

April 28, 2016

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, MI 48189-0576

Subject: Verizon Monopole/2727 East North Territorial Road; Conditional Use Review #1; Application received by Township on 3/18/2016.

Dear Commissioners:

We have reviewed the proposed conditional use application submitted by RJP Consulting on behalf of Verizon Wireless, for the construction of a new 120-foot tall wireless monopole structure at the Township-owned Fire Station#2, 2727 E. North Territorial Road. Along with a monopole, the applicant proposes an equipment shelter at the base of the tower, to be enclosed with chain link fence around a 2,000 sq. ft. lease area. The plan includes landscaping around the outside of the fence and a 30-foot-wide access and utility easement leading from N. Territorial Rd. to the lease site. The site is zoned AR (Agricultural) District.



Under the Michigan Zoning Enabling Act (MZEA), a new wireless communication facility can be reviewed as a conditional land use, subject to the information and requirements of the Zoning Ordinance. The MZEA also imposes time limits on the local review process. Wireless communication facilities are permitted in the AR District subject to conditional use approval per Section 36-838 of the Township Zoning Ordinance. The required public hearing is scheduled for May 4, 2016.

CONDITIONAL USE COMMENTS

Conditional use approval of wireless communication facilities is subject to both the specific standards listed in Section 36-720 of the Zoning Ordinance, and the general discretionary standards in Section 36-838 applicable to all conditional uses. Beginning with the specific requirements, our comments are provided below:

A. **Application Requirements Specific to Wireless Communications Facilities [Section 36-720 (c)(2)].** Most of the information required by this section has been provided, including contact information for the applicant; map showing location of all existing towers in the Township; scaled site plan with details; legal description of overall parcel and lease area; setbacks from nearest residential structures; separation distance from other towers; landscape plan; fencing; notarized statement regarding collocation; backhaul provider; suitability of existing towers or alternative technology; name of tower manufacturer; radiation output; and maintenance plan. The following items remain to be addressed:

1. The applicant's letter dated 3/16/2016 says that a map showing future tower locations, structures and antenna proposed or anticipated cannot be provided since it is proprietary. The applicant states that in general, new sites may be needed in the northwest, northcentral and southeast parts of the Township. Compliance with this requirement must be addressed to the satisfaction of the Planning Commission.
2. Sub-section m. requires an environmental impact statement. According to the application, a phase one environmental review has been completed and indicates no perceived impacts; a copy of that report must be submitted for Township review.
3. A narrative must be provided with the radiation output data that verifies whether the anticipated output is consistent with current FCC emission regulations.
4. The boundaries of the lease area must be clarified and dimensioned on the site plan. We recommend that the proposed evergreen trees outside the fence be included within the lease area.

B. **Section 36-720 (c)(4). Specific Factors Related to Wireless Communication Facilities.** The Planning Commission may waive or reduce any of the following requirements if it determines that doing so better serves the goals of the section:

1. **Height of proposed tower.** Section 36-720 (d)(5) limits heights of towers and structures to no more than 180 feet. At 120 ft. tall with an additional 7 ft. lightning rod, the proposed monopole complies.
2. **Proximity of tower to residential structures and residential district boundaries.** The proposed facility is on an AR Agriculture-zoned parcel - the Township-owned fire station. The AR district also permits single family residential dwellings on lots of 5 acres and larger. The closest residential dwellings are to the south and east, at 536 ft. and 595 ft. away.
3. **Nature of uses on adjacent and nearby properties.** The land to the west and north is wooded and some is farmed. To the east is a single family residence and the fire station building; to the south (across N. Territorial Rd.) is vacant/farmland and a single family dwelling with accessory structures.
4. **Surrounding topography.** The surroundings are relatively flat. McCarty Drain No. 2 is to the north.
5. **Surrounding tree coverage and foliage.** The proposed tower location is well screened by wooded land to the west and north. However, the N. Territorial Rd. frontage of the fire station is lawn and wide open to accommodate public safety vehicles and visibility. The house south of N. Territorial Rd. will have its view of the proposed tower partially buffered by the fire station building; the house to the east will have its view somewhat buffered by a tree/brush line (mostly deciduous). Both dwellings would benefit from additional screening; we recommend evergreen trees be planted

between the tower and the road frontage on both sides of the west fire station driveway and along the tree line to the east as transition strips. Relocation of the tower site west to be behind the woods could also improve its screening.

6. ***Design of the tower, with particular reference to design characteristics that have the effect of reducing or eliminating visual obtrusiveness.*** The applicant states that the proposed monopole is a less obtrusive design than a lattice tower. The galvanized metal color is intended to “blend in with the sky”. There are no other features incorporated that would reduce visual obtrusiveness.
7. ***Proposed ingress and egress.*** The tower site will be accessed from the fire station driveway with a gravel drive extension at the northwest corner of the existing pavement.
8. ***Availability of suitable existing towers, others structures or alternative technology.*** Propagation maps have been submitted, illustrating existing coverage without the facility and projected coverage that can be obtained with the new tower. Per the applicant, there is a lack of service on the stretch of N. Territorial Road that will be covered by the new facility.

Section 36-720(d)(1) sub-section a., requires that no tower may be located within 2 miles of another commercial communication tower. The tower location map shows that the proposed new tower would be within 1.7 and 1.9 miles of two other commercial towers. Also, in late 2014, AT&T was approved to build a tower at 6741 Sutton Rd. That tower has not been constructed, but it would also be within 2 miles of the site, approximately 0.5 miles away. Per Section 36-839, “*An approved conditional use permit, including all attached conditions, shall run with the land in the approval and shall be binding on all successors and assigns.*” It is our understanding that the AT&T tower’s site plan approval has expired and would have to be obtained again, but arguably, the conditional use approval could still be valid. The status of the Sutton Road tower site should be determined. If the Sutton Rd. site is still approved, it must be included on the map of facilities and considered in the evaluation of site alternatives.

The Planning Commission may waive the Ordinance’s separation distance requirements, if it determines that “*the proposed tower is of exceptional design so as to create a positive architectural and/or environmental feature which is compatible with the character of the surrounding area and community*”. The proposed tower is a standard monopole, and does not appear to be an exceptional positive architectural and/or environmental feature. While it is not uncommon for towers to be located at a public safety facility like a police or fire station, we recommend the Commission review this matter and give the applicant direction regarding alternative designs, such as a “tree” or mounting upon or incorporating into another compatible structure that could be substituted for the standard monopole.

Further, not enough information has been about the two closest tower locations identified by the applicant - How many carriers are already on those towers? Is there a possibility of collocation on those towers? If not, why? Can any adaptation be made to those towers to accommodate the applicant’s antenna without the need for a new facility?

9. ***The design of the proposed structure will accommodate collocation of additional users.*** The new monopole is designed to allow for two additional co-locators in the future, however the applicant must submit an affidavit stating they will permit and not unreasonably obstruct collocation.

C. **Section 36-720 (c)(5) Availability of Existing Towers or Other Structures or Alternate Technology.** This section requires that the applicant provide evidence to demonstrate no existing towers or alternative technology can be utilized to accommodate the proposed antenna. As described in comment B.8 above, additional information is required to justify the need for a new facility. While the applicant states that none of the existing towers will meet Verizon's coverage needs, it is not clear if modifying one or more of the existing towers in the vicinity, or if construction of the Sutton Rd. site (that the applicant did not include in its analysis) would create the applicant's desired coverage.

D. **Section 36-720 (d). General Regulations** for all wireless communication towers:

1. **Location of towers or structures.**

- a. ***No single tower shall be located within two miles of another commercial communication tower. This requirement may be waived if the Planning Commission determines that the tower is of an exceptional design so as to create a positive architectural and/or environmental feature which is compatible with the character of the surrounding area and community. Additional communications apparatus can, however, be located on an existing tower or other structure capable of accommodating such apparatus.*** See Comment B.8., above.
- b. ***No tower shall be located closer than 1,000 feet from the boundary of any residential district, including any PUD district incorporating residential uses.*** All of the surrounding land is zoned AR Agriculture. The closest residential dwelling is 536 feet from the proposed tower. We estimate that 4 houses are located within 1,000 feet of the proposed tower.
- c. ***A tower shall have a minimum setback from all property boundaries equal to the height of the tower.*** Setbacks are greater in all directions than the required 127 ft.
- d. ***Guys and accessory buildings must satisfy the minimum zoning district regulations.*** No guy wires are proposed since the structure is a monopole. The proposed equipment shelter complies with AR district setback regulations; the height of the equipment shelter and all accessories must be dimensioned.
- e. ***For purposes of measurement, any required tower setback and/or separation distance shall be calculated and applied to facilities located adjacent to municipal and county jurisdictional boundaries.*** Not applicable.

2. **Access.**

Unobstructed access constructed in accordance with all provisions of this chapter shall be provided to the tower and apparatus building to ensure service by police, fire, and emergency vehicles. Access to the tower lease area is unobstructed, across the paved fire station drive and a short gravel driveway.

3. **Structural design and installation.**

- a. ***The plans for the tower construction shall be certified by a registered structural engineer, and the applicant shall submit verification that the installation is in compliance with all applicable codes. All towers or structures must meet all applicable standards of the Federal Aviation Administration and the Federal Communications Commission.*** The applicant's letter states they will comply with all applicable FAA and FCC standards. A letter from an

engineer at the tower manufacturing company verifies the structural stability of the monopole proposed.

- b. ***All towers or structures must meet or exceed current standards and regulations of the FAA, the FCC, and other agency of the state or federal government with the authority to regulate towers, structures, and antennae. If such standards and regulations are changed, then the owners of the towers, structures, and antennae governed by this section shall bring such towers, structures, and antennae into compliance with such revised standards and regulations within six months of the effective date of such standards and regulations, unless a different compliance schedule is mandated by the controlling state or federal agency. Failure to bring towers, structures, and antennae into compliance with such revised standards and regulations shall constitute grounds for the removal of the tower or antenna at the owner's expense.*** The applicant agrees to comply with all applicable governmental, health and industry safety standards and FAA and FCC regulations and standards.
- c. ***To ensure the structural integrity of towers or structures, the owner of a tower shall ensure that it is maintained in compliance with standards contained in the state construction code and the applicable standards for towers or structures that are published by the Electronic Industries Association, as amended. If, upon inspection, the township concludes that a tower fails to comply with such codes and standards and constitutes a danger to persons or property, then upon notice being provided to the owner of the tower, the owner shall have 30 days to bring such tower into compliance with such standards. Failure to bring such tower into compliance within said 30 days shall constitute grounds for the removal of the tower or antenna at the owner's expense.*** The applicant agrees to comply with all applicable governmental, health and industry safety standards and FAA and FCC rules.
- d. ***Antennae and metal towers or structures shall be grounded for protection against a direct strike by lightning. The electrical wiring and connections on all towers and structures shall comply with all applicable local, state, and federal statutes, regulations, and standards.*** The top of the monopole includes a 7 ft. tall lightning rod. Information regarding grounding and compliance with the above listed regulations must be provided with the site plan.
- e. ***Towers or structures with antennae shall be designed to withstand a uniform wind loading as prescribed in the state construction code.*** The tower engineer's statement addresses this.
- f. ***Towers and structures shall be subject to any state and/or federal regulations concerning nonionizing electromagnetic radiation. If more restrictive state and/or federal regulations are adopted in the future, the operator of the tower shall bring the antennae into conformance with such standards within 60 days of its adoption, or the conditional use permit shall be subject to revocation by the township board. The operator of the tower shall bear the costs for testing and verification of compliance.*** The applicant agrees to comply with all applicable governmental, health and industry safety standards.
- g. ***All signals and remote control conductors of low energy extending substantially horizontally above the ground between a tower or antennae and a structure, or between towers, shall be at least eight feet above the ground at all points, unless buried underground.*** The applicant must provide a written statement that they will comply with the Township's requirements for signal and remote control conductors.

- ### **D. Towers**
- The following shall apply to all towers:
- a. **All communications tower operators shall be required to provide an annual report of total radiation output from all channels and all antennae on the tower, including all co-locators, from an independent contractor as recommended by the township engineer or its designee.** The report shall contain any and all information deemed necessary by the Planning Commission. The applicant must provide a written statement that they will provide any information required by the Township Engineer in this regard.
 - b. **Lighting.** *Towers or structures shall not be artificially illuminated.* The tower is not required to be lit since it is less than 200 feet in height.
 - c. **Height.** *Towers and structures shall not exceed 180 feet in height.* The proposed tower complies.
 - d. **Design.**
 - a. **Except as otherwise provided herein, all towers shall be of monopole design and shall be constructed of, or treated with, corrosive resistant material.** The tower is proposed as a galvanized steel monopole. Based upon the separation distance requirement, a stealth/alternate design is recommended. See comment B.8, above.
 - b. **Advertising, signs, and identification of any kind intended to be visible from the ground or other structures shall be prohibited, except as required for emergency purposes.** No signs are proposed other than required emergency contact information.
 - c. **The antennae shall be painted to match the exterior treatment of the tower. The paint scheme of the tower and antennae shall be designed to minimize off-site visibility of the antennae and tower.** The applicant must confirm compliance and note it on the plan.
 - d. **The design of the buildings and related structures shall, to the maximum extent possible, use materials, textures, screening, and landscaping that will blend them into the natural setting and surrounding buildings.** The applicant states that the galvanized steel tower will blend in with the sky. Details of the equipment cabinet and associated accessory structures must be provided.
 - e. **If an antenna is installed on a structure other than a tower (such as a clock tower, bell steeple, or light pole), the antenna and supporting electrical and mechanical equipment must be of a neutral color that is identical to, or closely compatible with, the color of the supporting structure so as to make the antenna and related equipment as visually unobtrusive as possible.** Not applicable.
 - e. **Fencing and Landscaping.** *The tower and appurtenant apparatus building shall be secured by fencing a minimum of six feet in height. The fencing and apparatus building shall be screened with a landscape strip at least 20 feet wide along each side of such fencing and/or building. Specifications for spacing and plant materials shall be as set forth in section 36-706. The landscape strip shall be maintained in good condition at all times so as to continue its effectiveness. Existing mature on-site vegetation and natural land forms shall be preserved to the maximum extent feasible. In some cases, such as towers or structures sited on large, wooded*

lots, natural growth around the property perimeter may provide sufficient buffer, in which case the planning commission may waive the landscaping requirements of this subsection. The site plan shows 6 ft. chain link fence with 3 strands of barbed wire around the equipment area. Barbed wire is permitted only around farmland. Although the site is in the AR district, a wireless communication facility does not constitute a “farmland” use. The barbed wire must be removed.

A landscape buffer of 6 ft. tall Colorado spruce planted 20 feet on center is proposed outside the fencing. Installation of the proposed monopole will not cause the removal of any existing mature vegetation. A landscape maintenance plan must be added to the site plan and note that “dead or diseased plants will be replaced within 6 months or in the next appropriate planting season, whichever comes first.”

8. ***Employees. No employees shall be located on the site on a permanent basis to service or maintain the antennae. Occasional or temporary repair and service activities are excluded from this restriction.*** The facility will be unmanned, with periodic visits by maintenance personnel.
9. ***Site plan required. The applicant shall submit a preliminary and final site plan in accordance with article XXVIII of this chapter, and including details of tower lighting required and approved by the Federal Aviation Administration.*** The applicant has submitted a preliminary site plan which must be revised as described in this review prior to site plan approval. No light detail is required.
10. ***Franchises. Owners and/or operators of towers, structures, or antennae shall certify that all franchises required by law for the construction and/or operation of a wireless communication system have been obtained and shall file a copy of all required franchises with the township prior to final site plan approval.*** The applicant must provide a written statement that they will comply with any franchising requirements.
11. ***Engineering certification. Any information of an engineering nature that the applicant submits, whether civil, mechanical, or structural, shall be certified by a licensed professional engineer.*** The 2-sheet plan set is signed and stamped by a licensed engineer.
12. ***Non-essential services. Towers, structures, and antennae shall be regulated and permitted pursuant to this section and shall not be regulated or permitted as essential services, public utilities, or private utilities.*** The application complies.
13. ***Cessation of operation. The township shall condition approval of any new tower subject to the removal of said tower, including all structural components of the tower above and below ground, within 180 days of cessation of operation. The township reserves the right to request evidence of ongoing operation at any time after construction of an approved tower. Any antenna or tower, whether approved under this section or existing at the time of adoption of the ordinance from which this chapter is derived, that is not operated for a continuous period of 180 days shall be deemed abandoned. Failure to remove an abandoned antenna or tower within 60 days of receipt of a notice from the township requesting such removal shall be grounds for the township to remove the tower or the antenna at the tower and/or property owner's expense. If there are two or more users of a single tower, this provision shall not take effect until all users cease using the tower.*** Written agreement to comply with removal requirements must be submitted to the Township.

14. **Division of property prohibited.** *The division of property for the purpose of locating a facility is prohibited unless all requirements of the township ordinances are met.* The site is Township-owned and no division is proposed.
 15. **Facility not to be used for advertising.** *The facility shall not be used for advertising purposes and shall contain no signs or lighting except to identify the provider and emergency telephone numbers and as may be required by the FAA.* No advertising is proposed.
 16. **Security.** *In order to ensure removal of the wireless communication structure, in the event of abandonment or cessation of operation, the planning commission may require that security be posted at the time a building permit is obtained for uses as specified in the conditional use permit in an amount sufficient to guarantee that the applicant shall perform the terms and conditions of the conditional use permit.* The applicant must provide the necessary financial guarantee.
- E. **Section 36-838. General Conditional Use Approval Requirements.** In addition to complying with the specific requirements for wireless facilities enumerated above, for conditional use approval to be granted, the Planning Commission and Township Board must find that the proposed use satisfies the following general criteria:
1. ***Will be harmonious with and in accordance with the general objectives, intent and purpose of this article.*** The proposed tower is located in an agriculturally zoned and master planned district and is not close to any concentration of uses. Per the applicant, the proposed tower is similar in appearance or perception to other large structures like wind turbines and high voltage transmission lines that are commonly found in agricultural areas. A properly designed tower that provides for public safety communication might be found harmonious. However, the standards and objectives of the Zoning Ordinance that are designed to avoid a concentration of towers (when collocation can be achieved) and thereby minimize the visual impact and clutter of these facilities, have not been met. Revisions to the facility design, acceptable confirmation that the applicant can't collocate on an existing tower(s) or use other means to provide service, and other options that are consistent with the intent and purposes of the Ordinance must be addressed to the Commission's satisfaction.
 2. ***Will be designed, constructed, operated, maintained and managed so as to be harmonious and appropriate in appearance with the existing or intended character of the general vicinity.*** The general vicinity is master planned AG, Agricultural for farming and single family residences on lots 5 acres and larger. The tower and associated ground-mounted equipment will be within a fenced area and accessed from the fire station's paved driveway. The fence and much of the equipment inside the enclosure will be screened with evergreen trees, and the land to the north and west is wooded, reducing the visual impact of the facility. The primary impact to the surroundings will be the view of the tall structure from road and the south and east; installation of additional landscape screening, and/or relocation of the tower to be better screened by existing trees is recommended, as discussed in this review.
- The facility will be unmanned and will be visited by maintenance personnel only, 2 to 4 times per month. The short drive and T-turn area inside the fence are noted as gravel surface; given the infrequent traffic to the enclosure, we believe the Commission could find this surface sufficient. A maintenance statement on the site plan assures that site problems will be corrected in accordance with Township requirements and a letter addresses weed control, and removal of snow and debris.

As a condition of site plan approval, a landscape maintenance plan with replacement guarantee will be required.

3. ***Will be compatible with the natural environment and existing and future uses in the vicinity.*** The north and west sides of the tower's lease area are generally screened from view off-site by existing trees and brush, but the installation will be very noticeable from N. Territorial Rd. In order to improve its compatibility with the vicinity, we recommend that (subject to Township Board approval) clusters of large evergreen trees and/or other dense vegetation should be planted between the tower and N. Territorial Rd. and as a transition strip on the east side of the fire station lot, at or near the lot line. Relocation of the facility to the west, so that the wooded area is to its south may also improve the tower's compatibility with existing and future uses.

The fence around the lease area will be screened with evergreen trees planted 20 feet on center. The fire station is a necessary public safety facility; the surroundings are generally intended to be very low density residential and agricultural uses. The environmental impact statement must be submitted to confirm the lack of negative environmental impacts.

4. ***Will be compatible with the Township land use development plan.*** The Township Master Plan designates the site for low density single family development, farms and farm structures, scenic corridors, landscape features such as fields and similar. The Plan does not anticipate a concentration of population here and the Zoning Ordinance mirrors the Master Plan by requiring, under ordinary conditions, tower separations of 2 miles or more. However, the site is near a minor arterial road carrying higher volumes of traffic through the Township and is part of the existing and planned Township fire station where communication facilities could be found compatible.

The proposed tower location, less than 2 miles from 2 existing towers and approximately 0.5 miles from a potential tower site, may not be compatible with the Master Plan's vision. This standard can be met if the tower is redesigned to be a positive feature that blends in with the surrounding rural residential environment and natural features. Further, sufficient evidence has not been submitted that would allow the Commission to determine that collocation and other more compatible alternatives are not feasible.

5. ***Will be or can be served adequately by essential public facilities and services.*** Access is to N. Territorial Road, a paved minor arterial road, via the fire station's existing paved driveway and a gravel drive. The only utilities required are electricity and fiber optic service, both of which are available. Fire protection is on-site.
6. ***Will not be hazardous or disturbing to existing or future neighboring uses.*** The proposed tower is a monopole which is less intrusive than a "lattice" tower design. Since the tower is less than 200 feet in height, the FCC does not require lights, and the Zoning Ordinance prohibits other tower illumination. The tower and equipment cabinet generate no noise, although in the event of a power outage, the generator will run and create noise. Noise mitigation must be documented so that the sound will not be in excess of that typical for residential areas. Per the plans, the 120 ft. monopole has a 127 ft. fall zone, well clear of any other structures, including the fire station which is the closest building. The applicant must provide evidence that the radio and radiation emissions will be compliant with FCC standards. In the event all other requirements are satisfied, we do not anticipate the use being hazardous or disturbing to the existing or future neighboring uses.

7. Will not create excessive additional requirements at public cost for public facilities and services.

No water or sanitary sewer connections are needed, and as noted above, power and fiber optic service are available. No additional infrastructure or public services are required. Per the applicant, there will be no public funds required for this project.

RECOMMENDATION

Based upon the information submitted, we find that the application for Verizon Wireless does not yet comply with several of the Zoning Ordinance requirements for conditional use approval. The deficiencies noted in our comments above, including some site design details, documentation regarding compliance with governmental regulations, the issue regarding inadequate separation distance of the proposed tower from other existing towers, compatible tower design, and other items must be addressed to the satisfaction of the Planning Commission. The major issues that must be resolved before making a recommendation, are presentation of sufficient evidence by the applicant that the 2 - 3 other towers/sites will not work, and proposing an "exceptional architectural and/or environmental design" that would justify the Commission allowing this new tower to be constructed less than 2 miles from those other towers.

Prior to the Planning Commission acting on the application, we recommend the following items and information be addressed with a revised and dated site plan:

Conditional Use:

1. If the Commission determines the applicant's general statement that future facilities will be needed in the northwest, northcentral and southeast parts of the Township is not sufficient, a map shall be provided;
2. Submit the environmental impact statement;
3. Explain radiation output data with documentation demonstrating compliance with FCC rules;
4. Clarify the boundaries of the lease area on the site plan, and include the evergreen trees;
5. Improve screening/buffering of the view of the tower from off-site by planting additional trees between the tower and the road frontage and along the tree line to the east, by relocating the tower to be better screened by existing trees, and/or by other means acceptable to the Planning Commission.
6. Confirm that the approval previously granted for monopole at 6741 Sutton Road has expired, or include that approved tower location as part of this application;
7. Submit additional written evidence regarding the other towers within 2 miles pertaining to their height, number of carriers/antenna in place, etc. to confirm whether or not collocation opportunity(s) that would accommodate the proposed antenna are available on any of them (including Sutton Rd. site if applicable), per Section 36-720 (c)(5);
8. Satisfaction of the requirement for the tower to be designed as a positive, exceptional architectural and/or environmental feature;
9. Affidavit agreeing to permit and not unreasonably obstruct collocation on the tower; and
10. Site plan approval.

Site Plan:

1. Provide details of, and dimension the height of the equipment shelter and all accessories;
2. Comply with the Township's requirements for grounding, wiring and signal and remote control conductors.
3. Agreement to provide annual report of total radiation output with information as determined by the Township engineer;
4. The antenna shall be painted or otherwise treated to match the tower and this noted on the plan;

5. Provide detailed landscape maintenance plan including replacement guarantee for landscaping;
6. Remove barbed wire from fence;
7. Replace the gravel surface with pavement unless the Commission determines that based on the infrequent traffic to the enclosure and nature of the use that gravel is acceptable;
8. Generator noise controls specified so as to be compatible with the vicinity;
9. Utilities and infrastructure to be reviewed during site plan review; and
10. Provide the Township with necessary assurances, agreements, documents and financial guarantees (as noted in Section D above).

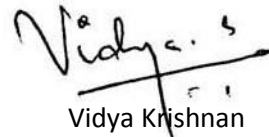
Under the MZEA's "shot clock", after an initial 14-day period, the Township has 90 days to take action on a new tower. In this case, if the Township does not take action by June 29th, the application may be considered approved. Therefore, if the above issues cannot be satisfactorily addressed by the Commission's May 18th meeting, the Planning Commission may need to recommend denial to the Township Board.

Respectfully submitted,

McKENNA ASSOCIATES



Sara J. Hodges, AICP
Senior Vice President



Vidya Krishnan
Senior Planner

cc: Howard Fink, Township Manager
New ParA Delaware Partnership DBA Verizon Wireless, 24242 Northwestern Hwy., Southfield, MI 48075

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Northfield Township

NORTHFIELD TOWNSHIP

Page 1 of 2

Conditional Use Application Form

Applicant

Owner

Name NEW PA A DELAWARE PARTNERSHIP DBA

Name NORTHFIELD TOWNSHIP

Address 2727 NORTHWESTERN HWY
SOUTHFIELD, MI 48075VENUE
WIRELESS

Address 8350 N. MAIN ST.

WHITLAND LAKE, MI 48189

Phone 248-613-4399

Phone 734-449-2880

If applicant is NOT the property owner, then a statement from the owner MUST be attached, authorizing the application.

☒ Statement has been attached, applicant is not owner (TWP MANAGER TO PROVIDE)
☐ Applicant is owner

Parcel ID number B-02-27-100-003

Address 2727 EAST NORTH TOWNSHIP ROAD

Zoning District AR

Development Name 2727 NORTH TOWNSHIP & SPENCER

Proposed Use UNMANNED WIRELESS COMMUNICATION FACILITY

General Location 2727 E. NORTH TOWNSHIP

Applicants Interest in Property LESSOR

Conditional Use is sought under Section 60.23

of the Northfield Township Zoning Ordinance.

An application for a conditional use permit shall contain the following information:

- ☒ Proof of ownership
- ☒ Legal Description
- ☒ Scaled and accurate survey drawing, with existing building, drives and other improvements
- ☒ A detailed description of the proposed use
- ☒ A site plan, meeting the requirements of a preliminary site plan, as set forth in Section 64.03, herein.
- ☒ Fee of \$600.00 for CUP / \$500.00 for PSP = \$1,100.00 as established by Northfield Township Board, must accompany application. Fee = \$1550.00

I have read the attached provisions of the Northfield Zoning Ordinance in regards to Article 63.0, Conditional Use and understand a public hearing will be established within sixty-five (65) days of the filing date.

Date 3/16/16 Applicant Bob [Signature] OSO VENUE WIRELESS

The Northfield Township Planning Commission has reviewed the particular circumstances of the above proposed use relative to Section 63.0 Conditional Uses; and

Approved / Disapproved same on _____, 20____. Supporting evidence is attached.

Conditions imposed on the conditional use of the above described property are as follows:

Breath of such conditions shall automatically invalidate this permit.

Chair, Planning Commission

Date

Secretary, Planning Commission

Date

I / We _____ applicant (s)
for this Conditional Use application and permit hereby agree to comply with the above imposed conditions as specified by the Northfield Township Zoning Ordinance and the Planning Commission of Northfield Township.

Date _____

RECEIVED

V2W 144

MAR 18 2016

Application # _____

NORTHFIELD TOWNSHIP
ASSESSOR'S OFFICE

NORTHFIELD TOWNSHIP

SITE PLAN REVIEW APPLICATION

PROJECT NAME: V2W 144 NORTH TOWNSHIP & SPENCER

PROJECT ADDRESS: 2727 E. NORTH TOWNSHIP

Applicant Information:

Name: NEW PAR A DELAWARE PARTNERSHIP DBA
VERIZON WIRELESS

Address: 24242 NORTHWESTERN HWY, SOUTHFIELD, MI 48075

Phone: 248-613-4399

Email:

Owner Information:

Name: NORTHFIELD TOWNSHIP

Address: 8350 N. MAIN ST., WHITMORE LAKE 48189

Phone:

Email:

If the applicant is not the property owner, then a statement from the owner **MUST** be attached authorizing the application.

Proof of ownership **OR** Statement if applicant is not owner is attached. ☒ TWP MANAGER TO PROVIDE

If applicant is not the owner, describe applicant's interest in the property
LESSOR

PROPERTY DESCRIPTION

Legal Description: ☐ Attached ☒ On Site Plan

Parcel ID(s): B-02-27-100-003

Description of Proposed Use: UNMANNED WIRELESS COMMUNICATION FACILITY

Total Acreage of Site: 18 ACRES

Total Floor Area: BASE AREA: 2,000 SQ FT

Existing:

Proposed: 2,000 SQ FT

Height of Structure(s) (in stories & feet):

120' MONOPOL

Sanitary Facilities: ☐ Sewer ☐ Septic

Water: ☐ Municipal ☐ Private Well

N/A

Zoning Classification(s):

☐ RC ☒ AR ☐ LR ☐ SR1 ☐ SR2 ☐ MR ☐ VC ☐ LC ☐ GC ☐ ES ☐ HC ☐ GI ☐ LI ☐ Other _____

SITE PLAN REVIEW OPTIONS

Administrative Site Plan Review:

- ☐ Expansion or reduction of an existing, conforming structure less than 2,000 sq. ft. / 5% of floor area
- ☐ Additional parking, loading / unloading spaces and landscape improvements

Site Plan Review:

- ☒ New Construction
- ☐ Building Addition

Development Plan Review:

- ☐ Planned Unit Development
- ☐ Planned Residential Development
- ☐ Site Condominium Plan

Amendment to Approved Site Plan or Development Plan:

- ☐ Site Plan
- ☐ Development Plan

Site or Development Plan Review in conjunction with: ☐ Rezoning Request ☒ Special Land Use Request

Application # _____

AUTHORIZED SIGNATURE

I hereby state that all of the above statements and all of the accompanying information are true and correct.

Applicant's Signature: Bob J. Oso Verizon Wireless Date: 3/16/16

FOR OFFICE USE ONLY

Application Received Date: _____

Planning Commission Received Date: _____

Planning Commission Action: ☐ Approved Date: _____ ☐ Denied Date: _____

Expiration Date: _____

Fee Received: ☐ Cash ☐ Check # _____

RJP CONSULTING

March 16, 2016

Planning Commission
Northfield Township
8350 North Main Street
Whitmore Lake, MI 48189

RE: Verizon Wireless Application for Conditional Use Permit and Site Plan Review at 2727 East North Territorial Road

Dear Planning Commission:

Enclosed with this correspondence are the following:

1. Completed and Signed Application for Conditional Use Permit and Site Plan Review
2. Signed and Sealed Site Plan
3. Radio Frequency Propagation Maps demonstrating gap/need for coverage
4. Map of Existing Township Towers
5. Fall Zone/Civil Engineer Letter
6. Letter from Applicant in compliance with Section 60.23
7. Letter Stating Total Radiation Output

In addition to the foregoing attachments, set forth below is a description of the criteria of Section 60.23 of the Northfield Township Ordinance ("Ordinance") and a response as to how Verizon Wireless has met each of these respective requirements under the Ordinance. We respectfully ask that Verizon's Application be considered by the Planning Commission at the first available date.

INTRODUCTION

As reflected in Verizon's responses below, it is necessary for Verizon to erect a 120' monopole (with 7' maximum lighting rod on top) and accompanying equipment ("Proposed Facility") at the property located at 2727 East North Territorial Road owned by the township and behind the fire station ("Site"), so it can remediate an existing gap in network coverage in the area surrounding the Site and improve its network reliability.

Verizon Wireless desires to provide Northfield Township with dependable wireless service. It is essential that Verizon Wireless be allowed to develop their network in such a way that enables them to provide adequate coverage to their existing and future customers in and through this area. Verizon Wireless has a Radio Frequency License from the FCC for the State of Michigan. The FCC requires its licensees to provide adequate and reliable service in the licensed area as specified in Title 47, Part 24.103 of the Code of Federal Regulations.

In order to fulfill this requirement for their FCC license, Verizon Wireless needs to provide continuous, uninterrupted wireless communication service in the area that is the subject of this Application. Without the proposed site, Verizon Wireless will suffer several hardships: 1.) disruption of the network design; 2.) compromising needed coverage; and 3.) Verizon Wireless' inability to provide adequate and reliable coverage to the public, among others. The Proposed Facility will allow Verizon Wireless to provide the quality of service required by the FCC and demanded by the public.

The Proposed Facility will be designed and constructed to meet applicable governmental, health and industry safety standards. Specifically, Verizon Wireless will comply with all FCC and FAA rules governing construction requirements, technical standards, lighting, interference protection, power and height limitations and radio frequency standards.

Verizon Wireless, if asked and in cooperation with local emergency services, will strongly consider and if reasonably possible, provide space on the tower for an emergency service antenna.

ORDINANCE ANALYSIS

In addition to the materials attached hereto, Section 60.23 of the Ordinance requests the Applicant to respond, in pertinent part, to the following:

- C.2. a: Applicant information provided on the CUP application as well as a separate letter.
- b: Provided and attached.
- c: Please see attached site plan.
- d: Please see attached site plan.
- e: Please see attached Map of Existing Township Towers
- f: Please see attached site plan.
- g: Please see attached site plan.
- h: Please see attached letter.
- i: AT&T provides fiber backhaul.
- j: The Proposed Facility is necessary to provide continuous, uninterrupted wireless communication service for Verizon customers in the area that is the subject of this Application. A Radio Frequency Engineer from Verizon has provided the accompanying RF Propagation Maps, attached hereto, which demonstrate that the Proposed Facility must be at least 120 feet in order to provide seamless coverage within the network plan. There are no existing towers in the area that can provide suitable coverage to meet our objectives.
- k: Verizon is unable to provide a map as it is proprietary information. Verizon can say that in the next few years it is forecasting a need for new sites in the northwest area, north central area, and southeast area of the township.
- l: Verizon has completed a Phase One environmental assessment and a NEPA review per FCC guidelines and there is no impact on wetlands, flood plains, wilderness areas, wildlife preserves, endangered species, and historical sites.
- m: Please see attached Fall Zone/Civil Engineer Letter.
- n: A Radio Frequency Engineer from Verizon has provided the accompanying RF Propagation Maps, attached hereto, which demonstrate that the Proposed Facility must be at least 120 feet in order to provide seamless coverage within the network plan.
- o: Please see attached Letter Stating Total Radiation Output.

p: Please see attached letter.

- D1. a: The existing towers in the township are just too far away from the area that Verizon is trying to improve the network in. If Verizon were to use any of the existing towers, it would leave a gap in coverage along North Territorial that would require Verizon to build a new tower anyway. By building this Proposed Facility, Verizon is eliminating a gap in coverage and providing continuous uninterrupted service in this particular area of the township as well as providing collocation opportunities for future use by carriers thus eliminating the need for multiple towers in a particular area.
- b: The Proposed Facility complies with this requirement.
- c: The Proposed Facility complies with this requirement.
- d: The Proposed Facility complies with this requirement.
- e: Not applicable.

CONDITIONAL USE STANDARDS

Will be harmonious, and in accordance, with objectives and regulations within the Zoning Ordinance:

The Proposed Facility is in an agricultural field and permitted within the AR District as a conditional use. It will have no adverse impact with regard to the surrounding area. Indeed, towers such as the Proposed Facility are consistent with such Districts. It is not uncommon to find much larger structures, such as High Voltage Transmission Lines or Wind Turbines in many agricultural areas.

Will be compatible with the natural environment and existing and future land uses in the vicinity:

The Proposed Facility meets this requirement in that it is located a significant distance from North Territorial Road, at the rear of the subject Property and over 500' from any residential structures. In addition, the Proposed Facility will use a low impact "monopole" design. Such designs are less visually obtrusive than traditional "lattice" type towers. The monopole will be constructed of galvanized metal, which is standard in the industry and designed to blend in with the sky.

That the proposed use will be served adequately by essential public facilities and disposal, or that the persons or agencies responsible for the establishment of the proposed use shall be able to provide adequately any such service:

The Proposed Facility will only require commercial power and fiber optic service. Both utilities are available along North Territorial Road and will be brought to the facility by Verizon. It will not require the use of water or sewer.

That the proposed use will not be detrimental, hazardous, or disturbing to the existing or future neighboring uses, persons, property, or the public welfare:

The Proposed Facility is consistent with the AR District where it is located. The Proposed Facility will use a low impact "monopole" design. Such designs are less visually obtrusive than traditional "lattice" type towers. The monopole will be constructed of galvanized metal, which is standard in the industry and designed to blend in with the sky. Enabling Verizon to remediate gaps in wireless coverage and providing reliable and adequate coverage to the area will foster the public health, safety and welfare.

That the proposal will not create additional requirements at public cost for public facilities and services that will be detrimental to the economic welfare of the community:

The Proposed Facility will only require commercial power and fiber optic service. Both utilities are available along North Territorial Road and will be brought to the facility by Verizon. It will not require the use of water or sewer. There will be no public funds required for this project.

Will be compatible with the Township's adopted general development plan:

The Proposed Facility is consistent with the AR District where it is located and permitted within the AR District as a conditional use. The Proposed Facility will use a low impact "monopole" design. Providing reliable and seamless coverage in the area subject to this Application will serve the public interest and convenience through providing wireless and internet services as well as enhancing and serving the emergency communications network.

OTHER LEGAL CONSIDERATIONS

A. Applicable Federal Law

The Telecommunications Act of 1996, 42 USC §§151-614 (2001) (effective Feb. 8, 1996) ("TCA") provides certain limitations on the powers of local zoning authorities with respect to the regulation, placement and construction of wireless service facilities. Specifically, the TCA provides that any regulation by the Township with respect to decisions involving wireless telecommunication towers "shall not prohibit or have the effect of prohibiting the provision of personal wireless services. 47 USC 332(c)(7)(B)(i)(I), emphasis added. The TCA further provides that "any decision by a State or local government or instrumentality thereof to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence." 47 USC 332(c)(7)(B)(iii), emphasis added.

It is Verizon's position that it's Application for a Conditional Use Permit to construct the Proposed Facility, as demonstrated herein, meets and/or exceeds all of the review standards set forth in the Ordinance. Therefore, Verizon respectfully requests that its requested Conditional Use Permit be approved by the Planning Commission.

CONCLUSION

In conclusion, Verizon respectfully requests that the foregoing materials be considered by the Planning Commission and that the Proposed Facility be approved and granted a Conditional Use Permit in accordance with Section 60.23 of the Ordinance. Without the Proposed Facility, Verizon will be unable to remediate the gap in network coverage which is demonstrated through the RF Maps attached hereto and as otherwise set forth in this Application and through testimony Verizon will provide at public hearings.

On behalf of Verizon Wireless, we thank you in advance for your timely attention to this Application and look forward to working with the Township throughout the zoning approval process.

Sincerely,



Bob Przybylo
RJP Consulting, Inc. o/b/o Verizon Wireless

Network



Verizon Wireless
24242 Northwestern Hwy.
Southfield, MI 48075

February 22, 2016

Planning Commission
Northfield Township
8350 N. Main Street
Whitmore Lake, MI 48189

RE: Verizon Wireless Conditional Use/Site Plan Review Application

To Whom It May Concern:

Please accept this letter as notification that the proposed tower will be designed to accommodate two additional carriers with an equal loading of that proposed by Verizon Wireless.

The contact person for this site is Doug Weber, 248-915-3560, douglas.weber@verizonwireless.com, 24242 Northwestern Hwy, Southfield, MI 48075.

Verizon Wireless has prepared the following maintenance plan for the proposed wireless communication facility.

- Weed control – apply anti-emergent weed control in May, treat weeds as required through growing season
- Snow removal - local service provider to be on call when needed
- Debris removal – local service provider to be on call when needed

Please call me at (248) 915-3560 if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Doug Weber", written over a light blue horizontal line.

Doug Weber
Real Estate Manager

STATE OF MICHIGAN)
) SS
COUNTY OF OAKLAND)

On this 23rd day of February, 2015 ^⑥ before me personally appeared Doug Weber, Real Estate Manager for Verizon Wireless to me known to be the person described above and who executed the foregoing instrument, and acknowledged that it was executed as said person's free act and deed.

Notary Public:

Print Name:

My Commission Expires:

Barbara Madigan Gwathmey
Barbara Madigan Gwathmey
Oakland County, MI
5/10/20

1. All site work construction shall be in accordance with the current standards and specifications of the Northfield Township, where applicable.
2. The proposed equipment cabinet is to be a computerized, unattended, telephone exchange structure. No water service, sanitary facilities or gas service is needed. Telephone and electrical services will be from an existing utility pole or line adjacent to the site.
3. The proposed equipment cabinet is to have a security system monitored 24 hours per day. The cabinet will also be constructed with bullet resistant materials.
4. There are two, low wattage (10W), LED lights proposed as part of this project. The lights are mounted to the canopy support posts, under the canopy with one next to the cabinet and one next to the generator. Lights shall be connected to a technician operated on/off switch with a timer with a two-hour maximum "on" duration.
5. There are no signs proposed for this project except for:
 - a. Emergency contact information purposes and FCC "call sign" placed on equipment cabinet door.
 - b. FCC registration number located on fence gate.
6. The cellular antenna and equipment cabinet will be approved by the Federal Communications Commission (FCC) and will not interfere with any frequency sensitive communications. Buyer warrants no adverse radio interference with adjacent land uses.
7. There are no toxic materials used by Lessee on the site. Lessee has no need for outdoor storage or garbage disposal and pick-up.
8. Maintenance personnel using van type service vehicles enter and exit the site approximately 2 to 4 times per month. No loading or unloading area is needed by them.
9. All areas disturbed by the construction of the tower and cabinet and driveway shall be restored in kind. Contractor is to provide soil erosion control measures as needed or as directed by owner or government agency, having jurisdiction.
10. All areas inside of and to 1'-0" outside of the fenced area will be covered with:
 - a. 3" of crushed limestone placed over "Typical" landscape fabric.
11. Ingress and egress by Lessee's personnel to the site shall be via an existing paved road and proposed gravel drive from East North Territorial Road.
12. The proposed drive shall consist of 3" of MDOJ Class 23A crushed limestone aggregate over 10" of 1/2" X 3/4" crushed concrete or slag over compacted subgrade. The subgrade shall be stripped free of all topsoil and organic material prior to placing aggregate base. Where poor subgrade soils are encountered a woven geotextile fabric (Mirafi 500X or approved equal) shall be placed so that it is a minimum of 2 ft. wider and longer than the drive which is to be constructed over the poor soils.

This site plan is based on the survey of the existing conditions conducted by Midwest Engineering Consulting, LLC on 06-15-2015.

Verizon Wireless maintains all of their sites through its Operation Month. The Operations technician visits the Verizon Wireless sites at least once a month. The Verizon Wireless Operation technician will issue the site at each visit and make arrangements to report and repair any and all issues with the site. The technician must be accompanied with all workers such as the tower, road, cabinet, etc. Anying that needs to be maintained is the responsibility of the Operations Department and they will make sure that the site is maintained to Verizon Wireless and Township Specifications.

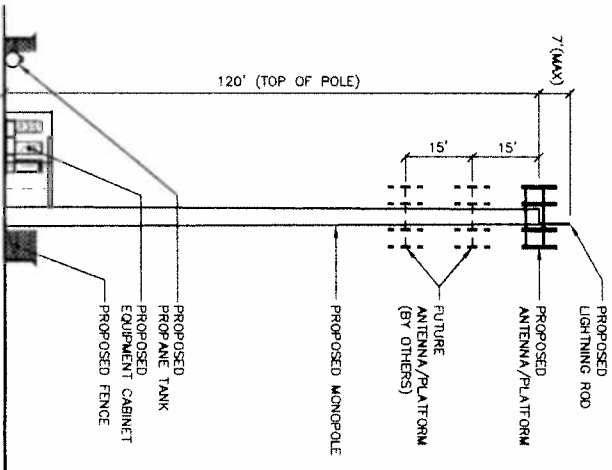
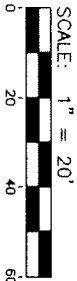


Diagram illustrating the setup for a tree stake and root collar:

- 2" x 2" HARDWOOD TREE STAKE
- 2" - 3" WIDE BELT-LIKE, NYLON OR PLASTIC
- SET ROOT COLLAR 2" TO 3" ABOVE FINISHED GRADE
- MULCH 4" DEPTH, LEAVE 3" WIDE CIRCLE AROUND TRUNK
- REMOVE BURLAP AND WIRE BASKET
- REMOVE 4" OF MULCH, 4" OF PLASTIC, 4" OF BURLAP AND FABRIC, REMOVE ALL ROT
- 3" SAUCER
- SCARIFY SIDES AND BOTTOM TO ELIMINATE ALL IMPROVUS SURFACES, BACKFILL WITH PLANTING MIXTURE AS SPECIFIED
- SET BALL ON 4" COMPACTED SOIL
- GET 4" MOUND OF UNDISTURBED SOIL
- 2/3 HEIGHT OF TREE
- HOLE WIDTH 2 TO 3x ROOT BALL

EXIST CONTOUR
PROP. CONTOUR
EXIST SPOT ELEVATION
PROP. SPOT ELEVATION
EXIST UTILITY POLE
CUT WARE
EXIST OVERHEAD UTILITY LINE
EXIST FIBER POLE
EXIST FIBER OPTIC LINE
TELEPHONE RISER
C/L OF DITCH
POST
FENCE
SECTION CORNER
FOUND MONUMENT
CONTROL PT.

2

SITE #144 - "N TERRITORIAL SPENCER"

NEW PAR, A DELAWARE PARTNERSHIP
dba VERIZON WIRELESS
24242 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075
PHONE: (248) 915-3000



RJP CONSULTING

March 15, 2016

Planning Commission
Northfield Township
8350 North Main Street
Whitmore Lake, MI 48189

RE: Verizon Wireless Total Radiation Output from Radio and Antenna System

700MHz LTE (60W radio output)

- $133\text{W/MHz} \times 10\text{MHz} = 1330\text{W ERP}$

2100MHz LTE (60W radio output)

- $188\text{W/MHz} \times 20\text{MHz} = 3760\text{W ERP}$

1900MHz LTE (60W radio output)

- $751\text{W/MHz} \times 5\text{MHz} = 3755\text{W ERP}$

Please call me at (248) 613-4399 if you have any questions.

Sincerely,



Bob Przybylo
RJP Consulting, Inc. o/b/o Verizon Wireless

RJP CONSULTING

March 15, 2016

Planning Commission
Northfield Township
8350 North Main Street
Whitmore Lake, MI 48189

RE: Verizon Wireless Network Propagation Maps

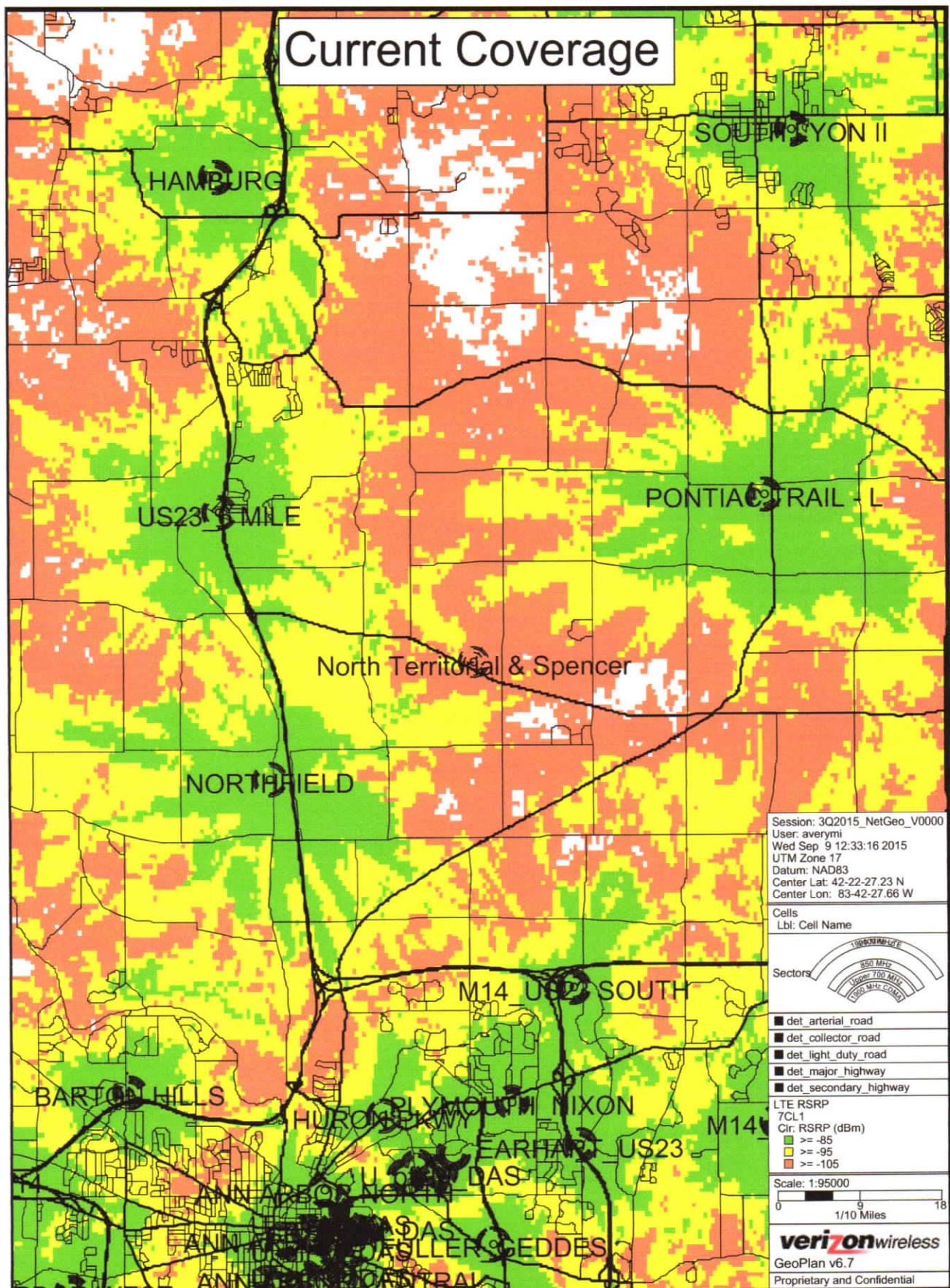
To Whom It May Concern:

Please see the attached maps. The first map shows the existing network coverage. The second map shows the network coverage with the proposed site. As you can see, the proposed site dramatically improves coverage in the area. Please note the maps show the network coverage as required by Verizon Wireless standards including in-car, in-building, and outside for both voice calls and data usage. Please call me at (248) 613-4399 if you have any questions.

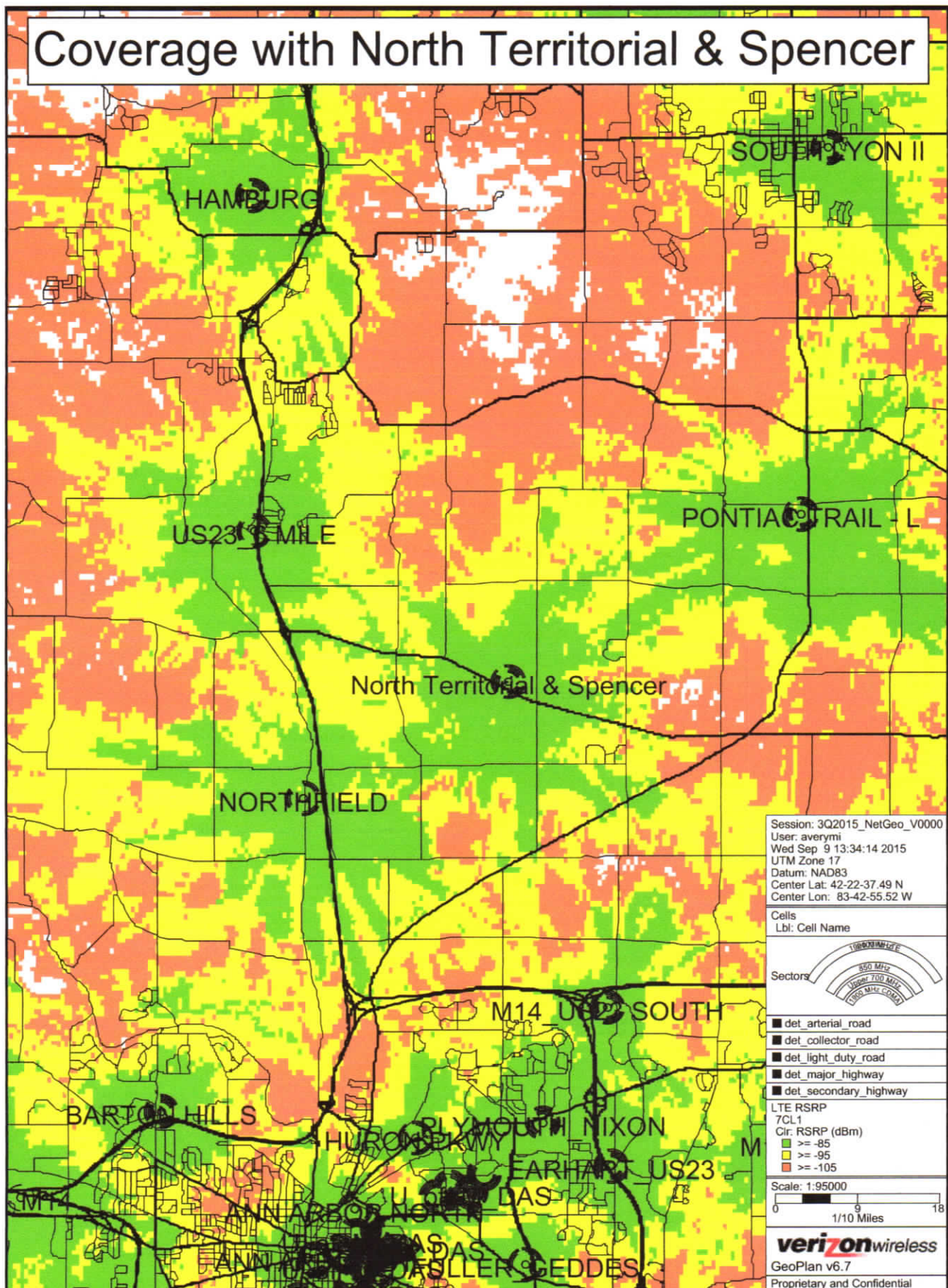
Sincerely,

A handwritten signature in blue ink, appearing to read 'Bob Przybylo'.

Bob Przybylo
RJP Consulting, Inc. o/b/o Verizon Wireless



Coverage with North Territorial & Spencer



RJP CONSULTING

March 15, 2016

Planning Commission
Northfield Township
8350 North Main Street
Whitmore Lake, MI 48189

RE: Verizon Wireless Existing Towers

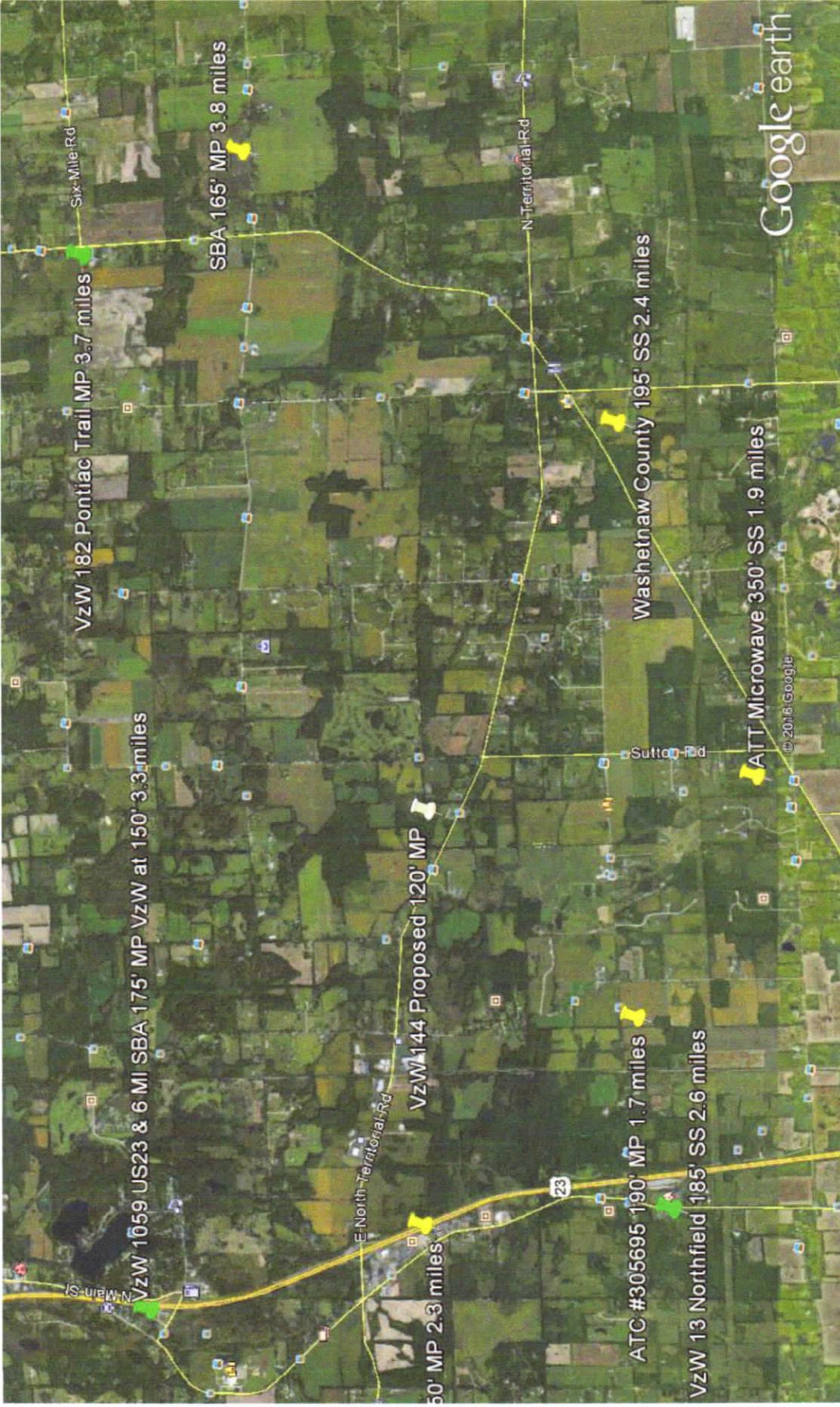
To Whom It May Concern:

Please see the attached map. It shows all of the existing towers within and near the township as well as type and height. These are depicted by the yellow push pins. The green push pins are existing Verizon Wireless sites in the area and the white push pin is the proposed site. Please call me at (248) 613-4399 if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Bob Przybylo'.

Bob Przybylo
RJP Consulting, Inc. o/b/o Verizon Wireless



Google earth

miles
km



February 22, 2016

Mr. Andrew Konyha
Verizon Wireless

RE: Proposed 120' Sabre Monopole for N Territorial Spencer, MI

Dear Mr. Konyha,

Upon receipt of order, we propose to design and supply the above referenced Sabre monopole for a Basic Wind Speed of 90 mph with no ice and 40 mph with 1" radial ice, Structure Class 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, resulting in an overall minimum safety factor of 25%. Therefore, it is highly unlikely that the monopole 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 the upper portion of the monopole shaft. Assuming that the wind pressure profile is similar to that used to design the monopole, the monopole will buckle at the location of the highest combined stress ratio within the upper portion of the monopole shaft. This is likely to result in the portion of the monopole above "folding over" onto the portion below, essentially collapsing on itself. ***Please note that this letter only applies to the above referenced monopole designed and manufactured by Sabre Towers & Poles.*** In the unlikely event of total separation, this will result in collapse within a radius of 60 feet.

Sincerely,

Robert E. Beacom, P.E., S.E.
Senior Design Engineer

