Dane County, Wisconsin
Wireless Communications Site Review
Application for New Tower

CityScape CONSULTANTS, INC.
2423 S. Orange Avenue, #317
Orlando, FL 32806
Tel: 877.438.2851 Fax: 877.220.4593

May 10, 2024

Dane County Zoning & Land Regulation Committee
c/o Dane County Planning & Development
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

Applicant/Provider: Iron Mountain Towers, LLC dba TowerKing / Dish Wireless, LLC
Site Name: McFarland
Site Address: Elvehjem Road, McFarland, WI 53589 (Town of Dunn)
Latitude: N 43° 00' 17.09" **Longitude:** W 89° 15' 28.38"
Proposed Structure: 170' Lattice Tower with 3-foot Lightning Rod on Top

Dear Zoning & Land Use Regulation Committee Members,

At your request, on behalf of Dane County, Wisconsin ("County"), CityScape Consultants ("CityScape"), in its capacity as a telecommunications consultant for the County, has considered the merits of an application for a Conditional Use Application for a wireless telecommunications facility submitted on behalf of Iron Mountain Towers, LLC dba TowerKing and Dish Wireless, LLC (collectively "Applicant").

The Applicant proposes to construct a new one hundred and seventy (170) foot *lattice tower* with a three (3) foot attached lightning rod at the top, see *Figure 1*. The subject property is located on Elvehjem Road in McFarland[1]. The property, currently undeveloped, is zoned Small Lot Farmland Preservation (FP-1) and is approximately 2.50 acres in size. CityScape defers to the Committee to determine if the proposed use of the property is consistent with the purposes of the Farmland Preservation zoning district. The location of the proposed wireless tower is shown in *Figure 2*.

The proposed tower height complies with the County's height limitation of one hundred and ninety-five (195) feet above ground for a proposed tower. Painting and lighting are not required by the FAA for aviation safety, as stated in the Determination of No Hazard dated 12/18/2023 (Applicant's Exhibit C in the application for CUP).

Cellusite, agent for the Applicant, states on Page 3 in their Application Cover Letter ("the Narrative") that, "DISH will attach its equipment on the Tower at the 160-foot centerline...and install its equipment near the base of the Tower...within the Leased Premises", indicating that Dish will be the anchor tenant on the tower if the Conditional Use Application is approved by the County.

The proposed new tower has been evaluated by CityScape from the following perspectives:

- Whether the application is complete and complies with the application submittal requirements of the County Communications Tower Ordinance – Section 10.103(9) of the County Code; and,

[1] The street number of the wireless facility is yet to be determined.

- Whether the proposed tower facility, as specified, is justified due to technological reasons and is essential for the Applicant to provide its telecommunications service; and,

- Whether the proposed facility follows the guidelines of the Telecommunications Act of 1996 and subsequent federal legislation and is compliant with the State of Wisconsin and Dane County Codes and all other pertinent rules and regulations including the FCC rules.

Search Ring

The Applicant provided Dish Network's search ring map for this project (Exhibit F in the application). Dish's search ring has a radius of 0.5 mile, which is reasonable for siting a macro cell wireless tower of the height proposed. As shown in *Figure 3*, the proposed tower site is just outside the search ring by a distance of 0.07 miles. It is not unusual for a wireless carrier to choose a site that is slightly outside the search ring. Factors that compel a carrier to look outside the search ring usually include the lack of property owners willing to negotiate a lease, no viable options for lease, or the proposed installation would not meet certain land use restrictions on some of the properties.

Investigation of Collocation Possibilities

On Page 4 of the Applicant's Narrative (as revised 4/16/2024), the Applicant states that "[t]here are no existing telecommunications towers within the search ring or close enough to the search ring [on which to collocate] to meet the coverage and capacity needs of DISH." CityScape has verified that there are no existing towers or tall structures within the search ring for possible collocation. The Applicant has mapped out the existing towers nearest to the center of the search ring, all of which are far outside Dish's search ring, see *Figure 3.*

CityScape, to verify to the extent possible the availability of potential sites within the Dish search ring, completed an independent database search of known existing structures over 100 feet in height within 1.5 miles of the proposed site, which is the threshold distance specified in Section 10.103(9)(b)1.c of the County Code. The tower data sources used by CityScape included the Federal Communication Commission's (FCC's) Antenna Structural Registration database, the Federal Aviation Administration's (FAA's) obstruction evaluation case database, and the collocation site locator tools from SBA Communications, American Tower, and Crown Castle[2] (the three largest holders of wireless infrastructure assets).

Based on CityScape's database searches, there are two existing tall structures greater than 100 feet within the 1.5-mile circle. One of them is a water tower (currently the supporting structure for wireless services) near the intersection of Juniper Ridge and Holscher Road in McFarland. This tower is located 1.36 miles from the center of the search ring and as such is well outside of it, see *Figure 3*. The other structure is a US Cellular monopole near Interstate 90/39 and County Road AB. This tower is 1.45 miles from the center of the search ring and thus is also far outside of it. Therefore, CityScape agrees with the

[2]The Crown Castle site locator tool also displays tower sites owned or managed by other companies.

determination that collocation on an existing tall structure is not possible according to the site requirements of Dish as specified by the search ring.

In the RF Sworn Statement (Applicant's Exhibit B of the application package), Dish's RF Design Engineer states, "DISH identified a genuine need for the Proposed Communications Facility, and thereafter, DISH's engineering department issued a 'search ring' defining the precise geographic area where the Proposed Communications Facility was needed to address the identified need..." The Sworn Statement did not elaborate on the specific geographic areas or locations that are in need of wireless service improvement from Dish, but Page 1 of the Applicant's Narrative described the need for the proposed facility this way: "The Wireless Communications Facility has been designed to accommodate additional providers (carriers, wireless internet providers and E911) interested in improving service within the greater area of the Village of McFarland, the Town of Dunn, and along a portion of Interstate 90/39 in Dane County." Although Dish was not mentioned specifically in this statement, the pre-construction propagation map from Dish indicates that Dish needs improved coverage in the area surrounding the proposed site, and the post-construction propagation map demonstrates that the proposed facility would address the need. The Applicant submitted the Dish propagation maps only to CityScape on a confidential basis at the Applicant's request.

In summary, CityScape finds the Applicant has provided preponderant evidence that Dish currently has a service coverage gap in the area where the proposed new facility is to be located and that no existing tall structures are available that would satisfactorily address the service gap.

Height Justification

Dish proposes to mount their antennas at the one hundred and sixty (160) foot elevation on the 170-foot lattice tower. The Dish engineer stated in the RF Sworn Statement that the minimum antenna height required for the proposed facility for this site is one hundred and sixty (160) feet above ground. CityScape believes that the height of the proposed tower is appropriate from a technical standpoint based on the before-after construction propagation maps provided by Dish.

FAA Determination of No Hazard

The Applicant provided the Determination of No Hazard from the FAA dated 12/18/2023 for a tower[3] at the proposed geographical coordinates (Aeronautical Study #2023-AGL-23187-OE, Applicant's Exhibit C).

Required Notification

According to Section 10.103(9)(b)1, subparts g and h, an Applicant for a new tower shall provide written notification to other personal wireless carriers of its intent to construct a new communications tower, and shall also do the same for airports within 5 miles of the proposed site. The Applicant has provided evidence of such notifications to the carriers by email and to the airports by US Postal Service (see Exhibits G and H of CUP application package).

[3] The Determination of No Hazard was based on a tower height of 199 feet above ground level, 26 feet higher that what is now being proposed. The FAA doesn't require the Applicant to obtain a new Determination of No Hazard for a lower height.

Design for Future Collocations on the Proposed Tower

According to the Applicant's elevation sketch of the tower, see *Figure1*, DISH's antennas would be at an elevation of one hundred and sixty (160) feet above ground. Up to three future collocations would be accommodated on the proposed tower at approximately 145, 130, and 115 feet, meeting the minimum of three total users, including the primary per County Code.

Before a building permit is issued, the Applicant is expected to submit a full structural analysis report demonstrating that the tower would structurally accommodate the antennas and ancillary equipment for Dish (the anchor tenant) and three (3) other possible collocators' equipment in accordance with ANSI/TIA-222-G standards, for a total of four (4) users.

RF Compliance

In the FCC Compliance Statement from Dish (Exhibit E of application), Dish states that its facility will operate below the maximum permissible RF exposure levels for both occupational and general population exposure, and that the facility will be operated in compliance with the FCC rules regarding interference to other communication services.

Based on CityScape's experience, if the facility is built as proposed and in accordance with industry standards, it is unlikely to cause interference to other authorized radio services, and is highly unlikely to create levels of human RF exposure at ground level that would exceed FCC limits even if four total personal wireless carriers (with antenna heights of approximately 160, 145, 130 and 115 feet) are operating at the facility.

Ground Compound

The Construction Drawings[4] (CDs), included as Exhibit A in the application package, show a 9,497 square foot lease area within which the Applicant will construct a fifty by fifty (50 x 50) foot fenced-in equipment compound. The proposed compound fence will surround the proposed tower and future ground equipment, see *Figure 4*. The CDs show a generic layout of equipment in the space. TowerKing or Dish should provide greater specificity for the ground equipment and the equipment on the tower before the installation of Dish's equipment.

Site Access

Vehicular access to the lease area will be facilitated by a 12-foot-wide gravel driveway within a thirty (30) foot wide access easement from the south side of Elvehjem Road to the compound. At the end of the driveway will be a turnaround area in front of the gate entrance to the compound, see *Figure 5*.

Setbacks

The minimum setbacks in the FP-1 zoning district are as follows: fifty (50) feet from the street centerline, fifty (50) feet from side yards, and ten (10) feet from the rear lot line. The proposed location of the tower exceeds these minimum setback standards.

[4] CDs by LANDTECH, Revision 5 dated 04/09/24 "Per Comments"

Tower Fall Zone

According to a letter submitted by the Applicant from Sabre Industries, presumably the vendor for the proposed structure (see *Figure 6* attached hereto or Exhibit J in application), in an extreme wind event resulting in structural failure, the tower would fall within a radius of 55 feet from the base of the structure with the portion of the tower above the failure point folding onto the portion of the tower below the failure point, thus falling within the underlying property line. A tower setback distance of 55 feet from the eastern property line (equal to the engineered 55-foot fall radius) is shown in the Enlarged Site Plan, Sheet S-2 of the CDs or *Figure 4* attached hereto.

Fencing and Landscaping

The proposed chain link fence around the compound will be six (6) feet high and will be topped with three (3) strands of barbed wire, angled outward, as a climbing deterrent. The applicant proposes to plant seven (7) arborvitae evergreen trees to visually block the equipment compound from Elvehjem Road (*Figure 4*). The Applicant is requesting to use existing vegetation along the remaining property lines to meet landscape requirements and states on age 7 of the Narrative to the County dated April 16, 2024, "If the adult trees to the east and south of the fenced equipment compound are removed or die, the Applicant will add landscaping to restore the visual buffer."

Visual Impact Assessment

The Applicant provided photo simulations from three locations along Elvehjem Road (Exhibit D of application). CityScape observes that the proposed tower may be visible from up to seven single-family residential dwellings on Elvehjem Road, the closest being approximately three hundred and seventy (370) feet from the proposed tower. Existing mature trees may provide some amount of visual screening from these homes.

The Applicant has not fully addressed this possible visual impact to the residences despite CityScape's recommendations to do so. CityScape suggested to the Applicant to consider installing a monopole instead of a lattice tower to mitigate the visual impact but the Applicant was resistant to the idea. If aesthetics is a concern, the Committee does have the right under Section 10.103(9)(d)3 of the Ordinance to "require, unless it is shown to be unreasonable, modifications to the tower design, including but not limited to visual screening or landscaping, that it deems necessary to minimize the aesthetic impact of the tower."

Summary

CityScape has investigated all possibilities of collocating on an existing or permitted structure to the extent allowed by County and State Code and has concluded that there are no such possibilities. CityScape also believes the location and height proposed are technically appropriate based on the search ring and propagation maps provided by the Applicant. Based on these facts, CityScape has determined there is a preponderance of evidence that no existing tower would adequately serve Dish subscribers in the area where Dish needs improved service, and only the construction of a new wireless tower will provide the needed improvements to its wireless service network. In conclusion, CityScape confirms that the subject proposal is justified from a technical point of view.

CityScape
CONSULTANTS, INC.

If the County elects to approve the new wireless facility, it should do so with the following conditions:

1) Prior to permitting, the Applicant shall provide the NEPA and Section 106 review reports; and,

2) Prior to permitting, the Applicant shall provide a full structural analysis report confirming that the tower will have the structural capacity to safely support Dish's equipment and similar equipment of three (3) future wireless service providers; and,

3) Prior to permitting, the Applicant shall submit final construction drawings for the facility which shall be certified by a Wisconsin Professional Engineer and shall include descriptions of the support structure and the electronic and electrical equipment including antennas, transmitters, radios, cabinets, cables, utility components, backup power generator (if proposed) and all related equipment to be installed on or near the support structure; and,

4) At the County's discretion, the tower, antennas, and all other ancillary equipment mounted on the tower shall be painted a color deemed the least visually obtrusive; and,

5) If a valid complaint of interference to an authorized County or municipal public safety radio facility is found to be associated with Dish's installation at the proposed facility, the Applicant shall comply with all applicable rules regarding radio-frequency interference as mandated by the Federal Communications Commission (FCC), and in accordance with the FCC's Best Practices Guide.

The undersigned certifies that, to the best of our knowledge, all the information included herein is accurate at the time of this report. CityScape is employed only by public entities and has unbiased opinions. All recommendations are based on technical merit without prejudice or bias per prevailing laws and codes.

Respectfully submitted,

B. Benjamin Evans
Senior Project Engineer
CityScape Consultants, Inc.

Susan Rabold
Project Manager
CityScape Consultants, Inc.

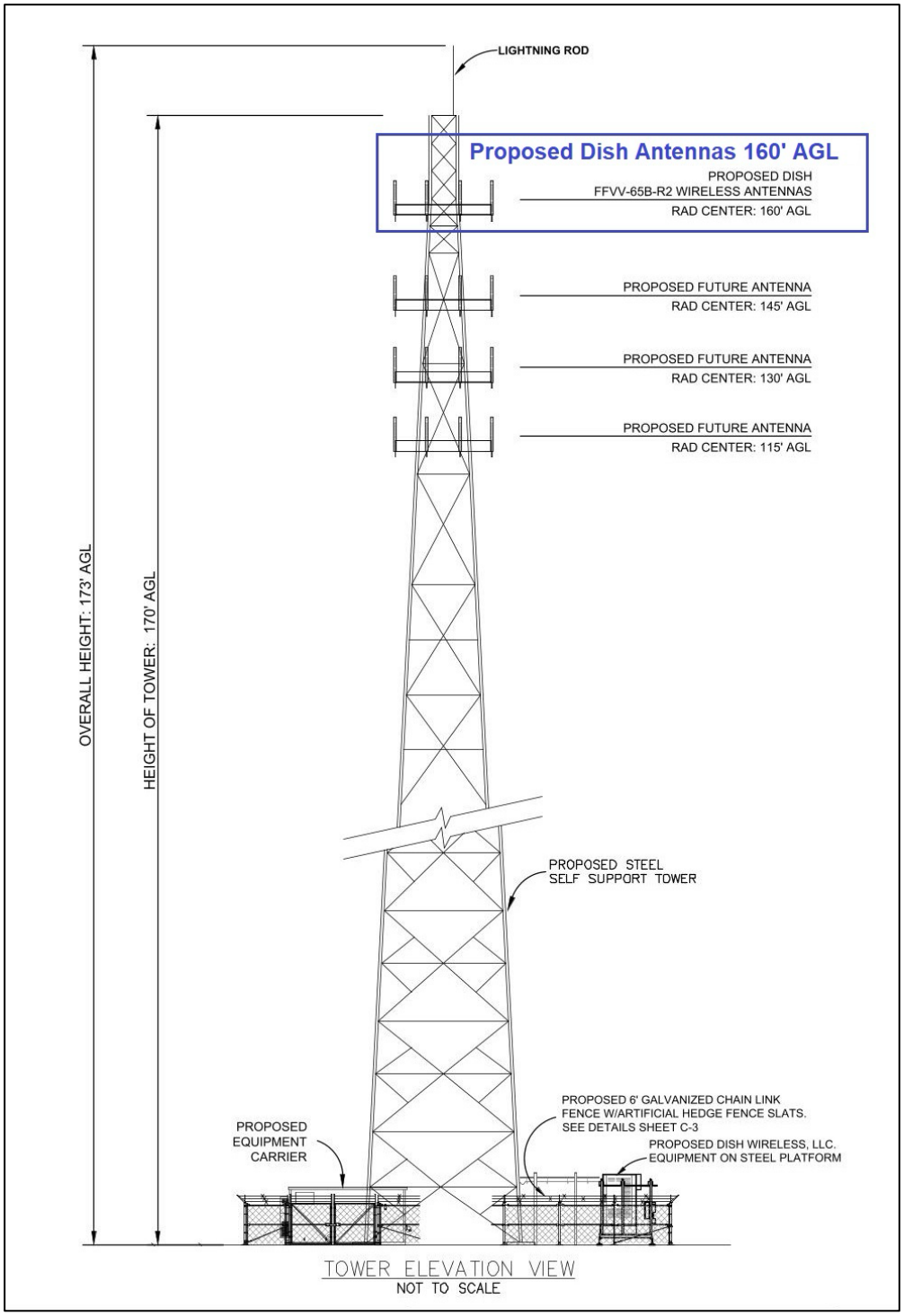

Figure 1. Tower Elevation Sketch

Figure 2. Vicinity Map of Proposed Facility Location

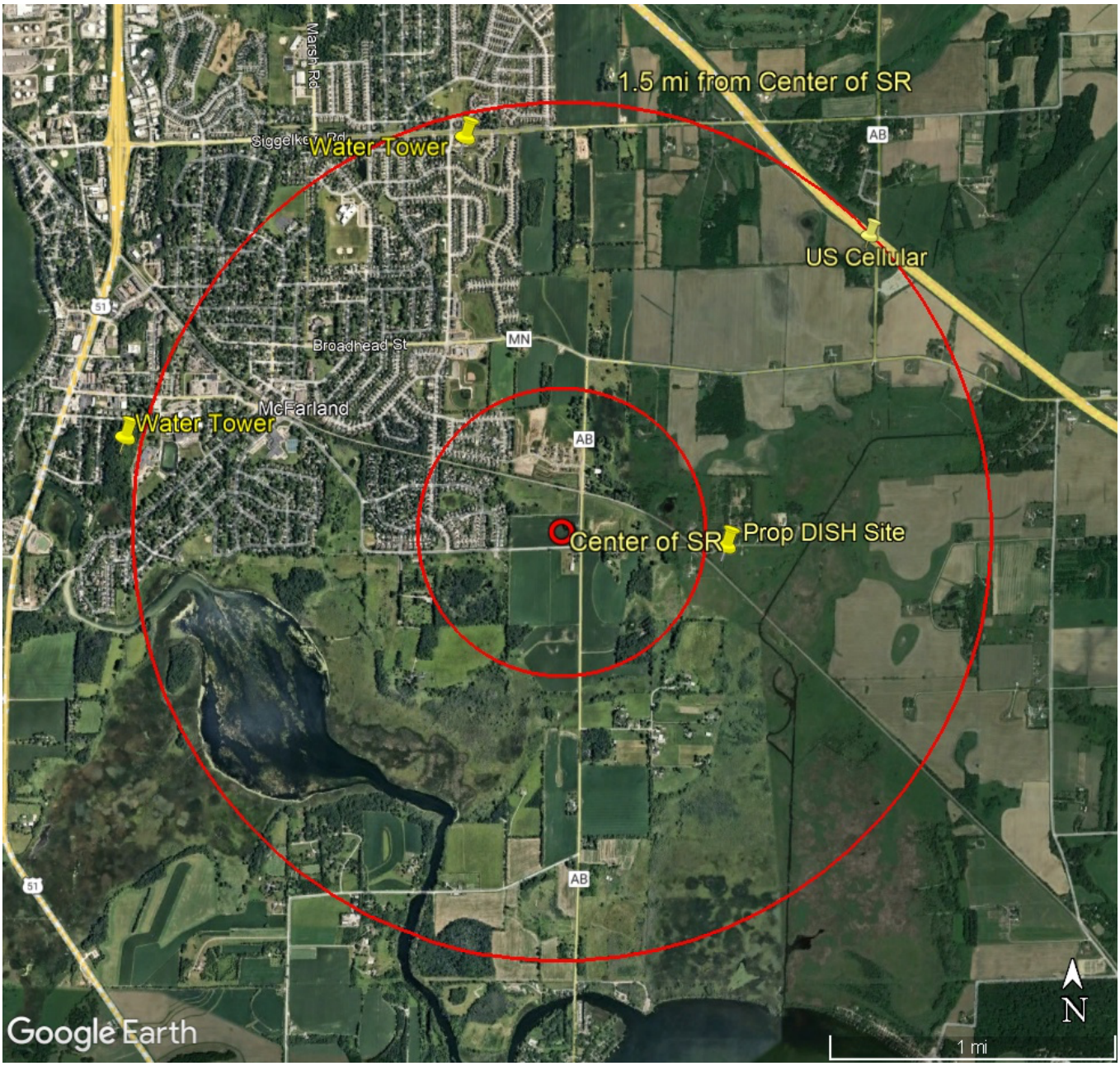

**Figure 3. Dish Search Ring Map (0.50 mile Radius),
Proposed Site and Existing Towers within 1.5 Miles of Search Ring Center**

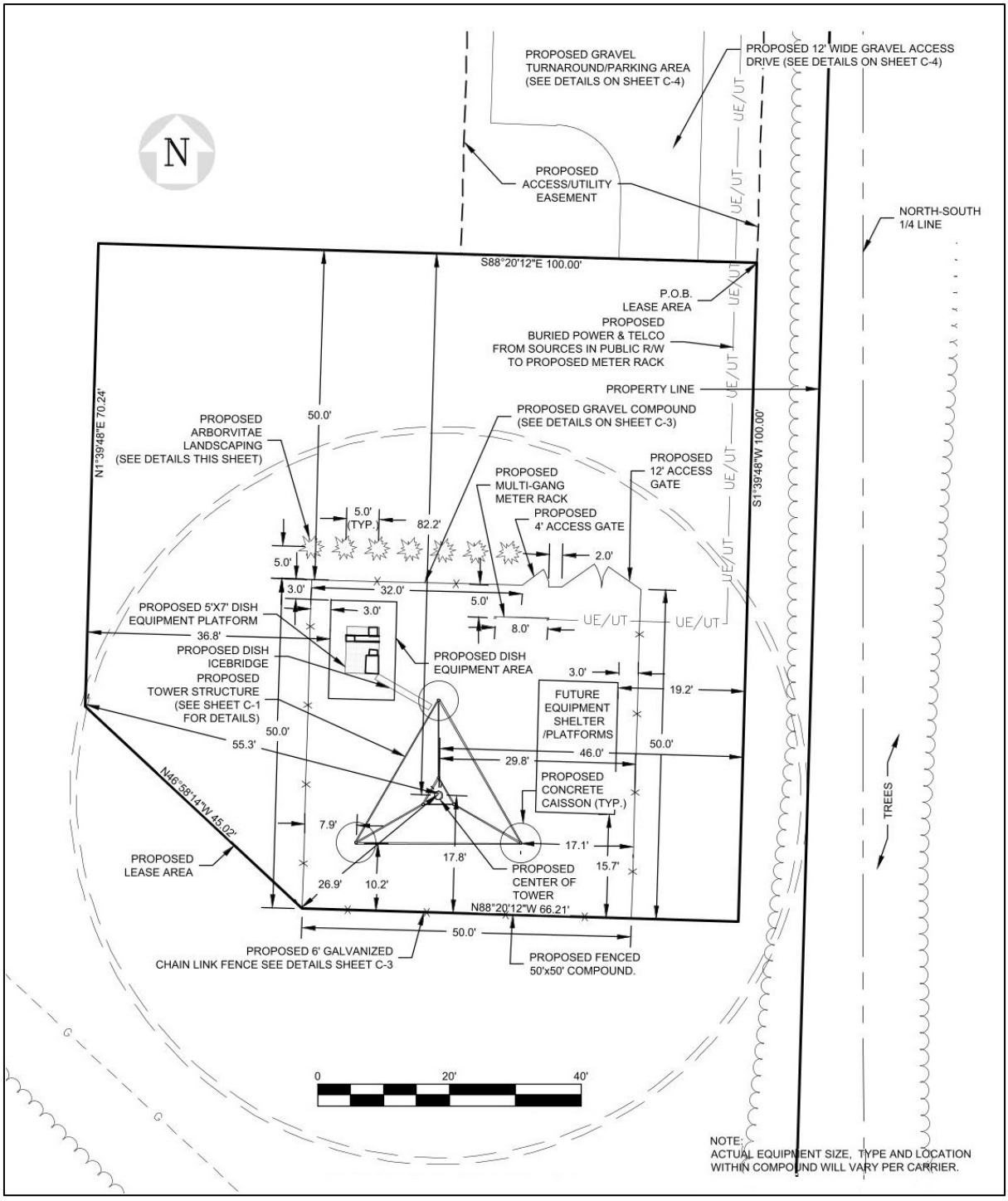

Figure 4. Ground Compound Plan

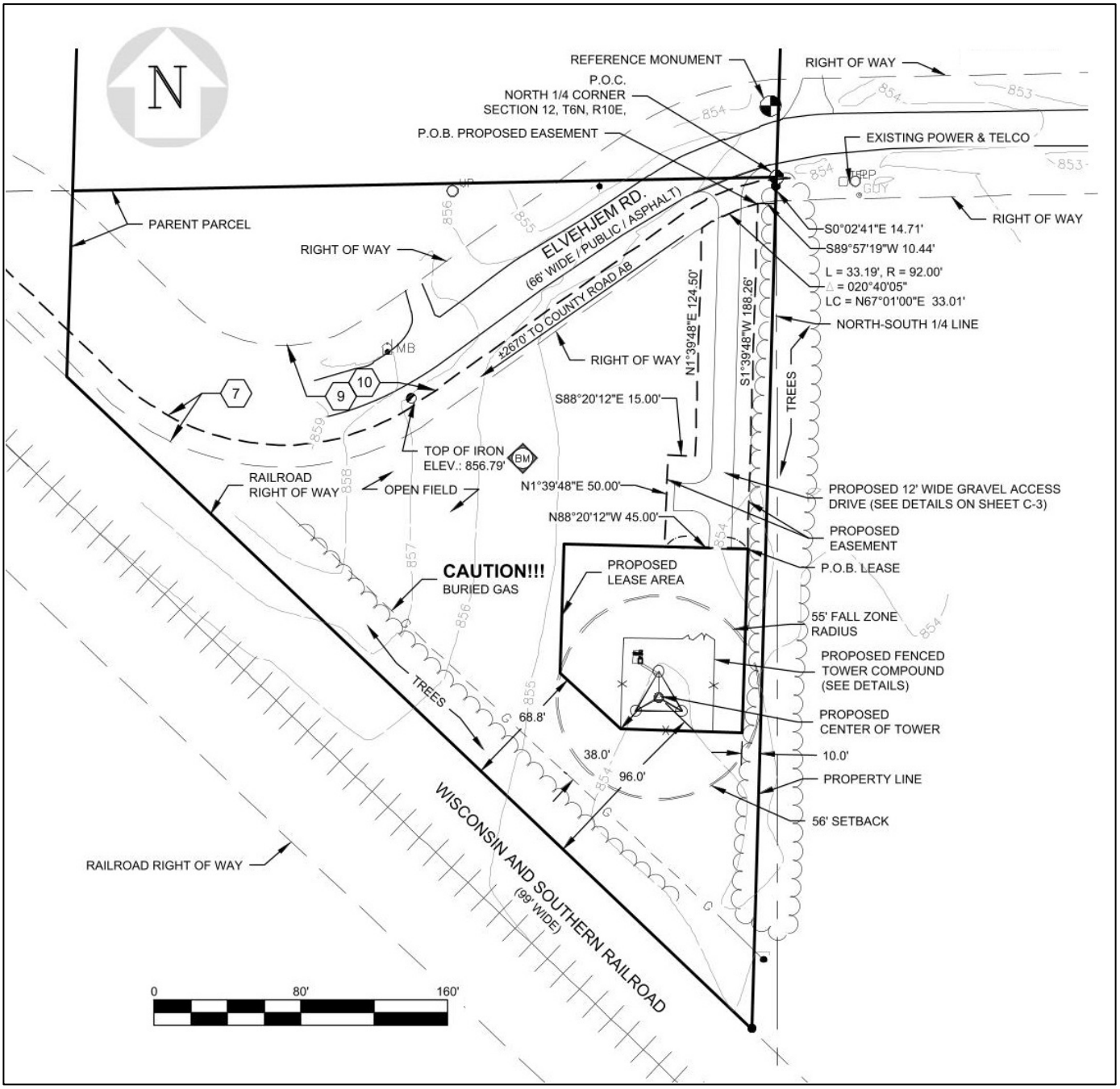

Figure 5. Survey Plan

Sabre Industries™
INNOVATION DELIVERED

January 23, 2024

Grant Phillips
Tower King
23434 Elliott Road
Defiance, OH

RE: Proposed 170' Sabre Self-Supporting Tower for New McFarland, WI

Dear Mr. Phillips,

Upon receipt of order, we propose to design a tower for the above referenced project for a Basic Wind Speed of 107 mph and 40 mph with 1.5" radial ice, Risk Category II, Exposure Category C, and Topographic Category 1 in accordance with the Telecommunications Industry Association Standard ANSI/TIA-222-G, "Structural Standard for Antenna Supporting Structures and Antennas".

When designed according to this standard, the wind pressures and steel strength capacities include several safety factors. Therefore, it is highly unlikely that the tower will fail structurally in a wind event where the design wind speed is exceeded within the range of the built-in safety factors.

Should the wind speed increase beyond the capacity of the built-in safety factors, to the point of failure of one or more structural elements, the most likely location of the failure would be within one or more of the tower members in the upper portion. This would result in a buckling failure mode, where the loaded member would bend beyond its elastic limit (beyond the point where the member would return to its original shape upon removal of the wind load).

Therefore, it is likely that the overall effect of such an extreme wind event would be localized buckling of a tower section. Assuming that the wind pressure profile is similar to that used to design the tower, the tower is most likely to buckle at the location of the highest combined stress ratio in the upper portion of the tower. This would result in the portion of the tower above the failure location "folding over" onto the portion of the tower below the failure location. *Please note that this letter only applies to the above referenced tower designed and manufactured by Sabre Towers & Poles.* In the unlikely event of total separation, this would result in a 55' fall radius at ground level.

Sincerely,

WISCONSIN
THOMAS T. WILSON
E-48877
LA CROSSE
WI
PROFESSIONAL ENGINEER
1/23/2024

Tom Wilson, P.E.
Design Engineer

Sabre Industries, Inc. • 7101 Southbridge Drive • Sioux City, IA 51111
P: 712-258-6690 **F:** 712-279-0814 **W:** www.SabreIndustries.com

Figure 6. Structural Statement & Fall Radius Design