGANIC SOIL, AND OTHER DETRIMENTAL MATERIAL COMPLETELY UNDER ENTIRE COMPOUND AND DRIVE. ALL WASTE MATERIALS INCLUDING, BUT NOT LIMITED TO, STUMPS AND DEBRIS SHALL BE REMOVED FROM THE PROPERTY AND DISPOSED OF PROPERLY.

B. STRIP ALL ORGANIC MATERIAL FROM COMPOUND AND ACCESS DRIVE. IF SITE CONTAINS WET SOIL, CONTRACTOR SHALL OVER EXCAVATE A MINIMUM OF 18 INCHES OF MATERIAL FROM THE ENTIRE COMPOUND AND ACCESS DRIVE.

C. PRIOR TO PLACEMENT OF FILL OR BASE MATERIALS, CONTRACTOR SHALL REMOVE ALL TOPSOIL, ORGANIC MATERIALS AND WET OR POOR SOILS. IF MORE THAN 2'-0" OF POOR SOILS ARE ENCOUNTERED, CONTRACTOR SHOULD IMMEDIATELY CONTACT CONSTRUCTION MANAGER AND/OR ENGINEER FOR GUIDANCE.

D. CONTRACTOR SHALL FOLLOW RECOMMENDATIONS CONTAINED IN PLANS AND GEOTECHNICAL REPORT.

2.3 EXCAVATION

A. CONTRACTOR SHALL EXCAVATE TO DEPTH, AND GRADES SHOWN ON THE PLANS.

MINIMUM COMPACTION SHALL BE 90% MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557 FOR SITE WORK AND 95% MAXIMUM DRY DENSITY UNDER STRUCTURAL ELEMENTS. AREAS OF SETTLEMENT IDENTIFIED WITHIN ONE YEAR OF ACCEPTANCE OF FINAL CONSTRUCTION BY OWNER WILL BE EXCAVATED, FILLED, AND RECOMPACTED AT CONTRACTOR'S EXPENSE.

B. CONTRACTOR SHALL REVIEW THE GRADING PLANS, GEOTECHNICAL REPORT, AND TOWER FOUNDATION PLANS THOROUGHLY PRIOR TO BIDDING. ANY DISCREPANCIES OR INCONSISTENCIES SHOULD BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER.

C. IT IS RECOMMENDED THAT THE OWNER HIRE AN INDEPENDENT GEOTECHNICAL ENGINEER TO REVIEW SOIL CONDITIONS AND AN ACI CERTIFIED INSPECTOR TO REVIEW ALL FOUNDATION ELEMENTS.

D. REGARDLESS OF THE ABOVE RECOMMENDATION, THE CONTRACTOR IS RESPONSIBLE TO OBSERVE SITE AND SOIL CONDITIONS THROUGHOUT THE CONSTRUCTION PROCESS AND COMPARE THE ABOVE TO THE GEOTECHNICAL REPORT, THE PLANS, AND THE TOWER DRAWINGS. ANY INCONSISTENCIES, DISCREPANCIES, OR ASSUMPTIONS THAT PROVE TO BE INCORRECT, SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER.

2.4 SITE GRADING

ANY INCONSISTENCIES BETWEEN THE GEOTECHNICAL REPORT, SITE DRAWINGS, TOWER PLANS, AND SPECIFICATIONS SHALL BE RESOLVED IN FAVOR OF THE STRICTER REQUIREMENT.

A. CONTRACTOR SHALL USE ON-SITE MATERIALS OR IMPORTED FILL TO MATCH THE LINES, GRADES, AND CROSS SECTIONS SHOWN ON THE DRAWINGS. HOWEVER, IN NO CASE SHALL ORGANIC MATERIALS, WET SOIL, FROZEN SOIL, OR POOR SOIL BE USED AS ON-SITE FILL. IN ADDITION, ALL FILL (ON-SITE OR IMPORTED) SHALL BE ADEQUATELY COMPACTED PER THE EARTHWORK SPECIFICATIONS.

B. IF DISCREPANCIES ARE IDENTIFIED BETWEEN THE GRADING PLAN AND ACTUAL SITE CONDITIONS, THESE SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH WORK. ANY CHANGES TO THE GRADING PLAN CONTOURS MUST BE PREAPPROVED.

C. THE CONTRACTOR SHALL LIMIT ALL SITE GRADING AND CONSTRUCTION ACTIVITIES TO THE LEASED AREA AND ASSOCIATED EASEMENT. IF THIS IS NOT POSSIBLE, CONTACT THE PROJECT MANAGER AND OBTAIN OWNER APPROVAL PRIOR TO WORKING OUTSIDE THE ABOVE LIMITS.

D. REGARDLESS OF THE CONTOURS DEPICTED IN THE PLANS, ALL REQUIREMENTS IN THE TOWER FOUNDATION DRAWINGS (INCLUDING THE MINIMUM SOIL COVER) MUST BE ADHERED TO STRICTLY.

E. ALL FINISHED SURFACES SHOULD BE GRADED TO DRAIN FROM FOUNDATION, PROVIDE PROPER DITCHING AND ROUTING OF SURFACE WATER, AND AVOID PONDING AND EROSION.

F. ALL EXPOSED SOIL SHALL BE PROPERLY SEEDED AND PROTECTED FROM EROSION.

G. THE FINISHED GRADE SHALL EXTEND A MINIMUM OF ONE FOOT BEYOND THE COMPOUND FENCE.

2.5 GRAVEL SURFACING

A. CONSTRUCT GRAVEL DRIVE AND COMPOUND AREAS USING CRUSHED AGGREGATE BASE AND FINISH COURSES AS SPECIFIED IN THE CONSTRUCTION DOCUMENTS OR AS DIRECTED BY THE CONSTRUCTION MANAGER.

B. PLACE FILL OR STONE IN MAXIMUM EIGHT INCH LIFTS AND COMPACT TO SPECIFIED DENSITY PRIOR TO PLACING NEXT LIFT.

2.6 RETAINING WALLS

A. RETAINING WALLS TO BE INSTALLED BY AN EXPERIENCED CONTRACTOR FAMILIAR WITH AT LEAST TEN (10) PROJECTS OF SIMILAR SIZE AND SCOPE.

B. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER DESIGN CHARTS AND INSTALLATION GUIDELINES.

C. ALL BACKFILLED MATERIAL SHALL BE QUALITY SOILS (SAND, GRAVEL, OR SILTY SAND) WITH A MINIMUM SOIL BEARING CAPACITY OF 2,500 P.S.F. LL BACKFILLED MATERIAL SHALL BE COMPACTED TO 95% STANDARD PROCTOR IN MAXIMUM 8" LIFTS.

D. DRAINAGE TILE SHALL BE USED BEHIND THE RETAINING WALL. THE DRAINAGE TILE SHALL RUN TO DAYLIGHT AT A MAXIMUM INTERVAL OF 20'. WHEN SITE CONDITIONS REQUIRE, WRAP DRAINAGE TILE IN 3/4" CRUSHED AGGREGATE AND FILTER FABRIC WITH DRAINAGE COMPOSITE OR AGGREGATE BACK DRAIN.

E. RETAINING WALL EMBEDMENT SHALL BE AT LEAST THE MINIMUM SPECIFIED IN THE DRAWINGS. IN ADDITION, MINIMUM EMBEDMENT MUST EXCEED ANY MANUFACTURER DESIGN GUIDELINES.

F. ALL GEOGRID MATERIAL IS TO BE COATED POLYESTER WITH A MINIMUM ALLOWABLE DESIGN STRENGTH OF LTDS = 1350 PK.

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SHEET TITLE:
GENERAL SPECIFICATIONS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**G-002**

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SECTION 3: TRENCHING

3.1 MATERIALS

FILL MATERIALS SHALL BE OBTAINED, WHEN POSSIBLE, FROM MATERIALS EXCAVATED FROM TRENCHES ON-SITE. STRUCTURAL FILL, SAND OR SLURRY SHALL BE APPROVED BY THE CONSTRUCTION MANAGER AND SHALL CONFORM TO LOCAL UTILITY COMPANY REQUIREMENTS. THE FILL MATERIAL SHALL CONTAIN NO ORGANIC MATERIALS OR ROCKS. ALL FILL MATERIAL SHALL BE FREE OF OBJECTIONABLE MATERIALS AND/OR MATERIALS DESIGNATED AS HAZARDOUS OR POTENTIALLY HAZARDOUS. THE FILL MATERIAL SHALL CONTAIN FINES SUFFICIENT TO FILL ALL VOIDS IN THE MATERIAL. COMPACTION OF SOIL SHALL BE IN 8 INCH LOOSE LIFTS WHEN UTILIZING HEAVY COMPACTION EQUIPMENT OR 6 INCH LOOSE LIFTS WHEN UTILIZING HAND OPERATED TAMPERS.

3.2 PIPE DETECTION AND IDENTIFICATION

ALL ELECTRIC SERVICE TRENCHES SHALL BE MARKED WITH DETECTABLE WARNING TAPE.

3.3 TRENCH EXCAVATION

A. DIG TRENCH TO DEPTHS AND GRADES SHOWN ON THE PLANS OR AS DIRECTED BY THE CONSTRUCTION MANAGER.

B. TRENCH LENGTH SHALL BE SUFFICIENT TO ALLOW FOR SATISFACTORY CONSTRUCTION AND INSPECTION OF THE PROJECT, WITHOUT ENDANGERING OTHER CONSTRUCTION WORK OR ADJACENT FACILITIES.

C. DISPOSE OF EXCESS AND UNSUITABLE EXCAVATION MATERIAL PROPERLY.

D. USE HAND EXCAVATION METHODS WHEN REQUIRED BY LOCAL OR STATE GUIDELINES, OR WHEN NECESSARY TO AVOID ENDANGERING EXISTING OR NEW STRUCTURES OR OTHER FACILITIES.

3.4 TRENCH PROTECTION

A. PROVIDE MATERIALS, LABOR, AND EQUIPMENT NECESSARY TO PROTECT TRENCHES AT ALL TIMES.

B. SHEETING AND BRACING SHOULD MEET OR EXCEED OSHA REQUIREMENTS.

3.5 BACKFILLING

A. CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER AT LEAST 24 HOURS IN ADVANCE OF BACKFILLING.

B. PROTECT CONDUIT FROM LATERAL MOVEMENT, DAMAGE FROM IMPACT, OR UNBALANCED LOADING TO AVOID DISPLACEMENT OF CONDIUT AND/OR STRUCTURES. DO NOT FREE FALL BACKFILL INTO TRENCH UNTIL THERE IS AT LEAST 12 INCHES OF COVER OVER THE CONDUIT.

3.6 COMPACTION

A. COMPACT BACKFILL TO AT LEAST 95% STANDARD PROCTOR.

B. IF REQUIRED COMPACTION DENSITY IS NOT OBTAINED, REMOVE BACKFILL FROM TRENCH, REPLACE WITH APPROVED BACKFILL, AND RECOMPACT AS SPECIFIED.

C. ANY SUBSEQUENT SETTLEMENT OF TRENCH OR BACKFILL DURING MAINTENANCE PERIOD (1 YEAR MINIMUM) SHALL BE REMOVED, REPLACED, AND RECOMPACTED BY CONTRACTOR AT NO ADDITIONAL EXPENSE TO OWNER.

SECTION 4: CONCRETE WORK

4.1 CONCRETE FORMWORK

CONTRACTOR SHALL FOLLOW ALL APPLICABLE CODES AND STANDARDS (IBC, ACI, ETC.) WHEN COMPLETING CONCRETE WORK.

A. FORMS SHALL BE SMOOTH AND FREE OF SURFACE IRREGULARITIES. CONTRACTOR SHALL UTILIZE FORM RELEASE AGENTS AS NECESSARY.

B. EXPOSED EDGES OF ALL TOWER FOUNDATIONS SHALL RECEIVE A 3/4" CHAMFER. OTHER EXPOSED EDGES SHALL RECEIVE A TOOLED RADIUS FINISH.

C. UPON COMPLETION, CONTRACTOR SHALL REMOVE ALL FORMS, INCLUDING THOSE CONCEALED OR BURIED.

D. REFER TO PLANS AND TOWER DRAWINGS FOR ADDITIONAL REQUIREMENTS.

4.2 CONCRETE REINFORCEMENT

REFER TO PLANS AND TOWER DRAWINGS FOR REINFORCEMENT REQUIREMENTS.

4.3 CAST-IN-PLACE CONCRETE

REFER TO STRUCTURAL DRAWINGS FOR CONCRETE REQUIREMENTS FOR FOOTINGS, FOUNDATIONS, ETC. ANY NON-STRUCTURAL SITE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

A. ALL CONCRETE SUBJECT TO FREEZE-THAW SHALL CONTAIN 4-8% AIR ENTRAINMENT.

B. ALL CONCRETE SHALL BE VIBRATED IN PLACE USING HIGH FREQUENCY, LOW AMPLITUDE MECHANICAL IMMERSION TYPE VIBRATORS. INSERT VIBRATORS IN CONCRETE AT REGULAR INTERVALS AND OVER ENTIRE SURFACE TO SOLIDLY FILL AROUND AND BETWEEN REINFORCEMENT AND INTO CORNERS AND IRREGULARITIES. DISCONTINUE VIBRATION WHEN RISING ENTRAPPED AIR BUBBLES STOP BREAKING THE LEVELING SURFACE. DO NOT OVERVIBRATE AS THIS MAY CAUSE SEGREGATION.

4.4 QUALITY CONTROL

A. ALL STRUCTURAL CONCRETE SHALL BE INSPECTED BY INDEPENDENT, QUALIFIED PERSONNEL (ACI OR OTHERWISE). ALL STRUCTURAL CONCRETE SHALL BE TESTED BY AN INDEPENDENT LAB. AT A MINIMUM, 5 CYLINDERS SHALL BE CAST AND TESTED AT 7, 14, AND 28 DAYS . THE REMAINING CYLINDER SHALL BE RESERVED FOR RE-TESTING, IF NECESSARY.

THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH THE CONSTRUCTION MANAGER AND/OR TESTING AGENCY A MINIMUM OF 48 HOURS PRIOR TO EACH FOUNDATION POUR. IF A POUR OCCURS WITHOUT THE REQUESTED INSPECTION, THE OWNER CAN ASSUME THAT THE INSTALLATION WAS NOT INSTALLED CORRECTLY AND REQUIRE REPLACEMENT.

B. THE CONTRACTOR SHALL BE RESPONSIBLE TO REMOVE AND REPLACE, AT HIS SOLE EXPENSE, ANY CONCRETE THAT DOES NOT MEET THE ABOVE SPECIFICATIONS, OR SIMILAR SPECIFICATIONS CONTAINED IN THE PLANS OR TOWER DRAWINGS. ANY CONCRETE THAT DOES NOT MEET THE MINIMUM COMPRESSIVE STRENGTH REQUIRED UPON COMPLETION OF LAB TESTING SHALL BE REPLACED. THE AVERAGE OF THE TWO 28 DAY BREAK RESULTS SHALL GOVERN. NO DISPUTES REGARDING THE METHOD USED TO COLLECT THE TEST CYLINDERS OR PERFORM THE LAB TESTING ARE ALLOWED. IF THE CONTRACTOR CHOOSES, HE MAY COLLECT AND TEST ADDITIONAL CYLINDERS AT HIS SOLE EXPENSE.

C. DESPITE THE ABOVE REQUIREMENT, THE CONTRACTOR IS RESPONSIBLE TO PERFORM QUALITY WORK AND IS THE GUARANTOR OF THE FINISHED PRODUCT. IF A DEFECT IS NOT IMMEDIATELY IDENTIFIED BY THE INSPECTOR, OWNER, OR CONSTRUCTION MANAGER, BUT IDENTIFIED SUBSEQUENTLY, THE CONTRACTOR SHALL STILL BE RESPONSIBLE TO CORRECT SAID DEFECT.

D. CONTRACTOR MUST VERIFY THAT CONCRETE MEETS DESIGN REQUIREMENT (FOR STRENGTH AND OTHER PARAMETERS) BEFORE PLACING ANY SERVICE LOADS.

SECTION 5: STRUCTURAL STEEL

A. UNLESS OTHERWISE NOTED, ALL DETAILING, FABRICATION AND PLACING OF REINFORCING STEEL SHALL CONFORM TO THE MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315).

B. ALL REINFORCING STEEL SHALL BE NEW BILLET STEEL, CONFORMING TO ASTM A-615, GRADE 60, DEFORMED.

C. HEATING AND WELDING OF BARS IS PROHIBITED UNLESS WRITTEN APPROVAL IS OBTAINED FROM THE STRUCTURAL ENGINEER.

D. ALL REINFORCEMENT BARS ARE TO BE FREE FROM LOOSE RUST AND SCALE.

E. UNLESS OTHERWISE NOTED, ALL REINFORCEMENT SHALL HAVE A MINIMUM CONCRETE COVER OF 3 INCHES. CONTRACTOR SHALL UTILIZE SPACERS AND CHAIRS AS REQUIRED.

F. SPLICES IN REINFORCEMENT STEEL ARE PROHIBITED, UNLESS APPROVED BY THE STRUCTURAL ENGINEER. ALL SPLICES MUST THEN MEET ALL APPLICABLE ASTM STANDARDS FOR SPLICING.

G. WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY (AWG) D.1.1-92. STRUCTURAL WELDING CODE.

SECTION 6: GROUNDING

A. GROUND RING IS TO BE CONSTRUCTED OF MATERIALS INDICATED ON THE DRAWINGS. ALL ABOVE GROUND LEADS TO BE SEALED IN CARFLEX CONDUITS.

B. GROUND ALL CORNER POSTS WITH EXOTHERMIC WELDS (CONNECTION TO BE NO MORE THAN 12 INCHES ABOVE GROUND BUT MUST BE VISIBLE).

C. ICE BRIDGE GROUND - GROUND SUPPORT POST TO GROUND RING AND GROUND ICE BRIDGE TO THE POST.

D. A SMOOTH, DOWNWARD PATH TO GROUND IS REQUIRED FOR ALL GROUND LEADS.

E. CONTRACTOR TO BOND PROPOSED GROUND SYSTEM TO EQUIPMENT/BUILDING GROUND RING IN 2 LOCATIONS.

F. PROPOSED GROUND RING SHALL BE INSTALLED A MINIMUM OF 2' FROM ANY STRUCTURE.

G. AT BASE OF ANTENNA TOWER, ATTACH GROUND KITS FROM COAXIAL CABLES TO TOWER GROUND BAR. LOCATE GROUND RING AROUND TOWER AND BOND GROUND BAR TO GROUND RING AS INDICATED ON DRAWINGS. CONTRACTOR TO PROVIDE GROUND BAR AND ALL MOUNTING HARDWARE.

H. DOUBLING UP OR "STACKING" OF CONNECTION IS NOT PERMITTED.

I. OXIDE INHIBITING COMPOUND TO BE USED AT ALL CONNECTIONS.

J. RESISTIVITY TEST SHALL BE PERFORMED BY THE CONTRACTOR PRIOR TO BACKFILLING. A MAXIMUM RESISTIVITY OF 5 OHMS MUST BE ACHIEVED PRIOR TO PROCEEDING. THE RESULTS OF THIS TEST SHALL BE DOCUMENTED, WITH COPIES PROVIDED TO THE OWNER AND CONSTRUCTION MANAGER.

K. DO NOT INSTALL BURIED GROUND RING OUTSIDE OF THE LEASED AREA. CONTRACTOR SHALL NOTIFY THE OWNER 24 HOURS IN ADVANCE OF THE GROUND RING INSTALLATION SO THAT A REPRESENTATIVE CAN INSPECT THE GROUND RING BEFORE IT IS BACKFILLED. IF A REPRESENTATIVE IS NOT PRESENT, CONTRACTOR SHALL PHOTOGRAPH ENTIRE INSTALLATION AND PROVIDE PHOTOGRAPHS TO CONSTRUCTION MANAGER WITHIN 48 HOURS.

SECTION 7: ELECTRICAL

A. PROVIDE 2 PULL STRINGS SECURELY FASTENED AT EACH END OF ALL CONDUITS.

B. THE CONTRACTOR SHALL LOCATE AND MARK ALL EXISTING UNDERGROUND POWER, TELCO, GROUNDING CONDUITS, AND ALL OTHER UTILITY EASEMENTS AND/OR WIRES PRIOR TO TRENCHING. ANY DAMAGE CAUSED TO THE EXISTING UNDERGROUND SERVICES OR SYSTEMS SHALL BE REPAIRED AT THE CONTRACTOR'S SOLE EXPENSE.

C. CONTRACTOR SHALL CONTACT UTILITY PROVIDER PRIOR TO BIDDING AND CONSTRUCTION TO VERIFY THAT SERVICE HAS BEEN ORDERED AND DISCUSS ANY SITE SPECIFIC REQUIREMENTS. CHANGE ORDERS RELATED TO UTILITY REQUIREMENTS OR REQUESTS WILL NOT BE ALLOWED UNLESS THIS CONDITION HAS BEEN MET.

D. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR CONNECTION OF TEMPORARY AND PERMANENT POWER TO THE SITE. THE TEMPORARY POWER AND ALL HOOKUP COSTS SHALL BE PAID BY CONTRACTOR.

E. ALL MATERIALS UTILIZED SHALL BE U.L. LISTED.

SECTION 8: TOWER AND ANTENNA INSTALLATION

A. IF REQUIRED, ERECT FURNISHED TOWER. PRIOR TO ERECTION, CONTRACTOR MUST VERIFY THAT CONCRETE HAS MET THE MINIMUM STRENGTH REQUIREMENTS AS WELL AS ANY OTHER INSPECTION OR TESTING REQUIREMENTS.

B. INSTALL ANTENNAS AND LINES AS INDICATED ON THE DRAWINGS AND PER OWNER SPECIFICATIONS.

C. INSTALL ANTENNA AND COAX MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS OR APPROVED BY THE CONSTRUCTION MANAGER.

D. ASSIST OWNER TECHNICIANS IN PERFORMING SWEEP TEST OF INSTALLED COAX.

E. ANTENNA INSTALLATION TO BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES.

F. CONTRACTOR SHALL FOLLOW ALL APPLICABLE STANDARDS INCLUDING, BUT NOT LIMITED TO: EIA 222 (LATEST VERSION), FAA ADVISORY CIRCULAR AC70/7460-1A, FCC RULES & REGULATIONS.

SECTION 9: LANDSCAPING & SITE RESTORATION

CONTRACTOR SHALL FURNISH, INSTALL, AND MAINTAIN LANDSCAPE WORK AS SHOWN ON THE CONSTRUCTION DRAWINGS OR REQUIRED IN THE SPECIFICATIONS.

CONTRACTOR SHALL UTLIZE THE SERVICES OF A LANDSCAPE CONTRACTOR TO ENSURE THE LANDSCAPING IS PROPERLY INSTALLED, WATERED, AND OTHERWISE MAINTAINED. CONTRACTOR SHALL GUARANTEE LANDSCAPING FOR A MINIMUM OF 1 YEAR AND SHALL REPLACE ANY DEAD OR VISIBLY DISTRESSED PLANTS WITHIN THIS PERIOD.

9.1 PROTECTION

A. CONTRACTOR SHALL PROTECT SEEDED AREAS FROM EROSION THROUGH THE USE OF AN EROSION CONTROL MESH OR MULCH NET.

B. ALL TREES PLACED IN CONJUNCTION WITH A LANDSCAPE PLAN WILL BE WRAPPED, TIED WITH HOSE PROTECTED WIRE AND SECURED TO A STEEL ANGLE EXTENDING TWO FEET INTO THE GROUND ON FOUR SIDES OF THE TREE.

C. ALL EXPOSED AREAS SHALL BE PROTECTED AGAINST WASHOUTS AND SOIL EROSION.

9.2 INSTALLATION

A. SEED AND FERTILIZER SHALL BE APPLIED TO SURFACE CONDITIONS TO ENCOURAGE ROOTING. RAKE AREAS TO BE SEEDED TO EVEN THE SURFACE AND LOOSEN THE SOIL.

B. SOW SEED IN TWO DIRECTIONS IN TWICE THE QUANTITY RECOMMENDED BY THE SEED PRODUCER.

C. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE GROWTH OF SEEDED AND LANDSCAPED AREAS BY WATERING. CONTINUE TO REWORK BARE AREAS UNTIL COMPLETE COVERAGE IS OBTAINED.

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CLIENT:
vertical bridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

GENERAL SPECIFICATIONS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	G-003

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NORTH

PARCEL NO: 19-09-104-013
PROPERTY OWNER: 261 LIBERTY RD LLC.

PARKING LOT

EXISTING BUILDING

RIGHT OF WAY

LIBERTY RD.

EXCEPTION NO. 10 & 11 10' WIDE UTILITY EASEMENT PER PLAT

EXISTING TREELINE

APPROX. PROPERTY LINE

WOODS

15' BUILDING SETBACK LINE, PER PLAT

EXTENTS OF PROPOSED 20' WIDE VERTICAL BRIDGE ACCESS AND UTILITY EASEMENT

PROPOSED TREELINE: REMOVE TREES 5' OFF OF COMPOUND

37'-10"

PROPOSED TELCO PEDESTAL

PROPOSED MONOPINE DESIGNED BY OTHERS, 110% TOWER SETBACK (115'-6") FROM EASTERN PROPERTY LINE REQUIRED; SEE T-201 FOR DETAILS

PROPOSED TRANSFORMER

263'-8"

PROPOSED 12' WIDE DOUBLE SWING ACCESS GATE

64'-9"

PARCEL NO: 19-09-104-016
PROPERTY OWNER: CITY OF CRYSTAL LAKE

PARKING LOT

PROPOSED UNDERGROUND UTILITY CONDUIT ROUTING

PROPOSED 10'-0" x 15'-0" TMO LEASE AREA

PROPOSED VB BTS 10' WIDE UTILITY EASEMENT

PROPOSED 50' x 50' FENCED COMPOUND

116'-2" TO EASTERN PROPERTY LINE FROM TOWER CENTER

GRASS

EXISTING BUILDING

EXISTING BUILDING

20' BUILDING SETBACK LINE, PER PLAT

BRUSH

25' BUILDING SETBACK LINE, PER PLAT

PARCEL NO: 19-09-104-015
PROPERTY OWNER: CALYPSO VENTURES, LLC.

SETBACK LINE

15' BUILDING SETBACK LINE, PER PLAT

APPROX. PROPERTY LINE



PARKING LOT

PARCEL NO: 19-09-126-014
PROPERTY OWNER: CL URBAN LLC.

15' 0 15' 30'

SCALE: 11" x 17" - 1" = 30'
22" x 34" - 1" = 15'

A AERIAL OVERVIEW OF SITE

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SITE PLAN

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

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JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

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PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	C-101

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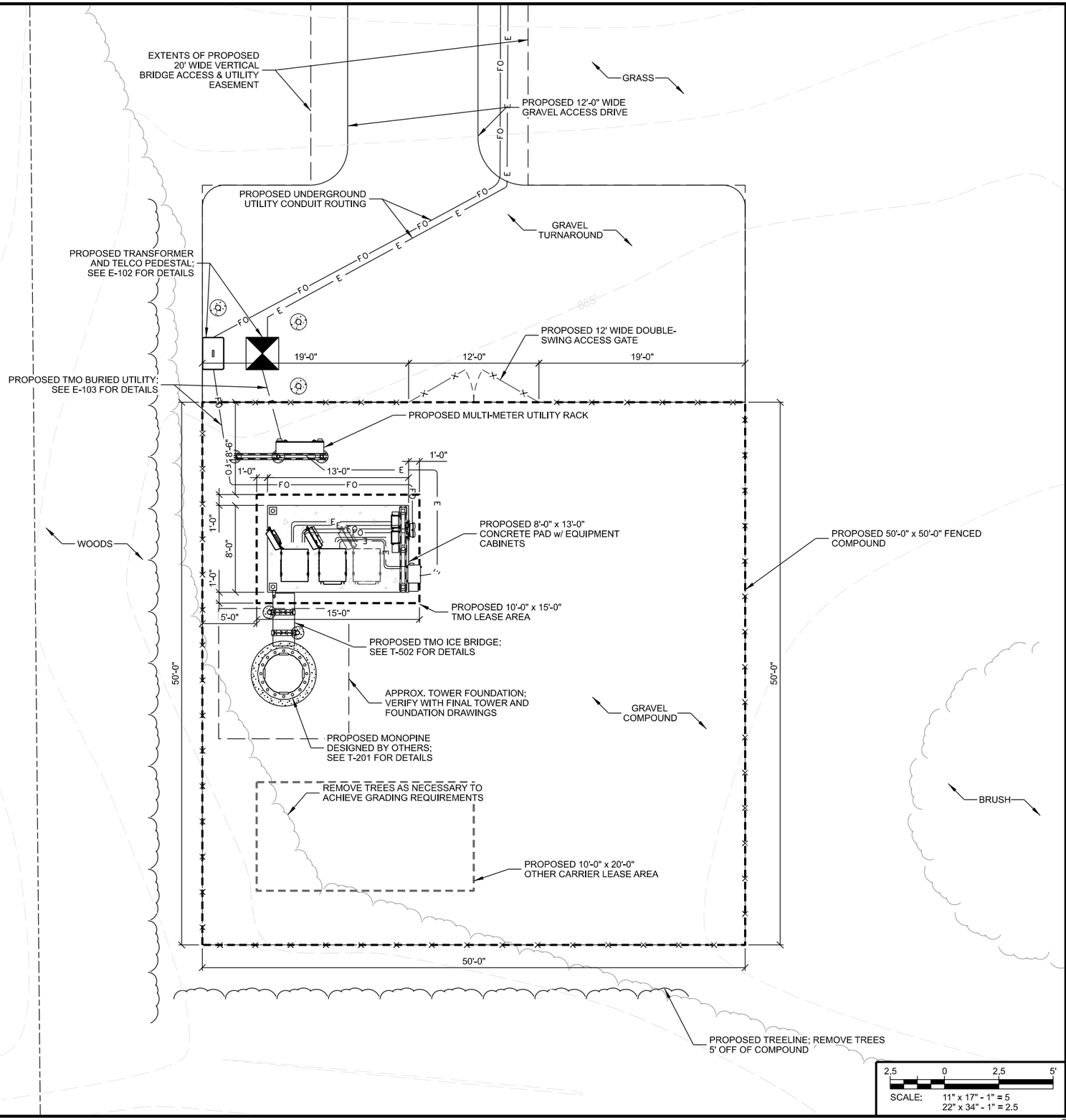
A SITE OVERVIEW



B SITE OVERVIEW



C SITE OVERVIEW



2,5 0 2,5 5'

SCALE: 11" x 17" - 1" = 5
22" x 34" - 1" = 2.5

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ENLARGED SITE PLAN
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

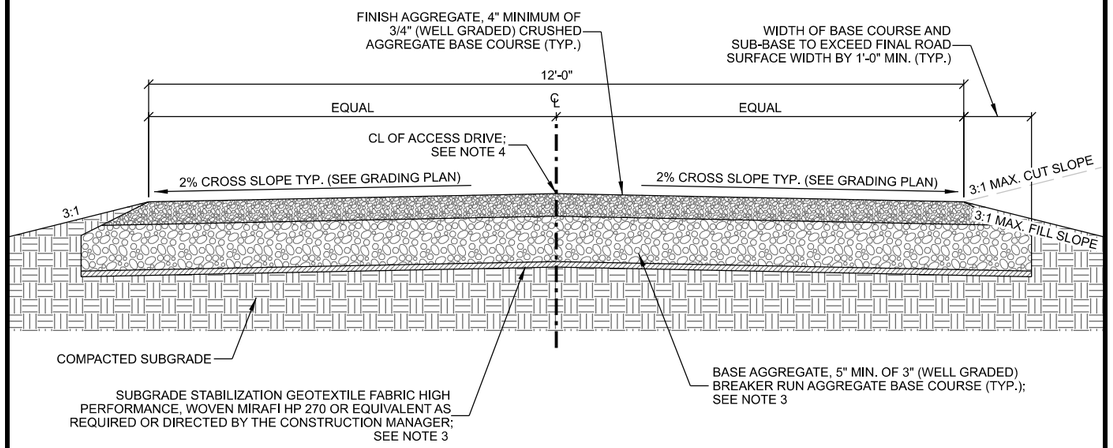
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PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	C-102

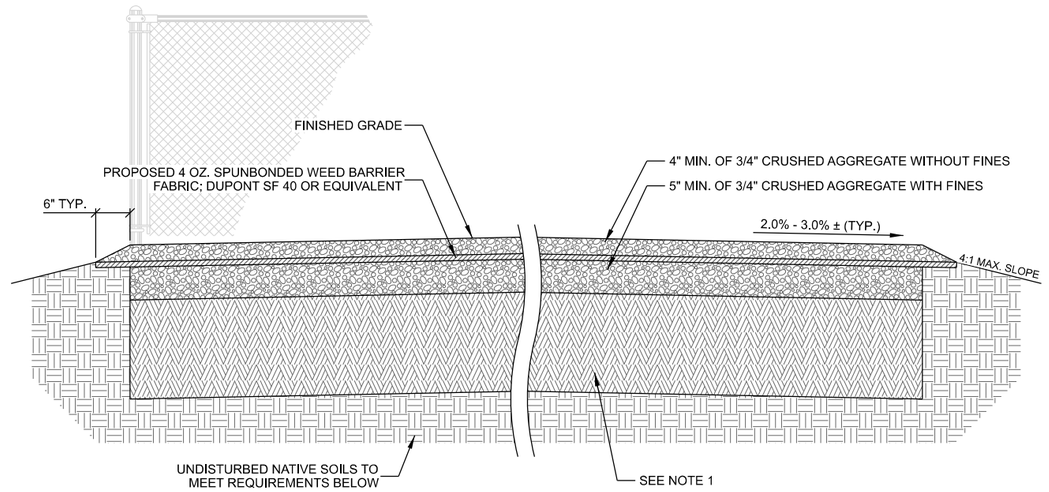
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GENERAL NOTES:

1. REMOVE ALL TOPSOIL, ORGANIC MATERIAL AND WET OR POOR SOILS ALONG ACCESS DRIVE. CONTRACTOR TO REVIEW SITE CONDITIONS AND CONSULT GEOTECHNICAL REPORT FOR ANTICIPATED DEPTH OF SOILS THAT WILL REQUIRE REMOVAL. IF POOR SOILS ARE ENCOUNTERED AT A DEPTH OF MORE THAN 12", CONTACT CONSTRUCTION MANAGER FOR GUIDANCE.
2. SUBGRADE TO BE COMPACTED TO 95% MODIFIED PROCTOR AND VERIFIED BY PROOF-ROLL WITH LOADED TRI-AXLE DUMP TRUCK. CONTACT CONSTRUCTION MANAGER FOR GUIDANCE FOR FAILING SUBGRADE SOILS.
3. FAILING AREAS OF SUBGRADE SHALL BE UNDERCUT TO A MINIMUM DEPTH OF 18" BELOW FINISH AGGREGATE AND STABILIZED WITH 3" (WELL GRADED) BREAKER RUN AGGREGATE OVER SUBGRADE STABILIZATION GEOTEXTILE FABRIC.
4. CONSULT GRADING PLAN OR SITE PLAN FOR FINAL SITE GRADES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ASPHALT ACCESS DRIVE REPAIR AND RESTORATION FOLLOWING CONSTRUCTION COMPLETION. ANY DISTURBED OR DAMAGED AREAS SHALL BE RESTORED TO THEIR ORIGINAL OR BETTER CONDITION UPON COMPLETION OF WORK.

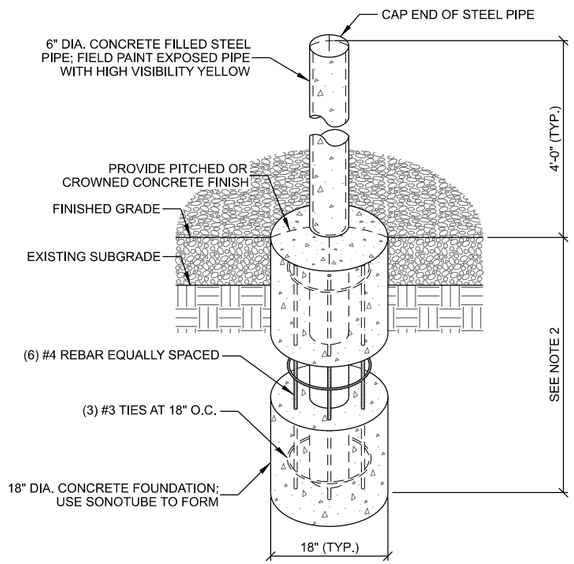
A GRAVEL DRIVE CROSS SECTION



NOTES:

1. REMOVE ALL TOPSOIL, ORGANIC MATERIAL AND WET OR POOR SOILS WITHIN COMPOUND AREA. CONTRACTOR TO REVIEW SITE CONDITIONS AND CONSULT GEOTECHNICAL REPORT FOR ANTICIPATED DEPTH OF SOILS THAT WILL REQUIRE REMOVAL. IF POOR SOILS ARE ENCOUNTERED SELECT FILL MAY BE REQUIRED. CONTACT CONSTRUCTION MANAGER FOR GUIDANCE.
2. FINAL TOWER FOUNDATION DESIGN RECOMMENDATIONS TO SUPERCEDE GRADING PLAN OR SITE PLAN ELEVATIONS.

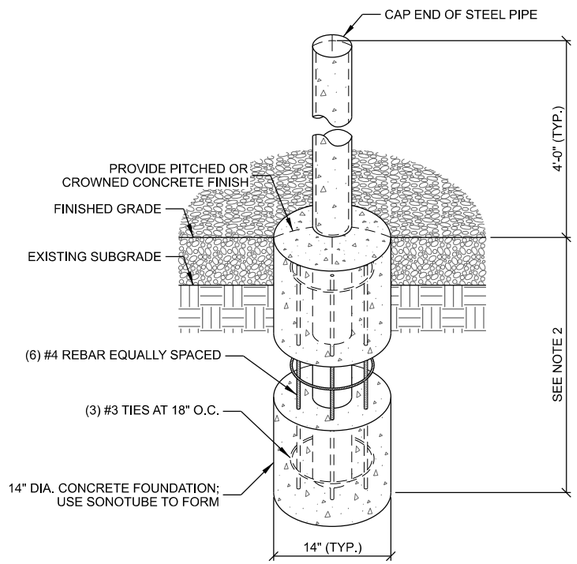
B COMPOUND CROSS SECTION



NOTES:

1. MAINTAIN 3" MINIMUM REBAR COVER IN ALL DIRECTION
2. PIER FOUNDATION DEPTH TO BE A MINIMUM OF 48"; DEPTH TO EXCEED LOCAL FROST DEPTH
3. CONCRETE TO BE A MINIMUM OF 3,000 PSI AT 28 DAYS

C PIPE BOLLARD



NOTES:

1. MAINTAIN 3" MINIMUM REBAR COVER IN ALL DIRECTION
2. PIER FOUNDATION DEPTH TO BE A MINIMUM OF 48"; DEPTH TO EXCEED LOCAL FROST DEPTH
3. CONCRETE TO BE A MINIMUM OF 3,000 PSI AT 28 DAYS

D UTILITY PIER FOUNDATION

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CONSULTANT:
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CLIENT:
verticalbridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

CONSTRUCTION DETAILS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	C-501

L:\33894\03\33894\Design\CAD\CD\Plot\C-501.dgn

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KEYNOTES: (THIS SHEET)

A. 4" DIA. SCHEDULE 40 GALVANIZED STEEL CORNER AND GATE POSTS; PROVIDE END CAP.

B. 3" DIA. SCHEDULE 40 GALVANIZED STEEL INTERMEDIARY LINE POSTS, TO BE EQUALLY SPACED AT MAXIMUM 8'-0" O.C.; PROVIDE END CAP.

C. 2" WELDED STEEL GATE FRAME

D. HEAVY DUTY BUTT HINGES

E. 3/8" DIA. TENSION ROD

F. 1" x 6" DOG-EARED VERTICAL CEDAR PLANKS SECURED TO HORIZONTAL RAILS. FINISH WITH CLEAR WOOD SEALER.

G. 2" x 4" HORIZONTAL CEDAR BACKING RAILS SECURED TO FENCE POSTS WITH MANUFACTURER APPROVED HARDWARE. FINISH WITH CLEAR WOOD SEALER.

H. LATCH WITH PADLOCK ON EXTERIOR GATE (GRAINGER @1XMN8 OR EQUIVALENT).

I. 6" x 6" HANDHOLE FOR CHAIN LOCK

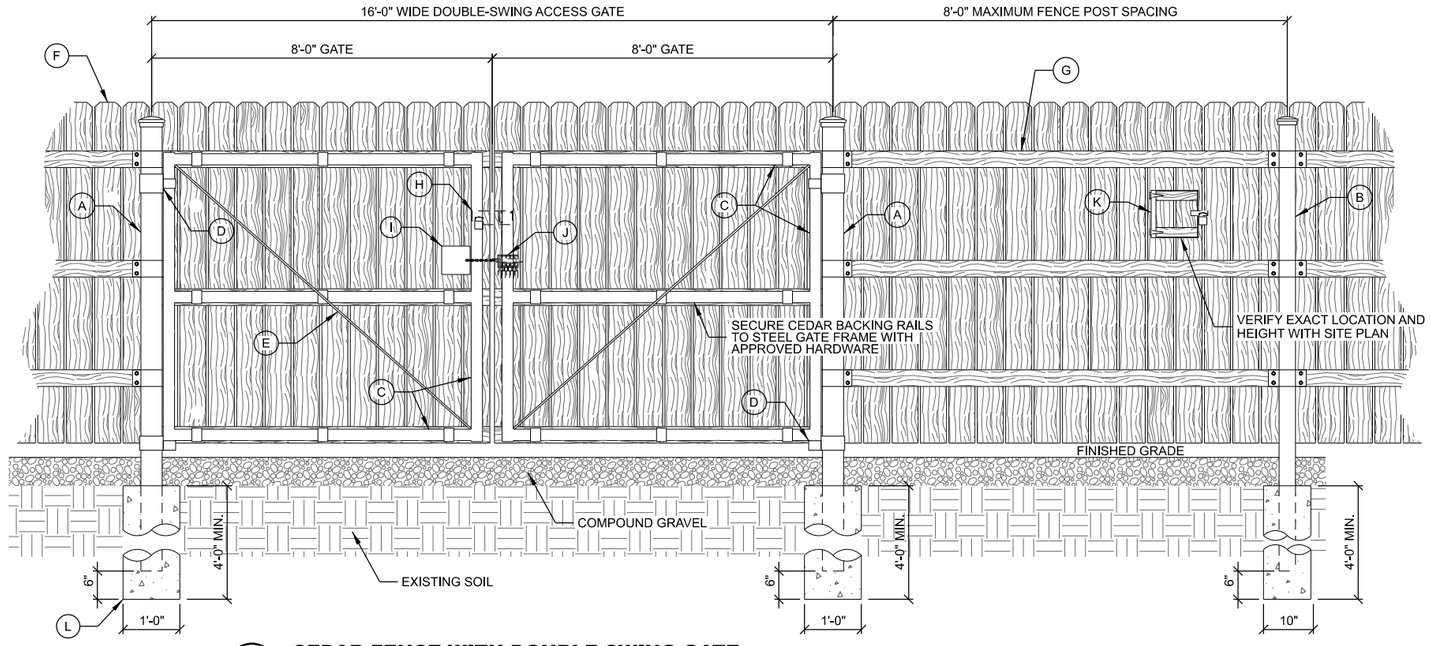
J. TAYHOPE MULTI-TENANT LOCK (OR EQUIVALENT)

K. 10" x 10" HINGED OPENING FOR ELECTRICAL METER READ-OUT. VERIFY EXACT POSITION AND HEIGHT WITH SITE PLAN.

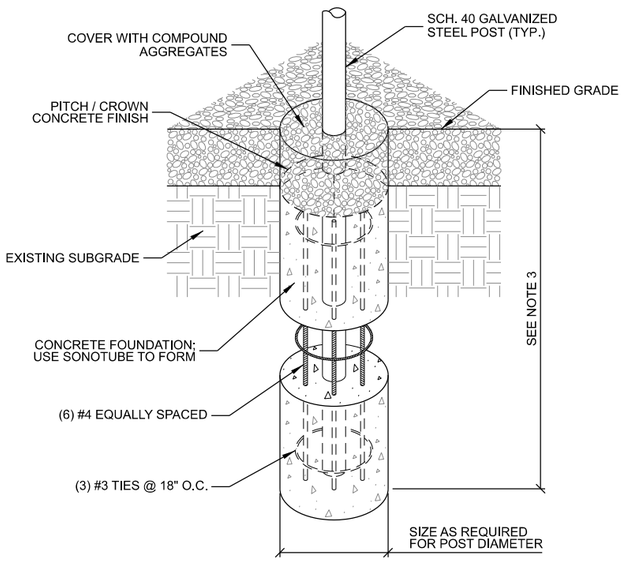
L. 12" DIA. AT GATE & CORNER POSTS, 10" DIA. AT LINE POSTS SEE DETAIL BELOW

GENERAL NOTES: (THIS SHEET)

1. CONTRACTOR TO FOLLOW MANUFACTURER INSTALLATION RECOMMENDATIONS. ALL HARDWARE TO FOLLOW MANUFACTURER SPECIFICATIONS.



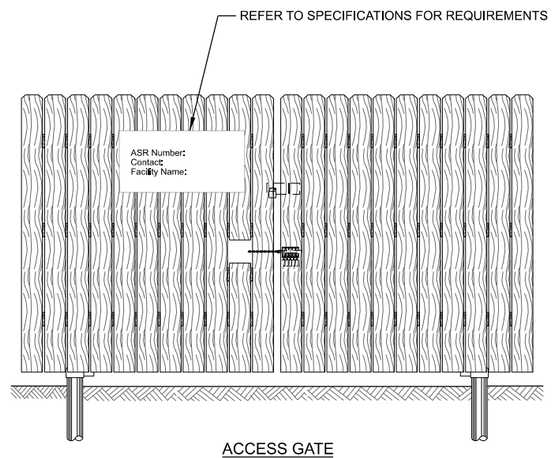
A **CEDAR FENCE WITH DOUBLE-SWING GATE**



NOTES:

1. MAINTAIN 3" MINIMUM REBAR COVER WITH CONCRETE IN ALL DIRECTIONS.
2. CONCRETE MIX TO BE 4,000 PSI @ 28 DAYS.
3. FOUNDATION DEPTH TO EXCEED LOCAL FROST DEPTH, OR 48" MINIMUM.

B **FENCE POST PIER FOUNDATION**



ACCESS GATE

GENERAL NOTES:

1. THE ANTENNA STRUCTURE REGISTRATION NUMBER SHALL BE DISPLAYED PER 47 CFR 17.4 (g).
2. THE ASR NUMBER SHALL BE POSTED ON THE PERIMETER FENCE OR ACCESS GATE SO THAT IT IS CONSPICUOUSLY VISIBLE AND LEGIBLE FROM THE PUBLICLY ACCESSIBLE AREA NEAREST THE BASE OF THE ANTENNA STRUCTURE ALONG A PUBLICLY ACCESSIBLE ROADWAY OR PATH.
3. MATERIALS USED TO DISPLAY THE ANTENNA STRUCTURE REGISTRATION NUMBER MUST BE WEATHER-RESISTANT AND OF SUFFICIENT SIZE TO BE EASILY SEEN WHERE POSTED.

C **ANTENNA STRUCTURE REGISTRATION (ASR) SIGNAGE**

FENCING NOTES: (THIS SHEET)

SCOPE:
1.1 THIS SECTION COVERS THE REQUIREMENTS FOR THE MATERIALS AND THE CONSTRUCTION OF SITE FENCING.

SPECIAL REQUIREMENTS:
2.1 ALL FITTINGS, HARDWARE AND STEEL MEMBERS USED FOR SITE AREA FENCING, SHALL BE HOT DIPPED GALVANIZED (ASTM A153) OR OTHER APPROVED NON CORROSIVE MATERIAL AND CONFORM TO FEDERAL SPEC RR-F-191G (1-25-74).
2.2 ALL NON-CORROSIVE MATERIAL SHALL BE PRE-APPROVED BY THE PROJECT MANAGER.
2.3 ANY DAMAGE TO GALVANIZING OR NON-CORROSIVE COATING DURING CONSTRUCTION SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S RECOMMENDED METHODS.
2.4 ALL WOOD TO BE CEDAR WITH CLEAR WOOD SEALER FINISH.

FENCE POSTS:
3.1 LOCATION OF CORNER POSTS SHALL BE DETERMINED FROM STAKES AND PROPERTY PINS INSTALLED BY THE REGISTERED LAND SURVEYOR UNDER CONTRACT FOR THE PROJECT. IF THE STAKES ARE NOT PRESENT OR DO NOT CONFORM TO THE SITE PLAN, CONSULT WITH THE PROJECT MANAGER.
3.2 CORNERS AND GATE POST FOR SITE SHALL BE 4" DIA. SCHEDULE 40 GALVANIZED PIPE. INTERMEDIARY POSTS SHALL BE 2-1/2" OR 3" DIA. SCHEDULE 40 GALVANIZED PIPE.
3.3 CORNER POSTS SHALL BE SET WITHIN ONE INCH (1") OF DIMENSIONS INDICATED ON THE SITE PLAN.
3.4 FENCE POSTS SHALL BE VERTICALLY PLUMB IN ALL PLANES WITHIN 1/2 INCH (1/2").
3.5 CORNER AND GATE POST FOUNDATIONS SHALL BE A MINIMUM FOUR FEET (4') DEEP OR SIX INCHES (6") BELOW THE FROST LINE, WHICHEVER IS GREATER, WITH MINIMUM THREE INCH (3") CLEARANCE BETWEEN BOTTOM OF POST AND BOTTOM OF THE HOLE.
3.6 POST FOUNDATIONS GATE AND CORNER POSTS SHALL BE 12 INCHES (12") IN DIAMETER. INTERMEDIARY POSTS FOUNDATIONS SHALL BE 10 INCHES (10") IN DIAMETER.
3.7 LINE POSTS BETWEEN CORNER AND GATE POSTS SHALL BE EQUALLY SPACED WITH AN EIGHT FOOT (8') MAXIMUM SPACING. GATE POST LOCATIONS SHALL BE IN ACCORDANCE WITH SITE PLAN AND SHALL BE VERIFIED WITH THE PROJECT MANAGER.
3.8 ALL POSTS SHALL BE CAPPED.
3.9 ALL FOUR CORNERS POSTS AND BOTH GATE POSTS SHALL BE CONNECTED TO THE SITE GROUNDING SYSTEM (REFER TO GROUNDING SYSTEM STANDARD).

FENCE ENCLOSURE:
4.1 ENCLOSURE BACKING RAILS TO CONSIST OF 2 INCH (2") BY 4 INCH (4") NOMINAL CEDAR PLANKS. ALL CEDAR TO HAVE CLEAR WOOD SEALER FINISH.
4.2 ENCLOSURE BOARDS TO BE HEAVY DUTY 1 INCH (1") BY 6 INCH (6") NOMINAL CEDAR PLANKS. ALL CEDAR TO HAVE CLEAR WOOD SEALER FINISH.
4.3. ALL ENCLOSURE BOARDS TO BE SECURED TO FENCE POSTS WITH MANUFACTURER APPROVED HARDWARE. CONTRACTOR TO FOLLOW MANUFACTURER RECOMMENDATIONS AND SPECIFICATIONS

GATE:
5.1 LOCATION OF GATE SHALL CONFORM TO THE SITE PLAN. GATE SIZE SHALL BE 12-0" WIDE (UNLESS OTHERWISE NOTED).
5.2 GATE FRAME TO BE CONSTRUCTED OF 2 INCH (2") WELDED STEEL WITH HEAVY DUTY HINGES. CONTRACTOR TO FOLLOW MANUFACTURER RECOMMENDATIONS AND SPECIFICATIONS.
5.3 GATE HINGES SHALL PROVIDE FOR 180 DEGREE RADIUS GATE SWING. ANY HINGE NUTS SHALL BE ON THE INSIDE AND DOUBLE-NUT TO DETER UNAUTHORIZED ENTRY.
5.4 GATE SHALL BE INSTALLED PLUMB AND SHALL OPEN AND CLOSE FREELY.
5.5 GATE POSTS SHALL NOT BE SHARED AS A CORNER POST.

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BOCA RATON, FL 33487

FENCE DETAILS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	C-502

L:\33880\33894\Design\CAD\CD\Plot\C-502.dgn

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MANUFACTURER: DELTA
MODEL: HP-LARGE 3 POWER CABINET
DIMENSIONS: 72" x 30" x 41" (H x W x D)
WEIGHT: 551 LBS (WITHOUT EQUIPMENT OR BATTERIES)

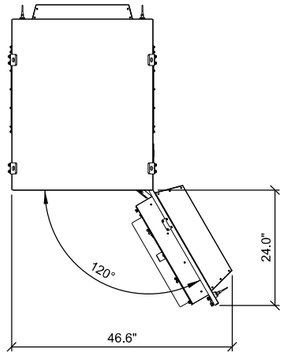
ORDERING INFORMATION:

CABINET
ESOA600-HCU01 (HP-LARGE 3 600A POWER CABINET)

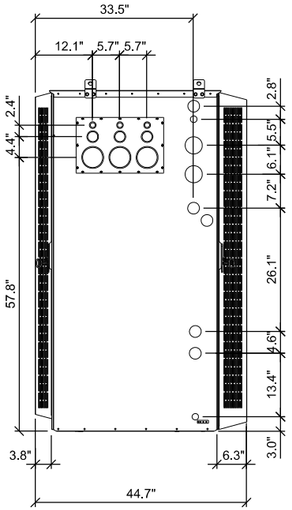
RECTIFIER
ESR-48/60A D-A (48V/56A 3000W, 96.4%, CAN COMM.)

CONTROLLER (SPARE)
TPS1020028AU17 (ORION TOUCH CONTROLLER)

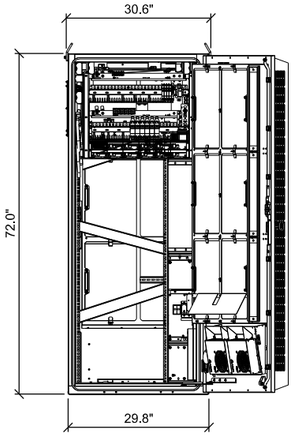
6" PLINTH
37993318816900-S



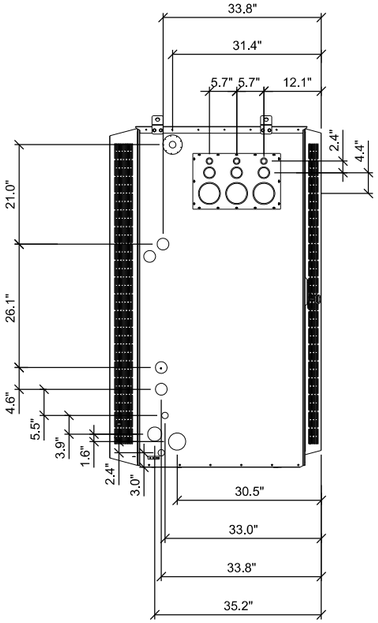
PLAN VIEW



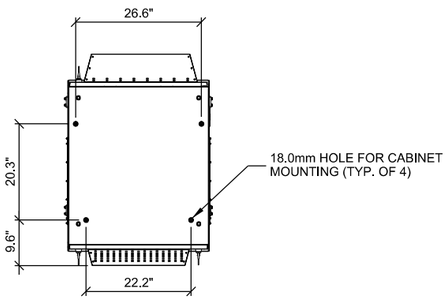
LEFT VIEW



FRONT VIEW



RIGHT VIEW



BOTTOM VIEW

A EQUIPMENT CABINET

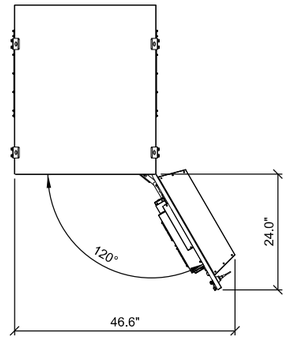
SCALE: 11" x 17" - 3/8" = 1'-0"
22" x 34" - 3/4" = 1'-0"

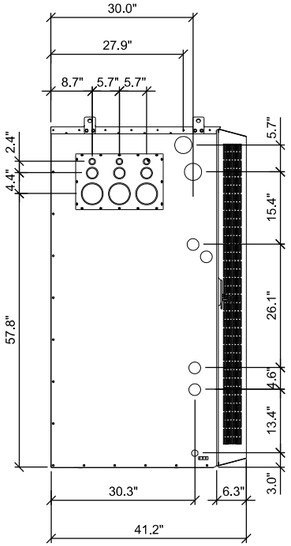
MANUFACTURER: DELTA
MODEL: LARGE BATTERY 3 CABINET
DIMENSIONS: 72" x 30" x 41" (H x W x D)
WEIGHT: 540 LBS (WITHOUT BATTERIES)

ORDERING INFORMATION:

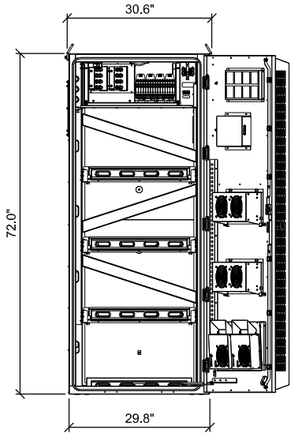
CABINET
ESOF015-ECV04 (LARGE 3 POWER CABINET)

6" PLINTH
37993318816900-S

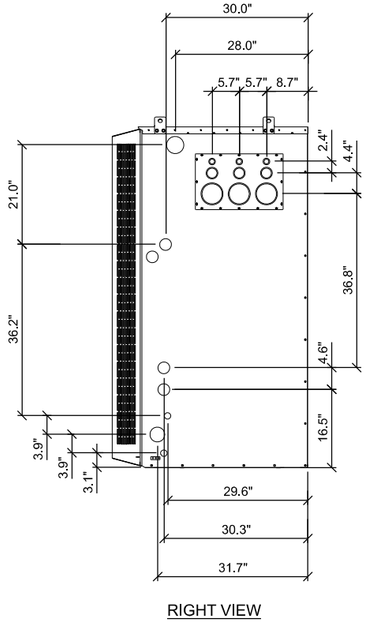




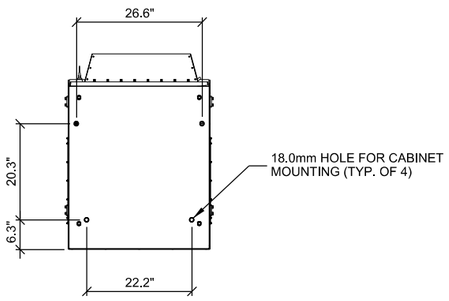
LEFT VIEW



FRONT VIEW



RIGHT VIEW



BOTTOM VIEW

B BATTERY BACKUP SYSTEM

SCALE: 11" x 17" - 3/8" = 1'-0"
22" x 34" - 3/4" = 1'-0"

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CLIENT:
vertical bridge
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750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

EQUIPMENT CABINET SPECIFICATIONS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

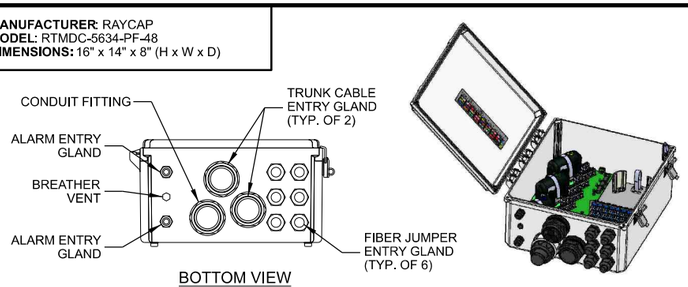
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	A-001

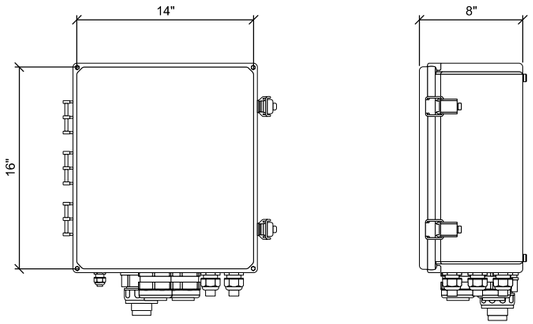
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L:\33894\03894\Design\CAD\CD\Plot\A-001.dgn

MANUFACTURER: RAYCAP
MODEL: RTMDC-5634-PF-48
DIMENSIONS: 16" x 14" x 8" (H x W x D)



BOTTOM VIEW



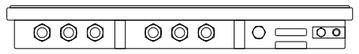
FRONT VIEW

SIDE VIEW

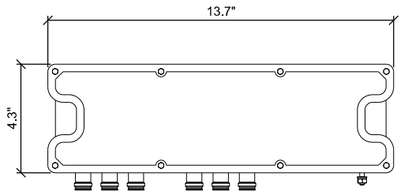
A RAYCAP OVER VOLTAGE PROTECTION (COVP)

MANUFACTURER: NOKIA
MODEL: 473551A (FSEE)
DIMENSIONS: 1.7" x 13.7" x 4.3" (H x W x D)
WEIGHT: 1.1 LBS

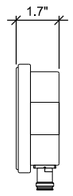




BOTTOM VIEW



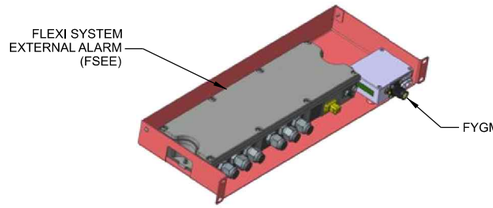
FRONT VIEW



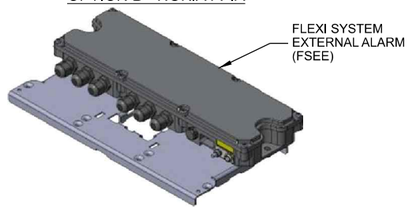
SIDE VIEW

B FLEXI SYSTEM EXTERNAL ALARM (FSEE)

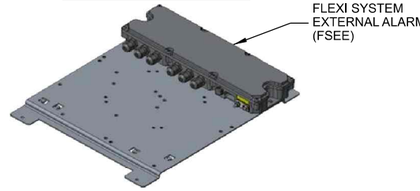
OPTION A - NOKIA FMAB



OPTION B - NOKIA FPIA



OPTION C - NOKIA FMAA



C FLEXI SYSTEM EXTERNAL ALARM (FSEE) MOUNTING

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verticalbridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

GROUND EQUIPMENT SPECIFICATIONS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	A-002

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GENERAL NOTES:

-HPL3 WILL CONTAIN FSEE, FSMFs AND AMIAa
-FSMF FANS TO BE REVERSED PRIOR TO INSTALLATION
-EQUIP. PLATFORM TO BE KEPT AS CLOSE TO GRADE AS POSSIBLE
-MIN. 8" CLEARANCE BETWEEN HPL3 AND LB3
-GPS CABLE TO BE ROUTED THROUGH THE COVP INTO CONDUIT FOR HPL3 CABINET

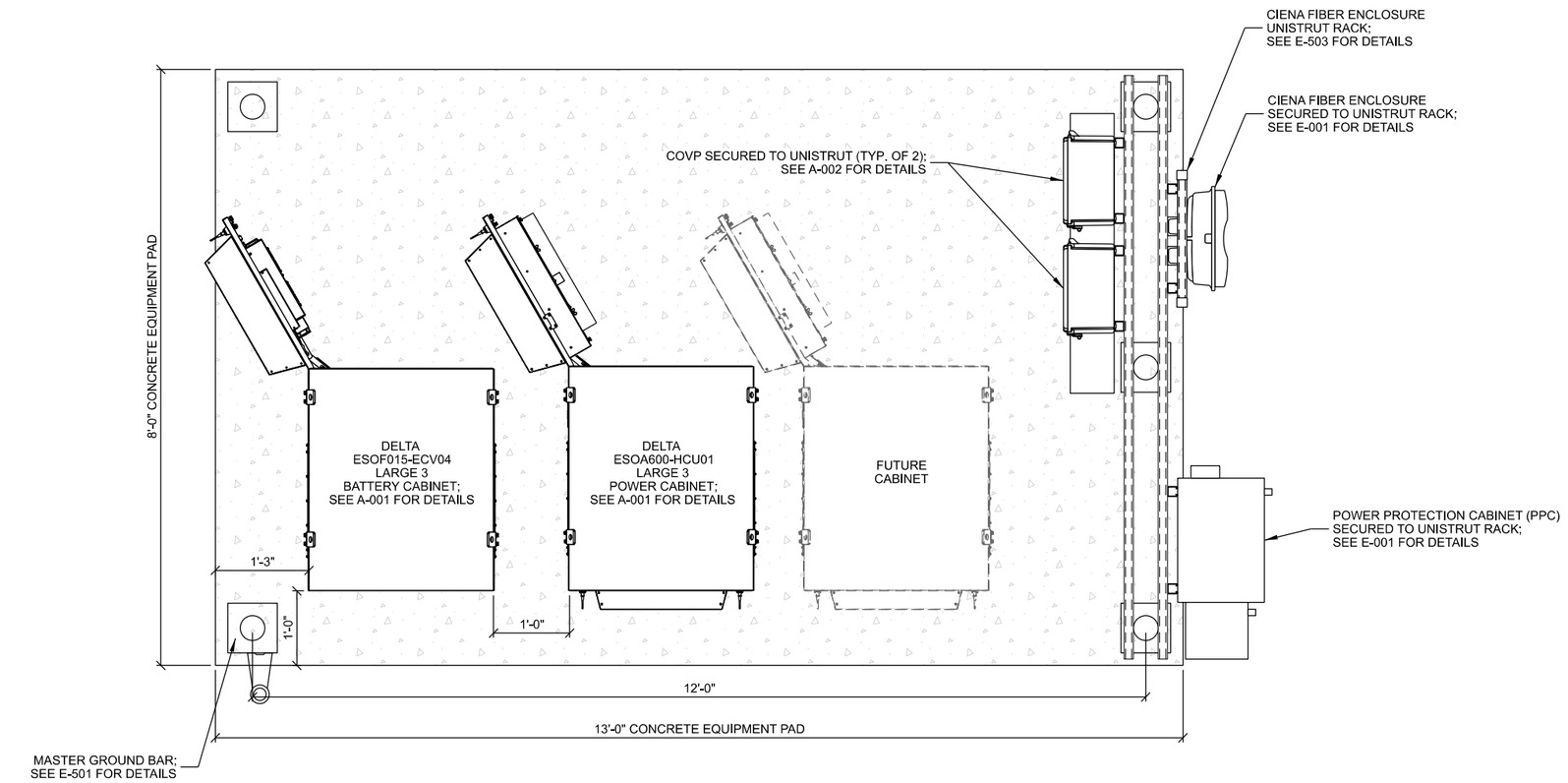
POWER CABINET NOTE:

VOLTAGE BOOSTER TO BE PLACED INSIDE OF HPL3 CABINET, TO BE LOCATED ABOVE THE FIRST AMIA TOWARD THE TOP OF THE RU SHELF.

MANUFACTURER #: POWERPLUS 100-3-1U

A
A-201

D
A-201



B
A-201

C
A-201

NOTE:

1. EQUIPMENT PLATFORM CANOPY NOT SHOWN FOR CLARITY.

A EQUIPMENT PAD LAYOUT

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

CONSULTANT:
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BOCA RATON, FL 33487

EQUIPMENT PAD PLAN

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

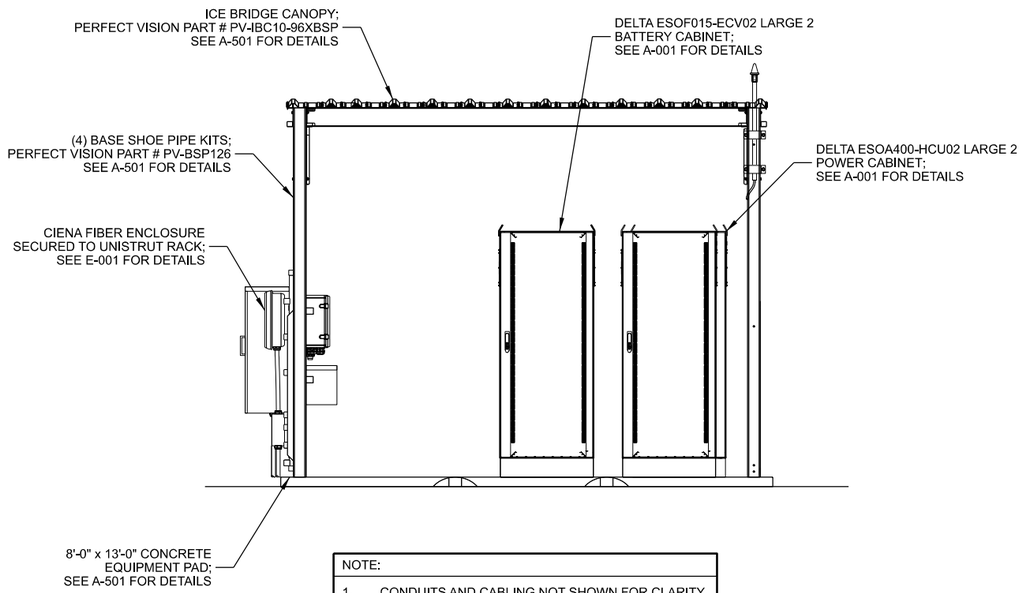
SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	A-101

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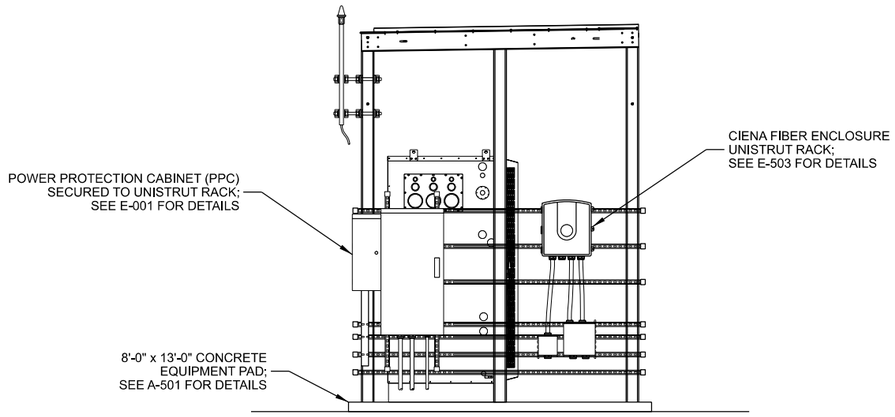
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NOTE:
1. CONDUITS AND CABLING NOT SHOWN FOR CLARITY.

A **EQUIPMENT PAD ELEVATION**

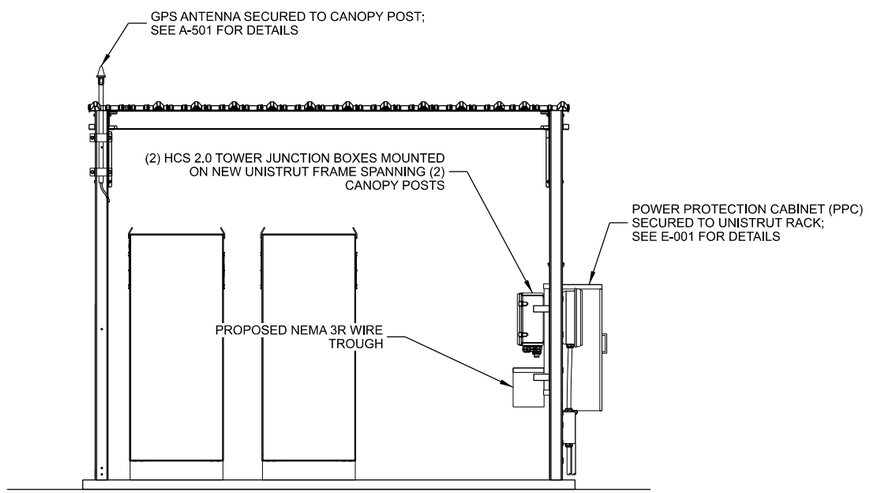
SCALE: 11" x 17" - 1/4" = 1'-0"
22" x 34" - 1/2" = 1'-0"



NOTE:
1. CONDUITS AND CABLING NOT SHOWN FOR CLARITY.

B **EQUIPMENT PLATFORM ELEVATION**

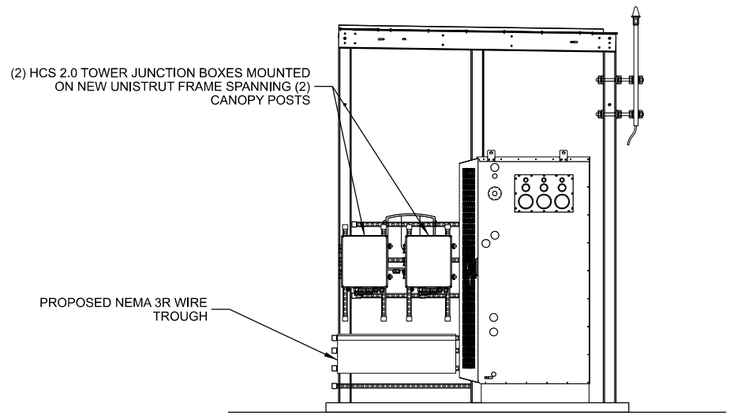
SCALE: 11" x 17" - 1/4" = 1'-0"
22" x 34" - 1/2" = 1'-0"



NOTE:
1. CONDUITS AND CABLING NOT SHOWN FOR CLARITY.

C **EQUIPMENT PAD ELEVATION**

SCALE: 11" x 17" - 1/4" = 1'-0"
22" x 34" - 1/2" = 1'-0"



NOTE:
1. CONDUITS AND CABLING NOT SHOWN FOR CLARITY.

D **EQUIPMENT PAD ELEVATION**

SCALE: 11" x 17" - 1/4" = 1'-0"
22" x 34" - 1/2" = 1'-0"

CONSULTANT:
Edge
Consulting Engineers, Inc.
624 WATER STREET
PRAIRIE DU SAC, WI 53578
608.644.1449 VOICE
608.644.1549 FAX
www.edgeconsult.com

CLIENT:
verticalbridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

EQUIPMENT PAD ELEVATIONS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

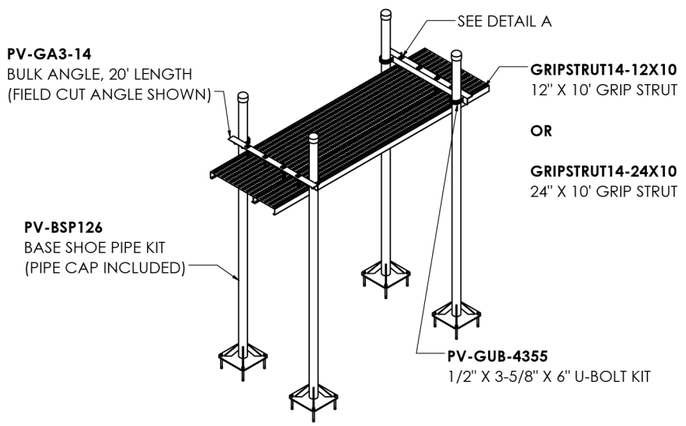
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PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**A-201**

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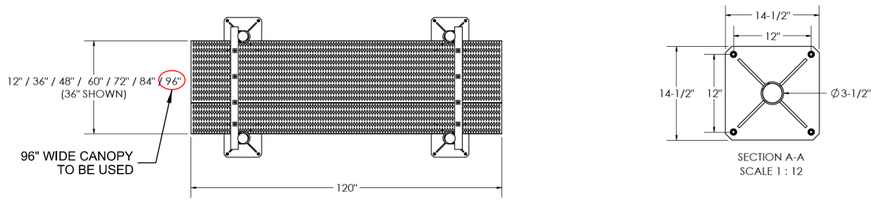
MANUFACTURER: PERFECT VISION
MODEL: PV-IBC10-96XBSP

10' x 96" w/ 4 POSTS & BASE SHOE PIPE

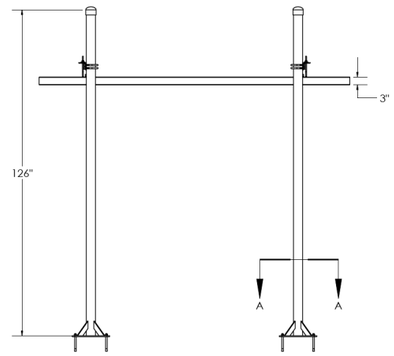


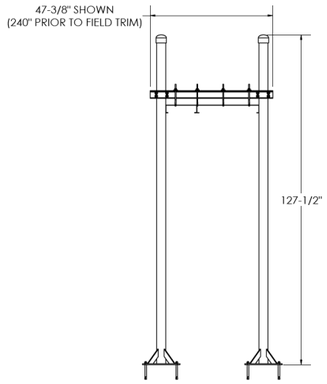
PV-IBC10-##XBSP
ICE BRIDGE CANOPY BASE SHOE PIPE

A **ICE CANOPY**

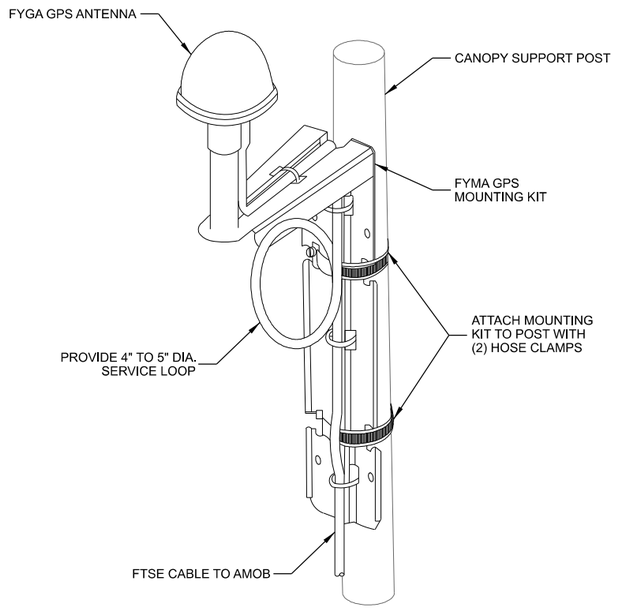


SECTION A-A
SCALE 1 : 12

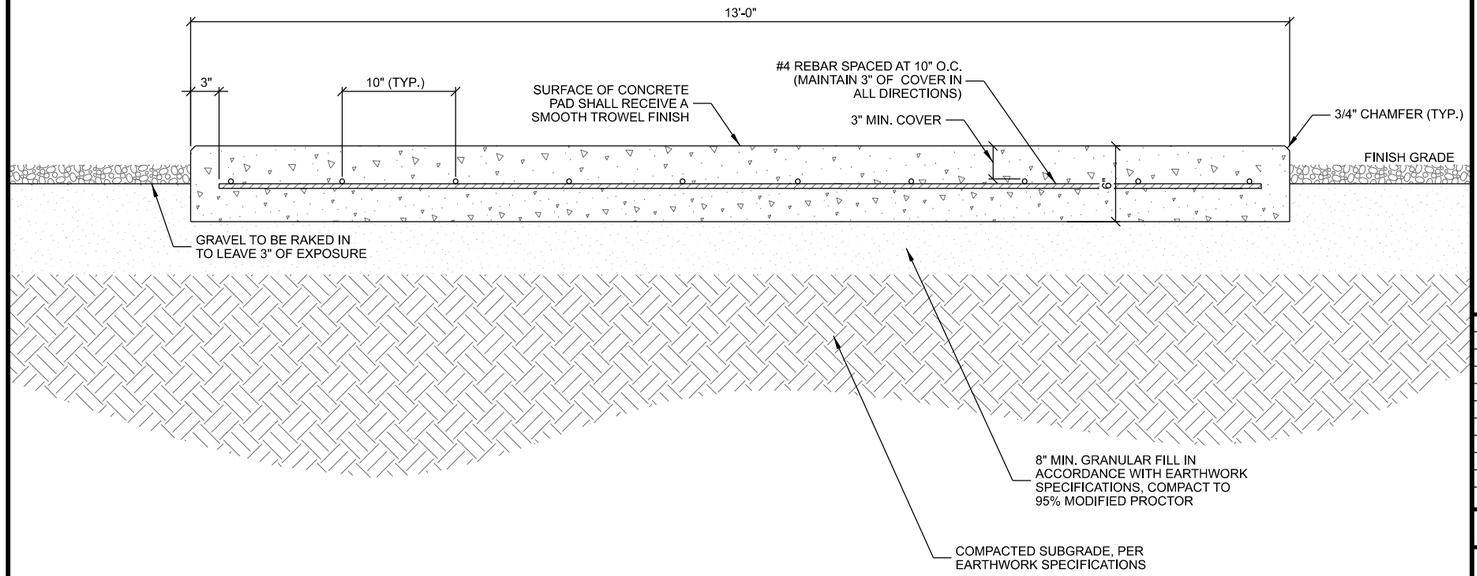




B **ICE CANOPY**



C **GPS ANTENNA MOUNTING**



D **TYPICAL FOUNDATION**

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EQUIPMENT PAD DEATILS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**A-501**

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FFVV-65C-R3-V1



8-port sector antenna, 4x 617-894 and 4x 1695–2690 MHz, 65° HPBW, 3x RET

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	4
RF Connector Quantity, low band	4
RF Connector Quantity, total	8

Remote Electrical Tilt (RET) Information

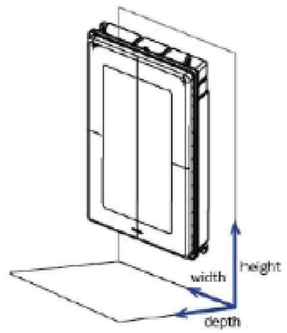
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (1)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	10 W
Protocol	3GPP/AISG 2.0 (Single RET)

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COMMSCOPE®

A **ANTENNA SPECIFICATION (700/600 & AWS/PCS)**

PRODUCT DESCRIPTION

Band	B41 – 2496-2690 MHz	
Supported Modulation schemes	(DL) BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM (UL) BPSK, QPSK, 16 QAM, 64 QAM	
No. of TX/RX	64TX64RX	
MIMO Streams	16	
Instantaneous IBW	194 MHz	
Occupied Bandwidth OBW	190 MHz	
Total Avg EIRP	74.8 dBm	
Supported bandwidths	LTE: 3x20 MHz 5G: 40/60/80/100MHz	
Output Power	5 W / TRX (320 W total, 2 W/MHz up to 160 MHz)	
Power Consumption	≤1330 W typical (75% DL duty cycle, 30% RF load) ≤1827 W max (75% DL duty cycle, 100% RF load)	
Optical Ports	4 x SFP28 (OCTIS), 25 Gbps, eCPRI	
Connector Type	APPG DC Pole connector	
Dimensions (H x W x D)	38.2 in x 21.5 in x 5.9 in	
Weight lbs	108.0 lb	
HW/SW Availability	SRAN20C/5G20B	
5G NR Support	Yes	
Material Description	Nokia AirScale MAA 64T64R 192AE B41 320W AEHC	AEHC 475124A

B **ANTENNA SPECIFICATION (LTE+5G)**

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CLIENT:
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750 PARK OF COMMERCE DRIVE
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ANTENNA SPECIFICATIONS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

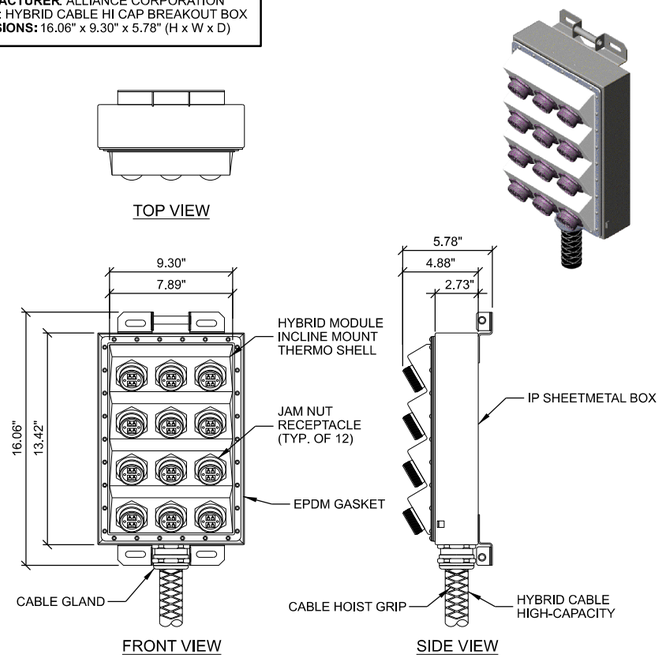
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**T-001**

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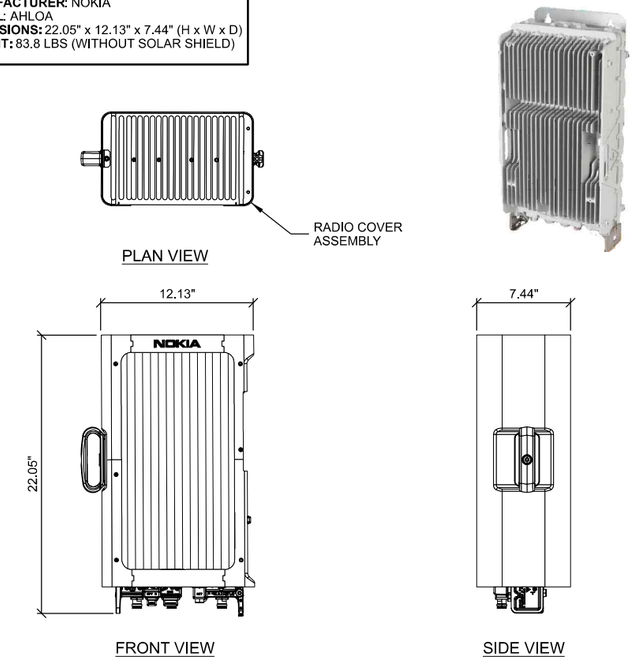
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MANUFACTURER: ALLIANCE CORPORATION
MODEL: HYBRID CABLE HI CAP BREAKOUT BOX
DIMENSIONS: 16.06" x 9.30" x 5.78" (H x W x D)



A HYBRID CABLE BREAKOUT BOX

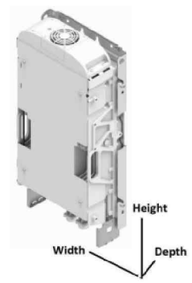
MANUFACTURER: NOKIA
MODEL: AHLOA
DIMENSIONS: 22.05" x 12.13" x 7.44" (H x W x D)
WEIGHT: 83.8 LBS (WITHOUT SOLAR SHIELD)



B REMOTE RADIO HEAD (RRH)

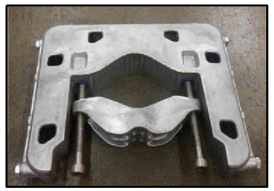
PRODUCT DESCRIPTION

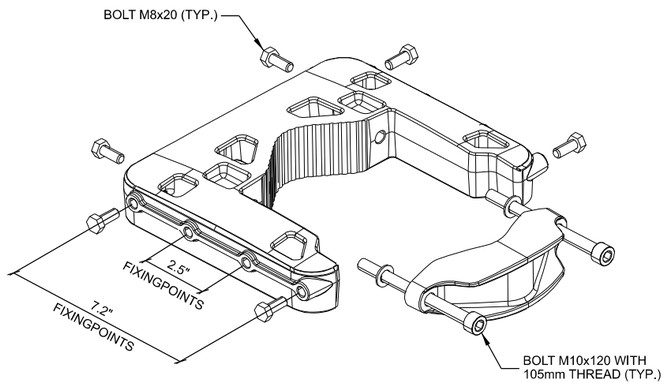
Band	B25 + B66
Instantaneous BW (DL/UL)	65MHz on Band 25, 80MHz on Band 66
Supported Modulation schemes	up to 64QAM (UL) and up to 256QAM (DL)
Supported bandwidths	LTE 1.4,3,5,10,15,20 MHz
No. of ports	4T4R
Output Power	80 W for Band 25 and 40 W for Band 66 (Total Power is 480W)
DC connector	Terminal block
Optical Fiber connector	2 x 9.8Gbps CPRI, R2CT IP seal
RF Connector	4.3-10+
AISG	AISG on all ports, DC on ANT1 and ANT3
Dimensions (H x W x D) in	27.3 x 12.1 x 5.2
Weight lbs	70.5 without cover
HW/SW Availability	Available now – SRAN19A
5G NR Support	YES
NB-IoT Support	YES (in band, guardband, standalone)



C REMOTE RADIO HEAD (RRH)

MANUFACTURER: NOKIA
DESCRIPTION: FLEXI POLE KIT (FPKA)
MODEL: 471649A





NOTES:
1. CAN BE USED WITH PIPES FROM 2.4"± DIA. TO 4.7"±.
2. MAX ALLOWABLE WEIGHT IS 352.7 LBS.

D FLEXI POLE KIT

THIS SPACE INTENTIONALLY LEFT BLANK

CONSULTANT:
Edge Consulting Engineers, Inc.
624 WATER STREET
PRAIRIE DU SAC, WI 53578
608.644.1449 VOICE
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www.edgeconsult.com

CLIENT:
verticalbridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

EQUIPMENT SPECIFICATIONS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

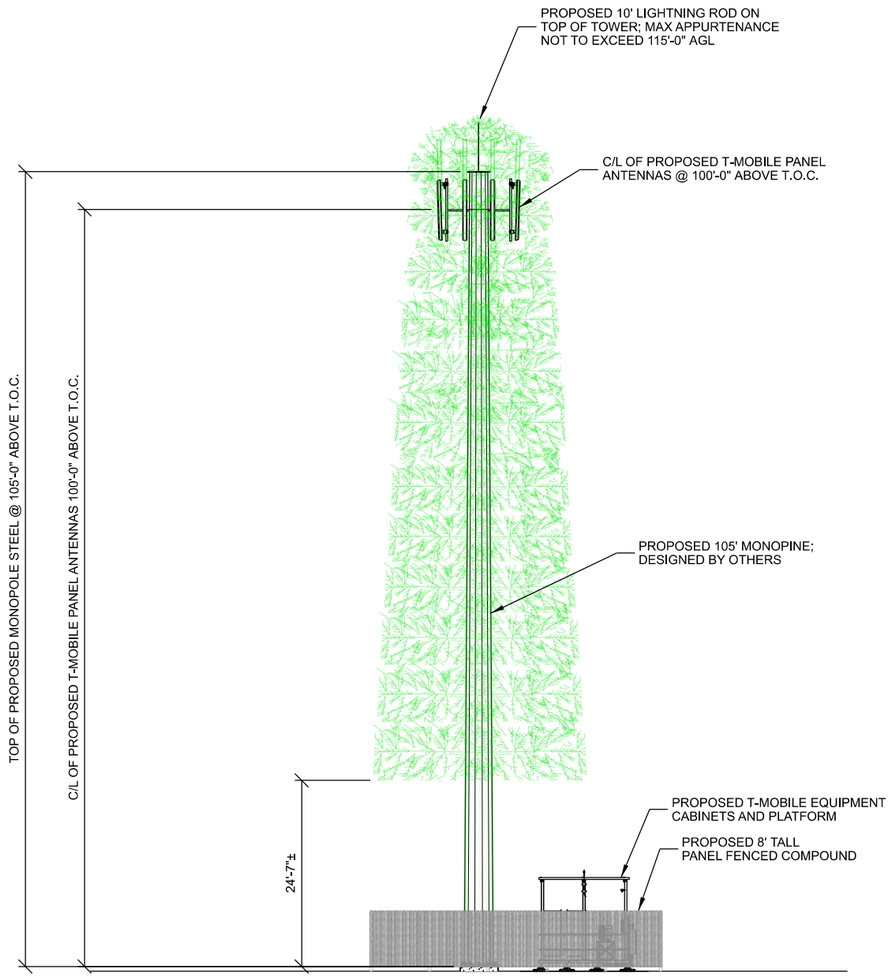
CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	T-002

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NOTES:

1. CONTRACTOR TO VERIFY HEIGHT AND DIRECTION OF ANTENNAS WITH PROJECT MANAGER.
2. CONTRACTOR TO VERIFY LIGHTNING ROD EXTENDS 2' MIN. ABOVE ALL ANTENNAS & EQUIPMENT
3. CONTRACTOR TO VERIFY MINIMUM 110% SETBACK (115'-6") TO EASTERN PROPERTY LINE



SPECIAL NOTE:

TOWER TO BE EQUIPPED WITH ANTI-CLIMBING DEVICE AS NECESSARY

NOTES:

1. ANCHOR BOLTS AND NUTS TO BE MARKED WITH INDELIBLE INK, 1/8" LINE.

A **SITE ELEVATION**

SCALE: 11" x 17" - 1" = 30'-0"
22" x 34" - 1" = 15'-0"

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CONSULTANT:

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CLIENT:

vertical bridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

SHEET TITLE:

SITE ELEVATION

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

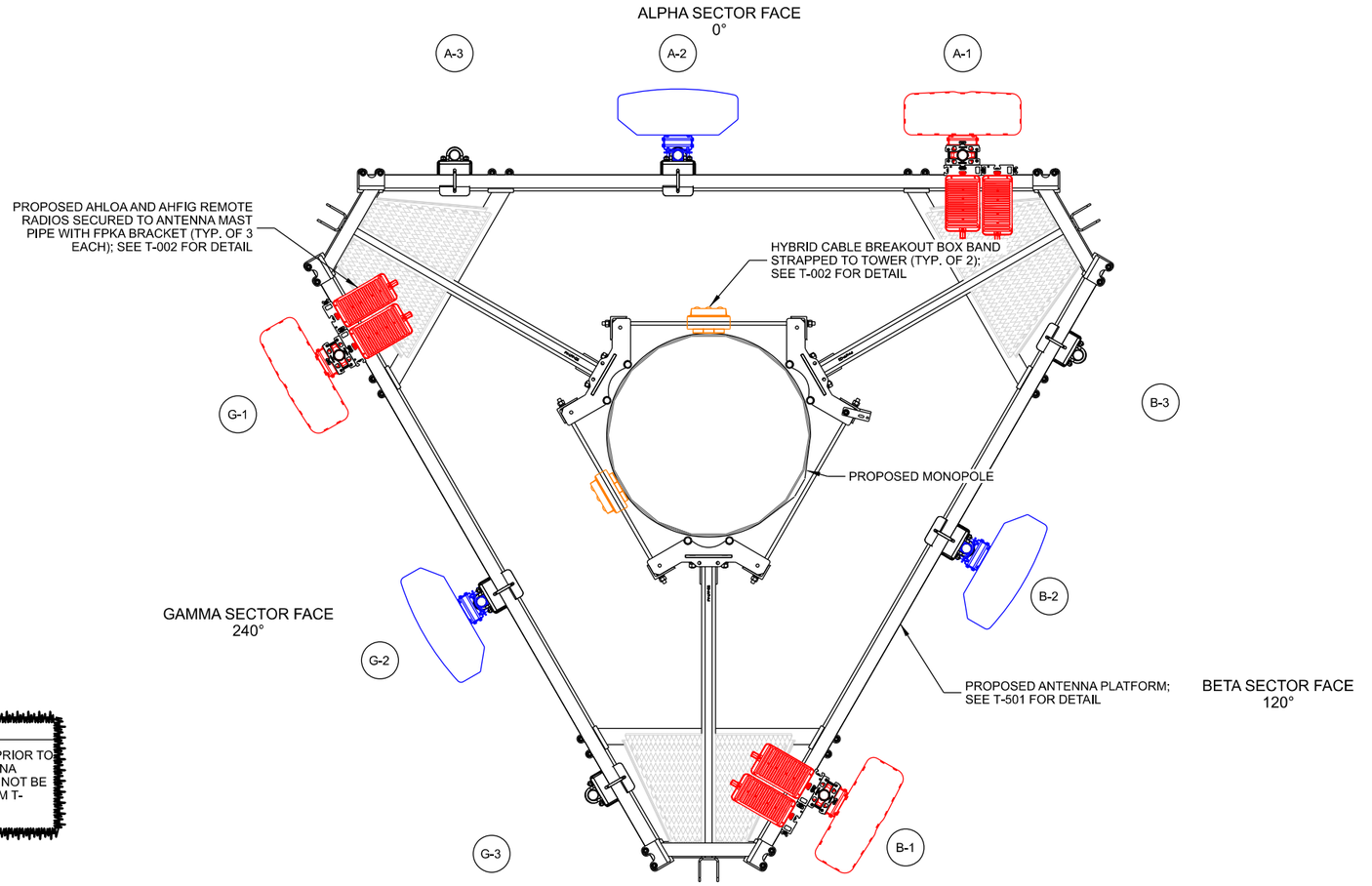
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INT.	DATE:	DESCRIPTION:
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JCB	12/08/2022	REV. B

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PLOT DATE	12/9/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**T-201**

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NORTH



NOTE:

T-MOBILE RF TO PROVIDE FINAL RFDS PRIOR TO ISSUING FINAL CDS. PROPOSED ANTENNA LOADING SHOWN IS TYPICAL, AND MAY NOT BE INDICATIVE OF FINAL SITE DESIGN FROM T-MOBILE

ANTENNA AND CABLE SCHEDULE (VIEW FROM THE REAR)

SECTOR	ALPHA			BETA			GAMMA		
LOCATION	A-3	A-2	A-1	B-3	B-2	B-1	G-3	G-2	G-1
TECHNOLOGY	N/A	LTE + 5G	AWS + PCS / 700 + 600	N/A	LTE + 5G	AWS + PCS / 700 + 600	N/A	LTE + 5G	AWS + PCS / 700 + 600
AZIMUTH	N/A	0°	0°	N/A	120°	120°	N/A	240°	240°
RAD CENTER	N/A	145'	145'	N/A	145'	145'	N/A	145'	145'
COLOR CODING	N/A	RED (5-8)	RED (1-8) (TYP. ALL SECTORS)	N/A	RED (5-8)	RED (1-8) (TYP. ALL SECTORS)	N/A	RED (5-8)	RED (1-8) (TYP. ALL SECTORS)
MODEL #	N/A	NOKIA AEHC	COMMSCOPE FFHH-65C-R3	N/A	NOKIA AEHC	COMMSCOPE FFHH-65C-R3	N/A	NOKIA AEHC	COMMSCOPE FFHH-65C-R3
MECHANICAL DOWNTILT	N/A	0°	0°	N/A	0°	0°	N/A	0°	0°
ELECTRICAL DOWNTILT	N/A	2°	2°	N/A	2°	2°	N/A	2°	2°
RRU TYPE	N/A	N/A	AHLOA & AHFIG	N/A	N/A	AHLOA & AHFIG	N/A	N/A	AHLOA & AHFIG
HCS TYPE/QUANTITY	(2) NOKIA HIGH CAP HCS 2.0 TRUNK - 12#6AWG 24 SM FIBER PR								
HCS ACTUAL LENGTH	125'								
BUNDLE TYPE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BUNDLE LENGTH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
JUMPER TYPE FROM COVP TO RRU	N/A	HCS 2.0 JUMPER - 10AWG 2PR AIRSCALE	HCS 2.0 JUMPER - 6AWG 2PR AIRSCALE	N/A	HCS 2.0 JUMPER - 10AWG 2PR AIRSCALE	HCS 2.0 JUMPER - 6AWG 2PR AIRSCALE	N/A	HCS 2.0 JUMPER - 10AWG 2PR AIRSCALE	HCS 2.0 JUMPER - 6AWG 2PR AIRSCALE
JUMPER LENGTH	N/A	15'	15'	N/A	15'	15'	N/A	15'	15'
JUMPER QUANTITY	N/A	1	2	N/A	1	2	N/A	1	2
JUMPER TYPE FROM COVP TO ANTENNA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
JUMPER LENGTH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
JUMPER QUANTITY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE:

1. ALL ANTENNA AZIMUTHS TO BE FROM TRUE NORTH.
2. CONTRACTOR TO INSTALL CABLE KEEPERS AS NEEDED ON ANY MOUNTS THAT MAY OBSTRUCT THE TOWER SAFETY CLIMB. THE SAFETY CLIMB CABLE SHALL BE ROUTED IN THE KEEPERS SUCH THAT IT DOES NOT RUB ON THE MOUNTS OR ANY RF CABLES.

A ANTENNA AND EQUIPMENT LAYOUT

CONSULTANT:

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CLIENT:

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VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

ANTENNA AND EQUIPMENT CONFIGURATION

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

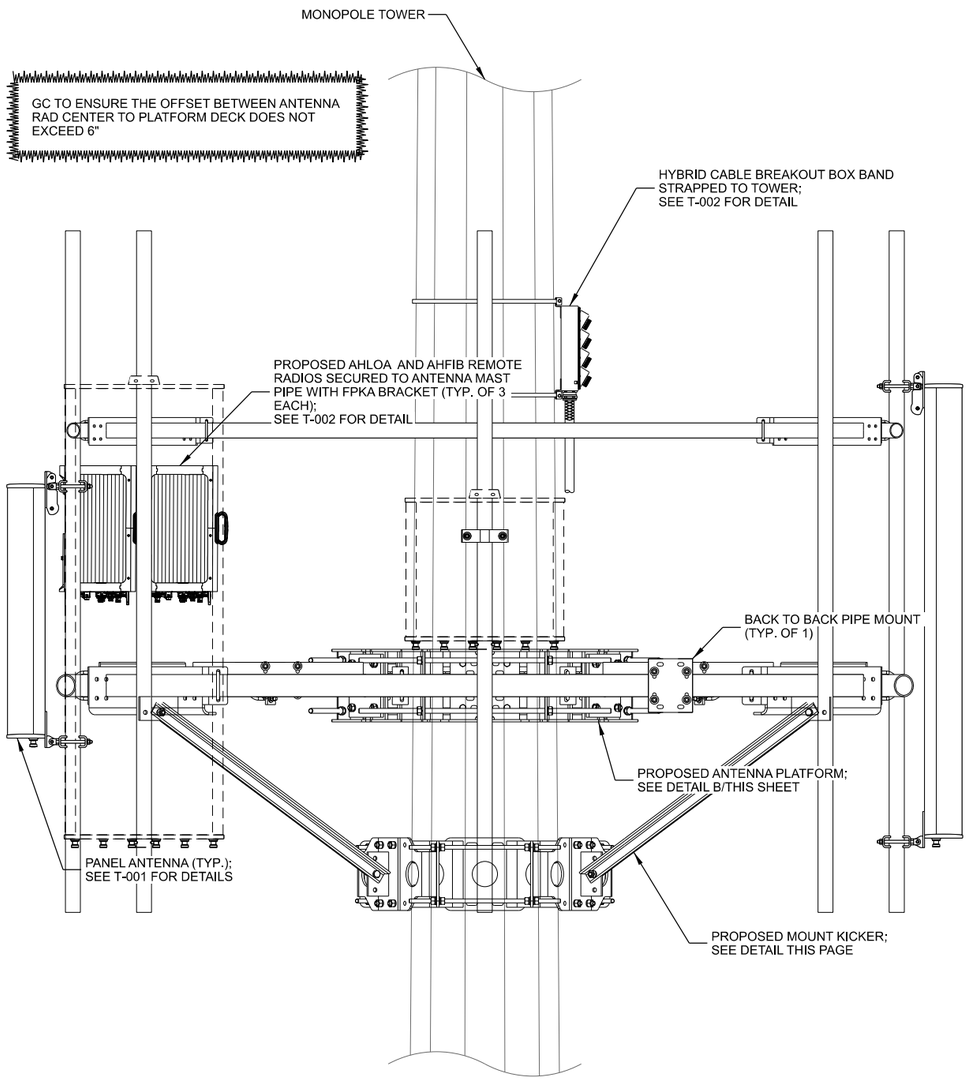
SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

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PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	T-301

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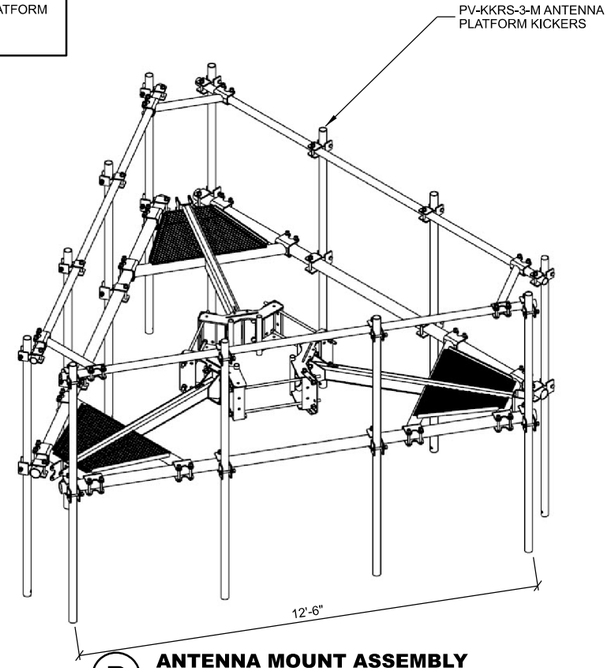


A **ANTENNA AND EQUIPMENT MOUNTING**

MANUFACTURER: PERFECT VISION
MODEL: PV-LPPGS-12M-HR2-AP2

MONOPOLE GUARDIAN MOUNT PLATFORM

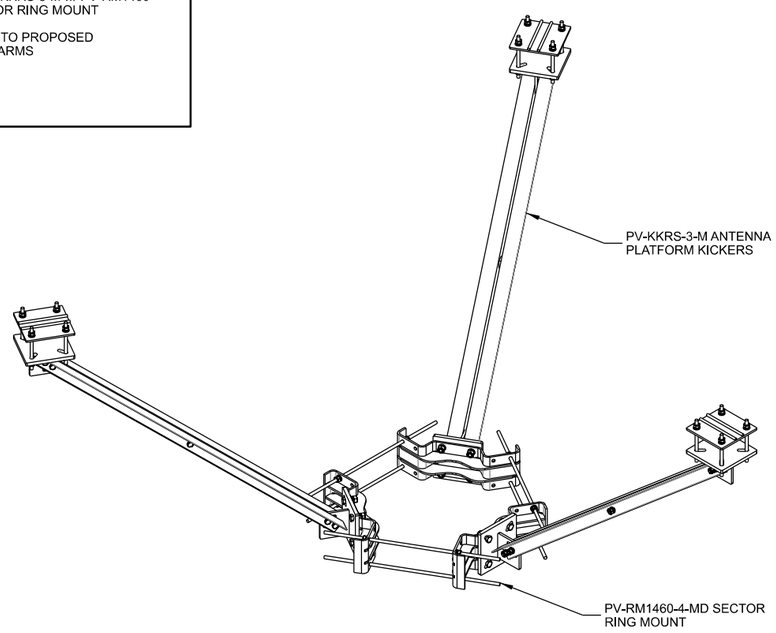
ACCEPTS 10" TO 40" POLE DIA.



B **ANTENNA MOUNT ASSEMBLY**

MANUFACTURER: PERFECT VISION
MODEL: PV-KKRS-3-M w/ PV-RM1460-4-MD SECTOR RING MOUNT

CONNECTS TO PROPOSED PLATFORM ARMS



C **ANTENNA MOUNT KICKER**

CONSULTANT:
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BOCA RATON, FL 33487

INSTALLATION DETAILS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

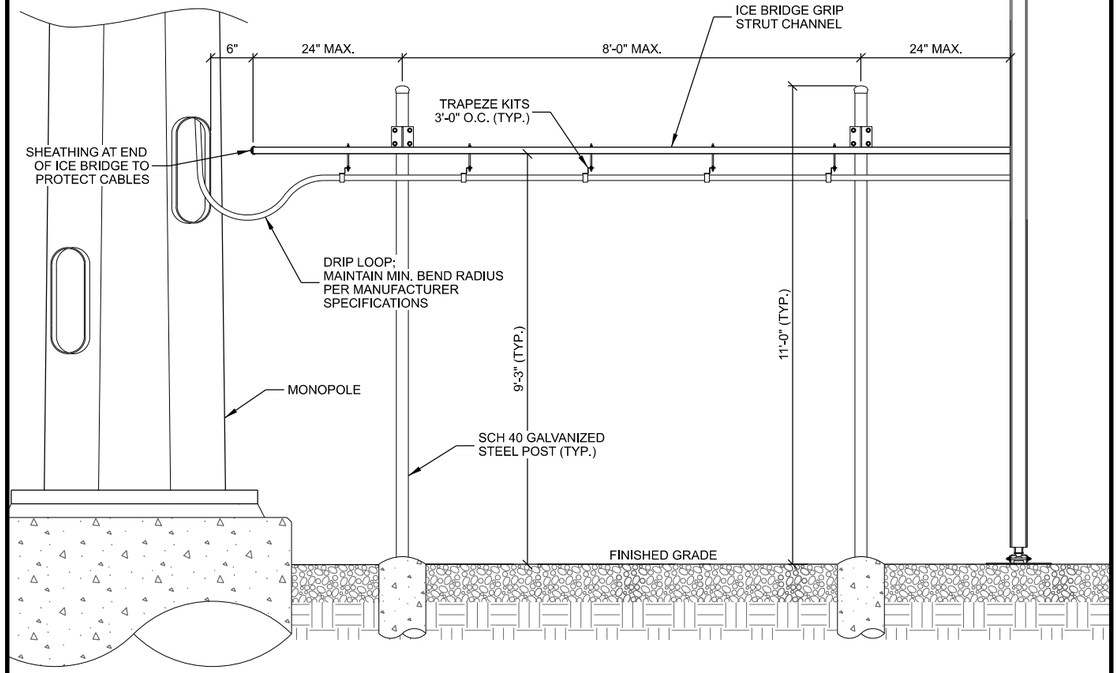
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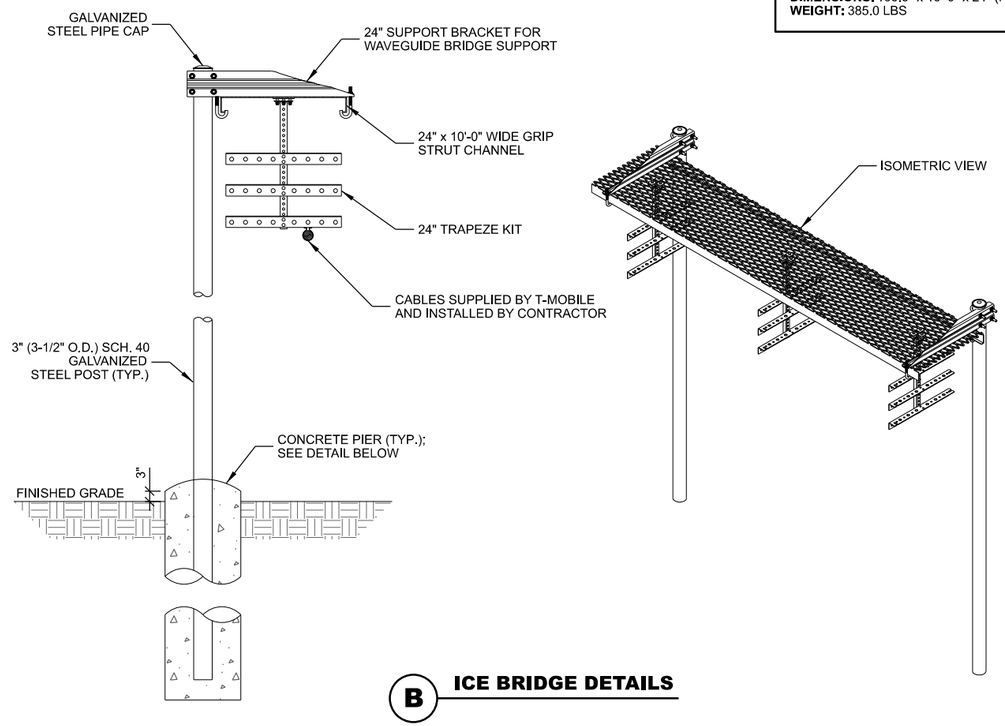
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PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**T-501**

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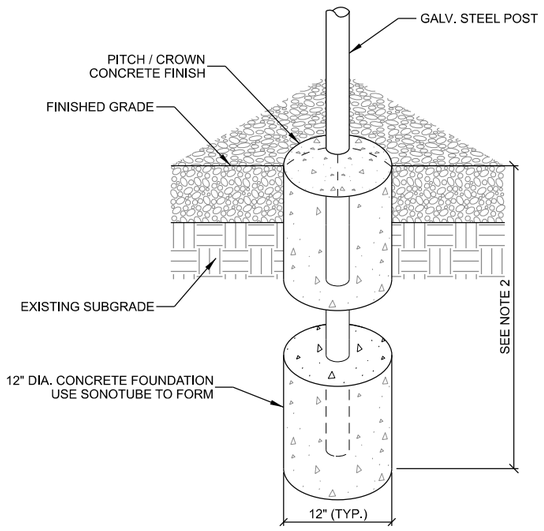


A **ICE BRIDGE INSTALLATION**



B **ICE BRIDGE DETAILS**

MANUFACTURER: ANDREW/COMMSCOPE
MODEL: WB-K210-B
DIMENSIONS: 160.0" x 10'-0" x 24" (H x L x W)
WEIGHT: 385.0 LBS



NOTES:
1. CONCRETE MIX TO BE 4,000 PSI @ 28 DAYS.
2. FOUNDATION DEPTH TO EXCEED LOCAL FROST DEPTH, OR 48" MINIMUM.

C **PIER FOUNDATION**

MANUFACTURER: SITE PRO 1
MODEL: UTL8

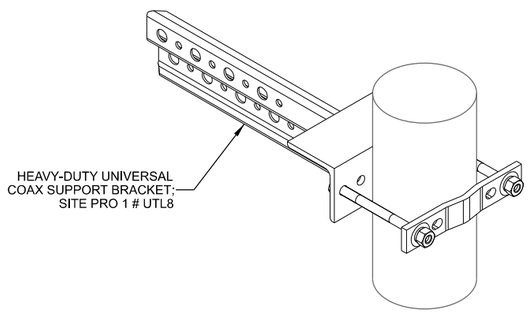
HEAVY-DUTY UNIVERSAL SUPPORT BRACKET

MOUNTS TO ROUND MEMBERS (1-1/2" O.D. TO 5-1/2" O.D.)

PUNCHED WITH 3/4" DIA. HOLES FOR SNAP-IN HANGERS AND 7/16" DIA. HOLES FOR HARDWARE

HOT-DIP GALVANIZED

CAN BE BOLTED DIRECTLY TO PIROD KNOCK-DOWN LEGS WITH INCLUDED HARDWARE



D **HEAVY-DUTY UNIVERSAL COAX SUPPORT BRACKET**

ICE BRIDGE NOTES : (THIS SHEET)

1. FOR COMPONENTS AS SHOWN IN STANDARD DETAILS, MAXIMUM ALLOWABLE SPAN BETWEEN SUPPORTS ON A CONTINUOUS SINGLE SECTION OF BRIDGE CHANNEL SHALL BE 8' FOR A 10' SECTION.
2. SPLICES IN SECTIONS OF BRIDGE CHANNEL SHALL BE INSTALLED AT SUPPORTS, WHERE POSSIBLE, OR AT MOST 2' FROM A SUPPORT.
3. FREE ENDS OF ICE BRIDGE CHANNELS SHALL NOT EXCEED A CANTILEVER DISTANCE OF 2' FROM A SUPPORT.
4. CUT BRIDGE CHANNEL SECTIONS SHALL HAVE RAW EDGES TREATED WITH COLD GALVANIZING SPRAY.
5. DEVIATIONS FROM STANDARDS FOR COMPONENT INSTALLATIONS ARE PERMITTED WITH MANUFACTURER'S AND ENGINEER'S APPROVAL.
6. DEVIATIONS FROM ICE BRIDGE FOUNDATIONS SHOWN ON SITE SPECIFIC DRAWINGS OR STANDARD DETAILS REQUIRE ENGINEERING APPROVAL.

CONSULTANT:
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608.644.1449 VOICE
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CLIENT:
verticalbridge
VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

CABLE ROUTING DETAILS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	T-502

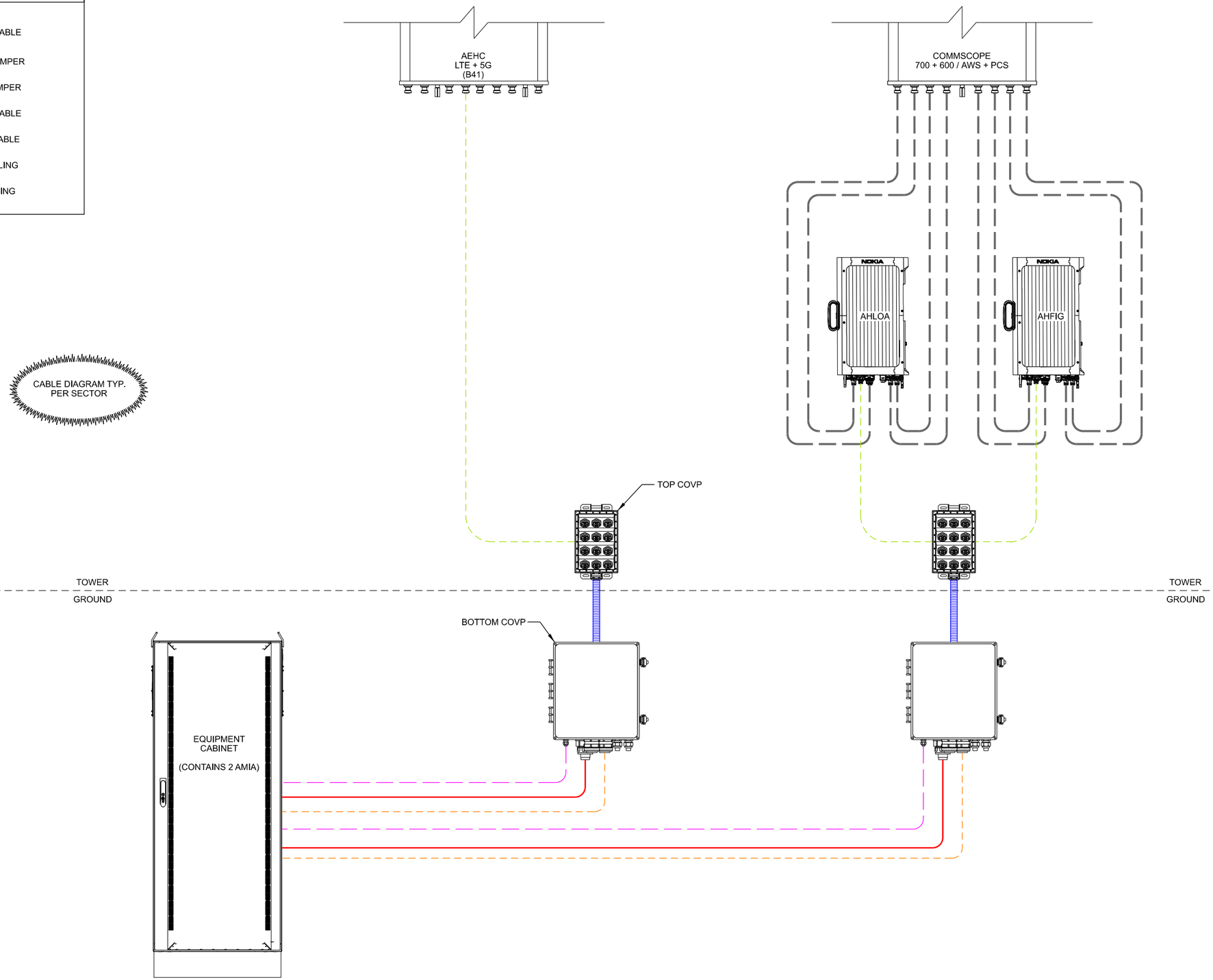
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CABLE LEGEND

- HYBRID CABLE
- HYBRID JUMPER
- FIBER JUMPER
- POWER CABLE
- ALARM CABLE
- RET CABLING
- RF CABLING

CABLE DIAGRAM TYP.
PER SECTOR



A TYP. PLUMBING DIAGRAM

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PLUMBING DIAGRAM
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

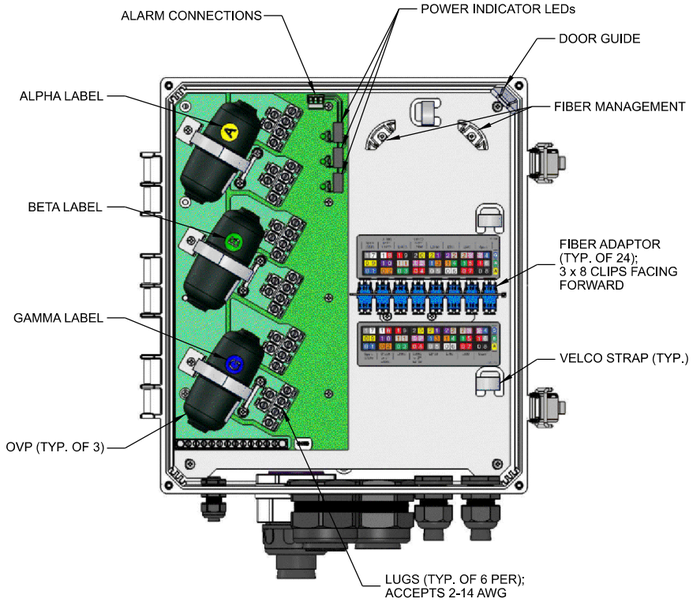
SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**T-503**

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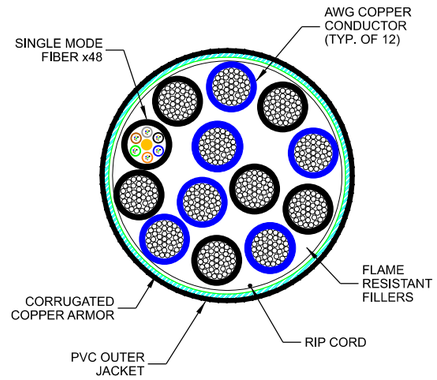
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A COVP FIBER AND POWER CONFIGURATION

MANUFACTURER: ALLIANCE CORPORATION
MODEL: ARMORED TRUNK HYBRID CABLE
HIGH-CAPACITY WITH #4 AWG CONDUCTORS

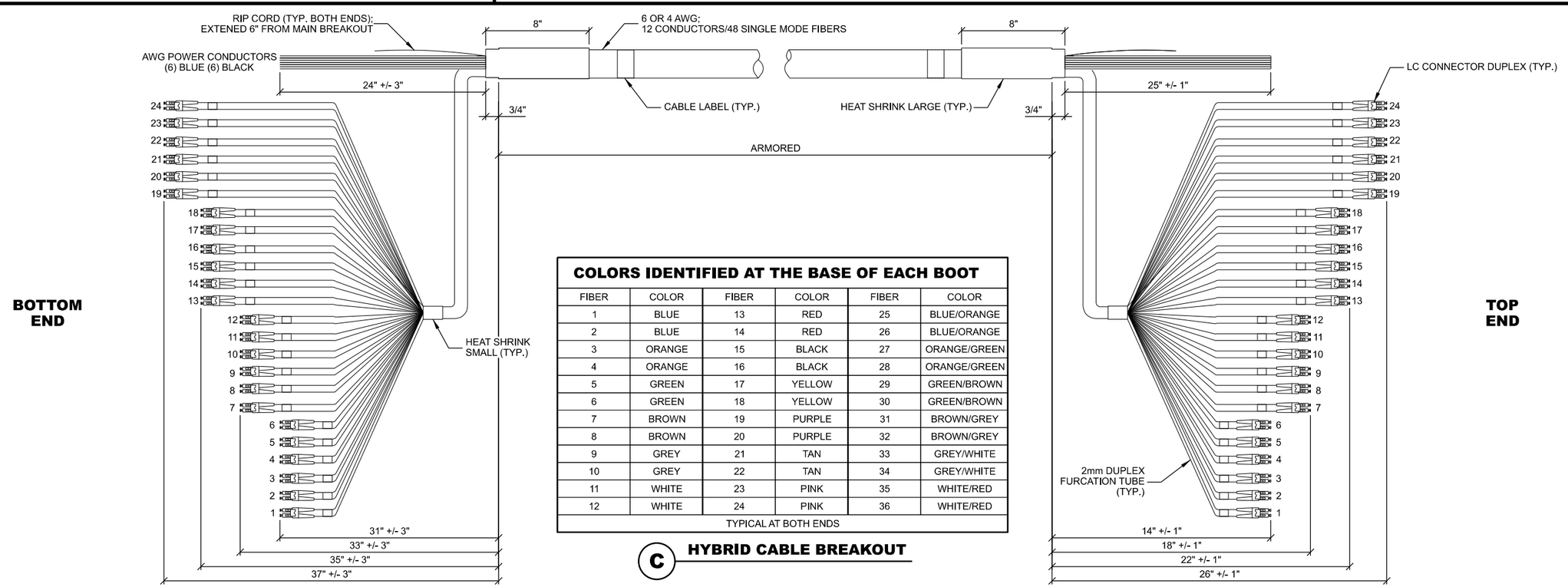
MECHANICAL:	
JACKET COLOR	BLACK
OUTER DIAMETER (IN.)	1.8
MIN. BEND RADIUS (IN.), MULTIPLE BENDS, LOADED	36
MIN. BEND RADIUS (IN.), MULTIPLE BENDS, UNLOADED	18
MIN. BEND RADIUS (IN.), SINGLE BEND, UNLOADED	12.6
MIN. BEND RADIUS (IN.), FURCATION	1.2
ARMOR	CORRUGATED COPPER
WEIGHT (LB./FT.)	2480
COMPRESSION (LB./IN.)	250
TENSILE LOAD, LONG TERM (LBF)	180
TENSILE LOAD, SHORT TERM (LBF)	600
ELECTRICAL:	
CONDUCTOR MATERIAL	COPPER
CONDUCTOR CONSTRUCTION	STRAND
CONDUCTOR COLOR	BLUE/BLACK
RESISTIVITY (nO AT 20° C)	16,78 nohm-M
CONDUCTORS, QUANTITY	12
CONDUCTOR SIZE (AWG)	4
EMI SHIELD	YES
UL RATING	UL TC-OF-ER
OPTICAL:	
FIBER TYPE	SINGLE MODE (G.657.A2)
FIBERS, QUANTITY	48
ATTENUATION (dB/KM), MAX, 1550/1285-1330 NM	0.5
DISPERSION, MAN, 1550/1285-1330 NM	18 ps/3.5 ps
RETURN LOSS (dB)	>50
INSERTION LOSS (dB), POST ENVIRONMENTAL	REDUCTION < 0.65
RETURN LOSS (dB), POST ENVIRONMENTAL	REDUCTION < 5
CUTOFF WAVELENGTH (NM)	1260
PIGTAIL TERMINATION	LC PAIR, STRAIGHT
ENVIRONMENTAL:	
OPERATING TEMPERATURE (°F)	-40 TO +167
STORAGE TEMPERATURE (°F)	-40 TO +167
UV	IEC 60068-2-5
THERMAL CYCLE	IEC 60068-2-14
VIBRATION	IEC 60068-2-64
IMPACT (FT. LB.)	4.4 NM PER ICEA696



B HYBRID CABLE HIGH-CAPACTIY

MANUFACTURER: ALLIANCE CORPORATION
MODEL: ARMORED TRUNK HYBRID CABLE
HIGH-CAPACITY WITH #6 AWG CONDUCTORS

MECHANICAL:	
JACKET COLOR	BLACK
OUTER DIAMETER (IN.)	1.46
MIN. BEND RADIUS (IN.), MULTIPLE BENDS, LOADED	29.2
MIN. BEND RADIUS (IN.), MULTIPLE BENDS, UNLOADED	14.6
MIN. BEND RADIUS (IN.), SINGLE BEND, UNLOADED	10.22
MIN. BEND RADIUS (IN.), FURCATION	1.2
ARMOR	CORRUGATED COPPER
WEIGHT (LB./FT.)	1610
COMPRESSION (LB./IN.)	250
TENSILE LOAD, LONG TERM (LBF)	180
TENSILE LOAD, SHORT TERM (LBF)	600
ELECTRICAL:	
CONDUCTOR MATERIAL	COPPER
CONDUCTOR CONSTRUCTION	STRAND
CONDUCTOR COLOR	BLUE/BLACK
RESISTIVITY (nO AT 20° C)	16,78 nohm-M
CONDUCTORS, QUANTITY	12
CONDUCTOR SIZE (AWG)	6
EMI SHIELD	YES
UL RATING	UL TC-OF-ER
OPTICAL:	
FIBER TYPE	SINGLE MODE (G.657.A2)
FIBERS, QUANTITY	48
ATTENUATION (dB/KM), MAX, 1550/1285-1330 NM	0.5
DISPERSION, MAN, 1550/1285-1330 NM	18 ps/3.5 ps
RETURN LOSS (dB)	>50
INSERTION LOSS (dB), POST ENVIRONMENTAL	REDUCTION < 0.65
RETURN LOSS (dB), POST ENVIRONMENTAL	REDUCTION < 5
CUTOFF WAVELENGTH (NM)	1260
PIGTAIL TERMINATION	LC PAIR, STRAIGHT
ENVIRONMENTAL:	
OPERATING TEMPERATURE (°F)	-40 TO +167
STORAGE TEMPERATURE (°F)	-40 TO +167
UV	IEC 60068-2-5
THERMAL CYCLE	IEC 60068-2-14
VIBRATION	IEC 60068-2-64
IMPACT (FT. LB.)	4.4 NM PER ICEA696



COLORS IDENTIFIED AT THE BASE OF EACH BOOT

FIBER	COLOR	FIBER	COLOR	FIBER	COLOR
1	BLUE	13	RED	25	BLUE/ORANGE
2	BLUE	14	RED	26	BLUE/ORANGE
3	ORANGE	15	BLACK	27	ORANGE/GREEN
4	ORANGE	16	BLACK	28	ORANGE/GREEN
5	GREEN	17	YELLOW	29	GREEN/BROWN
6	GREEN	18	YELLOW	30	GREEN/BROWN
7	BROWN	19	PURPLE	31	BROWN/GREY
8	BROWN	20	PURPLE	32	BROWN/GREY
9	GREY	21	TAN	33	GREY/WHITE
10	GREY	22	TAN	34	GREY/WHITE
11	WHITE	23	PINK	35	WHITE/RED
12	WHITE	24	PINK	36	WHITE/RED
TYPICAL AT BOTH ENDS					

C HYBRID CABLE BREAKOUT

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CABLING DETAILS
US-IL-5744 NORTHWEST HIGHWAY CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

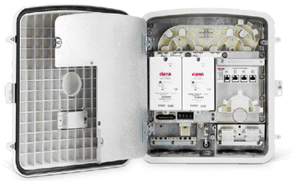
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

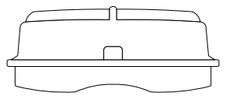
CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	T-504

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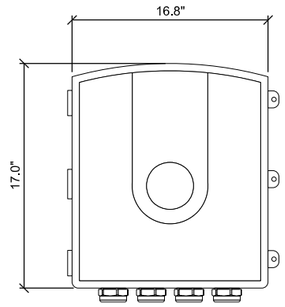
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MANUFACTURER: CIENA
MODEL: 3931
DIMENSIONS: 17.0" x 16.8" x 7.0" (H x W x D)
WEIGHT: 28.6 LBS

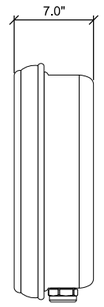




BOTTOM VIEW



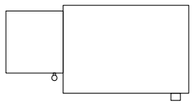
FRONT VIEW



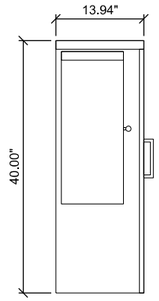
SIDE VIEW

A CIENA FIBER ENCLOSURE

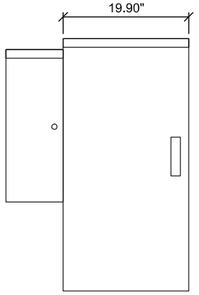
MANUFACTURER: DELTA
MODEL: 2262P1D30D-C00
DIMENSIONS: 40.00" x 19.90" x 13.94" (H x W x D)



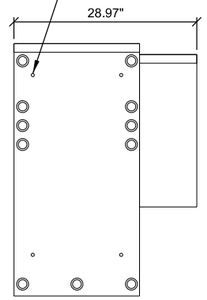
PLAN VIEW



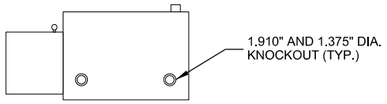
SIDE VIEW



FRONT VIEW



BACK VIEW



BOTTOM VIEW

B POWER PROTECTION CABINET (PPC)

NOTE:

1. ALL DISCONNECTS SHALL BE LEGIBLY IDENTIFIED AND ELECTRIC PANELS SHALL HAVE A SCHEDULE CIRCUIT DIRECTORY INSIDE OR ON THE FACE OF EACH PANEL (PER NEC 110.23 & 408.4).

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UTILITY EQUIPMENT SPECIFICATIONS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	E-001

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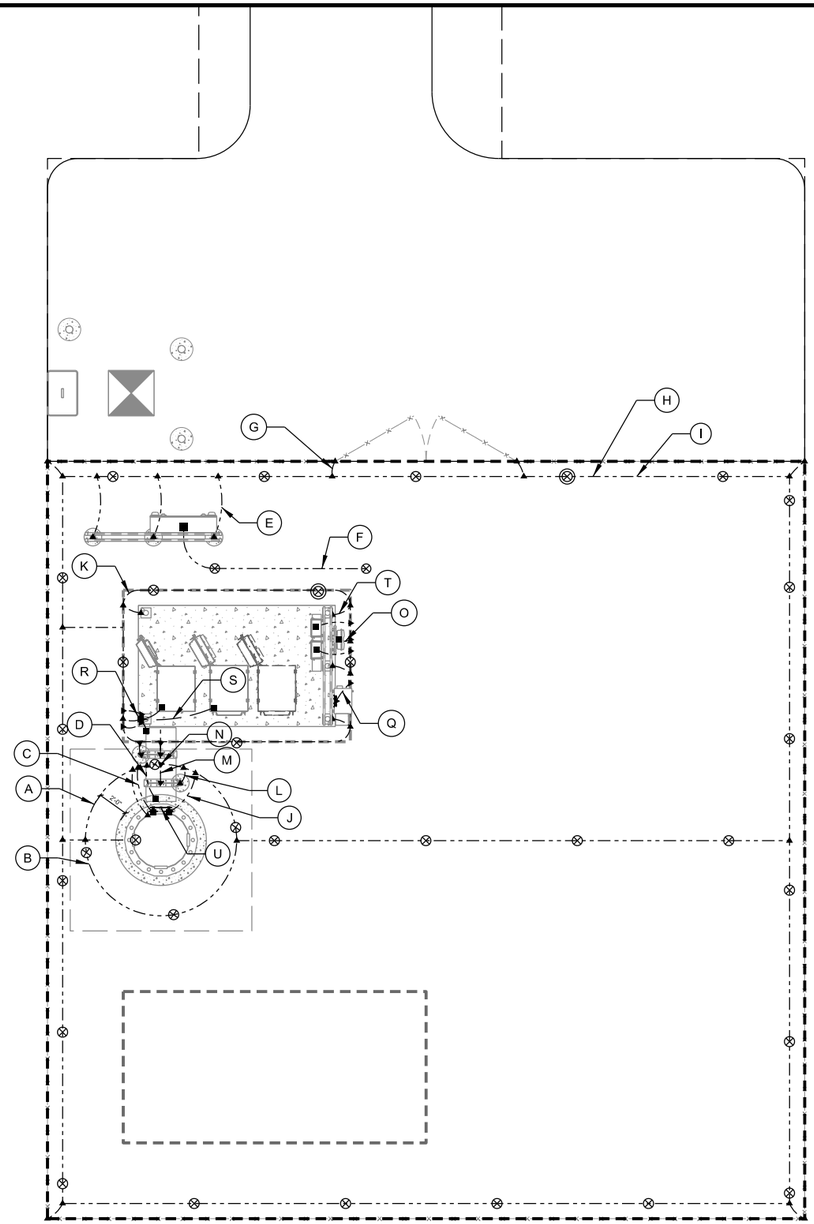
KEYNOTES: (THIS SHEET)

- (A) MAINTAIN 2-FOOT CLEARANCE FROM ALL STRUCTURES
- (B) TOWER GROUND RING, #2 SOLID BARE TINNED COPPER
- (C) GROUND LEADS FROM TOWER STEEL TO GROUND RING (TYP. OF 3) (USE GROUNDING TABS WHEN AVAILABLE), #2 SOLID BARE TINNED COPPER
- (D) TOWER FOUNDATION GROUND, #2 SOLID BARE TINNED COPPER
- (E) MULTI-METER RACK POST (TYP.)
- (F) GROUND ELECTRIC METER HOUSING TO (2) INDEPENDENT GROUND RODS, SPACED 10' O.C. WITH #2 SOLID BARE TINNED COPPER
- (G) GATE GROUND LEAD
- (H) PERIPHERAL GROUND RING SHOULD BE INSTALLED 1' TO 2' INSIDE THE FENCED LINE, #2 SOLID BARE TINNED COPPER
- (I) FENCE CORNER GROUND LEAD, GROUND FENCE WITHIN 25-FEET OF TOWER
- (J) (2) #2 SOLID BARE TINNED COPPER GROUND LEADS TO GROUND RING FOR FUTURE CARRIER GROUND BAR
- (K) EQUIPMENT PLATFORM GROUND RING #2 SOLID BARE TINNED COPPER; SEE E-502 FOR DETAILS
- (L) ICE BRIDGE POST GROUND (TYP.); SEE E-501 FOR DETAILS
- (M) ICE BRIDGE SECTION GROUNDS; SEE E-501 FOR DETAILS
- (N) BOND EQUIPMENT GROUND RING TO THE TOWER GROUND RING WITH EXOTHERMIC CONNECTION (TYP.)
- (O) CEINA GROUND LEAD TO EQUIPMENT PLATFORM GROUND RING; SEE E-501 FOR DETAILS
- (P) AUTOMATIC TRANSFER SWITCH (ATS) GROUND LEAD TO EQUIPMENT PLATFORM GROUND RING; SEE E-501 FOR DETAILS
- (Q) POWER PROTECTION CABINET (PPC) GROUND LEAD TO EQUIPMENT PLATFORM GROUND RING; SEE E-501 FOR DETAILS
- (R) GROUND MOUNTED EQUIPMENT GROUND TO MASTER GROUND BAR; SEE E-501 FOR DETAILS
- (S) EQUIPMENT CABINET GROUND TO MASTER GROUND BAR; SEE E-501 FOR DETAILS
- (T) GROUND LEAD FROM EQUIPMENT GROUND RING TO CANOPY STEEL POST; SEE E-501 FOR DETAILS
- (U) MASTER GROUND BAR SEE E-501 FOR DETAILS
- (V) (2) #2 SOLID BARE TINNED COPPER GROUND LEADS TO GROUND RING FOR FUTURE CARRIER GROUND BAR

NOTES: (THIS SHEET)

1. ALL EXTERIOR GROUNDING SHALL MEET OR EXCEED THE CURRENT NEC AND NFPA 780 CODE.
2. THE GROUNDING SYSTEM & CONDUCTORS SHALL BE INSPECTED PRIOR TO BACK FILLING WITH RESULTS APPROVED BY THE CARRIER. THE SYSTEM SHALL PROVIDE 5 OHM OR LESS RESISTANCE UPON COMPLETION.
3. HIGH COMPRESSION TYPE CONNECTORS SHALL BE USED FOR SECONDARY GROUNDING CONDUCTOR TO MAIN GROUNDING CONDUCTOR CONNECTIONS. AFTER INSPECTION CONNECTIONS SHALL BE WRAPPED WITH ELECTRICAL VINYL TAPE.
4. ALL MECHANICAL CONNECTIONS SHALL INCLUDE ANTI-OXIDANT COMPOUND BETWEEN LUG & CONNECTION POINT. SCRAPE PAINT FROM OBJECT BEING CONNECTED TO. TOUCH UP PAINT ANY EXPOSED METAL AFTER CONNECTION IS INSTALLED.
5. GROUNDING CONDUCTORS SHALL MAINTAIN, TO THE EXTENT PRACTICAL, A HORIZONTAL OR DOWNWARD DIRECTION FREE FROM UP AND DOWN POCKETS. THE RADIUS OF BEND SHALL NOT BE LESS THAN 8" AND THE ANGLE OF ANY BEND SHALL NOT BE SHARPER (LESS) THAN 90°.
6. THE MAXIMUM HORIZONTAL AND VERTICAL SPACING BETWEEN GROUNDING CONDUCTOR (NOT IN CONDUIT) SUPPORTS SHALL NOT EXCEED 4 FT.
7. IF A GROUNDING CONDUCTOR IS INSTALLED IN FERROUS METAL CONDUITS, THE CONDUCTOR SHALL BE BONDED TO THE TOP AND BOTTOM OF THE CONDUIT.
8. ALL NON-INSULATED GROUND LEADS EXTENDING ABOVE GROUND LEVEL SHALL BE ENCASED IN 3/4" PVC & SEALED WITH SILICONE ON BOTH ENDS.
9. ALL ABOVE GRADE EXOTHERMIC CONNECTIONS (TO GALVANIZED ITEMS) SHALL BE SPRAYED WITH COLD GALVANIZING COMPOUND TO PREVENT CORROSION.
10. GROUND RINGS & TOP OF RODS SHALL BE INSTALLED AT 30" BELOW FINISHED GRADE.
11. INSTALL 18" x 18" COPPER PLATES IN LIEU OF GROUND RODS WHEN INSTALLING OVER TOWER FOUNDATION OR WHERE DRIVING GROUND RODS IS NOT FEASIBLE. REFER TO GEOTECH REPORT FOR SOIL CONDITIONS.

NORTH



GROUNDING LEGEND: (THIS SHEET)

- ▲ EXOTHERMIC OR UL RATED IRREVERSIBLE CONNECTION
- ■ MECHANICAL CONNECTION
- — - - GROUND LEAD
- ⊗ GROUND INSPECTION WELL
- ⊗ COPPER CLAD GROUND ROD, (5/8" DIA. x 8' LONG) SPACE @ 10' O.C. MAX.
- ⊗ COPPER PLATE, (18" x 18" x .032" THK) SPACE @ 10' O.C. MAX.

5' 0 5' 10'

SCALE: 11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

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CLIENT:
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VERTICAL BRIDGE DEVELOPMENT, LLC
750 PARK OF COMMERCE DRIVE
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BOCA RATON, FL 33487

COMPOUND GROUNDING PLAN
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

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PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	E-101

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NORTH

RIGHT OF WAY

EXCEPTION NO. 10 & 11 10' WIDE UTILITY EASEMENT PER PLAT

APPROX. PROPERTY LINE

WOODS

PROPOSED TREELINE; REMOVE TREES 5' OFF OF COMPOUND

15' BUILDING SETBACK LINE, PER PLATE

PROPOSED 10'-0" x 15'-0" TMO LEASE AREA

EXTENTS OF PROPOSED 20' WIDE VERTICAL BRIDGE ACCESS AND UTILITY EASEMENT

PROPOSED MULTI-METER UTILITY RACK; SEE E-503 FOR DETAILS

PROPOSED TELCO PEDESTAL

PROPOSED MONOPINE DESIGNED BY OTHERS; SEE T-201 FOR DETAILS

PROPOSED UNDERGROUND UTILITY CONDUIT ROUTING

PARKING LOT

PROPOSED VB BTS 10' WIDE UTILITY EASEMENT

PROPOSED 50' x 50' FENCED COMPOUND

GRASS

EXISTING BUILDING

EXISTING BUILDING

25' BUILDING SETBACK LINE, PER PLATE

BRUSH

PARCEL NO: 19-09-104-015
PROPERTY OWNER: CALYPSO VENTURES, LLC.

SETBACK LINE

15' BUILDING SETBACK LINE, PER PLATE

APPROX. PROPERTY LINE

10' 0 10' 20'

SCALE: 11" x 17" - 1" = 20'
22" x 34" - 1" = 10'

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CONSULTANT:
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BOCA RATON, FL 33487

UTILITY PLAN

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

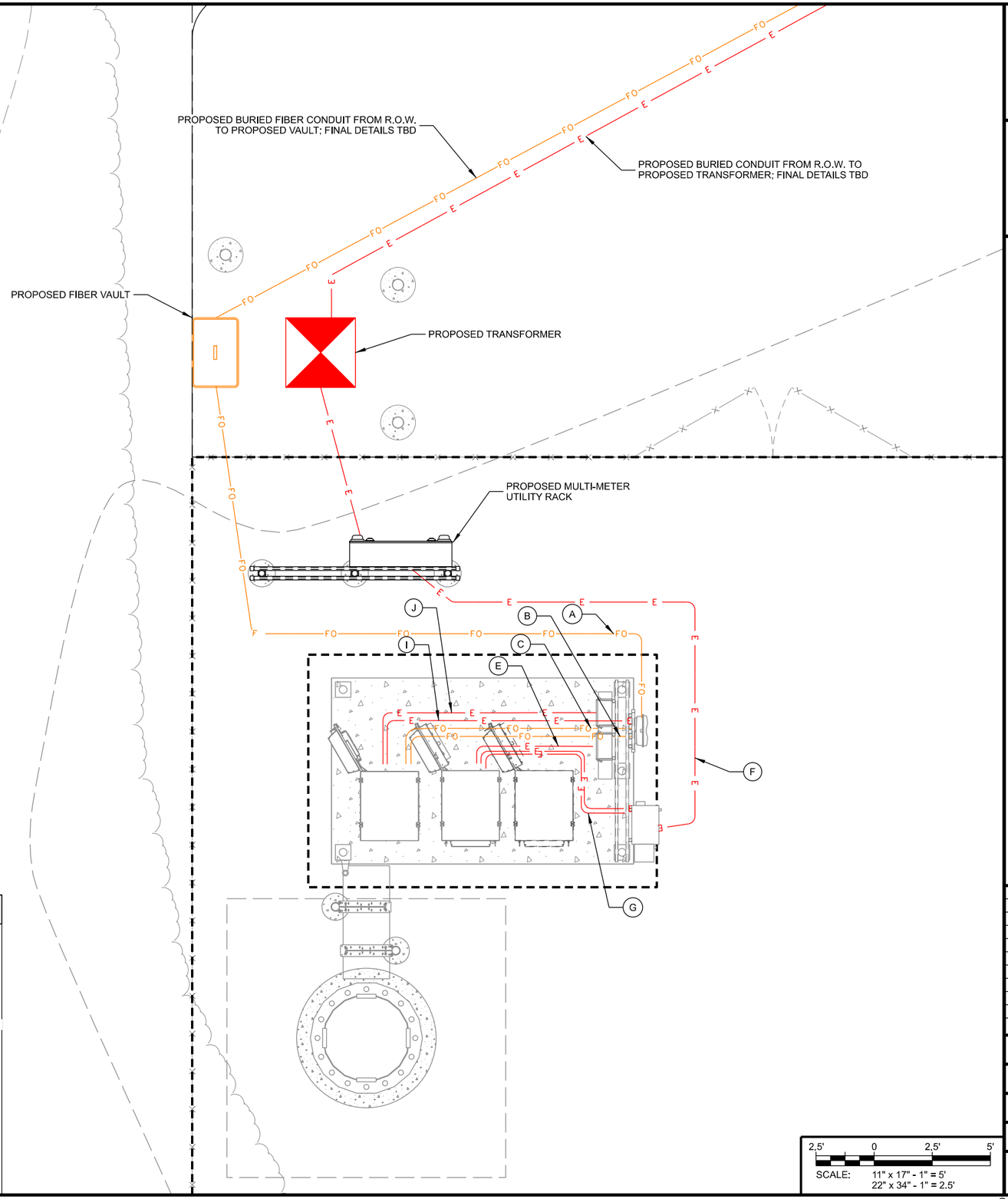
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JCB	12/08/2022	REV. B

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SET TYPE	PRELIM. DWGS.
SHEET NUMBER	E-102

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NORTH



KEYNOTES: (THIS SHEET)

- (A) 2" CONDUIT FROM FIBER VAULT TO CIENA
- (B) 1" CONDUIT FROM THE CIENA TO THE 6" x 6" x 4" HOFFMAN BOX FOR ETHERNET DELIVERY
- (C) 3/4" CONDUIT FROM SSC TO CIENA FOR ALARM CABLE
- (D) 3/4" CONDUIT TO DELIVER ETHERNET FROM CSR TO NSN SYSTEM MODULES
- (E) 3/4" CONDUIT FROM NSN SYSTEM MODULES TO COVP
- (F) 2" CONDUIT FROM METER TO ATS
- (G) 1-1/4" CONDUIT TO BE USED TO DELIVER POWER FROM PPC TO SSC
- (H) 3/4" CONDUIT FROM THE 12" x 12" x 4" HOFFMAN BOX TO NSN SYSTEM MODULES FOR POWER DELIVERY
- (I) 1" CONDUIT FROM THE 12" x 12" x 4" HOFFMAN BOX TO CIENA FOR POWER DELIVERY
- (J) 2" CONDUIT FROM THE 12" x 12" x 4" HOFFMAN BOX TO COVP FOR POWER DELIVERY
- (K) 2" CONDUIT FROM THE BATTERY BACKUP RACK TO SSC
- (L) 2" CONDUIT FROM GENERATOR TO AUTOMATIC TRANSFER SWITCH (ATS)
- (M) 2" CONDUIT FROM ATS TO PPC
- (N) 1" CONDUIT FROM GENERATOR TO FSEE (COVP) FOR ALARM
- (O) 1" CONDUIT FROM GENERATOR TO PPC FOR BLOCK HEATER
- (P) 3/4" CONDUIT FROM LIGHT SWITCH SECURED TO LOAD CENTER TO LED LIGHTS
- (Q) WE TO INSTALL 1" DIA. PE GAS LINE FROM ROW TO METER LOCATION
- (R) WE TO INSTALL GAS METER
- (S) 1" CONDUIT FROM GAS METER TO GENERATOR; TO BE INSTALLED BY GC
- (T) 3/4" CONDUIT FROM PPC TO SSC TO FSEE FOR LOSS OF COMMERCIAL POWER
- (U) 1" CONDUIT TO BE USED FOR THE START CIRCUIT FROM GENERATOR TO ATS
- (V) 1" CONDUIT TO BE USED FOR BATTERY CHARGER FROM GENERATOR TO PPC
- (W) HYBRID CONDUIT FROM EQUIPMENT CABINET TO HYBRID CABLE BREAKOUT BOX

NOTES: (THIS SHEET)

1. ALL UTILITY TRENCHES MUST BE A MINIMUM OF 42" BELOW GRADE AND MARKED WITH METALLIC, DETECTABLE TAPE INSTALLED PER MANUFACTURER'S REQUIREMENTS. CHANGES TO TRENCH DEPTH OR LOCATION MUST BE APPROVED BY THE PROJECT MANAGEMENT TEAM AND BE REFLECTED WITH AS-BUILT DOCUMENTS.
2. ALL FLEX CONDUIT USED FOR POWER OR FIBER NEEDS TO BE METALLIC AND SEAL-TIGHT.
3. ALL CONDUITS MUST BE SUPPORTED WITHIN 3' COMING OUT OF THE BOX AND SUPPORTED EVERY 5' THEREAFTER.
4. SEAL TIGHT CONNECTIONS TO SYSTEM MODULES MUST BE 45°, NOT 90° OR STRAIGHT.
5. ALL OUTDOOR CONDUIT LESS THAN 42" BELOW GRADE MUST BE RMC.
6. IF USING PVC AT 42" BELOW GRADE, ALL STUB-UPS MUST BE RMC.

2.5' 0 2.5' 5'

SCALE: 11" x 17" - 1" = 5'
22" x 34" - 1" = 2.5'

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T-MOBILE UTILITY PLAN
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	E-103

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KEYNOTES: (THIS SHEET)

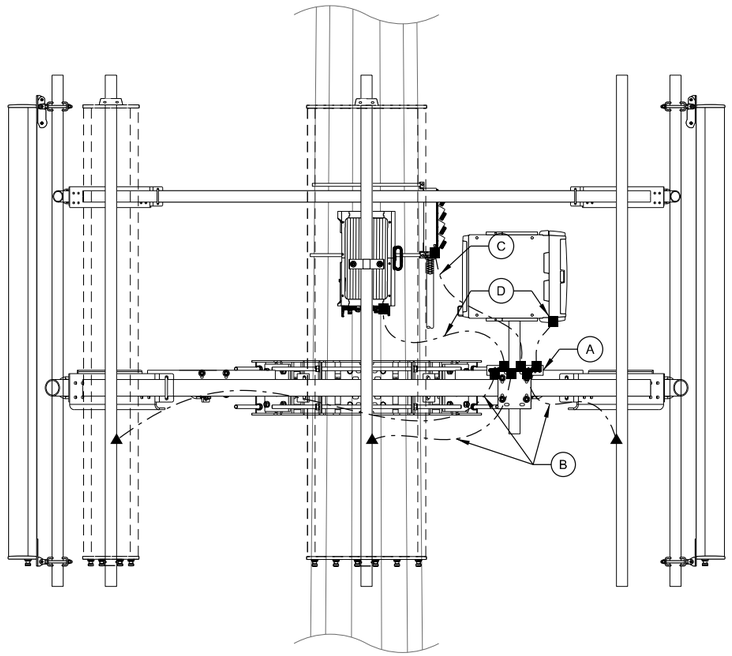
- (A) ANTENNA GROUND BAR FOR CONNECTION OF MULTIPLE GROUND KITS AT ONE LEVEL MOUNT TO TOWER STEEL (TYP. PER SECTOR)
- (B) MAST PIPE GROUND #2 SOLID INSULATED CONNECTION TO GROUND BAR WITH 2 HOLE LONG BARREL LUG (TYP.)
- (C) HYBRID BREAKOUT BOX GROUND #2 STRANDED INSULATED CONNECTION TO GROUND BAR WITH 2 HOLE LONG BARREL LUG
- (D) REMOTE RADIO GROUND #6 STRANDED INSULATED CONNECTION TO GROUND BAR WITH 2 HOLE LONG BARREL LUG (TYP.)
- (E) MASTER GROUND BAR (MGB) MOUNTED VERTICALLY TO EQUIPMENT PLATFORM ON INSULATORS
- (F) #2 SOLID TINNED COPPER GROUNDS ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE FROM MGB TO EQUIPMENT GROUND RING (TYP. OF 2)
- (G) EQUIPMENT CABINET GROUND #6 STRANDED INSULATED CONNECTION TO MGB WITH 2 HOLE LONG BARREL LUG (TYP.)
- (H) AMOB GROUND #6 STRANDED INSULATED CONNECTION TO MGB WITH 2 HOLE LONG BARREL LUG (TYP.)
- (I) FLEXI RADIO GROUND #6 STRANDED INSULATED CONNECTION TO MGB WITH 2 HOLE LONG BARREL LUG
- (J) GPS GROUND TO ICE CANOPY POST
- (K) ICE BRIDGE POST GROUND #2 SOLID TINNED COPPER ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE (TYP.)
- (L) ICE BRIDGE SECTION GROUND #2 STRANDED INSULATED WITH 2 HOLE LONG BARREL ON EACH END (TYP.)
- (M) ICE BRIDGE SECTION TO POST GROUNDS #2 STRANDED INSULATED WITH 2 HOLE LONG BARREL ON SECTION (TYP.); ORIENT LEAD WITH HIGH SIDE TOWARDS TOWER
- (N) EQUIPMENT PLATFORM GROUND #2 SOLID TINNED COPPER ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE (TYP.)
- (O) ICE CANOPY POST GROUND #2 SOLID TINNED COPPER ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE (TYP.)
- (P) ICE CANOPY TO ICE CANOPY POST GROUND #2 SOLID TINNED COPPER (TYP.)
- (Q) POWER PROTECTION CABINET (PPC) GROUND #2 SOLID TINNED COPPER ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE
- (R) AUTOMATIC TRANSFER SWITCH (ATS) GROUND #2 SOLID TINNED COPPER ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE
- (S) CIENA GROUND #2 SOLID TINNED COPPER ENCASED IN LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT TO 24" BELOW GRADE

GROUNDING LEGEND: (THIS SHEET)

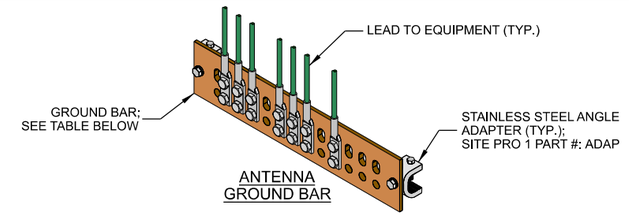
- ▲ EXOTHERMIC OR UL RATED IRREVERSIBLE CONNECTION
- ■ MECHANICAL CONNECTION
- — - - GROUND LEAD

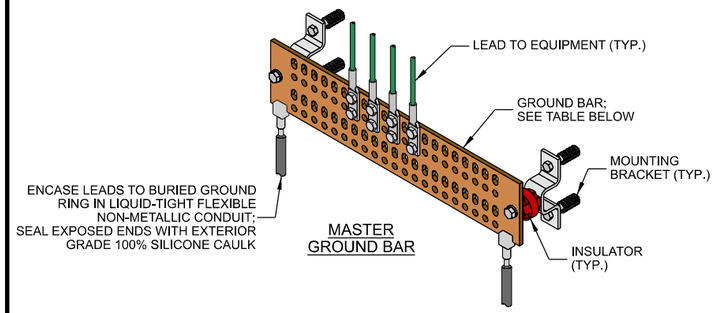
NOTES: (THIS SHEET)

1. ALL BELOW-GRADE CONNECTIONS ARE TO BE EXOTHERMICALLY WELDED A MINIMUM OF 48" BELOW GRADE.
2. ALL LEADS EXTENDING ABOVE GRADE TO BE ENCASED IN 3/4" CONDUIT AND EXTEND A MINIMUM OF 6" ABOVE FINISHED GRADE AND 24" BELOW FINISHED GRADE.
3. APPLY COLD GALVANIZATION TO ALL ABOVE-GROUND EXOTHERMICALLY WELDED CONNECTIONS.
4. APPLY ANTI OXIDANT COMPOUND TO ALL MECHANICAL CONNECTIONS.
5. UPPER AND LOWER TOWER GROUND BARS TO BE BONDED DIRECTLY TO TOWER STEEL WITH #2 CONDUCTORS.
6. AIR TERMINAL TO EXTEND 2' ABOVE HIGHEST ANTENNA MIN. ON MAST PIPE MECHANICALLY FASTEN AIR TERMINAL TO MAST PIPE MAST PIPE TO BE MECHANICALLY CONNECTED TO TOWER STEEL
7. ALL METAL FRAMING AND GROUNDING ELECTRODES PRESENT SHALL BE BONDED TO THE ELECTRICAL GROUNDING SYSTEM; SUBJECT TO COUNTY INSPECTION.



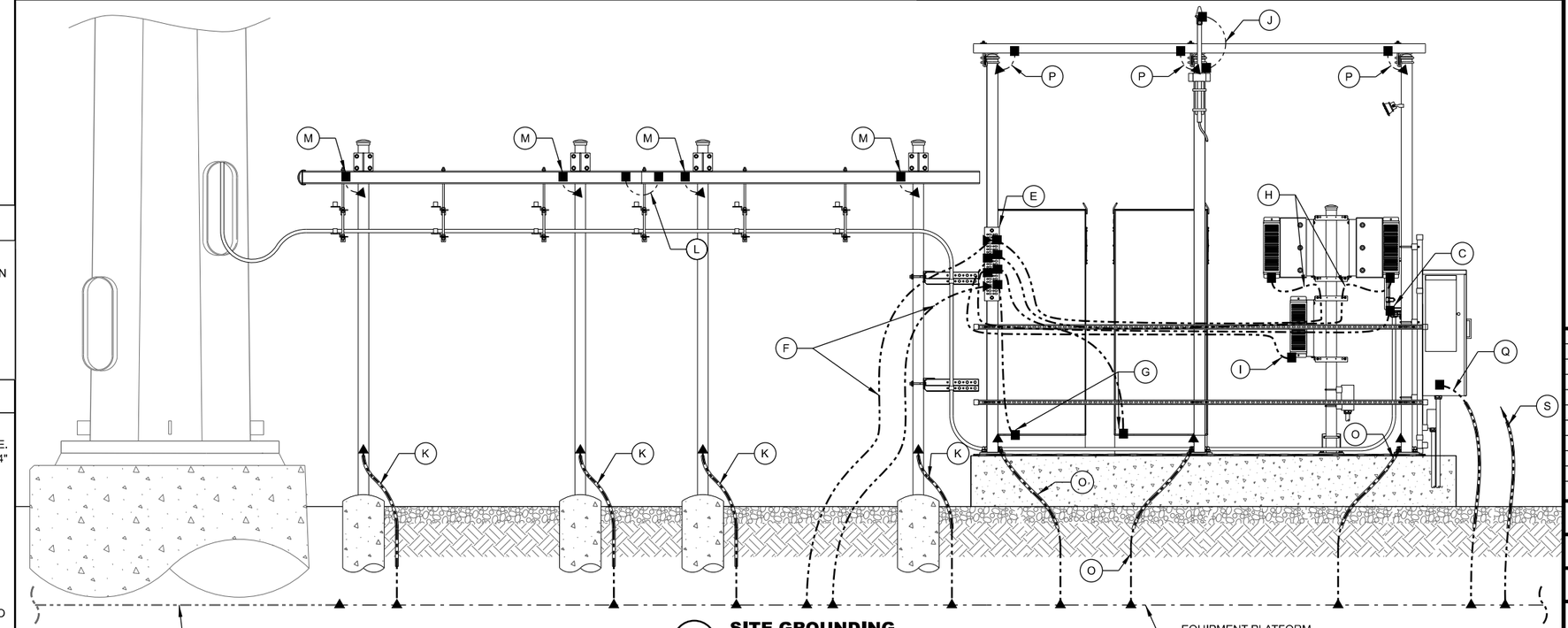
A ANTENNA LEVEL GROUNDING





GROUND BAR SCHEDULE:	
MASTER GROUND BAR	1/4" x 4" x 18" GROUND BAR WITH INSULATORS AND BRACKETS; SIZED FOR 42 SETS OF 2-HOLE LUGS SITE PRO PART #: MG418U-K OR EQUIVALENT
ANTENNA GROUND BAR	1/4" x 2" x 12" GROUND BAR SIZED FOR 13 SETS OF 2-HOLE LUGS SITE PRO PART #: MG212U OR EQUIVALENT

C GROUND BAR



B SITE GROUNDING

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750 PARK OF COMMERCE DRIVE
SUITE 200
BOCA RATON, FL 33487

GROUNDING DETAILS
US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

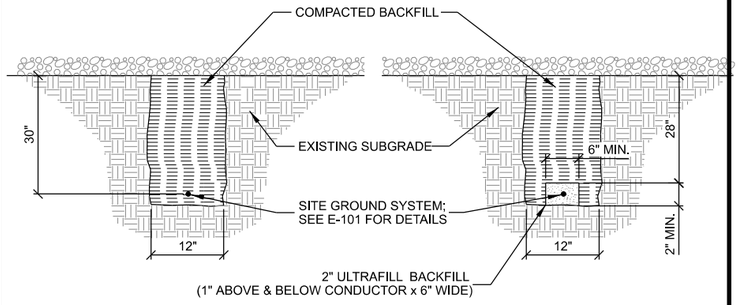
SUBMITTAL:

INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	E-501

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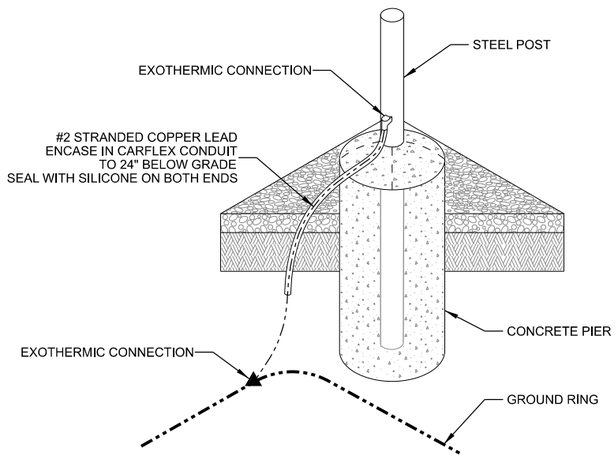


STANDARD GROUND TRENCH ENHANCED GROUND TRENCH

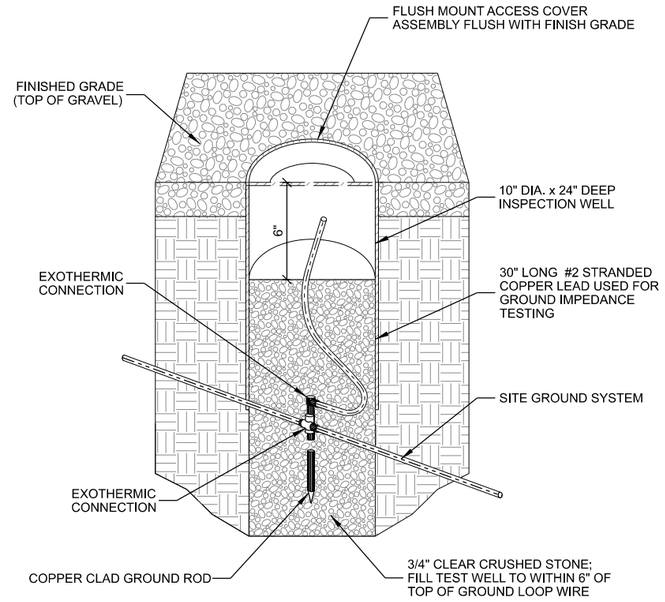
NOTES:

1. GROUNDING TRENCHES TO BE BACK FILLED WITH NATIVE SOIL.
2. COMPACT BACK FILL TO 95% MODIFIED PROCTOR.
3. CONTACT PSC MINIMUM 24HRS NOTICE PRIOR TO BACK FILLING TO ALLOW FOR INSPECTION.

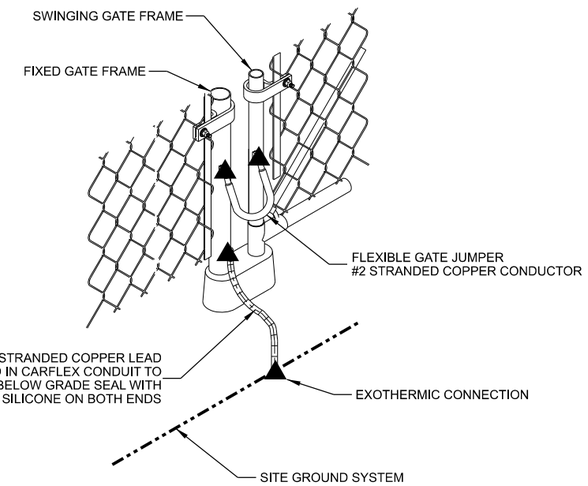
A GROUND TRENCH



B POST GROUNDING

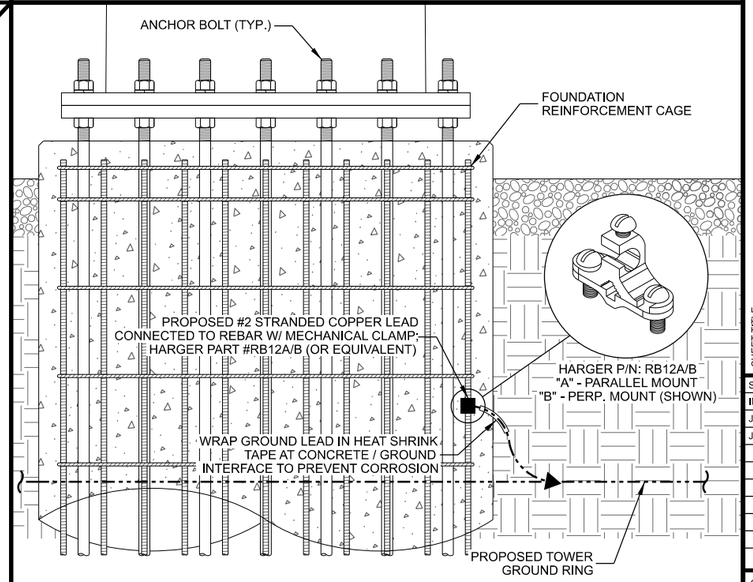


C INSPECTION WELL



D FENCE GATE GROUNDING

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NOTES:

1. FOUNDATION SHOWN IS TYPICAL. SEE TOWER FOUNDATION PLANS FOR PIER REINFORCEMENT DETAILS.
2. FOUNDATION GROUNDING PER NEC 250.52(3)(A). GROUNDING CONNECTIONS TO BE COVERED BY A MINIMUM OF 3" CONCRETE AND BE MADE TO A MIN, 20' CONTINUOUS REBAR, IF POSSIBLE.

E TOWER FOUNDATION GROUNDING

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GROUNDING DETAILS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

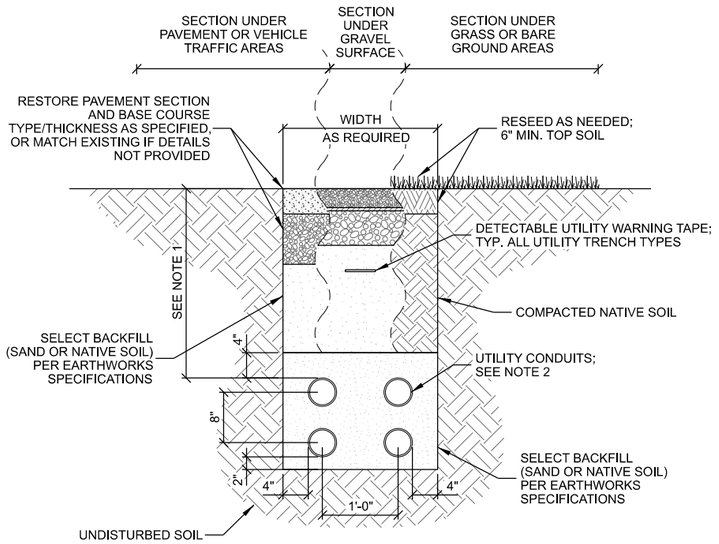
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JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	E-502

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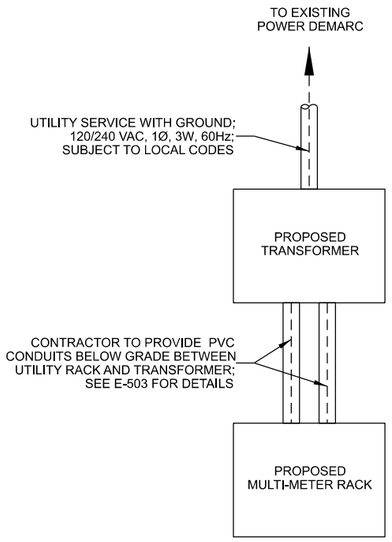
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NOTES:

1. UTILITY CONDUITS TO BE BURIED A MINIMUM DEPTH OF 42" BELOW GROUND LEVEL OR 6" BELOW THE FROST LINE.
2. CONDUIT TYPE, SIZE, AND QUANTITY SHOWN ON E-102.

A **UTILITY TRENCH**



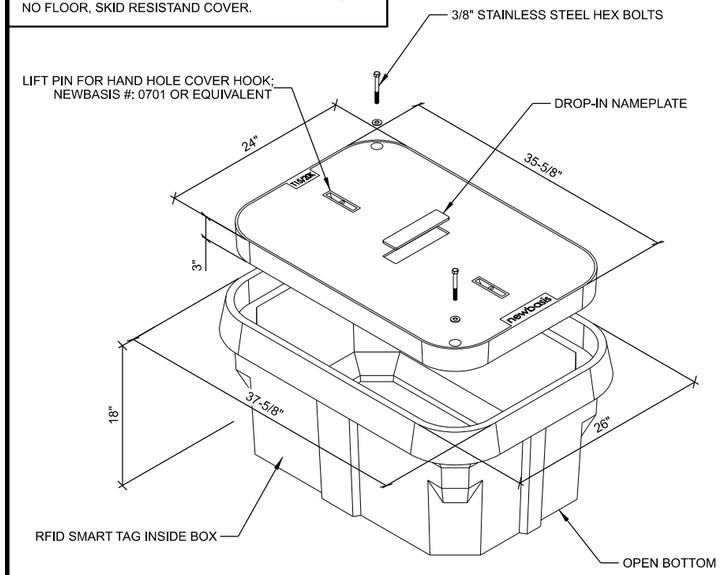
NOTES:

1. STANDARD DIAGRAM PROVIDED BY CLIENT, INCLUDED HERE FOR CONVENIENCE.

B **ELECTRIC LINE DIAGRAM**

MANUFACTURER: NEWBASIS
MODEL: PCA243618
INSIDE DIMENSIONS:
33-9/16" x 21-15/16" x 15" (L x W x D AT LARGEST POINT)
29" x 17-3/8" x 15" (L x W x D AT SMALLEST POINT)
LOAD RATINGS: WUC 3.6, ANSI/SCTE 77 - "T15/20K,"

POLYMER CONCRETE ASSEMBLY, STRAIGHT SIDES, NO FLOOR, SKID RESISTAND COVER.



C **UTILITY VAULT**

WARNING TAPE & TRACE WIRE NOTES: (THIS SHEET)

1. WARNING TAPE TO BE INSTALLED ABOVE THE ELECTRICAL RUN FROM THE GENERATOR TO THE PLATFORM AND ABOVE THE FUEL LINE BETWEEN THE GENERATOR AND FUEL SOURCE.
2. WARNING TAPE SHALL BE RUN CONTINUOUSLY ALONG THE ENTIRE LENGTH AND INSTALLED 12 INCHES ABOVE THE TOP OF THE CONDUITS
3. TRACER WIRE SHALL RUN CONTINUOUSLY ALONG THE ENTIRE LENGTH OF THE BURIED GAS AND ELECTRIC CONDUITS
4. TRACER WIRE SHALL BE SECURED TO THE CONDUIT AND MAINTAINED ABOVE THE CONDUIT CENTERLINE DURING TRENCH BACKFILLING.
5. TRACER WIRE TO EXTEND TO THE TOP OF PVC ABOVE CONCRETE ON BOTH ENDS - LOOP AND WRAP AROUND APPROPRIATE CONDUIT.
6. TRACER WIRE SHALL CONSIST OF 14GA. SOLID COPPER WIRE WITH A CORROSION PROTECTIVE COATING.
7. INSTALL TRACER WIRE WITH SPACER AND SECURE PER MNFG. RECOMMENDATIONS - AT A MIN. EVERY 10' AND AT ALL BENDS. - DO NOT WRAP BURIED CONDUIT WITH TRACER WIRE TO AVOID UNNECESSARY STRESS ON TRACER. - CONTRACTOR TO CHECK CONTINUITY OF TRACER WIRE BEFORE AND AFTER BURIAL AND DOCUMENT RESULTS. 12" ABOVE THE TOP OF THE CONDUITS.

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SUITE 200
BOCA RATON, FL 33487

UTILITY DETAILS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

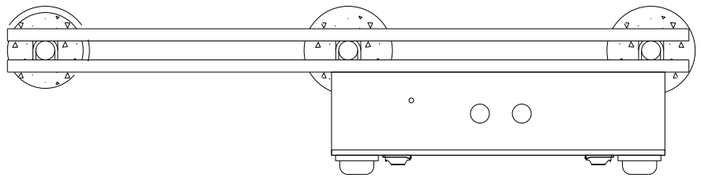
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INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

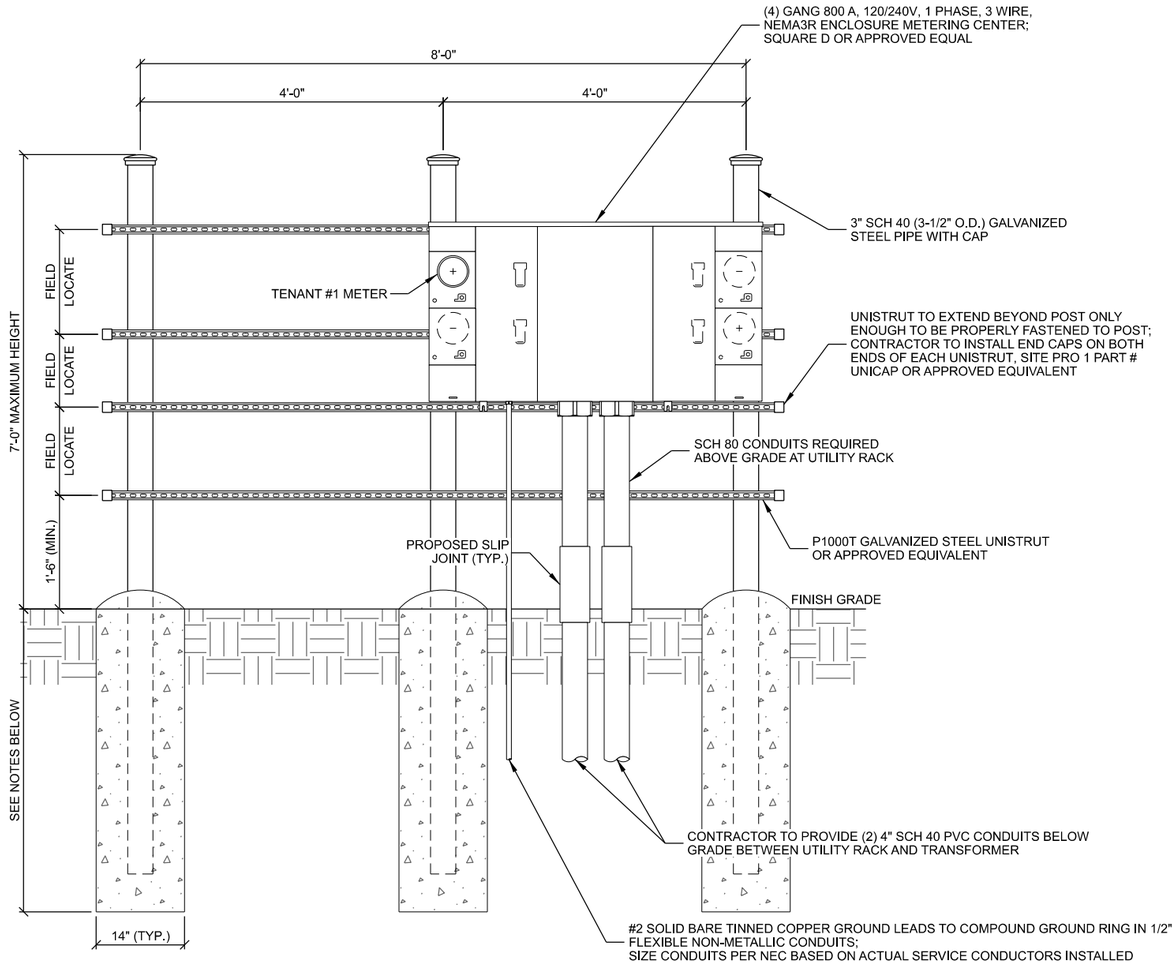
CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**E-503**

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PLAN VIEW



FRONT VIEW

NOTE:

1. INSTALL PVC CONDUITS FOR SERVICE LATERAL CONNECTION TO UTILITY.
2. EXTEND SERVICE LATERAL CONDUITS UNDERGROUND BEYOND FENCELINE. CAP ENDS (NO DUCT TAPE ALLOWED) AND STAKE, EQUIP WITH PULL CORD, VERIFY REQUIREMENTS W/UTILITY PROVIDER.
3. MARK CARRIER METER SLOT @ BREAKER OR SOCKET EXTERIOR.
4. FINAL LAYOUT AND DESIGN DETERMINED BY CONTRACTOR/UTILITY, VERIFY FINAL DESIGN WITH THE CARRIER.
5. CONCRETE FOR PIER TO BE A MINIMUM OF 3,000 PSI AT 28 DAYS.
6. MAINTAIN 3" MINIMUM REBAR COVER IN ALL DIRECTIONS.
7. PIER FOUNDATION DEPTH TO BE A MINIMUM OF 48"; DEPTH TO EXCEED LOCAL FROST DEPTH.

A **MULTI-METER UTILITY RACK**

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

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UTILITY DETAILS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

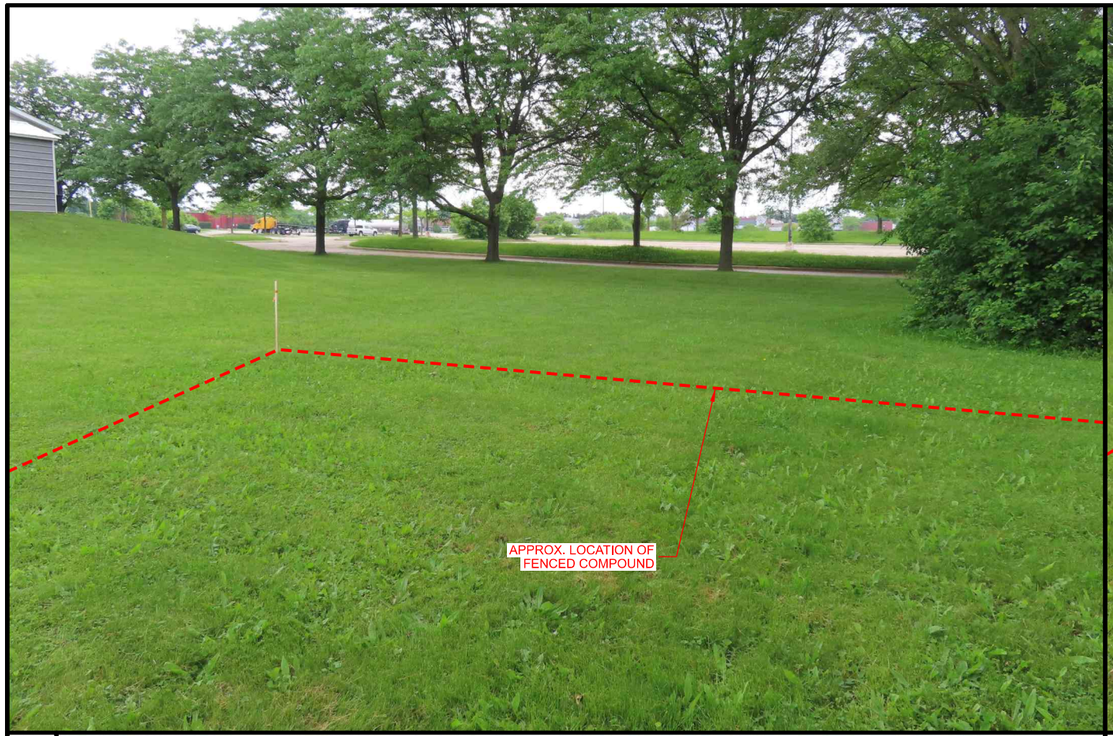
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JCB	12/08/2022	REV. B

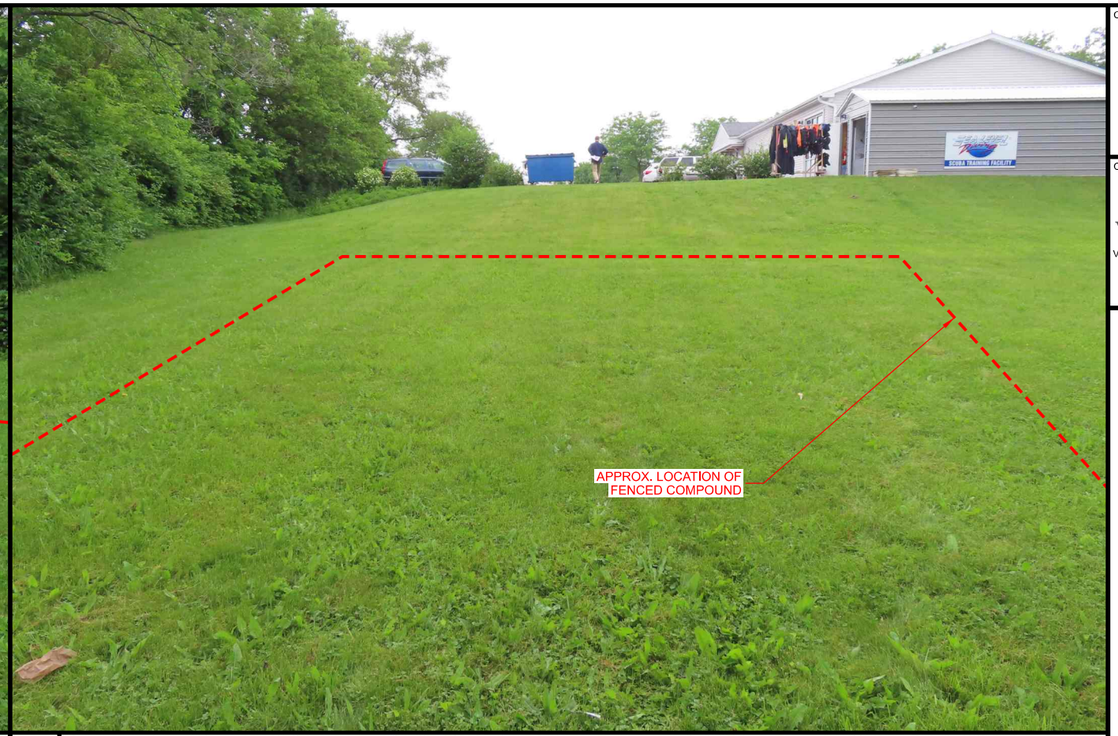
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PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	**E-504**

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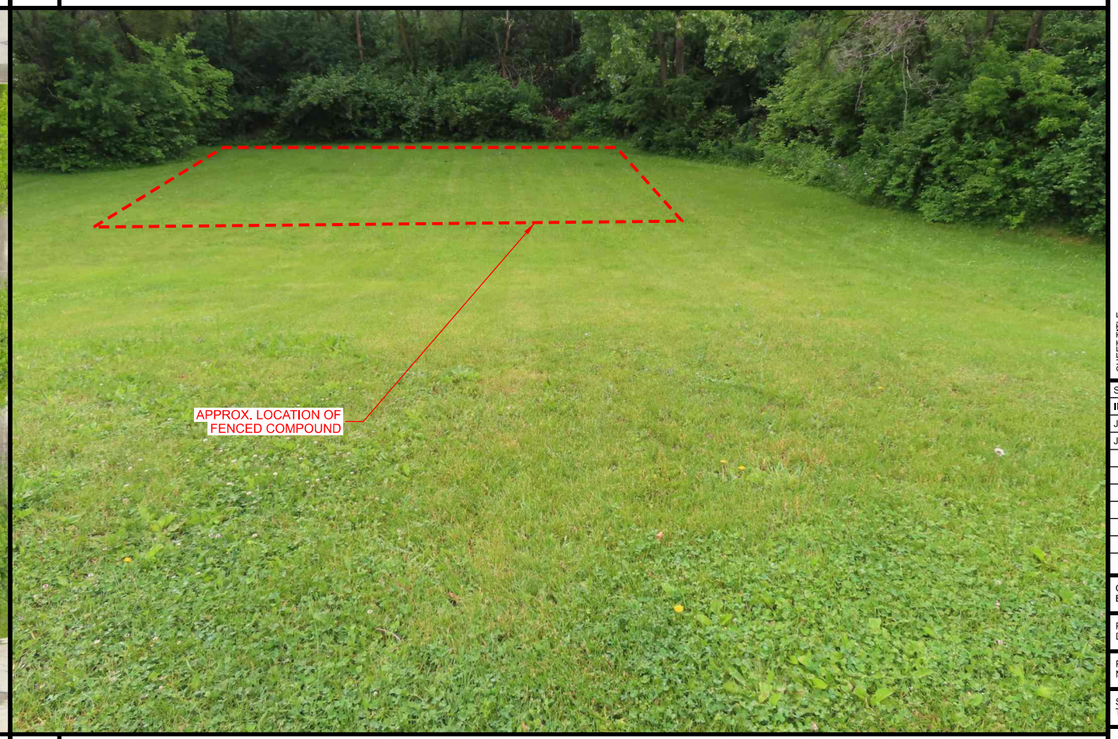
A PROPOSED COMPOUND AREA (LOOKING EAST)



B PROPOSED COMPOUND AREA (LOOKING NORTH)



C DRONE AERIAL VIEW



D PROPOSED COMPOUND AREA (LOOKING SOUTH)

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SUITE 200
BOCA RATON, FL 33487

SITE PHOTOS

US-IL-5744 NORTHWEST HIGHWAY
CRYSTAL LAKE, IL

SHEET TITLE:

SUBMITTAL:		
INT.	DATE:	DESCRIPTION:
JCB	08/24/2022	REV. A
JCB	12/08/2022	REV. B

CHECKED BY	ADP
PLOT DATE	12/8/2022
PROJECT NUMBER	33894
SET TYPE	PRELIM. DWGS.
SHEET NUMBER	R-901

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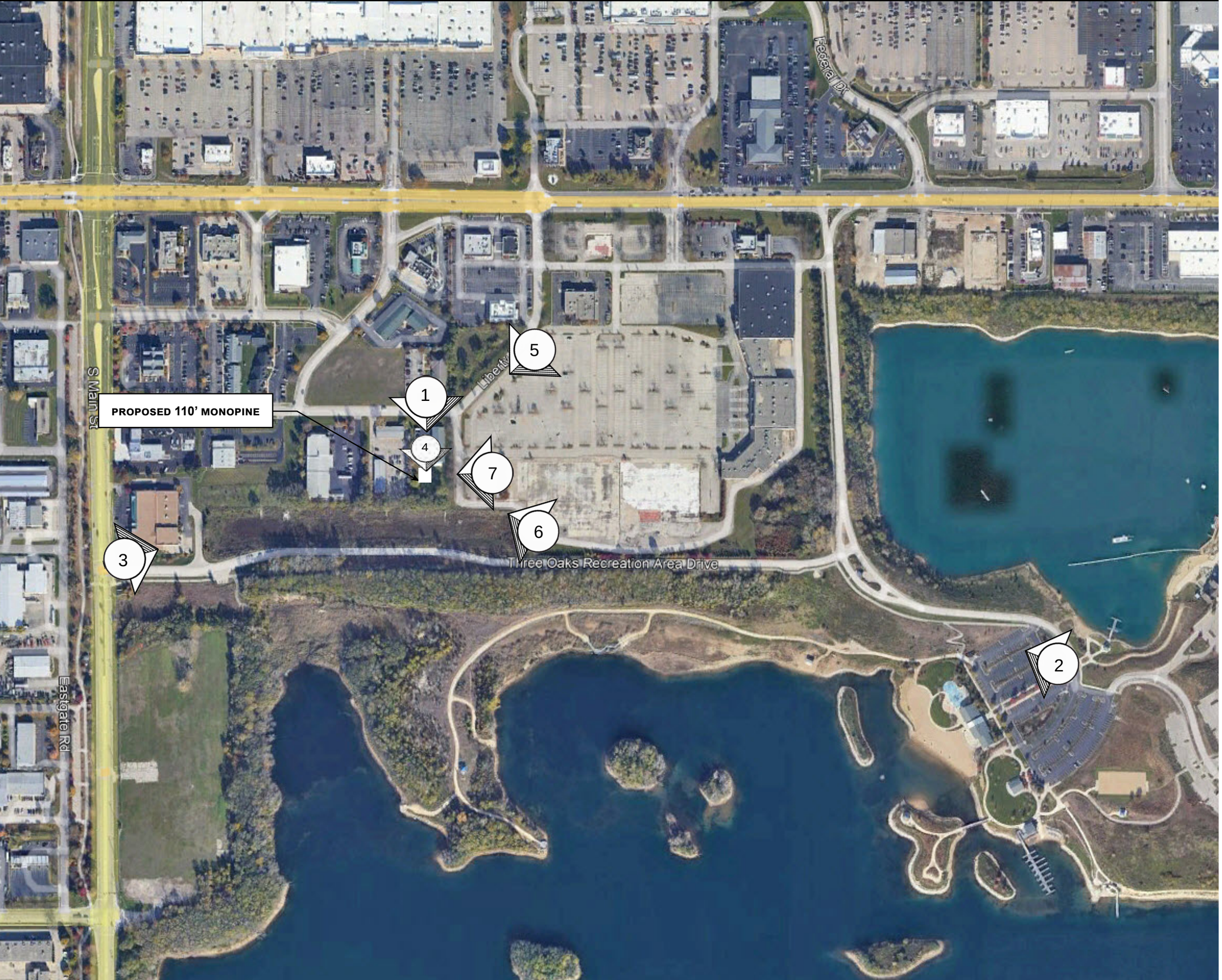


PHOTO SIM NOTES:

1. INTERPRETATION OF THE GENERAL APPEARANCE OF THE PROPOSED INSTALLATION. EACH SIMULATION IS BASED ON THE SCALING CRITERIA OR ASSUMPTIONS IDENTIFIED.
2. THE FINAL DESIGN AND DIMENSIONS WERE NOT AVAILABLE AT THE TIME THIS SIMULATION WAS PREPARED. THEREFORE, A TYPICAL TOWER/ANTENNA OF SIMILAR SIZE WAS USED FOR SIMULATION PURPOSES.
3. AN OBJECT OF KNOWN HEIGHT WAS NOT AVAILABLE FOR REFERENCE IN THE DIRECT VICINITY OF THE TOWER LOCATION, LIMITING RELIABILITY OF THE HEIGHT INTERPRETATION.
4. THE HORIZON LINE AT THE PROPOSED TOWER BASE IS NOT VISIBLE; A HORIZON LINE HAS BEEN ESTIMATED AT THE TOWER BASE FOR THE PHOTO SIMULATIONS.
5. PHOTO SIMULATIONS GENERATED USING A SIMILAR TOWER OF SIMILAR HEIGHT AT A SIMILAR DISTANCE; ARTISTIC INTERPRETATIONS USED TO ESTIMATE THE APPROXIMATE TOWER SIZE AND APPEARANCE.
6. THE DIFFERENCE IN ELEVATION BETWEN THE PHOTOGRAPH LOCATION AND TOWER LOCATION HAS BEEN TAKEN INTO CONSIDERATION.
7. TOPOGRAPHICAL FEATURES BETWEEN THE PHOTOGRAPH LOCATION ARE INTERPRETED AS BEST AS POSSIBLE. VISIBILITY OF THE TOWER WILL BE DRASTICALLY REDUCED WITHIN AREAS OF MATURE VEGETATION AND VALLEYS AND INCREASED WITHIN LARGE OPEN FIELDS AT HIGHER ELEVATIONS.
8. A STRUCTURAL ANALYSIS WAS NOT INCLUDED IN THE SCOPE OF WORK FOR THE INCLUDED PHOTO SIMULATIONS. EQUIPMENT & MOUNTING DEPECTED IS FOR AESTHETIC & LOCATION APPROVAL ONLY.

SITE INFORMATION:

SITE NAME: NORTHWEST HWY
SITE NUMBER: US-IL-5744
LOCATION: CRYSTAL LAKE, IL
EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

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PROPOSED 110’ MONOPINE



PHOTO SIMULATION 1

PHOTO LOCATION: PHOTO IS TAKEN FROM THE NORTH SIDE OF LIBERTY ROAD FACING SOUTH TOWARDS THE PROJET SITE

SITE INFORMATION:

SITE NAME: NORTHWEST HWY

SITE NUMBER: US-IL-5744

LOCATION: CRYSTAL LAKE, IL

EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

Edge
Consulting Engineers, Inc.
624 WATER STREET
PRAIRIE DU SAC, WI 53578
608.664.1449 VOICE
608.664.1549 FAX
www.edgeconsult.com

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PHOTO SIMULATION 2

PHOTO LOCATION: PHOTO IS TAKEN FROM THE SOUTHEAST CORNER OF THE NORTH PARKING LOT AT THREE OAK RECREATION AREA FACING NORTHWEST

SITE INFORMATION:

SITE NAME: NORTHWEST HWY
SITE NUMBER: US-IL-5744
LOCATION: CRYSTAL LAKE, IL
EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

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PROPOSED 110' MONOPINE



PHOTO SIMULATION 3

PHOTO LOCATION: PHOTO IS TAKEN FROM THE INTERSECTION OF THREE OAKS RECREATION AREA DRIVE AND MAYFAIR CARPET AND FURNITURE DRIVEWAY

SITE INFORMATION:

SITE NAME: NORTHWEST HWY
SITE NUMBER: US-IL-5744
LOCATION: CRYSTAL LAKE, IL
EDGE PROJECT #: 33894

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ALP	12/07/22	REV. 0

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PHOTO SIMULATION 4

PHOTO LOCATION: PHOTO IS TAKEN FROM THE SOUTH END OF THE PARKING LOT FACING NORTH TOWARD THE PROPOSED TOWER AND COMPOUND

SITE INFORMATION:

SITE NAME: NORTHWEST HWY
SITE NUMBER: US-IL-5744
LOCATION: CRYSTAL LAKE, IL
EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

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PHOTO SIMULATION 5

PHOTO LOCATION: PHOTO IS TAKEN FROM THE NORTH SIDE OF PARKING LOT FACING SOUTHWEST

SITE INFORMATION:

SITE NAME: NORTHWEST HWY
SITE NUMBER: US-IL-5744
LOCATION: CRYSTAL LAKE, IL
EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

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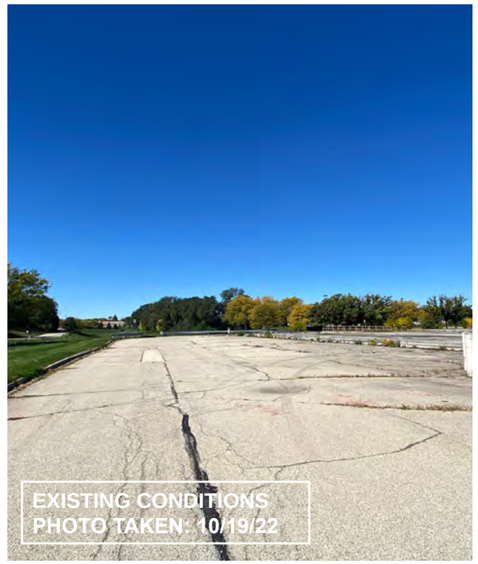


PHOTO SIMULATION 6

PHOTO LOCATION: PHOTO IS TAKEN FROM THE SOUTH SIDE OF PARKING LOT FACING NORTHWEST

SITE INFORMATION:

SITE NAME: NORTHWEST HWY

SITE NUMBER: US-IL-5744

LOCATION: CRYSTAL LAKE, IL

EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

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PHOTO SIMULATION 7

PHOTO LOCATION: PHOTO IS TAKEN FROM PARKING LOT FACING WEST

SITE INFORMATION:

SITE NAME: NORTHWEST HWY
SITE NUMBER: US-IL-5744
LOCATION: CRYSTAL LAKE, IL
EDGE PROJECT #: 33894

INT.	DATE	DESCRIPTION
ALP	12/07/22	REV. 0

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T-Mobile Central LLC
PROPOSED WIRELESS TELECOMMUNICATIONS FACILITY
269 LIBERTY ROAD, CRYSTAL LAKE, IL 60014

I, Rosemarie Bernardo, representing T-Mobile Central LLC, d/b/a T-Mobile, a Delaware limited liability company (hereinafter "T-Mobile"), whose address is 1400 Opus Place, 7th Floor, Downers Grove, Illinois, state the following:

1. I am the Senior Radio Frequency Engineer engaged in the development and deployment of T-Mobile's Chicago area network and involved in network design and optimization, including evaluation and selection of candidates for wireless telecommunications base station sites in the network.

2. In an effort to provide seamless in-building coverage in the City of Crystal Lake, T-Mobile has determined that it is necessary to obtain in the vicinity of 269 LIBERTY ROAD, CRYSTAL LAKE, IL 60014. This new site will help in offloading the existing on-air sites CH16749A on the west side of the ring and to support CH76318C on the south west side of the ring. This candidate will also serve the intersection of Northwest Hwy and S Main St., nearby commercial business areas, S Virginia Rd. and residential areas to the west of the ring. T-Mobile MUST be able to add a new site in order to maintain seamless service and high data capacity demand in the area.

3. There are no existing tower structures or feasible building structures with a suitable height of 100' within the desired area of coverage need.

4. My evaluation, conducted in the normal course of T-Mobile's operations, consisted of predicting signal propagation via industry-standard software models. T-Mobile calculated the proposed site's contribution to T-Mobile's needs for coverage and capacity in the area intended to be served by the site within reference to surrounding proposed sites.



Rosemarie Bernardo

T-Mobile Central LLC
PROPOSED WIRELESS TELECOMMUNICATIONS FACILITY
269 LIBERTY ROAD, CRYSTAL LAKE, IL 60014

I, Rosemarie Bernardo, representing T-Mobile Central LLC, d/b/a T-Mobile, a Delaware limited liability company (hereinafter "T-Mobile"), whose address is 1400 Opus Place, 7th Floor, Downers Grove, Illinois, state the following:

1. I am the Senior Radio Frequency Engineer engaged in the development and deployment of T-Mobile's Chicago area network and involved in network design and optimization, including evaluation and selection of candidates for wireless telecommunications base station sites in the network.

2. The intent of T-Mobile's proposed tower at 269 Liberty Road is to deploy the most current 5G technology to serve the voice and high data capacity needs of users in the commercial, recreational and residential areas surrounding the 269 Liberty Road location. To provide this cutting edge technology, T-Mobile must utilize 5G capable antennas and equipment. As presented, the proposed monopine tower located at 269 Liberty Road would fulfill T-Mobile's wireless voice and data improvement objectives.

3. I further evaluated whether the existing stealth tower located at 6521 Commercial Road in Crystal Lake, Illinois might be suitable for collocation. Simply state, collocation within the existing stealth tower is not a viable alternative to resolving T-Mobile's coverage improvement needs because the T-Mobile 5G antennas and equipment are far too large to fit within the designed tower.

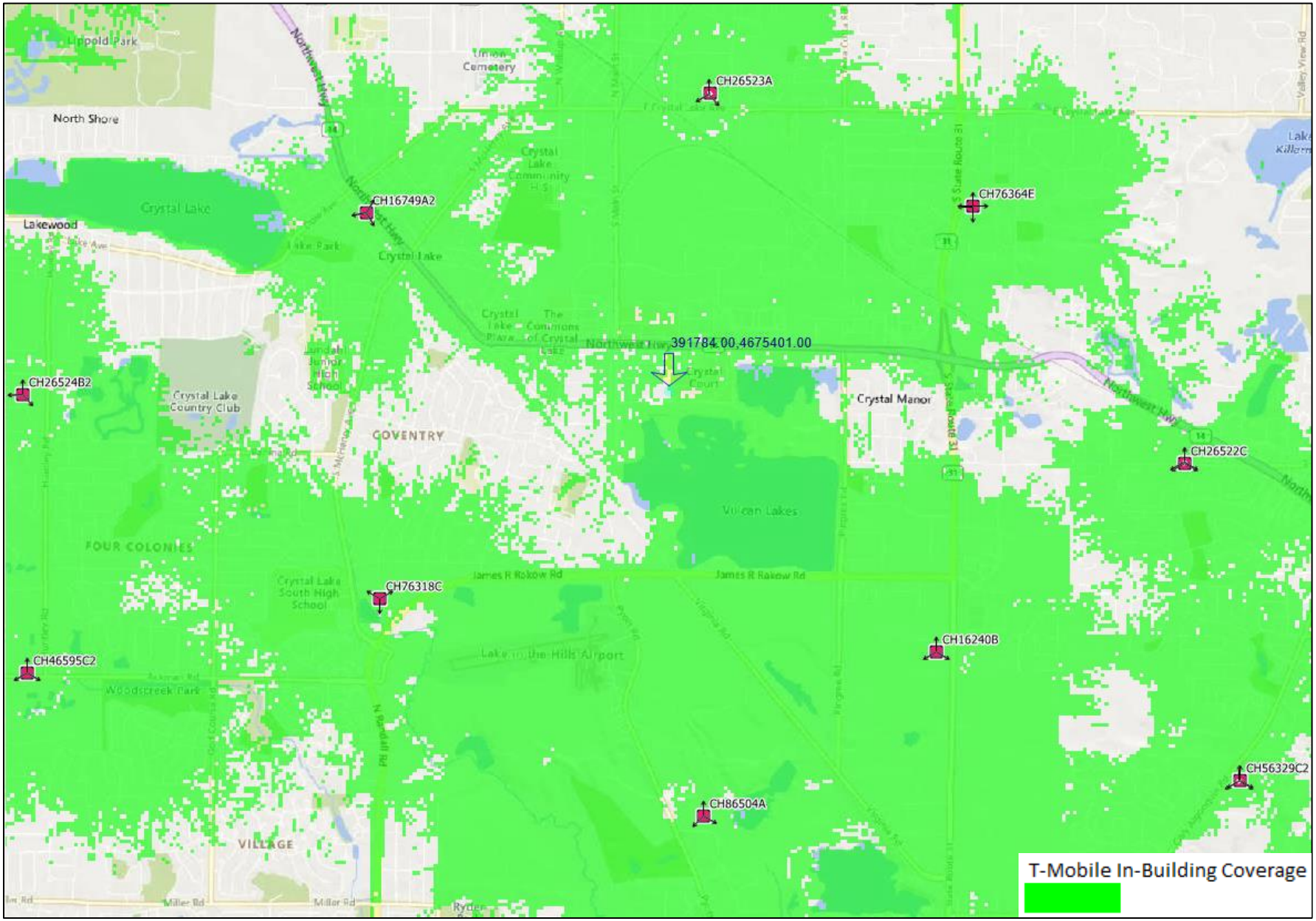
4. Next, I conducted a radio frequency analysis of whether the existing stealth tower located at 6521 Commercial Road would address T-Mobile's identified coverage needs if T-Mobile were able to collocate its antennas on the outside of the tower at a height of 110' (the highest available height on the existing tower). Simply stated, given its geographic location, this tower will not allow T-Mobile to provide sufficient coverage to the T-Mobile coverage objectives of the Three Oaks Recreation Center parking areas and the large commercial district located to the Northeast of the intersection of Main Street and Northwest Highway.

5. My evaluation, conducted in the normal course of T-Mobile's operations, consisted of predicting signal propagation via industry-standard software models. T-Mobile calculated the proposed site's contribution to T-Mobile's needs for coverage and capacity in the area intended to be served by the site within reference to surrounding proposed sites.

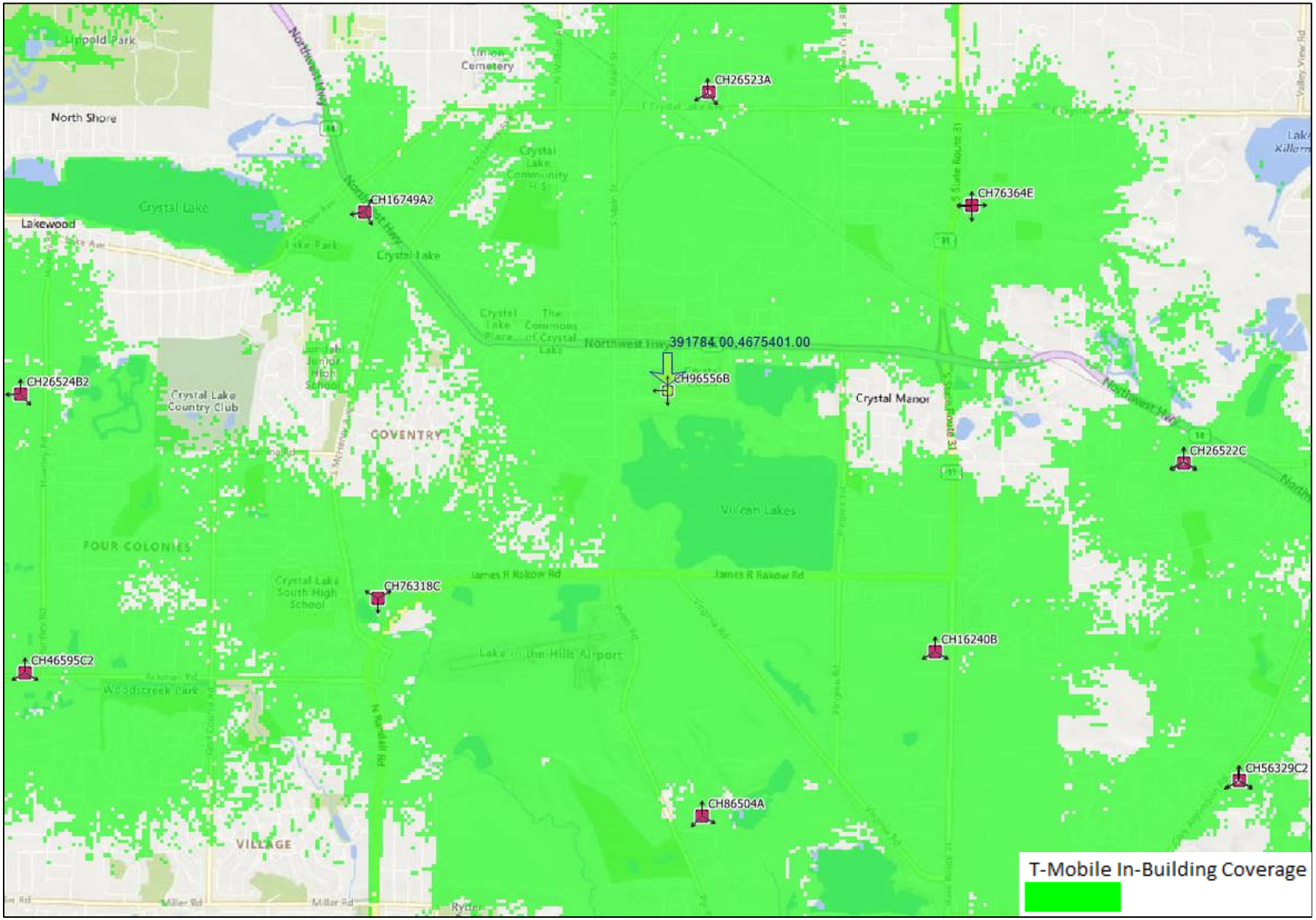


Rosemarie Bernardo

T-Mobile Existing In-Building Coverage



T-Mobile Proposed In-Building Coverage



Crystal Lake City Council
c/o Elizabeth Maxwell AICP / City Planner
100 West Woodstock Street
Crystal Lake, IL 60014

RE: Application No. 2022-199

SUPPLEMENTAL AFFIDAVIT OF CHIYU ZHANG, P.E., S.E.

STATE OF TEXAS
COUNTY OF DALLAS

Chiyu Zhang, P.E., S.E., who, after being duly sworn, deposes and states as follows:

1. I am a Structural Engineer for Allpro Consulting Group, Inc. ("Allpro").
2. I am a licensed Structural Engineer with the State of Illinois, License No. 081-008580.
3. I make this Affidavit with the understanding that it is to be used as a public comment in response to the Application for a Special Use Permit and Variations for new Monopine Wireless Communications Tower, under Application No. 2022-199 (the "Application"), submitted by Arthur Koch, as authorized agent of Calypso Ventures, LLC (the "Applicant"). All statements contained in this Affidavit are based upon my personal knowledge or my personal knowledge of the business records of Allpro. I am over the age of eighteen (18) and I am fully competent to testify to the facts recited herein.[1]

[1] In my capacity working for Allpro, I am one of the primary custodians of the organizational documents, files, applications, letters, correspondence, reports, and other paperwork transmitted or received by Allpro (the "Allpro Records"). Allpro's files contain documents which were made and/or kept as part of the Allpro Records, contemporaneously at or near the time of the events so memorialized herein, by or from information transmitted by Allpro's employees and personnel who had knowledge of the facts set forth in such documents. The Allpro Records are kept in the course of regularly conducted business activity and for each such document contained in the Allpro Records, it is the regular practice of business activity to make or retain such documents. To the extent that I refer to any such document other than those made or received by me personally, such document is one of the Allpro Records.

4. I understand that the Application is seeking to construct a 105-foot (115-feet with lightning rod) Wireless communications tower, which is intended to be situated on property located at 269 Liberty Road, Crystal Lake, IL (the "Proposed Tower").
5. SBA Towers X, LLC, a subsidiary of SBA Communications ("SBA") has owned, operated, and maintained a 126-foot (132-feet with lightning rod) Wireless communications tower situated on property located at 6521 Commercial Road, Crystal Lake, IL since 2018 (the "Existing SBA Tower").
6. The Existing SBA Tower is located approximately 0.46 miles or 2,428 feet from the Proposed Tower.
7. As an alternative solution to the canister expansion proposal as mentioned in my previous Affidavit dated Nov. 14th, SBA also engaged Allpro to provide engineering design that could convert existing tower to a Monopine in order to accommodate T-Mobile's 5G equipment. The proposed modifications would entail replacing the existing spine and canisters from 84' to 124' elevation with (2) new 20' pole sections and new Monopine branches, as well as adding (4) 2.5" new anchor rods reinforcement and a new 15'x15'x2.5' concrete pad at tower base. The Structural Analysis is attached hereto as **Exhibit "A**."
8. Based upon my education, training, and experience, I can confirm that the Structural Analysis is an accurate evaluation of the modifications which would be required in order to accommodate T-Mobile's 5G equipment on the Existing SBA Tower, and that such modifications can be made in approximately three (3) months, which is significantly less time than it would take to construct an entirely new communications tower.
9. Once the proposed modifications to the Existing SBA Tower have been completed, the Existing SBA Tower will have the same structural capacity as the Proposed Tower and

will be able to adequately accommodate T-Mobile's 5G equipment.

FURTHER AFFIANT SAYETH NOT

LICENSED STRUCTURAL ENGINEER
CHIYU ZHANG
081-008580
12/14/2022
STATE OF ILLINOIS
Expires 11/30/2024

Affiant: Chiyu Zhang, P.E., S.E.

STATE OF TEXAS
COUNTY OF DALLAS

Sworn to and subscribed before me by means of ☐ physical presence or ☐ online notarization, this 14 day of December, 2022. Such person did take an oath and:

(Notary must check applicable box).

☒ is/are personally known to me.
☐ produced a current _____ driver's license as identification.
☐ produced _____ as identification.

{Notary Seal must be affixed}

STEPHANI PARGAS
Notary Public, State of Texas
ID # 13202938-4
My Comm. Expires 05/29/2023

Stephani Pargas
SIGNATURE OF NOTARY

Stephani Pargas
Name of Notary *(Typed, Printed or Stamped)*

EXHIBIT "A"

Structural Analysis

ALLPRO
CONSULTING GROUP, INC.
9221 Lyndon B. Johnson Freeway, #204, Dallas, TX 75243 ★ PHONE 972-231-8893 ★ FAX 1-866-364-8375
www.allprocgi.com ★ e-mail: info@allprocgi.com

Tower Structural Analysis Report for
SBA Network Services, Inc.

Existing 124' Monopole w/ T-Mobile Monopine Conversion

SBA Site Name: Crystal Lake South
SBA Site ID: IL22533-A

Site Location: 6521 Commercial Road,
Crystal Lake, IL
Mchenry County

Latitude: 42.221600°
Longitude: -88.320200°

ACGI Job # 22-4227_Monopine Conversion option

ANALYSIS RESULTS (Monopine Conversion)		
Tower Components	> 200 %	Fail
Tower Foundation	112.8 %	Fail

Prepared By:
Snehalsinh Vansia, EIT
Staff Engineer



11/14/2022
Approved By:
Chiyu Zhang, P.E.
IL PE # 081-008580

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1. ANALYSIS SUMMARY

The existing 124' Stealth Monopole (with proposed changes), located in Crystal Lake, IL was analyzed by Allpro Consulting Group, Inc. (ACGI) for the existing loads and the proposed T-Mobile antennas, radios and coaxes authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with below mentioned proposed and existing loading is found to be **not in code compliance** under *TIA-222-H*, *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and International Building Code 2018 after proposed changes.*

2. SCOPE & SOURCE OF INFORMATION

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional loads proposed loads.

SOURCE OF INFORMATION		
Tower Data:	Sabre Industries	Tower Manufacturer Drawing by Sabre Industries Job #132129-MM dated 1/15/2016.
	Stealth Concealment Solution, LLC	Top Stealth Pole drawings by Stealth Concealment Solution, LLC Job #SA15-01581S-00R0 dated 2/8/2016.
	Tower Engineering Solutions	Previous Structural Analysis by Tower Engineering Solutions Project #120213 dated 12/13/2021.
Foundation Data:	Sabre Industries	Tower Manufacturer Drawing by Sabre Industries Job #132129-MM dated 1/15/2016.
Geotechnical Report:	G2 Consulting Group	Geotechnical data as per report by G2 Consulting Group, Project #152185 dated 05/26/2015
Loading Data:	SBA Communication Corp.	Proposed loading is per email from Breann Parreira with SBA dated 11/08/2022.
Authorization:	SBA Communication Corp.	

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3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-H. The tower was modeled using TNX Tower, a 3-D finite element program. TNX Tower is a general-purpose modeling, analysis, and design program created specifically for communication towers using the EIA-222-C, EIA-222-D, TIA/EIA-222-F, TIA-222-G standards or TIA-222-H code. The 3-D model included the tower, with existing appurtenances and all proposed loads.

SITE DATA	
SBA Site Name:	Crystal Lake South
SBA Site Number:	IL22533-A
Carrier Site Name:	T-Mobile
City, State:	Crystal Lake, IL
County:	McHenry
Code Wind Load Requirement:	TIA-222-H (107 mph Basic wind speed)
Wind Load Used:	TIA-222-H Code: • Basic wind speed of 107 mph • Structure Class II*. • Exposure Category C. • Topographic Category 1. • Crest Height 0.00 ft. • Nominal ice thickness of 1.5 in. • Ground Elevation 896.55ft
Seismic Requirement:	S_s=0.114, Seismic check calculations are included as per TIA-222-H

* This structural analysis is based upon the tower being classified as a class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

TOWER DATA	
Tower Type:	Monopole (Changes are pending)
Height:	124'
Cross Section:	18 Sided
Steel Strength:	A572-65 ksi (Shaft Steel) A500-42 ksi (Canister pipe)
Type of Foundation:	Pier Foundation

TOWER HISTORY	
Tower Manufacturer / Model:	Sabre / Stealth Concealment Solution, LLC
Date of Original Design:	1/15/2016
Previous Modifications:	Tower Modification Design is pending by others.
Original Design Code Req.:	TIA-222-G with 120 mph design wind speed

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4. APPURTENANCE LISTING

EXISTING LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in.)***	***TENANT***
120±	3	CommScope NHHSS-65C-R2BT4 Panel	Inside 34.0" concealment	(18) 7/8"	Verizon
	3	CommScope CBC61923T-DA-43 Triplexers			
119±	1	34" x 10' Canister	-	-	-
109±	1	34" x 10' Canister	-	-	-
99±	1	34" x 10' Canister	-	-	-
89±	1	34" x 10' Canister	-	-	-

FINAL LOADING DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
120±	**-**	**Total 125 ft² CaAa and 2250lb**	**-**	(18) 7/8"	**Verizon**
110±	**-**	**Total 125 ft² CaAa and 2250lb**	**-**	**(6) 1-5/8" (6) 7/8"**	**T-Mobile**
124±	**-**	**Top Branches (50 ft² CaAa and 1000lb)**	-	-	-
114±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			
109±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			
104±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			
99±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			
94±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			
89±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			
84±	**-**	**New Branches (50 ft² CaAa and 1000lb)**			

Notes:

1. ACGI should be notified of any discrepancies found in the data listed in this report.
2. Notify Allpro Consulting Group, Inc. of any potential physical and other interference with existing antennas for a redesign.

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5. CONCLUSIONS

RESULT SUMMARY			
MEMBER		*% Capacity*	*Pass/Fail*
Pole		**103.6 %**	**Acceptable**
Anchor Bolt and Base Plate		**> 200.0 %**	**Fail**
Foundation Check	Download	**6.5 %**	**Pass**
	Pier Length	**112.8 %**	**Fail**
	Moment Capacity	**98.4 %**	**Pass**
Tower Overall Rating > 200.0 % (Fail)			

As per the results of the analysis, the existing tower is **not in code compliance** for the new and existing antenna loads.

Maximum tower member stress **is more than 105%**, making it **not in code compliance** under the TIA-222-H code and 2018 International Building Code.

6. RECOMMENDATIONS

The existing tower is not recommended for the final loading listed on page number 5. However, the tower can be modified and can be brought into code compliance with new modifications. Modification design is not in the scope of this report but can be provided upon request.

The estimate cost for tower modification will be in the price range of $245,300 - $308,720. This estimate includes Tower Modification Design, Material and Labor, Project Management, Post Mod EIA/TIA and Post Modification Inspection (PMI including post construction field inspection and engineering construction review) costs.

Modification scope of work:

1. Remove existing 34" diameter canister with associated assembly at elevation 84'-124'.
2. Grind and remove existing flange plate and weld new flange plate 84'.
3. Install (2) 20' new pole sections with branch receptors at 84' - 124'.
4. Install new monopine branches between elevation 84' -124'.
5. Paint Pole to resemble tree bark at elevation 0'-84'.
6. Weld (8) 12"x8"x0.5" stiffener plates to modify existing base plate.
7. Install (4) 2-1/2" Williams anchor rods (150ksi) to modify existing anchor bolts.
8. Add 15'x15'x2.5' concrete pad at top to modify foundation.
9. Temporary relocate existing Verizon Equipment during modification.

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7. ASSUMPTIONS

This analysis was completed based on the following assumptions:

- Tower has been properly maintained
- Tower erection was in accordance to manufacturer drawings
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction
- Foundation was constructed in accordance to manufacturer drawings
- Foundation does not have structural damage
- Bolts have been properly tightened according to manufacturer specifications
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnxTower database and manufacturer information

8. DISCLAIMER

Installation procedures and related loading are not within the scope of this analysis. A contractor experienced in similar work should perform all installation work. The engineering services provided by Allpro Consulting Group, Inc. (ACGI) are limited to the computer analysis and calculations of the structure with the proposed and existing loads. This analysis is considered void if the loading mentioned in this report is changed or is different as installed. It is assumed that the existing structure is properly maintained and is in good condition free of any defects.

ACGI does not make any warranties, expressed or implied in connection with this engineering analysis report and disclaims any liability arising from deficiencies or any existing conditions of the original structure. ACGI will not be responsible for consequential or incidental damages sustained by any parties as a result of any data or conclusions included in this Report. The maximum liability of ACGI pursuant to this report shall be limited to the consulting fee received for the preparation of the report.

Climbers should not latch or tie their support lanyard or gear on to antennas, radios, mounts etc without proper evaluation. They should only tie to their support lanyards or gear to or attach to Tower structural members that have visible bolting and connection to the larger structure.

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9. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
L1	124 - 104	Pole	TP30x30x0.25	1	-9.51	783.04	32.8	Pass
L2	104 - 84.5	Pole	TP30x30x0.25	2	-16.22	783.04	103.6	Acceptable
L3	84.5 - 84	Pole	TP34x30x0.25	3	-16.24	783.04	103.6	Acceptable
L4	84 - 47.75	Pole	TP39.44x34x0.25	4	-22.62	1780.88	95.0	Pass
L5	47.75 - 0	Pole	TP46.1x38.115x0.313	5	-35.48	2661.03	101.8	Acceptable
							Summary	
						Pole (L3)	103.6	Acceptable
						RATING =	**103.6**	**Acceptable**

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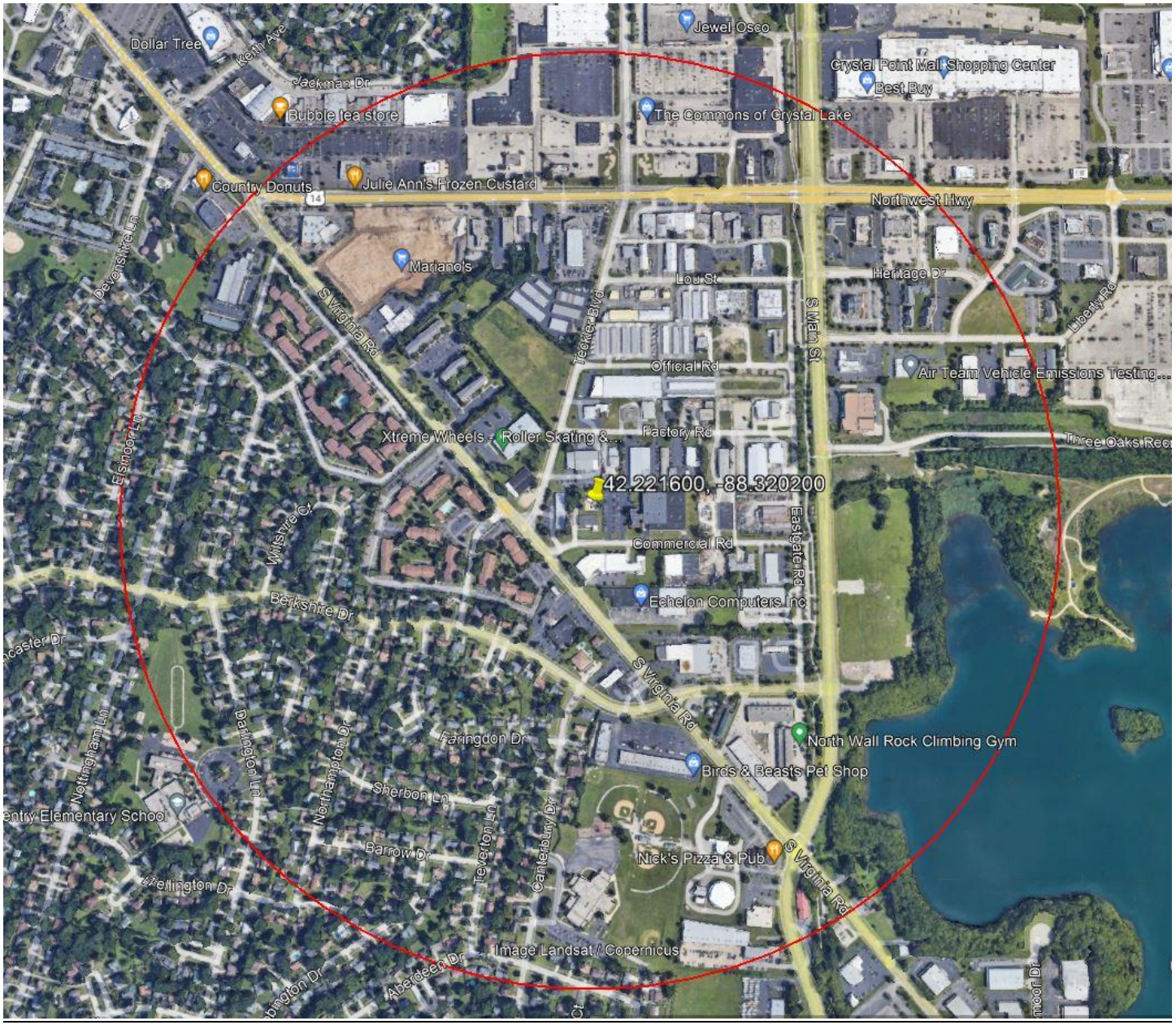
APPENDIX

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TOWER DATA

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IL22533-A / Crystal Lake South



Exposure Category "C"

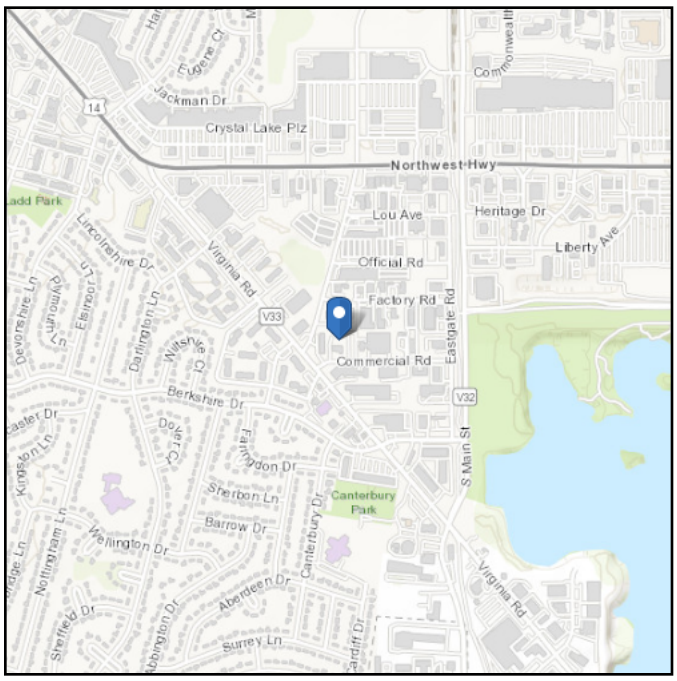
Topographic Category "1"

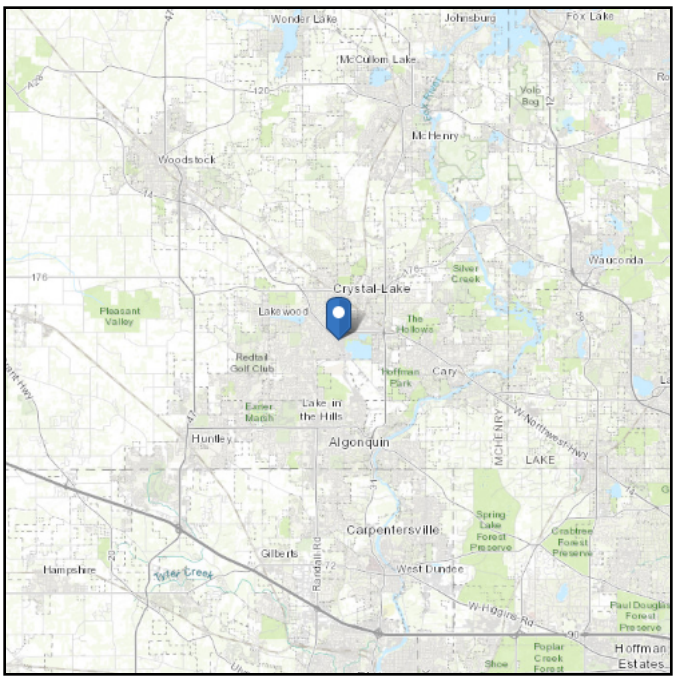
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 896.55 ft (NAVD 88)
Latitude: 42.2216
Longitude: -88.3202





Wind

Results:

Wind Speed	107 Vmph
10-year MRI	73 Vmph
25-year MRI	82 Vmph
50-year MRI	85 Vmph
100-year MRI	92 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Thu Nov 10 2022

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

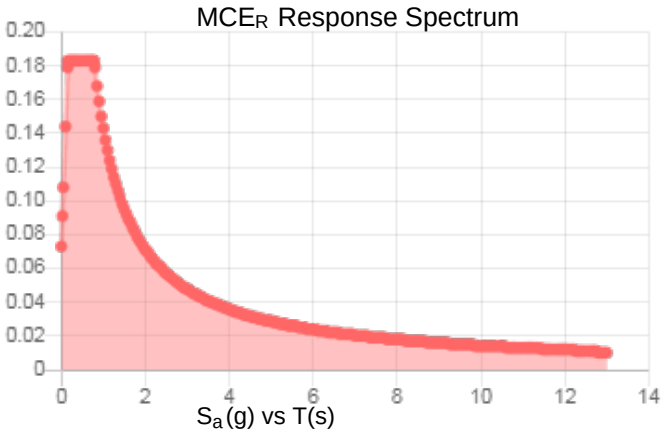
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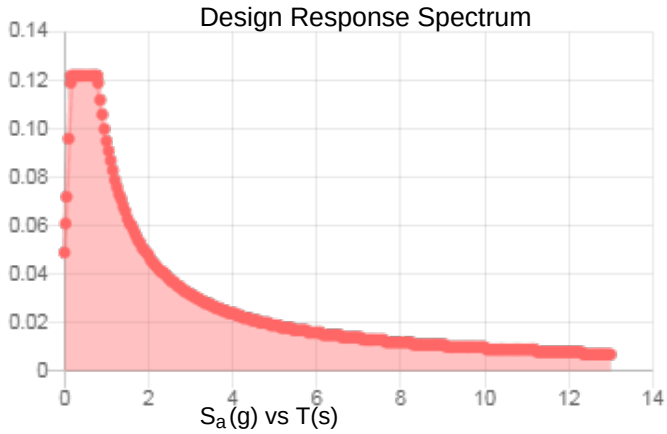
Site Soil Class: D - Stiff Soil

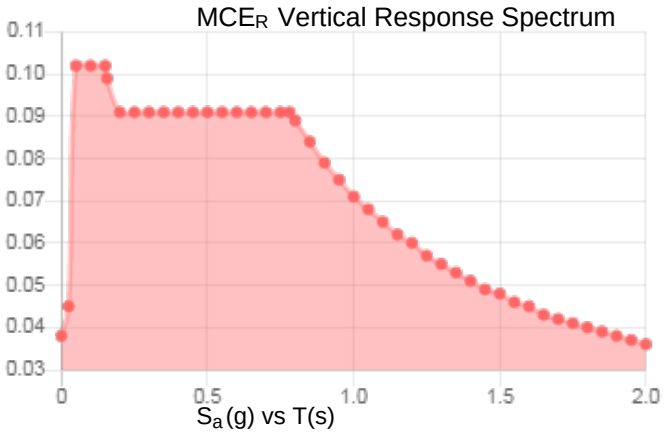
Results:

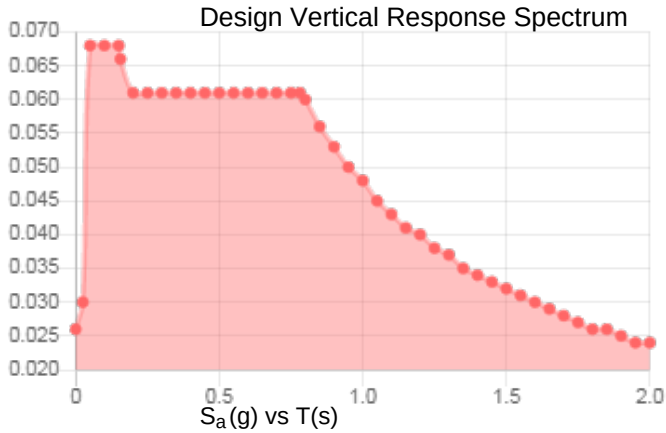
S_S :	0.114	S_{D1} :	0.095
S_1 :	0.06	T_L :	12
F_a :	1.6	PGA :	0.058
F_v :	2.4	PGA_M :	0.093
S_{MS} :	0.183	F_{PGA} :	1.6
S_{M1} :	0.143	I_e :	1
S_{DS} :	0.122	C_v :	0.7

Seismic Design Category B









Data Accessed: **Thu Nov 10 2022**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.50 in.
Concurrent Temperature:	-5 F
Gust Speed	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Thu Nov 10 2022

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

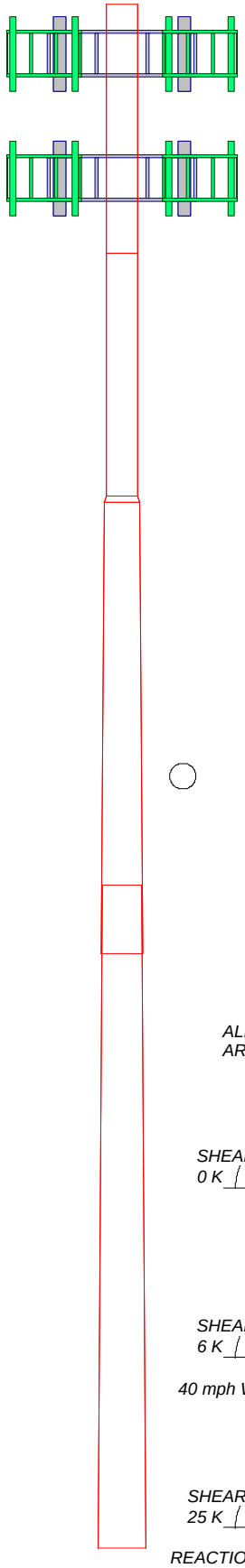
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TOWER ELEVATION DRAWINGS

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Section	1	2	3	4	5
Length (ft)	20.00	19.50	0.50	36.25	53.25
Number of Sides	1	1	1	18	18
Thickness (in)	0.250	0.250	0.250	0.250	0.313
Socket Length (ft)				5.50	
Top Dia (in)	30.000	30.000	30.000	34.000	38.115
Bot Dia (in)	30.000	30.000	34.000	39.440	46.100
Grade	A500-42				A572-65
Weight (K)	1.7	1.6	0.0	3.7	7.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Top Branches (Other)	124	L3	104
L1	124	New Branches (Other)	99
Verizon Loading (Verizon)	120	New Branches (Other)	94
New Branches (Other)	114	New Branches (Other)	89
T-Mobile Loading (T-Mobile)	110	L4	84.5
New Branches (Other)	109	New Branches (Other)	84
L2	104.5	L5	84
New Branches (Other)	104	L6	47.75

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A572-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in McHenry County, Illinois.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 107 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 103.6%

ALL REACTIONS ARE FACTORED

AXIAL 36 K
SHEAR 0 K
MOMENT 33 kip-ft

SEISMIC

AXIAL 53 K
SHEAR 6 K
MOMENT 674 kip-ft

40 mph WIND - 1.500 in ICE

AXIAL 36 K
SHEAR 25 K
MOMENT 2787 kip-ft

REACTIONS - 107 mph WIND

Allpro Consulting Group, inc.
9221 Lyndon B. Johnson Fwy., Suite #204
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

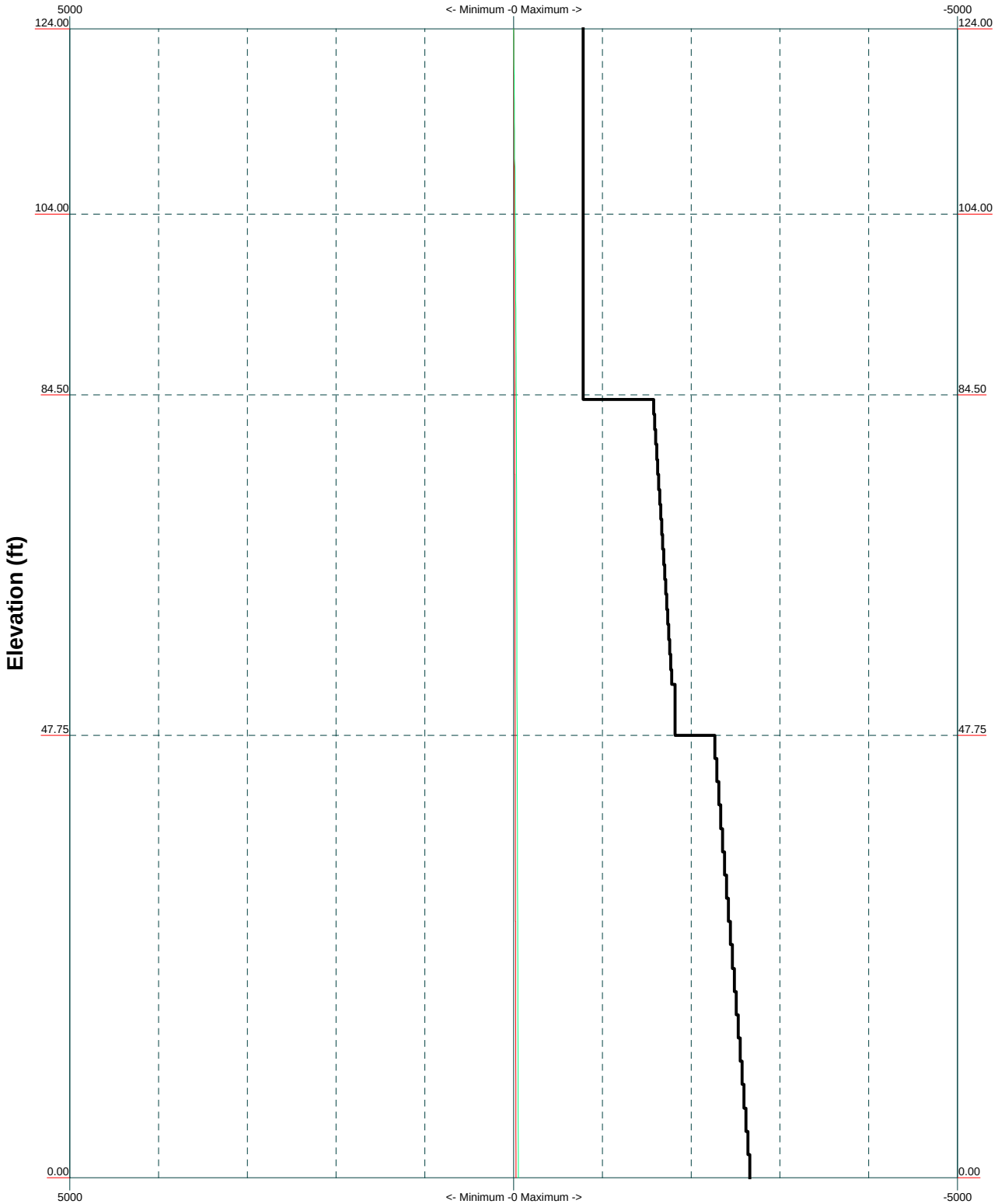
Job: ***22-4227***			
Project: ***IL22533-A Crystal Lake South***			
Client: SBA	Drawn by: SVansia	App'd:	
Code: TIA-222-H	Date: 11/14/22	Scale: NTS	
Path: C:\Users\Svansia\Desktop\IL22533InxTower\Monopine Conversion\IL22533-A_Crystal Lake South_SA ERI_11-14-2022.eri		Dwg No. E-1	

MISCELLANEOUS PLOTS

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TIA-222-H - 107 mph/40 mph 1.500 in Ice Exposure C

Leg Capacity ——— **Leg Compression (K)**



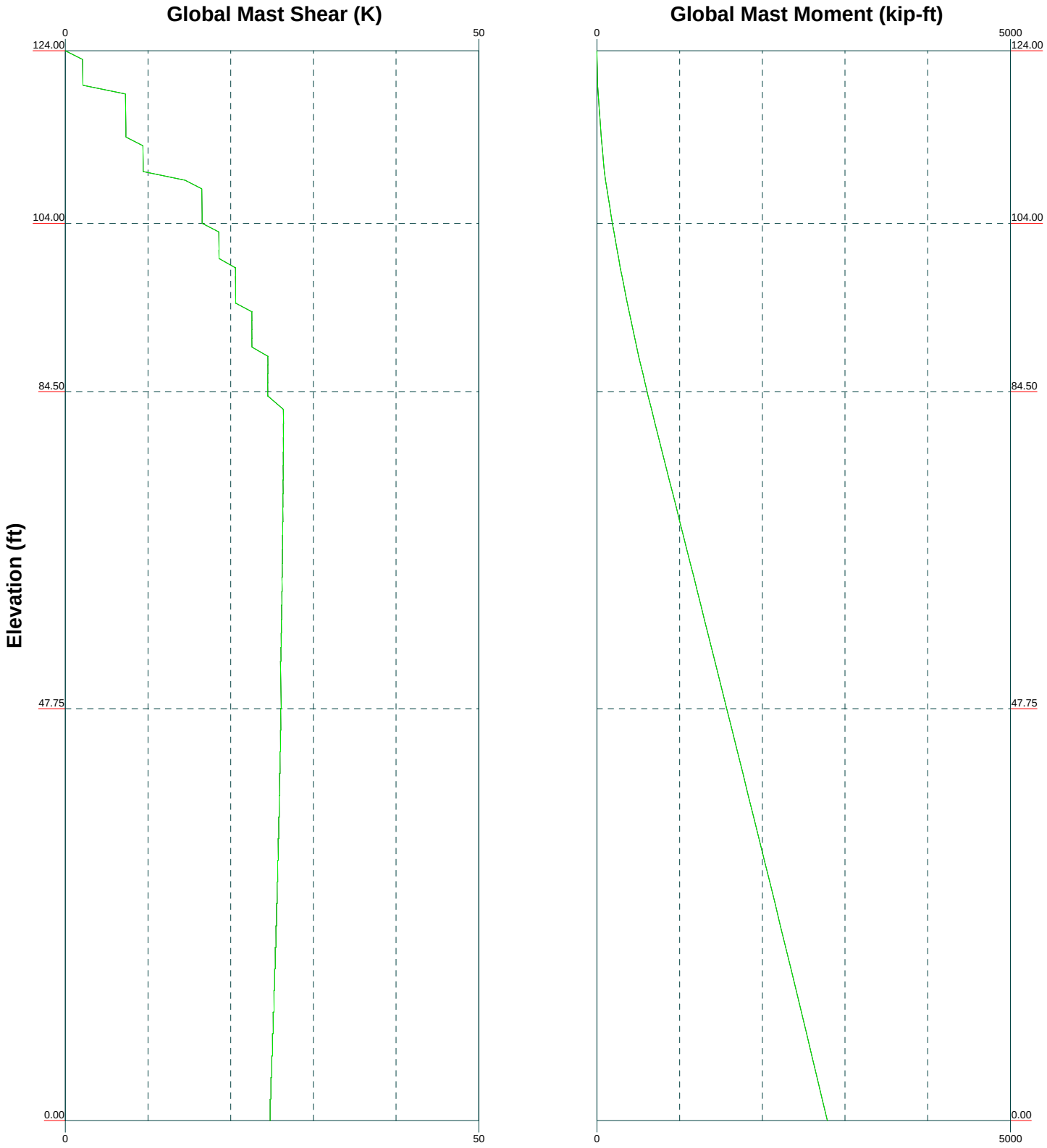
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Phone: 972-231-8893
FAX: 866-364-8375

Job: ***22-4227***		
Project: ***IL22533-A Crystal Lake South***		
Client: SBA	Drawn by: SVansia	App'd:
Code: TIA-222-H	Date: 11/14/22	Scale: NTS
Path: C:\Users\Svansia\Desktop\IL22533\tnxTower\Monopine Conversion\IL22533-A_Crystal Lake South_SA ERI_11-14-2022.eri		Dwg No. E-3

TIA-222-H - 107 mph/40 mph 1.500 in Ice Exposure C

Maximum Values

Vx Vz Mx Mz

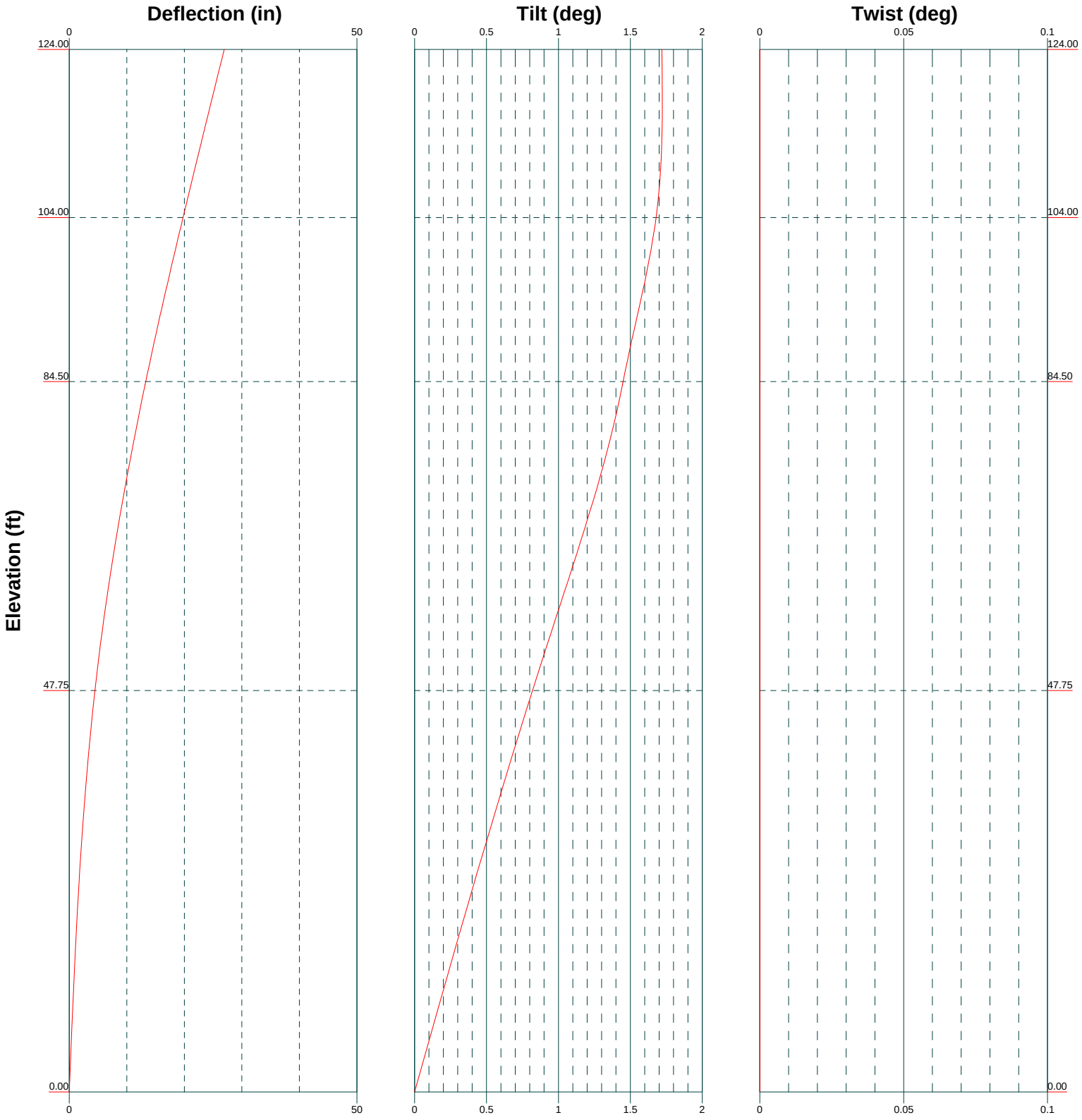


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Phone: 972-231-8893
FAX: 866-364-8375

Job: ***22-4227***			
Project: ***IL22533-A Crystal Lake South***			
Client: SBA	Drawn by: SVansia	App'd:	
Code: TIA-222-H	Date: 11/14/22	Scale: NTS	
Path: C:\Users\Svansia\Desktop\IL22533\tnxTower\Monopine Conversion\IL22533-A_Crystal Lake South_SA ERI_11-14-2022.eri		Dwg No. E-4	

TIA-222-H - Service - 60 mph

Maximum Values

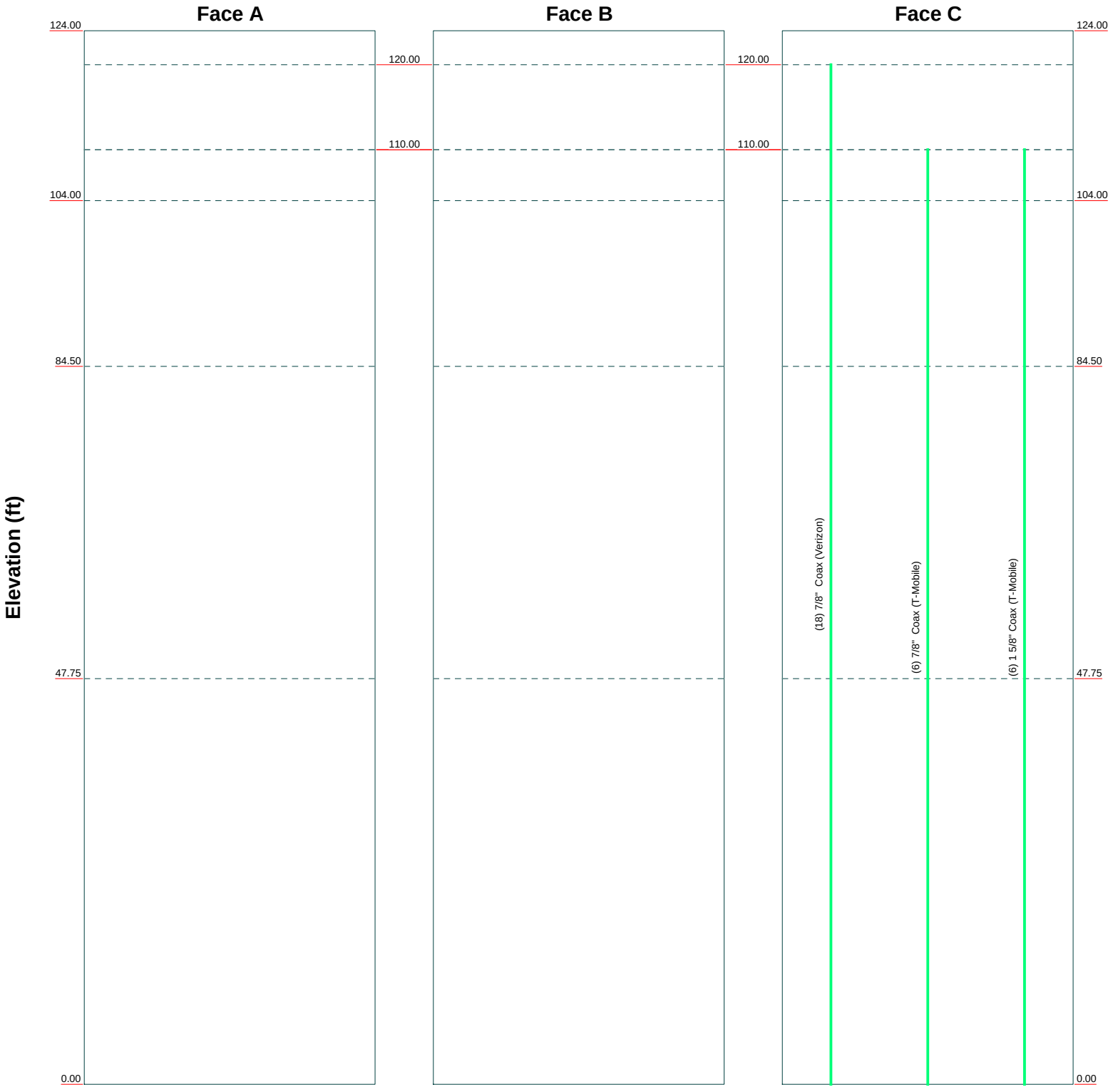


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Job: ***22-4227***		
Project: ***IL22533-A Crystal Lake South***		
Client: SBA	Drawn by: SVansia	App'd:
Code: TIA-222-H	Date: 11/14/22	Scale: NTS
Path: C:\Users\Svansia\Desktop\IL22533InxTower\Monopine Conversion\IL22533-A_Crystal Lake South_SA ERI_11-14-2022.eri		Dwg No. E-5

Feed Line Distribution Chart
0' - 124'

Round | Flat | App In Face | App Out Face | Truss Leg

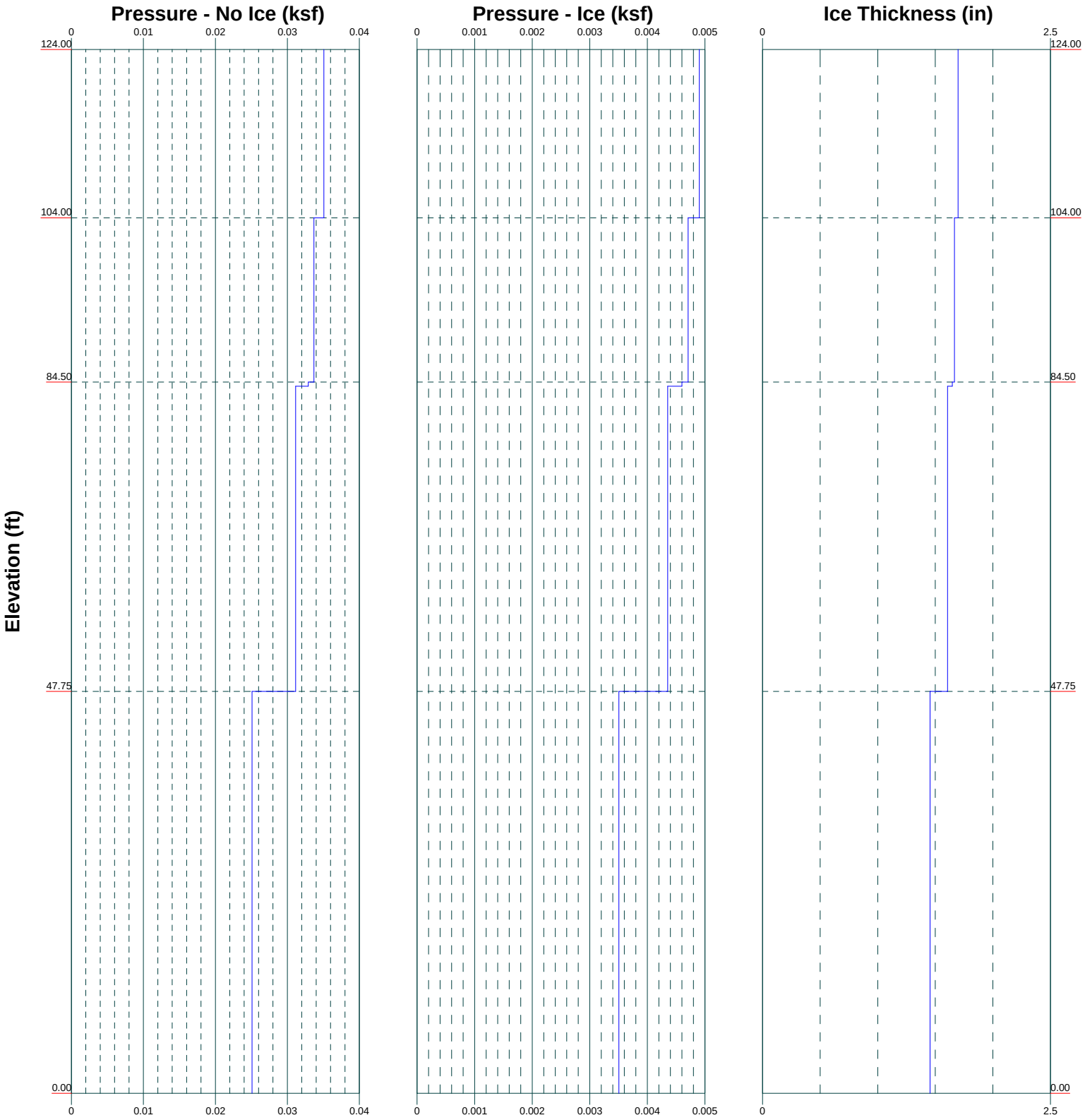


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FAX: 866-364-8375

Job: ***22-4227***		
Project: ***IL22533-A Crystal Lake South***		
Client: SBA	Drawn by: SVansia	App'd:
Code: TIA-222-H	Date: 11/14/22	Scale: NTS
Path: C:\Users\Svansia\Desktop\IL22533\InxTower\Monopine Conversion\IL22533-A_Crystal Lake South_SA ERI_11-14-2022.eri		Dwg No. E-7

Wind Pressures and Ice Thickness

TIA-222-H - 107 mph/40 mph 1.500 in Ice Exposure C



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Phone: 972-231-8893
FAX: 866-364-8375

Job: ***22-4227***		
Project: ***IL22533-A Crystal Lake South***		
Client: SBA	Drawn by: SVansia	App'd:
Code: TIA-222-H	Date: 11/14/22	Scale: NTS
Path: C:\Users\Svansia\Desktop\IL22533InxTower\Monopine Conversion\IL22533-A_Crystal Lake South_SA ERI_11-14-2022.eri		Dwg No. E-9

CALCULATION PRINTOUT

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Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in McHenry County, Illinois.
Tower base elevation above sea level: 896.55 ft.
Basic wind speed of 107 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	124.00-104.00	20.00	0.00	Round	30.000	30.000	0.250		A500-42 (42 ksi)
L2	104.00-84.50	19.50	0.00	Round	30.000	30.000	0.250		A500-42 (42 ksi)
L3	84.50-84.00	0.50	0.00	Round	30.000	34.000	0.250		A500-42 (42 ksi)
L4	84.00-47.75	36.25	5.50	18	34.000	39.440	0.250	1.000	A572-65 (65 ksi)
L5	47.75-0.00	53.25		18	38.115	46.100	0.313	1.252	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	30.000	23.366	2585.184	10.519	15.000	172.346	5170.368	11.676	0.000	0
	30.000	23.366	2585.184	10.519	15.000	172.346	5170.368	11.676	0.000	0
L2	30.000	23.366	2585.184	10.519	15.000	172.346	5170.368	11.676	0.000	0
	30.000	23.366	2585.184	10.519	15.000	172.346	5170.368	11.676	0.000	0
L3	30.000	23.366	2585.184	10.519	15.000	172.346	5170.368	11.676	0.000	0
	34.000	26.507	3774.375	11.933	17.000	222.022	7548.750	13.246	0.000	0
L4	34.486	26.781	3853.947	11.981	17.272	223.133	7712.965	13.393	5.544	22.176
	40.010	31.097	6034.068	13.912	20.036	301.169	12076.075	15.552	6.501	26.006
L5	39.492	37.554	6779.848	13.420	19.362	350.158	13568.617	18.781	6.157	19.672
	46.763	45.488	12048.009	16.254	23.419	514.459	24111.871	22.748	7.563	24.162

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 124.00-104.00				1	0	1.05			
L2 104.00-84.50				1	0	1.05			
L3 84.50-84.00				1	0	1.05			
L4 84.00-47.75				1	0	1.05			
L5 47.75-0.00				1	0	1.05			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***											

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
7/8" Coax (Verizon)	C	No	No	Inside Pole	120.00 - 0.00	18	No Ice	0.00	0.52
							1/2" Ice	0.00	0.52
							1" Ice	0.00	0.52
							2" Ice	0.00	0.52
***									
7/8" Coax (T-Mobile)	C	No	No	Inside Pole	110.00 - 0.00	6	No Ice	0.00	0.52
							1/2" Ice	0.00	0.52
							1" Ice	0.00	0.52
							2" Ice	0.00	0.52
1 5/8" Coax (T-Mobile)	C	No	No	Inside Pole	110.00 - 0.00	6	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
							2" Ice	0.00	1.04
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	124.00-104.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.21
L2	104.00-84.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.37
L3	84.50-84.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.01
L4	84.00-47.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.68
L5	47.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.89

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	124.00-104.00	A	1.698	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.21
L2	104.00-84.50	A	1.666	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.37
L3	84.50-84.00	A	1.647	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.01
L4	84.00-47.75	A	1.607	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.68
L5	47.75-0.00	A	1.455	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.89

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	124.00-104.00	0.000	0.000	0.000	0.000
L2	104.00-84.50	0.000	0.000	0.000	0.000
L3	84.50-84.00	0.000	0.000	0.000	0.000
L4	84.00-47.75	0.000	0.000	0.000	0.000
L5	47.75-0.00	0.000	0.000	0.000	0.000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

User Defined Loads - Seismic

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °	E_v K	E_{hx} K	E_{hz} K	E_h K
L1	124.00	0.00	0.000	0.03	0.00	0.00	0.05
L3	104.00	0.00	0.000	0.04	0.00	0.00	0.07
L4	84.50	0.00	0.000	0.00	0.00	0.00	0.00
L5	84.00	0.00	0.000	0.10	0.00	0.00	0.13
L6	47.75	0.00	0.000	0.20	0.00	0.00	0.15

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft	C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***								
***								
***								
***								
***								
***								

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
***									
***									
***									
Top Branches (Other)	C	None		0.000	124.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	114.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	109.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	104.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	99.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	94.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	89.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
New Branches (Other)	C	None		0.000	84.00	No Ice	50.00	50.00	1.00
						1/2" Ice	60.00	60.00	1.20
						1" Ice	70.00	70.00	1.40
						2" Ice	90.00	90.00	1.80
***									
T-Mobile Loading (T-Mobile)	C	None		0.000	110.00	No Ice	125.00	125.00	2.23
						1/2" Ice	150.00	150.00	2.67
						1" Ice	175.00	175.00	3.12
						2" Ice	225.00	225.00	4.00
***									
Verizon Loading (Verizon)	C	None		0.000	120.00	No Ice	125.00	125.00	2.23
						1/2" Ice	150.00	150.00	2.67
						1" Ice	175.00	175.00	3.12
						2" Ice	225.00	225.00	4.00

Load Combinations

Comb. No.	Description

Comb. No.	*Description*
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service
51	1.2 Dead+1.0 Ev+1.0 Eh 0 deg
52	0.9 Dead-1.0 Ev+1.0 Eh 0 deg
53	1.2 Dead+1.0 Ev+1.0 Eh 30 deg
54	0.9 Dead-1.0 Ev+1.0 Eh 30 deg
55	1.2 Dead+1.0 Ev+1.0 Eh 60 deg
56	0.9 Dead-1.0 Ev+1.0 Eh 60 deg
57	1.2 Dead+1.0 Ev+1.0 Eh 90 deg
58	0.9 Dead-1.0 Ev+1.0 Eh 90 deg
59	1.2 Dead+1.0 Ev+1.0 Eh 120 deg
60	0.9 Dead-1.0 Ev+1.0 Eh 120 deg
61	1.2 Dead+1.0 Ev+1.0 Eh 150 deg
62	0.9 Dead-1.0 Ev+1.0 Eh 150 deg

Comb. No.	Description
63	1.2 Dead+1.0 Ev+1.0 Eh 180 deg
64	0.9 Dead-1.0 Ev+1.0 Eh 180 deg
65	1.2 Dead+1.0 Ev+1.0 Eh 210 deg
66	0.9 Dead-1.0 Ev+1.0 Eh 210 deg
67	1.2 Dead+1.0 Ev+1.0 Eh 240 deg
68	0.9 Dead-1.0 Ev+1.0 Eh 240 deg
69	1.2 Dead+1.0 Ev+1.0 Eh 270 deg
70	0.9 Dead-1.0 Ev+1.0 Eh 270 deg
71	1.2 Dead+1.0 Ev+1.0 Eh 300 deg
72	0.9 Dead-1.0 Ev+1.0 Eh 300 deg
73	1.2 Dead+1.0 Ev+1.0 Eh 330 deg
74	0.9 Dead-1.0 Ev+1.0 Eh 330 deg

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	124 - 104	26.93	40	1.720	0.000
L2	104 - 84.5	19.77	40	1.679	0.000
L3	84.5 - 84	13.30	40	1.449	0.000
L4	84 - 47.75	13.15	40	1.443	0.000
L5	53.25 - 0	5.42	40	0.920	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	Top Branches	40	26.93	1.720	0.000	47123
120.00	Verizon Loading	40	25.48	1.722	0.000	47123
114.00	New Branches	40	23.32	1.720	0.000	23561
110.00	T-Mobile Loading	40	21.89	1.711	0.000	16829
109.00	New Branches	40	21.54	1.707	0.000	15707
104.50	L2	40	19.95	1.683	0.000	11426
104.00	New Branches	40	19.77	1.679	0.000	10940
99.00	New Branches	40	18.03	1.634	0.000	6887
94.00	New Branches	40	16.34	1.574	0.000	4865
89.00	New Branches	40	14.70	1.509	0.000	3764
84.50	L4	40	13.30	1.449	0.000	3789
84.00	New Branches	40	13.15	1.443	0.000	3885
47.75	L6	40	4.46	0.820	0.000	2745

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	124 - 104	96.33	8	6.159	0.000
L2	104 - 84.5	70.74	8	6.015	0.000
L3	84.5 - 84	47.60	8	5.190	0.000

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L4	84 - 47.75	47.05	8	5.167	0.000
L5	53.25 - 0	19.41	8	3.296	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	Top Branches	8	96.33	6.159	0.000	13447
120.00	Verizon Loading	8	91.17	6.167	0.000	13447
114.00	New Branches	8	83.45	6.159	0.000	6723
110.00	T-Mobile Loading	8	78.33	6.127	0.000	4801
109.00	New Branches	8	77.06	6.114	0.000	4480
104.50	L2	8	71.37	6.028	0.000	3257
104.00	New Branches	8	70.74	6.015	0.000	3119
99.00	New Branches	8	64.52	5.851	0.000	1960
94.00	New Branches	8	58.46	5.640	0.000	1383
89.00	New Branches	8	52.61	5.403	0.000	1068
84.50	L4	8	47.60	5.190	0.000	1074
84.00	New Branches	8	47.05	5.167	0.000	1102
47.75	L6	8	15.95	2.935	0.000	769

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	124 - 104 (1)	TP30x30x0.25 4.8.2 (1.04 CR) - 2	20.00	0.00	0.0	23.366	-9.51	783.04	0.012
L2	104 - 84.5 (2)	TP30x30x0.25 4.8.2 (1.04 CR) - 2	19.50	0.00	0.0	23.366	-16.22	783.04	0.021
L3	84.5 - 84 (3)	TP34x30x0.25 4.8.2 (1.04 CR) - 3	0.50	0.00	0.0	23.366	-16.24	783.04	0.021
L4	84 - 47.75 (4)	TP39.44x34x0.25	36.25	0.00	0.0	30.442	-22.62	1780.88	0.013
L5	47.75 - 0 (5)	TP46.1x38.115x0.313 4.8.2 (1.02 CR) - 5	53.25	0.00	0.0	45.488	-35.48	2661.03	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	124 - 104 (1)	TP30x30x0.25	186.92	607.55	0.308	0.00	607.55	0.000
L2	104 - 84.5 (2)	TP30x30x0.25	605.84	607.55	0.997	0.00	607.55	0.000
L3	84.5 - 84 (3)	TP34x30x0.25	605.84	607.55	0.997	0.00	607.55	0.000
L4	84 - 47.75 (4)	TP39.44x34x0.25	1425.95	1525.03	0.935	0.00	1525.03	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L5	47.75 - 0 (5)	TP46.1x38.115x0.313	2787.03	2776.03	1.004	0.00	2776.03	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	124 - 104 (1)	TP30x30x0.25	16.56	180.93	0.091	0.00	364.03	0.000
L2	104 - 84.5 (2)	TP30x30x0.25	24.49	180.93	0.135	0.00	364.03	0.000
L3	84.5 - 84 (3)	TP34x30x0.25	24.49	180.14	0.136	0.00	364.03	0.000
L4	84 - 47.75 (4)	TP39.44x34x0.25	26.09	534.26	0.049	0.00	1795.01	0.000
L5	47.75 - 0 (5)	TP46.1x38.115x0.313	24.77	798.31	0.031	0.00	3201.05	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	124 - 104 (1)	0.012	0.308	0.000	0.091	0.000	0.328 ✔	1.000	4.8.2 ✔
L2	104 - 84.5 (2)	0.021	0.997	0.000	0.135	0.000	1.036	1.000	4.8.2
L3	84.5 - 84 (3)	0.021	0.997	0.000	0.136	0.000	1.036	1.000	4.8.2
L4	84 - 47.75 (4)	0.013	0.935	0.000	0.049	0.000	0.950 ✔	1.000	4.8.2 ✔
L5	47.75 - 0 (5)	0.013	1.004	0.000	0.031	0.000	1.018	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	124 - 104	Pole	TP30x30x0.25	1	-9.51	783.04	32.8	Pass
L2	104 - 84.5	Pole	TP30x30x0.25	2	-16.22	783.04	103.6	Acceptable
L3	84.5 - 84	Pole	TP34x30x0.25	3	-16.24	783.04	103.6	Acceptable
L4	84 - 47.75	Pole	TP39.44x34x0.25	4	-22.62	1780.88	95.0	Pass
L5	47.75 - 0	Pole	TP46.1x38.115x0.313	5	-35.48	2661.03	101.8	Acceptable
							Summary	
						Pole (L3)	103.6	Acceptable
						RATING =	**103.6**	**Acceptable**

Seismic Load Analysis Output

Project Data

ACGI#	22-4227
Site Name/ID	IL22533-A Crystal Lake South
TIA Code	TIA-222-H
Type of Tower	MP
Risk Category	II

Output Result

Total Weight W	15.440	k
Fundamental Period (T)	2.421	s
Total Seimic Shear	0.404	k

Seismic Design Data

SDS	0.122
SD1	0.095
S1	0.06
TL(sec)	12

L1	124.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.028	0.053
L2	104.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000	0.000
L3	104.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.040	0.065
L4	84.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001	0.002
L5	84.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.104	0.134
L6	47.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.203	0.150

Monopole Circular Baseplate & Anchor Bolts Calculations

Site Data		
ACGI #	22-4227	
Site Name / ID	IL22533-A Crystal Lake South	
TIA Code	TIA-222-H	

Reactions		
Mu	2787	ft-Kips
Axial, Pu	36	Kips
Shear, Vu	25	Kips
ETA Factor, ŋ	0.5	

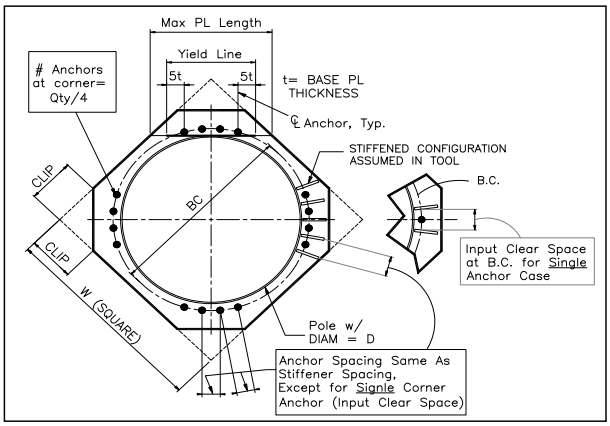
Anchor Rod Data		
Qty.	4	
Diameter	2.25	in
Yield Strength, Fy	75	ksi
Ultimate Strength, Fu	100	ksi
Bolt Circle	52.5	in
Anchor Rod Projection, Iar	2	in

Base Plate Data		
Width	49.75	in
Thickness	1.75	in
Clip Length	8	in
Yield Strength, Fy	50	ksi
Ultimate Strength, Fu	65	ksi

Stiffener Data		
Configuration	Unstiffened	

Pole Data at Base		
Diameter	46.1	in
Thickness	0.313	in
Number of sides	18	"0" For round
Yield Strength, Fy	65	Ksi
Ultimate Strength, Fu	80	Ksi

Modification of Anchor bolts	No



OUTPUT

Base Plate Results		
Base Plate Stress	111.31	Ksi
Allowable Plate Stress	45.00	Ksi
Base Plate Stress Ratio	**247.36%**	FAIL

Anchor Rod Results		
Anchor Rod Stress Ratio	**683.19%**	FAIL

MATHCAD CALCULATION PRINTOUT

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Existing 124 ft Monopole Pier Foundation Check

Customer Name: SBA Communications Corp
Customer Site Number: IL22533-A
Customer Site Name: Crystal Lake South

Site Location: Crystal Lake, Illinois

Latitude: 42.221600
Longitude: -88.320200

ACGI #22-4227

Allpro Consulting Group, Inc.
9221 Lyndon B. Johnson Freeway, Suite 204
Dallas, TX 75243
Tel: 972-231-8893, Fax: 866-364-8375

APPLICABLE CODES

- *ASCE7-16/ TIA-222-H/ IBC2018 - ACI 318-14 CODE*

INPUT DATA

-*Foundation Reactions-(factored)*

(Note: As per tnxTower Output)

Down Load: $P_{dwn} := 36 \cdot kips$

Uplift Load: $P_{up} := 0 \cdot kips$

Shear Load: $S := 25 \cdot kips$

Moment: $M := 2787 \cdot ft \cdot kips$

-*Reinforcement Data*-

Typical concrete cover $cc := 3 \cdot in$

Vertical rebar size $d_{bar} := 8$

No. of vertical rebars in each pier $NRB_{use} := 26$

Tiebar size $d_{tie} := 5$

-*Pier Dimensions*-

(Note: As per original foundation design by Sabre Job #137006 dated 2/10/2016)

Diameter: $D_{pier} := 6ft$

Extension above grade: $E_{pier} := 0.375 \cdot ft$

Concrete density See below

Concrete strength $F_c := 4000 \cdot psi$

Rebar Fy $F_y := 60 \cdot ksi$

ACI Strength reduction factors

$\phi_{comp} := 0.65$ (ACI 9.3.2.2)

$\phi_{tens} := 0.9$ (ACI 9.3.2.2a)

$\phi_{shear} := 0.75$ (ACI 9.3.2.3)

-*Factor of Safety for soil strength*-

$\phi_{s_Bear} := 0.75$ as per TIA-222-H code for bearing, 9.7 - for MP/SST

$\phi_{s_friction} := 0.75$ as per TIA-222-H code for skin friction resistance, 9.7

$\phi_{s_lateral} := 0.75$ as per TIA-222-H code for lateral resistance, 9.7

$\phi_{s_uplift} := 0.75$ as per TIA-222-H code for lateral resistance, 9.7

-*Soil Properties*- (Note: As per Geotechnical report by G2 Consulting Group, Project No #152185 dated 05/26/2015)

Number of soil layers $NSL := 3$ $i_{neg} := 1$ $j := 1 .. NSL$

Neglected soil height $L_{ngl} := 3 \cdot ft$ >= 1.0 x Pier Diam. $k := 1 .. NSL$

$i := 1 .. NSL$

$\alpha := 0.4$ Estimated cohesion

Ground Water @ 28.5ft depth below ground level

Height $H_j :=$	PHI $\phi_j :=$	Cu $Cu_j :=$	Soil Dens $\gamma_{s_j} :=$	Conc Dens $\gamma_{c_j} :=$	Ult Skin friction $SKU_{dn_j} :=$	$SKU_{up_j} :=$
3·ft	0·deg	0·ksf	110·pcf	150·pcf	0·ksf	0·ksf
2.5·ft	0·deg	1.25·ksf	125·pcf	150·pcf	0·ksf	0·ksf
8.5·ft	34·deg	0·ksf	110·pcf	150·pcf	0.57·ksf	0.57·ksf

$L_{pier} := \sum_{j=1}^{NSL} H_j$ $L_{pier} = 14\,ft$

$K_s := 1$

$\sigma 1_{v_2} := \gamma_{s_1} \cdot H_1 + \gamma_{s_2} \cdot \frac{H_2}{2}$ $\sigma 1_{v_2} = 0.49 \cdot ksf$ $SK2 := K_s \sigma 1_{v_2} \cdot \tan(\phi_2 \cdot 0.8)$ $SK2 = 0 \cdot ksf$

$\sigma 1_{v_3} := \gamma_{s_1} \cdot H_1 + \gamma_{s_2} \cdot H_2 + \gamma_{s_3} \cdot \frac{H_3}{2}$ $\sigma 1_{v_3} = 1.11 \cdot ksf$ $SK3 := K_s \sigma 1_{v_3} \cdot \tan(\phi_3 \cdot 0.8)$ $SK3 = 0.57 \cdot ksf$

Soil Bearing Safety fator: $SF := 3$ (As per GEO report)

Allowable bearing capacity: $BC_{all} := 12ksf$ (As per GEO report)

End Ultimate bearing capacity: $BC_{ult} := BC_{all} \cdot SF = 36 \cdot ksf$

CALCULATIONS

-Pier calculation-

Aspect ratio $A_r := \frac{(L_{pier} + E_{pier})}{D_{pier}} = 2.4$

Pier area $A_{pier} := \pi \cdot \frac{D_{pier}^2}{4}$ $A_{pier} = 28.27\,ft^2$

Pier perimeter $PM_{pier} := \pi \cdot D_{pier}$ $PM_{pier} = 18.85\,ft$

Pier volume $V_{pier} := A_{pier} \cdot (L_{pier} + E_{pier})$ $V_{pier} = 15.05 \cdot cy$

Weighted average unit weight of concrete

$$\gamma_{cave} := \frac{\sum_{n=1}^{NSL} (\gamma_{c_n} \cdot H_n)}{\sum_{n=1}^{NSL} H_n} \qquad \gamma_{cave} = 150 \cdot pcf$$

$$\gamma_{net} := \frac{\sum_{n=1}^{NSL} \left[(\gamma_{c_n} - \gamma_{s_n}) \cdot H_n\right]}{\sum_{n=1}^{NSL} H_n} \qquad \gamma_{net} = 37.32 \cdot pcf$$

Pier concrete weight $W_{pier} := V_{pier} \cdot \gamma_{cave}$ $W_{pier} = 60.97 \cdot kips$

Pier net weight $W_{pier_net} := V_{pier} \cdot \gamma_{net}$ $W_{pier_net} = 15.17 \cdot kips$

-Download capacity-

$SKFN_k := SKU_{dn_k} \cdot PM_{pier} \cdot H_k$ $P_k := if\left[k = NSL, \left[A_{pier} \cdot \left(BC_{ult}\right)\right], 0 \cdot kips\right]$ $SKUFN_k := SKU_{up_k} \cdot PM_{pier} \cdot H_k$

$SKFN_k =$

0	$\cdot lb$
0	
91326.1	

$P_k =$

0	$\cdot lb$
0	
$1.02 \cdot 10^6$	

$P_{dcap} := \sum_k P_k \cdot \phi_{s_Bear} + \sum_k SKFN_k \cdot \phi_{s_friction}$ $P_{dwn_total} := P_{dwn} + 1.2W_{pier_net}$

$P_{dcap} = 831.9 \cdot kips$ > $P_{dwn_total} = 54.2 \cdot kips$ **OK!** $\frac{P_{dwn_total}}{P_{dcap}} = 6.52 \cdot \%$

$\alpha = 0.4$ - (average value for soils 0.4)

$\sigma_{v_0} := 0.0 \cdot ksf$

$TL_0 := 0 \cdot ft$

$\sigma_{v_i} := \sigma_{v_{i-1}} + 1.0 \cdot \gamma_{s_i} \cdot H_i$

-Required Pier Length Based on Brohm's method-

Weighted average cohesion

$$C_u := \frac{\sum_{j=1}^{NSL} \left(Cu_j \cdot H_j\right)}{\sum_{j=1}^{NSL} H_j - L_{ngl}} \qquad C_u = 0.28 \cdot ksf$$

$$PP_i := if\left[i > i_{neg}, \left(2 \cdot Cu_i \cdot \sqrt{\tan\left(45 \cdot deg + \frac{\phi_i}{2}\right)^2} + \sigma_{v_i} \cdot \tan\left(45 \cdot deg + \frac{\phi_i}{2}\right)^2\right) \cdot \phi_{s_lateral}, 0 \cdot kips\right]$$

$PP_j =$

0	$\cdot psf$
2356.87	
4184.87	

$PP_j =$

0	$\cdot psf$
2356.87	
4184.87	

$$PP := \frac{\left[\sum_j \left[\left(PP_j + PP_{j-1}\right) \cdot \frac{H_j}{2}\right]\right]2}{\sum_j \left(H_j\right) - L_{ngl}}$$

$PP = 5.59 \cdot ksf$

Passive pressure $PP_{allw} := \frac{PP}{L_{pier} - L_{ngl}}$ $PP_{allw} = 0.51 \cdot kcf$

Depth to the point of zero shear

$$f := if\left[\sum_{j=1}^{NSL} \phi_j > 0deg\,,\ 0.816 \cdot \left(\frac{S}{D_{pier} \cdot PP_{allw}}\right)^{\frac{1}{2}}\,,\ \frac{S}{9 \cdot C_u \cdot D_{pier}}\right] \qquad f = 2.34\,ft$$

g ultimate for moment calculation

$$g_u := if\left[\sum_{j=1}^{NSL} \phi_j > 0deg\,,\ 0\,,\ \sqrt{\frac{S \cdot \left[\left(E_{pier} + L_{ngl}\right) + .5 \cdot f\right] + M}{2.25 \cdot C_u \cdot D_{pier}}}\right] \qquad g_u = 0\,ft$$

g allowable with $\phi_{s_lateral} = 0.75$

$$g_a := if\left[\sum_{j=1}^{NSL} \phi_j > 0deg\,,\ 0\,,\ \sqrt{\frac{S \cdot \left[\left(E_{pier} + L_{ngl}\right) + .5 \cdot f\right] + M}{2.25 \cdot \left(C_u \cdot \phi_{s_lateral}\right) \cdot D_{pier}}}\right] \qquad g_a = 0\,ft$$

-Required pier length- $L_1 := 5 \cdot ft$

$$A := root\left[S \cdot \left(E_{pier} + L_{ngl} + L_1\right) + M - \left[D_{pier} \cdot PP_{allw} \cdot L_1^{\,3} \cdot (.5)\right], L_1\right] \qquad A = 12.79\,ft$$

$$L_{req} := if\left[\sum_{j=1}^{NSL} \phi_j > 0deg\,,\ A + L_{ngl}\,,\ \left(f + L_{ngl}\right) + g_a\right]$$

$L_{req} = 15.79\,ft$ < $L_{pier} = 14\,ft$ **OK!** $\frac{L_{req}}{L_{pier}} = 112.8 \cdot \%$ **OK!**

Max. bending moment,

$$M_{max} := if\left[\sum_{j=1}^{NSL} \phi_j > 0deg\,,\ S \cdot \left(E_{pier} + L_{ngl} + f\right) - S \cdot \frac{f}{3} + M\,,\ 2.25 \cdot C_u \cdot D_{pier} \cdot g_u^{\,2}\right] = 2.91 \times 10^6\,ft \cdot lb$$

Location @ $f + L_{ngl} = 5.34\,ft$ below ground level

REINFORCEMENT CALCULATIONS

Effective pier diameter $D_{eff} := D_{pier} - cc \cdot 2$ $D_{eff} = 5.5\,ft$

-Minimum required area of steel per ACI-

$Area_{stlmin} := 0.005 \cdot \frac{\pi}{4} \cdot D_{pier}^{2}$ -(ACI 10.8.4) & (ACI 10.9.1) (TIA-222-H 9.4.1)

$Area_{stlmin} = 20.36 \cdot in^{2}$

-Rebar details-

Selected rebar size $d_{bar} = 8$

-Rebar details-

$No := (0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10 \ 11 \ 12 \ 13 \ 14 \ 15 \ 16 \ 17 \ 18)^{T}$

$d_b := (0 \ 0 \ 0 \ 0.375 \ 0.5 \ 0.625 \ 0.75 \ 0.875 \ 1.00 \ 1.125 \ 1.25 \ 1.41 \ 0 \ 0 \ 1.693 \ 0 \ 0$

$A_b := (0 \ 0 \ 0 \ 0.11 \ 0.20 \ 0.31 \ 0.44 \ 0.60 \ 0.79 \ 1.00 \ 1.27 \ 1.56 \ 0 \ 0 \ 2.25 \ 0 \ 0 \ 0 \ 4$

$B := d_{bar}$ $d_{b_B} = 1 \cdot in$ Bar area= $Area_{abar} := A_{b_B}$ $Area_{abar} = 0.79 \cdot in^{2}$

-Number of vertical rebars required-

$NRB := ceil\left(\frac{Area_{stlmin}}{Area_{abar}}\right)$ $NRB = 26$ $Area_{stluse} := Area_{abar} \cdot NRB$ $Area_{stluse} = 20.54 \cdot in^{2}$

Number rebars provided as per drawings $NRB_{use} = 26$

$\frac{P_{dwn}}{\phi_{tens}} = 40 \cdot kips$

$Mn := 39423.9 \cdot in \cdot kips$

$0.9 \cdot Mn = 2956.79 \cdot kips \cdot ft$ > $M_{max} = 2910.32 \cdot kips \cdot ft$ $\frac{M_{max}}{(0.9 \cdot Mn)} = 98.43\%$

Vertical bar spacing $S_{bar} := D_{eff} \cdot \frac{\pi}{NRB} - d_{b_B}$ $S_{bar} = 6.97 \cdot in$

$Area_{use} := Area_{abar} \cdot NRB$ $Area_{use} = 20.54 \cdot in^{2}$

-Check pier in compression-

$P_{comp} := 0.80 \cdot \phi_{comp} \cdot \left[0.85 \cdot F_c \cdot \left(A_{pier} - Area_{use}\right) + F_y \cdot Area_{use}\right]$ (ACI 10.3.6.2 - (10-2)

$P_{comp} = 7802.95 \cdot kips$ > $P_{dwn} = 36 \cdot kips$ **OK!** $\frac{P_{dwn}}{P_{comp}} = 0.46 \cdot \%$

SUMMARY

-Pier Dimensions-

Depth of pier	$L_{pier} = 14\,ft$	Concrete strength	$F_c = 4000\cdot psi$
Extension above grade	$E_{pier} = 0.38\,ft$	Rebar Fy	$F_y = 60\cdot ksi$
Total length of pier	$L_{tot} := L_{pier} + E_{pier}$	$L_{tot} = 14.38\,ft$	
Diameter	$D_{pier} = 6\,ft$		
Volume of pier concrete	$V_{pier} = 15.05\cdot cy$		
Weight of pier concrete	$W_{pier} = 60.97\cdot kips$		

Calculations summary

-Download capacity-

$P_{dcap} = 831.9\cdot kips$ > $P_{dwn_total} = 54.2\cdot kips$ **OK!** $\frac{P_{dwn_total}}{P_{dcap}} = 6.52\cdot\%$

-Required Pier Length Based on Brohm's method-

$L_{req} = 15.79\,ft$ < $L_{pier} = 14\,ft$ **OK!** $\frac{L_{req}}{L_{pier}} = 112.8\cdot\%$

```
================================================================================

                     LPile for Windows, Version 2019-11.009

                  Analysis of Individual Piles and Drilled Shafts
                 Subjected to Lateral Loading Using the p-y Method
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--------------------------------------------------------------------------------
                              Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:
\Users\Svansia\Desktop\IL22533\L-Pile\Monopine Conversion\

Name of input data file:
IL22533-A Pier.lp11d

Name of output report file:
IL22533-A Pier.lp11o

Name of plot output file:
IL22533-A Pier.lp11p

Name of runtime message file:
IL22533-A Pier.lp11r



--------------------------------------------------------------------------------
                            Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  November 11, 2022           Time:  15:27:37
```

Problem Title

Project Name: IL22533-A
Job Number: 22-4227
Client: SBA
Engineer: SV
Description: Pier

Program Options and Settings

Computational Options:
 - Compute nonlinear bending properties of pile only
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 14.500 ft
Depth of ground surface below top of pile = 0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	72.0000
2	14.500	72.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile
Length of section = 14.500000 ft

```
   Shaft Diameter                                    =    72.000000 in
   Shear capacity of section                         =       0.0000 lbs




--------------------------------------------------------------------------------
     Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
--------------------------------------------------------------------------------

Axial thrust force values were determined from input values

Number of Pile Sections Analyzed = 1

Pile Section No. 1:
-------------------

Dimensions and Properties of Drilled Shaft (Bored Pile):
--------------------------------------------------------

Length of Section                                  =    14.500000 ft
Shaft Diameter                                     =    72.000000 in
Concrete Cover Thickness (to edge of long. rebar)  =     3.000000 in
Number of Reinforcing Bars                         =           26 bars
Yield Stress of Reinforcing Bars                   =      60000. psi
Modulus of Elasticity of Reinforcing Bars          =    29000000. psi
Gross Area of Shaft                                =        4072. sq. in.
Total Area of Reinforcing Steel                    =    20.540000 sq. in.
Area Ratio of Steel Reinforcement                  =         0.50 percent
Edge-to-Edge Bar Spacing                           =     6.834884 in
Maximum Concrete Aggregate Size                    =     0.750000 in
Ratio of Bar Spacing to Aggregate Size             =         9.11
Offset of Center of Rebar Cage from Center of Pile =       0.0000 in

Axial Structural Capacities:
----------------------------

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As =    15005.678 kips
Tensile Load for Cracking of Concrete              =    -1753.556 kips
Nominal Axial Tensile Capacity                     =    -1232.400 kips


Reinforcing Bar Dimensions and Positions Used in Computations:

     Bar          Bar Diam.      Bar Area          X              Y
    Number         inches         sq. in.        inches         inches
  ----------     ----------     ----------     ----------     ----------
      1            1.000000       0.790000      32.500000        0.00000
      2            1.000000       0.790000      31.555609       7.777759
      3            1.000000       0.790000      28.777321      15.103503
      4            1.000000       0.790000      24.326599      21.551486
      5            1.000000       0.790000      18.462104      26.746976
      6            1.000000       0.790000      11.524659      30.388028
      7            1.000000       0.790000       3.917442      32.263038
      8            1.000000       0.790000      -3.917442      32.263038
      9            1.000000       0.790000     -11.524659      30.388028
```

10	1.000000	0.790000	-18.462104	26.746976
11	1.000000	0.790000	-24.326599	21.551486
12	1.000000	0.790000	-28.777321	15.103503
13	1.000000	0.790000	-31.555609	7.777759
14	1.000000	0.790000	-32.500000	0.00000
15	1.000000	0.790000	-31.555609	-7.777759
16	1.000000	0.790000	-28.777321	-15.103503
17	1.000000	0.790000	-24.326599	-21.551486
18	1.000000	0.790000	-18.462104	-26.746976
19	1.000000	0.790000	-11.524659	-30.388028
20	1.000000	0.790000	-3.917442	-32.263038
21	1.000000	0.790000	3.917442	-32.263038
22	1.000000	0.790000	11.524659	-30.388028
23	1.000000	0.790000	18.462104	-26.746976
24	1.000000	0.790000	24.326599	-21.551486
25	1.000000	0.790000	28.777321	-15.103503
26	1.000000	0.790000	31.555609	-7.777759

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 6.835 inches
between bars 18 and 19.

Ratio of bar spacing to maximum aggregate size = 9.11

Concrete Properties:

Compressive Strength of Concrete	=	4000. psi
Modulus of Elasticity of Concrete	=	3604997. psi
Modulus of Rupture of Concrete	=	-474.341649 psi
Compression Strain at Peak Stress	=	0.001886
Tensile Strain at Fracture of Concrete	=	-0.0001154
Maximum Coarse Aggregate Size	=	0.750000 in

Input Axial Thrust Forces:

Number of Axial Thrust Force Values Determined from Input Data = 1

Number	Axial Thrust Force kips
1	40.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in

```
      concrete more than 0.003. See ACI 318, Section 10.3.4.
  Z = depth of tensile zone in concrete section is less than 10 percent of
      section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.


Axial Thrust Force =     40.000 kips

    Bending       Bending       Bending      Depth to      Max Comp      Max Tens
Max Conc      Max Steel  Run
   Curvature      Moment       Stiffness      N Axis        Strain        Strain
Stress        Stress    Msg
    rad/in.       in-kip        kip-in2         in           in/in         in/in
ksi           ksi
------------ ------------ ------------ ------------ ------------ ------------ ----
--------- ------------ ---
  4.16667E-07         2437.   5848294013.    41.4182698    0.00001726   -0.00001274
0.0722273     0.4613208
  8.33333E-07         4861.   5833744503.    38.7179833    0.00003226   -0.00002774
0.1344203     0.8573846
   0.00000125         7274.   5818916185.    37.8179490    0.00004727   -0.00004273
0.1961173     1.2534507
   0.00000167         9673.   5804017543.    37.3679655    0.00006228   -0.00005772
0.2573183     1.6495183
   0.00000208        12061.   5789090710.    37.0980006    0.00007729   -0.00007271
0.3180231     2.0455875
   0.00000250        14435.   5774149773.    36.9180449    0.00009230   -0.00008770
0.3782317     2.4416583
   0.00000292        16798.   5759200767.    36.7895225     0.0001073    -0.0001027
0.4379443     2.8377305
   0.00000333        16798.   5039300671.    17.5559576    0.00005852    -0.0001815
 0.2394097    -4.9497241 C
   0.00000375        16798.   4479378374.    17.2036433    0.00006451    -0.0002055
 0.2634027    -5.6067538 C
   0.00000417        16798.   4031440537.    16.9225082    0.00007051    -0.0002295
 0.2873312    -6.2636969 C
   0.00000458        16798.   3664945942.    16.6811206    0.00007646    -0.0002535
 0.3109705    -6.9221511 C
   0.00000500        16798.   3359533781.    16.4804601    0.00008240    -0.0002776
 0.3345445    -7.5805333 C
   0.00000542        16798.   3101108105.    16.3112318    0.00008835    -0.0003016
 0.3580552    -8.2388273 C
   0.00000583        16798.   2879600383.    16.1648637    0.00009430    -0.0003257
 0.3814593    -8.8973439 C
   0.00000625        16798.   2687627024.    16.0331970     0.0001002    -0.0003498
 0.4046669    -9.5567330 C
   0.00000667        16798.   2519650335.    15.9184588     0.0001061    -0.0003739
  0.4278125   -10.2160313 C
   0.00000708        16798.   2371435610.    15.8176631     0.0001120    -0.0003980
  0.4508958   -10.8752385 C
   0.00000750        16798.   2239689187.    15.7284872     0.0001180    -0.0004220
  0.4739169   -11.5343542 C
```

```
    0.0004229        39591.     93613713.     8.8135080     0.0037274    -0.0267226
3.9785464    60.0000000 CYT
    0.0004429        39591.     89386565.     8.7587355     0.0038794    -0.0280106
3.9928533    60.0000000 CYT


--------------------------------------------------------------------------------
   Summary of Results for Nominal Moment Capacity for Section 1
--------------------------------------------------------------------------------

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

 Load           Axial Thrust        Nominal Mom. Cap.      Max. Comp.
  No.              kips                in-kip               Strain
 ----         ----------------     ------------------     ------------
   1               40.000             39423.949           0.00300000

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.75).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318,
or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial     Resist.       Nominal        Nominal     Ult. (Fac)    Ult. (Fac)   Bend.
Stiff.
Load      Factor       Ax. Thrust    Moment Cap    Ax. Thrust    Moment Cap    at Ult
Mom
 No.                      kips         in-kips        kips         in-kips      kip-in^2
-----  ------------   ------------  ------------  ------------  ------------  ----------
--
   1       0.65          40.000000        39424.     26.000000        25626.
724671789.

   1       0.75          40.000000        39424.     30.000000        29568.
700446947.

   1       0.90          40.000000        39424.     36.000000        35482.
451136478.



The analysis ended normally.
```

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Vertical Bridge REIT LLC's request for a Special Use Permit
Telecommunications Tower at 269 Liberty Road, Crystal Lake, Illinois 60014

AFFIDAVIT OF KENT MEIER

Kent Meier, being duly sworn, deposes and states that he has personal knowledge of the facts set forth in this Affidavit and if called to testify in this matter, he would swear to the following facts as true and correct:

1. I am a Site Marketing Manager for SBA Communications Corporation ("SBA"), have been in this position for over 20 years and have direct knowledge relating to T-Mobile's ("TMO") relationship with SBA.
2. It is my job to interact with carriers, such as TMO, who have located, or are interested in locating, onto SBA cell towers located in several states, including Illinois.
3. I maintain an open line of communication with the carriers to discuss tenant issues, including but not limited to collocation, new equipment, centerline placement of equipment onto SBA cell towers and other related matters, which includes the cell tower SBA has owned, operated, and maintained since April 2018 in Crystal Lake, Illinois on property commonly known as 6251 Commercial Boulevard, Crystal Lake, Illinois 60014 (the "Existing Cell Tower").
4. SBA has a national pricing agreement in place with respect to TMO wishing to collocate on any of SBA's existing towers.
5. VB BTS, LLC, a subsidiary of Vertical Bridge REIT LLC ("Vertical Bridge"), has submitted a Development Application to the City of Crystal Lake, Illinois requesting to construct a new 115-foot monopine on behalf of TMO located 0.46 miles from the Existing Cell Tower.
6. As with all other matters TMO has previously been directed to send any communication related to SBA's cell towers in Illinois to my attention.
7. I communicate with TMO on a weekly basis and they have never mentioned the proposed construction of the subject tower, collocating on the Existing Cell Tower, nor have they inquired whether the Existing Cell Tower could accommodate their equipment.
8. TMO collocating onto the Existing Cell Tower would prevent the unnecessary and needless proliferation of telecommunication towers.
9. Having reviewed my corporate records, SBA can accommodate additional equipment for TMO on the Existing Cell Tower, including 5G equipment, at 110', 100', and 90'.
10. Should TMO's current needs require modifications to the Existing Cell Tower, SBA is willing to discuss this with and attempt to accommodate TMO.
11. There is ample structural capacity for the Existing Cell Tower to handle more equipment as SBA constructed the Existing Cell Tower to house multiple tenants.
12. Having reviewed the radio frequency ("RF") coverage comparison map and study along with the RF Maps submitted by Vertical Bridge, the T-Mobile maps indicate that their coverage target/area of improvement is to the West and as such, the Existing Cell Tower would actually provide better coverage to this area since it is West of their proposed location.
13. If called upon I would testify consistent with the foregoing.

[signature follows on next page]

Dated this 29th day of September, 2022

Kent Meier

Kent Meier

Subscribed and sworn to before me this
29th day of SEPTEMBER, 2022

Notary Public

Official Seal
Patrick C Turner
Notary Public State of Illinois
My Commission Expires 06/01/2023

SBA