



**Engineering Statement
Prepared for the City of Madison
Re:
Proposed U.S. Cellular Site #782514
979 Jonathon Drive
Madison, WI 53713**

Application for CUP

February 1, 2010

Prepared by:

**Evans Associates Consulting Engineers
216 N. Green Bay Road, #205, Thiensville, WI 53092
Phone (262) 242-6000 Fax (262) 242-6045
www.evansassoc.com**

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I. BACKGROUND

This engineering report has been prepared by B. Benjamin Evans, P.E. of Evans Associates, Communications Consultants in Thiensville, Wisconsin, regarding a proposed U.S. Cellular 80-foot monopole antenna structure and associated equipment shelter in the City of Madison, Dane County, Wisconsin. The tower will be located on the Vera I. Daniels property at 979 Jonathon Drive in the City of Madison.

Evans Associates has been retained to evaluate the proposal from the standpoint of engineering and coverage necessity. Pursuant to our employment, this exhibit has been prepared.

The siting information provided to Evans Associates by U.S. Cellular has been used in evaluating the appropriate information with respect to the City of Madison's Zoning Ordinance, Section 28.04(22). The analysis and the conclusions contained herein have been prepared by or under the direction of B. Benjamin Evans, P.E., of Evans Associates, or have been submitted by the applicant. Information provided to Evans Associates by other parties is believed to be correct, and has been verified where feasible.

II. ABSTRACT

Every so often, cellular base station networks need to be supplemented with an additional site when a base station is overwhelmed by increased call traffic, or when base stations cannot penetrate an area populated with large buildings with high enough signals to provide service. As stated in U.S. Cellular's application for Conditional Use Permit, such is the case with the U.S. Cellular service along the Beltline Highway between Highway 14 and Fish Hatchery Road. According to U.S. Cellular, due to the increased wireless call demand in this area, a new site is needed to offload call traffic from adjacent U.S. Cellular base station sites which are reaching their call capacity, and to provide in-building coverage primarily to the Greenway Crossing industrial area which presently is not served adequately by the existing base stations.



Accordingly, the specified site is a "microcell", which means it is required for supplementary service in U.S. Cellular's service area, i.e., increased call capacity and in-building coverage to an underserved area.

As cellular phone use increases, the incidence of emergency and safety of life communications also increases, making high-penetration levels and the ability to connect mandatory on the cellular frequencies. Federal regulations require that local communities treat all carriers identically with respect to permit requirements.

On the other hand, public safety¹, land use and other environmental considerations must be addressed at the local level. Accordingly, the proposed site has been analyzed carefully from the standpoints of regulatory history, service necessity and availability of alternative sites. The conclusions reached herein represent the most complete engineering evaluation we are able to perform. This document and the attached exhibits are true and accurate to the best knowledge and belief of Evans Associates.

III. SITE ANALYSIS

The following paragraphs represent our analysis of the instant U.S. Cellular application for a base station antenna site in the City of Madison, referred to as the "Greenway site", which was conceived out of a need to offload the high call traffic areas of the Beltline, Highway 14 and the Greenway Crossing business and industrial area as well as providing in-building coverage in this area.

#1 Validation of RF Information

The proposed site utilizes a six-antenna array, representing full omnidirectional coverage. The tower height proposed, 80 feet AGL, has been requested by U.S. Cellular. The U.S. Cellular antennas will be mounted on the proposed monopole tower at 80 feet. According to the engineering information provided, this tower height will ensure suitability for two additional co-locators, for a total of three carriers. The co-locators' antenna arrays would be placed at 70 feet and 60 feet, thus meeting the requirements of the City Ordinance. Because of the topography of the area, a shorter structure than 80 feet would invite additional tower proliferation, which is not recommended. Relatively taller structures are required to serve areas behind hills and dense trees, especially for co-locators. The property is zoned C3L (commercial service & distribution).

In U.S. Cellular's opinion, this structure represents the minimum height and location that will achieve the required technical objectives. As the herein analysis confirms, Evans Associates agrees with this determination.

¹ Except *Radio Frequency (RF) Exposure* issues, which are regulated by the FCC.

#2 RF Exposure

The proposed site will meet FCC RF exposure requirements with respect to the general population as long as no cellular or PCS antennas are installed below 60 feet above ground level.

Accordingly, with the RF energy exposure standards utilized in previous evaluations by this consultant, and as per previous concurring opinions from the Medical College of Wisconsin, it is concluded that there is no credible concern related to RF health risks with respect to the described site as long as the industry standard construction practices are followed.

#3 Alternative Ways of Addressing a Particular Service Area Void

There appears to be no clearly superior existing tower within a 1½-mile radius of the proposed site (See Paragraph #9 below).

In the opinion of this consultant, U.S. Cellular has made a good-faith effort to locate existing antenna supporting structures to service the required area. It is the intent of the City's Ordinance to populate the city with the minimum number of structures by requiring co-location, while still ensuring a robust E-911 infrastructure.

#4 Conformance to Industry Standards

The proposed U.S. Cellular site is not within five miles of any public airport notified in the FAA's on-line search tool. Regarding private airports, the proposed U.S. Cellular site does not appear to be within three miles of any known private airstrips.

U.S. Cellular, to this engineer's knowledge, has not filed a notice with the Federal Aviation Administration as yet. However, at the requested height, notification is most likely not required.

Assuming no serious malfunction of U.S. Cellular's transmitters, interference to public safety or other RF services is not expected. In any case, all transmitters and receivers located at common sites should observe good engineering practice with respect to tower bonding and grounding.

#5 Proposed Height Verification

As per the above discussion, the tower height is dictated by the antenna height necessary for reliable coverage, which is influenced by topography and "look angle." This proposal appears to be reasonable at 80 feet above ground level, considering that U.S. Cellular intends to accommodate two additional carriers.

#6 Response to Nearby Residents' Questions

None received by Evans.

#7 Validation of Adequate Support Structure

U.S. Cellular has provided technical drawings of the proposed tower. A set of detailed design drawings should be reviewed and stamped by a structural engineer licensed by the State of Wisconsin to verify that the latest EIA/TIA standards are being observed and that the tower will support the antennas of two additional possible future wireless co-locators.

#8 Visual Impact Assessment

A visual assessment is not included in the scope of the consultant's work with respect to this project. Site photos, including simulation views from different locations, have been included with the application. They appear to show that the monopole would be fairly inconspicuous, owing to the 80-foot height, surrounding mature trees, and the industrial character of the area. The FAA is not likely to require the tower to be lighted, although local jurisdictions may have lighting requirements. It is probable that the monopole tower and all appurtenances could be left with a galvanized coating or painted a similar color to blend in with the sky, thus minimizing visual impact.

#9 Alternative Sites

The attached Figure 3 shows the site "search ring" within which a new base station tower should be located in order to address the service problems described in Section II of this report. The proposed Greenway site is well within this search ring. According to the applicant, and as confirmed by database searches performed by this office, there were no other towers within ¼ mile of the proposed site.

A search performed by this office of the FCC tower registration database revealed several existing communications structures within 1½ miles. The structures are identified below, along with the reasons they cannot or should not be used:

- WLMV(AM) Radio Towers – These are five towers that comprise the WLMV (1480 KHz) antenna tower system. Mounting cellular antennas on AM towers is generally not desirable, primarily from the standpoint of the safety of antenna maintenance workers, because in an AM antenna system, the towers radiate radio frequency energy. Also, antennas mounted on AM towers for other services could have an adverse impact on the operation of the AM station, creating a liability issue.

- WHA(AM) Radio Tower – This tower is the transmitting antenna of WHA on 970 KHz. For the same reason as stated above, the use of this tower is not deemed to be a viable alternative.
- Tower at 2995 Syene Road – U.S. Cellular states that this tower is too far away from the “Fish Hatchery site” on 1752 W. Beltline Highway to offload call traffic from this site, and too far away from the Greenway Crossing industrial area to provide the high radio signals necessary to penetrate the buildings in that area. Evans agrees with this determination.
- Tower at 2814 Syene Road – U.S. Cellular states that this tower is only available for short-term leases and is therefore unsuitable for the intended purpose.
- Existing U.S. Cellular sites – There are three existing U.S. Cellular base station sites within 1½ miles of the proposed Greenway site. Installing a new microsite at any of these three locations would not solve the problem of lack of in-building coverage in the Greenway Crossing area, since the only way to resolve that problem is to establish a new base station site in the vicinity of the problem area.

U.S. Cellular states that there are no buildings or other structures in the area that are greater than about 35 feet in height that might accommodate cellular antennas. This is not enough height above the horizon to resolve the service issues in the problem area.

The history of the search for a suitable solution to a coverage gap in the network reveals a difficult decision process. It is the opinion of Evans Associates that U.S. Cellular has done a thorough job of searching for alternative sites, and, in our opinion, has met the requirements of the City of Madison’s Ordinance in this regard.

#10 Co-location Capabilities

According to U.S. Cellular, the proposed tower has been designed to be 80 feet in height and accommodate up to two future additional carriers for a total of three carriers. It is the intent of U.S. Cellular to allow future PCS or cellular antenna arrays to be added. This is a good way of encouraging co-location, thereby reducing tower proliferation.

#11 Network Propagation Analysis

A propagation study conducted by U.S. Cellular, and verified by this engineer, shows that there is an unmistakable in-building coverage void south of the Beltline Highway, between Fish Hatchery Road and Highway 14, as seen in “yellow” in attached Figure 1. This coverage gap results in no connection, reduced quality or dropped calls in this area. A “green” level of service is necessary for reliable wireless service in industrial buildings.

Figure 2 shows a coverage areas map with the proposed site activated. The proposed U.S. Cellular site is well situated and will provide good service in the Greenway area, which is currently lacking in coverage.

The color scheme used for the propagation maps is as follows:

Green – excellent in-vehicle and in-building coverage
Yellow – excellent outdoor coverage

Figures 1 and 2 do not show information regarding call volume at the proposed Greenway site and existing U.S. Cellular sites.

IV. RECOMMENDATIONS

This consultant recommends the approval of the proposed site at the requested monopole height above ground of 80 feet.. It is the opinion of this consultant that the proposed facility will accommodate the communication needs of residents and businesses while protecting the public health, safety and general welfare, with respect to those items for which Evans Associates is expert.

It is this engineer's opinion that U.S. Cellular has sufficiently demonstrated a need for building a tower at the proposed site. According to U.S. Cellular, there have been many complaints from U.S. Cellular subscribers regarding lack of service in buildings in the Greenway area. The facility proposed will alleviate this problem. There are no alternative sites that can reasonably be determined as usable.

Assuming that a qualified contractor does the installation, no RF interference is expected that would be the subject of local jurisdiction.

The following recommendations are made with respect to the U.S. Cellular tower site:

1. All tower components, appurtenances and transmission lines should be securely bonded and grounded to prevent RF interference caused by stray signals.
2. A set of detailed design drawings should be reviewed and stamped by a structural engineer licensed by the State of Wisconsin to verify that the latest EIA/TIA standards are being observed and that the tower will support the antennas of two additional possible future wireless co-locators.



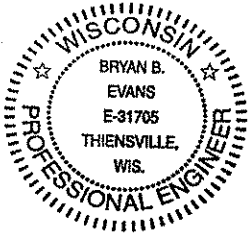
U.S. Cellular re: Greenway Site

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Benjamin Evans".

B. Benjamin Evans, P.E.
Evans Associates

February 1, 2010



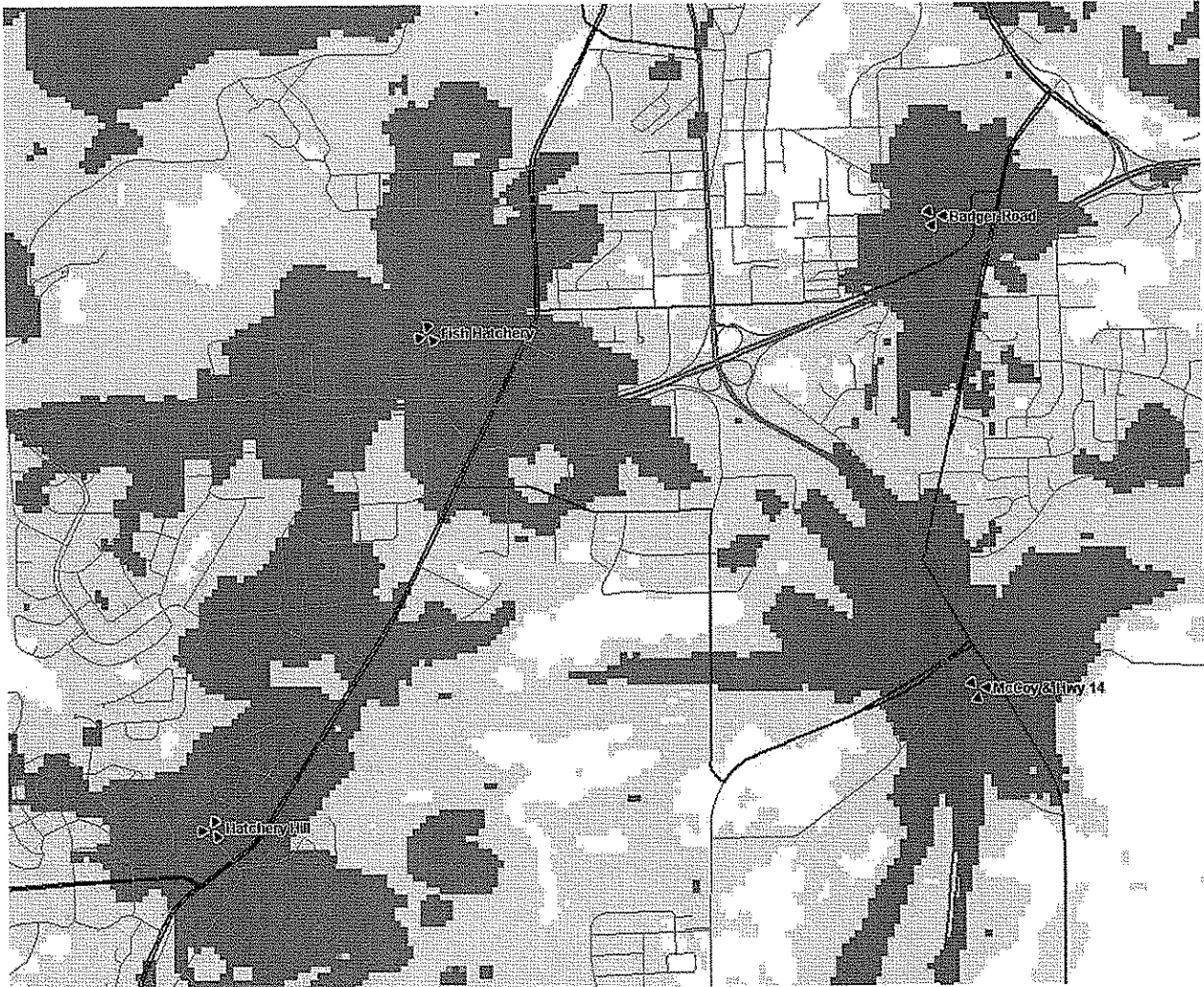


Figure 1 - Propagation Map Without Proposed Site

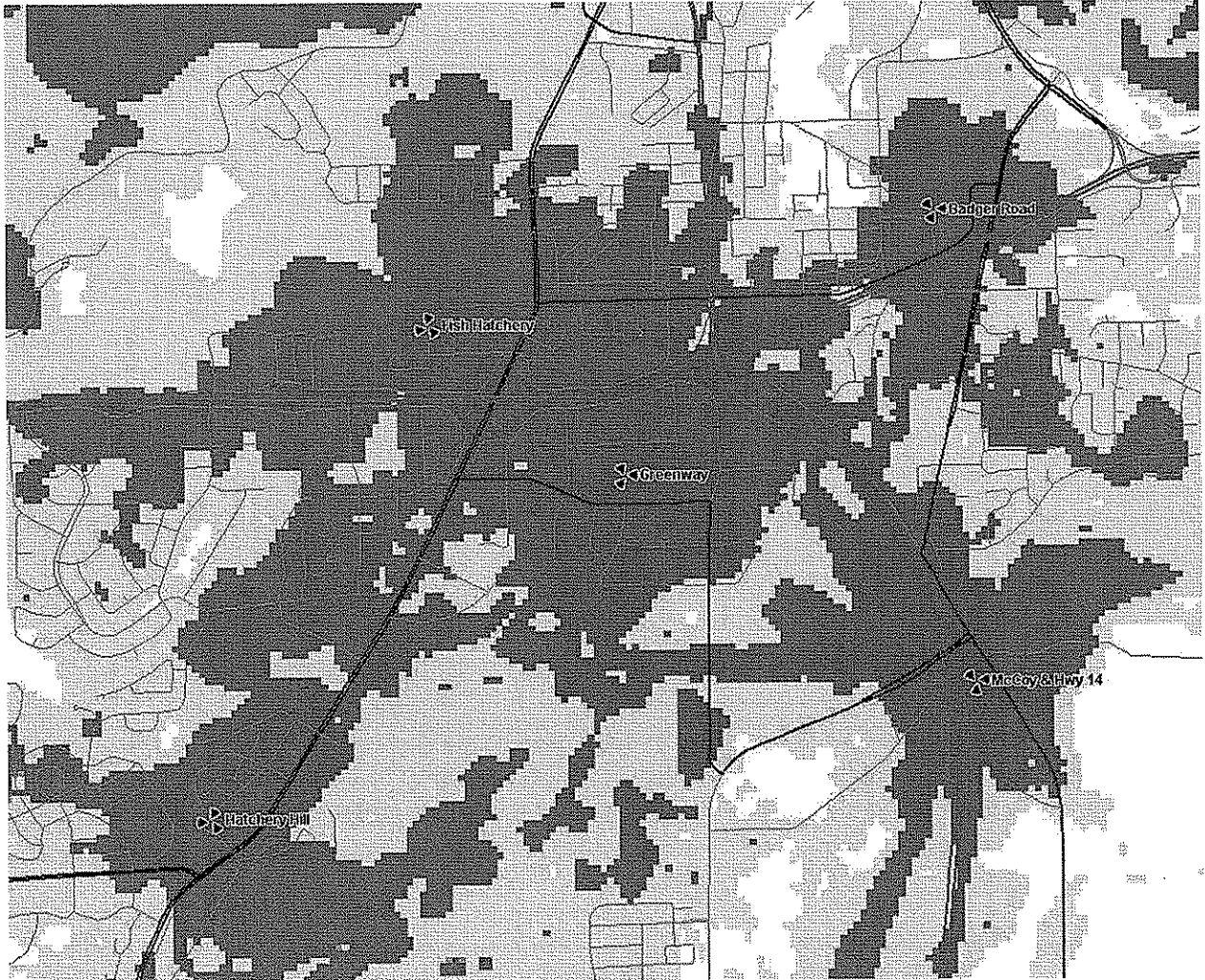


Figure 2 – Propagation Map with Proposed Site

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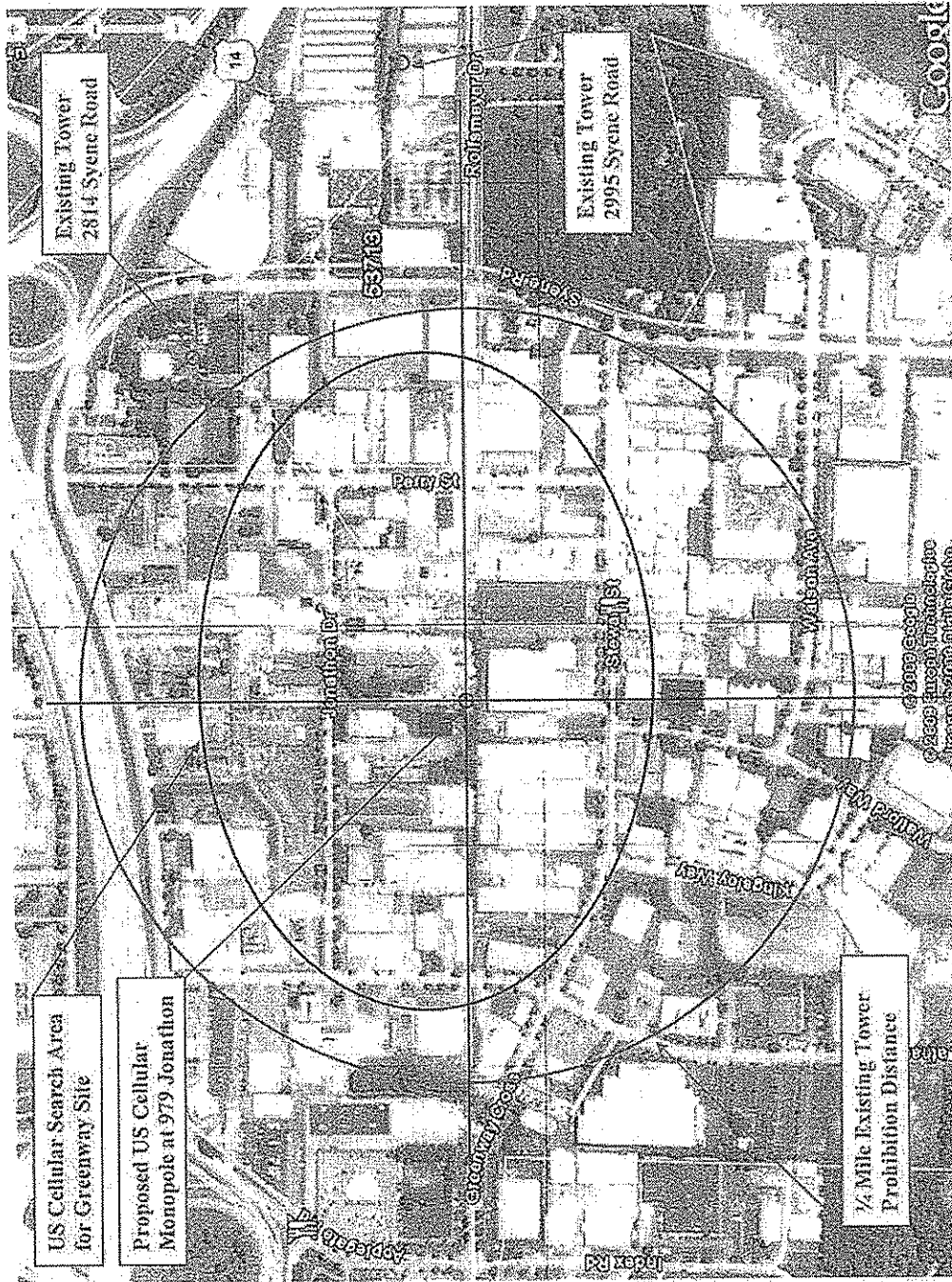


Figure 3 – Site Search Ring

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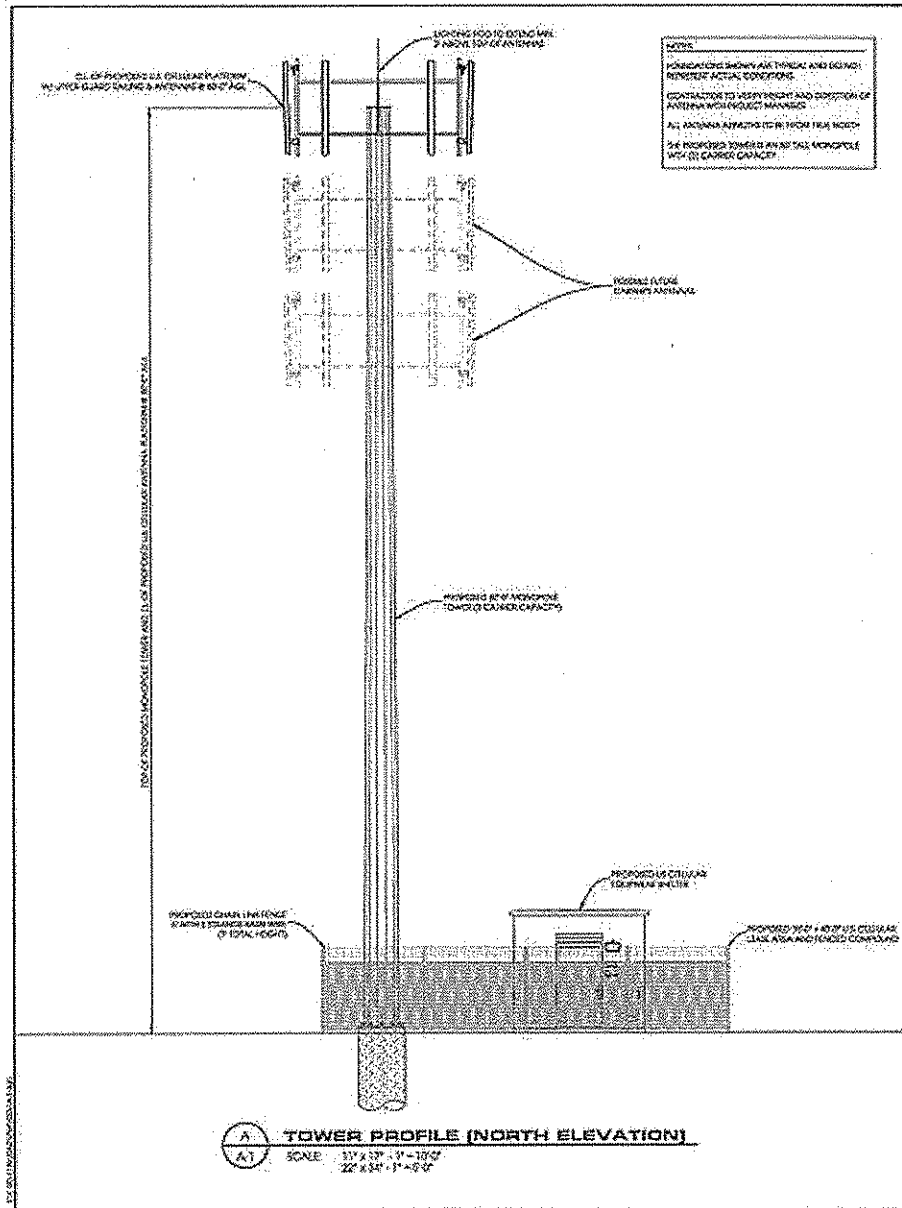


Figure 4 – Vertical Elevation Drawing

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